LONGHORN ARMY AMMUNITION PLANT KARNACK, TEXAS

ADMINISTRATIVE RECORD

Volume 1

2025

Bate Stamp Numbers
01288160 – 01290043

Prepared for

Department of the Army
Longhorn Army Ammunition Plant

1976–2025

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS
ADMINISTRATIVE RECORD – CHRONOLOGICAL INDEX

VOLUME 1

2025

A. Title: Report – Final Fifth Five-Year Review Report, Former Longhorn Army Ammunition Plant, Harrison County, Texas
Author(s): U.S. Army Environmental Command
Recipient: Environmental Protection Agency
Date: January 15, 2025
Bate Stamp: 01288160–01289460

B. Title: Letter – Concurrence Letter for Final Fifth Five-Year Review Report, Former Longhorn Army Ammunition Plant, Harrison County, Texas
Author(s): Environmental Protection Agency
Recipient: U.S. Army Environmental Command
Date: January 22, 2025
Bate Stamp: 01289461–01289463

C. Title: Minutes – Final Minutes, Quarterly Restoration Advisory Board (RAB) Meeting, Longhorn Army Ammunition Plant, November 14, 2024
Author(s): PCI-Bhate JV
Recipient: All Parties
Date: February 27, 2025
Bate Stamp: 01289464–01289505

D. Title: Transmittal – Surface Water Data Transmittal – 2024, Longhorn Army Ammunition Plant, Karnack, Texas, February 2025
Author(s): Department of the Army
Recipient: Environmental Protection Agency
Date: February 27, 2025
Bate Stamp: 01289506–01289646

E. Title: Report – Final Tenth Annual Remedial Action Operation Report, LHAAP-46 (Plant 2 Area), Longhorn Army Ammunition Plant (LHAAP), Karnack, Texas, March 2025
Author(s): Department of the Army
Recipient: Environmental Protection Agency and Texas Commission on Environmental Quality
Date: March 4, 2025
Bate Stamp: 01289647–01289983

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS
ADMINISTRATIVE RECORD – CHRONOLOGICAL INDEX

VOLUME 1 (Cont'd)

2025

F.	Title:	(Cont'd) Report – Level IV DoD Lab Report to Final Tenth Annual Remedial Action Operation Report, LHAAP-46 (Plant 2 Area), Longhorn Army Ammunition Plant (LHAAP), Karnack, Texas, January 2025
	Author(s):	Department of the Army
	Recipient:	Environmental Protection Agency and Texas Commission on Environmental Quality
	Date:	March 4, 2025
	Bate Stamp:	01289984–01290043

Final

FIFTH FIVE-YEAR REVIEW REPORT

FORMER LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

Prepared for:

United States Army Environmental Command
Fort Sam Houston, Texas

Former Longhorn Army Ammunition Plant
Karnack, Texas

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FIFTH FIVE-YEAR REVIEW REPORT

FORMER LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

Approved By:

BOWLBY.MICHAEL.A.1084812206

Digitally signed by BOWLBY.MICHAEL.A.1084812206
Date: 2025.01.15 09:18:29 -06'00'

Michael Bowlby **Date**
Midwest and Central America Division Team Lead
U.S. Army Environmental Command

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FIFTH FIVE-YEAR REVIEW REPORT

FORMER LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

Prepared By:

United States Army Corps of Engineers
Omaha District
1616 Capitol Avenue
Omaha, Nebraska 68102

Dawson Solutions, LLC
4100 Market Street, Suite 117
Huntsville, Alabama 35808

Prepared Under Contract Number: W9128F20D0054
Task Order Number: W9128F22F9238

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EXECUTIVE SUMMARY

The former Longhorn Army Ammunition Plant (LHAAP) is an inactive, government-owned, formerly contractor-operated and maintained industrial facility located in Harrison County, Texas. The former footprint of the facility encompasses approximately 8,416 acres between State Highway 43 at Karnack, Texas, and the southwestern shore of Caddo Lake. Approximately 7,300 acres of the installation have been transferred to the U.S. Fish and Wildlife Service for management as the Caddo Lake National Wildlife Refuge (Bhate, 2018).

LHAAP was listed on the National Priorities List (NPL) on August 9, 1990. A Federal Facility Agreement (FFA) was entered between the U.S. Army, U.S. Environmental Protection Agency (EPA), and Texas Natural Resources Conservation Commission (now known as the Texas Commission on Environmental Quality (TCEQ)) on December 30, 1991 (Bhate, 2018).

This statutory Five-Year Review was conducted in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act, Section 121, consistent with the National Contingency Plan. The purpose of a Five-Year Review is to evaluate the implementation and performance of a remedy in order to determine if the remedy is protective of human health and the environment. Five-Year Reviews also identify issues found during the review, if any, and provide recommendations to address them. This Five-Year Review has been prepared because hazardous substances, pollutants, or contaminants remain at levels that do not allow for unlimited use and unrestricted exposure. This is the Fifth Five-Year Review for the former LHAAP and includes the Installation Restoration Program (IRP) and Military Munitions Response Program (MMRP) sites listed in the table below.

Former Longhorn Army Ammunition Plant Five-Year Review IRP and MMRP Crosswalk

AEDB-R ID	Site Description	HQAES ID
LHAAP-001-R-01	South Test Area/Bomb Test Area (Site 27)	48315.1048
LHAAP-003-R-01	Ground Signal Test Area	48315.1050
LHAAP-03	Former Waste Collection Pad Building 722-P Paint Shop	48315.1003
LHAAP-004-R-01	Pistol Range	48315.1052
LHAAP-04	Former Pilot Wastewater Treatment Plant	48315.1004
LHAAP-012	Landfill 12 (SWMU 12)	48315.1011
LHAAP-016	Old Landfill (SWMU 16)	48315.1015
LHAAP-017	Burning Ground No. 2 Flashing Area, Group 2	48318.1016
LHAAP-018/ LHAAP-024	Burning Ground and Washout Pond/Former Unlined Evaporation Pond	48315.1017/48315.1020

AEDB-R ID	Site Description	HQAES ID
LHAAP-037	Chemical Laboratory Waste Pad	48315.1027
LHAAP-046	Plant 2 Area	48315.1053
LHAAP-049	Former Acid Storage Area	48315.1056
LHAAP-050	Former Waste Disposal Facility	48315.1030
LHAAP-058	Maintenance Complex	48315.1037
LHAAP-067	Above Ground Storage Tank	48315.1043

AEDB-R ID – Army Environmental Database-Restoration Identification
HQAES ID – Headquarters Army Environmental System Identification
LHAAP – Longhorn Army Ammunition Plant
IRP – Installation Restoration Program
MMRP – Military Munitions Response Program
SWMU – Solid Waste Management Unit
TNT – Trinitrotoluene

Implementation of the final remedy at LHAAP-18/24 has not yet occurred. A Pre-Design Investigation occurred from March 12 through June 30, 2021, to further define groundwater impacted by 1,4-dioxane, perchlorate, and VOCs. Soil samples were also collected to investigate perchlorate and VOC soil contaminant levels at the contact interval between the clay and sand. Current operation of the GWTP is in accordance with the interim remedial action to treat groundwater extracted from ICTs and extraction wells. The 2020 ROD selected "*enhanced groundwater extraction and treatment as needed, LUCs, enhanced ISB inside and outside containment area and in Wilcox Formation, unsaturated soil excavation, and thermal DNAPL removal*" as the final remedy for LHAAP-18/24 (Army, 2020).

Two additional IRP sites, LHAAP-29 and LHAAP-47 are currently in the remedial design phase and are therefore not included in this Five-Year Review. At LHAAP-29, a 2019 Record of Decision (ROD) selected excavation and off-site disposal for soil; plug lines; in situ thermal desorption, monitored natural attenuation and land use controls for intermediate zone groundwater; and monitored natural attenuation and land use controls for shallow groundwater. At LHAAP-47, a 2022 ROD selected excavation, in situ thermal desorption, in situ bioremediation, biobarriers, monitored natural attenuation, long term monitoring, and land use controls.

Per- and polyfluoroalkyl substances (PFAS) are being addressed by the Army in accordance with *Army Guidance for Addressing Releases of Per- Polyfluoroalkyl Substances* (Army, 2018). A PFAS preliminary assessment and site inspection (PA/SI) has been completed at LHAAP. The activities are being conducted via a CERCLA pathway that is separate from any of the sites summarized in this Five-Year Review. The next phase for completing the LHAAP PFAS evaluation is completion of an Remedial Investigation (RI) for the areas of potential interest identified during the preliminary assessment and site inspection. Evaluation of PFAS findings has been added, where applicable, in this Five-Year Review. Sites assessed for PFAS but not retained for further investigation include LHAAP-17 and LHAAP-35A (58). These sites will not have

evaluation of PFAS findings in this Five-Year Review. Sites that were retained as Areas of Potential Interest for further investigation during the PA/SI include LHAAP-04, LHAAP-12, LHAAP-16, LHAAP-18/24, LHAAP-46, and LHAAP-50.

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Five-Year Review Summary Form

SITE IDENTIFICATION		
Site Name: Former Longhorn Army Ammunition Plant		
EPA ID: TX6213820529		
Region: 6	**State:** TX	**City/County:** Karnack/Harrison
SITE STATUS		
NPL Status: Final		
Multiple OUs: Yes	**Has the site achieved construction completion?** No	
REVIEW STATUS		
Lead Agency: Other Federal Agency **If "Other Federal Agency" was selected above, enter Agency name:** U.S. Department of Defense		
Author name (Federal or State Project Manager): Lena Sierocinski, Environmental Support Manager		
Author Affiliation: U.S. Army Environmental Command		
Review period: October 24, 2022 – Signature date of Five-Year Review		
Date of site inspection: February 14, 2023		
Type of review: Statutory		
Review number: 5		
Triggering action date: September 30, 2019		
Due date (*five-year cycle after triggering action date*): September 30, 2024		

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<table>
<tr><th colspan="5">Issues/Recommendations</th></tr>
<tr><td colspan="5">OU(s) without Issues/Recommendations Identified in the Five-Year Review:</td></tr>
<tr><td colspan="5">LHAAP-03, LHAAP-04, LHAAP-12, LHAAP-18/24, LHAAP-49, LHAAP-67, LHAAP-001-R-01, LHAAP-003-R-01, and LHAAP-004-R-01</td></tr>
<tr><td colspan="5">Issues and Recommendations Identified in the Five-Year Review:</td></tr>
<tr><td rowspan="3">OU(s):
LHAAP-16</td><td>Issue Category:</td><td colspan="3">Remedy Performance</td></tr>
<tr><td colspan="4">Issue: At multiple wells within the biobarriers or downgradient, Total Organic Carbon has been depleted to below 20 mg/L or never achieved 20 mg/L; Oxidation-Reducing Potential exceeds -50 mV; and contaminant concentrations in groundwater performance wells for the landfill biobarriers remain above cleanup standards.</td></tr>
<tr><td colspan="4">Recommendation: Consider completing an evaluation of site-specific hydrology, geochemistry, and concentration data to determine if additional remediation should be completed and potential strategies for optimal performance.</td></tr>
<tr><td>Affect Current Protectiveness</td><td>Affect Future Protectiveness</td><td>Implementing Party</td><td>Oversight Party</td><td>Milestone Date</td></tr>
<tr><td>No</td><td>Yes</td><td>Federal Facility</td><td>EPA/State</td><td>December 31, 2025</td></tr>
<tr><td rowspan="3">OU(s):
LHAAP-16</td><td>Issue Category:</td><td colspan="3">Remedy Performance</td></tr>
<tr><td colspan="4">Issue: For downgradient wells from the landfill where there is no trend and concentrations remain high (e.g., 16WW16, 16WW36, 16WW35), there is a potential the conceptual site model is not fully understood and there may be a secondary source of groundwater contamination.</td></tr>
<tr><td colspan="4">Recommendation: Finalize the additional investigations being conducted to refine the conceptual site model for groundwater conditions at LHAAP-16.</td></tr>
<tr><td>Affect Current Protectiveness</td><td>Affect Future Protectiveness</td><td>Implementing Party</td><td>Oversight Party</td><td>Milestone Date</td></tr>
<tr><td>No</td><td>Yes</td><td>Federal Facility</td><td>EPA/State</td><td>December 31, 2025</td></tr>
</table>

Issues/Recommendations				
OU(s): LHAAP-16	**Issue Category:**	**Remedy Performance**		
	Issue: The TCE plume boundary is not delineated east of Harrison Bayou beyond monitoring wells 16WW57 and 16WW58.			
	Recommendation: Conduct additional investigation to further delineate the eastern plume boundary under and east of Harrison Bayou.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	Federal Facility	EPA/State	December 31, 2025
OU(s): LHAAP-16	**Issue Category:**	**Operations and Maintenance**		
	Issue: The Five-Year Review site inspection observed small pine trees growing on the northeastern boundary of the landfill surface.			
	Recommendation: Remove vegetation to ensure the vegetation does not compromise the integrity of the cap.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	Federal Facility	EPA/State	December 31, 2025
OU(s): LHAAP-16	**Issue Category:**	**Monitoring**		
	Issue: As a result of fluctuating groundwater flow directions and elevations, upgradient, side gradient, and downgradient wells might change over time at LHAAP-16. For example, monitoring wells 16RW04 and 16WW26 are located on the upper north portion of the Biobarrier #1. Since groundwater flow direction is southeast, these wells might be considered side gradient to the upgradient well 16RW01 and the Biobarrier has limited influence on these wells.			
	Recommendation: Evaluate the monitoring well network for each biobarrier and consider adding monitoring wells to better analyze the performance of the biobarriers.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	Federal Facility	EPA/State	December 31, 2025

Issues/Recommendations				
OU(s): LHAAP-16	**Issue Category:**	**Remedy Performance**		
	Issue: High VOC concentrations at Biobarrier #2 indicate the potential presence of another source that requires delineation.			
	Recommendation: Perform a source delineation through compound-specific isotope analysis in areas where VOC concentrations are exceptionally high, such as 16PM06.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	Federal Facility	EPA/State	December 31, 2025
OU(s): LHAAP-17	**Issue Category:**	**Changed Site Conditions**		
	Issue: Implementation of the remedy was interrupted by the discovery of munitions and explosives of concerns (MEC) during soil removal, and asbestos-containing material was discovered during soil removal actions			
	Recommendation: Delineate the nature and extent of MEC, MC, and asbestos-containing material in surface and subsurface soils.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
Yes	Yes	Federal Facility	EPA/State	December 31, 2027
OU(s): LHAAP-17	**Issue Category:**	**Changed Site Conditions**		
	Issue: The exposure assumptions used, and remedial action objectives selected at the time of the remedy selection are no longer valid because, prior to implementation of the remedy, there was no information to indicate the presence of MEC, MC, or asbestos-containing material at LHAAP-17.			
	Recommendation: Evaluate the exposure assumptions and conduct additional risk assessment to determine the risk to human health and the environment because of the presence of MEC, MC, and asbestos-containing material at LHAAP-17. If the risk assessment determines that there is unacceptable risk due to presence of MEC, MC and/or ACM, amend the remedy (including RAOs) through the appropriate post-ROD remedy change process.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
Yes	Yes	Federal Facility	EPA/State	December 31, 2027

Issues/Recommendations				
OU(s): LHAAP-17	**Issue Category:**	**Changed Site Conditions**		
	Issue: Upon completion of the TCRA and RA MEC specific LUCs need to be implemented but are not currently planned.			
	Recommendation: Develop MEC specific LUCs that will be implemented upon completion of TCRA and RA.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	Federal Facility	EPA/State	December 31, 2025
OU(s): LHAAP-35B (37)	**Issue Category:**	**Remedy Performance**		
	Issue: The TCE plume is no longer delineated downgradient from monitoring well 35BWW25. Monitoring well 35BWW25 is located near the northern LUC boundary and there is the potential the plume extends beyond the LUC boundary.			
	Recommendation: Conduct additional investigation to delineate the plume boundary downgradient of monitoring well 35BWW25 to determine if the plume extends beyond the LUC boundary.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	Federal Facility	EPA/State	December 31, 2025
OU(s): LHAAP-46	**Issue Category:**	**Monitoring**		
	Issue: COC concentrations exhibit an increasing trend at shallow zone monitoring well LHSMW21, with no downgradient sampling location to confirm the TCE plume boundary.			
	Recommendation: Install and evaluate additional downgradient monitoring wells within the shallow zone to delineate the plume boundary downgradient of monitoring well LHSMW21 and assist in evaluation of monitored natural attenuation.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	Federal Facility	EPA/State	December 31, 2025

Issues/Recommendations				
OU(s): **LHAAP-50**	**Issue Category:**	**Remedy Performance**		
	Issue: The ISB remedy is not meeting performance criteria at monitoring wells 50WW08 or 50WW12.			
	Recommendation: If COC concentrations continue to increase at monitoring wells 50WW08 or 50WW12, conduct additional investigations to determine if horizontal/vertical characterization of the contaminant plume is required or if optimization of remedy implementation is required.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	Federal Facility	EPA/State	December 31, 2025

Issues/Recommendations				
OU(s): LHAAP-50	**Issue Category:**	**Monitoring**		
	Issue: The upgradient plume boundary is not defined by the current monitoring well network			
	Recommendation: Delineate the plume boundary southwest of monitoring well 50WW08.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	Federal Facility	EPA/State	December 31, 2025
OU(s): LHAAP-35A (58)	**Issue Category:**	**Remedy Performance**		
	Issue: Aquifer geochemical conditions outside of the enhanced ISB areas (at well 35AWWW09) are unfavorable for reductive dechlorination and COC concentrations exhibit an increasing trend (wells 35AWW09 and LHSMW06)			
	Recommendation: Consider completing an evaluation of the ISB approach in the context of site-specific hydrology, geochemistry, and concentration data to assess the potential effectiveness of additional ISB injections, determine if additional injections should be completed, and identify potential adjustments to the injection strategy for optimization of performance.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	Federal Facility	EPA/State	December 31, 2025
OU(s): LHAAP-35A (58)	**Issue Category:**	**Monitoring**		
	Issue: Newly installed well 35AWW25 has been installed downgradient of 35AWW18 but has been dry for the first two sampling events to confirm delineation of the western plume boundary.			
	Recommendation: Determine if well 35AWW25 will delineate the western plume boundary and if it does not, consider some other means of delineating the plume beyond those wells where concentrations are exhibiting an increasing trend.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	Federal Facility	EPA/State	December 31, 2025

Protectiveness Statement(s)	
Operable Unit:	*Protectiveness Determination:*
LHAAP-03	Protective
The remedy at LHAAP-03 is protective of human health and the environment. Excavation of arsenic- and lead-contaminated soil and backfill with clean soil occurred in 2019 and 2020. Confirmation samples indicate all soil exceeding RGs has been removed to prevent the leaching of contaminants from soil to underlying groundwater.	
Operable Unit:	*Protectiveness Determination:*
LHAAP-04	Protective
The remedy at LHAAP-04 is protective of human health and the environment. ISB injections occurred in 2019 and performance monitoring sampling results indicate ISB injections succeeded in reducing perchlorate concentrations in groundwater to below the TRRP Tier 1 Groundwater Residential PCL. There is no migration to downgradient surface water bodies. LUC notices have been sent, as required, and LUC boundaries have been recorded in the Harrison County Courthouse. There have been no LUC violations.	
Operable Unit:	*Protectiveness Determination:*
LHAAP-12	Protective
The remedy at LHAAP-12 is protective of human health and the environment. LUCs are in place to prevent human exposure to contaminated groundwater and to prevent residential use of the property. The landfill cap continues to reduce leaching and migration of landfill hazardous substances into groundwater as observed by no increases in COC concentrations in groundwater during annual groundwater monitoring. Groundwater monitoring results indicate TCE contaminated groundwater is not migrating toward nearby surface water.	

Protectiveness Statement(s)	
Operable Unit:	*Protectiveness Determination:*
LHAAP-16	Short-term Protective

The remedy at LHAAP-16 currently protects human health and the environment. The remedy continues to minimize vertical infiltration of water through the landfill due to the presence of the multilayer cap installed in 1998. Groundwater data indicate the cap is also reducing leaching and migration of landfill hazardous substances into the groundwater. The cap prevents exposure to landfill contents. LUCs prevent human exposure to contaminated groundwater. Surface water samples indicate no COCs, or COC byproducts, are migrating into Harrison Bayou. However, in order for the remedy to be protective in the long term, the following actions need to be taken to ensure protectiveness:

- Consider completing an evaluation of site-specific hydrology, geochemistry, and concentration data to determine if additional remediation should be completed and potential strategies for optimal performance.
- Finalize the additional investigations being conducted to refine the conceptual site model for groundwater conditions at LHAAP-16.
- Conduct additional investigation to further delineate the eastern plume boundary under and east of Harrison Bayou.
- Remove vegetation to ensure the vegetation does not compromise the integrity of the cap.
- Evaluate the monitoring well network for each biobarrier and consider adding monitoring wells to better analyze the performance of the biobarriers.
- Perform a source delineation through compound-specific isotope analysis in areas where VOC concentrations are exceptionally high, such as 16PM06.

Protectiveness Statement(s)		
Operable Unit:	*Protectiveness Determination:*	Addendum Due Date: September 30, 2028
LHAAP-17	Protectiveness Deferred	

A protectiveness determination of the remedy at LHAAP-17 cannot be made at this time until further information is obtained. Further information will be obtained by taking the following actions:

- Delineate the nature and extent of MEC, MC, and ACM in surface and subsurface soils.
- Evaluate the exposure assumptions and conduct additional risk assessment to determine the risk to human health and the environment because of the presence of MEC, MC, and ACM at LHAAP-17. If the risk assessment determines that there is unacceptable risk due to presence of MEC, MC and/or ACM, amend the remedy (including RAOs) through the appropriate post-ROD remedy change process.
- Develop MEC specific LUCs that will be implemented upon completion of TCRA and RA.

It is expected that these actions will take approximately 4 years to complete, at which time a protectiveness determination will be made.

Operable Unit:	*Protectiveness Determination:*
LHAAP-18/24	Will be Protective

The planned remedy at LHAAP-18/24 is expected to be protective of human health and the environment upon completion. It is expected that the final remedial actions will take approximately 7 years to complete, at which time a protectiveness determination will be made.

Implementation of groundwater extraction/treatment as well as the cap over the unlined evaporation pond occurred as part of the interim remedial action and will remain a part of the final remedy. Remedial activities completed to date have adequately addressed all exposure pathways that could result in unacceptable risks in these areas. COCs remain in soils above soil cleanup levels but occur at depth and do not pose a risk to human health

Protectiveness Statement(s)	
Operable Unit:	*Protectiveness Determination:*
LHAAP-35B (37)	Short-term Protective

The remedy at LHAAP-35B (37) currently protects human health and the environment. LUCs are in place to prevent exposure to contaminated groundwater and to prevent residential use of the property. Groundwater contaminants are not migrating to nearby surface waters. However, in order for the remedy to be protective in the long term, the following action needs to be taken to ensure protectiveness:

- Conduct additional investigation to delineate the plume boundary downgradient of monitoring well 35BWW25 to determine if the plume extends beyond the LUC boundary. Due to the adjoining area and the LHAAP site restrictions on residential use, groundwater use, the lack of potable wells in the area, and reasonable anticipated future use the potential for the plume to extend beyond the LUC boundary does not affect protectiveness currently.

Operable Unit:	*Protectiveness Determination:*
LHAAP-46	Short-term Protective

The remedy at LHAAP-46 currently protects human health and the environment. LUCs are in place to prevent exposure to contaminated groundwater and to prevent residential use of the property. Groundwater contaminants are not migrating to nearby surface waters. However, in order for the remedy to be protective in the long term, the following action needs to be taken to ensure protectiveness:

- Install and evaluate additional downgradient monitoring wells within the shallow zone to delineate the plume boundary downgradient of monitoring well LHSMW21 and assist in evaluation of MNA.

Operable Unit:	*Protectiveness Determination:*
LHAAP-49	Protective

The no action decision at LHAAP-49 is protective of human health and the environment. Notification has been filed in the county disclosing that LHAAP-49 has been evaluated for nonresidential use in accordance with 30 TAC §335.566 and is restricted to that use. Land use remains as a national wildlife refuge with no observed residential use.

Protectiveness Statement(s)	
Operable Unit:	*Protectiveness Determination:*
LHAAP-50	Short-term Protective

The remedy at LHAAP-50 currently protects human health and the environment. LUCs are in place to prevent exposure to contaminated groundwater and to prevent residential use of the property. Excavation of perchlorate-contaminated soil removed the potential continuing source to groundwater contamination upgradient of the perchlorate plume. There is no evidence of COCs migrating to surface water. However, in order for the remedy to be protective in the long term, the following actions need to be taken to ensure protectiveness:

- If COC concentrations continue to increase at monitoring wells 50WW08 or 50WW12, conduct additional investigations to determine if horizontal/vertical characterization of the contaminant plume is required or if optimization of remedy implementation is required.
- Delineate the plume boundary southwest of monitoring well 50WW08.

Operable Unit:	*Protectiveness Determination:*
LHAAP-35A (58)	Short-term Protective

The remedy at LHAAP-35A (58) currently protects human health and the environment. LUCs are in place to prevent exposure to contaminated groundwater and to prevent residential use of the property. Groundwater contaminants are not migrating to nearby surface waters. However, in order for the remedy to be protective in the long term, the following actions need to be taken to ensure protectiveness:

- Consider completing an evaluation of the ISB approach in the context of site-specific hydrology, geochemistry, and concentration data to assess the potential effectiveness of additional ISB injections, determine if additional injections should be completed, and identify potential adjustments to the injection strategy for optimization of performance.
- Determine if well 35AWW25 will delineate the western plume boundary and if it does not, consider some other means of delineating the plume beyond those wells where concentrations are exhibiting an increasing trend.

Protectiveness Statement(s)	
Operable Unit:	*Protectiveness Determination:*
LHAAP-67	Protective
The remedy for LHAAP-67 is protective of human health and the environment. The LUCs are being maintained and managed in accordance with the ROD to prevent human exposure to contaminated groundwater, contaminated groundwater is not migrating into nearby surface water, and MNA is effective in the upgradient part of the plume to reduce concentrations to restore groundwater to its potential beneficial use as drinking water.	
Operable Unit:	*Protectiveness Determination:*
LHAAP-001-R-01	Protective
The remedy for LHAAP-001-R-01 is protective of human health and the environment. The LUCs are being maintained and managed in accordance with the ROD and the LUC RD/RACR.	
Operable Unit:	*Protectiveness Determination:*
LHAAP-003-R-01	Protective
The remedy for LHAAP-003-R-01 is protective of human health and the environment. The LUCs are being maintained and managed in accordance with the ROD and the LUC RD/RACR.	
Operable Unit:	*Protectiveness Determination:*
LHAAP-004-R-01	Protective
The NFA decision for the Former Pistol Range, LHAAP-004-R-01, is protective of human health and the environment. There have been no changes in land use or other assumptions that would affect protectiveness.	

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ACRONYMS AND ABBREVIATIONS

µg/kg	Micrograms per kilogram
µg/L	Micrograms per Liter
ACM	Asbestos-Containing Material
AEDB-R	Army Environmental Database-Restoration
amsl	Above Mean Sea Level
ARAR	Applicable or Relevant and Appropriate Requirement
Army	U.S. Department of the Army
AST	Aboveground Storage Tank
bgs	below ground surface
BIP	Blow-in-place
BTEX	Benzene, Toluene, Ethylbenzene, and Total Xylenes
CD	Cultural Debris
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
COC	Contaminant of Concern
DAWSON	Dawson Solutions, Inc.
DCA	Dichloroethane
DCE	Dichloroethene
DHB	2,3-Dihydroxybenzoate
DHC	Dehalococcoides
DO	Dissolved Oxygen
DoD	Department of Defense
DPT	Direct Push Technology
DPW	Department of Public Works
EPA	U.S. Environmental Protection Agency
ERA	Ecological Risk Assessment
ESD	Explanation of Significant Differences
EVO	Emulsified Vegetable Oil
FFA	Federal Facility Agreement
FS	Feasibility Study
GIS	Geographic Information System
GWTP	Groundwater Treatment Plant
HHRA	Human Health Risk Assessment
HQ	Hazard Quotient
HQAES	Headquarters Army Environmental System
ICT	Interceptor-Collection Trench
ID	Identification
IRP	Installation Restoration Program
ISB	In Situ Bioremediation
ISCO	In Situ Chemical Oxidation
LHAAP	Longhorn Army Ammunition Plant
LTM	Long Term Monitoring
LUC	Land Use Control
MCL	Maximum Contaminant Level

ACRONYMS AND ABBREVIATIONS CONTINUED

MD	Munitions Debris
MEC	Munitions and Explosives of Concern
mg/kg	Milligrams per Kilogram
mg/L	Milligrams per Liter
MMRP	Military Munitions Response Program
MNA	Monitored Natural Attenuation
MOA	Memorandum of Agreement
MPPEH	Material Potentially Presenting Explosive Hazard
MSC	Medium-Specific Concentration
NAPL	Non-Aqueous Phase Liquid
NCP	National Contingency Plan
NFA	No Further Action
ng/L	nanogram/liter
NPL	National Priorities List
NTU	Nephelometric turbidity unit
OSWER	Office of Solid Waste and Emergency Response
ORC®	Oxygen Release Compound®
ORP	Oxidation-Reduction Potential
OSD	Office of the Secretary of Defense
PAH	Polynuclear Aromatic Hydrocarbon
PCE	Tetrachloroethene
PCL	Protective Concentration Level
PFAS	Per- and Polyfluoroalkyl Substances
PFBS	Perfluorobutanesulfonic acid
PFOA	Perfluorooctanoic Acid
PFOS	Perfluorooctane Sulfonate
RACR	Remedial Action Completion Report
RAO	Remedial Action Objective
RAWP	Remedial Action Work Plan
RBC	Risk Based Concentration
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RG	Remedial Goal
RI	Remedial Investigation
ROD	Record of Decision
RPM	Restoration Program Manager
RRS	Risk Reduction Standard
RSL	Regional Screening Level
SARA	Superfund Amendments and Reauthorization Act
SDWA	Safe Drinking Water Act
SVOC	Semi-volatile Organic Compound
TAC	Texas Administrative Code
TCA	1,1,2-Trichloroethane
TCE	Trichloroethene

ACRONYMS AND ABBREVIATIONS CONTINUED

TCEQ	Texas Commission on Environmental Quality
TCRA	Time Critical Removal Action
TMB	Trimethylbenzene
TNT	Trinitrotoluene
TPH	Total Petroleum Hydrocarbons
TRRP	Texas Risk Reduction Program
UEP	Unlined Evaporation Pond
U.S.	United States
USACE	U.S. Army Corps of Engineers
USAEC	U.S. Army Environmental Command
USC	U.S. Code
USFWS	U.S. Fish and Wildlife Service
UST	Underground Storage Tank
UU/UE	Unlimited Use and Unrestricted Exposure
VOC	Volatile Organic Compound
WP	White Phosphorus

1.0 INTRODUCTION

The former Longhorn Army Ammunition Plant (LHAAP) is an inactive, government-owned, formerly contractor-operated and maintained industrial facility located in Harrison County, Texas. The former footprint of the facility encompasses approximately 8,416 acres between State Highway 43 at Karnack, Texas, and the southwestern shore of Caddo Lake. Approximately 7,300 acres of the installation have been transferred to the U.S. Fish and Wildlife Service (USFWS) for management as the Caddo Lake National Wildlife Refuge. The remaining property is intended to be transferred once environmental responses are complete (Bhate, 2018).

LHAAP was listed on the National Priorities List (NPL) on August 9, 1990. A Federal Facility Agreement (FFA) was entered between the U.S. Army, U.S. Environmental Protection Agency (EPA), and Texas Natural Resources Conservation Commission (now known as the Texas Commission on Environmental Quality (TCEQ)) on December 30, 1991 (Bhate, 2018). This is the Fifth Five-Year Review for the former LHAAP and includes sixteen installation restoration program (IRP) sites and military munitions response program (MMRP) sites (**Table 1**).

1.1 PURPOSE

The purpose of the Five-Year Review is to determine whether site remedies remain protective of human health and the environment. Five-Year Reviews also identify issues discovered during the review, if any, and provide recommendations to address them. This Five-Year Review has been prepared because hazardous substances, pollutants, or contaminants remain at the site above levels that allow for Unlimited Use and Unrestricted Exposure (UU/UE).

1.2 AUTHORITY

The U.S. Army Corps of Engineers (USACE), Omaha District, with assistance from Dawson Solutions, Inc. (DAWSON), has prepared this Five-Year Review on behalf of the U.S. Army Environmental Command (USAEC) pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section (§) 121, 42 U.S. Code (USC) § 9621, and the National Contingency Plan (NCP), 40 Code of Federal Regulations (CFR) Part 300. CERCLA §121 (c) states the following:

> *"If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews."*

The NCP, at 40 CFR § 300.430(f)(4)(ii), states:

> *"If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after initiation of the selected remedial action."*

Table 1 – Former Longhorn Army Ammunition Plant Five-Year Review IRP and MMRP Sites Crosswalk

AEDB-R ID	Site Description	HQAES ID	Section
LHAAP-03	Former Waste Collection Pad Building 722-P Paint Shop	48315.1003	4.0
LHAAP-04	Former Pilot Wastewater Treatment Plant	48315.1004	5.0
LHAAP-012	Landfill 12 (SWMU 12)	48315.1011	6.0
LHAAP-016	Old Landfill (SWMU 16)	48315.1015	7.0
LHAAP-017	Burning Ground No. 2 Flashing Area, Group 2	48318.1016	8.0
LHAAP-018/ LHAAP-024*	Burning Ground and Washout Pond/Former Unlined Evaporation Pond	48315.1017/ 48315.1020	9.0
LHAAP-037	Chemical Laboratory Waste Pad	48315.1027	10.0
LHAAP-046	Plant 2 Area	48315.1053	11.0
LHAAP-049	Former Acid Storage Area	48315.1056	12.0
LHAAP-050	Former Waste Disposal Facility	48315.1030	13.0
LHAAP-058	Maintenance Complex	48315.1037	14.0
LHAAP-067	Above Ground Storage Tank	48315.1043	15.0
LHAAP-001-R-01	South Test Area/Bomb Test Area (Site 27)	48315.1048	16.0
LHAAP-003-R-01	Ground Signal Test Area	48315.1050	17.0
LHAAP-004-R-01	Pistol Range	48315.1052	18.0

*LHAAP-018/LHAAP-024 comprise two IRP sites with a shared remedy and will be evaluated together.

AEDB-R ID – Army Environmental Database-Restoration Identification
HQAES ID – Headquarters Army Environmental System Identification
LHAAP – Longhorn Army Ammunition Plant
IRP – Installation Restoration Program
MMRP – Military Munitions Response Program
SWMU – Solid Waste Management Unit
TNT – Trinitrotoluene

Implementation of the final remedy at LHAAP-18/24 has not yet occurred. A Pre-Design Investigation occurred from March 12 through June 30, 2021, to further define groundwater impacted by 1,4-dioxane, perchlorate, and VOCs. Soil samples were also

collected to investigate perchlorate and VOC soil contaminant levels at the contact interval between the clay and sand. Current operation of the GWTP is in accordance with the interim remedial action to treat groundwater extracted from ICTs and extraction wells. The 2020 ROD selected "*enhanced groundwater extraction and treatment as needed, LUCs, enhanced ISB inside and outside containment area and in Wilcox Formation, unsaturated soil excavation, and thermal DNAPL removal*" as the final remedy for LHAAP-18/24 (Army, 2020).

Two additional IRP sites, LHAAP-29 and LHAAP-47 are currently in the remedial design phase and have not achieved construction complete; without the remedies in place, the two sites are not included in this Five-Year Review. At LHAAP-29, a 2019 Record of Decision (ROD) selected excavation and off-site disposal for soil; plug lines; in situ thermal desorption, monitored natural attenuation (MNA) and land use controls (LUCs) for intermediate zone groundwater; and MNA and LUCs for shallow groundwater. At LHAAP-47, a 2022 ROD selected excavation, in situ thermal desorption, in situ bioremediation (ISB), biobarriers, MNA, long term monitoring (LTM), and LUCs. Because the remedies are not yet in place, LHAAP-29 and LHAAP-47 are not included in this Five-Year Review.

The Army is the lead agency for LHAAP. The EPA, Region 6 and TCEQ are the lead agencies that provide regulatory oversight concerning environmental investigations, risk management, and cleanup activities. The FFA, signed by the Army, the EPA, and State of Texas in 1991, is the controlling mechanism for the Army's response to environmental contamination.

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2.0 BACKGROUND

Longhorn Army Ammunition Plant was established in December 1941 as a manufacturing facility for trinitrotoluene (TNT) for use in World War II. The first flake was produced in October 1942 with LHAAP ultimately producing 414 million pounds of TNT before production halted in August 1945 and the facility went on standby status. In 1952, during the Korean War, two new initiatives took place at LHAAP: the construction of a facility to produce pyrotechnics and the construction of a facility to produce solid-fuel rocket motors for tactical missiles. Production of pyrotechnics ended in 1956. Production of rocket motors remained the primary operation at LHAAP until 1965, when pyrotechnics production was reactivated. From September 1988 to May 1991, LHAAP was also used for the static firing and elimination of Pershing I and II rocket motors. In 1997, the plant was deactivated and declared excess to the Army's needs (Bhate, 2018).

2.1 PHYSICAL CHARACTERISTICS

The former footprint of LHAAP encompasses 8,416 acres, of which 7,300 acres have been transferred over to the USFWS. LHAAP is in central-east Texas in the northeastern corner of Harrison County. Harrison County has a population of approximately 68,000 people. The former footprint of LHAAP is bounded to the west and to the north, respectively, by the rural communities of Karnack, Texas, which has a population of approximately 2,600 people, and Uncertain, Texas, which has a population of approximately 100 people (U.S. Census Bureau, 2020). The remaining surrounding area is forested (USACE, 1992).

2.2 GEOLOGY

LHAAP is situated on an outcrop of the Wilcox Group, which covers a large part of the eastern half of Harrison County, and accounts for most of the unconsolidated sediments underlying LHAAP. Wilcox consists mostly of fine to medium grain sands interbedded with clay and lignite. Soil types generally present at LHAAP are fine grained clays, silts, and sands from residuum from weathering of Wilcox materials and alluvial deposits across the installation. Residual soils consist of silty or sandy clay while alluvial soils consist of interbedded fine-grained clays, silts, and sands. The uppermost Wilcox group's stratigraphic thickness ranges from 350 feet in the northwest corner of LHAAP to approximately 130 feet along the east side of LHAAP. Permeability of soils across the installation is relatively moderate to low (USACE, 1992; Bhate, 2018).

2.3 HYDROGEOLOGY

2.3.1 SURFACE WATER

LHAAP and the cities of Karnack and Uncertain are part of the Cypress Bayou Basin occurring in the Piney Woods ecological region of Texas. Tributaries of the Cypress Bayou include Cypress Creek, Big Cypress Creek, Black Cypress Creek, and Little Cypress Creek. Cypress Creek flows from headwaters in eastern Hopkins County to the east to its confluence with the Red River in Louisiana, passing through Caddo Lake.

Surface water at LHAAP drains northeast of the installation into Caddo Lake via four drainage systems: Saunder's Branch, Harrison Bayou, Central Creek, and Goose Prairie Creek. Saunder's Branch flows onto LHAAP in the southeastern corner and flows northward into Caddo Lake. Harrison Bayou enters LHAAP in the southeastern edge of the installation and bisects the former plant footprint in a northeasterly direction. Central Creek enters the installation on the western boundary and flows in a northeasterly direction towards Caddo Lake. The headwaters of Goose Prairie Creek are located near the northwestern corner of the former plant footprint and consist of one larger creek and several smaller creeks (Bhate, 2018; Texas Water Development Board, 2023).

2.3.2 GROUNDWATER

The primary aquifer underlying LHAAP is the Carrizo-Wilcox Aquifer. The Texas Water Development Board has identified the Wilcox Group as the basal unit of the Carrizo-Wilcox Aquifer. The Carrizo-Wilcox Aquifer is present under most of Harrison County and is comprised of the Wilcox Group, the Carrizo Sand, the Reklaw Formation, and the Queen City Sand. The thickness of the aquifer reaches a maximum of approximately 3,000 feet, while the freshwater saturated thickness of the sands reaches an average of 670 feet (USACE, 1992; George, Mace & Petrossian, 2011).

In the area of LHAAP, the Wilcox Group yields less than 50 gallons per minute of fresh water at wells throughout Harrison County. The Midway Group, which serves as an impermeable base of the Wilcox Group, does not yield usable quantities of water. The top of the Midway Group has been encountered anywhere from approximately 75 to 300 feet below ground surface depending on the area of LHAAP. Groundwater generally occurs in unconfined conditions and fluctuates with seasonal variations of rainfall. Depth to groundwater across LHAAP ranges from 1 to 70 feet below ground surface (bgs) but can typically be encountered at 12 to 16 feet bgs. The flow of groundwater across the site is generally east-northeast towards Caddo Lake (USACE, 1992; AECOM, 2014; USACE, 2019).

Three water supply wells are located within the boundary of LHAAP itself. One well is located at the Fire Station; the second well is located approximately 0.35 miles southwest of the Fire Station. The third well is located north of the USFWS administration building for the Caddo Lake National Wildlife Refuge, near the main entrance to LHAAP. The three water supply wells were completed at a depth much greater than the zone of contamination at LHAAP. None of these three wells are currently used for drinking water, although they may supply water for non-potable uses. Two additional wells previously supplied water to the installation, but these have been plugged and abandoned (Army, 2020).

2.4 LAND AND RESOURCE USE

The majority of the former LHAAP footprint is under management of the USFWS as the Caddo Lake National Wildlife Refuge. The mission of the refuge is to promote the conservation and enhancement of migratory birds, the conservation of Ramsar wetlands

and other wetlands at the refuge, and the development, advancement, management, conservation, and protection of all native fish and wildlife resources.

The remaining acreage of the plant is managed by the Army and continues to undergo environmental investigation and remediation. Once environmental response actions are complete, the remaining acreage will be transferred to the USFWS.

There are no habitable buildings on current LHAAP property over or near shallow volatile organic compound (VOC)-contaminated groundwater that would pose a potential vapor intrusion exposure. Prior to each transfer, Army prepares an Environmental Condition of Property report. The last Environmental Condition of Property report (VII) prepared was in August 2018, which is outside of the five-year review period. Vapor intrusion risks, if applicable, are documented in the Environmental Condition of Property reports.

2.4.1 CONTAMINANTS OF EMERGING CONCERN

Per- and polyfluoroalkyl substances (PFAS) are being addressed by the Army in accordance with *Army Guidance for Addressing Releases of Per- Polyfluoroalkyl Substances* (Army, 2018). A PFAS preliminary assessment and site inspection (PA/SI) has been completed at LHAAP. The activities are being conducted via a CERCLA pathway that is separate from any of the sites summarized in this Five-Year Review. The next phase for completing the LHAAP PFAS evaluation is completion of an RI for the areas of potential interest identified during the preliminary assessment and site inspection. Evaluation of PFAS findings has been added, where applicable, in this Five-Year Review. Sites assessed for PFAS but not retained for further investigation include LHAAP-17 and LHAAP-35A (58). These sites will not have evaluation of PFAS findings in this Five-Year Review. Sites that were retained as Areas of Potential Interest for further investigation during the PA/SI include LHAAP-04, LHAAP-12, LHAAP-16, LHAAP-18/24, LHAAP-46, and LHAAP-50.

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3.0 FIVE-YEAR REVIEW PROCESS

3.1 ADMINISTRATIVE COMPONENTS

The Army initiated this Fifth Five-Year Review for LHAAP on October 24, 2022, with a kick-off call with USACE, Omaha District; USAEC; USACE, Tulsa District; USACE, Fort Worth District; and DAWSON personnel to discuss the area and items of interest pertaining to the protectiveness of the remedies currently in place. A schedule was established that included:

- Community notification
- Document review
- Site inspection
- Interviews
- Five-Year Review Report (development and review)

3.2 COMMUNITY NOTIFICATION

A public notice was issued in the *Marshall News Messenger* on January 15, 2023, notifying the public that the Army was initiating the Five-Year Review at LHAAP. The Public Notice affidavits are included in **Appendix A**.

The results of the review and the report will be made available to the public at the site information repository located at:

Marshall Public Library
300 South Alamo Boulevard
Marshall Texas, 75670

The review will also be made available on the online administrative record located at www.longhornaap.com. Upon completion of the Fifth Five-Year Review Report, a public notice will be placed in *Marshall News Messenger* to announce availability of the Final Five-Year Review Report in the site information repository.

3.3 DOCUMENT REVIEW

The Fifth Five-Year Review required a review of relevant site documents including, but not limited to, decision/remedy selection documents, design and implementation reports, investigations, annual reports and related monitoring data, and regulatory documents. Reviewed documents are listed as references in **Section 20.0** of this report.

3.4 SITE INSPECTION

Site inspections are conducted to provide information about a site's status and to visually confirm and document the conditions of the remedy, the site, and the surrounding area

(EPA, 2001). The LHAAP site inspection occurred on February 14 and 15, 2023 and was attended by USACE, Tulsa District; USAEC; Aptim; TCEQ; EPA; Bhate; and DAWSON.

3.5 INTERVIEWS

During this Fifth Five-Year Review, interviews were conducted to document perceived problems or successes with the remedies implemented at LHAAP. The project team conducted interviews with the following individuals:

- TLI Solutions Project Manager
- Environmental Engineer, Army Environmental Section Regional Planning and Environmental Center Fort Worth District (located in Tulsa), USACE
- Bhate Environmental Project Manager
- Project Manager, TCEQ Remediation, Superfund Section
- Superfund Remedial Program Manager, EPA Region 6

During the interviews, operations and maintenance, regulatory issues, site history, and annual groundwater sampling activities were discussed. A summary of relevant information obtained from interviews can be found in the applicable IRP and MMRP evaluation sections of this report. Interview summaries are presented in **Appendix B**.

4.0 LHAAP-03 FORMER WASTE COLLECTION PAD BUILDING 722-P PAINT SHOP

4.1 SITE CHRONOLOGY

Important events and relevant dates for LHAAP-03 are presented below in **Table 2**.

Table 2 – LHAAP-03 Chronology

Event	Date
Waste Collection Operations	Unknown
Human Health Risk Assessment	2003
Excavation Area Sampling	2006-2008
Installation-Wide Baseline Ecological Risk Assessment	2007
Site Investigation Report	2009
Engineering Evaluation and Cost Analysis	2011
LHAAP-03 added to the National Priorities List	2011
Remedial Investigation/Focused Feasibility Study	2013
Record of Decision LHAAP-03	August 10, 2018
Pre-Excavation Soil Sampling	2018
Remedial Design and Remedial Action Work Plan	2019
Excavation of Contaminated Soil	2019-2020
Remedial Action Completion Report	2021
Remedial Action Operation	2021 - Present

LHAAP – Longhorn Army Ammunition Plant

4.2 BACKGROUND

4.2.1 PHYSICAL CHARACTERISTICS

LHAAP-03 is the Former Waste Collection Pad located approximately 50 feet west of former Building 722-P (**Figure 1)**. The originally identified 16-foot by 15-foot area was a waste collection site outside of former Building 722-P at the Maintenance Shop Area. LHAAP-03 is located within the boundary of LHAAP-35A (58) (Army, 2018).

4.2.2 LAND AND RESOURCE USE

The reasonably anticipated future land use is a national wildlife refuge. The 2004 Memorandum of Agreement (MOA) between USFWS and the Army documents the transfer of LHAAP land to USFWS. The former LHAAP land is now known as the Caddo Lake National Wildlife Refuge. LHAAP-03 will be transferred under this agreement in the future (Army, 2018).

There are no bodies of water at LHAAP-03. All surface water drains toward the southern branch of Goose Prairie Creek (approximately 800 feet southwest of LHAAP-03), which flows into Caddo Lake.

None of the water wells at LHAAP are used for drinking water; they supply water for non-potable uses only. However, the State of Texas considers all groundwater as potential drinking water, unless otherwise classified in accordance with 30 Texas Administrative Code (TAC) 335.563(h)(1).

4.2.3 History of Contamination

Building 722-P is the former paint shop used for spray painting and the coating of various items in polyurethane. 55-gallon drums stored on a gravel pad in an open-sided shed were used to collect heavy metal-based primers, waste paint, waste solvents and contaminated rags during operation. Previous descriptions of waste collected at LHAAP-03 included non-halogenated solvents, urethanes, and paint thinner (Army, 2018).

4.2.4 Initial Response

No initial response activities occurred at LHAAP-03.

4.2.5 Basis for Taking Action

Remedial action for soil is required to address the presence of lead and arsenic in soil. Concentrations of arsenic and lead in soil at LHAAP-03 were identified as having the potential to degrade groundwater quality because concentrations exceeded site-specific [risk reduction standard (RRS)3 medium-specific concentration (MSC)] soil concentrations (Army, 2018).

4.3 REMEDIAL ACTIONS

4.3.1 Remedial Action Objectives

The remedial action objective (RAO), per the 2018 ROD is to "*protect human health and the environment by preventing lead and arsenic contaminated soils from potentially leaching into the underlying groundwater*" (Army, 2018). Contaminants of concern (COCs) and their respective remediation goals (RGs) are presented in **Table 3**. The RGs are set at concentrations equal to largest of calculated RRS3 industrial soil MSC based on the site-specific soil standard for groundwater protection, and background soil concentration, as calculated during the preparation of the remedial investigation (RI) and focused feasibility study (FS).

Table 3 – LHAAP-03 Remediation Goals

Medium	Contaminant of Concern	Remediation Goal* (mg/kg)
Soil	Arsenic	5.9**
	Lead	180

Source: Army, 2018; Table 2-2.
mg/kg – Milligrams per kilogram
* Remediation goals are applicable risk reduction standard 3 industrial soil medium-specific concentration equals largest of calculated risk reduction standard 3 medium-specific concentration and background values.
** Arsenic remediation goal equals the background value for LHAAP, calculated as the 95% Upper Prediction Limit. (AECOM, 2013).

4.3.2 REMEDY DESCRIPTION

The remedy selected in the 2018 ROD was "*excavation and off-site disposal of soil at the LHAAP-03 soil operable unit*" (Army, 2018).

The remedy does not include any specific provisions for LUCs because "*LHAAP-03 lies wholly within the LUC boundary of LHAAP-35A(58) and all LUCs, as well as the non-residential land use notification, applicable to LHAAP-35A(58) will be applicable to LHAAP-03 in the same way and to the same extent*" (Army 2018).

4.3.3 REMEDY IMPLEMENTATION

The excavation areas (Areas A1, A2, B, and C) defined in the Remedial Design (RD)/Remedial Action Work Plan (RAWP) to address the soil to groundwater pathway are shown on **Figures 2 and 5**. Excavation began on October 1, 2019, and backfilling of excavated areas was completed on August 10, 2020. During excavation activities, confirmation samples were collected until no confirmation samples exceeded RGs for arsenic and lead. The excavated areas were expanded based on confirmation sample results shown on **Figure 4** and the final extents of each excavation area are shown on **Figure 5**. Approximately 120 cubic yards of soil were excavated and disposed at the East Texas Regional Landfill in Henderson, Texas (Bhate and APTIM, 2021d).

LHAAP experienced heavy rainfall that required stormwater runoff to be removed from excavations. Water was pumped into 275-gallon totes that had contained emulsified vegetable oil used for bioremediation injections at LHAAP-16. The totes were staged at the LHAAP-18/24 Groundwater Treatment Plant (GWTP) but were not run through the treatment plant due to concerns that the emulsified vegetable oil residue in the totes could disturb the operation of the treatment systems in the treatment plant. After sampling and waste characterization, the water in the totes was pumped into a vacuum truck on January 29, 2021, and disposed at the Waste Connection East Texas Regional Disposal Facility (Bhate and APTIM, 2021d).

As indicated above, because of the location of LHAAP-03 within the boundary of LHAAP-35A(58), LUCs for LHAAP-03 have been addressed in the Explanation of Significant

Differences (ESD) to the LHAAP-35A(58) ROD (**Section 14.3.2**) and have been implemented under the LHAAP-35A(58) remedial action (Bhate and APTIM, 2021d).

4.3.4 OPERATIONS, MAINTENANCE AND MONITORING

There are no operations, maintenance, and monitoring requirements at LHAAP-03.

4.4 PROGRESS SINCE THE FOURTH FIVE-YEAR REVIEW

This is the first Five-Year Review for LHAAP-03.

4.5 DATA REVIEW

Table 4 presents the final confirmation sampling results for excavation Areas A1, A2, B, and C. **Appendix E**, Table E.1 presents the soil boring sampling results used to define the sidewall extents for Area A1 and Area B.

Table 4 – LHAAP-03 Excavation Confirmation Sample Results

Excavation Area	Date	Sample Location	Depth (feet)	Arsenic (5.9 mg/kg)	Lead (180 mg/kg)
Area A1	10/2/2019	Floor	0-1	2.34	13.4
Area A2	10/2/2019	Wall and Floor Composite	0-1	3.38	75.5
Area B	10/2/2019	Floor	8	3.58	8.04 J
Area C	10/2/2019	Floor	8	2.77	9.43
	10/24/2019	East Wall	6-7	4.9	9.95
		West Wall	6-7	4.96	20.1
		North Wall	6-7	5.1 J	20.5 J
	8/4/2020	South Wall	6-7	2.23	9.01

mg/kg – Milligrams per kilogram
J - Estimated

4.6 SITE INSPECTION

The Five-Year Review site inspection did not observe any issues at LHAAP-03. The excavation areas were well vegetated and there were no changes in land use observed.

4.7 TECHNICAL ASSESSMENT

4.7.1 QUESTION A – IS THE REMEDY FUNCTIONING AS INTENDED BY THE DECISION DOCUMENTS?

Yes, the remedy is functioning as intended by the decision document. Excavation of arsenic- and lead-contaminated soil occurred in 2019 and 2020. Confirmation samples

indicate all soil exceeding RGs has been removed to prevent the leaching of contaminants from soil to underlying groundwater. The excavation areas were backfilled with clean soil. The excavated areas were well vegetated during the site inspection.

4.7.2 QUESTION B – ARE THE EXPOSURE ASSUMPTIONS, TOXICITY DATA, CLEANUP LEVELS, AND REMEDIAL ACTION OBJECTIVES USED AT THE TIME OF THE REMEDY SELECTION STILL VALID?

Yes, the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of the remedy selection are still valid. LHAAP-03 is located within the boundaries of LHAAP-35A(58), which is restricted to non-residential use. There have been no changes to land use that have resulted in any changes to the exposure assumptions. The arsenic RG is based on background arsenic levels at LHAAP, and the lead RG is based on RRS3 industrial soil MSCs that remain valid. The RAO to prevent the leaching of lead- and arsenic-contaminated soils into underlying groundwater has been achieved by excavating contaminated soil exceeding the RGs.

4.7.3 QUESTION C – HAS ANY OTHER INFORMATION COME TO LIGHT THAT COULD CALL INTO QUESTION THE PROTECTIVENESS OF THE REMEDY?

No other information has come to light that calls into question the protectiveness or performance of the remedy.

4.7.4 TECHNICAL ASSESSMENT SUMMARY

Excavation of arsenic- and lead-contaminated soil and backfill with clean soil occurred in 2019 and 2020. Confirmation samples indicate all soil exceeding RGs has been removed to prevent the leaching of contaminants from soil to underlying groundwater.

4.8 ISSUES

No issues were identified during this Five-Year Review that prevent the remedy from being protective now or in the future.

4.9 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

No recommendations or follow-up actions are required since there were no issues identified during this Five-Year Review that affect current or future protectiveness of the remedy.

4.10 PROTECTIVENESS STATEMENT

The remedy at LHAAP-03 is protective of human health and the environment.

Excavation of arsenic- and lead-contaminated soil and backfill with clean soil occurred in 2019 and 2020. Confirmation samples indicate all soil exceeding RGs has been removed to prevent the leaching of contaminants from soil to underlying groundwater.

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5.0 LHAAP-04 FORMER PILOT WASTEWATER TREATMENT PLANT

5.1 SITE CHRONOLOGY

Important events and relevant dates for LHAAP-04 are presented below in **Table 5**.

Table 5 – LHAAP-04 Chronology

Event	Date
Former Pilot Wastewater Treatment Plan operations began	1984–1997
RCRA Closure Activities	1997
Site Inspection and Remedial Investigation	1995–2000
Installation-Wide Perchlorate Investigation	2001
Data Gaps Investigation	2004–2007
Mercury-contaminated Soil Removal Action	2006
Engineering Evaluation and Cost Analysis	2009
Action Memorandum	2009
Remedial Design and Removal Action Work Plan	2009
CERCLA removal of perchlorate- and mercury-contaminated soil	2009
Removal Action Completion Report	2011
Record of Decision LHAAP-04	December 15, 2016
Monitoring Well Installation and Sampling	2017–Present
Comprehensive LUC Management Plan	2019
Remedial Design and Remedial Action Work Plan	2019
In Situ Bioremediation Injections	2019
Remedial Action Completion Report	April 2021
Remedial Action Completion Report (Revised)	August 2021
Remedial Action Operation	2019 - Present
Technical Memorandum, Proposed Revisions to LHAAP-04 and LHAAP-16 Remedial Action Operation Groundwater Monitoring Program	2022

CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act
LHAAP – Longhorn Army Ammunition Plant
LUC – Land Use Controls
RCRA – Resource Conservation and Recovery Act

5.2 BACKGROUND

5.2.1 PHYSICAL CHARACTERISTICS

LHAAP-04, also known as Former Pilot Wastewater Treatment Plant, is in the central portion of LHAAP, surrounded by light duty roads near the former fire station (**Figure 6**). The buildings associated with the former treatment plant were demolished in 1997. The facility structures, tanks, piping, and other associated wastes were disposed off site (USACE, 2016).

5.2.2 LAND AND RESOURCE USE

The reasonably anticipated future land use is a national wildlife refuge. The 2004 MOA between USFWS and the Army documents the transfer of LHAAP land to USFWS. The former LHAAP is now known as the Caddo Lake National Wildlife Refuge. LHAAP-04 will be transferred under this agreement in the future (Bhate and APTIM, 2019a).

There are no bodies of water at LHAAP-04. All surface water drains toward the southern branch of Goose Prairie Creek (approximately 700 feet south of LHAAP-04), which flows into Caddo Lake.

None of the water wells at LHAAP are used for drinking water; they supply water for non-potable uses only. However, the State of Texas considers all groundwater as potential drinking water, unless otherwise classified in accordance with 30 TAC 335.563(h)(1).

5.2.3 HISTORY OF CONTAMINATION

Wastewater treatment operations began taking place at LHAAP-04 in 1984. Wastewater from sumps at LHAAP was trucked to the former pilot wastewater treatment plant. Treatment began in settling tanks; sludge from settling tanks was blown down, drummed, and burned at LHAAP-18/24. Wastewater was then transferred to one of two storage tanks, then pumped through a heat exchanger to an evaporation tower. Solids from this process were shipped and disposed off site (Army, 2016).

5.2.4 INITIAL RESPONSE

LHAAP-04 was closed in 1997 under the Resource Conservation and Recovery Act (RCRA). Site closure activities included demolition of the facility structures, tanks, and piping, and the disposal of associated wastes, excluding the concrete slab on the north side of LHAAP-04. The concrete slab formerly housed four aboveground storage tanks (ASTs) at LHAAP-04. In 2009, a non-time critical removal action included excavation of 3,406 cubic yards of mercury- and perchlorate-impacted soil from the southern edge of the concrete slab (Shaw, 2011; Army, 2016).

5.2.5 BASIS FOR TAKING ACTION

Groundwater sampling results indicated perchlorate concentrations exceeded the Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective

Concentration Level (PCL) of 17 micrograms per liter (µg/L) (**Figure 7**). Actions for the groundwater are necessary to address the potential for human health risks in the unlikely event there is an attempt to use groundwater as a potable water source (Army, 2016).

5.3 REMEDIAL ACTIONS

5.3.1 REMEDIAL ACTION OBJECTIVES

The RAOs for LHAAP-04 as identified in the 2016 ROD include (Army, 2016):

- *"Protect human health by preventing ingestion of groundwater contaminated with perchlorate.*
- *Return groundwater to its potential beneficial use, wherever practicable, within a reasonable time period given the particular site circumstances; and*
- *Prevent groundwater contaminated with perchlorate from migrating into nearby surface water."*

The groundwater cleanup level for perchlorate at the Site is the TRRP Tier 1 Groundwater Residential PCL residential groundwater cleanup level, 17 µg/L (Army, 2016).

5.3.2 REMEDY DESCRIPTION

The 2016 ROD selected the following remedy for LHAAP-04 (Army, 2016):

"Alternative 3, which includes ISB in the target area, LTM and LUCs, is the selected alternative for LHAAP-04 and is consistent with the intended future use of the site as a national wildlife refuge."

It is estimated that perchlorate could be reduced to below its cleanup level in approximately 6 years.

5.3.3 REMEDY IMPLEMENTATION

5.3.3.1 In Situ Bioremediation

The ROD specified ISB would occur in the vicinity of monitoring well 04WW04.

ISB injections occurred October 22 through November 6, 2019, at 25 direct push technology (DPT) locations beginning in the outermost locations of the injection grid and proceeding inward. The injection substrate consisted of the emulsified vegetable oil (EVO) carbon source and diammonium phosphate, which was prepared 24 hours prior to each injection cycle. Injection locations are shown on **Figure 8**.

Baseline sampling occurred November 5 and 6, 2019 upon identification of non-compliance with the RD/RAWP, which required baseline sampling pre-remedy. Samples were collected from twelve shallow zone wells inside and outside the plume area, one intermediate zone well, and the Fire Station Well completed in the deep zone. However,

groundwater sampled from four wells within the treatment area (04WW01, 04WW07, 04WW09, and 04WW10) was a milky white color due to the EVO. Therefore, groundwater from the four wells within the treatment area was not analyzed for baseline perchlorate concentrations. Samples collected in January 2019 served as the baseline perchlorate concentrations at those locations (Bhate and APTIM, 2021a).

All post-injection design effectiveness samples had total organic carbon (TOC) concentrations above the optimal concentration for biological degradation (20 mg/L). TOC concentrations ranged from 32.8 mg/L to 680 mg/L, achieving the desired distribution of TOC into the shallow groundwater zone at LHAAP-04 (Bhate and APTIM, 2021a).

5.3.3.2 Performance and Long-Term Monitoring

Performance and LTM for LHAAP-04 occur in accordance with the 2019 RD/RAWP (Bhate and APTIM, 2019a):

- *Performance monitoring will be performed on a quarterly basis for a period of two years and will include analysis of perchlorate and geochemical parameters (sulfate, nitrate, nitrites, alkalinity).*
- *LTM will begin in Year 3 after treatment and will be conducted semiannually for 3 years (through Year 5), and annually thereafter.*

In 2022, a technical memorandum proposed revisions to the LTM program at LHAAP-04. As presented in **Section 5.5**, the eight quarterly sampling events for Years 1 and 2 and the first Year 3 semiannual sampling event indicated groundwater had returned to aerobic conditions with no observed rebound in perchlorate concentrations. The technical memorandum recommended reducing the number of wells sampled from 12 to 7 and recommended reducing the monitoring frequency to annual beginning in Year 4. EPA and TCEQ concurred with the proposed revisions (Bhate and APTIM, 2022a).

5.3.3.3 Land Use Controls

The LUC objectives include maintaining the integrity of the current or future remedial monitoring systems and preventing the use of groundwater contaminated above cleanup levels as a potable water source. The actions to be taken to implement these LUC objectives and requirements included modifying the “Comprehensive LUC Management Plan, Former Longhorn Army Ammunition Plant, Karnack, Texas” and detailing the LUCs in the RACR.

Administrative maintenance of the LUCs includes the following (Bhate and APTIM, 2019a):

- *Annual field inspections of the site to confirm that no violations of the LUCs have occurred.*
- *Annual certifications that no LUC-restricted activities have been authorized and that site conditions and use are consistent with the LUCs.*

- *Periodic transmittal of a LUC Notice to federal, state, and local authorities and to owners and occupants of LHAAP-04. The notice will include the groundwater and soil (surface and subsurface) contamination and any land use restrictions referenced in the ROD, a written description of the LUCs and a figure depicting the LUC boundaries. The transmittal will coincide with each Five-Year Review and will be documented in the report.*
- *The final LUC RD appendix of the RACR will be added to the Comprehensive LUC Management Plan and the plan will be provided to the owner or occupant of LHAAP-04.*

LUCs prohibiting groundwater use (except for monitoring and testing) have been implemented and are to remain in place until COC concentrations allow for UU/UE. In June 2017, initial notice of LUCs at LHAAP-04 was sent to relevant government officials, including a preliminary LUC boundary. The Comprehensive LUC Management Plan was finalized in 2019 (Bhate and APTIM, 2019b). A second Notice of LUCs for Soil and Groundwater Contamination was sent to federal, state, and local officials, and to the Texas Department of Licensing and Regulation on February 23, 2021, which can be found in the Comprehensive Land Use Control Management Plan. A civil survey of the LUC boundary was conducted in January 2021 and recorded in the Harrison County Courthouse on March 22, 2021, in accordance with TAC Title 30, §335.566.

5.3.4 Operations, Maintenance and Monitoring

The groundwater treatment and LTM remedial components include a groundwater monitoring system used to characterize the condition of the groundwater during the period the remedy is in place until the remediation goals are achieved and validated. The Army is responsible for maintaining the groundwater monitoring network until cleanup levels have been achieved and the network is no longer needed. If any of the elements of the groundwater monitoring network are damaged, destroyed, or become ineffective, they will be repaired or replaced to ensure collection of data of the quality necessary to determine the progress of the remedy.

The annual LUC inspections occurred at LHAAP-04 on February 13, 2020, May 27, 2021, and October 26, 2022. No issues or concerns were observed. Inspection of the monitoring wells showed no damage to the bollards, well pads, or protective casings. Mowing and clearing around the wells is conducted on an as-needed basis (Bhate and APTIM, 2021b).

5.4 PROGRESS SINCE THE FOURTH FIVE-YEAR REVIEW

This is the first Five-Year Review for LHAAP-04.

5.4.1 PFAS Preliminary Assessment/Site Inspection

LHAAP-04 was identified as an area of potential interest during the LHAAP 2023 PFAS PA/SI following records research, personnel interviews, and site reconnaissance due to historical storage and treatment of potentially PFAS-containing wastewater. Three groundwater samples were obtained from existing monitoring wells at LHAAP-04. There

were no detections of PFOS, PFOA, PFBS, PFNA, or PFHxS in any of the groundwater samples collected. The recommendation in the PA/SI report for LHAAP-04 is no further action at this time relating to PFAS.

5.5 DATA REVIEW

For this review, baseline sampling and Years 1 and 2 performance monitoring results were available for evaluation. During Years 1 and 2, there was only a single sampling event (February 2020) with exceedances of the perchlorate PCL (17 µg/L) in groundwater. All other concentrations since February 2020 were either below the PCL or nondetect. As a result, Mann-Kendall analysis to identify trends was not completed. Data tables from the quarterly monitoring events conducted in 2020 and 2021 are provided in **Appendix E.**

Twelve monitoring wells were sampled and analyzed for perchlorate quarterly in 2020 and 2021. Four of the 12 monitoring wells (04WW05, 04WW07, 04WW09, and 04WW10) are located within the treatment area and were also analyzed for nitrate, nitrites, sulfate, and alkalinity.

Perchlorate concentrations exceeded the PCL at three monitoring wells during the February 2020 sampling event (04WW01 [19 µg/L], 04WW07 [86 µg/L], and 04WW09 [18 µg/L]). Perchlorate concentrations decreased to below the PCL at every monitoring well during the May, August, and November 2020 and March, May, August, and November 2021 sampling events (**Figures 9 and 10**) (Bhate and APTIM, 2021b, 2022b).

During Year 1 performance monitoring sampling events, geochemical parameters indicated anaerobic conditions in the groundwater aquifer with Year 2 showing normal aerobic conditions to have returned. Nitrate and nitrite concentrations were below 1.0 mg/L in 2020 and decreased to below 0.1 mg/L in 2021. This indicated nitrate will not inhibit the anaerobic degradation of perchlorate. Sulfate concentrations ranged from 0.659 to 1,540 mg/L in 2020 and 1 to 686 mg/L in 2021; levels are elevated in two of the four wells. TOC concentrations have declined in three of the four wells to below 20 mg/L. TOC at 04WW09 decreased from 102 mg/L in the March 2021 sampling event to 60.8 mg/L in the November 2021 sampling event. This indicates the microbial populations have consumed most of the carbon source injected (Bhate and APTIM, 2021b, 2022).

Comparison of seasonal variations of groundwater elevations (up to 7 feet at some wells) to sampling results does not indicate any spatiotemporal variation in concentration of perchlorate (**Appendix E**).

5.6 SITE INSPECTION

The Five-Year Review site inspection confirmed LUCs prohibit groundwater use and land use remains non-residential. There were no violations of LUCs, nor evidence of prohibited use of groundwater observed during the site inspection.

5.7 TECHNICAL ASSESSMENT

5.7.1 QUESTION A – IS THE REMEDY FUNCTIONING AS INTENDED BY THE DECISION DOCUMENTS?

Yes, the remedy for LHAAP-04 is functioning as intended by the 2016 ROD. ISB injections occurred October 22 through November 6, 2019 at 25 DPT locations. Year 1 and Year 2 performance monitoring sampling results indicate ISB injections succeeded in reducing perchlorate concentrations in groundwater to below the TRRP Tier 1 Groundwater Residential PCL of 17 µg/L. There have been no detections of perchlorate in monitoring wells located downgradient of the contaminant plume, indicating no migration to downgradient surface water bodies.

In June 2017, initial notice of LUCs at LHAAP-04 was sent to relevant government officials, including a LUC boundary, and a second notice was sent on February 23, 2021. A civil survey of the LUC boundary was conducted in January 2021 and recorded in the Harrison County Courthouse on March 22, 2021 in accordance with TAC Title 30, §335.566. The document number associated with this filing is 2021-000003203. Annual LUC inspections occurred in February 2020 and May 2021 and did not identify any LUC violations. The Five-Year Review site inspection did not observe any violations of LUCs or prohibited groundwater use.

5.7.2 QUESTION B – ARE THE EXPOSURE ASSUMPTIONS, TOXICITY DATA, CLEANUP LEVELS, AND REMEDIAL ACTION OBJECTIVES USED AT THE TIME OF THE REMEDY SELECTION STILL VALID?

Yes, the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of the remedy selection are still valid. There have been no changes to land use since the 2016 ROD that resulted in changes to the exposure assumptions. In the absence of a federal drinking water standard for perchlorate, the TRRP Tier 1 Groundwater Residential PCL of 17 µg/L remains the applicable cleanup level at LHAAP-04.

Based on Years 1 and 2 performance monitoring sampling results, the remedy is progressing toward achieving the RAOs. LUCs prevent ingestion of groundwater contaminated with perchlorate and perchlorate concentrations have reduced to below the PCL of 17 µg/L. In addition, there is no evidence that groundwater contaminated with perchlorate is migrating into nearby surface water.

Areas of potential interest for PFAS have been identified within the boundaries of LHAAP-04. Groundwater samples collected for the 2023 PFAS PA/SI did not contain PFOS, PFOA, PFBS, PFHxS, or PFNA concentrations exceeding the Office of the Secretary of Defense (OSD) Risk Screening Levels, indicating there are no new contaminants potentially impacting the current remedy.

5.7.3 QUESTION C – HAS ANY OTHER INFORMATION COME TO LIGHT THAT COULD CALL INTO QUESTION THE PROTECTIVENESS OF THE REMEDY?

No other information has come to light that calls into question the protectiveness or performance of the remedy.

5.7.4 TECHNICAL ASSESSMENT SUMMARY

ISB injections occurred in 2019 and performance monitoring sampling results indicate ISB injections succeeded in reducing perchlorate concentrations in groundwater to below the TRRP Tier 1 Groundwater Residential PCL of 17 µg/L. There is no migration to downgradient surface water bodies. LUC notices have been sent, as required, and LUC boundaries have been recorded in the Harrison County Courthouse. There have been no LUC violations.

5.8 ISSUES

No issues were identified during this Five-Year Review that prevent the remedy from being protective now or in the future.

5.9 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

No recommendations or follow-up actions are required since there were no issues identified during this Five-Year Review that affect current or future protectiveness of the remedy.

5.10 PROTECTIVENESS STATEMENT

The remedy at LHAAP-04 is protective of human health and the environment.

ISB injections occurred in 2019 and performance monitoring sampling results indicate ISB injections succeeded in reducing perchlorate concentrations in groundwater to below the TRRP Tier 1 Groundwater Residential PCL. There is no migration to downgradient surface water bodies. LUC notices have been sent, as required, and LUC boundaries have been recorded in the Harrison County Courthouse. There have been no LUC violations.

6.0 LHAAP-12 LANDFILL 12

6.1 SITE CHRONOLOGY

Important events and relevant dates for LHAAP-12 are presented below in **Table 6**.

Table 6 – LHAAP-12 Chronology

Event	Date
Landfill Operations	1963–1994
Media Sampling and Analysis Program	1980
Remedial Investigation	1993–1998
Baseline Human Health Risk Assessment	1998–2004
Interim Remedial Action Focused Feasibility Study	1995
Record of Decision for Early Interim Action	September 27, 1995
Landfill cap and cover system installed	1996–1998
Landfill Cap Long Term Monitoring	1998–Present
Construction Completion Report	1998
Remedial Investigation	2001
Perchlorate Investigation	2000–2005
First Five-Year Review	August 13, 2002
Baseline Human Health Risk Assessment and Screening Ecological Risk Assessment	2002
Screening-Level Ecological Risk Evaluation for Soil	2004
Feasibility Study	2005
Proposed Plan	2005
Record of Decision for Landfill 12	July 24, 2006
Remedial Design Addendum for Landfill 12	2007
Natural Attenuation Evaluation LHAAP-12, 35B(37), and 67	2007
Operating Properly and Successfully Demonstration Report	2007
Baseline Ecological Risk Assessment	2007
Second Five-Year Review	September 24, 2008
Third Five-Year Review	May 15, 2014
Transfer of Property to U.S. Fish and Wildlife Service	May 2018
Fourth Five-Year Review	May 15 ,2019

LHAAP – Longhorn Army Ammunition Plant

6.2 BACKGROUND

6.2.1 PHYSICAL CHARACTERISTICS

LHAAP-12, also known as Landfill 12, is a capped landfill encompassing approximately 7 acres within the central portion of LHAAP (**Figure 11**). The landfill is an open area of grass bounded by heavy timber.

6.2.2 LAND AND RESOURCE USE

The reasonably anticipated future land use is a national wildlife refuge. The 2004 MOA between USFWS and the Army documents the transfer of LHAAP land to USFWS. The former LHAAP is now known as the Caddo Lake National Wildlife Refuge. Property comprising LHAAP-12 transferred in May 2018 (USACE, 2006).

All surface water at LHAAP-12 drains into the nearby tributary of Central Creek (approximately two miles downstream of LHAAP-12), which flows into Caddo Lake.

None of the water wells at LHAAP are used for drinking water; they supply water for non-potable uses only. However, the State of Texas considers all groundwater as potential drinking water, unless otherwise classified in accordance with 30 TAC 335.563(h)(1).

6.2.3 HISTORY OF CONTAMINATION

Disposal activities began at LHAAP-12 in 1963, including disposal of industrial solid waste, possibly containing small quantities of hazardous constituents generated at LHAAP. The landfill initially consisted of the upstream end of a diversion ditch traversing the site from Central Creek and one of its principal tributaries. In 1978, it expanded to include a previously undisturbed hillside adjoining the ditch. The last expansion occurred in the early 1980s and included a large area alongside the southeastern margin of the ditch. The landfill was closed in 1994. Waste in the diversion ditch was suspected to be the primary source of contamination at LHAAP-12 (Army, 1995; Army, 2006).

6.2.4 INITIAL RESPONSE

No initial response activities occurred at LHAAP-12.

6.2.5 BASIS FOR TAKING ACTION

The Early Interim Remedial Action was warranted to mitigate the potential risks posed by the low to moderate concentrations of contaminants detected at LHAAP-12, primarily trichloroethene (TCE) and perchlorate and their proximity to Central Creek. The potential exists for groundwater contaminants to pose an unacceptable human health risk to an industrial worker and to discharge to nearby surface water bodies, which could ultimately affect Caddo Lake. The basis for taking action was presence of TCE, *cis*-1,2-dichloroethene (*cis*-1,2-DCE), and vinyl chloride (VC) in groundwater at concentrations posing an unacceptable risk to an industrial worker (Army, 1995; Army, 2006).

6.3 REMEDIAL ACTIONS

6.3.1 REMEDIAL ACTION OBJECTIVES

The 1995 Interim ROD stated the RAOs for LHAAP-12 are to (Army, 1995):

- *Minimize long-term vertical infiltration of water through the landfills; and*
- *Minimize contaminant transport.*

The 2005 FS identified RAO goals (Shaw, 2005):

- *Protect the existing remedy (landfill cap) or prevent exposure to the landfill waste material.*
- *Prevent exposure to contaminated groundwater in excess of the 1 x 10^{-4} to 1 x 10^{-6} target risk range and an HI of 1 for the future maintenance worker, meet groundwater ARARs and prevent potential site groundwater impacts to nearby surface water bodies such that ARARs are met.*

The RAOs as defined in the 2006 ROD are (Army, 2006):

- *Protection of human health by preventing human exposure to TCE contaminated groundwater*
- *Protection of human health and the environment by reducing the leaching and migration of landfill hazardous substances into the groundwater*
- *Protection of human health and the environment by preventing TCE contaminated groundwater from migrating into nearby surface water*

Table 2-11 of the 2006 ROD identifies occurrence, distribution, and selection of chemicals of concern in groundwater. The table below (**Table 7**) presents those chemicals of concern that were flagged "yes," indicating the maximum concentration exceeded the background concentration and the MCL value.

Table 7 – LHAAP-12 Chemicals of Concern

Medium	Chemical of Concern	MCL or MSC Value* (µg/L)
Groundwater	Trichloroethene	5
	cis-1,2-Dichloroethene	70
	Vinyl Chloride	2
	Bis(2-ethylhexyl)phthalate**	6
	Antimony	6
	Cadmium	5
	Perchlorate***	72 (MSC)

Source: Army, 2006; Table 2-11.
µg/L – Micrograms per Liter
MCL – Maximum Contaminant Level
*MSC – Medium Specific Concentration (groundwater-industrial) for groundwater established by TCEQ rules (30TAC§335)
** Bis(2-ethylhexyl)phthalate was detected at low concentrations in only one monitoring well, 12WW01, and was not included in the LHAAP-12 groundwater monitoring program.
***Perchlorate has been removed from the sampling program following three non-detect sampling events.

The 2006 ROD identified TCE is the primary COC at LHAAP-12 (Army, 2006).

6.3.2 REMEDY DESCRIPTION

The 1995 Interim ROD selected a multilayer cap and cover system as the interim remedial action at LHAAP-12 (Army, 1995).

The 2006 ROD selected "*[LUCs] for groundwater use restrictions, maintenance of the existing landfill cap and [LUCs] for protection of the existing landfill cap and monitored natural attenuation*" as the final remedy for LHAAP-12 (Army, 2006).

Monitored natural attenuation (MNA) and LUCs are to remain in place until applicable or relevant and appropriate requirements (ARARs) are met. Groundwater ARARs are expected to be met in 23 to 261 years.

6.3.3 REMEDY IMPLEMENTATION

The interim remedial action began in 1996, prior to the completion of the Remedial Investigation/Feasibility Study and the final ROD. Construction of the multilayer cap and cover system was completed in 1998, fulfilling all requirements of the 1995 Interim ROD. The cap consists of a low permeability cover of a sodium bentonite geocomposite liner placed over a foundation soil layer used to provide proper grading of the landfill surfaces. A second low permeability layer consisting of a geosynthetic membrane liner was placed over the sodium bentonite layer. The cap is topped with a soil cover with adequate slopes and a vegetative cover with perimeter berms and drainage swales to control surface drainage. During cap construction, monitoring wells within the landfill limit were plugged and abandoned (OHM, 1998).

6.3.3.1 Land Use Controls

LUC objectives identified in the ROD prohibit digging or disturbing the existing cover or contents of the landfill; ensure no residential use or residential development of the property; and ensure no withdrawal or use of LHAAP-12 groundwater for other than environmental monitoring or testing. The ROD specified that "*specific LUCs and implantation details will be included in the land use component of the [RD].*" The 2007 Final RD Addendum further defined the LUC objectives at LHAAP-12 to include (Shaw, 2007b):

- Prohibit any activities that would affect the integrity of the cap.
- Prohibit any activities that would cause exposure to contaminated groundwater.

These objectives are met by the presence of a fence and signage surrounding the cap, annual inspection of the cap, and establishment of a LUC boundary to restrict groundwater use. The LUC boundary was surveyed in 2006, defining the area restricting groundwater use to environmental purposes (Landmark Consultants, 2006). The Texas Department of Licensing and Regulation was notified of the groundwater restriction in 2007 (Army, 2007). Physical inspections conducted annually confirm compliance with the above LUC objectives. Findings of annual inspections are recorded in accordance with the Comprehensive LUC Management Plan on inspection and maintenance logs and the Annual LUC Compliance Certification form.

LUCs transferred to the USFWS in 2014, when LHAAP-12 was transferred as part of the Caddo Lake National Wildlife Refuge. The Environmental Protection Provisions included the following land use restrictions (Army, 2013):

Land Use Restrictions and Covenants

A. The United States Department of the Army has undertaken careful environmental study of the Property and concluded that the land use restrictions set forth below are required to ensure protection of human health and the environment. The USFWS, its successors or assigns, shall not undertake nor allow any activity on or use of the property that would violate the land use restrictions contained herein. The land use restriction boundaries have been surveyed and metes and bounds established and recorded in Harrison County Courthouse. A map depicting the land use restriction locations is provided as Figure 2.

(1) Residential Use Restriction. *The USFWS, its successors and assigns, shall use the Property solely for the purpose of a national wildlife refuge consistent with industrial or recreational activities and not for residential purposes. For purposes of this provision, residential use includes, but is not limited to, single family or multi-family residences; child care facilities; and nursing home or assisted living facilities; and any type of educational purpose for children/young adults in grades kindergarten through 12.*

(2) Groundwater Restriction. *USFWS is hereby informed and acknowledges that the groundwater under the Property is contaminated with TCE and other VOCs. The USFWS, its successors and assigns, shall not access or use ground water underlying the Property for any purpose without the prior written approval of U.S. Army, the USEPA and the TCEQ. For the purpose of this restriction, "ground water" shall have the same meaning as in section 101(12) of the [CERCLA]. A [LUC] restricting the use of groundwater has been established for the protection of human health. Prior to transfer, the U.S. Army will record the groundwater use restriction and survey plat at the Harrison County Courthouse. The U.S. Army will also notify the Texas Department of Licensing and Regulation of the groundwater restriction which includes prohibition of water well installation for any purpose other than environmental monitoring and testing without prior approval by the U.S. Army, the USEPA and the TCEQ. The*

LUC will remain in place until [ARARs] as established in accordance with the NCP (40 CFR 300) are met.

(3) ***Landfill Restriction.*** *USFWS is hereby informed and acknowledges that a closed non-hazardous landfill (LHAAP-12) is located on the Property. LUCs have been established to protect the integrity of the remedy. Prior to transfer, the U.S. Army will record the landfill restriction and survey plat at the Harrison County Courthouse. The USFWS, its successors and assigns, shall not conduct or permit others to conduct any activity that would damage the integrity of the landfill cover (i.e. digging or disturbing the existing cover or contents of the landfill). The LUCs will remain in place for perpetuity unless otherwise removed by the U.S. Army per agreement with the USEPA and TCEQ.*

6.3.3.2 Maintenance

In accordance with the 2006 ROD, the Army is responsible for maintaining the existing landfill cap. As defined in the 2007 RD Addendum, this includes (Shaw, 2007b):

- Maintenance of the integrity of the landfill cap and repairs to desiccation cracks, erosion, or gullying upon observance.
- Maintenance of the vegetative cover on the landfill cap, including periodic mowing.
- Maintenance of fence line and signage around the landfill cap.

The landfill cap is inspected annually, though more frequent drive-by inspections are conducted. Inspection includes visual confirmation that the vegetative cover (e.g., grass mowed), fence, and signage are maintained. Inspections also confirm continued compliance of dig restrictions to ensure no digging or disturbance of landfill cover or contents. Repairs are made as needed.

Responsibilities for the above maintenance of LUCs transferred to the USFWS in 2014, when LHAAP-12 was transferred as part of the Caddo Lake National Wildlife Refuge. Because the use of the Caddo Lake National Wildlife Refuge is restricted to recreational use, the requirement for maintenance of the fence line around the landfill cap is no longer necessary. The USFWS is responsible for ensuring there are no activities that would damage the integrity of the landfill cover (i.e. digging or disturbing the existing cover or contents of the landfill). The Army maintains responsibility to ensure the LUC objectives are met to protect the integrity of the selected remedy.

6.3.3.3 Monitored Natural Attenuation

A groundwater monitoring program has been established to (Shaw, 2007):

- Determine the effectiveness of natural attenuation in reducing contaminant concentrations over time.

- Evaluate plume migration to ensure that TCE-contaminated groundwater does not impact nearby surface water.
- Perform trend analysis of groundwater contaminants of concern: TCE, *cis*-1,2-DCE, and vinyl chloride.
- Perform a comparison of contaminants of concern concentration trends relative to the MCLs.

The initial evaluation of MNA occurred quarterly in Years 1 and 2 and has been reduced to annually since Year 3. The current monitoring includes annual groundwater sampling of four on-site monitoring wells (12WW10R, 12WW20, 12WW21, and 12WW24). Monitoring frequency has been adjusted for the two downgradient compliance monitoring wells (12WW22 and 12WW23). Since 2014, the sampling frequency of monitoring well 12WW22 has been changed to once every five years. The next planned sampling event at monitoring well 12WW22 is December 2024. Monitoring well 12WW23 was last sampled in 2016, as recommended by the 2014 Remedial Action Operation Report, due to the distance of the well downgradient from the plume.

6.3.4 Operations, Maintenance and Monitoring

Annual maintenance of the landfill cap, vegetative cover, fencing, and signage around the landfill cap took place in 2018, 2019, 2020, and 2021. The 2022 report was not available for this five-year review. Mowing occurred as needed.

During the July 2018 inspection, the landfill was observed to be in good condition with no excessive cracking, desiccation cracks, or gullying (**Appendix F**). No evidence of animal burrowing was found in the landfill cap. The vegetative cover was found to have four holes that were repaired in February 2019. The vegetative cover was, otherwise, in good condition. Signs were visible around the landfill cap and the fence line was in good repair.

During the July 2019 inspection, the landfill cover was observed to be in good condition. No erosion, cracks, or gullying was found. No evidence of animal burrowing was found in the landfill cap. Mowing took place on July 15, 2019, and the vegetative cover was found to be maintained and in good condition. The fence line and signage were in good repair.

In 2020, mowing was conducted on April 14. The annual inspection took place in December and the vegetative cover was found to be maintained and in good condition. The fence and signage were in good repair. The landfill cap was observed and found to be in good condition with no erosion, cracks, or gullying found. No evidence of animal burrowing was found in the cap.

In 2021, the USFWS conducted a prescribed burn in March 2021 at LHAAP-12. A physical inspection of the LHAAP-12 landfill cap and well field occurred following the burn on March 23, 2021. Observation of the remaining vegetation indicated no bare spots or areas lacking vegetative cover. The landfill cover appeared in good condition and well maintained with no excessive cracking or desiccation cracks. Small trees observed to be growing on the landfill in January 2022 were manually removed in late April 2022. No

change in land or groundwater use was observed at the site, and the use of the site is consistent with the LUCs mandated by the ROD. Signs were all visible around the landfill. No damage to bollards, pads, or protective casings was observed, and minimal encroachment of weeds or brush on the well pads was observed. Well head locks continue to be in good condition.

Monitoring wells, including those that are not part of the sampling program, are gauged annually for groundwater elevation data. Monitoring wells 12WW21, 12WW22, and 12WW23 had screen siltation of 17 to 18 percent. Wells 12WW22 and 12WW23 were only used for groundwater gauging during the December 2021 sampling event, and the level of siltation observed is unlikely to have impacted the groundwater elevation measurements. Monitoring well 12WW23 was redeveloped in October 2021; the redevelopment did not change the total depth measurement of the well. Monitoring well 12WW21 was redeveloped prior to the 2022 sampling event. The remaining wells were in good condition with no evidence of turbidity or silt accumulation.

6.4 PROGRESS SINCE THE FOURTH FIVE-YEAR REVIEW

The following presents the protectiveness statement from the Fourth Five-Year Review Report for LHAAP-12 (USACE, 2019):

The LHAAP-12 remedy currently protects human health and the environment because the landfill cap is well maintained, LUCs are in place and long-term monitoring occurs. However, in order for the remedy to be protective in the long-term, the following action needs to be taken to ensure protectiveness: Establish a well network that captures seasonal and spatial variations in COC-impacted groundwater flow direction, by adding a well to the southeast.

Table 8 lists the LHAAP-12 issues and corresponding recommendations affecting protectiveness identified in the Fourth Five-Year Review and the summary of completion. **Table 9** lists the LHAAP-12 findings and corresponding recommendations not affecting protectiveness from the Fourth Five-Year Review and the summary of completion.

Table 8 – LHAAP-12 Issues/Recommendations from the Fourth Five-Year Review

Issues from Previous Review	Recommendations from Previous Review	Action Taken	Date of Action
Changes in groundwater flow direction result in contaminant migration outside the current MNA monitoring network.	*Establish a well network that captures seasonal and spatial variations in COC-impacted groundwater flow direction, by adding well to the southeast.*	Monitoring well 12WW10R was installed on August 9, 2019, in response to the recommendation from the previous Five-Year Review to define the plume to the east, downgradient of monitoring well 12WW24. 12WW10R was included in the December 2019 sampling event.	August 2019

Table 9 – LHAAP-12 Finding/Recommendation from the Fourth Five-Year Review Not Affecting Protectiveness

Finding from Previous Review	Recommendation from Previous Review	Action Taken	Date of Action
N/A	*Identify the coordinates and dimensions of settlement, burrows, and minor erosion on the annual report's maps to allow problem identification.*	This information is not collected as part of the current inspection and monitoring program.	Not Complete
N/A	*Verify well 12WW22 top of casing relative to surface water elevation. If near or under water may limit access or potentially compromise water quality results. Modify or abandon 12WW22.*	No issues were noted regarding the top of casing elevation (190.2 feet) in relation to the surface water elevation of Central Creek. According to the State of Texas Water Development Board Groundwater Database, the land elevation in the vicinity of well 12WW22 ranges between 186 to 189 feet. The surface water elevation is below that. Unrelated to the recommendation, monitoring well 12WW22	Planned for 2024

Finding from Previous Review	Recommendation from Previous Review	Action Taken	Date of Action
		will be evaluated to confirm whether siltation greater than ten percent is present and will be redeveloped prior to the 2024 sampling event if siltation is greater than ten percent.	

6.4.1 PFAS Preliminary Assessment/Site Investigation

Landfill 12 was identified as an area of potential interest during the LHAAP 2023 PFAS PA/SI following records research, personnel interviews, and site reconnaissance due to historical disposal of potentially PFAS-containing wastewater. Groundwater samples were collected from three existing monitoring wells at LHAAP-12. PFOA was detected at a concentration greater than the OSD Risk Screening Level of 6 ng/L at concentrations of 17 ng/L and 10 ng/L in two groundwater samples and at a level below the OSD Risk Screening Level at a concentration of 3.8 ng/L in one groundwater sample. PFOS, PFBS, PFNA, and PFHxS were not detected in any of the groundwater samples collected. Due to the detections above OSD Risk Screening Levels, Army is going to initiate an RI to further study PFAS at Landfill 12.

6.5 DATA REVIEW

For this review, data were available for 2018, 2019, 2020, and 2021 annual groundwater monitoring events with each occurring during the month of December. Groundwater samples were analyzed for VOCs from monitoring wells 12WW10R, 12WW20, 12WW21, and 12WW24 (**Figure 12**). The monitoring program does not include all COCs identified in the ROD (see Table 7); namely, antimony and cadmium have been excluded from the monitoring program. Bis(2-ethylhexyl)phthalate was detected at low concentrations in only one monitoring well, 12WW01, and was not included in the LHAAP-12 groundwater monitoring program. Perchlorate was removed from the sampling program following three non-detect sampling events.

Consistent with the previous Five-Year Review, monitoring well 12WW24 is the only well with detectable concentrations of TCE. TCE concentrations have continued to decrease year to year: 48 µg/L (2018), 19 µg/L (2019), 15 µg/L (2020), and 5.5 µg/L (2021) (**Appendix E, Table E.5**). Since 2006, TCE concentrations show a statistically significant decreasing trend at monitoring well 12WW24. Groundwater elevations have been steadily increasing since 2013, potentially contributing to dilution of TCE at monitoring well 12WW24. Previous increases in concentration, in 2013 and 2015, occurred following drought conditions.

During the most recent monitoring event (2021), concentrations of all other detected VOCs were below MCLs, including *cis*-1,2-DCE (**Figure 13**). Vinyl chloride was not detected. Groundwater elevations have been consistent, with a slight increase in groundwater elevation from 180.3 feet above mean sea level (amsl) (2018) to 182.9 feet amsl (2021) (**Figure 14**; **Appendix E, Table E.6**).

Monitoring well 12WW10R, installed to delineate the plume in accordance with the recommendation of the previous Five-Year Review, did not contain detectable COC concentrations. Other monitoring wells in the source area also did not contain detectable COC concentrations, indicating the plume is delineated at monitoring well 12WW24 (**Figure 15, Appendix E, Table E.7**).

Downgradient monitoring well 12WW22 is gauged during each monitoring event, but, since 2014, is sampled every five years in accordance with the recommendation in the 2014 Remedial Action Operation Report. There were no detections of any VOCs in groundwater from monitoring well 12WW22 in 2019. The next planned sampling event at monitoring well 12WW22 is December 2024.

Statistically significant increasing or decreasing Mann-Kendall analysis trends are indicated by confidence levels above 95%. Mann-Kendall analysis is conducted as part of the monitoring program. TCE concentrations in groundwater from monitoring well 12WW24 show a statistically significant decreasing trend since 2006 based on Mann-Kendall analysis (**Appendix E, Table E.8**).

6.6 SITE INSPECTION

The Five-Year Review site inspection confirmed LUCs prohibit groundwater use and land use remains non-residential. There were no violations of LUCs, nor evidence of prohibited use of groundwater observed during the site inspection.

At the LHAAP-12 boundary, fencing was damaged in multiple locations (see photographs 59, 60, 63, 66 and 67 in **Appendix C**). The gate was unlocked and appeared non-functioning (see photograph 59 in **Appendix C**). Signs were obscured or removed from fencing in multiple locations (see photographs 60, 62, and 63 in **Appendix C**).

The existing vegetation and soil cover was observed to have small areas of depressions/settlement and holes that did not extend into the cap (see photographs 69, 70, and 71 in **Appendix C**). These will be addressed as maintenance activities by the current LTM contractor.

All monitoring wells were observed to be in good condition.

6.7 TECHNICAL ASSESSMENT

6.7.1 QUESTION A – IS THE REMEDY FUNCTIONING AS INTENDED BY THE DECISION DOCUMENTS?

Yes, the remedy for LHAAP-12 is functioning as intended by the 2006 ROD. LUCs are in place to prevent human exposure to contaminated groundwater and to prevent residential use of the property. The landfill cap continues to reduce leaching and migration of landfill hazardous substances into groundwater as observed by no increases in COC concentrations in groundwater during annual groundwater monitoring. Groundwater monitoring indicate TCE contaminated groundwater is not migrating toward nearby surface water. TCE concentrations continue to be localized at monitoring well 12WW24 with most recent concentrations in groundwater only slightly exceeding the MCL. There have been no detections of TCE in downgradient monitoring wells. The current monitoring program does not include antimony and cadmium, which were identified as COCs in the ROD. Both metals had low frequencies of detection but did have maximum concentrations that exceeded background concentrations and their respective MCLs.

The 2006 ROD LUC objective is to “prohibit digging or disturbing the existing cover or contents of the landfill.” The 2007 RD identified “maintenance of fence line and signage around landfill cap” as a LUC to be implemented at LHAAP-12. This responsibility transferred to USFWS in 2014. At the LHAAP-12 boundary, fencing was damaged in multiple locations during the Five-Year Review site inspection. Signs were obscured by excessive vegetation or removed from fencing in multiple locations. The existing landfill cap was observed to have small areas of depressions/settlement and holes. Because the use of the Caddo Lake National Wildlife Refuge is restricted to recreational use, the requirement for maintenance of the fence line around the landfill cap is likely no longer necessary. The USFWS is responsible for ensuring there are no activities that would damage the integrity of the landfill cover (i.e. digging or disturbing the existing cover or contents of the landfill).

6.7.2 QUESTION B – ARE THE EXPOSURE ASSUMPTIONS, TOXICITY DATA, CLEANUP LEVELS, AND REMEDIAL ACTION OBJECTIVES USED AT THE TIME OF THE REMEDY SELECTION STILL VALID?

Yes, the toxicity data and cleanup levels are still valid. There have been no changes to land use and there is no unauthorized use of groundwater at LHAAP-12. There have been no changes to COC MCL levels. The remedy is progressing toward achievement of the RAOs and is supported by the current groundwater monitoring program. Maintenance of the multilayer cap and cover system prevents exposure to landfill contents.

The exposure assumptions used at the time of the remedy are no longer valid. A 2023 PFAS PA/SI revealed concentrations of PFOA above the OSD Risk Screening Level. PFOA concentrations were detected at 17 ng/L and 10 ng/L, exceeding the 6 ng/L OSD Risk Screening Level. Army is initiating an RI that will include Landfill 12. Currently, the extent of the PFOA in groundwater is unknown however, there are LUC restrictions on

groundwater use at LHAAP-12 that will prevent exposure to PFAS-contaminated groundwater.

6.7.3 QUESTION C – HAS ANY OTHER INFORMATION COME TO LIGHT THAT COULD CALL INTO QUESTION THE PROTECTIVENESS OF THE REMEDY?

No other information has come to light that calls into question the protectiveness or performance of the remedy.

6.7.4 TECHNICAL ASSESSMENT SUMMARY

The remedy for LHAAP-12 is functioning as intended by the 2006 ROD. LUCs are in place to prevent human exposure to contaminated groundwater and to prevent residential use of the property. The landfill cap continues to reduce leaching and migration of landfill hazardous substances into groundwater as observed by no increases in COC concentrations in groundwater during annual groundwater monitoring. Groundwater monitoring indicate TCE contaminated groundwater is not migrating toward nearby surface water.

6.8 ISSUES

No issues were identified during this Five-Year Review that prevent the remedy from being protective now or in the future.

6.9 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

No recommendations are required since there were no issues identified during this Five-Year Review that affect current or future protectiveness of the remedy.

6.9.1 OTHER FINDINGS

The following Other Findings do not affect protectiveness:

- At the LHAAP-12 boundary, fencing and signage was damaged in multiple locations during the Five-Year Review site inspection. Because the use of the Caddo Lake National Wildlife Refuge is restricted to recreational use, the requirement for maintenance of the fence line around the landfill cap is likely no longer necessary. The USFWS is responsible for ensuring there are no activities that would damage the integrity of the landfill cover (i.e. digging or disturbing the existing cover or contents of the landfill). It is recommended that Army discuss with USFWS and prepare a memorandum to file to remove the maintenance of the fence and signage as a requirement for compliance with LUCs.
- The current monitoring program does not include antimony and cadmium, which were identified as COCs in the ROD. Both metals had low frequencies of detection but did have maximum concentrations that exceeded background concentrations and their respective MCLs. Army should consider evaluating if antimony and cadmium remain chemicals of concern posing an unacceptable risk for future

receptors at LHAAP-12 and if they should be included in the groundwater monitoring program.

6.10 PROTECTIVENESS STATEMENT

The remedy at LHAAP-12 is protective of human health and the environment. LUCs are in place to prevent human exposure to contaminated groundwater and to prevent residential use of the property. The extent of PFAS contamination at Landfill 12 is not yet known, but LUCs prevent exposure to PFAS-contaminated groundwater. The landfill cap continues to reduce leaching and migration of landfill hazardous substances into groundwater as observed by no increases in COC concentrations in groundwater during annual groundwater monitoring. Groundwater monitoring results indicate TCE contaminated groundwater is not migrating toward nearby surface water.

7.0 LHAAP-16 OLD LANDFILL

7.1 SITE CHRONOLOGY

Important events and relevant dates for LHAAP-16 are presented below in **Table 10**.

Table 10 – LHAAP-16 Chronology

Event	Date
LHAAP-016 Landfill Operations	1940s-1980s
Groundwater Wells Installed and Sampled	1980
Contamination Survey	1982
Soil, Groundwater, Surface Water, and Sediment Samples Collected	1987
Multi-Phase Investigation of LHAAP-016	1993-1999
Final Phase 2 Work Plan	1994
Final Work Plan Landfill Caps Remedial Design investigations	1994
Contamination Analysis Report	1995
Groundwater Background Concentration Report	1995
Record of Decision for Early Interim Remedial Action at LHAAP 12 and 16 Landfills	September 27, 1995
Groundwater Extraction System Installed	1996 and 1997
Early Interim Remedial Action Implemented	1996-1998
Final Workplan Site 16 Old Landfill Groundwater Control System	1996
Landfill Cap Constructed	1998
Surface Water Monitoring	1999-Present
Remedial Investigation and Feasibility Study	2000
Human Health and Ecological Risk Assessment	2001
First Five-Year Review Report	August 13, 2002
In Situ Bioremediation ESTCP Pilot Study	2004-2006
Installation and Sampling of Wells near Harrison Bayou	2007
Baseline Ecological Risk Assessment	2007
Second Five-Year Review	September 24, 2008
Sampling and Analysis for Metals, Perchlorates, and Volatile Organic Compounds	2009
Feasibility Study Addendum	March 2010
Proposed Plan	September 2010

Event	Date
Dispute Resolution	2011 – 2014
Third Five-Year Review	May 15, 2014
Final Record of Decision LHAAP-016	August 16, 2016
Remedial Design	2017
Fourth Five-Year Review	May 15, 2019
Remedial Action Completion Report	April 2021
Remedial Action Operation	2021 – Present

LHAAP – Longhorn Army Ammunition Plant

7.2 BACKGROUND

7.2.1 PHYSICAL CHARACTERISTICS

LHAAP-16, encompassing approximately 22 acres with 13 acres being covered by a landfill cap, is in the south-central portion of LHAAP (**Figure 16**). LHAAP-16 is relatively flat with the land becoming steeper along the northeastern border. Along the northeastern edge runs the Harrison Bayou (Shaw, 2016a).

7.2.2 LAND AND RESOURCE USE

The reasonably anticipated future land use is a national wildlife refuge. The 2004 MOA between USFWS and the Army documents the transfer of LHAAP land to USFWS. The former LHAAP is now known as the Caddo Lake National Wildlife Refuge. LHAAP-16 will be transferred under this agreement in the future (Shaw, 2016a).

There are no bodies of water at LHAAP-16. All surface water drains through ditches and gullies toward Harrison Bayou along the northeastern edge of LHAAP-16, which flows into Caddo Lake.

None of the water wells at LHAAP are used for drinking water; they supply water for non-potable uses only. However, the State of Texas considers all groundwater as potential drinking water, unless otherwise classified in accordance with 30 TAC 335.563(h)(1). .

7.2.3 HISTORY OF CONTAMINATION

LHAAP-16, an unlined landfill used for the disposal of solid and industrial waste, operated from the 1940s to the 1980s. Known landfill contents include TNT wastewater ash, substandard TNT, barrels of chemicals, oil, paint, scrap iron, containers, scrap metal, wood, and various other items. Though there is little documentation, burn pits and waste storage were reported to be common at LHAAP-16 (Shaw, 2016a).

7.2.4 Initial Response

In 1996 and 1997, a groundwater extraction system was installed as a treatability study to prevent the groundwater plume from migrating to Harrison Bayou (Army, 2016). The extraction system operated intermittently from 1996 through September 27, 2019. Extraction was terminated during the implementation of the remedy documented in the 2016 ROD (Bhate-Aptim, 2021).

7.2.5 Basis for Taking Action

The major groundwater COCs for LHAAP-16 identified in the FS are TCE, *cis*-1,2-DCE, vinyl chloride, and perchlorate in the shallow and intermediate groundwater. Remedial action is necessary to mitigate potential risks posed by buried source materials and to address the potential for human health risks in the unlikely event there is an attempt to use groundwater as a potable water source (Army, 1995; Army, 2016).

7.3 REMEDIAL ACTIONS

7.3.1 Remedial Action Objectives

The 1995 Interim ROD stated the RAOs for LHAAP-16 are to (Army, 1995):

- *Minimize long-term vertical infiltration of water through the landfills; and*
- *Minimize contaminant transport.*

The RAOs as defined in the 2016 ROD are (Army, 2016):

- *Protection of human health and the environment by preventing exposure to landfill contents*
- *Protection of human health and the environment by reducing leaching and migration of landfill hazardous substances into the groundwater*
- *Protection of human health by preventing human exposure to the contaminated groundwater*
- *Protection of human health and the environment by preventing COCs and COC byproducts from migrating into Harrison Bayou at levels that cause surface water in Harrison Bayou to exceed surface water criteria.*
- *Return of groundwater to its potential beneficial uses as drinking water, wherever practicable*

MCLs have been identified as cleanup levels for each of the COCs except for perchlorate, manganese, and nickel, which are based on TRRP Tier 1 Groundwater Residential PCLs (**Table 11**) (Army, 2016).

Table 11 – LHAAP-16 Groundwater and Surface Water Cleanup Levels

Contaminant of Concern	Remediation Goal (µg/L)*
Maximum Contaminant Level	
Trichloroethene	5
cis-1,2-Dichloroethene	70
1,1 - Dichloroethene	7
1,2-dichloroethane	5
Vinyl Chloride	2
1,1,2-Trichloroethane	5
Methylene Chloride	5
Chromium	100
Arsenic	10
Thallium	2
TRRP Tier 1 Groundwater Residential Protective Concentration Level	
Nickel	490
Perchlorate	17
Manganese	7,820**

µg/L – Micrograms per liter
* U.S. Army, 2016; Table 2-7.
** 95% UTL value from Final Evaluation of Perimeter Well Data for Use as Groundwater Background (Shaw, 2007) for Manganese is 7,820 µg/L, which is above the TRRP Tier 1 Groundwater Residential PCL(1,100 µg/L), thus the background value will be considered the Cleanup Level for Manganese

7.3.2 REMEDY DESCRIPTION

The 1995 Interim ROD selected a multilayer cap and cover system as the interim remedial action at LHAAP-16 (Army, 1995).

The 2016 ROD selected *"Alternative 7, capping, LUCs, in situ enhanced bioremediation in a target area, biobarriers, and MNA"* as the remedy for LHAAP-16 (Army, 2016).

MNA and LUCs are to remain in place until ARARs are met, which is expected to be in approximately 280 years.

7.3.3 REMEDY IMPLEMENTATION

During implementation of the interim remedial action, approximately 35,840 cubic yards of treated soil from LHAAP-18/24 Thermal Desorbers and 10,581 cubic yards of imported clay were placed at LHAAP-16 as a grading layer of the cap. Construction of the cap was completed in 1999 and included a low permeability cover of a sodium bentonite geocomposite liner with a second low permeability layer consisting of a geosynthetic

membrane liner placed over the sodium bentonite layer. The cap is topped with a soil cover with adequate slopes and a vegetative cover with perimeter berms and drainage swales to control surface drainage. Finalization of the interim remedial action included a fence with barbed wire and warning signs placed around the landfill (OHM, 1998; Shaw, 2008; Green and Marr, 1990).

The 2021 RACR summarized the implementation of the remedy selected in the 2016 ROD (Bhate-Aptim, 2016).

7.3.3.1 Maintenance

In accordance with the 2016 ROD, the Army is responsible for maintaining the existing landfill cap. Maintenance activities are identified through inspection of the cover surface, vegetation, animal burrows, erosion and drainage system, and access features including fences, gates, and signs. Inspections are recorded on inspection and maintenance logs and Annual LUC Compliance Inspection Documentation and Form. These are all documented and included in the Comprehensive LUC Management Plan.

7.3.3.2 Land Use Controls

LUCs at LHAAP-16 include (Bhate-Aptim, 2021):

- Prohibit intrusive activities (e.g., digging) within the landfill boundary.
- Prohibit groundwater use until COCs in surface and subsurface soil and groundwater are reduced to levels that allow UU/UE.
- Prohibit residential use until COCs in surface and subsurface soil and groundwater are reduced to levels that allow UU/UE.
- Maintain the integrity of any current or future remedial or monitoring system.

Army provided the initial notice of the LUCs and preliminary boundaries on December 8, 2016, to federal, state, and local officials including Senators and Congressman, State Representatives, the Harrison County Judge, the City of Uncertain Mayor, and Caddo Lake and Leigh Water Supply Corporations' Presidents and Boards of Directors, as well as the Caddo Lake National Wildlife Refuge manager, the future transferee of the property. Final notification to federal, state, and local officials and to the Texas Department of Licensing and Regulation (Water Well Drillers and Pump Installers Section) occurred on February 23, 2021, showing the area covered by the final groundwater use restriction LUCs (**Figure 17**) and can be found in the Comprehensive Land Use Control Management Plan. The Notice of Land Use Controls, including a description of the LUCs, the Survey Plat and Legal Description of the parcel subject to the LUCs was recorded in Harrison County on March 22, 2021 (Bhate-Aptim, 2021).

Implementation of the LUC Management Plan includes annual inspections that are recorded on the Inspection and Maintenance Checklist and the Land Use Control Compliance Certification Form.

7.3.3.3 In Situ Bioremediation and Biobarriers

The remedy included ISB in the most contaminated portion of the shallow and intermediate groundwater zones, in conjunction with the phased shut down of the existing groundwater extraction system. From September to December 2019, the following six ISB systems were installed at LHAAP-16 (Bhate-Aptim, 2021):

- A "Bayou Biobarrier" in the shallow groundwater zone northeast of the Mid-Plume area near Harrison Bayou.
- A bio grid in the shallow groundwater zone in the Mid-Plume Area.
- A biobarrier in the intermediate groundwater zone in the Mid-Plume Area.
- Landfill Biobarrier #1 in the shallow groundwater zone southwest of the Mid-Plume area and adjacent to the landfill.
- Landfill Biobarrier #2 in the shallow groundwater zone west of the Mid-Plume area and adjacent to the landfill at the location of the past Semi-Passive Biobarrier Demonstration.
- Landfill Biobarrier #3 in the shallow groundwater zone west of the Mid-Plume area and adjacent to the landfill and immediately north of Landfill Biobarrier #2.

The locations of the systems are presented in **Figure 18** and details of the biobarriers, bio grid, and ISB injection system are presented in **Figures 19** through **25**.

The primary injection components were the carbon source and APTIM's dechlorinating microbial consortium (SDC-9™). The same carbon source (an EVO product known as Electron Donor Solution Extended Release [EDS-ER™] from Tersus Environmental, LLC) was used for the injection mixtures at all ISB areas except for the Bayou Biobarrier. EDS-ER™ was supplied as a water mixable oil that contains no water; therefore, it was mixed with water in the field to generate the applicable volumes for each barrier in accordance with the RAWP (Bhate, 2018). At the Bayou Biobarrier, an amendment mixture referred to as ABC+™ (comprised of microscale zero valent iron [ZVI] and a carbon source [ABC™]) was used instead of EDS-ER™. ZVI was added to the injectate solution at the Bayou Biobarrier to supplement the other amendments and accelerate degradation of the site COCs. The volume of amendment mixtures injected at each area and the targeted injection intervals are provided in **Table 12** (Bhate, 2021).

Table 12 – LHAAP-16 ISB Amendment Mixtures

Area	Total Vol. (gal)	Water (gal)	Carbon Source			SDC-9™ (gal)	ZVI (lbs)	Sodium Bromide (lbs)
			Product	Mass (lbs)	Vol. (gal)			
Bayou Biobarrier	3,794	3,366	ABC™	3,500	427	1.32	3,500	15.4
Mid Plume Shallow Zone Biogrid	41,627	37,467	EDS-ER™	28,414	4,107	53.10	0	171.6
Mid Plume Intermediate Zone Biobarrier	23,585	21,173	EDS-ER™	16,565	2,394	17.70	0	99.0
Landfill Biobarrier #1	7,241	6,510	EDS-ER™	5,041	729	1.59	0	30.4
Landfill Biobarrier #2	5,302	4,781	EDS-ER™	3,594	520	1.06	0	11.0
Landfill Biobarrier #3	3,377	3,039	EDS-ER™	2,333	337	0.79	0	13.2

ABC™ - Anaerobic Biochem
EDS-ER™ – Electron Donor Solution – Extended Release
gal – Gallons
lbs – Pounds
SDC-9™ – dechlorinating microbial consortium
Vol. – Volume
ZVI – Zero Valent Iron

7.3.3.4 Performance Monitoring

Pre-remedy sampling of groundwater occurred in 2018 and 2019 to characterize the VOC and perchlorate concentrations and geochemical conditions that existed prior to the ISB injections. Groundwater sampling occurred at 29 shallow wells (25 sampled in October 2018 and 16 sampled in September 2019) and 19 intermediate wells (15 sampled in October 2018 and 12 sampled in September 2019). Surface water sampling occurred at three locations in Harrison Bayou. The pre-remedy sampling results provide a baseline for comparison against performance monitoring results (Bhate-Aptim, 2021).

Quarterly performance monitoring is required for 2 years (Year 1 and Year 2) following the implementation of ISB. The objectives of the monitoring program are to confirm the remedies:

- Achieve and maintain plume stability as measured by concentrations decreasing in most performance wells relative to the baseline and/or historical concentrations.
- Achieve and maintain geochemical conditions conducive to natural attenuation of COCs in the shallow and intermediate groundwater zones based on evaluation of biodegradation screening scores using EPA guidance.

- Demonstrate MNA processes are occurring using attenuation rate calculations, increases in COC degradation product concentrations, and microbial culture counts.

Based on the remedial design, the average groundwater seepage velocities through the treatment zone are 0.11 feet per day or 38.8 feet per year. For most downgradient wells in the performance monitoring network, impacts from the injections would not appear until after Year 1 post-injection. And due to fluctuating groundwater elevations (**Figure 26** and **Figure 27**) and flow directions, the radius of influence for each injection location would be variable, making evaluation of the performance of each biobarrier difficult based on the proposed performance monitoring well network.

The EVO injections were presumed to last for 3 to 5 years; however, the following criteria were established to determine if additional injections are required:

- Depletion of total organic carbon to below 20 mg/L
- ORP increase above -50 millivolts (mV)
- Contaminant concentrations in groundwater performance wells for the landfill biobarriers and in surface water for the Bayou Biobarrier remain above cleanup standards.

If these conditions occur, reinjections are proposed to occur in the areas that meet the above criteria as a contingency to the remedy. **Appendix E, Tables E.10** through **E.14** present the performance monitoring plan.

7.3.3.5 Monitored Natural Attenuation

The remedy is currently not in the MNA LTM phase. After two years of quarterly performance monitoring, MNA will be evaluated in the shallow and intermediate groundwater zones outside the active treatment areas. The wells and analyses selected for MNA evaluation are specified in **Appendix E, Table E.15**.

The ROD specified that monitoring for metals (chromium, arsenic, nickel and/or manganese) will be evaluated at the first Five-Year Review to determine if any further monitoring for metals is warranted (Army, 2016). Metals sampling occurred in June and July 2022.

7.3.4 Operations, Maintenance and Monitoring

An annual inspection of LUCs occurred on October 8, 2020, and did not observe any unauthorized activities or uses. The inspection and maintenance checklist noted no cracks, ponded water, or damaged areas to the landfill cap. There were no signs of stressed/dead vegetation, deep-rooted plants, bare spots, or animal burrows.

Well inspections occurred prior to each monitoring event. No damage to bollards, well pads or protective casings was observed and minimal encroachment of weeds or brush

on the well pads was observed. Area mowing and clearing around the wells was conducted on an as-needed basis prior to sampling events.

Monitoring wells 16EW07, 16EW08, 16WW13, 16WW14, 16WW37, 16WW42 had screen siltation of 11.2 to 38.6 percent during the January/February 2021 RA-O sampling event. The July 2021 RA-O event confirmed siltation more than 10 percent at monitoring wells 16EW07, 16EW08, 16WW13, and 16WW37. Monitoring wells 16WW14 and 16WW42 were not silted more than 10 percent during the July 2021 RA-O event. The RA-O contractor planned to redevelop monitoring wells 16EW07, 16EW08, 16WW13, and 16WW37 prior to the next quarterly sampling event.

Year 1 and Year 2 quarterly sampling occurred March 2020 through July 2022 to determine geochemical conditions, VOC concentrations, and perchlorate concentrations and to determine the performance of the ISB. Year 1 and Year 2 sampling results are analyzed in **Section 7.5**, below. Surface water monitoring was also conducted during quarterly performance monitoring to ensure concentrations did not exceed surface water standards for contaminants (Bhate-Aptim, 2022). The performance monitoring requirements for each treatment area and surface water are identified in **Appendix E, Tables E.10** through **E.14**.

7.4 PROGRESS SINCE THE FOURTH FIVE-YEAR REVIEW

The following presents the protectiveness statement presented in the Fourth Five-Year Review Report for LHAAP-16 (USACE, 2019):

The interim remedy at LHAAP-16 currently protects human health and the environment because the landfill cap prevents unacceptable exposure to landfill contents, and the cap minimizes vertical infiltration of water through the landfill and augmented by the treatability study extraction system, minimizes contaminant transport. However, in order for the remedy to be protective in the long-term, the following actions need to be taken to ensure protectiveness: Implement the remedy selected in the 2016 ROD, consisting of landfill cap maintenance and repair, in situ enhanced bioremediation, biobarriers, MNA, and LUCs. The multi-layer landfill cap is in place, regularly inspected, and maintained, thereby ensuring no unacceptable exposure.

Table 13 lists the LHAAP-16 issues and corresponding recommendations affecting protectiveness identified in the Fourth Five-Year Review and the summary of completion. **Table 14** lists the LHAAP-16 findings and corresponding recommendations not affecting protectiveness from the Fourth Five-Year Review and the summary of completion.

7.4.1 PFAS PRELIMINARY ASSESSMENT/SITE INSPECTION

Landfill 16 was identified as an area of potential interest during the LHAAP 2023 PFAS PA/SI following records research, personnel interviews, and site reconnaissance due to historical disposal of potentially PFAS-containing wastewater. Groundwater samples were obtained from three existing monitoring wells at LHAAP-16. PFOA was detected in two samples at concentrations above the OSD Risk Screening Level of 6 ng/L at 620

mg/L and 95 ng/L. One sample had a concentration of PFOA below the OSD Risk Screening Level at a concentration of 2.1 ng/L. PFOS was detected at a concentration greater than the OSD Risk Screening Level of 4 ng/L in one groundwater sample at a concentration of 8.2 ng/L. PFBS and PFNA were not detected in any of the groundwater samples collected. PFHxS was detected in one groundwater sample at a concentration below the OSD Risk Screening Level of 39 ng/L at a concentration of 4.6 ng/L. Due to the detections above OSD Risk Screening Levels, Army is going to initiate an RI to further study PFAS at Landfill 16.

Table 13 – LHAAP-16 Issues/Recommendations from the Fourth Five-Year Review

Issues from Previous Review	Recommendations from Previous Review	Action Taken	Date of Action
Relatively high concentrations of TCE persist downgradient of the cap, suggesting that a continuing source may be present.	*Implement the remedy selected in the 2016 ROD, consisting of landfill cap maintenance and repair, in situ enhanced bioremediation, biobarriers, MNA, and LUCs.*	According to the 2021 Remedial Action Completion Report, landfill cap maintenance and repair, in situ enhanced bioremediation, biobarriers, MNA, and LUCs have been implemented.	September 2019

Table 14 – LHAAP-16 Finding/Recommendation from the Fourth Five-Year Review Not Affecting Protectiveness

Finding from Previous Review	Recommendation from Previous Review	Action Taken	Date of Action
Landfill cap inspection results are not located on site inspection maps, so trends in minor maintenance problems cannot be evaluated and addressed before becoming costly issues later.	*Require all observations noted on the Site Inspection Form to be located on current imagery (e.g., Google Earth).*	None.	None
N/A	*The perimeter fence that holds the signs needs to be mended in one place, and the overgrown southwestern part of the fence cut back to show warning signs and reduce fence maintenance costs.*	The date of repair of the fence and signs is unknown. The October 8, 2020 inspection and maintenance checklist noted no damage to the fence and no missing signage.	Unknown

Finding from Previous Review	Recommendation from Previous Review	Action Taken	Date of Action
A potentially orphan monitoring well with a rusted protective casing is located near the 16WW14/15/20 cluster.	*Assess and repair or abandon well as needed.*	Unknown	Unknown

7.5 DATA REVIEW

For this review, data were available for Years 1 and 2 of the RA-O (March 2020 to June/July 2022). Groundwater samples were analyzed in accordance with the ISB performance monitoring plan (**Appendix E, Tables E.10 to E.14**).

7.5.1 LANDFILL BIOBARRIER #1 PERFORMANCE MONITORING

The performance monitoring program for Landfill Biobarrier #1 includes two upgradient wells for monitoring influent concentrations (16RW01 and 16RW02), four downgradient wells for monitoring effluent concentrations and biobarrier effectiveness (16RW04, 16RW05, 16WW26, and 16WW42), and one well within the biobarrier (16IW09). **Table 15** presents quarterly sampling results for VOCs that exceeded MCLs in upgradient wells and the monitoring wells located approximately downgradient from them (**Figure 19**). Monitoring well 16IW09 (biobarrier well) is located between upgradient monitoring well 16RW02 and downgradient monitoring well 16RW05.

Table 15 – Landfill Biobarrier #1 Performance Monitoring Sampling Results Years 1 and 2

Well ID	16RW01	16RW04	16WW26	16RW02	16IW09	16RW05	16WW42
TCE (5 µg/L)							
Mar-20	**3,300**	NS	NS	2.3	ND	3	NS
Jul-20	**4,200**	**3,500**	**490**	4.8	ND	ND	1.3
Oct-20	**4,000**	**3,600**	**850**	**6.7**	**5.8**	0.89J	3.2
Jan-21	**2,900**	**2,800**	**1,000**	1.9	1	ND	0.59J
Apr-21	**3,000**	**1,100**	**130**	3.1	0.62J	0.52J	0.97J
Jul-21	**2,300**	**1,200**	**26**	2.1	3.8	1.1	1.1
Oct-21	**2,200**	**1,600**	**500**	2.7	0.99	ND	**180**
Jan-22	**1,200**	**970**	**440**	2.7	ND	0.81	**190**
Jul-22	**2,100**	**2,500**	**1,100**	NS	ND	ND	**850**
***cis*-1,2-DCE (70 µg/L)**							
Mar-20	**120**	NS	NS	ND	ND	7.8	NS
Jul-20	**150**	**150**	**78**	ND	ND	8	24
Oct-20	**120**	**140**	54	ND	ND	9.3	**180**

Jan-21	**120**	**130**	8.7	ND	ND	1.5	**98**
Apr-21	**130**	62	3.7	ND	ND	ND	66
Jul-21	**84**	**80**	36	ND	ND	0.69J	67
Oct-21	**81**	**88**	44	ND	ND	ND	**980**
Jan-22	64	66	41	ND	ND	0.86J	**1,200**
Jul-22	**87**	**130**	**110**	NS	3.8	0.61	**1,400**

Green = Upgradient of the biobarrier
Blue = Downgradient of biobarrier
Purple = In biobarrier
Bold = concentration exceeds MCL

TCE concentrations exhibited a decreasing trend at downgradient well 16RW04 until July 2022 when concentrations rebounded. Groundwater elevation data for the June/July 2022 monitoring event were not available for the Five-Year Review. There is no trend for concentrations of *cis*-1,2-DCE in wells downgradient of Landfill Biobarrier #1.

Year 2 field measurements and general chemistry parameters taken from monitoring wells 16WW26 and 16WW42 indicate conditions are not favorable for reductive dechlorination. At downgradient monitoring well 16WW26, TOC was consistently below 20 mg/L, DO was greater than 0.5 mg/L, sulfate ranged from 341 to 372 mg/L, there were no increases in ethane, ethene, or methane concentrations, pH was consistently below 6, and ORP ranged from 155 to 243 mV.

Groundwater parameters within the biobarrier at well 16IW09 indicate TOC remains above 20 mg/L but has decreased from a high of 1,840 mg/L in July 2020 to 128 mg/L in June 2022. ORP has fluctuated throughout the monitoring period from as low as -92 mV to as high as 143 mV. All other parameters, including DO, pH, and alkalinity fluctuate above and below their respective performance criteria. In June 2022, Dehalococcoides (DHC) was measured at less than 2.5 cells per milliliter (cells/mL) at well 16IW09, indicating a microbial culture not capable of reductive dechlorination in groundwater at Landfill Biobarrier #1.

There were no exceedances of perchlorate at any well at Landfill Biobarrier #1 during Year 1 or Year 2 performance monitoring events.

7.5.2 Landfill Biobarrier #2 Performance Monitoring

The performance monitoring program for Landfill Biobarrier #2 includes two upgradient wells for monitoring influent concentrations (16PM02 and 16PM03), four downgradient wells for monitoring effluent concentrations and biobarrier effectiveness (16PM06, 16PM09, 16PM14, and 16WW36), and one well within the biobarrier (16IW03). **Table 16** presents quarterly sampling results for VOCs that exceeded MCLs in upgradient, biobarrier, and downgradient wells (**Figure 20**).

Table 16 – Landfill Biobarrier #2 Performance Monitoring Sampling Results Years 1 and 2

Well ID	16PM02	16PM09	16PM03	16IW03	16PM14	16PM06	16WW36
TCE (5 µg/L)							
Mar-20	**21,000**	NS	**9,700**	**8,000**	NS	NS	**18,000**
Jul-20	**31,000**	**1,400**	**9,100**	**13,000**	**5,100**	**58,000**	**25,000**
Oct-20	**65,000**	**2,000**	**12,000**	**10,000**	**5,800**	**85,000**	**22,000**
Jan-21	**23,000**	**1,300**	**9,800**	**8,800**	**3,800**	**49,000**	**1,500**
Apr-21	**15,000**	**640**	**9,000**	**8,900**	**4,300**	**77,000**	**10,000**
Jul-21	**17,000**	**370**	**8,400**	**8,100**	**3,700**	**57,000**	**15,000**
Oct-21	**16,000**	**770**	**6,300**	**9,000**	**2,200**	**19,000**	**8,100**
Jan-22	**31,000**	**1,300**	**6,800**	**5,600**	**2,300**	**28,000**	**8,100**
Jul-22	**32,000**	**1,200**	**8,400**	**7,300**	**5,700**	**71,000**	**32,000**
***cis*-1,2-DCE (70 µg/L)**							
Mar-20	**3,200**	NS	**6,600**	**14,000**	NS	NS	**19,000**
Jul-20	**4,800**	**520**	**9,300**	**14,000**	**3,300**	**49,000**	**29,000**
Oct-20	**8,800**	**1,000**	**5,700**	**11,000**	**3,500**	**47,000**	**26,000**
Jan-21	**2,700**	**560**	**5,300**	**12,000**	**3,500**	**33,000**	**980**
Apr-21	**2,200**	**210**	**7,100**	**11,000**	**2,900**	**42,000**	**9,000**
Jul-21	**3,400**	**200**	**8,300**	**10,000**	**3,700**	**38,000**	**17,000**
Oct-21	**2,500**	**520**	**7,500**	**14,000**	**2,900**	**11,000**	**8,700**
Jan-22	**4,500**	**950**	**7,100**	**15,000**	**3,100**	**17,000**	**6,700**
Jul-22	**3,800**	**470**	**6,100**	**17,000**	**5,900**	**33,000**	**23,000**
1,1-DCE (7 µg/L)							
Mar-20	**32**	NS	**66**	**37**	NS	NS	**160**
Jul-20	**44**	**30**	**50**	**51**	**21**	**150**	**290**
Oct-20	**74**	**50**	**40**	**38**	**25**	**140**	**170**
Jan-21	**34**	**33**	**31**	**49**	**18**	**65**	**15**
Apr-21	**27**	**13**	**37**	**46**	**14**	**120**	**74**
Jul-21	**32**	**11**	**37**	**38**	**15**	**100**	**180**
Oct-21	**21**	**20**	**21**	**38**	**9.5**	**36**	**39**
Jan-22	**48**	**52**	**31**	**42**	**13**	**36**	**39**
Jul-22	**40**	**24**	**23**	**44**	**26**	**73**	**200**
1,2-DCA (5 µg/L)							
Mar-20	ND	NS	**21**	ND	NS	NS	**13**
Jul-20	**25**	ND	**25**	ND	**24**	**50**	**20**
Oct-20	**60**	ND	**23**	**5.4**	**26**	**55**	ND
Jan-21	**13**	ND	**18**	**5.9J**	**23**	**40**	ND
Apr-21	**14**	ND	**23J**	**6.2J**	**22**	**54**	ND
Jul-21	**15**	ND	**20**	**6.7J**	**21**	**35**	**13**

Well ID	16PM02	16PM09	16PM03	16IW03	16PM14	16PM06	16WW36
Oct-21	**16**	ND	**21**	ND	**18**	**40**	**10**
Jan-22	**23**	ND	**25**	ND	**21**	**33**	**8**
Jul-22	**16J**	ND	**21**	ND	**23**	**33**	**21**
VC (2 µg/L)							
Mar-20	**51**	NS	**370**	**160**	NS	NS	**180**
Jul-20	**110**	**23**	**320**	**460**	**150**	**2,100**	**320**
Oct-20	**240**	**47**	**370**	**530**	**140**	**1,800**	**180**
Jan-21	**50**	**32**	**310**	**3,700**	**130**	**790**	**17**
Apr-21	**40**	**10**	**240**	**3,700**	**110**	**1,800**	**78**
Jul-21	**43**	**9.1**	**230**	**2,600**	**110**	**930**	**140**
Oct-21	**35**	**23**	**120**	**2,500**	**56**	**390**	**43**
Jan-22	**99**	**84**	**200**	**3,000**	**81**	**350**	**49**
Jul-22	**57**	**26**	**160**	**2,300**	**180**	**670**	**260**

Green = Upgradient of the biobarrier
Blue = Downgradient of biobarrier
Purple = In biobarrier
Bold = concentration exceeds MCL

At biobarrier monitoring well 16IW03, TCE concentrations have remained stable, fluctuating from March 2020 to July 2022. All other VOC concentrations have fluctuated within the treatment area. Groundwater parameters within the biobarrier at well 16IW03 indicate TOC remains well above 20 mg/L (2,230 mg/L in July 2022). ORP has fluctuated throughout the monitoring period from as low as -1033 mV to as high as 50 mV. All other parameters, including DO, pH, and alkalinity fluctuate above and below their respective performance criteria.

The unusually high concentration of chlorinated solvents at downgradient monitoring well 16PM06 could be due to DNAPL. Field sampling logs do not provide any information on the appearance of the sample or any other observations to indicate if DNAPL may be present. There is a lack of significant increase of TOC and bromide concentrations in the injection wells 16IW03 and 16IW04, which suggests injections have not successfully distributed amendments within the design radius of influence to achieve the goal of creating conditions conducive for reductive dechlorination of the COCs. ORP in all samples except one was not favorable for reductive dechlorination.

7.5.3 Landfill Biobarrier #3 Performance Monitoring

The performance monitoring program for Landfill Biobarrier #3 includes two upgradient wells for monitoring influent concentrations (16RW06 and 16RW07), two downgradient wells for monitoring effluent concentrations and biobarrier effectiveness (16RW09 and 16RW10), and one well within the biobarrier (16IW10). **Table 17** presents quarterly sampling results for VOCs that exceeded MCLs in upgradient, downgradient, and biobarrier wells (**Figure 21**).

Table 17 – Landfill Biobarrier #3 Performance Monitoring Sampling Results Years 1 and 2

Well ID	16RW06	16RW09	16RW07	16IW10	16RW10
TCE (5 µg/L)					
Mar-20	**86**	NS	**1,900**	**200**	NS
Jul-20	**77**	**1,300**	**2,300**	**190**	**1,800**
Oct-20	**110**	**980**	**1,100**	**46**	**2,000**
Jan-21	**95**	**690**	**2,000**	**31**	**5,300**
Apr-21	**60**	**810**	**900**	**5.4**	**2,400**
Jul-21	**64**	**1,400**	**760**	**13**	**200**
Oct-21	**34**	**610**	**700**	ND	**950**
Jan-22	**37**	**730**	**540**	**0.91J**	**1,300**
Jul-22	**73**	**1,900**	**780**	2.1	**930**
***cis*-1,2-DCE (70 µg/L)**					
Mar-20	1.9	NS	**120**	**110**	NS
Jul-20	2.4	**45**	**110**	**110**	**290**
Oct-20	4.8	**290**	38	**220**	**390**
Jan-21	3.3	**230**	**120**	23	**1,200**
Apr-21	1.7	**160**	46	15	**710**
Jul-21	4.4	**180**	35	19	**670**
Oct-21	6.8	**340**	35	11	**500**
Jan-22	5.3	**160**	38	2	**620**
Jul-22	6.4	**130**	24	2.7	**420**
1,1-DCE (7 µg/L)					
Mar-20	0.9J	NS	**12**	ND	NS
Jul-20	1	**9.9**	**15**	1.5	**17**
Oct-20	1.3	**7.5**	6.4	0.67	**21**
Jan-21	1.3	6.8	**13**	ND	**14**
Apr-21	0.82J	4.8	4.8	ND	**14**
Jul-21	ND	**9.6**	4.1	ND	**8.5**
Oct-21	ND	5.4	4.1	ND	**3.9**
Jan-22	ND	4.4	3.4	ND	**6.7**
Jul-22	0.75 J	**12**	3.8	ND	**20**
1,2-DCA (5 µg/L)					
Mar-20	ND	ND	ND	ND	NS
Jul-20	ND	ND	ND	0.96J	4J
Oct-20	ND	ND	ND	0.98J	**4.6J**
Jan-21	ND	ND	ND	ND	**66**
Apr-21	ND	ND	ND	ND	**24**
Jul-21	ND	ND	ND	ND	**16**

Well ID	16RW06	16RW09	16RW07	16IW10	16RW10
Oct-21	ND	ND	ND	ND	**15**
Jan-22	ND	ND	ND	ND	**18**
Jul-22	ND	ND	ND	ND	4.8 J
VC (2 µg/L)					
Mar-20	0.84J	ND	**76**	ND	NS
Jul-20	1.2	**52**	**95**	**8.4**	**80**
Oct-20	**2.5**	**33**	**28**	**53**	**100**
Jan-21	**2.2**	**25**	**90**	**8.3**	**50**
Apr-21	ND	**33**	**29**	**2.5**	**93**
Jul-21	ND	**59**	**15**	**1.3**	**49**
Oct-21	ND	**28**	**15**	ND	**25**
Jan-22	1.2	**25**	**15**	ND	**49**
Jul-22	2 J	**94**	**10**	1.3	**190**
Perchlorate (17 µg/L)					
Mar-20	ND	NS	4.9	ND	NS
Jul-20	ND	0.491J	2.45	ND	**62.7**
Oct-20	ND	0.12J	0.391	ND	8.11
Jan-21	ND	0.459J	0.638J	ND	**125J**
Apr-21	ND	0.241	1	ND	**36.5**
Jul-21	ND	ND	ND	ND	**18.7**
Oct-21	ND	ND	0.262J	ND	**27.8**
Jan-22	ND	ND	0.27	ND	4.1
Jul-22	0.12	ND	0.335	0.108	2.05

Green = Upgradient of the biobarrier
Blue = Downgradient of biobarrier
Purple = In biobarrier

Bold = concentration exceeds Cleanup Level
ND = Not Detected
J = Estimated value

At biobarrier monitoring well 16IW10, TCE concentrations decreased from 200 µg/L in March 2020 to 2.1 µg/L in July 2022. All other VOCs also decreased within the treatment area, including upgradient well 16RW07. Groundwater parameters are not collected at upgradient well 16RW07, but decreasing concentrations may indicate well 16RW07 is within the radius of influence of biobarrier well 16IW10 (approximately 15 feet between the two wells) and where the hydraulic gradient is minimal based on groundwater elevation measurements. Perchlorate was not detected in groundwater at biobarrier monitoring well 16IW10, except for July 2022 when it was detected at a concentration of 0.108 µg/L. Perchlorate exceeded its cleanup level in downgradient well 16RW10. Noting the northeast direction of groundwater flow, downgradient well 16RW10 might be influenced by upgradient well 16PM03, which serves as an upgradient performance monitoring well for Landfill Biobarrier #2.

Groundwater parameters within the biobarrier at well 16IW10 indicate TOC remains above 20 mg/L but has decreased from a high of 2,720 mg/L in March 2020 to 139 mg/L

in June 2022. ORP has fluctuated throughout the monitoring period from as low as -149 mV to as high as 61 mV. All other parameters, including DO, pH, and alkalinity fluctuate above and below their respective performance criteria. In June 2022, DHC was measured at 5,110 cells/mL at well 16IW10, indicating a microbial culture capable of reductive dechlorination in groundwater at Landfill Biobarrier #3.

7.5.4 Bayou Biobarrier Performance Monitoring

The performance monitoring program for the Bayou Biobarrier includes three upgradient wells for monitoring influent concentrations (16WW39, 16WW22, and 16WW12), one downgradient well for monitoring effluent concentrations and biobarrier effectiveness (16WW40), and two wells within the biobarrier (16IW20 and 16RW11). **Table 18** presents quarterly sampling results for VOCs that exceeded MCLs in upgradient wells and downgradient monitoring well 16WW40 (**Figure 22**). Monitoring well 16RW12 is not identified as a downgradient performance monitoring well for Years 1 and 2 but was sampled in June 2022. Groundwater contained concentrations of TCE (52 µg/L) and vinyl chloride (8.1 µg/L) exceeding the MCL. TOC and other MNA parameters were not analyzed.

Table 18 – Bayou Biobarrier Performance Monitoring Sampling Results Years 1 and 2

Well ID	16WW22	16WW39	16WW12	16IW20	16RW11	16WW40
TCE (5 µg/L)						
Mar-20	**52**	**1,100**	**1,700**	NS	**20**	NS
Jul-20	**24**	**560**	**2,800**	**280**	**8.9J**	**1,700**
Oct-20	**7.8**	**350**	**1,500**	**130**	3.7	**1,700**
Jan-21	**30**	**300**	**1,100**	**13**	2.2	**1,500**
Apr-21	**12**	**330**	**2,100**	**5.7**	2	**1,000**
Jul-21	**13**	**230**	**1,700**	**7.6**	2.3	**1,900**
Oct-21	**7.6**	**210**	**1,000**	1.2J	1.3J	**1,000**
Jan-22	**13**	**120**	**1,100**	0.96J	1.1	**540**
Jul-22	**6.1**	**230**	**2,100**	1.6	NS	**990**
***cis*-1,2-DCE (70 µg/L)**						
Mar-20	4.2	**98**	48	NS	73	NS
Jul-20	2.7	**74**	**71**	**170**	60J	**220**
Oct-20	3	**73**	67	**170**	3.5	**230**
Jan-21	3.2	37	**84**	47J	0.92J	**160**
Apr-21	2	39	**76**	30	0.85J	**210**
Jul-21	2.2	29	64	7.2	1.1	**190**
Oct-21	2.5	28	69	1.9J	ND	**170**
Jan-22	2.9	10	**77**	1.1	ND	**120**
Jul-22	0.96	28	**100**	0.52 J	NS	**180 J**

Well ID	16WW22	16WW39	16WW12	16IW20	16RW11	16WW40
1,1-DCE (7 µg/L)						
Mar-20	0.65J	2.3	3.6	NS	0.56J	NS
Jul-20	ND	2	**7.5**	3.5	ND	7
Oct-20	ND	1.7	3.8J	1.6	ND	**7.5**
Jan-21	ND	0.84J	3.2	ND	ND	5.3
Apr-21	ND	0.75J	5.4J	ND	ND	2.8
Jul-21	ND	0.58J	4J	ND	ND	7
Oct-21	ND	0.61J	ND	ND	ND	ND
Jan-22	ND	ND	ND	ND	ND	1.5
Jul-22	ND	0.93 J	4.4 J	ND	NS	3.2
1,2-DCA (5 µg/L)						
Mar-20	ND	1.7	**7.5**	NS	1.6	NS
Jul-20	ND	1.2	**12**	4.4	1.6	**6.1**
Oct-20	ND	1.3	**5.5**	2.7	0.91J	**6**
Jan-21	ND	0.72J	4.3	0.92J	ND	**7**
Apr-21	ND	0.72J	**7.3J**	0.7J	ND	**5.6**
Jul-21	ND	0.58J	**5.8**	0.56J	ND	**6.4**
Oct-21	ND	ND	**5.1J**	ND	ND	**5.2**
Jan-22	ND	ND	4.8J	ND	ND	3.7
Jul-22	ND	ND	**6.5**	ND	NS	3.7
VC (2 µg/L)						
Mar-20	0.69J	**5.3**	**3.4J**	NS	ND	NS
Jul-20	ND	**3.3**	**8.1**	ND	ND	**5.3**
Oct-20	ND	**5**	**5.8**	ND	ND	**6.3**
Jan-21	0.49J	2	**4.8**	**7.2**	ND	**4.5**
Apr-21	ND	1.1	**8.2J**	**9.1**	ND	**5.4**
Jul-21	ND	0.97	**5.5**	**10**	0.79J	**9**
Oct-21	ND	1.8	**4.6J**	**3.2**	ND	ND
Jan-22	ND	0.73	**5J**	**4.6**	ND	**2.9**
Jul-22	ND	**2.2**	**9.9**	**3.7**	NS	**10**
Perchlorate (17 µg/L)						
Mar-20	2.35	**62**	**53**	NS	ND	NS
Jul-20	1.23	15.1	**61.5**	0.562J	ND	0.9J
Oct-20	0.81	1.08	**18.5**	ND	ND	0.24
Jan-21	1.13	3.64	**24.1J**	ND	ND	1.31J
Apr-21	0.47	7.87	**42.1**	ND	ND	0.88
Jul-21	0.15	6.76	16	ND	ND	0.69J
Oct-21	0.49	9.07	**23.2**	ND	ND	0.62
Jan-22	0.4	4	**30.5**	ND	ND	0.55

Well ID	16WW22	16WW39	16WW12	16IW20	16RW11	16WW40
Jul-22	0.0564 J	5.56	**58.3**	0.0415 J	NS	ND

Green = Upgradient of the biobarrier
Blue = Downgradient of biobarrier
Purple = In biobarrier
Bold = concentration exceeds MCL
J = Estimated Value
ND = Not Detected
NS = Not Sampled (reason unknown)

At biobarrier monitoring well 16IW20, TCE concentrations decreased from 280 µg/L in July 2020 to 1.6 µg/L in June 2022. Perchlorate was not detected in groundwater at 16IW20 or in downgradient monitoring well 16WW40. All other VOCs also decreased within the treatment area. Downgradient monitoring well 16WW40 continues to have groundwater with concentrations of TCE well above the MCL. It is unclear where the eastern TCE plume boundary ends beyond 16WW40. Groundwater parameters within the biobarrier at well 16IW20 indicate TOC was less than 20 mg/L during all quarterly sampling events, except January 2021 when TOC was 20.1 mg/L. TOC did not exceed 20 mg/L in any other wells where TOC was measured. ORP has fluctuated throughout the monitoring period from as low as -211 mV to as high as 82 mV. All other parameters, including DO, pH, and alkalinity fluctuate above and below their respective performance criteria.

7.5.5 Mid-Plume Performance Monitoring

The performance monitoring program for the Mid-Plume includes the shallow zone, intermediate zone, and upper deep zone.

Shallow Zone

In the shallow zone, performance monitoring occurred at four wells within the biobarrier (16EW01, 16EW02, 16EW03, and 16EW04) and three downgradient wells for monitoring effluent concentrations and biobarrier effectiveness (16WW48, 16WW30, and 16WW39). **Table 19** presents quarterly sampling results for VOCs at the wells shown in **Figure 23**. Based on groundwater elevation data, groundwater flow is highly variable.

Table 19 – Mid-Plume Shallow Zone Performance Monitoring Sampling Results Years 1 and 2

Well ID	16EW01	16EW02	16EW03	16EW04	16WW48	16WW30	16WW39
TCE (5 µg/L)							
Mar-20	NS	NS	**170**	NS	**7,100**	14	**1,100**
Jul-20	**4,700**	**37,000**	**60**	**15,000**	**9,000**	3.5	**560**
Oct-20	**5,400**	**26,000**	**130**	**520**	**14,000**	**5.7**	**350**
Jan-21	**4,100**	**38,000**	**290**	**17,000**	**13,000**	2.2	**300**
Apr-21	**3,500**	**23,000**	**250**	**9,500**	**15,000**	**11**	**330**
Jul-21	**990**	**25,000**	**77**	**3,100**	**13,000**	**12**	**230**
Oct-21	**970**	**23,000**	**54**	**5,100**	**15,000**	**32**	**210**
Jan-22	**1,800**	**19,000**	**84**	**3,400**	**13,000**	**31**	**120**
Jul-22	**2,900**	**35,000**	3.8 J	**9,800**	**20,000**	**45**	**230**
cis-1,2-DCE (70 µg/L)							

Well ID	16EW01	16EW02	16EW03	16EW04	16WW48	16WW30	16WW39
Mar-20	NS	NS	**1700**	NS	**5,000**	ND	**98**
Jul-20	**6,800**	**22,000**	**440**	**4,300**	**9,500**	ND	**74**
Oct-20	**7,600**	**26,000**	**1,400**	**4,400**	**16,000**	ND	**73**
Jan-21	**7,200**	**35,000**	**1,100**	**4,800**	**15,000**	ND	37
Apr-21	**6,000**	**18,000**	**1,200**	**2,600**	**17,000**	ND	38
Jul-21	**2,000**	**18,000**	**1,500**	**640**	**18,000**	ND	29
Oct-21	**3,400**	**22,000**	**270**	**1,300**	**17,000**	ND	28
Jan-22	**3,600**	**16,000**	**1,000**	**1,300**	**13,000**	ND	10
Jul-22	**7,600**	**33,000**	**120**	**2,700**	**22,000**	3.3	28
1,1-DCE (7 µg/L)							
Mar-20	NS	NS	ND	NS	**13**	ND	2.3
Jul-20	**36**	**97**	ND	**20J**	**27**	ND	2
Oct-20	**29**	**110**	1.2	5.9J	**32**	ND	1.7
Jan-21	**24**	**140**	4J	**16**	**36**	ND	0.84
Apr-21	**22**	**64**	3.1J	**11**	**38**	ND	0.75
Jul-21	**7.4**	**58**	ND	3.2J	**40**	ND	0.58
Oct-21	6.8	**65**	ND	5.6J	**37**	ND	0.61
Jan-22	**9.6**	**50**	ND	5.5J	**29**	ND	ND
Jul-22	**27**	**99**	ND	**12**	**53**	ND	0.93 J
1,2-DCA (5 µg/L)							
Mar-20	NS	NS	4.5J	NS	**19**	ND	1.7
Jul-20	**27**	**43**	ND	13J	**34**	ND	1.2
Oct-20	**25**	**48**	3.4	ND	**44**	ND	1.3
Jan-21	**16**	**55**	ND	13	**36**	ND	0.72
Apr-21	**18**	**35**	2.8J	**6.2J**	**39**	ND	0.72
Jul-21	**7.1**	**29**	ND	ND	**34**	ND	0.58
Oct-21	**8**	**37**	ND	ND	**35**	ND	ND
Jan-22	**9.6**	**35**	ND	ND	**33**	ND	ND
Jul-22	**14 J**	**45**	ND	**6.1 J**	**39**	ND	ND
VC (2 µg/L)							
Mar-20	NS	NS	**750**	NS	ND	ND	**5.3**
Jul-20	**780**	**39**	ND	**15J**	**22**	ND	**3.3**
Oct-20	**630**	**51**	**200**	ND	**57**	ND	**5**
Jan-21	**820**	**930**	**780**	**29**	**20**	ND	2
Apr-21	**720**	**45**	**460**	**11**	**16**	ND	1.1
Jul-21	**100**	**42**	**310**	**2.5J**	**110**	ND	0.97J
Oct-21	**180**	**630**	**92**	**15**	**170**	ND	1.8
Jan-22	**260**	**340**	**230**	**11**	**48**	ND	0.73J
Jul-22	**2.2**	**730**	ND	**44**	**410**	ND	
Perchlorate (17 µg/L)							
Mar-20	NS	NS	ND	NS	**120**	ND	**62**
Jul-20	**28.4**	16.2	2.09	1.42	**157**	0.309J	15.1
Oct-20	**27.5**	ND	ND	ND	**167**	ND	1.08
Jan-21	**180**	ND	ND	ND	**122**	ND	3.64J
Apr-21	**41.9**	0.53	ND	ND	**94.7**	ND	7.87
Jul-21	**29**	0.98J	ND	ND	**53.7**	ND	6.76

Well ID	16EW01	16EW02	16EW03	16EW04	16WW48	16WW30	16WW39
Oct-21	**40.3**	2.53	ND	ND	**37.9**	ND	9.07
Jan-22	**61**	1.6	ND	ND	14.8	ND	4
Jul-22	**38.1**	0.24 J	ND	ND	7.87	0.176 J	5.56

Blue = Downgradient of biobarrier
Purple = In biobarrier
Bold = concentration exceeds MCL
J = Estimated Value
ND = Not Detected

At all biobarrier monitoring wells, TCE concentrations decreased between March 2020 and January 2022 and increased in July 2022. Concentrations of all VOCs and perchlorate rebounded during some sampling events which was potentially the result of fluctuating groundwater flow directions. At those wells where TOC is monitored (16EW03 and 16WW48), TOC rarely measured above 20 mg/L. At 16EW03, within the treatment area, TOC increased from 12.2 mg/L (April 2021) to a high of 67 mg/L (October 2021) but then decreased to 15.8 mg/L (June 2022). TOC never exceeded 20 mg/L at downgradient well 16WW48. ORP has fluctuated throughout the monitoring period from as low as -263 mV to -43 mV within the treatment area at 16EW03. All other parameters, including DO, pH, and alkalinity fluctuate above and below their respective performance criteria. In June 2022, DHC was measured at 8,360 cells/mL at well 16EW02, indicating a microbial culture capable of reductive dechlorination at this well.

Intermediate Zone

In the intermediate zone, performance monitoring occurred at four wells within the biobarrier (16EW05, 16EW06, 16EW07, and 16EW08) and three downgradient wells for monitoring effluent concentrations and biobarrier effectiveness (16WW29, 16WW49, and 16WW51) (**Figure 24**). Sampling results for wells 16EW05, 16EW06, 16EW07, or 16EW08 are not included in this Five-Year Review. Samples collected from these wells were very viscous and classified by the laboratory as solids with high dilution during some of the sampling events. Contents at well 16EW05 were solidified and could not be collected in Quarter 3 or Quarter 4 of Year 1. Due to residual EVO present in the wells, groundwater samples required dilution prior to sampling, resulting in detection limits an order of magnitude higher than the MCL of 5 µg/L for TCE.

There were no COCs that exceeded cleanup levels at downgradient well 16WW29. Only TCE and *cis*-1,2-DCE exceeded MCLs at monitoring well 16WW49. Concentrations of TCE decreased from 260 µg/L prior to treatment in September 2019 to 46 µg/L in June 2022. *Cis*-1,2-DCE did not exceed its MCL of 70 µg/L in June 2022 (50 µg/L). At downgradient monitoring well 16WW51, TCE and *cis*-1,2-DCE concentrations increased from 68 µg/L (February 2019) to 2,000 µg/L (June 2022) and 58 µg/L (February 2019) to 170 µg/L (June 2022), respectively. There are no data from intermediate wells upgradient of the mid-plume biobarrier to compare effectiveness of the biobarrier at decreasing COC concentrations in groundwater downgradient of the biobarrier.

Upper Deep Zone

Monitoring well 16WW21 is the single well sampled in the mid-plume treatment area. There were no exceedances of cleanup levels for any COCs at 16WW21.

7.5.6 WELLS DOWNGRADIENT FROM LANDFILL

Wells in the shallow zone, located downgradient from the landfill include 16WW38, 16WW16, 16WW36, 16WW26, 16WW42, and 16WW24. Mann-Kendall tests show either no trend (16WW16, 16WW36, and 16WW42) or decreasing trends (16WW38 and 16WW26) at the monitoring wells with detections of either TCE or perchlorate (**Table 20**). Monitoring well 16WW24 had no detections.

In the intermediate zone, groundwater wells 16WW35 and 16WW37 had no trend and 16WW23 did not have any detections of either perchlorate or TCE.

Table 20 –Shallow and Intermediate Zone Sampling Results – Wells Downgradient from the Landfill

Well ID	Date	Perchlorate	TCE
Shallow Zone			
16WW38	May-13	ND	745J
	Oct-18		4,400
	Mar-20		3,000
	Jul-20		2,400
	Oct-20		3,800
	Jan-21		2,300
	Apr-21		2,100
	Jul-21		2,000
	Oct-21		1,200
	Jan-22		1,200
	Jun-22		4,200
16WW16	May-13	443	22,000
	Oct-18	420	21,000
	Sep-19	460	13,000
	Mar-20	510	27,000
	Jul-20	442	28,000
	Oct-20	480	32,000
	Jan-21	309	5,700
	Apr-21	288	28,000
	Jul-21	408	30,000
	Oct-21	555	34,000
	Jan-22	561	29,000
	Jun-22	581	40,000
16WW36	May-13	ND	4,220
	Oct-18		22,000
	Sep-19		15,000
	Mar-20		18,000

Well ID	Date	Perchlorate	TCE
	Jul-20		25,000
	Oct-20		22,000
	Jan-21		1,500
	Apr-21		10,000
	Jul-21		15,000
	Oct-21		8,100
	Jan-22		8,100
	Jun-22		32,000
16WW26	May-13	ND or detections below PCL	4,580
	Oct-18		2,400
	Sep-19		440
	Mar-20		900
	Jul-20		490
	Oct-20		850
	Jan-21		1,000
	Apr-21		130
	Jul-21		26
	Oct-21		500
	Jan-22		440
	Jun-22		1,100
16WW42	May-13	ND	1.31
	Oct-18		6
	Sep-19		29
	Mar-20		3.3
	Jul-20		1.3
	Oct-20		3.2
	Jan-21		0.59
	Apr-21		0.97
	Jul-21		1.1
	Oct-21		180
	Jan-22		190
	Jun-22		850
Intermediate Zone			
16WW35	May-13	310	4,830
	Oct-18	420	21,000
	Sep-19	410	13,000
	Mar-20	560	11,000
	Jul-20	451	9,500
	Oct-20	565	11,000

Well ID	Date	Perchlorate	TCE
	Jan-21	ND	13,000
	Apr-21	367	9,300
	Jul-21	352	8,100
	Oct-21	366	9,700
	Jan-22	342	11,000
	Jun-22	419	7,800
16WW37	May-13	10.4	305
	Oct-18	ND	84
	Mar-20	ND	110
	Jul-20	ND	87
	Oct-20	0.393	120
	Jan-21	0.786	99
	Apr-21	1.6	110
	Jul-21	2.74	89
	Oct-21	168	190
	Jan-22	55.3	180
	Jun-22	25.1	200

While concentrations are not increasing at wells downgradient from the landfill, concentrations are also not decreasing.

7.5.7 METALS SAMPLING

In accordance with the ROD, groundwater was analyzed for metals (arsenic, chromium, nickel, manganese, nickel, and thallium) in June and July 2022. Sampling results are presented in **Table 21**. There were limited detections and exceedances of arsenic, chromium, manganese, and nickel and no detections of thallium.

Table 21 –2022 Metals Sampling Results

Well ID	Arsenic	Chromium	Manganese	Nickel
MCL(µg/L)	**10**	**100**	**7,820**	**490**
16WW12	NA	**578**	NA	NA
16WW13	NA	NA	**12,600**	NA
16WW14	NA	**285**	NA	NA
16WW16	NA	NA	1,390	NA
16WW22	NA	NA	NA	**331**
16WW23	NA	NA	**19,700**	NA
16WW24	NA	**386**	7,010 J	NA
16WW25	ND	NA	**11,500**	NA
16WW26	NA	NA	1,190 B	NA

Well ID	Arsenic	Chromium	Manganese	Nickel
MCL(µg/L)	10	100	7,820	490
16WW27	NA	NA	**18,000**	NA
16WW28	<12.5	NA	**11,500**	NA
16WW29	NA	NA	7360 B	NA
16WW30	NA	NA	844	NA
16WW31	NA	59.2	NA	NA
16WW33	NA	NA	535	NA
16WW34	NA	**155**	NA	**1,420**
16WW35	ND	NA	**7,880 B**	NA
16WW36	NA	NA	**13,600**	NA
16WW37	NA	NA	5090	NA
16WW38	NA	**177**	NA	NA
16WW39	0.805 J	0.7 J	125 B	10.6
16WW40	**11**	1.54 J	2300	24.7
16WW41	ND	**280**	1140	**2,100**
16WW42	1.61 J	0.703 J	**32,000**	88.6
16WW43	8.68	1.08	689	12.7
16WW44	**13.2**	0.469 J	57.1	2.84 J
16WW45	6.49	4.9 J	475	3.89 J

J = Estimated Value
ND = Not Detected
B = Sample result qualified due to blank contamination

7.5.8 PLUME CONTAINMENT

The TCE and perchlorate plumes in shallow and intermediate groundwater have not expanded beyond May 2013 plume extents, which is when comprehensive groundwater sampling occurred. The monitoring network does not fully delineate the plume in the northeast direction towards the Harrison Bayou. **Appendix E, Table E.16** includes sampling results from 2018 through 2022 for wells that bound the TCE and perchlorate plumes.

Based on May 2013 plume extents, shallow wells 16WW44, 16WW34, 16WW32, and 16WW46 bound the TCE and perchlorate plumes in shallow groundwater to the north. Shallow wells 16WW24 and 16WW43 bound the TCE plume to the south. The perchlorate plume is bound by monitoring wells 16WW26 and 16WW30 to the south in shallow groundwater. Since 2013, there have been no detections of TCE or perchlorate in wells 16WW44, 16WW34, 16WW32, and 16WW46. Shallow wells 16WW24 and 16WW43 continue to have no detections of TCE and 16WW26 and 16WW30 have no detections of perchlorate.

In intermediate groundwater, the intermediate TCE and perchlorate plumes are bound by wells 16WW33 and 16WW31 to the north. Wells 16WW23 and 16WW27 bound the intermediate TCE plume to the south and wells 16WW13, 16WW25, 16WW51, and 16WW29 bound the intermediate perchlorate plume. Since 2013, there have been no detections of TCE or perchlorate in wells 16WW33 and 16WW31. TCE continues to not be detected in wells 16WW23 and 16WW27, and perchlorate has not been detected in wells 16WW13, 16WW25, 16WW51, and 16WW29.

7.5.9 SURFACE WATER

Surface water sampling includes three surface water sampling locations, 16SW01 (downstream), 16SW02, and 16SW03 (upstream), in Harrison Bayou. Samples are analyzed for VOCs, perchlorate, metals, and field parameters, including dissolved oxygen (DO), pH, ORP, conductivity, and temperature. During Year 1, perchlorate and VOCs were not detected at any of the three surface water sampling locations. Arsenic, chromium, manganese, and nickel were detected but were below their respective cleanup levels. Thallium was not detected at any location during Year 1.

7.6 SITE INSPECTION

The Five-Year Review site inspection confirmed LUCs prohibit groundwater use and land use remains non-residential. There were no violations of LUCs, nor evidence of prohibited use of groundwater observed during the site inspection.

Access to LHAAP-16 was through functioning gates within a secured fence that was in good condition. Some areas of fencing were damaged (see photograph 13 in **Appendix C**). Signs are in good condition and legible.

The existing landfill vegetation and soil cover was observed to have small areas of minor ponding in multiple locations (see photographs 19 and 21 in **Appendix C**). There were also small pine trees located on the northeastern portion of the landfill surface that require removal. These will be addressed as maintenance activities by the current LTM contractor.

7.7 TECHNICAL ASSESSMENT

7.7.1 QUESTION A – IS THE REMEDY FUNCTIONING AS INTENDED BY THE DECISION DOCUMENTS?

The remedy is currently not functioning as intended by the decision document. The TCE plume is not fully delineated to the east but is bound by the monitoring well network to the north and south.

The current monitoring well network includes wells located immediately downgradient from the landfill. These wells are currently included in the sampling plan for evaluating upgradient concentrations in groundwater prior to entering the treatment areas. Analysis should also focus on historical trends of COC concentrations to determine if leaching may be occurring from the landfill. Groundwater samples from the wells are analyzed for VOCs

and perchlorate. Metals sampling occurred in June/July 2022. Evaluation for this five-year review indicates concentrations of TCE and perchlorate in monitoring wells downgradient from the landfill exhibit either no trend or a decreasing trend, indicating TCE and perchlorate are not migrating or leaching from hazardous substances in the landfill. For those wells where there is no trend and concentrations remain high (e.g., 16WW16, 16WW36, 16WW35), it appears the groundwater in contact with the buried waste material continues to provide a mechanism for transportation of COCs away from the landfill.

Based on the upgradient concentrations at 16RW02, concentrations at the biobarrier well 16IW09, and downgradient concentrations at 16RW05, the ability to monitor the performance of Biobarrier #1 at this location over two years of quarterly sampling is limited. Years 1 and 2 performance monitoring groundwater data indicate the biobarriers effectiveness at reducing concentrations of VOCs and perchlorate in groundwater is limited. The effectiveness appears to mostly be localized at the biobarriers, most specifically at Biobarrier #3. Additional data are needed to determine the effectiveness of the biobarriers to reduce concentrations downgradient of the biobarriers. Seasonal fluctuations in groundwater flow may result in contaminated groundwater flowing around or past the biobarriers toward Harrison Bayou. In addition, some wells have not maintained geochemical conditions conducive to natural attenuation of COCs. There is also some concern regarding the data quality. The sample collection logs do not provide any observations about the appearance of the samples. Upon further review, numerous wells had samples taken with turbidity readings well above 10 nephelometric turbidity units (NTUs) after limited purge time and volume (less than one well volume). The wells with turbidity above 10 NTUs include, but is not limited to, wells with EVO injections.

The ROD specified that monitoring for metals (chromium, arsenic, nickel and/or manganese) will be evaluated at the first Five-Year Review to determine if any further monitoring for metals is warranted. Metals sampling occurred in June and July 2022. There were limited detections and exceedances of arsenic, chromium, manganese, and nickel and no detections of thallium. The metals detections do not appear to be associated with widespread contamination from the landfill. However, it is recommended that while active ISB is ongoing that groundwater continue to be analyzed for metals at a frequency of at least every five years due to potential changes in the site-wide geochemistry.

The site inspection revealed small pine trees growing on the northeastern portion of the landfill surface that require removal. LHAAP-16 is mowed annually prior to inspections to allow evaluation of the landfill cap surface, animal burrows, erosion, monitoring wells, and site access. The landfill cap and LUCs prevent exposure to landfill contents and groundwater. Warning signs are in place and cap inspection, maintenance, and repair occur.

The groundwater and land use restriction boundary extends beyond the known TCE plume extent, providing a buffer area to ensure groundwater and land use restrictions are in place east of Harrison Bayou. Surface water sampling results indicate COCs are not migrating into Harrison Bayou at levels to cause surface water in Harrison Bayou to exceed surface water criteria.

7.7.2 QUESTION B – ARE THE EXPOSURE ASSUMPTIONS, TOXICITY DATA, CLEANUP LEVELS, AND REMEDIAL ACTION OBJECTIVES USED AT THE TIME OF THE REMEDY SELECTION STILL VALID?

Yes, toxicity data, cleanup levels, and RAOs remain valid. There have been no changes to land use and there is no unauthorized use of groundwater at LHAAP-16. The cleanup levels have not changed and continue to be based on MCLs and the PCL for perchlorate. Evaluation of the second RAO is currently not occurring as part of the groundwater monitoring program, though groundwater data do not indicate hazardous substances (VOCs or perchlorate) from the landfill are leaching or migrating to groundwater. The cap achieves the second RAO by reducing leaching and migration of landfill hazardous substances into the groundwater, but groundwater monitoring data at wells downgradient from the landfill provide another line of evidence that the cap is effectively doing so.

The exposure assumptions used at the time of the remedy are no longer valid. A 2023 PFAS PA/SI revealed concentrations of PFOA, PFOS, and PFHxS greater than the OSD Risk Screening Levels. Army is initiating an RI that will include Landfill 16. Currently, the extent of the PFOA in groundwater is unknown however, there are LUC restrictions on groundwater use at LHAAP-16 that will prevent exposure to PFAS-contaminated groundwater.

7.7.3 QUESTION C – HAS ANY OTHER INFORMATION COME TO LIGHT THAT COULD CALL INTO QUESTION THE PROTECTIVENESS OF THE REMEDY?

No other information has come to light that calls into question the protectiveness or performance of the remedy.

7.7.4 TECHNICAL ASSESSMENT SUMMARY

The landfill cap and cover prevent exposure to landfill contents. Small pine trees growing on the northeast portion of the landfill boundary need to be removed to ensure the integrity of the landfill cap. LUCs prevent access to the landfill contents and human exposure to contaminated groundwater. Surface water samples indicate no COCs, or COC byproducts are migrating into Harrison Bayou. Years 1 and 2 performance monitoring groundwater data indicate the biobarriers effectiveness at reducing concentrations of VOCs and perchlorate in groundwater is limited. At multiple wells, TOC has been depleted to below 20 mg/L or never achieved 20 mg/L; ORP exceeds -50 mV; and contaminant concentrations in groundwater performance wells for the landfill biobarriers remain above cleanup standards. In accordance with the RAWP, *"if these conditions occur, reinjections will be conducted only in specific areas that meet the above criteria."* However, due to the ineffectiveness of the biobarriers to date, additional investigation is recommended to refine the conceptual site model prior to further injections. No other information has come to light that calls into question the protectiveness or performance of the remedy.

7.8 ISSUES

Table 22 lists the issues identified at LHAAP-16 for this Fifth Five-Year Review.

Table 22 – LHAAP-16 Issues

Issue No.	Issue	Affects Current Protectiveness (Yes/No)	Affects Future Protectiveness (Yes/No)
1	The Five-Year Review site inspection observed small pine trees growing on the northeastern boundary of the landfill surface.	No	Yes
2	At multiple wells within the biobarriers or downgradient, TOC has been depleted to below 20 mg/L or never achieved 20 mg/L; ORP exceeds -50 mV; and contaminant concentrations in groundwater performance wells for the landfill biobarriers remain above cleanup standards.	No	Yes
3	For downgradient wells from the landfill where there is no trend and concentrations remain high (e.g., 16WW16, 16WW36, 16WW35), there is a potential the conceptual site model is not fully understood and there may be a secondary source of groundwater contamination.	No	Yes
4	The TCE plume boundary is not delineated east of Harrison Bayou beyond monitoring wells 16WW57 and 16WW58.	No	Yes
5	As a result of fluctuating groundwater flow directions and elevations, upgradient, side gradient, and downgradient wells might change over time at LHAAP-16. For example, monitoring wells 16RW04 and 16WW26 are located on the upper north portion of the Biobarrier #1. Since groundwater flow direction is southeast, these wells might be considered side gradient to the upgradient well 16RW01 and the Biobarrier has limited influence on these wells.	No	Yes
6	High VOC concentrations at Biobarrier #2 indicate the potential presence of another source that requires delineation.	No	Yes

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7.9 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

7.9.1 RECOMMENDATIONS

Table 23 lists the LHAAP-16 recommendations for this Fifth Five-Year Review.

Table 23 – LHAAP-16 Recommendations

Issue No.	Recommendation	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Yes/No)	
					Current	Future
1	Remove vegetation to ensure the vegetation does not compromise the integrity of the cap.	Army	EPA/TCEQ	December 31, 2025	No	Yes
2	Consider completing an evaluation of site-specific hydrology, geochemistry, and concentration data to determine if additional remediation should be completed and potential strategies for optimal performance.	Army	EPA/TCEQ	December 31, 2025	No	Yes
3	Finalize the additional investigations being conducted to refine the conceptual site model for groundwater conditions at LHAAP-16.	Army	EPA/TCEQ	December 31, 2025	No	Yes
4	Conduct additional investigation to define the plume extent east of Harrison Bayou.	Army	EPA/TCEQ	December 31, 2025	No	Yes

Issue No.	Recommendation	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Yes/No)	
					Current	Future
5	Evaluate the monitoring well network for each biobarrier and consider adding monitoring wells to better analyze the performance of the biobarriers.	Army	EPA/TCEQ	December 31, 2025	No	Yes
6	Perform a source delineation through compound-specific isotope analysis in areas where VOC concentrations are exceptionally high, such as 16PM06.	Army	EPA/TCEQ	December 31, 2025	No	Yes

7.9.2 OTHER FINDINGS

The following Other Findings do not affect protectiveness:

- It is recommended data tables in the RA(O) reports be organized by performance monitoring location.
- It is recommended that outside the Five-Year Review, the RA(O) report include a discussion of COC concentration trends in the wells downgradient from the landfill to evaluate if leaching/migration from the landfill may be occurring. The cap achieves the second RAO by reducing leaching and migration of landfill hazardous substances into the groundwater; however, groundwater monitoring data at wells downgradient from the landfill would provide another line of evidence that the cap is effectively doing so.
- The ROD specified that monitoring for metals (chromium, arsenic, nickel and/or manganese) will be evaluated at the first Five-Year Review to determine if any further monitoring for metals is warranted (Army, 2016). Metals sampling occurred in June and July 2022. It is recommended that while active ISB is ongoing that groundwater continue to be analyzed for metals due to potential changes in the site-wide geochemistry.
- Ensure changes to the performance monitoring network are captured in addendums to the RAWP.
- Because of the high concentrations of TCE and potential presence of DNAPL, the Five-Year Review evaluated sample collection logs. The sample collection logs do not provide any observations about the appearance of the sample. And upon further review, numerous wells had samples taken with turbidity readings well above 10 NTUs after limited purge time and volume (less than one well volume). It is recommended the sampling methodology be evaluated and the sample collection logs be completed to include the appearance of the sample and any other observations noted during sample collection.

7.10 PROTECTIVENESS STATEMENT

The remedy at LHAAP-16 currently protects human health and the environment. The remedy continues to minimize vertical infiltration of water through the landfill due to the presence of the multilayer cap installed in 1998. Groundwater data indicate the cap is also reducing leaching and migration of landfill hazardous substances into the groundwater. The cap prevents exposure to landfill contents. LUCs prevent human exposure to contaminated groundwater. The extent of PFAS contamination at Landfill 16 is not yet known, but LUCs prevent exposure to PFAS-contaminated groundwater. Surface water samples indicate no COCs, or COC byproducts, are migrating into Harrison Bayou. However, in order for the remedy to be protective in the long term, the following actions need to be taken to ensure protectiveness:

- Remove vegetation to ensure the vegetation does not compromise the integrity of the cap.

- Consider completing an evaluation of site-specific hydrology, geochemistry, and concentration data to determine if additional remediation should be completed and potential strategies for optimal performance.
- Finalize the additional investigations being conducted to refine the conceptual site model for groundwater conditions at LHAAP-16.
- Conduct additional investigation to further delineate the eastern plume boundary under and east of Harrison Bayou.
- Evaluate the monitoring well network for each biobarrier and consider adding monitoring wells to better analyze the performance of the biobarriers.
- Perform a source delineation through compound-specific isotope analysis in areas where VOC concentrations are exceptionally high, such as 16PM06.

8.0 LHAAP-17 BURNING GROUND NO. 2 FLASHING AREA, GROUP 2 GROUNDWATER

8.1 SITE CHRONOLOGY

Important events and relevant dates for LHAAP-17 are presented below in **Table 24**.

Table 24 – LHAAP-17 Chronology

Event	Date
Burning Ground Operations	1959-1980
Multi-Phase Investigation at Group 2 Sites	1982-1998
Soil, Surface Water, and Sediment Sampling	1982-1998
Remedial Investigation Report	2001
Baseline Human Health and Screening Ecological Risk Assessment Completed	2002
Perchlorate Treatability Demonstration	2003 and 2004
Feasibility Study	2010
Proposed Plan	2010
Final Record of Decision LHAAP-17	September 13, 2016
Pre-Design Investigation Report	September 2018
Remedial Design and Remedial Action Work Plan	March 2018
Summary Report, Excavation and Backfill Activities	March 2021
Time-Critical Removal Action Memorandum	October 2021

LHAAP – Longhorn Army Ammunition Plant

8.2 BACKGROUND

8.2.1 PHYSICAL CHARACTERISTICS

LHAAP-17, known as Burning Ground No. 2/Flashing Area, comprises approximately 3.9 acres in the heavily wooded southeastern portion of LHAAP (**Figure 28**). Two 185-feet by 305-feet cleared areas are located at LHAAP-17, separated by a gravel road (Shaw, 2016b).

8.2.2 LAND AND RESOURCE USE

The reasonably anticipated future land use is a national wildlife refuge. The 2004 MOA between USFWS and the Army documents the transfer of LHAAP land to USFWS. The former LHAAP is now known as the Caddo Lake National Wildlife Refuge. LHAAP-17 will be transferred under this agreement in the future (Shaw, 2016b).

There are no bodies of water at LHAAP-17. All surface water drains through ditches toward Harrison Bayou located west of LHAAP-17, which flows into Caddo Lake.

None of the water wells at LHAAP are used for drinking water; they supply water for non-potable uses only. However, the State of Texas considers all groundwater as potential drinking water, unless otherwise classified in accordance with 30 TAC 335.563(h)(1). .

8.2.3 History of Contamination

From 1959 through 1980, LHAAP-17 was used as a burning ground where bulk TNT, photo flash powder, and Universal Match Corporation operations reject-material were burned. Waste materials removed from LHAAP-29 and LHAAP-32 during demolition activities were burned at LHAAP-17 in 1959. The area was then used as a flashing area to decontaminate recoverable metal byproducts until 1980. Burning trenches were located around the inside perimeter and filled with ash until full and then covered and a new trench was dug.

8.2.4 Initial Response

The ash waste from the trenches was reportedly removed in 1984 (Shaw, 2016b).

8.2.5 Basis for Taking Action

The COCs for soil include explosives (2,4,6-TNT, 2,4-DNT, and 2,6-DNT) and perchlorate. The COCs for the shallow groundwater zone are perchlorate and VOCs (1,2-DCA, 1,1-DCE, cis-1,2-DCE, TCE, and vinyl chloride). The COCs for the intermediate groundwater zone are TCE and its degradation products (DCE and vinyl chloride). Remedial action is necessary to mitigate potential risks to the future maintenance worker and ecological receptors from contaminated soil and groundwater. A Baseline Human Health Risk Assessment from 2002 concluded that the soil and groundwater at LHAAP-17 both posed unacceptable carcinogenic and non-carcinogenic risk to the hypothetical future maintenance worker (Army, 2016).

8.3 REMEDIAL ACTIONS

8.3.1 Remedial Action Objectives

The RAOs as defined in the 2016 ROD are (Army, 2016):

- *Protection of human health by preventing human exposure to the contaminated groundwater and contaminated soil.*
- *Protection of human health by preventing further potential degradation of groundwater from contaminated soil.*
- *Protection of ecological receptors by preventing exposure to the contaminated soil.*

- *Protection of human health and the environment by preventing contaminated groundwater from migrating into nearby surface water; and*
- *Return of groundwater to its potential beneficial uses as drinking water, wherever practicable.*

Table 2-10 of the 2016 ROD includes cleanup levels for both soil and groundwater with groundwater COCs for the shallow zone and the intermediate zone listed separately. Table 2-10 includes cleanup levels for degradation products of TCE, even when they are not COCs based on the risk assessment due to their low detections. Cleanup levels for LHAAP-17 established in the 2016 ROD are presented in **Table 25** and **Table 26** below.

Table 25 – LHAAP-17 Chemicals of Concern

Medium	Chemical of Concern	Cleanup Level
Shallow Zone Groundwater* (µg/L)	1,1-Dichloroethene	7[a]
	1,2-Dichloeroethane	5[a]
	cis-1,2-Dichloroethene	70[a]
	Trichloroethene	5[a]
	Vinyl Chloride	2[a]
	Perchlorate	17[b]
Intermediate Zone Groundwater* (µg/L)	*cis*-1,2-Dichloroethene	70[a]
	Trichloroethene	5[a]
	Vinyl Chloride	2[a]
Soil (mg/kg)	2,4,6-Trinitrotoluene	5.1[c]
	2,4-Dinitrotoluene	0.042[c]
	2,6-Dinitrotoluene	0.042[c]
	Perchlorate	7.2[c]

* 30 Texas Administrative Code (TAC) 335.563(h)(1) states "Groundwater that has a background total dissolved solids content less than or equal to 10,000 milligrams per liter and that occurs within a geologic zone that is sufficiently permeable to transmit water to a pumping well in usable quantities shall be considered a current or potential source of drinking water for the purpose of determining cleanup levels." Groundwater at LHAAP is classified as a potential source of drinking water.

[a] Safe Drinking Water Act (SDWA) Maximum Contaminant Level (MCL) consistent with 40 CFR §300.430(e)(2)(i)(B&C).

[b] TRRP Tier 1 Residential PCL for groundwater ingestion pathway in accordance with 30 TAC 350 and available at https://www.tceq.texas.gov/remediation/trrp/trrppcls.html.

[c] TCEQ soil medium-specific concentration (MSC) for industrial use based on groundwater protection (GWP-Ind) in accordance with 30 TAC 335.558 and 30 TAC 335.559(g)(2).

mg/kg – milligrams per kilogram

µg/L – micrograms per liter

Table 26 – LHAAP-17 Cleanup Levels for Ecological Risk in Soil (EcoPRGs)

Chemical	SS EcoPRG [a] (mg/kg)	TS EcoPRG [a] (mg/kg)	Depth [b]
Barium	222	–	0 – 0.5 feet
	–	520	0 – 3 feet
2,4-Dinitrotoluene	–	12	0 – 3 feet
2,6-Dinitrotoluene	2.7	6.8	0 – 3 feet
2,4,6-Trinitrotoluene	–	4.7	0 – 3 feet
2,3,7,8-TCDD TEC	$4x10^{-6}$	$4x10^{-6}$	0 – 3 feet

[a] From Baseline Ecological Risk Assessment Table 16-1 (Shaw, 2007b)
[b] Depth and locations of remedial action for Waste Sub-Area
EcoPRG – ecological preliminary remediation goal
mg/kg – milligrams per kilogram
SS – surface soil from 0-0.5 feet (applicable to deer mouse)
TCDD – tetrachlorodibenzo-p-dioxin
TEC – toxicity equivalence concentration
TS – total soil from 0-3 feet (applicable to short-tailed shrew)

8.3.2 REMEDY DESCRIPTION

The 2016 ROD selected *"excavation and off-site disposal of soil; groundwater extraction; MNA and LUCs"* as the remedy for LHAAP-17 (Army, 2016). Components of the remedy include:

- Contaminated soil removal with off-site disposal to protect the hypothetical future maintenance worker and ecological receptors and to eliminate the soil-to-groundwater pathway.
- Extraction and treatment of groundwater until the trigger level (i.e., interim cleanup level) of 20,000 µg/L of perchlorate is reached. Upon reaching the trigger level, the remedial action will transition from the initial measure of groundwater extraction to the primary remedy of MNA.
    - If the 20,000 µg/L of perchlorate level is not reached after approximately 1.5 years, a contingency remedy of in situ bioremediation will be implemented to reduce the perchlorate levels more quickly so conditions become amenable for TCE to attenuate naturally. Elevated sulfate concentrations and low TOC concentrations may be limiting factors for biodegradation. The depletion of perchlorate may help subsurface conditions to become reducing enough for complete reductive dichlorination.
- MNA to confirm protection of human health and the environment by documenting that the contaminated groundwater remains localized with minimal migration and that contaminant concentrations are being reduced to cleanup levels.
- Implementation of LUCs, which include maintaining the integrity of any current or future remedial or monitoring systems; preventing the use of groundwater

contaminated above cleanup levels as a potable water source; and, restricting land use to nonresidential until it is demonstrated that surface and subsurface soil and groundwater COCs are at levels that allow for UU/UE.

MNA and LUCs are to remain in place until ARARs are met. Groundwater ARARs are expected to be met in 117 years.

8.3.3 REMEDY IMPLEMENTATION

8.3.3.1 Excavation and Off-Site Disposal

Excavation and confirmation sampling activities occurred from August 14 through September 29, 2019, before the discovery of munitions and explosives of concern (MEC) halted excavation activities (USACE, 2019). Backfilling occurred August 5 through August 13, 2020, for excavations where sample data or confirmation samples confirmed all contaminated soil had been excavated. Backfilling operations were delayed due to seasonal heavy rainfall between fall 2019 and summer 2020 (Bhate and APTIM, 2021e).

The Excavation and Backfill Summary report and interim RACR summarized the following excavation activities as having been completed August 20 to September 28, 2019, which were supplemented by additional excavations from October 7, 2021 through March 28, 2022, during the Time Critical Removal Action (TCRA) discussed below:

- *Area A – Completely excavated to the designed boundary shown on [**Figure 29**]. No over-excavation was required.*
- *Area B – Completely excavated to the designed boundary shown on [**Figure 29**]. No over-excavation was required.*
- *Area C – Completely excavated to the designed boundary shown on [**Figure 29**]. No over-excavation was required. Excavation backfilled and partially covered with packed gravel to reroute the haul road.*
- *Area D – Completely excavated to the designed boundary shown on [**Figure 29**]. No over-excavation was required.*
- *Area E – Completely excavated to the designed boundary shown on [**Figure 29**] and over-excavated approximately 5 feet to northeast and southeast based on confirmation sampling. No further over-excavation was required.*
- *Area F – Completely excavated to the designed boundary shown on [**Figure 29**]. No over-excavation was required.*
- *Area G – Completely excavated to the designed boundary shown on [**Figure 29**]. No over-excavation was required.*
- *Area H – Completely excavated to the designed boundary shown on [**Figure 29**] except for approximately 700 square feet along the eastern edge of the excavation, as shown on [Figure 28]. Confirmation samples have not been collected from the eastern end of the excavation (discussed further in Section 6.0)*

due to the discovery of MEC. Over-excavation of approximately 5 feet was conducted to the north and approximately 10 feet to the south.

- *Over-excavation was conducted along the south wall of Area H (West); ultimately, the Area H South sidewall was removed and extended to the northern boundary of Area K [**Figure 30**].*
- *Over-excavation was completed and confirmed laterally along the eastern wall (the approximately 700 square foot section) and vertically (central floor) of Area H (East) [**Figure 30**].*
- *Confirmation samples were collected along the northern border of Area H (East) and floor samples were collected in the four quadrants documenting the extent of the deep excavation within Area H (East) [**Figure 30**].*
- *Over-excavation was conducted along the southern wall of Area H (East). Confirmation samples indicate that further over-excavation is needed along the south wall of the Area H (East) [**Figure 30**].*

- *Area J – Completely excavated to the designed boundary shown on [**Figure 29**] except for approximately 1,250 square feet in the southeastern portion of the area, as shown on [**Figure 28]**-2. A confirmation sample still needs to be collected at the southern end of the excavation (See Section 6.0), but no over-excavation is required based on currently available information.*
- *Area K – Completely excavated to the designed boundary shown on [**Figure 29**]. Over-excavation of approximately 5 feet was conducted to the south and approximately 10 to 15 feet to the east. Confirmation samples collected indicate that further over-excavation will be needed along the east wall of the excavation.*
  - *Over-excavation along the eastern boundary of Area K was completed. No further over-excavation is required [**Figure 30**].*
- *Area L – Completely excavated to the designed boundary shown on [**Figure 29**]. Confirmation samples indicate that over-excavation of the west and north walls is required.*
  - *Over-excavation was conducted along the northern and western boundaries of Area L. The northern extent of over-excavation was completed and confirmed. Confirmation samples indicate that further over-excavation is needed along the western wall of the Area L [**Figure 30**].*
- *Area M – Completely excavated to the designed boundary shown on [**Figure 29**]. Confirmation samples indicate that over-excavation of the west, south, and north shallow walls and expansion of the deep walls is required.*
  - *The lateral extent of the deep excavation in Area M (i.e., Area M [Deep]) has been completed and confirmed. Over-excavation of the Area M (Shallow) was completed to the north and west. Confirmation samples indicate that further over-excavation is needed along both the northern and western walls of Area M [**Figure 30**].*

- *Area N – Completely excavated to the designed boundary shown on [**Figure 29**]. Confirmation samples indicate that over-excavation of the south wall and shallow excavation floor is required.*
    - *Over-excavation of the southern wall was completed to the south. In addition, over-excavation of the floor of Area N was also completed and confirmed. No further over-excavation is required [**Figure 30**].*

Due to discovery of munitions and explosives of concern, not all soil excavations were completed. The additional work required to complete all soil excavations includes:

- *Excavation, loading, and transportation for disposal of soil from Area J to the originally planned extent.*
- *Over-excavation, loading, transportation, and disposal of soil from the following areas:*
    - *Area H (East) – South sidewall (unknown volume). This coincides with an originally planned extent excavation to 2.5 feet bgs located northwest of Area J/south of Area H (East)*
    - *Area M – North and West sidewall (unknown volume)*
    - *Area L – West sidewall (unknown volume)*
- *Collection and analysis of originally planned confirmation samples from Area J (1 wall) for 2,4-DNT, 2,6-DNT, and 2,4,6-TNT.*
- *Collection of confirmation samples from over-excavation areas in Areas H, M, and L.*
- *Backfilling of remaining original areas to be excavated and over-excavation areas in Areas H, M, and L.*

Discovery of Munitions and Explosives of Concern

Excavation of Area H began on August 20, 2019, with soil being stockpiled over the eastern portion of Area H to prepare for loading. Loading of trucks began on August 21, 2019. Excavation activities continued from August 21 through August 30 without incident. During the excavation of Area N on August 30, 2019, excavation work ceased following the discovery of a 4.2-inch mortar round. The Harrison County Sheriff was contacted, who referred the notice to Fort Hood Explosive Ordnance Disposal (EOD). Fort Hood EOD personnel inspected and identified the item as an M335 4.2-inch illumination mortar round (Army, 2019). The EOD personnel detonated the item on September 3, 2019, and determined the item was empty.

Following the EOD response on September 3, 2019, site excavation activities resumed on September 4, 2019, under the assumption that the empty munition was an anomalous find. Excavation activities resumed on September 5, 2019, and continued until discovery of a second munition item during excavation of Area N on September 7, 2019. Following the same protocols, the Army EOD dispatched a unit from Fort Polk on September 10,

2019. The item was determined to be empty, and detonation was not necessary. An Ordnance and Explosives Safety Specialist (OESS) provided unexploded ordnance construction support from September 16 through September 28, 2019. Numerous inert munitions items encountered in Areas L, M, and N were removed and secured by the OESS. Two 81-millimeter illumination rounds recovered by the OESS between Areas L and M could not be confirmed as inert, and EOD dispatched to detonate the rounds on September 28, 2019.

Excavation in Areas L, M, and N halted on September 27, 2019, but continued in other areas. During excavation of the eastern portion of Area H on September 28, 2019, additional MEC items were encountered, and all further intrusive activities were discontinued.

Time Critical Removal Action

As a result of the MEC items discovered during excavation activities, a TCRA occurred from June 2021 to April 2022. In total, 4,048.25 cubic yards of loose soils were excavated, 1,505 cubic yards of existing stockpile soils were screened, and 4,887.5 cubic yards of bank soils were screened. Metallic debris segregated during screening using two Anaconda stackers with cross belt magnets were sent for sorting at a Material Potentially Presenting an Explosive Hazard (MPPEH) processing area.

A total of 96 MEC items were recovered and disposed of via open detonation using donor explosives during the munition response field activities. MEC items recovered and disposed of included: 12 M48/51 Series Fuzes, 11 37mm M3 Series Tracer Rounds, 48 M-126 Signal Flares, 2 M-127 Signal Flares, 7 M565 Mechanical Time Fuzes, 2 M19A1 Signal Flares, 11 M65 Powder Train Time Fuzes, 1 60mm M83 Illumination Mortar, and 2 81mm M301 Illumination Mortars. MEC demolition/disposal operations were conducted on February 2, April 8, and April 20, 2022.

A total of 18,700 pounds of material documented as safe and 41,150 pounds of non-munitions related debris were recovered and disposed of.

The TCRA also included digital geophysical mapping, which indicated subsurface anomalies remain and determined through data analysis that residual concentrations of munitions constituents remain in soil.

Discovery of Asbestos-Containing Material

Asbestos-containing material (ACM) was identified in the southeast corner of Area K excavation area and along the western wall of Area L. Based on field conditions, it appears the material has been buried across the center of the site between Area K and Area L. The materials extend from approximately 18 inches bgs to 4 feet bgs. Based on the estimated depth of the materials and the documented excavation depth in Area L and Area K, ACM may remain in soils.

8.3.3.2 Groundwater Extraction

In April 2022, the initiation of construction began for the extraction system to include an extraction system pump house, holding tank, and extraction system water conveyance piping (**Figure 31**). The pump house is a steel structure with corrugated metal siding and roof and includes a concrete pad. The pump house includes a 2,500-gallon dual wall high density polyethylene pipe (HDPE) holding tank equipped with an auto shut off system including high-low floats to prevent overflow of the tank. The tank also has an air diaphragm transfer pump activated by level sensors to transfer water to the GWTP.

The groundwater extraction system began operating on August 5, 2022, and underwent a leak test. No leaks or deficiencies were observed. Between August 5 and December 31, 2022, a total of 278,966 gallons of contaminated groundwater was extracted from 17WW02 and 17WW06 and conveyed to the groundwater treatment plant. The groundwater extraction period was extended until the Remedial Action and TCRA are completed.

8.3.3.3 Monitored Natural Attenuation

Once the target perchlorate concentration in the sampled wells is achieved and the extraction system is shut down, the MNA monitoring program will begin with quarterly sampling of monitoring wells selected for the monitoring network for two years. In the interim, groundwater samples are only analyzed for perchlorate.

The ROD states *"the long-term groundwater and surface water monitoring and [MNA] performance monitoring plan will also be presented in the [RD].*" The 2019 RD did not include a surface water monitoring plan, as required by the ROD.

8.3.3.4 Land Use Controls

LUCs specified in the LUC plan for LHAAP-17 include (RD-RAWP, 2019):

- Prohibit the use of groundwater contaminated as a potable water source.
- Restrict land use to nonresidential.
- Maintain the integrity of any current or future remedial or monitoring systems.

Army provided the initial notice of the LUCs and preliminary boundaries on December 8, 2016, to federal, state, and local officials including Senators and Congressman, State Representatives, the Harrison County Judge, the City of Uncertain Mayor, and Caddo Lake and Leigh Water Supply Corporations' Presidents and Boards of Directors, as well as the Caddo Lake National Wildlife Refuge manager, the future transferee of the property. Final notification has not occurred to date. The interim LUC boundary is shown in Comprehensive Land Use Control Management Plan.

A LUC Plan was included in the RD/RAWP. The implementation activities, as well as ongoing maintenance, monitoring, and reporting requirements will be presented in the

RACR, as the final LUC RD, but are not included in the interim RACR prepared in March 2023.

To date, only the initial notice of LUCs has been completed. Access to LHAAP-17 within LHAAP is restricted by two gravel access roads that are chained/gated. The frequency of LUC inspections will be finalized when the LUC RD is finalized and documented in the final RACR.

8.3.4 Operations, Maintenance and Monitoring

Since operations began, weekly operations and maintenance is performed. Extracted volumes transferred to the groundwater extraction system are monitored on a continual basis. Groundwater sampling for perchlorate from 17WW01, 17WW02, 17WW03, 17WW06, and 130 occurred in April 2022 as part of a baseline sampling event and in August, October, and November 2022 as part of the 6-month performance monitoring period. Groundwater monitoring results for 2023 were not available for this Five-Year Review.

Following system start up, groundwater extraction volumes recorded during maintenance and monitoring events indicate between August 5, 2022 and December 31, 2022, a total of 278,966 gallons of contaminated groundwater was extracted from extraction wells 17WW02 and 17WW06 and conveyed to the GWTP.

A sitewide groundwater level measurement was conducted in November 2022 in conjunction with the groundwater monitoring event. Groundwater at LHAAP-17 flows northwest, with the highest groundwater elevation occurring at 17WW08 in the southeastern portion of LHAAP-17 (169.51 feet amsl) and the lowest groundwater elevation occurring at 17WW19 in the northwestern portion of LHAAP-17 (164.18 feet amsl).

8.4 PROGRESS SINCE THE FOURTH FIVE-YEAR REVIEW

This is the first Five-Year Review for LHAAP-17.

8.5 DATA REVIEW

During the review period, pre-design sampling occurred in June 2021 (monitoring wells 17WW06, 17WW10, 17WW11, 17WW12, 17WW19, and 17WW20), baseline monitoring occurred in April 2022 (monitoring wells 17WW01, 17WW02, 17WW03, 17WW06, and 130), and performance monitoring occurred in August, October, and November 2022 (17WW01, 17WW02, 17WW03, 17WW06, and 130). Only validated groundwater analytical sampling results were available for review for this Five-Year Review. Groundwater samples were only analyzed for perchlorate. Monitoring for other COCs will begin once the performance objective to reduce perchlorate concentrations to below 20,000 µg/L has been met. Sampling results are presented in **Table 27** and include pre-ROD sampling results.

Table 27 – LHAAP-17 Performance Monitoring Results for Perchlorate (µg/L)

Well ID	3/5/2009	11/15/2017	4/8/2022	8/31/2022	10/7/2022	11/10/2022
17WW01	56,000	ND (<4)	239	1,740	24.5	0.549
17WW02*	160,000	2,500J	5,250	16,400	19,000	17,200
17WW03	ND	ND (<4)	44.7	0.07J	0.06J	0.03J
17WW06*	74,000	110,000	120,000	101,000	104,000	89,900
130	1,700	2.5	15	0.06J	0.08J	0.463

* Wells 17WW02 and 17WW06 serve as extraction wells and have sampling ports for collection of groundwater samples.
µg/L – micrograms per liter ID – Identification J – Estimated ND – Not detected

Figure 32 presents a comparison of the baseline groundwater perchlorate plume and November 2022 groundwater perchlorate plume. Perchlorate concentrations in groundwater at well 17WW06 decreased during the first four months of groundwater extraction.

8.6 SITE INSPECTION

The Five-Year Review site inspection confirmed LUCs prohibit groundwater use and land use remains non-residential. LUCs are enforced but documentation of restrictions on land use and groundwater use in accordance with the ROD is pending. There were no violations of LUCs, nor evidence of prohibited use of groundwater observed during the site inspection.

MNA will begin following completion of the groundwater extraction and treatment remedial action. Some monitoring wells were noted to have excess vegetation growing around the well as well as some wells that were not locked/secured (see photographs 23 through 25, and 27 through 29 in **Appendix C**).

8.7 TECHNICAL ASSESSMENT

8.7.1 QUESTION A – IS THE REMEDY FUNCTIONING AS INTENDED BY THE DECISION DOCUMENTS?

No, the remedy is not functioning as intended by the 2016 ROD. Implementation of the remedy was interrupted by the discovery of MEC during soil removal. This resulted in a delay in implementing the remedy, including the full excavation of contaminated soil at multiple areas at LHAAP-17. Additional work required includes excavating, loading, and transporting contaminated soil from Area J to the original planned extent of excavation, as well as over-excavating, loading, transporting, and disposing of soil from Areas H, M, and L. Confirmations sampling is required at the above areas, and backfilling operations need to be completed at Areas H, M, and L.

Army provided the initial notice of the LUCs and preliminary boundaries on December 8, 2016, to federal, state, and local officials. The preliminary LUC boundary includes the

groundwater perchlorate plume. Human exposure to contaminated groundwater is prevented by LUCs. Access to LHAAP-17 within LHAAP is restricted by two gravel access roads that are chained/gated. There was no sign of any trespassers during the Five-Year Review Site Inspection.

The groundwater extraction system is operational and is extracting groundwater from two wells (17WW02 and 17WW06) to reduce perchlorate concentrations to 20,000 µg/L. Perchlorate concentrations in groundwater at well 17WW06 decreased during the first four months of groundwater extraction. Groundwater data does not indicate contaminated groundwater is migrating into nearby surface waters.

8.7.2 Question B – Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of the remedy selection still valid?

No, the exposure assumptions used at the time of the remedy selection are no longer valid. Prior to implementation of the remedy, there was no information to indicate the presence of MEC, MC, or ACM at LHAAP-17. Additional delineation of the nature and extent of MEC and MC in surface and subsurface soils is required at LHAAP-17. Future munitions response may be appropriate to eliminate the potential threat of an encounter with MEC to the public, including protection of construction workers during completion of implementation of the selected remedy for LHAAP-17 (i.e., excavation of contaminated soils to a level which eliminates the soil to groundwater pathway which will protect the hypothetical future maintenance worker and ecological receptors). Pending additional investigation, the exposure assumptions identified in the ROD will need to be reevaluated to account for the potential presence of MEC and MC in surface and subsurface soils. Similar exposure assumption considerations will be required for ACM.

The toxicity data, cleanup levels, and RAOs remain valid. LUCs achieve the RAO to prevent exposure to contaminated groundwater and contaminated soil. Excavations conducted to date protect ecological receptors from contaminated soil by having removed contaminated shallow soils. Groundwater extraction is ongoing to reduce perchlorate concentrations in groundwater to 20,000 µg/L. There currently is no surface water monitoring program in place to evaluate the achievement of the fourth RAO. Groundwater data does not indicate contaminated groundwater is migrating into nearby surface waters. Additional RAOs may be required to address MEC and MC concerns, as well as the potential presence of ACM in soil.

8.7.3 Question C – Has any other information come to light that could call into question the protectiveness of the remedy?

No other information has come to light that could call into question the protectiveness of the remedy.

8.7.4 Technical Assessment Summary

The remedy is not functioning as intended by the 2016 ROD. Implementation of the remedy was interrupted by the discovery of MEC during soil removal. This resulted in a

delay in implementing the remedy, including the full excavation of contaminated soil at multiple areas at LHAAP-17. Army provided the initial notice of the LUCs and preliminary boundaries on December 8, 2016, to federal, state, and local officials. The preliminary LUC boundary includes the groundwater perchlorate plume. Human exposure to contaminated groundwater is prevented by LUCs. There was no sign of any trespassers during the Five-Year Review Site Inspection. The groundwater extraction system is operational and is extracting groundwater from two extraction wells (17WW02 and 17WW06) to reduce perchlorate concentrations to 20,000 µg/L. Perchlorate concentrations are decreasing. The exposure assumptions used at the time of the remedy selection are no longer valid. Prior to implementation of the remedy, there was no information to indicate the presence of MEC, MC, or ACM at LHAAP-17. Additional delineation of the nature and extent of MEC, MC, and ACM in surface and subsurface soils is required at LHAAP-17.

8.8 ISSUES

Table 28 lists the issues identified at LHAAP-17 for this Fifth Five-Year Review.

Table 28 – LHAAP-17 Issues

Issue No.	Issue	Affects Current Protectiveness (Yes/No)	Affects Future Protectiveness (Yes/No)
1	Implementation of the remedy was interrupted by the discovery of MEC during soil removal, and ACM was discovered during soil removal actions.	Yes	Yes
2	The exposure assumptions used and RAOs selected at the time of the remedy selection are no longer valid because, prior to implementation of the remedy, there was no information to indicate the presence of MEC, MC, or ACM at LHAAP-17.	Yes	Yes
3	Upon completion of the TCRA and RA MEC specific LUCs need to be implemented but are not currently planned.	No	Yes

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8.9 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

8.9.1 RECOMMENDATIONS

Table 29 lists the LHAAP-17 recommendations for this Fifth Five-Year Review.

Table 29 – LHAAP-17 Recommendations

Issue No.	Recommendation	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Yes/No)	
					Current	Future
1	Delineate the nature and extent of MEC, MC, and ACM in surface and subsurface soils.	Army	EPA/TCEQ	December 31, 2027	Yes	Yes
2	Evaluate the exposure assumptions and conduct additional risk assessment to determine the risk to human health and the environment because of the presence of MEC, MC, and ACM at LHAAP-17. If the risk assessment determines that there is unacceptable risk due to presence of MEC, MC and/or ACM, amend the remedy, including RAOs, through the appropriate post-ROD remedy change process as needed.	Army	EPA/TCEQ	December 31, 2027	Yes	Yes
3	Develop MEC specific LUCs that will be implemented upon completion of TCRA and RA.	Army	EPA/TCEQ	TBD	No	Yes

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8.9.2 OTHER FINDINGS

There are no Other Findings identified during this Five-Year Review.

8.10 PROTECTIVENESS STATEMENT

A protectiveness determination of the remedy at LHAAP-17 cannot be made at this time until further information is obtained. Further information will be obtained by taking the following actions:

- Delineate the nature and extent of MEC, MC, and ACM in surface and subsurface soils.
- Evaluate the exposure assumptions and conduct additional risk assessment to determine the risk to human health and the environment because of the presence of MEC, MC, and ACM at LHAAP-17. If the risk assessment determines that there is unacceptable risk due to presence of MEC, MC and/or ACM, amend the remedy (including RAOs) through the appropriate post-ROD remedy change process.
- Develop MEC specific LUCs that will be implemented upon completion of TCRA and RA.

It is expected that these actions will take approximately 4 years to complete, at which time a protectiveness determination will be made.

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9.0 LHAAP-18/24 BURNING GROUND NO. 3 AND UNLINED EVAPORATION POND

9.1 SITE CHRONOLOGY

Important events and relevant dates for LHAAP-18/24 are presented below in **Table 30**.

Table 30 – LHAAP-18/24 Chronology

Event	Date
LHAAP-18 Burning Ground No. 3 Operations	1955 - 1998
LHAAP-24 Unlined Evaporation Pond Operations	1963 - 1984
Groundwater Wells Installed and Sampled	1980
Nine Additional Groundwater Wells Installed and Sampled	1982
Ten Additional Groundwater Wells Installed and Sampled	1986
UEP Impoundment Capped	1986
Site Investigation and Groundwater Well Samples Collected	1987
Phase I Investigation	1993
Phase II Investigation	1995
Record of Decision for Early Interim Remedial Action at Burning Ground No. 3	May 12, 1995
Interim Remedial Action Implemented	1997
Phase III Investigation	1998
Remedial Investigation	2001
Baseline Human Health Risk Assessment	2002
First Five-Year Review	2002
Baseline Ecological Risk Assessment	2007
Second Five-Year Review	2008
Groundwater Treatment Plant Quarterly Evaluation Reports	2012 - Present
Explanation of Significant Differences for Early Interim Remedial Action at Burning Ground No. 3	August 23, 2010
Post-Screening Investigations	2013, 2014, 2016
Third Five-Year Review	2014
Natural Attenuation Evaluation	2017
Revised Feasibility Study	2017
Fourth Five-Year Review	2019
Final Record of Decision LHAAP-18/24	January 2, 2020

Event	Date
Final Pre-Design Investigation Work Plan	May 2021

LHAAP – Longhorn Army Ammunition Plant
UEP – Unlined Evaporation Pond

9.2 BACKGROUND

9.2.1 PHYSICAL CHARACTERISTICS

LHAAP-18/24, Burning Ground No. 3 (LHAAP-18) and the Unlined Evaporation Pond (LHAAP-24), comprises approximately 34.5 acres of a heavily wooded area in the east central portion of LHAAP (**Figure 33**). Topography of the site is mostly flat with the burning ground area gaining more relief near the western corner and the northern corner which contains the mounded surface of the former Unlined Evaporation Pond (UEP) (Army, 2020).

9.2.2 LAND AND RESOURCE USE

The reasonably anticipated future land use is a national wildlife refuge. The 2004 MOA between USFWS and the Army documents the transfer of LHAAP land to USFWS. The former LHAAP is now known as the Caddo Lake National Wildlife Refuge. LHAAP-18/24 will be transferred under this agreement in the future (Army, 2020).

There are no bodies of water at LHAAP-18/24. All surface water drains through ditches and gullies toward Harrison Bayou located adjacent to LHAAP-18/24, which flows into Caddo Lake.

None of the water wells at LHAAP are used for drinking water; they supply water for non-potable uses only. However, the State of Texas considers all groundwater as potential drinking water, unless otherwise classified in accordance with 30 TAC 335.563(h)(1).

9.2.3 HISTORY OF CONTAMINATION

From 1955 through 1998, LHAAP-18 was used for the treatment, storage, and disposal of solid and liquid explosive, pyrotechnic, and combustible solvent waste through open burning/open detonation, incineration, evaporation, and burial. LHAAP-24, the UEP, operated from 1963 to 1984. It was used to collect wastewater from the washout of rocket motor casings and process waste sumps. In 1986, sludge from the UEP was removed and the impoundment was capped (Army, 2020).

9.2.4 INITIAL RESPONSE

Prior to the Interim ROD the UEP was closed as a RCRA interim status surface impoundment, all waste was removed, and it was capped (Army, 2020). Army has issued a final ROD for LHAAP-18/24.

9.2.5 BASIS FOR TAKING ACTION

Action is necessary *"protect the public health or welfare or the environment from actual or threatened releases of hazardous substances, pollutants, or contaminants into the environment. Actions for the groundwater are necessary to address the potential for human health risks in the unlikely event there is an attempt to use groundwater as a potable water source. Actions for soil are necessary to address human health risk including the pathway from soil to groundwater"* (Army, 2020).

9.3 REMEDIAL ACTIONS

9.3.1 REMEDIAL ACTION OBJECTIVES

The RAOs for groundwater as defined in the 2020 ROD are (Army, 2020):

- *Protection of human health by preventing human exposure to the groundwater contaminated with COCs,*
- *Protection of human health and the environment by preventing groundwater contaminated with COCs from migrating into nearby surface water,*
- *Return groundwater to its beneficial uses wherever practicable, within a timeframe that is reasonable given the particular circumstances of the Site (40 C.F.R. § 300.430(a)((1)(iii)(F)).*

The RAO for soil as defined in the 2020 ROD is (Army, 2020):

- *Protection of human health and the environment by preventing the migration of contaminants to groundwater from potential sources in the soil.*

Extraction, excavation, and treatment of groundwater and source material was selected as an interim remedy in the 1995 Interim ROD. This interim remedial action was established to mitigate potential risks posed by high concentrations of chlorinated solvents and heavy metals in shallow groundwater and buried source material at LHAAP-18, to minimize vertical infiltration of water into the landfill, and reduce possible contaminant transport into surface water (Army, 1995b). Approximately 32,000 cubic yards of soil was removed and a groundwater extraction system that incorporated 5,000 feet of ICTs and the GWTP was installed. As of September 2024, over 162 million gallons of contaminated groundwater has been treated and released.

Table 2-10 of the 2020 ROD includes cleanup levels for both soil and groundwater with groundwater COCs for the shallow zone and the Wilcox Formation groundwater listed separately. Table 2-10 includes cleanup levels for degradation products of TCE, even when they are not COCs based on the risk assessment due to their low detections. Cleanup levels for LHAAP-18/24 established in the 2020 ROD are presented in **Table 31**.

Table 31 – LHAAP 18/24 Cleanup Levels

Medium	Contaminant of Concern	Cleanup Level
Shallow Zone Groundwater (µg/L)	Methylene chloride	5[a]
	Trichloroethene	5[a]
	cis-1,2-Dichloroethene*	70[a]
	Tetrachloroethene	5[a]
	Benzene	5[a]
	1,1,2-Trichloroethane	5[a]
	Vinyl Chloride*	2[a]
	Arsenic	10[a]
	Barium	2,000[a]
	Chromium	100[a]
	Bromodichloromethane	15[b]
	1,3,5-Trinitrobenzene	730[b]
	1,4-Dioxane	9.1[b]
	Cobalt	240[b]
	Nickel	490[b]
	Perchlorate	17[b]
Wilcox Formation Groundwater (µg/L)	Methylene chloride	5[a]
	Trichloroethene	5[a]
	cis-1,2-Dichloroethene*	70[a]
	Tetrachloroethene	5[a]
	Benzene	5[a]
	Vinyl Chloride*	2[a]
	Arsenic	10[a]
	Barium	2,000[a]
	Bromodichloromethane	15[b]
	1,3,5-Trinitrobenzene	730[b]
	1,4-Dioxane	9.1[b]
	Perchlorate	17[b]
Soil (mg/kg)	Methylene Chloride	0.5[c]
	Trichloroethene	0.5[c]
	Perchlorate	7.2[c]

Medium	Contaminant of Concern	Cleanup Level
	Tetrachloroethene	0.5[c]

* Trichloroethene degradation products
GWP-Ind MSC – Texas Commission on Environmental Quality soil medium-specific concentration (MSC) for industrial use based on groundwater protection.
[a] Safe Drinking Water Act (SDWA) Maximum Contaminant Level (MCL) consistent with 40 CFR §300.430(e)(2)(i)(B&C).
[b] TRRP Tier 1 Residential PCL for groundwater ingestion pathway in accordance with 30 TAC 350 and available at https://www.tceq.texas.gov/remediation/trrp/trrppcls.html.
[c] TCEQ soil medium-specific concentration (MSC) for industrial use based on groundwater protection (GWP-Ind) in accordance with 30 TAC 335.558 and 30 TAC 335.559(g)(2).
µg/L – micrograms per liter
mg/kg – milligrams per kilogram

9.3.2 REMEDY DESCRIPTION

The 2020 ROD selected "*enhanced groundwater extraction and treatment as needed, LUCs, enhanced ISB inside and outside containment area and in Wilcox Formation, unsaturated soil excavation, and thermal DNAPL removal*" as the final remedy for LHAAP-18/24 (Army, 2020). Components of the remedy include:

- *Continued use of the existing groundwater extraction system with enhancements (reactivate two existing [interceptor-collection trenches (ICTs)] until COC concentrations are low enough that MNA can address remaining contamination within the containment area.*
- *Continued operation of the current GWTP, or potentially a new GWTP as needed, will be determined during the RD phase.*
- *Excavation of unsaturated soil exceeding groundwater protection-industrial MSC (GWP-Ind).*
- *Excavation of soil beneath the UEP could be implemented in the future as a contingency remedy (e.g., depending on the results of the Five-Year Review of the groundwater remedy).*
- *Implementation of ISB of shallow zone groundwater outside the containment area at several locations; in the Wilcox Formation at three locations, and inside the containment at five locations.*
- *Implementation of thermal desorption and removal of DNAPL in two distinct areas inside the containment area at the site.*
- *Maintenance of existing cap over the former UEP.*
- *MNA for both shallow and intermediate zone groundwater for areas outside the influence of the treatment areas and for areas inside the influence of the treatment areas to reduce groundwater contamination to cleanup levels and confirm contamination remains localized and degrades over time.*
- *A contingency remedy to enhance MNA if MNA is found to be ineffective. The contingency remedy would consist of injection of bioremediation amendments to*

enhance degradation of the groundwater contaminants at selected locations based on data available at the time it is determined MNA is not successful. Details for the contingency remedy would be presented in a RD/RAWP.

- *Groundwater monitoring will be conducted to evaluate inorganic COCs. The need to continue groundwater monitoring for this purpose will be evaluated at five-year reviews.*
- *LTM semiannually for 3 years, annually until the next five-year review, then annually until recommended otherwise at the five-year review to evaluate remedy performance and determine if plume conditions remain constant, improve, or worsen. Monitoring will continue until five-year review demonstrate that cleanup levels are reached.*

9.3.3 REMEDY IMPLEMENTATION

Implementation of the final remedy has not yet occurred. A Pre-Design Investigation occurred from March 12 through June 30, 2021, to further define groundwater impacted by 1,4-dioxane, perchlorate, and VOCs. Soil samples were also collected to investigate perchlorate and VOC soil contaminant levels at the contact interval between the clay and sand. The RD was completed in February 2024 and RA implementation is pending.

Current operation of the GWTP is in accordance with the interim remedial action to treat groundwater extracted from ICTs and extraction wells.

9.3.3.1 Groundwater Treatment Plant

The GWTP receives and treats extracted groundwater from multiple ICTs and extraction wells at LHAAP-18/24. The GWTP has also received groundwater for treatment from LHAAP-16. After implementation of the final remedy at LHAAP-16 in September 2019, the GWTP stopped receiving groundwater flow from eight extraction wells at LHAAP-16. The GWTP also currently receives extracted groundwater from LHAAP-17, which began in August 2022 (see **Section 8.3.3**).

Quarterly evaluation reports present groundwater treatment information for LHAAP-18/24.

The groundwater remediation processing for LHAAP-18/24 comprises the following operable systems:

- Equalization tank (water storage) pretreatment system (metals removal);
- Air stripper system;
- Sludge treatment system (thickening, devolatilization, and belt filter press);
- Perchlorate treatment system (fluidized bed reactor [FBR] and ion exchange [IX] vessels);

- Various pumps, meters, piping, and valves tying the treatment systems together; and
- Programmable Logic Controller (PLC) that communicates the status of the operable systems, including the extraction wells, to a central computer that can then notify the operators of shutdowns and similar issues remotely.

Contaminated water from the extraction wells and ICTs is pumped into the GWTP and stored in the equalization storage tank. The contaminated water is then pumped to the pretreatment system for precipitation of metals. Sludge from the pretreatment system is delivered to the sludge treatment system to be thickened, air stripped of VOCs, and filter pressed for disposal in a landfill. The water from the pretreatment system is delivered to the air stripper system for air stripping of VOCs. Water from the air stripper is stored in the effluent storage tank for further treatment by the perchlorate system, which consists of a FBR and IX vessels.

Groundwater extraction, treatment, discharge, and monitoring activities include:

- Continuous extraction of groundwater from multiple ICTs and extraction wells at LHAAP-18/24;
- Treatment of extracted groundwater for heavy metals, chlorinated compounds, and perchlorate using precipitation, air stripping, and biological methods, respectively;
- Evaluation of the hydraulic effectiveness of the extraction system by groundwater monitoring;
- Monitoring and analysis of treated groundwater to ensure compliance with the discharge limits; and
- Discharge of treated water to Harrison Bayou or to a holding pond (INF Pond), or the treated water may be released as irrigation water on LHAAP-18/24.

The locations of the extraction wells and ICTs are shown on **Figure 34**. The process flow diagram of the GWTP is shown on **Figure 35**.

The existing GWTP will continue to be operational during the implementation of the 2020 remedy and will continue to hydraulically control migration of contaminants while the soil and groundwater remedial actions are being completed. Army will evaluate if the in-situ remedial technologies specified in the RD sufficiently reduced site COCs to levels amenable to MNA and will determine at that time if a new or modified GWTP is required.

9.3.3.2 Groundwater Monitoring

Groundwater monitoring is performed semi-annually at LHAAP-18/24 for select wells in the shallow zone and Wilcox formation. The wells sampled are modified to capture spatial variability, which is documented in the Quarterly Evaluation Reports (AECOM, 2017).

9.3.3.3 Land Use Controls

According to the 2020 ROD, implemented LUCs are to have the following performance objectives (Army, 2020):

- *Prohibit groundwater use (except for environmental testing and monitoring) as a potable source until the levels of COCs (i.e., including all hazardous substances, pollutants, and contaminants found at the Site at cleanup levels as listed in [Table 31]) in groundwater are met.*
- *Restrict land use to nonresidential until it is demonstrated that the surface and subsurface soil and groundwater COCs (i.e., including all hazardous substances, pollutants, and contaminants found at the Site at cleanup levels as listed in [Table 31]) are at levels that allow for unlimited use and unrestricted exposure.*
- *Preserve the integrity of the surface impoundment cap and restrict intrusive activities that may degrade or alter the cap until the underlying source soil is removed and/or the cleanup levels for soil listed in [Table 31] have been achieved.*
- *Maintain the integrity of any current or future remedial or monitoring systems until the levels of COCs (i.e., including all hazardous substances, pollutants and contaminants found at the Site at cleanup levels as listed in [Table 31]) in groundwater are met.*

Army provided the initial notice of the LUCs and preliminary boundaries on March 16, 2020, to federal, state, and local officials including Senators and Congressman, State Representatives, the Harrison County Judge, the City of Uncertain Mayor, and Caddo Lake and Leigh Water Supply Corporations' Presidents and Boards of Directors, as well as the Caddo Lake National Wildlife Refuge manager, the future transferee of the property. Final notification has not occurred to date. The interim LUC boundary is shown in **Appendix F**.

9.3.4 Operations, Maintenance and Monitoring

Operations and maintenance at the GWTP include routine maintenance, as well as maintenance required because of malfunctions or weather, including extreme freezing temperatures in December 2022. A historical summary of the GWTP operations is contained within the 4th quarter 2022 quarterly evaluation report, and relevant sections from the report are included as **Appendix G**.

During the last five years, major maintenance was required during each quarterly reporting period (see **Appendix G**). Examples of major maintenance activities include repairs to a sodium hydroxide tank, replacement of a blown fuse on an overhead powerline, installation of a transformer, and replacement of broken valves and pipes.

Routine maintenance and sampling activities include the following:

- Perform housekeeping

- Mow grass and trim weeds
- Remove and clean basket from 4-inch strainer on discharge of the PBR
- Replace tubing
- Replace filter socks
- Install new sump pumps
- Replace air regulator
- Repair air lines
- Install freeze protection
- Replace valves and flanges
- Collect quarterly surface water samples
- Collect quarterly air samples at GWTP
- Collect monthly water levels at LHAAP-18/24
- Collect influent and effluent samples

Figure 36 shows the monthly total volume of groundwater that was extracted from the ICT and extraction wells at LHAAP-18/24 between January 2014 and December 2022; at LHAAP-16 between January 2014 and September 2019; and at LHAAP-17 from August 2022 to December 2022. Extracted groundwater volumes from LHAAP-16 and LHAAP-17 have remained relatively stable during the period shown, but LHAAP-18/24 has seen a more inconsistent trend that is beginning to stabilize. **Figure 37** shows the treated groundwater discharged monthly from June 2012 through December 2022, which has fluctuated over time but by the end of 2021 to 2022 has stabilized in volumes discharged.

The GWTP was subject to frequent shutdowns in the last five years due to plant malfunctions and weather-related incidents. The RD states that maintenance for the GWTP is included in the plan until the GWTP is no longer needed to achieve cleanup levels.

Monitoring at LHAAP-18/24 included monitoring related to the operation of the GWTP, semi-annual groundwater monitoring, as well as a pre-design investigation to refine the conceptual site model prior to completing the RD for the final remedy. Sampling and analysis were conducted each quarter in accordance with the requirements specified in the Final Revised Sampling and Analysis Plan (AECOM, September 2017). Sample analyses are performed on the influent and effluent samples to monitor the effectiveness of the perchlorate treatment (FBR and/or IX vessels) process.

The pre-design investigation included advancing 44 DPT borings to the clay layer separating the Shallow Zone from the Wilcox Formation to further evaluate the extent of perchlorate and VOC contaminated groundwater and soil present outside the Northeast ICTs Boundary and the planned ISB grids in the southwest corner of the site. Soil samples were collected at 17 DPT borings advanced outside the Northeast ICTs Boundary; soil

samples were not collected from DPT borings installed within the planned ISB grids. All temporary DPT wells and five permanent monitoring wells were installed a foot or two into the clay at each location and fitted with 10-foot screens. One permanent monitoring well was installed in the northwest corner near MW-14 to evaluate the extent of contamination in the upper Wilcox Formation.

9.4 PROGRESS SINCE THE FOURTH FIVE-YEAR REVIEW

The following presents the protectiveness statement presented in the Fourth Five-Year Review Report for LHAAP-18/24 (USACE, 2019):

The remedy at LHAAP-18/24 currently protects human health and the environment because soil removal/treatment, groundwater extraction, and groundwater monitoring have reduced and/or prevented further migration of contaminants of concern into deeper groundwater zones and surface water bodies, thereby eliminating or minimizing the potential for exposure to human and ecological receptors. However, in order for the remedy to be protective in the long-term, the following actions need to be taken to ensure protectiveness: Implement the preferred alternative identified in the 2019 Proposed Plan, consisting of enhanced groundwater extraction and treatment, Land Use Controls (LUCs), enhanced in situ bioremediation inside and outside of the containment area in the shallow zone and in the Wilcox Formation, unsaturated soil excavation and off-site disposal, and thermal dense non-aqueous phase liquid (DNAPL) removal.

Table 32 lists the LHAAP-18/24 issues and corresponding recommendations affecting protectiveness identified in the Fourth Five-Year Review and the summary of completion. **Table 33** lists the LHAAP-18/24 findings and corresponding recommendations not affecting protectiveness from the Fourth Five-Year Review and the summary of completion.

Table 32 – LHAAP-18/24 Issues/Recommendations from the Fourth Five-Year Review

Issues from Previous Review	Recommendations from Previous Review	Action Taken	Date of Action
Groundwater treatment plant operation experiences frequent breakdowns resulting in excessive down time, reduced mass removal, increasing potential impacts to Harrison Bayou.	*Implement the preferred alternative identified in the 2019 Proposed Plan, consisting of enhanced groundwater extraction and treatment, Land Use Controls (LUCs), enhanced in situ bioremediation inside and outside of the containment area in the shallow zone and in the Wilcox Formation, unsaturated soil excavation and off-*	The final ROD was signed in February 2020. Army is currently working on the remedial design for the final remedy.	February 2020

Issues from Previous Review	Recommendations from Previous Review	Action Taken	Date of Action
	site disposal, and thermal dense non-aqueous phase liquid (DNAPL) removal.		

Table 33 – LHAAP-18/24 Finding/Recommendation from the Fourth Five-Year Review Not Affecting Protectiveness

Finding from Previous Review	Recommendation from Previous Review	Action Taken	Date of Action
GAC is redundant.	*Consider removing GAC from the treatment train.*	The recommendation has not been implemented. GAC is still part of the treatment train.	Not completed
N/A	*Track LHAAP-18/24 O&M costs separately from LHAAP-16.*	LHAAP-16 no longer includes groundwater extraction and treatment at the GWTP.	September 2019

9.4.1 PFAS Preliminary Assessment/Site Inspection

LHAAP-18/24 was retained as an area of potential interest in the LHAAP 2023 PFAS PA/SI following records research, personnel interviews, and site reconnaissance due to historical treatment, storage, and disposal of potentially PFAS-containing material.

Groundwater samples were obtained from three existing monitoring wells in LHAAP-18. PFOS was detected at a concentration less that the OSD Risk Screening Level of 4 ng/L in two groundwater samples at 3.4 ng/L and 2.8 ng/L. PFOA was detected a concentration greater than the OSD Risk Screening Level of 6 ng/L in two groundwater samples at 7.1 ng/L and 22 ng/L and at a concentration less that the OSD Risk Screening Level in one groundwater sample at 5.2 ng/L. PFBS was detected at a concentration below the OSD Risk Screening Level of 601 ng/L in one groundwater sample at 3.5 ng/L. PFNA was not detected at any of the groundwater samples collected from LHAAP-18. PFHxS was detected at a concentration below the OSD Risk Screening Level of 39 ng/L in one groundwater samples at 2.4 ng/L. Soil samples were collected at five locations within LHAAP-18. PFOS, PFOA, PFBS, PFNA, and PFHxS were not detected in any of the soil samples collected.

Three groundwater samples were collected at LHAAP-24 from three existing monitoring wells. PFOS was detected at a concentration greater than the OSD Risk Screening Level of 4 ng/L in two groundwater samples at concentrations of 26 ng/L and 42 ng/L and at a concentration less than the OSD Risk Screening Level in one groundwater sample at a

concentration of 2.9 ng/L. PFOA was detected at a concentration that was greater than the OSD Risk Screening Level of 6 ng/L in three groundwater samples at concentrations of 23 ng/L, 24 ng/L, and 9.3 ng/L. PFBS was detected at a concentration less than the OSD Risk Screening Level of 601 ng/L in three groundwater samples at concentrations of 9.5 ng/L, 11 ng/L, and 1.9 ng/L. PFNA was not detected in any of the groundwater samples collected. PFHxS was detected at a concentration less than the OSD Risk Screening Level of 39 ng/L in three groundwater samples at concentrations of 2.2 ng/L, 5.3 ng/L, and 5.6 ng/L.

Due to concentrations above the OSD Risk Screening Levels LHAAP-18/24 was recommended for further study in a remedial investigation.

9.5 DATA REVIEW

9.5.1 PRE-DESIGN INVESTIGATION

Figures 38 and **39** present the perchlorate plume boundary from the first quarter of 2023 Quarterly Evaluation Report for the Groundwater Treatment Plant . The plume is still within the bounds of the proposed LUC boundary but is close to the northeast boundary along the roadway.

To confirm groundwater contamination does not extend northwest of monitoring well MW-14, the pre-design investigation installed a permanent monitoring well, 1824DPTMW06, northwest of well MW-14. Perchlorate, *cis*-1,2-DCE, TCE and 1,4-dioxane were detected at very low concentrations below the TRRP Tier 1 Groundwater Residential PCL and MCL, except for TCE. TCE was detected at an estimated concentration of 37.3 J µg/L, exceeding the MCL of 5 µg/L.

The pre-design investigation also included surface and subsurface soil sampling to identify the nature and extent of contamination remaining in soil. Elevated concentrations, in exceedance of soil cleanup levels, are present outside the northeast ICT boundary. TCE and perchlorate contamination in subsurface soil is at depths ranging from 24 feet bgs to 42 feet bgs**.**

9.5.2 GROUNDWATER

Groundwater samples were collected semi-annually during the review period for laboratory analysis (VOCs, perchlorate, 1,4-dioxane, and metals). Data collected from 2018 through 2022 were available for review. Data were compared to the cleanup levels identified in the 2020 ROD (**Table 31**). Mann-Kendall trend analysis was completed for data sets that exceeded cleanup levels and had detection rates of greater than 50%. Data summaries and trend analyses are included in **Appendix E**.

9.5.2.1 Within Subsite Boundary

Cleanup levels were exceeded in 21 monitoring wells located within the subsite boundary between 2018 and 2022.

Perchlorate exceeded the cleanup level of 17 µg/L in 18 on-site monitoring wells between 2018 and 2022. The lateral extent of perchlorate contamination includes the entire subsite.

1,4-Dioxane exceeded the cleanup level of 26 µg/L in 3 on-site monitoring wells between 2018 and 2022. Exceedances are located near the western corner of the subsite and in an isolated area in the central portion of the subsite.

Benzene, carbon tetrachloride, 1,2-DCA, 1,2-DCE, cis-1,2,-DCE, trans-1,2-DCE, methylene chloride, PCE, 1,1,2-TCA, TCE, and VC exceeded their respective cleanup levels between 2018 and 2022. VOC contamination impacts the entire subsite.

Arsenic, barium, chromium, manganese, and nickel exceeded their respective cleanup levels between 2018 and 2022. The lateral extents of metals exceedances are limited in size.

9.5.2.2 Downgradient Toward Harrison Bayou

Cleanup levels were exceeded in 10 wells located between the subsite boundary and Harrison Bayou between 2018 and 2022.

Perchlorate exceeded the cleanup level of 17 µg/L in 6 monitoring wells located along the west and northwest of the subsite boundary and east of the Harrison Bayou. Mann-Kendall trend analysis indicates decreasing trends in perchlorate in monitoring wells 18CPTMW15, 18CPTMW19, 18CPTMW23, and MW-16 and an increasing trend in monitoring well 18WW08.

1,4-Dioxane exceeded the cleanup level of 26 µg/L in 2 monitoring wells: 18CPTMW23 and MW-16 located near Harrison Bayou. Mann-Kendall trend analysis indicates no increasing or decreasing trend in the concentrations at those monitoring wells.

1,1-DCE, 1,2-DCA, cis-1,2-DCE, TCE, and VC exceeded their respective cleanup levels between 2018 and 2022. Wells with exceedances include 18CPTMW23, 18WW08, and MW-16 which are to the northwest and west of the subsite and east of the Harrison Bayou. Mann-Kendall trend analysis indicate decreasing trends in 1,2-DCA and TCE at well 18CPTMW23, decreasing trends in 1,1-DCE, 1,2-DCA, and TCE at MW-16, and an increasing trend in TCE at 18WW08. There were no trends for vinyl chloride.

Metals (Including arsenic, chromium, manganese, and nickel) exceeded their respective cleanup levels in four monitoring wells between 2018 and 2022. Exceedances are isolated; however, two of the wells (18WW24 and 18WW25) are located within approximately 10 feet of Harrison Bayou (**Figure 38**). Mann-Kendall trend analysis indicates an increasing trend in manganese at monitoring well 18WW24 and a decreasing trend in manganese at 18WW25. Mann-Kendall analysis did not show any other trends for metals.

Overall, the trend of COCs in wells near the Harrison Bayou are decreasing. The increasing trends include perchlorate, manganese, and TCE, which occurs at three

monitoring wells out of 14 that were analyzed for this boundary. Migration of COCs from within the site have the potential to flow off-site below and through gaps in the ICTs where the ICTs do not meet the clay layer. However, due to the gradient seen in monitoring wells 18CPTMW16, 18WW07, and 18WW08 surrounding the Harrison Bayou contaminated groundwater is likely flowing under the Bayou. Harrison Bayou is sampled for perchlorate on a quarterly basis. The results for the Harrison Bayou perchlorate sampling are mostly non-detects or low estimated values of less than 1 µg/L except for location HBW-7. The highest detection was in location HBW-7 with an initial detection of 27 µg/L but was later resampled and produced a 1.2 µg/L estimated value. Without surface water sampling data, a full determination of surface water contamination cannot be made.

9.5.2.3 Off-Site Monitoring Wells

Cleanup levels were exceeded in three off-site wells located to the northwest[1] between 2018 and 2022. Perchlorate exceeded the cleanup level of 17 µg/L in all three wells. VOCs (TCE and methylene chloride) and arsenic exceeded their respective cleanup levels in one well (125).

Cleanup levels were exceeded in eight off-site wells located to the northeast between 2018 and 2022. Perchlorate exceeded the cleanup level of 17 µg/L in 4 monitoring wells. VOCs (including methylene chloride, TCE, and VC) exceeded their respective cleanup levels in three monitoring wells. Metals (including arsenic, barium, chromium, lead, manganese, and nickel) exceeded their respective cleanup levels in six monitoring wells.

Cleanup levels were exceeded in 11 off-site wells located to the southwest between 2018 and 2022. Perchlorate exceeded the cleanup level of 17 µg/L in 3 monitoring wells. 1,4-Dioxane exceeded the cleanup level of 26 µg/L in 1 monitoring well. VOCs (including benzene, carbon tetrachloride, 1,1-DCE, 1,2-DCA, methylene chloride, TCE, 1,2-trichloroporane, and VC) exceeded their respective cleanup levels in eight monitoring wells. Metals (including arsenic, chromium, manganese, and nickel) exceeded their respective cleanup levels in six monitoring wells.

Cleanup levels were exceeded in four off-site wells located to the southeast between 2018 and 2022. Perchlorate exceeded the cleanup level of 17 µg/L in 2 monitoring wells. VOCs (including 1,2-DCA, methylene chloride, PCE, and TCE) exceeded their respective cleanup levels in one monitoring well. Metals (including arsenic, barium, cadmium, chromium, manganese, and nickel) exceeded their respective cleanup levels in three monitoring wells.

[1] This discussion does not include the monitoring wells used to assess potential migration to Harrison Bayou, see Section 9.5.2.2.

9.5.3 GWTP

Data are presented in **Appendix E, Table E.18**. Data show the system remains effective at reducing perchlorate concentrations to below the Harrison Bayou Maximum Allowable Daily Discharge Perchlorate Concentration (589 µg/L). The data also show that all other COCs are below Maximum Allowable Daily Discharge Concentrations except for barium. Barium exceeded the Daily Discharge Concentration of 2 mg/L one time in 3Q2021 at 2.66 mg/L. Quarterly groundwater elevation measurements show that groundwater extraction at the interceptor trenches (along the subsite perimeter) results in radial groundwater flow towards the trenches. Elevation measurements do not show distinct effects in the immediate vicinity of extraction wells EW-1 and 18WW17. The trenches along the southwest and northwest borders (ICT-12A through 12E and ICT-13A through 13G) are lined with HDPE on the downgradient sides; these liners provide a physical barrier to movement of shallow groundwater toward Harrison Bayou, but also prevent capture of the groundwater contaminant plume outside of the subsite boundaries by the extraction system (Bhate, 2023).

9.6 SITE INSPECTION

The Five-Year Review site inspection confirmed there is no groundwater use and land use remain non-residential. LUCs are enforced but documentation of restrictions on land use and groundwater use in accordance with the ROD is pending.

The GWTP was observed to be in good operable condition, though the system is aging and requires frequent maintenance.

9.7 TECHNICAL ASSESSMENT

9.7.1 QUESTION A – IS THE REMEDY FUNCTIONING AS INTENDED BY THE DECISION DOCUMENTS?

The remedy is not yet functioning as intended by the 2020 ROD, as the remedy has not been fully implemented and is in the remedial design phase. However, implementation of groundwater extraction/treatment as well as the cap over the unlined evaporation pond occurred as part of the interim remedial action and will remain a part of the final remedy. Those aspects of the remedy are effective and functioning as designed to 1) protect human health by preventing human exposure to the groundwater contaminated with COCs and 2) return groundwater to its potential beneficial use as drinking water, wherever practicable. The RAO to prevent groundwater contaminated COCs from migrating into nearby surface water appears to be functioning properly due to the groundwater gradient, but further evidence is needed to ensure high concentrations of COCs in groundwater are not entering Harrison Bayou. The perchlorate sampling in the Harrison Bayou is essential data for making surface water contamination conclusions but there are other COCs such as TCE and manganese that are not being sampled for that have high concentrations in wells near the Bayou. The RAO to prevent migration of contaminants to groundwater from potential sources in the soil is not currently being achieved because the remedy has not been fully implemented. A pre-design investigation

identified additional areas of soil contamination that appear to be contributing to groundwater contamination but do not present a direct contact hazard. Monitoring data show that the GWTP is reducing concentrations of COCs in the groundwater, though with limited effectiveness because of frequent shutdowns.

Army provided the initial notice of the LUCs and preliminary boundaries on March 16, 2020 to federal, state, and local officials. Final notification has not occurred to date. The Five-Year Review site inspection did not observe any violations of LUCs nor evidence of prohibited use of groundwater. Groundwater data collected during the pre-design investigation determined the perchlorate plume extends further northeast but is still within the LUC boundary.

9.7.2 Question B – Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of the remedy selection still valid?

Yes, toxicity data, cleanup levels, and RAOs used at the time of the final remedy selection in 2020 remain valid. There have been no changes in land use.The cleanup levels established in the 2020 ROD remain valid.

The exposure assumptions used at the time of the remedy are no longer valid. A 2023 PFAS PA/SI revealed concentrations of PFOA and PFOS greater than the OSD Risk Screening Levels. Army is initiating an RI that will include LHAAP-18/24. Currently, the extent of the PFOA and PFOS in groundwater is unknown however, there are LUC restrictions on groundwater use at LHAAP-18/24 that will prevent exposure to PFAS-contaminated groundwater.

9.7.3 Question C – Has any other information come to light that could call into question the protectiveness of the remedy?

No other information has come to light that calls into question the protectiveness or performance of the remedy.

9.7.4 Technical Assessment Summary

The remedy is not yet functioning as intended by the 2020 ROD, as the remedy has not been fully implemented and is in the remedial design phase. However, implementation of groundwater extraction/treatment as well as the cap over the unlined evaporation pond occurred as part of the interim remedial action and will remain a part of the final remedy. Those aspects of the remedy are effective and functioning as designed to 1) protect human health by preventing human exposure to the groundwater contaminated with COCs, 2) prevent groundwater contaminated with COCs from migrating into nearby surface water, and 3) return groundwater to its potential beneficial use as drinking water, wherever practicable. COCs remain in soils above soil cleanup levels but occur at depths that do not pose a potential hazard to human and ecological receptors. Preventing migration of contaminants to groundwater from potential sources in the soil is the only RAO currently not being achieved. Army provided the initial notice of the LUCs and preliminary boundaries on March 16, 2020, to federal, state, and local officials.

Groundwater data collected during the pre-design investigation determined the perchlorate plume extends further northeast but is still within the LUC boundary. Final notification has not occurred to date. The Five-Year Review site inspection did not observe any violations of LUCs nor evidence of prohibited use of groundwater.

9.8 ISSUES

No issues were identified during this Five-Year Review that prevent the remedy from being protective now or in the future.

9.9 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

9.9.1 RECOMMENDATIONS

No recommendations are required since there were no issues identified during this Five-Year Review that affect current or future protectiveness of the remedy.

9.9.2 OTHER FINDINGS

The following Other Findings do not affect protectiveness:

- Complete surface water sampling to ensure no migration of COCs to Harrison Bayou.
- Ensure final remedy design addresses potential off-site migration of COCs.

9.10 PROTECTIVENESS STATEMENT

The planned remedy at LHAAP-18/24 is expected to be protective of human health and the environment upon completion. It is expected that the final remedial actions will take approximately 7 years to complete, at which time a protectiveness determination will be made.

Implementation of groundwater extraction/treatment as well as the cap over the unlined evaporation pond occurred as part of the interim remedial action and will remain a part of the final remedy. Remedial activities completed to date have adequately addressed all exposure pathways that could result in unacceptable risks in these areas. COCs remain in soils above soil cleanup levels but occur at depth and do not pose a risk to human health. The extent of PFAS contamination at LHAAP-18/24 is not yet known, but LUCs prevent exposure to PFAS-contaminated groundwater.

10.0 LHAAP-35B (37) CHEMICAL LABORATORY

10.1 SITE CHRONOLOGY

Important events and relevant dates for LHAAP-35B (37) are presented below in **Table 34**.

Table 34 – LHAAP-35B (37) Chronology

Event	Date
Chemical Laboratory Constructed	1953 – 1955
Three Phases of Remedial Investigations Completed, Monitoring Wells Installed, Groundwater and Soil Sampling Completed	1993-1998
First Five-Year Review Report	2002
Baseline Human Health Risk Assessment	2003
One Additional Monitoring Well Installed and Groundwater Sampling Completed	2004
Feasibility Study Conducted	2005
Three Additional Monitoring Wells Installed and Groundwater Sampling Completed	2006
Natural Attenuation Evaluation	2007
Baseline Ecological Risk Assessment	2007
Two Additional Monitoring Wells Installed and Groundwater Sampling Completed	2007
Final Proposed Plan	2008
Second Five-Year Review Report	2008
Final Record of Decision LHAAP-35B (37) and LHAAP-67	June 7, 2010
Final Remedial Design	2011
Well Installation and Sampling Completion Report	2012
In Situ Microbial Bioreactor Field Test	2012 – 2013
Final Remedial Action Work Plan	2013
MNA Monitoring Well Network Construction Completed	2013
Third Five-Year Review Report	2014
Final Remedial Action Completion Report	2016
Remedial Action Operation	2016 - Present
Fourth Five-Year Review Report	2019

LHAAP – Longhorn Army Ammunition Plant
MNA – Monitored Natural Attenuation

10.2 BACKGROUND

10.2.1 PHYSICAL CHARACTERISTICS

LHAAP-35B (37), the Chemical Laboratory, comprises approximately 12.2 acres in the north-central portion of LHAAP near the southwestern corner of LHAAP-47 (**Figure 40**). Perpendicular to the western border of LHAAP-35B (37) runs Goose Prairie Creek which turns south through the east-central portion of the area. At LHAAP-35B (37) there is a mixture of asphalt-paved roads, parking areas, remnants of concrete foundations and partial walls of administration buildings, the former Chemical Laboratory (Building 29-A), and vegetated areas (AECOM, 2016b).

10.2.2 LAND AND RESOURCE USE

The reasonably anticipated future land use is a national wildlife refuge. The 2004 MOA between USFWS and the Army documents the transfer of LHAAP land to USFWS. The former LHAAP is now known as the Caddo Lake National Wildlife Refuge. LHAAP-35B (37) will be transferred under this agreement in the future (Shaw, 2010a).

None of the water wells at LHAAP are used for drinking water; they supply water for non-potable uses only. However, the State of Texas considers all groundwater as potential drinking water, unless otherwise classified in accordance with 30 TAC 335.563(h)(1).

10.2.3 HISTORY OF CONTAMINATION

The Chemical Laboratory was originally used to support production activities at LHAAP, which included research and testing of materials used in the production processes and quality assurance testing. One waste rack sump was located at LHAAP-35B (37) (Shaw, 2010a).

10.2.4 INITIAL RESPONSE

No initial response actions occurred at LHAAP-35B (37).

10.2.5 BASIS FOR TAKING ACTION

Groundwater poses an unacceptable risk or hazard to a hypothetical future maintenance worker at LHAAP-35B (37) under an industrial scenario (Jacobs, 2003). The primary COCs for LHAAP-35B (37) groundwater are TCE, PCE, and 1,1-DCE due to their significant contribution to the total risk. Additionally, hazardous substances present in LHAAP-35B (37) groundwater could potentially discharge to surface water in Goose Prairie Creek, which flows to Caddo Lake, a drinking water supply.

10.3 REMEDIAL ACTIONS

10.3.1 REMEDIAL ACTION OBJECTIVES

The RAOs for groundwater as defined in the 2010 ROD are (Army, 2010):

- *Protection of human health by preventing human exposure to the contaminated groundwater*
- *Protection of human health and the environment by preventing contaminated groundwater from migrating into nearby surface water*
- *Return of groundwater to its potential beneficial uses as drinking water, wherever practicable*

Because contaminated groundwater has the potential to discharge to Central Creek and Goose Prairie Creek, downgradient surface water features that flow to Caddo Lake, a drinking water supply, chemical-specific ARARs for surface water consumption have been identified as appropriate and relevant (**Table 35**).

Table 35 – LHAAP-35B (37) Cleanup Levels and Chemical-Specific ARARs

Medium	Contaminant of Concern	Cleanup Level (µg/L)
Groundwater	1,1-Dichloroethene (1,1-DCE)	**7**
	Tetrachloroethene (PCE)	**5**
	Trichloroethene (TCE)	**5**
	Antimony	**6**
	Thallium	**2**
Medium	**Contaminant of Concern**	**30 TAC 307.6(d)(1) (µg/L)**
Surface Water	Trichloroethene (TCE)	5
	Tetrachloroethene (PCE)	5
	1,1-Dichloroethene (1,1-DCE)	1.63*

Source: U.S. Army, 2010
µg/L – Micrograms per liter
*Current 1,1-DCE Cleanup Level per 30 TAC 307.6(d)(1) is 7 µg/L

10.3.2 Remedy Description

The 2010 ROD selected the following remedy for LHAAP-35B (37) (Army, 2010):

Alternative 2, LUCs with MNA, is the preferred alternative for LHAAP-35B (37)…and is consistent with the intended future use of the sites as a wildlife refuge.

Based on groundwater modeling, groundwater MCLs are expected to be met through natural attenuation in 28 to 38 years for PCE, 39 to 43 years for TCE, and 16 to 21 years for 1,1-DCE at LHAAP-35B (37).

10.3.3 Remedy Implementation

10.3.3.1 Land Use Controls

LUCs restrict the use of groundwater exceeding the applicable cleanup levels to environmental monitoring and testing only. The LUC will remain in effect until such time as Army, EPA, and TCEQ agree that COC concentrations have met cleanup levels. A civil survey of the LUC boundary was completed in January 2015 and recorded in the Harrison County Courthouse in March 2015.

10.3.3.2 Monitored Natural Attenuation

An MNA program has been implemented to establish attenuation trends and to confirm the VOC plume is stable or decreasing and does not migrate to nearby surface water. The groundwater monitoring program includes surface water monitoring. Groundwater monitoring evaluates and monitors natural attenuation of COCs in shallow zone groundwater. Surface water monitoring evaluates potential migration of contaminated groundwater to surface water. Monitoring occurred 2018 through 2022.

Objectives of the monitoring program include:

- Demonstrate that natural attenuation is effectively occurring.
- Detect changes in environmental conditions (e.g., geochemical, hydrogeologic, etc.) that may reduce the efficacy of natural attenuation processes.
- Identify potentially toxic and/or mobile transformation products.
- Verify that the plume(s) is not expanding.
- Verify no unacceptable impact to downgradient receptors.
- Detect new releases of contaminants to the environment that could impact effectiveness of the natural attenuation remedy.
- Verify attainment of the RAOs.

10.3.4 Operations, Maintenance and Monitoring

Quarterly and semiannual groundwater monitoring occurred from 2018 through 2022. The groundwater monitoring network is shown on **Figure 41**. Groundwater monitoring included measuring groundwater elevations. Site-wide, groundwater elevations have increased by approximately 2 feet and fluctuate seasonally with variances between 2 to 3 feet.

Surface water samples were collected in 2018 and 2020. Surface water samples, per the RACR, are not collected if groundwater elevations are lower than the creek bottom elevation during a particular sampling event, indicating that the groundwater is not influencing the creek. To determine if groundwater contamination may be contributing to the surface water, the groundwater elevations at 35BWW05 and 35BWW12 were compared to the creek bottom elevations at 35BSW01 and 35BSW02, respectively. In

2019, 2021, and 2022, groundwater elevations were below the creek bottom elevation of both surface water sampling locations.

Annual LUC inspections were conducted to confirm no violations of LUCs occurred. LUC compliance certification documentation is included with annual RA(O) reports and confirms no unauthorized use of groundwater, no installation of new groundwater wells, and no tampering with existing wells. Well maintenance activities occurred, as required, and included re-installing bollards and painting of bollards and well stickup casings. Mowing the area to control brush and weeds is conducted to allow access to the wells.

10.4 PROGRESS SINCE THE FOURTH FIVE-YEAR REVIEW

The following presents the protectiveness statement presented in the Fourth Five-Year Review Report for LHAAP-35B (37) (USACE, 2019):

The LHAAP-35B (37) remedy is protective of human health and the environment. LUCs ensure there is no exposure, and MNA ensures a stable or decreasing plume.

Table 36 lists the LHAAP-35B (37) issues and corresponding recommendations identified in the Fourth Five-Year Review and the summary of completion.

Table 36 – LHAAP-35B (37) Findings/Recommendations from the Fourth Five-Year Review

Finding from Previous Review	Recommendations from Previous Review	Action Taken	Date of Action
None. The available data are insufficient to evaluate the MNA remedy.	*The MNA remedy will be evaluated in the 2024 Five-Year Review.*	No action required.	N/A

MNA – monitored natural attenuation
N/A – not applicable

10.5 DATA REVIEW

10.5.1 SURFACE WATER

Surface water samples collected in February 2018, November 2018, and May 2020, at both sampling location 35BSW01 and 35BSW02, were all nondetect for COCs (**Appendix E, Table E.20**).

10.5.2 GROUNDWATER

The TCE, PCE, and 1,1-DCE plumes during baseline sampling in 2013 and 2014 and the plumes as interpolated following the November 2021 and May 2022 sampling events are presented in **Figures 43, 44, and 45**, respectively. The figures show that the plume for 1,1-DCE is no longer detected by the November 2021 sampling event. The plumes for TCE and PCE are contracting and migrating in a northwesterly direction. **Table 37**

presents the Mann-Kendall trend analysis results for wells where COCs exceeded cleanup levels from February 2018 to May 2020. 1,1-DCE has not been detected at values exceeding cleanup levels during any monitoring event from 2018 through May 2022.

Table 37 also presents the May 2020 MNA parameters for those wells where MNA parameters are evaluated (35BWW04, 35BWW08, 35BWW12, and 35BWW14). **Appendix E** presents the Mann-Kendall trend analysis results for the entire data set. **Appendix E, Table E.20** presents the groundwater monitoring data for LHAAP-35B (37). The current geochemical conditions are not favorable to MNA by biological degradation, however the primary MNA processes reducing concentrations are abiotic processes including dispersion, dilution, sorption, and volatilization. No increasing trend was observed at any monitoring well with a COC above the respective MCL. Results from future sampling events will be evaluated for concentration trends.

Table 37 – LHAAP-35B (37) 2018-2020 Trend Analysis Results

Well ID	PCE Trend	TCE Trend	MNA Parameters
	Concentration Range	Concentration Range	
35BWW04	No Trend 2.2 µg/L (Aug 2018) – 10 µg/L (Feb 2018)		TOC – 0.941J mg/L ORP – 228 mV Sulfate – 27.1 mg/L pH – 5.43
35BWW05	No Trend 1.1 µg/L (May 2019) – 4.1 µg/L (May 2022)	Decreasing 1.8 µg/L (May 2022) – 10 µg/L (Feb 2018)	Not sampled
35BWW09		Decreasing 13 µg/L (May 2021) – 580 µg/L (Nov 2018)	Not sampled
35BWW10	Decreasing Nondetect (May 2022) – 45 µg/L (Nov 2018)	Decreasing Nondetect (May 2022) – 50 µg/L (Feb 2019)	Not sampled
35BWW12	Decreasing 2 µg/L (May 2022) – 8.7 µg/L (Nov 2018)		TOC – 1.92 mg/L ORP – 153 mV Sulfate – 32.6 mg/L pH – 5.65
35BWW14	No Trend 19 µg/L (May 2022) – 44 µg/L (Feb 2018)	Decreasing 5.1 µg/L (May 2022) – 110 µg/L (May 2019)	TOC – <1 mg/L ORP – 246 mV Sulfate – 59.2 mg/L pH – 6.13
35BWW15	No Trend 7.8 µg/L (May 2019) – 14 µg/L (May 2021)	Decreasing 4.9 µg/L (May 2022) – 14 µg/L (Feb 2018)	Not sampled

Well ID	PCE Trend	TCE Trend	MNA Parameters
	Concentration Range	Concentration Range	
35BWW16	Decreasing	Decreasing	Not sampled
	Nondetect (May 2022) – 15 µg/L (Nov 2018)	Nondetect (May 2022) – 6.5 µg/L (Nov 2018)	
35BWW20	Decreasing	Decreasing	Not sampled
	5.4 µg/L (Nov 2021) – 34 µg/L (Feb 2018)	1.3 µg/L (Nov 2021) – 6.3 µg/L (May 2018)	
35BWW25		No Trend	Not sampled
		5.3 µg/L (Aug 2018) – 15 µg/L (Aug 2019)	
LHSMW58	No Trend	No Trend	Not sampled
	3.1 µg/L (Feb 2019) – 26 µg/L (Aug 2018)	Nondetect – 2.2 µg/L (Aug 2018)	

Strikethrough boxes indicate insufficient data to conduct trend analysis

There are two monitoring wells outside of the LHAAP-35B (37) boundary that consistently have TCE concentrations exceeding the MCLs, 35BWW09 and 35BWW25. The most recent TCE concentration at each well was 34 µg/L and 10 µg/L, respectively. There is no concentration trend at monitoring well 35BWW25 and a decreasing trend at monitoring well 35BWW09. Based on groundwater flow to the north-northeast (**Figures 45 and 46**), monitoring well 35BWW09 is an upgradient well and monitoring well 35BWW25 is downgradient. The fluctuating concentrations in TCE at upgradient groundwater monitoring well 35BWW09 may be due to the increases in groundwater elevations but is overall decreasing. There are no monitoring wells further downgradient from monitoring well 35BWW25, and the northern boundary of the TCE plume is not defined. The plume may extend outside of the LUC boundary (**Figure 44**).

10.6 SITE INSPECTION

The Five-Year Review site inspection confirmed LUCs prohibit groundwater use and land use remains non-residential. There were no violations of LUCs, nor evidence of prohibited use of groundwater observed during the site inspection.

Monitoring wells were observed to be in good condition.

10.7 TECHNICAL ASSESSMENT

10.7.1 QUESTION A – IS THE REMEDY FUNCTIONING AS INTENDED BY THE DECISION DOCUMENTS?

Yes, the remedy is functioning as intended by the 2010 ROD. LUCs prevent human exposure to contaminated groundwater. Monitoring data do not indicate contaminated groundwater is migrating to nearby surface water as observed by no detections of any COCs during any of the annual surface water monitoring events. There are some

decreases in contaminant concentrations in groundwater. These decreases do not appear to be the result of optimal geochemical conditions but rather the result of dispersion, dilution, sorption, and volatilization. The TCE plume does not appear to be defined further downgradient from monitoring well 35BWW25, where there is no trend for TCE concentrations and the May 2022 TCE concentration in groundwater was 10 µg/L. Monitoring well 35BWW25 is located near the northern LUC boundary and there is the potential the plume extends beyond the LUC boundary.

10.7.2 Question B – Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of the remedy selection still valid?

Yes, the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of remedy selection remain valid. Land use remains non-residential, as observed during the Five-Year Review site inspection and groundwater use is restricted. There have been no changes to toxicity data or cleanup levels for the COCs identified in the ROD, which include TCE, PCE, and 1,1-DCE. The remedy is progressing toward meeting RAOs with COC concentrations decreasing at most wells due to dispersion, dilution, sorption, and volatilization.

10.7.3 Question C – Has any other information come to light that could call into question the protectiveness of the remedy?

No other information has come to light that calls into question the protectiveness or performance of the remedy.

10.7.4 Technical Assessment Summary

LUCs prevent human exposure to contaminated groundwater. Monitoring data do not indicate contaminated groundwater is migrating to nearby surface water. Contaminant concentrations are decreasing in groundwater and decreases appear to be the result of dispersion, dilution, sorption, and volatilization. The TCE plume is no longer defined further downgradient from monitoring well 35BWW25. Monitoring well 35BWW25 is located near the northern LUC boundary and there is the potential the plume extends beyond the LUC boundary. However, the adjoining area and the LHAAP site maintains restrictions for residential and groundwater use, there are no potable wells is the area, and the reasonable anticipated future land use is for a wildlife refuge. The exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of remedy selection remain valid.

10.8 ISSUES

Table 38 lists the issue identified at LHAAP-35B (37) for this Fifth Five-Year Review.

Table 38 – LHAAP-35B (37) Issues

Issue No.	Issue	Affects Current Protectiveness (Yes/No)	Affects Future Protectiveness (Yes/No)
1	The TCE plume is no longer delineated downgradient from monitoring well 35BWW25. Monitoring well 35BWW25 is located near the northern LUC boundary and there is the potential the plume extends beyond the LUC boundary.	No	Yes

10.9 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

10.9.1 RECOMMENDATIONS

Table 39 lists the LHAAP-35B (37) recommendations for this Fifth Five-Year Review.

Table 39 – LHAAP-35B (37) Recommendations

Issue No.	Recommendation	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Yes/No)	
					Current	Future
1	Conduct additional investigation to delineate the plume boundary downgradient of monitoring well 35BWW25 to determine if the plume extends beyond the LUC boundary.	Army	EPA/TCEQ	December 31, 2025	No	Yes

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10.9.2 Other Findings

There are no Other Findings identified during this Five-Year Review.

10.10 PROTECTIVENESS STATEMENT

The remedy at LHAAP-35B (37) currently protects human health and the environment. LUCs are in place to prevent exposure to contaminated groundwater and to prevent residential use of the property. Groundwater contaminants are not migrating to nearby surface waters. However, in order for the remedy to be protective in the long term, the following action needs to be taken to ensure protectiveness:

- Conduct additional investigation to delineate the plume boundary downgradient of monitoring well 35BWW25 to determine if the plume extends beyond the LUC boundary. Due to the adjoining area and the LHAAP site restrictions on residential use, groundwater use, the lack of potable wells in the area, and reasonable anticipated future use the potential for the plume to extend beyond the LUC boundary does not affect protectiveness at this time.

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11.0 LHAAP-46 PLANT 2 AREA

11.1 SITE CHRONOLOGY

Important events and relevant dates for LHAAP-46 are presented below in **Table 40**.

Table 40 – LHAAP-46 Chronology

Event	Date
Sump Removed	1990s
Multi-Phase Investigation of Group 4 Sites	1992 – 2001
Remedial Investigation	2002
Baseline Human Health Risk Assessment	2003
Additional Investigations Completed to Further Delineate the Extent of Groundwater Contamination	2004
Baseline Ecological Risk Assessment	2007
Feasibility Study Completed	2009
Final Proposed Plan	2010
Final Record of Decision LHAAP-46	September 30, 2010
Remedial Design	September 2011
Remedial Action Work Plan	December 2012
Third Five-Year Review	2014
Remedial Action Completion Report	January 2015
Remedial Action Operation	2015 - Present
Remedial Action Operation Reports	2018 – Present
Fourth Five-Year Review	2019

LHAAP – longhorn Army Ammunition Plant

11.2 BACKGROUND

11.2.1 PHYSICAL CHARACTERISTICS

LHAAP-46, known as the Plant 2 Area, comprises approximately 190 acres in the north-central portion of the installation (**Figure 47**). Features at the site include asphalt-paved roads, parking areas, building foundation remnants, old buildings, and vegetated areas (Shaw, 2010b).

11.2.2 LAND AND RESOURCE USE

The reasonably anticipated future land use is a national wildlife refuge. The 2004 MOA between USFWS and the Army documents the transfer of LHAAP land to USFWS. The

former LHAAP is now known as the Caddo Lake National Wildlife Refuge. LHAAP-46 will be transferred under this agreement in the future (Shaw, 2010b).

There are no bodies of water at LHAAP-46. All surface water drains through ditches and gullies towards tributaries of Goose Prairie Creek, which flows into Caddo Lake.

None of the water wells at LHAAP are used for drinking water; they supply water for non-potable uses only. However, the State of Texas considers all groundwater as potential drinking water, unless otherwise classified in accordance with 30 TAC 335.563(h)(1).

11.2.3 History of Contamination

Production of JB-2 propellant fuel took place at the former Plant 2 Area in 1944 until production halted with the end of World War II in 1945. Operations picked up from 1952 through 1956 to produce photoflash bombs, simulators, hand signals, tracers for 40 mm ammunition, and other pyrotechnic ammunition. Plant 2 was then reactivated in 1964 to produce pyrotechnic and illuminating devices until LHAAP and Plant 2 was placed on inactive status in 1997 (Shaw, 2010b).

11.2.4 Initial Response

No initial response actions occurred at LHAAP-46.

11.2.5 Basis for Taking Action

The basis for taking action is the presence of TCE, DCE, VC and three inorganics (thallium, antimony, and manganese) in groundwater at concentrations posing an unacceptable risk to an industrial worker.

11.3 REMEDIAL ACTIONS

11.3.1 Remedial Action Objectives

The RAOs as defined in the 2010 ROD for LHAAP-46 are (Army, 2010b):

- *Protection of human health by preventing human exposure to the contaminated groundwater*
- *Protection of human health and the environment by preventing contaminated groundwater from migrating into nearby surface water*
- *Return of groundwater to its potential beneficial uses as drinking water, wherever practicable*

Table 41 presents the cleanup levels for the COCs.

Table 41 – LHAAP-46 Cleanup Levels

Medium	Chemical of Concern	Cleanup Level (µg/L)
Groundwater	Trichloroethene	5
	cis-1,2-Dichloroethene	70
	Vinyl Chloride	2

µg/L – Micrograms per liter
U.S. Army, 2010b; Table 2-7

11.3.2 Remedy Description

The 2010 ROD selected Alternative 2, LUCs and MNA as the remedy for LHAAP-46. Components of the remedy include (Army, 2010b):

- LUCs: LUCs in the impacted area ensure protection of human health by restricting the use of groundwater to environmental monitoring and testing only. The LUCs will remain in effect until such time as the U.S. Army, EPA and TCEQ agree that COC concentrations have met cleanup levels.
- MNA: The MNA program establishes attenuation trends and verifies that the VOC plumes are stable or shrinking and are not migrating to surface water at levels that may present an unacceptable risk to human health or the environment. Natural attenuation is expected to return groundwater to acceptable quality over time. The MNA program performance objectives will be evaluated after two years of groundwater monitoring. During those two years, groundwater monitoring will be performed on a quarterly basis.
- Long-Term Monitoring/Five-Year Reviews: MNA will be performed for two years, after which LTM will be continued at a semiannual frequency for the following three years (until the Five-Year Review). In subsequent years, LTM will be performed annually until the next CERCLA Five-Year Review. LTM associated with this remedy will be used to track the continued effectiveness of MNA and will continue once every five years until the cleanup levels are achieved. Based on the calculated attenuation rates for LHAAP-46, groundwater cleanup levels are expected to be attained through natural attenuation in approximately 23 years (Army, 2010b). This timeframe will be reevaluated as part of the MNA evaluation and periodic reviews.

11.3.3 Remedy Implementation

11.3.3.1 Land Use Controls

The LUC Plan is presented in the 2015 RACR and LHAAP-46 LUCs have been added to the Comprehensive LUC Management Plan. The objectives of LUCs at LHAAP-46 are to prevent human exposure to groundwater contamination presenting an unacceptable risk to human health and ensure that there is no withdrawal or use of groundwater beneath the site for anything other than environmental monitoring and testing until the cleanup

levels are attained. A restriction against residential use of groundwater will remain in effect until the levels of COCs in groundwater allow UU/UE. Notification of the groundwater use restriction was recorded at the Harrison County Courthouse in accordance with the TAC Title 30, §335.566 on December 9, 2014.

The LUCs address the area of LHAAP-46 that contains shallow and intermediate zone groundwater contamination. The groundwater analytical baseline data collected as part of the remedial activities in conjunction with the historical data defined the LUC boundary at LHAAP-46 (**Figure 48**). Drought-like conditions at LHAAP-46 in 2013 through 2015 resulted in dry conditions in several DPT points and monitoring wells in the shallow zone, which influenced the interpretation of the shallow zone TCE plume. A buffer to the surveyed LUC boundary was provided to address potential uncertainties in the data.

The legal description of the surveyed LUC area is appended to the existing survey plat for the property, which was recorded in the Harrison County Courthouse in accordance with TAC Title 30, §335.566. The Texas Department of Licensing and Regulation was notified of the groundwater restriction to prohibit water well installation for any purpose other than environmental monitoring and testing without prior approval from the EPA and TCEQ.

11.3.3.2 Monitored Natural Attenuation

MNA has been implemented to monitor COCs and ensure protection of human health and the environment. Performance monitoring to evaluate remedy effectiveness includes groundwater and surface water monitoring. The groundwater monitoring program evaluates and monitors attenuation of COCs in both shallow and intermediate groundwater zones. The surface water monitoring program monitors potential migration of contaminated groundwater to surface water.

The monitoring program evaluates achievement of the following objectives:

- Demonstrate that natural attenuation is occurring according to expectations;
- Detect changes in environmental conditions (e.g., geochemical, hydrogeological, etc.) that may reduce the efficacy of any of the natural attenuation processes;
- Identify potentially toxic and/or mobile transformation products;
- Verify that the plumes are not expanding;
- Verify no unacceptable impact to down gradient receptors;
- Detect new releases of contaminants to the environment that could impact effectiveness of the natural attenuation remedy; and,
- Verify attainment of the remediation objectives.

The monitoring program monitors the suspected source area and downgradient directions in the shallow and intermediate groundwater zones. **Appendix E, Table E.21** presents the current monitoring network, which comprises 14 shallow zone monitoring wells, 1

shallow/intermediate zone monitoring well, 10 intermediate zone monitoring wells, and 1 deep zone monitoring well (**Figure 48**). Surface water sampling occurs at 46SW10 if surface water is present and the groundwater elevation at either LHSMW21 or 46WW16 exceeds 197 feet.

MNA parameters were revised in accordance with the 2019 Technical Memorandum – Monitored Natural Attenuation Parameters (Bhate, 2019b). Phosphorus, manganese, total iron, and dissolved iron (laboratory) were not analyzed for in the sampling events covered since 2020.

11.3.4 Operations, Maintenance and Monitoring

Inspections of the monitoring wells were conducted during each sampling event. Maintenance activities included painting bollards, painting monitoring wells, and replacing well locks. No noncompliance issues or concerns were noted during the annual inspections. No damage to well bollards, pads, or protective well casings was observed. Mowing to control brush and weeds occurred as needed at LHAAP-46, usually prior to the sampling event.

Measured total depths in some monitoring wells, including 46WW05 and 46WW17 in 2021, indicated elevated silt accumulation at the screened interval, in some instances greater than 10 percent. Wells with siltation above 10 percent are redeveloped prior to each subsequent monitoring event. In addition to siltation, some wells were persistently dry in 2018 through 2021. Wells that were dry and not included in the monitoring program included: shallow zone monitoring wells 46WW01, 46WW04, 46WW10, 46WW12, 46WW13, 46WW15, LHSMW11, LHSMW12, LHSMW15, LHSMW16 (not dry in February 2019), LHSMW17, LHSMW18, LHSMW20, LHSMW22, and LHSMW24; and intermediate zone monitoring well LHSMW23, which was replaced with LHSMW23R in 2019 (**Appendix E, Table E.22)**. An attempt was made to install a shallow well downgradient of LHSMW21 and there was no apparent confining layer between the shallow and intermediate zones and thus a shallow/intermediate well was subsequently installed (46WW17).The lack of water may be due to a regional decline in groundwater elevations and/or the cessation of plant activities that would have contributed water to a shallow zone. Regulators approved the use of fewer wells for MNA evaluation in January 2018.

Annual LUC compliance inspections for LHAAP-46 occurred in 2018, 2019, 2020, and 2021. The inspections did not observe any LUC violations. Groundwater use at LHAAP-46 continues to be restricted to environmental monitoring and testing until levels of COCs in groundwater and soil allow UU/UE. The restriction applies to groundwater underlying a 63.772-acre tract defined by the surveyed LUC boundary (AECOM, 2015).

11.4 PROGRESS SINCE THE FOURTH FIVE-YEAR REVIEW

The following presents the protectiveness statement presented in the Fourth Five-Year Review Report for LHAAP-46 (USACE, 2019):

The LHAAP-46 remedy currently protects human and the environment health because LUCs are in place and MNA long-term monitoring occurs. However, in order for the

remedy to be protective in the long-term, assessment of whether declining trends (consistently dry for several sampling events) in the shallow zone monitoring wells are maintained during high recharge period, and sampling of monitoring wells when groundwater elevations are recovered is recommended.

Table 42 lists the LHAAP-46 issues and corresponding recommendations affecting protectiveness identified in the Fourth Five-Year Review and the summary of completion. **Table 43** lists the LHAAP-46 findings and corresponding recommendations not affecting protectiveness from the Fourth Five-Year Review and the summary of completion.

Table 42 – LHAAP-46 Issues/Recommendations from the Fourth Five-Year Review

Issues from Previous Review	Recommendations from Previous Review	Action Taken	Date of Action
It is uncertain if the declining trends in TCE concentrations are maintained when groundwater elevation are recovered during high recharge periods	*Assessment of whether declining trends (consistently dry for several sampling events) in the shallow zone monitoring wells are maintained during high recharge period, and sampling of monitoring wells when groundwater elevations are recovered is recommended*	Dry wells were sampled when possible. Wells that were historically dry that were sampled during the last five years include LHSMW16 (2019) and LHSMW27 (2019). All other wells remained dry between 2018 and 2021. Based on a technical memorandum completed on the dry wells in November 2018, there is no correlation between rainfall and groundwater elevation changes.	February 2019

Table 43 – LHAAP-46 Finding/Recommendation from the Fourth Five-Year Review Not Affecting Protectiveness

Finding from Previous Review	Recommendation from Previous Review	Action Taken	Date of Action
N/A	*Confirm the extent of the footprint to the north by sampling LHSMW21 if 46WW12 and LHSMW20 are dry.*	LHSMW21 was sampled in 2019, 2020, and 2021 and confirmed the plume extends further east.	February 2019

Finding from Previous Review	Recommendation from Previous Review	Action Taken	Date of Action
N/A	*Assess the two potential UST fill pipes found during the site inspection.*	An investigation of the standpipes was conducted in September 2021. Both pipes were accessed and the atmosphere for one of the two pipes initially had a potential hazardous atmosphere (O2: 17.2%; CO: 499 parts per million [ppm]; LEL: 29%; H2S:18 ppm; and VOCs: 6.1 ppm) but it dissipated after four days. Both pipes were cut off, using a grinder, just above the ground surface and an endoscope was used to investigate. The pipes extended 18 inches below the ground surface and then turned 90 degrees to the south. The endoscope was advanced approximately 20 feet at which point another turn, tee, or debris prevented further advancement. Liquids or electrical wiring were not encountered that would provide information about the former use of the pipe. The standpipes do not pose any danger to human health or the environment, as such no further action was recommended.	September 2021

11.4.1 PFAS Preliminary Assessment/Site Inspection

LHAAP-46 was retained as an area of potential interest following records research, personnel interviews, and site reconnaissance due to historical operations using potentially PFAS-containing materials. LHAAP-46 had six groundwater samples collected from six existing monitoring wells. PFOS was detected at a concentration greater than the OSD Risk Screening Level of 4 ng/L in one groundwater sample at a concentration of 17 ng/L and at a concentration less that the OSD Risk Screening Level in one groundwater sample at a concentration of 2.6 ng/L. PFOA was detected at a

concentration greater than the OSD Risk Screening Level of 6 ng/L in one groundwater sample at a concentration of 26 ng/L. PFBS was detected at a concentration below the OSD Risk Screening Level of 601 ng/L in one groundwater sample at a concentration of 2.6 ng/L. PFNA was not detected in any of the groundwater samples. PFHxS was detected at a concentration below the OSD Risk Screening Level of 39 ng/L in one groundwater sample at a concentration of 4.4 ng/L. LHAAP-46 was recommended for further study in a remedial investigation due to concentrations above the OSD Risk Screening Levels.

11.5 DATA REVIEW

For this review, data were available from semiannual sampling events in 2018 and 2019 and annual sampling events in 2020 and 2021. Groundwater samples were analyzed for VOCs.

11.5.1 SURFACE WATER

Surface water sample location 46SW10 is in a tributary to Goose Prairie Creek, downgradient of the intermediate zone groundwater plume but cross gradient from the shallow zone groundwater plume. For every sampling event, groundwater elevations are compared to the elevation at the bottom of the creek. The elevation of the bottom of the creek at surface water sampling location 46SW10 is 197.27 feet amsl. Groundwater elevations at nearby shallow zone and intermediate zone monitoring wells are compared to the bottom of the creek elevation. The groundwater elevations were below the bottom of the creek during all sampling events, except for February 2018. There were no detections of any COCs from the single surface water sample collected at 46SW10 during the review period. Surface water samples were not collected during any other monitoring event.

11.5.2 GROUNDWATER

The groundwater monitoring network at LHAAP-46 consists of 24 wells of which several, between 5 to 11 wells, have been dry during sampling events covered in this review. **Table 44** presents the groundwater monitoring results for the shallow and intermediate zone monitoring wells at LHAAP-46 that had COCs above the MCL (**Table E.22**). Shallow zone wells with COCs above the MCL included monitoring well 46WW11 and LHSMW19 (central within boundary) and monitoring well LHSMW21 (northeast within LHAAP-46 boundary). Intermediate zone wells with COCs above the MCL included monitoring wells 46WW02 (central within boundary) and 46WW05 (north within LHAAP-46 boundary).

Table 44 – LHAAP-46 Groundwater Monitoring Results

	Shallow			Intermediate	
Well ID	**46WW11**	**LHSMW19**	**LHSMW21**	**46WW02**	**46WW05**
TCE (5 µg/L)					
Feb-18	**18**	2.4	NS	**21**	**14**

Well ID	Shallow			Intermediate	
	46WW11	LHSMW19	LHSMW21	46WW02	46WW05
Aug-18	**13**	**8.8**	NS	**24**	**6.4**
Feb-19	**13**	**16**	**20**	**16**	**27**
Aug-19	**24**	**13**	**41**	**17**	**62**
Feb-20	**14**	**19**	**36**	**15**	**19**
Mar-21	**19**	**13**	**33**	**25**	**20**
***cis*-1,2-DCE (70 µg/L)**					
Feb-18	ND	ND	NS	0.52J	0.62J
Aug-18	ND	1.7	NS	1.4	ND
Feb-19	ND	3.9	**100**	1	2.2
Aug-19	ND	4.2	**170**	1.1	4.8
Feb-20	ND	5.6	**170**	1.6	1.6
Mar-21	ND	3.9	**130**	1.4	1.6
VC (2 µg/L)					
Feb-18	ND	ND	NS	ND	ND
Aug-18	ND	ND	NS	ND	ND
Feb-19	ND	ND	ND	ND	ND
Aug-19	ND	ND	0.97J	ND	1.2
Feb-20	ND	ND	**2.4**	ND	0.65J
Mar-21	ND	ND	**3.7**	ND	ND

NS – Not Sampled
ND – Not Detected

Analysis of the historical COC data indicates a decreasing trend in shallow monitoring wells 46WW11 and LHSMW19. However, the shallow zone plume may be fluctuating or migrating northeastward, based on the increasing trends until 2020 for TCE, *cis*-1,2-DCE, and VC at LHSMW21 followed by decreases in TCE and 1,2-DCE in 2021. All COCs are below their detection limits at shallow intermediate zone monitoring well 46WW17, installed in 2019. The plume appears to be bound in this direction, based on the lack of a separate shallow saturated zone noted during drilling; however, there are not enough data points to confirm the downgradient plume extent from LHSMW21 (**Figure 49**). A shallow/intermediate zone well was installed downgradient of LHSMW21 in 2020. July 2020 and March 2021 sampling results for 46MW17 were non detect for all COCs. Five of the typically dry shallow monitoring wells are located within the historical TCE plume area or downgradient of the current TCE plume. The inability to sample these wells prevents a full evaluation of the plume extent and progress towards remedial goals. The lack of groundwater elevation data due to the presence of so many dry wells also make it difficult to confirm the groundwater flow direction, though shallow groundwater flow appears to generally be toward the southeast (**Figure 50**), which is consistent with the historical generally eastward groundwater flow direction.

In the intermediate zone, only two wells, 46WW02 and 46WW05, have COCs above the MCLs (**Figure 51**). Groundwater flow in the intermediate zone is believed to generally be to the north (**Figure 52**). Intermediate zone wells within that flow path are 46WW02, 46WW09, 46WW05, and 46WW16. TCE concentrations in groundwater are above MCLs at intermediate zone monitoring wells 46WW02 and 46WW05, with downgradient wells 46WW09 and 46WW16 having no detections of TCE. Two distinct plumes may be localized at monitoring wells 46WW02 and 46WW05. The plume at 46WW05 is defined by up and cross-gradient monitoring wells. The plume at 46WW02 is not well defined upgradient of monitoring well 46WW02.

Geochemical parameters indicate groundwater conditions are not favorable for biological reductive dechlorination in most areas, and that abiotic MNA processes appear to be primarily responsible for reducing concentrations in the intermediate zone. Trend graphs for the five wells with exceedances of MCLs during the review period are presented in **Figure 53**.

11.6 SITE INSPECTION

The Five-Year Review site inspection confirmed LUCs prohibit groundwater use and land use remains non-residential. There were no violations of LUCs, nor evidence of prohibited use of groundwater observed during the site inspection.

Monitoring wells were observed to be in good condition.

11.7 TECHNICAL ASSESSMENT

11.7.1 QUESTION A – IS THE REMEDY FUNCTIONING AS INTENDED BY THE DECISION DOCUMENTS?

Yes, the LUC portion of the remedy, a restriction against residential use of groundwater, is in place and functioning as intended. The LUC will remain in effect until the levels of COCs in groundwater allow UU/UE. The groundwater restriction was recorded in Harrison County, Texas and LUC inspections occur annually. No land use activities beyond wildlife refuge occur and no access to groundwater has occurred beyond environmental monitoring and testing. Groundwater elevation data are used to determine if contaminated groundwater is migrating into nearby surface water. Based on groundwater elevations, only one surface water sampling event occurred in 2018 to evaluate the presence of groundwater COCs in surface water. There were no detections of COCs in surface water in 2018, and all other years, groundwater elevations indicated groundwater was not discharging to the creek.

MNA appears to have stabilized the COC plumes in the intermediate zone; however, COC concentrations exhibit an increasing trend at shallow zone monitoring well LHSMW21, with no downgradient sampling location to confirm the TCE plume boundary. In addition, numerous monitoring network wells continue to be dry, which impact plume delineation, as well as creation of potentiometric surface maps to determine groundwater flow directions. The lack of water may be due to a regional decline in groundwater elevations

and/or the cessation of plant activities that would have contributed water to a shallow zone. Regulators approved the use of fewer wells for MNA evaluation in January 2018.

11.7.2 Question B – Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of the remedy selection still valid?

Yes, toxicity data, cleanup levels, and RAOs used at the time of remedy selection remain valid. Land use remains non-residential, as observed during the Five-Year Review site inspection and groundwater use is restricted. There have been no changes to toxicity data or cleanup levels for the COCs identified in the ROD, which include TCE, *cis*-1,2-DCE and VC. The remedy is progressing toward meeting RAOs with COC concentrations decreasing at intermediate zone wells and most shallow zone wells. An increasing trend has been recorded at shallow zone well LHSMW21. Should an increasing trend continue, the RAO to return groundwater to its potential beneficial use as drinking water may not be met within the time estimated in the 2010 ROD (23 years).

The exposure assumptions used at the time of the remedy are no longer valid. A 2023 PFAS PA/SI revealed concentrations of PFOA and PFOS greater than the OSD Risk Screening Levels. Army is initiating an RI that will include LHAAP-46. Currently, the extent of the PFOA and PFOS in groundwater is unknown however, there are LUC restrictions on groundwater use at LHAAP-46 that will prevent exposure to PFAS-contaminated groundwater.

11.7.3 Question C – Has any other information come to light that could call into question the protectiveness of the remedy?

No other information has come to light that calls into question the protectiveness or performance of the remedy.

11.7.4 Technical Assessment Summary

LUCs restrict the use of groundwater and restrict residential use of the property. The groundwater restrictions are recorded in Harrison County, Texas and LUC inspections occur annually. No land use activities beyond wildlife refuge occur and no access to groundwater has occurred beyond environmental monitoring and testing. There were no detections of COCs in surface water in 2018, and all other years, groundwater elevations indicated groundwater was not discharging to the creek. MNA appears to have stabilized the COC plumes in the intermediate zone; however, COC concentrations exhibit an increasing trend at shallow zone monitoring well LHSMW21, with no downgradient sampling location to confirm the TCE plume boundary.

11.8 ISSUES

Table 45 lists the issue identified at LHAAP-46 for this Fifth Five-Year Review

Table 45 – LHAAP-46 Issues

Issue No.	Issue	Affects Current Protectiveness (Yes/No)	Affects Future Protectiveness (Yes/No)
1	COC concentrations exhibit an increasing trend at shallow zone monitoring well LHSMW21, with no downgradient sampling location to confirm the TCE plume boundary.	No	Yes

11.9 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

11.9.1 RECOMMENDATION

Table 46 lists the LHAAP-46 recommendations for this Fifth Five-Year Review.

Table 46 – LHAAP-46 Recommendations

Issue No.	Recommendation	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Yes/No)	
					Current	Future
1	Install and evaluate additional downgradient monitoring wells within the shallow zone to delineate the plume boundary downgradient of monitoring well LHSMW21 and assist in evaluation of MNA.	Army	EPA/TCEQ	December 31, 2025	No	Yes

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11.9.2 OTHER FINDINGS

There are no Other Findings identified during this Five-Year Review.

11.10 PROTECTIVENESS STATEMENT

The remedy at LHAAP-46 currently protects human health and the environment. LUCs are in place to prevent exposure to contaminated groundwater and to prevent residential use of the property. The extent of PFAS contamination at LHAAP-46 is not yet known, but LUCs prevent exposure to PFAS-contaminated groundwater. Groundwater contaminants are not migrating to nearby surface waters. However, in order for the remedy to be protective in the long term, the following action needs to be taken to ensure protectiveness:

- Install and evaluate additional downgradient monitoring wells within the shallow zone to delineate the plume boundary downgradient of monitoring well LHSMW21 and assist in evaluation of MNA.

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12.0 LHAAP-49 FORMER ACID STORAGE AREA

12.1 SITE CHRONOLOGY

Important events and relevant dates for LHAAP-49 are presented below in **Table 47**.

Table 47 – LHAAP-49 Chronology

Event	Date
Acid Storage Area Operations	1942 – 1945
Phase III Investigation	1998
Field Investigation	2000
Baseline Human Health Risk Assessment	2002
USFWS Soil Sampling Event	2002
USACE Soil Sampling Event	2004
Shaw Soil, Sediment, and Surface Water Sampling Event	2004
Groundwater Sampling Events	2005, 2007 – 2009
Final Record of Decision LHAAP-49	September 7, 2010
First Five-Year Review Report	2014
Second Five-Year Review Report	2019

LHAAP – Longhorn Army Ammunition Plant

12.2 BACKGROUND

12.2.1 PHYSICAL CHARACTERISTICS

LHAAP-49, the Former Acid Storage Area, comprises approximately 30 acres in the west-central portion of LHAAP (**Figure 54**). The area is relatively flat with numerous building foundations and concrete saddles and platforms that previously supported ASTs (Shaw, 2010c).

12.2.2 LAND AND RESOURCE USE

The reasonably anticipated future land use is a national wildlife refuge. The 2004 MOA between USFWS and the Army documents the transfer of LHAAP land to USFWS. The former LHAAP is now known as the Caddo Lake National Wildlife Refuge. LHAAP-49 will be transferred under this agreement in the future (Shaw, 2010c).

There are no bodies of water at LHAAP-49. All surface water drains through ditches and gullies towards tributaries of Goose Prairie Creek to the north, east, and south of LHAAP-49, which flow into Caddo Lake.

None of the water wells at LHAAP are used for drinking water; they supply water for non-potable uses only. However, the State of Texas considers all groundwater as potential drinking water, unless otherwise classified in accordance with 30 TAC 335.563(h)(1).

12.2.3 History of Contamination

From 1942 to 1945, LHAAP-49 was used for the formulation and storage of acids and acid mixtures in support of TNT production during the second World War. The manufacturing and handling of large quantities of nitric acid and sulfuric acid occurred in the area (Shaw, 2010c).

12.2.4 Initial Response

No initial response actions occurred at LHAAP-49.

12.2.5 Basis for Taking Action

The determination for the No Action decision for LHAAP-49 was based on the RI (Jacobs, 2002d), Baseline Human Health Risk Assessment (Jacobs 2002a), and Baseline Ecological Risk Assessment (Shaw 2007c, d) and concluded that no action is necessary to protect public health or welfare or the environment. The risk evaluation was based on the reasonably anticipated future use as non-residential. There were no COCs identified under the non-residential use scenario. There is UU/UE restriction because hazardous substances, pollutants, or contaminants remain at the site above levels that allow for UU/UE.

12.3 REMEDIAL ACTIONS

12.3.1 Remedial Action Objectives

According to the 2010 ROD, "*The lead agency has determined that no CERCLA action is necessary at LHAAP-49 to protect public health or welfare or the environment… The risk evaluation conducted for LHAAP-49 determined that the site is suitable for nonresidential use.*"

12.3.2 Remedy Description

The 2010 ROD selected No Action for LHAAP-49 (Army, 2010d).

12.3.3 Remedy Implementation

Notification of the land use assumption for LHAAP-49 that the site is suitable for nonresidential use in accordance with TAC Title 30 §335.566 was recorded in Harrison County records on January 19, 2012 (Army, 2012).

12.3.4 Operations, Maintenance and Monitoring

There are no operations, maintenance, or monitoring requirements at LHAAP-49.

12.4 PROGRESS SINCE THE FOURTH FIVE-YEAR REVIEW

The following presents the protectiveness statement presented in the Fourth Five-Year Review Report for LHAAP-49 (USACE, 2019):

The LHAAP-49 No Action decision is protective of human health and the environment. There have been no changes in land use or other assumptions that would affect protectiveness.

12.5 DATA REVIEW

There are no data to review for LHAAP-49**.**

12.6 SITE INSPECTION

The Five-Year Review site inspection confirmed LHAAP-49 is not used for residential purposes.

12.7 TECHNICAL ASSESSMENT

12.7.1 QUESTION A – IS THE REMEDY FUNCTIONING AS INTENDED BY THE DECISION DOCUMENTS?

There was a determination that no CERCLA action is necessary to protect public health or welfare or the environment. A notification of the land use assumption that LHAAP-49 is suitable for nonresidential use in accordance with TAC 30 §335.566 was recorded in Harrison County records on January 19, 2012 (Army 2012).

12.7.2 QUESTION B – ARE THE EXPOSURE ASSUMPTIONS, TOXICITY DATA, CLEANUP LEVELS, AND REMEDIAL ACTION OBJECTIVES USED AT THE TIME OF THE REMEDY SELECTION STILL VALID?

Yes, the exposure assumptions, toxicity data, and RAOs used at the time of the remedy selection are still valid. No cleanup levels were established as there were no COCs identified under a non-residential use scenario. The land use remains consistent with the no action decision in the ROD. Future use is reasonably anticipated to be a wildlife refuge, which follows the non-residential use scenario.

12.7.3 QUESTION C – HAS ANY OTHER INFORMATION COME TO LIGHT THAT COULD CALL INTO QUESTION THE PROTECTIVENESS OF THE REMEDY?

No other information has come to light that calls into question the protectiveness or performance of the no action decision.

12.7.4 Technical Assessment Summary

LHAAP-49 remains non-residential. Notification has been filed in the county disclosing that LHAAP-49 has been evaluated for nonresidential use in accordance with 30 TAC §335.566 and is restricted to that use.

12.8 ISSUES

No issues were identified during this Five-Year Review that prevent the no action decision from being protective now or in the future.

12.9 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

No recommendations or follow-up actions are required since there were no issues identified during this Five-Year Review that affect current or future protectiveness of the remedy.

12.10 PROTECTIVENESS STATEMENT

The no action decision at LHAAP-49 is protective of human health and the environment. Notification has been filed in the county disclosing that LHAAP-49 has been evaluated for nonresidential use in accordance with 30 TAC §335.566 and is restricted to that use. Land use remains as a national wildlife refuge with no observed residential use.

13.0 LHAAP-50 FORMER SUMP WATER TANK

13.1 SITE CHRONOLOGY

Important events and relevant dates for LHAAP-50 are presented below in **Table 48**.

Table 48 – LHAAP-50 Chronology

Event	Date
Site Operations	1955 – 1988
Initial Site Investigation, Soil and Sediment Samples Collected	1995
Installation of Groundwater Wells and Soil Borings	2000 – 2002
Phase II and Phase III Investigations Conducted	2002
Site Assessment	2003
Baseline Human Health Risk Assessment	2003
Soil, Sediment, Groundwater, and Surface Water Sampling Events	2004 – 2008
Quarterly Groundwater Sampling Events	2007 – 2010
Baseline Environmental Risk Assessment	2007
Final Feasibility Study	2009
Final Proposed Plan	2010
Final Record of Decision LHAAP-50	September 30, 2010
Final Remedial Action Work Plan	2013
Final Remedial Action Completion Report	2015
Remedial Action Operation	2015 - Present
Remedial Action Operation Reports	2016 – Present
Fourth Five-Year Review Report	2019
Explanation of Significant Differences	August 6, 2019

LHAAP – Longhorn Army Ammunition Plant

13.2 BACKGROUND

13.2.1 PHYSICAL CHARACTERISTICS

LHAAP-50, known as the Former Sump Water Tank, which contained a 47,000-gallon AST, comprises approximately 1 acre in the north-central portion of LHAAP (**Figure 55**). LHAAP-50 is bordered to the northwest by Goose Prairie Creek, to the northeast by South Crockett Road, and to the southwest by a drainage ditch (Shaw, 2010d).

13.2.2 Land and Resource Use

The reasonably anticipated future land use is a national wildlife refuge. The 2004 MOA between USFWS and the Army documents the transfer of LHAAP land to USFWS. The former LHAAP is now known as the Caddo Lake National Wildlife Refuge. LHAAP-50 will be transferred under this agreement in the future (Shaw, 2010d).

There are no bodies of water at LHAAP-50. All surface water drains through ditches and gullies towards Goose Prairie Creek located to the north of LHAAP-50, which flow into Caddo Lake.

None of the water wells at LHAAP are used for drinking water; they supply water for non-potable uses only. However, the State of Texas considers all groundwater as potential drinking water, unless otherwise classified in accordance with 30 TAC 335.563(h)(1).

13.2.3 History of Contamination

From 1955 to 1988, the AST at LHAAP-50 received industrial wastewater from various industrial waste production sumps throughout LHAAP (Shaw, 2010d).

13.2.4 Initial Response

No initial response actions occurred at LHAAP-50.

13.2.5 Basis for Taking Action

The basis for taking action is the presence of COCs in groundwater presenting an unacceptable risk to human health, under an industrial use scenario. COCs in groundwater include perchlorate, PCE, TCE, *cis*-1,2-DCE, 1,1,-DCE, 1,2-DCA, and VC. The COC in soil is perchlorate. Remedial action is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances, pollutants, or contaminants into the environment.

13.3 REMEDIAL ACTIONS

13.3.1 Remedial Action Objectives

The RAOs as defined in the 2010 ROD for LHAAP-50 are (Army, 2010c):

- *Protection of human health by preventing human exposure to the contaminated groundwater;*
- *Protection of human health by preventing further potential degradation of groundwater and surface water from contaminated soil;*
- *Protection of human health and the environment by preventing contaminated groundwater from migrating into nearby surface water; and*
- *Return of groundwater to its potential beneficial uses as drinking water, wherever practicable.*

Table 49 presents the cleanup levels for the COCs. Except for perchlorate, the MCL has been identified as the cleanup levels for COCs as laid out in the 2010 ROD. The perchlorate cleanup level for groundwater was established in the 2016 RACR to be 17 µg/L, which is the TRRP Tier 1 Residential Groundwater PCL (AECOM, 2016a). For perchlorate in soil, the soil medium-specific concentration for industrial use based on groundwater protection (GWP-Ind) value is used as the cleanup level (AECOM, 2016).

Table 49 – LHAAP-50 Cleanup Levels

Medium	Chemical of Concern	Cleanup Level
Groundwater		MCL (µg/L)
	1,1-Dichloroethene	7[a]
	1,2-Dichloroethane	5[a]
	cis-1,2-Dichloroethene	70[a]
	Perchlorate	17*
	Tetrachloroethene	5[a]
	Trichloroethene	5[a]
	Vinyl Chloride	2[a]
Soil		GWP-Ind (µg/kg)
	Perchlorate	7,200[b]

* The 2019 ESD adjusted the cleanup level for perchlorate in accordance with an EPA 2014 dispute decision (EPA, 2014).
µg/L – Micrograms per liter
µg /kg – Micrograms per kilogram
U.S. Army, 2010c; Table 2-6.
[a] Safe Drinking Water Act (SDWA) Maximum Contaminant Level (MCL) consistent with 40 CFR §300.430(e)(2)(i)(B&C).
[b] TRRP Tier 1 Residential PCL for groundwater ingestion pathway in accordance with 30 TAC 350 and available at https://www.tceq.texas.gov/remediation/trrp/trrppcls.html.
[c] TCEQ soil medium-specific concentration (MSC) for industrial use based on groundwater protection (GWP-Ind) in accordance with 30 TAC 335.558 and 30 TAC 335.559(g)(2).

13.3.2 Remedy Description

The 2010 ROD selected Alternative 2, Excavation, MNA, and LUC as the remedy for LHAAP-50. Components of the remedy include (Army, 2010c):

- *Soil Removal: Excavation and off-site disposal of perchlorate-contaminated soil.*
- *[LUC]: LUC in the impacted area will ensure protection of human health by restricting the use of groundwater to environmental monitoring and testing only. The LUC will remain in effect until such time as the U.S. Army, TCEQ and EPA agree that the concentrations of COCs have met the cleanup levels.*
- *[MNA]: A program of MNA will be implemented to establish confidence in attenuation trends and verify that the perchlorate and VOC plumes are stable or*

shrinking and will not migrate to nearby surface water at levels that may present an unacceptable risk to human health or the environment. Natural attenuation is expected to reduce contaminant concentrations to their respective clean-up levels, and return groundwater to its beneficial use, wherever practicable.

Performance objectives for the MNA program will be re-evaluated after two years of groundwater monitoring. During those two years, groundwater monitoring will be performed on a quarterly basis. If MNA is found to be ineffective, a contingency remedy to enhance MNA will be implemented.

- *[LTM]/Five-year Reviews: If MNA is found to be effective (at the end of the two-year period), it will be continued, and [LTM] will begin at a semiannual frequency for the following three years. In subsequent years, LTM will be performed annually until the following CERCLA five-year review. The LTM associated with this remedy will be used to track the continued effectiveness of MNA and will continue at least once every five years until the cleanup levels are achieved. Based on the calculated attenuation rates for the LHAAP-50 site, groundwater cleanup levels are expected to be met through natural attenuation in approximately 50 years (Shaw, 2009). This time-frame will be re-evaluated as part of the MNA evaluation and periodic reviews.*

A 2019 ESD documented a significant change from the ROD selected remedy of MNA and *"the proposed implementation of the ISB contingency remedy to enhance MNA. The ISB contingency remedy is consistent with the ROD requirement to enhance MNA and is capable of degrading perchlorate and TCE to address the increased concentrations detected"* (Army, 2019). The contingency remedy will consist of injection of EVO, a microbial culture (SDC-9™), and nutrients to enhance the MNA remedy in an approximately 6,000 square foot area near monitoring wells 50WW12 and 50WW13. Upon implementation of the contingency remedy (ISB), two years of quarterly performance monitoring will be conducted. ISB will be the contingency remedy implemented for the impacted groundwater.

13.3.3 REMEDY IMPLEMENTATION

13.3.3.1 Soil Removal

Perchlorate-contaminated soils were excavated to a depth between 12 to 18 inches over a 4,000-square foot area, resulting in the removal of 183 cubic yards of contaminated soil. Confirmation samples from the excavation floor and sidewalls included five-point composite soil samples collected from areas of the excavation floor measuring approximately 750 square feet each, for six excavation floor composite samples. A single grab sample was collected from each sidewall of the excavation, for eight sidewall samples. All confirmation samples did not exceed the 7,200 µg/kg Texas GWP-Ind for perchlorate. The area was backfilled with certified clean backfill material to match surrounding grade (AECOM, 2016).

13.3.3.2 Land Use Controls

The LHAAP-50 LUC objectives include preventing human exposure to shallow zone groundwater contamination presenting an unacceptable risk to human health by ensuring there is no withdrawal or use of groundwater beneath the site for anything other than environmental monitoring and testing until the cleanup levels are attained. A restriction against residential use of groundwater is in effect until the levels of COCs in groundwater and soil allow UU/UE. Notification of the groundwater use restriction accompanying all transfer documents was recorded at the Harrison County Courthouse in accordance with the TAC Title 30, Section 335.566 on June 4, 2015. The LUC boundary is presented in **Figure 56**.

13.3.3.3 Monitored Natural Attenuation

The 3rd Annual Remedial Action Operation Report for LHAAP-50 identified that geochemical conditions were not optimal for MNA. The TCE groundwater plume expanded beyond its baseline footprint and extended to 50WW12, the current downgradient monitoring well within the plume. At 50WW12, TCE concentrations increased from 0.5 µg/L in October 2013 to 79 µg/L in May 2018 while perchlorate concentrations increased from 23,600 µg/L in October 2013 to 91,000 µg/L in May 2018 suggesting continued migration within the current plume boundary. Though the perchlorate plume was relatively stable, a decreasing trend was observed only at one well. Army, EPA, and TCEQ determined MNA was not effective, and the contingency remedy should be implemented (APTIM, 2018). MNA processes continue to be monitored as part of the Remedial Action Operation.

13.3.3.4 In Situ Bioremediation

A baseline sampling event occurred in November 2019 to characterize the perchlorate and VOC concentrations and geochemical conditions prior to ISB injections.

Implementation of the ISB contingency remedy occurred in March 2020 in the upper and lower shallow zone groundwater in the vicinity of wells 50WW11 and 50WW13 and in the shallow zone groundwater in the vicinity of well 50WW12 where the highest concentrations of TCE and perchlorate were detected. Injections were performed at 12 direct-push technology (DPT) locations (**Figure 57**) The ISB remedy involved injecting amendments including microbial cultures, electron donor sources, and nutrients into the subsurface to remove contaminant mass by enhancing microbial populations that will utilize the contaminants in groundwater during respiratory or metabolic activities (Bhate, 2020).

The performance objectives of the ISB are to (Bhate, 2020):

- *Achieve and maintain plume stability as measured by concentrations decreasing in the majority of performance wells relative to the baseline and/or historical concentrations.*

- *Achieve and maintain geochemical conditions conducive to natural attenuation of COCs in the shallow and intermediate groundwater zones.*
- *Demonstrate MNA processes are occurring using attenuation rate calculations, increases in COC daughter product concentrations, and microbial culture counts.*

13.3.3.5 Performance Monitoring

Performance monitoring occurred the first two years post-injection with eight ISB performance monitoring wells sampled quarterly. Performance monitoring samples were analyzed for VOCs, perchlorate, MNA parameters (anions, dissolved gases [ethane, methane, and carbon dioxide], and total organic carbon) and field parameters (DO, oxidation reduction potential, pH, and ferrous iron). Performance monitoring well locations are shown in **Figure 58**.

13.3.4 Operations, Maintenance and Monitoring

LUC compliance inspections occurred annually to confirm no unauthorized use of groundwater and no residential use of the LHAAP-50 property. The inspections observed no compliance issues or changes in land use.

During each sampling event, inspections of the conditions/integrity of monitoring wells occurred. Maintenance and repairs were completed, as needed. There was no reported major damage to well bollards, pads, or protective well casings during the reporting period. Mowing occurred, as needed, to control brush and weeds and to allow access to the monitoring wells.

The first quarterly sampling event for the contingency remedy occurred in July 2020 (Bhate, 2022). The second year of quarterly sampling occurred in July 2021, October 2021, January 2022, and April 2022 (Bhate, 2023). The quarterly data show seasonal fluctuations in groundwater elevation, with increases in groundwater elevations beginning in 2017. Observed increases in groundwater elevation averaged 3 feet between 2017 and 2022 in most wells with the highest groundwater elevations occurring in the summer months. Potentiometric contour maps for the Year 2 performance monitoring period are presented as **Figures 60 through 63**.

13.4 PROGRESS SINCE THE FOURTH FIVE-YEAR REVIEW

The following presents the protectiveness statement presented in the Fourth Five-Year Review Report for LHAAP-50 (USACE, 2019):

The LHAAP-50 remedy currently protects human health and the environment because LUCs are in place and MNA long-term monitoring occurs. However, for the remedy to be protective in the long-term, the following action needs to be taken to ensure protectiveness:

- *Implement the contingency remedy to enhance MNA (such as in situ bioremediation) to address increasing trends of COCs near wells 50WW12 and 50WW13.*

Table 50 lists the LHAAP-50 issues and corresponding recommendations affecting protectiveness identified in the Fourth Five-Year Review and the summary of completion.

Table 50 – LHAAP-50 Issues/Recommendations from the Fourth Five-Year Review

Issues from Previous Review	Recommendations from Previous Review	Action Taken	Date of Action
TCE and Perchlorate trends are increasing across part of the site.	*Implement the contingency remedy following the ESD to the ROD to enhance MNA (such as in situ bioremediation) to address increasing trends of COCs near wells 50WW12 and 50WW13.*	Injections occurred in March 2020. Two years of performance monitoring have been completed.	March 2020

13.4.1 PFAS Preliminary Assessment/Site Inspection

LHAAP-50 was retained as an area of potential interest during the 2023 LHAAP PFAS PA/SI following records research, personnel interviews, and site reconnaissance due to historical storage, treatment, and disposal of potentially PFAS-containing waste. Two groundwater samples were collected from two existing monitoring wells in LHAAP-50 area. PFOA was detected at a concentration above the OSD Risk Screening Level of 6 ng/L at a concentration of 22 ng/L in one groundwater sample. PFOS, PFBS, PFNA, PFHxS were not detected in either of the groundwater samples collected. LHAAP-50 was recommended for further study in a remedial investigation due to exceedance of the OSD Risk Screening Level for PFOA.

13.5 DATA REVIEW

For this review, data were available from a baseline sampling event conducted in 2019 and two years of quarterly performance monitoring sampling events. Groundwater samples were analyzed for VOCs, perchlorate, and MNA parameters. The groundwater monitoring network approved in the Contingency Remedy RD/RAWP includes 8 wells sampled quarterly as part of the performance monitoring program to evaluate the ISB remedy and 14 wells sampled annually as part of the LTM network.

Figures 64 and 65 present a comparison of the 2019 baseline sampling event plume boundaries and the April 2022 quarterly sampling event. Concentrations of perchlorate and TCE continue to increase at monitoring well 50WW12. **Table 51** presents the Mann-Kendall trend analysis results from November 2019 to April 2022 for those wells included in the performance monitoring well network.

Appendix E presents the Mann-Kendall trend analysis results for the entire data set. **Appendix E, Table E.25** presents the groundwater monitoring data for LHAAP-50.

Table 51 – LHAAP-50 November 2019- April 2022 Trend Analysis Results

Well ID	Perchlorate	TCE	*cis*-1,2-DCE	1,1-DCE	1,2-DCA
Upgradient – Upper Shallow Monitoring Well					
50WW08	No Trend	Increasing	Increasing	~~	~~
Upgradient – Lower Shallow Monitoring Well					
50WW09	~~	No Trend	~~	~~	~~
Treatment Area – Upper Shallow Monitoring Wells					
50WW13	No Trend	No Trend	No Trend	No Trend	No Trend
50WW11	Decreasing	No Trend	No Trend	Decreasing	Decreasing
50WW05	~~	Decreasing	Decreasing	~~	~~
50WW12	No Trend	Increasing	~~	Increasing	No Trend
Treatment Area – Lower Shallow Monitoring Wells					
50WW14	~~	No Trend	~~	~~	~~
50WW06	No Trend	No Trend	~~	~~	~~

Strikethrough boxes indicate insufficient data to conduct trend analysis.

Since implementation of ISB at LHAAP-50, there have not been substantial decreases in COC concentrations within the treatment area. Most wells exhibit no trend. Wells with decreasing trends include monitoring wells 50WW11 and 50WW05. Monitoring well 50WW11 is located within the western ISB treatment area and 50WW05 is located cross-gradient from the treatment area.

Wells with increasing concentrations include monitoring wells 50WW08 and 50WW12. Monitoring well 50WW08 is located upgradient of the treatment area. The extent of the plume southwest of 50WW08 is unknown as there are no sampling locations further upgradient. Monitoring well 50WW22, which is sampled annually, appears to be cross-gradient from well 50WW08 based on groundwater elevation data shown in **Table 52** below. Groundwater flow at this location appears to be variable as shown on **Figure 58** through **Figure 62**.

Table 52 – LHAAP-50 Upper Shallow Monitoring Wells 50WW08 and 50WW22 Groundwater Elevations

Date	Groundwater Elevation (feet above mean sea level)	
	50WW08	**50WW22**
7/8/2020	179.17	179.07

10/5/2020	178.69	178.68
1/25/2021	179.32	178.88
4/5/2021	180.03	179.85
7/7/2021	180.57	180.38
10/11/2021	179.00	179.20
1/5/2022	178.94	179.00
4/6/2022	179.23	179.12

Monitoring well 50WW12 is located within the eastern ISB treatment area. Perchlorate concentrations exhibit no trend but exceed the cleanup level with concentrations up to 141,000 µg/L. TCE and 1,1-DCE concentrations are increasing with TCE concentrations up to 1,400 µg/L. Monitoring well 50WW29 is located further downgradient and did not have concentrations exceeding the cleanup levels, indicating the downgradient plume boundary is confined (**Figure 65**).

April 2022 MNA parameters for those wells where MNA parameters are evaluated (55WW06, 50WW11, 50WW12, 50WW13, and 50WW14) indicate conditions are not conducive to biological reduction of VOCs and perchlorate within the treatment area. TOC was consistently below 25 mg/L and ORP exceeded -50 mV. Other monitoring parameters were also outside of their optimal range for supporting reductive dechlorination of VOCs through ISB. Similar conditions were observed at wells outside of the treatment area.

During the Year 2 performance monitoring at LHAAP-50, DHC results indicate a microbial culture potentially capable of reductive dechlorination exists in site groundwater, but the populations present are not sufficient to promote significant contaminant degradation. Research indicates high concentrations of perchlorate may decrease the relative abundance of DHC (Wen et al, 2016).

13.6 SITE INSPECTION

The Five-Year Review site inspection confirmed LUCs prohibit groundwater use and land use remains non-residential. There were no violations of LUCs, nor evidence of prohibited use of groundwater observed during the site inspection.

Monitoring wells were observed to be in good condition.

13.7 TECHNICAL ASSESSMENT

13.7.1 QUESTION A – IS THE REMEDY FUNCTIONING AS INTENDED BY THE DECISION DOCUMENTS?

The remedy is not functioning as intended by the decision documents. LUCs prevent human exposure to contaminated groundwater. The use restriction was recorded at the Harrison County Courthouse in accordance with the TAC Title 30, Section 335.566 on

June 4, 2015. Excavation of perchlorate-contaminated soil removed the potential continuing source to groundwater contamination upgradient of the perchlorate plume. However, additional sources of contamination may be present in soil in areas where COC concentrations exhibit an increasing trend, at upgradient monitoring well 50WW08 and downgradient monitoring well 50WW12. The plume is not defined upgradient from monitoring well 50WW08. The ISB remedy is not meeting performance criteria at monitoring wells 50WW08 or 50WW12. TCE and perchlorate concentrations continue to increase from 2019 baseline concentrations; geochemical conditions are not conducive to natural attenuation of COCs; and it cannot be demonstrated that MNA processes are occurring based on increases in COC degradation product concentrations. Should concentrations continue to increase at monitoring wells 50WW08 and 50WW12, additional investigation will be required to evaluate the cause.

13.7.2 Question B – Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of the remedy selection still valid?

Yes, toxicity data, cleanup levels, and RAOs used at the time of remedy selection remain valid. Land use remains non-residential, as observed during the Five-Year Review site inspection and groundwater use is restricted. There have been no changes to toxicity data or cleanup levels for the COCs identified in the ROD or 2019 ESD. Values are protective of human health based on an industrial use scenario.

The exposure assumptions used at the time of the remedy are no longer valid. A 2023 PFAS PA/SI revealed concentrations of PFOA greater than the OSD Risk Screening Levels. Army is initiating an RI that will include LHAAP-50. Currently, the extent of the PFOA in groundwater is unknown however, there are LUC restrictions on groundwater use at LHAAP-50 that will prevent exposure to PFAS-contaminated groundwater.

13.7.3 Question C – Has any other information come to light that could call into question the protectiveness of the remedy?

No other information has come to light that calls into question the protectiveness or performance of the remedy.

13.7.4 Technical Assessment Summary

LUCs prevent human exposure to contaminated groundwater, and the use restriction was recorded at the Harrison County Courthouse, as required. Excavation of perchlorate-contaminated soil removed the potential continuing source to groundwater contamination upgradient of the perchlorate plume. Additional sources of contamination may be present in soil in areas where COC concentrations exhibit an increasing trend, at upgradient monitoring well 50WW08 and downgradient monitoring well 50WW12. The upgradient plume boundary is not defined at monitoring well 50WW08. The ISB remedy is not meeting performance criteria at monitoring wells 50WW08 or 50WW12. Should concentrations continue to increase at monitoring wells 50WW08 and 50WW12,

additional investigation will be required to evaluate the cause. The exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of remedy selection remain valid.

13.8 ISSUES

Table 53 lists the issues identified at LHAAP-50 for this Fifth Five-Year Review.

Table 53 – LHAAP-50 Issues

Issue No.	Issue	Affects Current Protectiveness (Yes/No)	Affects Future Protectiveness (Yes/No)
1	The ISB remedy is not meeting performance criteria at monitoring wells 50WW08 or 50WW12.	No	Yes
2	The upgradient plume boundary is not defined by the current monitoring well network	No	Yes

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13.9 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

13.9.1 RECOMMENDATIONS

Table 54 lists the LHAAP-50 recommendations for this Fifth Five-Year Review.

Table 54 – LHAAP-50 Recommendations

Issue No.	Recommendation	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Yes/No)	
					Current	Future
1	If COC concentrations continue to increase at monitoring wells 50WW08 or 50WW12, conduct additional investigations to determine if horizontal/vertical characterization of the contaminant plume is required or if optimization of remedy implementation is required.	Army	EPA/TCEQ	December 31, 2025	No	Yes
2	Delineate the plume boundary southwest of monitoring well 50WW08.	Army	EPA/TCEQ	December 31, 2025	No	Yes

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13.9.2 Other Findings

There are no Other Findings for LHAAP-50.

13.10 PROTECTIVENESS STATEMENT

The remedy at LHAAP-50 currently protects human health and the environment. LUCs are in place to prevent exposure to contaminated groundwater and to prevent residential use of the property. The extent of PFAS contamination at LHAAP-50 is not yet known, but LUCs prevent exposure to PFAS-contaminated groundwater. Excavation of perchlorate-contaminated soil removed the potential continuing source to groundwater contamination upgradient of the perchlorate plume. There is no evidence of COCs migrating to surface water. However, in order for the remedy to be protective in the long term, the following actions need to be taken to ensure protectiveness:

- If COC concentrations continue to increase at monitoring wells 50WW08 or 50WW12, conduct additional investigations to determine if horizontal/vertical characterization of the contaminant plume is required or if optimization of remedy implementation is required.
- Delineate the plume boundary southwest of monitoring well 50WW08.

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14.0 LHAAP-35A (58) SHOPS AREA

14.1 SITE CHRONOLOGY

Important events and relevant dates for LHAAP-35A (58) are presented below in **Table 55**.

Table 55 – LHAAP-35A (58) Chronology

Event	Date
Shops Area Operations	1942 - 1997
Multi-Phase Investigation of Group 4 Sites, Monitoring Wells Installed, Groundwater, Surface Water, Sump Contents, Soil, and Sediment Samples Collected	1992 - 2001
Baseline Human Health Risk Assessment	2003
Environmental Site Assessment	2003
Additional Investigations Conducted to Further Delineate the Extent of Groundwater Contamination	2004
Baseline Ecological Risk Assessment	2007
Sumps Report	2008
Final Feasibility Study	2009
Final Proposed Plan	2010
Final Record of Decision LHAAP-35A (58)	September 30, 2010
Final Remedial Design	2011
Final Remedial Action Work Plan	2013
Third Five-Year Review Report	2014
Draft Final Remedial Action Completion Report	May 2015
Final Remedial Action Work Plan	July 2016
Remedial Action Operation	2016 - Present
Revised Final Remedial Action Work Plan, Contingency Remedy for Western Plume	January 2018
Explanation of Significant Differences for Western Plume Contingency Remedy	April 26, 2018
Draft Final Remedial Action Completion Report, Contingency Remedy for Western Plume, Aug 2018	August 2018
Explanation of Significant Differences	September 2018
Fourth Five-Year Review Report	2019

LHAAP – Longhorn Army Ammunition Plant

14.2 BACKGROUND

14.2.1 PHYSICAL CHARACTERISTICS

LHAAP-35A (58), known as the Shops Area, comprises approximately 11 acres in the north-central portion of LHAAP (**Figure 66**). LHAAP-35A (58) was an industrial area that consisted of the former maintenance complex which included the Shops Area. Other sites located within the boundaries of LHAAP-35A (58) include LHAAP-02 (vacuum truck overnight parking), LHAAP-03 (Paint Shop Building 722), LHAAP-60 (pesticide storage buildings), LHAAP-68 (mobile storage tank parking), and LHAAP-69 (service station underground storage tanks) (Shaw, 2010e).

14.2.2 LAND AND RESOURCE USE

The reasonably anticipated future land use is a national wildlife refuge. The 2004 MOA between USFWS and the Army documents the transfer of LHAAP land to USFWS. The former LHAAP is now known as the Caddo Lake National Wildlife Refuge. LHAAP-35A (58) will be transferred under this agreement in the future (Shaw, 2010e).

There are no bodies of water at LHAAP-35A (58). All surface water drains through ditches and gullies towards Goose Prairie Creek located to the south and west of LHAPP-35A (58), which flows into Caddo Lake.

None of the water wells at LHAAP are used for drinking water; they supply water for non-potable uses only. However, the State of Texas considers all groundwater as potential drinking water, unless otherwise classified in accordance with 30 TAC 335.563(h)(1).

14.2.3 HISTORY OF CONTAMINATION

The Shops Area facilities included laundry, automotive, woodworking, metalworking, painting, refrigeration, and electrical services for the installation which resulted in releases of chemicals from facility operations (Shaw, 2010e).

14.2.4 INITIAL RESPONSE

No initial response actions occurred at LHAAP-35A (58).

14.2.5 BASIS FOR TAKING ACTION

The basis for taking action was the presence of COCs for groundwater at LHAAP-35A(58), which include PCE, TCE, 1,1-DCE, *cis*-1,2-DCE, *trans*-1,2-DCE, and VC in groundwater at concentrations posing an unacceptable risk to an industrial worker.

14.3 REMEDIAL ACTIONS

14.3.1 REMEDIAL ACTION OBJECTIVES

The RAOs as defined in the 2010 ROD for LHAAP-35A (58) are (Army, 2010d):

- *Protection of human health by preventing human exposure to the contaminated groundwater;*
- *Protection of human health and the environment by preventing contaminated groundwater from migrating into nearby surface water; and*
- *Return of groundwater to its potential beneficial uses as drinking water, wherever practicable.*

Table 56 presents the cleanup levels for groundwater COCs. MCLs have been identified as the cleanup levels for each of the COCs except for 1,1-DCA and chloroethene, which have the GW-Ind used as the cleanup level.

Table 56 – LHAAP-35A (58) Cleanup Levels

Medium	Chemical of Concern	Cleanup Level
Groundwater		MCL (µg/L)
	1,1-Dichloroethene	7[a]
	cis-1,2-Dichloroethene	70[a]
	Trans-1,2-Dichloroethene	100[a]
	Tetrachloroethene	5[a]
	Trichloroethene	5[a]
	Vinyl Chloride	2[a]

µg/L – Micrograms per liter
MCL – Maximum Contaminant Level
Army, 2015; Table 1-1.
[a] Safe Drinking Water Act (SDWA) Maximum Contaminant Level (MCL) consistent with 40 CFR §300.430(e)(2)(i)(B&C).

14.3.2 REMEDY DESCRIPTION

The 2010 ROD selected Alternative 4, In Situ Bioremediation for Eastern Plume followed by MNA and LUC; and MNA and LUC for Western Plume for LHAAP-35A (58). Components of the remedy include (Army, 2010d):

- Eastern plume
  - In situ bioremediation in a target area that has the highest contaminant concentrations.
  - MNA with LTM to reduce groundwater contamination to cleanup levels.
  - LUC until the cleanup levels are achieved.
- Western plume
  - MNA to return groundwater to its potential beneficial use, wherever practicable.

- Performance objectives to evaluate the MNA remedy performance after two years.
- LTM semiannually for three years, annually until the next five-year review, then once every five years to evaluate remedy performance and determine if plume conditions remain constant, improve, or worsen until cleanup levels are reached.
- A contingency remedy to enhance MNA to reach the RAOs if MNA is found to be ineffective.
- LUC until the cleanup levels are achieved.

A 2018 ESD documented a significant change from the ROD to implement the contingency remedy, ISB, to enhance MNA in the western plume (Army, 2018). A second ESD documented that the LUCs and groundwater monitoring required for LHAAP-03, a small site entirely contained in the LHAAP-35A (58) eastern VOC plume and LUC boundaries, is captured under LHAAP-35A (58). The 2018 ESDs specified that well 03WW01 will be sampled for arsenic. LUCs will remain in place until the levels of the COCs in groundwater allows for UU/UE.

14.3.3 REMEDY IMPLEMENTATION

14.3.3.1 Land Use Control

The LHAAP-35A (58) LUC objectives include preventing human exposure to shallow zone groundwater contamination presenting an unacceptable risk to human health by ensuring there is no withdrawal or use of groundwater beneath the site for anything other than environmental monitoring and testing until the cleanup levels are attained. A restriction against residential use of groundwater is in effect until the levels of COCs in groundwater and soil allow UU/UE. Notification of the groundwater use restriction accompanying all transfer documents was recorded at the Harrison County Courthouse in accordance with the TAC Title 30, Section 335.566 on March 16, 2015. The LUC boundary is presented in **Figure 67**.

The following sites are located within the LUC boundary (groundwater use restrictions area) for LHAAP-35A (58) (**Figure 67**):

- LHAAP-02, former vacuum truck overnight parking;
- LHAAP-03, the Former Paint Shop Building 722 (waste collection);
- LHAAP-56, a former vehicle wash rack and oil/water separator, Building 744-A;
- LHAAP-59, Former Storage Building 725;
- LHAAP-60, Former Building 411;
- LHAAP-60, Former Storage Building 714;
- LHAAP-65, Former Building 209 (flammable materials storehouse);

- LHAAP-68, a former mobile storage tank parking area; and
- LHAAP-69, former service station with underground storage tanks.

14.3.3.2 Eastern Plume

In Situ Bioremediation

Enhanced ISB treatment implementation included selection of carbon substrate, mixing and injection procedures, a baseline sampling event, bioaugmentation (injections of microbial culture), post injection monitoring and analysis of data. August and October 2013 injections targeted the depth interval of approximately 23 to 30 feet bgs at each point. Follow-on bioaugmentation injections occurred in October 2013.

Monitored Natural Attenuation

Groundwater monitoring at LHAAP-35A (58) was conducted quarterly following enhanced ISB injections at the eastern plume for 2 years. During the review period, groundwater monitoring was conducted semiannually.

Groundwater and surface water monitoring is performed to demonstrate that enhanced ISB in conjunction with MNA of the eastern and western plumes are effective remedies to:

- Detect changes in environmental conditions that may reduce the efficacy of the remedial processes,
- Identify potentially toxic and/or mobile transformation products,
- Verify that the plumes are not expanding,
- Verify that no unacceptable impacts to downgradient receptors are occurring, such as discharges of contaminated groundwater to surface water,
- Detect new releases of contaminants to the environment that could impact the effectiveness of the remedies, and
- Verify attainment of the RAOs.

14.3.3.3 Western Plume

Monitored Natural Attenuation

Based on the 2nd Annual Remedial Action Operation Report for LHAAP-35A(58) (AECOM, 2016), there was evidence of plume migration, increasing COC trends and geochemical conditions that are not optimal for MNA in the western plume.

Since implementation of enhanced ISB, wells continue to be evaluated for MNA parameters. The MNA analyte list is based on the 2019 Technical Memorandum - MNA Parameters (Bhate/APTIM, 2019). Analytes eliminated included alkalinity; nitrite; sulfide; total iron; dissolved iron and manganese; and total phosphorous. For the eastern plume only, chloride, nitrate, sulfate, dissolved gases, TOC, dechlorinating bacteria, and volatile fatty acids were also eliminated.

In Situ Bioremediation

The contingency remedy for the western plume, enhanced ISB injections was implemented in March and April 2018 (Bhate, 2018). Implementation included installation of two monitoring wells on February 20, 2018, within the western portion of LHAAP-35A (58). Monitoring well 35AWW23 is located southeast of 35AWW20 and was completed to a depth of 40.1 feet bgs. Monitoring well 35AWW24 is located downgradient of the plume to ensure plume definition and was completed to a depth of 32.1 feet bgs.

A baseline groundwater sampling event was completed prior to enhanced ISB implementation to establish baseline COC concentrations and geochemical conditions. Sampling included seven monitoring wells: 35AWW06, 35AWW11, 35AWW19, 35AWW20, 35AWW23, 35AWW24, and LHSMW07.

The substrate and the bioaugmentation was injected into the subsurface through DPT injection points using a single point injection system. The injection system included a bulk storage tank, mixing equipment, an injection pump, and volume metering and control equipment. The dilute substrate and bioaugmentation was pressure-fed into each injection point using a transfer pump and a portable polyethylene mixing tank. The substrate used at the LHAAP-58 western plume was SRS®-SD, Small Droplet EVO.

Based on baseline groundwater sampling, KB-1® Plus, a proprietary microbial culture comprised of a mix of DHC (bacteria well known for degradation of PCE/TCE; *cis*-1,2-DCE; and VC) and 2,3-dihydroxybenzoate (DHB) (bacteria well known for degradation of TCA and 1,1-dichloroethane [DCA]) was injected in a portion of the plume while KB-1® was injected into the remaining portion of the plume. Only two monitoring wells (35AWW20 and LHSMW07) had 1,1-DCA present in the baseline samples. Injection points upgradient of these monitoring wells received the KB-1® Plus.

Performance Monitoring

Performance monitoring evaluates the effectiveness of the enhance ISB treatment and is used to determine if additional substrate injections are necessary. The groundwater

monitoring data evaluate the effectiveness of enhanced ISB in meeting the RAOs. Groundwater monitoring was performed for eight quarterly events following implementation of enhanced ISB. Six monitoring wells (35AWW20, LHSMW07, 35AWW06, 35AWW11, 35AWW19, and 35AWW23) were included in the enhanced ISB monitoring program for collection and analysis of groundwater samples for VOCs and biogeochemical parameters.

14.3.4 Operations, Maintenance and Monitoring

LUC compliance inspections occurred annually to confirm no unauthorized use of groundwater and no residential use of the LHAAP-35A (58) property. The inspections observed no compliance issues or changes in land use.

During each sampling event, inspections of the conditions/integrity of monitoring wells occurred. Maintenance and repairs were completed, as needed. There was no reported major damage to well bollards, pads, or protective well casings during the reporting period. Mowing occurred, as needed, to control brush and weeds and to allow access to the monitoring wells.

Groundwater monitoring consisted of semiannual groundwater sampling events, one conducted in December 2021 (Western Plume only), and one conducted in June 2022 as specified in the Eastern Plume RAWP (AECOM, 2013) and the Western Plume RAWP (Bhate, 2018). Semiannual surface water sampling at 35ASW03, located adjacent to the western groundwater plume in a ditch that runs parallel to 4th Street, was not performed during the reporting period, except in June 2021 when groundwater elevations in the nearest upgradient monitoring well 35AWW18 were above the elevation of the ditch.

Eastern plume monitoring includes the following wells that are sampled annually: 03WW01, 35AWW08, 35AWW09, 35AWW10, 35AWW12, 35AWW13, 35AWW14, 35AWW15, 35AWW16, 35AWW17, 35AWW18, 35AWW21, 35AWW22, 35AWW24, and LHSMW06. Monitoring well LHSMW04 was dry in July 2018, December 2018, December 2019, June 2020, December 2020, June 2021, December 2021, and June 2022. Intermediate groundwater zone well 35AWW01 was also sampled in June 2022.

Western plume monitoring includes 35AWW06, 35AWW11, 35AWW19, 35AWW20, 35AWW23, and LHSMW07. The eighth and final quarterly event occurred in March 2020 and follow on sampling events occurred semiannually. Monitoring wells LHSMW06, 35AWW14, 35AWW15, 35AWW16, 35AWW17, 35AWW18, and 35AWW24, which are sampled as part of the eastern plume monitoring, help define the western plume boundary.

14.4 PROGRESS SINCE THE FOURTH FIVE-YEAR REVIEW

The following presents the protectiveness statement presented in the Fourth Five-Year Review Report for LHAAP-35A (58) (USACE, 2019):

The LHAAP-35A (58) remedy currently protects human health and the environment because LUCs are in place, [enhanced ISB] has been implemented in the eastern and

western plumes, and MNA long-term monitoring occurs. However, in order for the remedy to be protective in the long-term, the following actions need to be taken to ensure protectiveness:

- *Implement [enhanced ISB] performance monitoring and assess if additional monitoring wells are required to delineate the plume to the south and southwest.*

Table 57 lists the LHAAP-35A (58) issues and corresponding recommendations affecting protectiveness identified in the Fourth Five-Year Review and the summary of completion. **Table 58** lists the LHAAP-35A (58) findings and corresponding recommendations not affecting protectiveness from the Fourth Five-Year Review and the summary of completion.

Table 57 – LHAAP-35A (58) Issues/Recommendations from the Fourth Five-Year Review

Issues from Previous Review	Recommendations from Previous Review	Action Taken	Date of Action
[Enhanced ISB] implementation requires performance monitoring to establish effectiveness.	*Implement [enhanced ISB] performance monitoring and assess if additional monitoring wells are required to delineate the plume to the south and southwest.*	Injections occurred in March and April 2018. Performance monitoring has been completed, and the monitoring program now comprises semiannual monitoring. Additional wells have been installed to delineate the plume to the south and southwest. Newly installed well 35AWW25 has been installed downgradient of 35AWW18 and though it has been dry for the first two sampling events to confirm delineation, ample opportunity has not been provided to determine if this well will wet up for future sampling events to delineate plume boundary.	Ongoing

Table 58 – LHAAP-35A (58) Finding/Recommendation from the Fourth Five-Year Review Not Affecting Protectiveness

Finding from Previous Review	Recommendation from Previous Review	Action Taken	Date of Action
N/A	*Assess effectiveness of [enhanced ISB] in attenuating the eastern plume. It is recommended that the effectiveness of [enhanced ISB]/MNA, including the maximum extent of the COCs footprint, be determined.*	Evaluation is ongoing.	Ongoing

14.5 DATA REVIEW

For this review, data were available from 2018 through 2022. Evaluation of the data are presented below and is separated by the eastern plume and western plume. **Appendix E, Table E.26** presents historical surface water and groundwater monitoring results. There were no exceedances of COC concentrations in the intermediate zone during the reporting period.

14.5.1 SURFACE WATER

Surface water was sampled in June 2021. There were no detections of any COCs in surface water.

14.5.2 EASTERN PLUME

Well 03WW01 is located within the enhanced ISB area. Since 2013, PCE concentrations in groundwater have decreased from 368 µg/L to 9.9 µg/L in June 2022. TCE concentrations have decreased from 223 µg/L to 10 µg/L. *cis*-1,2-DCE concentrations peaked in April 2016 (117 µg/L) but have decreased to 7.3 µg/L in June 2022. *cis*-1,2-DCE has been below the MCL since July 2018. (**Figure 68**)

Well 35AWW08 is also located within the enhanced ISB area. All COCs at this well have been below detection limits during the most recent sampling event. TCE concentrations have been fluctuating seasonally since 2019 with winter sampling events resulting in no TCE detections in groundwater and summer sampling events resulting in TCE detections of 17 µg/L (June 2020) and 53 µg/L (June 2021) **(Figure 69)**.

Well 35AWW09 is downgradient of the September 2013 enhanced ISB area. PCE and TCE were detected in this well at concentrations above their respective MCLs with concentrations increasing from 57.6 J µg/L in October 2013 to 380 µg/L in June 2022. TCE concentrations increased from 8.97 J µg/L in October 2013 to 140 µg/L in June 2022. Degradation products *cis*-1,2-DCE and VC were either not detected or did not exceed cleanup levels **(Figure 69)**.

There is no expansion of the eastern plume occurring, as observed by no increased concentrations in boundary wells 35AWW10, 35AWW13, 35AWW22, 35AWW12, and 35AWW21 (**Figure 70**).

14.5.3 Western Plume

Well 35AWW20 is downgradient of the March 2018 enhanced ISB area that included KB-1 Plus™ inoculation. Concentrations of TCE; *cis*-1,2-DCE; 1,1-DCE; and VC continue to exceed cleanup levels. Enhanced ISB injections reduced TCE concentrations from 320 µg/L (November 2017) to 150 µg/L (June 2022). 1,1-DCE concentrations decreased from 1,900 µg/L (November 2017) to 1,600 µg/L (June 2022). *cis*-1,2-DCE and VC increased during this same time period indicating reductive dechlorination is occurring in the vicinity of 35AWW20. 1,1,2-TCA (75 µg/L [December 2021] / 62 µg/L [June 2022]) and 1,2-DCA (14 µg/L [December 2021]/ 13 µg/L [June 2022]) concentrations exceed MCLs in 35AWW20. Prior to enhanced ISB, 1,12-TCA and 1,2-DCA concentrations fluctuated and continue to fluctuate **(Figure 69)**.

Well LHSMW06 is not within an enhanced ISB injection area and has had increasing COC concentrations.

Well LHSMW07 is downgradient of the March 2018 enhanced ISB area that included KB-1 Plus™ inoculation. Since implementation of enhanced ISB, 1,1-DCE has exceeded its MCL of 7 µg/L with most recent concentrations of 22 µg/L and 8.8 µg/L. TCE remained below the MCL of 5 µg/L. VC was detected at 35 µg/L, above the MCL of 2 µg/L, in December 2021 but was not detected in June 2022. Decreasing trends are observed for TCE and 1,1-DCE, while no trend was evident for VC **(Figure 69)**.

The western plume is mostly stable, except at monitoring well 35AWW18 where 1,1-DCE increased from 4.1 µg/L in December 2019, to 18 µg/L in June 2020 and has remained above the MCL through June 2022 (15 µg/L) (**Figure 70**). Monitoring well 35AWW18 is downgradient of 35AWW20 indicating plume migration in a southeasterly direction in this portion of the western plume.

14.5.4 Arsenic Sampling

Arsenic monitoring in eastern plume monitoring wells 03WW01, 35AWW08, and 35AWW09 and western plume monitoring wells 35AWW20 and LHSMW06 occurred, as required by the Revised Technical Memorandum, Steps to Remedy-in-Place for LHAAP-03/LHAAP-58 (AECOM, 2012); the ESD for LHAAP-03 groundwater and LUCs (Bhate/APTIM, 2018); the 2013 RAWP (AECOM, 2013); and the 4th Annual RA(O) Report (Bhate/APTIM, 2018). Monitoring of arsenic also occurred at 35AWW01 an intermediate groundwater well evaluated for MNA. Groundwater analytical results are compared to the MCL (0.01 mg/L).

Table 59 – LHAAP-35A (58) Arsenic Sampling Results (mg/L)

Month-Year	Eastern Plume				Western Plume	
	03WW01	35AWW08	35AWW09	35AWW01	35AWW20	LHSWM06
Nov-17	**0.035**	**0.148**	ND	ND	NA	ND
Jul-18	NA	**0.122**	0.00199J	0.00065J	NA	0.00186J
Dec-18	NA	**0.0593**	0.00096J	ND	NA	ND
Jun-19	**0.0133**	**0.116**	0.00308	NA	**0.0194J**	0.00123J
Dec-19	**0.0158**	**0.0253**	0.00061J	NA	NA	ND
June-20	0.00936	**0.0210**	ND	NA	0.00119J	ND
Dec-20	**0.0152**	**0.0244**	NA	ND	NA	0.00048J
Jun-21	**0.0169J**	0.00220J	0.00099J	ND	0.00293J	0.00055J
Dec-21	NS	NS	NS	NA	0.00246J	0.00053J
Jun-22	0.0096	**0.0314**	0.00053J	0.00092J	0.00221J	0.00045J

mg/L – milligram/liter
NA – Not Analyzed
ND – Nondetect
NS – Not Sampled

Arsenic continues to exceed the arsenic MCL in eastern plume well 35AWW08 and was just below the arsenic MCL in June 2022 at well 03WW01 after several exceedances. There have been very low or no detections at intermediate well 35AWW01.

14.6 SITE INSPECTION

The Five-Year Review site inspection confirmed LUCs prohibit groundwater use and land use remains non-residential. There were no violations of LUCs, nor evidence of prohibited use of groundwater observed during the site inspection.

Monitoring wells were observed to be in good condition.

14.7 TECHNICAL ASSESSMENT

14.7.1 QUESTION A – IS THE REMEDY FUNCTIONING AS INTENDED BY THE DECISION DOCUMENTS?

The remedy is not functioning as intended by the decision documents. Enhanced ISB has been effective at reducing COC concentrations within the eastern and western plumes. However, aquifer geochemical conditions outside of the enhanced ISB areas are unfavorable for reductive dechlorination. At wells with increasing COC concentration trends, including 35AWW09 and LHSMW06, additional treatment may be needed. The eastern plume boundary is defined by the current monitoring well network; however, additional monitoring wells are required to define the western plume boundary. A well (35AWW25) has been installed downgradient of 35AWW18 and 35AWW14 but has been dry for the first two sampling events to confirm delineation. Additional time is required to

determine if the well will be able to serve as a viable well for plume delineation. LUCs prevent human exposure to contaminated groundwater. The use restriction was recorded at the Harrison County Courthouse in accordance with the TAC Title 30, Section 335.566 on March 16, 2015. Surface water sampling in 2020 confirmed contaminated groundwater is not migrating into nearby surface water.

14.7.2 Question B – Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of the remedy selection still valid?

Yes. Exposure assumptions, toxicity data, cleanup levels, and RAOs remain valid. There have been no changes to land use. The cleanup levels established in the ROD remain valid. Exposure and toxicity factors have changed since the ROD, but the cleanup levels remain protective. The RAOs are being met except for returning groundwater to its potential beneficial use as drinking water. COC concentrations are increasing at 35AWW09 and LHSMW06.

14.7.3 Question C – Has any other information come to light that could call into question the protectiveness of the remedy?

No other information has come to light that calls into question the protectiveness or performance of the remedy.

14.7.4 Technical Assessment Summary

LUCs prevent human exposure to contaminated groundwater, and the use restriction was recorded at the Harrison County Courthouse. Surface water sampling in 2020 confirmed contaminated groundwater is not migrating into nearby surface water. Enhanced ISB has been effective at reducing COC concentrations within the eastern and western plumes. However, some wells have increasing COC concentrations and may require further action. The western plume boundary is not yet delineated in the downgradient direction, though newly installed monitoring well 35AWW25 may provide a sampling location downgradient of wells 35AWW18 and 35AWW14.

14.8 ISSUES

Table 60 lists the issues identified at LHAAP-35A (58) for this Fifth Five-Year Review.

Table 60 – LHAAP-35A (58) Issues

Issue No.	Issue	Affects Current Protectiveness (Yes/No)	Affects Future Protectiveness (Yes/No)
1	Aquifer geochemical conditions outside of the enhanced ISB areas (at well 35AWWW09) are unfavorable for reductive dechlorination and COC concentrations exhibit an increasing trend (wells 35AWW09 and LHSMW06)	No	Yes
2	Newly installed well 35AWW25 has been installed downgradient of 35AWW18 but has been dry for the first two sampling events to confirm delineation of the western plume boundary.	No	Yes

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14.9 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

14.9.1 RECOMMENDATIONS

Table 61 lists the LHAAP-35A (58) recommendations for this Fifth Five-Year Review.

Table 61 – LHAAP-35A (58) Recommendations

Issue No.	Recommendation	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Yes/No)	
					Current	Future
1	Consider completing an evaluation of the ISB approach in the context of site-specific hydrology, geochemistry, and concentration data to assess the potential effectiveness of additional ISB injections, determine if additional injections should be completed, and identify potential adjustments to the injection strategy for optimization of performance.	Army	EPA/TCEQ	December 31, 2025	No	Yes
2	Determine if well 35AWW25 will delineate the western plume boundary and if it does not, consider some other means of delineating the plume beyond those wells where concentrations are exhibiting an increasing trend.	Army	EPA/TCEQ	December 31, 2025	No	Yes

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14.9.2 OTHER FINDINGS

There are no Other Findings identified during this Five-Year Review.

14.10 PROTECTIVENESS STATEMENT

The remedy at LHAAP-35A (58) currently protects human health and the environment. LUCs are in place to prevent exposure to contaminated groundwater and to prevent residential use of the property. Groundwater contaminants are not migrating to nearby surface waters. However, in order for the remedy to be protective in the long term, the following actions need to be taken to ensure protectiveness:

- Consider completing an evaluation of the ISB approach in the context of site-specific hydrology, geochemistry, and concentration data to assess the potential effectiveness of additional ISB injections, determine if additional injections should be completed, and identify potential adjustments to the injection strategy for optimization of performance.
- Determine if well 35AWW25 will delineate the western plume boundary and if it does not, consider some other means of delineating the plume beyond those wells where concentrations are exhibiting an increasing trend.

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15.0 LHAAP-67 ABOVEGROUND STORAGE TANK FARM

15.1 SITE CHRONOLOGY

Important events and relevant dates for LHAAP-67 are presented below in **Table 62**.

Table 62 – LHAAP-67 Chronology

Event	Date
Plant 3 Became Operational	1954
US Army Toxic and Hazardous Material Agency Records Search	1980
US Army Environmental Hygiene Agency Contamination Survey	1987
Staging Area for Site Investigations	1998
Groundwater Monitoring Wells Installed, Groundwater and Soil Sampled Collected	1998 – 2002
Remedial Investigation Completed	2002
Final Remedial Investigation Report Addendum	2002
Groundwater Sampling Event	2004
Final Baseline Human Health Risk Assessment	2003
Final Feasibility Study	2005
Groundwater Sampling Event	2006
Final Baseline Ecological Risk Assessment	2007
Final Natural Attenuation Evaluation	2007
Final Proposed Plan	2008
Record of Decision	2010
Final Remedial Action Work Plan	2013
Remedial Action Completion Report	2016
Remedial Action Operation	2016 - Present
Remedial Action Operations Reports	2017 – Present
Fourth Five-Year Review Report	2019

15.2 BACKGROUND

15.2.1 PHYSICAL CHARACTERISTICS

LHAAP-67, a former AST farm, comprises approximately 1.9 acres at the southeast corner of 48th Street and Ignatius Avenue in the central portion of LHAAP (**Figure 71**). The site topography is relatively flat with a slight southeastern slope (Shaw, 2010a).

15.2.2 Land and Resource Use

The reasonably anticipated future land use is a national wildlife refuge. The 2004 MOA between USFWS and the Army documents the transfer of LHAAP land to USFWS. The former LHAAP is now known as the Caddo Lake National Wildlife Refuge. LHAAP-67 has already been transferred to the USFWS for management (Shaw, 2010a).

There are no bodies of water at LHAAP-67. All surface water drains through ditches and gullies towards Central Creek located to southeast of LHAPP-67, which flows into Caddo Lake.

None of the water wells at LHAAP are used for drinking water; they supply water for non-potable uses only. However, the State of Texas considers all groundwater as potential drinking water, unless otherwise classified in accordance with 30 TAC 335.563(h)(1).

15.2.3 History of Contamination

When operational, LHAAP-67 consisted of seven ASTs used for storing No. 2 fuel oil, kerosene, solvent, and LP33 resin. The size of the tanks is unknown. The tanks were surrounded by earthen dikes designed to contain potential spills. The ASTs have been removed and the only structure remaining at the site is a railroad bed. Although there is no information related to a known release in the record, It is likely that incidental spills occurred during transfer of fuels and solvents to and from the tanks (Jacobs, 2002; Shaw, 2010a).

15.2.4 Initial Response

No initial response actions occurred at LHAAP-67.

15.2.5 Basis for Taking Action

The basis for taking action was presence of 1,1-DCE, PCE, TCE, and 2,3,7,8-TCDD and two inorganics (thallium and antimony) in groundwater at concentrations posing an unacceptable risk to an industrial worker. Hazardous substances present in LHAAP-67 groundwater could potentially discharge to surface water in Central Creek, which flows to Caddo Lake, a drinking water source.

15.3 REMEDIAL ACTIONS

15.3.1 Remedial Action Objectives

The RAOs for groundwater as defined in the 2010 ROD are (Army, 2010):

- *Protection of human health by preventing human exposure to the contaminated groundwater*
- *Protection of human health and the environment by preventing contaminated groundwater from migrating into nearby surface water*

- *Return of groundwater to its potential beneficial uses as drinking water, wherever practicable*

Surface water monitoring is no longer required for LHAAP-67 due to the change in groundwater flow direction and with concurrence of TCEQ and USEPA. Groundwater flow direction, north-northwest, indicates that Central Creek is upgradient from LHAAP-67 and makes surface water monitoring unnecessary.

Table 63 – LHAAP-67 Chemical-Specific ARARs

Medium	Contaminant of Concern	MCL Value (µg/L)
Groundwater	1,1,1-Trichloroethane	200
	1,1,2-Trichloroethane	5
	1,1-Dichloroethene	7
	1,2-Dichloroethane	5
	Trichloroethene	5

Source: U.S. Army, 2010
µg/L – Micrograms per liter

15.3.2 REMEDY DESCRIPTION

The 2010 ROD selected the following remedy for LHAAP-67 (Army, 2010):

Alternative 2, LUCs with MNA, is the preferred alternative for…LHAAP-67 and is consistent with the intended future use of the sites as a wildlife refuge.

Based on groundwater modeling, MCLs would be met through natural attenuation at LHAAP-67 in 17 to 66 years for TCE, 20 to 34 years for 1,1-DCE, and 21 to 43 years for 1,2-DCA.

The remedy consists of (AECOM, 2016i, US Army, 2010b):

- Groundwater LUC. Ensure protection of human health by restricting the use of groundwater exceeding cleanup levels to environmental monitoring and testing only. The LUC will remain in effect until the Army and EPA agree and TCEQ concurs that the concentrations of COCs have met cleanup levels.

- MNA. Passive remedial action that relies on natural biological, chemical, and physical processes that act to reduce the mass and concentrations of groundwater COCs under favorable conditions. A program of MNA will be implemented to establish confidence in attenuation trends and verify that the plume is stable and will not migrate to nearby surface water at levels that may present an unacceptable risk to human health or the environment. Natural attenuation is expected to reduce contaminant concentrations to their respective clean-up levels, and return groundwater to its beneficial use, wherever practicable. Performance objectives for the MNA program will be evaluated after two years of groundwater monitoring.

During those two years, groundwater monitoring will be performed on a quarterly basis.

- Long-term Monitoring: LTM will begin at a semiannual frequency after the first two years until the CERCLA Five-Year Review. In subsequent years, LTM will be performed annually until the following CERCLA Five-Year Review. The LTM associated with this remedy will be used to track the continued effectiveness of MNA and will continue at least once every five-years until the cleanup levels are achieved. The need for continued monitoring will be evaluated every five-years during the CERCLA Five-Year Review.

Because the LHAAP-67 remedy does not restore the site to unrestricted use/unrestricted exposure conditions, five-year reviews are required to ensure protection of human health and the environment under CERCLA Section 121(c), 42 U.S.C § 9621(c).

15.3.3 Remedy Implementation

MNA at the LHAAP-67 site is implemented to monitor COCs and ensure protection of human health and the environment. Performance monitoring to evaluate remedy effectiveness includes groundwater and surface water monitoring. The groundwater monitoring program is designed to evaluate and monitor natural attenuation of COCs in Shallow Groundwater Zone. The surface water monitoring program is designed to monitor potential migration of contaminated groundwater to surface water. The monitoring program is intended to meet the following objectives:

- Demonstrate that natural attenuation is occurring according to expectations;
- Detect changes in environmental conditions (e.g., geochemical, hydrogeological, etc.) that may reduce the efficacy of any of the natural attenuation processes;
- Identify potentially toxic and/or mobile transformation products;
- Verify that the plumes are not expanding;
- Verify no unacceptable impact to down gradient receptors;
- Detect new releases of contaminants to the environment that could impact effectiveness of the natural attenuation remedy; and,
- Verify attainment of the remediation objectives.

Work completed to meet the above objectives include the installation of two new monitoring wells, annual groundwater monitoring, LUC inspections, and well maintenance.

15.3.3.1 Land Use Controls

The LHAAP-67 LUC objectives are to prevent human exposure to Shallow Groundwater Zone contamination presenting an unacceptable risk to human health and ensure that there is no withdrawal or use of groundwater beneath the site for anything other than environmental monitoring and testing until the cleanup levels are attained (AECOM, 2016i). A restriction against residential use of groundwater will remain in effect until the levels of COCs in groundwater allow UU/UE. Notification of the groundwater use restriction accompanying all transfer documents was recorded at the Harrison County Courthouse in accordance with the TAC Title 30, §335.566 (Army, 2014). The Army provided a survey plat, legal boundary, and description of the groundwater restriction, in conjunction with a locator map to the Texas Department of Licensing and Regulation in hard and electronic copy. The Army and regulators will confer to determine appropriate actions should there be a failure of a LUC objective at the site after it has been transferred.

15.3.4 Operations, Maintenance and Monitoring

LHAAP-67 OM&M activities are:

- Collection of monitoring well and piezometer water-level measurements and groundwater samples
- Maintenance of monitoring well network, and routine maintenance activities (mowing, etc.)

15.4 PROGRESS SINCE THE FOURTH FIVE-YEAR REVIEW

The following presents the protectiveness statement presented in the Fourth Five-Year Review Report for LHAAP-67 (USACE, 2019):

The LHAAP-67 remedy currently protects human health in the short-term because LUCs are in place and MNA long-term monitoring occurs. However, in order for the remedy to be protective in the long-term, the Army will evaluate the data in the north area of the plume to determine if temporary exceedances indicate plume migration or require extension of the plume boundary well monitoring system.

Table 64 lists the LHAAP-67 issues and corresponding recommendations affecting protectiveness identified in the Fourth Five-Year Review and the summary of completion. **Table 65** lists the LHAAP-67 findings and corresponding recommendations not affecting protectiveness from the Fourth Five-Year Review and the summary of completion.

Table 64 – LHAAP-67 Issues/Recommendations from the Fourth Five-Year Review

Issues from Previous Review	Recommendations from Previous Review	Action Taken	Date of Action
Changes in groundwater flow	*Evaluate data in the north area of the plume to*	Two new monitoring wells (67WW17 and 67WW18)	July 2019

Issues from Previous Review	Recommendations from Previous Review	Action Taken	Date of Action
direction result in occasional contaminant migration outside the current MNA monitoring network.	*determine if temporary exceedances indicate plume migration or require extension of the plume boundary well monitoring system.*	were installed to the north and northwest of the site in July and August 2019 and the COCs have been below MCLs in these wells and continue to be sampled.	

Table 65 – LHAAP-67 Finding/Recommendation from the Previous Five-Year Review Not Affecting Protectiveness

Finding from Previous Review	Recommendation from Previous Review	Action Taken	Date of Action
The qualitative assessment of geochemical indicators during the three RA(O) period in the Shallow Groundwater Zone at LHAAP-67 indicates current geochemical conditions are not optimal for MNA.	*Because these conditions are anticipated to remain relatively stable, it is recommended that sampling for these indicators be terminated.*	Sampling for these indicators has not been terminated. However, in February 2019, the Final Technical Memorandum – Monitored Natural Attenuation Monitoring Parameters updated the list of geochemical parameters to reduce redundancy.	February 2019

15.5 DATA REVIEW

15.5.1 GROUNDWATER MONITORING

For this review, data were available for 2019, 2020, and 2021 annual groundwater monitoring events. Sampling was attempted at 17 monitoring wells, including new monitoring wells 67WW17 and 67WW18. Groundwater samples were analyzed for VOCs at all wells except at well 67WW03 due there being insufficient water to collect for analysis all three years. Samples collected from monitoring wells 67WW08 and 67WW13 were analyzed for MNA geochemical parameters.

Eight monitoring wells had concentrations of VOCs above the MCLs, these wells include 67WW01, 67WW02, 67WW08, 67WW09, 67WW12, 67WW13, 67WW14, and 67WW15. The VOCs above their MCLs include 1,1-DCE, 1,2-DCA, and 1,1,2-TCA. The highest VOC concentration all three years was 1,1-DCE: 640 µg/L (2019), 730 µg/L (2020) and 402 µg/L (2021). The highest concentrations of 1,1-DCE occurred at in-plume wells 67WW13 (2019) and 67WW15 (2019, 2020, and 2021). Since May 2018, 1,2-DCA concentrations at 67WW13 have increased from 27 µg/L to 43 µg/L in November 2021. Concentrations of 1,1,2-TCA have fluctuated near the MCL of 5 µg/L, and in November 2021, the level increased slightly from 5.7 in 2020 to 5.9 µg/L. Since 2013, 1,1,2-TCA

levels ranged from 7.66 µg/L in November 2015 to 3.9 µg/L in May 2019; however, the overall trend is increasing.

Monitoring wells 67WW17 and 67WW18 were installed and added to the monitoring plan to evaluate and bound the groundwater plume along with wells 67WW02 and 67WW05. Monitoring wells 67WW05, 67WW17, and 67WW18 did not have detectable concentrations of COCs for any of the annual sampling events. Downgradient well 67WW02 had detectable concentrations above the MCL for 1,1-DCE for all three sampling events and for 1,2-DCA for the 2020 sampling event. Downgradient well 67WW02 has increasing trends for both 1,1-DCE and 1,2-DCA since remedy implementation. No trend is observed in data from October 2018 through November 2021. Concentrations increased to the highest level of 1,1-DCE at 220 µg/L, from 6.9 µg/L in October 2018. Concentrations decreased to 100 µg/L in November 2021. An increasing trend since remedy implementation has also been observed for 1,2-DCA with concentrations exceeding the MCL for the first time in November 2020. No trend is observed in data from October 2018 through November 2021. Concentrations decreased to below the MCL in November 2021, with 1,2-DCA being detected at 3.3 µg/L. Due to the groundwater flow direction becoming more northerly, the plume may be expanding in this direction. The plume is bounded by two new downgradient monitoring wells, 67WW17 and 67WW18, which have not exceeded MCLs since being installed in 2019.

Increasing trends were also observed at upgradient monitoring well 67WW09. Both 1,2-DCA and 1,1,1-TCA exceeded MCLs with concentrations of 29 µg/L and 5.5 µg/L, respectively, in November 2021. All prior events had been below the detection limits (0.5 µg/L). Further monitoring is required to determine if these increases are anomalous.

15.5.2 Surface Water

Surface water monitoring is not required for LHAAP-67 due to the change in groundwater flow direction and with concurrence of TCEQ and USEPA. Groundwater flow direction, north-northwest, indicates that Central Creek is upgradient from LHAAP-67 and makes surface water monitoring unnecessary.

15.5.3 Monitored Natural Attenuation

The evaluation of MNA at LHAAP-67 indicates decreasing concentrations in the upgradient part of the plume may have some limited biological degradation, but the primary pathways for reductions are abiotic processes, including dispersion, dilution, sorption, and volatilization. However, at the leading edges of the plume, there is no strong evidence that MNA will prevent the plume from expanding in the downgradient and eastern direction (**Figures 72 and 73**). In the wells located at the western edge of the plume, the levels are low and fluctuating. Additional sampling is required to determine if the downgradient increases are sustained.

15.6 SITE INSPECTION

A site inspection was conducted on 14-15 February 2023. No issues or other findings were identified during the site inspection. Land use has not changed since the Fourth

Review, nor is it anticipated to change. There were no violations of LUCs, or evidence of prohibited groundwater use observed during the inspection.

15.7 TECHNICAL ASSESSMENT

15.7.1 QUESTION A – IS THE REMEDY FUNCTIONING AS INTENDED BY THE DECISION DOCUMENTS?

The remedy is functioning as intended by the ROD. MNA appears to be occurring with decreasing concentrations in the upgradient part of the plume, which may have some limited biological degradation, but the primary pathways for reductions are abiotic processes, including dispersion, dilution, sorption, and volatilization. There is currently no evidence that MNA will prevent the plume from expanding downgradient, as observed with increasing concentrations of 1,1-DCE and 1,2-DCA at downgradient monitoring well 67WW02 since remedy implementation. No trend is observed in data from October 2018 through November 2021 for 1,1-DCE and 1,2-DCA. Based on groundwater modeling at the time of the ROD, MCLs would be met through natural attenuation in 20 to 34 years for 1,1-DCE and 21 to 43 years for 1,2-DCA. As a result, the increasing concentrations at downgradient monitoring well 67WW02 are currently not identified as posing an issue affecting protectiveness. Further monitoring is required to determine if these increases are anomalous.

LUCs prevent human exposure to contaminated Shallow Groundwater Zone and ensure that there is no withdrawal or use of groundwater beneath the site for anything other than environmental monitoring and testing. The LUC will remain in effect until the levels of COCs in groundwater allow UU/UE. The groundwater restriction was recorded in Harrison County, Texas. No access to groundwater has occurred beyond environmental monitoring and testing.

15.7.2 QUESTION B – ARE THE EXPOSURE ASSUMPTIONS, TOXICITY DATA, CLEANUP LEVELS, AND REMEDIAL ACTION OBJECTIVES USED AT THE TIME OF THE REMEDY SELECTION STILL VALID?

Yes, the exposure assumptions, toxicity data, and RAOs used at the time of remedy selection are still valid. Land use remains non-residential, as observed during the Five-Year Review site inspection and groundwater use is restricted. There have been no changes to toxicity data or cleanup levels for the COCs identified in the ROD. The remedy implemented is functioning as intended by the ROD, and the exposure assumptions and RAO continue to be valid.

15.7.3 QUESTION C – HAS ANY OTHER INFORMATION COME TO LIGHT THAT COULD CALL INTO QUESTION THE PROTECTIVENESS OF THE REMEDY?

No other information has come to light that calls into question the protectiveness or performance of the remedy.

15.7.4 Technical Assessment Summary

LUCs are in place to restrict site use/access and to reduce and prevent the exposure of potential receptors to surface and near surface soil contamination. No changes in land use were made and no new routes of exposure or receptors were identified. Therefore, the remedy implemented is functioning as intended by the 2010 ROD, and the exposure assumptions and RAO continue to be valid.

15.8 ISSUES

No issues were identified during this Five-Year Review that prevent the remedy from being protective now or in the future.

15.9 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

15.9.1 Recommendations

No recommendations or follow-up actions are required since no issues were identified during this Five-Year Review that affect current or future protectiveness of the remedy.

15.9.2 Other Findings

Increasing concentrations at downgradient monitoring well 67WW02 since remedy implementation and geochemical parameters may indicate that MNA will not prevent the plume from expanding downgradient. Monitoring wells 67WW17 and 67WW18 have been installed to evaluate and delineate the groundwater plume beyond 67WW02. There have been no detections of COCs at either well during the reporting period. However, due to the increasing concentrations, it is recommended that Army complete an evaluation of MNA in the context of site-specific hydrology, geochemistry, and concentration data to assess if MNA will prevent the downgradient expansion of the plume.

15.10 PROTECTIVENESS STATEMENT

The remedy for LHAAP-67 is protective of human health and the environment. The LUCs are being maintained and managed in accordance with the ROD to prevent human exposure to contaminated groundwater, contaminated groundwater is not migrating into nearby surface water, and MNA is effective in the upgradient part of the plume to reduce concentrations to restore groundwater to its potential beneficial use as drinking water.

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16.0 LHAAP-001-R-01 SITE 27; SOUTH TEST AREA/BOMB TEST AREA

16.1 SITE CHRONOLOGY

Important events and relevant dates for LHAAP-001-R-01 are presented below in **Table 66**.

Table 66 – LHAAP-001-R-01 Chronology

Event	Date
Photoflash Bombs Production and Testing Operations	1954-1956
Demilitarization of Illuminating Signal Devices at Test Pits.	Late 1950's
Potential Demilitarization of Leaking Production Items	Early 1960's
LHAAP Contamination Survey	1984
No Further Action Record of Decision	January 23, 1998
MMRP Site Investigation	2002 – 2004
USFWS Soil Sampling Event	2003
Engineering Evaluation/Cost Analysis Completed	2007
MEC Removal Action Work Plan	2008
Munitions Constituents Data Summary	2011
Proposed Plan	2011
MEC Removal Action SSFR	2011
Final Record of Decision LHAAP-001-R and LHAAP-003-R	September 13, 2016
Final Land Use Control Remedial Design and Remedial Action Completion Report	2018
Limited Groundwater Monitoring Report for Perchlorate	2019
Long Term Monitoring Reports	2019 – Present
Fourth Five-Year Review Report	2019

MEC – Munitions and Explosives of Concern
MMRP – Military Munitions Response Program
SSFR – Site Specific Final Report
USFWS – United States Fish and Wildlife Service

16.2 BACKGROUND

16.2.1 PHYSICAL CHARACTERISTICS

Munitions response site (MRS) LHAAP-001-R-01, known as the South Test Area/Bomb Test Area, is situated in the southern portion of LHAAP and covers an area of approximately 79 acres (**Figure 74 and 76**). Surface features at LHAAP-001-R included

a deteriorated asphalt and gravel road, concrete bunkers, the site of the demolished former observation building, and a circular, 50-foot-wide fire lane with a 2,000-foot diameter centered at the test pad. LHAAP-001-R-01 is co-located with IRP site LHAAP-27 (Shaw, 2016c). Several investigations were conducted at LHAAP-27 including soil, groundwater, surface water, and sediment. Based on those investigations and the risk assessment LHAAP-27 an IRP no further action decision was made in January 1998 (Shaw, 2016c).

16.2.2 Land and Resource Use

The reasonably anticipated future land use is a national wildlife refuge. The 2004 MOA between USFWS and the Army documents the transfer of LHAAP land to USFWS. The former LHAAP is now known as the Caddo Lake National Wildlife Refuge. LHAAP-001-R-01 will be transferred under this agreement in the future (Shaw, 2010c).

There are no bodies of water at LHAAP-001-R-01. All surface water drains southeast from the hillside towards Harrison Bayou, which flows into Caddo Lake.

None of the water wells at LHAAP are used for drinking water; they supply water for non-potable uses only. However, the State of Texas considers all groundwater as potential drinking water, unless otherwise classified in accordance with 30 TAC 335.563(h)(1).

16.2.3 History of Contamination

From 1954 through 1956, LHAAP-001-R-01 was used for the production and testing of photoflash bombs. In the late 1950s, within pits near the test pad area, illuminating devices, such as XM40E5 “button bombs”, were demilitarized. It is also suspected that in the early 1960s, leaking production items may have been demilitarized by detonation at the site. In the early 1980s, approximately 52,000 one- and two-pound photoflash cartridges were destroyed in a 500-square foot area about 300 feet east of the former observation building. Leaking white phosphorus (WP) munitions are also suspected to have been disposed of at LHAAP-001-R-01, though there is no formal documentation (Shaw, 2016c; Army, 1998).

16.2.4 Initial Response

Between August and November 2008, a non-time critical MEC removal action was conducted, and surface clearances were performed at LHAAP-001-R-01. A surface clearance of approximately 65 acres and subsurface clearance to the depth of detection in a 14-acre open burn/open detonation (OB/OD) area were performed. A total of 384 MEC/material potentially presenting explosive hazard (MPPEH) items and 14 inert items were located and destroyed and a total of 22,139 pounds of munitions debris (MD) and 1,876 pounds of cultural debris (CD) were removed during surface and subsurface clearance.

16.2.5 Basis for Taking Action

The basis for taking action is the result of explosive hazards that may remain in place following MEC removal actions.

16.3 REMEDIAL ACTIONS

16.3.1 Remedial Action Objectives

The LUC RAO developed for LHAAP-001-R, as outlined in the ROD (U.S. Army, August 2016) is:

- Protection of human health and safety from explosive hazards that may have remained at the sites after the MEC removal action.

16.3.2 Remedy Description

The LUC remedial action for MEC at LHAAP-001-R is comprised of the following elements:

- LUC to prohibit residential use.
- LUC to restrict land use to non-residential.
- LUC to restrict intrusive activities (e.g., digging).
- Signage to convey MEC warning.
- Education Program.

The Educational Program materials, including pamphlets and video, were delivered to the USFWS in hard copy and electronic form as part of the Site-Specific Final Report for the MEC Removal Action report (EODT, 2009).

16.3.3 Remedy Implementation

16.3.3.1 Land Use Controls

Per the Final ROD, the LUCs' performance objectives are to:

- Prohibit the development and use of the property for residential housing, elementary and secondary schools, childcare facilities, and playgrounds.
- Restrict land use to non-residential
- Prohibit intrusive activities such as digging or any other activity which could result in explosive safety risk.
- Maintain existing MEC warning signs at the perimeter of each site to physically demarcate controlled areas.

For portions of LHAAP-001-R-01 subject to LUCs that are not owned by the Army, the Army will monitor and report on the implementation, maintenance, and enforcement of LUCs, and coordinate with federal, state, and local governments and owners and occupants of properties subject to LUCs. The Army remains responsible for ensuring that the remedy remains protective of human health and safety. This section presents the maintenance of monitoring of the LUCs at both sites in accordance with the final LUC RD/RACR (U.S. Army, May 2018).

Boundaries of the LUCs that are part of the remedial action were finalized as the preliminary LUC boundaries. LUC boundaries were surveyed and finalized based on EPA and TCEQ concurrence. The LUC plats, legal descriptions, and restriction language was recorded in the Harrison County Courthouse in accordance with Title 30 TAC §335.566 on April 19, 2018.

MEC warning signs have been installed at the perimeter of LHAAP-001-R-01 (64 signs), that serve as a physical demarcation of the controlled areas. The signs have visibility from one sign to the next with a maximum spacing of 100 feet. The signs include warning of potential presence of MEC and state the restriction against intrusive activities.

Maintenance is conducted, as needed, and may include the following activities:

- Mowing and brush clearing around MEC warning signs to ensure that they are visible from one sign location to the next sign location.
- Rehanging/affixing MEC warning signs or replacing MEC warning sign(s) if they become damaged or illegible.
- Repairing existing MEC warning signposts, which may require the reestablishment of the concrete base or post replacement.

16.3.4 Operations, Maintenance and Monitoring

The LUCs are being maintained and managed in accordance with the ROD and the LUC RD/Remedial Action Construction Report as follows:

- LHAAP-001-R-01 is not being developed or used for residential housing, elementary and secondary schools, childcare facilities, and playgrounds.
- Land use is non-residential.
- Annual field inspections to ensure no violations of the LUCs has occurred.
- No digging or any other activity which could result in explosive safety risk was noted during the LUC inspections completed.
- Periodic transmittal of LUC Notice to federal, State, and local authorities and to owners and occupants to include land use restrictions referenced in the ROD, a written description of the LUCs, and a figure depicting the LUC boundaries.
- Existing MEC warning signs at the perimeter of each site to physically demarcate controlled areas are being maintained per the ROD.

Mowing and brush clearing around MEC warning signs was completed on October 29, 2018, and January 30, 2020, to ensure that they are visible from one sign location to the next sign location. No repairs to signage were needed for either site during the LUC inspections.

16.4 PROGRESS SINCE THE FOURTH FIVE-YEAR REVIEW

The following presents the protectiveness statement presented in the Fourth Five-Year Review Report for LHAAP-001-R-01 (USACE, 2019):

The LHAAP-001-R-01 remedy is protective of human health and the environment. LUCs—including perimeter signage, prohibitions on intrusive activities and land development, and an educational awareness program—prevent exposure to MEC, and groundwater monitoring has confirmed that perchlorate remains below the remedial goal.

16.5 DATA REVIEW

The remedy currently consists of LUCs; therefore, no data was generated or reviewed**.**

16.6 SITE INSPECTION

A site inspection was conducted on 14-15 February 2023.

No issues or other findings were identified during the site inspection. Land use has not changed, nor is it anticipated to change. The MEC warning signs were in good condition, visible, and set within the 100-foot requirement as documented in the ROD. There was no groundwater use or intrusive activities observed during the inspection.

16.7 TECHNICAL ASSESSMENT

16.7.1 QUESTION A – IS THE REMEDY FUNCTIONING AS INTENDED BY THE DECISION DOCUMENTS?

Yes, the remedy is functioning as intended by the ROD. The remedy is effective and functioning as designed to 1) Prohibit the development and use of the property for residential housing, elementary and secondary schools, child care facilities, and playgrounds, 2) restrict land use to non-residential, 3) prohibit intrusive activities such as digging or any other activity which could result in explosive safety risk and 4) maintain existing MEC warning signs at the perimeter of each site to physically demarcate controlled areas. The Five-Year Review site inspection confirmed LUCs prohibit changes in land use and that warning signs are maintained and in good condition. There were no violations of LUCs observed during the site inspection.

Operation and maintenance include annual inspection of the MEC warning signs as well as any maintenance needed to clear brush or replace damaged signs and posts. Reports document that no LUC-restricted activities have been authorized and that conditions and use are consistent with the LUCs.

16.7.2 QUESTION B – ARE THE EXPOSURE ASSUMPTIONS, TOXICITY DATA, CLEANUP LEVELS, AND REMEDIAL ACTION OBJECTIVES USED AT THE TIME OF THE REMEDY SELECTION STILL VALID?

Yes, the exposure assumptions, toxicity data, and RAOs used at the time of remedy selection are still valid.

16.7.3 QUESTION C – HAS ANY OTHER INFORMATION COME TO LIGHT THAT COULD CALL INTO QUESTION THE PROTECTIVENESS OF THE REMEDY?

No other information has come to light that calls into question the protectiveness or performance of the remedy.

16.7.4 TECHNICAL ASSESSMENT SUMMARY

LUCs are in place to promote ongoing protection of human safety against potential explosive hazards that may have remained at the site. No changes in land use were made and no new routes of exposure or receptors were identified. Therefore, the remedy implemented is functioning as intended by the 2016 ROD, and the exposure assumptions and RAO continue to be valid.

16.8 ISSUES

No issues were identified during this Five-Year Review that prevent the remedy from being protective now or in the future.

16.9 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

No recommendations or follow-up actions are required since no issues were identified during this Five-Year Review that affect current or future protectiveness of the remedy.

16.9.1 OTHER FINDINGS

The RACR requires periodic transmittal of a LUC Notice to federal, state, and local authorities and to owners and occupants of LHAAP-001-R-01. The transmittal is to coincide with each Five-Year Review and will be documented in the report. To date, no transmittal has occurred to be documented in this Five-Year Review Report.

16.10 PROTECTIVENESS STATEMENT

The remedy for LHAAP-001-R-01 is protective of human health and the environment. The LUCs are being maintained and managed in accordance with the ROD and the LUC RD/RACR.

17.0 LHAAP-003-R-01 GROUND SIGNAL TEST AREA

17.1 SITE CHRONOLOGY

Important events and relevant dates for LHAAP-003-R-01 are presented below in **Table 67**.

Table 67 – LHAAP-003-R-01 Chronology

Event	Date
LHAAP-003-R-01 Operations Began	1963
No Further Action Record of Decision	January 23, 1998
MMRP Site Investigation	2002 – 2004
Soil Sampling Event	2003
Site Investigation	2005
Engineering Evaluation/Cost Analysis	2007
Installation-wide Baseline ERA	2007
MEC Removal Action Conducted	2008
Munitions Constituents Data Summary Report	2011
Groundwater Sampling Event	2009
MEC Remedial Action Report	2009
Final Record of Decision LHAAP-001-R and LHAAP-003-R	September 13, 2016
Final LUC Remedial Design and Remedial Action Completion Report	2018
Remedial Action Operation	2018 - Present
Long Term Monitoring Reports	2019 – Present
Fourth Five-Year Review Report	2019

MEC – Munitions and Explosives of Concern
MMRP – Military Munitions Response Program

17.2 BACKGROUND

17.2.1 PHYSICAL CHARACTERISTICS

LHAAP-003-R-01, the Ground Signal Test Area, is in the southeastern portion of LHAAP and comprises approximately 80 acres (**Figure 74 and 76**). The only surface feature at LHAAP-003-R-01 is an asphalt road. Other than the asphalt road, the area is undeveloped and overgrown with woody vegetation. LHAAP-003-R-01 is co-located with IRP site LHAAP-54 (Shaw, 2016c). Several investigations were conducted at LHAAP-54 including soil, groundwater, surface water, and sediment. Based on those investigations

and the risk assessment LHAAP-54 an IRP no further action decision was made in January 1998 (Shaw, 2016c).

17.2.2 Land and Resource Use

The reasonably anticipated future land use is a national wildlife refuge. The 2004 MOA between USFWS and the Army documents the transfer of LHAAP land to USFWS. The former LHAAP is now known as the Caddo Lake National Wildlife Refuge. LHAAP-003-R-01 will be transferred under this agreement in the future (Shaw, 2016c).

There are no bodies of water at LHAAP-003-R-01. All surface water drains through ditches to the northeast towards Saunders Branch and to the southwest towards Harrison Bayou, which flow into Caddo Lake.

None of the water wells at LHAAP are used for drinking water; they supply water for non-potable uses only. However, the State of Texas considers all groundwater as potential drinking water, unless otherwise classified in accordance with 30 TAC 335.563(h)(1).

17.2.3 History of Contamination

Beginning in April 1963, LHAAP-003-R-01 was used for aerial and on-ground testing and destruction of a variety of devices, including pyrotechnic signal devices, red phosphorus smoke wedges, infrared flares, illuminating mortar shells and cartridges, button bombs, and various types of explosive simulators. Intermittently over a 20-year period, the area was also used for the testing and burn-out of rocket motors. From 1988 to 1991 LHAAP-003-R-01 was used for burn-out of Pershing missile rocket motors. Periodically, leaking WP munitions were demilitarized at LHAAP-003-R-01 (Shaw, 2016c).

17.2.4 Initial Response

In 1998, a No Further Remedial Action decision was selected for the Group 1 Sites at LHAAP. It was concluded that the area does not pose an unacceptable risk to human health or the environment (Army, 1998).

A 2007 EE/CA recommended surface clearance of MEC items with LUCs to reduce the risk within LHAAP-003-R. Between August and November 2008, a MEC removal action was conducted and LUCs were developed for the site (EODT, 2009). Magnetometer-assisted surface clearance was performed at LHAAP-003-R. The clearance team worked in grids and established 5-ft sweep lanes within each grid, removing and disposing of all surface MEC and MPPEH, MD, CD, and range-related debris. Twelve MEC/MPPEH items and one inert item were located and destroyed, and 6,880 pounds of MD and 5,981 pounds of CD were removed during surface clearance. All MEC items were destroyed using the blow-in-place (BIP) method following approved demolition procedures. All debris was consolidated and relocated to the site lay down area. The debris was shipped off site for final disposition (Shaw, 2016c).

17.2.5 Basis for Taking Action

The basis for taking action is the result of explosive hazards that may remain in place following MEC removal actions.

17.3 REMEDIAL ACTIONS

17.3.1 Remedial Action Objectives

The LUC RAO developed for LHAAP-003-R-01 (U.S. Army, August 2016) is:

- Protection of human health and safety from explosive hazards that may have remained at the sites after the MEC removal action.

17.3.2 Remedy Description

The LUC remedial action for MEC at LHAAP-003-R-01 is comprised of the following elements:

- LUC to prohibit residential use.
- LUC to restrict land use to non-residential.
- LUC to restrict intrusive activities (e.g., digging).
- Signage to convey MEC warning.
- Education Program.

The Educational Program materials, including pamphlets and video, were delivered to the USFWS in hard copy and electronic form as part of the Site-Specific Final Report for the MEC Removal Action report (EODT, 2009).

17.3.3 Remedy Implementation

Per the Final ROD, the LUCs' performance objectives are to:

- Prohibit the development and use of the property for residential housing, elementary and secondary schools, childcare facilities, and playgrounds.
- Restrict land use to non-residential.
- Prohibit intrusive activities such as digging or any other activity which could result in explosive safety risk.
- Maintain existing MEC warning signs at the perimeter of each site to physically demarcate controlled areas.

For portions of LHAAP-003-R-01 subject to LUCs that are not owned by the Army, the Army will monitor and report on the implementation, maintenance, and enforcement of LUCs, and coordinate with federal, state, and local governments and owners and occupants of properties subject to LUCs. The Army remains responsible for ensuring that

the remedy remains protective of human health and safety. This section presents the maintenance of monitoring of the LUCs at both sites in accordance with the final LUC RD/Remedial Action Construction Report (U.S. Army, May 2018).

Boundaries of the LUCs that are part of the remedial action were finalized as the preliminary LUC boundaries. LUC boundaries were surveyed and finalized based on EPA and TCEQ concurrence. The LUC plats, legal descriptions, and restriction language was recorded in the Harrison County Courthouse in accordance with Title 30 TAC §335.566 on April 19, 2018.

MEC warning signs have been installed at the perimeter of LHAAP-003-R-01 (64 signs), that serve as a physical demarcation of the controlled areas. The signs have visibility from one sign to the next with a maximum spacing of 100 feet. The signs include warning of potential presence of MEC and state the restriction against intrusive activities.

Maintenance is conducted, as needed, and may include the following activities:

- Mowing and brush clearing around MEC warning signs to ensure that they are visible from one sign location to the next sign location.
- Rehanging/affixing MEC warning signs or replacing MEC warning sign(s) if they become damaged or illegible.

Repairing existing MEC warning signposts, which may require the reestablishment of the concrete base or post replacement.

17.3.4 Operations, Maintenance and Monitoring

The LUCs are being maintained and managed in accordance with the ROD and the LUC RD/Remedial Action Construction Report as follows:

- LHAAP-003-R-01 is not being developed or used for residential housing, elementary and secondary schools, childcare facilities, and playgrounds.
- Land use is non-residential.
- Annual field inspections to ensure no violations of the LUCs has occurred.
- No digging or any other activity which could result in explosive safety risk was noted during the LUC inspections completed.
- Periodic transmittal of LUC Notice to federal, State, and local authorities and to owners and occupants to include land use restrictions referenced in the ROD, a written description of the LUCs, and a figure depicting the LUC boundaries.
- Existing MEC warning signs at the perimeter of each site to physically demarcate controlled areas are being maintained per the ROD.

Mowing and brush clearing around MEC warning signs was completed on October 29, 2018 and January 30, 2020, to ensure that they are visible from one sign location to the

next sign location. No repairs to signage were needed for either site during the LUC inspections.

17.4 PROGRESS SINCE THE FOURTH FIVE-YEAR REVIEW

The following presents the protectiveness statement presented in the Fourth Five-Year Review Report for LHAAP-003-R-01 (USACE, 2019):

The LHAAP-003-R-01 remedy is protective of human health and the environment. LUCs—including perimeter signage, prohibitions on intrusive activities and land development, and an educational awareness program—prevent exposure to MEC, and groundwater monitoring has confirmed that perchlorate remains below the remedial goal.

17.5 DATA REVIEW

The remedy currently consists of LUCs; therefore, no data was generated or reviewed**.**

17.6 SITE INSPECTION

A site inspection was conducted on 14-15 February 2023.

No issues or other findings were identified during the site inspection. Land use has not changed since the Year 1 Review, nor is it anticipated to change. The MEC warning signs were in good condition, visible, and set within the 100-foot requirement as documented in the ROD. There was no groundwater use or intrusive activities observed during the inspection.

17.7 TECHNICAL ASSESSMENT

17.7.1 QUESTION A – IS THE REMEDY FUNCTIONING AS INTENDED BY THE DECISION DOCUMENTS?

Yes, the remedy is functioning as intended by the ROD. The remedy is effective and functioning as designed to 1) Prohibit the development and use of the property for residential housing, elementary and secondary schools, child care facilities, and playgrounds, 2) restrict land use to non-residential, 3) prohibit intrusive activities such as digging or any other activity which could result in explosive safety risk and 4) maintain existing MEC warning signs at the perimeter of each site to physically demarcate controlled areas. The Five-Year Review site inspection confirmed LUCs prohibit changes in land use and that warning signs are maintained and in good condition. There were no violations of LUCs observed during the site inspection.

Operation and maintenance include annual inspection of the MEC warning signs as well as any maintenance needed to clear brush or replace damaged signs and posts. Reports document that no LUC-restricted activities have been authorized and that conditions and use are consistent with the LUCs.

17.7.2 QUESTION B – ARE THE EXPOSURE ASSUMPTIONS, TOXICITY DATA, CLEANUP LEVELS, AND REMEDIAL ACTION OBJECTIVES USED AT THE TIME OF THE REMEDY SELECTION STILL VALID?

Yes, the exposure assumptions, toxicity data, and RAOs used at the time of remedy selection are still valid.

17.7.3 QUESTION C – HAS ANY OTHER INFORMATION COME TO LIGHT THAT COULD CALL INTO QUESTION THE PROTECTIVENESS OF THE REMEDY?

No other information has come to light that calls into question the protectiveness or performance of the remedy.

17.7.4 TECHNICAL ASSESSMENT SUMMARY

LUCs are in place to promote ongoing protection of human safety against potential explosive hazards that may have remained at the site. No changes in land use were made and no new routes of exposure or receptors were identified. Therefore, the remedy implemented is functioning as intended by the 2016 ROD, and the exposure assumptions and RAO continue to be valid.

17.8 ISSUES

No issues were identified during this Five-Year Review that prevent the remedy from being protective now or in the future.

17.9 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

No recommendations or follow-up actions are required since no issues were identified during this Five-Year Review that affect current or future protectiveness of the remedy.

17.9.1 OTHER FINDINGS

The RACR requires periodic transmittal of a LUC Notice to federal, state, and local authorities and to owners and occupants of LHAAP-003-R-01. The transmittal is to coincide with each Five-Year Review and will be documented in the report. To date, no transmittal has occurred to be documented in this Five-Year Review Report.

17.10 PROTECTIVENESS STATEMENT

The remedy for LHAAP-003-R-01 is protective of human health and the environment. The LUCs are being maintained and managed in accordance with the ROD and the LUC RD/RACR.

18.0 LHAAP-004-R-01 FORMER PISTOL RANGE

18.1 SITE CHRONOLOGY

Important events and relevant dates for LHAAP-004-R-01 are presented below in **Table 68**.

Table 68 – LHAAP-004-R-01 Chronology

Event	Date
Pistol Range Operations	1950s – 2004
Soil Samples Collected	1995
No Further Action Record of Decision	January 23, 1998
Comprehensive Site Investigation	2006 and 2007
Final Removal Action Work Plan	2009
Non-Time Critical Removal Action	2009
Engineering Evaluation/Cost Analysis	2009
Final Proposed Plan	2010
Non-Time Critical Removal Action Completion Report	2010
Final Record of Decision Former Pistol Range	September 7, 2010
First Five-Year Review Report	2014
Second Five-Year Review Report	2019

18.2 BACKGROUND

18.2.1 PHYSICAL CHARACTERISTICS

LHAAP-004-R-001, known as the former Pistol Range, comprises approximately 0.4 acres in the southeastern portion of LHAAP, approximately 280 feet south of Avenue Q at the end of Robert Avenue (**Figure 77**). LHAAP-004-R-001 slopes gently upward to the east with elevation increasing by approximately 10 feet at the very eastern end. This slope constituted the target portion of the Pistol Range. Currently, the flat portion of the former Pistol Range is covered by grass while the eastern slope is forested. One shallow monitoring well is in the eastern portion of the former Pistol Range near the toe of the target slope (Shaw, 2010f).

18.2.2 LAND AND RESOURCE USE

The reasonably anticipated future land use is a national wildlife refuge. The 2004 MOA between USFWS and the Army documents the transfer of LHAAP land to USFWS. The former LHAAP is now known as the Caddo Lake National Wildlife Refuge. LHAAP-004-R-001 will be transferred under this agreement in the future (Shaw, 2010f).

There are no bodies of water at LHAAP-004-R-001. All surface water drains to the west towards Harrison Bayou through sheet flow or the drainage swale, located along the southwestern portion of LHAAP-004-R-001, which then flows into Caddo Lake.

None of the water wells at LHAAP are used for drinking water; they supply water for non-potable uses only. However, the State of Texas considers all groundwater as potential drinking water, unless otherwise classified in accordance with 30 TAC 335.563(h)(1).

18.2.3 History of Contamination

The former Pistol Range was established in the 1950s and was used by installation security personnel for small arms target practice and qualifying tests until 2004 (Shaw, 2010f).

Preliminary site-specific field investigations were conducted at the former Pistol Range in 1995. During the initial investigation, soil samples were collected from the target embankment and were subjected to the toxicity characteristic leaching procedure (TCLP). The leachate was analyzed for lead. Results of the analysis indicated that lead contamination was limited to the surface where lead bullets were located. In addition, results indicated that soil, if excavated from the target embankment, would likely be hazardous if the soil contained lead fragments (Thiokol, 1995 and CES, 2004).

18.2.4 Initial Response

In 1998, a No Further Remedial Action remedy was selected for the Group 1 Sites, which included the Inert Burning Ground, Suspected TNT Burial Site, South Test Area, and Ground Signal Test Area, at LHAAP. It was concluded that the area does not pose an unacceptable risk to human health or the environment (Army, 1998).

Between August 4 and August 19, 2009, non-time critical removal action activities were conducted at the former Pistol Range site including excavation of contaminated soil, confirmation sampling, and site restoration. Soil with lead contamination above the cleanup level (SAI-Ind) was excavated. Excavation activities were terminated where confirmation sampling results indicated that the cleanup level had been achieved. The removal action objective of protection of human health from lead at unacceptable concentrations had been achieved as demonstrated by the confirmation soil analytical results. The site was restored by backfilling with clean soil, covering the sloped area of the excavation with erosion control fabric, seeding, and mulching. Transport of excavated soil and proper disposal activities were completed on October 6, 2009 (Shaw, 2010f).

18.2.5 Basis for Taking Action

The lead agency has determined that no further CERCLA action is necessary at the former Pistol Range to protect public health, welfare, or the environment based on the reasonable anticipated use as industrial or recreational. The recommendation for NFA is consistent with the criteria required under CERCLA.

The results of the 2006 and 2007 investigations demonstrated that sediment and surface water were not impacted by the site (Shaw, 2009d, e). As a result, no removal action was necessary to ensure protection of human health and the environment under the industrial land use scenario.

18.3 REMEDIAL ACTIONS

The Former Pistol Range is an NFA site and RAOs do not apply.

Since the NFA decision was based on industrial land use and does not restore the site to UU/UE conditions, five-year reviews are required to ensure protection of human health and the environment.

18.4 PROGRESS SINCE THE FOURTH FIVE-YEAR REVIEW

The following presents the protectiveness statement presented in the Fourth Five-Year Review Report for LHAAP-004-R-01 (USACE, 2019):

The LHAAP-004-R-01 No Action decision is protective of human health and the environment. There have been no changes in land use or other assumptions that would affect protectiveness.

18.5 DATA REVIEW

Not Applicable.

18.6 SITE INSPECTION

A site inspection was conducted on 14-15 February 2023, which included visual inspection of former target berm and the soil remediation area.

No issues or other findings were identified during the site inspection. Land use has not changed since the First Five-Year Review (2013), nor is it anticipated to change.

18.7 TECHNICAL ASSESSMENT

18.7.1 QUESTION A – IS THE REMEDY FUNCTIONING AS INTENDED BY THE DECISION DOCUMENTS?

Yes, the no action decision is functioning as intended because intended land use has not changed.

18.7.2 QUESTION B – ARE THE EXPOSURE ASSUMPTIONS, TOXICITY DATA, CLEANUP LEVELS, AND REMEDIAL ACTION OBJECTIVES USED AT THE TIME OF THE REMEDY SELECTION STILL VALID?

Yes. The wildlife refuge exposure assumptions remain the same since the ROD. There are no cleanup levels or RAOs as this is an NFA site and RAOs do not apply.

18.7.3 Question C – Has any other information come to light that could call into question the protectiveness of the remedy?

No other information has come to light that calls into question the protectiveness or performance of the remedy.

18.7.4 Technical Assessment Summary

This Five-Year Review found no changes to current or future intended land use.

18.8 ISSUES

No issues were identified during this Five-Year Review that prevent the NFA decision from being protective now or in the future.

18.9 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

No recommendations or follow-up actions are required since no issues were identified during this Five-Year Review that affect current or future protectiveness of the NFA decision.

18.10 PROTECTIVENESS STATEMENT

The NFA decision for the Former Pistol Range, LHAAP-004-R-01, is protective of human health and the environment. There have been no changes in land use or other assumptions that would affect protectiveness.

19.0 NEXT REVIEW

The next Five-Year Review will be due on September 30, 2029.

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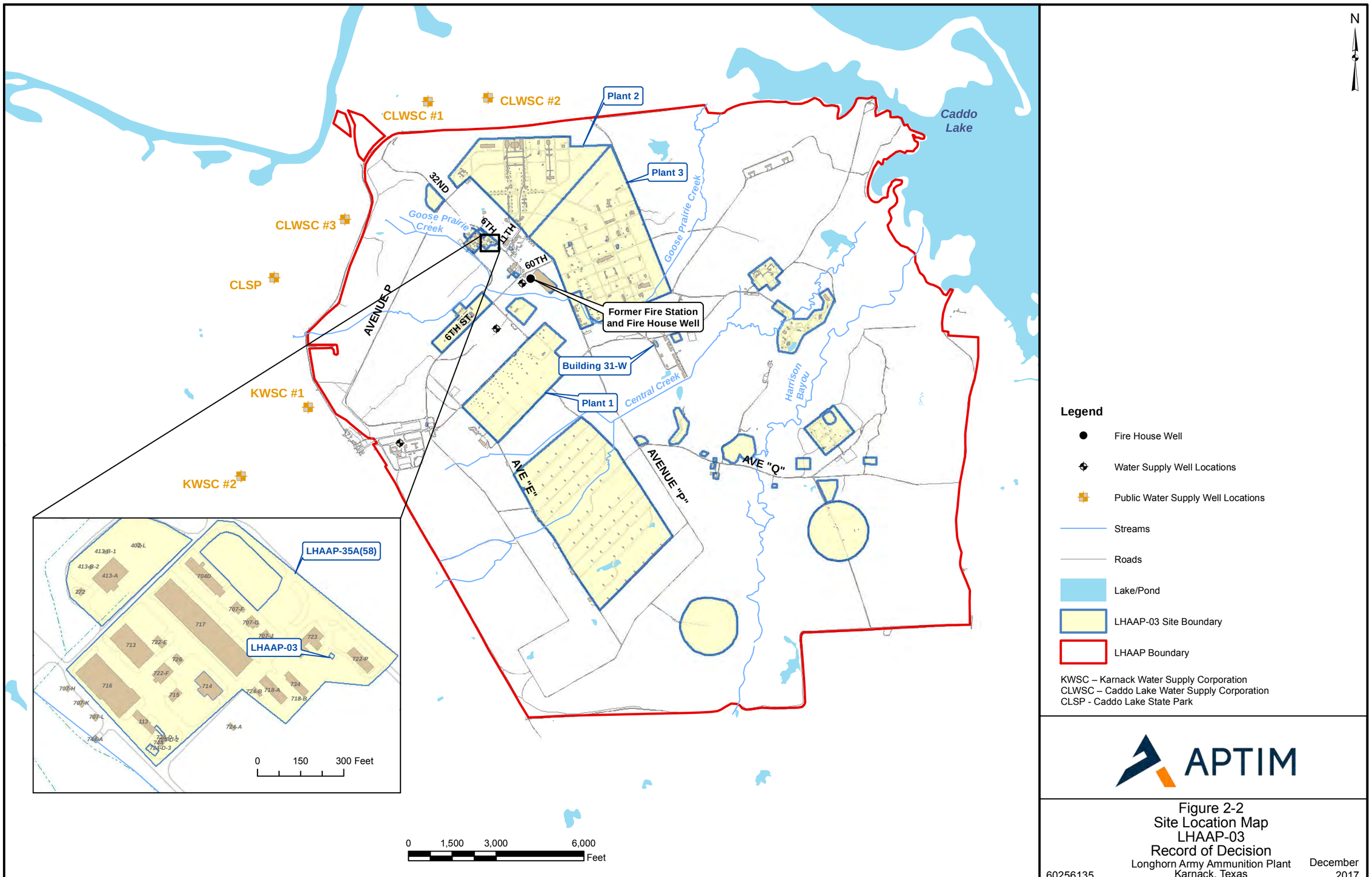
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FIGURES

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Figure 1



APTIM

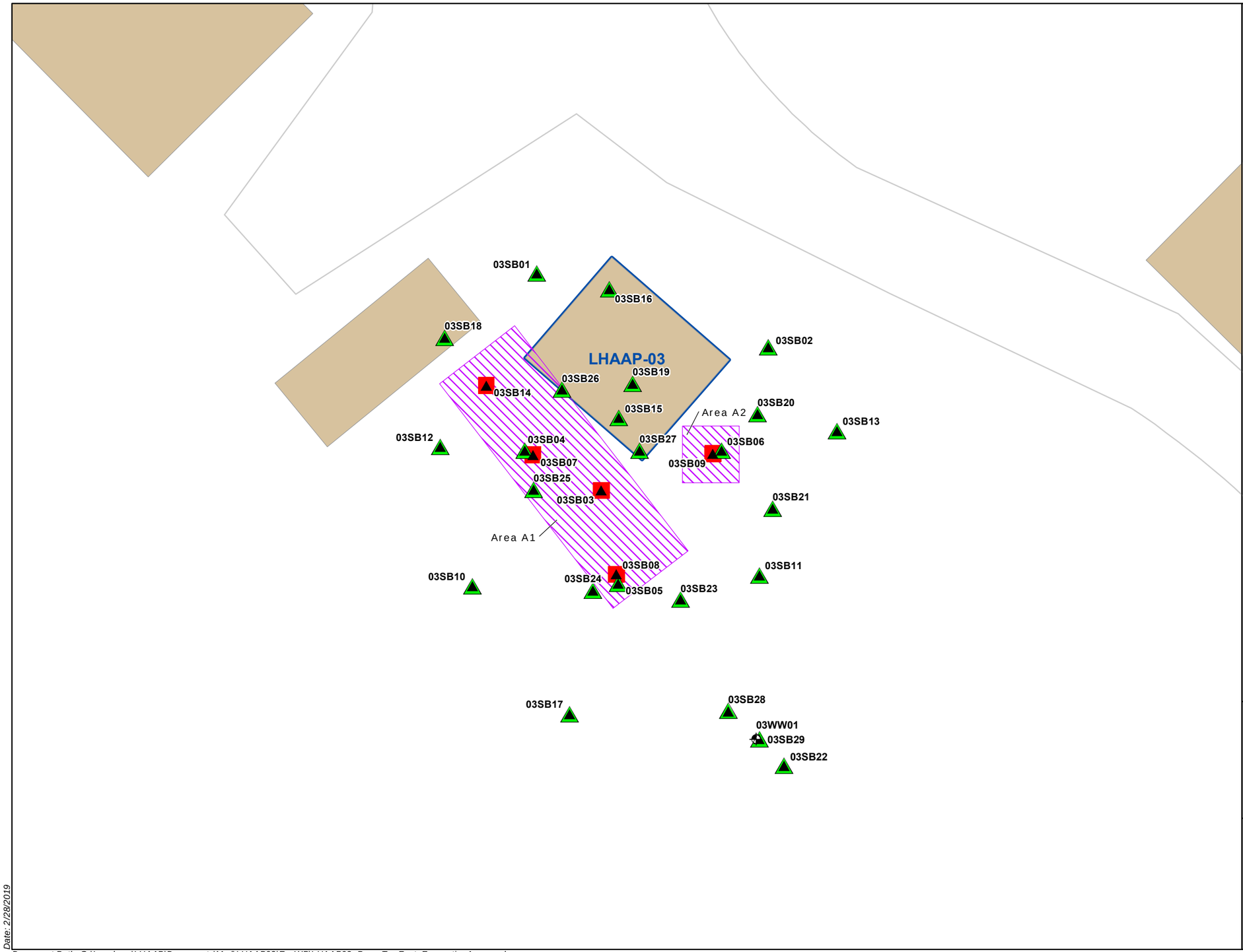
Figure 2-2
Site Location Map
LHAAP-03
Record of Decision
Longhorn Army Ammunition Plant
Karnack, Texas

60256135

December 2017

\\usgrn1vfp001\data\group\L:\Group\IT_GIS\GIS Projects\Longhorn\MXDs\LHAAP-03\2013-May-16\Figure 2-2 LHAAP-03 Site Location Map_CH.mxd

Figure 2



Soil Boring

0-0.5 or 0-2 foot bgs
Sample below RRS3 MSC

0-0.5 foot deep soil contamination
above RRS3 MSC to be removed

1 ft Excavation Depth

Roads

Buildings

Site Boundary

Note:
1. bgs - below ground surface
2. RRS3 MSCs - Risk Reduction Standard 3 Medium-specific Concentrations

N

0 5 10 Feet

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TULSA DISTRICT
TULSA, OKLAHOMA

bhate APTIM

Figure 2-1

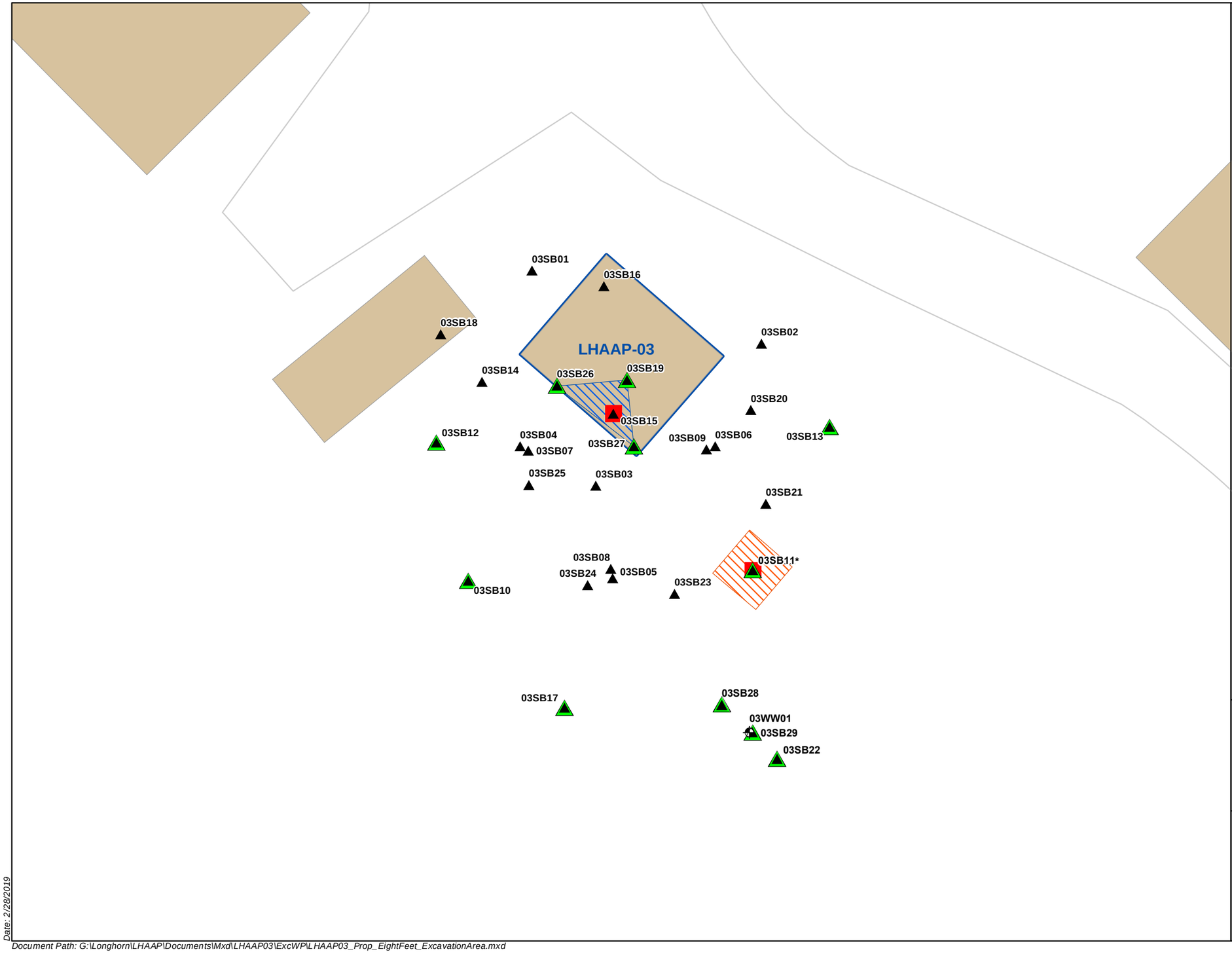
Planned 1-Foot Excavation Areas
LHAAP-03

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Date: 2/28/2019

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Figure 3



6-7 foot deep soil contamination above RRS3 MSC to be removed

Below Cleanup Level at 6-7 ft bgs

Soil Boring not Sampled at 6-7 ft bgs

Area B (Excavation 8 feet bgs)

Area C (Excavation 8 feet bgs)

Shallow Monitoring Well

Roads

Former Buildings/Structures

Site Boundary

Note:
1. bgs - below ground surface
2. RRS3 MSCs - Risk Reduction Standard 3 Medium-specific Concentrations

* 03SB11 sample intervals from 9-10 feet bgs and 14-15 feet bgs were below RRS3 MSC

N

0 5 10 Feet

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TULSA, OKLAHOMA

bhate APTIM

Figure 2-2

Planned 8-Foot Excavation Areas
LHAAP-03

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Date: 2/28/2019

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Figure 4

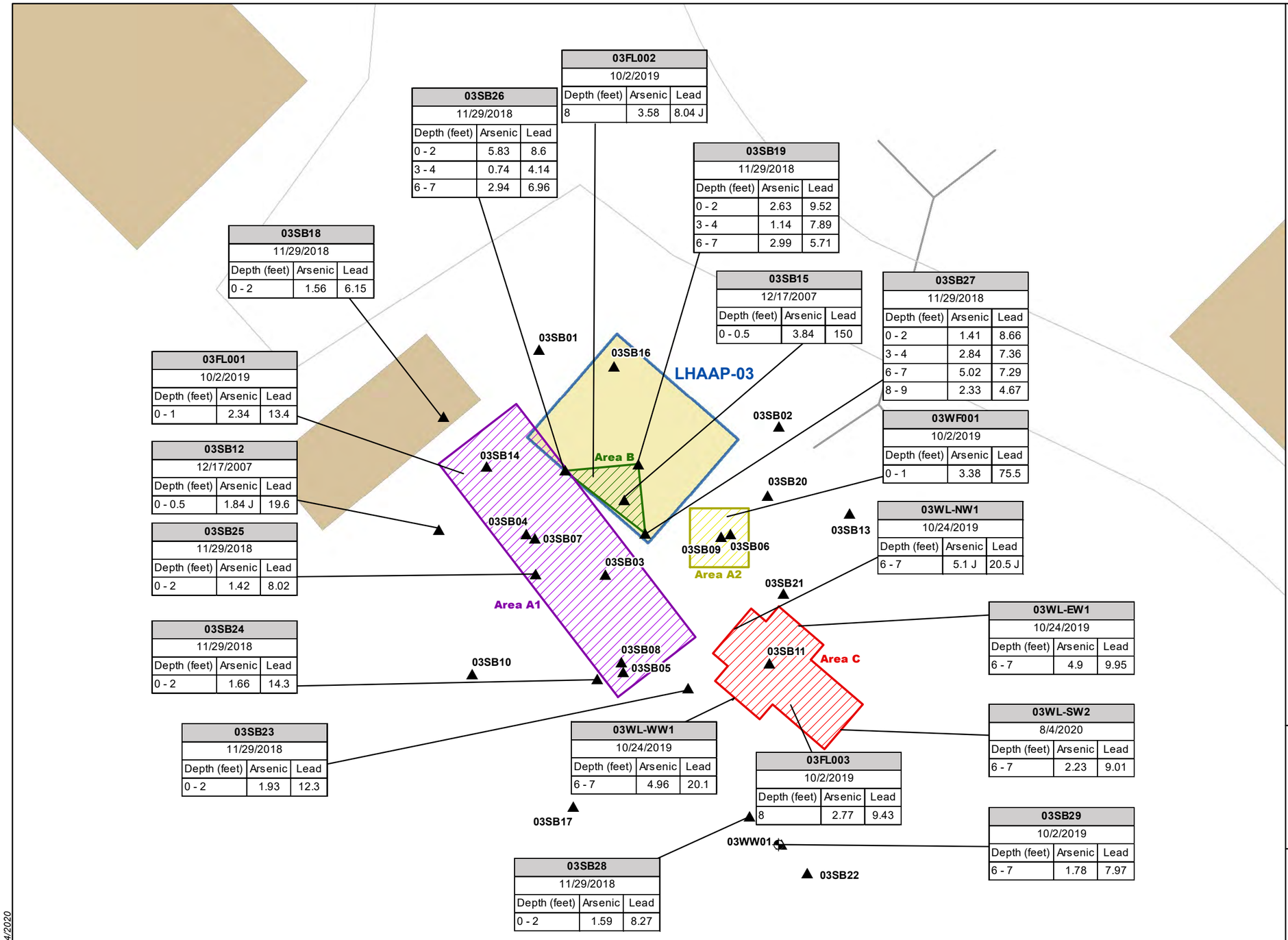
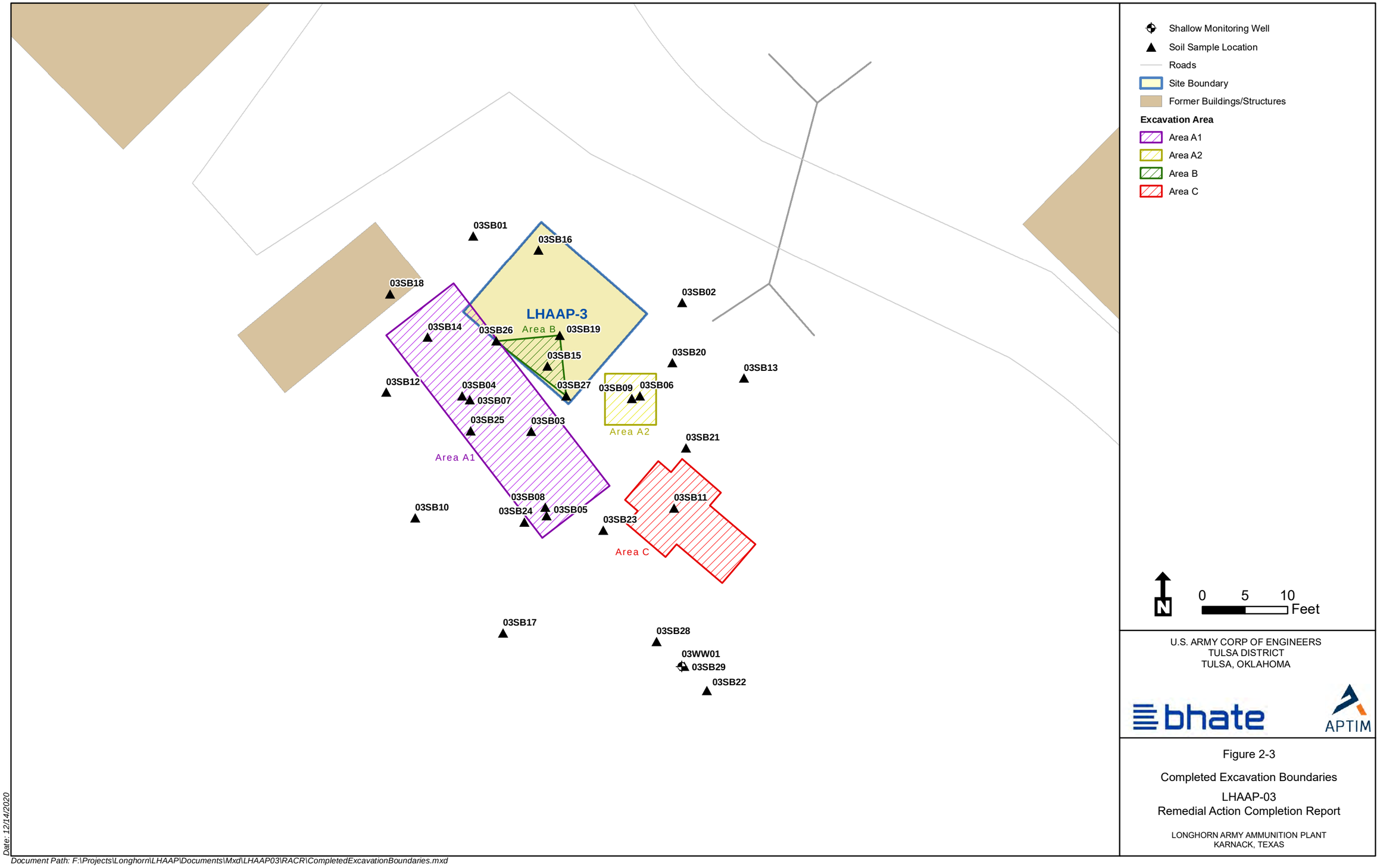

03FL002
10/2/2019
Depth (feet) | Arsenic | Lead
8 | 3.58 | 8.04 J
03SB26
11/29/2018
Depth (feet) | Arsenic | Lead
0 - 2 | 5.83 | 8.6
3 - 4 | 0.74 | 4.14
6 - 7 | 2.94 | 6.96
03SB19
11/29/2018
Depth (feet) | Arsenic | Lead
0 - 2 | 2.63 | 9.52
3 - 4 | 1.14 | 7.89
6 - 7 | 2.99 | 5.71
03SB18
11/29/2018
Depth (feet) | Arsenic | Lead
0 - 2 | 1.56 | 6.15
03SB15
12/17/2007
Depth (feet) | Arsenic | Lead
0 - 0.5 | 3.84 | 150
03SB27
11/29/2018
Depth (feet) | Arsenic | Lead
0 - 2 | 1.41 | 8.66
3 - 4 | 2.84 | 7.36
6 - 7 | 5.02 | 7.29
8 - 9 | 2.33 | 4.67
03FL001
10/2/2019
Depth (feet) | Arsenic | Lead
0 - 1 | 2.34 | 13.4
03SB12
12/17/2007
Depth (feet) | Arsenic | Lead
0 - 0.5 | 1.84 J | 19.6
03WF001
10/2/2019
Depth (feet) | Arsenic | Lead
0 - 1 | 3.38 | 75.5
03SB25
11/29/2018
Depth (feet) | Arsenic | Lead
0 - 2 | 1.42 | 8.02
03WL-NW1
10/24/2019
Depth (feet) | Arsenic | Lead
6 - 7 | 5.1 J | 20.5 J
03SB24
11/29/2018
Depth (feet) | Arsenic | Lead
0 - 2 | 1.66 | 14.3
03WL-EW1
10/24/2019
Depth (feet) | Arsenic | Lead
6 - 7 | 4.9 | 9.95
03SB23
11/29/2018
Depth (feet) | Arsenic | Lead
0 - 2 | 1.93 | 12.3
03WL-WW1
10/24/2019
Depth (feet) | Arsenic | Lead
6 - 7 | 4.96 | 20.1
03WL-SW2
8/4/2020
Depth (feet) | Arsenic | Lead
6 - 7 | 2.23 | 9.01
03FL003
10/2/2019
Depth (feet) | Arsenic | Lead
8 | 2.77 | 9.43
03SB29
10/2/2019
Depth (feet) | Arsenic | Lead
6 - 7 | 1.78 | 7.97
03SB28
11/29/2018
Depth (feet) | Arsenic | Lead
0 - 2 | 1.59 | 8.27
LHAAP-03
Area A1
Area A2
Area B
Area C
03SB01
03SB02
03SB03
03SB04
03SB05
03SB06
03SB07
03SB08
03SB09
03SB10
03SB11
03SB13
03SB14
03SB16
03SB17
03SB20
03SB21
03SB22
03WW01
Shallow Monitoring Well
Soil Sample Location
Roads
Site Boundary
Former Buildings/Structures
Excavation Area
Area A1
Area A2
Area B
Area C
Note:
1. J - Estimated Value
2. Values are in milligrams per kilogram (mg/kg).
N
0 5 10
Feet
U.S. ARMY CORP OF ENGINEERS
TULSA DISTRICT
TULSA, OKLAHOMA
bhate
APTIM
Figure 3-1
Confirmation Sampling Summary
LHAAP-03
Remedial Action Completion Report
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS
Date: 12/14/2020
Document Path: F:\Projects\Longhorn\LHAAP\Documents\Mxd\LHAAP03\RACR\ConfirmationSampling.mxd

Figure 5



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Figure 2-3

Completed Excavation Boundaries

LHAAP-03
Remedial Action Completion Report

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Date: 12/14/2020

Document Path: F:\Projects\Longhorn\LHAAP\Documents\Mxd\LHAAP03\RACR\CompletedExcavationBoundaries.mxd

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Figure 6

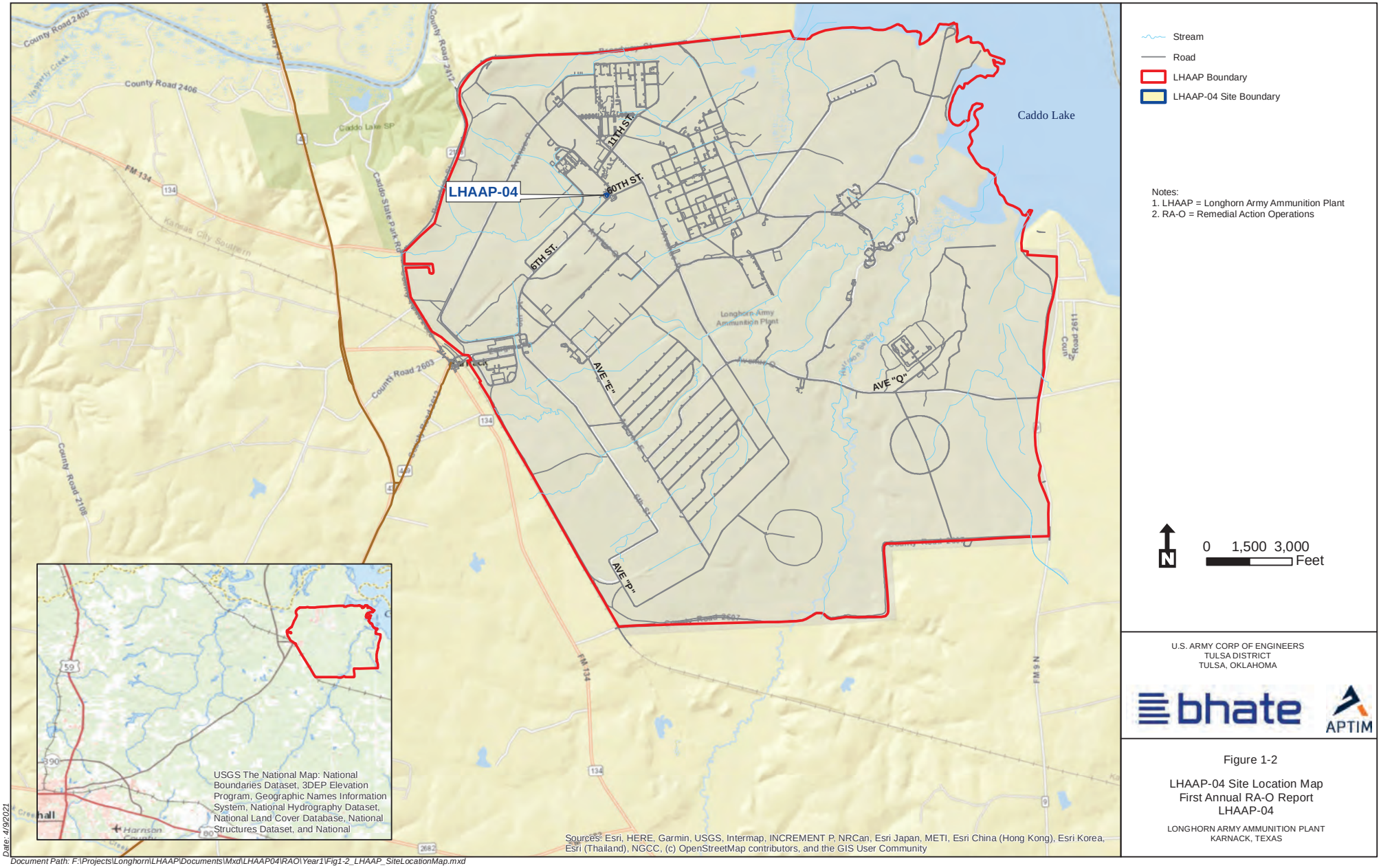
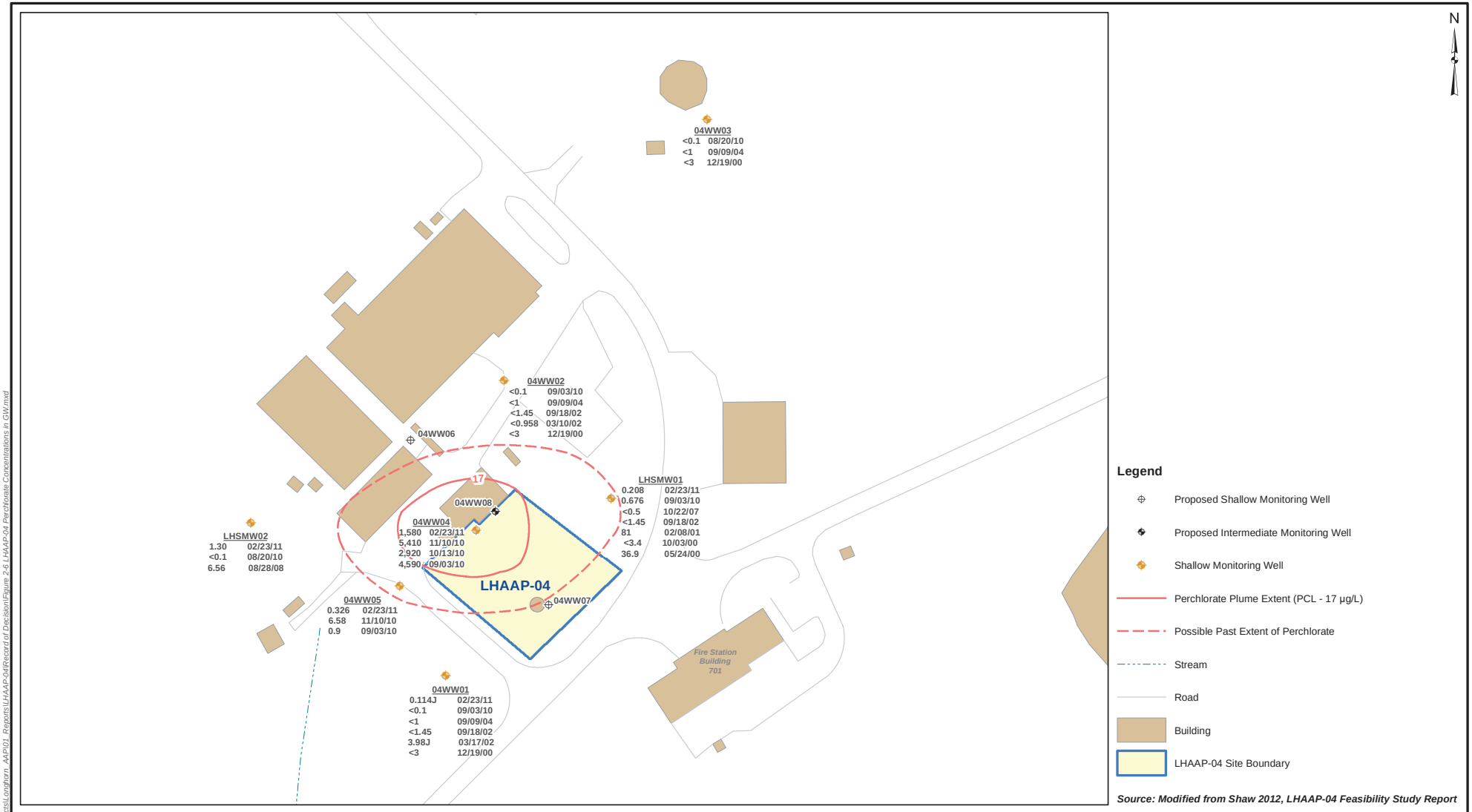

Stream
Road
LHAAP Boundary
LHAAP-04 Site Boundary
Caddo Lake
LHAAP-04
60TH ST.
11TH ST.
6TH ST.
AVE "E"
AVE "Q"
AVE "P"
Longhorn Army Ammunition Plant
County Road 2405
County Road 2406
County Road 2412
County Road 2603
County Road 2108
Caddo Lake SP
FM 134
Kansas City Southern
Notes:
1. LHAAP = Longhorn Army Ammunition Plant
2. RA-O = Remedial Action Operations
N
0 1,500 3,000
Feet
USGS The National Map: National Boundaries Dataset, 3DEP Elevation Program, Geographic Names Information System, National Hydrography Dataset, National Land Cover Database, National Structures Dataset, and National
Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community
U.S. ARMY CORP OF ENGINEERS
TULSA DISTRICT
TULSA, OKLAHOMA
bhate
APTIM
Figure 1-2
LHAAP-04 Site Location Map
First Annual RA-O Report
LHAAP-04
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS
Date: 4/9/2021
Document Path: F:\Projects\Longhorn\LHAAP\Documents\Mxd\LHAAP04\RAO\Year1\Fig1-2_LHAAP_SiteLocationMap.mxd

Figure 7



Notes:
1. Perchlorate concentrations reported in micrograms per liter (µg/L).
2. Plume boundaries based on most recent results available at each well (2011).
3. The wells 04WW06, 04WW07, and 04WW08 are proposed and will be installed as part of the Remedial Design activities. Locations shown are approximate and will be adjusted in the field based on site conditions and any additional data that may be available at that time.
4. PCL - Texas Risk Reduction Program Protective Concentration Level for Residential Groundwater.

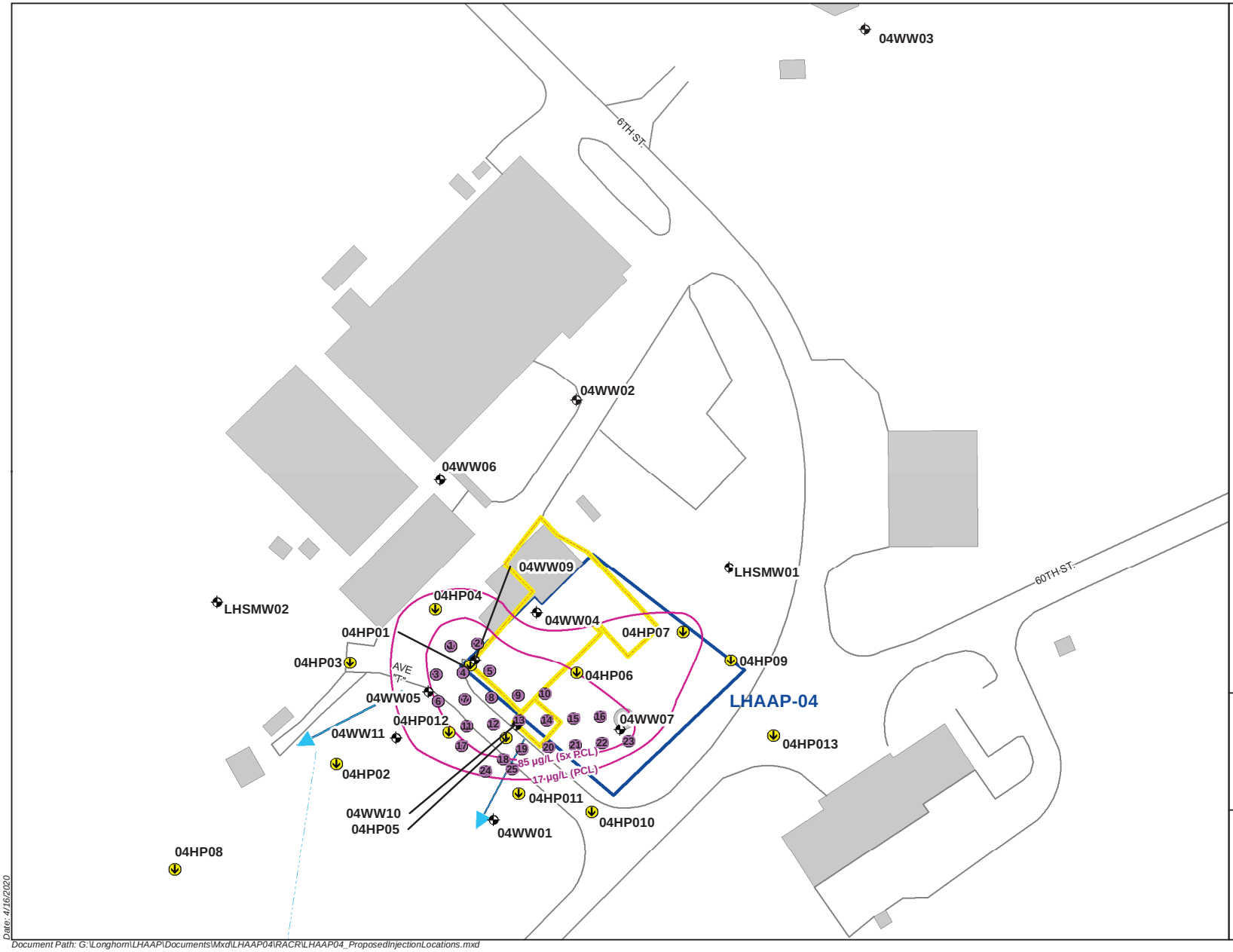
AECOM

Figure 2-6
Perchlorate Concentrations in Groundwater
LHAAP-04 Record of Decision
Longhorn Army Ammunition Plant
Karnack, Texas

60274185 October 2016

Path: L:\AGE\GIS\AUS GIS\GIS_Projects\Longhorn_AAP\01_Reports\LHAAP-04\Record of Decision\Figure 2-6 LHAAP-04 Perchlorate Concentrations in GW.mxd

Figure 8



Shallow Monitoring Well
Proposed Injection Location
Hydropunch Location
Groundwater Flow Direction based on January 2019 Potentiometric Contours (Bhate 2019a)
January 2019 Perchlorate Plume Extent (PCL - 17 µg/L)
Limits of Excavation at Surface (*Source: LHAAP-04 Final Completion Report, Shaw, 2011*)
Stream
Road
Building
Site Boundary

Note:
1. Plume boundaries based on most recent results available at each well (2018).
2. PCL - Texas Risk Reduction Program Protective Concentration Level for Residential Groundwater
3. The injection pattern generally targets the area within the 85 µg/L contour, but has been shifted to the southwest to account for future migration.

N
0 50 100 Feet

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TULSA, OKLAHOMA

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Figure 3-1

In Situ Bioremediation Injection Map

LHAAP-04
Remedial Action Completion Report
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Date: 4/16/2020

Document Path: G:\Longhorn\LHAAP\Documents\Mxd\LHAAP04\RACR\LHAAP04_ProposedInjectionLocations.mxd

Figure 9

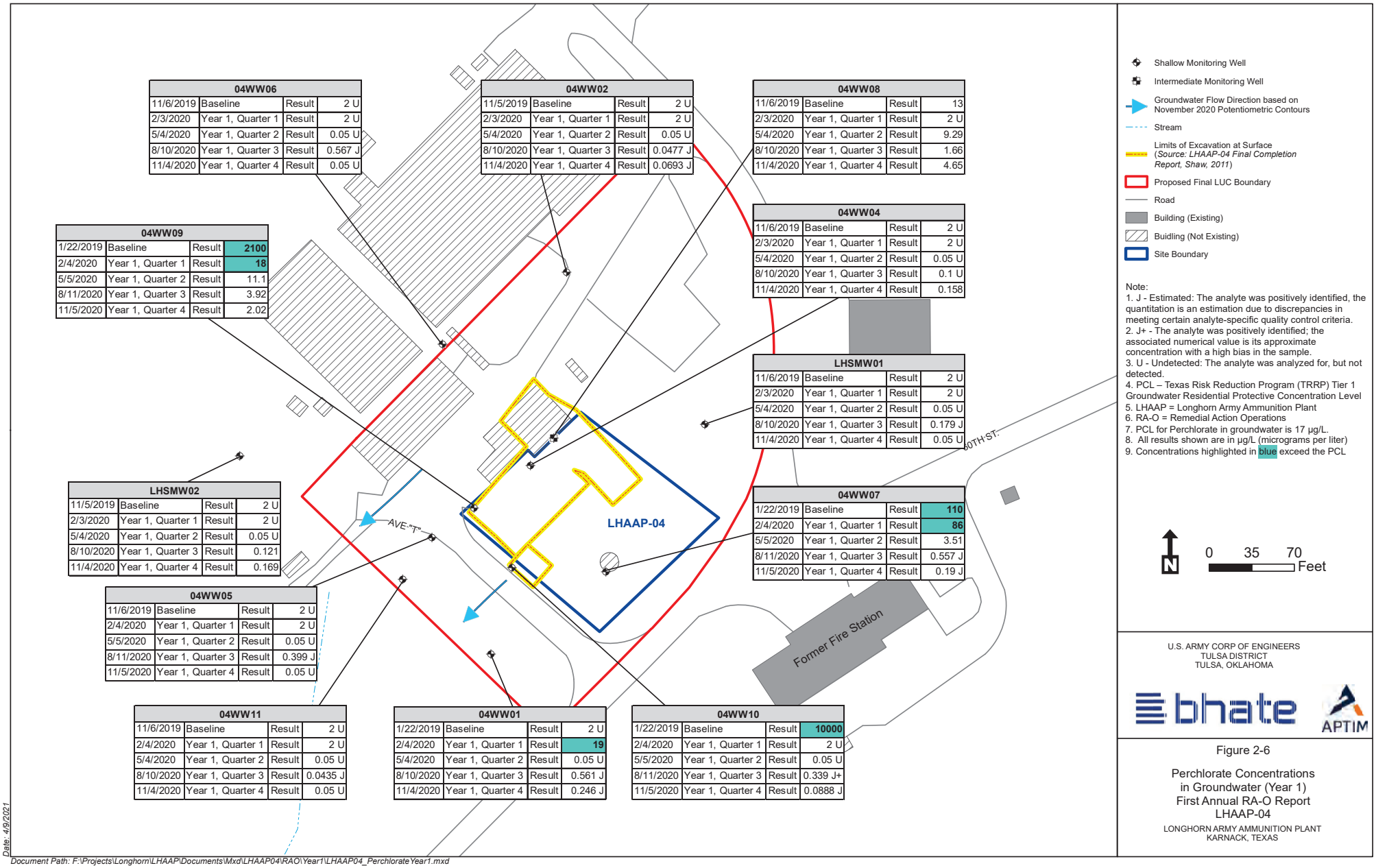

04WW06
11/6/2019 Baseline Result 2 U
2/3/2020 Year 1, Quarter 1 Result 2 U
5/4/2020 Year 1, Quarter 2 Result 0.05 U
8/10/2020 Year 1, Quarter 3 Result 0.567 J
11/4/2020 Year 1, Quarter 4 Result 0.05 U
04WW02
11/5/2019 Baseline Result 2 U
2/3/2020 Year 1, Quarter 1 Result 2 U
5/4/2020 Year 1, Quarter 2 Result 0.05 U
8/10/2020 Year 1, Quarter 3 Result 0.0477 J
11/4/2020 Year 1, Quarter 4 Result 0.0693 J
04WW08
11/6/2019 Baseline Result 13
2/3/2020 Year 1, Quarter 1 Result 2 U
5/4/2020 Year 1, Quarter 2 Result 9.29
8/10/2020 Year 1, Quarter 3 Result 1.66
11/4/2020 Year 1, Quarter 4 Result 4.65
04WW09
1/22/2019 Baseline Result 2100
2/4/2020 Year 1, Quarter 1 Result 18
5/5/2020 Year 1, Quarter 2 Result 11.1
8/11/2020 Year 1, Quarter 3 Result 3.92
11/5/2020 Year 1, Quarter 4 Result 2.02
04WW04
11/6/2019 Baseline Result 2 U
2/3/2020 Year 1, Quarter 1 Result 2 U
5/4/2020 Year 1, Quarter 2 Result 0.05 U
8/10/2020 Year 1, Quarter 3 Result 0.1 U
11/4/2020 Year 1, Quarter 4 Result 0.158
LHSMW01
11/6/2019 Baseline Result 2 U
2/3/2020 Year 1, Quarter 1 Result 2 U
5/4/2020 Year 1, Quarter 2 Result 0.05 U
8/10/2020 Year 1, Quarter 3 Result 0.179 J
11/4/2020 Year 1, Quarter 4 Result 0.05 U
LHSMW02
11/5/2019 Baseline Result 2 U
2/3/2020 Year 1, Quarter 1 Result 2 U
5/4/2020 Year 1, Quarter 2 Result 0.05 U
8/10/2020 Year 1, Quarter 3 Result 0.121
11/4/2020 Year 1, Quarter 4 Result 0.169
04WW07
1/22/2019 Baseline Result 110
2/4/2020 Year 1, Quarter 1 Result 86
5/5/2020 Year 1, Quarter 2 Result 3.51
8/11/2020 Year 1, Quarter 3 Result 0.557 J
11/5/2020 Year 1, Quarter 4 Result 0.19 J
04WW05
11/6/2019 Baseline Result 2 U
2/4/2020 Year 1, Quarter 1 Result 2 U
5/5/2020 Year 1, Quarter 2 Result 0.05 U
8/11/2020 Year 1, Quarter 3 Result 0.399 J
11/5/2020 Year 1, Quarter 4 Result 0.05 U
04WW11
11/6/2019 Baseline Result 2 U
2/4/2020 Year 1, Quarter 1 Result 2 U
5/4/2020 Year 1, Quarter 2 Result 0.05 U
8/10/2020 Year 1, Quarter 3 Result 0.0435 J
11/4/2020 Year 1, Quarter 4 Result 0.05 U
04WW01
1/22/2019 Baseline Result 2 U
2/4/2020 Year 1, Quarter 1 Result 19
5/4/2020 Year 1, Quarter 2 Result 0.05 U
8/10/2020 Year 1, Quarter 3 Result 0.561 J
11/4/2020 Year 1, Quarter 4 Result 0.246 J
04WW10
1/22/2019 Baseline Result 10000
2/4/2020 Year 1, Quarter 1 Result 2 U
5/5/2020 Year 1, Quarter 2 Result 0.05 U
8/11/2020 Year 1, Quarter 3 Result 0.339 J+
11/5/2020 Year 1, Quarter 4 Result 0.0888 J
LHAAP-04
AVE "T"
60TH ST.
Former Fire Station
Shallow Monitoring Well
Intermediate Monitoring Well
Groundwater Flow Direction based on November 2020 Potentiometric Contours
Stream
Limits of Excavation at Surface (Source: LHAAP-04 Final Completion Report, Shaw, 2011)
Proposed Final LUC Boundary
Road
Building (Existing)
Buidling (Not Existing)
Site Boundary
Note:
1. J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
2. J+ - The analyte was positively identified; the associated numerical value is its approximate concentration with a high bias in the sample.
3. U - Undetected: The analyte was analyzed for, but not detected.
4. PCL – Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level
5. LHAAP = Longhorn Army Ammunition Plant
6. RA-O = Remedial Action Operations
7. PCL for Perchlorate in groundwater is 17 µg/L.
8. All results shown are in µg/L (micrograms per liter)
9. Concentrations highlighted in blue exceed the PCL
N
0 35 70
Feet
U.S. ARMY CORP OF ENGINEERS
TULSA DISTRICT
TULSA, OKLAHOMA
bhate
APTIM
Figure 2-6
Perchlorate Concentrations in Groundwater (Year 1)
First Annual RA-O Report
LHAAP-04
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS
Date: 4/9/2021
Document Path: F:\Projects\Longhorn\LHAAP\Documents\Mxd\LHAAP04\RAO\Year1\LHAAP04_PerchlorateYear1.mxd

Figure 10

04WW06	
3/10/2021	<0.05
5/24/2021	0.0272 J
8/4/2021	<0.5
11/4/2021	<0.2

04WW02	
3/10/2021	<0.05
5/24/2021	0.54
8/4/2021	<0.25
11/4/2021	<0.2

04WW08	
3/10/2021	4
5/24/2021	0.0359 J
8/4/2021	<0.5
11/4/2021	<0.2

04WW09	
3/11/2021	<0.05
5/25/2021	<0.5
8/5/2021	<0.5
11/9/2021	<0.2

04WW04	
3/10/2021	0.139
5/24/2021	<0.05
8/4/2021	<0.25
11/4/2021	<0.2

LHSMW01	
3/10/2021	<0.05
5/24/2021	<0.05
8/4/2021	<0.1
11/4/2021	<0.2

LHSMW02	
3/10/2021	0.082 J
5/24/2021	0.0392 J
8/4/2021	<0.25
11/4/2021	<0.2

04WW07	
3/11/2021	0.169
5/25/2021	<0.05
8/5/2021	<0.5
11/9/2021	<0.2

04WW05	
3/11/2021	<0.05
5/25/2021	<0.05
8/5/2021	<0.5
11/9/2021	<0.2

04WW11	
3/10/2021	<0.05
5/24/2021	0.0627 J
8/4/2021	<0.25
11/4/2021	<0.2

04WW01	
3/10/2021	<0.05
5/24/2021	<0.05
8/4/2021	<0.5
11/4/2021	<0.2

04WW10	
3/11/2021	<0.05
5/25/2021	<0.05
8/5/2021	<0.05
11/9/2021	<0.2

LHAAP-04

AVE "T"

6TH ST.

60TH ST.

Former Fire Station

- Shallow Monitoring Well
- Intermediate Monitoring Well
- Groundwater Flow Direction based on November 2021 Potentiometric Contours
- Stream
- Limits of Excavation at Surface (*Source: LHAAP-04 Final Completion Report, Shaw, 2011*)
- Final LUC Boundary
- Road
- Building (Existing)
- Buidling (Not Existing)
- Site Boundary

Note:
1. J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
2. < - Undetected: The analyte was not detected above the detection limit shown.
3. PCL – Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level
4. LHAAP = Longhorn Army Ammunition Plant
5. RA-O = Remedial Action Operations
6. PCL for Perchlorate in groundwater is 17 µg/L.
7. All results shown are in micrograms per liter (µg/L).

N

0 35 70 Feet

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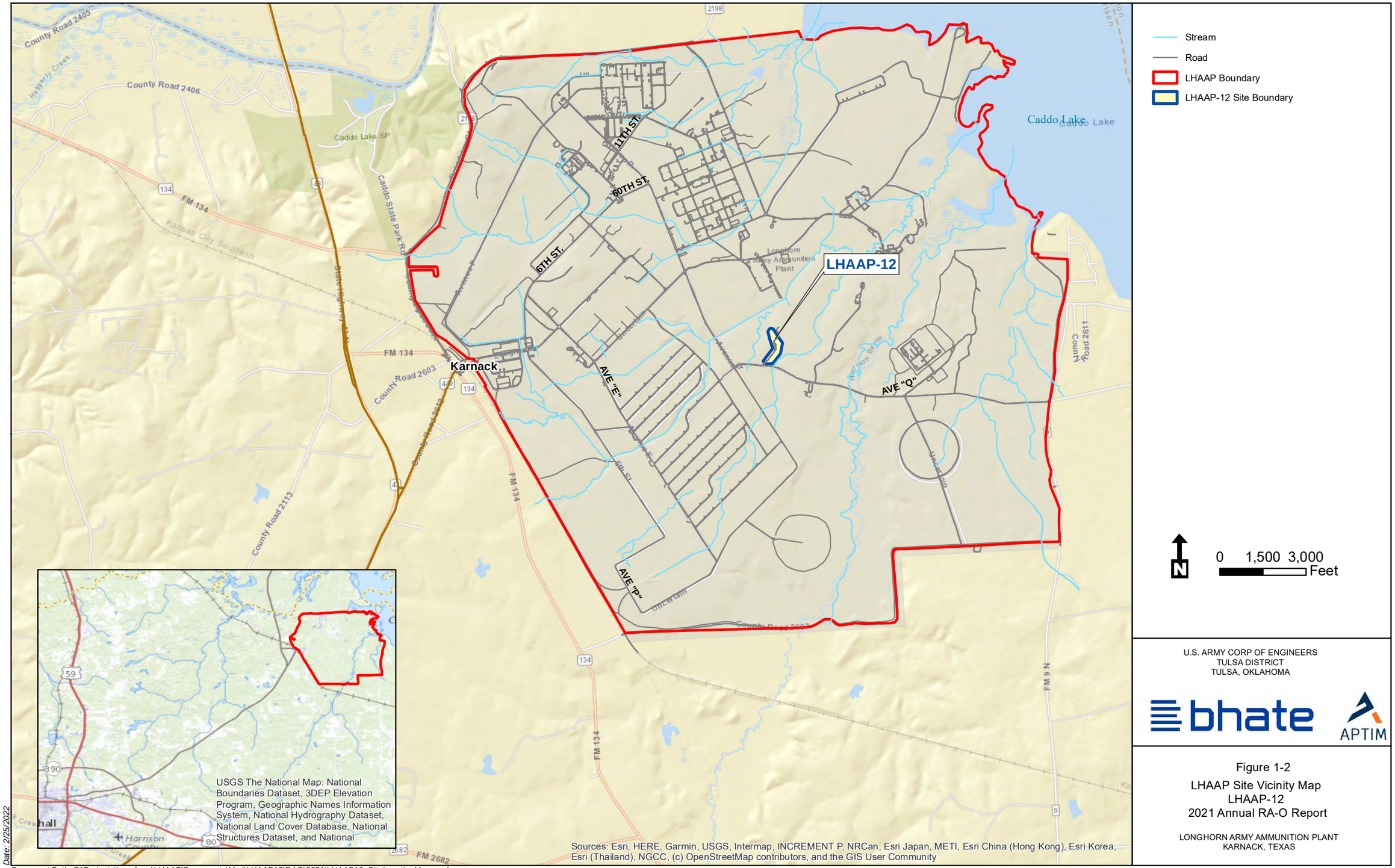
Figure 2-6

Perchlorate Concentrations in Groundwater (Year 2)
Second Annual RA-O Report
LHAAP-04
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Date: 7/27/2022

Document Path: F:\Projects\Longhorn\LHAAP\Documents\Mxd\LHAAP04\RAO\Year2\LHAAP04_PerchlorateYear2.mxd

Figure 11



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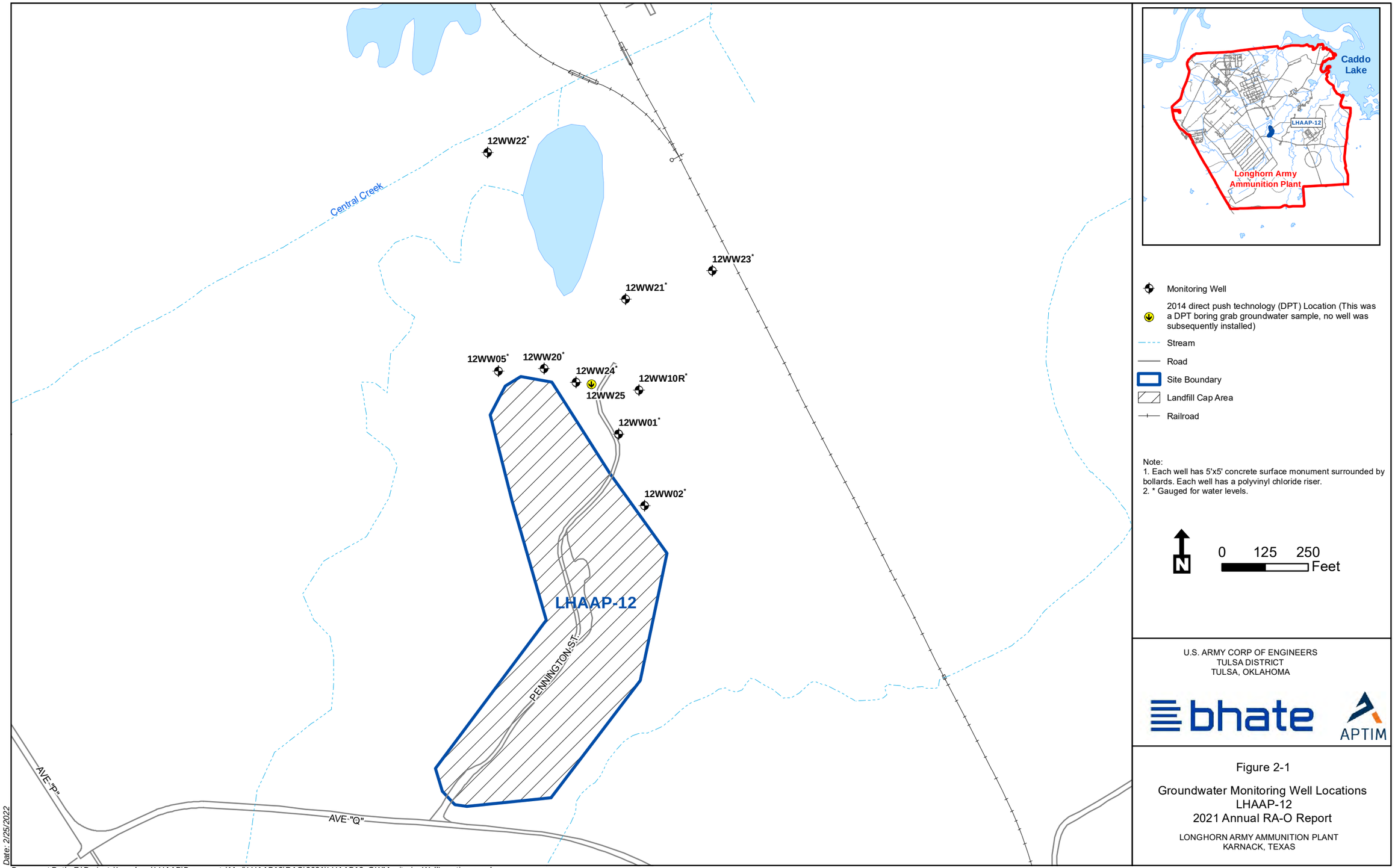
Figure 1-2
LHAAP Site Vicinity Map
LHAAP-12
2021 Annual RA-O Report

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Date: 2/25/2022

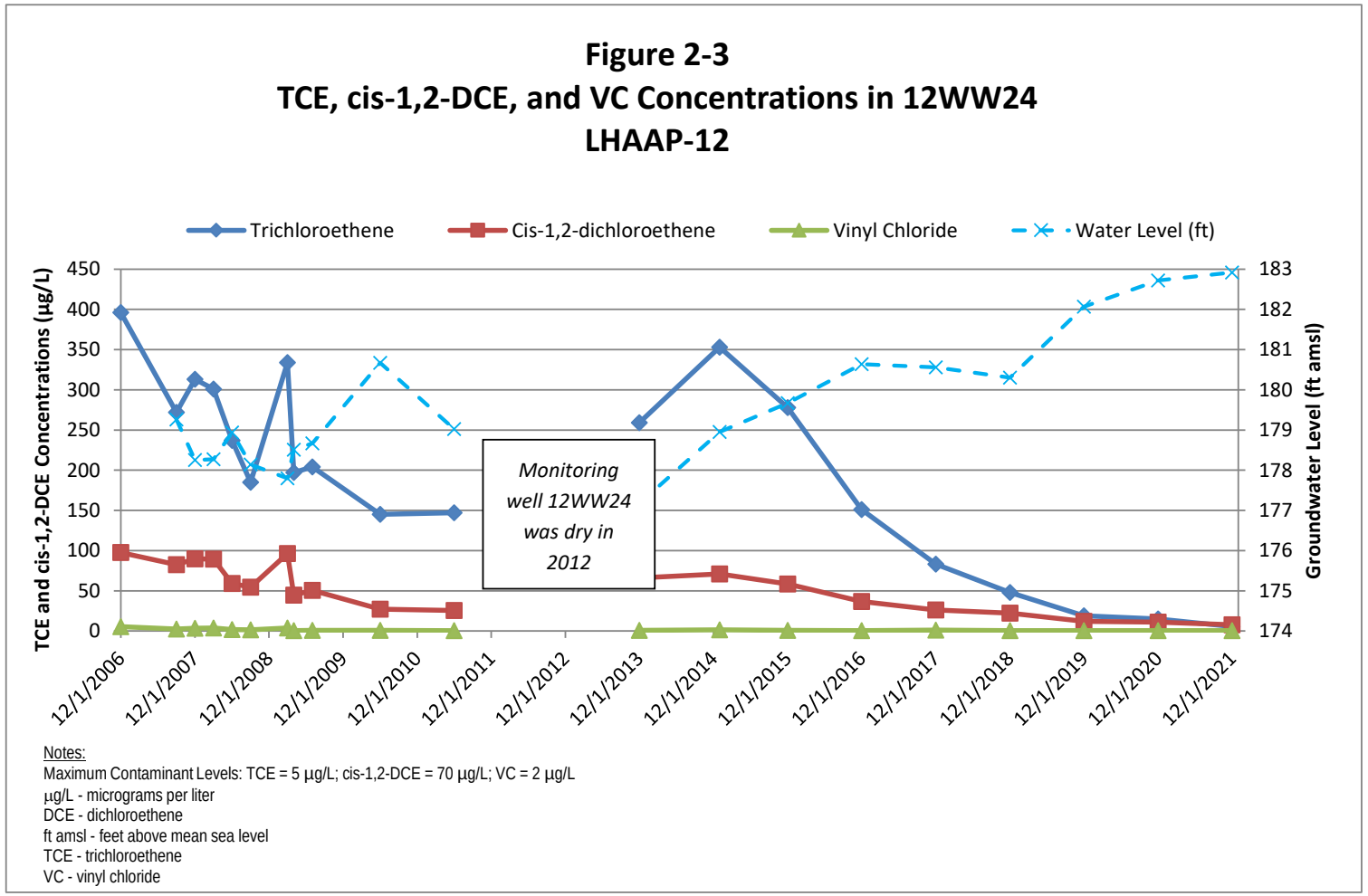
Document Path: F:\Projects\Longhorn\LHAAP\Documents\Mxd\LHAAP12\RAO\2021\LHAAP12_SiteLocationMap.mxd

Figure 12


12WW22*
Central Creek
12WW23*
12WW21*
12WW05*
12WW20*
12WW24*
12WW10R*
12WW25
12WW01*
12WW02*
LHAAP-12
PENNINGTON ST
AVE "P"
AVE "Q"
Caddo Lake
LHAAP-12
Longhorn Army Ammunition Plant
Monitoring Well
2014 direct push technology (DPT) Location (This was a DPT boring grab groundwater sample, no well was subsequently installed)
Stream
Road
Site Boundary
Landfill Cap Area
Railroad
Note:
1. Each well has 5'x5' concrete surface monument surrounded by bollards. Each well has a polyvinyl chloride riser.
2. * Gauged for water levels.
N
0 125 250
Feet
U.S. ARMY CORP OF ENGINEERS
TULSA DISTRICT
TULSA, OKLAHOMA
bhate
APTIM
Figure 2-1
Groundwater Monitoring Well Locations
LHAAP-12
2021 Annual RA-O Report
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS
Date: 2/25/2022
Document Path: F:\Projects\Longhorn\LHAAP\Documents\Mxd\LHAAP12\RAO\2021\LHAAP12_GWMonitoringWellLocations.mxd

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Figure 13


Figure 2-3
TCE, cis-1,2-DCE, and VC Concentrations in 12WW24
LHAAP-12
Trichloroethene
Cis-1,2-dichloroethene
Vinyl Chloride
Water Level (ft)
TCE and cis-1,2-DCE Concentrations (µg/L)
Groundwater Level (ft amsl)
450
400
350
300
250
200
150
100
50
0
183
182
181
180
179
178
177
176
175
174
12/1/2006
12/1/2007
12/1/2008
12/1/2009
12/1/2010
12/1/2011
12/1/2012
12/1/2013
12/1/2014
12/1/2015
12/1/2016
12/1/2017
12/1/2018
12/1/2019
12/1/2020
12/1/2021
Monitoring well 12WW24 was dry in 2012
Notes:
Maximum Contaminant Levels: TCE = 5 µg/L; cis-1,2-DCE = 70 µg/L; VC = 2 µg/L
µg/L - micrograms per liter
DCE - dichloroethene
ft amsl - feet above mean sea level
TCE - trichloroethene
VC - vinyl chloride

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Figure 14

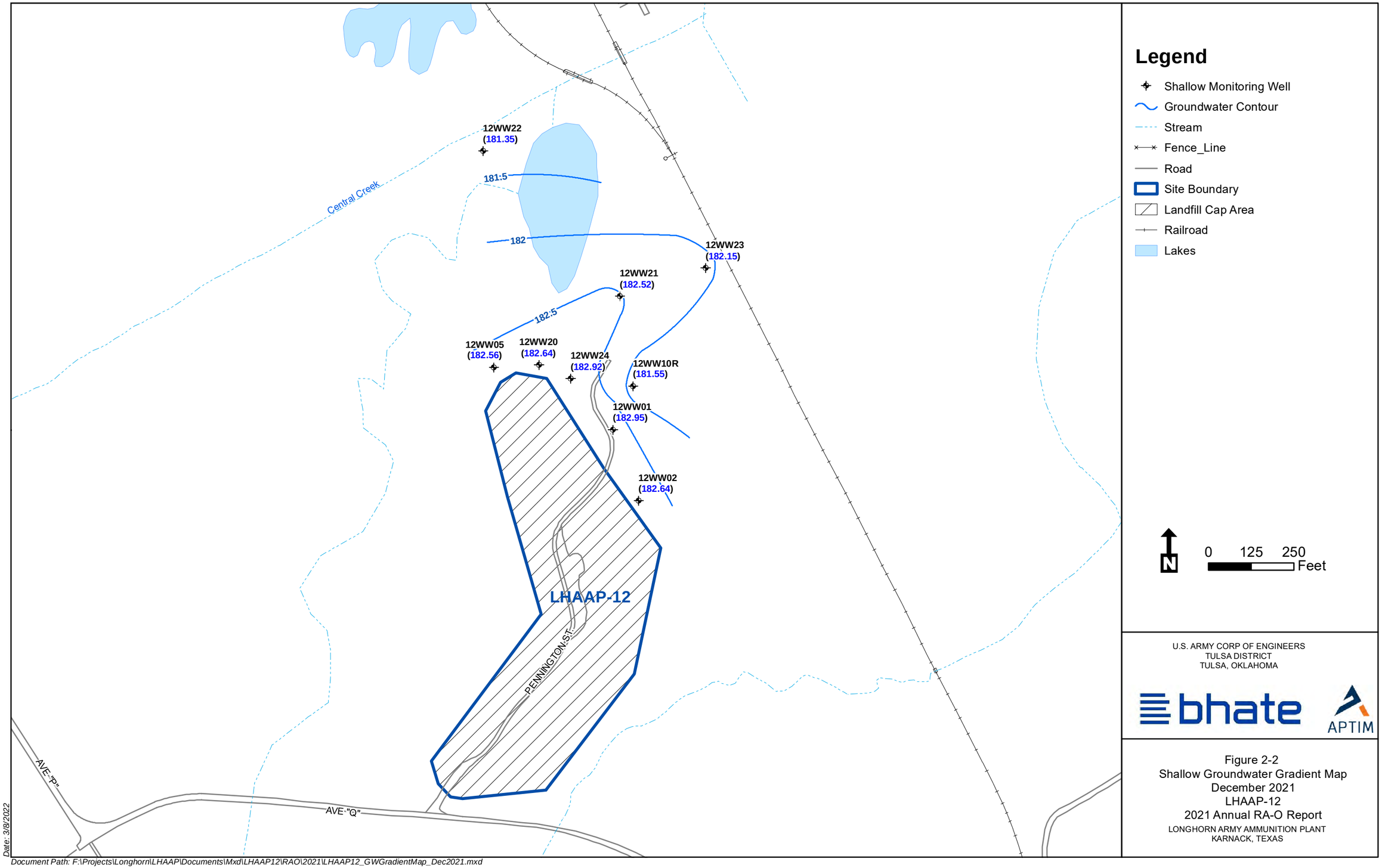

12WW22
(181.35)
181.5
Central Creek
182
12WW23
(182.15)
12WW21
(182.52)
182.5
12WW05
(182.56)
12WW20
(182.64)
12WW24
(182.92)
12WW10R
(181.55)
12WW01
(182.95)
12WW02
(182.64)
LHAAP-12
PENNINGTON ST
AVE "P"
AVE "Q"
Legend
Shallow Monitoring Well
Groundwater Contour
Stream
Fence_Line
Road
Site Boundary
Landfill Cap Area
Railroad
Lakes
N
0 125 250
Feet
U.S. ARMY CORP OF ENGINEERS
TULSA DISTRICT
TULSA, OKLAHOMA
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APTIM
Figure 2-2
Shallow Groundwater Gradient Map
December 2021
LHAAP-12
2021 Annual RA-O Report
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS
Date: 3/8/2022
Document Path: F:\Projects\Longhorn\LHAAP\Documents\Mxd\LHAAP12\RAO\2021\LHAAP12_GWGradientMap_Dec2021.mxd

Figure 15

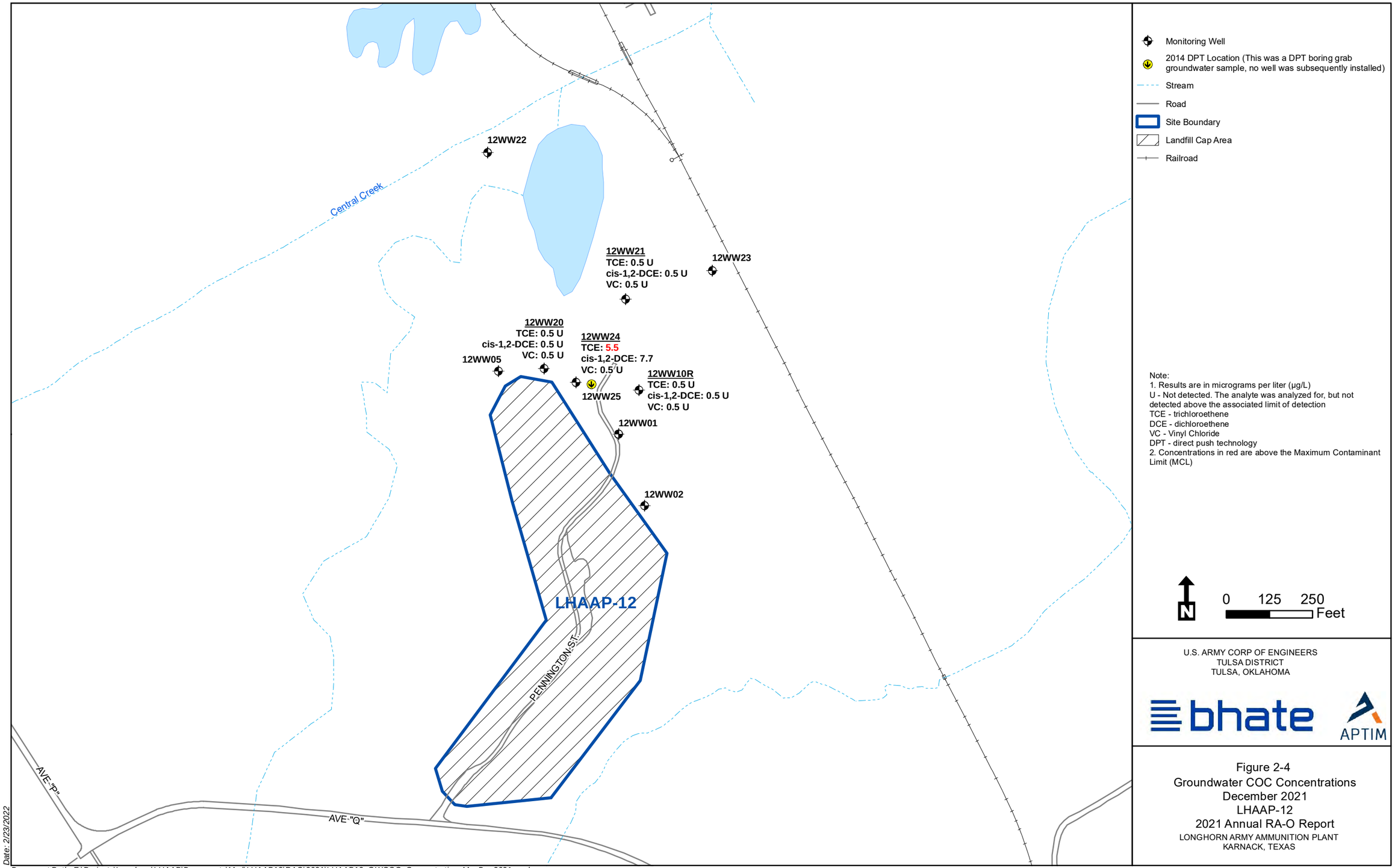

Central Creek
12WW22
12WW21
TCE: 0.5 U
cis-1,2-DCE: 0.5 U
VC: 0.5 U
12WW23
12WW20
TCE: 0.5 U
cis-1,2-DCE: 0.5 U
VC: 0.5 U
12WW05
12WW24
TCE: 5.5
cis-1,2-DCE: 7.7
VC: 0.5 U
12WW25
12WW10R
TCE: 0.5 U
cis-1,2-DCE: 0.5 U
VC: 0.5 U
12WW01
12WW02
LHAAP-12
PENNINGTON ST
AVE "P"
AVE "Q"
Monitoring Well
2014 DPT Location (This was a DPT boring grab groundwater sample, no well was subsequently installed)
Stream
Road
Site Boundary
Landfill Cap Area
Railroad
Note:
1. Results are in micrograms per liter (µg/L)
U - Not detected. The analyte was analyzed for, but not detected above the associated limit of detection
TCE - trichloroethene
DCE - dichloroethene
VC - Vinyl Chloride
DPT - direct push technology
2. Concentrations in red are above the Maximum Contaminant Limit (MCL)
N
0
125
250
Feet
U.S. ARMY CORP OF ENGINEERS
TULSA DISTRICT
TULSA, OKLAHOMA
bhate
APTIM
Figure 2-4
Groundwater COC Concentrations
December 2021
LHAAP-12
2021 Annual RA-O Report
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS
Date: 2/23/2022
Document Path: F:\Projects\Longhorn\LHAAP\Documents\Mxd\LHAAP12\RAO\2021\LHAAP12_GWCOC_ConcentrationsMapDec2021.mxd

Figure 16

01080979

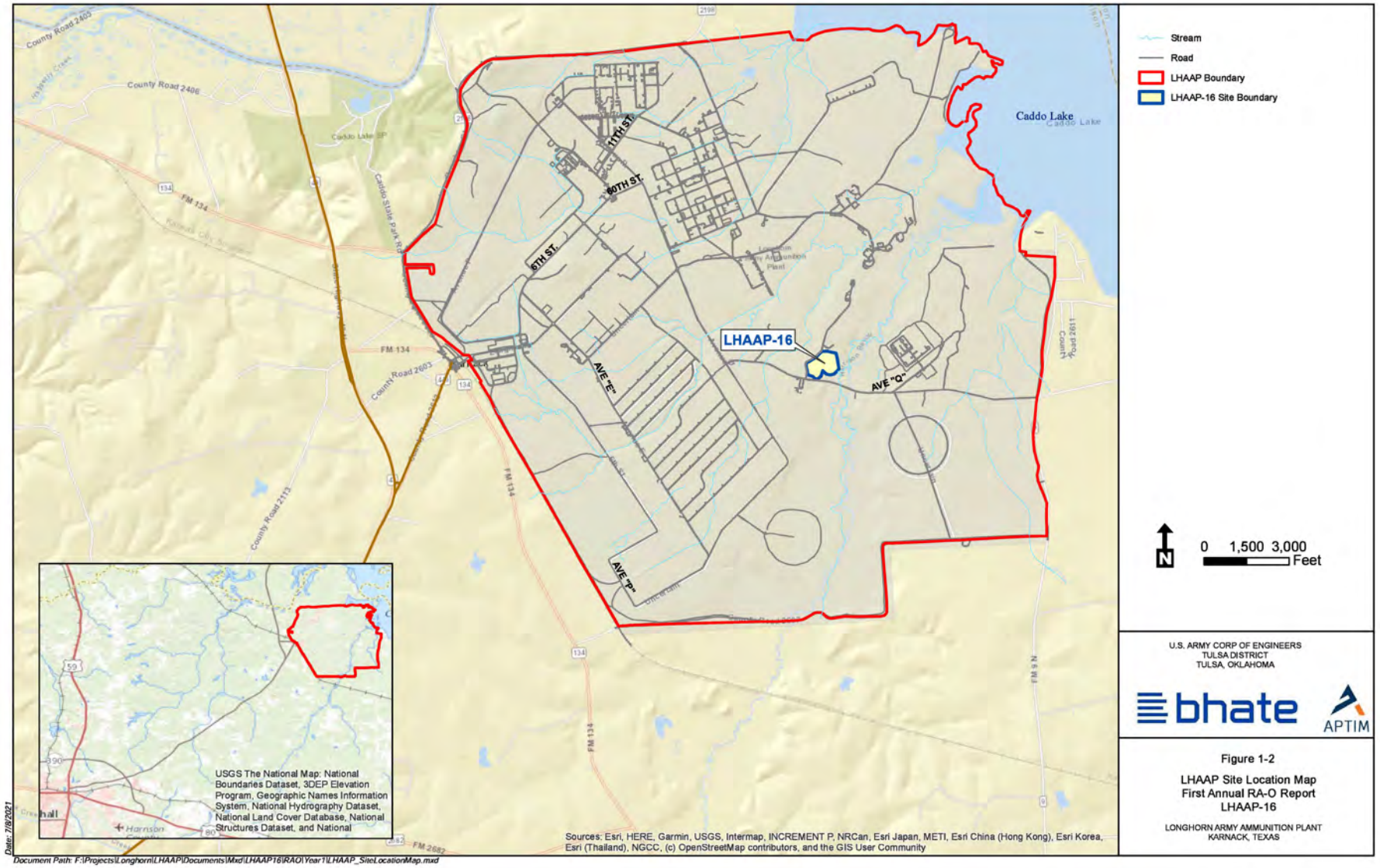


Figure 17

01080980

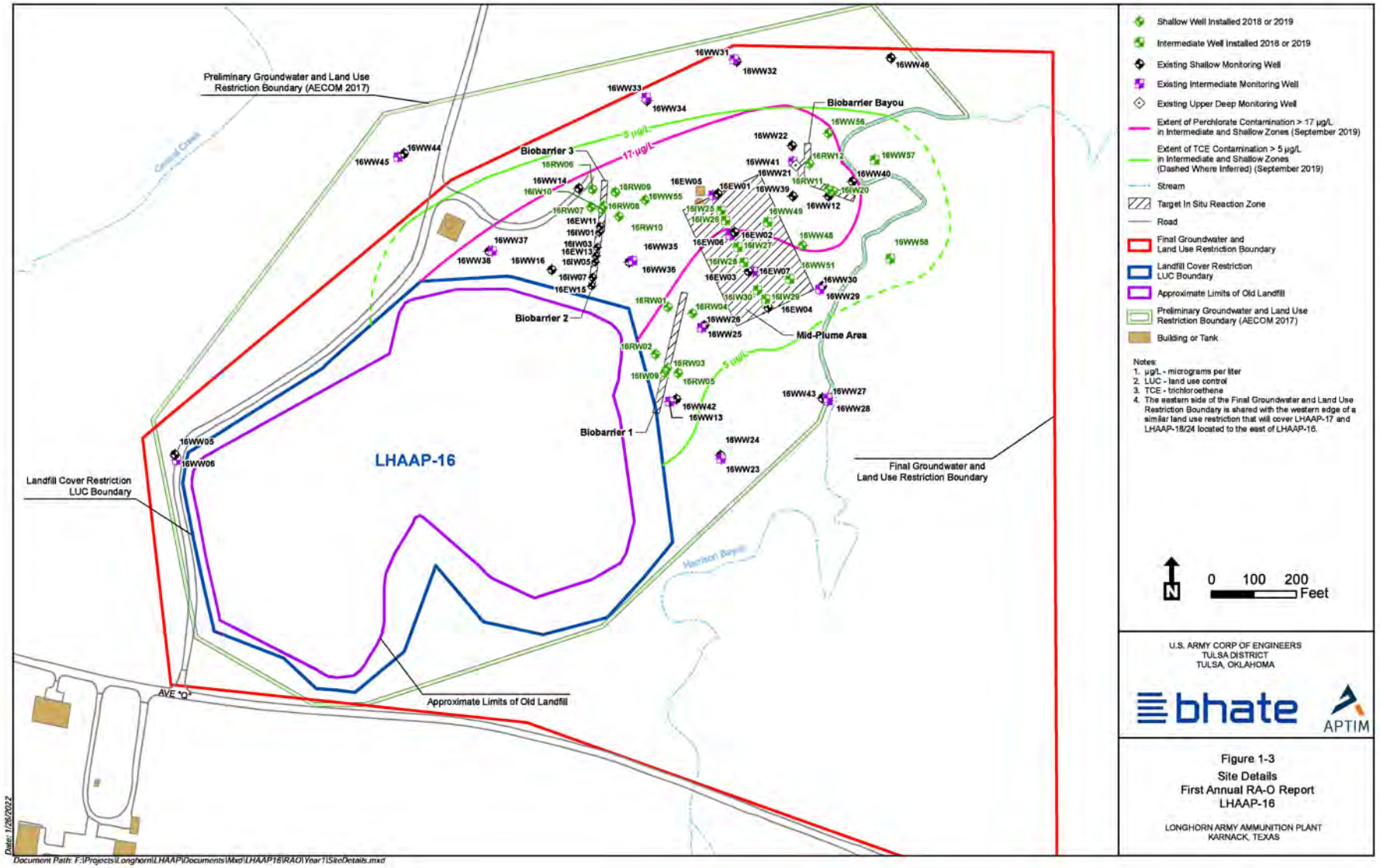
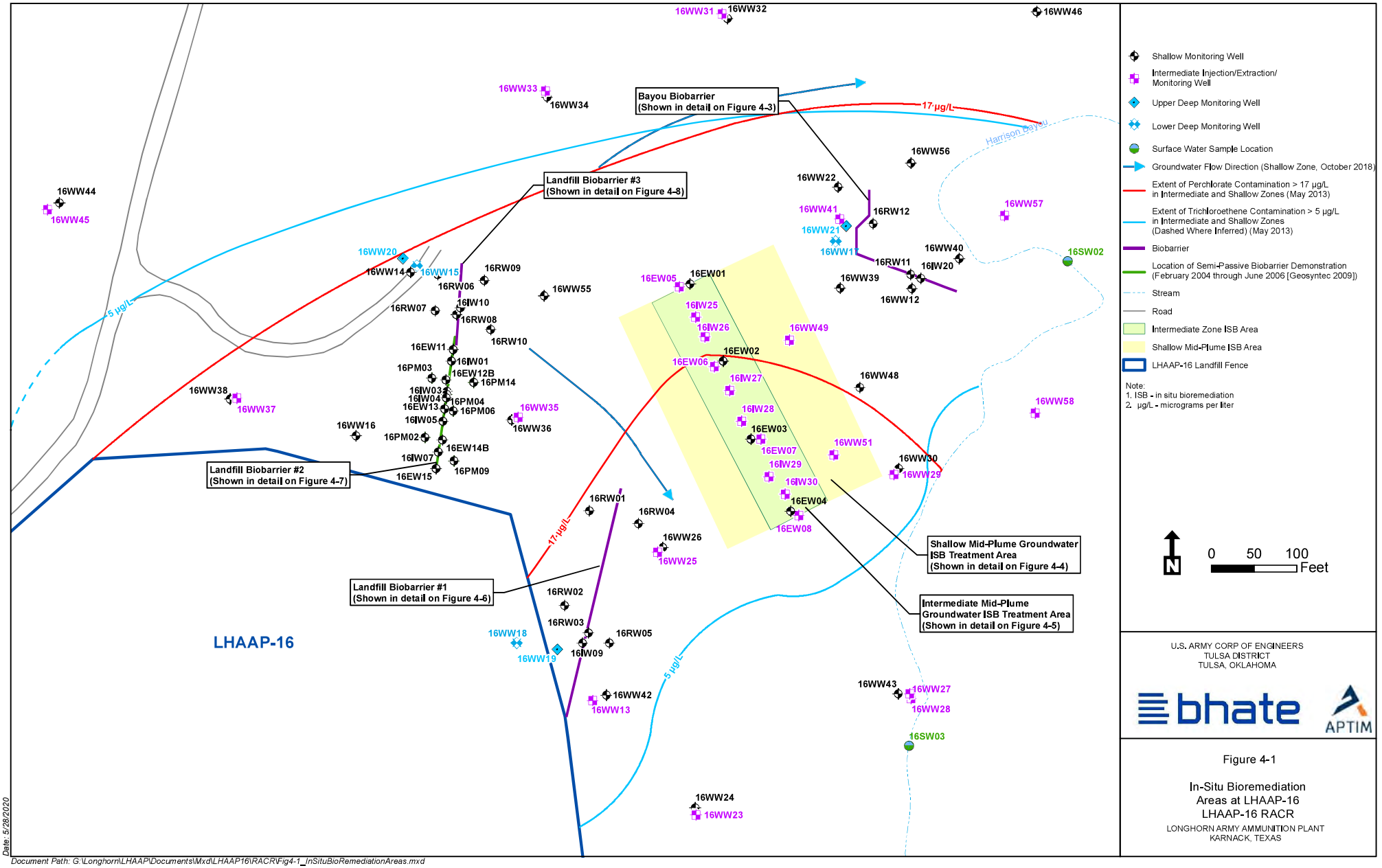
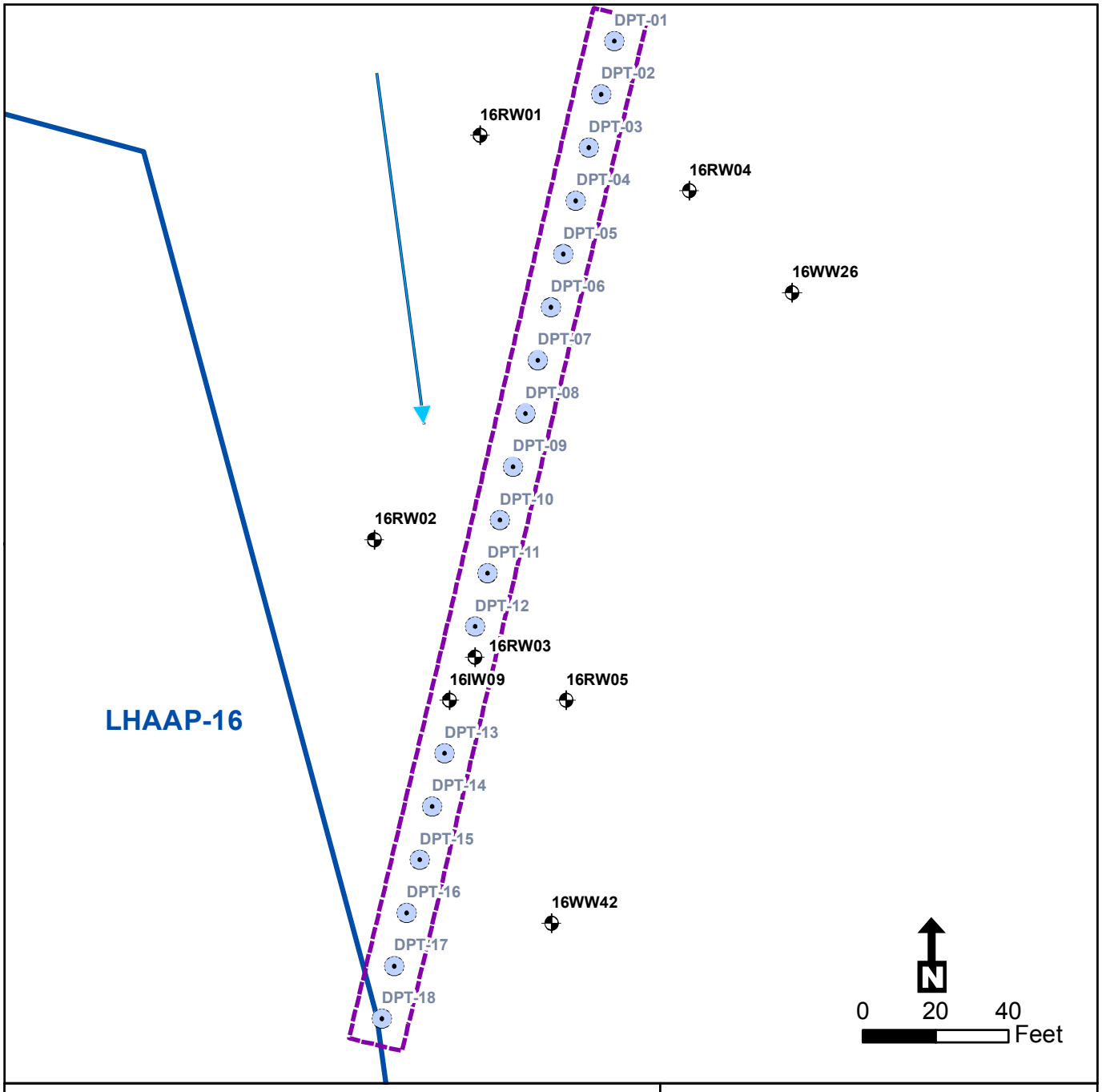


Figure 18


16WW31
16WW32
16WW46
16WW33
16WW34
Bayou Biobarrier
(Shown in detail on Figure 4-3)
17 µg/L
Harrison Bayou
16WW56
16WW44
16WW45
Landfill Biobarrier #3
(Shown in detail on Figure 4-8)
16WW22
16WW41
16RW12
16WW57
16WW21
16WW40
16SW02
16WW20
16WW14
16WW15
16RW09
16RW06
16IW10
16WW55
16RW07
16RW08
16WW39
16WW12
16IW20
16WW11
16EW05
16EW01
16IW25
16IW26
16WW49
16EW02
16EW06
16EW11
16IW01
16PM03
16EW12B
16PM14
16IW27
16WW48
16WW38
16WW37
16IW03
16IW04
16PM04
16EW13
16PM06
16WW35
16WW36
16IW28
16WW58
16WW16
16IW05
16PM02
16EW14B
16EW03
16WW51
16IW07
16EW15
16PM09
16EW07
16WW30
16WW29
16IW29
16IW30
16EW04
16EW08
16RW01
16RW04
16WW26
16WW25
Landfill Biobarrier #2
(Shown in detail on Figure 4-7)
17 µg/L
Shallow Mid-Plume Groundwater
ISB Treatment Area
(Shown in detail on Figure 4-4)
Landfill Biobarrier #1
(Shown in detail on Figure 4-6)
16RW02
16RW03
16RW05
Intermediate Mid-Plume
Groundwater ISB Treatment Area
(Shown in detail on Figure 4-5)
LHAAP-16
16WW18
16WW19
16IW09
5 µg/L
16WW43
16WW27
16WW28
16WW42
16WW13
16SW03
16WW24
16WW23
5 µg/L
Shallow Monitoring Well
Intermediate Injection/Extraction/
Monitoring Well
Upper Deep Monitoring Well
Lower Deep Monitoring Well
Surface Water Sample Location
Groundwater Flow Direction (Shallow Zone, October 2018)
Extent of Perchlorate Contamination > 17 µg/L
in Intermediate and Shallow Zones (May 2013)
Extent of Trichloroethene Contamination > 5 µg/L
in Intermediate and Shallow Zones
(Dashed Where Inferred) (May 2013)
Biobarrier
Location of Semi-Passive Biobarrier Demonstration
(February 2004 through June 2006 [Geosyntec 2009])
Stream
Road
Intermediate Zone ISB Area
Shallow Mid-Plume ISB Area
LHAAP-16 Landfill Fence
Note:
1. ISB - in situ bioremediation
2. µg/L - micrograms per liter
N
0
50
100
Feet
U.S. ARMY CORP OF ENGINEERS
TULSA DISTRICT
TULSA, OKLAHOMA
bhate
APTIM
Figure 4-1
In-Situ Bioremediation
Areas at LHAAP-16
LHAAP-16 RACR
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS
Date: 5/28/2020
Document Path: G:\Longhorn\LHAAP\Documents\Mxd\LHAAP16\RACR\Fig4-1_InSituBioRemediationAreas.mxd

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Figure 19



Shallow Well Location

Direct Push Injection Point

Groundwater Flow Direction (October 2018)

Target In Situ Reaction Zone

LHAAP-16 Landfill Fence

U.S. ARMY CORP OF ENGINEERS
TULSA DISTRICT
TULSA, OKLAHOMA

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Figure 4-6

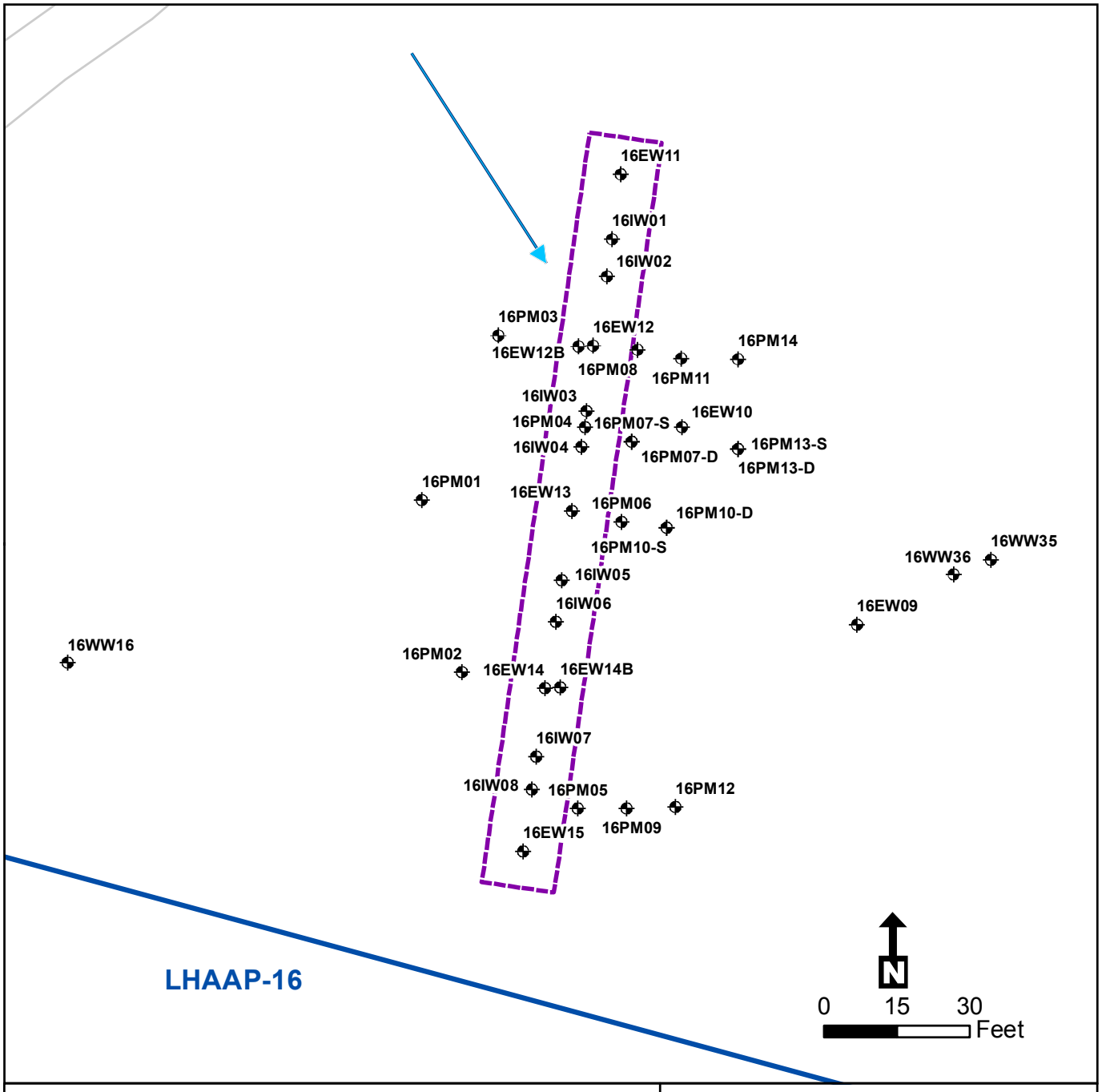
Landfill Biobarrier #1
LHAAP-16 RACR

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Date: 5/28/2020

Document Path: G:\Longhorn\LHAAP\Documents\Mxd\LHAAP16\RACR\Fig4-6_Landfill_Biobarrier_1.mxd

Figure 20



Shallow Extraction, Injection, or Monitoring Well

Groundwater Flow Direction (October 2018)

Target In Situ Reaction Zone

LHAAP-16 Landfill Fence

U.S. ARMY CORP OF ENGINEERS
TULSA DISTRICT
TULSA, OKLAHOMA

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Figure 4-7

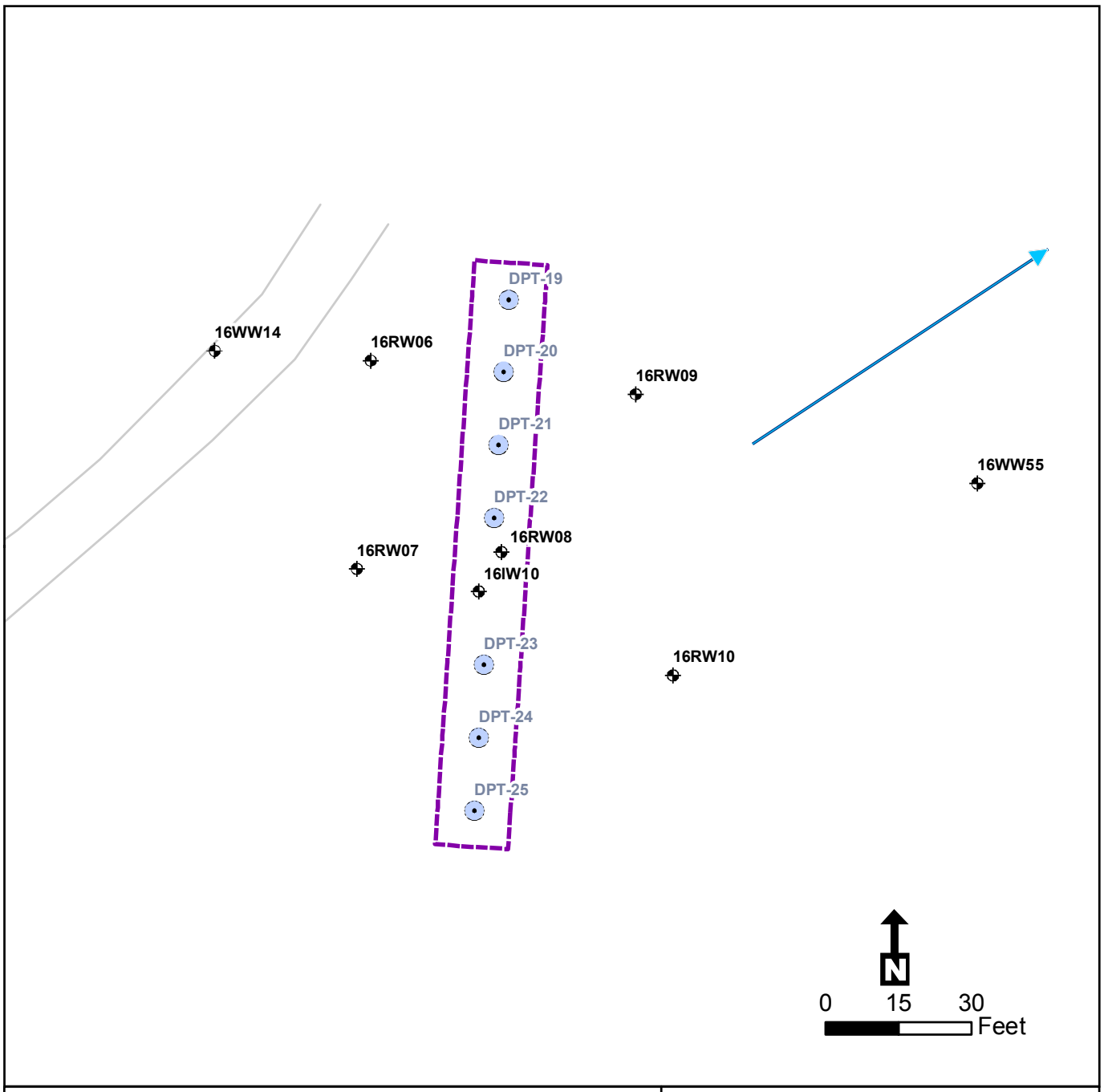
Landfill Biobarrier #2
LHAAP-16 RACR

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Date: 5/28/2020

Document Path: G:\Longhorn\LHAAP\Documents\Mxd\LHAAP16\RACR\Fig4-7_Landfill_Biobarrier_2.mxd

Figure 21



Shallow Zone Injection, Monitoring, or Recovery Well

Direct Push Injection Point

Groundwater Flow Direction (October 2018)

Target In Situ Reaction Zone

U.S. ARMY CORP OF ENGINEERS
TULSA DISTRICT
TULSA, OKLAHOMA

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Figure 4-8

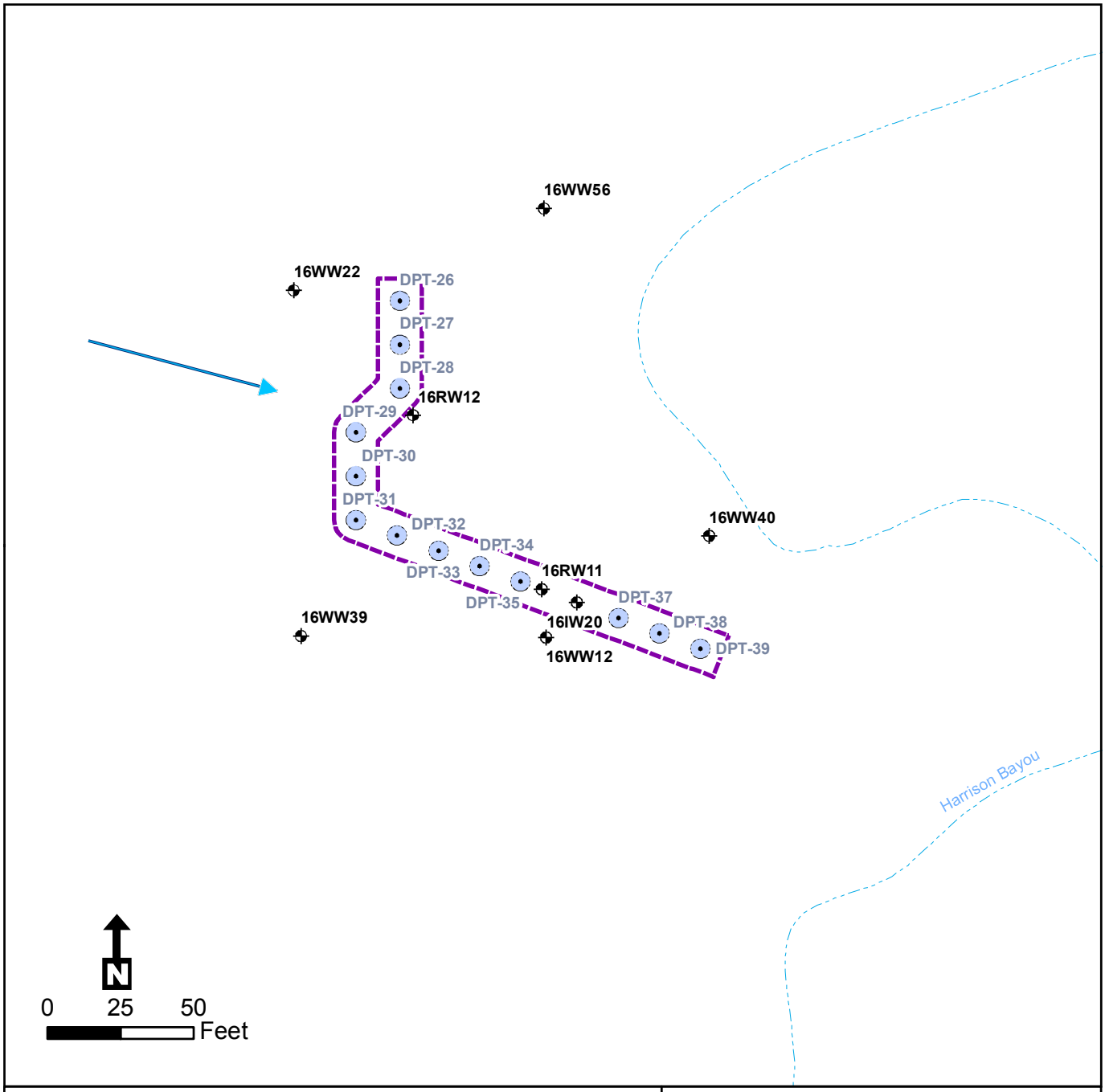
Landfill Biobarrier #3
LHAAP-16 RACR

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Date: 5/28/2020

Document Path: G:\Longhorn\LHAAP\Documents\Mxd\LHAAP16\RACR\Fig4-8_Landfill_Biobarrier_3.mxd

Figure 22



Shallow Well

Direct Push Injection Point

Groundwater Flow Direction (October 2018)

Target In Situ Reaction Zone Based on Design Radius of Influence

U.S. ARMY CORP OF ENGINEERS
TULSA DISTRICT
TULSA, OKLAHOMA

bhate APTIM

Figure 4-3

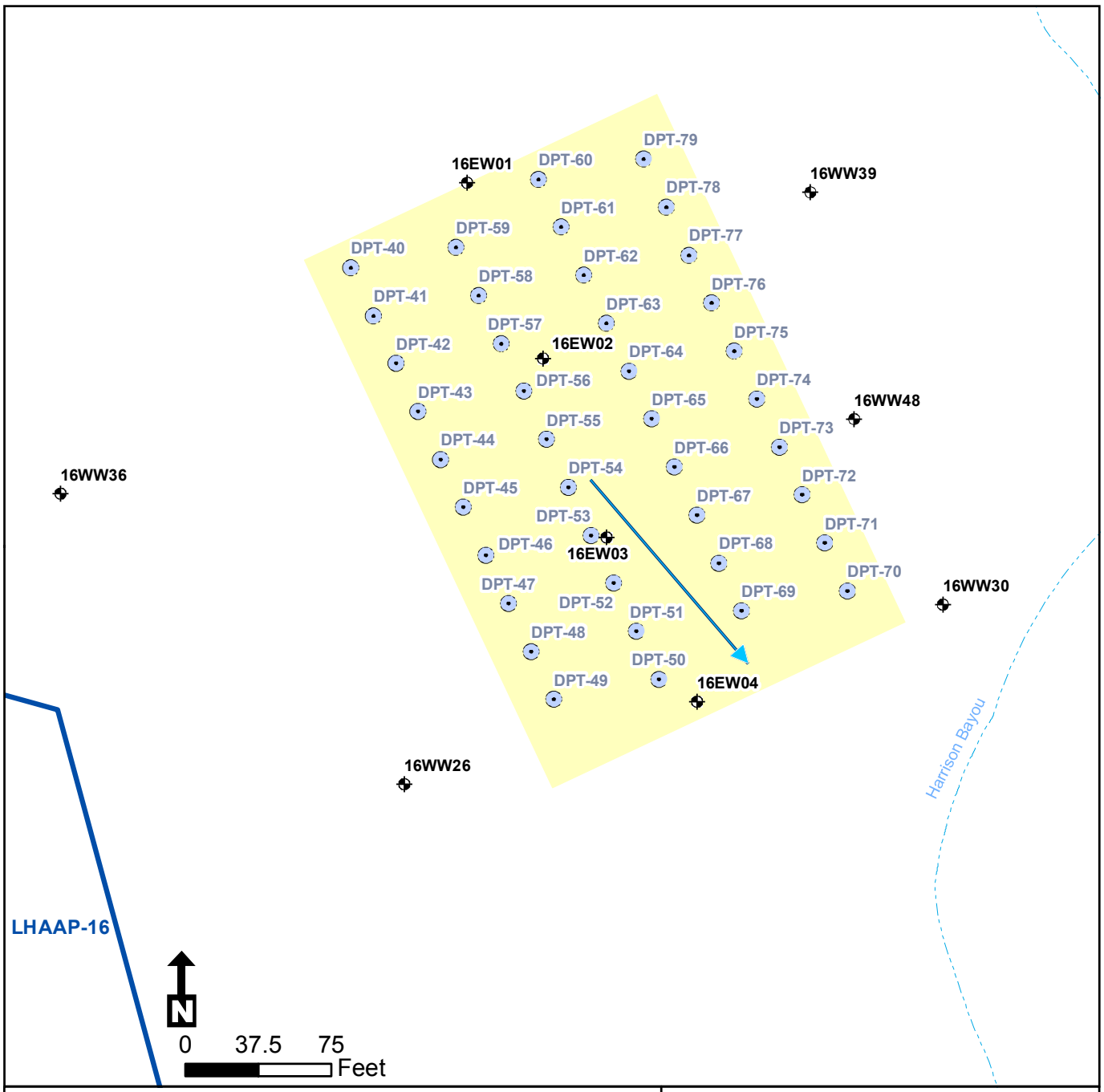
Bayou Biobarrier
LHAAP-16 RACR

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Date: 5/28/2020

Document Path: G:\Longhorn\LHAAP\Documents\Mxd\LHAAP16\RACR\Fig4-3_Landfill_Biobarrier_Bayou.mxd

Figure 23



Shallow Zone Extraction or Monitoring Well

Direct Push Injection Point

Groundwater Flow Direction (October 2018)

Stream

Shallow In Situ Bioremediation Area

LHAAP-16 Landfill Fence

U.S. ARMY CORP OF ENGINEERS
TULSA DISTRICT
TULSA, OKLAHOMA

bhate APTIM

Figure 4-4

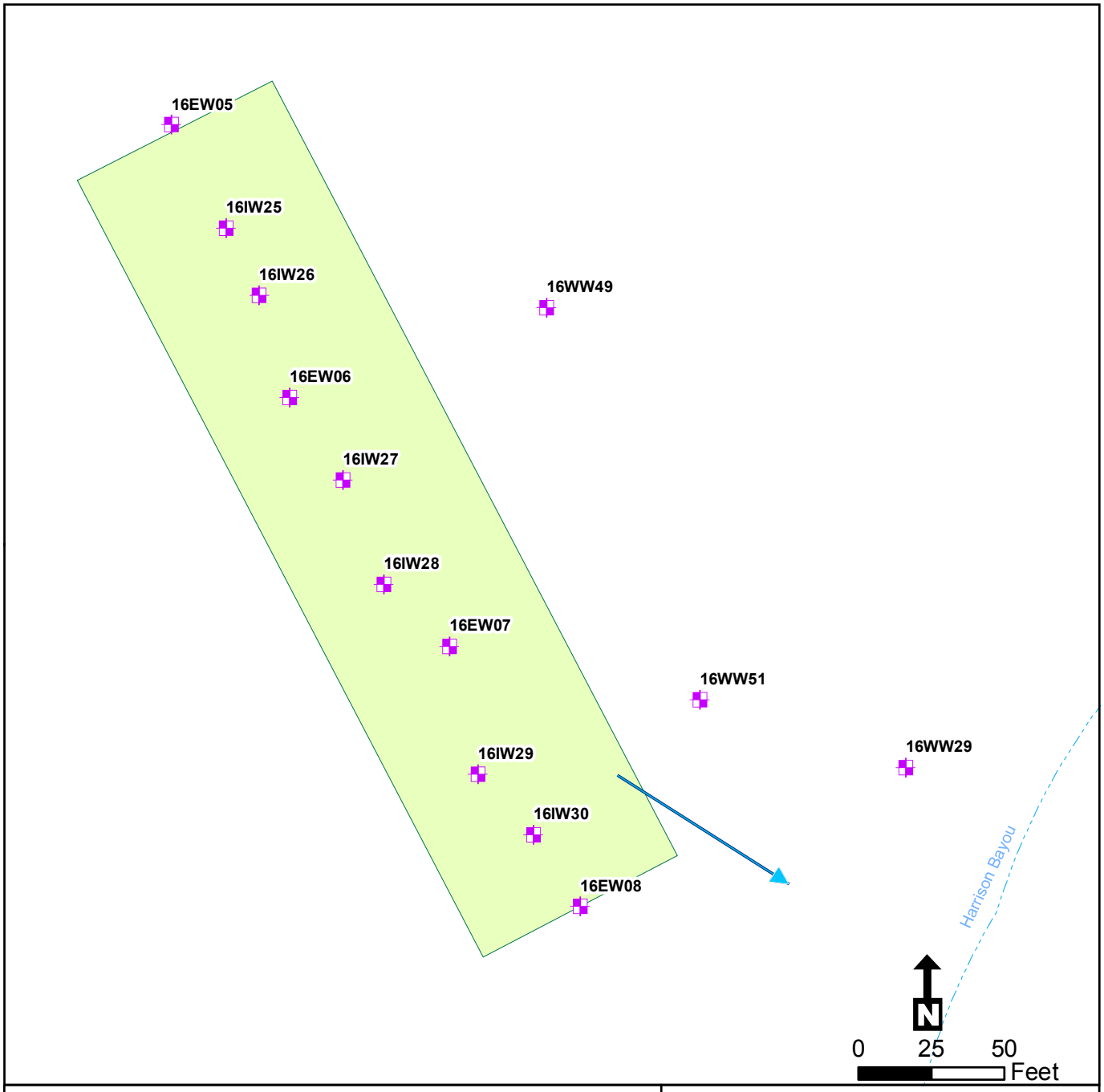
Mid-Plume Shallow Groundwater Zone
Biogrid
LHAAP-16 RACR

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Date: 5/28/2020

Document Path: G:\Longhorn\LHAAP\Documents\Mxd\LHAAP16\RACR\Fig4-4_Biobarrier_MidPlume_Shallow.mxd

Figure 24



Intermediate Zone Injection, Extraction, or Monitoring Well

Groundwater Flow Direction (October 2018)

Stream

Intermediate Groundwater Zone In Situ Bioremediation Area

U.S. ARMY CORP OF ENGINEERS
TULSA DISTRICT
TULSA, OKLAHOMA

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Figure 4-5

Mid-Plume Intermediate Groundwater Zone Biobarrier
LHAAP-16 RACR

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Date: 5/28/2020

Document Path: G:\Longhorn\LHAAP\Documents\Mxd\LHAAP16\RACR\Fig4-5_Biobarrier_Intermediate.mxd

Figure 25

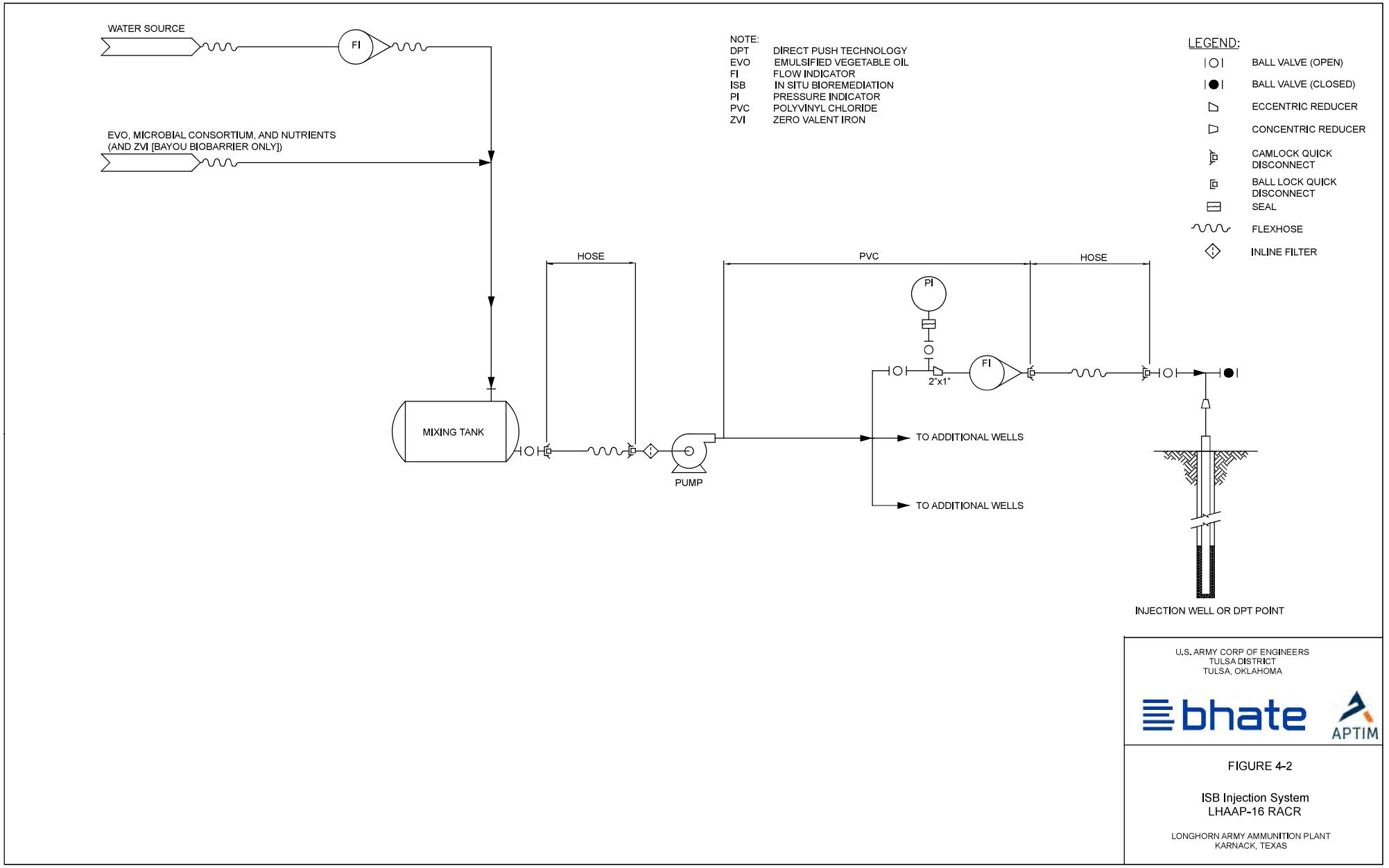
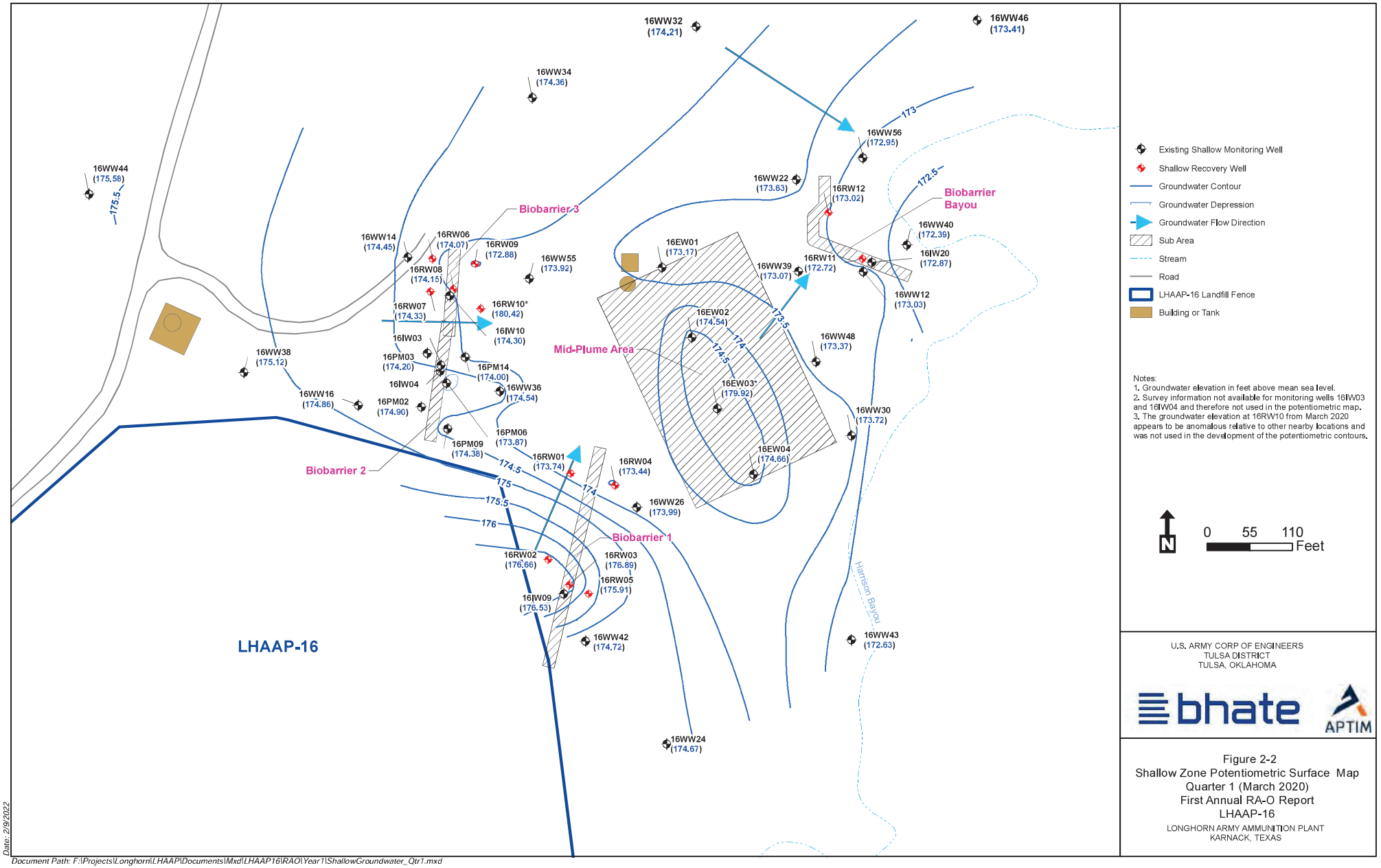

WATER SOURCE
FI
EVO, MICROBIAL CONSORTIUM, AND NUTRIENTS
(AND ZVI [BAYOU BIOBARRIER ONLY])
NOTE:
DPT DIRECT PUSH TECHNOLOGY
EVO EMULSIFIED VEGETABLE OIL
FI FLOW INDICATOR
ISB IN SITU BIOREMEDIATION
PI PRESSURE INDICATOR
PVC POLYVINYL CHLORIDE
ZVI ZERO VALENT IRON
LEGEND:
BALL VALVE (OPEN)
BALL VALVE (CLOSED)
ECCENTRIC REDUCER
CONCENTRIC REDUCER
CAMLOCK QUICK DISCONNECT
BALL LOCK QUICK DISCONNECT
SEAL
FLEXHOSE
INLINE FILTER
HOSE
PVC
HOSE
PI
FI
2"X1"
MIXING TANK
PUMP
TO ADDITIONAL WELLS
TO ADDITIONAL WELLS
INJECTION WELL OR DPT POINT
U.S. ARMY CORP OF ENGINEERS
TULSA DISTRICT
TULSA, OKLAHOMA
bhate
APTIM
FIGURE 4-2
ISB Injection System
LHAAP-16 RACR
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Figure 26



U.S. ARMY CORP OF ENGINEERS
TULSA DISTRICT
TULSA, OKLAHOMA

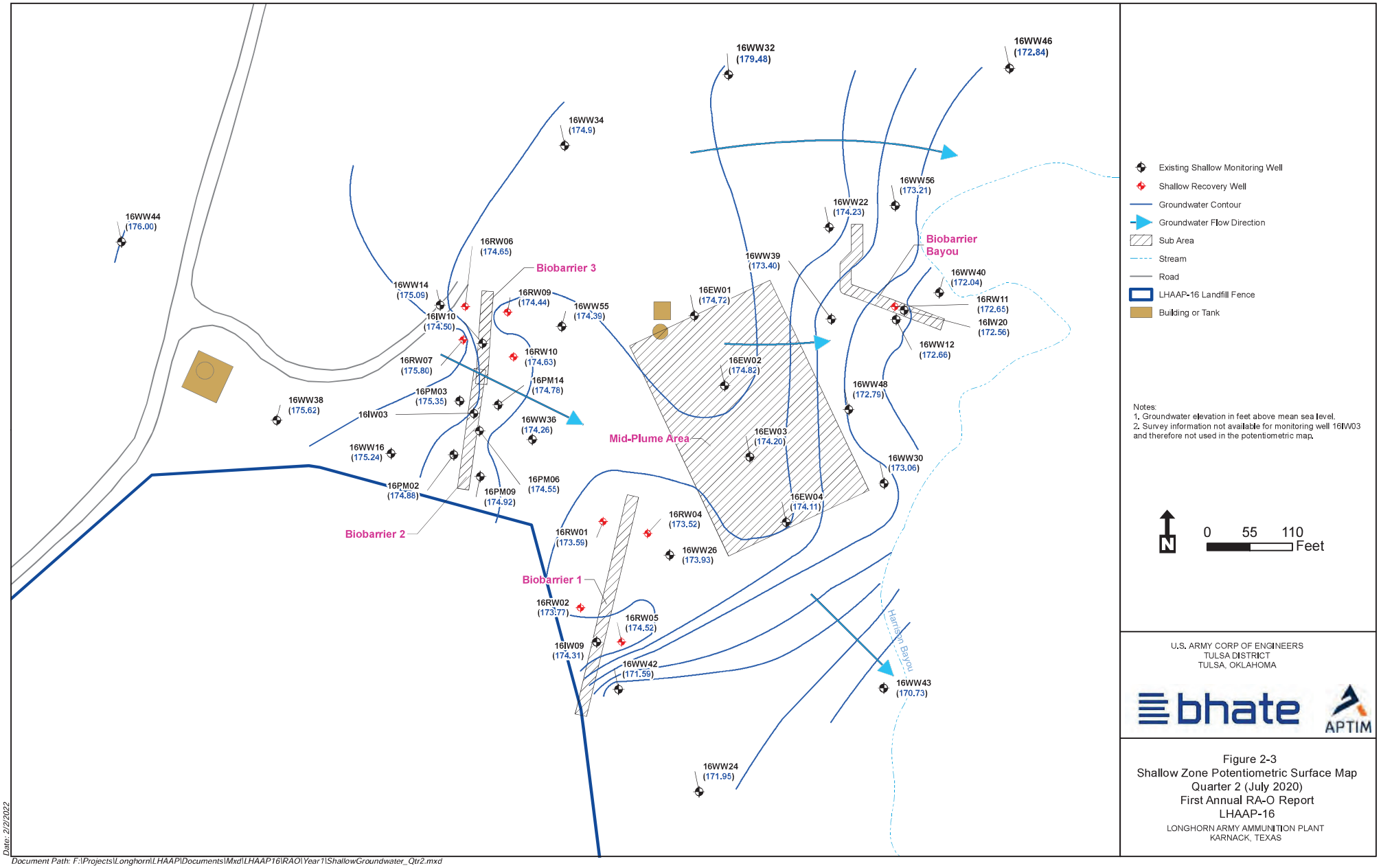
bhate APTIM

Figure 2-2
Shallow Zone Potentiometric Surface Map
Quarter 1 (March 2020)
First Annual RA-O Report
LHAAP-16
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Date: 2/9/2022

Document Path: F:\Projects\Longhorn\LHAAP\Documents\Mxd\LHAAP16\RAO\Year1\ShallowGroundwater_Qtr1.mxd

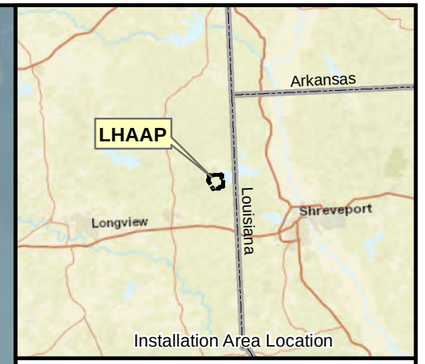
Figure 27


16WW32 (179.48)
16WW46 (172.84)
16WW34 (174.9)
16WW44 (176.00)
16RW06 (174.65)
Biobarrier 3
16WW14 (175.09)
16RW09 (174.44)
16WW55 (174.39)
16IW10 (174.50)
16RW10 (174.63)
16RW07 (175.80)
16PM14 (174.78)
16PM03 (175.35)
16WW38 (175.62)
16IW03
16WW36 (174.26)
16WW16 (175.24)
Mid-Plume Area
16PM02 (174.88)
16PM09 (174.92)
16PM06 (174.55)
Biobarrier 2
16RW01 (173.59)
16RW04 (173.52)
16WW26 (173.93)
Biobarrier 1
16RW02 (173.77)
16RW05 (174.52)
16IW09 (174.31)
16WW42 (171.59)
16WW43 (170.73)
16WW24 (171.95)
16WW39 (173.40)
16EW01 (174.72)
16EW02 (174.82)
16EW03 (174.20)
16EW04 (174.11)
16WW22 (174.23)
16WW56 (173.21)
Biobarrier Bayou
16WW40 (172.04)
16RW11 (172.65)
16IW20 (172.56)
16WW12 (172.66)
16WW48 (172.79)
16WW30 (173.06)
Harrison Bayou
Existing Shallow Monitoring Well
Shallow Recovery Well
Groundwater Contour
Groundwater Flow Direction
Sub Area
Stream
Road
LHAAP-16 Landfill Fence
Building or Tank
Notes:
1. Groundwater elevation in feet above mean sea level.
2. Survey information not available for monitoring well 16IW03 and therefore not used in the potentiometric map.
N
0 55 110
Feet
U.S. ARMY CORP OF ENGINEERS
TULSA DISTRICT
TULSA, OKLAHOMA
bhate
APTIM
Figure 2-3
Shallow Zone Potentiometric Surface Map
Quarter 2 (July 2020)
First Annual RA-O Report
LHAAP-16
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS
Date: 2/2/2022
Document Path: F:\Projects\Longhorn\LHAAP\Documents\Mxd\LHAAP16\RAO\Year1\ShallowGroundwater_Qtr2.mxd

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Figure 28





Legend

- LHAAP-17
- LHAAP Installation Boundary
- Lake
- Stream

Longhorn Army Ammunition Plant
Karnack, Texas

Figure 2: LHAAP-17
Site Location Map

Drawn: R Buttrey
Date: 12/9/2020

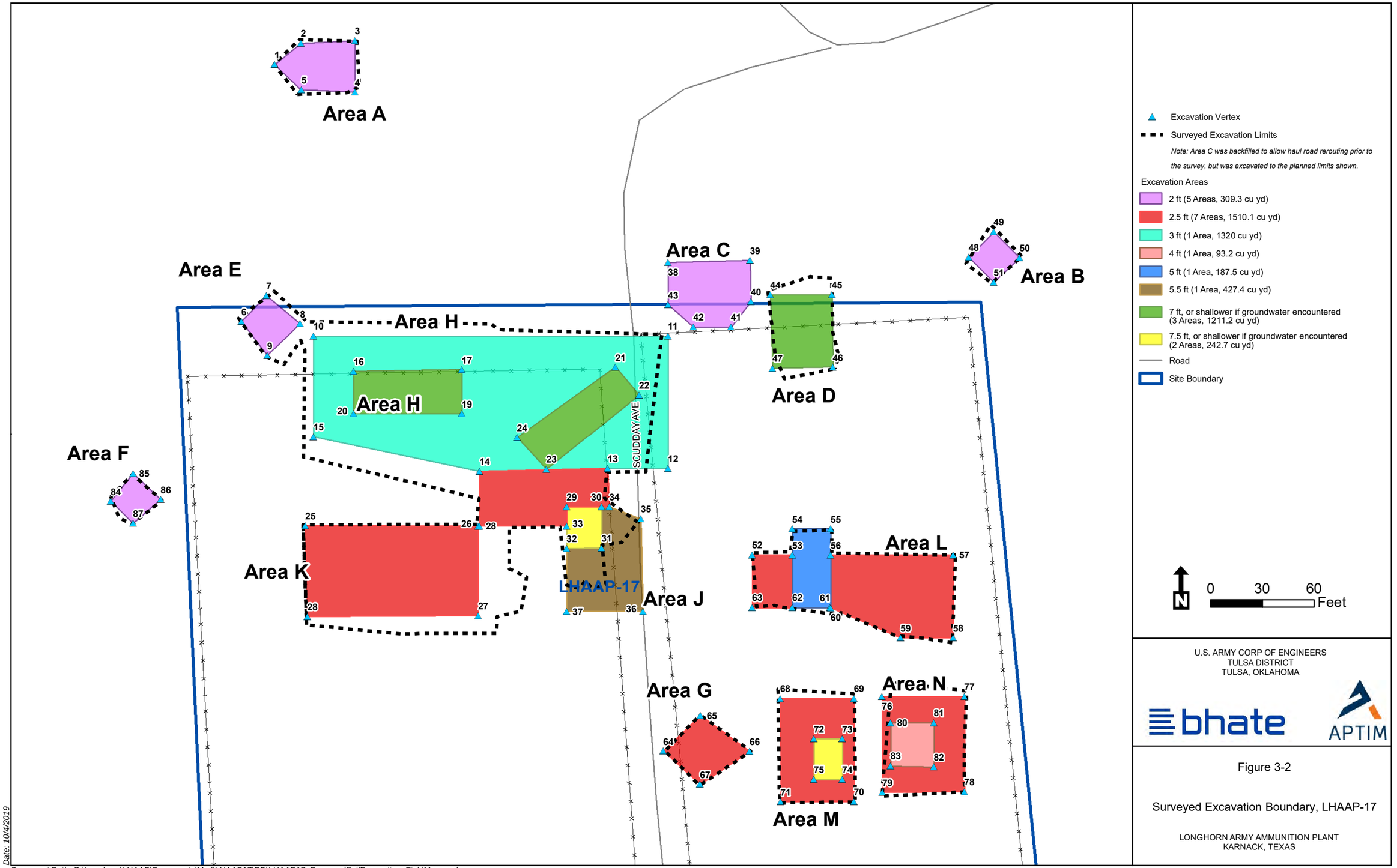
MMG Munitions Management Group
TLI JOINT VENTURE

0 1,250 2,500 5,000
Feet

Service Layer Credits: Google satellite imagery

Document Path: C:\Ray\TLI Solutions\Longhorn\Maps\QAPP\Figure_ES-2_Site_Location_Map.mxd

Figure 29



U.S. ARMY CORP OF ENGINEERS
TULSA DISTRICT
TULSA, OKLAHOMA

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Figure 3-2

Surveyed Excavation Boundary, LHAAP-17

LONGHORN army AMMUNITION PLANT
KARNACK, TEXAS

Date: 10/4/2019

Document Path: G:\Longhorn\LHAAP\Documents\Mxd\LHAAP17\RD\LHAAP17_ProposedSoilExcavation_FieldMap.mxd

Figure 30

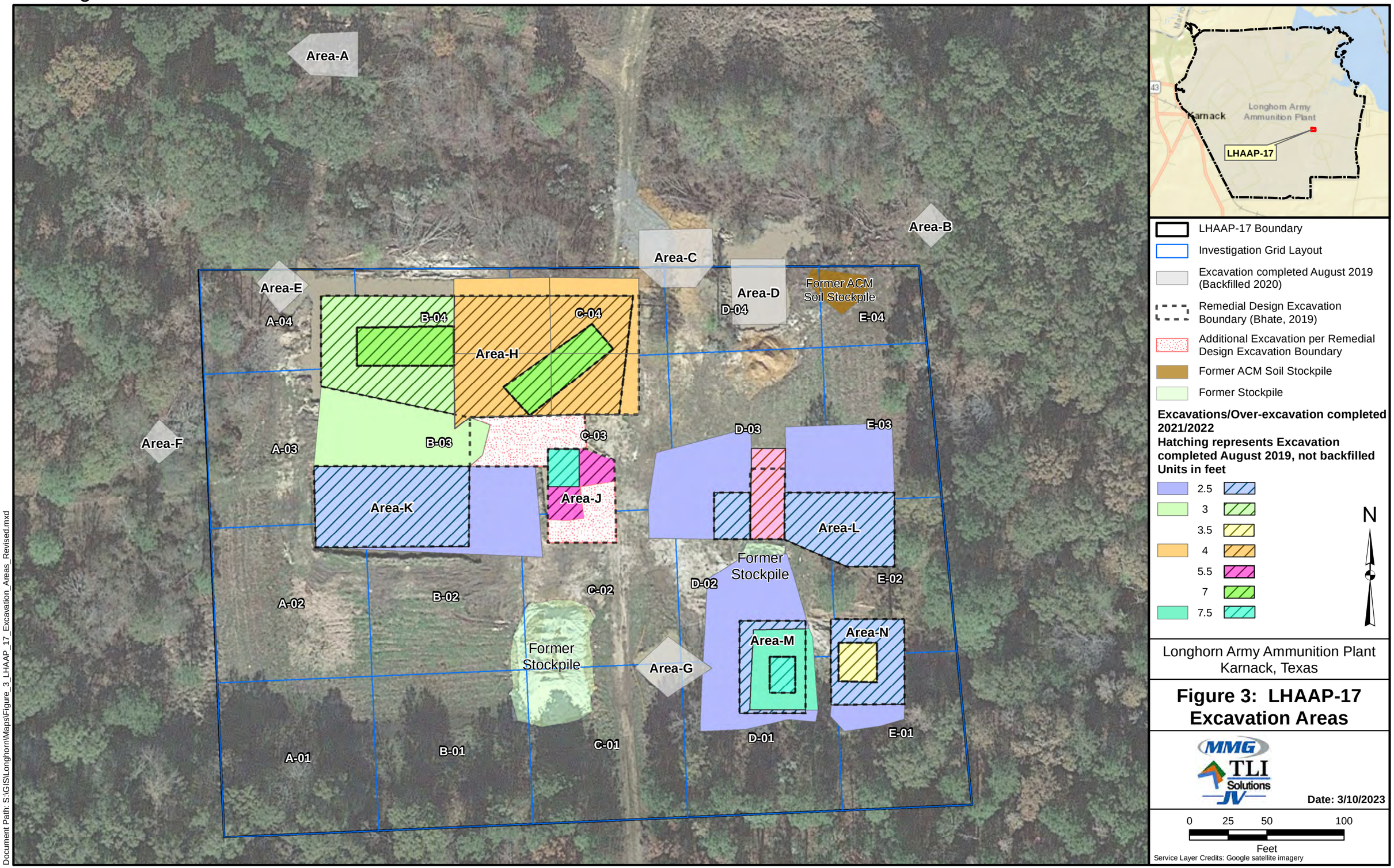
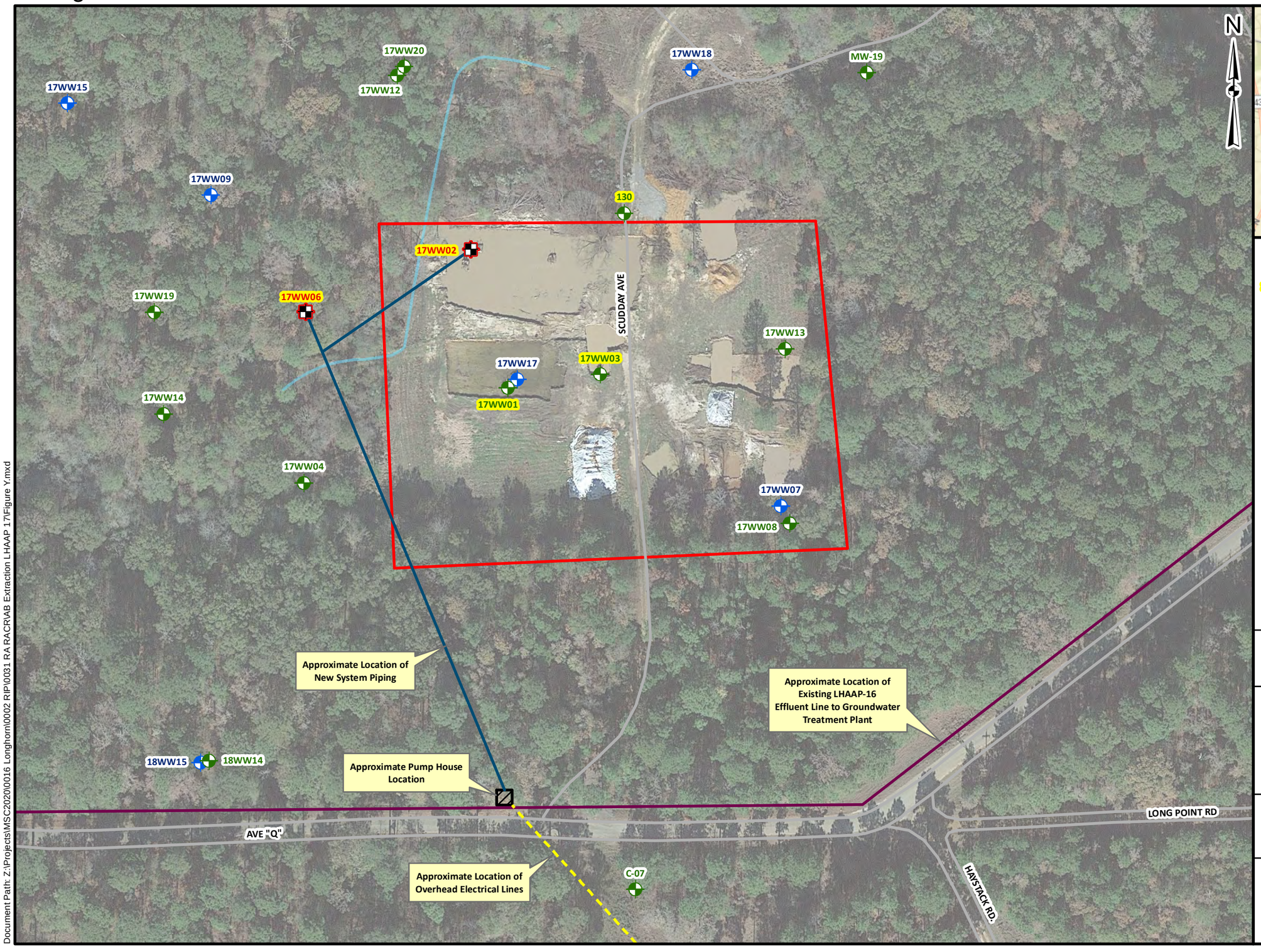

Area-A
Area-B
Area-C
Area-D
Area-E
Area-F
Area-G
Area-H
Area-J
Area-K
Area-L
Area-M
Area-N
A-01
A-02
A-03
A-04
B-01
B-02
B-03
B-04
C-01
C-02
C-03
C-04
D-01
D-02
D-03
D-04
E-01
E-02
E-03
E-04
Former ACM Soil Stockpile
Former Stockpile
Former Stockpile
Karnack
Longhorn Army Ammunition Plant
LHAAP-17
LHAAP-17 Boundary
Investigation Grid Layout
Excavation completed August 2019 (Backfilled 2020)
Remedial Design Excavation Boundary (Bhate, 2019)
Additional Excavation per Remedial Design Excavation Boundary
Former ACM Soil Stockpile
Former Stockpile
Excavations/Over-excavation completed 2021/2022
Hatching represents Excavation completed August 2019, not backfilled
Units in feet
2.5
3
3.5
4
5.5
7
7.5
N
Longhorn Army Ammunition Plant
Karnack, Texas
Figure 3: LHAAP-17 Excavation Areas
MMG
TLI Solutions JV
Date: 3/10/2023
0 25 50 100
Feet
Service Layer Credits: Google satellite imagery
Document Path: S:\GIS\Longhorn\Maps\Figure_3_LHAAP_17_Excavation_Areas_Revised.mxd

Figure 31



Legend

- 17WW02 — Performance Monitoring Locations Highlighted
- Extraction Well
- Shallow Monitoring Well
- Intermediate Monitoring Well
- LHAAP-17 Boundary
- Road
- Stream

Longhorn Army Ammunition Plant
Karnack, Texas

Figure 9 LHAAP-17 Groundwater Extraction System Layout

0 50 100 200 Feet

1 inch = 100 feet

Prepared By: MMG, TLI JOINT VENTURE

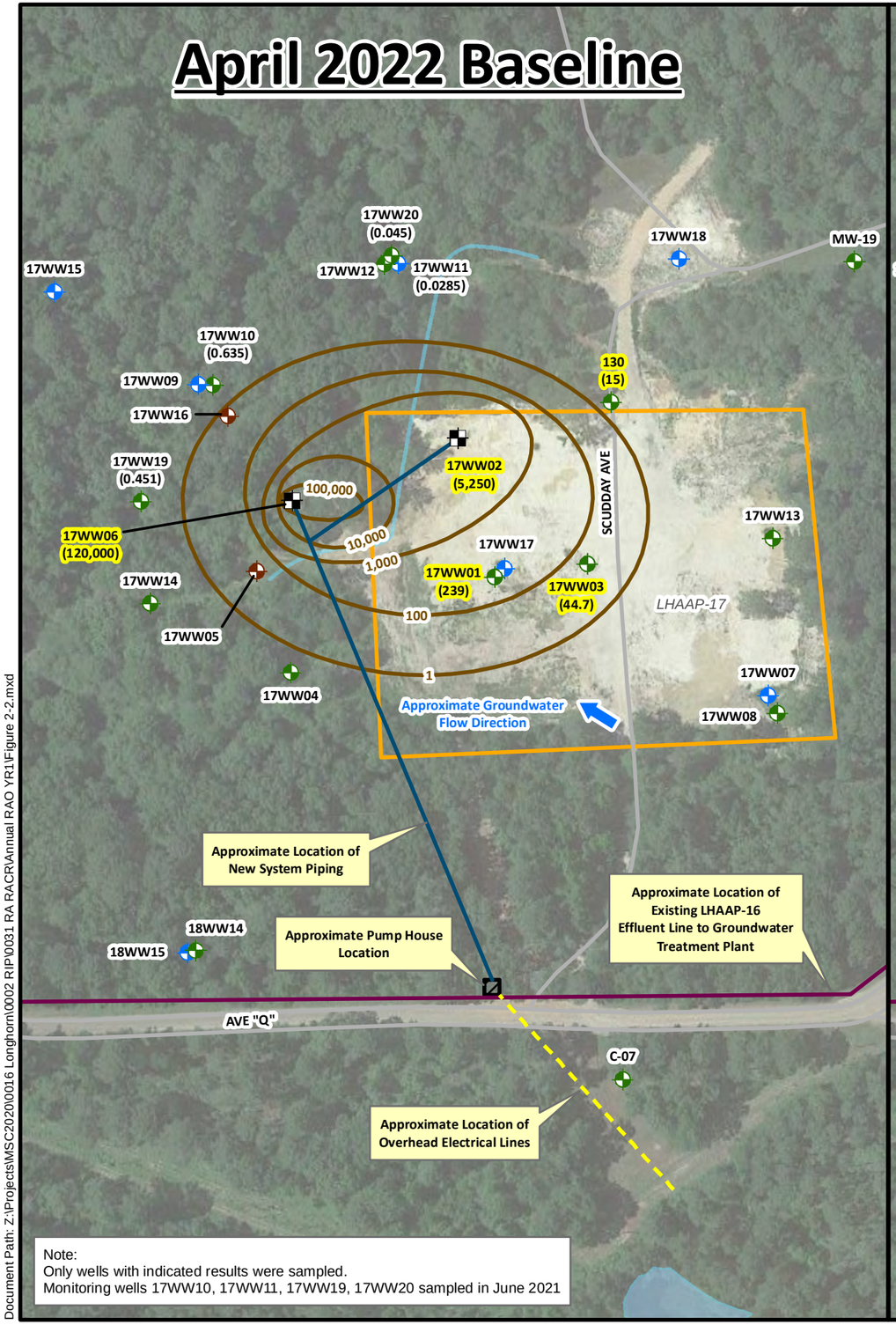
Map Date: 9/27/2022

Service Layer Credits: Google satellite imagery

Document Path: Z:\Projects\MSC2020\0016 Longhorn\0002 RIP\0031 RA RACRVAB Extraction LHAAP 17\Figure Y.mxd

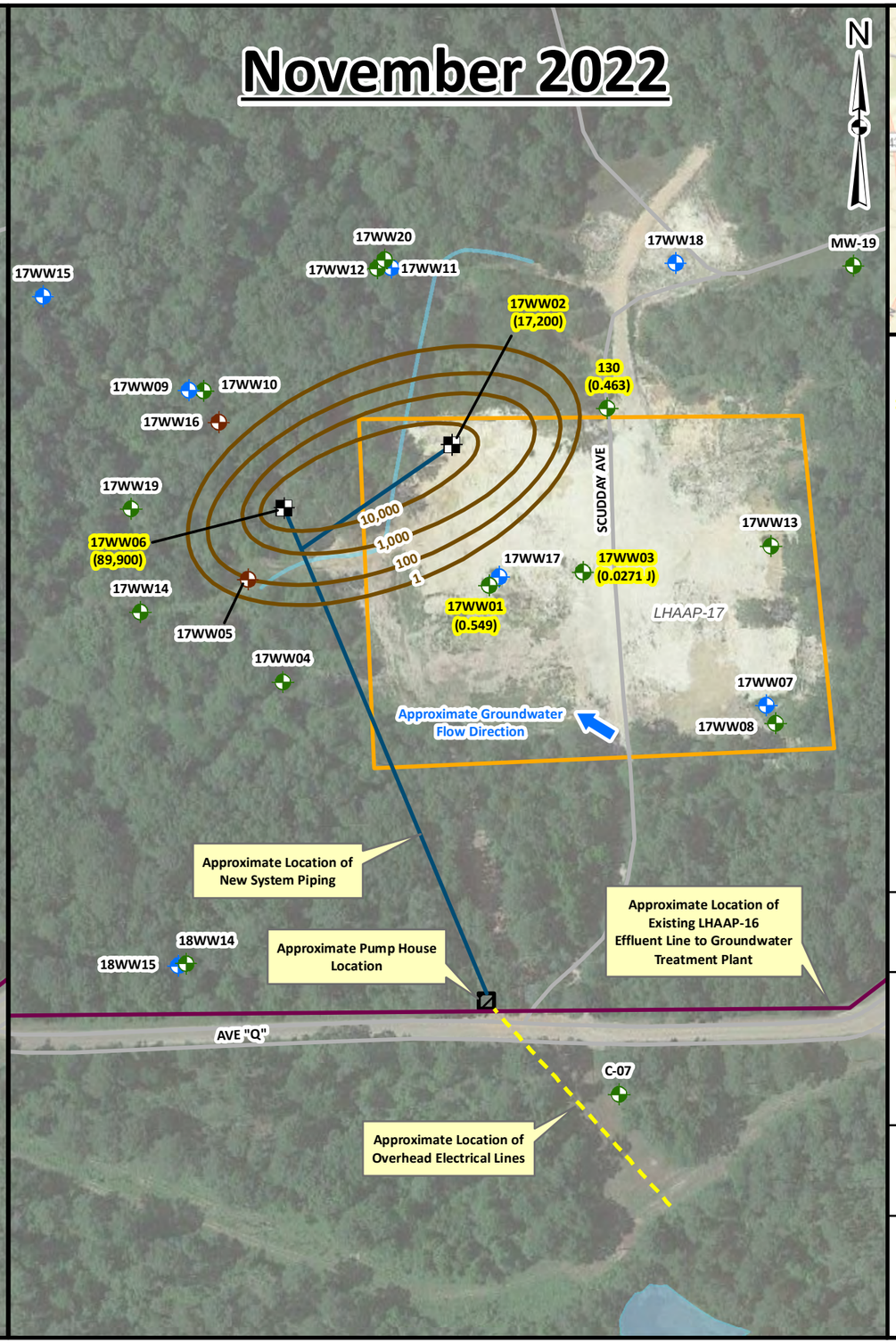
Figure 32

April 2022 Baseline



Note:
Only wells with indicated results were sampled.
Monitoring wells 17WW10, 17WW11, 17WW19, 17WW20 sampled in June 2021

November 2022





Installation Area Location

Legend

- 17WW02 — Performance Monitoring Locations Highlighted
- Extraction Well
- Shallow Monitoring Well
- Intermediate Monitoring Well
- Deep Monitoring Well
- LHAAP-17 Boundary
- Road
- Stream
- (0.463) — Perchlorate Concentration Reported in Micrograms per Liter (µg/L)
- (J) — Estimated Concentration
- Perchlorate Isoconcentration Contour

Longhorn Army Ammunition Plant
Karnack, Texas

Figure 2-2
April 2022 & November 2022
Groundwater Results

0 70 140 280 Feet

1 inch = 140 feet

Prepared By: MMG, TLI JOINT VENTURE

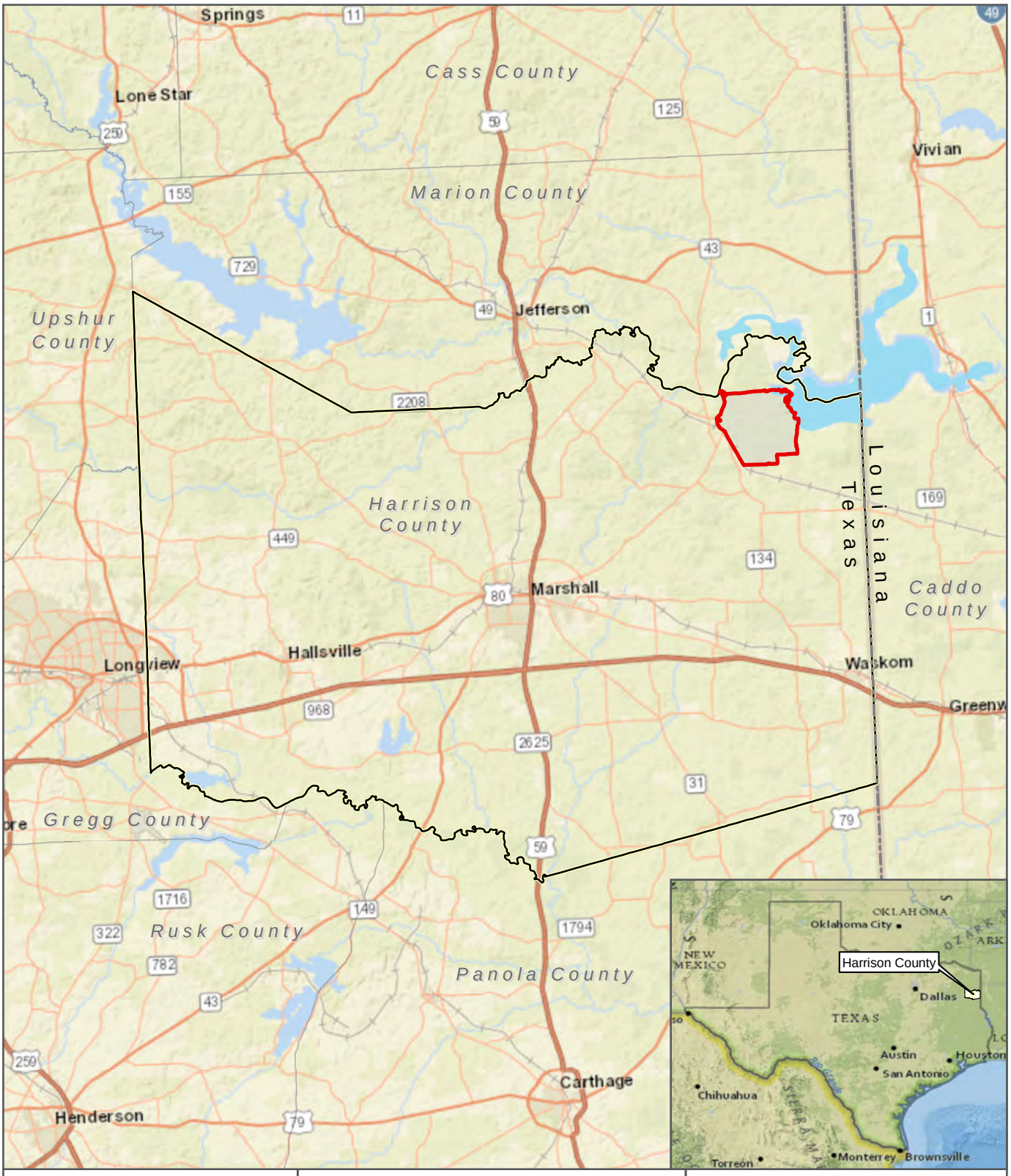
Map Date: 4/12/2023

Service Layer Credits: Google satellite imagery

Document Path: Z:\Projects\MSC20200016 Longhorn\0002 RIP\0031 RA RACR\Annual RAO YR1\Figure 2-2.mxd

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Figure 33



N

0 5 10
MILES

LEGEND

- LHAAP Installation Boundary
- Harrison County
- State Boundary

SITE LOCATION

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

DATA SOURCES: AECOM, ESRI, LHAAP

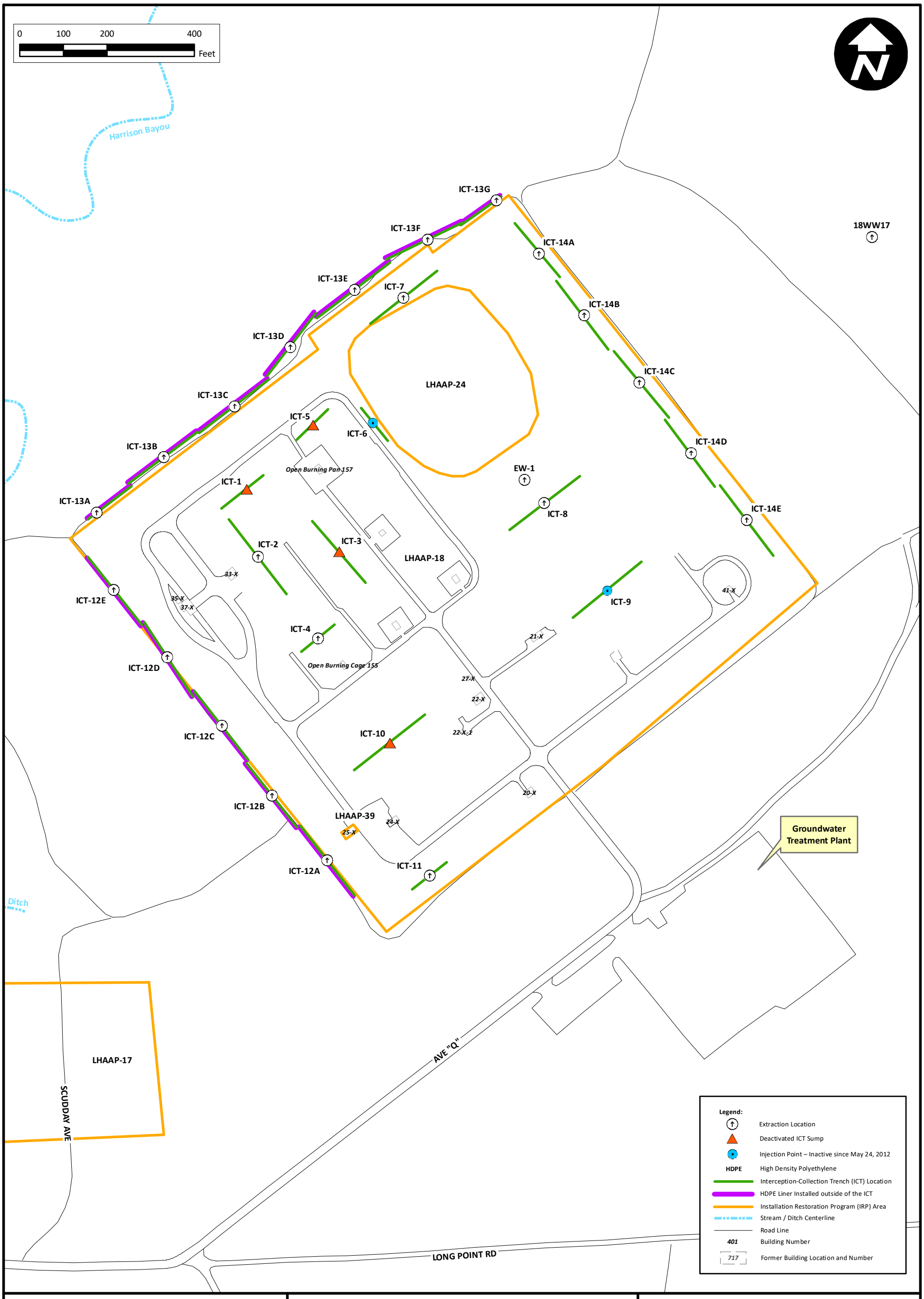
DISCLAIMER: Map information was compiled from the best available sources.
No warranty is made for its accuracy or completeness.

FIGURE 2-1

PATH: J:\2018\18-025_LHAAP_SITES29_47_18AND24_ROD_(WERNER)\7.2_WORK_IN_PROGRESS\MAP_DOCS\DRAFT\LHAAP29\LHAAP_29_ROD_LHAAP_SITE_LOCATION.MXD - USER: EBOWLIN - DATE: 7/24/2019

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Figure 34



bhate

www.bhate.com

Quarterly Evaluation Report
Groundwater Treatment Plant
Longhorn Army Ammunition Plant, Karnack, Texas

PROJECT NO:	SCALE:	DATE:	DRAWN BY:
NWO1312.0150	As Shown	1/12/2023	MRM

ICT Layout Map

Figure A-1

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Figure 35

PROCESS WATER FROM SUMP COLLECTION
FLOW MONITORING METER FIT-140
GROUNDWATER FROM BURNING GROUNDS AND SITE 17
TK-140 EQUALIZATION 300,700 GAL.
TK-140 Sampling Spigot
FLOW MONITORING METER FIT-172
TK-200A ORP 5,900 GAL.
TK-200B pH 5,700 GAL.
TK-200C POLYMER 3,400 GAL.
POLYMER POTABLE WATER
METALS TREATMENT
TK-240 CLARIFIER 10,000 GAL.
TK-640 BACK WASH TANK
FL-290 SAND FILTER
TK-300 STRIPPER FEED TANK 22,800 GAL.
FLOW MONITORING METER FIT-322
VENT TO ATMOSPHERE
VENT HEADER
TK-530 8,670 GAL.
TK-510B 8,670 GAL.
TK-510A 8,670 GAL.
DECANT
DECANT
FILTER PRESS MAKEUP WATER SOURCE
SAND FILTER BACKWASH WATER SOURCE
RECYCLE
FILTER CAKE FOR DISPOSAL
BELT PRESS BFP-560
SOLIDS REMOVAL
COLLECTION FROM FLOOR DRAINS IN CONTAINMENT AREA AND FROM DECON PAD
SUMP
TO TK 140
ELECTRON DONOR SUBSTRATE TANK 55 GAL. DRUM
TK-103 NUTRIENT TANK
P-104
P-103
FILTER PRESS MAKEUP WATER
SAND FILTER BACKWASH WATER
CARBON FILTER
T-330 AIR STRIPPER
TK-630 EFFLUENT STORAGE 127,000 GAL.
P-175
FLOW MONITORING METER FIT-103
Recycle
Liquid Phase Adsorber Protect™ LM-36 Series
VOLATILE ORGANICS TREATMENT
P-101A
P-101B
T-101 FBR
TK-650 1,000 GAL.
P-641
P-642
TO INF POND
TO HARRISON BAYOU
TO IRRIGATION AT BURNING GROUNDS
PERCHLORATE TREATMENT
TK-650 Sampling Spigot
FLOW MONITORING METER FIT-686

NOTES:

GAL.	GALLON
TK or T	TANK
BFP	BELT FILTER PRESS
P	PUMP
FL	FILTER
FBR	FLUIDIZED BED REACTOR
I/X	ION EXCHANGE

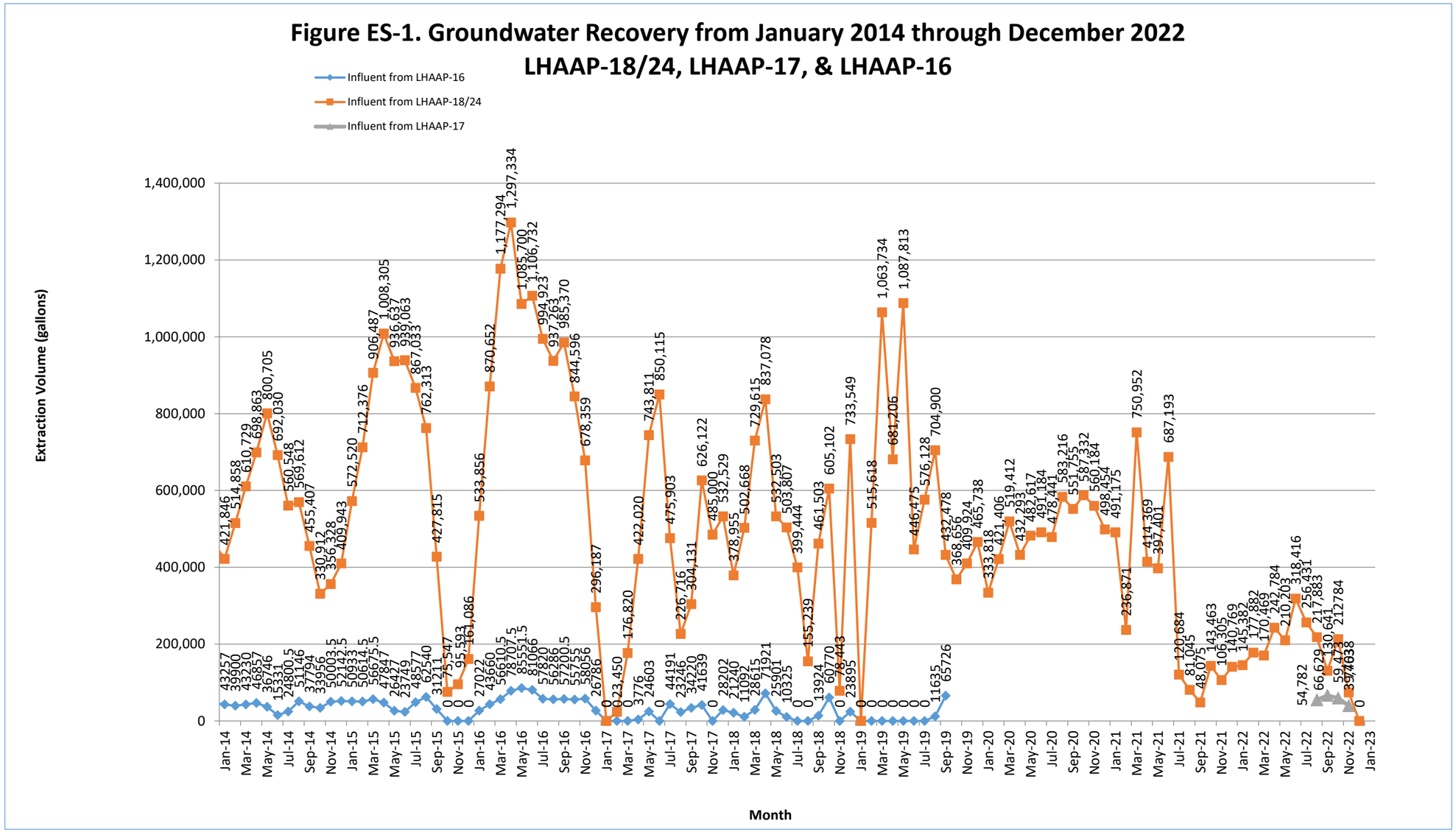
Process Flow Diagram
Figure A-2

Quarterly Evaluation Report
Groundwater Treatment Plant
Longhorn Army Ammunition Plant, Karnack, Texas

DRAWN BY: MRM
DATE: 1/12/2023
SCALE: Not to Scale
PROJECT NO: NWO1312.0150

bhate
www.bhate.com

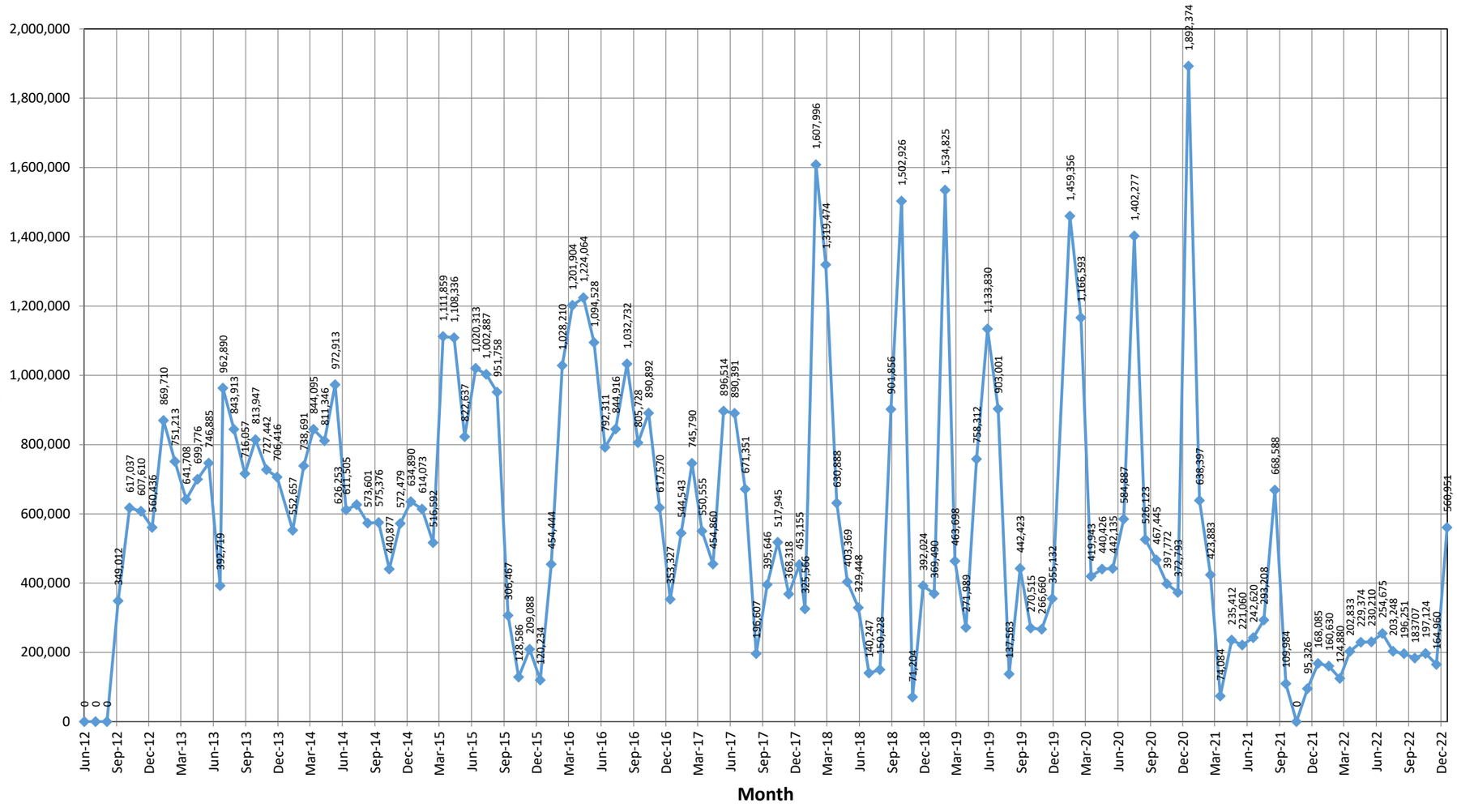
Figure 36



Note: Starting in September 2019, no groundwater was extracted subsequent to the final remedy of injections being implemented at LHAAP-16.

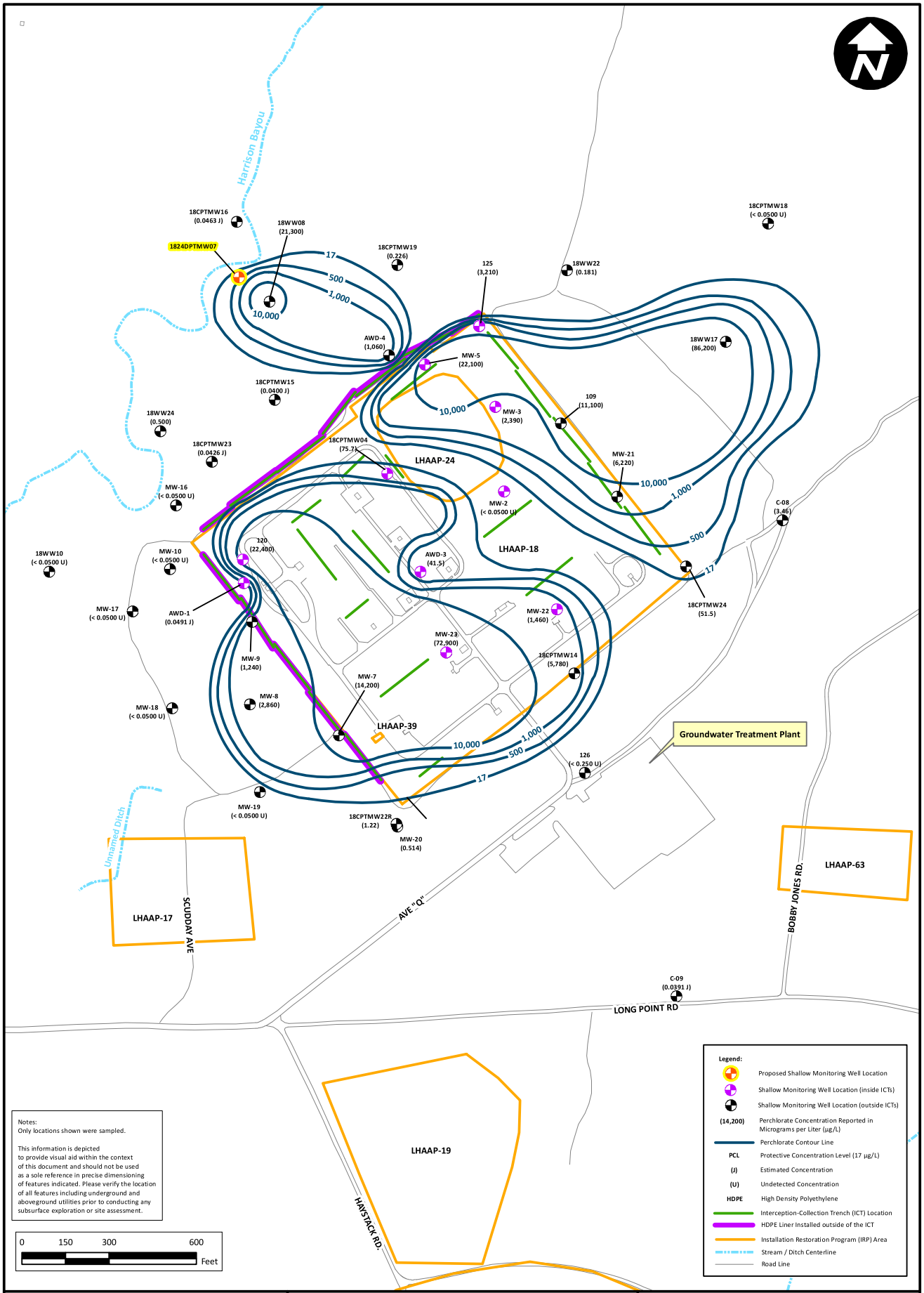
Figure 37

Figure ES-2. Treated Groundwater Discharged Monthly from June 2012 through December 2022



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Figure 38



bhate
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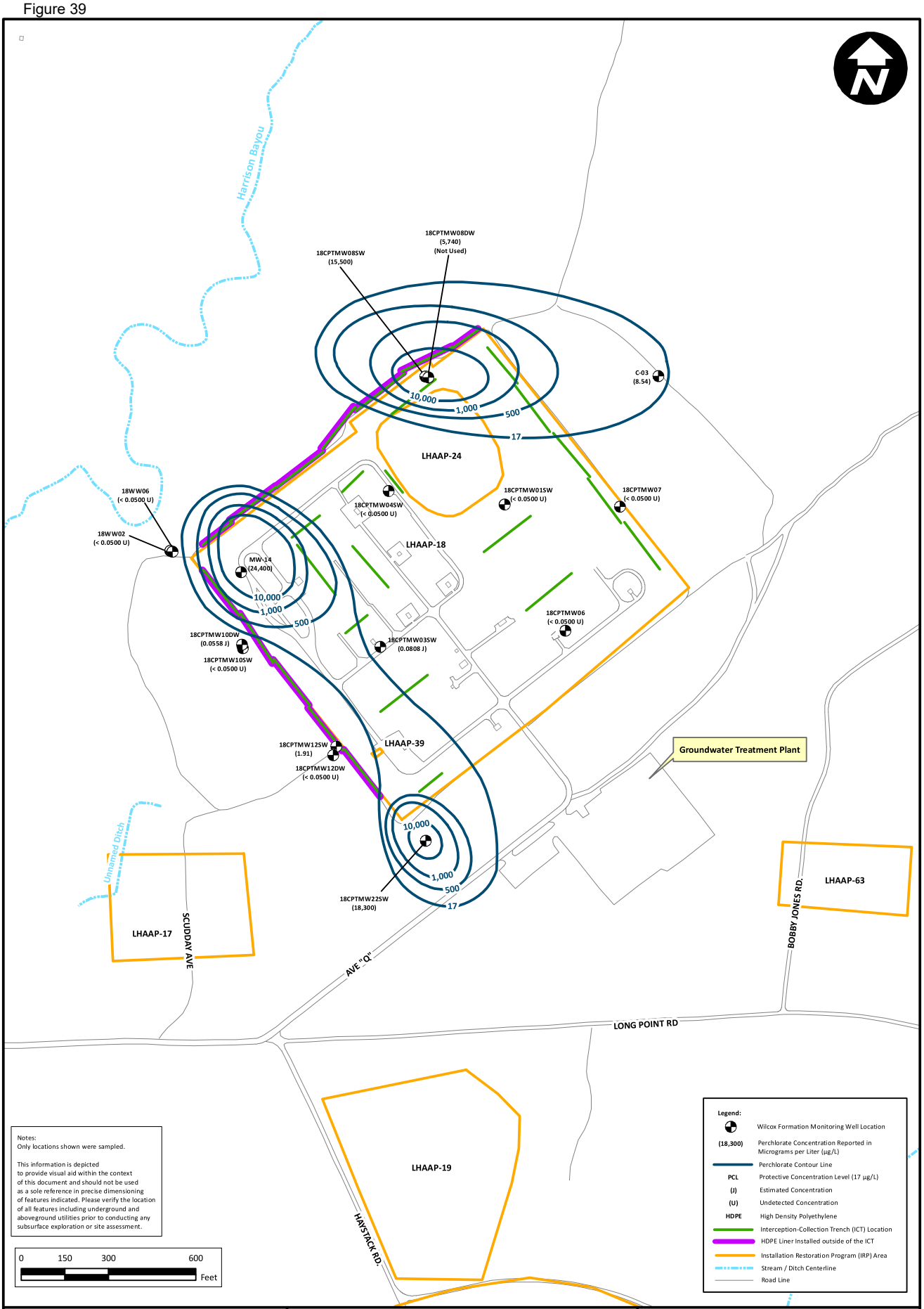
Quarterly Evaluation Report 1st Quarter (January – March) 2023
Groundwater Treatment Plant
Longhorn Army Ammunition Plant, Karnack, Texas

PROJECT NO:	SCALE:	DATE:	DRAWN BY:
NWO1312.0150	As Shown	5/31/2023	MRM

Perchlorate Isopleth Contours in Shallow Zone (December 2022 - January 2023)

Figure D-1

Figure 39



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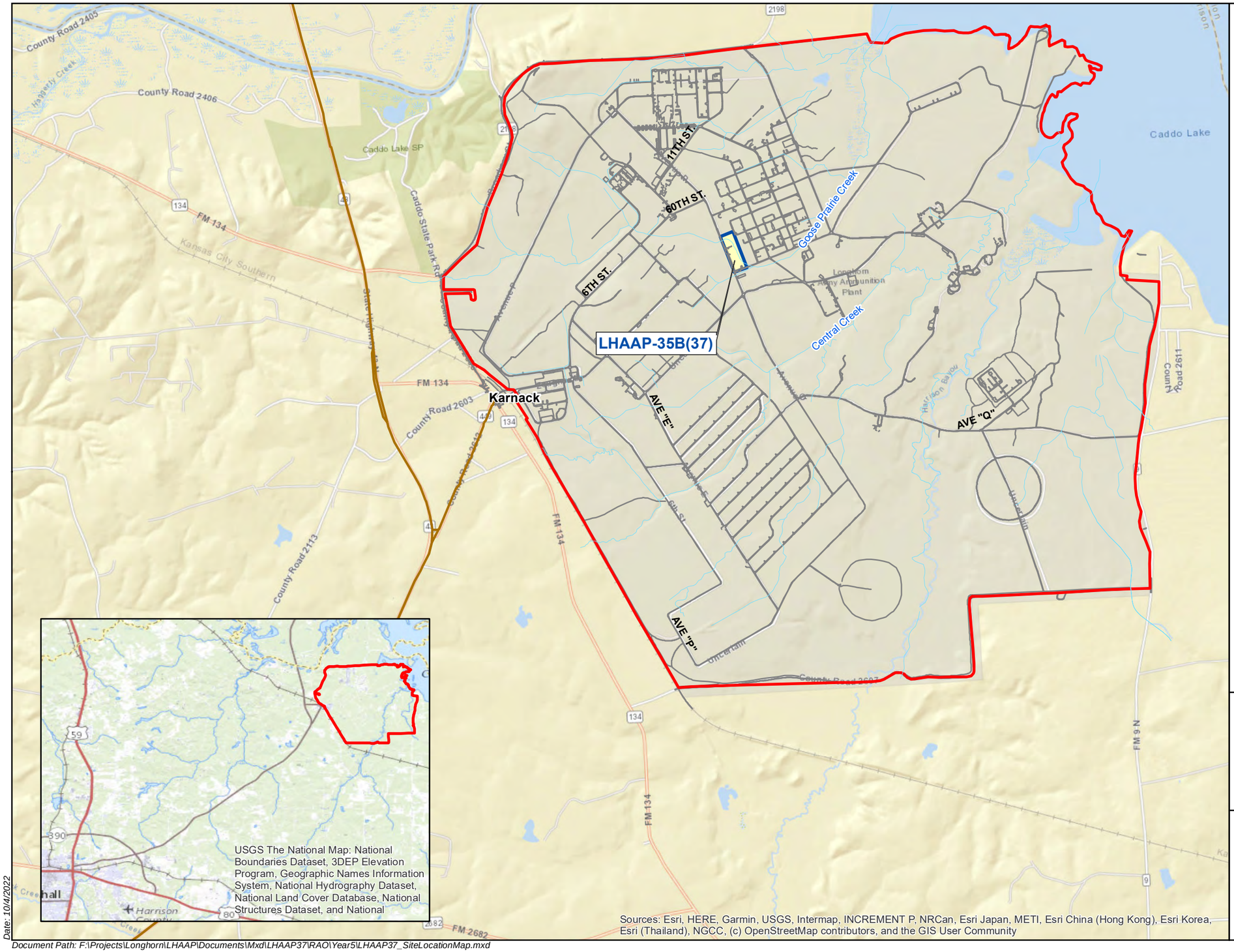
Quarterly Evaluation Report 1st Quarter (January – March) 2023
Groundwater Treatment Plant
Longhorn Army Ammunition Plant, Karnack, Texas

PROJECT NO:	SCALE:	DATE:	DRAWN BY:
NWO1312.0150	As Shown	3/16/2023	MRM

Perchlorate Isopleth Contours in Wilcox Formation (December 2022 - January 2023)

Figure D-2

Figure 40



U.S. ARMY CORP OF ENGINEERS
TULSA DISTRICT
TULSA, OKLAHOMA

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Figure 1-2

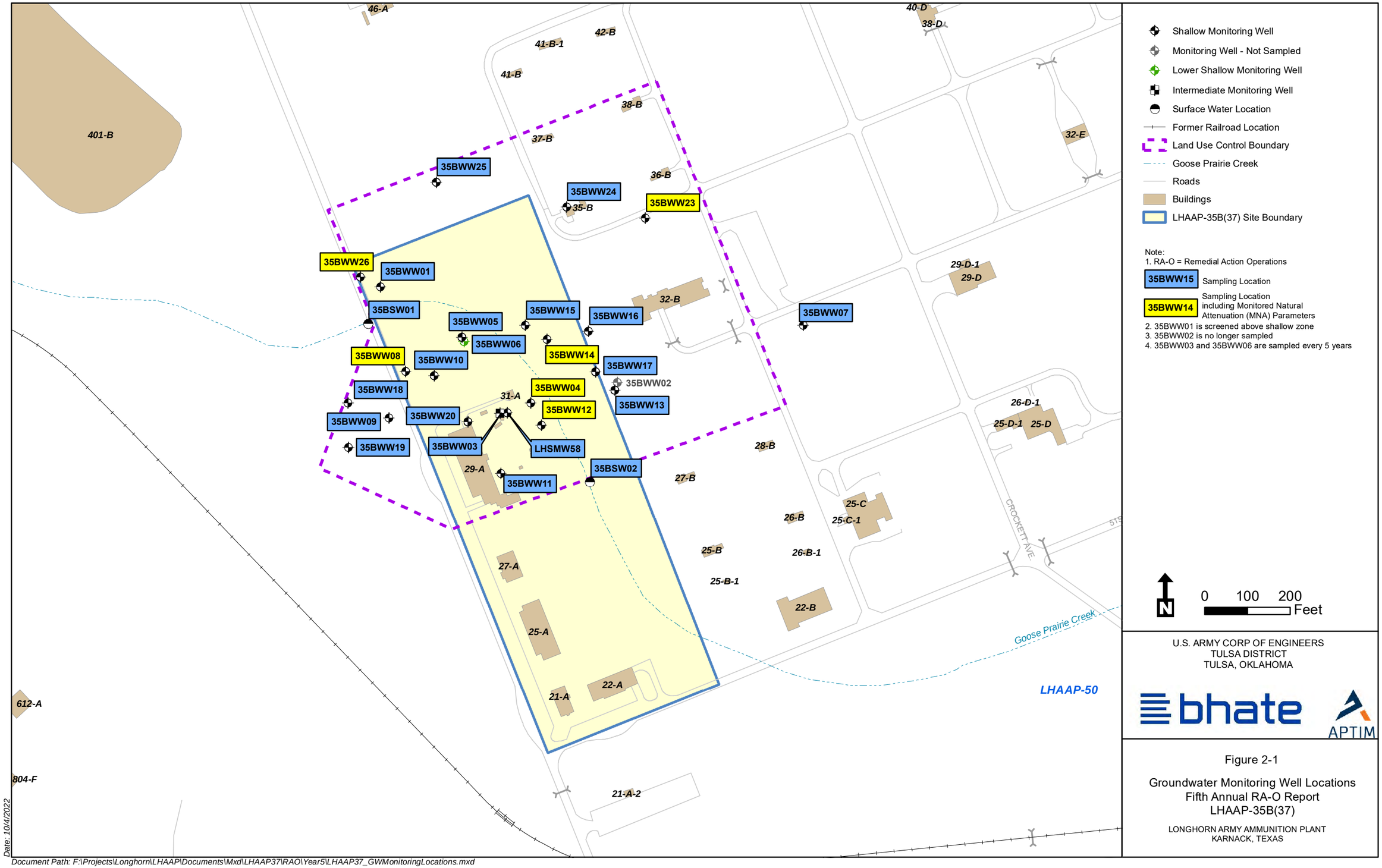
LHAAP Site Vicinity Map
Fifth Annual RA-O Report
LHAAP-35B(37)

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Date: 10/4/2022

Document Path: F:\Projects\Longhorn\LHAAP\Documents\Mxd\LHAAP37\RAO\Year5\LHAAP37_SiteLocationMap.mxd

Figure 41



U.S. ARMY CORP OF ENGINEERS
TULSA DISTRICT
TULSA, OKLAHOMA

bhate APTIM

Figure 2-1

Groundwater Monitoring Well Locations
Fifth Annual RA-O Report
LHAAP-35B(37)

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Date: 10/4/2022

Document Path: F:\Projects\Longhorn\LHAAP\Documents\Mxd\LHAAP37\RAO\Year5\LHAAP37_GWMonitoringLocations.mxd

Figure 42

35BWW03		
Analyte	MCL	Oct-13
Tetrachloroethene	5	0.5 U
Trichloroethene	5	0.5 U
1,1-Dichloroethene	7	1 U
cis-1,2-Dichloroethene	70	0.5 U
Vinyl Chloride	2	0.5 U

35BWW23		
Analyte	MCL	Jul-14
Tetrachloroethene	5	0.5 U
Trichloroethene	5	0.5 U
1,1-Dichloroethene	7	1 U
cis-1,2-Dichloroethene	70	0.5 U
Vinyl Chloride	2	0.5 U

35BWW05		
Analyte	MCL	Oct-13
Tetrachloroethene	5	1.57
Trichloroethene	5	**14**
1,1-Dichloroethene	7	1 U
cis-1,2-Dichloroethene	70	0.295 J
Vinyl Chloride	2	0.5 U

35BWW06		
Analyte	MCL	Oct-13
Tetrachloroethene	5	0.5 U
Trichloroethene	5	0.5 U
1,1-Dichloroethene	7	1 U
cis-1,2-Dichloroethene	70	0.5 U
Vinyl Chloride	2	0.5 U

35BWW08		
Analyte	MCL	Oct-13
Tetrachloroethene	5	0.5 U
Trichloroethene	5	**43.8**
1,1-Dichloroethene	7	1 U
cis-1,2-Dichloroethene	70	0.5 U
Vinyl Chloride	2	0.5 U

35BWW18		
Analyte	MCL	Oct-13
Tetrachloroethene	5	0.5 U
Trichloroethene	5	0.5 U
1,1-Dichloroethene	7	1 U
cis-1,2-Dichloroethene	70	0.5 U
Vinyl Chloride	2	0.5 U

35BWW10		
Analyte	MCL	Oct-13
Tetrachloroethene	5	4.45
Trichloroethene	5	**56.3**
1,1-Dichloroethene	7	1 U
cis-1,2-Dichloroethene	70	0.5 U
Vinyl Chloride	2	0.5 U

35BWW19		
Analyte	MCL	Oct-13
Tetrachloroethene	5	0.5 U
Trichloroethene	5	0.5 U
1,1-Dichloroethene	7	1 U
cis-1,2-Dichloroethene	70	0.5 U
Vinyl Chloride	2	0.5 U

35BWW09		
Analyte	MCL	Oct-13
Tetrachloroethene	5	0.5 U
Trichloroethene	5	**49**
1,1-Dichloroethene	7	1 U
cis-1,2-Dichloroethene	70	0.529 J
Vinyl Chloride	2	0.5 U

35BWW15		
Analyte	MCL	Jan-14
Tetrachloroethene	5	**8.69**
Trichloroethene	5	**43.5**
1,1-Dichloroethene	7	**35.5**
cis-1,2-Dichloroethene	70	6.25
Vinyl Chloride	2	**3.42**

35BWW07		
Analyte	MCL	Oct-13
Tetrachloroethene	5	0.5 U
Trichloroethene	5	0.5 U
1,1-Dichloroethene	7	1 U
cis-1,2-Dichloroethene	70	0.5 U
Vinyl Chloride	2	0.5 U

35BWW16		
Analyte	MCL	Oct-13
Tetrachloroethene	5	0.447 J
Trichloroethene	5	2.57
1,1-Dichloroethene	7	0.865 J
cis-1,2-Dichloroethene	70	0.5 U
Vinyl Chloride	2	0.5 U

35BWW14		
Analyte	MCL	Oct-13
Tetrachloroethene	5	**19**
Trichloroethene	5	**82.8**
1,1-Dichloroethene	7	**57.2**
cis-1,2-Dichloroethene	70	14.3
Vinyl Chloride	2	**5.09**

35BWW13		
Analyte	MCL	Oct-13
Tetrachloroethene	5	4.14
Trichloroethene	5	1.84
1,1-Dichloroethene	7	1 U
cis-1,2-Dichloroethene	70	0.5 U
Vinyl Chloride	2	0.5 U

35BWW17		
Analyte	MCL	Feb-14
Tetrachloroethene	5	0.512 J
Trichloroethene	5	0.5 U
1,1-Dichloroethene	7	1 U
cis-1,2-Dichloroethene	70	0.5 U
Vinyl Chloride	2	0.5 U

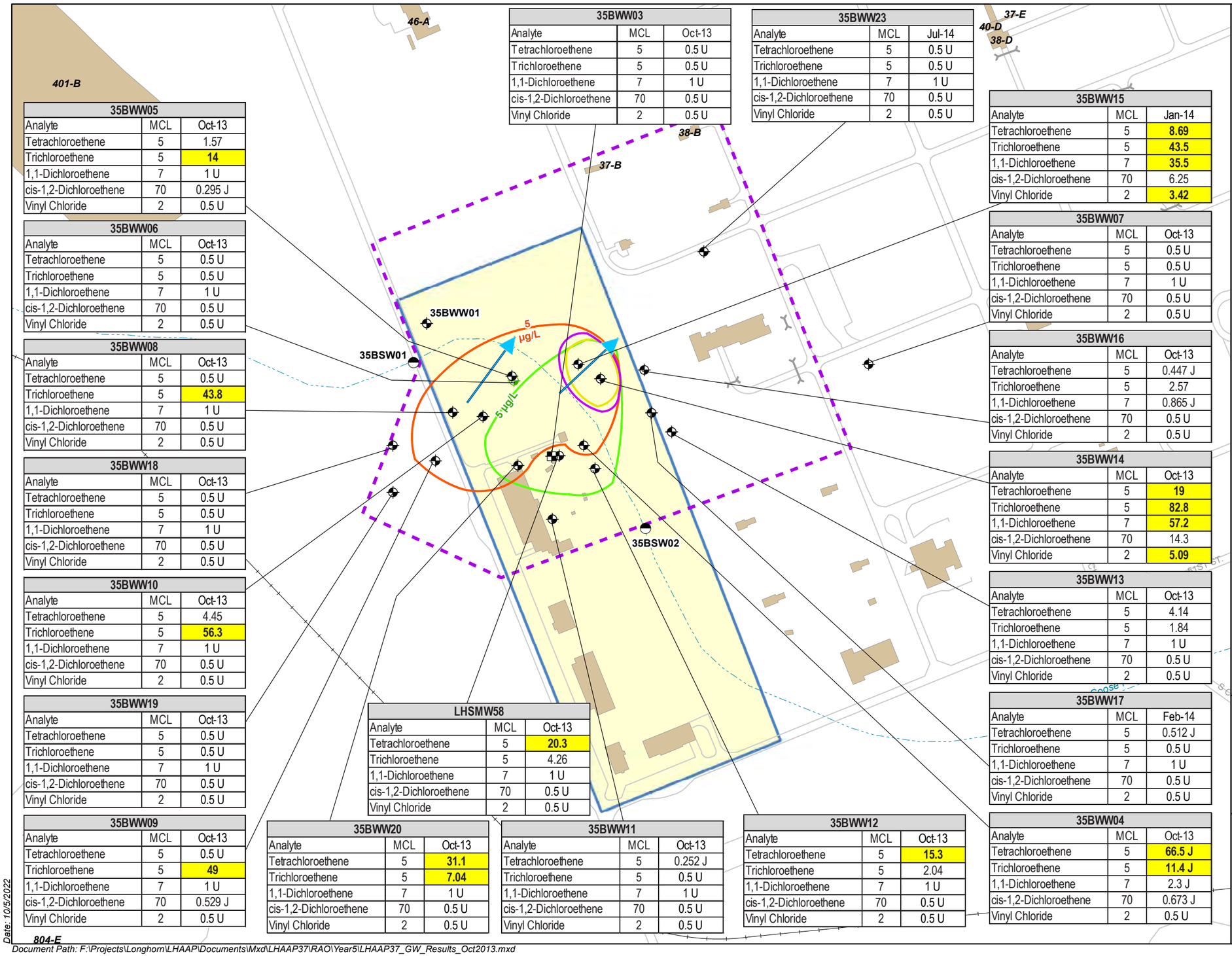
35BWW04		
Analyte	MCL	Oct-13
Tetrachloroethene	5	**66.5 J**
Trichloroethene	5	**11.4 J**
1,1-Dichloroethene	7	2.3 J
cis-1,2-Dichloroethene	70	0.673 J
Vinyl Chloride	2	0.5 U

LHSMW58		
Analyte	MCL	Oct-13
Tetrachloroethene	5	**20.3**
Trichloroethene	5	4.26
1,1-Dichloroethene	7	1 U
cis-1,2-Dichloroethene	70	0.5 U
Vinyl Chloride	2	0.5 U

35BWW20		
Analyte	MCL	Oct-13
Tetrachloroethene	5	**31.1**
Trichloroethene	5	**7.04**
1,1-Dichloroethene	7	1 U
cis-1,2-Dichloroethene	70	0.5 U
Vinyl Chloride	2	0.5 U

35BWW11		
Analyte	MCL	Oct-13
Tetrachloroethene	5	0.252 J
Trichloroethene	5	0.5 U
1,1-Dichloroethene	7	1 U
cis-1,2-Dichloroethene	70	0.5 U
Vinyl Chloride	2	0.5 U

35BWW12		
Analyte	MCL	Oct-13
Tetrachloroethene	5	**15.3**
Trichloroethene	5	2.04
1,1-Dichloroethene	7	1 U
cis-1,2-Dichloroethene	70	0.5 U
Vinyl Chloride	2	0.5 U



- Shallow Monitoring Well
- Lower Shallow Monitoring Well
- Intermediate Monitoring Well
- Surface Water Location
- Groundwater Flow Direction
- Tetrachloroethene Contour
- Trichloroethene Contour
- 1,1-Dichloroethene Contour
- Vinyl Chloride Contour
- Former Railroad Location
- Land Use Control Boundary
- Goose Prairie Creek
- Roads
- Buildings
- LHAAP-35B(37) Site Boundary

Note:
1. RA-O = Remedial Action Operations
2. MCL = Maximum Contaminant Level
3. J = estimated level
4. U = below detection limit
5. Groundwater flow arrows are from October 2013.

N

0 100 200 Feet

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TULSA, OKLAHOMA

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Figure 2-4
Groundwater Results
Baseline 2013-2014
Fifth Annual RA-O Report
LHAAP-35B(37)
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Date: 10/5/2022

Document Path: F:\Projects\Longhorn\LHAAP\Documents\Mxd\LHAAP37\RAO\Year5\LHAAP37_GW_Results_Oct2013.mxd

Figure 43

35BWW26		
Analyte	MCL	11/17/2021
Tetrachloroethene	5	1 U
Trichloroethene	5	0.5 U
1,1-Dichloroethene	7	0.5 U
cis-1,2-Dichloroethene	70	0.5 U
Vinyl chloride	2	0.5 U

35BWW01		
Analyte	MCL	11/15/2021
Tetrachloroethene	5	1 U
Trichloroethene	5	0.5 U
1,1-Dichloroethene	7	0.5 U
cis-1,2-Dichloroethene	70	0.5 U
Vinyl chloride	2	0.5 U

35BWW25		
Analyte	MCL	11/22/2021
Tetrachloroethene	5	0.53 J
Trichloroethene	5	**10**
1,1-Dichloroethene	7	1 U
cis-1,2-Dichloroethene	70	1 U
Vinyl chloride	2	1 U

35BWW24		
Analyte	MCL	11/22/2021
Tetrachloroethene	5	1 U
Trichloroethene	5	2.9
1,1-Dichloroethene	7	1 U
cis-1,2-Dichloroethene	70	1 U
Vinyl chloride	2	1 U

35BWW23		
Analyte	MCL	11/22/2021
Tetrachloroethene	5	1 U
Trichloroethene	5	1 U
1,1-Dichloroethene	7	1 U
cis-1,2-Dichloroethene	70	1 U
Vinyl chloride	2	1 U

35BWW05		
Analyte	MCL	11/15/2021
Tetrachloroethene	5	1.8
Trichloroethene	5	3.5
1,1-Dichloroethene	7	0.5 U
cis-1,2-Dichloroethene	70	0.5 U
Vinyl chloride	2	0.5 U

35BWW16		
Analyte	MCL	11/17/2021
Tetrachloroethene	5	4.8
Trichloroethene	5	1.7
1,1-Dichloroethene	7	0.5 U
cis-1,2-Dichloroethene	70	0.5 U
Vinyl chloride	2	0.5 U

35BWW06		
Analyte	MCL	11/15/2021
Tetrachloroethene	5	1 U
Trichloroethene	5	0.5 U
1,1-Dichloroethene	7	0.5 U
cis-1,2-Dichloroethene	70	0.5 U
Vinyl chloride	2	0.5 U

35BWW07		
Analyte	MCL	11/17/2021
Tetrachloroethene	5	1 U
Trichloroethene	5	0.5 U
1,1-Dichloroethene	7	0.5 U
cis-1,2-Dichloroethene	70	0.5 U
Vinyl chloride	2	0.5 U

35BWW08		
Analyte	MCL	11/7/2021
Tetrachloroethene	5	1 U
Trichloroethene	5	0.5 U
1,1-Dichloroethene	7	0.5 U
cis-1,2-Dichloroethene	70	0.5 U
Vinyl chloride	2	0.5 U

35BWW15		
Analyte	MCL	11/22/2021
Tetrachloroethene	5	**13**
Trichloroethene	5	**5.1**
1,1-Dichloroethene	7	1 U
cis-1,2-Dichloroethene	70	1 U
Vinyl chloride	2	1 U

35BWW18		
Analyte	MCL	11/15/2021
Tetrachloroethene	5	1 U
Trichloroethene	5	0.5 U
1,1-Dichloroethene	7	0.5 U
cis-1,2-Dichloroethene	70	0.5 U
Vinyl chloride	2	0.5 U

35BWW14		
Analyte	MCL	11/22/2021
Tetrachloroethene	5	**24**
Trichloroethene	5	**6.1**
1,1-Dichloroethene	7	1.3
cis-1,2-Dichloroethene	70	0.5 J
Vinyl chloride	2	1 U

35BWW10		
Analyte	MCL	11/15/2021
Tetrachloroethene	5	1 U
Trichloroethene	5	0.5 U
1,1-Dichloroethene	7	0.5 U
cis-1,2-Dichloroethene	70	0.5 U
Vinyl chloride	2	0.5 U

35BWW13		
Analyte	MCL	11/17/2021
Tetrachloroethene	5	1 U
Trichloroethene	5	0.5 U
1,1-Dichloroethene	7	0.5 U
cis-1,2-Dichloroethene	70	0.5 U
Vinyl chloride	2	0.5 U

35BWW19		
Analyte	MCL	11/15/2021
Tetrachloroethene	5	1 U
Trichloroethene	5	0.5 U
1,1-Dichloroethene	7	0.5 U
cis-1,2-Dichloroethene	70	0.5 U
Vinyl chloride	2	0.5 U

35BWW03		
Analyte	MCL	11/15/2021
Tetrachloroethene	5	1 U
Trichloroethene	5	0.5 U
1,1-Dichloroethene	7	0.5 U
cis-1,2-Dichloroethene	70	0.5 U
Vinyl chloride	2	0.5 U

LHSMW58		
Analyte	MCL	11/15/2021
Tetrachloroethene	5	**13**
Trichloroethene	5	1
1,1-Dichloroethene	7	0.5 U
cis-1,2-Dichloroethene	70	0.5 U
Vinyl chloride	2	0.5 U

35BWW17		
Analyte	MCL	11/22/2021
Tetrachloroethene	5	1 U
Trichloroethene	5	1 U
1,1-Dichloroethene	7	1 U
cis-1,2-Dichloroethene	70	1 U
Vinyl chloride	2	1 U

35BWW09		
Analyte	MCL	11/15/2021
Tetrachloroethene	5	1.1
Trichloroethene	5	**23**
1,1-Dichloroethene	7	0.5 U
cis-1,2-Dichloroethene	70	0.5 U
Vinyl chloride	2	0.5 U

35BWW20		
Analyte	MCL	11/17/2021
Tetrachloroethene	5	**5.4**
Trichloroethene	5	1.3
1,1-Dichloroethene	7	0.5 U
cis-1,2-Dichloroethene	70	0.5 U
Vinyl chloride	2	0.5 U

35BWW11		
Analyte	MCL	11/17/2021
Tetrachloroethene	5	1 U
Trichloroethene	5	0.5 U
1,1-Dichloroethene	7	0.5 U
cis-1,2-Dichloroethene	70	0.5 U
Vinyl chloride	2	0.5 U

35BWW12		
Analyte	MCL	11/22/2021
Tetrachloroethene	5	2.1
Trichloroethene	5	1 U
1,1-Dichloroethene	7	1 U
cis-1,2-Dichloroethene	70	1 U
Vinyl chloride	2	1 U

35BWW04		
Analyte	MCL	11/17/2021
Tetrachloroethene	5	**6.3**
Trichloroethene	5	0.88 J
1,1-Dichloroethene	7	0.5 U
cis-1,2-Dichloroethene	70	0.5 U
Vinyl chloride	2	0.5 U

35BSW01
35BSW02
35BWW02
35-B
31-A
804-E
5 ug/L
5 ug/L

- Shallow Monitoring Well
- Shallow Monitoring Well - Not Sampled
- Lower Shallow Monitoring Well
- Intermediate Monitoring Well
- Surface Water Location
- Groundwater Flow Direction
- Tetrachloroethene Contour
- Trichloroethene Contour (*Dashed where inferred*)
- Former Railroad Location
- Land Use Control Boundary
- Goose Prairie Creek
- Roads
- Buildings
- LHAAP-35B(37) Site Boundary

Note:
1. RA-O = Remedial Action Operations
2. MCL = Maximum Contaminant Level
3. J = estimated level
4. U = below detection limit
5. Y5SA1 = Year 5 Semiannual 1

N

0 100 200 Feet

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TULSA DISTRICT
TULSA, OKLAHOMA

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Figure 2-5
Groundwater Results
November 2021 Y5SA1
Fifth Annual RA-O Report
LHAAP-35B(37)
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Date: 1/4/2023

Document Path: F:\Projects\Longhorn\LHAAP\Documents\Mxd\LHAAP37\RAO\Year5\LHAAP37_GW_Results_Nov2021.mxd

Figure 44

35BWW26		
Analyte	MCL	5/17/2022
Tetrachloroethene	5	0.5 U
Trichloroethene	5	0.5 U
1,1-Dichloroethene	7	0.5 U
cis-1,2-Dichloroethene	70	0.5 U
Vinyl chloride	2	0.5 U

35BWW01		
Analyte	MCL	5/17/2022
Tetrachloroethene	5	0.5 U
Trichloroethene	5	0.5 U
1,1-Dichloroethene	7	0.5 U
cis-1,2-Dichloroethene	70	0.5 U
Vinyl chloride	2	0.5 U

35BWW25		
Analyte	MCL	5/16/2022
Tetrachloroethene	5	0.69 J
Trichloroethene	5	10
1,1-Dichloroethene	7	0.5 U
cis-1,2-Dichloroethene	70	0.5 U
Vinyl chloride	2	0.5 U

35BWW24		
Analyte	MCL	5/16/2022
Tetrachloroethene	5	0.5 U
Trichloroethene	5	3.9
1,1-Dichloroethene	7	0.5 U
cis-1,2-Dichloroethene	70	0.5 U
Vinyl chloride	2	0.5 U

35BWW23		
Analyte	MCL	5/18/2022
Tetrachloroethene	5	0.5 U
Trichloroethene	5	0.5 U
1,1-Dichloroethene	7	0.5 U
cis-1,2-Dichloroethene	70	0.5 U
Vinyl chloride	2	0.5 U

35BWW05		
Analyte	MCL	5/16/2022
Tetrachloroethene	5	4.1
Trichloroethene	5	1.8
1,1-Dichloroethene	7	0.5 U
cis-1,2-Dichloroethene	70	0.5 U
Vinyl chloride	2	0.5 U

35BWW15		
Analyte	MCL	5/18/2022
Tetrachloroethene	5	9.8
Trichloroethene	5	4.9
1,1-Dichloroethene	7	0.5 U
cis-1,2-Dichloroethene	70	0.5 U
Vinyl chloride	2	0.5 U

35BWW07		
Analyte	MCL	5/16/2022
Tetrachloroethene	5	1.1
Trichloroethene	5	3.7
1,1-Dichloroethene	7	0.5 U
cis-1,2-Dichloroethene	70	0.5 U
Vinyl chloride	2	0.5 U

35BWW08		
Analyte	MCL	5/17/2022
Tetrachloroethene	5	0.5 U
Trichloroethene	5	0.5 U
1,1-Dichloroethene	7	0.5 U
cis-1,2-Dichloroethene	70	0.5 U
Vinyl chloride	2	0.5 U

35BWW16		
Analyte	MCL	5/16/2022
Tetrachloroethene	5	0.5 U
Trichloroethene	5	0.5 U
1,1-Dichloroethene	7	0.5 U
cis-1,2-Dichloroethene	70	0.5 U
Vinyl chloride	2	0.5 U

35BWW18		
Analyte	MCL	5/18/2022
Tetrachloroethene	5	0.5 U
Trichloroethene	5	0.5 U
1,1-Dichloroethene	7	0.5 U
cis-1,2-Dichloroethene	70	0.5 U
Vinyl chloride	2	0.5 U

35BWW14		
Analyte	MCL	5/18/2022
Tetrachloroethene	5	19
Trichloroethene	5	5.1
1,1-Dichloroethene	7	1.3
cis-1,2-Dichloroethene	70	0.5 U
Vinyl chloride	2	0.5 U

35BWW10		
Analyte	MCL	5/16/2022
Tetrachloroethene	5	0.5 U
Trichloroethene	5	0.5 U
1,1-Dichloroethene	7	0.5 U
cis-1,2-Dichloroethene	70	0.5 U
Vinyl chloride	2	0.5 U

35BWW13		
Analyte	MCL	5/16/2022
Tetrachloroethene	5	0.5 U
Trichloroethene	5	0.5 U
1,1-Dichloroethene	7	0.5 U
cis-1,2-Dichloroethene	70	0.5 U
Vinyl chloride	2	0.5 U

35BWW19		
Analyte	MCL	5/18/2022
Tetrachloroethene	5	0.5 U
Trichloroethene	5	0.5 U
1,1-Dichloroethene	7	0.5 U
cis-1,2-Dichloroethene	70	0.5 U
Vinyl chloride	2	0.5 U

LHSMW58		
Analyte	MCL	5/17/2022
Tetrachloroethene	5	9.5
Trichloroethene	5	0.5 U
1,1-Dichloroethene	7	0.5 U
cis-1,2-Dichloroethene	70	0.5 U
Vinyl chloride	2	0.5 U

35BWW17		
Analyte	MCL	5/16/2022
Tetrachloroethene	5	0.5 U
Trichloroethene	5	0.5 U
1,1-Dichloroethene	7	0.5 U
cis-1,2-Dichloroethene	70	0.5 U
Vinyl chloride	2	0.5 U

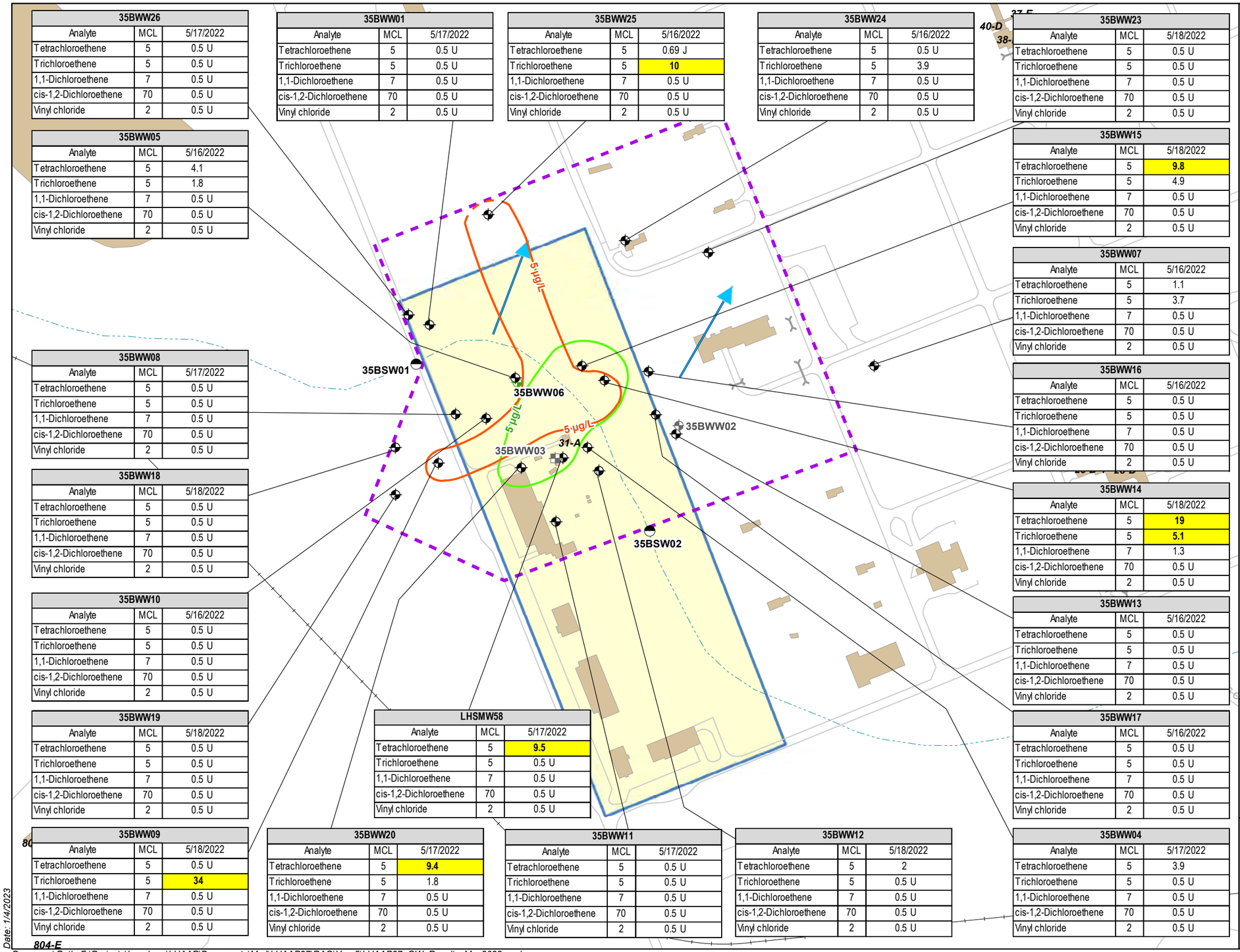
35BWW09		
Analyte	MCL	5/18/2022
Tetrachloroethene	5	0.5 U
Trichloroethene	5	34
1,1-Dichloroethene	7	0.5 U
cis-1,2-Dichloroethene	70	0.5 U
Vinyl chloride	2	0.5 U

35BWW20		
Analyte	MCL	5/17/2022
Tetrachloroethene	5	9.4
Trichloroethene	5	1.8
1,1-Dichloroethene	7	0.5 U
cis-1,2-Dichloroethene	70	0.5 U
Vinyl chloride	2	0.5 U

35BWW11		
Analyte	MCL	5/17/2022
Tetrachloroethene	5	0.5 U
Trichloroethene	5	0.5 U
1,1-Dichloroethene	7	0.5 U
cis-1,2-Dichloroethene	70	0.5 U
Vinyl chloride	2	0.5 U

35BWW12		
Analyte	MCL	5/18/2022
Tetrachloroethene	5	2
Trichloroethene	5	0.5 U
1,1-Dichloroethene	7	0.5 U
cis-1,2-Dichloroethene	70	0.5 U
Vinyl chloride	2	0.5 U

35BWW04		
Analyte	MCL	5/17/2022
Tetrachloroethene	5	3.9
Trichloroethene	5	0.5 U
1,1-Dichloroethene	7	0.5 U
cis-1,2-Dichloroethene	70	0.5 U
Vinyl chloride	2	0.5 U



- Shallow Monitoring Well
- Shallow Monitoring Well - Not Sampled
- Lower Shallow Monitoring Well - Not Sampled
- Intermediate Monitoring Well - Not Sampled
- Surface Water Location
- Groundwater Flow Direction
- Tetrachloroethene Contour
- Trichloroethene Contour (*Dashed where inferred*)
- Former Railroad Location
- Land Use Control Boundary
- Goose Prairie Creek
- Roads
- Buildings
- LHAAP-35B(37) Site Boundary

Note:
1. RA-O = Remedial Action Operations
2. MCL = Maximum Contaminant Level
3. J = estimated level
4. U = below detection limit
5. Y5SA2 = Year 5 Semiannual 2

N

0 100 200 Feet

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TULSA, OKLAHOMA

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Figure 2-6
Groundwater Results
May 2022 Y5SA2
Fifth Annual RA-O Report
LHAAP-35B(37)
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Date: 1/4/2023

Document Path: F:\Projects\Longhorn\LHAAP\Documents\Mxd\LHAAP37\RAO\Year5\LHAAP37_GW_Results_May2022.mxd

Figure 45

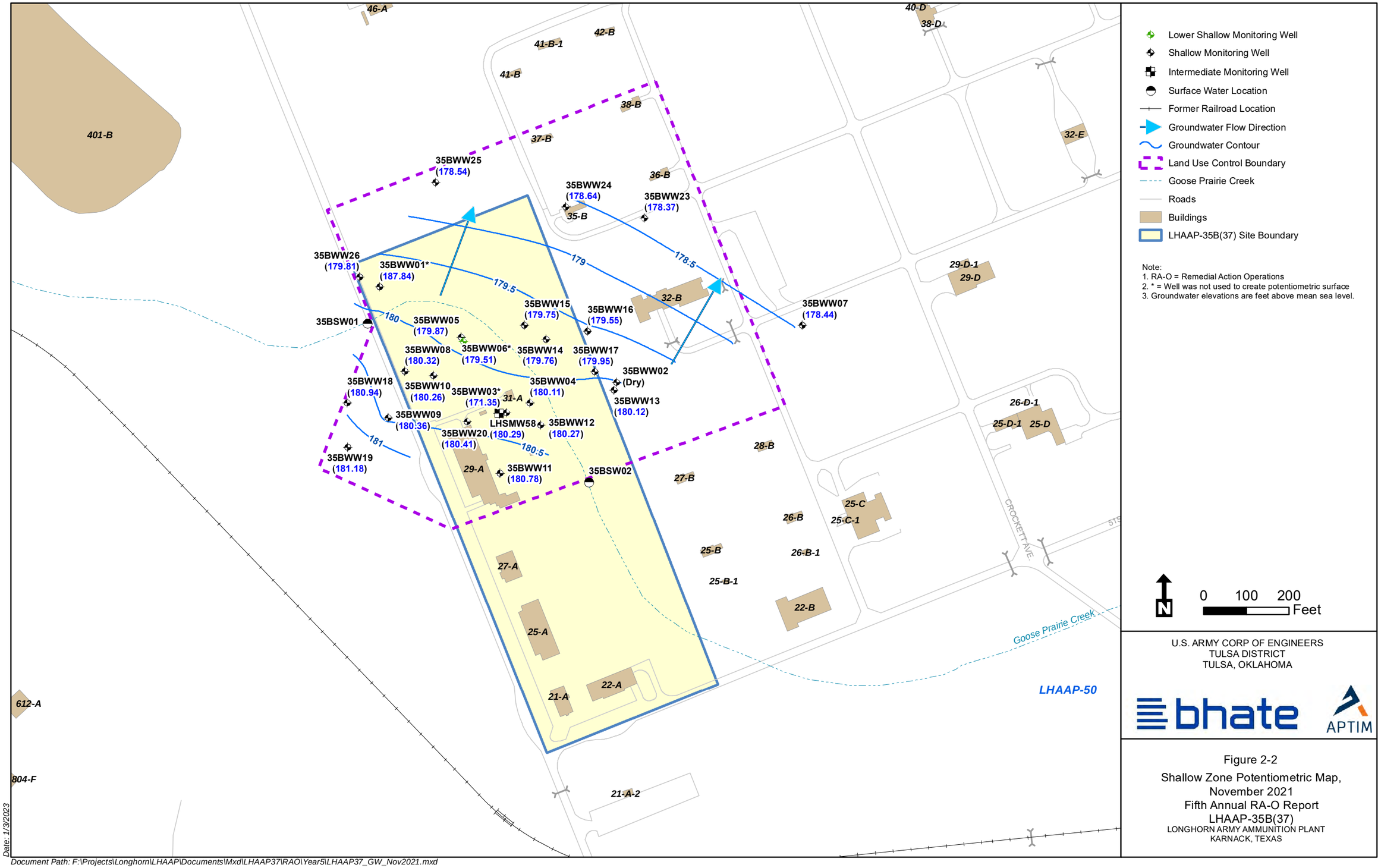

35BWW25 (178.54)
35BWW24 (178.64)
35BWW23 (178.37)
35BWW26 (179.81)
35BWW01* (187.84)
35BSW01
35BWW05 (179.87)
35BWW15 (179.75)
35BWW16 (179.55)
35BWW07 (178.44)
35BWW08 (180.32)
35BWW06* (179.51)
35BWW14 (179.76)
35BWW17 (179.95)
35BWW02 (Dry)
35BWW18 (180.94)
35BWW10 (180.26)
35BWW03* (171.35)
35BWW04 (180.11)
35BWW13 (180.12)
35BWW09 (180.36)
LHSMW58
35BWW12 (180.27)
35BWW20 (180.41)
(180.29)
35BWW19 (181.18)
35BWW11 (180.78)
35BSW02
179
178.5
179.5
180
181
180.5
401-B
46-A
42-B
41-B-1
41-B
38-B
37-B
36-B
35-B
32-B
32-E
40-D
38-D
29-D-1
29-D
31-A
29-A
28-B
27-B
27-A
26-D-1
25-D-1
25-D
25-C
25-C-1
26-B
26-B-1
25-B
25-B-1
25-A
22-B
22-A
21-A
21-A-2
612-A
804-F
CROCKETT AVE
Goose Prairie Creek
LHAAP-50
Lower Shallow Monitoring Well
Shallow Monitoring Well
Intermediate Monitoring Well
Surface Water Location
Former Railroad Location
Groundwater Flow Direction
Groundwater Contour
Land Use Control Boundary
Goose Prairie Creek
Roads
Buildings
LHAAP-35B(37) Site Boundary
Note:
1. RA-O = Remedial Action Operations
2. * = Well was not used to create potentiometric surface
3. Groundwater elevations are feet above mean sea level.
N
0 100 200
Feet
U.S. ARMY CORP OF ENGINEERS
TULSA DISTRICT
TULSA, OKLAHOMA
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Figure 2-2
Shallow Zone Potentiometric Map, November 2021
Fifth Annual RA-O Report
LHAAP-35B(37)
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS
Date: 1/3/2023
Document Path: F:\Projects\Longhorn\LHAAP\Documents\Mxd\LHAAP37\RAO\Year5\LHAAP37_GW_Nov2021.mxd

Figure 46

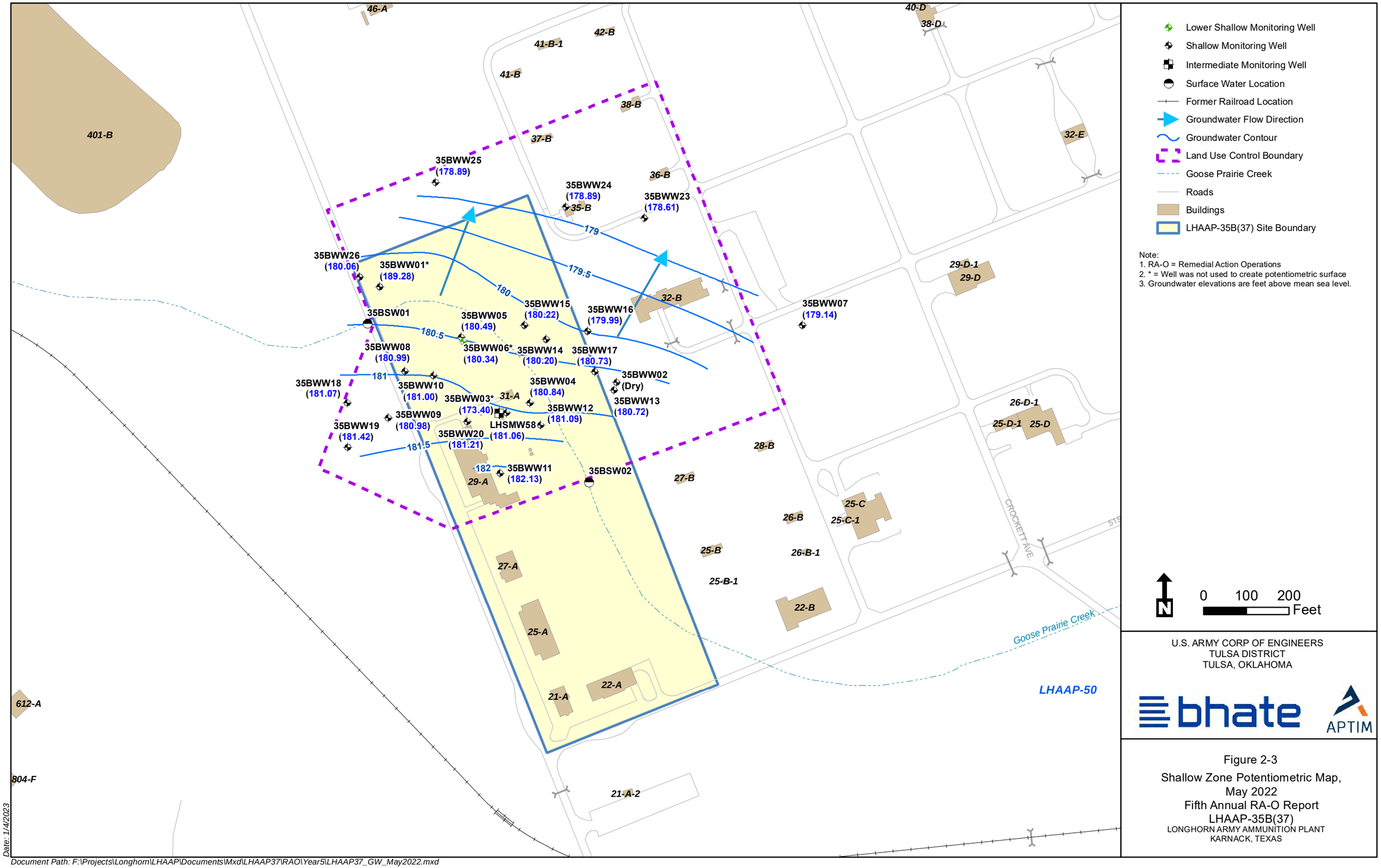
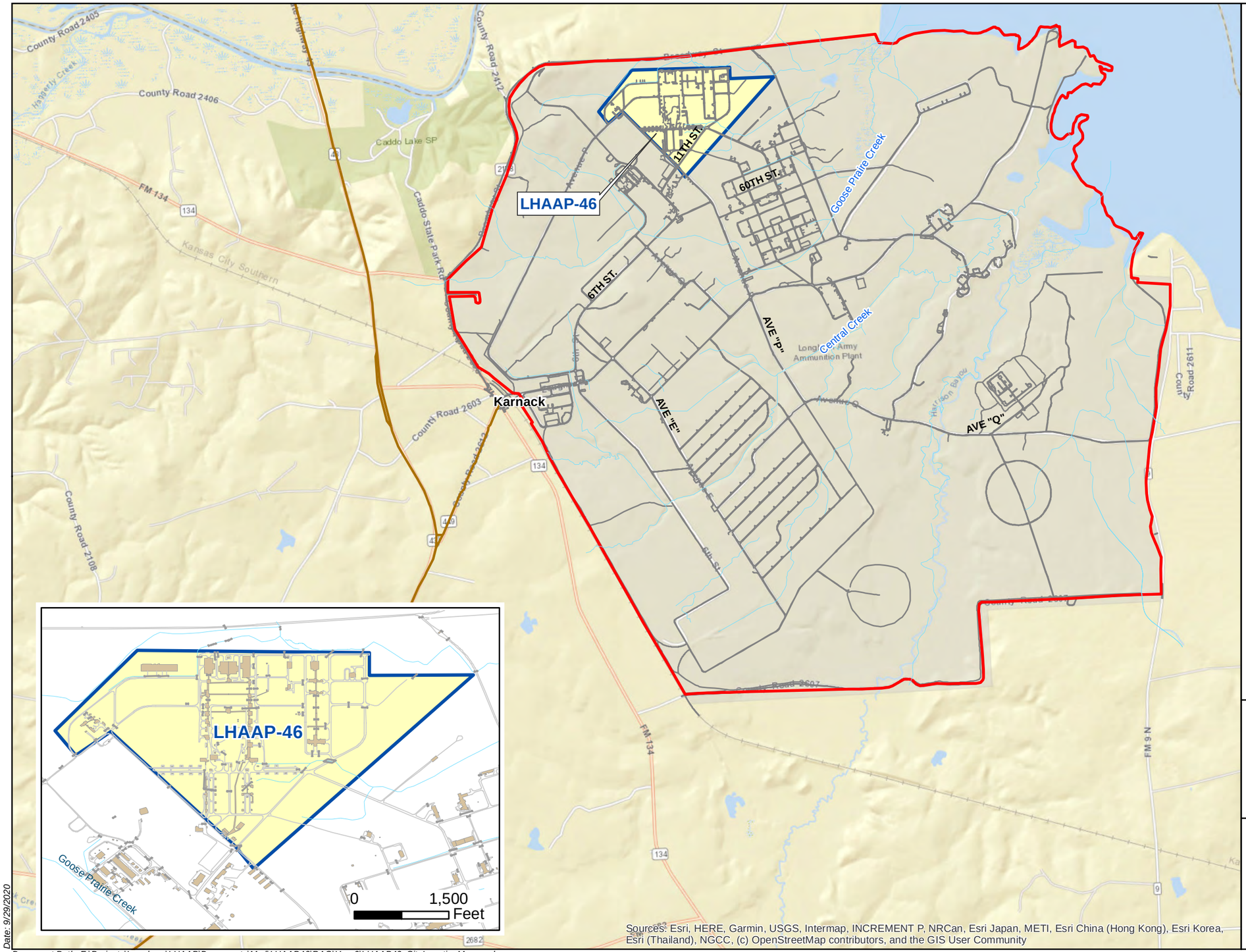

35BWW25 (178.89)
35BWW24 (178.89)
35BWW23 (178.61)
35BWW26 (180.06)
35BWW01* (189.28)
35BSW01
35BWW05 (180.49)
35BWW15 (180.22)
35BWW16 (179.99)
35BWW07 (179.14)
35BWW08 (180.99)
35BWW06* (180.34)
35BWW14 (180.20)
35BWW17 (180.73)
35BWW18 (181.07)
35BWW10 (181.00)
35BWW04 (180.84)
35BWW02 (Dry)
35BWW03* (173.40)
35BWW12 (181.09)
35BWW13 (180.72)
35BWW19 (181.42)
35BWW09 (180.98)
LHSMW58 (181.06)
35BWW20 (181.21)
35BWW11 (182.13)
35BSW02
179
179.5
180
180.5
181
181.5
182
401-B
46-A
42-B
41-B-1
41-B
38-B
37-B
36-B
35-B
32-B
32-E
40-D
38-D
29-D-1
29-D
31-A
29-A
28-B
27-B
27-A
26-B
26-B-1
25-C
25-C-1
25-B
25-B-1
25-A
22-B
22-A
21-A
21-A-2
26-D-1
25-D-1
25-D
612-A
804-F
CROCKETT AVE
Goose Prairie Creek
LHAAP-50
Lower Shallow Monitoring Well
Shallow Monitoring Well
Intermediate Monitoring Well
Surface Water Location
Former Railroad Location
Groundwater Flow Direction
Groundwater Contour
Land Use Control Boundary
Goose Prairie Creek
Roads
Buildings
LHAAP-35B(37) Site Boundary
Note:
1. RA-O = Remedial Action Operations
2. * = Well was not used to create potentiometric surface
3. Groundwater elevations are feet above mean sea level.
N
0 100 200
Feet
U.S. ARMY CORP OF ENGINEERS
TULSA DISTRICT
TULSA, OKLAHOMA
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Figure 2-3
Shallow Zone Potentiometric Map,
May 2022
Fifth Annual RA-O Report
LHAAP-35B(37)
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS
Date: 1/4/2023
Document Path: F:\Projects\Longhorn\LHAAP\Documents\Mxd\LHAAP37\RAO\Year5\LHAAP37_GW_May2022.mxd

Figure 47



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Figure 1-2

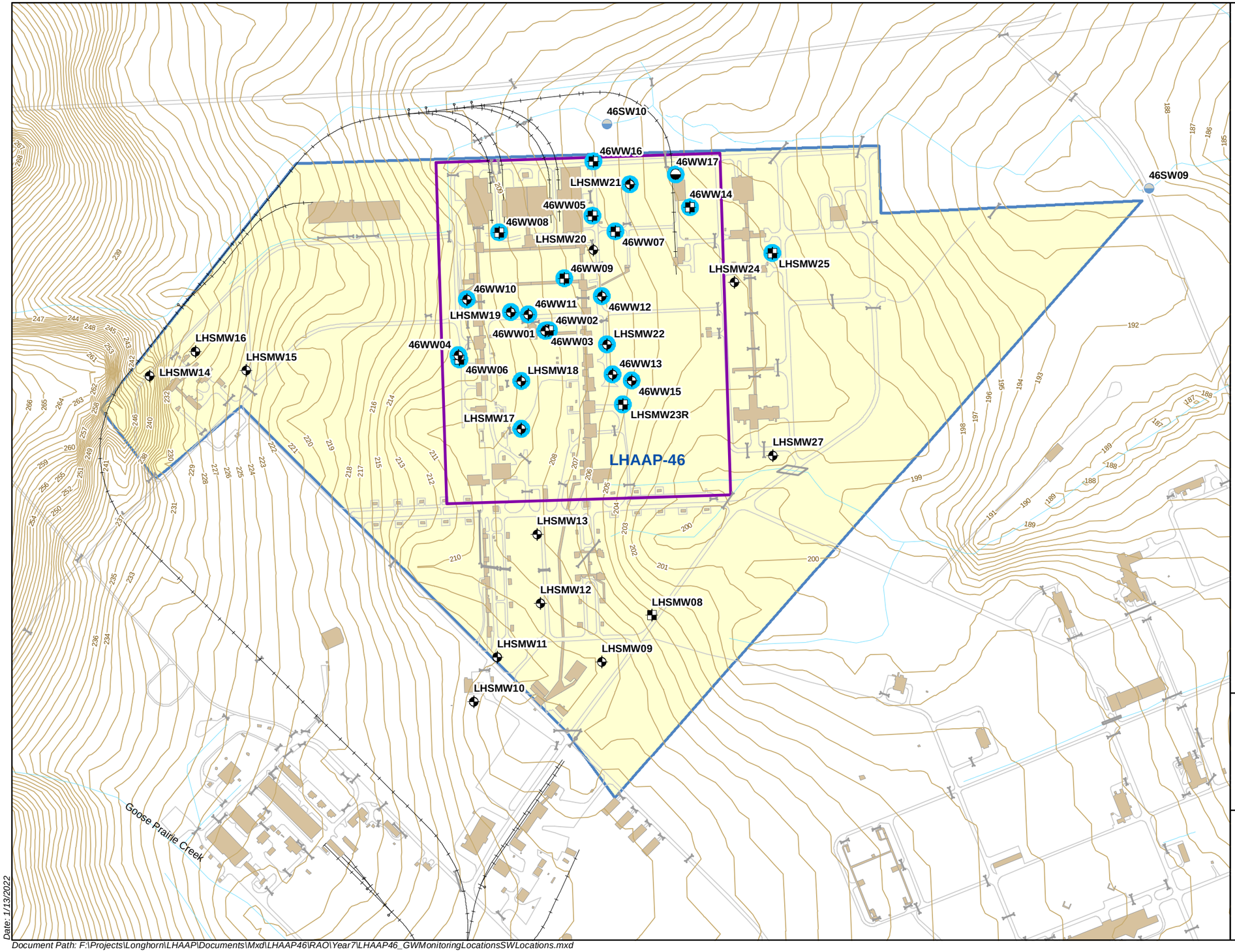
LHAAP Site Vicinity Map
Seventh Annual RA-O Report
LHAAP-46

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Date: 9/29/2020

Document Path: F:\Projects\Longhorn\LHAAP\Documents\Mxd\LHAAP46\RAO\Year6\LHAAP46_SiteLocationMap.mxd

Figure 48



- Shallow Monitoring Well
- Shallow/Intermediate Monitoring Well
- Intermediate Monitoring Well
- Deep Monitoring Well
- RA-O Monitoring Well
- Surface Water Sample Location
- Former Railroad Location
- Culvert
- Surveyed Land Use Control Boundary
- Stream
- Surface Elevation Lines (in feet above mean sea level)
- Roads
- Former Buildings
- LHAAP-46 Site Boundary

Note:
1. RA-O = Remedial Action Operations
2. LHAAP = Longhorn Army Ammunition Plant

N

0 250 500 Feet

U.S. ARMY CORP OF ENGINEERS
TULSA DISTRICT
TULSA, OKLAHOMA

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Figure 2-1
Groundwater Monitoring Wells and Surface Water Locations
Seventh Annual RA-O Report
LHAAP-46
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Date: 1/13/2022

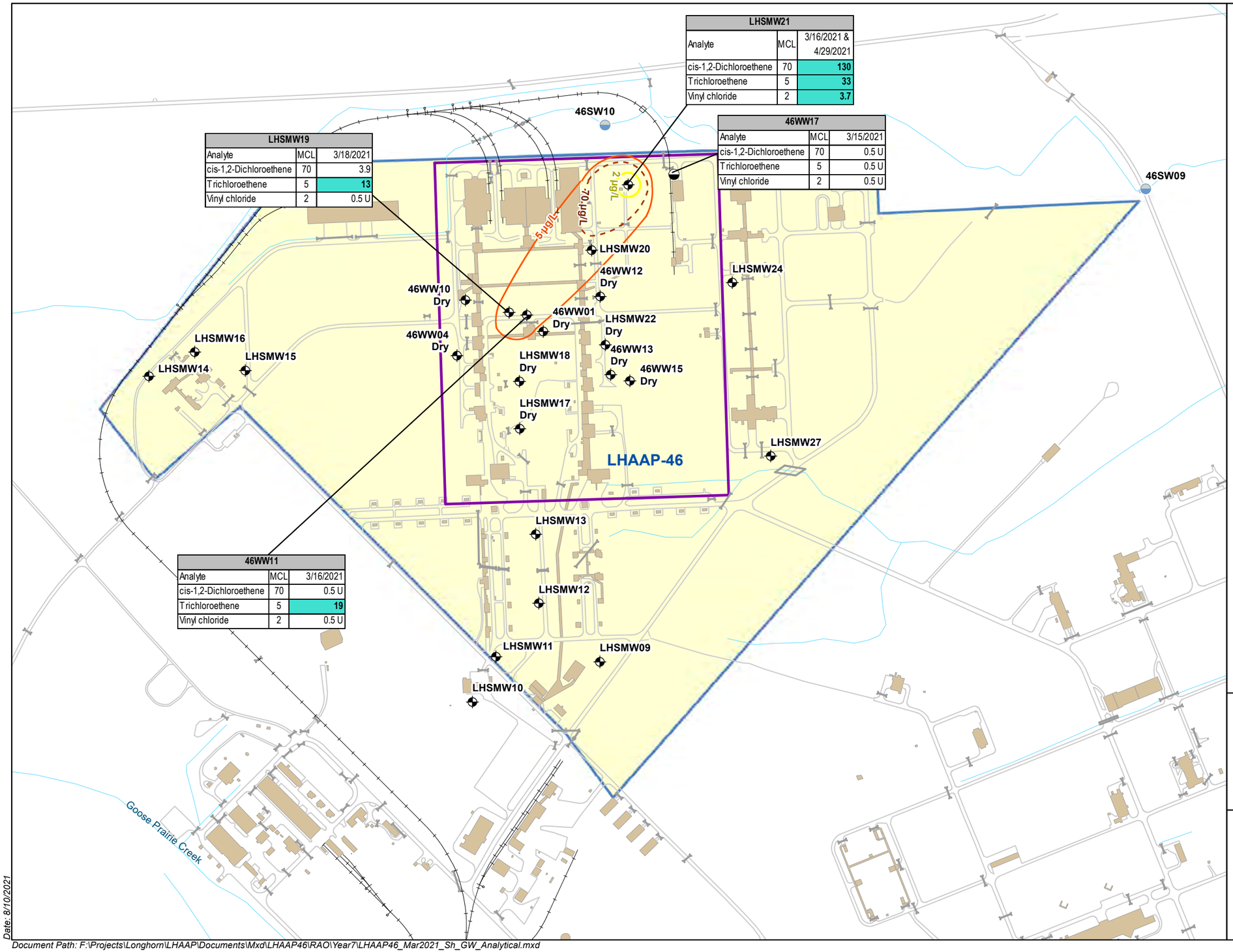
Document Path: F:\Projects\Longhorn\LHAAP\Documents\Mxd\LHAAP46\RAO\Year7\LHAAP46_GWMonitoringLocationsSWLocations.mxd

LHSMW21		
Analyte	MCL	3/16/2021 & 4/29/2021
cis-1,2-Dichloroethene	70	130
Trichloroethene	5	33
Vinyl chloride	2	3.7

LHSMW19		
Analyte	MCL	3/18/2021
cis-1,2-Dichloroethene	70	3.9
Trichloroethene	5	13
Vinyl chloride	2	0.5 U

46WW17		
Analyte	MCL	3/15/2021
cis-1,2-Dichloroethene	70	0.5 U
Trichloroethene	5	0.5 U
Vinyl chloride	2	0.5 U

46WW11		
Analyte	MCL	3/16/2021
cis-1,2-Dichloroethene	70	0.5 U
Trichloroethene	5	19
Vinyl chloride	2	0.5 U



- Shallow Monitoring Well
- Shallow/Intermediate Monitoring Well
- Surface Water Sample Location
- Shallow Zone TCE Plume (*Dashed where inferred*)
- Shallow Zone cis-1,2 DCE Plume (*Dashed where inferred*)
- Shallow Zone VC Plume (*Dashed where inferred*)
- Former Railroad Location
- Culvert
- Surveyed Land Use Control Boundary
- Stream
- Roads
- Former Buildings
- LHAAP-46 Site Boundary

Note:
1. RA-O = Remedial Action Operations
2. LHAAP = Longhorn Army Ammunition Plant

N

0 250 500 Feet

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TULSA, OKLAHOMA

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Figure 2-4
Shallow Groundwater Results,
March 2021
Seventh Annual RA-O Report
LHAAP-46
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Date: 8/10/2021

Document Path: F:\Projects\Longhorn\LHAAP\Documents\Mxd\LHAAP46\RAO\Year7\LHAAP46_Mar2021_Sh_GW_Analytical.mxd

Figure 50

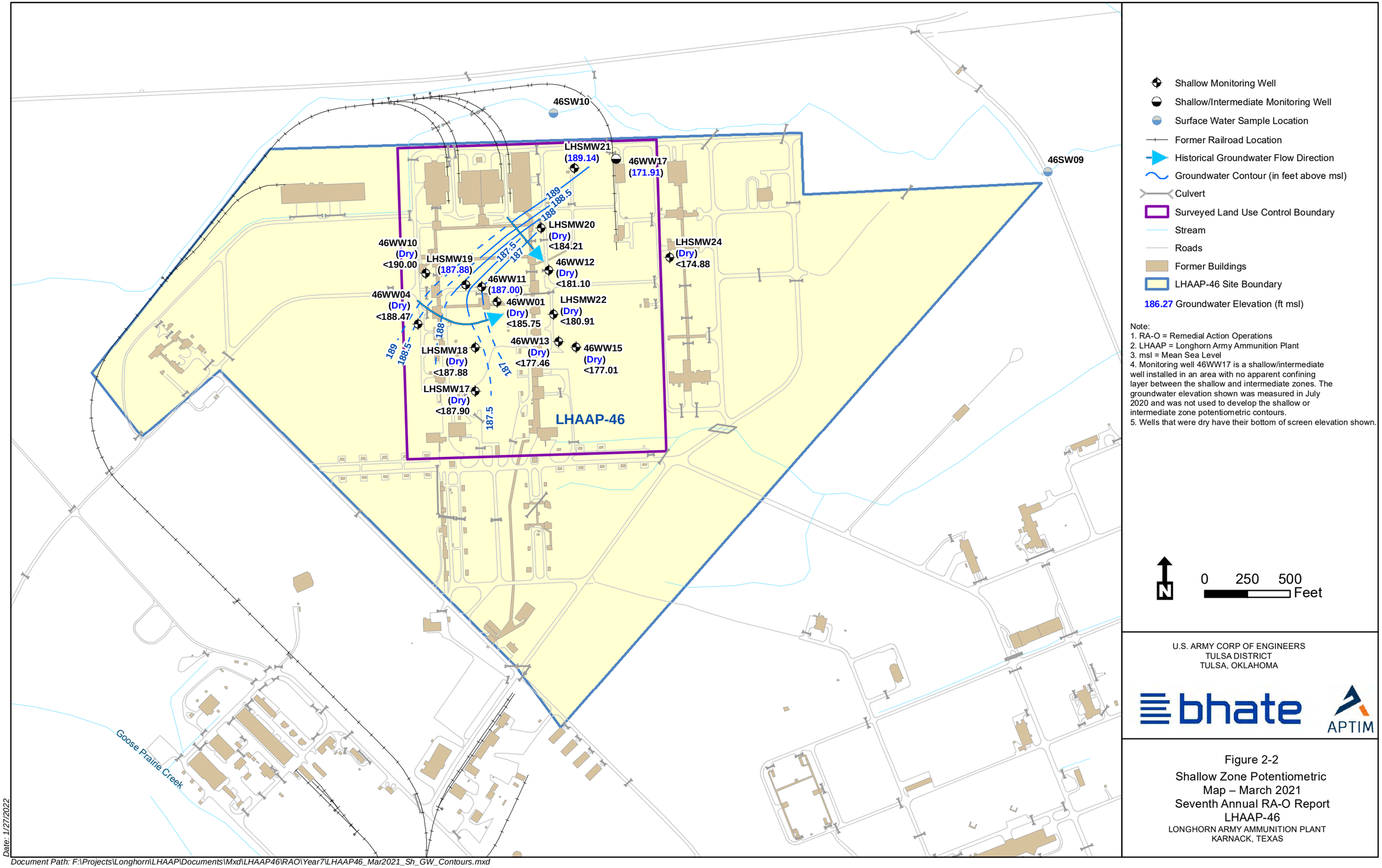

46SW10
46SW09
LHSMW21
(189.14)
46WW17
(171.91)
LHSMW20
(Dry)
<184.21
LHSMW24
(Dry)
<174.88
46WW10
(Dry)
<190.00
LHSMW19
(187.88)
46WW12
(Dry)
<181.10
46WW11
(187.00)
46WW04
(Dry)
<188.47
46WW01
(Dry)
<185.75
LHSMW22
(Dry)
<180.91
46WW13
(Dry)
<177.46
46WW15
(Dry)
<177.01
LHSMW18
(Dry)
<187.88
LHSMW17
(Dry)
<187.90
189
188.5
188
187.5
187
LHAAP-46
Goose Prairie Creek
Shallow Monitoring Well
Shallow/Intermediate Monitoring Well
Surface Water Sample Location
Former Railroad Location
Historical Groundwater Flow Direction
Groundwater Contour (in feet above msl)
Culvert
Surveyed Land Use Control Boundary
Stream
Roads
Former Buildings
LHAAP-46 Site Boundary
186.27 Groundwater Elevation (ft msl)
Note:
1. RA-O = Remedial Action Operations
2. LHAAP = Longhorn Army Ammunition Plant
3. msl = Mean Sea Level
4. Monitoring well 46WW17 is a shallow/intermediate well installed in an area with no apparent confining layer between the shallow and intermediate zones. The groundwater elevation shown was measured in July 2020 and was not used to develop the shallow or intermediate zone potentiometric contours.
5. Wells that were dry have their bottom of screen elevation shown.
N
0 250 500
Feet
U.S. ARMY CORP OF ENGINEERS
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TULSA, OKLAHOMA
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Figure 2-2
Shallow Zone Potentiometric Map – March 2021
Seventh Annual RA-O Report
LHAAP-46
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS
Date: 1/27/2022
Document Path: F:\Projects\Longhorn\LHAAP\Documents\Mxd\LHAAP46\RAO\Year7\LHAAP46_Mar2021_Sh_GW_Contours.mxd

Figure 51

46WW16		
Analyte	MCL	3/16/2021
cis-1,2-Dichloroethene	70	0.5 U
Trichloroethene	5	0.5 U
Vinyl chloride	2	0.5 U

46WW05		
Analyte	MCL	3/16/2021
cis-1,2-Dichloroethene	70	1.6
Trichloroethene	5	**20**
Vinyl chloride	2	0.5 U

46WW08		
Analyte	MCL	3/15/2021
cis-1,2-Dichloroethene	70	0.5 U
Trichloroethene	5	0.5 U
Vinyl chloride	2	0.5 U

46WW17		
Analyte	MCL	3/15/2021
cis-1,2-Dichloroethene	70	0.5 U
Trichloroethene	5	0.5 U
Vinyl chloride	2	0.5 U

46WW14		
Analyte	MCL	3/15/2021
cis-1,2-Dichloroethene	70	0.5 U
Trichloroethene	5	0.5 U
Vinyl chloride	2	0.5 U

LHSMW25		
Analyte	MCL	3/15/2021
cis-1,2-Dichloroethene	70	0.5 U
Trichloroethene	5	0.5 U
Vinyl chloride	2	0.5 U

46WW02		
Analyte	MCL	3/16/2021
cis-1,2-Dichloroethene	70	1.4
Trichloroethene	5	**25**
Vinyl chloride	2	0.5 U

46WW07		
Analyte	MCL	3/18/2021
cis-1,2-Dichloroethene	70	0.5 U
Trichloroethene	5	0.5 U
Vinyl chloride	2	0.5 U

46WW06		
Analyte	MCL	3/15/2021
cis-1,2-Dichloroethene	70	0.5 U
Trichloroethene	5	0.5 U
Vinyl chloride	2	0.5 U

46WW09		
Analyte	MCL	3/16/2021
cis-1,2-Dichloroethene	70	0.5 U
Trichloroethene	5	0.5 U
Vinyl chloride	2	0.5 U

LHSMW23R		
Analyte	MCL	3/18/2021
cis-1,2-Dichloroethene	70	0.66 J
Trichloroethene	5	0.64 J
Vinyl chloride	2	0.5 U

46SW10

46SW09

5 µg/L

5 µg/L

LHAAP-46

LHSMW08

Goose Prairie Creek

- Shallow/Intermediate Monitoring Well
- Intermediate Monitoring Well
- Surface Water Sample Location
- Intermediate Zone TCE Plume (*Dashed where inferred*)
- Former Railroad Location
- Culvert
- Surveyed Land Use Control Boundary
- Stream
- Roads
- Former Buildings
- LHAAP-46 Site Boundary

Note:
1. RA-O = Remedial Action Operations
2. LHAAP = Longhorn Army Ammunition Plant

N

0 250 500 Feet

U.S. ARMY CORP OF ENGINEERS
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TULSA, OKLAHOMA

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Figure 2-5
Intermediate Groundwater Results, March 2021
Seventh Annual RA-O Report
LHAAP-46
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Date: 8/10/2021

Document Path: F:\Projects\Longhorn\LHAAP\Documents\Mxd\LHAAP46\RAO\Year7\LHAAP46_Mar2021_Int_GW_Analytical.mxd

Figure 52

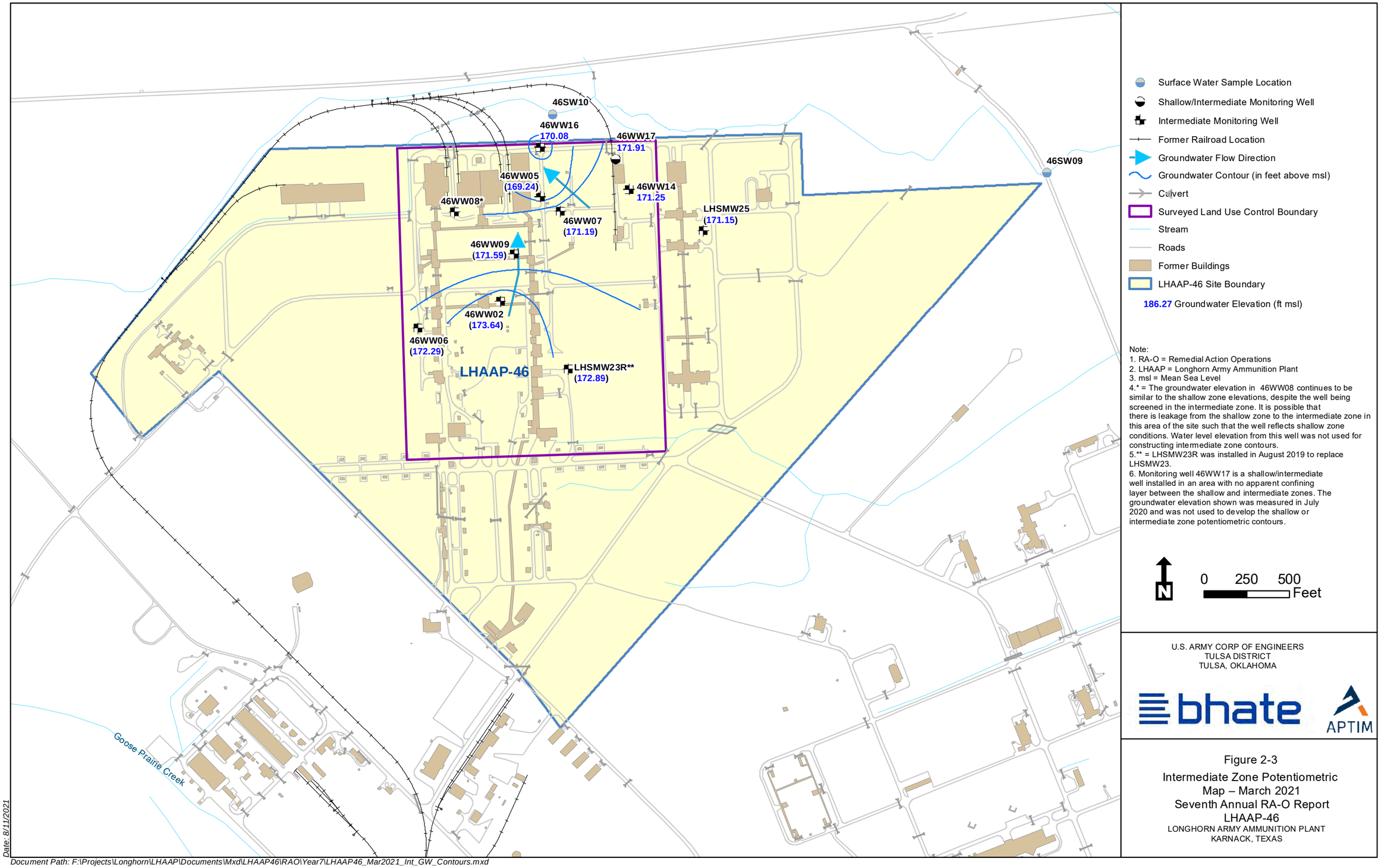
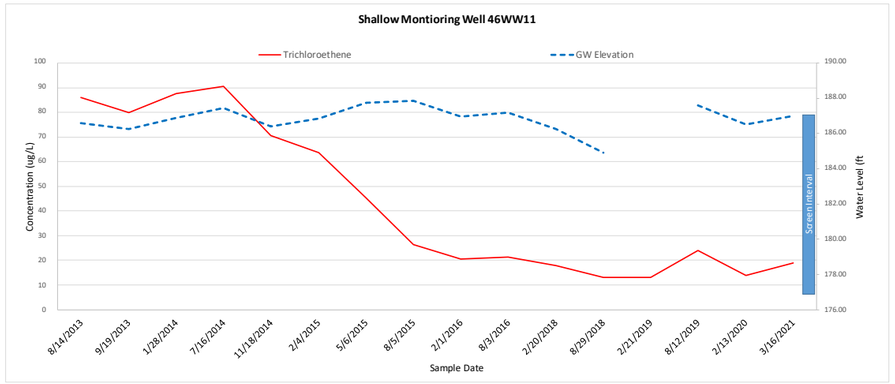
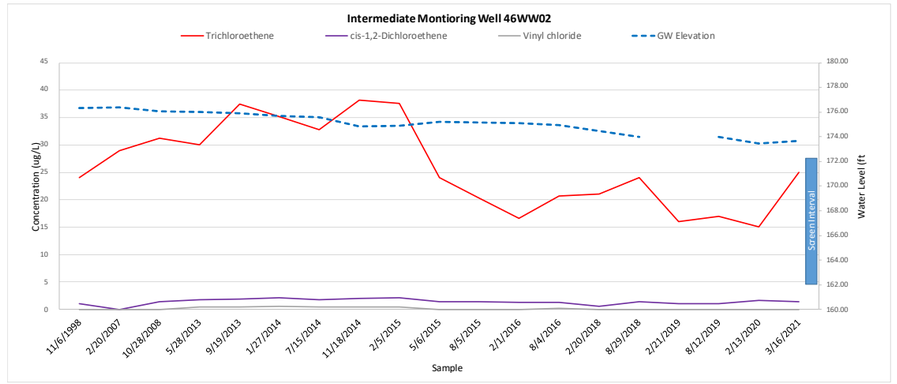
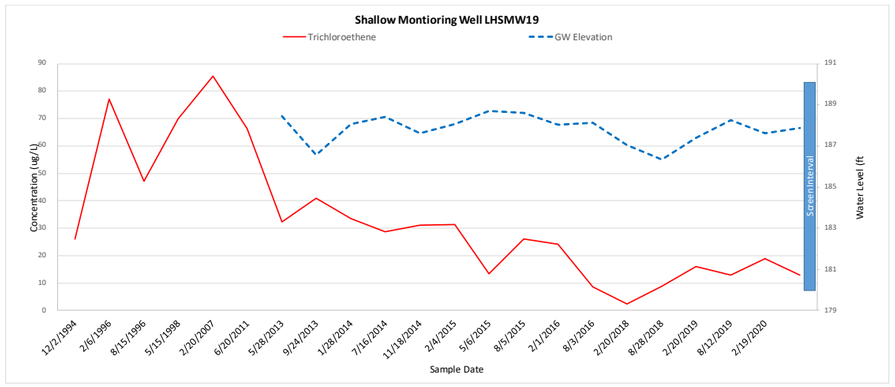
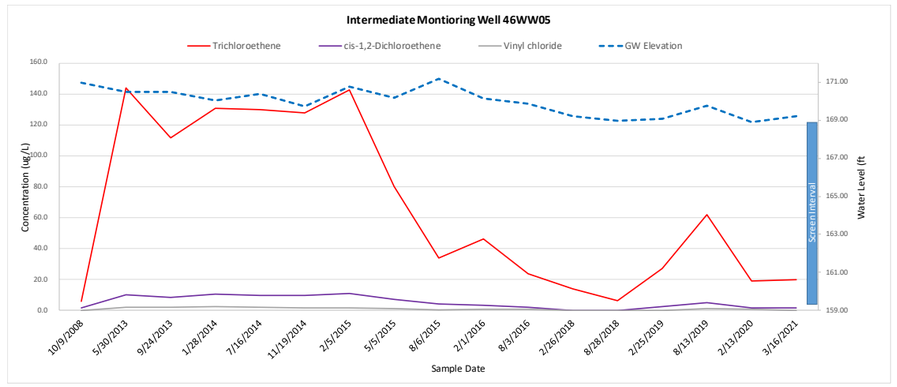

46SW10
46WW16
170.08
46WW17
171.91
46SW09
46WW05
(169.24)
46WW14
171.25
46WW08*
46WW07
(171.19)
LHSMW25
(171.15)
46WW09
(171.59)
46WW02
(173.64)
46WW06
(172.29)
LHAAP-46
LHSMW23R**
(172.89)
Goose Prairie Creek
Surface Water Sample Location
Shallow/Intermediate Monitoring Well
Intermediate Monitoring Well
Former Railroad Location
Groundwater Flow Direction
Groundwater Contour (in feet above msl)
Culvert
Surveyed Land Use Control Boundary
Stream
Roads
Former Buildings
LHAAP-46 Site Boundary
186.27 Groundwater Elevation (ft msl)
Note:
1. RA-O = Remedial Action Operations
2. LHAAP = Longhorn Army Ammunition Plant
3. msl = Mean Sea Level
4.* = The groundwater elevation in 46WW08 continues to be similar to the shallow zone elevations, despite the well being screened in the intermediate zone. It is possible that there is leakage from the shallow zone to the intermediate zone in this area of the site such that the well reflects shallow zone conditions. Water level elevation from this well was not used for constructing intermediate zone contours.
5.** = LHSMW23R was installed in August 2019 to replace LHSMW23.
6. Monitoring well 46WW17 is a shallow/intermediate well installed in an area with no apparent confining layer between the shallow and intermediate zones. The groundwater elevation shown was measured in July 2020 and was not used to develop the shallow or intermediate zone potentiometric contours.
N
0 250 500
Feet
U.S. ARMY CORP OF ENGINEERS
TULSA DISTRICT
TULSA, OKLAHOMA
bhate
APTIM
Figure 2-3
Intermediate Zone Potentiometric Map – March 2021
Seventh Annual RA-O Report
LHAAP-46
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS
Date: 8/11/2021
Document Path: F:\Projects\Longhorn\LHAAP\Documents\Mxd\LHAAP46\RAO\Year7\LHAAP46_Mar2021_Int_GW_Contours.mxd

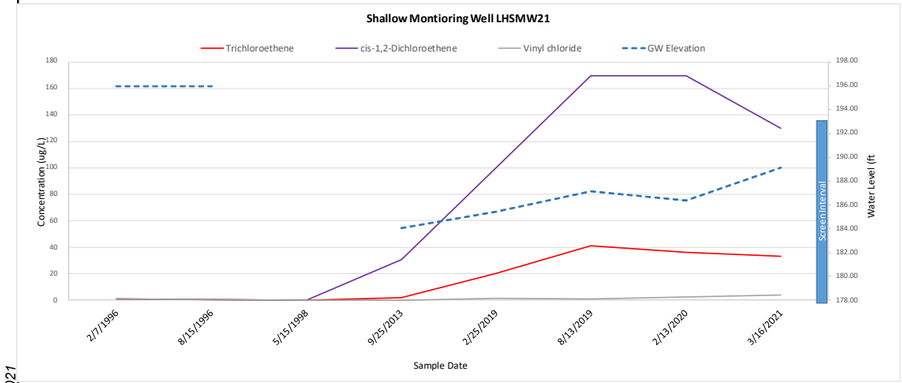
Figure 53











Cleanup Levels:
1,1-Dichlorothene = 7 µg/L
cis-1,2-Dichloroethene = 70 µg/L
Trichloroethene = 5 µg/L
Vinyl Chloride = 2 µg/L

Notes:
1. RA-O = Remedial Action Operations

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TULSA, OKLAHOMA

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Figure 3-1

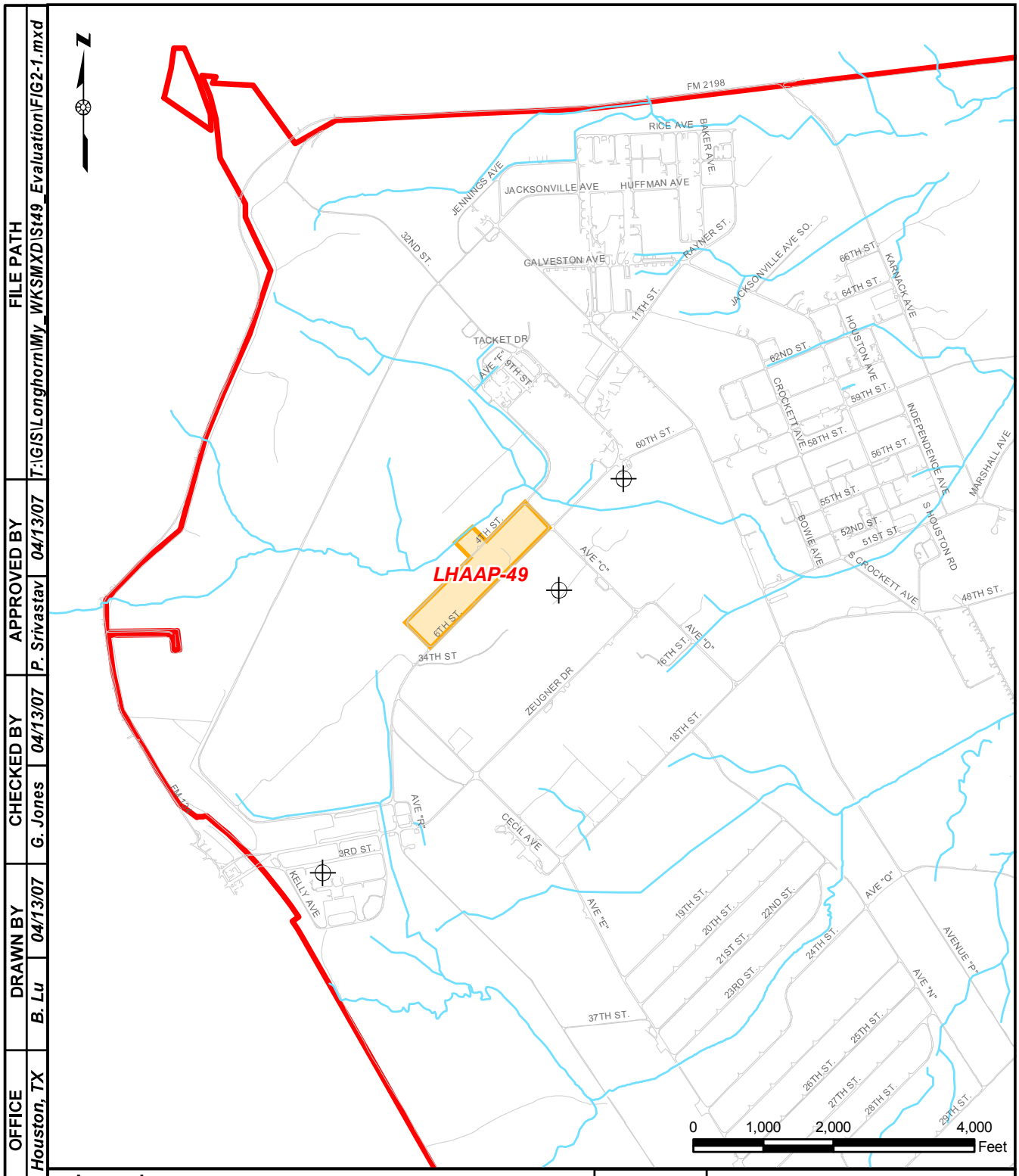
COC Concentration Trends
Seventh Annual RA-O Report
LHAAP-46

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Date: 8/11/2021

Document Path: F:\Projects\Longhorn\LHAAP\Documents\Mxd\LHAAP46\RAO\Year7\LHAAP46_COC_Concentrations.mxd

Figure 54



Legend

- Stream
- Road
- Site
- Lake/Pond
- LHAAP Boundary
- LHAAP Water Supply Well

Shaw

U.S. ARMY CORPS OF ENGINEERS
TULSA DISTRICT
TULSA, OKLAHOMA

FIGURE 2-2

SITE LHAAP-49 LOCATION MAP

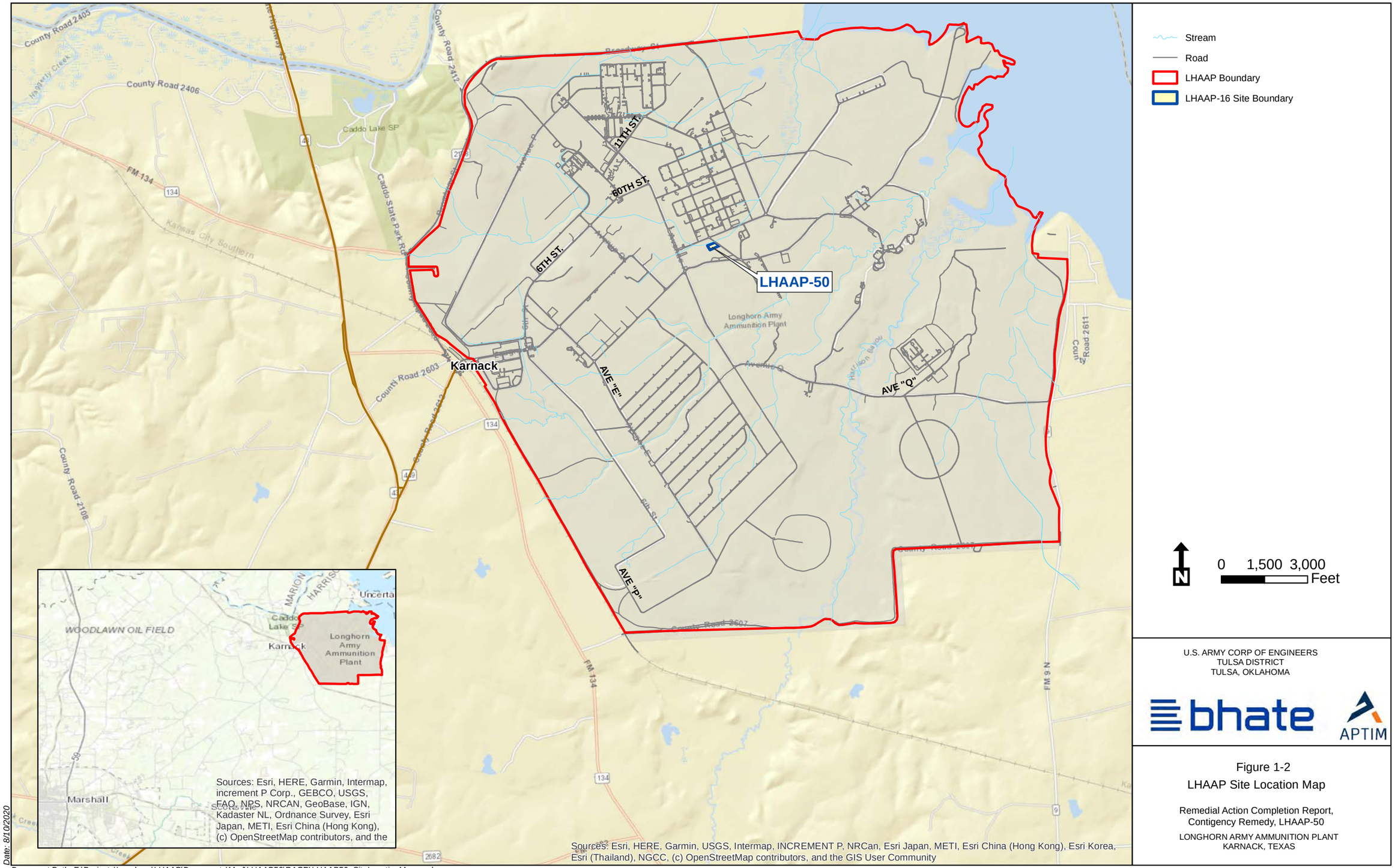
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

OFFICE	DRAWN BY		CHECKED BY		APPROVED BY		FILE PATH
Houston, TX	B. Lu	04/13/07	G. Jones	04/13/07	P. Srivastav	04/13/07	T:\G\S\Longhorn\My_WKSMXD\St49_Evaluation\FIG2-1.mxd

Plot Date: 06/07

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Figure 55



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TULSA, OKLAHOMA

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Figure 1-2
LHAAP Site Location Map

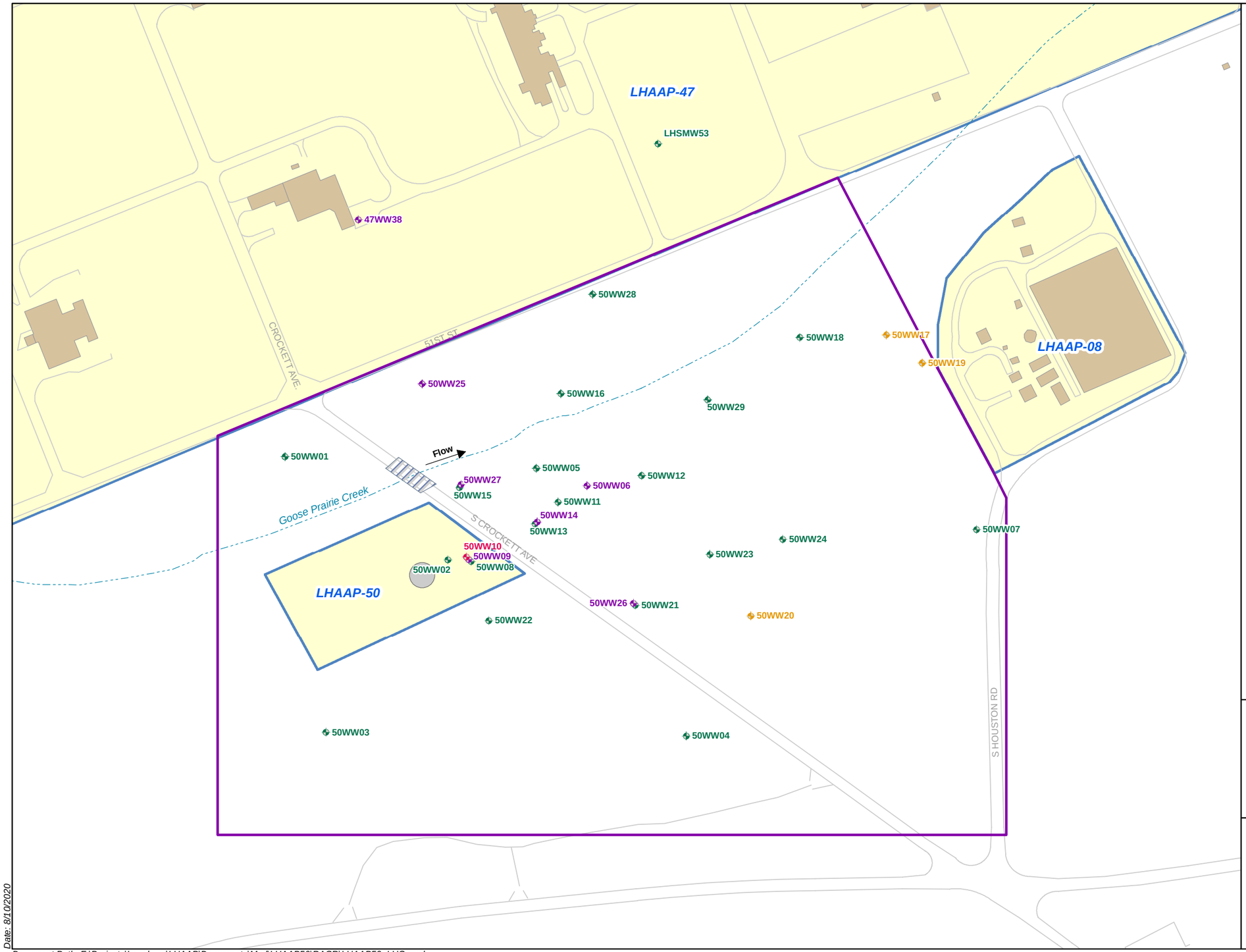
Remedial Action Completion Report,
Contigency Remedy, LHAAP-50

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Date: 8/10/2020

Document Path: F:\Projects\Longhorn\LHAAP\Documents\Mxd\LHAAP50\RACR\LHAAP50_SiteLocationMap.mxd

Figure 56



- Lower Shallow Monitoring Well
- Upper Shallow Monitoring Well
- Fully Penetrating Shallow Monitoring Well
- Intermediate Monitoring Well
- Goose Prairie Creek
- Roads
- Land Use Control Boundary
- Bridges
- Former Storage Tank Location
- Buildings
- Site Boundaries

Note:
LUC boundary established in the 2016 Final Remedial Action Completion Report, LHAAP-50, Former Sump Water Tank (AECOM 2016)

N

0 75 150 Feet

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TULSA DISTRICT
TULSA, OKLAHOMA

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Figure 1-3
Land Use Control Boundary

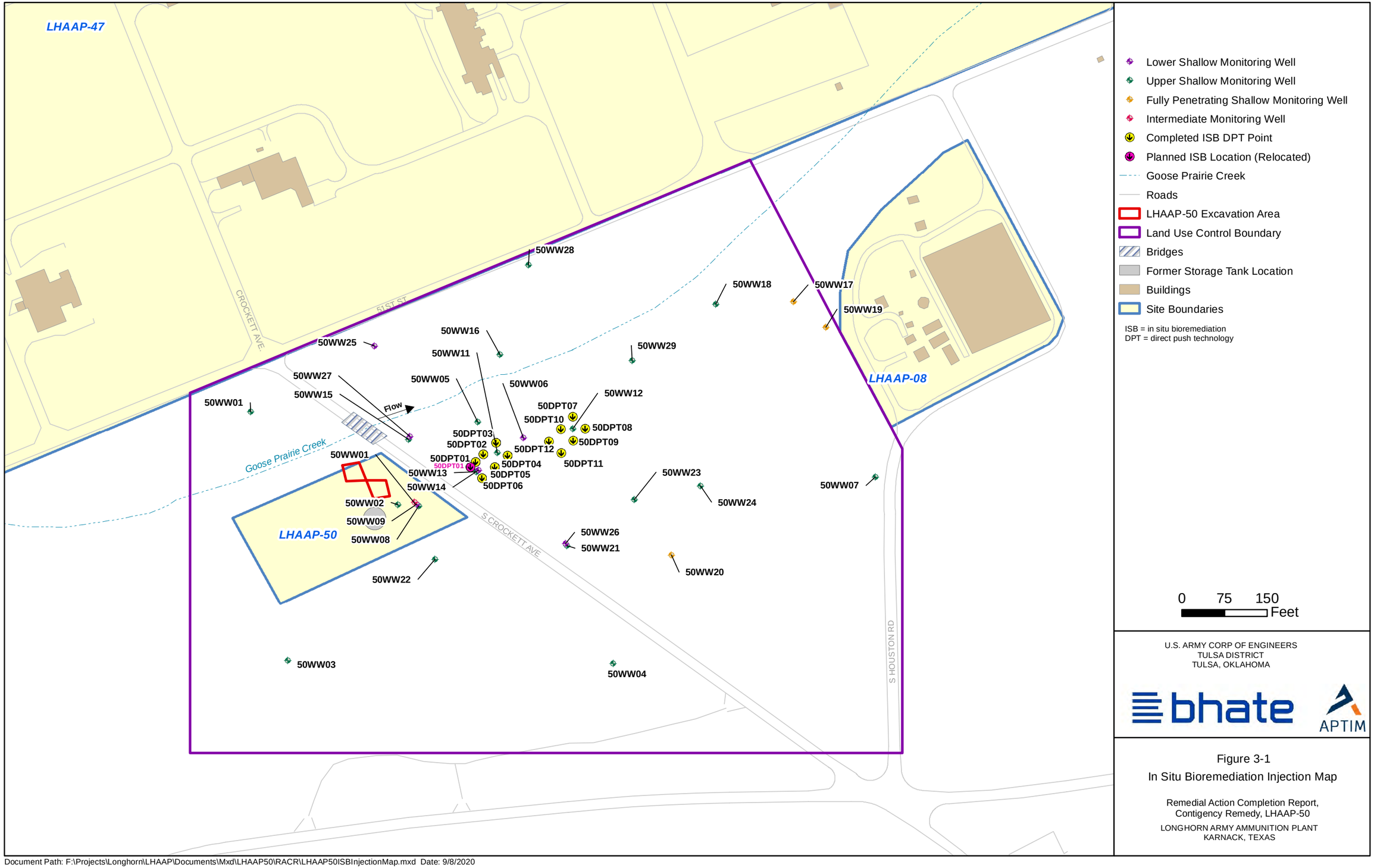
Remedial Action Completion Report,
Contigency Remedy, LHAAP-50

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Date: 8/10/2020

Document Path: F:\Projects\Longhorn\LHAAP\Documents\Mxd\LHAAP50\RACR\LHAAP50_LUC.mxd

Figure 57



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TULSA, OKLAHOMA

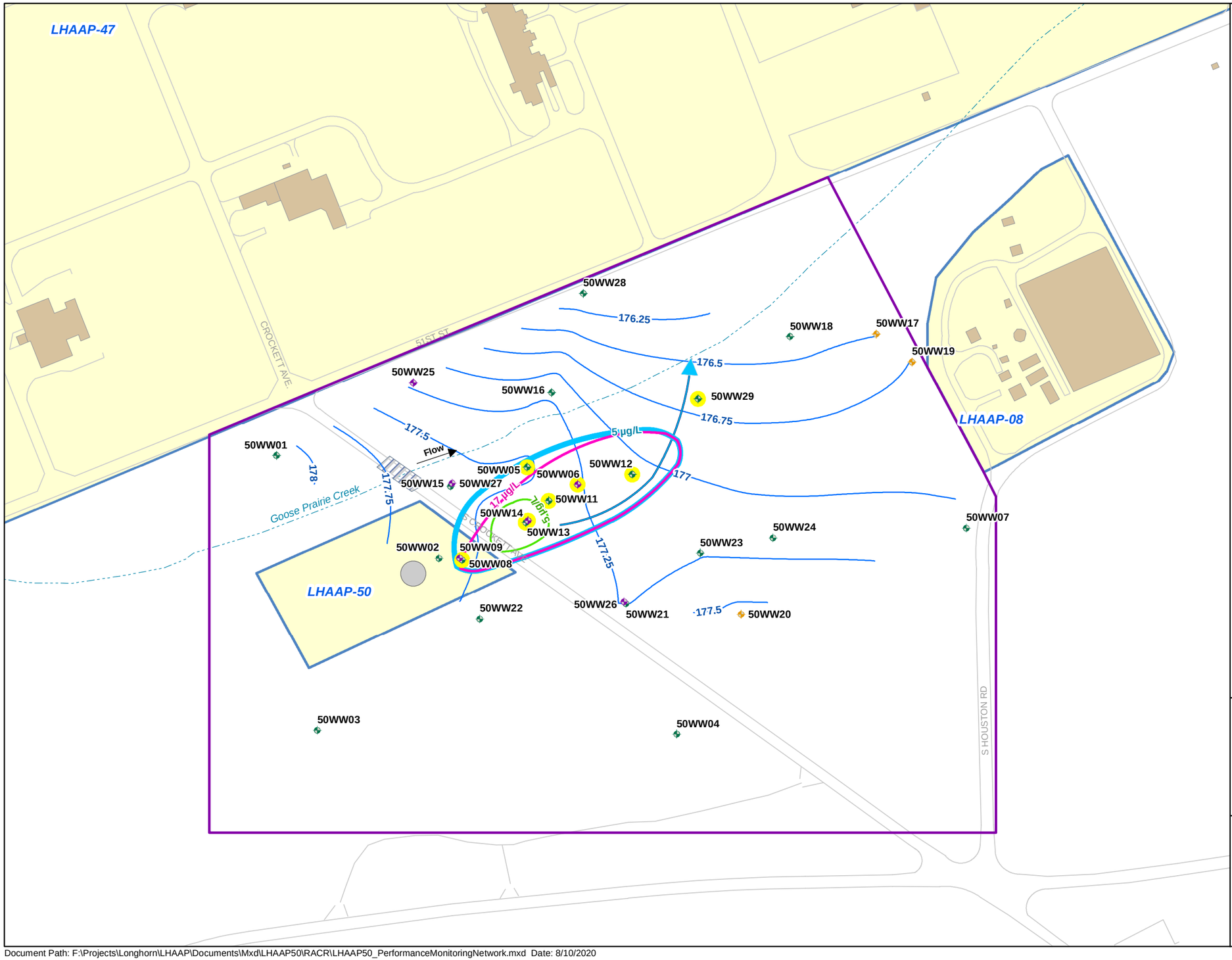
bhate APTIM

Figure 3-1
In Situ Bioremediation Injection Map

Remedial Action Completion Report,
Contigency Remedy, LHAAP-50
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Document Path: F:\Projects\Longhorn\LHAAP\Documents\Mxd\LHAAP50\RACR\LHAAP50ISBInjectionMap.mxd Date: 9/8/2020

Figure 58



- Lower Shallow Monitoring Well
- Upper Shallow Monitoring Well
- Fully Penetrating Shallow Monitoring Well
- Performance Monitoring Well
- 1,2-DCA Contour
- Perchlorate Contour (*Dashed where inferred*)
- TCE Contour
- Groundwater Flow Direction
- Groundwater Contour
- Land Use Control Boundary
- Bridges
- Former Storage Tank Location
- Goose Prairie Creek
- Roads
- Buildings
- Site Boundaries

0 75 150 Feet

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TULSA, OKLAHOMA

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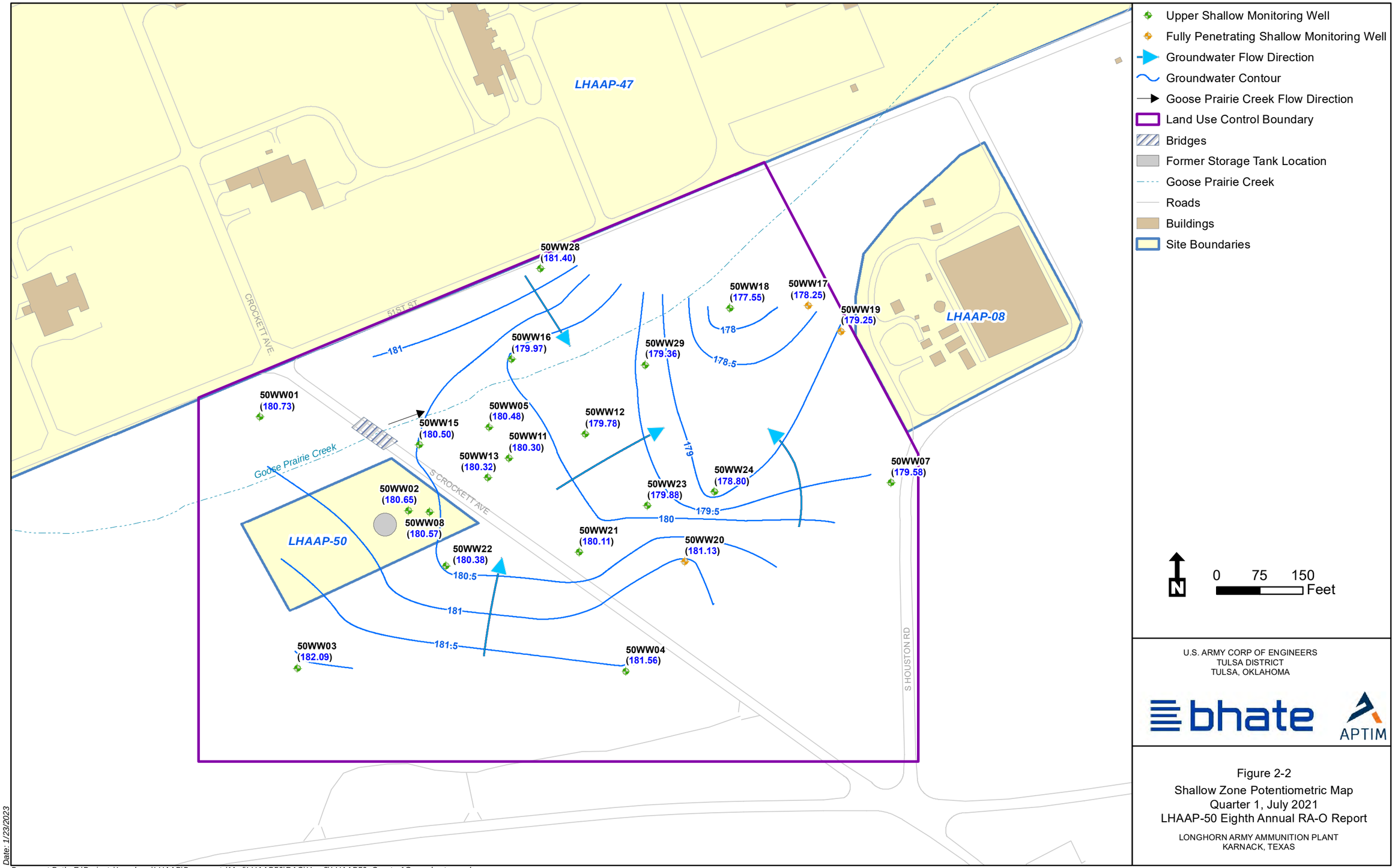
Figure 4-1

Performance Monitoring Network
Remedial Action Completion Report,
Contigency Remedy, LHAAP-50

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Document Path: F:\Projects\Longhorn\LHAAP\Documents\Mxd\LHAAP50\RACR\LHAAP50_PerformanceMonitoringNetwork.mxd Date: 8/10/2020

Figure 59



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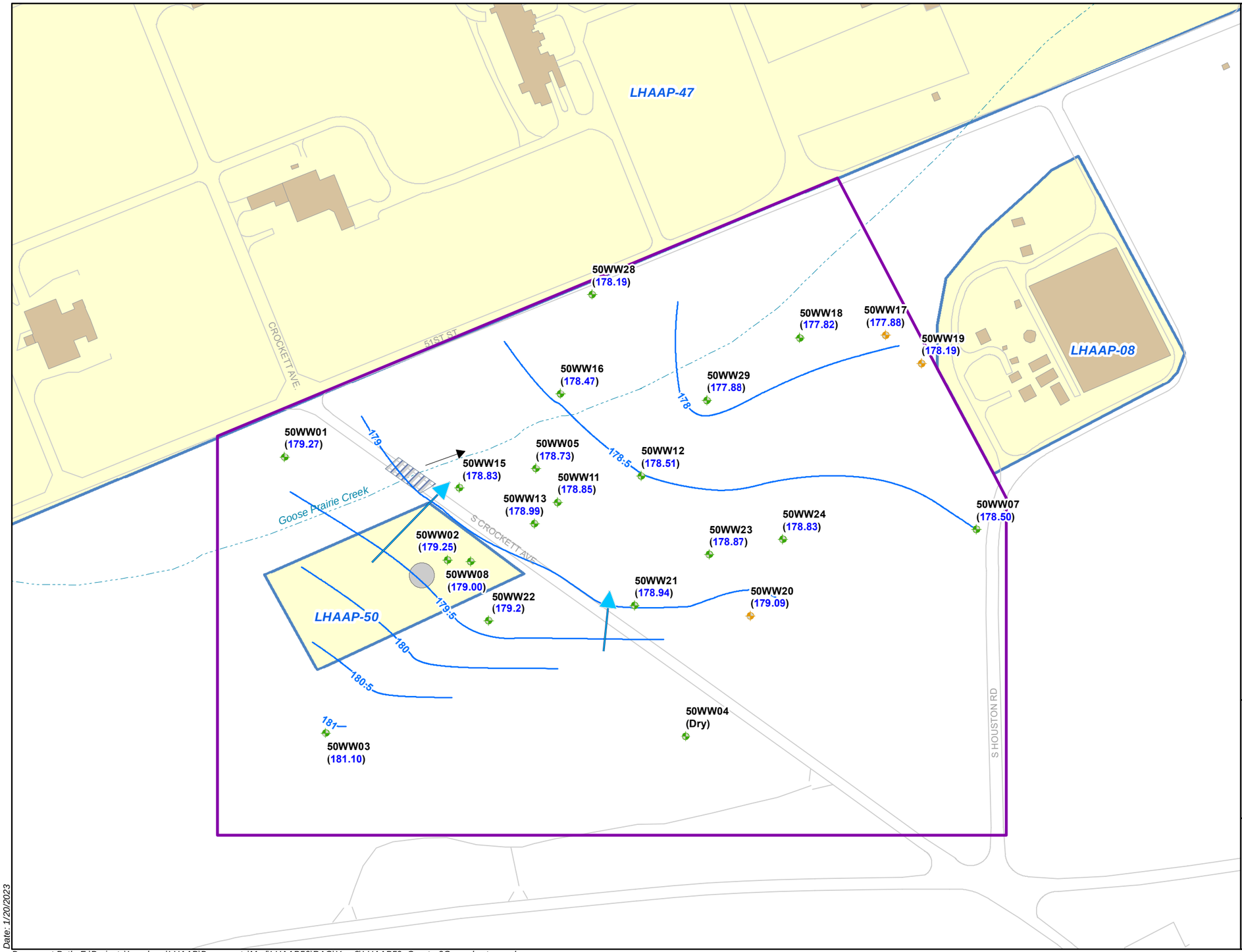
Figure 2-2
Shallow Zone Potentiometric Map
Quarter 1, July 2021
LHAAP-50 Eighth Annual RA-O Report

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Date: 1/23/2023

Document Path: F:\Projects\Longhorn\LHAAP\Documents\Mxd\LHAAP50\RAO\Year8\LHAAP50_Quarter1Groundwater.mxd

Figure 60



U.S. ARMY CORP OF ENGINEERS
TULSA DISTRICT
TULSA, OKLAHOMA

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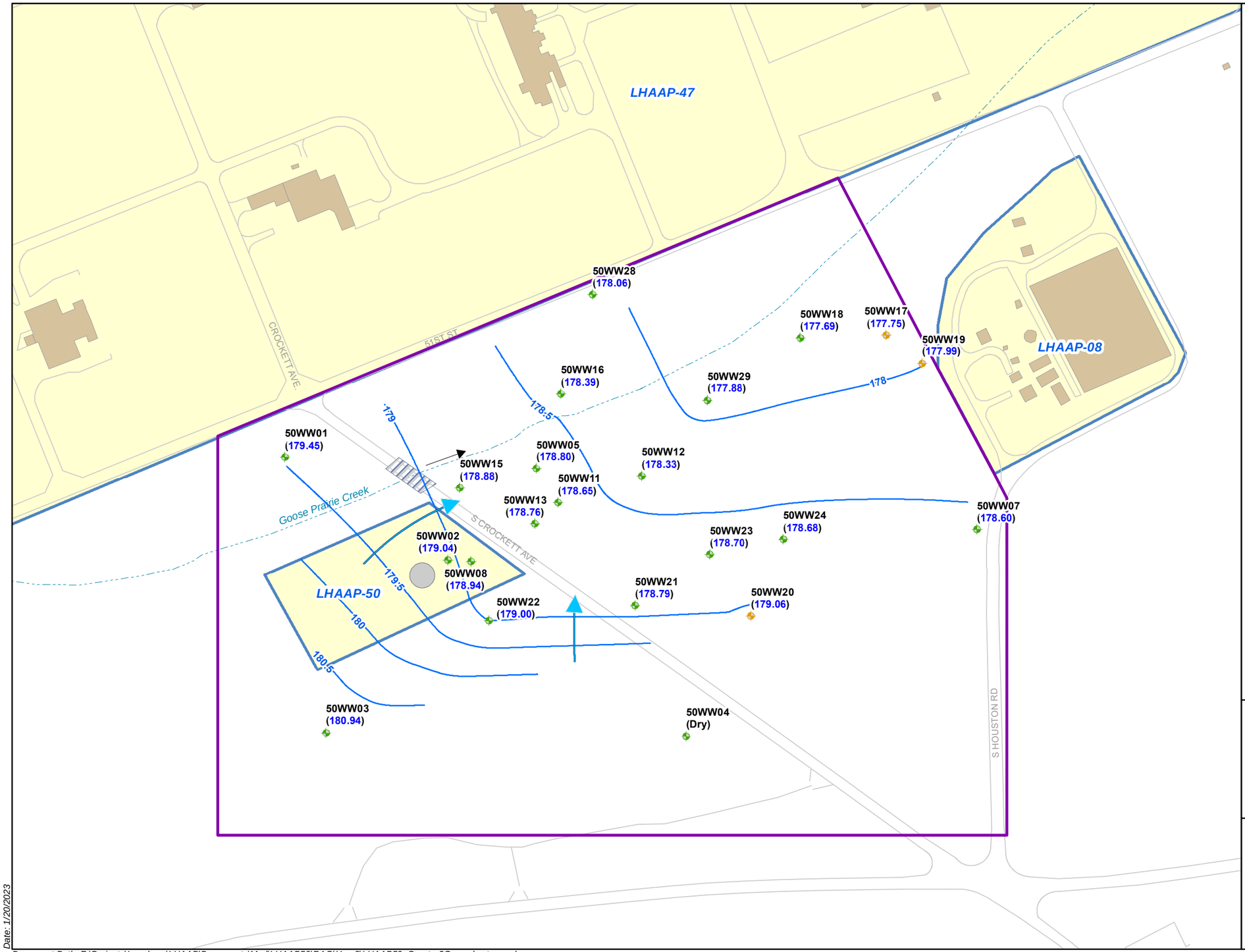
Figure 2-3
Shallow Zone Potentiometric Map
Quarter 2, October 2021
LHAAP-50 Eighth Annual RA-O Report

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Date: 1/20/2023

Document Path: F:\Projects\Longhorn\LHAAP\Documents\Mxd\LHAAP50\RAO\Year8\LHAAP50_Quarter2Groundwater.mxd

Figure 61



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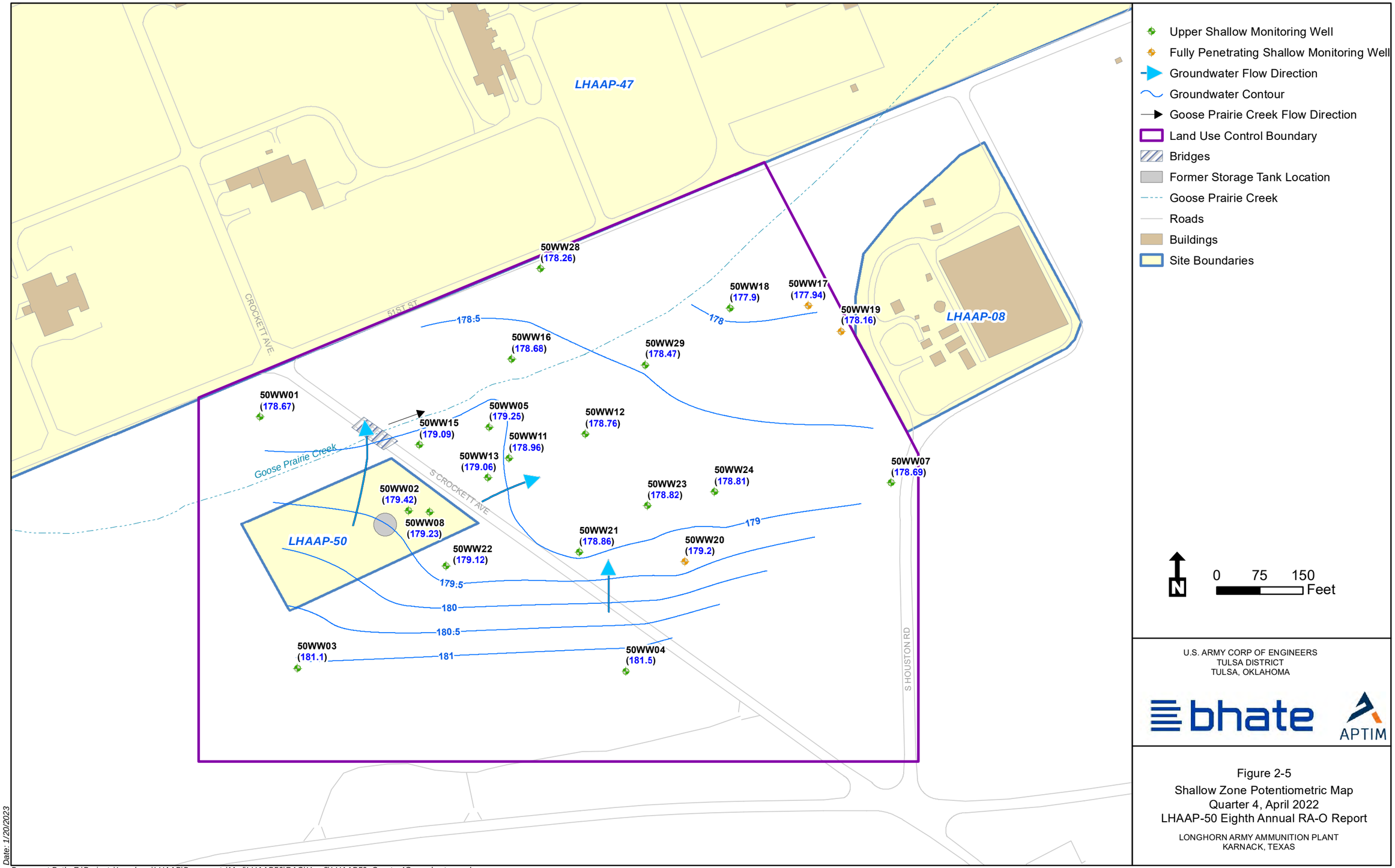
Figure 2-4
Shallow Zone Potentiometric Map
Quarter 3, January 2022
LHAAP-50 Eighth Annual RA-O Report

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Date: 1/20/2023

Document Path: F:\Projects\Longhorn\LHAAP\Documents\Mxd\LHAAP50\RAO\Year8\LHAAP50_Quarter3Groundwater.mxd

Figure 62



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TULSA DISTRICT
TULSA, OKLAHOMA

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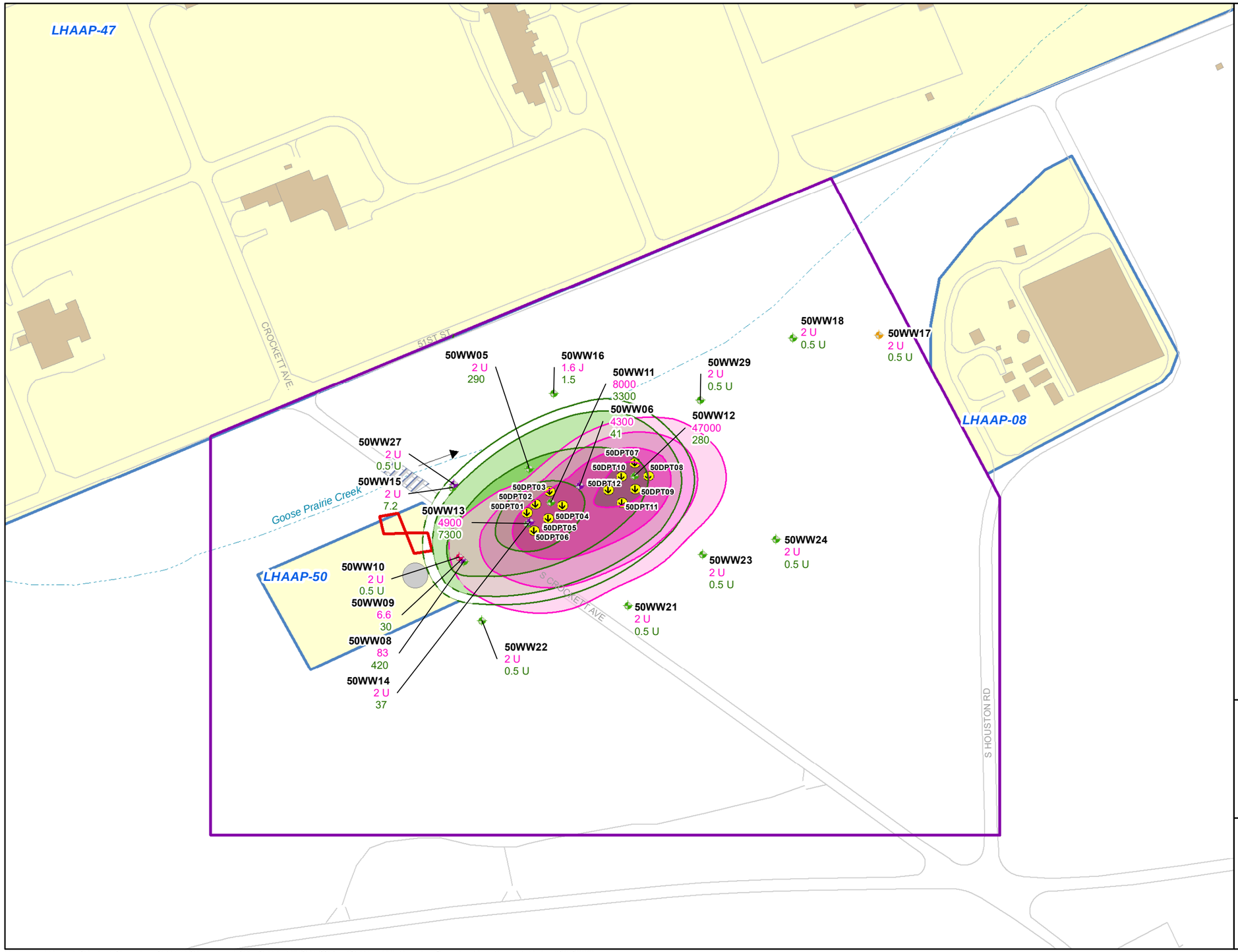
Figure 2-5
Shallow Zone Potentiometric Map
Quarter 4, April 2022
LHAAP-50 Eighth Annual RA-O Report

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Date: 1/20/2023

Document Path: F:\Projects\Longhorn\LHAAP\Documents\Mxd\LHAAP50\RAO\Year8\LHAAP50_Quarter4Groundwater.mxd

Figure 63



- Lower Shallow Monitoring Well
- Upper Shallow Monitoring Well
- Fully Penetrating Shallow Monitoring Well
- Intermediate Monitor Well
- ISB DPT Point

Perchlorate Plume (µg/L)
- 17 - 100
- 100 - 1,000
- 1,000 - 10,000
- >10,000

Trichloroethene (TCE) Plume (µg/L)
- 5 - 10
- 10 - 100
- 100 - 1,000
- >1,000

- Goose Prairie Creek Flow Direction
- LHAAP-50 Excavation Area
- Land Use Control Boundary
- Bridges
- Former Storage Tank Location
- Goose Prairie Creek
- Roads
- Buildings
- Site Boundaries

Notes:
1. Perchlorate MCL/PCL = 17 µg/L
TCE MCL/PCL = 5 µg/L
2. Qualifiers:
J - Estimated: The analyte was positively identified; the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
U - Undetected: The analyte was analyzed for, but not detected.
3. µg/L = micrograms per liter
4. ISB = in situ bioremediation
DPT = direct push technology
5. LUC boundary established in the 2016 Final Remedial Action Completion Report, LHAAP-50, Former Sump Water Tank (AECOM 2016)

0 75 150
Feet

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TULSA, OKLAHOMA

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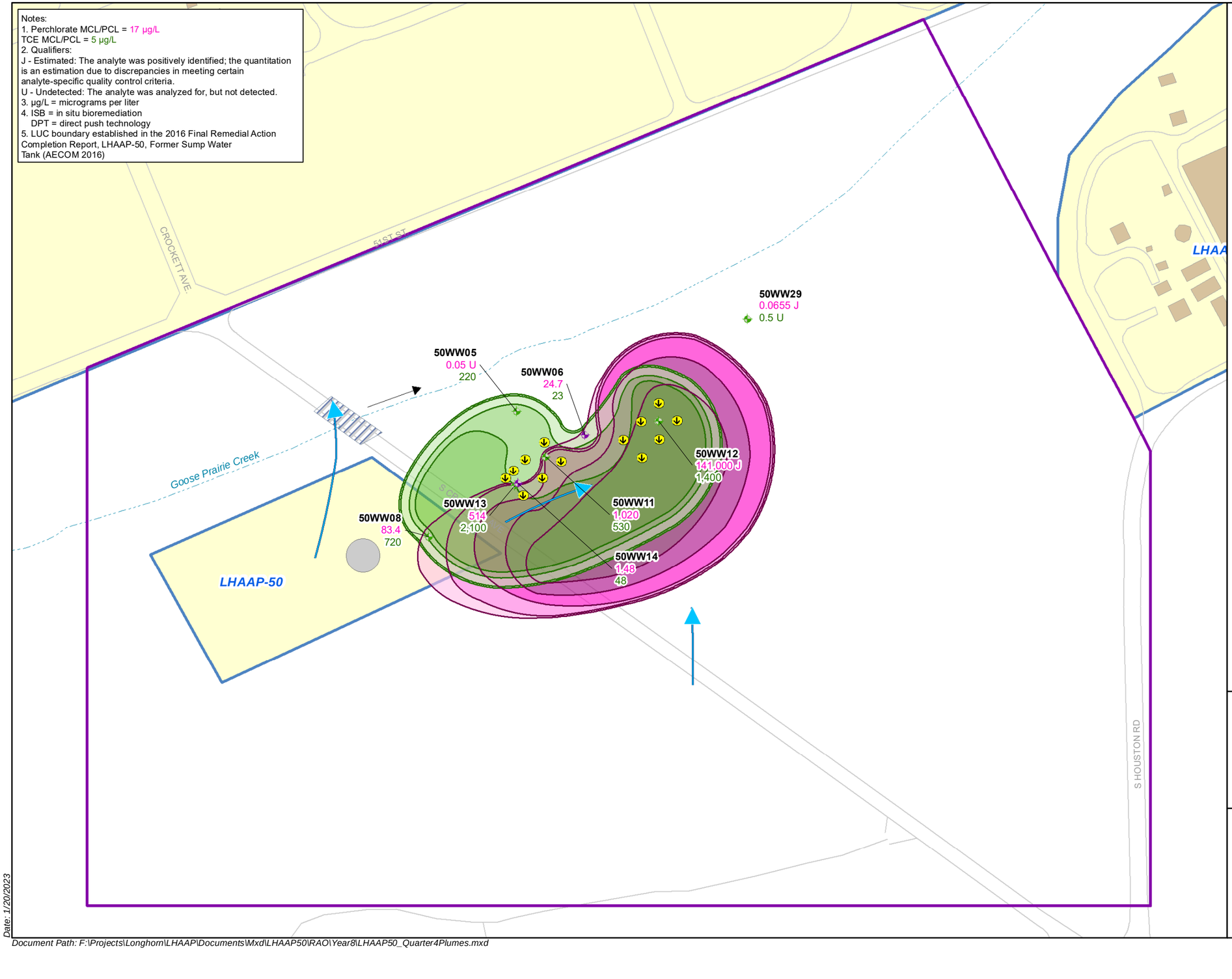
Figure 1-4

TCE and Perchlorate Plumes
Baseline
LHAAP-50 Eighth Annual RA-O Report
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Document Path: F:\Projects\Longhorn\LHAAP\Documents\Mxd\LHAAP50\RAO\Year8\LHAAP50_BaselineSamplingResults.mxd Date: 1/20/2023

Figure 64

Notes:
1. Perchlorate MCL/PCL = 17 µg/L
TCE MCL/PCL = 5 µg/L
2. Qualifiers:
J - Estimated: The analyte was positively identified; the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
U - Undetected: The analyte was analyzed for, but not detected.
3. µg/L = micrograms per liter
4. ISB = in situ bioremediation
DPT = direct push technology
5. LUC boundary established in the 2016 Final Remedial Action Completion Report, LHAAP-50, Former Sump Water Tank (AECOM 2016)



- Lower Shallow Monitoring Well
- Upper Shallow Monitoring Well
- Groundwater Flow Direction
- ISB DPT Point
- Goose Prairie Creek Flow Direction
- Land Use Control Boundary
- Bridges
- Former Storage Tank Location
- Goose Prairie Creek
- Roads
- Buildings
- Site Boundaries

Trichloroethene (TCE) Plume (µg/L)
- 5 - 10
- 10 - 100
- 100 - 1,000
- >1,000

Perchlorate Plume (µg/L)
- 17 - 100
- 100 - 1,000
- 1,000 - 10,000
- 10,000 - 100,000
- >100,000

N

0 55 110 Feet

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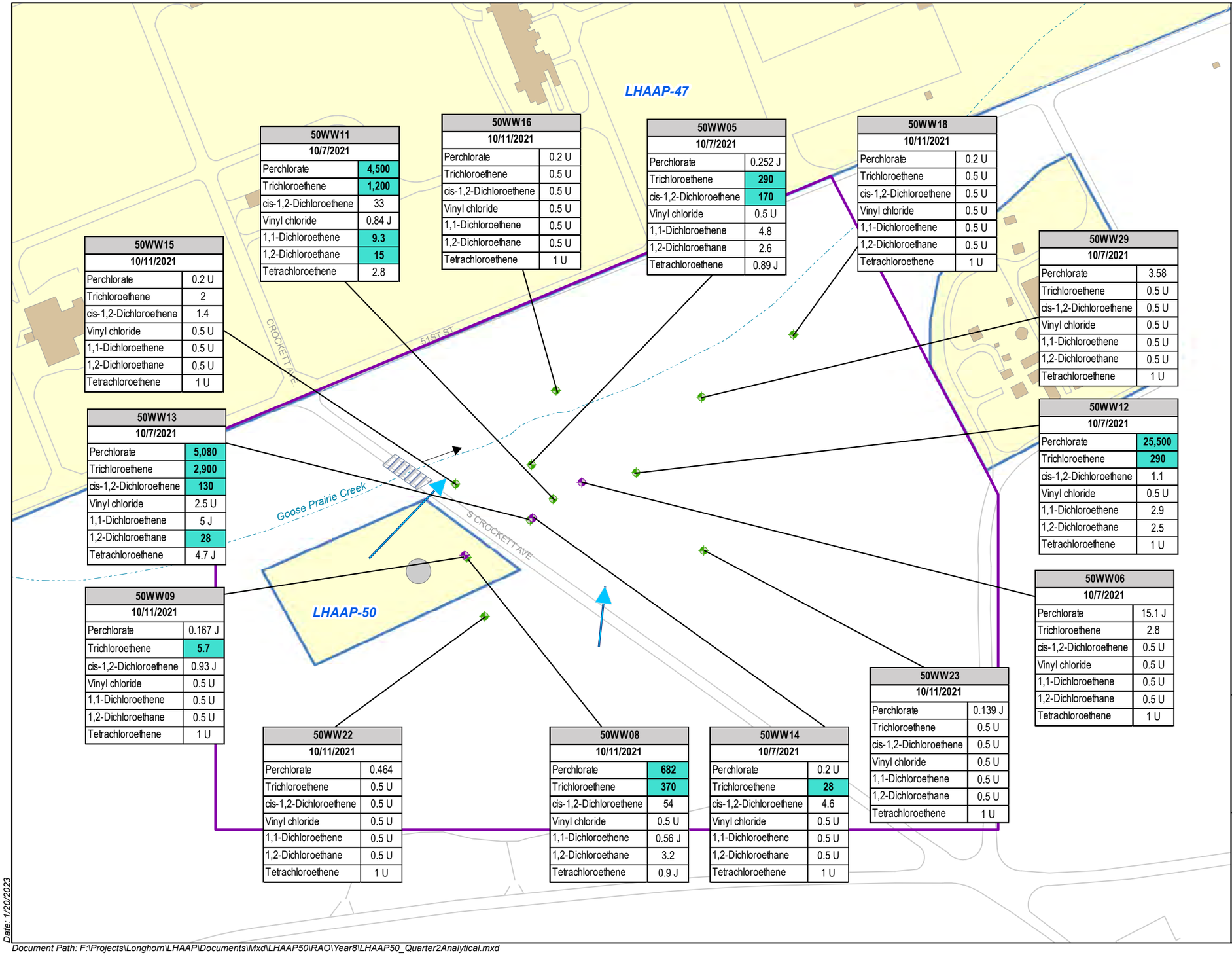
Figure 2-11
TCE and Perchlorate Plumes
Quarter 4, April 2022
LHAAP-50 Eighth Annual RA-O Report

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Date: 1/20/2023

Document Path: F:\Projects\Longhorn\LHAAP\Documents\Mxd\LHAAP50\RAO\Year8\LHAAP50_Quarter4Plumes.mxd

Figure 65



50WW11	
10/7/2021	
Perchlorate	**4,500**
Trichloroethene	**1,200**
cis-1,2-Dichloroethene	33
Vinyl chloride	0.84 J
1,1-Dichloroethene	**9.3**
1,2-Dichloroethane	**15**
Tetrachloroethene	2.8

50WW16	
10/11/2021	
Perchlorate	0.2 U
Trichloroethene	0.5 U
cis-1,2-Dichloroethene	0.5 U
Vinyl chloride	0.5 U
1,1-Dichloroethene	0.5 U
1,2-Dichloroethane	0.5 U
Tetrachloroethene	1 U

50WW05	
10/7/2021	
Perchlorate	0.252 J
Trichloroethene	**290**
cis-1,2-Dichloroethene	**170**
Vinyl chloride	0.5 U
1,1-Dichloroethene	4.8
1,2-Dichloroethane	2.6
Tetrachloroethene	0.89 J

50WW18	
10/11/2021	
Perchlorate	0.2 U
Trichloroethene	0.5 U
cis-1,2-Dichloroethene	0.5 U
Vinyl chloride	0.5 U
1,1-Dichloroethene	0.5 U
1,2-Dichloroethane	0.5 U
Tetrachloroethene	1 U

50WW15	
10/11/2021	
Perchlorate	0.2 U
Trichloroethene	2
cis-1,2-Dichloroethene	1.4
Vinyl chloride	0.5 U
1,1-Dichloroethene	0.5 U
1,2-Dichloroethane	0.5 U
Tetrachloroethene	1 U

50WW29	
10/7/2021	
Perchlorate	3.58
Trichloroethene	0.5 U
cis-1,2-Dichloroethene	0.5 U
Vinyl chloride	0.5 U
1,1-Dichloroethene	0.5 U
1,2-Dichloroethane	0.5 U
Tetrachloroethene	1 U

50WW13	
10/7/2021	
Perchlorate	**5,080**
Trichloroethene	**2,900**
cis-1,2-Dichloroethene	**130**
Vinyl chloride	2.5 U
1,1-Dichloroethene	5 J
1,2-Dichloroethane	**28**
Tetrachloroethene	4.7 J

50WW12	
10/7/2021	
Perchlorate	**25,500**
Trichloroethene	**290**
cis-1,2-Dichloroethene	1.1
Vinyl chloride	0.5 U
1,1-Dichloroethene	2.9
1,2-Dichloroethane	2.5
Tetrachloroethene	1 U

50WW06	
10/7/2021	
Perchlorate	15.1 J
Trichloroethene	2.8
cis-1,2-Dichloroethene	0.5 U
Vinyl chloride	0.5 U
1,1-Dichloroethene	0.5 U
1,2-Dichloroethane	0.5 U
Tetrachloroethene	1 U

50WW09	
10/11/2021	
Perchlorate	0.167 J
Trichloroethene	**5.7**
cis-1,2-Dichloroethene	0.93 J
Vinyl chloride	0.5 U
1,1-Dichloroethene	0.5 U
1,2-Dichloroethane	0.5 U
Tetrachloroethene	1 U

50WW22	
10/11/2021	
Perchlorate	0.464
Trichloroethene	0.5 U
cis-1,2-Dichloroethene	0.5 U
Vinyl chloride	0.5 U
1,1-Dichloroethene	0.5 U
1,2-Dichloroethane	0.5 U
Tetrachloroethene	1 U

50WW08	
10/11/2021	
Perchlorate	**682**
Trichloroethene	**370**
cis-1,2-Dichloroethene	54
Vinyl chloride	0.5 U
1,1-Dichloroethene	0.56 J
1,2-Dichloroethane	3.2
Tetrachloroethene	0.9 J

50WW14	
10/7/2021	
Perchlorate	0.2 U
Trichloroethene	**28**
cis-1,2-Dichloroethene	4.6
Vinyl chloride	0.5 U
1,1-Dichloroethene	0.5 U
1,2-Dichloroethane	0.5 U
Tetrachloroethene	1 U

50WW23	
10/11/2021	
Perchlorate	0.139 J
Trichloroethene	0.5 U
cis-1,2-Dichloroethene	0.5 U
Vinyl chloride	0.5 U
1,1-Dichloroethene	0.5 U
1,2-Dichloroethane	0.5 U
Tetrachloroethene	1 U

- Lower Shallow Monitoring Well
- Upper Shallow Monitoring Well
- Groundwater Flow Direction
- Goose Prairie Creek Flow Direction
- Goose Prairie Creek
- Roads
- Land Use Control Boundary
- Bridges
- Former Storage Tank Location
- Buildings
- Site Boundaries

Notes:
1. Blue Highlighting Indicates the concentration exceeds the MCL/PCL.
2. Qualifiers:
J - Estimated: The analyte was positively identified; the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
U - Undetected: The analyte was analyzed for, but not detected.

N

0 75 150 Feet

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TULSA DISTRICT
TULSA, OKLAHOMA

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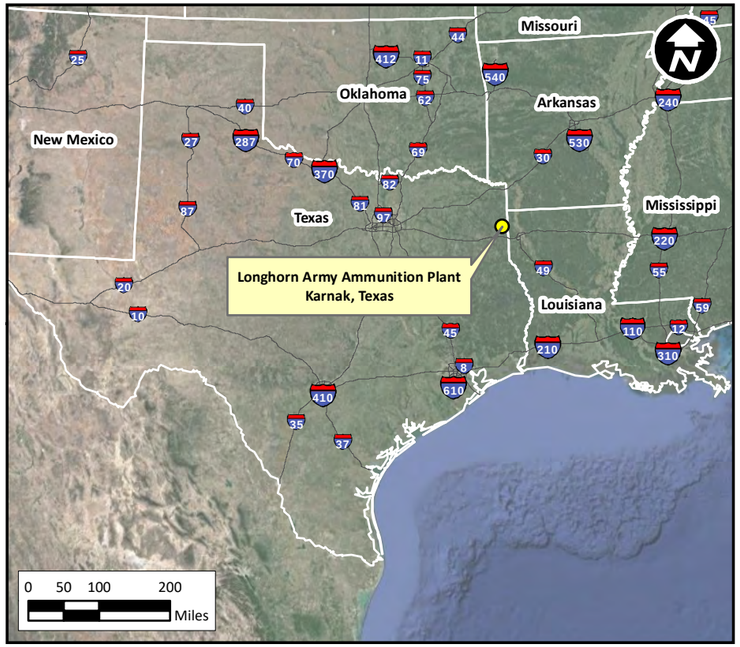
Figure 2-7
COC Concentrations in Groundwater
Year 2, Quarter 2
LHAAP-50 Eighth Annual RA-O Report

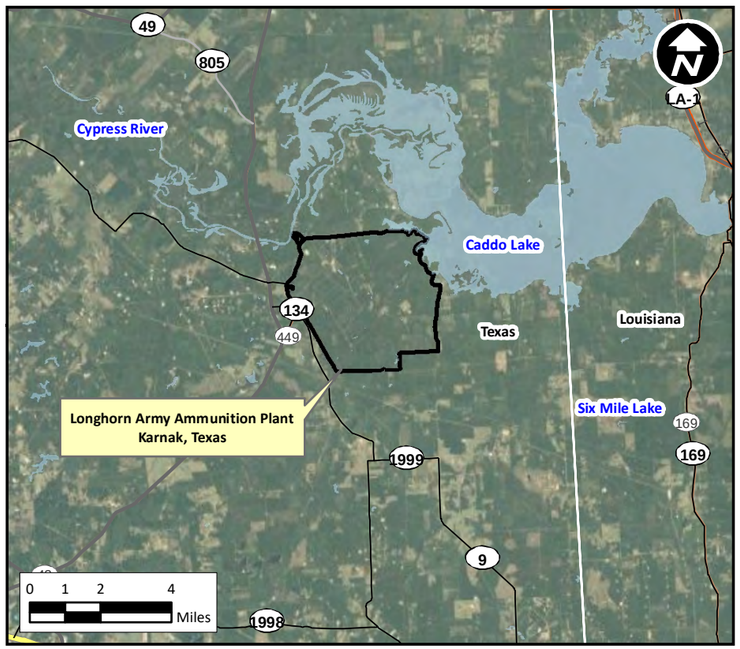
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

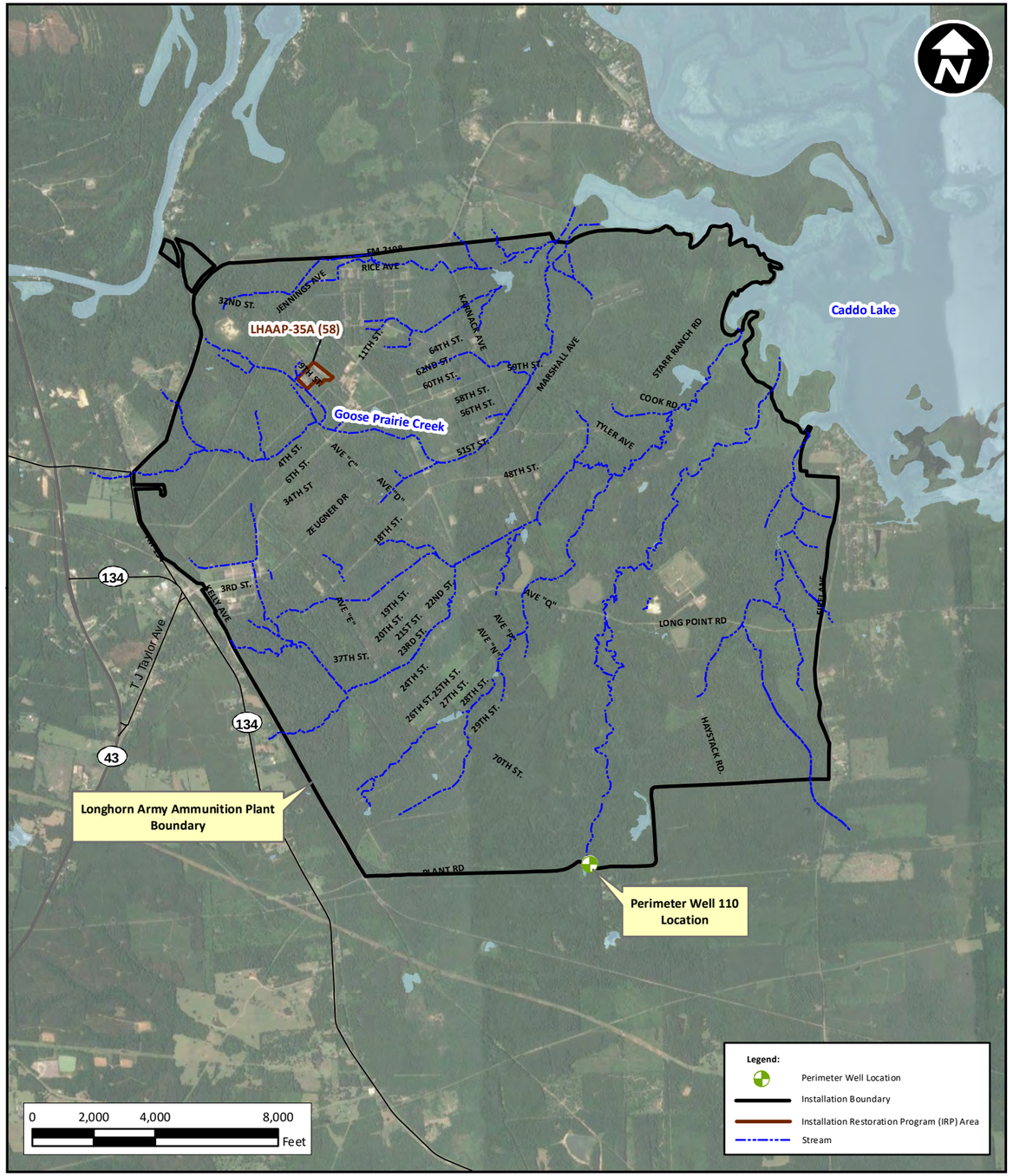
Date: 1/20/2023

Document Path: F:\Projects\Longhorn\LHAAP\Documents\Mxd\LHAAP50\RAO\Year8\LHAAP50_Quarter2Analytical.mxd

Figure 66







Longhorn Army Ammunition Plant
Location and Site Vicinity Map

Figure 1

Year 8 Annual Remedial Action Operation Report (December 2021 – June 2022)
LHAAP-35A (58), Shops Area
Longhorn Army Ammunition Plant
Karnack, Texas

DRAWN BY: MRM

DATE: 2/27/2023

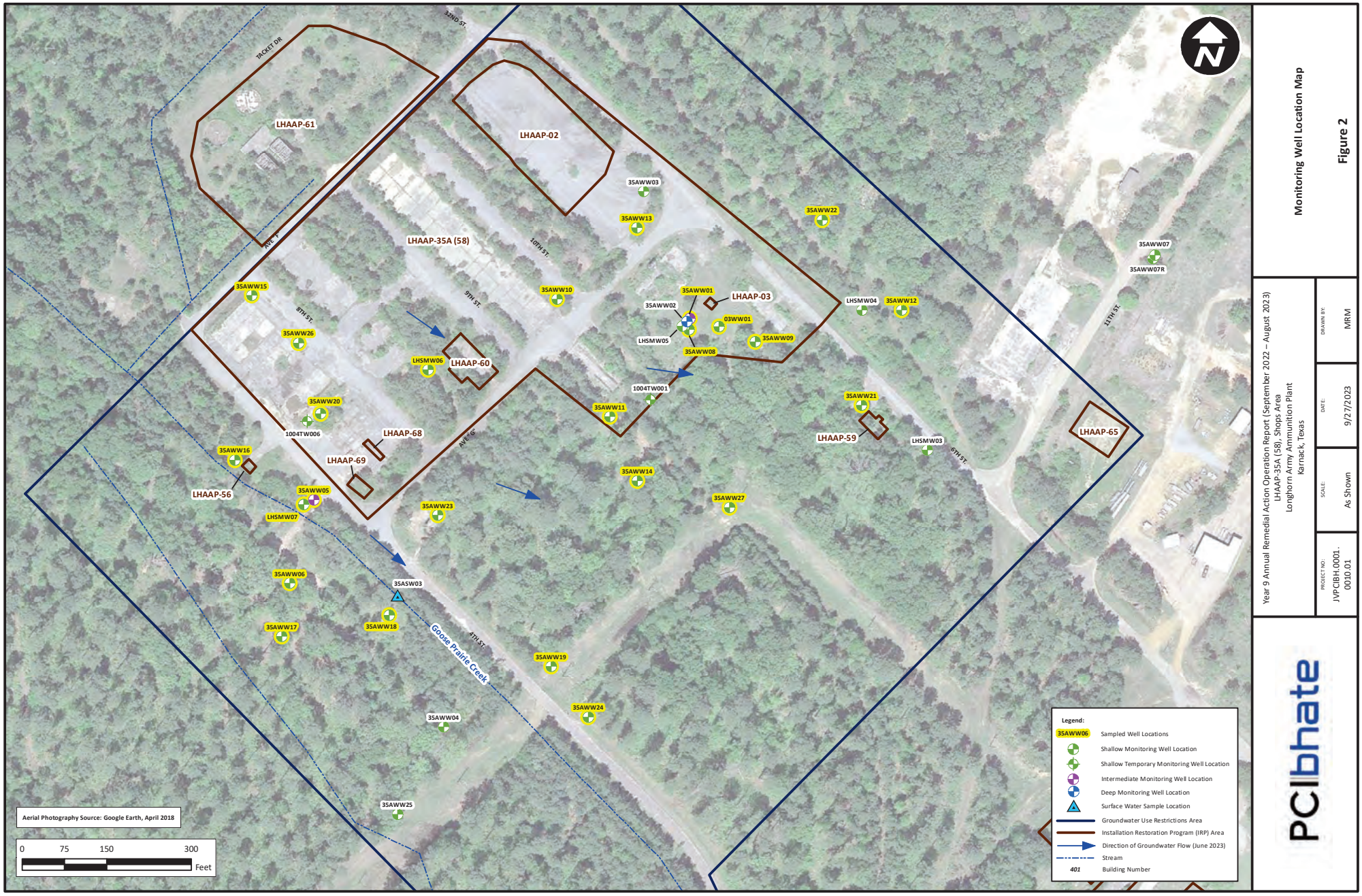
SCALE: As Shown

PROJECT NO: NWO1312.0150.012.0001.03

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Figure 67


Monitoring Well Location Map
Figure 2
Year 9 Annual Remedial Action Operation Report (September 2022 – August 2023)
LHAAP-35A (58), Shops Area
Longhorn Army Ammunition Plant
Karnack, Texas
PROJECT NO.: JVPCIBH.0001.0010.01
SCALE: As Shown
DATE: 9/27/2023
DRAWN BY: MRM
PCIbhate
LHAAP-61
LHAAP-02
LHAAP-35A (58)
LHAAP-03
LHAAP-60
LHAAP-68
LHAAP-69
LHAAP-56
LHAAP-59
LHAAP-65
32ND ST.
TACKET DR
FIRE ST
10TH ST.
9TH ST.
8TH ST.
AVE G
11TH ST.
6TH ST.
4TH ST.
Goose Prairie Creek
35AWW01
35AWW02
35AWW03
35AWW04
35AWW05
35AWW06
35AWW07
35AWW07R
35AWW08
35AWW09
35AWW10
35AWW11
35AWW12
35AWW13
35AWW14
35AWW15
35AWW16
35AWW17
35AWW18
35AWW19
35AWW20
35AWW21
35AWW22
35AWW23
35AWW24
35AWW25
35AWW26
35AWW27
03WW01
1004TW001
1004TW006
LHSMW03
LHSMW04
LHSMW05
LHSMW06
LHSMW07
35ASW03
Aerial Photography Source: Google Earth, April 2018
0 75 150 300 Feet
Legend:
35AWW06 Sampled Well Locations
Shallow Monitoring Well Location
Shallow Temporary Monitoring Well Location
Intermediate Monitoring Well Location
Deep Monitoring Well Location
Surface Water Sample Location
Groundwater Use Restrictions Area
Installation Restoration Program (IRP) Area
Direction of Groundwater Flow (June 2023)
Stream
401 Building Number

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Figure 68

Legend
U = Result is less than the laboratory detection limit
< = less than
COC = Contaminant of Concern
USEPA = United States Environmental Protection Agency
MCL = Maximum Contaminant Level
FD = Field Duplicate
DCA = Dichloroethane
DCE = Dichloroethene
PCE = Tetrachloroethene
TCA = Trichloroethane
TCE = Trichloroethene
VC = Vinyl Chloride
Bold Red values exceed the USEPA MCL
All results and MCLs are reported in micrograms per liter (µg/L)

COCs shown on this figure	
COC	MCL
1,1-DCE	7
1,1,2-TCA	5
1,2-DCA	5
Benzene	5
cis-1,2-DCE	70
PCE	5
trans-1,2-DCE	100
TCE	5
VC	2

LHSMW06		12/2/2021	12/2/2021	6/9/2022
COC	MCL	Result	FD Result	Result
1,1-DCE	7	12	12	9.1
cis-1,2-DCE	70	140	130	81
TCE	5	21	20	13
VC	2	4.2	4.3	2.3

03WW01		6/6/2022
COC	MCL	Result
PCE	5	9.9
TCE	5	10

35AWW20		12/1/2021	6/8/2022
COC	MCL	Result	Result
1,1,2-TCA	5	75	62
1,1-DCE	7	1,100	1,600
1,2-DCA	5	14	13
Benzene	5	5.8	7.2
cis-1,2-DCE	70	86	89
TCE	5	100	150
VC	2	650	840

35AWW09		6/6/2022
COC	MCL	Result
PCE	5	380
TCE	5	140

LHSMW07		12/1/2021	6/8/2022
COC	MCL	Result	Result
1,1-DCE	7	22	8.8
VC	2	35	<0.50 U

35AWW14		6/6/2022
COC	MCL	Result
1,1-DCE	7	9.6
TCE	5	13

35AWW18		6/9/2022
COC	MCL	Result
1,1-DCE	7	15

LHAAP-35A (58)

35AWW03 (NS), 35AWW13, 35AWW22, 35AWW07R (NS), 35AWW10, 35AWW15, LHSMW04 (NS, Dry), 35AWW12, LHSMW05 (NS), 35AWW08, 1004TW001 (NS), 35AWW21, 1004TW006 (NS), 35AWW11, LHSMW03 (NS), 35AWW16, 35AWW23, 35AWW06, 35AWW17, 35AWW19, 35AWW04 (NS, Dry), 35AWW24

HARRELL ST, 32ND ST., TACKET DR, AVE "F", 10TH ST., 8TH ST., 9TH ST., AVE "G", 6TH ST., 11TH ST., AVE "P", Goose Prairie Creek

207, 103, 102, 102-R, 102, L-6, 101, GH-1

Aerial Photography Source: Google Earth, April 2018

0 100 200 400 Feet

Legend:
- Shallow Monitoring Well Location
- Shallow Temporary Monitoring Well Location
- Shallow Monitoring Well Location — No exceedances above MCLs for listed COCs
- Shallow Monitoring Well Location - Removed from RA(O)
- KB1® Plus Injection Point Locations (March 2018)
- KB1® Injection Point Locations (March 2018)
- Injection Locations (2013)
- (NS) Not Sampled
- Installation Restoration Program (IRP) Area
- Direction of Groundwater Flow (June 2022)
- Stream
- 401 Building Number

COC Exceedances in Shallow Groundwater (December 2021 - June 2022)

Figure 6

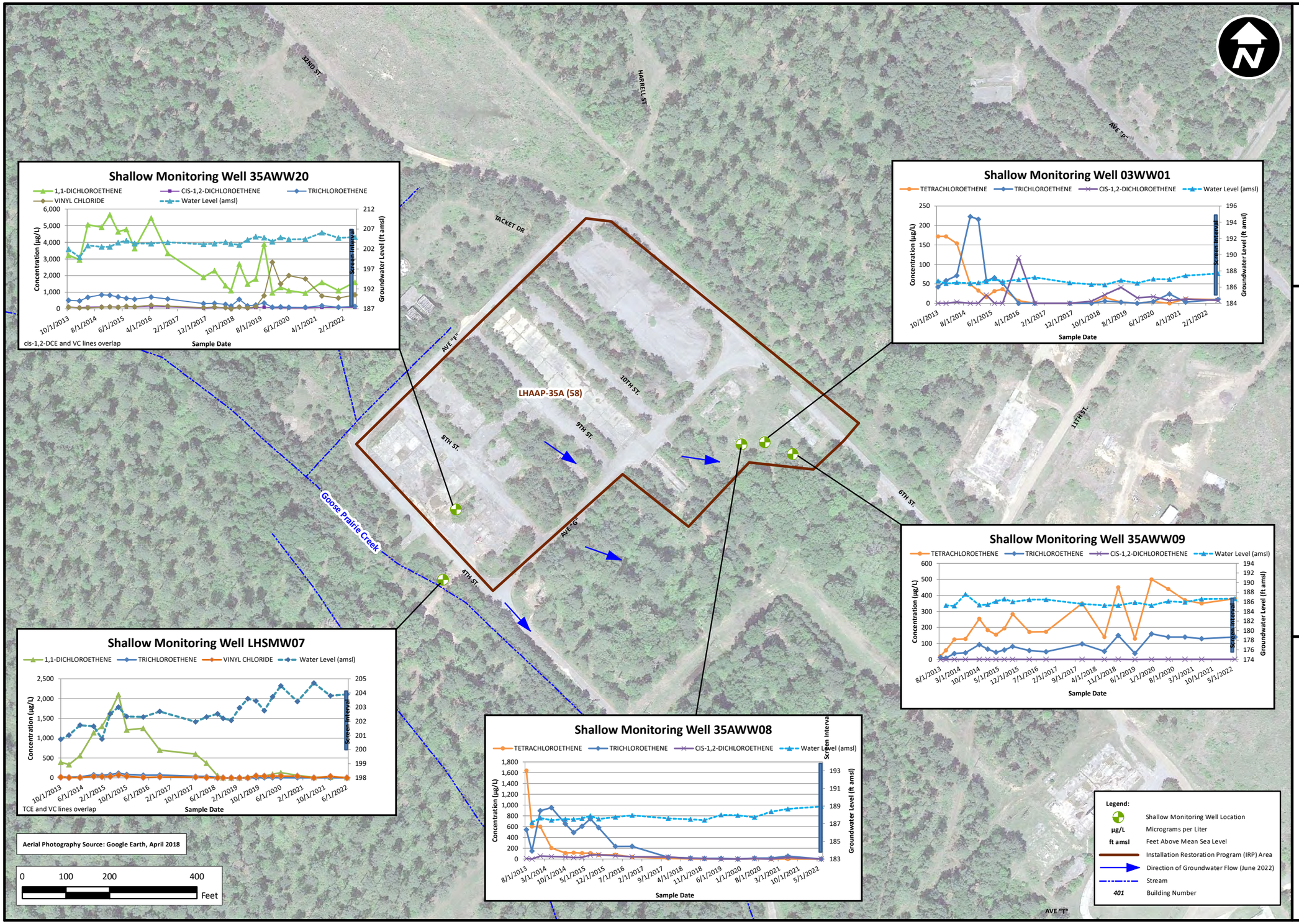
Year 8 Annual Remedial Action Operation Report (December 2021 – June 2022)
LHAAP-35A (58), Shops Area
Longhorn Army Ammunition Plant
Karnack, Texas

DRAWN BY: MRM
DATE: 2/13/2023
SCALE: As Shown
PROJECT NO: NWO1312.0150.012.0001.03

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Figure 69

01288501



COC Concentration Trends

Figure 8

Year 8 Annual Remedial Action Operation Report (December 2021 – June 2022)
LHAAP-35A (58), Shops Area
Longhorn Army Ammunition Plant
Karnack, Texas

DRAWN BY: MRM

DATE: 2/13/2023

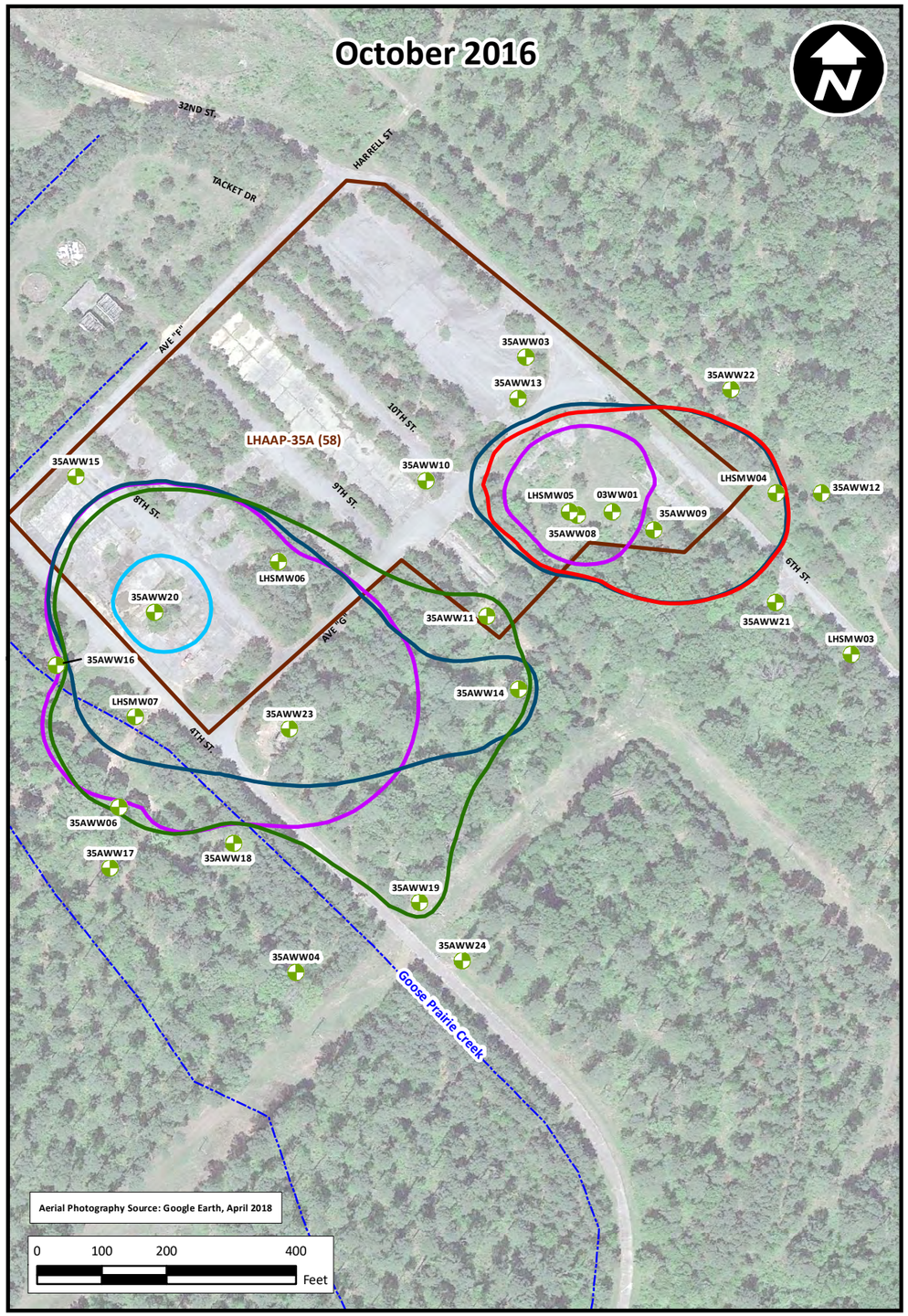
SCALE: As Shown

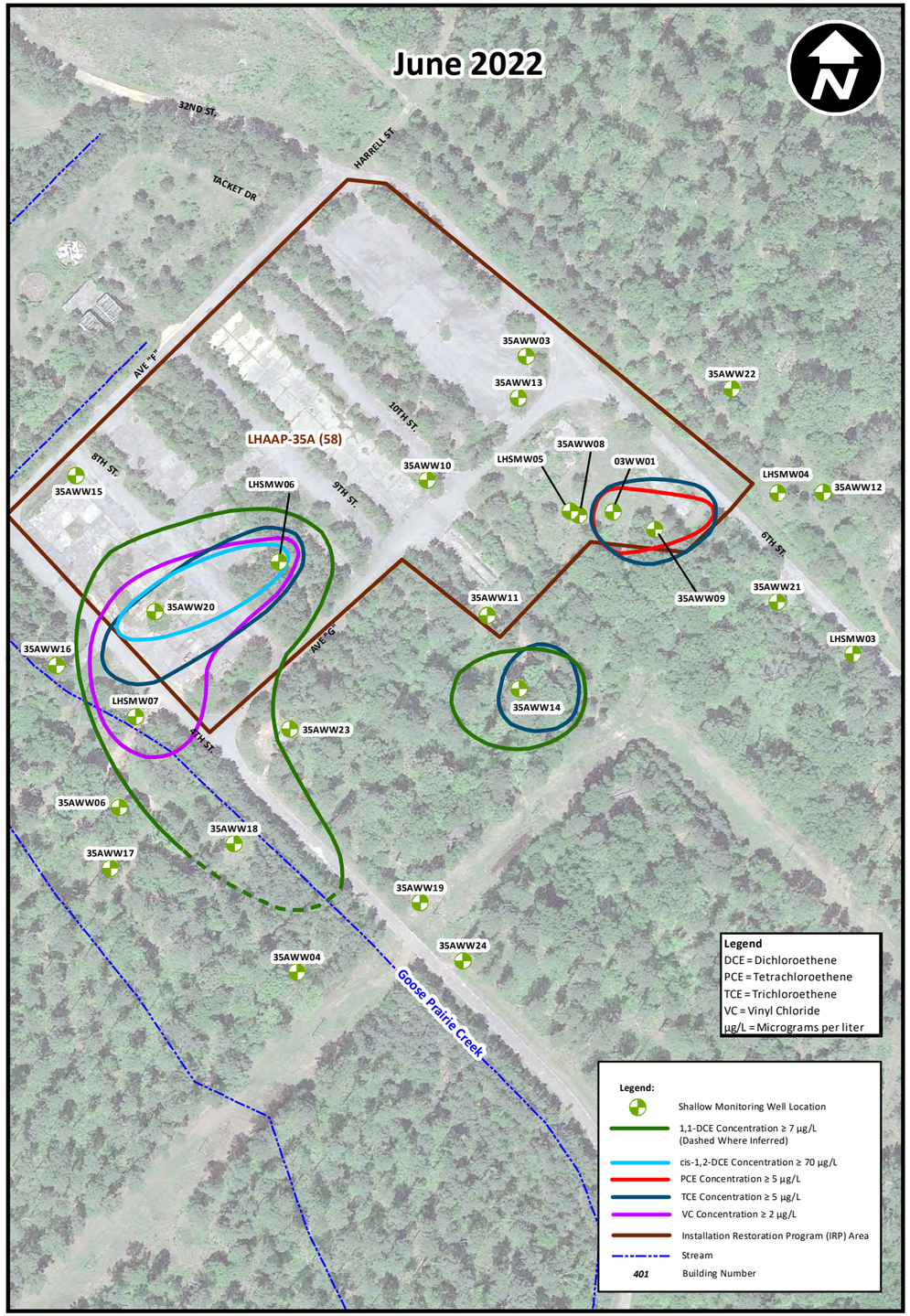
PROJECT NO: NW01312.0150.012.0001.03

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Figure 70





Lateral Extent of Plume Comparison (October 2016 and June 2022)

Figure 9

Year 8 Annual Remedial Action Operation Report (December 2021 – June 2022)
LHAAP-35A (58), Shops Area
Longhorn Army Ammunition Plant
Karnack, Texas

DRAWN BY: MRM

DATE: 2/10/2023

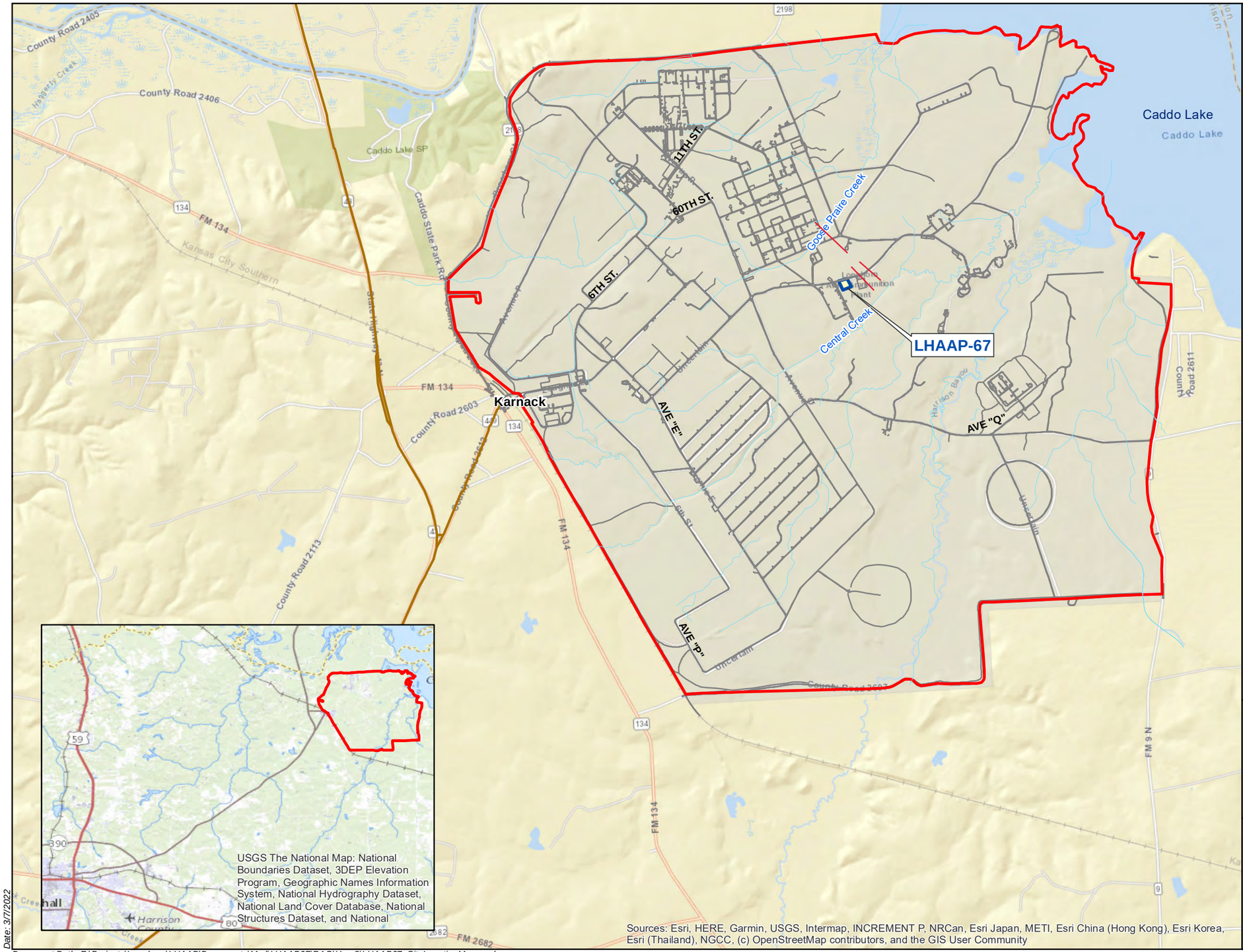
SCALE: As Shown

PROJECT NO: NWO1312.0150.012.0001.03

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Figure 71



Notes:
1. LHAAP = Longhorn Army Ammunition Plant
2. RA-O = Remedial Action Operations

N

0 1,500 3,000 Feet

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TULSA DISTRICT
TULSA, OKLAHOMA

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Figure 1-2

LHAAP Site Vicinity Map
Eighth Annual RA-O Report
LHAAP-67

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Date: 3/7/2022

Document Path: F:\Projects\Longhorn\LHAAP\Documents\Mxd\LHAAP67\RAO\Year8\LHAAP67_SiteLocationMap.mxd

Figure 72

67WW05		
Analyte	MCL	Nov 2021
1,1,1-Trichloroethane	200	< 0.5 U
1,1,2-Trichloroethane	5	< 1 U
1,1-Dichloroethene	7	< 0.5 U
1,2-Dichloroethane	5	< 0.5 U
cis-1,2-Dichloroethene	70	< 0.5 U
Trichloroethene	5	< 0.5 U
Vinyl chloride	2	< 0.5 U

67WW02		
Analyte	MCL	Nov 2021
1,1,1-Trichloroethane	200	< 0.5 U
1,1,2-Trichloroethane	5	0.6 J
1,1-Dichloroethene	7	**100**
1,2-Dichloroethane	5	3.2
cis-1,2-Dichloroethene	70	< 0.5 U
Trichloroethene	5	< 0.5 U
Vinyl chloride	2	< 0.5 U

67WW17		
Analyte	MCL	Nov 2021
1,1,1-Trichloroethane	200	< 0.5 U
1,1,2-Trichloroethane	5	< 1 U
1,1-Dichloroethene	7	< 0.5 U
1,2-Dichloroethane	5	< 0.5 U
cis-1,2-Dichloroethene	70	< 0.5 U
Trichloroethene	5	< 0.5 U
Vinyl chloride	2	< 0.5 U

67WW01		
Analyte	MCL	Nov 2021
1,1,1-Trichloroethane	200	< 0.5 U
1,1,2-Trichloroethane	5	< 1 U
1,1-Dichloroethene	7	**23**
1,2-Dichloroethane	5	3
cis-1,2-Dichloroethene	70	< 0.5 U
Trichloroethene	5	< 0.5 U
Vinyl chloride	2	< 0.5 U

67WW12		
Analyte	MCL	Nov 2021
1,1,1-Trichloroethane	200	< 0.5 U
1,1,2-Trichloroethane	5	< 1 U
1,1-Dichloroethene	7	6.5
1,2-Dichloroethane	5	< 0.5 U
cis-1,2-Dichloroethene	70	< 0.5 U
Trichloroethene	5	< 0.5 U
Vinyl chloride	2	< 0.5 U

67WW16I		
Analyte	MCL	Nov 2021
1,1,1-Trichloroethane	200	< 0.5 U
1,1,2-Trichloroethane	5	< 1 U
1,1-Dichloroethene	7	< 0.5 U
1,2-Dichloroethane	5	< 0.5 U
cis-1,2-Dichloroethene	70	< 0.5 U
Trichloroethene	5	< 0.5 U
Vinyl chloride	2	< 0.5 U

67WW18		
Analyte	MCL	Nov 2021
1,1,1-Trichloroethane	200	< 0.5 U
1,1,2-Trichloroethane	5	< 1 U
1,1-Dichloroethene	7	< 0.5 U
1,2-Dichloroethane	5	< 0.5 U
cis-1,2-Dichloroethene	70	< 0.5 U
Trichloroethene	5	< 0.5 U
Vinyl chloride	2	< 0.5 U

67WW13*		
Analyte	MCL	Nov 2021
1,1,1-Trichloroethane	200	< 0.5 U
1,1,2-Trichloroethane	5	**5.9 J**
1,1-Dichloroethene	7	**410 J**
1,2-Dichloroethane	5	**43 J**
cis-1,2-Dichloroethene	70	1.6 J
Trichloroethene	5	2.4 J
Vinyl chloride	2	< 0.5 U

67WW08		
Analyte	MCL	Nov 2021
1,1,1-Trichloroethane	200	< 0.5 U
1,1,2-Trichloroethane	5	< 1 U
1,1-Dichloroethene	7	**18**
1,2-Dichloroethane	5	0.67 J
cis-1,2-Dichloroethene	70	< 0.5 U
Trichloroethene	5	< 0.5 U
Vinyl chloride	2	< 0.5 U

67WW14		
Analyte	MCL	Nov 2021
1,1,1-Trichloroethane	200	< 0.5 U
1,1,2-Trichloroethane	5	< 1 U
1,1-Dichloroethene	7	3
1,2-Dichloroethane	5	0.58 J
cis-1,2-Dichloroethene	70	< 0.5 U
Trichloroethene	5	< 0.5 U
Vinyl chloride	2	< 0.5 U

67WW15		
Analyte	MCL	Nov 2021
1,1,1-Trichloroethane	200	< 0.5 U
1,1,2-Trichloroethane	5	**5.7**
1,1-Dichloroethene	7	**420**
1,2-Dichloroethane	5	**43**
cis-1,2-Dichloroethene	70	1.6
Trichloroethene	5	2.2
Vinyl chloride	2	< 0.5 U

67WW09		
Analyte	MCL	Nov 2021
1,1,1-Trichloroethane	200	< 0.5 U
1,1,2-Trichloroethane	5	**5.5**
1,1-Dichloroethene	7	< 0.5 U
1,2-Dichloroethane	5	**29**
cis-1,2-Dichloroethene	70	1.4
Trichloroethene	5	1.4
Vinyl chloride	2	< 0.5 U

67WW11		
Analyte	MCL	Nov 2021
1,1,1-Trichloroethane	200	< 0.5 U
1,1,2-Trichloroethane	5	< 1 U
1,1-Dichloroethene	7	1.2
1,2-Dichloroethane	5	< 0.5 U
cis-1,2-Dichloroethene	70	< 0.5 U
Trichloroethene	5	< 0.5 U
Vinyl chloride	2	< 0.5 U

67WW07		
Analyte	MCL	Nov 2021
1,1,1-Trichloroethane	200	< 0.5 U
1,1,2-Trichloroethane	5	< 1 U
1,1-Dichloroethene	7	< 0.5 U
1,2-Dichloroethane	5	< 0.5 U
cis-1,2-Dichloroethene	70	< 0.5 U
Trichloroethene	5	< 0.5 U
Vinyl chloride	2	< 0.5 U

67WW10		
Analyte	MCL	Nov 2021
1,1,1-Trichloroethane	200	< 0.5 U
1,1,2-Trichloroethane	5	< 1 U
1,1-Dichloroethene	7	< 0.5 U
1,2-Dichloroethane	5	< 0.5 U
cis-1,2-Dichloroethene	70	< 0.5 U
Trichloroethene	5	< 0.5 U
Vinyl chloride	2	< 0.5 U

67WW09A		
Analyte	MCL	Nov 2021
1,1,1-Trichloroethane	200	< 0.5 U
1,1,2-Trichloroethane	5	< 1 U
1,1-Dichloroethene	7	< 0.5 U
1,2-Dichloroethane	5	< 0.5 U
cis-1,2-Dichloroethene	70	< 0.5 U
Trichloroethene	5	< 0.5 U
Vinyl chloride	2	< 0.5 U

67WW03 Dry

67WW06

67WW04

7 µg/L

5 µg/L

5 µg/L

7 µg/L

- Current MNA Parameter Analysis Well Location
- Shallow Monitoring Well
- Intermediate Monitoring Well
- Former Railroad Location
- Groundwater Flow Direction
- 1,1,2-Trichloroethane Contour
- 1,1-Dichloroethene Contour (*Dashed where inferred*)
- 1,2-Dichloroethane Contour
- Culvert
- Roads
- Buildings
- LHAAP-67 Site Boundary

Note:
1. Data Qualifiers:
J = Estimated value; analyte concentration was less than the limit of quantification.
U = Analyte was not detected
2. Result highlighted yellow indicates results exceeds MCL.
3. MCL = Maximum Contaminant Level
4. All concentrations are in microgram per liter (µg/L)
5. RA-O = Remedial Action Operations
6. LHAAP = Longhorn Army Ammunition Plant
7. 67WW16I is an intermediate well and data was not used for contour lines
8. * = The Field Duplicate results were used. An evaluation of the historical data concluded that these values are more representative of the site groundwater.

Monitoring wells 67WW04 and 67WW06 are no longer part of the RA-O monitoring network.

N

0 35 70 Feet

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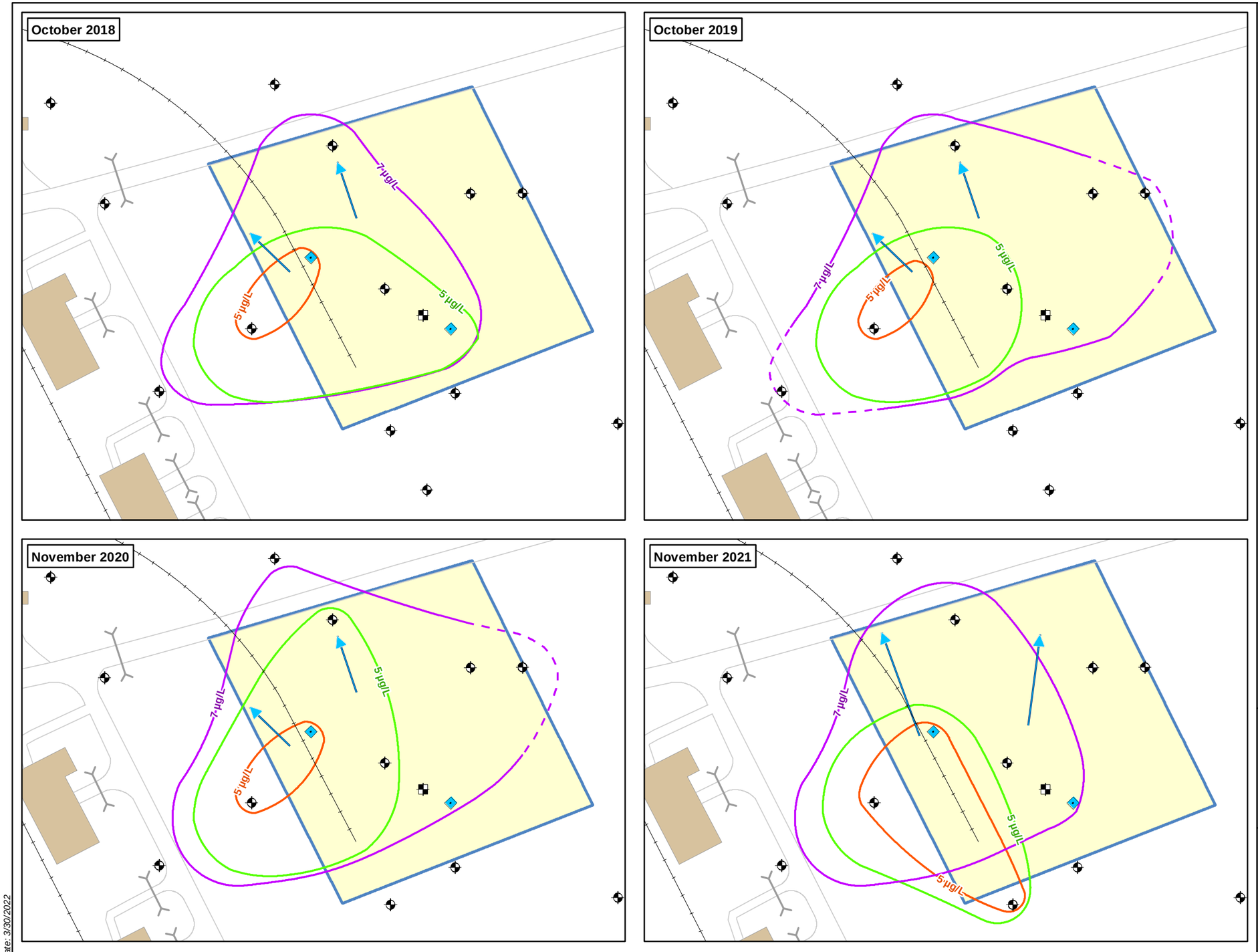
Figure 2-4
Groundwater Results
November 2021
Eighth Annual RA-O Report
LHAAP-67

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Date: 3/30/2022

Document Path: F:\Projects\Longhorn\LHAAP\Documents\Mxd\LHAAP67\RAO\Year8\LHAAP67_VOCsShallowZoneNov2021_GW.mxd

Figure 73



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TULSA, OKLAHOMA

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Figure 3-2

Plume Stability
Eighth Annual RA-O Report
LHAAP-67

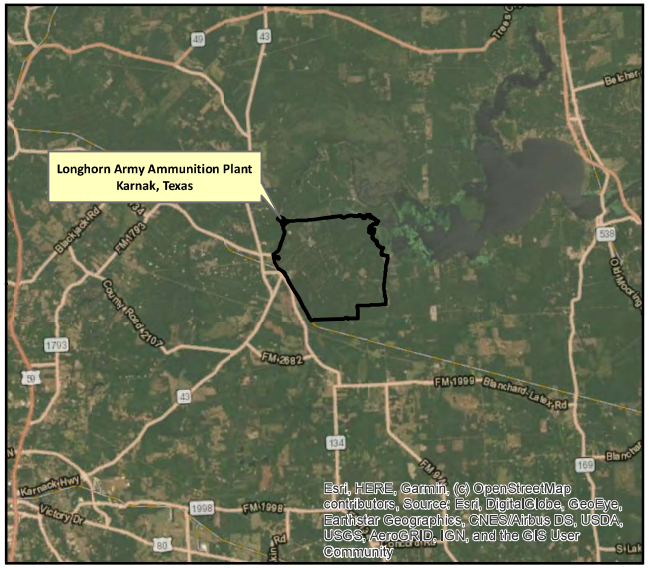
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

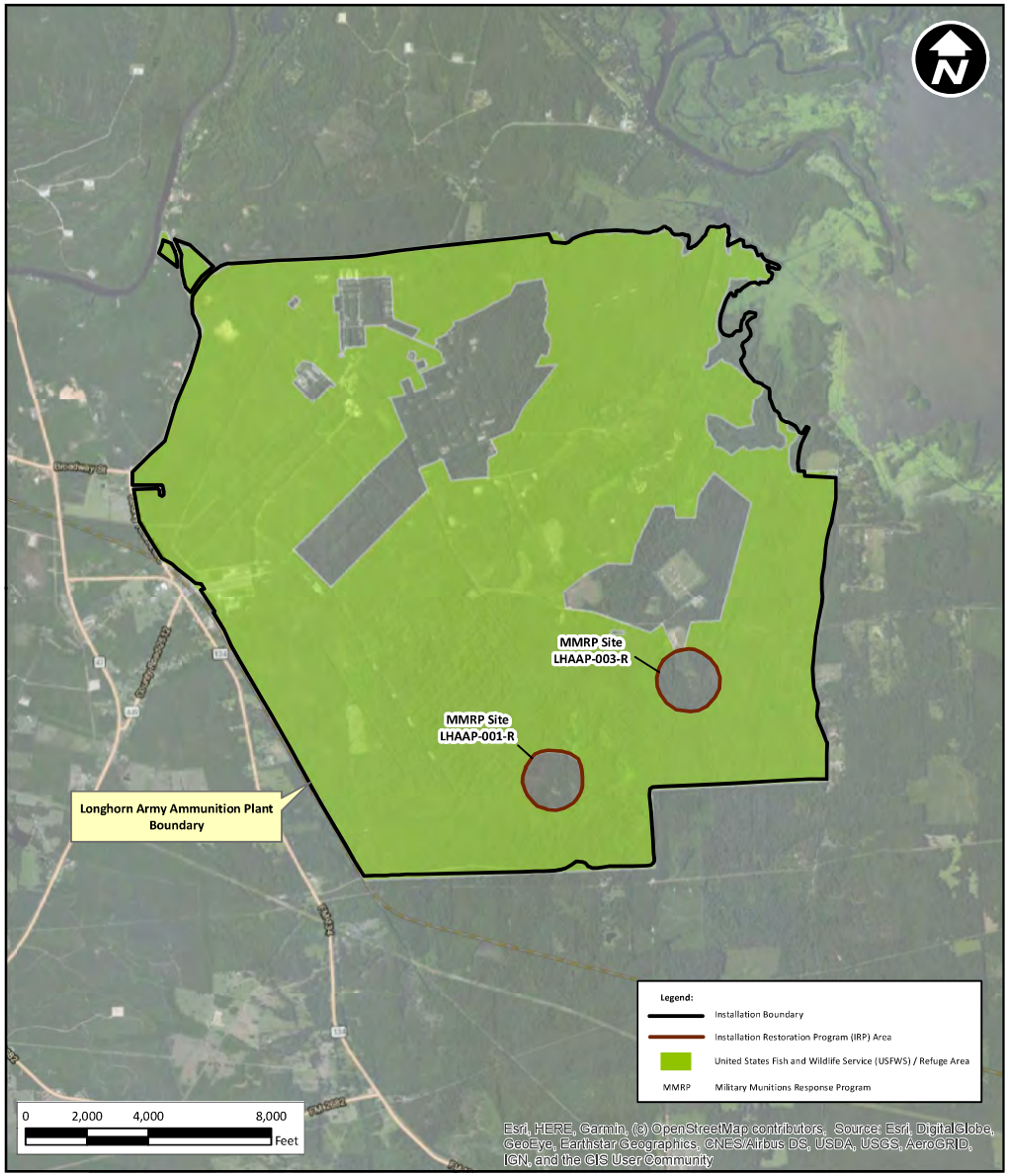
Date: 3/30/2022

Document Path: F:\Projects\Longhorn\LHAAP\Documents\Mxd\LHAAP67\RAO\Year8\LHAAP67_PlumeStability.mxd

Figure 74







LHAAP Site Map

Figure 1-1

Year 3 Land Use Control Monitoring Report for
LHAAP-001-R-01 AND LHAAP-003-R-01
Longhorn Army Ammunition Plant
Karnack, Texas

DRAWN BY: MRM

DATE: 4/10/2020

SCALE: As Shown

PROJECT NO: NWO1312.0150.014.0001.04

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Figure 75

Figure 1-2. LHAAP-001-R-01 Site Location Map with LUC Boundaries
Longhorn Army Ammunition Plant, Karnack, Texas

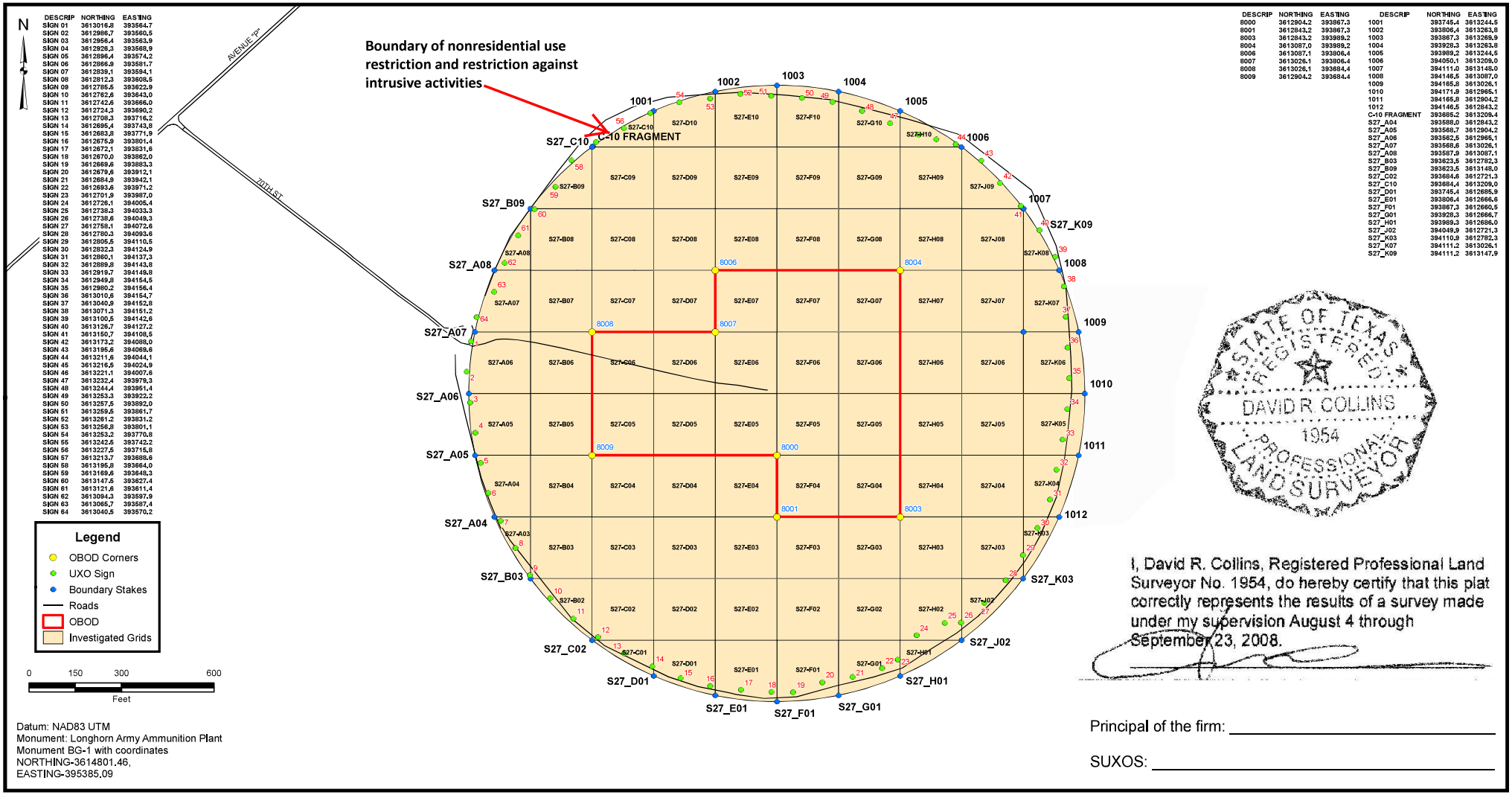
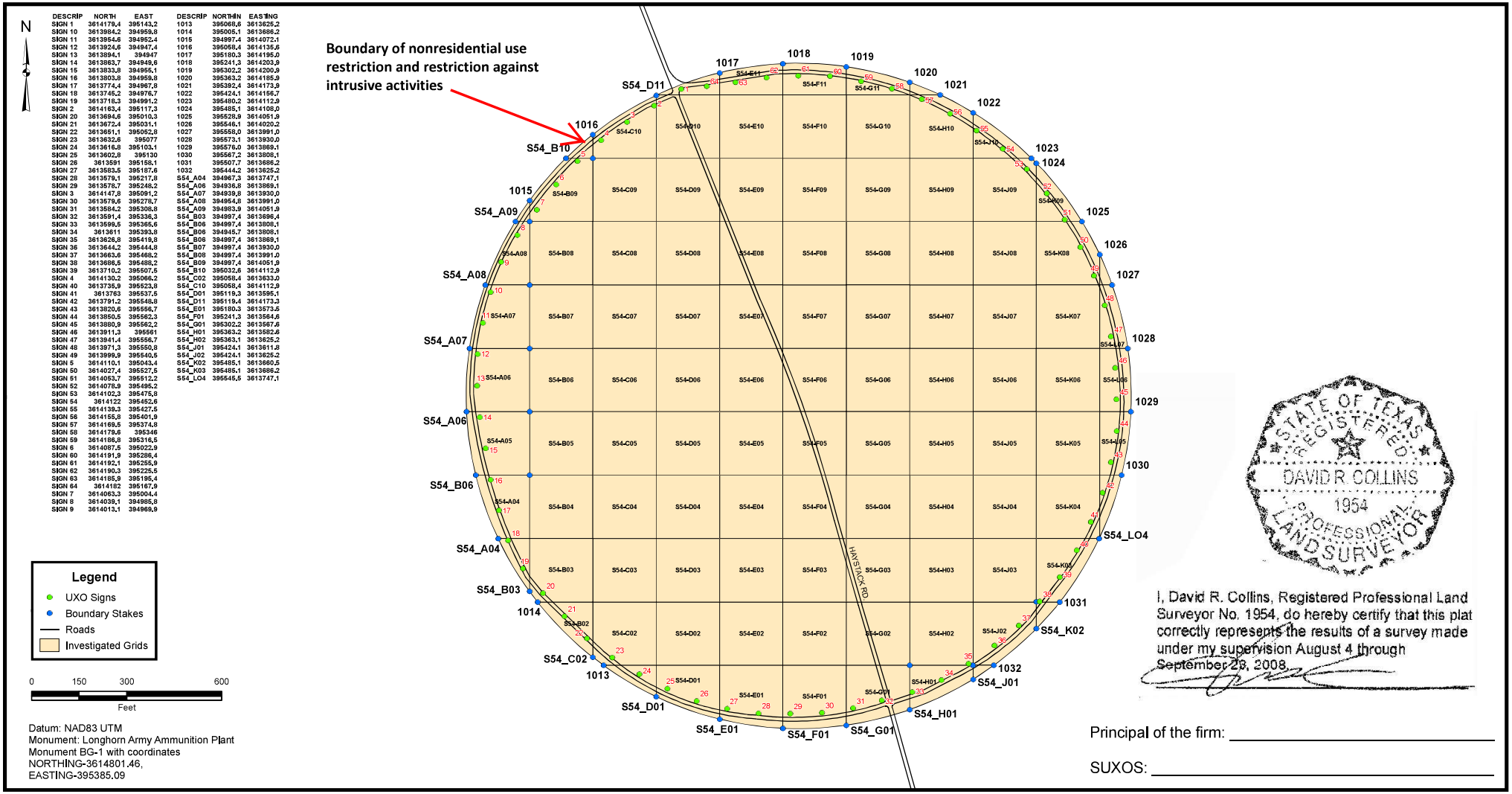


Figure 76

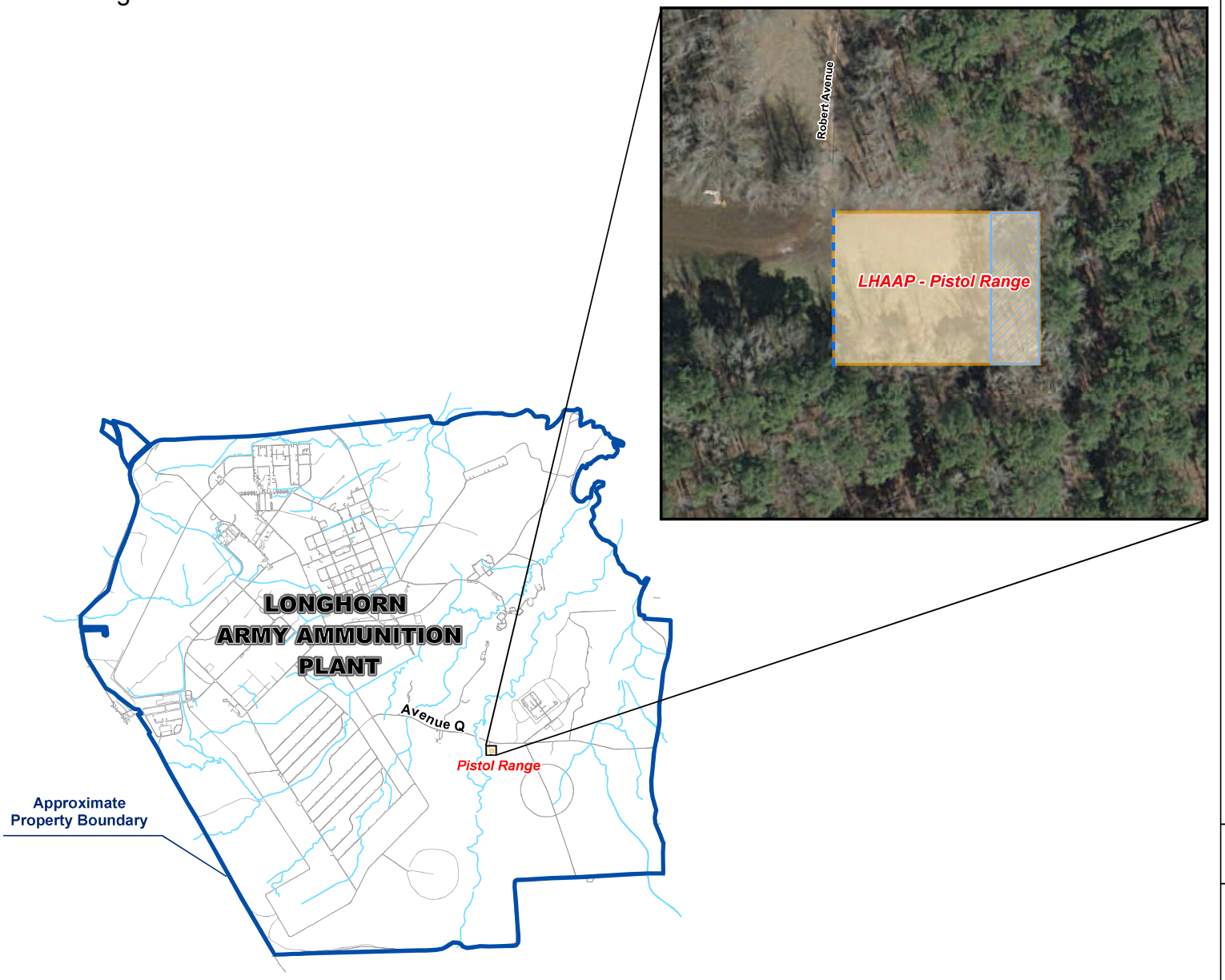
Figure 1-3. LHAAP-003-R-01 Site Location Map with LUC Boundaries
Longhorn Army Ammunition Plant, Karnack, Texas



DESCRIP	NORTH	EAST
SIGN 1	3614179,4	395143,2
SIGN 10	3613984,2	394959,8
SIGN 11	3613954,6	394952,4
SIGN 12	3613924,6	394947,4
SIGN 13	3613894,1	394947
SIGN 14	3613863,7	394948,6
SIGN 15	3613833,8	394955,1
SIGN 16	3613803,8	394959,8
SIGN 17	3613774,4	394967,9
SIGN 18	3613745,2	394976,7
SIGN 19	3613718,3	394991,2
SIGN 2	3614163,4	395117,3
SIGN 20	3613694,6	395010,3
SIGN 21	3613672,4	395031,1
SIGN 22	3613651,1	395052,8
SIGN 23	3613632,6	395077
SIGN 24	3613616,8	395103,1
SIGN 25	3613602,8	395130
SIGN 26	3613591	395158,1
SIGN 27	3613583,5	395187,6
SIGN 28	3613579,1	395217,8
SIGN 29	3613578,7	395248,2
SIGN 3	3614147,8	395091,2
SIGN 30	3613579,6	395278,7
SIGN 31	3613584,2	395308,8
SIGN 32	3613591,4	395336,3
SIGN 33	3613599,5	395365,8
SIGN 34	3613611	395393,8
SIGN 35	3613626,8	395419,8
SIGN 36	3613644,2	395444,8
SIGN 37	3613663,6	395468,2
SIGN 38	3613686,5	395488,2
SIGN 39	3613710,2	395507,5
SIGN 4	3614130,2	395066,2
SIGN 40	3613735,9	395523,8
SIGN 41	3613763	395537,5
SIGN 42	3613791,2	395548,8
SIGN 43	3613820,6	395556,7
SIGN 44	3613850,5	395562,3
SIGN 45	3613880,9	395562,2
SIGN 46	3613911,3	395561
SIGN 47	3613941,4	395556,7
SIGN 48	3613971,3	395550,8
SIGN 49	3613999,9	395540,5
SIGN 5	3614110,1	395043,4
SIGN 50	3614027,4	395527,5
SIGN 51	3614053,7	395512,2
SIGN 52	3614078,9	395495,2
SIGN 53	3614102,3	395475,8
SIGN 54	3614122	395452,8
SIGN 55	3614138,3	395427,5
SIGN 56	3614155,8	395401,9
SIGN 57	3614169,5	395374,8
SIGN 58	3614179,6	395346
SIGN 59	3614186,8	395316,5
SIGN 6	3614087,5	395022,9
SIGN 60	3614191,9	395286,4
SIGN 61	3614192,1	395255,9
SIGN 62	3614190,3	395225,5
SIGN 63	3614185,9	395195,4
SIGN 64	3614182	395167,9
SIGN 7	3614063,3	395004,4
SIGN 8	3614039,1	394985,8
SIGN 9	3614013,1	394969,9

DESCRIP	NORTHIN	EASTING
1013	395068,8	3613625,2
1014	395005,1	3613686,2
1015	394997,4	3614072,1
1016	395068,4	3614135,8
1017	395180,3	3614195,0
1018	395241,3	3614203,9
1019	395302,2	3614200,9
1020	395363,2	3614185,9
1021	395392,4	3614173,9
1022	395424,1	3614156,7
1023	395480,2	3614112,9
1024	395485,1	3614108,0
1025	395528,9	3614051,9
1026	395546,1	3614020,2
1027	395558,0	3613991,0
1028	395573,1	3613930,0
1029	395576,0	3613869,1
1030	395567,2	3613808,1
1031	395507,7	3613686,2
1032	395444,2	3613625,2
S54_A04	394967,3	3613747,1
S54_A06	394936,8	3613869,1
S54_A07	394939,8	3613930,0
S54_A08	394954,8	3613991,0
S54_A09	394983,9	3614051,9
S54_B03	394997,4	3613696,4
S54_B06	394997,4	3613808,1
S54_B06	394945,7	3613808,1
S54_B06	394997,4	3613869,1
S54_B07	394997,4	3613930,0
S54_B08	394997,4	3613991,0
S54_B09	394997,4	3614051,9
S54_B10	395032,6	3614112,9
S54_C02	395058,4	3613633,0
S54_C10	395058,4	3614112,9
S54_D01	395119,3	3613595,1
S54_D11	395119,4	3614173,3
S54_E01	395180,3	3613573,6
S54_F01	395241,3	3613564,6
S54_G01	395302,2	3613567,6
S54_H01	395363,2	3613582,6
S54_H02	395363,1	3613625,2
S54_J01	395424,1	3613611,8
S54_J02	395424,1	3613625,2
S54_K02	395485,1	3613660,5
S54_K03	395485,1	3613686,2
S54_LO4	395545,5	3613747,1

Figure 77



LEGEND

- Approximate Firing Line Location
- Stream
- Road
- Target Embankment
- Pistol Range

N

0 37.5 75 150 Feet

OFFICE	DRAWN BY	CHECKED BY	APPROVED BY	FILE PATH
Houston, TX	B. Grod 01/20/10	A. Mayila 01/20/10	G. Jones 01/20/10	T:\GIS\1117591_LHAAP\Doc\Mxd\PistolRange\RodFig2-2SiteLocation.mxd

Shaw

U.S. ARMY CORPS OF ENGINEERS
TULSA DISTRICT
TULSA, OKLAHOMA

FIGURE 2-2

SITE LOCATION MAP
FORMER PISTOL RANGE

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

APPENDIX A
PUBLIC NOTICE AFFIDAVIT

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THE MARSHALL
NEWS MESSENGER

The Marshall News Messenger
309 E Austin
Marshall, TX 75670

01/12/23

Phone:(903) 935-7914 Fax:(903) 935-6242 Email:

AFFIDAVIT OF PUBLICATION

State of Texas)

County of Harrison)

This Affidavit of Publication for the Marshall News Messenger, a daily newspaper of general circulation, printed and published at Marshall, hereby certifies that the attached legal notice, ad # 1758560, was published in said newspaper on January 15, 2023, and that copies of each paper in which said Public Notice was published were delivered by carriers to the subscribers of said paper, according to their accustomed mode of business in this office.

Dianne Gray
for the Marshall News Messenger

The above Affidavit and Certificate of Publication was subscribed and sworn to before me by the above-named Dianne Gray, who is personally known to me to be the identical person in the above certificate on this 17th day of January, 2023.

Dana Morton
Notary Public in and for
State of Texas)
County of Harrison)

My commission expires 3-21-2025

DANA MORTON
Notary Public, State of Texas
Comm. Expires 03-21-2025
Notary ID 2486572

ad id: 1758560

Longhorn Army Ammunition Plant, Texas
Public Notice: Fifth Five-Year Review for Longhorn Army Ammunition Plant

The U.S. Department of the Army is initiating the Fifth Five-Year Review of the environmental remedies implemented at 14 sites at Longhorn Army Ammunition Plant (LHAAP), Texas. LHAAP was placed on the National Priorities List in August 1990. The U.S. Environmental Protection Agency and Texas Commission on Environmental Quality provide regulatory oversight support concerning environmental cleanup measures.

Five-Year Reviews are required by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), commonly known as Superfund, and the National Contingency Plan or NCP. The purpose of a Five-Year Review is to evaluate the implementation and performance of a remedy to determine if the remedy is or will be protective of human health and the environment. Five-Year Reviews also identify issues discovered during the review, if any, and provide recommendations to address them. The Five-Year Review Report documents the methods used for the review, and the findings and conclusions based on a records review and a site inspection. The Fifth Five-Year Review includes evaluation of the following sites:

- LHAAP-001-R-001 Site 27; South Test Area/Bomb Test Area
- LHAAP-003-R-01 Ground Signal Test Area
- LHAAP-004-R-01 Former Pistol Range
- LHAAP-03 Former Waste Collection Pad Building 722-P Paint Shop
- LHAAP-12 Sanitary Fill Area
- LHAAP-16 Landfill
- LHAAP-17 Burning Ground No. 2 Flashing Area, Group 2 Groundwater
- LHAAP-18/24 Burning Ground No. 3 and Unlined Evaporation Pond
- LHAAP-35B(37) Chemical Laboratory
- LHAAP-46 Plant 2 Area, Group 4
- LHAAP-49 Former Acid Storage Area
- LHAAP-50 Former Waste Tank, Group 4
- LHAAP-35A(58) Shops Area, Group 4
- LHAAP-67 Above Ground Storage Tank Farm

The Fifth Five-Year Review Report is scheduled for completion by December 15, 2023. Upon completion of the Fifth Five-Year Review Report, a public notice will be published to announce its availability for public review in the Administrative Record available at http://www.lonzhornaap.com/ and in person at:

Marshall Public Library
300 South Alamo Boulevard
Marshall Texas, 75670

Please contact Rose Zeiler at (571) 403-3232 or via email at rose.m.zeilerctr@army.mil if you have any questions or comments about this LHAAP Five-Year Review.

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The Marshall News Messenger CLASSIFIEDS

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LEGAL NOTICES

Former Longhorn Army Ammunition Plant, Texas Public Notice: Fifth Five-Year Review for Former Longhorn Army Ammunition Plant

The U.S. Department of the Army is initiating the Fifth Five-Year Review of the environmental remedies implemented at 14 sites at the former Longhorn Army Ammunition Plant (LHAAP), Texas. LHAAP was placed on the National Priorities List in August 1990. The U.S. Environmental Protection Agency and Texas Commission on Environmental Quality provide regulatory oversight support concerning environmental cleanup measures.

Five-Year Reviews are required by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), commonly known as Superfund, and the National Contingency Plan or NCP. The purpose of a Five-Year Review is to evaluate the implementation and performance of a remedy to determine if the remedy is or will be protective of human health and the environment. Five-Year Reviews also identify issues discovered during the review, if any, and provide recommendations to address them. The Five-Year Review Report documents the methods used for the review, and the findings and conclusions based on a records review and a site inspection. The Fifth Five-Year Review includes evaluation of the following sites:

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Marshall Public Library
300 South Alamo Boulevard
Marshall Texas, 75679

Please contact Rose Zeiler at (571) 403-3232 or via email at rose.m.zeiler.ctr@army.mil if you have any questions or comments about this LHAAP Five-Year Review.

CITATION BY PUBLICATION

THE STATE OF TEXAS
TO: UNKNOWN HEIRS OF **BEVERLY LOFTON MEADOWS, DECEASED**

On 14th November, 2020, **TAMMY LOFTON** filed an **APPLICATION FOR INDEPENDENT ADMINISTRATION AND LETTERS OF ADMINISTRATION PURSUANT TO SECTION 401.003 OF THE TEXAS ESTATE CODE, AND APPLICATION TO DETERMINE HEIRSHIP** in a proceeding styled In The Estate of BEVERLY LOFTON MEADOWS, **DECEASED**, and bearing the number **2022-18684-CCL**, in the County Court At Law of Harrison County, Texas**.**

The Court will hear the aforesaid **Application** at 10:00 A.M. on the Monday next after the expiration of 10 days after the date of publication of this citation, before the Honorable Joe Black in the County Court at Law of Harrison County, at the Courthouse in said County located at 200 West Houston Street in Marshall, Texas.

All persons interested in the aforesaid estate are commanded to appear at or before the time set for said hearing by filing a written contest to or answer to said Amended Application should they desire to oppose or contest it.

Said written contest or answer shall be filed in the office of the County Clerk of Harrison County, Texas in Marshall, Texas.

The officer serving this citation shall, in compliance with the law, serve it by publication once in a newspaper of general circulation in this, the county in which such proceeding is pending, for not less than ten days before the return day hereof, exclusive of the day of publication, and the date of publication said newspaper bears shall be the day of publication.

If this citation is not served within 90 days after the date of issuance, it shall be returned unserved.

Given under my hand and seal of said Court at Marshall, Texas this 12 January 2023.

Attorney for Applicant:
Ronald Ned Dennis
P.O. Box 299
Marshall, Texas 75670
903-938-3746 (Phone)
903-938-6012 (Fax)

Clerk of the Court:
ELIZABETH JAMES, COUNTY CLERK
Harrison County, Texas

By: Wanda Spencer, Deputy Clerk

NOTICE OF APPLICATION FOR COMMERCIAL DISPOSAL PERMIT

Crosstex Environmental Services, 0415 Texas St, Ste 201 Shreveport, LA 71101 is applying to the Railroad Commission of Texas for a commercial disposal permit to dispose of oil and gas waste by injection into a formation not productive of oil or gas. The applicant proposes to inject into the Fredericksburg/Goodland Lime formation, Frazier, well number 1. The well is located 4 miles Southeast of Scottsville, TX in the Longwood (Goodland Lime) field in Harrison County. Fluid will be injected into strata in the subsurface depth interval from 2,865 to 2,990 feet.

LEGAL AUTHORITY: Chapter 27 of the Texas Water Code, As amended, Title 3 of the Texas Natural Resources Code, as amended and the Statewide Rules of the Oil and Gas Division of the Railroad Commission of Texas.

Requests for public hearing from persons who can show they are adversely affected or requests for further information concerning any aspect of the application should be submitted in writing, within fifteen days of publication, to Environmental Services Section, Oil and Gas Division, Railroad Commission of Texas, P O Box 12967 Austin, Texas 78711.
(512-463-6792).

Notice of Sale:
DC Self Storage, 3103 W. Grand, **Saturday, January 14, 2023 @ 10 a.m.** Contents of:
A-6, A-56; B-81, B-103;
C-128, C-135; E-193, E-195;
F-219, F-231; G-255;
P-310, P-313

NOTICE OF PUBLIC SALE

Pursuant to Chapter 59, Texas Property Code, **Marshall Storage**, which is located at **2600 Victory Dr. Marshall, TX 75672**, will hold an **ONLINE AUCTION** public auction of property being sold to satisfy a landlord's lien. This is **not** in person. All winners must pay a $100 deposit that will be refunded back to their card once the unit is cleaned out.
The sale will be held at the following website address:
Lockerfox.com.
Starting **SUNDAY JANUARY 22ND** & ending **SUNDAY JANUARY 29TH AT 7PM**.
Property will be sold to the highest bidder through the website. Seller reserves the right to not accept any bid and to withdraw property from sale. Property in each space may be sold item-by-item, in batches, or by the space. Property being sold includes contents in space(s) of the tenant listed below, with brief description of contents in the space(s).

General description of property:
Taylor Evans A5 - Baby furniture, couches, ottoman, tables
Yarkendus Bradley A22 - Misc furniture
Lakeisha Mackey A32 - Decorative pictures, bed frames, misc decor, TV, bar stool
Celia Bradden A45 – rainbow Christmas tree, misc plastic bins
Gloria Hawkins A58 - Records, misc. Furniture & boxes
James Brown B29 - Swing, Microwave, misc boxes, trunk, misc furniture
Norman Padgett C39 – automotive supplies
Norman Padgett D13 - Trunk, tool box, misc boxes, headboard, total body sculptor, kids toys
Christian Fyffe E16 - Misc furniture, kids toys
Deshanna Brown F28 - Mattresses, misc furniture, misc boxes, lamps

NOTICE OF PUBLIC SALE

Pursuant to Chapter 59, Texas Property Code, **AMERICAN STORAGE**, which is located at **2408 EAST END BLVD SOUTH, MARSHALL, TX 75670** will hold an **ONLINE AUCTION** public auction of property being sold to satisfy a landlord's lien. This is **not** in person. All winners must pay a $100 deposit that will be refunded back to their card once the unit is cleaned out.
The sale will be held at the following website address:
Lockerfox.com.
Starting **SUNDAY JANUARY 22ND** & ending **SUNDAY JANUARY 29TH AT 7PM**.
Property will be sold to the highest bidder through the website. Seller reserves the right to not accept any bid and to withdraw property from sale. Property in each space may be sold item-by-item, in batches, or by the space. Property being sold includes contents in space(s) of the tenant listed below, with brief description of contents in the space(s).

General description of property:
Connie Gray A7 - Rocking chair, curio cabinet, record cabinet, plastic bins, trunk, misc furniture, rocking chair, misc boxes
Barbara Davis A12 - Coffee table, misc pillows, misc boxes
LS Jernigan B26 - Space heaters, plastic bins, dining chairs
Quaren Hall B41 - Car jack, misc boxes, mattress, electric wheelchair, shelves
Scott Jones B44 - Electric fireplaces, toolboxes, furniture, misc plastic bins & boxes, guitar
Greg McPherson B48 - Couches, mini-fridge, misc chairs, misc boxes
Ricardo Lugones C11 - TV stand, dresser, chairs, dining tables & chair, misc small appliances & furniture

LIQUOR LICENSE

Legal Notice

Notice is hereby given in accordance with the terms and provisions of the Texas Alcoholic Beverage Code that Dolgencorp of Texas, Inc. has filed for a Wine and Malt Beverage Retail Dealer's Off Premise Permit to be issued to: Dolgencorp of Texas, Inc. dba Dollar General Store #24486 located at 9646 Hwy 59 N, Marshall, TX 75670.

Steven R. Deckard – CEO
John Garratt – CFO
Emily C. Taylor - SEC

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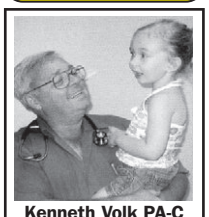
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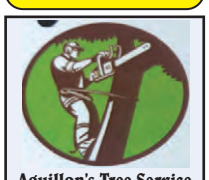
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APPENDIX B
SITE INSPECTION FORMS

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I. SITE INFORMATION	
Site name: LHAAP-03	**Date of inspection:** February 14-15, 2023
Location and Region: Longhorn Army Ammunition Plant / U.S. Environmental Protection Agency (EPA), Region 6	**EPA ID:** TX110000619910
Agency, office, or company leading the five-year review: U.S. Army Corps of Engineers, Omaha District	**Weather/temperature:** Sunny/60ºF

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☐ Access controls
- ☐ Institutional controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☒ Other Excavation and Offsite Disposal
- ☐ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls

Attachments: ☐ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (Check all that apply)

Interviews conducted separate from the site inspection. Interview responses are presented in Appendix D of the Five-Year Review.

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**
   - ☐ O&M manual ☐ Readily available ☐ Up to date ☒ N/A
   - ☐ As-built drawings ☐ Readily available ☐ Up to date ☒ N/A
   - ☐ Maintenance logs ☐ Readily available ☐ Up to date ☒ N/A

   Remarks Bhate, 2019. Remedial Design and Remedial Action Work Plan, LHAAP-03 Former Waste Collection Pad, Building 722-P, Paint Shop, LHAAP, Karnack, TX.

2. **Site-Specific Health and Safety Plan** ☒ Readily available ☒ Up to date ☐ N/A
   ☐ Contingency/Emergency Response Plan ☐ Readily available ☐ Up to date ☐ N/A
   Remarks _____

3. **O&M and OSHA Training Records** ☐ Readily available ☐ Up to date ☒ N/A
   Remarks _____

4. **Permits and Service Agreements**
   - ☐ Air discharge permit ☐ Readily available ☐ Up to date ☒ N/A
   - ☐ Effluent discharge ☐ Readily available ☐ Up to date ☒ N/A
   - ☐ Waste disposal, POTW ☐ Readily available ☐ Up to date ☒ N/A
   - ☐ Other permits _____ ☐ Readily available ☐ Up to date ☒ N/A

   Remarks _____

5. **Gas Generation Records** ☐ Readily available ☐ Up to date ☒ N/A
   Remarks _____

6. **Settlement Monument Records** ☐ Readily available ☐ Up to date ☒ N/A
   Remarks _____

7. **Groundwater Monitoring Records** ☐ Readily available ☐ Up to date ☒ N/A
   Remarks _____

8. **Leachate Extraction Records** ☐ Readily available ☐ Up to date ☒ N/A
   Remarks _____

9. **Discharge Compliance Records**
   - ☐ Air ☐ Readily available ☐ Up to date ☒ N/A
   - ☐ Water (effluent) ☐ Readily available ☐ Up to date ☒ N/A

   Remarks _____

10. **Daily Access/Security Logs** ☐ Readily available ☐ Up to date ☒ N/A
Remarks _____
_____

IV. O&M COSTS

1. **O&M Organization**
☐ State in-house ☐ Contractor for State
☐ PRP in-house ☐ Contractor for PRP
☐ Federal Facility in-house ☐ Contractor for Federal Facility
☐ Other _____
_____

2. **O&M Cost Records**
☐ Readily available ☐ Up to date
☐ Funding mechanism/agreement in place
Original O&M cost estimate _____ ☐ Breakdown attached

Total annual cost by year for review period if available

From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost
From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost
From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost
From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost
From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost

3. **Unanticipated or Unusually High O&M Costs During Review Period**
Describe costs and reasons: Operations and maintenance costs were not obtained. Work is being completed under a performance-based acquisition contract. As a result, costs are fixed-price and do not include variances that would identify potential remedy problems or issues.

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N/A

A. Fencing

1. **Fencing damaged** ☐ Location shown on site map ☐ Gates secured ☒ N/A
Remarks

B. Other Access Restrictions

1. **Signs and other security measures** ☐ Location shown on site map ☒ N/A
Remarks _____
_____

C. Institutional Controls (ICs)

1. **Implementation and enforcement**
Site conditions imply ICs not properly implemented ☐ Yes ☒ No ☐ N/A
Site conditions imply ICs not being fully enforced ☐ Yes ☒ No ☐ N/A

Type of monitoring (*e.g.*, self-reporting, drive by) Site inspections
Frequency Annual
Responsible party/agency Army
Contact Aaron Williams USAEC Tulsa District _____
Name Title Date Phone no.

Reporting is up-to-date ☒ Yes ☐ No ☐ N/A
Reports are verified by the lead agency ☒ Yes ☐ No ☐ N/A

Specific requirements in deed or decision documents have been met
☒ Yes ☐ No ☐ N/A
Violations have been reported ☐ Yes ☒ No ☐ N/A
Other problems or suggestions: ☐ Report attached
Note that LUCs and ICs for LHAAP-03 are not a part of the remedy. LHAAP-03 is contained within LHAAP-58 and the LUCs and restrictions in place for LHAAP-58 have incorporated LHAAP-03 following a 2018 ESD for LHAAP-58

2. **Adequacy** ☒ ICs are adequate ☐ ICs are inadequate ☐ N/A
Remarks Current and future land use is restricted to non-residential use. Groundwater use is prohibited and was not observed during the inspection.

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ☒ No vandalism evident
Remarks _____
_____

2. **Land use changes on site** ☐ N/A
Remarks No land use changes on site.

3. **Land use changes off site** ☐ N/A
Remarks No land use changes off site.

VI. GENERAL SITE CONDITIONS

A. Roads ☒ Applicable ☐ N/A

1. **Roads damaged** ☐ Location shown on site map ☒ Roads adequate ☐ N/A
Remarks Access to the site is via paved roads in good condition.

B. Other Site Conditions

Remarks None.

VII. LANDFILL COVERS ☐ Applicable ☒ N/A

A. Landfill Surface

1. **Settlement** (Low spots) ☐ Location shown on site map ☐ Settlement not evident
Areal extent _____ Depth _____
Remarks _____
_____

2. **Cracks** ☐ Location shown on site map ☐ Cracking not evident
Lengths _____ Widths _____ Depths _____
Remarks _____
_____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
Areal extent _____ Depth _____
Remarks

4. **Holes** ☐ Location shown on site map ☐ Holes not evident
Areal extent _____ Depth _____
Remarks _____
_____

5. **Vegetative Cover** ☐ Grass ☐ Cover properly established ☐ No signs of stress
☐ Trees/Shrubs (indicate size and locations on a diagram)
Remarks

6. **Alternative Cover (armored rock, concrete, etc.)** ☐ N/A
Remarks _____
_____

7. **Bulges** ☐ Location shown on site map ☐ Bulges not evident
Areal extent _____ Height _____
Remarks _____
_____

8. **Wet Areas/Water Damage** ☐ Wet areas/water damage not evident
☐ Wet areas ☐ Location shown on site map Areal extent
☐ Ponding ☐ Location shown on site map Areal extent _____
☐ Seeps ☐ Location shown on site map Areal extent _____
☐ Soft subgrade ☐ Location shown on site map Areal extent _____
Remarks

9. **Slope Instability** ☐ Slides ☐ Location shown on site map ☐ No evidence of slope instability
Areal extent _____
Remarks _____
_____

B. Benches ☐ Applicable ☒ N/A
(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** ☐ Location shown on site map ☐ N/A or okay
Remarks _____
_____

2. **Bench Breached** ☐ Location shown on site map ☐ N/A or okay
Remarks _____
_____

3. **Bench Overtopped** ☐ Location shown on site map ☐ N/A or okay
Remarks _____
_____

C. Letdown Channels ☐ Applicable ☒ N/A
(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** ☐ Location shown on site map ☐ No evidence of settlement
Areal extent _____ Depth _____
Remarks _____
_____

2. **Material Degradation** ☐ Location shown on site map ☐ No evidence of degradation
Material type _____ Areal extent _____
Remarks _____
_____

3. **Erosion** ☐ Location shown on site map ☐ No evidence of erosion
Areal extent _____ Depth _____
Remarks _____
_____

4. **Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting
Areal extent _____ Depth _____
Remarks _____
_____

5. **Obstructions** ☐ No obstructions ☐ Location shown on site map
Type _____ Areal extent _____
Size _____
Remarks _____
_____

6. **Excessive Vegetative Growth** Type _____
☐ No evidence of excessive growth
☐ Vegetation in channels does not obstruct flow
☐ Location shown on site map Areal extent _____
Remarks _____
_____

D. Cover Penetrations ☐ Applicable ☒ N/A

1. **Gas Vents** ☐ Active ☐ Passive
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks _____
_____

2. **Gas Monitoring Probes**
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks

3. **Monitoring Wells** (within surface area of landfill)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks

4. **Leachate Extraction Wells**
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks _____
_____

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☐ N/A
Remarks_____
_____

E. Gas Collection and Treatment ☐ Applicable ☒ N/A

1. **Gas Treatment Facilities**
☐ Flaring ☐ Thermal destruction ☐ Collection for reuse
☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

2. **Gas Collection Wells, Manifolds and Piping**
☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

3. **Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings)
☐ Good condition ☐ Needs Maintenance ☐ N/A
Remarks _____
_____

F. Cover Drainage Layer ☐ Applicable ☒ N/A

1. **Outlet Pipes Inspected** ☐ Functioning ☐ N/A
Remarks _____
_____

2. **Outlet Rock Inspected** ☐ Functioning ☐ N/A
Remarks _____
_____

G. Detention/Sedimentation Ponds ☐ Applicable ☒ N/A

1. **Siltation** Areal extent _____ Depth _____ ☐ N/A
☐ Siltation not evident
Remarks _____
_____

2. **Erosion** Areal extent _____ Depth _____
☐ Erosion not evident
Remarks _____
_____

3. **Outlet Works** ☐ Functioning ☐ N/A
Remarks _____
_____

4. **Dam** ☐ Functioning ☐ N/A
Remarks _____
_____

H. Retaining Walls ☐ Applicable ☒ N/A

1. **Deformations** ☐ Location shown on site map ☐ Deformation not evident
Horizontal displacement _____ Vertical displacement _____
Rotational displacement _____
Remarks _____
_____

2. **Degradation** ☐ Location shown on site map ☐ Degradation not evident
Remarks _____
_____

I. Perimeter Ditches/Off-Site Discharge ☐ Applicable ☒ N/A

1. **Siltation** ☐ Location shown on site map ☐ Siltation not evident
Areal extent _____ Depth _____
Remarks _____
_____

2. **Vegetative Growth** ☐ Location shown on site map ☐ N/A
☐ Vegetation does not impede flow
Areal extent _____ Type _____
Remarks _____
_____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
Areal extent _____ Depth _____
Remarks

4. **Discharge Structure** ☐ Functioning ☐ N/A
Remarks _____
_____

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A

Remarks Vertical barrier walls are not a component of the remedy at LHAAP-03.

1. **Settlement** ☐ Location shown on site map ☐ Settlement not evident
Areal extent _____ Depth _____
Remarks _____
_____

2. **Performance Monitoring** Type of monitoring _____
☐ Performance not monitored
Frequency _____ ☐ Evidence of breaching
Head differential _____
Remarks _____
_____

IX. GROUNDWATER/SURFACE WATER REMEDIES ☐ Applicable ☒ N/A

A. Groundwater Extraction Wells, Pumps, and Pipelines ☐ Applicable ☒ N/A

1. **Pumps, Wellhead Plumbing, and Electrical**
☐ Good condition ☐ All required wells properly operating ☐ Needs Maintenance ☐ N/A
Remarks _____
_____
_____

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

3. **Spare Parts and Equipment**
☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided
Remarks _____
_____

B. Surface Water Collection Structures, Pumps, and Pipelines ☐ Applicable ☒ N/A

1. **Collection Structures, Pumps, and Electrical**
☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

3. **Spare Parts and Equipment**
☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided
Remarks _____
_____

C. Treatment System ☐ Applicable ☒ N/A

1. **Treatment Train** (Check components that apply)
   - ☐ Metals removal ☐ Oil/water separation ☐ Bioremediation
   - ☐ Air stripping ☐ Carbon adsorbers
   - ☐ Filters _____
   - ☐ Additive (*e.g.*, chelation agent, flocculent) _____
   - ☐ Others _____
   - ☐ Good condition ☐ Needs Maintenance
   - ☐ Sampling ports properly marked and functional
   - ☐ Sampling/maintenance log displayed and up to date
   - ☐ Equipment properly identified
   - ☐ Quantity of groundwater treated annually _____
   - ☐ Quantity of surface water treated annually _____

   Remarks _____

2. **Electrical Enclosures and Panels** (properly rated and functional)
   - ☐ N/A ☐ Good condition ☐ Needs Maintenance

   Remarks _____

3. **Tanks, Vaults, Storage Vessels**
   - ☐ N/A ☐ Good condition ☐ Proper secondary containment ☐ Needs Maintenance

   Remarks _____

4. **Discharge Structure and Appurtenances**
   - ☐ N/A ☐ Good condition ☐ Needs Maintenance

   Remarks _____

5. **Treatment Building(s)**
   - ☐ N/A ☐ Good condition (esp. roof and doorways) ☐ Needs repair
   - ☐ Chemicals and equipment properly stored

   Remarks _____

6. **Monitoring Wells** (pump and treatment remedy)
   - ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
   - ☐ All required wells located ☐ Needs Maintenance ☐ N/A

   Remarks _____

D. Monitoring Data

1. Monitoring Data
   - ☐ Is routinely submitted on time ☐ Is of acceptable quality

2. Monitoring data suggests:
☐ Groundwater plume is effectively contained ☐ Contaminant concentrations are declining

E. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ All required wells located ☐ Needs Maintenance ☒ N/A
Remarks _____
_____

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

Soil excavation and offsite disposal occurred in 2019 and 2020. Confirmation sampling determined that all samples achieved cleanup goals for lead and most samples achieved cleanup goals for arsenic (5.9 mg/kg). Step out excavations occurred at Area C in August 2020 until all samples were below the remediation goal for arsenic. The backfill used to level the excavation sites was below cleanup goals and the LHAAP-03 site is contained within the LHAAP-58 site and covered by its LUC and MNA remedies.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).
The remedy was effective and functioning as designed to protect human health by preventing lead and arsenic contaminated soils from potentially leaching into the underlying groundwater. The Five-Year Review site inspection confirmed the land use controls for LHAAP-58 prohibit changes in land use. There were no violations of LHAAP-58 land use controls nor evidence of prohibited use of groundwater observed during the site inspection.

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.
There is no requirement for O&M.

C. Early Indicators of Potential Remedy Problems

Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.

There are no indications of potential problems that were identified during the Five-Year Review site inspection.

D.	Opportunities for Optimization
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. The Five-Year Review did not identify opportunities for optimization at LHAAP-03.

I. SITE INFORMATION	
Site name: LHAAP-04	**Date of inspection:** February 14-15, 2023
Location and Region: Longhorn Army Ammunition Plant / U.S. Environmental Protection Agency (EPA), Region 6	**EPA ID:** TX110000619910
Agency, office, or company leading the five-year review: U.S. Army Corps of Engineers, Omaha District	**Weather/temperature:** Sunny/60°F

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☒ Access controls
- ☒ Institutional controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☒ Other In situ bioremediation
- ☒ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls

Attachments: ☐ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (Check all that apply)

Interviews conducted separate from the site inspection. Interview responses are presented in Appendix D of the Five-Year Review.

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**
   - ☒ O&M manual — ☒ Readily available — ☒ Up to date — ☐ N/A
   - ☒ As-built drawings — ☒ Readily available — ☒ Up to date — ☐ N/A
   - ☒ Maintenance logs — ☒ Readily available — ☒ Up to date — ☐ N/A

   Remarks *Draft Final Remedial Design and Remedial Action Work Plan, LHAAP-04 Former Pilot Wastewater Treatment Plant, Longhorn Army Ammunition Plant, Karnack, Texas, April 2019*

2. **Site-Specific Health and Safety Plan** ☒ Readily available ☒ Up to date ☐ N/A
   ☐ Contingency/Emergency Response Plan ☐ Readily available ☐ Up to date ☐ N/A
   Remarks _____

3. **O&M and OSHA Training Records** ☐ Readily available ☐ Up to date ☒ N/A
   Remarks _____

4. **Permits and Service Agreements**
   - ☐ Air discharge permit — ☐ Readily available — ☐ Up to date — ☒ N/A
   - ☐ Effluent discharge — ☐ Readily available — ☐ Up to date — ☒ N/A
   - ☐ Waste disposal, POTW — ☐ Readily available — ☐ Up to date — ☒ N/A
   - ☐ Other permits _____ — ☐ Readily available — ☐ Up to date — ☒ N/A

   Remarks _____

5. **Gas Generation Records** ☐ Readily available ☐ Up to date ☒ N/A
   Remarks _____

6. **Settlement Monument Records** ☐ Readily available ☐ Up to date ☒ N/A
   Remarks _____

7. **Groundwater Monitoring Records** ☒ Readily available ☒ Up to date ☐ N/A
   Remarks *Draft Final First Annual Remedial Action Operation Report, LHAAP-04 Former Pilot Wastewater Treatment Plant, Longhorn Army Ammunition Plant, Karnack, Texas, June 2021*

8. **Leachate Extraction Records** ☐ Readily available ☐ Up to date ☒ N/A
   Remarks _____

9. **Discharge Compliance Records**
   - ☐ Air — ☐ Readily available — ☐ Up to date — ☒ N/A
   - ☐ Water (effluent) — ☐ Readily available — ☐ Up to date — ☒ N/A

   Remarks _____

10. **Daily Access/Security Logs** ☐ Readily available ☐ Up to date ☒ N/A
Remarks _____
_____

IV. O&M COSTS

1. **O&M Organization**
☐ State in-house ☐ Contractor for State
☐ PRP in-house ☐ Contractor for PRP
☐ Federal Facility in-house ☐ Contractor for Federal Facility
☐ Other _____
_____

2. **O&M Cost Records**
☐ Readily available ☐ Up to date
☐ Funding mechanism/agreement in place
Original O&M cost estimate _____ ☐ Breakdown attached

Total annual cost by year for review period if available

From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost
From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost
From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost
From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost
From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost

3. **Unanticipated or Unusually High O&M Costs During Review Period**
Describe costs and reasons: Operations and maintenance costs were not obtained. Work is being completed under a performance-based acquisition contract. As a result, costs are fixed-price and do not include variances that would identify potential remedy problems or issues.

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N/A

A. Fencing

1. **Fencing damaged** ☐ Location shown on site map ☐ Gates secured ☒ N/A
Remarks _____
_____

B. Other Access Restrictions

1. **Signs and other security measures** ☐ Location shown on site map ☒ N/A
Remarks _____
_____

C. Institutional Controls (ICs)

1. **Implementation and enforcement**
Site conditions imply ICs not properly implemented ☐ Yes ☒ No ☐ N/A
Site conditions imply ICs not being fully enforced ☐ Yes ☒ No ☒ N/A

Type of monitoring (*e.g.*, self-reporting, drive by) Site inspections
Frequency Annual
Responsible party/agency Army
Contact Rose Zeiler LHAAP RPMP _____
Name Title Date Phone no.

Reporting is up-to-date ☒ Yes ☐ No ☐ N/A
Reports are verified by the lead agency ☒ Yes ☐ No ☐ N/A

Specific requirements in deed or decision documents have been met
☒ Yes ☐ No ☐ N/A
Violations have been reported ☐ Yes ☒ No ☐ N/A
Other problems or suggestions: ☐ Report attached
Land use restrictions were filed with Harrison County in 2021 and are enforced on site.

2. **Adequacy** ☒ ICs are adequate ☐ ICs are inadequate ☐ N/A
Remarks Current and future land use is restricted to non-residential use. Groundwater use is prohibited and was not observed during the inspection.

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ☒ No vandalism evident
Remarks _____
_____

2. **Land use changes on site** ☐ N/A
Remarks No land use changes on site.

3. **Land use changes off site** ☐ N/A
Remarks No land use changes off site.

VI. GENERAL SITE CONDITIONS

A. Roads ☒ Applicable ☐ N/A

1. **Roads damaged** ☐ Location shown on site map ☒ Roads adequate ☐ N/A
Remarks Access to the site is via paved roads in good condition.

B. Other Site Conditions

Remarks None.

VII. LANDFILL COVERS ☐ Applicable ☒ N/A

A. Landfill Surface

1. **Settlement** (Low spots) ☐ Location shown on site map ☐ Settlement not evident
   Areal extent _____ Depth _____
   Remarks _____
   _____

2. **Cracks** ☐ Location shown on site map ☐ Cracking not evident
   Lengths _____ Widths _____ Depths _____
   Remarks _____
   _____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
   Areal extent _____ Depth _____
   Remarks

4. **Holes** ☐ Location shown on site map ☐ Holes not evident
   Areal extent _____ Depth _____
   Remarks _____
   _____

5. **Vegetative Cover** ☐ Grass ☐ Cover properly established ☐ No signs of stress
   ☐ Trees/Shrubs (indicate size and locations on a diagram)
   Remarks

6. **Alternative Cover (armored rock, concrete, etc.)** ☐ N/A
   Remarks _____
   _____

7. **Bulges** ☐ Location shown on site map ☐ Bulges not evident
   Areal extent _____ Height _____
   Remarks _____
   _____

8. **Wet Areas/Water Damage** ☐ Wet areas/water damage not evident
   ☐ Wet areas ☐ Location shown on site map Areal extent
   ☐ Ponding ☐ Location shown on site map Areal extent _____
   ☐ Seeps ☐ Location shown on site map Areal extent _____
   ☐ Soft subgrade ☐ Location shown on site map Areal extent _____
   Remarks

9. **Slope Instability** ☐ Slides ☐ Location shown on site map ☐ No evidence of slope instability
Areal extent _____
Remarks _____
_____

B. Benches ☐ Applicable ☒ N/A
(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** ☐ Location shown on site map ☐ N/A or okay
Remarks _____
_____

2. **Bench Breached** ☐ Location shown on site map ☐ N/A or okay
Remarks _____
_____

3. **Bench Overtopped** ☐ Location shown on site map ☐ N/A or okay
Remarks _____
_____

C. Letdown Channels ☐ Applicable ☒ N/A
(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** ☐ Location shown on site map ☐ No evidence of settlement
Areal extent _____ Depth _____
Remarks _____
_____

2. **Material Degradation** ☐ Location shown on site map ☐ No evidence of degradation
Material type _____ Areal extent _____
Remarks _____
_____

3. **Erosion** ☐ Location shown on site map ☐ No evidence of erosion
Areal extent _____ Depth _____
Remarks _____
_____

4. **Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting
Areal extent _____ Depth _____
Remarks _____
_____

5. **Obstructions** ☐ No obstructions ☐ Location shown on site map
Type _____ Areal extent _____
Size _____
Remarks _____
_____

6. **Excessive Vegetative Growth** Type _____
☐ No evidence of excessive growth
☐ Vegetation in channels does not obstruct flow
☐ Location shown on site map Areal extent _____
Remarks _____
_____

D. Cover Penetrations ☐ Applicable ☒ N/A

1. **Gas Vents** ☐ Active ☐ Passive
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks _____
_____

2. **Gas Monitoring Probes**
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks _____
_____

3. **Monitoring Wells** (within surface area of landfill)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks _____
_____

4. **Leachate Extraction Wells**
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks _____
_____

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☐ N/A
Remarks_____
_____

E. Gas Collection and Treatment ☐ Applicable ☒ N/A

1. **Gas Treatment Facilities**
☐ Flaring ☐ Thermal destruction ☐ Collection for reuse
☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

2. **Gas Collection Wells, Manifolds and Piping**
☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

3. **Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings)
☐ Good condition ☐ Needs Maintenance ☐ N/A
Remarks _____
_____

F. Cover Drainage Layer ☐ Applicable ☒ N/A

1. **Outlet Pipes Inspected** ☐ Functioning ☐ N/A
Remarks _____
_____

2. **Outlet Rock Inspected** ☐ Functioning ☐ N/A
Remarks _____
_____

G. Detention/Sedimentation Ponds ☐ Applicable ☒ N/A

1. **Siltation** Areal extent _____ Depth _____ ☐ N/A
☐ Siltation not evident
Remarks _____
_____

2. **Erosion** Areal extent _____ Depth _____
☐ Erosion not evident
Remarks _____
_____

3. **Outlet Works** ☐ Functioning ☐ N/A
Remarks _____
_____

4. **Dam** ☐ Functioning ☐ N/A
Remarks _____
_____

H. Retaining Walls ☐ Applicable ☒ N/A

1. **Deformations** ☐ Location shown on site map ☐ Deformation not evident
Horizontal displacement _____ Vertical displacement _____
Rotational displacement _____
Remarks _____
_____

2. **Degradation** ☐ Location shown on site map ☐ Degradation not evident
Remarks _____
_____

I. Perimeter Ditches/Off-Site Discharge ☐ Applicable ☒ N/A

1. **Siltation** ☐ Location shown on site map ☐ Siltation not evident
Areal extent _____ Depth _____
Remarks _____
_____

2. **Vegetative Growth** ☐ Location shown on site map ☐ N/A
☐ Vegetation does not impede flow
Areal extent _____ Type _____
Remarks _____
_____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
Areal extent _____ Depth _____
Remarks

4. **Discharge Structure** ☐ Functioning ☐ N/A
Remarks _____
_____

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A
Remarks Vertical Barrier Walls are not component of the remedy at LHAAP-04

1. **Settlement** ☐ Location shown on site map ☐ Settlement not evident
Areal extent _____ Depth _____
Remarks _____
_____

2. **Performance Monitoring** Type of monitoring _____
☐ Performance not monitored
Frequency _____ ☐ Evidence of breaching
Head differential _____
Remarks _____
_____

IX. GROUNDWATER/SURFACE WATER REMEDIES ☒ Applicable ☐ N/A

A. Groundwater Extraction Wells, Pumps, and Pipelines ☐ Applicable ☒ N/A

1. **Pumps, Wellhead Plumbing, and Electrical**
☐ Good condition ☐ All required wells properly operating ☐ Needs Maintenance ☐ N/A
Remarks _____
_____
_____

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

3. **Spare Parts and Equipment**
☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided
Remarks _____
_____

B. Surface Water Collection Structures, Pumps, and Pipelines ☐ Applicable ☒ N/A

1. **Collection Structures, Pumps, and Electrical**
☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

3. **Spare Parts and Equipment**
☐ Readily available ☐ Good condition ☐ Requires upgrade ☒ Needs to be provided
Remarks _____
_____

C. Treatment System ☒ Applicable ☐ N/A

1. **Treatment Train** (Check components that apply)
☐ Metals removal ☐ Oil/water separation ☒ Bioremediation
☐ Air stripping ☐ Carbon adsorbers
☐ Filters _____
☐ Additive (*e.g.*, chelation agent, flocculent) _____
☐ Others _____
☐ Good condition ☐ Needs Maintenance
☐ Sampling ports properly marked and functional
☐ Sampling/maintenance log displayed and up to date
☐ Equipment properly identified
☐ Quantity of groundwater treated annually _____
☐ Quantity of surface water treated annually _____
Remarks Bioremediation amendments consisted of emulsified vegetable oil and diammonium phosphate

2. **Electrical Enclosures and Panels** (properly rated and functional)
☐ N/A ☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

3. **Tanks, Vaults, Storage Vessels**
☐ N/A ☐ Good condition ☐ Proper secondary containment ☐ Needs Maintenance
Remarks _____
_____

4. **Discharge Structure and Appurtenances**
☐ N/A ☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

5. **Treatment Building(s)**
☐ N/A ☐ Good condition (esp. roof and doorways) ☐ Needs repair
☐ Chemicals and equipment properly stored
Remarks _____
_____

6. **Monitoring Wells** (pump and treatment remedy)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ All required wells located ☐ Needs Maintenance ☐ N/A
Remarks _____
_____

D. Monitoring Data

1. Monitoring Data
☒ Is routinely submitted on time ☒ Is of acceptable quality

2. Monitoring data suggests:
☒ Groundwater plume is effectively contained ☒ Contaminant concentrations are declining

E. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)
☒ Properly secured/locked ☒ Functioning ☐ Routinely sampled ☒ Good condition
☐ All required wells located ☐ Needs Maintenance ☐ N/A
Remarks _____
_____

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).
The remedy is effective and functioning as designed to 1) protect human health by preventing ingestion of groundwater contaminated with perchlorate, 2) prevent groundwater contaminated with perchlorate from migrating into nearby surface water and 3) return groundwater to its potential beneficial use as drinking water, wherever practicable, within a reasonable time period given the particular site circumstances. The bioremediation injections appear to have been effective at decreasing concentrations of perchlorate below the protective concentration level throughout the site. The Five-Year Review site inspection confirmed land use controls prohibit changes in land use. There were no violations of land use controls nor evidence of prohibited use of groundwater observed during the site inspection.

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.
O&M includes annual inspection of groundwater monitoring system and LUC maintenance. Reports are included in the annual remedial action operation reports. No issues with O&M were found during the site inspection.

C. Early Indicators of Potential Remedy Problems

Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.

There are no indications of potential problems that were identified during the Five-Year Review site inspection.

D.	Opportunities for Optimization
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. The Five-Year Review did not identify opportunities for optimization at LHAAP-04.

I. SITE INFORMATION	
Site name: LHAAP-012	**Date of inspection:** February 14-15, 2023
Location and Region: Longhorn Army Ammunition Plant / U.S. Environmental Protection Agency (EPA), Region 6	**EPA ID:** TX110000619910
Agency, office, or company leading the five-year review: U.S. Army Corps of Engineers, Omaha District	**Weather/temperature:** Sunny/60ºF

Remedy Includes: (Check all that apply)

- ☒ Landfill cover/containment
- ☒ Access controls
- ☒ Institutional controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☐ Other
- ☒ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls

Attachments: ☐ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (Check all that apply)

Interviews conducted separate from the site inspection. Interview responses are presented in Appendix D of the Five-Year Review.

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**
   - ☒ O&M manual — ☒ Readily available — ☒ Up to date — ☐ N/A
   - ☒ As-built drawings — ☒ Readily available — ☒ Up to date — ☐ N/A
   - ☒ Maintenance logs — ☒ Readily available — ☒ Up to date — ☐ N/A

   Remarks Shaw, 2007. Final Remedial Design Addendum Landfill 12 (LHAAP-12) Longhorn Army Ammunition Plant, Karnack, Texas.

2. **Site-Specific Health and Safety Plan** ☒ Readily available ☒ Up to date ☐ N/A
   ☐ Contingency/Emergency Response Plan ☐ Readily available ☐ Up to date ☐ N/A
   Remarks _____

3. **O&M and OSHA Training Records** ☐ Readily available ☐ Up to date ☒ N/A
   Remarks _____

4. **Permits and Service Agreements**
   - ☐ Air discharge permit — ☐ Readily available — ☐ Up to date — ☒ N/A
   - ☐ Effluent discharge — ☐ Readily available — ☐ Up to date — ☒ N/A
   - ☐ Waste disposal, POTW — ☐ Readily available — ☐ Up to date — ☒ N/A
   - ☐ Other permits _____ — ☐ Readily available — ☐ Up to date — ☒ N/A

   Remarks _____

5. **Gas Generation Records** ☐ Readily available ☐ Up to date ☒ N/A
   Remarks _____

6. **Settlement Monument Records** ☐ Readily available ☐ Up to date ☒ N/A
   Remarks _____

7. **Groundwater Monitoring Records** ☒ Readily available ☒ Up to date ☐ N/A
   Remarks *2020 Remedial Action Operation Report, Landfill 12 (LHAAP-12), June 2021*

8. **Leachate Extraction Records** ☐ Readily available ☐ Up to date ☒ N/A
   Remarks _____

9. **Discharge Compliance Records**
   - ☐ Air — ☐ Readily available — ☐ Up to date — ☒ N/A
   - ☐ Water (effluent) — ☐ Readily available — ☐ Up to date — ☒ N/A

   Remarks _____

10. **Daily Access/Security Logs** ☐ Readily available ☐ Up to date ☒ N/A
Remarks _____
_____

IV. O&M COSTS

1. **O&M Organization**
☐ State in-house ☐ Contractor for State
☐ PRP in-house ☐ Contractor for PRP
☐ Federal Facility in-house ☐ Contractor for Federal Facility
☐ Other _____
_____

2. **O&M Cost Records**
☐ Readily available ☐ Up to date
☐ Funding mechanism/agreement in place
Original O&M cost estimate _____ ☐ Breakdown attached

Total annual cost by year for review period if available

From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost
From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost
From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost
From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost
From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost

3. **Unanticipated or Unusually High O&M Costs During Review Period**
Describe costs and reasons: Operations and maintenance costs were not obtained. Work is being completed under a performance-based acquisition contract. As a result, costs are fixed-price and do not include variances that would identify potential remedy problems or issues.

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N/A

A. Fencing

1. **Fencing damaged** ☐ Location shown on site map ☐ Gates secured ☐ N/A
Remarks Fencing was damaged in multiple locations (see photographs 59, 60, 63, 66 and 67 in Appendix C). Gate was unlocked and appeared non-functioning (see photograph 59 in Appendix C)

B. Other Access Restrictions

1. **Signs and other security measures** ☐ Location shown on site map ☐ N/A
Remarks Signs were obscured or removed from fencing in multiple locations (see photographs 60, 62, and 63 in Appendix C).

C. Institutional Controls (ICs)

1. **Implementation and enforcement**
Site conditions imply ICs not properly implemented ☐ Yes ☒ No ☐ N/A
Site conditions imply ICs not being fully enforced ☒ Yes ☐ No ☐ N/A

Type of monitoring (*e.g.*, self-reporting, drive by) Site inspections
Frequency Annual
Responsible party/agency Army
Contact Rose Zeiler LHAAP RPMP
Name Title Date Phone no.

Reporting is up-to-date ☒ Yes ☐ No ☐ N/A
Reports are verified by the lead agency ☒ Yes ☐ No ☐ N/A

Specific requirements in deed or decision documents have been met
☒ Yes ☐ No ☐ N/A
Violations have been reported ☐ Yes ☒ No ☐ N/A
Other problems or suggestions: ☐ Report attached
_____
_____
_____
_____

2. **Adequacy** ☐ ICs are adequate ☒ ICs are inadequate ☐ N/A
Remarks Current and future land use is restricted to non-residential use. Groundwater use is prohibited and was not observed during the inspection. Fencing around the landfill was damaged in multiple areas and the gate was not secured.

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ☒ No vandalism evident
Remarks _____
_____

2. **Land use changes on site** ☐ N/A
Remarks There have been no changes to land use since the previous Five-Year Review.

3. **Land use changes off site** ☐ N/A
Remarks No land use changes off site.

VI. GENERAL SITE CONDITIONS

A. Roads ☒ Applicable ☐ N/A

1. **Roads damaged** ☐ Location shown on site map ☒ Roads adequate ☐ N/A
   Remarks Access to the site is via paved roads in good condition.

B. Other Site Conditions

Remarks None.

VII. LANDFILL COVERS ☒ Applicable ☐ N/A

A. Landfill Surface

1. **Settlement** (Low spots) ☐ Location shown on site map ☐ Settlement not evident
   Areal extent 12-18 ft^2 Depth _____
   Remarks Small areas of depressions/settlement were found during site inspection (see photograph 71 in Appendix C).

2. **Cracks** ☐ Location shown on site map ☒ Cracking not evident
   Lengths _____ Widths _____ Depths _____
   Remarks _____

3. **Erosion** ☐ Location shown on site map ☒ Erosion not evident
   Areal extent _____ Depth _____
   Remarks

4. **Holes** ☐ Location shown on site map ☐ Holes not evident
   Areal extent Approximately 9 in^2 Depth _____
   Remarks A small number of holes were found during site inspection (see photographs 69 and 70 in Appendix C).

5. **Vegetative Cover** ☒ Grass ☐ Cover properly established ☐ No signs of stress
   ☐ Trees/Shrubs (indicate size and locations on a diagram)
   Remarks

6. **Alternative Cover (armored rock, concrete, etc.)** ☒ N/A
   Remarks _____

7. **Bulges** ☐ Location shown on site map ☒ Bulges not evident
   Areal extent _____ Height _____
   Remarks _____

8. **Wet Areas/Water Damage** ☒ Wet areas/water damage not evident
☐ Wet areas ☐ Location shown on site map Areal extent
☐ Ponding ☐ Location shown on site map Areal extent _____
☐ Seeps ☐ Location shown on site map Areal extent _____
☐ Soft subgrade ☐ Location shown on site map Areal extent _____
Remarks

9. **Slope Instability** ☐ Slides ☐ Location shown on site map ☒ No evidence of slope instability
Areal extent _____
Remarks _____
_____

B. Benches ☐ Applicable ☒ N/A
(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** ☐ Location shown on site map ☐ N/A or okay
Remarks _____
_____

2. **Bench Breached** ☐ Location shown on site map ☐ N/A or okay
Remarks _____
_____

3. **Bench Overtopped** ☐ Location shown on site map ☐ N/A or okay
Remarks _____
_____

C. Letdown Channels ☐ Applicable ☒ N/A
(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** ☐ Location shown on site map ☐ No evidence of settlement
Areal extent _____ Depth _____
Remarks _____
_____

2. **Material Degradation** ☐ Location shown on site map ☐ No evidence of degradation
Material type _____ Areal extent _____
Remarks _____
_____

3. **Erosion** ☐ Location shown on site map ☐ No evidence of erosion
Areal extent _____ Depth _____
Remarks _____
_____

4. **Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting
Areal extent _____ Depth _____
Remarks _____
_____

5. **Obstructions** ☐ No obstructions ☐ Location shown on site map
Type _____ Areal extent _____
Size _____
Remarks _____
_____

6. **Excessive Vegetative Growth** Type _____
☐ No evidence of excessive growth
☐ Vegetation in channels does not obstruct flow
☐ Location shown on site map Areal extent _____
Remarks _____
_____

D. Cover Penetrations ☐ Applicable ☒ N/A

1. **Gas Vents** ☐ Active ☐ Passive
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks _____
_____

2. **Gas Monitoring Probes**
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks

3. **Monitoring Wells** (within surface area of landfill)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks

4. **Leachate Extraction Wells**
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☒ N/A
Remarks _____
_____

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☒ N/A
Remarks_____
_____

E. Gas Collection and Treatment ☐ Applicable ☒ N/A

1. **Gas Treatment Facilities**
☐ Flaring ☐ Thermal destruction ☐ Collection for reuse
☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

2. **Gas Collection Wells, Manifolds and Piping**
☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

3. **Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings)
☐ Good condition ☐ Needs Maintenance ☐ N/A
Remarks _____
_____

F. Cover Drainage Layer ☐ Applicable ☒ N/A

1. **Outlet Pipes Inspected** ☐ Functioning ☐ N/A
Remarks _____
_____

2. **Outlet Rock Inspected** ☐ Functioning ☐ N/A
Remarks _____
_____

G. Detention/Sedimentation Ponds ☐ Applicable ☒ N/A

1. **Siltation** Areal extent _____ Depth _____ ☐ N/A
☐ Siltation not evident
Remarks _____
_____

2. **Erosion** Areal extent _____ Depth _____
☐ Erosion not evident
Remarks _____
_____

3. **Outlet Works** ☐ Functioning ☐ N/A
Remarks _____
_____

4. **Dam** ☐ Functioning ☐ N/A
Remarks _____
_____

H. Retaining Walls ☐ Applicable ☒ N/A

1. **Deformations** ☐ Location shown on site map ☐ Deformation not evident
Horizontal displacement _____ Vertical displacement _____
Rotational displacement _____
Remarks _____
_____

2. **Degradation** ☐ Location shown on site map ☐ Degradation not evident
Remarks _____
_____

I. Perimeter Ditches/Off-Site Discharge ☐ Applicable ☒ N/A

1. **Siltation** ☐ Location shown on site map ☐ Siltation not evident
Areal extent _____ Depth _____
Remarks _____
_____

2. **Vegetative Growth** ☐ Location shown on site map ☐ N/A
☐ Vegetation does not impede flow
Areal extent _____ Type _____
Remarks _____
_____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
Areal extent _____ Depth _____
Remarks

4. **Discharge Structure** ☐ Functioning ☐ N/A
Remarks _____
_____

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A
Remarks Vertical Barrier Walls are not component of the remedy at LHAAP-012.

1. **Settlement** ☐ Location shown on site map ☐ Settlement not evident
Areal extent _____ Depth _____
Remarks _____
_____

2. **Performance Monitoring** Type of monitoring _____
☐ Performance not monitored
Frequency _____ ☐ Evidence of breaching
Head differential _____
Remarks _____
_____

IX. GROUNDWATER/SURFACE WATER REMEDIES ☒ Applicable ☐ N/A

A. Groundwater Extraction Wells, Pumps, and Pipelines ☐ Applicable ☒ N/A

1. **Pumps, Wellhead Plumbing, and Electrical**
☐ Good condition ☐ All required wells properly operating ☐ Needs Maintenance ☐ N/A
Remarks _____
_____
_____

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

3. **Spare Parts and Equipment**
☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided
Remarks _____
_____

B. Surface Water Collection Structures, Pumps, and Pipelines ☐ Applicable ☒ N/A

1. **Collection Structures, Pumps, and Electrical**
☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

3. **Spare Parts and Equipment**
☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided
Remarks _____
_____

C. Treatment System ☐ Applicable ☒ N/A

1. **Treatment Train** (Check components that apply)
☐ Metals removal ☐ Oil/water separation ☐ Bioremediation
☐ Air stripping ☐ Carbon adsorbers
☐ Filters _____
☐ Additive (*e.g.*, chelation agent, flocculent) _____
☐ Others _____
☐ Good condition ☐ Needs Maintenance
☐ Sampling ports properly marked and functional
☐ Sampling/maintenance log displayed and up to date
☐ Equipment properly identified
☐ Quantity of groundwater treated annually _____
☐ Quantity of surface water treated annually _____
Remarks _____
_____

2. **Electrical Enclosures and Panels** (properly rated and functional)
☐ N/A ☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

3. **Tanks, Vaults, Storage Vessels**
☐ N/A ☐ Good condition ☐ Proper secondary containment ☐ Needs Maintenance
Remarks _____
_____

4. **Discharge Structure and Appurtenances**
☐ N/A ☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

5. **Treatment Building(s)**
☐ N/A ☐ Good condition (esp. roof and doorways) ☐ Needs repair
☐ Chemicals and equipment properly stored
Remarks _____
_____

6. **Monitoring Wells** (pump and treatment remedy)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ All required wells located ☐ Needs Maintenance ☐ N/A
Remarks _____
_____

D. Monitoring Data

1. Monitoring Data
☒ Is routinely submitted on time ☒ Is of acceptable quality

2. Monitoring data suggests:
☒ Groundwater plume is effectively contained ☒ Contaminant concentrations are declining

E. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)
☒ Properly secured/locked ☐ Functioning ☒ Routinely sampled ☒ Good condition
☐ All required wells located ☐ Needs Maintenance ☐ N/A
Remarks _____
_____

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).
The remedy is effective and functioning as designed to 1) protect human health by preventing human exposure to TCE contaminated groundwater, 2) protection of human health and the environment by reducing the leaching and migration of landfill hazardous substances into the groundwater and 3) protection of human health and the environment by preventing TCE contaminated groundwater from migrating into nearby surface water. The Five-Year Review site inspection confirmed land use controls prohibit changes in land use. There were no violations of land use controls observed during the site inspection. Damage to fencing, gates, and signs suggests that maintenance is needed to prevent future access to the landfill and ensure no prohibited digging/disturbance of the cap or landfill contents can occur.

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.
O&M includes annual inspection of cap and documentation that no LUC-restricted activities have been authorized and that conditions and use are consistent with the LUCs. The most recently available report does not comment on the conditions of the fencing or gate, but does state that signage was visible.

C. Early Indicators of Potential Remedy Problems

	Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future. There are no indications of potential problems that were identified during the Five-Year Review site inspection.
D.	**Opportunities for Optimization**
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. The Five-Year Review did not identify opportunities for optimization at LHAAP-012.

I. SITE INFORMATION	
Site name: LHAAP-016	**Date of inspection:** February 14-15, 2023
Location and Region: Longhorn Army Ammunition Plant / U.S. Environmental Protection Agency (EPA), Region 6	**EPA ID:** TX110000619910
Agency, office, or company leading the five-year review: U.S. Army Corps of Engineers, Omaha District	**Weather/temperature:** Sunny/60ºF

Remedy Includes: (Check all that apply)

- ☒ Landfill cover/containment
- ☒ Access controls
- ☒ Institutional controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☒ Other Bioremediation and Biobarriers
- ☒ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls

Attachments: ☐ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (Check all that apply)

Interviews conducted separate from the site inspection. Interview responses are presented in Appendix D of the Five-Year Review.

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**
   - ☒ O&M manual — ☒ Readily available — ☒ Up to date — ☐ N/A
   - ☒ As-built drawings — ☒ Readily available — ☒ Up to date — ☐ N/A
   - ☒ Maintenance logs — ☒ Readily available — ☒ Up to date — ☐ N/A

   Remarks Bhate, 2018. Remedial Action Work Plan LHAAP-16 Landfill, LHAAP, Karnack, TX.

2. **Site-Specific Health and Safety Plan** ☒ Readily available ☒ Up to date ☐ N/A
   ☐ Contingency/Emergency Response Plan ☐ Readily available ☐ Up to date ☐ N/A
   Remarks _____

3. **O&M and OSHA Training Records** ☐ Readily available ☐ Up to date ☒ N/A
   Remarks _____

4. **Permits and Service Agreements**
   - ☐ Air discharge permit — ☐ Readily available — ☐ Up to date — ☒ N/A
   - ☐ Effluent discharge — ☐ Readily available — ☐ Up to date — ☒ N/A
   - ☐ Waste disposal, POTW — ☐ Readily available — ☐ Up to date — ☒ N/A
   - ☐ Other permits _____ — ☐ Readily available — ☐ Up to date — ☒ N/A

   Remarks _____

5. **Gas Generation Records** ☐ Readily available ☐ Up to date ☒ N/A
   Remarks _____

6. **Settlement Monument Records** ☐ Readily available ☐ Up to date ☒ N/A
   Remarks _____

7. **Groundwater Monitoring Records** ☒ Readily available ☒ Up to date ☐ N/A
   Remarks *Final First Annual Remedial Action Operation Report LHAAP-16 Landfill, Longhorn Army Ammunition Plant, Karnack, Texas, April 2022*.

8. **Leachate Extraction Records** ☐ Readily available ☐ Up to date ☒ N/A
   Remarks _____

9. **Discharge Compliance Records**
   - ☐ Air — ☐ Readily available — ☐ Up to date — ☒ N/A
   - ☐ Water (effluent) — ☐ Readily available — ☐ Up to date — ☒ N/A

   Remarks _____

10. **Daily Access/Security Logs** ☐ Readily available ☐ Up to date ☒ N/A
Remarks _____
_____

IV. O&M COSTS

1. **O&M Organization**
☐ State in-house ☐ Contractor for State
☐ PRP in-house ☐ Contractor for PRP
☐ Federal Facility in-house ☐ Contractor for Federal Facility
☐ Other _____
_____

2. **O&M Cost Records**
☐ Readily available ☐ Up to date
☐ Funding mechanism/agreement in place
Original O&M cost estimate _____ ☐ Breakdown attached

Total annual cost by year for review period if available

From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost
From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost
From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost
From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost
From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost

3. **Unanticipated or Unusually High O&M Costs During Review Period**
Describe costs and reasons: Operations and maintenance costs were not obtained. Work is being completed under a performance-based acquisition contract. As a result, costs are fixed-price and do not include variances that would identify potential remedy problems or issues.

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N/A

A. Fencing

1. **Fencing damaged** ☐ Location shown on site map ☒ Gates secured ☐ N/A
Remarks Access to the site was within a secured fence that was in good condition with functioning gates. Some areas of fencing were damaged (see photograph 13 in Appendix C).
_____

B. Other Access Restrictions

1. **Signs and other security measures** ☐ Location shown on site map ☐ N/A
Remarks Signs are in good condition and legible.

C. Institutional Controls (ICs)

1. **Implementation and enforcement**
Site conditions imply ICs not properly implemented ☐ Yes ☒ No ☐ N/A
Site conditions imply ICs not being fully enforced ☐ Yes ☒ No ☒ N/A

Type of monitoring (*e.g.*, self-reporting, drive by) Site inspections
Frequency Annual
Responsible party/agency Army
Contact Rose Zeiler LHAAP RPMP
Name Title Date Phone no.

Reporting is up-to-date ☒ Yes ☐ No ☐ N/A
Reports are verified by the lead agency ☒ Yes ☐ No ☐ N/A

Specific requirements in deed or decision documents have been met
☒ Yes ☐ No ☐ N/A
Violations have been reported ☐ Yes ☒ No ☐ N/A
Other problems or suggestions: ☐ Report attached
_____
_____
_____
_____

2. **Adequacy** ☒ ICs are adequate ☐ ICs are inadequate ☐ N/A
Remarks Current and future land use is restricted to non-residential use. Groundwater use is prohibited and was not observed during the inspection.

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ☐ No vandalism evident
Remarks _____
_____

2. **Land use changes on site** ☐ N/A
Remarks There have been no changes to land use since the previous Five-Year Review.

3. **Land use changes off site** ☐ N/A
Remarks No land use changes off site.

VI. GENERAL SITE CONDITIONS

A. Roads ☒ Applicable ☐ N/A

1. **Roads damaged** ☐ Location shown on site map ☒ Roads adequate ☐ N/A
Remarks Access to the site is via paved roads in good condition.

B. Other Site Conditions

Remarks None.

VII. LANDFILL COVERS ☒ Applicable ☐ N/A

A. Landfill Surface

1. **Settlement** (Low spots) ☐ Location shown on site map ☒ Settlement not evident
Areal extent _____ Depth _____
Remarks _____
_____

2. **Cracks** ☐ Location shown on site map ☒ Cracking not evident
Lengths _____ Widths _____ Depths _____
Remarks _____
_____

3. **Erosion** ☐ Location shown on site map ☒ Erosion not evident
Areal extent _____ Depth _____
Remarks

4. **Holes** ☐ Location shown on site map ☐ Holes not evident
Areal extent _____ Depth _____
Remarks Observed a small number of minor holes in the cap (see photograph 17 in Appendix C).

5. **Vegetative Cover** ☒ Grass ☐ Cover properly established ☐ No signs of stress
☒ Trees/Shrubs (indicate size and locations on a diagram)
Remarks Many small pine trees were established throughout the cap (see Appendix C, Photographs 18 and 20)

6. **Alternative Cover (armored rock, concrete, etc.)** ☒ N/A
Remarks _____
_____

7. **Bulges** ☐ Location shown on site map ☒ Bulges not evident
Areal extent _____ Height _____
Remarks _____
_____

8. **Wet Areas/Water Damage** ☐ Wet areas/water damage not evident
☒ Wet areas ☐ Location shown on site map Areal extent
☒ Ponding ☐ Location shown on site map Areal extent <10 feet
☐ Seeps ☐ Location shown on site map Areal extent _____
☐ Soft subgrade ☐ Location shown on site map Areal extent _____
Remarks Small areas of minor ponding were observed in multiple locations on the cap (see photographs 19 and 21 in Appendix C).

9. **Slope Instability** ☐ Slides ☐ Location shown on site map ☒ No evidence of slope instability
Areal extent _____
Remarks _____
_____

B. Benches ☐ Applicable ☒ N/A
(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** ☐ Location shown on site map ☐ N/A or okay
Remarks _____
_____

2. **Bench Breached** ☐ Location shown on site map ☐ N/A or okay
Remarks _____
_____

3. **Bench Overtopped** ☐ Location shown on site map ☐ N/A or okay
Remarks _____
_____

C. Letdown Channels ☐ Applicable ☒ N/A
(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** ☐ Location shown on site map ☐ No evidence of settlement
Areal extent _____ Depth _____
Remarks _____
_____

2. **Material Degradation** ☐ Location shown on site map ☐ No evidence of degradation
Material type _____ Areal extent _____
Remarks _____
_____

3. **Erosion** ☐ Location shown on site map ☐ No evidence of erosion
Areal extent _____ Depth _____
Remarks _____
_____

4. **Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting
Areal extent _____ Depth _____
Remarks _____
_____

5. **Obstructions** ☐ No obstructions ☐ Location shown on site map
Type _____ Areal extent _____
Size _____
Remarks _____
_____

6. **Excessive Vegetative Growth** Type _____
☐ No evidence of excessive growth
☐ Vegetation in channels does not obstruct flow
☐ Location shown on site map Areal extent _____
Remarks _____
_____

D. Cover Penetrations ☐ Applicable ☒ N/A

1. **Gas Vents** ☐ Active ☐ Passive
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks _____
_____

2. **Gas Monitoring Probes**
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks

3. **Monitoring Wells** (within surface area of landfill)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks

4. **Leachate Extraction Wells**
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☒ N/A
Remarks _____
_____

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☒ N/A
Remarks_____
_____

E. Gas Collection and Treatment ☐ Applicable ☒ N/A

1. **Gas Treatment Facilities**
☐ Flaring ☐ Thermal destruction ☐ Collection for reuse
☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

2. **Gas Collection Wells, Manifolds and Piping**
☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

3. **Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings)
☐ Good condition ☐ Needs Maintenance ☐ N/A
Remarks _____
_____

F. Cover Drainage Layer ☐ Applicable ☒ N/A

1. **Outlet Pipes Inspected** ☐ Functioning ☐ N/A
Remarks _____
_____

2. **Outlet Rock Inspected** ☐ Functioning ☐ N/A
Remarks _____
_____

G. Detention/Sedimentation Ponds ☐ Applicable ☒ N/A

1. **Siltation** Areal extent _____ Depth _____ ☐ N/A
☐ Siltation not evident
Remarks _____
_____

2. **Erosion** Areal extent _____ Depth _____
☐ Erosion not evident
Remarks _____
_____

3. **Outlet Works** ☐ Functioning ☐ N/A
Remarks _____
_____

4. **Dam** ☐ Functioning ☐ N/A
Remarks _____
_____

H. Retaining Walls ☐ Applicable ☒ N/A

1. **Deformations** ☐ Location shown on site map ☐ Deformation not evident
Horizontal displacement _____ Vertical displacement _____
Rotational displacement _____
Remarks _____
_____

2. **Degradation** ☐ Location shown on site map ☐ Degradation not evident
Remarks _____
_____

I. Perimeter Ditches/Off-Site Discharge ☒ Applicable ☐ N/A

1. **Siltation** ☐ Location shown on site map ☒ Siltation not evident
Areal extent _____ Depth _____
Remarks _____
_____

2. **Vegetative Growth** ☐ Location shown on site map ☒ N/A
☐ Vegetation does not impede flow
Areal extent _____ Type _____
Remarks _____
_____

3. **Erosion** ☐ Location shown on site map ☒ Erosion not evident
Areal extent _____ Depth _____
Remarks

4. **Discharge Structure** ☐ Functioning ☒ N/A
Remarks _____
_____

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A
Remarks Vertical Barrier Walls are not component of the remedy at LHAAP-016.

1. **Settlement** ☐ Location shown on site map ☐ Settlement not evident
Areal extent _____ Depth _____
Remarks _____
_____

2. **Performance Monitoring** Type of monitoring _____
☐ Performance not monitored
Frequency _____ ☐ Evidence of breaching
Head differential _____
Remarks _____
_____

IX. GROUNDWATER/SURFACE WATER REMEDIES ☒ Applicable ☐ N/A

A. Groundwater Extraction Wells, Pumps, and Pipelines ☐ Applicable ☒ N/A

1. **Pumps, Wellhead Plumbing, and Electrical**
☐ Good condition ☐ All required wells properly operating ☐ Needs Maintenance ☐ N/A
Remarks _____
_____
_____

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

3. **Spare Parts and Equipment**
☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided
Remarks _____
_____

B. Surface Water Collection Structures, Pumps, and Pipelines ☐ Applicable ☒ N/A

1. **Collection Structures, Pumps, and Electrical**
☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

3. **Spare Parts and Equipment**
☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided
Remarks _____
_____

C. Treatment System ☐ Applicable ☒ N/A

1. **Treatment Train** (Check components that apply)
☐ Metals removal ☐ Oil/water separation ☒ Bioremediation
☐ Air stripping ☐ Carbon adsorbers
☐ Filters _____
☐ Additive (*e.g.*, chelation agent, flocculent) _____
☐ Others _____
☐ Good condition ☐ Needs Maintenance
☐ Sampling ports properly marked and functional
☐ Sampling/maintenance log displayed and up to date
☐ Equipment properly identified
☐ Quantity of groundwater treated annually _____
☐ Quantity of surface water treated annually _____
Remarks Biobarriers in three locations. Bioremediation components varied by site, including a dechlorinating microbial consortium, emulsified vegetable oil, and zero valent iron.

2. **Electrical Enclosures and Panels** (properly rated and functional)
☐ N/A ☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

3. **Tanks, Vaults, Storage Vessels**
☐ N/A ☐ Good condition ☐ Proper secondary containment ☐ Needs Maintenance
Remarks _____
_____

4. **Discharge Structure and Appurtenances**
☐ N/A ☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

5. **Treatment Building(s)**
☐ N/A ☐ Good condition (esp. roof and doorways) ☐ Needs repair
☐ Chemicals and equipment properly stored
Remarks _____
_____

6. **Monitoring Wells** (pump and treatment remedy)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ All required wells located ☐ Needs Maintenance ☐ N/A
Remarks _____
_____

D. Monitoring Data

1. Monitoring Data
☒ Is routinely submitted on time ☒ Is of acceptable quality

2. Monitoring data suggests:
☐ Groundwater plume is effectively contained ☐ Contaminant concentrations are declining

E. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)
☒ Properly secured/locked ☒ Functioning ☒ Routinely sampled ☒ Good condition
☐ All required wells located ☐ Needs Maintenance ☐ N/A
Remarks Most wells were found to be locked and in good condition (see photograph 6 and 8 in Appendix C), however a small number of monitoring wells were found to be unlocked and not secure (see photograph 7 and 11 in Appendix C).

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).
The remedy is effective and functioning as designed to 1) protect human health and the environment by preventing exposure to landfill contents 2) protect human health by preventing human exposure to the contaminated groundwater, 3) reduce leaching and migration of landfill hazardous substances into groundwater, 4) prevent COCs and COC daughter products migrating into Harrison Bayou at levels that cause surface water in Harrison Bayou to exceed surface water criteria, and 5) return groundwater to its potential beneficial use as drinking water, wherever practicable. The Five-Year Review site inspection confirmed land use controls prohibit changes in land use. There were no violations of land use controls nor evidence of prohibited use of groundwater observed during the site inspection.

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.
O&M includes annual inspection of groundwater monitoring system and LUC maintenance. Reports are included in the annual remedial action operation reports. No issues with O&M were found during the site inspection.

C. Early Indicators of Potential Remedy Problems

Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.

There are no indications of potential problems that were identified during the Five-Year Review site inspection.

D.	Opportunities for Optimization
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. The Five-Year Review did not identify opportunities for optimization at LHAAP-16.

I. SITE INFORMATION	
Site name: LHAAP-17	**Date of inspection:** February 14-15, 2023
Location and Region: Longhorn Army Ammunition Plant / U.S. Environmental Protection Agency (EPA), Region 6	**EPA ID:** TX110000619910
Agency, office, or company leading the five-year review: U.S. Army Corps of Engineers, Omaha District	**Weather/temperature:** Raining/50 °F

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☒ Access controls
- ☒ Institutional controls
- ☒ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☒ Other Contaminated Soil Removal
- ☒ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls

Attachments: ☐ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (Check all that apply)

4. **Other interviews** (optional) ☒ Report attached.

Interviews conducted separate from the site inspection. Interview responses are presented in Appendix D of the Five-Year Review.

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**
   ☒ O&M manual ☒ Readily available ☒ Up to date ☐ N/A
   ☒ As-built drawings ☒ Readily available ☒ Up to date ☐ N/A
   ☒ Maintenance logs ☒ Readily available ☒ Up to date ☐ N/A Remarks Bhate, 2019. Remedial Design and Remedial Action Work Plan, LHAAP-17 Burning Ground No. 2 / Flashing Area, Group 2, LHAAP, Karnack, TX.

2. **Site-Specific Health and Safety Plan** ☒ Readily available ☒ Up to date ☐ N/A
   ☐ Contingency/Emergency Response Plan ☐ Readily available ☐ Up to date ☐ N/A
   Remarks _____

3. **O&M and OSHA Training Records** ☐ Readily available ☐ Up to date ☒ N/A
   Remarks _____

4. **Permits and Service Agreements**
   ☐ Air discharge permit ☐ Readily available ☐ Up to date ☒ N/A
   ☐ Effluent discharge ☐ Readily available ☐ Up to date ☒ N/A
   ☐ Waste disposal, POTW ☐ Readily available ☐ Up to date ☒ N/A
   ☐ Other permits _____ ☐ Readily available ☐ Up to date ☒ N/A
   Remarks _____

5. **Gas Generation Records** ☐ Readily available ☐ Up to date ☒ N/A
   Remarks _____

6. **Settlement Monument Records** ☐ Readily available ☐ Up to date ☒ N/A
   Remarks _____

7. **Groundwater Monitoring Records** ☐ Readily available ☐ Up to date ☒ N/A
   Remarks Groundwater monitoring for MNA will begin following completion of the remedial actions associated with soil removal and extraction/treatment of perchlorate contaminated groundwater.

8. **Leachate Extraction Records** ☐ Readily available ☐ Up to date ☒ N/A
   Remarks _____

9. **Discharge Compliance Records**
   ☐ Air ☐ Readily available ☐ Up to date ☒ N/A
   ☐ Water (effluent) ☐ Readily available ☐ Up to date ☒ N/A
   Remarks _____

10. **Daily Access/Security Logs** ☐ Readily available ☐ Up to date ☒ N/A
Remarks _____
_____

IV. O&M COSTS

1. **O&M Organization**
☐ State in-house ☐ Contractor for State
☐ PRP in-house ☐ Contractor for PRP
☐ Federal Facility in-house ☐ Contractor for Federal Facility
☐ Other _____
_____

2. **O&M Cost Records**
☐ Readily available ☐ Up to date
☐ Funding mechanism/agreement in place
Original O&M cost estimate _____ ☐ Breakdown attached

Total annual cost by year for review period if available

From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost
From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost
From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost
From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost
From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost

3. **Unanticipated or Unusually High O&M Costs During Review Period**
Describe costs and reasons: Operations and maintenance costs were not obtained. Work is being completed under a performance-based acquisition contract. As a result, costs are fixed-price and do not include variances that would identify potential remedy problems or issues.

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N/A

A. Fencing

1. **Fencing damaged** ☐ Location shown on site map ☐ Gates secured ☒ N/A
Remarks _____
_____

B. Other Access Restrictions

1. **Signs and other security measures** ☐ Location shown on site map ☒ N/A
Remarks _____
_____

C. Institutional Controls (ICs)

1. **Implementation and enforcement**
Site conditions imply ICs not properly implemented ☐ Yes ☒ No ☐ N/A
Site conditions imply ICs not being fully enforced ☐ Yes ☒ No ☐ N/A

Type of monitoring (*e.g.*, self-reporting, drive by) Site inspections
Frequency Frequency of LUC inspections will be finalized when the Remedial Design is finalized.
Responsible party/agency Army
Contact Rose Zeiler LHAAP RPMP _____
Name Title Date Phone no.

Reporting is up-to-date ☐ Yes ☐ No ☒ N/A
Reports are verified by the lead agency ☐ Yes ☐ No ☒ N/A

Specific requirements in deed or decision documents have been met
☒ Yes ☐ No ☐ N/A
Violations have been reported ☐ Yes ☒ No ☐ N/A
Other problems or suggestions: ☐ Report attached
Filing of land use restrictions with Harrison County is currently pending but is enforced on site.

2. **Adequacy** ☒ ICs are adequate ☐ ICs are inadequate ☐ N/A
Remarks Current and future land use is restricted to non-residential use. Groundwater use is prohibited and was not observed during the inspection.

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ☒ No vandalism evident
Remarks _____
_____

2. **Land use changes on site** ☐ N/A
Remarks No land use changes on site.

3. **Land use changes off site** ☐ N/A
Remarks No land use changes off site.

VI. GENERAL SITE CONDITIONS

A. Roads ☒ Applicable ☐ N/A

1. **Roads damaged** ☐ Location shown on site map ☒ Roads adequate ☐ N/A
Remarks Access to the site is via paved roads in good condition.

B. Other Site Conditions

Remarks None.

VII. LANDFILL COVERS ☐ Applicable ☒ N/A

A. Landfill Surface

1. **Settlement** (Low spots) ☐ Location shown on site map ☐ Settlement not evident
Areal extent _____ Depth _____
Remarks _____
_____

2. **Cracks** ☐ Location shown on site map ☐ Cracking not evident
Lengths _____ Widths _____ Depths _____
Remarks _____
_____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
Areal extent _____ Depth _____
Remarks

4. **Holes** ☐ Location shown on site map ☐ Holes not evident
Areal extent _____ Depth _____
Remarks _____
_____

5. **Vegetative Cover** ☐ Grass ☐ Cover properly established ☐ No signs of stress
☐ Trees/Shrubs (indicate size and locations on a diagram)
Remarks

6. **Alternative Cover (armored rock, concrete, etc.)** ☐ N/A
Remarks _____
_____

7. **Bulges** ☐ Location shown on site map ☐ Bulges not evident
Areal extent _____ Height _____
Remarks _____
_____

8. **Wet Areas/Water Damage** ☐ Wet areas/water damage not evident
☐ Wet areas ☐ Location shown on site map Areal extent
☐ Ponding ☐ Location shown on site map Areal extent _____
☐ Seeps ☐ Location shown on site map Areal extent _____
☐ Soft subgrade ☐ Location shown on site map Areal extent _____
Remarks

9. **Slope Instability** ☐ Slides ☐ Location shown on site map ☐ No evidence of slope instability
Areal extent _____
Remarks _____
_____

B. Benches ☐ Applicable ☒ N/A
(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** ☐ Location shown on site map ☐ N/A or okay
Remarks _____
_____

2. **Bench Breached** ☐ Location shown on site map ☐ N/A or okay
Remarks _____
_____

3. **Bench Overtopped** ☐ Location shown on site map ☐ N/A or okay
Remarks _____
_____

C. Letdown Channels ☐ Applicable ☒ N/A
(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** ☐ Location shown on site map ☐ No evidence of settlement
Areal extent _____ Depth _____
Remarks _____
_____

2. **Material Degradation** ☐ Location shown on site map ☐ No evidence of degradation
Material type _____ Areal extent _____
Remarks _____
_____

3. **Erosion** ☐ Location shown on site map ☐ No evidence of erosion
Areal extent _____ Depth _____
Remarks _____
_____

4. **Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting
Areal extent _____ Depth _____
Remarks _____
_____

5. **Obstructions** ☐ No obstructions ☐ Location shown on site map
Type _____ Areal extent _____
Size _____
Remarks _____
_____

6. **Excessive Vegetative Growth** Type _____
☐ No evidence of excessive growth
☐ Vegetation in channels does not obstruct flow
☐ Location shown on site map Areal extent _____
Remarks _____
_____

D. Cover Penetrations ☐ Applicable ☒ N/A

1. **Gas Vents** ☐ Active ☐ Passive
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks _____
_____

2. **Gas Monitoring Probes**
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks _____
_____

3. **Monitoring Wells** (within surface area of landfill)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks _____
_____

4. **Leachate Extraction Wells**
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks _____
_____

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☐ N/A
Remarks_____
_____

E. Gas Collection and Treatment ☐ Applicable ☒ N/A

1. **Gas Treatment Facilities**
   ☐ Flaring ☐ Thermal destruction ☐ Collection for reuse
   ☐ Good condition ☐ Needs Maintenance
   Remarks _____
   _____

2. **Gas Collection Wells, Manifolds and Piping**
   ☐ Good condition ☐ Needs Maintenance
   Remarks _____
   _____

3. **Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings)
   ☐ Good condition ☐ Needs Maintenance ☐ N/A
   Remarks _____
   _____

F. Cover Drainage Layer ☐ Applicable ☒ N/A

1. **Outlet Pipes Inspected** ☐ Functioning ☐ N/A
   Remarks _____
   _____

2. **Outlet Rock Inspected** ☐ Functioning ☐ N/A
   Remarks _____
   _____

G. Detention/Sedimentation Ponds ☐ Applicable ☒ N/A

1. **Siltation** Areal extent _____ Depth _____ ☐ N/A
   ☐ Siltation not evident
   Remarks _____
   _____

2. **Erosion** Areal extent _____ Depth _____
   ☐ Erosion not evident
   Remarks _____
   _____

3. **Outlet Works** ☐ Functioning ☐ N/A
   Remarks _____
   _____

4. **Dam** ☐ Functioning ☐ N/A
   Remarks _____
   _____

H. Retaining Walls ☐ Applicable ☒ N/A

1. **Deformations** ☐ Location shown on site map ☐ Deformation not evident
Horizontal displacement _____ Vertical displacement _____
Rotational displacement _____
Remarks _____
_____

2. **Degradation** ☐ Location shown on site map ☐ Degradation not evident
Remarks _____
_____

I. Perimeter Ditches/Off-Site Discharge ☐ Applicable ☒ N/A

1. **Siltation** ☐ Location shown on site map ☐ Siltation not evident
Areal extent _____ Depth _____
Remarks _____
_____

2. **Vegetative Growth** ☐ Location shown on site map ☐ N/A
☐ Vegetation does not impede flow
Areal extent _____ Type _____
Remarks _____
_____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
Areal extent _____ Depth _____
Remarks

4. **Discharge Structure** ☐ Functioning ☐ N/A
Remarks _____
_____

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A
Remarks Vertical Barrier Walls are not component of the remedy at LHAAP-17.

1. **Settlement** ☐ Location shown on site map ☐ Settlement not evident
Areal extent _____ Depth _____
Remarks _____
_____

2. **Performance Monitoring** Type of monitoring _____
☐ Performance not monitored
Frequency _____ ☐ Evidence of breaching
Head differential _____
Remarks _____
_____

IX. GROUNDWATER/SURFACE WATER REMEDIES ☒ Applicable ☐ N/A

A. Groundwater Extraction Wells, Pumps, and Pipelines ☒ Applicable ☐ N/A

1. **Pumps, Wellhead Plumbing, and Electrical**
☒ Good condition ☐ All required wells properly operating ☐ Needs Maintenance ☐ N/A
Remarks _____
_____
_____

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

3. **Spare Parts and Equipment**
☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided
Remarks _____
_____

B. Surface Water Collection Structures, Pumps, and Pipelines ☐ Applicable ☒ N/A

1. **Collection Structures, Pumps, and Electrical**
☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

3. **Spare Parts and Equipment**
☐ Readily available ☐ Good condition ☐ Requires upgrade ☒ Needs to be provided
Remarks _____
_____

C. Treatment System ☒ Applicable ☐ N/A

1. **Treatment Train** (Check components that apply)
☐ Metals removal ☐ Oil/water separation ☐ Bioremediation
☐ Air stripping ☐ Carbon adsorbers
☐ Filters _____
☐ Additive (*e.g.*, chelation agent, flocculent) _____
☒ Others Fluidized bed reactor at GWTP for perchlorate removal
☒ Good condition ☐ Needs Maintenance
☐ Sampling ports properly marked and functional
☐ Sampling/maintenance log displayed and up to date
☐ Equipment properly identified
☐ Quantity of groundwater treated annually _____
☐ Quantity of surface water treated annually _____
Remarks _____
_____

2. **Electrical Enclosures and Panels** (properly rated and functional)
☐ N/A ☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

3. **Tanks, Vaults, Storage Vessels**
☐ N/A ☒ Good condition ☐ Proper secondary containment ☐ Needs Maintenance
Remarks _____
_____

4. **Discharge Structure and Appurtenances**
☐ N/A ☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

5. **Treatment Building(s)**
☐ N/A ☒ Good condition (esp. roof and doorways) ☐ Needs repair
☐ Chemicals and equipment properly stored
Remarks _____
_____

6. **Monitoring Wells** (pump and treatment remedy)
☐ Properly secured/locked ☒ Functioning ☐ Routinely sampled ☒ Good condition
☐ All required wells located ☐ Needs Maintenance ☐ N/A
Remarks _____
_____

D. Monitoring Data

1. Monitoring Data
☐ Is routinely submitted on time ☐ Is of acceptable quality

2. Monitoring data suggests:
☐ Groundwater plume is effectively contained ☐ Contaminant concentrations are declining

E. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ All required wells located ☒ Needs Maintenance ☐ N/A
Remarks MNA will begin following completion of the groundwater extraction and treatment remedial action. Some monitoring wells were noted to have excess vegetation growing around the well as well as some wells that were not locked/secured (see photographs 23 through 25, and 27 through 29 in Appendix C).

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).
Implementation of the remedy was interrupted by the discovery of munitions and explosives of concern during soil removal. The remedial design for MEC removal is completed, but the remedial design for the remedy in the ROD is not yet finalized. LUCs are enforced but restrictions on land use and groundwater use are pending. MNA will be implemented following successful extraction and treatment of perchlorate in the groundwater to reduce the concentration below 20,000 µg/L.

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.
O&M procedures have not yet been finalized in the remedial design which is not yet finalized.

C. Early Indicators of Potential Remedy Problems

Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.

There are no indications of potential problems that were identified during the Five-Year Review site inspection.

D.	Opportunities for Optimization
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. The Five-Year Review did not identify opportunities for optimization at LHAAP-17. Remedial actions are ongoing.

I. SITE INFORMATION	
Site name: LHAAP-018/24	**Date of inspection:** February 14-15, 2023
Location and Region: Longhorn Army Ammunition Plant / U.S. Environmental Protection Agency (EPA), Region 6	**EPA ID:** TX110000619910
Agency, office, or company leading the five-year review: U.S. Army Corps of Engineers, Omaha District	**Weather/temperature:** Raining/50 °F

Remedy Includes: (Check all that apply)

- ☒ Landfill cover/containment
- ☒ Access controls
- ☒ Institutional controls
- ☒ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☒ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls
- ☒ Other In-Situ Bioremediation (planned Remedy), Contaminated Soil Removal, and Thermal In-situ Desorption for DNAPLs (Planned Remedy). Groundwater pump and treatment includes use of interceptor-collection trenches for hydraulic control. Note: MNA is part of the Planned Remedy.

Attachments: ☐ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (Check all that apply)

4. **Other interviews** (optional) ☒ Report attached.

Interviews conducted separate from the site inspection. Interview responses are presented in Appendix D of the Five-Year Review.

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**

☒ O&M manual	☒ Readily available	☒ Up to date	☐ N/A
☒ As-built drawings	☒ Readily available	☒ Up to date	☐ N/A
☒ Maintenance logs	☒ Readily available	☒ Up to date	☐ N/A

Remarks Quarterly Evaluation Report, 4th Quarter (October-December 2021), Groundwater Treatment Plant, Longhorn Army Ammunition Plant, Karnack, Texas, May 2022.

2. **Site-Specific Health and Safety Plan** ☒ Readily available ☒ Up to date ☐ N/A
☐ Contingency/Emergency Response Plan ☐ Readily available ☐ Up to date ☐ N/A
Remarks _____

3. **O&M and OSHA Training Records** ☐ Readily available ☐ Up to date ☒ N/A
Remarks _____

4. **Permits and Service Agreements**

☐ Air discharge permit	☐ Readily available	☐ Up to date	☒ N/A
☐ Effluent discharge	☐ Readily available	☐ Up to date	☒ N/A
☐ Waste disposal, POTW	☐ Readily available	☐ Up to date	☒ N/A
☐ Other permits _____	☐ Readily available	☐ Up to date	☒ N/A

Remarks _____

5. **Gas Generation Records** ☐ Readily available ☐ Up to date ☒ N/A
Remarks _____

6. **Settlement Monument Records** ☐ Readily available ☐ Up to date ☒ N/A
Remarks _____

7. **Groundwater Monitoring Records** ☒ Readily available ☒ Up to date ☐ N/A
Remarks Draft Final Pre-Design Investigation Report, LHAAP-18/24, Burning Ground No. 3 and Unlined Evaporation Pond, Longhorn Army Ammunition Plant, Karnack, Texas, February, 2022.

Quarterly Evaluation Report, 4th Quarter (October-December 2021), Groundwater Treatment Plant, Longhorn Army Ammunition Plant, Karnack, Texas, May 2022.

8. **Leachate Extraction Records** ☐ Readily available ☐ Up to date ☒ N/A
Remarks _____

9. **Discharge Compliance Records**

☐ Air ☐ Readily available ☐ Up to date ☒ N/A

☐ Water (effluent) ☐ Readily available ☐ Up to date ☒ N/A

Remarks _____

_____

10. **Daily Access/Security Logs** ☐ Readily available ☐ Up to date ☒ N/A

Remarks _____

_____

IV. O&M COSTS

1. **O&M Organization**

☐ State in-house ☐ Contractor for State

☐ PRP in-house ☐ Contractor for PRP

☐ Federal Facility in-house ☐ Contractor for Federal Facility

☐ Other _____

_____

2. **O&M Cost Records**

☐ Readily available ☐ Up to date

☐ Funding mechanism/agreement in place

Original O&M cost estimate _____ ☐ Breakdown attached

Total annual cost by year for review period if available

From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost

From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost

From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost

From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost

From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost

3. **Unanticipated or Unusually High O&M Costs During Review Period**

Describe costs and reasons: Operations and maintenance costs were not obtained. Work is being completed under a performance-based acquisition contract. As a result, costs are fixed-price and do not include variances that would identify potential remedy problems or issues.

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N/A

A. Fencing

1. **Fencing damaged** ☐ Location shown on site map ☒ Gates secured ☐ N/A
Remarks Access to the site and the groundwater treatment plant were within a secured fence that was in good condition with functioning gates. Fencing and gates are not a part of the remedy.

B. Other Access Restrictions

1. **Signs and other security measures** ☐ Location shown on site map ☐ N/A
Remarks _____

C. Institutional Controls (ICs)

1. **Implementation and enforcement**
Site conditions imply ICs not properly implemented ☐ Yes ☒ No ☐ N/A
Site conditions imply ICs not being fully enforced ☐ Yes ☒ No ☒ N/A

Type of monitoring (*e.g.*, self-reporting, drive by) Site inspections
Frequency LUC Remedial Design is not finalized, frequency of monitoring will be determined in the final remedial design report
Responsible party/agency Army
Contact Rose Zeiler LHAAP RPMP
Name Title Date Phone no.

Reporting is up-to-date ☒ Yes ☐ No ☐ N/A
Reports are verified by the lead agency ☒ Yes ☐ No ☐ N/A

Specific requirements in deed or decision documents have been met
☒ Yes ☐ No ☐ N/A
Violations have been reported ☐ Yes ☒ No ☐ N/A
Other problems or suggestions: ☐ Report attached
Filing of land use restrictions with Harrison County is currently pending but is enforced on site.

2. **Adequacy** ☒ ICs are adequate ☐ ICs are inadequate ☐ N/A
Remarks Current and future land use is restricted to non-residential use. Groundwater use is prohibited and was not observed during the inspection.

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ☒ No vandalism evident
Remarks _____

2. **Land use changes on site** ☐ N/A
Remarks There have been no changes to land use since the previous Five-Year Review.

3. **Land use changes off site** ☐ N/A
Remarks No land use changes off site.

VI. GENERAL SITE CONDITIONS

A. Roads ☒ Applicable ☐ N/A

1. **Roads damaged** ☐ Location shown on site map ☒ Roads adequate ☐ N/A
Remarks Access to the site is via paved roads in good condition.

B. Other Site Conditions

Remarks None.

VII. LANDFILL COVERS ☐ Applicable ☒ N/A

A. Landfill Surface

1. **Settlement** (Low spots) ☐ Location shown on site map ☐ Settlement not evident
Areal extent _____ Depth _____
Remarks _____
_____

2. **Cracks** ☐ Location shown on site map ☐ Cracking not evident
Lengths _____ Widths _____ Depths _____
Remarks _____
_____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
Areal extent _____ Depth _____
Remarks

4. **Holes** ☐ Location shown on site map ☐ Holes not evident
Areal extent _____ Depth _____
Remarks _____
_____

5. **Vegetative Cover** ☐ Grass ☐ Cover properly established ☐ No signs of stress
☐ Trees/Shrubs (indicate size and locations on a diagram)
Remarks

6. **Alternative Cover (armored rock, concrete, etc.)** ☐ N/A
Remarks _____
_____

7. **Bulges** ☐ Location shown on site map ☐ Bulges not evident
Areal extent _____ Height _____
Remarks _____
_____

8. **Wet Areas/Water Damage** ☐ Wet areas/water damage not evident
☐ Wet areas ☐ Location shown on site map Areal extent
☐ Ponding ☐ Location shown on site map Areal extent _____
☐ Seeps ☐ Location shown on site map Areal extent _____
☐ Soft subgrade ☐ Location shown on site map Areal extent _____
Remarks

9. **Slope Instability** ☐ Slides ☐ Location shown on site map ☒ No evidence of slope instability
Areal extent _____
Remarks _____
_____

B. Benches ☐ Applicable ☒ N/A
(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** ☐ Location shown on site map ☐ N/A or okay
Remarks _____
_____

2. **Bench Breached** ☐ Location shown on site map ☐ N/A or okay
Remarks _____
_____

3. **Bench Overtopped** ☐ Location shown on site map ☐ N/A or okay
Remarks _____
_____

C. Letdown Channels ☐ Applicable ☒ N/A
(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** ☐ Location shown on site map ☐ No evidence of settlement
Areal extent _____ Depth _____
Remarks _____
_____

2. **Material Degradation** ☐ Location shown on site map ☐ No evidence of degradation
Material type _____ Areal extent _____
Remarks _____
_____

3. **Erosion** ☐ Location shown on site map ☐ No evidence of erosion
Areal extent _____ Depth _____
Remarks _____
_____

4. **Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting
Areal extent _____ Depth _____
Remarks _____
_____

5. **Obstructions** ☐ No obstructions ☐ Location shown on site map
Type _____ Areal extent _____
Size _____
Remarks _____
_____

6. **Excessive Vegetative Growth** Type _____
☐ No evidence of excessive growth
☐ Vegetation in channels does not obstruct flow
☐ Location shown on site map Areal extent _____
Remarks _____
_____

D. Cover Penetrations ☐ Applicable ☒ N/A

1. **Gas Vents** ☐ Active ☐ Passive
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks _____
_____

2. **Gas Monitoring Probes**
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks _____
_____

3. **Monitoring Wells** (within surface area of landfill)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks _____
_____

4. **Leachate Extraction Wells**
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☒ N/A
Remarks _____
_____

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☒ N/A
Remarks_____
_____

E. Gas Collection and Treatment ☐ Applicable ☒ N/A

1. **Gas Treatment Facilities**
   ☐ Flaring ☐ Thermal destruction ☐ Collection for reuse
   ☐ Good condition ☐ Needs Maintenance
   Remarks _____
   _____

2. **Gas Collection Wells, Manifolds and Piping**
   ☐ Good condition ☐ Needs Maintenance
   Remarks _____
   _____

3. **Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings)
   ☐ Good condition ☐ Needs Maintenance ☐ N/A
   Remarks _____
   _____

F. Cover Drainage Layer ☐ Applicable ☒ N/A

1. **Outlet Pipes Inspected** ☐ Functioning ☐ N/A
   Remarks _____
   _____

2. **Outlet Rock Inspected** ☐ Functioning ☐ N/A
   Remarks _____
   _____

G. Detention/Sedimentation Ponds ☐ Applicable ☒ N/A

1. **Siltation** Areal extent _____ Depth _____ ☐ N/A
   ☐ Siltation not evident
   Remarks _____
   _____

2. **Erosion** Areal extent _____ Depth _____
   ☐ Erosion not evident
   Remarks _____
   _____

3. **Outlet Works** ☐ Functioning ☐ N/A
   Remarks _____
   _____

4. **Dam** ☐ Functioning ☐ N/A
   Remarks _____
   _____

H. Retaining Walls ☐ Applicable ☒ N/A

1. **Deformations** ☐ Location shown on site map ☐ Deformation not evident
Horizontal displacement _____ Vertical displacement _____
Rotational displacement _____
Remarks _____
_____

2. **Degradation** ☐ Location shown on site map ☐ Degradation not evident
Remarks _____
_____

I. Perimeter Ditches/Off-Site Discharge ☐ Applicable ☒ N/A

1. **Siltation** ☐ Location shown on site map ☐ Siltation not evident
Areal extent _____ Depth _____
Remarks _____
_____

2. **Vegetative Growth** ☐ Location shown on site map ☐ N/A
☐ Vegetation does not impede flow
Areal extent _____ Type _____
Remarks _____
_____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
Areal extent _____ Depth _____
Remarks

4. **Discharge Structure** ☐ Functioning ☐ N/A
Remarks _____
_____

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A

Remarks Vertical Barrier Walls are not component of the remedy at LHAAP-018 / LHAAP-024.

1. **Settlement** ☐ Location shown on site map ☐ Settlement not evident
Areal extent _____ Depth _____
Remarks _____
_____

2. **Performance Monitoring** Type of monitoring _____
☐ Performance not monitored
Frequency _____ ☐ Evidence of breaching
Head differential _____
Remarks _____
_____

IX. GROUNDWATER/SURFACE WATER REMEDIES ☒ Applicable ☐ N/A

A. Groundwater Extraction Wells, Pumps, and Pipelines ☒ Applicable ☐ N/A

1. **Pumps, Wellhead Plumbing, and Electrical**
   ☒ Good condition ☐ All required wells properly operating ☐ Needs Maintenance ☐ N/A
   Remarks _____

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
   ☒ Good condition ☐ Needs Maintenance
   Remarks _____

3. **Spare Parts and Equipment**
   ☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided
   Remarks _____

B. Surface Water Collection Structures, Pumps, and Pipelines ☐ Applicable ☒ N/A

1. **Collection Structures, Pumps, and Electrical**
   ☐ Good condition ☐ Needs Maintenance
   Remarks _____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
   ☐ Good condition ☐ Needs Maintenance
   Remarks _____

3. **Spare Parts and Equipment**
   ☐ Readily available ☐ Good condition ☐ Requires upgrade ☒ Needs to be provided
   Remarks _____

C. Treatment System ☒ Applicable ☐ N/A

1. **Treatment Train** (Check components that apply)
☒ Metals removal ☐ Oil/water separation ☐ Bioremediation
☒ Air stripping ☐ Carbon adsorbers
☐ Filters _____
☐ Additive (*e.g.*, chelation agent, flocculent) _____
☒ Others Fluidized bed reactor at GWTP for perchlorate removal
☒ Good condition ☐ Needs Maintenance
☐ Sampling ports properly marked and functional
☐ Sampling/maintenance log displayed and up to date
☐ Equipment properly identified
☒ Quantity of groundwater treated annually 3,049,385 gallons (2021 data)
☐ Quantity of surface water treated annually _____
Remarks _____
_____

2. **Electrical Enclosures and Panels** (properly rated and functional)
☐ N/A ☒ Good condition ☐ Needs Maintenance
Remarks _____
_____

3. **Tanks, Vaults, Storage Vessels**
☐ N/A ☒ Good condition ☐ Proper secondary containment ☐ Needs Maintenance
Remarks _____
_____

4. **Discharge Structure and Appurtenances**
☐ N/A ☒ Good condition ☐ Needs Maintenance
Remarks _____
_____

5. **Treatment Building(s)**
☐ N/A ☒ Good condition (esp. roof and doorways) ☐ Needs repair
☐ Chemicals and equipment properly stored
Remarks _____
_____

6. **Monitoring Wells** (pump and treatment remedy)
☐ Properly secured/locked ☒ Functioning ☒ Routinely sampled ☒ Good condition
☐ All required wells located ☐ Needs Maintenance ☐ N/A
Remarks _____
_____

D. Monitoring Data

1. Monitoring Data
☒ Is routinely submitted on time ☒ Is of acceptable quality

2. Monitoring data suggests:
☐ Groundwater plume is effectively contained ☒ Contaminant concentrations are declining

E. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ All required wells located ☐ Needs Maintenance ☒ N/A Remarks Remedial Design is still in progress, MNA will commence following finalizing of remedy implementation.

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

Maintenance of the existing cap over the former unlined evaporation pond. Observations during the inspection found the cap to be in good condition with no evidence of settlement, ponding, erosion, cracking, or other maintenance issues.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).
Full implementation of the remedy as described in the 2020 ROD is not yet complete and is in the remedial design phase. Implementation of groundwater extraction/treatment as well as the cap over the unlined evaporation pond began prior to the 2020 ROD. Those aspects of the remedy are effective and functioning as designed to 1) protect human health by preventing human exposure to the groundwater contaminated with COCs, 2) prevent groundwater contaminated with COCs from migrating into nearby surface water and 3) return groundwater to its potential beneficial use as drinking water, wherever practicable, within a timeframe that is reasonable given the particular site circumstances, and 4) prevent migration of contaminants to groundwater from potential sources in the soil. Historical monitoring data show that the groundwater treatment plant is reducing concentrations of COCs in the groundwater. LUCs are enforced by the site and the filing of land use restrictions with the county is pending. The Five-Year Review site inspection did not observe any violations of land use controls nor evidence of prohibited use of groundwater.

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.
O&M for the groundwater treatment plant is adequate and reported quarterly. Maintenance is regularly performed and reported.

C.	Early Indicators of Potential Remedy Problems
	Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future. There are no indications of potential problems that were identified during the Five-Year Review site inspection.
D.	**Opportunities for Optimization**
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. The Five-Year Review did not identify opportunities for optimization at LHAAP-18&24. Ongoing remedial design is assessing if the groundwater treatment plant needs to be replaced with a smaller unit and if interception trenches 3 and 9 should be reactivated.

I. SITE INFORMATION	
Site name: LHAAP-37	**Date of inspection:** February 14-15, 2023
Location and Region: Longhorn Army Ammunition Plant / U.S. Environmental Protection Agency (EPA), Region 6	**EPA ID:** TX110000619910
Agency, office, or company leading the five-year review: U.S. Army Corps of Engineers, Omaha District	**Weather/temperature:** Raining/50 °F

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☒ Access controls
- ☒ Institutional controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☐ Other
- ☒ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls

Attachments: ☐ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (Check all that apply)

Interviews conducted separate from the site inspection. Interview responses are presented in Appendix D of the Five-Year Review.

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**
   - ☒ O&M manual — ☒ Readily available — ☒ Up to date — ☐ N/A
   - ☒ As-built drawings — ☒ Readily available — ☒ Up to date — ☐ N/A
   - ☒ Maintenance logs — ☒ Readily available — ☒ Up to date — ☐ N/A

   Remarks AECOM, 2017. Final Remedial Action Work Plan for LHAAP-35B (37), Chemical Laboratory Longhorn Army Ammunition Plant, Karnack, Texas

2. **Site-Specific Health and Safety Plan** ☒ Readily available ☒ Up to date ☐ N/A
   ☐ Contingency/Emergency Response Plan ☐ Readily available ☐ Up to date ☐ N/A
   Remarks _____

3. **O&M and OSHA Training Records** ☐ Readily available ☐ Up to date ☒ N/A
   Remarks _____

4. **Permits and Service Agreements**
   - ☐ Air discharge permit — ☐ Readily available — ☐ Up to date — ☒ N/A
   - ☐ Effluent discharge — ☐ Readily available — ☐ Up to date — ☒ N/A
   - ☐ Waste disposal, POTW — ☐ Readily available — ☐ Up to date — ☒ N/A
   - ☐ Other permits _____ — ☐ Readily available — ☐ Up to date — ☒ N/A

   Remarks _____

5. **Gas Generation Records** ☐ Readily available ☐ Up to date ☒ N/A
   Remarks _____

6. **Settlement Monument Records** ☐ Readily available ☐ Up to date ☒ N/A
   Remarks _____

7. **Groundwater Monitoring Records** ☒ Readily available ☒ Up to date ☐ N/A
   Remarks _Draft Final Fourth Annual Remedial Action Operation Report, LHAAP-35B(37) (Chemical Laboratory), January 2022

8. **Leachate Extraction Records** ☐ Readily available ☐ Up to date ☒ N/A
   Remarks _____

9. **Discharge Compliance Records**
   - ☐ Air — ☐ Readily available — ☐ Up to date — ☒ N/A
   - ☐ Water (effluent) — ☐ Readily available — ☐ Up to date — ☒ N/A

   Remarks _____

10. **Daily Access/Security Logs** ☐ Readily available ☐ Up to date ☒ N/A
Remarks _____
_____

IV. O&M COSTS

1. **O&M Organization**
☐ State in-house ☐ Contractor for State
☐ PRP in-house ☐ Contractor for PRP
☐ Federal Facility in-house ☐ Contractor for Federal Facility
☐ Other _____
_____

2. **O&M Cost Records**
☐ Readily available ☐ Up to date
☐ Funding mechanism/agreement in place
Original O&M cost estimate _____ ☐ Breakdown attached

Total annual cost by year for review period if available

From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost
From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost
From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost
From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost
From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost

3. **Unanticipated or Unusually High O&M Costs During Review Period**
Describe costs and reasons: Operations and maintenance costs were not obtained. Work is being completed under a performance-based acquisition contract. As a result, costs are fixed-price and do not include variances that would identify potential remedy problems or issues.

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N/A

A. Fencing

1. **Fencing damaged** ☐ Location shown on site map ☐ Gates secured ☒ N/A
Remarks _____
_____

B. Other Access Restrictions

1. **Signs and other security measures** ☐ Location shown on site map ☒ N/A
Remarks _____
_____

C. Institutional Controls (ICs)

1. **Implementation and enforcement**
Site conditions imply ICs not properly implemented ☐ Yes ☒ No ☐ N/A
Site conditions imply ICs not being fully enforced ☐ Yes ☒ No ☒ N/A

Type of monitoring (*e.g.*, self-reporting, drive by) Site inspections
Frequency Annual
Responsible party/agency Army
Contact Rose Zeiler LHAAP RPMP _____
Name Title Date Phone no.

Reporting is up-to-date ☒ Yes ☐ No ☐ N/A
Reports are verified by the lead agency ☒ Yes ☐ No ☐ N/A

Specific requirements in deed or decision documents have been met
☒ Yes ☐ No ☐ N/A
Violations have been reported ☐ Yes ☒ No ☐ N/A
Other problems or suggestions: ☐ Report attached
_____
_____
_____
_____

2. **Adequacy** ☒ ICs are adequate ☐ ICs are inadequate ☐ N/A
Remarks Current and future land use is restricted to non-residential use. Groundwater use is prohibited and was not observed during the inspection.

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ☒ No vandalism evident
Remarks _____
_____

2. **Land use changes on site** ☐ N/A
Remarks There have been no changes to land use since the previous Five-Year Review.

3. **Land use changes off site** ☐ N/A
Remarks No land use changes off site.

VI. GENERAL SITE CONDITIONS

A. Roads ☒ Applicable ☐ N/A

1. **Roads damaged** ☐ Location shown on site map ☒ Roads adequate ☐ N/A
Remarks Access to the site is via paved roads in good condition.

B. Other Site Conditions

Remarks None.

VII. LANDFILL COVERS ☐ Applicable ☒ N/A

A. Landfill Surface

1. **Settlement** (Low spots) ☐ Location shown on site map ☐ Settlement not evident
Areal extent _____ Depth _____
Remarks _____
_____

2. **Cracks** ☐ Location shown on site map ☐ Cracking not evident
Lengths _____ Widths _____ Depths _____
Remarks _____
_____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
Areal extent _____ Depth _____
Remarks

4. **Holes** ☐ Location shown on site map ☐ Holes not evident
Areal extent _____ Depth _____
Remarks _____
_____

5. **Vegetative Cover** ☐ Grass ☐ Cover properly established ☐ No signs of stress
☐ Trees/Shrubs (indicate size and locations on a diagram)
Remarks

6. **Alternative Cover (armored rock, concrete, etc.)** ☐ N/A
Remarks _____
_____

7. **Bulges** ☐ Location shown on site map ☐ Bulges not evident
Areal extent _____ Height _____
Remarks _____
_____

8. **Wet Areas/Water Damage** ☐ Wet areas/water damage not evident
☐ Wet areas ☐ Location shown on site map Areal extent
☐ Ponding ☐ Location shown on site map Areal extent _____
☐ Seeps ☐ Location shown on site map Areal extent _____
☐ Soft subgrade ☐ Location shown on site map Areal extent _____
Remarks

9. **Slope Instability** ☐ Slides ☐ Location shown on site map ☐ No evidence of slope instability
Areal extent _____
Remarks _____
_____

B. Benches ☐ Applicable ☒ N/A
(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** ☐ Location shown on site map ☐ N/A or okay
Remarks _____
_____

2. **Bench Breached** ☐ Location shown on site map ☐ N/A or okay
Remarks _____
_____

3. **Bench Overtopped** ☐ Location shown on site map ☐ N/A or okay
Remarks _____
_____

C. Letdown Channels ☐ Applicable ☒ N/A
(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** ☐ Location shown on site map ☐ No evidence of settlement
Areal extent _____ Depth _____
Remarks _____
_____

2. **Material Degradation** ☐ Location shown on site map ☐ No evidence of degradation
Material type _____ Areal extent _____
Remarks _____
_____

3. **Erosion** ☐ Location shown on site map ☐ No evidence of erosion
Areal extent _____ Depth _____
Remarks _____
_____

4. **Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting
Areal extent _____ Depth _____
Remarks _____
_____

5. **Obstructions** ☐ No obstructions ☐ Location shown on site map
Type _____ Areal extent _____
Size _____
Remarks _____
_____

6. **Excessive Vegetative Growth** Type _____
☐ No evidence of excessive growth
☐ Vegetation in channels does not obstruct flow
☐ Location shown on site map Areal extent _____
Remarks _____
_____

D. Cover Penetrations ☐ Applicable ☒ N/A

1. **Gas Vents** ☐ Active ☐ Passive
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks _____
_____

2. **Gas Monitoring Probes**
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks _____
_____

3. **Monitoring Wells** (within surface area of landfill)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks _____
_____

4. **Leachate Extraction Wells**
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks _____
_____

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☐ N/A
Remarks_____
_____

E. Gas Collection and Treatment ☐ Applicable ☒ N/A

1. **Gas Treatment Facilities**
   ☐ Flaring ☐ Thermal destruction ☐ Collection for reuse
   ☐ Good condition ☐ Needs Maintenance
   Remarks _____
   _____

2. **Gas Collection Wells, Manifolds and Piping**
   ☐ Good condition ☐ Needs Maintenance
   Remarks _____
   _____

3. **Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings)
   ☐ Good condition ☐ Needs Maintenance ☐ N/A
   Remarks _____
   _____

F. Cover Drainage Layer ☐ Applicable ☒ N/A

1. **Outlet Pipes Inspected** ☐ Functioning ☐ N/A
   Remarks _____
   _____

2. **Outlet Rock Inspected** ☐ Functioning ☐ N/A
   Remarks _____
   _____

G. Detention/Sedimentation Ponds ☐ Applicable ☒ N/A

1. **Siltation** Areal extent _____ Depth _____ ☐ N/A
   ☐ Siltation not evident
   Remarks _____
   _____

2. **Erosion** Areal extent _____ Depth _____
   ☐ Erosion not evident
   Remarks _____
   _____

3. **Outlet Works** ☐ Functioning ☐ N/A
   Remarks _____
   _____

4. **Dam** ☐ Functioning ☐ N/A
   Remarks _____
   _____

H. Retaining Walls ☐ Applicable ☒ N/A

1. **Deformations** ☐ Location shown on site map ☐ Deformation not evident
Horizontal displacement _____ Vertical displacement _____
Rotational displacement _____
Remarks _____
_____

2. **Degradation** ☐ Location shown on site map ☐ Degradation not evident
Remarks _____
_____

I. Perimeter Ditches/Off-Site Discharge ☐ Applicable ☒ N/A

1. **Siltation** ☐ Location shown on site map ☐ Siltation not evident
Areal extent _____ Depth _____
Remarks _____
_____

2. **Vegetative Growth** ☐ Location shown on site map ☐ N/A
☐ Vegetation does not impede flow
Areal extent _____ Type _____
Remarks _____
_____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
Areal extent _____ Depth _____
Remarks

4. **Discharge Structure** ☐ Functioning ☐ N/A
Remarks _____
_____

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A
Remarks Vertical Barrier Walls are not component of the remedy at LHAAP-37.

1. **Settlement** ☐ Location shown on site map ☐ Settlement not evident
Areal extent _____ Depth _____
Remarks _____
_____

2. **Performance Monitoring** Type of monitoring _____
☐ Performance not monitored
Frequency _____ ☐ Evidence of breaching
Head differential _____
Remarks _____
_____

IX. GROUNDWATER/SURFACE WATER REMEDIES ☒ Applicable ☐ N/A

A. Groundwater Extraction Wells, Pumps, and Pipelines ☐ Applicable ☒ N/A

1. **Pumps, Wellhead Plumbing, and Electrical**
☐ Good condition ☐ All required wells properly operating ☐ Needs Maintenance ☐ N/A
Remarks _____
_____
_____

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

3. **Spare Parts and Equipment**
☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided
Remarks _____
_____

B. Surface Water Collection Structures, Pumps, and Pipelines ☐ Applicable ☒ N/A

1. **Collection Structures, Pumps, and Electrical**
☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

3. **Spare Parts and Equipment**
☐ Readily available ☐ Good condition ☐ Requires upgrade ☒ Needs to be provided
Remarks _____
_____

C. Treatment System ☐ Applicable ☒ N/A

1. **Treatment Train** (Check components that apply)
☐ Metals removal ☐ Oil/water separation ☐ Bioremediation
☐ Air stripping ☐ Carbon adsorbers
☐ Filters _____
☐ Additive (*e.g.*, chelation agent, flocculent) _____
☐ Others _____
☐ Good condition ☐ Needs Maintenance
☐ Sampling ports properly marked and functional
☐ Sampling/maintenance log displayed and up to date
☐ Equipment properly identified
☐ Quantity of groundwater treated annually _____
☐ Quantity of surface water treated annually _____
Remarks _____
_____

2. **Electrical Enclosures and Panels** (properly rated and functional)
☐ N/A ☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

3. **Tanks, Vaults, Storage Vessels**
☐ N/A ☐ Good condition ☐ Proper secondary containment ☐ Needs Maintenance
Remarks _____
_____

4. **Discharge Structure and Appurtenances**
☐ N/A ☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

5. **Treatment Building(s)**
☐ N/A ☐ Good condition (esp. roof and doorways) ☐ Needs repair
☐ Chemicals and equipment properly stored
Remarks _____
_____

6. **Monitoring Wells** (pump and treatment remedy)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ All required wells located ☐ Needs Maintenance ☐ N/A
Remarks _____
_____

D. Monitoring Data

1. Monitoring Data
☒ Is routinely submitted on time ☒ Is of acceptable quality

2. Monitoring data suggests:
☒ Groundwater plume is effectively contained ☒ Contaminant concentrations are declining

E. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)
☒ Properly secured/locked ☐ Functioning ☒ Routinely sampled ☒ Good condition
☐ All required wells located ☐ Needs Maintenance ☐ N/A
Remarks _____

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).
The remedy is effective and functioning as designed to 1) protect human health by preventing human exposure to the contaminated groundwater, 2) prevent contaminated groundwater from migrating into nearby surface water and 3) return groundwater to its potential beneficial use as drinking water, wherever practicable. The Five-Year Review site inspection confirmed land use controls prohibit changes in land use. There were no violations of land use controls nor evidence of prohibited use of groundwater observed during the site inspection.

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.
There is no requirement for O&M.

C. Early Indicators of Potential Remedy Problems

Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.

There are no indications of potential problems that were identified during the Five-Year Review site inspection.

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

The Five-Year Review did not identify opportunities for optimization at LHAAP-37.

I. SITE INFORMATION	
Site name: LHAAP-046	**Date of inspection:** February 14-15, 2023
Location and Region: Longhorn Army Ammunition Plant / U.S. Environmental Protection Agency (EPA), Region 6	**EPA ID:** TX110000619910
Agency, office, or company leading the five-year review: U.S. Army Corps of Engineers, Omaha District	**Weather/temperature:** Raining/50 °F

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☒ Access controls
- ☒ Institutional controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☐ Other
- ☒ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls

Attachments: ☒ Inspection team roster attached ☒ Site map attached

II. INTERVIEWS (Check all that apply)

Interviews conducted separate from the site inspection. Interview responses are presented in Appendix D of the Five-Year Review.

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**
   - ☒ O&M manual — ☒ Readily available — ☒ Up to date — ☐ N/A
   - ☒ As-built drawings — ☒ Readily available — ☒ Up to date — ☐ N/A
   - ☒ Maintenance logs — ☒ Readily available — ☒ Up to date — ☐ N/A

   Remarks AECOM, 2013. Final Remedial Action Work Plan for LHAAP-46, Plant 2 Area, Longhorn Army Ammunition Plant, Karnack, Texas

2. **Site-Specific Health and Safety Plan** ☒ Readily available ☒ Up to date ☐ N/A
   ☐ Contingency/Emergency Response Plan ☐ Readily available ☐ Up to date ☐ N/A
   Remarks _____

3. **O&M and OSHA Training Records** ☐ Readily available ☐ Up to date ☒ N/A
   Remarks _____

4. **Permits and Service Agreements**
   - ☐ Air discharge permit — ☐ Readily available — ☐ Up to date — ☒ N/A
   - ☐ Effluent discharge — ☐ Readily available — ☐ Up to date — ☒ N/A
   - ☐ Waste disposal, POTW — ☐ Readily available — ☐ Up to date — ☒ N/A
   - ☐ Other permits _____ — ☐ Readily available — ☐ Up to date — ☒ N/A

   Remarks _____

5. **Gas Generation Records** ☐ Readily available ☐ Up to date ☒ N/A
   Remarks _____

6. **Settlement Monument Records** ☐ Readily available ☐ Up to date ☒ N/A
   Remarks _____

7. **Groundwater Monitoring Records** ☒ Readily available ☒ Up to date ☐ N/A
   Remarks Draft Final Seventh Annual Remedial Action Operation Report, LHAAP-46 (Plant 2 Area), Longhorn Army Ammunition Plant, Karnack, Texas, January 2022.

8. **Leachate Extraction Records** ☐ Readily available ☐ Up to date ☒ N/A
   Remarks _____

9. **Discharge Compliance Records**
   - ☐ Air — ☐ Readily available — ☐ Up to date — ☒ N/A
   - ☐ Water (effluent) — ☐ Readily available — ☐ Up to date — ☒ N/A

   Remarks _____

10. **Daily Access/Security Logs** ☐ Readily available ☐ Up to date ☒ N/A
Remarks _____
_____

IV. O&M COSTS

1. **O&M Organization**
☐ State in-house ☐ Contractor for State
☐ PRP in-house ☐ Contractor for PRP
☐ Federal Facility in-house ☐ Contractor for Federal Facility
☐ Other _____
_____

2. **O&M Cost Records**
☐ Readily available ☐ Up to date
☐ Funding mechanism/agreement in place
Original O&M cost estimate _____ ☐ Breakdown attached

Total annual cost by year for review period if available

From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost
From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost
From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost
From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost
From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost

3. **Unanticipated or Unusually High O&M Costs During Review Period**
Describe costs and reasons: Operations and maintenance costs were not obtained. Work is being completed under a performance-based acquisition contract. As a result, costs are fixed-price and do not include variances that would identify potential remedy problems or issues.

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N/A

A. Fencing

1. **Fencing damaged** ☐ Location shown on site map ☐ Gates secured ☒ N/A
Remarks _____
_____

B. Other Access Restrictions

1. **Signs and other security measures** ☐ Location shown on site map ☒ N/A
Remarks _____
_____

C. Institutional Controls (ICs)

1. **Implementation and enforcement**
Site conditions imply ICs not properly implemented ☐ Yes ☒ No ☐ N/A
Site conditions imply ICs not being fully enforced ☐ Yes ☒ No ☐ N/A

Type of monitoring (*e.g.*, self-reporting, drive by) Site inspections
Frequency Annual
Responsible party/agency Army
Contact Rose Zeiler LHAAP RPMP _____
Name Title Date Phone no.

Reporting is up-to-date ☒ Yes ☐ No ☐ N/A
Reports are verified by the lead agency ☒ Yes ☐ No ☐ N/A

Specific requirements in deed or decision documents have been met
☒ Yes ☐ No ☐ N/A
Violations have been reported ☐ Yes ☒ No ☐ N/A
Other problems or suggestions: ☐ Report attached
_____
_____
_____
_____

2. **Adequacy** ☒ ICs are adequate ☐ ICs are inadequate ☐ N/A
Remarks Current and future land use is restricted to non-residential use. Groundwater use is prohibited and was not observed during the inspection.

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ☒ No vandalism evident
Remarks _____
_____

2. **Land use changes on site** ☐ N/A
Remarks There have been no changes to land use since the previous Five-Year Review.

3. **Land use changes off site** ☐ N/A
Remarks No land use changes off site.

VI. GENERAL SITE CONDITIONS

A. Roads ☒ Applicable ☐ N/A

1. **Roads damaged** ☐ Location shown on site map ☒ Roads adequate ☐ N/A
Remarks Access to the site is via paved roads in good condition.

B. Other Site Conditions

Remarks None.

VII. LANDFILL COVERS ☐ Applicable ☒ N/A

A. Landfill Surface

1. **Settlement** (Low spots) ☐ Location shown on site map ☐ Settlement not evident
Areal extent _____ Depth _____
Remarks _____
_____

2. **Cracks** ☐ Location shown on site map ☐ Cracking not evident
Lengths _____ Widths _____ Depths _____
Remarks _____
_____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
Areal extent _____ Depth _____
Remarks

4. **Holes** ☐ Location shown on site map ☐ Holes not evident
Areal extent _____ Depth _____
Remarks _____
_____

5. **Vegetative Cover** ☐ Grass ☐ Cover properly established ☐ No signs of stress
☐ Trees/Shrubs (indicate size and locations on a diagram)
Remarks

6. **Alternative Cover (armored rock, concrete, etc.)** ☐ N/A
Remarks _____
_____

7. **Bulges** ☐ Location shown on site map ☐ Bulges not evident
Areal extent _____ Height _____
Remarks _____
_____

8. **Wet Areas/Water Damage** ☐ Wet areas/water damage not evident
☐ Wet areas ☐ Location shown on site map Areal extent
☐ Ponding ☐ Location shown on site map Areal extent _____
☐ Seeps ☐ Location shown on site map Areal extent _____
☐ Soft subgrade ☐ Location shown on site map Areal extent _____
Remarks

9. **Slope Instability** ☐ Slides ☐ Location shown on site map ☐ No evidence of slope instability
Areal extent _____
Remarks _____
_____

B. Benches ☐ Applicable ☒ N/A
(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** ☐ Location shown on site map ☐ N/A or okay
Remarks _____
_____

2. **Bench Breached** ☐ Location shown on site map ☐ N/A or okay
Remarks _____
_____

3. **Bench Overtopped** ☐ Location shown on site map ☐ N/A or okay
Remarks _____
_____

C. Letdown Channels ☐ Applicable ☒ N/A
(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** ☐ Location shown on site map ☐ No evidence of settlement
Areal extent _____ Depth _____
Remarks _____
_____

2. **Material Degradation** ☐ Location shown on site map ☐ No evidence of degradation
Material type _____ Areal extent _____
Remarks _____
_____

3. **Erosion** ☐ Location shown on site map ☐ No evidence of erosion
Areal extent _____ Depth _____
Remarks _____
_____

4. **Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting
Areal extent _____ Depth _____
Remarks _____
_____

5. **Obstructions** ☐ No obstructions ☐ Location shown on site map
Type _____ Areal extent _____
Size _____
Remarks _____
_____

6. **Excessive Vegetative Growth** Type _____
☐ No evidence of excessive growth
☐ Vegetation in channels does not obstruct flow
☐ Location shown on site map Areal extent _____
Remarks _____
_____

D. Cover Penetrations ☐ Applicable ☒ N/A

1. **Gas Vents** ☐ Active ☐ Passive
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks _____
_____

2. **Gas Monitoring Probes**
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks _____
_____

3. **Monitoring Wells** (within surface area of landfill)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks _____
_____

4. **Leachate Extraction Wells**
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks _____
_____

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☐ N/A
Remarks_____
_____

E. Gas Collection and Treatment ☐ Applicable ☒ N/A

1. **Gas Treatment Facilities**
   ☐ Flaring ☐ Thermal destruction ☐ Collection for reuse
   ☐ Good condition ☐ Needs Maintenance
   Remarks _____
   _____

2. **Gas Collection Wells, Manifolds and Piping**
   ☐ Good condition ☐ Needs Maintenance
   Remarks _____
   _____

3. **Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings)
   ☐ Good condition ☐ Needs Maintenance ☐ N/A
   Remarks _____
   _____

F. Cover Drainage Layer ☐ Applicable ☒ N/A

1. **Outlet Pipes Inspected** ☐ Functioning ☐ N/A
   Remarks _____
   _____

2. **Outlet Rock Inspected** ☐ Functioning ☐ N/A
   Remarks _____
   _____

G. Detention/Sedimentation Ponds ☐ Applicable ☒ N/A

1. **Siltation** Areal extent _____ Depth _____ ☐ N/A
   ☐ Siltation not evident
   Remarks _____
   _____

2. **Erosion** Areal extent _____ Depth _____
   ☐ Erosion not evident
   Remarks _____
   _____

3. **Outlet Works** ☐ Functioning ☐ N/A
   Remarks _____
   _____

4. **Dam** ☐ Functioning ☐ N/A
   Remarks _____
   _____

H. Retaining Walls ☐ Applicable ☒ N/A

1. **Deformations** ☐ Location shown on site map ☐ Deformation not evident
Horizontal displacement _____ Vertical displacement _____
Rotational displacement _____
Remarks _____
_____

2. **Degradation** ☐ Location shown on site map ☐ Degradation not evident
Remarks _____
_____

I. Perimeter Ditches/Off-Site Discharge ☒ Applicable ☐ N/A

1. **Siltation** ☐ Location shown on site map ☐ Siltation not evident
Areal extent _____ Depth _____
Remarks _____
_____

2. **Vegetative Growth** ☐ Location shown on site map ☐ N/A
☐ Vegetation does not impede flow
Areal extent _____ Type _____
Remarks _____
_____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
Areal extent _____ Depth _____
Remarks

4. **Discharge Structure** ☐ Functioning ☐ N/A
Remarks _____
_____

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A
Remarks Vertical Barrier Walls are not component of the remedy at LHAAP-046.

1. **Settlement** ☐ Location shown on site map ☐ Settlement not evident
Areal extent _____ Depth _____
Remarks _____
_____

2. **Performance Monitoring** Type of monitoring _____
☐ Performance not monitored
Frequency _____ ☐ Evidence of breaching
Head differential _____
Remarks _____
_____

IX. GROUNDWATER/SURFACE WATER REMEDIES ☒ Applicable ☐ N/A

A. Groundwater Extraction Wells, Pumps, and Pipelines ☐ Applicable ☒ N/A

1. **Pumps, Wellhead Plumbing, and Electrical**
☐ Good condition ☐ All required wells properly operating ☐ Needs Maintenance ☐ N/A
Remarks _____
_____
_____

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

3. **Spare Parts and Equipment**
☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided
Remarks _____
_____

B. Surface Water Collection Structures, Pumps, and Pipelines ☐ Applicable ☒ N/A

1. **Collection Structures, Pumps, and Electrical**
☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

3. **Spare Parts and Equipment**
☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided
Remarks _____
_____

C. Treatment System ☐ Applicable ☒ N/A

1. **Treatment Train** (Check components that apply)
☐ Metals removal ☐ Oil/water separation ☐ Bioremediation
☐ Air stripping ☐ Carbon adsorbers
☐ Filters _____
☐ Additive (*e.g.*, chelation agent, flocculent) _____
☐ Others _____
☐ Good condition ☐ Needs Maintenance
☐ Sampling ports properly marked and functional
☐ Sampling/maintenance log displayed and up to date
☐ Equipment properly identified
☐ Quantity of groundwater treated annually _____
☐ Quantity of surface water treated annually _____
Remarks _____
_____

2. **Electrical Enclosures and Panels** (properly rated and functional)
☐ N/A ☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

3. **Tanks, Vaults, Storage Vessels**
☐ N/A ☐ Good condition ☐ Proper secondary containment ☐ Needs Maintenance
Remarks _____
_____

4. **Discharge Structure and Appurtenances**
☐ N/A ☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

5. **Treatment Building(s)**
☐ N/A ☐ Good condition (esp. roof and doorways) ☐ Needs repair
☐ Chemicals and equipment properly stored
Remarks _____
_____

6. **Monitoring Wells** (pump and treatment remedy)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ All required wells located ☐ Needs Maintenance ☐ N/A
Remarks _____
_____

D. Monitoring Data

1. Monitoring Data
☒ Is routinely submitted on time ☒ Is of acceptable quality

2.	Monitoring data suggests: ☒ Groundwater plume is effectively contained ☒ Contaminant concentrations are declining
E. Monitored Natural Attenuation	
1.	**Monitoring Wells** (natural attenuation remedy) ☒ Properly secured/locked ☐ Functioning ☒ Routinely sampled ☒ Good condition ☐ All required wells located ☐ Needs Maintenance ☐ N/A Remarks _____
X. OTHER REMEDIES	
If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.	
XI. OVERALL OBSERVATIONS	
A.	**Implementation of the Remedy**
Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.). The remedy is effective and functioning as designed to 1) protect human health by preventing human exposure to the contaminated groundwater, 2) prevent contaminated groundwater from migrating into nearby surface water and 3) return groundwater to its potential beneficial use as drinking water, wherever practicable. The Five-Year Review site inspection confirmed land use controls prohibit changes in land use. There were no violations of land use controls nor evidence of prohibited use of groundwater observed during the site inspection.	
B.	**Adequacy of O&M**
Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy. There is no requirement for O&M.	
C.	**Early Indicators of Potential Remedy Problems**
Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future. There are no indications of potential problems that were identified during the Five-Year Review site inspection.	
D.	**Opportunities for Optimization**
Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. The Five-Year Review did not identify opportunities for optimization at LHAAP-46.	

I. SITE INFORMATION	
Site name: LHAAP-049	**Date of inspection:** February 14-15, 2023
Location and Region: Longhorn Army Ammunition Plant / U.S. Environmental Protection Agency (EPA), Region 6	**EPA ID:** TX110000619910
Agency, office, or company leading the five-year review: U.S. Army Corps of Engineers, Omaha District	**Weather/temperature:** Sunny/60°F

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☐ Access controls
- ☐ Institutional controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☐ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls
- ☒ Other No further Remedial Action will be required at this time.

Attachments: ☐ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (Check all that apply)

Interviews conducted separate from the site inspection. Interview responses are presented in Appendix D of the Five-Year Review.

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**
   - ☐ O&M manual — ☐ Readily available ☐ Up to date ☒ N/A
   - ☐ As-built drawings — ☐ Readily available ☐ Up to date ☒ N/A
   - ☐ Maintenance logs — ☐ Readily available ☐ Up to date ☒ N/A

   Remarks _____

2. **Site-Specific Health and Safety Plan** ☐ Readily available ☐ Up to date ☒ N/A
   ☐ Contingency/Emergency Response Plan ☐ Readily available ☐ Up to date ☐ N/A

   Remarks _____

3. **O&M and OSHA Training Records** ☐ Readily available ☐ Up to date ☒ N/A

   Remarks _____

4. **Permits and Service Agreements**
   - ☐ Air discharge permit — ☐ Readily available ☐ Up to date ☒ N/A
   - ☐ Effluent discharge — ☐ Readily available ☐ Up to date ☒ N/A
   - ☐ Waste disposal, POTW — ☐ Readily available ☐ Up to date ☒ N/A
   - ☐ Other permits _____ — ☐ Readily available ☐ Up to date ☒ N/A

   Remarks _____

5. **Gas Generation Records** ☐ Readily available ☐ Up to date ☒ N/A

   Remarks _____

6. **Settlement Monument Records** ☐ Readily available ☐ Up to date ☒ N/A

   Remarks _____

7. **Groundwater Monitoring Records** ☐ Readily available ☐ Up to date ☒ N/A

   Remarks _____

8. **Leachate Extraction Records** ☐ Readily available ☐ Up to date ☒ N/A

   Remarks _____

9. **Discharge Compliance Records**
   - ☐ Air — ☐ Readily available ☐ Up to date ☒ N/A
   - ☐ Water (effluent) — ☐ Readily available ☐ Up to date ☒ N/A

   Remarks _____

10. **Daily Access/Security Logs** ☐ Readily available ☐ Up to date ☒ N/A
Remarks _____
_____

IV. O&M COSTS

1. **O&M Organization**
☐ State in-house ☐ Contractor for State
☐ PRP in-house ☐ Contractor for PRP
☐ Federal Facility in-house ☐ Contractor for Federal Facility
☐ Other _____
_____

2. **O&M Cost Records**
☐ Readily available ☐ Up to date
☐ Funding mechanism/agreement in place
Original O&M cost estimate _____ ☐ Breakdown attached

Total annual cost by year for review period if available

From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost
From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost
From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost
From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost
From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost

3. **Unanticipated or Unusually High O&M Costs During Review Period**
Describe costs and reasons: There is no requirement for O&M.

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N/A

A. Fencing

1. **Fencing damaged** ☐ Location shown on site map ☐ Gates secured ☒ N/A
Remarks _____
_____

B. Other Access Restrictions

1. **Signs and other security measures** ☐ Location shown on site map ☒ N/A
Remarks _____
_____

C. Institutional Controls (ICs)

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented ☐ Yes ☒ No ☐ N/A

Site conditions imply ICs not being fully enforced ☐ Yes ☒ No ☐ N/A

Type of monitoring (*e.g.*, self-reporting, drive by) Monitoring not required

Frequency N/A

Responsible party/agency

Contact _____

Name	Title	Date	Phone no.

Reporting is up-to-date ☐ Yes ☐ No ☒ N/A

Reports are verified by the lead agency ☐ Yes ☐ No ☒ N/A

Specific requirements in deed or decision documents have been met ☒ Yes ☐ No ☐ N/A

Violations have been reported ☐ Yes ☒ No ☐ N/A

Other problems or suggestions: ☐ Report attached

None.

2. **Adequacy** ☒ ICs are adequate ☐ ICs are inadequate ☐ N/A

Remarks Current and future land use is restricted to non-residential use.

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ☒ No vandalism evident

Remarks _____

_____

2. **Land use changes on site** ☐ N/A

Remarks There have been no changes to land use since the previous Five-Year Review.

3. **Land use changes off site** ☐ N/A

Remarks No land use changes off site.

VI. GENERAL SITE CONDITIONS

A. Roads ☒ Applicable ☐ N/A

1. **Roads damaged** ☐ Location shown on site map ☐ Roads adequate ☐ N/A

Remarks Access to the site is via paved roads in good condition.

B. Other Site Conditions

Remarks None.

VII. LANDFILL COVERS ☐ Applicable ☒ N/A

A. Landfill Surface

1. **Settlement** (Low spots) ☐ Location shown on site map ☐ Settlement not evident
   Areal extent _____ Depth _____
   Remarks _____
   _____

2. **Cracks** ☐ Location shown on site map ☐ Cracking not evident
   Lengths _____ Widths _____ Depths _____
   Remarks _____
   _____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
   Areal extent _____ Depth _____
   Remarks

4. **Holes** ☐ Location shown on site map ☐ Holes not evident
   Areal extent _____ Depth _____
   Remarks _____
   _____

5. **Vegetative Cover** ☐ Grass ☐ Cover properly established ☐ No signs of stress
   ☐ Trees/Shrubs (indicate size and locations on a diagram)
   Remarks _____
   _____

6. **Alternative Cover (armored rock, concrete, etc.)** ☐ N/A
   Remarks _____
   _____

7. **Bulges** ☐ Location shown on site map ☐ Bulges not evident
   Areal extent _____ Height _____
   Remarks _____
   _____

8. **Wet Areas/Water Damage** ☐ Wet areas/water damage not evident
   ☐ Wet areas ☐ Location shown on site map Areal extent
   ☐ Ponding ☐ Location shown on site map Areal extent _____
   ☐ Seeps ☐ Location shown on site map Areal extent _____
   ☐ Soft subgrade ☐ Location shown on site map Areal extent _____
   Remarks

9. **Slope Instability** ☐ Slides ☐ Location shown on site map ☐ No evidence of slope instability
Areal extent _____
Remarks _____
_____

B. Benches ☐ Applicable ☒ N/A
(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** ☐ Location shown on site map ☐ N/A or okay
Remarks _____
_____

2. **Bench Breached** ☐ Location shown on site map ☐ N/A or okay
Remarks _____
_____

3. **Bench Overtopped** ☐ Location shown on site map ☐ N/A or okay
Remarks _____
_____

C. Letdown Channels ☐ Applicable ☒ N/A
(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** ☐ Location shown on site map ☐ No evidence of settlement
Areal extent _____ Depth _____
Remarks _____
_____

2. **Material Degradation** ☐ Location shown on site map ☐ No evidence of degradation
Material type _____ Areal extent _____
Remarks _____
_____

3. **Erosion** ☐ Location shown on site map ☐ No evidence of erosion
Areal extent _____ Depth _____
Remarks _____
_____

4. **Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting
Areal extent _____ Depth _____
Remarks _____
_____

5. **Obstructions** ☐ No obstructions ☐ Location shown on site map
Type _____ Areal extent _____
Size _____
Remarks _____
_____

6. **Excessive Vegetative Growth** Type _____
☐ No evidence of excessive growth
☐ Vegetation in channels does not obstruct flow
☐ Location shown on site map Areal extent _____
Remarks _____
_____

D. Cover Penetrations ☐ Applicable ☒ N/A

1. **Gas Vents** ☐ Active ☐ Passive
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks _____
_____

2. **Gas Monitoring Probes**
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks

3. **Monitoring Wells** (within surface area of landfill)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks

4. **Leachate Extraction Wells**
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks _____
_____

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☒ N/A
Remarks_____
_____

E. Gas Collection and Treatment ☐ Applicable ☒ N/A

1. **Gas Treatment Facilities**
☐ Flaring ☐ Thermal destruction ☐ Collection for reuse
☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

2. **Gas Collection Wells, Manifolds and Piping**
☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

3. **Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings)
☐ Good condition ☐ Needs Maintenance ☐ N/A
Remarks _____
_____

F. Cover Drainage Layer ☐ Applicable ☒ N/A

1. **Outlet Pipes Inspected** ☐ Functioning ☐ N/A
Remarks _____
_____

2. **Outlet Rock Inspected** ☐ Functioning ☐ N/A
Remarks _____
_____

G. Detention/Sedimentation Ponds ☐ Applicable ☒ N/A

1. **Siltation** Areal extent _____ Depth _____ ☐ N/A
☐ Siltation not evident
Remarks _____
_____

2. **Erosion** Areal extent _____ Depth _____
☐ Erosion not evident
Remarks _____
_____

3. **Outlet Works** ☐ Functioning ☐ N/A
Remarks _____
_____

4. **Dam** ☐ Functioning ☐ N/A
Remarks _____
_____

H. Retaining Walls ☐ Applicable ☒ N/A

1. **Deformations** ☐ Location shown on site map ☐ Deformation not evident
Horizontal displacement _____ Vertical displacement _____
Rotational displacement _____
Remarks _____
_____

2. **Degradation** ☐ Location shown on site map ☐ Degradation not evident
Remarks _____
_____

I. Perimeter Ditches/Off-Site Discharge ☐ Applicable ☒ N/A

1. **Siltation** ☐ Location shown on site map ☐ Siltation not evident
Areal extent _____ Depth _____
Remarks _____
_____

2. **Vegetative Growth** ☐ Location shown on site map ☐ N/A
☐ Vegetation does not impede flow
Areal extent _____ Type _____
Remarks _____
_____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
Areal extent _____ Depth _____
Remarks

4. **Discharge Structure** ☐ Functioning ☐ N/A
Remarks _____
_____

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A

Remarks Vertical barrier walls are not a component of the remedy at LHAAP-049.

1. **Settlement** ☐ Location shown on site map ☐ Settlement not evident
Areal extent _____ Depth _____
Remarks _____
_____

2. **Performance Monitoring** Type of monitoring _____
☐ Performance not monitored
Frequency _____ ☐ Evidence of breaching
Head differential _____
Remarks _____
_____

IX. GROUNDWATER/SURFACE WATER REMEDIES ☐ Applicable ☒ N/A

A. Groundwater Extraction Wells, Pumps, and Pipelines ☐ Applicable ☒ N/A

1. **Pumps, Wellhead Plumbing, and Electrical**
☐ Good condition ☐ All required wells properly operating ☐ Needs Maintenance ☐ N/A
Remarks _____
_____
_____

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

3. **Spare Parts and Equipment**
☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided
Remarks _____
_____

B. Surface Water Collection Structures, Pumps, and Pipelines ☐ Applicable ☒ N/A

1. **Collection Structures, Pumps, and Electrical**
☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

3. **Spare Parts and Equipment**
☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided
Remarks _____
_____

C. Treatment System ☐ Applicable ☒ N/A

1. **Treatment Train** (Check components that apply)
☐ Metals removal ☐ Oil/water separation ☐ Bioremediation
☐ Air stripping ☐ Carbon adsorbers
☐ Filters _____
☐ Additive (*e.g.*, chelation agent, flocculent) _____
☐ Others _____
☐ Good condition ☐ Needs Maintenance
☐ Sampling ports properly marked and functional
☐ Sampling/maintenance log displayed and up to date
☐ Equipment properly identified
☐ Quantity of groundwater treated annually _____
☐ Quantity of surface water treated annually _____
Remarks _____
_____

2. **Electrical Enclosures and Panels** (properly rated and functional)
☐ N/A ☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

3. **Tanks, Vaults, Storage Vessels**
☐ N/A ☐ Good condition ☐ Proper secondary containment ☐ Needs Maintenance
Remarks _____
_____

4. **Discharge Structure and Appurtenances**
☐ N/A ☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

5. **Treatment Building(s)**
☐ N/A ☐ Good condition (esp. roof and doorways) ☐ Needs repair
☐ Chemicals and equipment properly stored
Remarks _____
_____

6. **Monitoring Wells** (pump and treatment remedy)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ All required wells located ☐ Needs Maintenance ☐ N/A
Remarks _____
_____

D. Monitoring Data

1. Monitoring Data
☐ Is routinely submitted on time ☐ Is of acceptable quality

2. Monitoring data suggests:
☐ Groundwater plume is effectively contained ☐ Contaminant concentrations are declining

E. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ All required wells located ☐ Needs Maintenance ☐ N/A
Remarks _____
_____

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

	Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.). Mercury-contaminated soil was removed from LHAAP-49. Confirmation sampling showed no residual contamination. The site was classified as No Further Action, so it has no RAOs or remedy beyond the Five-Year Review site inspection. The Five-Year Review site inspection confirmed land use controls prohibit changes in land use. There were no violations of land use controls observed during the site inspection.
B.	**Adequacy of O&M**
	Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy. There is no requirement for O&M.
C.	**Early Indicators of Potential Remedy Problems**
	Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future. There are no indications of potential problems that were identified during the Five-Year Review site inspection.
D.	**Opportunities for Optimization**
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. The Five-Year Review did not identify opportunities for optimization at LHAAP-49.

I. SITE INFORMATION	
Site name: LHAAP-050	**Date of inspection:** February 14-15, 2023
Location and Region: Longhorn Army Ammunition Plant / U.S. Environmental Protection Agency (EPA), Region 6	**EPA ID:** TX110000619910
Agency, office, or company leading the five-year review: U.S. Army Corps of Engineers, Omaha District	**Weather/temperature:** Raining/50 °F

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☒ Access controls
- ☒ Institutional controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☐ Other Soil Removal with Off-site Disposal, in situ bioremediation.
- ☒ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls

Attachments: ☐ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (Check all that apply)

Interviews conducted separate from the site inspection. Interview responses are presented in Appendix D of the Five-Year Review.

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**
   - ☒ O&M manual — ☒ Readily available — ☒ Up to date — ☐ N/A
   - ☒ As-built drawings — ☒ Readily available — ☒ Up to date — ☐ N/A
   - ☒ Maintenance logs — ☒ Readily available — ☒ Up to date — ☐ N/A

   Remarks Shaw, 2011. Remedial Design LHAAP-50, Former Sum Water Tank, Group 4 Longhorn Army Ammunition Plant Karnack, Texas.

2. **Site-Specific Health and Safety Plan** ☒ Readily available ☒ Up to date ☐ N/A
   ☐ Contingency/Emergency Response Plan ☐ Readily available ☐ Up to date ☐ N/A
   Remarks _____

3. **O&M and OSHA Training Records** ☐ Readily available ☐ Up to date ☒ N/A
   Remarks _____

4. **Permits and Service Agreements**
   - ☐ Air discharge permit — ☐ Readily available — ☐ Up to date — ☒ N/A
   - ☐ Effluent discharge — ☐ Readily available — ☐ Up to date — ☒ N/A
   - ☐ Waste disposal, POTW — ☐ Readily available — ☐ Up to date — ☒ N/A
   - ☐ Other permits _____ — ☐ Readily available — ☐ Up to date — ☒ N/A

   Remarks _____

5. **Gas Generation Records** ☐ Readily available ☐ Up to date ☒ N/A
   Remarks _____

6. **Settlement Monument Records** ☐ Readily available ☐ Up to date ☒ N/A
   Remarks _____

7. **Groundwater Monitoring Records** ☒ Readily available ☒ Up to date ☐ N/A
   Remarks Final Sixth Annual Remedial Action Operation Report, LHAAP-50 Former Sump Water Tank, Longhorn Army Ammunition Plant, Karnack, Texas, February 2021.

8. **Leachate Extraction Records** ☐ Readily available ☐ Up to date ☒ N/A
   Remarks _____

9. **Discharge Compliance Records**
   - ☐ Air — ☐ Readily available — ☐ Up to date — ☒ N/A
   - ☐ Water (effluent) — ☐ Readily available — ☐ Up to date — ☒ N/A

   Remarks _____

10. **Daily Access/Security Logs** ☐ Readily available ☐ Up to date ☒ N/A
Remarks _____
_____

IV. O&M COSTS

1. **O&M Organization**
☐ State in-house ☐ Contractor for State
☐ PRP in-house ☐ Contractor for PRP
☐ Federal Facility in-house ☐ Contractor for Federal Facility
☐ Other _____
_____

2. **O&M Cost Records**
☐ Readily available ☐ Up to date
☐ Funding mechanism/agreement in place
Original O&M cost estimate _____ ☐ Breakdown attached

Total annual cost by year for review period if available

From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost
From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost
From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost
From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost
From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost

3. **Unanticipated or Unusually High O&M Costs During Review Period**
Describe costs and reasons: Operations and maintenance costs were not obtained. Work is being completed under a performance-based acquisition contract. As a result, costs are fixed-price and do not include variances that would identify potential remedy problems or issues.

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N/A

A. Fencing

1. **Fencing damaged** ☐ Location shown on site map ☐ Gates secured ☒ N/A
Remarks _____
_____

B. Other Access Restrictions

1. **Signs and other security measures** ☐ Location shown on site map ☒ N/A
Remarks _____
_____

C. Institutional Controls (ICs)

1. **Implementation and enforcement**
Site conditions imply ICs not properly implemented ☐ Yes ☒ No ☐ N/A
Site conditions imply ICs not being fully enforced ☐ Yes ☒ No ☐ N/A

Type of monitoring (*e.g.*, self-reporting, drive by) Site inspections
Frequency Annual
Responsible party/agency Army
Contact Rose Zeiler LHAAP RPMP _____
Name Title Date Phone no.

Reporting is up-to-date ☒ Yes ☐ No ☐ N/A
Reports are verified by the lead agency ☒ Yes ☐ No ☐ N/A

Specific requirements in deed or decision documents have been met
☒ Yes ☐ No ☐ N/A
Violations have been reported ☐ Yes ☒ No ☐ N/A
Other problems or suggestions: ☐ Report attached
_____
_____
_____
_____

2. **Adequacy** ☒ ICs are adequate ☐ ICs are inadequate ☐ N/A
Remarks Current and future land use is restricted to non-residential use. Groundwater use is prohibited and was not observed during the inspection.

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ☐ No vandalism evident
Remarks _____
_____

2. **Land use changes on site** ☐ N/A
Remarks There have been no changes to land use since the previous Five-Year Review.

3. **Land use changes off site** ☐ N/A
Remarks No land use changes off site.

VI. GENERAL SITE CONDITIONS

A. Roads ☒ Applicable ☐ N/A

1. **Roads damaged** ☐ Location shown on site map ☒ Roads adequate ☐ N/A
Remarks Access to the site is via paved roads in good condition.

B. Other Site Conditions

Remarks None.

VII. LANDFILL COVERS ☐ Applicable ☒ N/A

A. Landfill Surface

1. **Settlement** (Low spots) ☐ Location shown on site map ☐ Settlement not evident
Areal extent _____ Depth _____
Remarks _____
_____

2. **Cracks** ☐ Location shown on site map ☐ Cracking not evident
Lengths _____ Widths _____ Depths _____
Remarks _____
_____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
Areal extent _____ Depth _____
Remarks

4. **Holes** ☐ Location shown on site map ☐ Holes not evident
Areal extent _____ Depth _____
Remarks _____
_____

5. **Vegetative Cover** ☐ Grass ☐ Cover properly established ☐ No signs of stress
☐ Trees/Shrubs (indicate size and locations on a diagram)
Remarks

6. **Alternative Cover (armored rock, concrete, etc.)** ☐ N/A
Remarks _____
_____

7. **Bulges** ☐ Location shown on site map ☐ Bulges not evident
Areal extent _____ Height _____
Remarks _____
_____

8. **Wet Areas/Water Damage** ☐ Wet areas/water damage not evident
☐ Wet areas ☐ Location shown on site map Areal extent
☐ Ponding ☐ Location shown on site map Areal extent _____
☐ Seeps ☐ Location shown on site map Areal extent _____
☐ Soft subgrade ☐ Location shown on site map Areal extent _____
Remarks

9. **Slope Instability** ☐ Slides ☐ Location shown on site map ☐ No evidence of slope instability
Areal extent _____
Remarks _____
_____

B. Benches ☐ Applicable ☒ N/A
(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** ☐ Location shown on site map ☐ N/A or okay
Remarks _____
_____

2. **Bench Breached** ☐ Location shown on site map ☐ N/A or okay
Remarks _____
_____

3. **Bench Overtopped** ☐ Location shown on site map ☐ N/A or okay
Remarks _____
_____

C. Letdown Channels ☐ Applicable ☒ N/A
(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** ☐ Location shown on site map ☐ No evidence of settlement
Areal extent _____ Depth _____
Remarks _____
_____

2. **Material Degradation** ☐ Location shown on site map ☐ No evidence of degradation
Material type _____ Areal extent _____
Remarks _____
_____

3. **Erosion** ☐ Location shown on site map ☐ No evidence of erosion
Areal extent _____ Depth _____
Remarks _____
_____

4. **Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting
Areal extent _____ Depth _____
Remarks _____
_____

5. **Obstructions** ☐ No obstructions ☐ Location shown on site map
Type _____ Areal extent _____
Size _____
Remarks _____
_____

6. **Excessive Vegetative Growth** Type _____
☐ No evidence of excessive growth
☐ Vegetation in channels does not obstruct flow
☐ Location shown on site map Areal extent _____
Remarks _____
_____

D. Cover Penetrations ☐ Applicable ☒ N/A

1. **Gas Vents** ☐ Active ☐ Passive
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks _____
_____

2. **Gas Monitoring Probes**
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks _____
_____

3. **Monitoring Wells** (within surface area of landfill)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks _____
_____

4. **Leachate Extraction Wells**
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks _____
_____

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☐ N/A
Remarks_____
_____

E. Gas Collection and Treatment ☐ Applicable ☒ N/A

1. **Gas Treatment Facilities**
   ☐ Flaring ☐ Thermal destruction ☐ Collection for reuse
   ☐ Good condition ☐ Needs Maintenance
   Remarks _____
   _____

2. **Gas Collection Wells, Manifolds and Piping**
   ☐ Good condition ☐ Needs Maintenance
   Remarks _____
   _____

3. **Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings)
   ☐ Good condition ☐ Needs Maintenance ☐ N/A
   Remarks _____
   _____

F. Cover Drainage Layer ☐ Applicable ☒ N/A

1. **Outlet Pipes Inspected** ☐ Functioning ☐ N/A
   Remarks _____
   _____

2. **Outlet Rock Inspected** ☐ Functioning ☐ N/A
   Remarks _____
   _____

G. Detention/Sedimentation Ponds ☐ Applicable ☒ N/A

1. **Siltation** Areal extent _____ Depth _____ ☐ N/A
   ☐ Siltation not evident
   Remarks _____
   _____

2. **Erosion** Areal extent _____ Depth _____
   ☐ Erosion not evident
   Remarks _____
   _____

3. **Outlet Works** ☐ Functioning ☐ N/A
   Remarks _____
   _____

4. **Dam** ☐ Functioning ☐ N/A
   Remarks _____
   _____

H. Retaining Walls ☐ Applicable ☒ N/A

1. **Deformations** ☐ Location shown on site map ☐ Deformation not evident
Horizontal displacement _____ Vertical displacement _____
Rotational displacement _____
Remarks _____
_____

2. **Degradation** ☐ Location shown on site map ☐ Degradation not evident
Remarks _____
_____

I. Perimeter Ditches/Off-Site Discharge ☐ Applicable ☒ N/A

1. **Siltation** ☐ Location shown on site map ☐ Siltation not evident
Areal extent _____ Depth _____
Remarks _____
_____

2. **Vegetative Growth** ☐ Location shown on site map ☐ N/A
☐ Vegetation does not impede flow
Areal extent _____ Type _____
Remarks _____
_____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
Areal extent _____ Depth _____
Remarks

4. **Discharge Structure** ☐ Functioning ☐ N/A
Remarks _____
_____

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A
Remarks Vertical Barrier Walls are not component of the remedy at LHAAP-50

1. **Settlement** ☐ Location shown on site map ☐ Settlement not evident
Areal extent _____ Depth _____
Remarks _____
_____

2. **Performance Monitoring** Type of monitoring _____
☐ Performance not monitored
Frequency _____ ☐ Evidence of breaching
Head differential _____
Remarks _____
_____

IX. GROUNDWATER/SURFACE WATER REMEDIES ☒ Applicable ☐ N/A

A. Groundwater Extraction Wells, Pumps, and Pipelines ☐ Applicable ☒ N/A

1. **Pumps, Wellhead Plumbing, and Electrical**
☐ Good condition ☐ All required wells properly operating ☐ Needs Maintenance ☐ N/A
Remarks _____
_____
_____

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

3. **Spare Parts and Equipment**
☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided
Remarks _____
_____

B. Surface Water Collection Structures, Pumps, and Pipelines ☐ Applicable ☒ N/A

1. **Collection Structures, Pumps, and Electrical**
☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

3. **Spare Parts and Equipment**
☐ Readily available ☐ Good condition ☐ Requires upgrade ☒ Needs to be provided
Remarks _____
_____

C. Treatment System ☒ Applicable ☐ N/A

1. **Treatment Train** (Check components that apply)
☐ Metals removal ☐ Oil/water separation ☒ Bioremediation
☐ Air stripping ☐ Carbon adsorbers
☐ Filters _____
☐ Additive (*e.g.*, chelation agent, flocculent) _____
☐ Others _____
☐ Good condition ☐ Needs Maintenance
☐ Sampling ports properly marked and functional
☐ Sampling/maintenance log displayed and up to date
☐ Equipment properly identified
☐ Quantity of groundwater treated annually _____
☐ Quantity of surface water treated annually _____
Remarks _2019 ESD added *in situ* bioremediation to enhance MNA that was found to be ineffective during performance evaluation.

2. **Electrical Enclosures and Panels** (properly rated and functional)
☐ N/A ☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

3. **Tanks, Vaults, Storage Vessels**
☐ N/A ☐ Good condition ☐ Proper secondary containment ☐ Needs Maintenance
Remarks _____
_____

4. **Discharge Structure and Appurtenances**
☐ N/A ☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

5. **Treatment Building(s)**
☐ N/A ☐ Good condition (esp. roof and doorways) ☐ Needs repair
☐ Chemicals and equipment properly stored
Remarks _____
_____

6. **Monitoring Wells** (pump and treatment remedy)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ All required wells located ☐ Needs Maintenance ☐ N/A
Remarks _____
_____

D. Monitoring Data

1. Monitoring Data
☒ Is routinely submitted on time ☒ Is of acceptable quality

2. Monitoring data suggests:
☒ Groundwater plume is effectively contained ☐ Contaminant concentrations are declining

E. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)
   ☒ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☒ Good condition
   ☐ All required wells located ☐ Needs Maintenance ☐ N/A
   Remarks _____

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

Excavation and off-site disposal of perchlorate contaminated soil.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).
The remedy is effective and functioning as designed to 1) protect human health by preventing human exposure to the contaminated groundwater, 2) protect human health by preventing further potential degradation of groundwater and surface water from contaminated soil, 3) protect human health and the environment by preventing contaminated groundwater from migrating into nearby surface water and 4) return groundwater to its potential beneficial uses as drinking water, wherever practicable. The Five-Year Review site inspection confirmed land use controls prohibit changes in land use. There were no violations of land use controls nor evidence of prohibited use of groundwater observed during the site inspection.

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.
O&M includes annual inspection of LUCs to document that no LUC-restricted activities have been authorized and that conditions and use are consistent with the LUCs.

C. Early Indicators of Potential Remedy Problems

Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.

There are no indications of potential problems that were identified during the Five-Year Review site inspection.

D.	Opportunities for Optimization
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. The Five-Year Review did not identify opportunities for optimization at LHAAP-50.

I. SITE INFORMATION	
Site name: LHAAP-58	**Date of inspection:** February 14-15, 2023
Location and Region: Longhorn Army Ammunition Plant / U.S. Environmental Protection Agency (EPA), Region 6	**EPA ID:** TX110000619910
Agency, office, or company leading the five-year review: U.S. Army Corps of Engineers, Omaha District	**Weather/temperature:** Sunny/60ºF

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☒ Access controls
- ☒ Institutional controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☒ Other Bioremediation
- ☒ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls

Attachments: ☐ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (Check all that apply)

Interviews conducted separate from the site inspection. Interview responses are presented in Appendix D of the Five-Year Review.

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**
   - ☒ O&M manual — ☒ Readily available — ☒ Up to date — ☐ N/A
   - ☒ As-built drawings — ☒ Readily available — ☒ Up to date — ☐ N/A
   - ☒ Maintenance logs — ☒ Readily available — ☒ Up to date — ☐ N/A

   Remarks Shaw, 2011. Remedial Design LHAAP-35A (58), Shops Area, Group 4 Longhorn Army Ammunition Plant Karnack, Texas

2. **Site-Specific Health and Safety Plan** ☒ Readily available ☒ Up to date ☐ N/A
   ☐ Contingency/Emergency Response Plan ☐ Readily available ☐ Up to date ☐ N/A
   Remarks _____

3. **O&M and OSHA Training Records** ☐ Readily available ☐ Up to date ☒ N/A
   Remarks _____

4. **Permits and Service Agreements**
   - ☐ Air discharge permit — ☐ Readily available — ☐ Up to date — ☒ N/A
   - ☐ Effluent discharge — ☐ Readily available — ☐ Up to date — ☒ N/A
   - ☐ Waste disposal, POTW — ☐ Readily available — ☐ Up to date — ☒ N/A
   - ☐ Other permits _____ — ☐ Readily available — ☐ Up to date — ☒ N/A

   Remarks _____

5. **Gas Generation Records** ☐ Readily available ☐ Up to date ☒ N/A
   Remarks _____

6. **Settlement Monument Records** ☐ Readily available ☐ Up to date ☒ N/A
   Remarks _____

7. **Groundwater Monitoring Records** ☒ Readily available ☒ Up to date ☐ N/A
   Remarks Draft Final Year 7 Annual Remedial Action Operation Report (September 2020 – August 2021), LHAAP-35A (58) Shops Area, Longhorn Army Ammunition Plant, Karnack, Texas, January 2022

8. **Leachate Extraction Records** ☐ Readily available ☐ Up to date ☒ N/A
   Remarks _____

9. **Discharge Compliance Records**
   - ☐ Air — ☐ Readily available — ☐ Up to date — ☒ N/A
   - ☐ Water (effluent) — ☐ Readily available — ☐ Up to date — ☒ N/A

   Remarks _____

10. **Daily Access/Security Logs** ☐ Readily available ☐ Up to date ☒ N/A
Remarks _____
_____

IV. O&M COSTS

1. **O&M Organization**
☐ State in-house ☐ Contractor for State
☐ PRP in-house ☐ Contractor for PRP
☐ Federal Facility in-house ☐ Contractor for Federal Facility
☐ Other _____
_____

2. **O&M Cost Records**
☐ Readily available ☐ Up to date
☐ Funding mechanism/agreement in place
Original O&M cost estimate _____ ☐ Breakdown attached

Total annual cost by year for review period if available

From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost
From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost
From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost
From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost
From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost

3. **Unanticipated or Unusually High O&M Costs During Review Period**
Describe costs and reasons: Operations and maintenance costs were not obtained. Work is being completed under a performance-based acquisition contract. As a result, costs are fixed-price and do not include variances that would identify potential remedy problems or issues.

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N/A

A. Fencing

1. **Fencing damaged** ☐ Location shown on site map ☐ Gates secured ☒ N/A
Remarks _____
_____

B. Other Access Restrictions

1. **Signs and other security measures** ☐ Location shown on site map ☒ N/A
Remarks _____
_____

C. Institutional Controls (ICs)

1. **Implementation and enforcement**
Site conditions imply ICs not properly implemented ☐ Yes ☒ No ☐ N/A
Site conditions imply ICs not being fully enforced ☐ Yes ☒ No ☒ N/A

Type of monitoring (*e.g.*, self-reporting, drive by) Site inspections
Frequency Annual
Responsible party/agency Army
Contact Rose Zeiler LHAAP RPMP _____
Name Title Date Phone no.

Reporting is up-to-date ☒ Yes ☐ No ☐ N/A
Reports are verified by the lead agency ☒ Yes ☐ No ☐ N/A

Specific requirements in deed or decision documents have been met
☒ Yes ☐ No ☐ N/A
Violations have been reported ☐ Yes ☒ No ☐ N/A
Other problems or suggestions: ☐ Report attached
_____
_____
_____
_____

2. **Adequacy** ☒ ICs are adequate ☐ ICs are inadequate ☐ N/A
Remarks Current and future land use is restricted to non-residential use. Groundwater use is prohibited and was not observed during the inspection.

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ☒ No vandalism evident
Remarks _____
_____

2. **Land use changes on site** ☐ N/A
Remarks There have been no changes to land use since the previous Five-Year Review.

3. **Land use changes off site** ☐ N/A
Remarks No land use changes off site.

VI. GENERAL SITE CONDITIONS

A. Roads ☒ Applicable ☐ N/A

1. **Roads damaged** ☐ Location shown on site map ☒ Roads adequate ☐ N/A
Remarks Access to the site is via paved roads in good condition.

B. Other Site Conditions

Remarks None.

VII. LANDFILL COVERS ☐ Applicable ☒ N/A

A. Landfill Surface

1. **Settlement** (Low spots) ☐ Location shown on site map ☐ Settlement not evident
Areal extent _____ Depth _____
Remarks _____
_____

2. **Cracks** ☐ Location shown on site map ☐ Cracking not evident
Lengths _____ Widths _____ Depths _____
Remarks _____
_____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
Areal extent _____ Depth _____
Remarks

4. **Holes** ☐ Location shown on site map ☐ Holes not evident
Areal extent _____ Depth _____
Remarks _____
_____

5. **Vegetative Cover** ☐ Grass ☐ Cover properly established ☐ No signs of stress
☐ Trees/Shrubs (indicate size and locations on a diagram)
Remarks

6. **Alternative Cover (armored rock, concrete, etc.)** ☐ N/A
Remarks _____
_____

7. **Bulges** ☐ Location shown on site map ☐ Bulges not evident
Areal extent _____ Height _____
Remarks _____
_____

8. **Wet Areas/Water Damage** ☐ Wet areas/water damage not evident
☐ Wet areas ☐ Location shown on site map Areal extent
☐ Ponding ☐ Location shown on site map Areal extent _____
☐ Seeps ☐ Location shown on site map Areal extent _____
☐ Soft subgrade ☐ Location shown on site map Areal extent _____
Remarks

9. **Slope Instability** ☐ Slides ☐ Location shown on site map ☐ No evidence of slope instability
Areal extent _____
Remarks _____
_____

B. Benches ☐ Applicable ☒ N/A
(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** ☐ Location shown on site map ☐ N/A or okay
Remarks _____
_____

2. **Bench Breached** ☐ Location shown on site map ☐ N/A or okay
Remarks _____
_____

3. **Bench Overtopped** ☐ Location shown on site map ☐ N/A or okay
Remarks _____
_____

C. Letdown Channels ☐ Applicable ☒ N/A
(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** ☐ Location shown on site map ☐ No evidence of settlement
Areal extent _____ Depth _____
Remarks _____
_____

2. **Material Degradation** ☐ Location shown on site map ☐ No evidence of degradation
Material type _____ Areal extent _____
Remarks _____
_____

3. **Erosion** ☐ Location shown on site map ☐ No evidence of erosion
Areal extent _____ Depth _____
Remarks _____
_____

4. **Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting
Areal extent _____ Depth _____
Remarks _____
_____

5. **Obstructions** ☐ No obstructions ☐ Location shown on site map
Type _____ Areal extent _____
Size _____
Remarks _____
_____

6. **Excessive Vegetative Growth** Type _____
☐ No evidence of excessive growth
☐ Vegetation in channels does not obstruct flow
☐ Location shown on site map Areal extent _____
Remarks _____
_____

D. Cover Penetrations ☐ Applicable ☒ N/A

1. **Gas Vents** ☐ Active ☐ Passive
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks _____
_____

2. **Gas Monitoring Probes**
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks _____
_____

3. **Monitoring Wells** (within surface area of landfill)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks _____
_____

4. **Leachate Extraction Wells**
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks _____
_____

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☐ N/A
Remarks_____
_____

E. Gas Collection and Treatment ☐ Applicable ☒ N/A

1. **Gas Treatment Facilities**
   ☐ Flaring ☐ Thermal destruction ☐ Collection for reuse
   ☐ Good condition ☐ Needs Maintenance
   Remarks _____
   _____

2. **Gas Collection Wells, Manifolds and Piping**
   ☐ Good condition ☐ Needs Maintenance
   Remarks _____
   _____

3. **Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings)
   ☐ Good condition ☐ Needs Maintenance ☐ N/A
   Remarks _____
   _____

F. Cover Drainage Layer ☐ Applicable ☒ N/A

1. **Outlet Pipes Inspected** ☐ Functioning ☐ N/A
   Remarks _____
   _____

2. **Outlet Rock Inspected** ☐ Functioning ☐ N/A
   Remarks _____
   _____

G. Detention/Sedimentation Ponds ☐ Applicable ☒ N/A

1. **Siltation** Areal extent _____ Depth _____ ☐ N/A
   ☐ Siltation not evident
   Remarks _____
   _____

2. **Erosion** Areal extent _____ Depth _____
   ☐ Erosion not evident
   Remarks _____
   _____

3. **Outlet Works** ☐ Functioning ☐ N/A
   Remarks _____
   _____

4. **Dam** ☐ Functioning ☐ N/A
   Remarks _____
   _____

H. Retaining Walls ☐ Applicable ☒ N/A

1. **Deformations** ☐ Location shown on site map ☐ Deformation not evident
Horizontal displacement _____ Vertical displacement _____
Rotational displacement _____
Remarks _____
_____

2. **Degradation** ☐ Location shown on site map ☐ Degradation not evident
Remarks _____
_____

I. Perimeter Ditches/Off-Site Discharge ☐ Applicable ☒ N/A

1. **Siltation** ☐ Location shown on site map ☐ Siltation not evident
Areal extent _____ Depth _____
Remarks _____
_____

2. **Vegetative Growth** ☐ Location shown on site map ☐ N/A
☐ Vegetation does not impede flow
Areal extent _____ Type _____
Remarks _____
_____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
Areal extent _____ Depth _____
Remarks

4. **Discharge Structure** ☐ Functioning ☐ N/A
Remarks _____
_____

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A
Remarks Vertical Barrier Walls are not component of the remedy at LHAAP-058.

1. **Settlement** ☐ Location shown on site map ☐ Settlement not evident
Areal extent _____ Depth _____
Remarks _____
_____

2. **Performance Monitoring** Type of monitoring _____
☐ Performance not monitored
Frequency _____ ☐ Evidence of breaching
Head differential _____
Remarks _____
_____

IX. GROUNDWATER/SURFACE WATER REMEDIES ☒ Applicable ☐ N/A

A. Groundwater Extraction Wells, Pumps, and Pipelines ☐ Applicable ☒ N/A

1. **Pumps, Wellhead Plumbing, and Electrical**
☐ Good condition ☐ All required wells properly operating ☐ Needs Maintenance ☐ N/A
Remarks _____
_____
_____

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

3. **Spare Parts and Equipment**
☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided
Remarks _____
_____

B. Surface Water Collection Structures, Pumps, and Pipelines ☐ Applicable ☒ N/A

1. **Collection Structures, Pumps, and Electrical**
☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

3. **Spare Parts and Equipment**
☐ Readily available ☐ Good condition ☐ Requires upgrade ☒ Needs to be provided
Remarks _____
_____

C. Treatment System ☒ Applicable ☐ N/A

1. **Treatment Train** (Check components that apply)
☐ Metals removal ☐ Oil/water separation ☒ Bioremediation
☐ Air stripping ☐ Carbon adsorbers
☐ Filters _____
☐ Additive (*e.g.*, chelation agent, flocculent) _____
☐ Others _____
☐ Good condition ☐ Needs Maintenance
☐ Sampling ports properly marked and functional
☐ Sampling/maintenance log displayed and up to date
☐ Equipment properly identified
☐ Quantity of groundwater treated annually _____
☐ Quantity of surface water treated annually _____
Remarks _____
_____

2. **Electrical Enclosures and Panels** (properly rated and functional)
☐ N/A ☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

3. **Tanks, Vaults, Storage Vessels**
☐ N/A ☐ Good condition ☐ Proper secondary containment ☐ Needs Maintenance
Remarks _____
_____

4. **Discharge Structure and Appurtenances**
☐ N/A ☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

5. **Treatment Building(s)**
☐ N/A ☐ Good condition (esp. roof and doorways) ☐ Needs repair
☐ Chemicals and equipment properly stored
Remarks _____
_____

6. **Monitoring Wells** (pump and treatment remedy)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ All required wells located ☐ Needs Maintenance ☐ N/A
Remarks _____
_____

D. Monitoring Data

1. Monitoring Data
☒ Is routinely submitted on time ☒ Is of acceptable quality

2. Monitoring data suggests:
☒ Groundwater plume is effectively contained ☒ Contaminant concentrations are declining

E. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)
☒ Properly secured/locked ☐ Functioning ☒ Routinely sampled ☒ Good condition
☐ All required wells located ☐ Needs Maintenance ☐ N/A
Remarks _Wells were generally in good condition, but a small number need maintenance due to vegetative growth (see photographs 51 and 52 in Appendix C).

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).
The remedy is effective and functioning as designed to 1) protect human health by preventing human exposure to the contaminated groundwater, 2) prevent contaminated groundwater from migrating into nearby surface water and 3) return groundwater to its potential beneficial use as drinking water, wherever practicable. The Five-Year Review site inspection confirmed land use controls prohibit changes in land use. There were no violations of land use controls nor evidence of prohibited use of groundwater observed during the site inspection.

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.
There is no requirement for O&M.

C. Early Indicators of Potential Remedy Problems

Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.

There are no indications of potential problems that were identified during the Five-Year Review site inspection.

D.	Opportunities for Optimization
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. The Five-Year Review did not identify opportunities for optimization at LHAAP-58.

I. SITE INFORMATION	
Site name: LHAAP-067	**Date of inspection:** February 14-15, 2023
Location and Region: Longhorn Army Ammunition Plant / U.S. Environmental Protection Agency (EPA), Region 6	**EPA ID:** TX110000619910
Agency, office, or company leading the five-year review: U.S. Army Corps of Engineers, Omaha District	**Weather/temperature:** Raining/50 °F

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☒ Access controls
- ☒ Institutional controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☐ Other
- ☒ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls

Attachments: ☐ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (Check all that apply)

Interviews conducted separate from the site inspection. Interview responses are presented in Appendix D of the Five-Year Review.

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**
   - ☒ O&M manual — ☒ Readily available — ☒ Up to date — ☐ N/A
   - ☒ As-built drawings — ☒ Readily available — ☒ Up to date — ☐ N/A
   - ☒ Maintenance logs — ☒ Readily available — ☒ Up to date — ☐ N/A

   Remarks USACE, 2011. Remedial Design LHAAP-35B (37), Chemical Laboratory and LHAAP-67, Above Ground Storage Tank Farm Longhorn Army Ammunition Plant, Karnack, Texas.

2. **Site-Specific Health and Safety Plan** ☒ Readily available ☒ Up to date ☐ N/A
   ☐ Contingency/Emergency Response Plan ☐ Readily available ☐ Up to date ☐ N/A
   Remarks _____

3. **O&M and OSHA Training Records** ☐ Readily available ☐ Up to date ☒ N/A
   Remarks _____

4. **Permits and Service Agreements**
   - ☐ Air discharge permit — ☐ Readily available — ☐ Up to date — ☒ N/A
   - ☐ Effluent discharge — ☐ Readily available — ☐ Up to date — ☒ N/A
   - ☐ Waste disposal, POTW — ☐ Readily available — ☐ Up to date — ☒ N/A
   - ☐ Other permits _____ — ☐ Readily available — ☐ Up to date — ☒ N/A

   Remarks _____

5. **Gas Generation Records** ☐ Readily available ☐ Up to date ☒ N/A
   Remarks _____

6. **Settlement Monument Records** ☐ Readily available ☐ Up to date ☒ N/A
   Remarks _____

7. **Groundwater Monitoring Records** ☒ Readily available ☒ Up to date ☐ N/A
   Remarks Draft Final Seventh Annual Remedial Action Operation Report, LHAAP-67 (Aboveground Storage Tank Farm), July 2021.

8. **Leachate Extraction Records** ☐ Readily available ☐ Up to date ☒ N/A
   Remarks _____

9. **Discharge Compliance Records**
   - ☐ Air — ☐ Readily available — ☐ Up to date — ☒ N/A
   - ☐ Water (effluent) — ☐ Readily available — ☐ Up to date — ☒ N/A

   Remarks _____

10. **Daily Access/Security Logs** ☐ Readily available ☐ Up to date ☒ N/A
Remarks _____
_____

IV. O&M COSTS

1. **O&M Organization**
☐ State in-house ☐ Contractor for State
☐ PRP in-house ☐ Contractor for PRP
☐ Federal Facility in-house ☐ Contractor for Federal Facility
☐ Other _____
_____

2. **O&M Cost Records**
☐ Readily available ☐ Up to date
☐ Funding mechanism/agreement in place
Original O&M cost estimate _____ ☐ Breakdown attached

Total annual cost by year for review period if available

From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost
From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost
From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost
From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost
From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost

3. **Unanticipated or Unusually High O&M Costs During Review Period**
Describe costs and reasons: Operations and maintenance costs were not obtained. Work is being completed under a performance-based acquisition contract. As a result, costs are fixed-price and do not include variances that would identify potential remedy problems or issues.

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N/A

A. Fencing

1. **Fencing damaged** ☐ Location shown on site map ☐ Gates secured ☒ N/A
Remarks _____
_____

B. Other Access Restrictions

1. **Signs and other security measures** ☐ Location shown on site map ☒ N/A
Remarks _____
_____

C. Institutional Controls (ICs)

1. **Implementation and enforcement**
Site conditions imply ICs not properly implemented ☐ Yes ☒ No ☐ N/A
Site conditions imply ICs not being fully enforced ☐ Yes ☒ No ☒ N/A

Type of monitoring (*e.g.*, self-reporting, drive by) Site inspections
Frequency Annual
Responsible party/agency Army
Contact Rose Zeiler LHAAP RPMP _____
Name Title Date Phone no.

Reporting is up-to-date ☒ Yes ☐ No ☐ N/A
Reports are verified by the lead agency ☒ Yes ☐ No ☐ N/A

Specific requirements in deed or decision documents have been met
☒ Yes ☐ No ☐ N/A
Violations have been reported ☐ Yes ☒ No ☐ N/A
Other problems or suggestions: ☐ Report attached
_____
_____
_____
_____

2. **Adequacy** ☒ ICs are adequate ☐ ICs are inadequate ☐ N/A
Remarks Current and future land use is restricted to non-residential use. Groundwater use is prohibited and was not observed during the inspection.

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ☒ No vandalism evident
Remarks _____
_____

2. **Land use changes on site** ☐ N/A
Remarks There have been no changes to land use since the previous Five-Year Review.

3. **Land use changes off site** ☐ N/A
Remarks No land use changes off site.

VI. GENERAL SITE CONDITIONS

A. Roads ☒ Applicable ☐ N/A

1. **Roads damaged** ☐ Location shown on site map ☒ Roads adequate ☐ N/A
Remarks Access to the site is via paved roads in good condition.

B. Other Site Conditions

Remarks None.

VII. LANDFILL COVERS ☐ Applicable ☒ N/A

A. Landfill Surface

1. **Settlement** (Low spots) ☐ Location shown on site map ☐ Settlement not evident
Areal extent _____ Depth _____
Remarks _____
_____

2. **Cracks** ☐ Location shown on site map ☐ Cracking not evident
Lengths _____ Widths _____ Depths _____
Remarks _____
_____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
Areal extent _____ Depth _____
Remarks

4. **Holes** ☐ Location shown on site map ☐ Holes not evident
Areal extent _____ Depth _____
Remarks _____
_____

5. **Vegetative Cover** ☐ Grass ☐ Cover properly established ☐ No signs of stress
☐ Trees/Shrubs (indicate size and locations on a diagram)
Remarks

6. **Alternative Cover (armored rock, concrete, etc.)** ☐ N/A
Remarks _____
_____

7. **Bulges** ☐ Location shown on site map ☐ Bulges not evident
Areal extent _____ Height _____
Remarks _____
_____

8. **Wet Areas/Water Damage** ☐ Wet areas/water damage not evident
☐ Wet areas ☐ Location shown on site map Areal extent
☐ Ponding ☐ Location shown on site map Areal extent _____
☐ Seeps ☐ Location shown on site map Areal extent _____
☐ Soft subgrade ☐ Location shown on site map Areal extent _____
Remarks

9. **Slope Instability** ☐ Slides ☐ Location shown on site map ☒ No evidence of slope instability
Areal extent _____
Remarks _____
_____

B. Benches ☐ Applicable ☒ N/A
(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** ☐ Location shown on site map ☐ N/A or okay
Remarks _____
_____

2. **Bench Breached** ☐ Location shown on site map ☐ N/A or okay
Remarks _____
_____

3. **Bench Overtopped** ☐ Location shown on site map ☐ N/A or okay
Remarks _____
_____

C. Letdown Channels ☐ Applicable ☒ N/A
(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** ☐ Location shown on site map ☐ No evidence of settlement
Areal extent _____ Depth _____
Remarks _____
_____

2. **Material Degradation** ☐ Location shown on site map ☐ No evidence of degradation
Material type _____ Areal extent _____
Remarks _____
_____

3. **Erosion** ☐ Location shown on site map ☐ No evidence of erosion
Areal extent _____ Depth _____
Remarks _____
_____

4. **Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting
Areal extent _____ Depth _____
Remarks _____
_____

5. **Obstructions** ☐ No obstructions ☐ Location shown on site map
Type _____ Areal extent _____
Size _____
Remarks _____
_____

6. **Excessive Vegetative Growth** Type _____
☐ No evidence of excessive growth
☐ Vegetation in channels does not obstruct flow
☐ Location shown on site map Areal extent _____
Remarks _____
_____

D. Cover Penetrations ☐ Applicable ☒ N/A

1. **Gas Vents** ☐ Active ☐ Passive
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks _____
_____

2. **Gas Monitoring Probes**
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks _____
_____

3. **Monitoring Wells** (within surface area of landfill)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks _____
_____

4. **Leachate Extraction Wells**
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☒ N/A
Remarks _____
_____

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☒ N/A
Remarks_____
_____

E. Gas Collection and Treatment ☐ Applicable ☒ N/A

1. **Gas Treatment Facilities**
   ☐ Flaring ☐ Thermal destruction ☐ Collection for reuse
   ☐ Good condition ☐ Needs Maintenance
   Remarks _____
   _____

2. **Gas Collection Wells, Manifolds and Piping**
   ☐ Good condition ☐ Needs Maintenance
   Remarks _____
   _____

3. **Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings)
   ☐ Good condition ☐ Needs Maintenance ☐ N/A
   Remarks _____
   _____

F. Cover Drainage Layer ☐ Applicable ☒ N/A

1. **Outlet Pipes Inspected** ☐ Functioning ☐ N/A
   Remarks _____
   _____

2. **Outlet Rock Inspected** ☐ Functioning ☐ N/A
   Remarks _____
   _____

G. Detention/Sedimentation Ponds ☐ Applicable ☒ N/A

1. **Siltation** Areal extent _____ Depth _____ ☐ N/A
   ☐ Siltation not evident
   Remarks _____
   _____

2. **Erosion** Areal extent _____ Depth _____
   ☐ Erosion not evident
   Remarks _____
   _____

3. **Outlet Works** ☐ Functioning ☐ N/A
   Remarks _____
   _____

4. **Dam** ☐ Functioning ☐ N/A
   Remarks _____
   _____

H. Retaining Walls ☐ Applicable ☒ N/A

1. **Deformations** ☐ Location shown on site map ☐ Deformation not evident
Horizontal displacement _____ Vertical displacement _____
Rotational displacement _____
Remarks _____
_____

2. **Degradation** ☐ Location shown on site map ☐ Degradation not evident
Remarks _____
_____

I. Perimeter Ditches/Off-Site Discharge ☐ Applicable ☒ N/A

1. **Siltation** ☐ Location shown on site map ☐ Siltation not evident
Areal extent _____ Depth _____
Remarks _____
_____

2. **Vegetative Growth** ☐ Location shown on site map ☐ N/A
☐ Vegetation does not impede flow
Areal extent _____ Type _____
Remarks _____
_____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
Areal extent _____ Depth _____
Remarks

4. **Discharge Structure** ☐ Functioning ☒ N/A
Remarks _____
_____

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A
Remarks Vertical Barrier Walls are not component of the remedy at LHAAP-067.

1. **Settlement** ☐ Location shown on site map ☐ Settlement not evident
Areal extent _____ Depth _____
Remarks _____
_____

2. **Performance Monitoring** Type of monitoring _____
☐ Performance not monitored
Frequency _____ ☐ Evidence of breaching
Head differential _____
Remarks _____
_____

IX. GROUNDWATER/SURFACE WATER REMEDIES ☒ Applicable ☐ N/A

A. Groundwater Extraction Wells, Pumps, and Pipelines ☐ Applicable ☒ N/A

1. **Pumps, Wellhead Plumbing, and Electrical**
☐ Good condition ☐ All required wells properly operating ☐ Needs Maintenance ☐ N/A
Remarks _____
_____
_____

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

3. **Spare Parts and Equipment**
☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided
Remarks _____
_____

B. Surface Water Collection Structures, Pumps, and Pipelines ☐ Applicable ☒ N/A

1. **Collection Structures, Pumps, and Electrical**
☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

3. **Spare Parts and Equipment**
☐ Readily available ☐ Good condition ☐ Requires upgrade ☒ Needs to be provided
Remarks _____
_____

C. Treatment System ☐ Applicable ☒ N/A

1. **Treatment Train** (Check components that apply)
☐ Metals removal ☐ Oil/water separation ☐ Bioremediation
☐ Air stripping ☐ Carbon adsorbers
☐ Filters _____
☐ Additive (*e.g.*, chelation agent, flocculent) _____
☐ Others _____
☐ Good condition ☐ Needs Maintenance
☐ Sampling ports properly marked and functional
☐ Sampling/maintenance log displayed and up to date
☐ Equipment properly identified
☐ Quantity of groundwater treated annually _____
☐ Quantity of surface water treated annually _____
Remarks _____
_____

2. **Electrical Enclosures and Panels** (properly rated and functional)
☐ N/A ☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

3. **Tanks, Vaults, Storage Vessels**
☐ N/A ☐ Good condition ☐ Proper secondary containment ☐ Needs Maintenance
Remarks _____
_____

4. **Discharge Structure and Appurtenances**
☐ N/A ☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

5. **Treatment Building(s)**
☐ N/A ☐ Good condition (esp. roof and doorways) ☐ Needs repair
☐ Chemicals and equipment properly stored
Remarks _____
_____

6. **Monitoring Wells** (pump and treatment remedy)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ All required wells located ☐ Needs Maintenance ☐ N/A
Remarks _____
_____

D. Monitoring Data

1. Monitoring Data
☒ Is routinely submitted on time ☒ Is of acceptable quality

2.	Monitoring data suggests: ☐ Groundwater plume is effectively contained ☐ Contaminant concentrations are declining
E. Monitored Natural Attenuation	
1.	**Monitoring Wells** (natural attenuation remedy) ☒ Properly secured/locked ☒ Functioning ☒ Routinely sampled ☒ Good condition ☐ All required wells located ☐ Needs Maintenance ☐ N/A Remarks _____
X. OTHER REMEDIES	
	If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.
XI. OVERALL OBSERVATIONS	
A.	**Implementation of the Remedy**
	Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.). The remedy is effective and functioning as designed to 1) protect human health by preventing human exposure to the contaminated groundwater, 2) prevent contaminated groundwater from migrating into nearby surface water and 3) return groundwater to its potential beneficial use as drinking water, wherever practicable. The Five-Year Review site inspection confirmed land use controls prohibit changes in land use. There were no violations of land use controls nor evidence of prohibited use of groundwater observed during the site inspection.
B.	**Adequacy of O&M**
	Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy. There is no requirement for O&M.
C.	**Early Indicators of Potential Remedy Problems**
	Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future. There are no indications of potential problems that were identified during the Five-Year Review site inspection.
D.	**Opportunities for Optimization**
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. The Five-Year Review did not identify opportunities for optimization at LHAAP-67.

I. SITE INFORMATION	
Site name: LHAAP-001-R-001	**Date of inspection:** February 14-15, 2023
Location and Region: Longhorn Army Ammunition Plant / U.S. Environmental Protection Agency (EPA), Region 6	**EPA ID:** TX110000619910
Agency, office, or company leading the five-year review: U.S. Army Corps of Engineers, Omaha District	**Weather/temperature:** Sunny/60ºF

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☒ Access controls
- ☒ Institutional controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☐ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls
- ☒ Other MEC Removal and Limited Groundwater Sampling

Attachments: ☐ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (Check all that apply)

Interviews conducted separate from the site inspection. Interview responses are presented in Appendix D of the Five-Year Review.

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**
   - ☒ O&M manual — ☒ Readily available — ☒ Up to date — ☐ N/A
   - ☒ As-built drawings — ☒ Readily available — ☒ Up to date — ☐ N/A
   - ☒ Maintenance logs — ☒ Readily available — ☒ Up to date — ☐ N/A

   Remarks USACE, 2018. Land Use Control Remedial Design / Remedial Action Construction Report LHAAP-001-R-001 and LHAAP-003-R-01, Longhorn Army Ammunition Plant.

2. **Site-Specific Health and Safety Plan** ☒ Readily available ☒ Up to date ☐ N/A
   ☐ Contingency/Emergency Response Plan ☐ Readily available ☐ Up to date ☐ N/A
   Remarks _____

3. **O&M and OSHA Training Records** ☐ Readily available ☐ Up to date ☒ N/A
   Remarks _____

4. **Permits and Service Agreements**
   - ☐ Air discharge permit — ☐ Readily available — ☐ Up to date — ☒ N/A
   - ☐ Effluent discharge — ☐ Readily available — ☐ Up to date — ☒ N/A
   - ☐ Waste disposal, POTW — ☐ Readily available — ☐ Up to date — ☒ N/A
   - ☐ Other permits _____ — ☐ Readily available — ☐ Up to date — ☒ N/A

   Remarks _____

5. **Gas Generation Records** ☐ Readily available ☐ Up to date ☒ N/A
   Remarks _____

6. **Settlement Monument Records** ☐ Readily available ☐ Up to date ☒ N/A
   Remarks _____

7. **Groundwater Monitoring Records** ☒ Readily available ☒ Up to date ☐ N/A
   Remarks *Limited Groundwater Monitoring Report, LHAAP, 2019.*

8. **Leachate Extraction Records** ☐ Readily available ☐ Up to date ☒ N/A
   Remarks _____

9. **Discharge Compliance Records**
   - ☐ Air — ☐ Readily available — ☐ Up to date — ☒ N/A
   - ☐ Water (effluent) — ☐ Readily available — ☐ Up to date — ☒ N/A

   Remarks _____

10. **Daily Access/Security Logs** ☐ Readily available ☐ Up to date ☒ N/A
Remarks _____
_____

IV. O&M COSTS

1. **O&M Organization**
☐ State in-house ☐ Contractor for State
☐ PRP in-house ☐ Contractor for PRP
☐ Federal Facility in-house ☐ Contractor for Federal Facility
☐ Other _____
_____

2. **O&M Cost Records**
☐ Readily available ☐ Up to date
☐ Funding mechanism/agreement in place
Original O&M cost estimate _____ ☐ Breakdown attached

Total annual cost by year for review period if available

From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost
From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost
From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost
From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost
From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost

3. **Unanticipated or Unusually High O&M Costs During Review Period**
Describe costs and reasons: Operations and maintenance costs were not obtained. Work is being completed under a performance-based acquisition contract. As a result, costs are fixed-price and do not include variances that would identify potential remedy problems or issues.

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N/A

A. Fencing

1. **Fencing damaged** ☐ Location shown on site map ☐ Gates secured ☒ N/A
Remarks_____
_____

B. Other Access Restrictions

1. **Signs and other security measures** ☐ Location shown on site map ☐ N/A
Remarks Signs are in good condition and legible. Each sign was visible from the previous sign and within the 100 foot requirement set by the Record of Decision.

C. Institutional Controls (ICs)

1. **Implementation and enforcement**
Site conditions imply ICs not properly implemented ☐ Yes ☒ No ☐ N/A
Site conditions imply ICs not being fully enforced ☐ Yes ☒ No ☐ N/A

Type of monitoring (*e.g.*, self-reporting, drive by) Site inspections
Frequency Annual
Responsible party/agency Army
Contact Rose Zeiler LHAAP RPMP
Name Title Date Phone no.

Reporting is up-to-date ☒ Yes ☐ No ☐ N/A
Reports are verified by the lead agency ☒ Yes ☐ No ☐ N/A

Specific requirements in deed or decision documents have been met
☒ Yes ☐ No ☐ N/A
Violations have been reported ☐ Yes ☒ No ☐ N/A
Other problems or suggestions: ☐ Report attached
_____
_____
_____
_____

2. **Adequacy** ☒ ICs are adequate ☐ ICs are inadequate ☐ N/A
Remarks Current and future land use is restricted to non-residential use. Groundwater use is prohibited and was not observed during the inspection.

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ☒ No vandalism evident
Remarks _____
_____

2. **Land use changes on site** ☐ N/A
Remarks There have been no changes to land use since the previous Five-Year Review.

3. **Land use changes off site** ☐ N/A
Remarks No land use changes off site.

VI. GENERAL SITE CONDITIONS

A. Roads ☒ Applicable ☐ N/A

1. **Roads damaged** ☐ Location shown on site map ☒ Roads adequate ☐ N/A
Remarks Access to the site is via paved roads in good condition.

B. Other Site Conditions

Remarks None.

VII. LANDFILL COVERS ☐ Applicable ☒ N/A

A. Landfill Surface

1. **Settlement** (Low spots) ☐ Location shown on site map ☐ Settlement not evident
Areal extent _____ Depth _____
Remarks _____
_____

2. **Cracks** ☐ Location shown on site map ☐ Cracking not evident
Lengths _____ Widths _____ Depths _____
Remarks _____
_____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
Areal extent _____ Depth _____
Remarks

4. **Holes** ☐ Location shown on site map ☒ Holes not evident
Areal extent _____ Depth _____
Remarks _____
_____

5. **Vegetative Cover** ☐ Grass ☐ Cover properly established ☐ No signs of stress
☐ Trees/Shrubs (indicate size and locations on a diagram)
Remarks

6. **Alternative Cover (armored rock, concrete, etc.)** ☐ N/A
Remarks _____
_____

7. **Bulges** ☐ Location shown on site map ☐ Bulges not evident
Areal extent _____ Height _____
Remarks _____
_____

8. **Wet Areas/Water Damage** ☐ Wet areas/water damage not evident
☐ Wet areas ☐ Location shown on site map Areal extent
☐ Ponding ☐ Location shown on site map Areal extent _____
☐ Seeps ☐ Location shown on site map Areal extent _____
☐ Soft subgrade ☐ Location shown on site map Areal extent _____
Remarks

9. **Slope Instability** ☐ Slides ☐ Location shown on site map ☐ No evidence of slope instability
Areal extent _____
Remarks _____
_____

B. Benches ☐ Applicable ☒ N/A
(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** ☐ Location shown on site map ☐ N/A or okay
Remarks _____
_____

2. **Bench Breached** ☐ Location shown on site map ☐ N/A or okay
Remarks _____
_____

3. **Bench Overtopped** ☐ Location shown on site map ☐ N/A or okay
Remarks _____
_____

C. Letdown Channels ☐ Applicable ☒ N/A
(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** ☐ Location shown on site map ☐ No evidence of settlement
Areal extent _____ Depth _____
Remarks _____
_____

2. **Material Degradation** ☐ Location shown on site map ☐ No evidence of degradation
Material type _____ Areal extent _____
Remarks _____
_____

3. **Erosion** ☐ Location shown on site map ☐ No evidence of erosion
Areal extent _____ Depth _____
Remarks _____
_____

4. **Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting
Areal extent _____ Depth _____
Remarks _____
_____

5. **Obstructions** ☐ No obstructions ☐ Location shown on site map
Type _____ Areal extent _____
Size _____
Remarks _____
_____

6. **Excessive Vegetative Growth** Type _____
☐ No evidence of excessive growth
☐ Vegetation in channels does not obstruct flow
☐ Location shown on site map Areal extent _____
Remarks _____
_____

D. Cover Penetrations ☐ Applicable ☒ N/A

1. **Gas Vents** ☐ Active ☐ Passive
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks _____
_____

2. **Gas Monitoring Probes**
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks

3. **Monitoring Wells** (within surface area of landfill)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks

4. **Leachate Extraction Wells**
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks _____
_____

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☐ N/A
Remarks_____
_____

E. Gas Collection and Treatment ☐ Applicable ☒ N/A

1. **Gas Treatment Facilities**
☐ Flaring ☐ Thermal destruction ☐ Collection for reuse
☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

2. **Gas Collection Wells, Manifolds and Piping**
☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

3. **Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings)
☐ Good condition ☐ Needs Maintenance ☐ N/A
Remarks _____
_____

F. Cover Drainage Layer ☐ Applicable ☒ N/A

1. **Outlet Pipes Inspected** ☐ Functioning ☐ N/A
Remarks _____
_____

2. **Outlet Rock Inspected** ☐ Functioning ☐ N/A
Remarks _____
_____

G. Detention/Sedimentation Ponds ☐ Applicable ☒ N/A

1. **Siltation** Areal extent _____ Depth _____ ☐ N/A
☐ Siltation not evident
Remarks _____
_____

2. **Erosion** Areal extent _____ Depth _____
☐ Erosion not evident
Remarks _____
_____

3. **Outlet Works** ☐ Functioning ☐ N/A
Remarks _____
_____

4. **Dam** ☐ Functioning ☐ N/A
Remarks _____
_____

H. Retaining Walls ☐ Applicable ☒ N/A

1. **Deformations** ☐ Location shown on site map ☐ Deformation not evident
Horizontal displacement _____ Vertical displacement _____
Rotational displacement _____
Remarks _____
_____

2. **Degradation** ☐ Location shown on site map ☐ Degradation not evident
Remarks _____
_____

I. Perimeter Ditches/Off-Site Discharge ☐ Applicable ☒ N/A

1. **Siltation** ☐ Location shown on site map ☐ Siltation not evident
Areal extent _____ Depth _____
Remarks _____
_____

2. **Vegetative Growth** ☐ Location shown on site map ☐ N/A
☐ Vegetation does not impede flow
Areal extent _____ Type _____
Remarks _____
_____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
Areal extent _____ Depth _____
Remarks

4. **Discharge Structure** ☐ Functioning ☐ N/A
Remarks _____
_____

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A

Remarks Vertical barrier walls are not a component of the remedy at LHAAP-001-R-001.

1. **Settlement** ☐ Location shown on site map ☐ Settlement not evident
Areal extent _____ Depth _____
Remarks _____
_____

2. **Performance Monitoring** Type of monitoring _____
☐ Performance not monitored
Frequency _____ ☐ Evidence of breaching
Head differential _____
Remarks _____
_____

IX. GROUNDWATER/SURFACE WATER REMEDIES ☐ Applicable ☒ N/A

A. Groundwater Extraction Wells, Pumps, and Pipelines ☐ Applicable ☒ N/A

1. **Pumps, Wellhead Plumbing, and Electrical**
☐ Good condition ☐ All required wells properly operating ☐ Needs Maintenance ☐ N/A
Remarks _____
_____
_____

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

3. **Spare Parts and Equipment**
☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided
Remarks _____
_____

B. Surface Water Collection Structures, Pumps, and Pipelines ☐ Applicable ☒ N/A

1. **Collection Structures, Pumps, and Electrical**
☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

3. **Spare Parts and Equipment**
☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided
Remarks _____
_____

C. Treatment System ☐ Applicable ☒ N/A

1. **Treatment Train** (Check components that apply)
☐ Metals removal ☐ Oil/water separation ☐ Bioremediation
☐ Air stripping ☐ Carbon adsorbers
☐ Filters _____
☐ Additive (*e.g.*, chelation agent, flocculent) _____
☐ Others _____
☐ Good condition ☐ Needs Maintenance
☐ Sampling ports properly marked and functional
☐ Sampling/maintenance log displayed and up to date
☐ Equipment properly identified
☐ Quantity of groundwater treated annually _____
☐ Quantity of surface water treated annually _____
Remarks _____
_____

2. **Electrical Enclosures and Panels** (properly rated and functional)
☐ N/A ☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

3. **Tanks, Vaults, Storage Vessels**
☐ N/A ☐ Good condition ☐ Proper secondary containment ☐ Needs Maintenance
Remarks _____
_____

4. **Discharge Structure and Appurtenances**
☐ N/A ☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

5. **Treatment Building(s)**
☐ N/A ☐ Good condition (esp. roof and doorways) ☐ Needs repair
☐ Chemicals and equipment properly stored
Remarks _____
_____

6. **Monitoring Wells** (pump and treatment remedy)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ All required wells located ☐ Needs Maintenance ☐ N/A
Remarks _____
_____

D. Monitoring Data

1. Monitoring Data
☐ Is routinely submitted on time ☐ Is of acceptable quality

2. Monitoring data suggests:
☒ Groundwater plume is effectively contained ☐ Contaminant concentrations are declining

E. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ All required wells located ☐ Needs Maintenance ☐ N/A
Remarks _Groundwater monitoring ceased as described in the Record of Decision. Monitoring wells have been plugged and abandoned.

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).
The remedy is effective and functioning as designed to 1) Prohibit the development and use of the property for residential housing, elementary and secondary schools, child care facilities, and playgrounds, 2) restrict land use to non-residential, 3) prohibit intrusive activities such as digging or any other activity which could result in explosive safety risk and 4) maintain existing MEC warning signs at the perimeter of each site to physically demarcate controlled areas. The Five-Year Review site inspection confirmed land use controls prohibit changes in land use and that warning signs are maintained and in good condition. There were no violations of land use controls observed during the site inspection.

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.
O&M includes annual inspection of the MEC warning signs as well as any maintenance needed to clear brush or replace damaged signs and posts. Reports also document that no LUC-restricted activities have been authorized and that conditions and use are consistent with the LUCs.

C. Early Indicators of Potential Remedy Problems

Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.

There are no indications of potential problems that were identified during the Five-Year Review site inspection.

D.	Opportunities for Optimization
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. The Five-Year Review did not identify opportunities for optimization at LHAAP-001-R-001.

I. SITE INFORMATION	
Site name: LHAAP-003-R-01	**Date of inspection:** February 14-15, 2023
Location and Region: Longhorn Army Ammunition Plant / U.S. Environmental Protection Agency (EPA), Region 6	**EPA ID:** TX110000619910
Agency, office, or company leading the five-year review: U.S. Army Corps of Engineers, Omaha District	**Weather/temperature:** Raining/50 °F

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☒ Access controls
- ☒ Institutional controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☐ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls
- ☒ Other MEC Removal and Limited Groundwater Sampling

Attachments: ☐ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (Check all that apply)

Interviews conducted separate from the site inspection. Interview responses are presented in Appendix D of the Five-Year Review.

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**
   - ☒ O&M manual — ☒ Readily available — ☒ Up to date — ☐ N/A
   - ☒ As-built drawings — ☒ Readily available — ☒ Up to date — ☐ N/A
   - ☒ Maintenance logs — ☒ Readily available — ☒ Up to date — ☐ N/A

   Remarks USACE, 2018. Land Use Control Remedial Design / Remedial Action Construction Report LHAAP-001-R-001 and LHAAP-003-R-01, Longhorn Army Ammunition Plant.

2. **Site-Specific Health and Safety Plan** ☒ Readily available ☒ Up to date ☐ N/A
   ☐ Contingency/Emergency Response Plan ☐ Readily available ☐ Up to date ☐ N/A
   Remarks _____

3. **O&M and OSHA Training Records** ☐ Readily available ☐ Up to date ☒ N/A
   Remarks _____

4. **Permits and Service Agreements**
   - ☐ Air discharge permit — ☐ Readily available — ☐ Up to date — ☒ N/A
   - ☐ Effluent discharge — ☐ Readily available — ☐ Up to date — ☒ N/A
   - ☐ Waste disposal, POTW — ☐ Readily available — ☐ Up to date — ☒ N/A
   - ☐ Other permits _____ — ☐ Readily available — ☐ Up to date — ☒ N/A

   Remarks _____

5. **Gas Generation Records** ☐ Readily available ☐ Up to date ☒ N/A
   Remarks _____

6. **Settlement Monument Records** ☐ Readily available ☐ Up to date ☒ N/A
   Remarks _____

7. **Groundwater Monitoring Records** ☒ Readily available ☒ Up to date ☐ N/A
   Remarks *Limited Groundwater Monitoring Report, LHAAP, 2019.*

8. **Leachate Extraction Records** ☐ Readily available ☐ Up to date ☒ N/A
   Remarks _____

9. **Discharge Compliance Records**
   - ☐ Air — ☐ Readily available — ☐ Up to date — ☒ N/A
   - ☐ Water (effluent) — ☐ Readily available — ☐ Up to date — ☒ N/A

   Remarks _____

10. **Daily Access/Security Logs** ☐ Readily available ☐ Up to date ☒ N/A
Remarks _____
_____

IV. O&M COSTS

1. **O&M Organization**
☐ State in-house ☐ Contractor for State
☐ PRP in-house ☐ Contractor for PRP
☐ Federal Facility in-house ☐ Contractor for Federal Facility
☐ Other _____
_____

2. **O&M Cost Records**
☐ Readily available ☐ Up to date
☐ Funding mechanism/agreement in place
Original O&M cost estimate _____ ☐ Breakdown attached

Total annual cost by year for review period if available

From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost
From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost
From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost
From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost
From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost

3. **Unanticipated or Unusually High O&M Costs During Review Period**
Describe costs and reasons: Operations and maintenance costs were not obtained. Work is being completed under a performance-based acquisition contract. As a result, costs are fixed-price and do not include variances that would identify potential remedy problems or issues.

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N/A

A. Fencing

1. **Fencing damaged** ☐ Location shown on site map ☐ Gates secured ☐ N/A
Remarks _____
_____

B. Other Access Restrictions

1. **Signs and other security measures** ☐ Location shown on site map ☐ N/A
Remarks Signs are in good condition and legible. Each sign was visible from the previous sign and within the 100 foot requirement set by the Record of Decision.

C. Institutional Controls (ICs)

1. **Implementation and enforcement**
Site conditions imply ICs not properly implemented ☐ Yes ☒ No ☐ N/A
Site conditions imply ICs not being fully enforced ☐ Yes ☒ No ☐ N/A

Type of monitoring (*e.g.*, self-reporting, drive by) Site inspections
Frequency Annual
Responsible party/agency Army
Contact Rose Zeiler LHAAP RPMP
Name Title Date Phone no.

Reporting is up-to-date ☒ Yes ☐ No ☐ N/A
Reports are verified by the lead agency ☒ Yes ☐ No ☐ N/A

Specific requirements in deed or decision documents have been met
☒ Yes ☐ No ☐ N/A
Violations have been reported ☐ Yes ☒ No ☐ N/A
Other problems or suggestions: ☐ Report attached
_____
_____
_____
_____

2. **Adequacy** ☒ ICs are adequate ☐ ICs are inadequate ☐ N/A
Remarks Current and future land use is restricted to non-residential use. Groundwater use is prohibited and was not observed during the inspection.

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ☐ No vandalism evident
Remarks _____
_____

2. **Land use changes on site** ☐ N/A
Remarks There have been no changes to land use since the previous Five-Year Review.

3. **Land use changes off site** ☐ N/A
Remarks No land use changes off site.

VI. GENERAL SITE CONDITIONS

A. Roads ☒ Applicable ☐ N/A

1. **Roads damaged** ☐ Location shown on site map ☒ Roads adequate ☐ N/A
Remarks Access to the site is via paved roads in good condition.

B. Other Site Conditions

Remarks None.

VII. LANDFILL COVERS ☐ Applicable ☒ N/A

A. Landfill Surface

1. **Settlement** (Low spots) ☐ Location shown on site map ☐ Settlement not evident
Areal extent _____ Depth _____
Remarks _____
_____

2. **Cracks** ☐ Location shown on site map ☐ Cracking not evident
Lengths _____ Widths _____ Depths _____
Remarks _____
_____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
Areal extent _____ Depth _____
Remarks

4. **Holes** ☐ Location shown on site map ☐ Holes not evident
Areal extent _____ Depth _____
Remarks _____
_____

5. **Vegetative Cover** ☐ Grass ☐ Cover properly established ☐ No signs of stress
☐ Trees/Shrubs (indicate size and locations on a diagram)
Remarks

6. **Alternative Cover (armored rock, concrete, etc.)** ☐ N/A
Remarks _____
_____

7. **Bulges** ☐ Location shown on site map ☐ Bulges not evident
Areal extent _____ Height _____
Remarks _____
_____

8. **Wet Areas/Water Damage** ☐ Wet areas/water damage not evident
☐ Wet areas ☐ Location shown on site map Areal extent
☐ Ponding ☐ Location shown on site map Areal extent _____
☐ Seeps ☐ Location shown on site map Areal extent _____
☐ Soft subgrade ☐ Location shown on site map Areal extent _____
Remarks

9. **Slope Instability** ☐ Slides ☐ Location shown on site map ☐ No evidence of slope instability
Areal extent _____
Remarks _____
_____

B. Benches ☐ Applicable ☒ N/A
(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** ☐ Location shown on site map ☐ N/A or okay
Remarks _____
_____

2. **Bench Breached** ☐ Location shown on site map ☐ N/A or okay
Remarks _____
_____

3. **Bench Overtopped** ☐ Location shown on site map ☐ N/A or okay
Remarks _____
_____

C. Letdown Channels ☐ Applicable ☒ N/A
(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** ☐ Location shown on site map ☐ No evidence of settlement
Areal extent _____ Depth _____
Remarks _____
_____

2. **Material Degradation** ☐ Location shown on site map ☐ No evidence of degradation
Material type _____ Areal extent _____
Remarks _____
_____

3. **Erosion** ☐ Location shown on site map ☐ No evidence of erosion
Areal extent _____ Depth _____
Remarks _____
_____

4. **Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting
Areal extent _____ Depth _____
Remarks _____
_____

5. **Obstructions** ☐ No obstructions ☐ Location shown on site map
Type _____ Areal extent _____
Size _____
Remarks _____
_____

6. **Excessive Vegetative Growth** Type _____
☐ No evidence of excessive growth
☐ Vegetation in channels does not obstruct flow
☐ Location shown on site map Areal extent _____
Remarks _____
_____

D. Cover Penetrations ☐ Applicable ☒ N/A

1. **Gas Vents** ☐ Active ☐ Passive
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks _____
_____

2. **Gas Monitoring Probes**
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks

3. **Monitoring Wells** (within surface area of landfill)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks

4. **Leachate Extraction Wells**
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☒ N/A
Remarks _____
_____

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☒ N/A
Remarks_____
_____

E. Gas Collection and Treatment ☐ Applicable ☒ N/A

1. **Gas Treatment Facilities**
☐ Flaring ☐ Thermal destruction ☐ Collection for reuse
☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

2. **Gas Collection Wells, Manifolds and Piping**
☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

3. **Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings)
☐ Good condition ☐ Needs Maintenance ☐ N/A
Remarks _____
_____

F. Cover Drainage Layer ☐ Applicable ☒ N/A

1. **Outlet Pipes Inspected** ☐ Functioning ☐ N/A
Remarks _____
_____

2. **Outlet Rock Inspected** ☐ Functioning ☐ N/A
Remarks _____
_____

G. Detention/Sedimentation Ponds ☐ Applicable ☒ N/A

1. **Siltation** Areal extent _____ Depth _____ ☐ N/A
☐ Siltation not evident
Remarks _____
_____

2. **Erosion** Areal extent _____ Depth _____
☐ Erosion not evident
Remarks _____
_____

3. **Outlet Works** ☐ Functioning ☐ N/A
Remarks _____
_____

4. **Dam** ☐ Functioning ☐ N/A
Remarks _____
_____

H. Retaining Walls ☐ Applicable ☒ N/A

1. **Deformations** ☐ Location shown on site map ☐ Deformation not evident
Horizontal displacement _____ Vertical displacement _____
Rotational displacement _____
Remarks _____
_____

2. **Degradation** ☐ Location shown on site map ☐ Degradation not evident
Remarks _____
_____

I. Perimeter Ditches/Off-Site Discharge ☐ Applicable ☒ N/A

1. **Siltation** ☐ Location shown on site map ☐ Siltation not evident
Areal extent _____ Depth _____
Remarks _____
_____

2. **Vegetative Growth** ☐ Location shown on site map ☐ N/A
☐ Vegetation does not impede flow
Areal extent _____ Type _____
Remarks _____
_____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
Areal extent _____ Depth _____
Remarks

4. **Discharge Structure** ☐ Functioning ☐ N/A
Remarks _____
_____

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A

Remarks Vertical barrier walls are not a component of the remedy at LHAAP-003-R-01.

1. **Settlement** ☐ Location shown on site map ☐ Settlement not evident
Areal extent _____ Depth _____
Remarks _____
_____

2. **Performance Monitoring** Type of monitoring _____
☐ Performance not monitored
Frequency _____ ☐ Evidence of breaching
Head differential _____
Remarks _____
_____

IX. GROUNDWATER/SURFACE WATER REMEDIES ☐ Applicable ☒ N/A

A. Groundwater Extraction Wells, Pumps, and Pipelines ☐ Applicable ☒ N/A

1. **Pumps, Wellhead Plumbing, and Electrical**
☐ Good condition ☐ All required wells properly operating ☐ Needs Maintenance ☐ N/A
Remarks _____
_____
_____

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

3. **Spare Parts and Equipment**
☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided
Remarks _____
_____

B. Surface Water Collection Structures, Pumps, and Pipelines ☐ Applicable ☒ N/A

1. **Collection Structures, Pumps, and Electrical**
☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

3. **Spare Parts and Equipment**
☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided
Remarks _____
_____

C. Treatment System ☐ Applicable ☒ N/A

1. **Treatment Train** (Check components that apply)
☐ Metals removal ☐ Oil/water separation ☐ Bioremediation
☐ Air stripping ☐ Carbon adsorbers
☐ Filters _____
☐ Additive (*e.g.*, chelation agent, flocculent) _____
☐ Others _____
☐ Good condition ☐ Needs Maintenance
☐ Sampling ports properly marked and functional
☐ Sampling/maintenance log displayed and up to date
☐ Equipment properly identified
☐ Quantity of groundwater treated annually _____
☐ Quantity of surface water treated annually _____
Remarks _____
_____

2. **Electrical Enclosures and Panels** (properly rated and functional)
☐ N/A ☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

3. **Tanks, Vaults, Storage Vessels**
☐ N/A ☐ Good condition ☐ Proper secondary containment ☐ Needs Maintenance
Remarks _____
_____

4. **Discharge Structure and Appurtenances**
☐ N/A ☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

5. **Treatment Building(s)**
☐ N/A ☐ Good condition (esp. roof and doorways) ☐ Needs repair
☐ Chemicals and equipment properly stored
Remarks _____
_____

6. **Monitoring Wells** (pump and treatment remedy)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ All required wells located ☐ Needs Maintenance ☐ N/A
Remarks _____
_____

D. Monitoring Data

1. Monitoring Data
☐ Is routinely submitted on time ☐ Is of acceptable quality

2. Monitoring data suggests:
☒ Groundwater plume is effectively contained ☐ Contaminant concentrations are declining

E. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ All required wells located ☐ Needs Maintenance ☐ N/A
Remarks Groundwater monitoring ceased as described in the Record of Decision. Monitoring wells have been plugged and abandoned.

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).
The remedy is effective and functioning as designed to 1) Prohibit the development and use of the property for residential housing, elementary and secondary schools, child care facilities, and playgrounds, 2) restrict land use to non-residential, 3) prohibit intrusive activities such as digging or any other activity which could result in explosive safety risk and 4) maintain existing MEC warning signs at the perimeter of each site to physically demarcate controlled areas. The Five-Year Review site inspection confirmed land use controls prohibit changes in land use and that warning signs are maintained and in good condition. There were no violations of land use controls observed during the site inspection.

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.
O&M includes annual inspection of the MEC warning signs as well as any maintenance needed to clear brush or replace damaged signs and posts. Reports also document that no LUC-restricted activities have been authorized and that conditions and use are consistent with the LUCs.

C. Early Indicators of Potential Remedy Problems

Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.

There are no indications of potential problems that were identified during the Five-Year Review site inspection.

D.	Opportunities for Optimization
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. The Five-Year Review did not identify opportunities for optimization at LHAAP-001-R-001.

I. SITE INFORMATION	
Site name: LHAAP-004-R-01	**Date of inspection:** February 14-15, 2023
Location and Region: Longhorn Army Ammunition Plant / U.S. Environmental Protection Agency (EPA), Region 6	**EPA ID:** TX110000619910
Agency, office, or company leading the five-year review: U.S. Army Corps of Engineers, Omaha District	**Weather/temperature:** Raining/50 °F

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☐ Access controls
- ☐ Institutional controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☐ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls
- ☒ Other Site has been deemed suitable for No Further Action

Attachments: ☐ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (Check all that apply)

Interviews conducted separate from the site inspection. Interview responses are presented in Appendix D of the Five-Year Review.

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**
   - ☐ O&M manual — ☐ Readily available ☐ Up to date ☒ N/A
   - ☐ As-built drawings — ☐ Readily available ☐ Up to date ☒ N/A
   - ☐ Maintenance logs — ☐ Readily available ☐ Up to date ☒ N/A

   Remarks _____

2. **Site-Specific Health and Safety Plan** ☐ Readily available ☐ Up to date ☒ N/A
   ☐ Contingency/Emergency Response Plan ☐ Readily available ☐ Up to date ☒ N/A

   Remarks _____

3. **O&M and OSHA Training Records** ☐ Readily available ☐ Up to date ☒ N/A

   Remarks _____

4. **Permits and Service Agreements**
   - ☐ Air discharge permit — ☐ Readily available ☐ Up to date ☒ N/A
   - ☐ Effluent discharge — ☐ Readily available ☐ Up to date ☒ N/A
   - ☐ Waste disposal, POTW — ☐ Readily available ☐ Up to date ☒ N/A
   - ☐ Other permits _____ — ☐ Readily available ☐ Up to date ☒ N/A

   Remarks _____

5. **Gas Generation Records** ☐ Readily available ☐ Up to date ☒ N/A

   Remarks _____

6. **Settlement Monument Records** ☐ Readily available ☐ Up to date ☒ N/A

   Remarks _____

7. **Groundwater Monitoring Records** ☐ Readily available ☐ Up to date ☒ N/A

   Remarks _____

8. **Leachate Extraction Records** ☐ Readily available ☐ Up to date ☒ N/A

   Remarks _____

9. **Discharge Compliance Records**
   - ☐ Air — ☐ Readily available ☐ Up to date ☒ N/A
   - ☐ Water (effluent) — ☐ Readily available ☐ Up to date ☒ N/A

   Remarks _____

10. **Daily Access/Security Logs** ☐ Readily available ☐ Up to date ☒ N/A
Remarks _____
_____

IV. O&M COSTS

1. **O&M Organization**
☐ State in-house ☐ Contractor for State
☐ PRP in-house ☐ Contractor for PRP
☐ Federal Facility in-house ☐ Contractor for Federal Facility
☐ Other _____
_____

2. **O&M Cost Records**
☐ Readily available ☐ Up to date
☐ Funding mechanism/agreement in place
Original O&M cost estimate _____ ☐ Breakdown attached

Total annual cost by year for review period if available

From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost
From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost
From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost
From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost
From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost

3. **Unanticipated or Unusually High O&M Costs During Review Period**
Describe costs and reasons: There is no requirement for O&M.

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N/A

A. Fencing

1. **Fencing damaged** ☐ Location shown on site map ☐ Gates secured ☒ N/A
Remarks _____
_____

B. Other Access Restrictions

1. **Signs and other security measures** ☐ Location shown on site map ☒ N/A
Remarks _____
_____

C. Institutional Controls (ICs)

1. **Implementation and enforcement**
Site conditions imply ICs not properly implemented ☐ Yes ☒ No ☐ N/A
Site conditions imply ICs not being fully enforced ☐ Yes ☒ No ☐ N/A

Type of monitoring (*e.g.*, self-reporting, drive by) Monitoring not required
Frequency N/A
Responsible party/agency
Contact _____

Name	Title	Date	Phone no.

Reporting is up-to-date ☐ Yes ☐ No ☒ N/A
Reports are verified by the lead agency ☐ Yes ☐ No ☒ N/A

Specific requirements in deed or decision documents have been met
☒ Yes ☐ No ☐ N/A
Violations have been reported ☐ Yes ☒ No ☐ N/A
Other problems or suggestions: ☐ Report attached
None.

2. **Adequacy** ☒ ICs are adequate ☐ ICs are inadequate ☐ N/A
Remarks Current and future land use is restricted to non-residential use.

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ☒ No vandalism evident
Remarks _____
_____

2. **Land use changes on site** ☐ N/A
Remarks There have been no changes to land use since the previous Five-Year Review.

3. **Land use changes off site** ☐ N/A
Remarks No land use changes off site.

VI. GENERAL SITE CONDITIONS

A. Roads ☒ Applicable ☐ N/A

1. **Roads damaged** ☐ Location shown on site map ☒ Roads adequate ☐ N/A
Remarks Access to the site is via paved roads in good condition.

B. Other Site Conditions

Remarks None.

VII. LANDFILL COVERS ☐ Applicable ☒ N/A

A. Landfill Surface

1. **Settlement** (Low spots) ☐ Location shown on site map ☐ Settlement not evident
   Areal extent _____ Depth _____
   Remarks _____
   _____

2. **Cracks** ☐ Location shown on site map ☐ Cracking not evident
   Lengths _____ Widths _____ Depths _____
   Remarks _____
   _____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
   Areal extent _____ Depth _____
   Remarks

4. **Holes** ☐ Location shown on site map ☐ Holes not evident
   Areal extent _____ Depth _____
   Remarks _____
   _____

5. **Vegetative Cover** ☐ Grass ☐ Cover properly established ☐ No signs of stress
   ☐ Trees/Shrubs (indicate size and locations on a diagram)
   Remarks _____
   _____

6. **Alternative Cover (armored rock, concrete, etc.)** ☐ N/A
   Remarks _____
   _____

7. **Bulges** ☐ Location shown on site map ☐ Bulges not evident
   Areal extent _____ Height _____
   Remarks _____
   _____

8. **Wet Areas/Water Damage** ☐ Wet areas/water damage not evident
   ☐ Wet areas ☐ Location shown on site map Areal extent
   ☐ Ponding ☐ Location shown on site map Areal extent _____
   ☐ Seeps ☐ Location shown on site map Areal extent _____
   ☐ Soft subgrade ☐ Location shown on site map Areal extent _____
   Remarks

9. **Slope Instability** ☐ Slides ☐ Location shown on site map ☐ No evidence of slope instability
Areal extent _____
Remarks _____
_____

B. Benches ☐ Applicable ☒ N/A
(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** ☐ Location shown on site map ☐ N/A or okay
Remarks _____
_____

2. **Bench Breached** ☐ Location shown on site map ☐ N/A or okay
Remarks _____
_____

3. **Bench Overtopped** ☐ Location shown on site map ☐ N/A or okay
Remarks _____
_____

C. Letdown Channels ☐ Applicable ☒ N/A
(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** ☐ Location shown on site map ☐ No evidence of settlement
Areal extent _____ Depth _____
Remarks _____
_____

2. **Material Degradation** ☐ Location shown on site map ☐ No evidence of degradation
Material type _____ Areal extent _____
Remarks _____
_____

3. **Erosion** ☐ Location shown on site map ☐ No evidence of erosion
Areal extent _____ Depth _____
Remarks _____
_____

4. **Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting
Areal extent _____ Depth _____
Remarks _____
_____

5. **Obstructions** ☐ No obstructions ☐ Location shown on site map
Type _____ Areal extent _____
Size _____
Remarks _____
_____

6. **Excessive Vegetative Growth** Type _____
☐ No evidence of excessive growth
☐ Vegetation in channels does not obstruct flow
☐ Location shown on site map Areal extent _____
Remarks _____
_____

D. Cover Penetrations ☐ Applicable ☒ N/A

1. **Gas Vents** ☐ Active ☐ Passive
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks _____
_____

2. **Gas Monitoring Probes**
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks

3. **Monitoring Wells** (within surface area of landfill)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks

4. **Leachate Extraction Wells**
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☒ N/A
Remarks _____
_____

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☒ N/A
Remarks_____
_____

E. Gas Collection and Treatment ☐ Applicable ☒ N/A

1. **Gas Treatment Facilities**
☐ Flaring ☐ Thermal destruction ☐ Collection for reuse
☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

2. **Gas Collection Wells, Manifolds and Piping**
☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

3. **Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings)
☐ Good condition ☐ Needs Maintenance ☐ N/A
Remarks _____
_____

F. Cover Drainage Layer ☐ Applicable ☒ N/A

1. **Outlet Pipes Inspected** ☐ Functioning ☐ N/A
Remarks _____
_____

2. **Outlet Rock Inspected** ☐ Functioning ☐ N/A
Remarks _____
_____

G. Detention/Sedimentation Ponds ☐ Applicable ☒ N/A

1. **Siltation** Areal extent _____ Depth _____ ☐ N/A
☐ Siltation not evident
Remarks _____
_____

2. **Erosion** Areal extent _____ Depth _____
☐ Erosion not evident
Remarks _____
_____

3. **Outlet Works** ☐ Functioning ☐ N/A
Remarks _____
_____

4. **Dam** ☐ Functioning ☐ N/A
Remarks _____
_____

H. Retaining Walls ☐ Applicable ☒ N/A

1. **Deformations** ☐ Location shown on site map ☐ Deformation not evident
Horizontal displacement _____ Vertical displacement _____
Rotational displacement _____
Remarks _____
_____

2. **Degradation** ☐ Location shown on site map ☐ Degradation not evident
Remarks _____
_____

I. Perimeter Ditches/Off-Site Discharge ☐ Applicable ☒ N/A

1. **Siltation** ☐ Location shown on site map ☐ Siltation not evident
Areal extent _____ Depth _____
Remarks _____
_____

2. **Vegetative Growth** ☐ Location shown on site map ☐ N/A
☐ Vegetation does not impede flow
Areal extent _____ Type _____
Remarks _____
_____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
Areal extent _____ Depth _____
Remarks

4. **Discharge Structure** ☐ Functioning ☐ N/A
Remarks _____
_____

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A

Remarks Vertical barrier walls are not a component of the remedy at LHAAP-004-R-01.

1. **Settlement** ☐ Location shown on site map ☐ Settlement not evident
Areal extent _____ Depth _____
Remarks _____
_____

2. **Performance Monitoring** Type of monitoring _____
☐ Performance not monitored
Frequency _____ ☐ Evidence of breaching
Head differential _____
Remarks _____
_____

IX. GROUNDWATER/SURFACE WATER REMEDIES ☐ Applicable ☒ N/A

A. Groundwater Extraction Wells, Pumps, and Pipelines ☐ Applicable ☒ N/A

1. **Pumps, Wellhead Plumbing, and Electrical**
☐ Good condition ☐ All required wells properly operating ☐ Needs Maintenance ☐ N/A
Remarks _____
_____
_____

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

3. **Spare Parts and Equipment**
☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided
Remarks _____
_____

B. Surface Water Collection Structures, Pumps, and Pipelines ☐ Applicable ☒ N/A

1. **Collection Structures, Pumps, and Electrical**
☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

3. **Spare Parts and Equipment**
☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided
Remarks _____
_____

C. Treatment System ☐ Applicable ☒ N/A

1. **Treatment Train** (Check components that apply)
☐ Metals removal ☐ Oil/water separation ☐ Bioremediation
☐ Air stripping ☐ Carbon adsorbers
☐ Filters _____
☐ Additive (*e.g.*, chelation agent, flocculent) _____
☐ Others _____
☐ Good condition ☐ Needs Maintenance
☐ Sampling ports properly marked and functional
☐ Sampling/maintenance log displayed and up to date
☐ Equipment properly identified
☐ Quantity of groundwater treated annually _____
☐ Quantity of surface water treated annually _____
Remarks _____
_____

2. **Electrical Enclosures and Panels** (properly rated and functional)
☐ N/A ☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

3. **Tanks, Vaults, Storage Vessels**
☐ N/A ☐ Good condition ☐ Proper secondary containment ☐ Needs Maintenance
Remarks _____
_____

4. **Discharge Structure and Appurtenances**
☐ N/A ☐ Good condition ☐ Needs Maintenance
Remarks _____
_____

5. **Treatment Building(s)**
☐ N/A ☐ Good condition (esp. roof and doorways) ☐ Needs repair
☐ Chemicals and equipment properly stored
Remarks _____
_____

6. **Monitoring Wells** (pump and treatment remedy)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ All required wells located ☐ Needs Maintenance ☐ N/A
Remarks _____
_____

D. Monitoring Data

1. Monitoring Data
☐ Is routinely submitted on time ☐ Is of acceptable quality

2. Monitoring data suggests:
☐ Groundwater plume is effectively contained ☐ Contaminant concentrations are declining

E. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ All required wells located ☐ Needs Maintenance ☒ N/A
Remarks _____
_____

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

	Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.). The RAO was to minimize the potential for human contact with soil containing lead via a soil removal, confirmatory sampling, and backfill with clean soil. The site is classified as No Further Action, so it has no RAOs or remedy beyond the Five-Year Review site inspection. The Five-Year Review site inspection confirmed land use controls prohibit changes in land use. There were no violations of land use controls observed during the site inspection.
B.	**Adequacy of O&M**
	Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy. There is no requirement for O&M.
C.	**Early Indicators of Potential Remedy Problems**
	Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future. There are no indications of potential problems that were identified during the Five-Year Review site inspection.
D.	**Opportunities for Optimization**
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. The Five-Year Review did not identify opportunities for optimization at LHAAP-004-R-01.

APPENDIX C
PHOTOGRAPH LOG

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Thank LHAAP-18/24 Burning Ground/Washout Pond / Former Unlined Evaporation Pond	
Photograph 1 **Location:** LHAAP-18/24 **Date:** 2/14/2023 **Description:** Current site conditions with monitoring wells in the background. Looking south towards LHAAP-18/24. Conditions were as expected, and site conditions are well-maintained.	
Photograph 2 **Location:** LHAAP-18/24 **Date:** 2/14/2023 **Description:** View of current site condition. Looking southeast towards LHAAP-18/24. Conditions were as expected, and site conditions are well-maintained.	

Photograph 3 **Location:** LHAAP-18/24 **Date:** 2/14/2023 **Description:** View of overgrown conditions at monitoring well 8A-935.	
Photograph 4 **Location:** LHAAP-18/24 **Date:** 2/14/2023 **Description:** Current site conditions with barrels and construction supplies on a concrete pad, facing northwest at LHAAP-18/24.	

Photograph 5 **Location:** LHAAP-18/24 **Date:** 2/14/2023 **Description:** Current site conditions facing northwest at LHAAP-18/24	
LHAAP-016 **Old Landfill (SWMU 16)**	
Photograph 6 **Location:** LHAAP-16 **Date:** 2/14/2022 **Description:** View of monitoring wells 16-WW-14, 16-WW-15, and 16-WW-20. The monitoring wells were locked and are maintained in good condition.	

Photograph 7 **Location:** LHAAP-16 **Date:** 2/14/2023 **Description:** View of monitoring well 16-RW-02 The monitoring well was noted to be unlocked and not secure.	
Photograph 8 **Location:** LHAAP-16 **Date:** 2/14/2023 **Description:** View of monitoring well 16-RW-03. The monitoring well was locked and is maintained in good working condition.	

Photograph 9 **Location:** LHAAP-16 **Date:** 2/14/2023 **Description:** View of general site conditions at LHAAP-16 facing southeast. Conditions were as expected, and site conditions are maintained.	
Photograph 10 **Location:** LHAAP-16 **Date:** 2/14/2023 **Description:** View of general site conditions and monitoring well in the background, facing northwest at LHAAP-16. Conditions were as expected, and site conditions are maintained.	

Photograph 11	
Location: LHAAP-16	
Date: 2/14/2023	
Description: View of monitoring well 16WW12. The monitoring well was not properly secured and closed.	
Photograph 12	
Location: LHAAP-16	
Date: 2/14/2023	
Description: Current site conditions of the landfill surface cap, facing south at LHAAP-16. Several large pine trees were noted to be present on the landfill surface cap and need be removed to ensure cap integrity.	

Photograph 13 **Location:** LHAAP-16 **Date:** 2/14/2023 **Description:** View of damaged fence located along the southwestern boundary of the landfill surface cap.	
Photograph 14 **Location:** LHAAP-16 **Date:** 2/14/2023 **Description:** View of general site conditions facing northeast at LHAAP-16	

Photograph 15 **Location:** LHAAP-16 **Date:** 2/14/2023 **Description:** View of warning sign and fence along the southwestern boundary of the landfill surface cap at LHAAP-16.	
Photograph 16 **Location:** LHAAP-16 **Date:** 2/14/2023 **Description:** View of the entrance gate of the landfill surface cap at LHAAP-16. Gate is normally closed and locked.	

Photograph 17 **Location:** LHAAP-16 **Date:** 2/14/2023 **Description:** View of hole with minor ponding on the surface cap of LHAAP-16.	
Photograph 18 **Location:** LHAAP-16 **Date:** 2/12/2023 **Description:** Close up view of small pine trees located on the northeastern portion of the landfill surface cap at LHAAP-16	

Photograph 19	
Location: LHAAP-16	
Date: 1/11/2023	
Description: View of a small hole with minor ponding on the landfill surface cap of LHAAP-16.	
Photograph 20	
Location: LHAAP-16	
Date: 2/14/2023	
Description: View of a faded warning signs located along the southwest boundary of the landfill surface cap of LHAAP-16.	

Photograph 21	
Location: LHAAP-16	
Date: 2/14/2023	
Description: View of minor ponding with algae on the surface on the water at the surface cap. Clipboard show for scale.	
LHAAP-17 **Burning Ground No. 2 Flashing Area, Group 2**	
Photograph 22	
Location: LHAAP-17	
Date: 2/14/2023	
Description: View of general site conditions and monitoring wells in the background, facing east at LHAAP-17.	

Photograph 23 **Location:** LHAAP-17 **Date:** 2/14/2023 **Description:** View of monitoring 17WW16 overgrown with vegetation.	
Photograph 24 **Location:** LHAAP-17 **Date:** 2/14/2023 **Description:** View of monitoring well 17WW11 with damaged bollard and unlocked at LHAAP-17	

Photograph 25 **Location:** LHAAP-17 **Date:** 2/14/2023 **Description:** View of monitoring well, 17MW13, overgrown with vegetation and unlocked.	
Photograph 26 **Location:** LHAAP-17 **Date:** 2/14//2023 **Description:** View of pumping well at LHAAPH-17, was noted to be in good working condition.	

Photograph 27 **Location:** LHAAP-17 **Date:** 2/14/2023 **Description:** View of monitoring well 17MW012 with overgrown vegetation and unlocked.	
Photograph 28 **Location:** LHAAP-17 **Date:** 2/14/2023 **Description:** View of groundwater monitoring 17WW14, unlocked and not secured at LHAAP-17.	

Photograph 29	
Location: LHAAP-17	
Date: 2/14/2023	
Description: View of monitoring well 17WW17, unlocked and not secure at LHAAP-17.	
Photograph 30	
Location: LHAAP-17	
Date: 2/14/2023	
Description: View of water treatment pumping facility shed at LHAAP-17. Conditions were as expected, and treatment pumping facility shed is maintained.	

Photograph 31	
Location: LHAAP-17	
Date: 2/14/2023	
Description: View of water treatment pumping facility shed door locked and properly secure.	
LHAAP-67 **Above Ground Storage Tank Farm**	
Photograph 32	
Location: LHAAP-67	
Date: 2/14/2023	
Description: View of monitoring well 67WW01, unlocked and unsecured at LHAAP-67	

Photograph 33 **Location:** LHAAP-67 **Date:** 2/14/2023 **Description:** View of general site conditions at LHAAP-67, facing southeast.	
Photograph 34 **Location:** LHAAP-67 **Date:** 12/14/2023 **Description:** View of general site conditions at LHAAP-67, facing southwest.	

Photograph 35 **Location:** LHAAP-67 **Date:** 1/10/2023 **Description:** Current site conditions of LHAAP-67, facing east.	
Photograph 36 **Location:** LHAAP-67 **Date:** 2/14/2023 **Description:** View of groundwater monitoring well 67WW08. The monitoring well was locked and is in good condition.	

LHAAP-50
Former Waste Disposal Area

Photograph 37 **Location:** LHAAP-50 **Date:** 2/14/2023 **Description:** View of groundwater monitoring wells, 50WW14 and 50WW13 properly locked and secured. Groundwater monitoring wells were noted to be in good condition.	
Photograph 38 **Location:** LHAAP-50 **Date:** 2/14/2023 **Description:** View of general site conditions and groundwater monitoring wells. Conditions were as expected, and site conditions are maintained.	

Photograph 39	
Location: LHAAP-50	
Date: 2/14/2023	
Description: View of groundwater monitoring well 50WW06. The monitoring well was secure and in good condition	
LHAAP-37 **Chemical Laboratory Waste Pad**	
Photograph 40	
Location: LHAAP-37	
Date: 2/14/2023	
Description: View of general site conditions, facing northeast at LHAAP-37.	

Photograph 41 **Location:** LHAAP-37 **Date:** 2/14/2023 **Description:** View of general site conditions at LHAAP-37, facing south.	
Photograph 42 **Location:** LHAAP-37 **Date:** 2/14/2023 **Description:** View of general site conditions at LHAAP-37, facing northwest.	

Photograph 43	
Location: LHAAP-37	
Date: 2/14/2023	
Description: View of LHAAP-37 general site conditions and monitoring wells, facing southwest. Conditions were as expected, and site conditions are maintained.	

Photograph 44	
Location: LHAAP-37	
Date: 2/14/2023	
Description: View of groundwater monitoring well LHSMW58. The monitoring well was properly locked and in good condition.	
LHAAP-46 **Plant 2 Area**	
Photograph 45	
Location: LHAAP-46	
Date: 2/14/2023	
Description: View of current site conditions and monitoring wells at LHAAP-46, facing northeast. Conditions were as expected, and site conditions are maintained.	

Photograph 46	
Location: LHAAP-46	
Date: 2/14/2023	
Description: View of groundwater monitoring well, 46WW10. The monitoring well was locked and in good condition.	
Photograph 47	
Location: LHAAP-46	
Date: 2/14/2023	
Description: View of current site conditions at LHAAP-46, facing north. Current site conditions were as expected and maintained.	

Photograph 48 **Location:** LHAAP-46 **Date:** 2/14/2023 **Description:** View of current site conditions at LHAAP-46, facing north. Conditions were as expected and site conditions are well maintained.	
Photograph 49 **Location:** LHAAP-46 **Date:** 2/14/2023 **Description:** View of current site conditions at LHAAP-46, facing northwest Conditions were as expected and site conditions are well maintained.	

LHAAP-58 Maintenance Complex	
Photograph 50	
Location: LHAAP-58	
Date: 2/14/2023	
Description: View of general site conditions and monitoring wells at LHAAP-58, facing northwest.	
Photograph 51	
Location: LHAAP-58	
Date: 2/14/2023	
Description: View of LHAAP-58, monitoring well, 35AWW13 facing west.	

Photograph 52	
Location: LHAAP-58	
Date: 2/14/2023	
Description: View of LHAAP-58, monitoring well, 35AWW03, facing west.	
LHAAP-03 **Former Waste Collection Pad Building 722-P Paint Shop**	
Photograph 53	
Location: LHAAP-03	
Date: 2/14/2023	
Description: View of general site conditions at LHAAP-03, facing northwest.	

LHAAP-49 **Former Acid Storage Area**	
Photograph 54	
Location: LHAAP-49	
Date: 2/14/2023	
Description: View of general site conditions at LHAAP-49, facing west.	
Photograph 55	
Location: LHAAP-49	
Date: 2/14/2023	
Description: View of general site conditions at LHAAP-49, facing north	

LHAAP-012 Active Landfill	
Photograph 56	
Location: LHAAP-12	
Date: 2/14/2023	
Description: View of general site conditions of the landfill surface cap at LHAAP-12, facing northeast. Conditions were as expected and maintained.	
Photograph 57	
Location: LHAAP-12	
Date: 2/14/2023	
Description: View of general site conditions at LHAAP-12, facing north. Conditions were as expected and maintained.	

Photograph 58 **Location:** LHAAP-12 **Date:** 2/14/2023 **Description:** View of fencing and a sign surrounding the perimeter of the landfill surface cap of LHAAP-12.	
Photograph 59 **Location:** LHAAP-12 **Date:** 2/14/2023 **Description:** View of the entrance gate at the landfill surface cap of LHAAP-12. The gate was damaged and not in good working condition.	

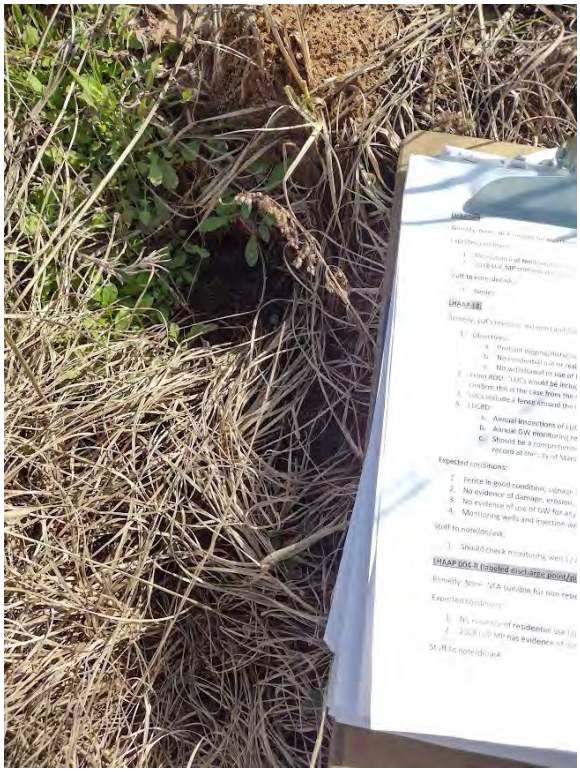
Photograph 60 **Location:** LHAAP-12 **Date:** 2/14/2023 **Description:** View of knocked down sign and fencings surrounding the landfill surface cap at LHAAP-12.	
Photograph 61 **Location:** LHAAP-12 **Date:** 2/14/2023 **Description:** View of the general conditions, fence, and warning sign at LHAAP-12.	

Photograph 62	
Location: LHAAP-12	
Date: 2/14/2023	
Description: View of warning sign overgrown with vegetation along the southwester portion of the perimeter landfill fencing at LHAAP-12.	
Photograph 63	
Location: LHAAP-12	
Date: 2/14/2023	
Description: View of damaged fence and tilted sign along the perimeter of the landfill surface cap of LHAAP-12.	

Photograph 64	
Location: LHAAP-12	
Date: 2/14/2023	
Description: View of groundwater monitoring well 12WW02. The monitoring well was locked and in good condition.	
Photograph 65	
Location: LHAAP-12	
Date: 2/14/2023	
Description: View of groundwater monitoring well 12WW01. The monitoring well was locked and in good condition.	

Photograph 66 **Location:** LHAAP-12 **Date:** 2/14/2023 **Description:** View of a fallen tree damaging the fencing surrounding the landfill surface cap on the far northeastern extent of LHAAP-12.	
Photograph 67 **Location:** LHAAP-12 **Date:** 2/14/2023 **Description:** View of damaged fencing along the southwestern portion of the LHAAP-12 perimeter.	

Photograph 68 **Location:** LHAAP-12 **Date:** 2/14/2023 **Description:** View of small depression on the landfill surface cap of LHAAP-12. Clipboard provided as scale.	
Photograph 69 **Location:** LHAAP-12 **Date:** 2/14/2023 **Description:** View of small hole on the landfill surface cap of LHAAP-12. Clipboard provided as scale.	

Photograph 70	
Location: LHAAP-12	
Date: 2/14/2023	
Description: View of small hole the landfill surface cap of LHAAP-12. Clipboard provided as scale.	
Photograph 71	
Location: LHAAP-12	
Date: 2/14/2023	
Description: View of small hole/depression the landfill surface cap of LHAAP-12. Clipboard provided as scale.	

LHAAP-001-R-001 **(Site 27) South Test Area/Bomb Test Area**	
Photograph 72	
Location: LHAAP-001-R-001	
Date: 2/14/2023	
Description: View of warning sign and general site conditions at LHAAP-001-R-001, facing northeast. Conditions were as expected and warning sign and site conditions are maintained.	
Photograph 73	
Location: LHAAP-001-R-001	
Date: 2/14/2023	
Description: View of warning signs at LHAAP-001-R-001 are displayed with proper placement and the correct 100-foot interval, facing south.	

LHAAP-003-R-01
Ground Signal Test Area

Photograph 74

Location: LHAAP-003-R-001

Date: 2/14/2023

Description:

View of warning sign and general site conditions at LHAAP-001-R-003, facing southeast. Conditions were as expected and warning sign and site conditions are maintained.



Photograph 75

Location: LHAAP-001-R-003

Date: 2/14/2023

Description:

View of warning signs at LHAAP-001-R-003 displaying properly placement and the correct 100-foot interval, facing southwest.



LHAAP-004-R-01 **Pistol Range 12**	
Photograph 76 **Location:** LHAAP-001-R-004 **Date:** 2/14/2023 **Description:** View of general site conditions at LHAAP-004-R-001, facing east. Conditions were as excepted and site conditions are maintained.	
Photograph 77 **Location:** LHAAP-001-R-004 **Date:** 2/14/2023 **Description:** View of warning sign at LHAAP-001-R-004. Note: warning signs are not part of the remedy at LHAAP-001-R-004.	

LHAAP-04
Former Pilot Wastewater Treatment Plant

Photograph 78

Location: LHAAP-04

Date: 2/14/2023

Description:

View of general site conditions at LHAAP-04, facing southeast. Conditions were as expected and site conditions are maintained.



Photograph 79

Location: LHAAP-04

Date: 2/14/2023

Description:

View of monitoring well 04WW07. The monitoring well was locked and in good working condition.



Photograph 80	
Location: LHAAP-04	
Date: 2/14/2023	
Description: View of general site conditions and monitoring wells, facing northeast. Conditions were as expected and site conditions and monitoring wells are maintained.	

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APPENDIX D
INTERVIEWS

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INTERVIEW RECORD

Site Name: Former Longhorn Army Ammunition Plant		**EPA ID No.:** TX6213820529
Subject: Fifth Five-Year Review for Former Longhorn Army Ammunition Plant	**Time:** 1515 EST	**Date:** 3/3/2023
Type: ☐ Telephone ☐ Visit ☒ Other (email) **Location of Interview:** Remote	☐ Incoming ☒ Outgoing	

Contact Made By:

Name: [redacted]	**Title:** Senior Project Manager	**Organization:** Dawson

Individual Contacted:

Name: [redacted]	**Title:** Military Munitions Program Manager	**Organization:** TLI Solutions

Telephone No: [redacted] **Fax No:** [redacted]	**Street Address:** [redacted] **City, State, Zip:** [redacted]

Summary Of Conversation

General Questions

1. What are your roles and responsibilities for environmental cleanup activities at former Longhorn Army Ammunition Plant?

   I serve as the project manager of record for Military Munitions Group (MMG) and TLI Solutions, Inc. (TLI) Joint Venture (MMG-TLI JV). My role serves as the primary point of contract to USACE to ensure execution at the site IAW PWS and all applicable regulations. As the PM, I ensure management steps through the life-cyclce of the project are addressed and executed IAW the PMP framework. My key focus in the team members and communication, manpower use and reporting, and management techniques for project execution.

2. Describe your involvement with environmental cleanup activities at the following sites.

   LHAAP-17 & LHAAP 46: MMG-TLI JV serves to provide environmental activities including munitions response IAW CERCLA. LHAAP 17 was selected to undergo a Remedial Design/Remedial Action Work Plan (RD/RAWP) in 2019. During soil remediation, Bhate encountered multiple munitions and explosive of concern (MEC) and was further directed to stop work under the current task order.

   MMG-TLI JV and serving as the PM, it was my responsibility to oversee a geophysical survey for the entire 4.0 acre site and remove surface munitions and selected targets-of-interest under a Time Critical Removal Action to reduce the exposure of MEC to future contractors. In addition, working with our subcontract (Bhata) install a groundwater extraction system to help remedy the PCB plume on LHAAP. During the project's life-cycle, additional activities have been awarded and currently underway to include groundwater sampling at select wells and compiling analytical reports for regulatory review under selected remedy.

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Site Name: Former Longhorn Army Ammunition Plant	**EPA ID No.:** TX6213820529

1. What is your overall impression of the project? (general sentiment)

   LHAAP 17 remains a complex site. The installation of the ground water extraction system appears to be working better than anticipated, however, additional wells and pumps may be required to achieve a UU/UE level. The site remains contaminated with heavy metals and PCBs, however, due to funding constraints under the PBR task order, we were unable to achieve the full selected remedy. The sites location and heavy weather played an impact on our abilities to potentially receive a better response to the remedy selection. Geophsical mapping showed the site is heavily contaminated with metals and non-munitions related debris making the selection of TOIs difficult. As most of the site is characterized as Saturated, it is likely additional soil removal is required and MEC is likely still present subsurface.

2. Is the remedy functioning as expected? How well is the remedy performing?

   The selected remedy is currently working better than anticipated, however, the constraints tied to the cubic yardages selected for removal/treatment were not enough based on sampling characteristics. Heavy influence from the rising groundwater table and the heavy saturation of NMRD remaining on site ultimately mean the exposure to MEC is still a high likelihood for any subsurface work and future construction on LHAAP 17. The PCBs are being managed by Bhate, however the current GWTP is undergoing heavy repairs and routinely falls behind schedule with treatment due to an influx of new contaminats on LHAAP.

3. What does the monitoring data show? Are there any trends that show contaminant levels are decreasing?

   Initial monitoring showed a spike on certain wells, however, the longer the treatment remains in place the more likely the contaminate levels will drop. I would however caution Bhate is our subcontractor for management and analytics tied to groundwater sampling and would refer you to them.

4. Is there a continuous on-site operations and maintenance (O&M) presence? If so, please describe staff and activities. If there is not a continuous on-site presence, describe staff and frequency of site inspections and activities.

   There are current O&M underway and monthly sampling is on-going to develop the analatics required for the RA(O) report.

5. Have there been any significant changes in the O&M requirements, maintenance schedules, or sampling routines since start-up or in the last five years? If so, do they affect the protectiveness or effectiveness of the remedy? Please describe changes and impacts.

   Bhate is currently conducting all O&M, maintenance, monitoring and optimiazation for the in-place systems. During the life-cylce, the RA(O) report will give us a better idea as to how the treatment remedy is working and what improvements it likely needs.

6. Have there been unexpected O&M difficulties or costs at the site since start-up or in the last five years? If so, please give details.

   No, the Ground Water extraction system is still in its initial 6 month operation. As the year and half progression moves, we will bill able to provide more context.

INTERVIEW RECORD	
Site Name: Former Longhorn Army Ammunition Plant	**EPA ID No.:** TX6213820529

7. Have there been opportunities to optimize O&M, or sampling efforts? Please describe changes and resultant or desired cost savings or improved efficiency.

   None thus far.

8. Do you have any comments, suggestions, or recommendations regarding the project?

   The project's scope was limited due to funding constraints shaped in the removal and treatment of contaminated soils. It is likely UU/UE may never be obtainable due to the water table on LHAAP 17 and its proximity to surrounding water. LUCs will be difficult to establish until the TCRA is complete, which will likely require a full mag-and-dig approach to a depth of 3ft bgs for MEC and MPPEH. Upon completion, the site could undergo better treatment for Perchlorates and continuation of O&M for the extractions system and future wells.

INTERVIEW RECORD

Site Name: Former Longhorn Army Ammunition Plant		**EPA ID No.:** TX6213820529
Subject: Fifth Five-Year Review for Former Longhorn Army Ammunition Plant	**Time:0800**	**Date: 04/14/23**
Type: ☐ Telephone ☐ Visit ☒ Other (email) **Location of Interview:**		☐ Incoming ☐ Outgoing

Contact Made By:		
Name:	**Title:**	**Organization:**
Individual Contacted:		
Name: [redacted]	**Title: Environmental Engineer**	**Organization: U S A C E**

Telephone No: [redacted] **Fax No:** **E-Mail Address:** [redacted]	**Street Address:** [redacted] **City, State, Zip:** [redacted]

Summary Of Conversation

General Questions

1. What are your roles and responsibilities for environmental cleanup activities at former Longhorn Army Ammunition Plant? I am the Technical Manager and I review all site CERCLA documents for the LHAAP sites to ensure site remedies remain protective and are functioning as intended.

2. Describe your involvement with environmental cleanup activities at the following sites.

LHAAP-001-R-001: I inspect the site during visits and review the annual LTM report to ensure LUCs are being maintained and remain in compliance.

LHAAP-003-R-01: I inspect the site during visits and review the annual LTM report to ensure LUCs are being maintained and remain in compliance.

LHAAP-004-R-01: I inspect the site during five-year reviews and review the FYR report to ensure land use remains nonresidential.

LHAAP-03: I inspect the site during five-year reviews and review the FYR report to ensure land use remains nonresidential.

LHAAP-04: I inspect the site during visits and review the annual RA-O report to ensure the remedy remains protective and is functioning as intended.

LHAAP-12: I inspect the site during visits and review the annual RA-O report to ensure the remedy remains protective and is functioning as intended and that the landfill is being properly maintained.

LHAAP-16: I inspect the site during visits and review the annual RA-O report to ensure the remedy remains protective and is functioning as intended and that the landfill is being properly maintained.

LHAAP-17: The groundwater remedy for this site is just underway, such that an annual report has not been produced for review yet, however I have reviewed the first 6-months of validated data to ensure the remedy is functioning as intended. The soil remedy is only partially

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Site Name: Former Longhorn Army Ammunition Plant	**EPA ID No.:** TX6213820529

complete and will be completed under a new contract.

LHAAP-18/24: I inspect the site during visits and review the annual interim RA-O report to ensure the interim remedy remains protective and is functioning as intended.

LHAAP-37: I inspect the site during visits and review the annual RA-O report to ensure the remedy remains protective and is functioning as intended.

LHAAP-46: I inspect the site during visits and review the annual RA-O report to ensure the remedy remains protective and is functioning as intended.

LHAAP-49: I inspect the site during five-year reviews and review the FYR report to ensure land use remains nonresidential.

LHAAP-50: I inspect the site during visits and review the annual RA-O report to ensure the remedy remains protective and is functioning as intended.

LHAAP-58: I inspect the site during visits and review the annual RA-O report to ensure the remedy remains protective and is functioning as intended.

LHAAP-67: I inspect the site during visits and review the annual RA-O report to ensure the remedy remains protective and is functioning as intended.

1. What is your overall impression of the project? (general sentiment)

LHAAP-001-R-001: LUCs are being managed well.

LHAAP-003-R-01: : LUCs are being managed well.

LHAAP-004-R-01: FYR site inspection confirms site remains nonresidential

LHAAP-03: FYR site inspection confirms site remains nonresidential

LHAAP-04: RA-O for this site looks really good with perchlorate below cleanup levels for the last nine sampling events.

LHAAP-12: Landfill cap is being maintained and there is just one well with TCE just slightly above the cleanup level.

LHAAP-16: Some trees were observed on the landfill during the FYR site inspection that need to be addressed, the groundwater remedy for this site is working well in some parts of the plume but not in all areas, an additional treatment is likely needed in some areas.

LHAAP-17: The groundwater extraction remedy so far is looking good with decreasing trends observed in the extraction well with the highest perchlorate but it is still a little too early to draw conclusions.

LHAAP-18/24: The Interim Remedial Action is working as intended to prevent migration of contaminants in the shallow groundwater from migrating to surface water bodies (Harrison Bayou), when the system is working. However the groundwater treatment system is old (> 20 years) and resources would be better invested toward implementing the final remedy than performing substantial upgrades to the existing treatment system.

LHAAP-37: RA-O for this site looks good with the plume shrinking in some parts based on recent data.

LHAAP-46: RA-O for this site looks good with no signs of plume migration, an additional well may be required in the north to confirm extent.

LHAAP-49: FYR site inspection confirms site remains nonresidential

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Site Name: Former Longhorn Army Ammunition Plant	**EPA ID No.:** TX6213820529

LHAAP-50: RA-O for this site looks good with no signs of plume migration, an additional treatment may be required near 50WW12 which has showed increasing trends with recent data.

LHAAP-58: RA-O for this site looks good with no signs of plume migration and decreasing trends.

LHAAP-67: RA-O for this site looks good with no signs of plume migration.

2. Is the remedy functioning as expected? How well is the remedy performing?

LHAAP-001-R-001: Yes, LUC signs remain intact and visible from one sign to the next.
LHAAP-003-R-01: Yes, LUC signs remain intact and visible from one sign to the next.
LHAAP-004-R-01: Yes, site remains nonresidential.

LHAAP-03: Yes, site remains nonresidential.
LHAAP-04: Yes, see response to question #1.
LHAAP-12: Yes, see response to question #1.
LHAAP-16: Yes, see response to question #1.
LHAAP-17: Yes, see response to question #1.
LHAAP-18/24: Yes, see response to question #1.
LHAAP-37: Yes, see response to question #1.
LHAAP-46: Yes, see response to question #1.
LHAAP-49: Yes, site remains nonresidential.
LHAAP-50: Yes, see response to question #1.
LHAAP-58: Yes, see response to question #1.
LHAAP-67: Yes, see response to question #1.

3. What does the monitoring data show? Are there any trends that show contaminant levels are decreasing?

A majority of the plume trends are decreasing, however there are some parts of plumes for a few of the sites that are currently displaying increasing trends.

4. Is there a continuous on-site operations and maintenance (O&M) presence? If so, please describe staff and activities. If there is not a continuous on-site presence, describe staff and frequency of site inspections and activities.

Yes, the Groundwater Treatment Plant and associated groundwater extraction system requires regular on-site operation and maintenance. There are two on-site technicians who monitor the GWTP operation and repair and/or replace pumps, gauges, sensors, motors and chemicals for the operation in addition to collecting water samples regularly to ensure the GWTP is operating as intended.

5. Have there been any significant changes in the O&M requirements, maintenance schedules, or sampling routines since start-up or in the last five years? If so, do they affect the protectiveness or effectiveness of the remedy? Please describe changes and impacts.

No, I can't think of any.

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Site Name: Former Longhorn Army Ammunition Plant	**EPA ID No.:** TX6213820529

6. Have there been unexpected O&M difficulties or costs at the site since start-up or in the last five years? If so, please give details.

   I wouldn't necessarily say unexpected since it is an aging GWTP, requiring more maintenance. There was recently a clog in one of the pipes that was limiting flow and was the result of accumulation over the years and the plant required shutdown to access and replace the clogged pipe. Additionally, the Fluidized Bed Reactor required a recharge of Granular Activated Carbon to get to optimal design bed height.

7. Have there been opportunities to optimize O&M, or sampling efforts? Please describe changes and resultant or desired cost savings or improved efficiency.

   None that come to mind.

8. Do you have any comments, suggestions, or recommendations regarding the project?

   Yes, a few comments/recommendations were provided in response to question #1.

INTERVIEW RECORD

Site Name: Former Longhorn Army Ammunition Plant		**EPA ID No.:** TX6213820529
Subject: Fifth Five-Year Review for Former Longhorn Army Ammunition Plant	**Time:**	**Date: 4/12/2023**
Type: ☐ Telephone ☐ Visit ☒ Other (email) **Location of Interview:** Remote	☐ Incoming ☐ Outgoing	

Contact Made By:		
Name:	**Title:**	**Organization:**
Individual Contacted:		
Name: [redacted]	**Title: LHAAP PBR PM**	**Organization: Bhate Environmental**

Telephone No: [redacted] **Fax No:** **E-Mail Address:** [redacted]	**Street Address:** [redacted] **City, State, Zip:** [redacted]

Summary Of Conversation

General Questions

1. What are your roles and responsibilities for environmental cleanup activities at former Longhorn Army Ammunition Plant? Bhate Environmental Associates, Inc. was the PBR contractor for 12 sites that had an existing ROD. Bhate completed LUC inspections, RA-O, operation of the groundwater treatment system and extraction wells and implemented several remedies.

2. Describe your involvement with environmental cleanup activities at the following sites.

LHAAP-001-R-001: Prepared final monitoring reports to achieve RC and annual LUC Reports.

LHAAP-003-R-01: Prepared final monitoring reports to achieve RC and annual LUC Reports.

LHAAP-004-R-01: No activity

LHAAP-03: Prepared ESD to transfer groundwater monitoring from LHAAP-03 to LHAAP-58, prepared ROD, RD/RAWP, completed soil removal action for arsenic and lead, and prepared RACR.

LHAAP-04: Completed ERD injections to successfully remediate perchlorate and then implemented RA-O

LHAAP-12: Continued RA-O of MNA and LUC remedy.

LHAAP-16: Installed multiple new monitoring and injection wells on both sides of Harrison Bayou. Completed ERD injections for perchlorate/CVOCs via established design for biobarriers and then implemented RA-O for three years

LHAAP-17: Additional pre-design investigation including soil and groundwater sampling and performance of a 72-hour pump test, soil removal and offsite disposal, and installation of groundwater extraction system. Conducted RA-O for the extraction system

LHAAP-18/24: Implemented interim remedy including extraction from ICTs and wells for treatment at the GWTP followed by discharge to the INF pond and/or Harrison Bayou.

LHAAP-37: Completed RA-O for MNA and LUCs remedy.

LHAAP-46: Completed RA-O for MNA and LUCs. Installed on new shallow/intermediate well to

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assist with downgradient plume delineation.

LHAAP-49: No site knowledge; not in the PBR

LHAAP-50: Prepared Explanation of Significant Different to add a Contingency Remedy. ISB injections for the contingency remedy were completed in March 2020 and included injection of the emulsified vegetable oil carbon source (Electron Donor Solution – Extended Release™ from Tersus Environmental, LLC), microbial nutrient (diammonium phosphate), and APTIM's dechlorinating culture (SDC-9™).

LHAAP-58: Prepared ESD and RAWP for ERD remedy. Completed ERD injections for CVOCs within the western plume, including preparation of an ESD. Installed additional wells to further bound the western plume and continued RA-O

LHAAP-67: Two wells, 67WW17 and 67WW18, were installed in August 2019 to determine the extent of the downgradient plume and were sampled for the third time during the Year 8 RA-O. Performed RA-O for ongoing MNA/LUC remedy.

1. What is your overall impression of the project? (general sentiment)

LHAAP-001-R-001: LUCs are appropriate and able to be implemented easily.

LHAAP-003-R-01: LUCs are appropriate and able to be implemented easily.

LHAAP-004-R-01: No site knowledge

LHAAP-03: Site work complete.

LHAAP-04: Site has not had perchlorate above the PCLs in over 2 years. Closure of the site is expected in the coming years following the geochemistry's return to natural conditions**.**

LHAAP-12: The presence of daughter product cis 1,2 DCE indicates that reductive dechlorination is also occurring. The degradation rate analysis for the entire data set estimates that TCE may decrease to below the MCL at LHAAP-12 within six months.

LHAAP-16: CSM improvements/evaluation recommended followed by enhancement of the current remedy.

LHAAP-17: Site currently on hold for removal of additional MEC. However, extraction system for the perchlorate in groundwater is performing as designed.

LHAAP-18/24: IROD continues to function as designed. Site is advancing towards a final remedy.

LHAAP-37: The evaluation of MNA at LHAAP-35B (37) indicates that, based on the data collected thus far, decreases observed in COCs are occurring and are primarily due to abiotic MNA processes, including dispersion, dilution, sorption, and volatilization.

LHAAP-46: MNA with LUCs is still considered an appropriate remedy at this time. Downgradient migration may be occurring and additional delineation may be needed.

LHAAP-49: No site knowledge; not in the PBR

LHAAP-50: Additional injections and investigation recommended.

LHAAP-58: Additional injections to treat mass recommended.

LHAAP-67: The evaluation of MNA at LHAAP-67 indicates decreasing concentrations in most wells in the upgradient part of the plume may have some limited biological degradation, but the primary pathways for reductions are abiotic processes, including dispersion, dilution, sorption, and volatilization.

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Site Name: Former Longhorn Army Ammunition Plant	**EPA ID No.:** TX6213820529

2. Is the remedy functioning as expected? How well is the remedy performing?

LHAAP-001-R-001: Functioning as designed. Remedy is performing as designed.

LHAAP-003-R-01: Functioning as designed. Remedy is performing as designed.

LHAAP-004-R-01: No knowledge.

LHAAP-03: Remedy is complete.

LHAAP-04: Functioning as designed.

LHAAP-12: Functioning as designed.

LHAAP-16: Functioning as designed. However, additional optimizations will be needed

LHAAP-17: Functioning as designed. However, full remedy has not been implemented due to encountering MEC.

LHAAP-18/24: Functioning as designed.

LHAAP-37: Functioning as designed. MNA remedy is appropriate.

LHAAP-46: Functioning as designed.

LHAAP-49: No site knowledge; not in the PBR

LHAAP-50: Based on the second year of RA-O data post injections, the ISB remedy is not meeting the performance criteria at 50WW12 as outlined in the Contingency Remedy RD/RAWP. Additional investigation may be needed in the vicinity of 50WW12 to understand the source of increasing TCE and perchlorate concentrations. Future remedial alternatives should also consider the possibility that the high perchlorate concentrations may be inhibiting the biological degradation of the chlorinated COCs in the vicinity of 50WW12.

LHAAP-58: Functioning as designed. However, TCEQ and EPA have requested additional wells in support fo further plume delineation and monitoring.

LHAAP-67: Functioning as designed.

3. What does the monitoring data show? Are there any trends that show contaminant levels are decreasing? Please review the most recent RA-O Reports for more detail on individual sites.

4. Is there a continuous on-site operations and maintenance (O&M) presence? If so, please describe staff and activities. If there is not a continuous on-site presence, describe staff and frequency of site inspections and activities.

Bhate has two full-time staff at the LHAAP GWTP to complete O&M, LUC inspections, groundwater sampling, water level measurements, repairs and maintenance of the GWTP,signage and wells.

5. Have there been any significant changes in the O&M requirements, maintenance schedules, or sampling routines since start-up or in the last five years? If so, do they affect the protectiveness or effectiveness of the remedy? Please describe changes and impacts.

A final remedy was implemented at LHAAP-16 such that groundwater was no longer being extracted and discharged to the GWTP. However, a new extraction system was installed at

INTERVIEW RECORD	
Site Name: Former Longhorn Army Ammunition Plant	**EPA ID No.:** TX6213820529

LHAAP-17 in August 2022 that does now discharge to the GWTP.

Improvements to the GWTP in the past 5 years have included new IX vessels, PLC system (including radio controls at LHAAP-17), installation of two new compressors, and replacement of the FBR nossels and piping. Major repairs included repairs to the laeral extraction piping for the ICTs, acid washing the air stripper media, replace of the sand in the sand filter and backwashing of the carbon vessels.

6. Have there been unexpected O&M difficulties or costs at the site since start-up or in the last five years? If so, please give details.

Given that the GWTP is over 20 years old, O&M is always difficult and expensive. Repairs of the system is constant as is refurbishment of the extraction pumps. The quarterly GWTP Reports should be reviewed. Implementation of the soil excavation portion of the LHAAP-17 remedy has been inhibited by the discovery of MEC at the site.

7. Have there been opportunities to optimize O&M, or sampling efforts? Please describe changes and resultant or desired cost savings or improved efficiency.

The GAC vessels are backups to the air stripper and are planned for replacement since backwashing has not resulted in desired results. The CSM for LHAAP-16 requires updating to optimize the remedy and eventually the groundwater monitoring program.

8. Do you have any comments, suggestions, or recommendations regarding the project?

INTERVIEW RECORD

Site Name: Former Longhorn Army Ammunition Plant		**EPA ID No.:** TX6213820529
Subject: Fifth Five-Year Review for Former Longhorn Army Ammunition Plant	**Time:**	**Date: 3/20/23**
Type: ☐ Telephone ☐ Visit ☒ Other (email) **Location of Interview: N/A**		☐ Incoming ☐ Outgoing

Contact Made By:

Name:	**Title:**	**Organization:**

Individual Contacted:

Name: [redacted]	**Title: Project Manager**	**Organization: T C E Q**
Telephone No: [redacted] **Fax No: N/A** **E-Mail Address:** [redacted]	**Street Address:** [redacted] **City, State, Zip:** [redacted]	

Summary Of Conversation

1. What is your overall impression of the project? (general sentiment)

   The Army and current contractors are doing a good job with site assessment, remedy implementation, and remedial action operation activities.

2. Are you aware of any environmental issues the Five-Year Review should consider?
   No issues other than those noted in question 3.

3. Are the remedies functioning as expected?

   LHAAP-001-R-001 Site 27; South Test Area/Bomb Test Area - Yes

   LHAAP-003-R-01 Ground Signal Test Area - Yes

   LHAAP-004-R-01 Former Pistol Range – Yes

   LHAAP-03 Former Waste Collection Pad Building 722-P Paint Shop - Yes

   LHAAP-04 Former Pilot Wastewater Treatment Plant - Yes

   LHAAP-12 Sanitary Fill Area - Yes

   LHAAP-16 Landfill – Generally functioning as expected. As noted in the most recent report, some areas of the remedy are not effectively reducing or capturing the groundwater plume from the landfill. The Bayou Barrier is not adequately treating the groundwater flowing to the east-southeast from the mid-plume treatment area, and a southward extension of the biobarrier may be necessary. Additional intermediate wells are also needed to delineate the groundwater plume on the east side of Harrison Bayou. Contingency remedies may be necessary where the remedy is not effective, as indicated by limited evidence of degradation or increasing statistical trends.

   LHAAP-17 Burning Ground No. 2 Flashing Area, Group 2 Groundwater - Yes. The Army and their contractors dealt with the unexpected MEC during remedy implementation efficiently and professionally.

   LHAAP-18/24 Burning Ground No. 3 and Unlined Evaporation Pond - Generally functioning as expected. The interim remedy (GWTP) effectively captures the groundwater plume for most of the site but there are areas outside of the capture zone. The final remedy is intended to address those areas as part of the remedial action. The aging GWTP has been maintained and repaired

	during this five-year period. LHAAP-35B(37) Chemical Laboratory - Yes LHAAP-46 Plant 2 Area, Group 4 - Yes LHAAP-49 Former Acid Storage Area – No action decision, Yes LHAAP-50 Former Waste Tank, Group 4 - Generally functioning as expected. As noted in the most recent report, the remedy is not meeting the performance criteria at 50WW12 and concentrations are increasing at upgradient well 50WW08. Additional investigation and remedy modification may be necessary. LHAAP-35A(58) Shops Area, Group 4 – Generally functioning as expected. As noted in the most recent report, additional injections may be necessary to optimize the remedy. LHAAP-67 Above Ground Storage Tank Farm - Yes
4.	Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please give purpose and results of the responses. Yes, site visits, quarterly meetings, and monthly meetings.
5.	Have there been any complaints, violations, or other incidents related to the site requiring a response by your office? If so, please give details of the events and results of the responses. No.
6.	What effects have site operations had on the surrounding community? Generally positive effects. The community supports the refuge. As sites achieve remedy in place property and surface water rights are transferred to the USFWS.
7.	Do you feel well informed about the site's activities and progress? Yes, well informed through monthly meetings and regular email outreach.
8.	Do you have any comments, suggestions, or recommendations regarding the site's management or operation? No.

INTERVIEW RECORD

Site Name: Former Longhorn Army Ammunition Plant		**EPA ID No.:** TX6213820529
Subject: Fifth Five-Year Review for Former Longhorn Army Ammunition Plant	**Time:**	**Date:**
Type: ☐ Telephone ☐ Visit ☒ Other (email) **Location of Interview:**		☐ Incoming ☐ Outgoing

Contact Made By:		
Name:	**Title:**	**Organization:**
Individual Contacted:		
Name: [redacted]	**Title: RPM**	**Organization: U S E P A**

Telephone No: **Fax No:** **E-Mail Address:**	**Street Address:** **City, State, Zip:**

Summary Of Conversation

1. What is your overall impression of the project? (general sentiment)

Overall the site is making good progress towards cleanup and reuse.

2. Are you aware of any environmental issues the Five-Year Review should consider? **The FYR should consider the ongoing monitoring of MNA effectiveness at the different OUS.**

3. Are the remedies functioning as expected?

LHAAP-001-R-001 Site 27; South Test Area/Bomb Test Area – **Yes LUCs are in place and functioning**

LHAAP-003-R-01 Ground Signal Test Area - **Yes LUCs are in place and functioning**

LHAAP-004-R-01 Former Pistol Range - **Yes LUCs are in place and functioning, however there is some concern over the lead levels as the regulatory levels are changing.**

LHAAP-03 Former Waste Collection Pad Building 722-P Paint Shop - **Yes**

LHAAP-04 Former Pilot Wastewater Treatment Plant - **Yes**

LHAAP-12 Sanitary Fill Area - **Yes**

LHAAP-16 Landfill **– No. There are multiple questions about the migration of contamination at the landfill. The flow of contaminated GW across the creek bring into question the plume stability and the data gaps in the site model. Additionally there is question about source. If the landfill is properly maintained then is there a secondary source of contamination that is not accounted for**.

LHAAP-17 Burning Ground No. 2 Flashing Area, Group 2 Groundwater – **The interim actions are functioning until the MEC removal is complete and RA can be completed.**

LHAAP-18/24 Burning Ground No. 3 and Unlined Evaporation Pond – **GW pumping is functioning as expected until the RD/RA can be completed. There is some concern about the health of the groundwater treatment plant.**

LHAAP-35B(37) Chemical Laboratory – **Continued monitoiring will determine remedy effectiveness.**

LHAAP-46 Plant 2 Area, Group 4 – **Continued monitoiring will determine remedy**

	effectiveness. LHAAP-49 Former Acid Storage Area - **Yes LUCs are in place and functioning** LHAAP-50 Former Waste Tank, Group 4 **– Continued moniroiting of MNA effectiveness is advised.** LHAAP-35A(58) Shops Area, Group 4 – **New monitoring wells will be placed to define the extent of the plume and ensure there is no migration of the contaminated groundwater. This will be beneficial in determining the effectiveness of MNA at the OU.** LHAAP-67 Above Ground Storage Tank Farm – **MNA should continued to be monitored at the OU.**
4.	Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please give purpose and results of the responses. **Communication between all entities has been very effective. Meetings, site activities, community meetings, and other events are planned well in advance and provide plenty of detail.**
5.	Have there been any complaints, violations, or other incidents related to the site requiring a response by your office? If so, please give details of the events and results of the responses. **Not to my knowledge**
6.	What effects have site operations had on the surrounding community? **The site operations do not appear to impact the surrounding community in a negative manner. The community is made aaware of all ongoing work and transfer of property to USFWS has had a positive effect on the community.**
7.	Do you feel well informed about the site's activities and progress? **I feel well informed about all site activites**
8.	Do you have any comments, suggestions, or recommendations regarding the site's management or operation? **None**

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DATA TABLES

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Table 3-1
November 2018 Soil Sample Analytical Results, LHAAP-03

			Location Code	03SB18		03SB19						03SB20					
			Sample ID	03SB18-0.0-2.0		03SB19-0.0-2.0		03SB19-3.0-4.0		03SB19-6.0-7.0		03SB20-0.0-2.0		03SB20-0.0-2.0-FD		03SB20-3.0-4.0	
			Sample Date	11/29/2018		11/29/2018		11/29/2018		11/29/2018		11/29/2018		11/29/2018		11/29/2018	
			Sample Interval Depth (ft bgs)	0 - 2		0 - 2		3 - 4		6 - 7		0 - 2		0 - 2		3 - 4	
			Sample Purpose	REG		REG		REG		REG		REG		FD		REG	
Parameter		Units	RRS3 MSCs	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
METALS																	
Arsenic		mg/kg	5.9	1.56		2.63		1.14		2.99		1.54		4.05		3.9	
Lead		mg/kg	180	6.15		9.52		7.89		5.71		8.26		11.3		16.3	

Notes:
FD - field duplicate
ft bgs - feet below ground surface
ID - identification
J - estimated value
mg/kg - milligrams per kilogram
RRS3 MSCs - Risk Reduction Standard 3 Medium-Specific Concentrations
REG - regular sample
Val Qual - validation qualifier

Table 3-1
November 2018 Soil Sample Analytical Results, LHAAP-03

			Location Code	03SB21				03SB22								03SB23			
			Sample ID	03SB21-0.0-2.0		03SB21-3.0-4.0		03SB22-0.0-2.0		03SB22-3.0-4.0		03SB22-3.0-4.0-FD		03SB22-6.0-7.0		03SB23-0.0-2.0		03SB23-3.0-4.0	
			Sample Date	11/29/2018		11/29/2018		11/29/2018		11/29/2018		11/29/2018		11/29/2018		11/29/2018		11/29/2018	
			Sample Interval Depth (ft bgs)	0 - 2		3 - 4		0 - 2		3 - 4		3 - 4		6 - 7		0 - 2		3 - 4	
			Sample Purpose	REG		REG		REG		REG		FD		REG		REG		REG	
Parameter	Units	RRS3 MSCs		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
METALS																			
Arsenic	mg/kg	5.9		1.74	J	0.974		1.79		4.61		0.709		2.63		1.93		4.16	
Lead	mg/kg	180		10.2		4.97		9.07		8.66		6.26		7.62		12.3		7.12	

Notes:
FD - field duplicate
ft bgs - feet below ground surface
ID - identification
J - estimated value
mg/kg - milligrams per kilogram
RRS3 MSCs - Risk Reduction Standard 3 Medium-Specific Concentrations
REG - regular sample
Val Qual - validation qualifier

Table 3-1
November 2018 Soil Sample Analytical Results, LHAAP-03

			Location Code	03SB24		03SB25		03SB26							
			Sample ID	03SB24-0.0-2.0		03SB25-0.0-2.0		03SB26-0.0-2.0		03SB26-0.0-2.0-FD		03SB26-3.0-4.0		03SB26-6.0-7.0	
			Sample Date	11/29/2018		11/29/2018		11/29/2018		11/29/2018		11/29/2018		11/29/2018	
			Sample Interval Depth (ft bgs)	0 - 2		0 - 2		0 - 2		0 - 2		3 - 4		6 - 7	
			Sample Purpose	REG		REG		REG		FD		REG		REG	
Parameter	Units	RRS3 MSCs		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
METALS															
Arsenic	mg/kg	5.9		1.66		1.42		5.83		1.92		0.74		2.94	
Lead	mg/kg	180		14.3		8.02		8.6		8.38		4.14		6.96	

Notes:
FD - field duplicate
ft bgs - feet below ground surface
ID - identification
J - estimated value
mg/kg - milligrams per kilogram
RRS3 MSCs - Risk Reduction Standard 3 Medium-Specific Concentrations
REG - regular sample
Val Qual - validation qualifier

Table 3-1
November 2018 Soil Sample Analytical Results, LHAAP-03

			Location Code	03SB27								03SB28					
			Sample ID	03SB27-0.0-2.0		03SB27-3.0-4.0		03SB27-6.0-7.0		03SB27-8.0-9.0		03SB28-0.0-2.0		03SB28-3.0-4.0		03SB28-6.0-7.0	
			Sample Date	11/29/2018		11/29/2018		11/29/2018		11/29/2018		11/29/2018		11/29/2018		11/29/2018	
			Sample Interval Depth (ft bgs)	0 - 2		3 - 4		6 - 7		8 - 9		0 - 2		3 - 4		6 - 7	
			Sample Purpose	REG		REG		REG		REG		REG		REG		REG	
Parameter		Units	RRS3 MSCs	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
METALS																	
Arsenic		mg/kg	5.9	1.41		2.84		5.02		2.33		1.59		0.565		1.6	
Lead		mg/kg	180	8.66		7.36		7.29		4.67		8.27		5.29		5.96	

Notes:
FD - field duplicate
ft bgs - feet below ground surface
ID - identification
J - estimated value
mg/kg - milligrams per kilogram
RRS3 MSCs - Risk Reduction Standard 3 Medium-Specific Concentrations
REG - regular sample
Val Qual - validation qualifier

Table 2-2
Groundwater Elevation Data

Monitoring Well	Date	Ground Surface Elevation (ft MSL)	Top of Casing Elevation (ft MSL)	Top of Screen (ft BTOC)	Bottom of Screen (ft BTOC)	Constructed Well Depth (ft BTOC)	Measured Well Depth (ft BTOC)	Depth to Water (ft BTOC)	Groundwater Elevation (ft MSL)	Screened Interval Siltation [a] (%)
04WW01	2/4/2020	208.78	212.51	16.73	26.73	26.73	27.23	8.43	204.08	None
	5/4/2020	208.78	212.51	16.73	26.73	26.73	27.23	6.25	206.26	None
	8/10/2020	208.78	212.51	16.73	26.73	26.73	27.22	9.50	203.01	None
	11/4/2020	208.78	212.51	16.73	26.73	26.73	27.22	10.10	202.41	None
	3/10/2021	208.78	212.51	16.73	26.73	26.73	27.21	7.10	205.41	None
	5/24/2021	208.78	212.51	16.73	26.73	26.73	27.22	6.63	205.88	None
	8/4/2021	208.78	212.51	16.73	26.73	26.73	27.22	8.98	203.53	None
	11/4/2021	208.78	212.51	16.73	26.73	26.73	27.21	11.77	200.74	None
04WW02	2/3/2020	212.80	216.7	16.9	26.9	26.9	26.70	5.95	210.75	2
	5/4/2020	212.80	216.7	16.9	26.9	26.9	26.70	9.35	207.35	2
	8/10/2020	212.80	216.7	16.9	26.9	26.9	26.70	8.31	208.39	2
	11/4/2020	212.80	216.7	16.9	26.9	26.9	26.67	7.82	208.88	2.3
	3/10/2021	212.80	216.7	16.9	26.9	26.9	26.68	6.31	210.39	2.2
	5/24/2021	212.80	216.7	16.9	26.9	26.9	26.66	5.92	210.78	2.4
	8/4/2021	212.80	216.7	16.9	26.9	26.9	26.70	7.52	209.18	2
	11/4/2021	212.80	216.7	16.9	26.9	26.9	26.63	10.27	206.43	2.7
04WW04	2/3/2020	211.3	214.1	10.8	20.8	20.8	21.55	4.11	209.99	None
	5/4/2020	211.3	214.1	10.8	20.8	20.8	21.55	4.95	209.15	None
	8/10/2020	211.3	214.1	10.8	20.8	20.8	21.57	7.12	206.98	None
	11/4/2020	211.3	214.1	10.8	20.8	20.8	21.55	7.05	207.05	None
	3/10/2021	211.3	214.1	10.8	20.8	20.8	21.42	4.93	209.17	None
	5/24/2021	211.3	214.1	10.8	20.8	20.8	21.55	4.15	209.95	None
	8/4/2021	211.3	214.1	10.8	20.8	20.8	21.56	6.65	207.45	None
	11/4/2021	211.3	214.1	10.8	20.8	20.8	21.40	8.73	205.37	None
04WW05	2/4/2020	211	213.7	18.7	28.7	28.7	29.61	7.25	206.45	None
	5/5/2020	211	213.7	18.7	28.7	28.7	29.62	6.55	207.15	None
	8/11/2020	211	213.7	18.7	28.7	28.7	29.62	8.95	204.75	None
	11/4/2020	211	213.7	18.7	28.7	28.7	29.57	9.66	204.04	None
	3/11/2021	211	213.7	18.7	28.7	28.7	29.62	6.41	207.29	None

Table 2-2
Groundwater Elevation Data

Monitoring Well	Date	Ground Surface Elevation (ft MSL)	Top of Casing Elevation (ft MSL)	Top of Screen (ft BTOC)	Bottom of Screen (ft BTOC)	Constructed Well Depth (ft BTOC)	Measured Well Depth (ft BTOC)	Depth to Water (ft BTOC)	Groundwater Elevation (ft MSL)	Screened Interval Siltation [a] (%)
04WW05	5/25/2021	211	213.7	18.7	28.7	28.7	29.60	6.12	207.58	None
	8/5/2021	211	213.7	18.7	28.7	28.7	29.61	8.15	205.55	None
	11/9/2021	211	213.7	18.7	28.7	28.7	29.60	11.05	202.65	None
04WW06	2/3/2020	212.52	215.63	18.11	28.11	28.11	28.07	4.97	210.66	0.4
	5/4/2020	212.52	215.63	18.11	28.11	28.11	28.11	5.34	210.29	None
	8/10/2020	212.52	215.63	18.11	28.11	28.11	28.08	7.96	207.67	0.3
	11/4/2020	212.52	215.63	18.11	28.11	28.11	28.05	7.84	207.79	0.6
	3/10/2021	212.52	215.63	18.11	28.11	28.11	28.06	5.03	210.60	0.5
	5/24/2021	212.52	215.63	18.11	28.11	28.11	28.07	4.60	211.03	0.4
	8/4/2021	212.52	215.63	18.11	28.11	28.11	28.08	7.08	208.55	0.3
	11/4/2021	212.52	215.63	18.11	28.11	28.11	28.05	10.87	204.76	0.6
04WW07	2/4/2020	211.66	214.64	12.98	22.98	22.98	22.61	5.27	209.37	3.7
	5/5/2020	211.66	214.64	12.98	22.98	22.98	22.98	6.30	208.34	None
	8/11/2020	211.66	214.64	12.98	22.98	22.98	22.63	8.41	206.23	3.5
	11/4/2020	211.66	214.64	12.98	22.98	22.98	22.63	8.39	206.25	3.5
	3/11/2021	211.66	214.64	12.98	22.98	22.98	22.60	6.20	208.44	3.8
	5/25/2021	211.66	214.64	12.98	22.98	22.98	22.25	5.52	209.12	7.3
	8/5/2021	211.66	214.64	12.98	22.98	22.98	22.28	7.82	206.82	7
	11/9/2021	211.66	214.64	12.98	22.98	22.98	22.61	10.53	204.11	3.7
04WW08	2/3/2020	212.07	214.82	33.75	43.75	43.75	43.82	15.92	198.90	None
	5/4/2020	212.07	214.82	33.75	43.75	43.75	43.90	16.23	198.59	None
	8/10/2020	212.07	214.82	33.75	43.75	43.75	43.93	16.79	198.03	None
	11/4/2020	212.07	214.82	33.75	43.75	43.75	43.65	16.63	198.19	1
	3/10/2021	212.07	214.82	33.75	43.75	43.75	43.65	16.33	198.49	1
	5/24/2021	212.07	214.82	33.75	43.75	43.75	43.63	16.90	197.92	1.2
	8/4/2021	212.07	214.82	33.75	43.75	43.75	43.65	17.37	197.45	1
	11/4/2021	212.07	214.82	33.75	43.75	43.75	43.81	18.22	196.60	None

Table 2-2
Groundwater Elevation Data

Monitoring Well	Date	Ground Surface Elevation (ft MSL)	Top of Casing Elevation (ft MSL)	Top of Screen (ft BTOC)	Bottom of Screen (ft BTOC)	Constructed Well Depth (ft BTOC)	Measured Well Depth (ft BTOC)	Depth to Water (ft BTOC)	Groundwater Elevation (ft MSL)	Screened Interval Siltation [a] (%)
04WW09	2/4/2020	211.47	214.61	13.14	23.14	23.14	23.45	5.62	208.99	None
	5/5/2020	211.47	214.61	13.14	23.14	23.14	23.47	4.43	210.18	None
	8/11/2020	211.47	214.61	13.14	23.14	23.14	23.48	5.81	208.80	None
	11/4/2020	211.47	214.61	13.14	23.14	23.14	23.47	7.95	206.66	None
	3/11/2021	211.47	214.61	13.14	23.14	23.14	23.45	5.43	209.18	None
	5/25/2021	211.47	214.61	13.14	23.14	23.14	23.49	4.87	209.74	None
	8/5/2021	211.47	214.61	13.14	23.14	23.14	23.45	7.50	207.11	None
	11/9/2021	211.47	214.61	13.14	23.14	23.14	23.45	9.68	204.93	None
04WW10	2/4/2020	210.40	213.67	12.27	22.27	22.27	22.52	6.91	206.76	None
	5/5/2020	210.40	213.67	12.27	22.27	22.27	22.53	6.65	207.02	None
	8/11/2020	210.40	213.67	12.27	22.27	22.27	22.55	8.20	205.47	None
	11/4/2020	210.40	213.67	12.27	22.27	22.27	22.52	7.72	205.95	None
	3/11/2021	210.40	213.67	12.27	22.27	22.27	22.54	6.35	207.32	None
	5/25/2021	210.40	213.67	12.27	22.27	22.27	22.55	6.09	207.58	None
	8/5/2021	210.40	213.67	12.27	22.27	22.27	22.53	7.66	206.01	None
	11/9/2021	210.40	213.67	12.27	22.27	22.27	22.52	9.53	204.14	None
04WW11	2/4/2020	209.31	212.01	8.2	18.2	18.2	18.50	5.40	206.61	None
	5/4/2020	209.31	212.01	8.2	18.2	18.2	18.45	5.29	206.72	None
	8/10/2020	209.31	212.01	8.2	18.2	18.2	18.55	8.75	203.26	None
	11/4/2020	209.31	212.01	8.2	18.2	18.2	18.49	9.32	202.69	None
	3/10/2021	209.31	212.01	8.2	18.2	18.2	18.44	4.77	207.24	None
	5/24/2021	209.31	212.01	8.2	18.2	18.2	18.50	4.45	207.56	None
	8/4/2021	209.31	212.01	8.2	18.2	18.2	18.51	8.10	203.91	None
	11/4/2021	209.31	212.01	8.2	18.2	18.2	18.47	10.18	201.83	None
LHSMW01	2/3/2020	211.19	214.43	7.74	17.74	18.24	17.95	3.90	210.53	None
	5/4/2020	211.19	214.43	7.74	17.74	18.24	17.95	4.86	209.57	None
	8/10/2020	211.19	214.43	7.74	17.74	18.24	17.90	7.71	206.72	None
	11/4/2020	211.19	214.43	7.74	17.74	18.24	17.95	7.32	207.11	None
	3/10/2021	211.19	214.43	7.74	17.74	18.24	17.95	4.25	210.18	None

Table 2-2
Groundwater Elevation Data

Monitoring Well	Date	Ground Surface Elevation (ft MSL)	Top of Casing Elevation (ft MSL)	Top of Screen (ft BTOC)	Bottom of Screen (ft BTOC)	Constructed Well Depth (ft BTOC)	Measured Well Depth (ft BTOC)	Depth to Water (ft BTOC)	Groundwater Elevation (ft MSL)	Screened Interval Siltation [a] (%)
LHSMW01	5/24/2021	211.19	214.43	7.74	17.74	18.24	17.95	4.11	210.32	None
	8/4/2021	211.19	214.43	7.74	17.74	18.24	17.95	10.52	203.91	None
	11/4/2021	211.19	214.43	7.74	17.74	18.24	17.90	9.20	205.23	None
LHSMW02	2/3/2020	213.75	215.43	7.18	17.18	17.68	19.00	13.53	201.90	None
	5/4/2020	213.75	215.43	7.18	17.18	17.68	18.98	8.64	206.79	None
	8/10/2020	213.75	215.43	7.18	17.18	17.68	19.00	12.00	203.43	None
	11/4/2020	213.75	215.43	7.18	17.18	17.68	19.10	13.90	201.53	None
	3/10/2021	213.75	215.43	7.18	17.18	17.68	19.04	7.66	207.77	None
	5/24/2021	213.75	215.43	7.18	17.18	17.68	19.03	6.34	209.09	None
	8/4/2021	213.75	215.43	7.18	17.18	17.68	19.06	10.85	204.58	None
	11/4/2021	213.75	215.43	7.18	17.18	17.68	19.05	14.90	200.53	None

Notes:

[a] The percent siltation of the screened interval is calculated as the length of silted screened interval divided by the total screened interval length, times 100. Wells will be redeveloped if the siltation reaches or exceeds 10%.

ft MSL - feet above mean sea level

ft BTOC - feet below top of casing

% - percent

Table 1
2019 to 2022 LHAAP-04 Groundwater Analytical Results

Location			04WW01													
Sample Identification			04WW01-190122 [a]		04WW01-200204		04WW01-200504		04WW01-200810		04WW01-201104		04WW01-210310		04WW01-210524	
Sample Date			1/22/2019		2/4/2020		5/4/2020		8/10/2020		11/4/2020		3/10/2021		5/24/2021	
Location Description			Shallow Zone, Downgradient of Plume													
Parameter	Units	PCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Field Parameters																
Dissolved Oxygen	mg/L	NV	0.15		0.03		0.04		0.05		0.03		0.02		0.03	
Ferrous Iron	NA	NV	NM		NM		NM		NM		NM		NM		NM	
Oxidation-Reduction Potential	mV	NV	327		-52		-135		-191		-115		-219		-152	
General Chemistry																
Alkalinity	mg/L	NV	NA		NA		NA		NA		NA		NA		NA	
Nitrate	mg/L	NV	NA		NA		NA		NA		NA		NA		NA	
Nitrite	mg/L	NV	NA		NA		NA		NA		NA		NA		NA	
Sulfate	mg/L	NV	NA		NA		NA		NA		NA		NA		NA	
Total Organic Carbon	mg/L	NV	NA		NA		NA		NA		NA		NA		NA	
Perchlorate																
Perchlorate	µg/L	17	< 2	U	19		< 0.05	U	0.561	J	0.246	J	< 0.05	U	< 0.05	U

Notes:

Perchlorate concentrations highlighted in blue exceed the PCL.

[a] Emulsified vegetable oil was present in monitoring wells 04WW01, 04WW07, 04WW09, and 04WW10 when baseline sampling was attempted in November 2019 and samples were not collected. The January 2019 sample results will be used as the baseline at these locations. Samples collected in January 2019 were only analyzed for perchlorate.

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

J+ - The analyte was positively identified; the associated numerical value is its approximate concentration with a high bias in the sample.

U - Undetected: The analyte was analyzed for, but not detected.

PCL – Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level.

µg/L - micrograms per liter

mg/L - milligrams per liter

mV - millivolt

NA - not analyzed

NM - not measured

NV - No value, PCL values are only shown for constituents of concern.

Std. Units - standard pH units

Val Qual - validation qualifier

Table 1
2019 to 2022 LHAAP-04 Groundwater Analytical Results

Location			04WW01						04WW02							
Sample Identification			04WW01-210804		04WW01-211104		04WW01-220201		04WW02-191105		04WW02-200203		04WW02-200504		04WW02-200810	
Sample Date			8/4/2021		11/4/2021		2/1/2022		11/5/2019		2/3/2020		5/4/2020		8/10/2020	
Location Description			Shallow Zone, Downgradient of Plume						Shallow Zone, Upgradient of Plume							
Parameter	Units	PCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Field Parameters																
Dissolved Oxygen	mg/L	NV	0.41		0.38		0.65		1.44		0.02		0.04		0.09	
Ferrous Iron	NA	NV	NM		NM		NM		NM		NM		NM		NM	
Oxidation-Reduction Potential	mV	NV	-110		-50		52		221		23		76		67	
General Chemistry																
Alkalinity	mg/L	NV	NA		NA		NA		NA		NA		NA		NA	
Nitrate	mg/L	NV	NA		NA		NA		NA		NA		NA		NA	
Nitrite	mg/L	NV	NA		NA		NA		NA		NA		NA		NA	
Sulfate	mg/L	NV	NA		NA				NA		NA		NA		NA	
Total Organic Carbon	mg/L	NV	NA		NA		NA		NA		NA		NA		NA	
Perchlorate																
Perchlorate	µg/L	17	< 0.5	U	< 0.2	U	< 0.2	U	< 2	U	< 2	U	< 0.05	U	0.0477	J

Notes:

Perchlorate concentrations highlighted in blue exceed the PCL.

[a] Emulsified vegetable oil was present in monitoring wells 04WW01, 04WW07, 04WW09, and 04WW10 when baseline sampling was attempted in November 2019 and samples were not collected. The January 2019 sample results will be used as the baseline at these locations. Samples collected in January 2019 were only analyzed for perchlorate.

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µg/L - micrograms per liter

mg/L - milligrams per liter

mV - millivolt

NA - not analyzed

NM - not measured

NV - No value, PCL values are only shown for constituents of concern.

Std. Units - standard pH units

Val Qual - validation qualifier

Table 1
2019 to 2022 LHAAP-04 Groundwater Analytical Results

			Location	04WW02										04WW04	
			Sample Identification	04WW02-201104		04WW02-210310		04WW02-210524		04WW02-210804		04WW02-211104		04WW02-220201		04WW04-191106	
			Sample Date	11/4/2020		3/10/2021		5/24/2021		8/4/2021		11/4/2021		2/1/2022		11/6/2019	
			Location Description	Shallow Zone, Upgradient of Plume												Shallow Zone, Within Plume Area	
Parameter	Units	PCL		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Field Parameters																	
Dissolved Oxygen	mg/L	NV		0.57		0.03		0.1		0.93		1.22		0.66		0.06	
Ferrous Iron	NA	NV		NM		NM		NM		NM		NM		NM		NM	
Oxidation-Reduction Potential	mV	NV		60		-6		32		90		39		118		-43	
General Chemistry																	
Alkalinity	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Nitrate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Nitrite	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Sulfate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Total Organic Carbon	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Perchlorate																	
Perchlorate	µg/L	17		0.0693	J	< 0.05	U	0.54		< 0.25	U	< 0.2	U	< 0.2	U	< 2	U

Notes:

Perchlorate concentrations highlighted in blue exceed the PCL.

[a] Emulsified vegetable oil was present in monitoring wells 04WW01, 04WW07, 04WW09, and 04WW10 when baseline sampling was attempted in November 2019 and samples were not collected. The January 2019 sample results will be used as the baseline at these locations. Samples collected in January 2019 were only analyzed for perchlorate.

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PCL – Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level.

µg/L - micrograms per liter

mg/L - milligrams per liter

mV - millivolt

NA - not analyzed

NM - not measured

NV - No value, PCL values are only shown for constituents of concern.

Std. Units - standard pH units

Val Qual - validation qualifier

Table 1
2019 to 2022 LHAAP-04 Groundwater Analytical Results

Location			04WW04													
Sample Identification			04WW04-200203		04WW04-200504		04WW04-200810		04WW04-201104		04WW04-210310		04WW04-210524		04WW04-210804	
Sample Date			2/3/2020		5/4/2020		8/10/2020		11/4/2020		3/10/2021		5/24/2021		8/4/2021	
Location Description			Shallow Zone, Within Plume Area													
Parameter	Units	PCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Field Parameters																
Dissolved Oxygen	mg/L	NV	0.06		1.5		0.05		0.45		0.08		0.44		0.45	
Ferrous Iron	NA	NV	NM		NM		NM		NM		NM		NM		NM	
Oxidation-Reduction Potential	mV	NV	-26		-111		-45		127		-88		-44		18	
General Chemistry																
Alkalinity	mg/L	NV	NA		NA		NA		NA		NA		NA		NA	
Nitrate	mg/L	NV	NA		NA		NA		NA		NA		NA		NA	
Nitrite	mg/L	NV	NA		NA		NA		NA		NA		NA		NA	
Sulfate	mg/L	NV	NA		NA		NA		NA		NA		NA		NA	
Total Organic Carbon	mg/L	NV	NA		NA		NA		NA		NA		NA		NA	
Perchlorate																
Perchlorate	µg/L	17	< 2	U	< 0.05	U	< 0.1	U	0.158		0.139		< 0.05	U	< 0.25	U

Notes:

Perchlorate concentrations highlighted in blue exceed the PCL.

[a] Emulsified vegetable oil was present in monitoring wells 04WW01, 04WW07, 04WW09, and 04WW10 when baseline sampling was attempted in November 2019 and samples were not collected. The January 2019 sample results will be used as the baseline at these locations. Samples collected in January 2019 were only analyzed for perchlorate.

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PCL – Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level.

µg/L - micrograms per liter

mg/L - milligrams per liter

mV - millivolt

NA - not analyzed

NM - not measured

NV - No value, PCL values are only shown for constituents of concern.

Std. Units - standard pH units

Val Qual - validation qualifier

Table 1
2019 to 2022 LHAAP-04 Groundwater Analytical Results

	Location		04WW04				04WW05									
	Sample Identification		04WW04-211104		04WW04-220201		04WW05-191106		04WW05-200204		04WW05-200505		04WW05-200811		04WW05-201105	
	Sample Date		11/4/2021		2/1/2022		11/6/2019		2/4/2020		5/5/2020		8/11/2020		11/5/2020	
	Location Description		Shallow Zone, Within Plume Area				Shallow Zone, Within Plume Area									
Parameter	Units	PCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Field Parameters																
Dissolved Oxygen	mg/L	NV	0.48		0.49		0.18		0.09		0.22		0.14		0.15	
Ferrous Iron	NA	NV	NM		NM		0.31		0.63		2.55		0.73		3.3	
Oxidation-Reduction Potential	mV	NV	25		151		-36		-88		-90		-66		-36	
General Chemistry																
Alkalinity	mg/L	NV	NA		NA		438		535		448		542		605	
Nitrate	mg/L	NV	NA		NA				0.0475	J	< 0.1	U	< 0.1	U	< 0.1	U
Nitrite	mg/L	NV	NA		NA				< 0.1	U	< 0.1	U	< 0.1	U	< 0.1	U
Sulfate	mg/L	NV	NA		NA		72.8		41.1		61.5		85.8		117	
Total Organic Carbon	mg/L	NV	NA		NA		20		3.97		2.64		2.31		1.93	
Perchlorate																
Perchlorate	µg/L	17	< 0.2	U	0.055	J	< 2	U	< 2	U	< 0.05	U	0.399	J	< 0.05	U

Notes:

Perchlorate concentrations highlighted in blue exceed the PCL.

[a] Emulsified vegetable oil was present in monitoring wells 04WW01, 04WW07, 04WW09, and 04WW10 when baseline sampling was attempted in November 2019 and samples were not collected. The January 2019 sample results will be used as the baseline at these locations. Samples collected in January 2019 were only analyzed for perchlorate.

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J+ - The analyte was positively identified; the associated numerical value is its approximate concentration with a high bias in the sample.

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PCL – Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level.

µg/L - micrograms per liter

mg/L - milligrams per liter

mV - millivolt

NA - not analyzed

NM - not measured

NV - No value, PCL values are only shown for constituents of concern.

Std. Units - standard pH units

Val Qual - validation qualifier

Table 1
2019 to 2022 LHAAP-04 Groundwater Analytical Results

Location			04WW05										04WW06		
Sample Identification			04WW05-210311		04WW05-210525		04WW05-210805		04WW05-211109		04WW05-220202		04WW06-191106		04WW06-200203	
Sample Date			3/11/2021		5/25/2021		8/5/2021		11/9/2021		2/2/2022		11/6/2019		2/3/2020	
Location Description			Shallow Zone, Within Plume Area										Shallow Zone, Cross-Gradient to Plume Area			
Parameter	Units	PCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Field Parameters																
Dissolved Oxygen	mg/L	NV	0.08		0.08		0.48		0.52		0.76		0.01		0.05	
Ferrous Iron	NA	NV	1.81		2.73		1.33		2.15		3.02		NM		NM	
Oxidation-Reduction Potential	mV	NV	-320		-60		3		-4		127		2		-16	
General Chemistry																
Alkalinity	mg/L	NV	404		422		494		606		NA		NA		NA	
Nitrate	mg/L	NV	< 0.1	U	< 0.1	U	< 0.1	U	0.0598	J	NA		NA		NA	
Nitrite	mg/L	NV	< 0.1	U	0.0939	J	< 0.1	U	< 0.1	U	NA		NA		NA	
Sulfate	mg/L	NV	65.6		54.7		77		119		NA		NA		NA	
Total Organic Carbon	mg/L	NV	2.09		2.44		2.26		6.29		4.61		NA		NA	
Perchlorate																
Perchlorate	µg/L	17	< 0.05	U	< 0.05	U	< 0.5	U	< 0.2	U	0.28		< 2	U	< 2	U

Notes:

Perchlorate concentrations highlighted in blue exceed the PCL.

[a] Emulsified vegetable oil was present in monitoring wells 04WW01, 04WW07, 04WW09, and 04WW10 when baseline sampling was attempted in November 2019 and samples were not collected. The January 2019 sample results will be used as the baseline at these locations. Samples collected in January 2019 were only analyzed for perchlorate.

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mV - millivolt

NA - not analyzed

NM - not measured

NV - No value, PCL values are only shown for constituents of concern.

Std. Units - standard pH units

Val Qual - validation qualifier

Table 1
2019 to 2022 LHAAP-04 Groundwater Analytical Results

Location			04WW06													
Sample Identification			04WW06-200504		04WW06-200810		04WW06-201104		04WW06-210310		04WW06-210524		04WW06-210804		04WW06-211104	
Sample Date			5/4/2020		8/10/2020		11/4/2020		3/10/2021		5/24/2021		8/4/2021		11/4/2021	
Location Description			Shallow Zone, Cross-Gradient to Plume Area													
Parameter	Units	PCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Field Parameters																
Dissolved Oxygen	mg/L	NV	0.08		0.04		0.14		0.1		0.22		0.68		0.47	
Ferrous Iron	NA	NV	NM		NM		NM		NM		NM		NM		NM	
Oxidation-Reduction Potential	mV	NV	106		41		37		10		42		33		44	
General Chemistry																
Alkalinity	mg/L	NV	NA		NA		NA		NA		NA		NA		NA	
Nitrate	mg/L	NV	NA		NA		NA		NA		NA		NA		NA	
Nitrite	mg/L	NV	NA		NA		NA		NA		NA		NA		NA	
Sulfate	mg/L	NV	NA		NA		NA		NA		NA		NA		NA	
Total Organic Carbon	mg/L	NV	NA		NA		NA		NA		NA		NA		NA	
Perchlorate																
Perchlorate	µg/L	17	< 0.05	U	0.567	J	< 0.05	U	< 0.05	U	0.0272	J	< 0.1	U	< 0.2	U

Notes:

Perchlorate concentrations highlighted in blue exceed the PCL.

[a] Emulsified vegetable oil was present in monitoring wells 04WW01, 04WW07, 04WW09, and 04WW10 when baseline sampling was attempted in November 2019 and samples were not collected. The January 2019 sample results will be used as the baseline at these locations. Samples collected in January 2019 were only analyzed for perchlorate.

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mV - millivolt

NA - not analyzed

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Val Qual - validation qualifier

Table 1
2019 to 2022 LHAAP-04 Groundwater Analytical Results

Aptim Federal Services, LLC

	Location		04WW06		04WW07											
	Sample Identification		04WW06-220201		04WW07-190122 [a]		04WW07-200204		04WW07-200505		04WW07-200811		04WW07-200811-FD		04WW07-201105	
	Sample Date		2/1/2022		1/22/2019		2/4/2020		5/5/2020		8/11/2020		8/11/2020		11/5/2020	
	Location Description		Shallow Zone, Cross-Gradient to Former Plume Area		Shallow Zone, Within Treatment Zone											
Parameter	Units	PCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Field Parameters																
Dissolved Oxygen	mg/L	NV	1.74		1.83		0.05		2.12		0.04		0.04		0.03	
Ferrous Iron	NA	NV	NM		NM		1.31		0.97		1.17		1.17		2.59	
Oxidation-Reduction Potential	mV	NV	98		338		-260		-314		-112		-112		-105	
General Chemistry																
Alkalinity	mg/L	NV	NA		NA		1130		865		923		922		1180	
Nitrate	mg/L	NV	NA		NA		< 0.1	U	0.0318	J	< 0.1	U	< 0.1	U	< 0.1	U
Nitrite	mg/L	NV	NA		NA		< 0.1	U	< 0.1	U	< 0.1	U	< 0.1	U	< 0.1	U
Sulfate	mg/L	NV	NA		NA		2.6		1.78		1.27		2.47		2.68	
Total Organic Carbon	mg/L	NV	NA		NA		75.5		25		23.8		24.2		19.8	
Perchlorate																
Perchlorate	µg/L	17	< 0.2	U	110		86		3.51		0.557	J	0.58	J	0.19	J

Notes:

Perchlorate concentrations highlighted in blue exceed the PCL.

[a] Emulsified vegetable oil was present in monitoring wells 04WW01, 04WW07, 04WW09, and 04WW10 when baseline sampling was attempted in November 2019 and samples were not collected. The January 2019 sample results will be used as the baseline at these locations. Samples collected in January 2019 were only analyzed for perchlorate.

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mg/L - milligrams per liter

mV - millivolt

NA - not analyzed

NM - not measured

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Std. Units - standard pH units

Val Qual - validation qualifier

Table 1
2019 to 2022 LHAAP-04 Groundwater Analytical Results

		Location	04WW07										
		Sample Identification	04WW07-210311		04WW07-210525		04WW07-210525-FD		04WW07-210805		04WW07-211109		04WW07-211109-FD	
		Sample Date	3/11/2021		5/25/2021		5/25/2021		8/5/2021		11/9/2021		11/9/2021	
		Location Description	Shallow Zone, Within Treatment Zone											
Parameter	Units	PCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Field Parameters														
Dissolved Oxygen	mg/L	NV	0.04		0.02		0.02		0.46		3.46		3.46	
Ferrous Iron	NA	NV	1.21		0.99		0.99		0.39		0.36		0.36	
Oxidation-Reduction Potential	mV	NV	-436		-311		-311		-252		-34		-34	
General Chemistry														
Alkalinity	mg/L	NV	708		753		735		616		723		719	
Nitrate	mg/L	NV	< 0.1	U	< 0.1	U	< 0.1	U	< 0.1	U	0.0562	J	0.0585	J
Nitrite	mg/L	NV	< 0.1	U	< 0.1	U	< 0.1	U	< 0.1	U	< 0.1	U	< 0.1	U
Sulfate	mg/L	NV	30.1		82.8		85.3		96.1		112		109	
Total Organic Carbon	mg/L	NV	7.97		7.52		8.49		7.73		12.1		15.3	
Perchlorate														
Perchlorate	µg/L	17	0.169		< 0.05	U	< 0.05	U	< 0.5	U	< 0.2	U	< 0.2	U

Notes:

Perchlorate concentrations highlighted in blue exceed the PCL.

[a] Emulsified vegetable oil was present in monitoring wells 04WW01, 04WW07, 04WW09, and 04WW10 when baseline sampling was attempted in November 2019 and samples were not collected. The January 2019 sample results will be used as the baseline at these locations. Samples collected in January 2019 were only analyzed for perchlorate.

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mg/L - milligrams per liter

mV - millivolt

NA - not analyzed

NM - not measured

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Std. Units - standard pH units

Val Qual - validation qualifier

Table 1
2019 to 2022 LHAAP-04 Groundwater Analytical Results

	Location		04WW07				04WW08									
	Sample Identification		04WW07-220202		04WW07-220202-FD		04WW08-191106		04WW08-200203		04WW08-200504		04WW08-200810		04WW08-200810-FD	
	Sample Date		2/2/2022		2/2/2022		11/6/2019		2/3/2020		5/4/2020		8/10/2020		8/10/2020	
	Location Description		Shallow Zone, Downgradient of Former Plume Area				Intermediate Zone, Slightly Upgradient of Plume									
Parameter	Units	PCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Field Parameters																
Dissolved Oxygen	mg/L	NV	0.67		0.67		0.03		0.08		0.26		0.06		0.06	
Ferrous Iron	NA	NV	0.83		0.83		NM		NM		NM		NM		NM	
Oxidation-Reduction Potential	mV	NV	150		150		-151		27		-160		-25		-25	
General Chemistry																
Alkalinity	mg/L	NV	NA		NA		NA		NA		NA		NA		NA	
Nitrate	mg/L	NV	NA		NA		NA		NA		NA		NA		NA	
Nitrite	mg/L	NV	NA		NA		NA		NA		NA		NA		NA	
Sulfate	mg/L	NV	NA		NA		NA		NA		NA		NA		NA	
Total Organic Carbon	mg/L	NV	10		12.6		NA		NA		NA		NA		NA	
Perchlorate																
Perchlorate	µg/L	17	< 0.2	U	< 0.2	U	13		< 2	U	9.29		1.66		1.22	

Notes:

Perchlorate concentrations highlighted in blue exceed the PCL.

[a] Emulsified vegetable oil was present in monitoring wells 04WW01, 04WW07, 04WW09, and 04WW10 when baseline sampling was attempted in November 2019 and samples were not collected. The January 2019 sample results will be used as the baseline at these locations. Samples collected in January 2019 were only analyzed for perchlorate.

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µg/L - micrograms per liter

mg/L - milligrams per liter

mV - millivolt

NA - not analyzed

NM - not measured

NV - No value, PCL values are only shown for constituents of concern.

Std. Units - standard pH units

Val Qual - validation qualifier

Table 1
2019 to 2022 LHAAP-04 Groundwater Analytical Results

	Location		04WW08												04WW09	
	Sample Identification		04WW08-201104		04WW08-210310		04WW08-210524		04WW08-210804		04WW08-211104		04WW08-220201		04WW09-190122 [a]	
	Sample Date		11/4/2020		3/10/2021		5/24/2021		8/4/2021		11/4/2021		2/1/2022		1/22/2019	
	Location Description		Intermediate Zone, Slightly Upgradient of Plume Area												Shallow Zone, Within Treatment Area	
Parameter	Units	PCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Field Parameters																
Dissolved Oxygen	mg/L	NV	0.8		0.09		0.13		0.49		0.46		0.73		5.78	
Ferrous Iron	NA	NV	NM		NM		NM		NM		NM		NM		NM	
Oxidation-Reduction Potential	mV	NV	-8		-21		43		51		9		60		326	
General Chemistry																
Alkalinity	mg/L	NV	NA		NA		NA		NA		NA		NA		NA	
Nitrate	mg/L	NV	NA		NA		NA		NA		NA		NA		NA	
Nitrite	mg/L	NV	NA		NA		NA		NA		NA		NA		NA	
Sulfate	mg/L	NV	NA		NA		NA		NA		NA		NA		NA	
Total Organic Carbon	mg/L	NV	NA		NA		NA		NA		NA		NA		NA	
Perchlorate																
Perchlorate	µg/L	17	4.65		4		0.0359	J	< 0.5	U	< 0.2	U	< 1	U	2,100	

Notes:

Perchlorate concentrations highlighted in blue exceed the PCL.

[a] Emulsified vegetable oil was present in monitoring wells 04WW01, 04WW07, 04WW09, and 04WW10 when baseline sampling was attempted in November 2019 and samples were not collected. The January 2019 sample results will be used as the baseline at these locations. Samples collected in January 2019 were only analyzed for perchlorate.

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mg/L - milligrams per liter

mV - millivolt

NA - not analyzed

NM - not measured

NV - No value, PCL values are only shown for constituents of concern.

Std. Units - standard pH units

Val Qual - validation qualifier

Table E.3 -LHAAP-04

Aptim Federal Services, LLC

Table 1
2019 to 2022 LHAAP-04 Groundwater Analytical Results

Location			04WW09										
Sample Identification			04WW09-200204		04WW09-200204-FD		04WW09-200505		04WW09-200811		04WW09-201105		04WW09-201105-FD	
Sample Date			2/4/2020		2/4/2020		5/5/2020		8/11/2020		11/5/2020		11/5/2020	
Location Description			Shallow Zone, Within Treatment Area											
Parameter	Units	PCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Field Parameters														
Dissolved Oxygen	mg/L	NV	0.08		0.08		0.04		0.03		0.02		0.02	
Ferrous Iron	NA	NV	3.3		3.3		3.3		1.38		3.87		3.87	
Oxidation-Reduction Potential	mV	NV	-74		-74		-16		-87		-91		-91	
General Chemistry														
Alkalinity	mg/L	NV	332		332		328		504		537		538	
Nitrate	mg/L	NV	< 0.2	U	< 0.2	U	0.0732	J	0.0347	J	< 0.1	U	< 0.1	U
Nitrite	mg/L	NV	< 0.2	U	< 0.2	U	1.77		< 0.1	U	1.63		1.57	
Sulfate	mg/L	NV	0.732	J	0.659	J	2		2.31		1.04		0.956	
Total Organic Carbon	mg/L	NV	880		910		334		470		177		178	
Perchlorate														
Perchlorate	µg/L	17	18		22		11.1		3.92		2.02		2.58	

Notes:

Perchlorate concentrations highlighted in blue exceed the PCL.

[a] Emulsified vegetable oil was present in monitoring wells 04WW01, 04WW07, 04WW09, and 04WW10 when baseline sampling was attempted in November 2019 and samples were not collected. The January 2019 sample results will be used as the baseline at these locations. Samples collected in January 2019 were only analyzed for perchlorate.

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mV - millivolt

NA - not analyzed

NM - not measured

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Std. Units - standard pH units

Val Qual - validation qualifier

Table 1
2019 to 2022 LHAAP-04 Groundwater Analytical Results

	Location		04WW09												04WW10	
	Sample Identification		04WW09-210311		04WW09-210311-FD		04WW09-210525		04WW09-210805		04WW09-211109		04WW09-220202		04WW10-190122 [a]	
	Sample Date		3/11/2021		3/11/2021		5/25/2021		8/5/2021		11/9/2021		2/2/2022		1/22/2019	
	Location Description		Shallow Zone, Within Treatment Area												Shallow Zone, Within Treatment Area	
Parameter	Units	PCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Field Parameters																
Dissolved Oxygen	mg/L	NV	0.09		0.09		0.04		0.33		0.22		0.43		3.59	
Ferrous Iron	NA	NV	3.24		3.24		3.67		2.27		2.78		2.77		NM	
Oxidation-Reduction Potential	mV	NV	-308		-308		-246		-132		-85		23		333	
General Chemistry																
Alkalinity	mg/L	NV	643		593		845		839		838		NA		NA	
Nitrate	mg/L	NV	< 0.1	U	< 0.1	U	0.0418	J	0.0338	J	0.06	J	NA		NA	
Nitrite	mg/L	NV	< 0.1	U	< 0.1	U	< 0.1	U	< 0.1	U	< 0.1	U	NA		NA	
Sulfate	mg/L	NV	1		1.06		2.65		3.86		11.9		NA		NA	
Total Organic Carbon	mg/L	NV	102		101		79.6		58.4		60.8		16.3		NA	
Perchlorate																
Perchlorate	µg/L	17	< 0.05	U	< 0.05	U	< 0.5	U	< 0.5	U	< 0.2	U	< 1	U	10,000	

Notes:

Perchlorate concentrations highlighted in blue exceed the PCL.

[a] Emulsified vegetable oil was present in monitoring wells 04WW01, 04WW07, 04WW09, and 04WW10 when baseline sampling was attempted in November 2019 and samples were not collected. The January 2019 sample results will be used as the baseline at these locations. Samples collected in January 2019 were only analyzed for perchlorate.

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mV - millivolt

NA - not analyzed

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NV - No value, PCL values are only shown for constituents of concern.

Std. Units - standard pH units

Val Qual - validation qualifier

Table E.3 -LHAAP-04

Aptim Federal Services, LLC

Table 1
2019 to 2022 LHAAP-04 Groundwater Analytical Results

Location			04WW10													
Sample Identification			04WW10-200204		04WW10-200505		04WW10-200505-FD		04WW10-200811		04WW10-201105		04WW10-210311		04WW10-210525	
Sample Date			2/4/2020		5/5/2020		5/5/2020		8/11/2020		11/5/2020		3/11/2021		5/25/2021	
Location Description			Shallow Zone, Within Treatment Area													
Parameter	Units	PCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Field Parameters																
Dissolved Oxygen	mg/L	NV	5.54		2.72		2.72		1.03		0.11		0.04		0.15	
Ferrous Iron	NA	NV	1.8		1.08		1.08		0.89		3.14		1.18		2.3	
Oxidation-Reduction Potential	mV	NV	-79		-286		-286		-47		-62		-159		-77	
General Chemistry																
Alkalinity	mg/L	NV	565		690		696		703		663		492		554	
Nitrate	mg/L	NV	0.109		< 0.1	U	< 0.1	U	< 0.5	U	< 0.1	U	< 0.1	U	< 0.1	U
Nitrite	mg/L	NV	< 0.1	U	< 0.1	U	< 0.1	U	< 0.5	U	< 0.1	U	< 0.1	U	0.0693	J
Sulfate	mg/L	NV	368		924		918		1540		1040		286		186	
Total Organic Carbon	mg/L	NV	4.82		4.37		4.52		3.1		3.32		3.03		2.62	
Perchlorate																
Perchlorate	µg/L	17	< 2	U	< 0.05	U	< 0.05	U	0.339	J+	0.0888	J	< 0.05	U	< 0.05	U

Notes:

Perchlorate concentrations highlighted in blue exceed the PCL.

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mV - millivolt

NA - not analyzed

NM - not measured

NV - No value, PCL values are only shown for constituents of concern.

Std. Units - standard pH units

Val Qual - validation qualifier

Table 1
2019 to 2022 LHAAP-04 Groundwater Analytical Results

Location			04WW10								04WW11					
Sample Identification			04WW10-210805		04WW10-210805-FD		04WW10-211109		04WW10-220202		04WW11-191106		04WW11-200204		04WW11-200504	
Sample Date			8/5/2021		8/5/2021		11/9/2021		2/2/2022		11/6/2019		2/4/2020		5/4/2020	
Location Description			Shallow Zone, Within Treatment Area								Shallow Zone, Downgradient of Plume					
Parameter	Units	PCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Field Parameters																
Dissolved Oxygen	mg/L	NV	0.7		0.7		1.64		0.63		3.21		5.54		0.14	
Ferrous Iron	NA	NV	1.08		1.08		1.42		0.14		NM		NM		NM	
Oxidation-Reduction Potential	mV	NV	-38		-38		-35		68		158		-79		136	
General Chemistry																
Alkalinity	mg/L	NV	573		553		614		NA		NA		NA		NA	
Nitrate	mg/L	NV	< 0.1	U	< 0.1	U	< 0.1	U	NA		NA		NA		NA	
Nitrite	mg/L	NV	< 0.1	U	< 0.1	U	< 0.1	UJ	NA		NA		NA		NA	
Sulfate	mg/L	NV	416		424		686		NA		NA		NA		NA	
Total Organic Carbon	mg/L	NV	3.68		3.59		3.52		5.63		NA		NA		NA	
Perchlorate																
Perchlorate	µg/L	17	< 0.05	U	< 0.05	U	< 0.2	U	< 0.2	U	< 2	U	< 2	U	< 0.05	U

Notes:

Perchlorate concentrations highlighted in blue exceed the PCL.

[a] Emulsified vegetable oil was present in monitoring wells 04WW01, 04WW07, 04WW09, and 04WW10 when baseline sampling was attempted in November 2019 and samples were not collected. The January 2019 sample results will be used as the baseline at these locations. Samples collected in January 2019 were only analyzed for perchlorate.

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

J+ - The analyte was positively identified; the associated numerical value is its approximate concentration with a high bias in the sample.

U - Undetected: The analyte was analyzed for, but not detected.

PCL – Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level.

µg/L - micrograms per liter

mg/L - milligrams per liter

mV - millivolt

NA - not analyzed

NM - not measured

NV - No value, PCL values are only shown for constituents of concern.

Std. Units - standard pH units

Val Qual - validation qualifier

Table 1
2019 to 2022 LHAAP-04 Groundwater Analytical Results

Location			04WW11											
Sample Identification			04WW11-200810		04WW11-201104		04WW11-201104-FD		04WW11-210310		04WW11-210310-FD		04WW11-210524	
Sample Date			8/10/2020		11/4/2020		11/4/2020		3/10/2021		3/10/2021		5/24/2021	
Location Description			Shallow Zone, Downgradient of Plume											
Parameter	Units	PCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Field Parameters														
Dissolved Oxygen	mg/L	NV	0.03		1.66		1.66		0.05		0.05		0.85	
Ferrous Iron	NA	NV	NM		NM		NM		NM		NM		NM	
Oxidation-Reduction Potential	mV	NV	72		86		86		98		98		237	
General Chemistry														
Alkalinity	mg/L	NV	NA		NA		NA		NA		NA		NA	
Nitrate	mg/L	NV	NA		NA		NA		NA		NA		NA	
Nitrite	mg/L	NV	NA		NA		NA		NA		NA		NA	
Sulfate	mg/L	NV	NA		NA		NA		NA		NA		NA	
Total Organic Carbon	mg/L	NV	NA		NA		NA		NA		NA		NA	
Perchlorate														
Perchlorate	µg/L	17	0.0435	J	< 0.05	U	< 0.05	U	< 0.05	U	< 0.05	U	0.0627	J

Notes:

Perchlorate concentrations highlighted in blue exceed the PCL.

[a] Emulsified vegetable oil was present in monitoring wells 04WW01, 04WW07, 04WW09, and 04WW10 when baseline sampling was attempted in November 2019 and samples were not collected. The January 2019 sample results will be used as the baseline at these locations. Samples collected in January 2019 were only analyzed for perchlorate.

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

J+ - The analyte was positively identified; the associated numerical value is its approximate concentration with a high bias in the sample.

U - Undetected: The analyte was analyzed for, but not detected.

PCL – Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level.

µg/L - micrograms per liter

mg/L - milligrams per liter

mV - millivolt

NA - not analyzed

NM - not measured

NV - No value, PCL values are only shown for constituents of concern.

Std. Units - standard pH units

Val Qual - validation qualifier

Table E.3 -LHAAP-04

Aptim Federal Services, LLC

Table 1
2019 to 2022 LHAAP-04 Groundwater Analytical Results

Location			04WW11								LHSMW01					
Sample Identification			04WW11-210804		04WW11-210804-FD		04WW11-211104		04WW11-220201		LHSMW01-191106		LHSMW01-200203		LHSMW01-200504	
Sample Date			8/4/2021		8/4/2021		11/4/2021		2/1/2022		11/6/2019		2/3/2020		5/4/2020	
Location Description			Shallow Zone, Downgradient of Plume								Shallow Zone, Cross-Gradient to Plume					
Parameter	Units	PCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Field Parameters																
Dissolved Oxygen	mg/L	NV	0.8		0.8		0.44		0.63		0.48		0.04		0.05	
Ferrous Iron	NA	NV	NM		NM		NM		NM		NM		NM		NM	
Oxidation-Reduction Potential	mV	NV	175		175		129		158		127		63		96	
General Chemistry																
Alkalinity	mg/L	NV	NA		NA		NA		NA		NA		NA		NA	
Nitrate	mg/L	NV	NA		NA		NA		NA		NA		NA		NA	
Nitrite	mg/L	NV	NA		NA		NA		NA		NA		NA		NA	
Sulfate	mg/L	NV	NA		NA		NA		NA		NA		NA		NA	
Total Organic Carbon	mg/L	NV	NA		NA		NA		NA		NA		NA		NA	
Perchlorate																
Perchlorate	µg/L	17	< 0.25	U	< 0.25	U	< 0.2	U	< 0.2	U	< 2	U	< 2	U	< 0.05	U

Notes:

Perchlorate concentrations highlighted in blue exceed the PCL.

[a] Emulsified vegetable oil was present in monitoring wells 04WW01, 04WW07, 04WW09, and 04WW10 when baseline sampling was attempted in November 2019 and samples were not collected. The January 2019 sample results will be used as the baseline at these locations. Samples collected in January 2019 were only analyzed for perchlorate.

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

J+ - The analyte was positively identified; the associated numerical value is its approximate concentration with a high bias in the sample.

U - Undetected: The analyte was analyzed for, but not detected.

PCL – Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level.

µg/L - micrograms per liter

mg/L - milligrams per liter

mV - millivolt

NA - not analyzed

NM - not measured

NV - No value, PCL values are only shown for constituents of concern.

Std. Units - standard pH units

Val Qual - validation qualifier

Table 1
2019 to 2022 LHAAP-04 Groundwater Analytical Results

Location			LHSMW01										
Sample Identification			LHSMW01-200810		LHSMW01-201104		LHSMW01-210310		LHSMW01-210524		LHSMW01-210524-FD		LHSMW01-210804	
Sample Date			8/10/2020		11/4/2020		3/10/2021		5/24/2021		5/24/2021		8/4/2021	
Location Description			Shallow Zone, Cross-Gradient to Plume Area											
Parameter	Units	PCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Field Parameters														
Dissolved Oxygen	mg/L	NV	0.5		0.53		0.07		0.2		0.2		0.95	
Ferrous Iron	NA	NV	NM		NM		NM		NM		NM		NM	
Oxidation-Reduction Potential	mV	NV	143		211		-7		90		90		109	
General Chemistry														
Alkalinity	mg/L	NV	NA		NA		NA		NA		NA		NA	
Nitrate	mg/L	NV	NA		NA		NA		NA		NA		NA	
Nitrite	mg/L	NV	NA		NA		NA		NA		NA		NA	
Sulfate	mg/L	NV	NA		NA		NA		NA		NA		NA	
Total Organic Carbon	mg/L	NV	NA		NA		NA		NA		NA		NA	
Perchlorate														
Perchlorate	µg/L	17	0.179	J	< 0.05	U	< 0.05	U	< 0.05	U	< 0.05	U	< 0.1	U

Notes:

Perchlorate concentrations highlighted in blue exceed the PCL.

[a] Emulsified vegetable oil was present in monitoring wells 04WW01, 04WW07, 04WW09, and 04WW10 when baseline sampling was attempted in November 2019 and samples were not collected. The January 2019 sample results will be used as the baseline at these locations. Samples collected in January 2019 were only analyzed for perchlorate.

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

J+ - The analyte was positively identified; the associated numerical value is its approximate concentration with a high bias in the sample.

U - Undetected: The analyte was analyzed for, but not detected.

PCL – Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level.

µg/L - micrograms per liter

mg/L - milligrams per liter

mV - millivolt

NA - not analyzed

NM - not measured

NV - No value, PCL values are only shown for constituents of concern.

Std. Units - standard pH units

Val Qual - validation qualifier

Table 1
2019 to 2022 LHAAP-04 Groundwater Analytical Results

		Location	LHSMW01						LHSMW02					
		Sample Identification	LHSMW01-211104		LHSMW01-211104-FD		LHSMW01-220201		LHSMW02-191105		LHSMW02-200203		LHSMW02-200203-FD	
		Sample Date	11/4/2021		11/4/2021		2/1/2022		11/5/2019		2/3/2020		2/3/2020	
		Location Description	Shallow Zone, Cross-Gradient to Plume Area						Shallow Zone, Downgradient of Plume					
Parameter	Units	PCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Field Parameters														
Dissolved Oxygen	mg/L	NV	0.74		0.74		0.65		0.22		0.03		0.03	
Ferrous Iron	NA	NV	NM		NM		NM		NM		NM		NM	
Oxidation-Reduction Potential	mV	NV	154		154		263		52		7		7	
General Chemistry														
Alkalinity	mg/L	NV	NA		NA		NA		NA		NA		NA	
Nitrate	mg/L	NV	NA		NA		NA		NA		NA		NA	
Nitrite	mg/L	NV	NA		NA		NA		NA		NA		NA	
Sulfate	mg/L	NV	NA		NA		NA		NA		NA		NA	
Total Organic Carbon	mg/L	NV	NA		NA		NA		NA		NA		NA	
Perchlorate														
Perchlorate	µg/L	17	< 0.2	U	< 0.2	U	0.078	J	< 2	U	< 2	U	< 2	U

Notes:

Perchlorate concentrations highlighted in blue exceed the PCL.

[a] Emulsified vegetable oil was present in monitoring wells 04WW01, 04WW07, 04WW09, and 04WW10 when baseline sampling was attempted in November 2019 and samples were not collected. The January 2019 sample results will be used as the baseline at these locations. Samples collected in January 2019 were only analyzed for perchlorate.

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

J+ - The analyte was positively identified; the associated numerical value is its approximate concentration with a high bias in the sample.

U - Undetected: The analyte was analyzed for, but not detected.

PCL – Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level.

µg/L - micrograms per liter

mg/L - milligrams per liter

mV - millivolt

NA - not analyzed

NM - not measured

NV - No value, PCL values are only shown for constituents of concern.

Std. Units - standard pH units

Val Qual - validation qualifier

Table 1
2019 to 2022 LHAAP-04 Groundwater Analytical Results

Location			LHSMW02													
Sample Identification			LHSMW02-200504		LHSMW02-200504-FD		LHSMW02-200810		LHSMW02-201104		LHSMW02-210310		LHSMW02-210524		LHSMW02-210804	
Sample Date			5/4/2020		5/4/2020		8/10/2020		11/4/2020		3/10/2021		5/24/2021		8/4/2021	
Location Description			Shallow Zone, Downgradient to Plume Area													
Parameter	Units	PCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Field Parameters																
Dissolved Oxygen	mg/L	NV	0.56		0.56		0.07		0.17		0.06		0.62		0.57	
Ferrous Iron	NA	NV	NM		NM		NM		NM		NM		NM		NM	
Oxidation-Reduction Potential	mV	NV	170		170		165		102		167		177		132	
General Chemistry																
Alkalinity	mg/L	NV	NA		NA		NA		NA		NA		NA		NA	
Nitrate	mg/L	NV	NA		NA		NA		NA		NA		NA		NA	
Nitrite	mg/L	NV	NA		NA		NA		NA		NA		NA		NA	
Sulfate	mg/L	NV	NA		NA		NA		NA		NA		NA		NA	
Total Organic Carbon	mg/L	NV	NA		NA		NA		NA		NA		NA		NA	
Perchlorate																
Perchlorate	µg/L	17	< 0.05	U	< 0.05	U	0.121		0.169		0.082	J	0.0392	J	< 0.25	U

Notes:

Perchlorate concentrations highlighted in blue exceed the PCL.

[a] Emulsified vegetable oil was present in monitoring wells 04WW01, 04WW07, 04WW09, and 04WW10 when baseline sampling was attempted in November 2019 and samples were not collected. The January 2019 sample results will be used as the baseline at these locations. Samples collected in January 2019 were only analyzed for perchlorate.

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

J+ - The analyte was positively identified; the associated numerical value is its approximate concentration with a high bias in the sample.

U - Undetected: The analyte was analyzed for, but not detected.

PCL – Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level.

µg/L - micrograms per liter

mg/L - milligrams per liter

mV - millivolt

NA - not analyzed

NM - not measured

NV - No value, PCL values are only shown for constituents of concern.

Std. Units - standard pH units

Val Qual - validation qualifier

Table 1
2019 to 2022 LHAAP-04 Groundwater Analytical Results

Location			LHSMW02					
Sample Identification			LHSMW02-211104		LHSMW02-220201		LHSMW02-220201-FD	
Sample Date			11/4/2021		2/1/2022		2/1/2022	
Location Description			Shallow Zone, Downgradient to Former Plume Area					
Parameter	Units	PCL	Result	Val Qual	Result	Val Qual	Result	Val Qual
Field Parameters								
Dissolved Oxygen	mg/L	NV	0.39		0.85		0.85	
Ferrous Iron	NA	NV	NM		NM		NM	
Oxidation-Reduction Potential	mV	NV	87		124		124	
General Chemistry								
Alkalinity	mg/L	NV	NA		NA		NA	
Nitrate	mg/L	NV	NA		NA		NA	
Nitrite	mg/L	NV	NA		NA		NA	
Sulfate	mg/L	NV	NA		NA		NA	
Total Organic Carbon	mg/L	NV	NA		NA		NA	
Perchlorate								
Perchlorate	µg/L	17	< 0.2	U	< 0.2	U	< 0.2	U

Notes:

Perchlorate concentrations highlighted in blue exceed the PCL.

[a] Emulsified vegetable oil was present in monitoring wells 04WW01, 04WW07, 04WW09, and 04WW10 when baseline sampling was attempted in November 2019 and samples were not collected. The January 2019 sample results will be used as the baseline at these locations. Samples collected in January 2019 were only analyzed for perchlorate.

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

J+ - The analyte was positively identified; the associated numerical value is its approximate concentration with a high bias in the sample.

U - Undetected: The analyte was analyzed for, but not detected.

PCL – Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level.

µg/L - micrograms per liter

mg/L - milligrams per liter

mV - millivolt

NA - not analyzed

NM - not measured

NV - No value, PCL values are only shown for constituents of concern.

Std. Units - standard pH units

Val Qual - validation qualifier

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Table 2-4
Historical Perchlorate Concentrations (2000–2021)

Monitoring Well	Date	Perchlorate Concentration (µg/L)
04WW01	12/19/2000	< 0.3
	3/17/2002	3.98
	9/18/2002	< 4
	9/9/2004	< 1
	9/3/2010	< 0.1
	2/23/2011	0.114
	1/10/2018	< 4
	1/22/2019	< 2
	2/4/2020	19
	5/4/2020	< 0.05 U
	8/10/2020	0.561 J
	11/4/2020	0.246 J
	3/10/2021	< 0.05
	5/24/2021	< 0.05
	8/4/2021	< 0.5
	11/4/2021	< 0.2
04WW02	12/19/2000	< 0.3
	3/10/2002	< 4
	9/18/2002	< 4
	9/9/2004	< 1
	9/3/2010	< 0.1
	1/9/2018	< 4
	1/21/2019	< 4
	11/5/2019	< 2
	2/3/2020	< 2
	5/4/2020	< 0.05
	8/10/2020	0.0477 J
	11/4/2020	0.0693 J
	3/10/2021	< 0.05
	5/24/2021	0.54
	8/4/2021	< 0.25
	11/4/2021	< 0.2
04WW03	12/19/2000	< 0.3
	9/9/2004	< 1
	8/20/2010	< 0.1
	1/9/2018	< 4
	1/21/2019	< 4
	11/6/2019	< 2
04WW04	9/3/2010	4,590
	10/13/2010	2,920
	11/10/2010	5,410
	2/23/2011	1,580
	1/9/2018	31 J
	1/21/2019	< 2

Table 2-4
Historical Perchlorate Concentrations (2000–2021)

Monitoring Well	Date	Perchlorate Concentration (µg/L)
04WW04 (cont.)	11/6/2019	< 2
	2/3/2020	< 2
	5/4/2020	< 0.05
	8/10/2020	< 0.1
	11/4/2020	0.158
	3/10/2021	0.139
	5/24/2021	< 0.05
	8/4/2021	< 0.25
	11/4/2021	< 0.2
04WW05	9/3/2010	0.9
	11/10/2010	6.58
	2/23/2011	0.326
	2/23/2011	0.327
	1/9/2018	78
	1/21/2019	78
	11/6/2019	< 2
	2/4/2020	< 2
	5/5/2020	< 0.05
	8/11/2020	0.399 J
	11/4/2020	< 0.05
	3/11/2021	< 0.05
	5/25/2021	< 0.05
	8/5/2021	< 0.5
	11/9/2021	< 0.2
04WW06	1/9/2018	3.1 J
	1/21/2019	< 2
	11/6/2019	< 2
	2/3/2020	< 2
	5/4/2020	< 0.05
	8/10/2020	0.567 J
	11/4/2020	< 0.05
	3/10/2021	< 0.05
	5/24/2021	0.0272 J
	8/4/2021	< 0.1
	11/4/2021	< 0.2
04WW07	1/9/2018	13
	1/22/2019	110
	2/4/2020	86
	5/5/2020	3.51
	8/11/2020	0.557 J
	11/4/2020	0.19 J
	3/11/2021	0.169
	5/25/2021	< 0.05
	8/5/2021	< 0.5
	11/9/2021	< 0.2

Table 2-4
Historical Perchlorate Concentrations (2000–2021)

Monitoring Well	Date	Perchlorate Concentration (µg/L)
04WW08	1/9/2018	1.5 J
	11/6/2019	13
	2/3/2020	< 2
	5/4/2020	9.29
	8/10/2020	1.66
	11/4/2020	4.65
	3/10/2021	4
	5/24/2021	0.0359 J
	8/4/2021	< 0.5
	11/4/2021	< 0.2
04WW09	1/22/2019	2100
	2/4/2020	18
	5/5/2020	11.1
	8/11/2020	3.92
	11/4/2020	2.02
	3/11/2021	< 0.05
	5/25/2021	< 0.5
	8/5/2021	< 0.5
	11/9/2021	< 0.2
04WW10	1/22/2019	10,000
	2/4/2020	< 2
	5/5/2020	< 0.05
	8/11/2020	0.339 J+
	11/4/2020	0.0888 J
	3/11/2021	< 0.05
	5/25/2021	< 0.05
	8/5/2021	< 0.05
	11/9/2021	< 0.2
04WW11	1/22/2019	< 4
	11/6/2019	< 2
	2/4/2020	< 2
	5/4/2020	< 0.05
	8/10/2020	0.0435 J
	11/4/2020	< 0.05
	3/10/2021	< 0.05
	5/24/2021	0.0627 J
	8/4/2021	< 0.25
	11/4/2021	< 0.2
LHSMW01	5/24/2000	36.9
	10/3/2000	< 16
	2/8/2001	81
	9/18/2002	< 4
	9/3/2010	0.676
	2/23/2011	0.208
	1/9/2018	< 4

Table 2-4
Historical Perchlorate Concentrations (2000–2021)

Monitoring Well	Date	Perchlorate Concentration (µg/L)
LHSMW01 (cont.)	1/22/2019	< 4
	11/6/2019	< 2
	2/3/2020	< 2
	5/4/2020	< 0.05
	8/10/2020	0.179 J
	11/4/2020	< 0.05
	3/10/2021	< 0.05
	5/24/2021	< 0.05
	8/4/2021	< 0.1
	11/4/2021	< 0.2
LHSMW02	8/20/2010	< 0.1
	2/23/2011	1.3
	2/15/2018	< 4
	1/21/2019	< 2
	11/5/2019	< 2
	2/3/2020	< 2
	5/4/2020	< 0.05
	8/10/2020	0.121
	11/4/2020	0.169
	3/10/2021	0.082 J
	5/24/2021	0.0392 J
	8/4/2021	< 0.25
	11/4/2021	< 0.2

Notes:

Bolded and blue highlighted concentrations exceed the PCL (17 µg/L).

Some samples may have been diluted due to the concentration(s) of one or more analytes exceeding the upper limit of the calibration curve.

< Perchlorate was not detected above the detection limit shown.

µg/L - micrograms per liter.

J Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

J+ The analyte was positively identified; the associated numerical value is its approximate concentration with a high bias in the sample.

PCL - Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level.

Table 2-4
Historical COC Concentrations at Monitoring Well 12WW24

Sampling Date	Monitoring Wells		
	Trichloroethene (µg/L)	cis-1,2-DCE (µg/L)	Vinyl Chloride (µg/L)
12/19/2006	396	1 U	1 U
9/5/2007	272	1 U	1 U
12/19/2007	313	1 U	1 U
3/5/2008	301	0.25 U	0.25 U
6/4/2008	237	0.25 U	0.25 U
9/11/2008	185	0.25 U	0.25 U
3/4/2009	334	0.25 U	0.25 U
4/29/2009	197	0.25 U	0.25 U
7/14/2009	204	0.25 U	0.25 U
6/16/2010	145	0.25 U	0.25 U
6/7/2011	147	0.25 U	0.25 U
12/11/2013	259 [a]	66.1	0.873 J
1/1/2015	353	70.8	1.25
12/15/2015	278	58.5	0.786
12/16/2016	151	36.7	0.51
12/4/2017	83	26	1 U
12/4/2018	48	22	0.5 U
12/3/2019	19	12	0.5 U
12/21/2020	15	11	0.5 U
12/28/2021	5.5	7.7	0.5 U

Notes:

[a] Analyte diluted 5X.

µg/L - micrograms per liter

J - estimated value; analyte concentration was less than the limit of quantification.

U - Not detected. The analyte was analyzed for, but not detected above the associated limit of detection.

COC - contaminant of concern

DCE - dichloroethene

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Table 2-1
Groundwater Elevation Data, LHAAP-12

Well ID	Sampling Date	Top of Casing Elevation (ft)	Depth to Water from TOC (ft)	Groundwater Elevation (ft amsl)	Total Depth (ft bgs)	Screen Interval (ft bgs)
12WW01	12/1/2016	204.19	23.60	180.59	26.5	14.50 - 26.50
	3/27/2018	204.19	23.55	180.64		
	1/29/2019	204.19	22.99	181.20		
	12/3/2019	204.19	22.10	182.09		
	12/21/2020	204.19	21.57	182.62		
	12/28/2021	204.19	21.24	182.95		
12WW02	12/1/2016	202.45	22.07	180.38	28.50	13.50 - 28.50
	3/27/2018	202.45	21.82	180.63		
	1/29/2019	202.45	20.93	181.52		
	12/3/2019	202.45	20.5	181.95		
	12/21/2020	202.45	20	182.45		
	12/28/2021	202.45	19.81	182.64		
12WW05	12/1/2016	190.52	9.88	180.64	35.50	15.50 - 35.50
	3/27/2018	190.52	8.05	182.47		
	1/29/2019	190.52	6.95	183.57		
	12/3/2019	190.52	8.52	182		
	12/21/2020	190.52	6.8	183.72		
	12/28/2021	190.52	7.96	182.56		
12WW10R	12/3/2019	202.59	22	180.59	28	18-28
	12/21/2020	202.59	21.38	181.21		
	12/28/2021	202.59	21.04	181.55		
12WW20	6/15/2010	199.15	17.98	181.17	38	28 - 38
	6/7/2011	199.15	19.78	179.37		
	12/3/2012	199.15	22.03	177.12		
	1/8/2014	199.15	20.71	178.44		
	1/9/2015	199.15	19.34	179.81		
	12/19/2015	199.15	19.00	180.15		
	12/1/2016	199.15	18.69	180.46		
	12/4/2017	199.15	18.8	180.35		
	3/27/2018	199.15	17.6	181.55		
	12/4/2018	199.15	18.35	180.8		
	1/29/2019	199.15	16.81	182.34		
	12/3/2019	199.15	17.23	181.92		
	12/21/2020	199.15	16	183.15		
	12/28/2021	199.15	16.51	182.64		
12WW21	6/15/2010	202.07	21.85	180.22	41.00	31 - 41
	6/7/2011	202.07	23.35	178.72		
	12/3/2012	202.07	24.21	177.86		
	1/8/2014	202.07	24.56	177.51		
	1/9/2015	202.07	24.35	177.72		
	12/19/2015	202.07	22.95	179.12		
	12/1/2016	202.07	21.97	180.10		
	12/4/2017	202.07	21.92	180.15		
	3/27/2018	202.07	21.42	180.65		
	12/4/2018	202.07	22.2	179.87		
	1/29/2019	202.07	21.00	181.07		
	12/3/2019	202.07	20.45	181.62		

Table 2-1
Groundwater Elevation Data, LHAAP-12

Well ID	Sampling Date	Top of Casing Elevation (ft)	Depth to Water from TOC (ft)	Groundwater Elevation (ft amsl)	Total Depth (ft bgs)	Screen Interval (ft bgs)
12WW21 (cont.)	12/21/2020	202.07	19.57	182.5	41.00	31 - 41
	12/28/2021	202.07	19.55	182.52		
12WW22	6/15/2010	190.20	7.93	182.27	38	28 - 38
	6/7/2011	190.20	9.72	180.48		
	12/3/2012	190.20	13.46	176.74		
	1/8/2014	190.20	10.57	179.63		
	1/9/2015	190.20	9.60	180.60		
	12/1/2016	190.20	10.32	179.88		
	3/27/2018	190.20	7.81	182.39		
	1/29/2019	190.20	6.93	183.27		
	12/3/2019	190.20	9.3	180.90		
	12/21/2020	190.20	7.61	182.59		
	12/28/2021	190.20	8.85	181.35		
12WW23	6/16/2010	196.97	18.28	178.69	25	15 - 25
	6/7/2011	196.97	19.40	177.57		
	12/3/2012	196.97	20.38	176.59		
	1/8/2014	196.97	20.80	176.17		
	1/9/2015	196.97	19.34	177.63		
	12/1/2016	196.97	17.23	179.74		
	3/27/2018	196.97	16.88	180.09		
	1/29/2019	196.97	16.02	180.95		
	12/3/2019	196.97	15.48	181.49		
	12/21/2020	196.97	15.63	181.34		
	12/28/2021	196.97	14.82	182.15		
12WW24	6/16/2010	203.17	22.50	180.67	25.50	15.50 - 25.50
	6/7/2011	203.17	24.15	179.02		
	12/3/2012	203.17	Dry	Dry		
	12/9/2013	203.17	26.00	177.17		
	1/9/2015	203.17	24.22	178.95		
	12/18/2015	203.17	23.50	179.67		
	11/30/2016	203.17	22.53	180.64		
	12/4/2017	203.17	22.61	180.56		
	3/27/2018	203.17	22.35	180.82		
	12/4/2018	203.17	22.87	180.30		
	1/29/2019	203.17	21.61	181.56		
	12/3/2019	203.17	21.1	182.07		
	12/21/2020	203.17	20.45	182.72		
	12/28/2021	203.17	20.25	182.92		

Notes:

amsl - above mean sea level

bgs - below ground surface

ft - feet

ID - identifier

TOC - top of casing

Table 2-3
Historical TCE Concentrations at LHAAP-12 Monitoring Wells

	Monitoring Wells						
Sampling Date	12WW10R (µg/L)	12WW20 (µg/L)	12WW21 (µg/L)	12WW22 (µg/L)	12WW23 (µg/L)	12WW24 (µg/L)	12WW25(30) [a] (µg/L)
19 Dec 2006	NA	0.713	1 U	1 U	1 U	396	NS
5 Sep 2007	NA	1.34	1 U	1 U	1 U	272	NS
19 Dec 2007	NA	1.19	1 U	1 U	1 U	313	NS
5 Mar 2008	NA	0.999 J	0.25 U	0.25 U	0.25 U	301	NS
4 Jun 2008	NA	1.04	0.25 U	0.25 U	0.25 U	237	NS
11 Sep 2008	NA	0.985	0.25 U	0.25 U	0.25 U	185	NS
4 Mar 2009	NA	1.18	0.25 U	0.25 U	0.25 U	334	NS
29 Apr 2009	NA	0.997	0.25 U	0.25 U	0.25 U	197	NS
14 Jul 2009	NA	0.931	0.25 U	0.25 U	0.25 U	204	NS
16 Jun 2010	NA	0.353 J	0.25 U	0.25 U	0.25 U	145	NS
7 Jun 2011	NA	0.263 J	0.25 U	0.25 U	0.25 U	147	NS
3 Dec 2012	NA	0.5 J	0.582 J	0.5 U	0.5 U	Dry Well	NS
11 Dec 2013	NA	5	0.721 J	0.5 U	0.5 U	259 [b]	NS
1 Aug 2014	NA	NS	NS	NS	NS	NS	0.317 J
1 Jan 2015	NA	0.293 J	0.25 U	0.25 U	0.25 U	353	NS
15 Dec 2015	NA	0.5 U	0.5 U	NS	NS	278	NS
16 Dec 2016	NA	0.5 U	0.5 U	0.5 U	0.5 U	151	NS
4 Dec 2017	NA	1 U	1 U	NS	NS	83	NS
4 Dec 2018	NA	0.5 U	0.5 U	NS	NS	48	NS
3 Dec 2019	0.5 U	0.5 U	0.5 U	0.5 U	NS	19	NS
21 Dec 2020	0.5 U	0.5 U	0.5 U	0.5 U	NS	15	NS
28 Dec 2021	0.5 U	0.5 U	0.5 U	0.5 U	NS	5.5	NS

Notes:

[a] This was a 2014 DPT boring grab groundwater sample; no well was subsequently installed.

[b] Analyte diluted 5X.

µg/L - micrograms per liter

J - estimated value; analyte concentration was less than the limit of quantification.

U - Not detected. The analyte was analyzed for, but not detected above the associated limit of detection.

DPT - direct-push technology

NA - not available

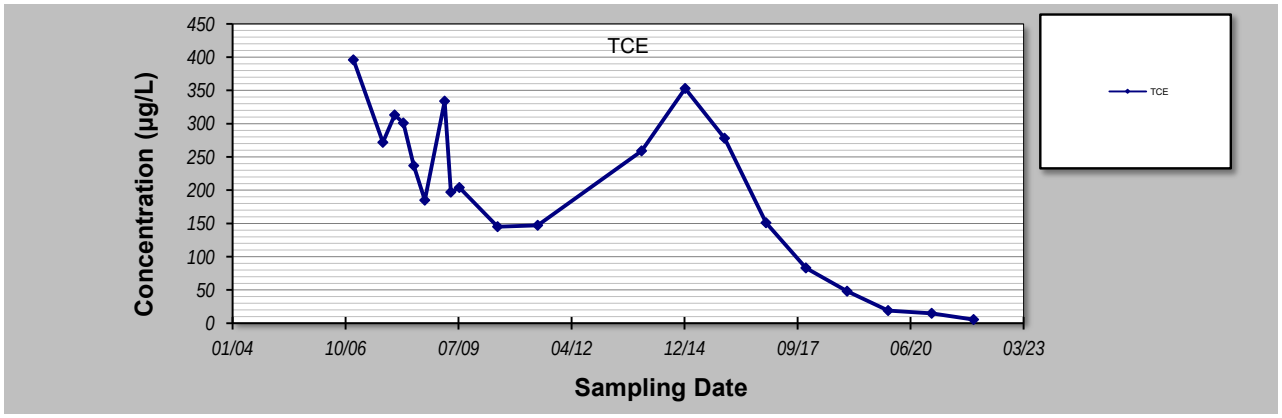
NS - not sampled

TCE - trichloroethene

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	22-Feb-22	Job ID:	501032
Facility Name:	LHAAP-12	Constituent:	12WW24
Conducted By:	Allen Willmore	Concentration Units:	µg/L
Sampling Point ID:	TCE		

Sampling Event	Sampling Date	12WW24 CONCENTRATION (µg/L)
1	19-Dec-06	396
2	5-Sep-07	272
3	19-Dec-07	313
4	5-Mar-08	301
5	4-Jun-08	237
6	11-Sep-08	185
7	4-Mar-09	334
8	29-Apr-09	197
9	14-Jul-09	204
10	16-Jun-10	145
11	7-Jun-11	147
12	11-Dec-13	259
13	1-Jan-15	353
14	15-Dec-15	278
15	16-Dec-16	151
16	4-Dec-17	83
17	4-Dec-18	48
18	3-Dec-19	19
19	21-Dec-20	15
20	28-Dec-21	5.5
21		
22		
23		
24		
25		
Coefficient of Variation:		0.60
Mann-Kendall Statistic (S):		-114
Confidence Factor:		>99.9%
Concentration Trend:		Decreasing



Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water* , 41(3):355-367, 2003.

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Table 4-10
Surface Water Sampling Plan, LHAAP-16

Monitoring Locations	Proposed Analyses			
	VOCs [a] (SW8260B)	Perchlorate (6850)	Metals (/6020A/7471B)	Field Parameters [b]
16SW01	✓	✓	✓	✓
16SW02	✓	✓	✓	✓
16SW03	✓	✓	✓	✓

Notes:

Surface water samples will be collected from the above locations as part of the pre-remedy sampling event and quarterly performance monitoring events

[a] VOCs include trichloroethene (TCE); cis-1,2-dichloroethene (DCE); 1,1-DCE; 1,2-dichloroethane (DCA); 1,1,2-trichloroethane (TCA); Vinyl Chloride (VC); and methylene chloride.

[b] Metals include arsenic, chromium, manganese, nickel and thallium.

[c] Field Parameters include dissolved oxygen, oxidation reduction potential, conductivity, temperature and pH.

✓ Indicates that sample will be collected and analyzed for the listed analyte.

VOCs - volatile organic compounds

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Table 4-4
ISB Performance Monitoring Plan (Years 1 and 2) – Landfill Biobarrier #1

Monitoring Locations	Primary Rationale for Well Selection	Year 1 (Quarterly)																		Year 2 (Quarterly)											
		DO (field reading)	ORP (field reading)	pH (field reading)	Bromide (E300.0)	TOC (SW9060)	Perchlorate (6850)	VOCs [c] (SW8260B)	DO (field reading)	ORP (field reading)	pH (field reading)	Alkalinity (2320B)	Anions [b] (E300.0)	Ethene (RSK-175)	Ethane (RSK-175)	Methane (RSK-175)	DHC (qPCR)	Bromide (E300.0)	TOC (SW9060)	Perchlorate (6850)	VOCs [c] (SW8260B)	DO (field reading)	ORP (field reading)	pH (field reading)	Alkalinity (2320B)	Anions [b] (E300.0)	Ethene (RSK-175)	Ethane (RSK-175)	Methane (RSK-175)	Bromide (E300.0)	TOC (SW9060)
16RW03	Performance data within the biobarrier	✓	✓	✓	✓	✓																									
16IW09	Performance data within the biobarrier	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
16RW01	Upgradient well for monitoring influent concentrations	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓									✓	✓	✓	✓	✓							
16RW02	Upgradient well for monitoring influent concentrations	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓									✓	✓	✓	✓	✓							
16RW04	Downgradient well to monitor effluent concentrations and biobarrier effectiveness	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓							✓	✓	✓	✓	✓	✓	✓							
16RW05	Downgradient well to monitor effluent concentrations and biobarrier effectiveness	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓							✓	✓	✓	✓	✓	✓	✓							
16WW26	Downgradient well to monitor effluent concentrations and biobarrier effectiveness	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓							✓	✓	✓	✓	✓	✓	✓			✓	✓	✓		✓
16WW42	Downgradient well to monitor effluent concentrations and biobarrier effectiveness	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓							✓	✓	✓	✓	✓	✓	✓			✓	✓	✓		✓

Notes:

[a] To be conducted within 15 to 30 days of the completion of substrate injection. A second event will be collected between 45 and 60 days if the results from the first event were inconclusive.

[b] Anions include nitrate and sulfate.

[c] VOCs include TCE; cis-1,2-DCE; 1,1-DCE; 1,2-DCA; 1,1,2-TCA; VC; and methylene chloride.

✓ Indicates that sample will be collected and analyzed for the listed analyte.

ISB - in-situ bioremediation

Table 4-5
ISB Performance Monitoring Plan (Years 1 and 2) – Landfill Biobarrier #2

Monitoring Locations	Primary Rationale for Well Selection	Year 1 (Quarterly)																		Year 2 (Quarterly)											
		DO (field reading)	ORP (field reading)	pH (field reading)	Bromide (E300.0)	TOC (SW9060)	Perchlorate (6850)	VOCs [c] (SW8260B)	DO (field reading)	ORP (field reading)	pH (field reading)	Alkalinity (2320B)	Anions [b] (E300.0)	Ethene (RSK-175)	Ethane (RSK-175)	Methane (RSK-175)	DHC (qPCR)	Bromide (E300)	TOC (SW9060)	Perchlorate (6850)	VOCs [c] (SW8260B)	DO (field reading)	ORP (field reading)	pH (field reading)	Alkalinity (2320B)	Anions [b] (E300.0)	Ethene (RSK-175)	Ethane (RSK-175)	Methane (RSK-175)	Bromide (E300.0)	TOC (SW9060)
16IW03	Performance data within the biobarrier	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
16IW04	Performance data within the biobarrier	✓	✓	✓	✓	✓																									
16PM02	Upgradient well for monitoring influent concentrations	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓									✓	✓	✓	✓	✓							
16PM03	Upgradient well for monitoring influent concentrations	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓									✓	✓	✓	✓	✓							
16PM06	Downgradient well to monitor effluent concentrations and biobarrier effectiveness	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓							✓	✓	✓	✓	✓	✓	✓							
16PM09	Downgradient well to monitor effluent concentrations and biobarrier effectiveness	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓									✓	✓	✓	✓	✓							
16PM14	Downgradient well to monitor effluent concentrations and biobarrier effectiveness	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓							✓	✓	✓	✓	✓	✓	✓							
16WW36	Downgradient well to monitor effluent concentrations and biobarrier effectiveness	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓							✓	✓	✓	✓	✓	✓	✓			✓	✓	✓		✓

Notes:

[a] To be conducted within 15 to 30 days of the completion of substrate injection. A second event will be collected between 45 and 60 days if the results from the first event were inconclusive.

[b] Anions include nitrate and sulfate.

[c] VOCs include trichloroethene (TCE); cis-1,2-dichloroethene (DCE); 1,1-DCE; 1,2-dichloroethane (DCA); 1,1,2-trichloroethane (TCA); Vinyl Chloride (VC); and methylene chloride.

✓ Indicates that sample will be collected and analyzed for the listed analyte.

ISB - in-situ bioremediation

Table 4-6
ISB Performance Monitoring Plan (Years 1 and 2) – Landfill Biobarrier #3

Monitoring Locations	Primary Rationale for Well Selection	Year 1 (Quarterly)																		Year 2 (Quarterly)											
		DO (field reading)	ORP (field reading)	pH (field reading)	Bromide (E300.0)	TOC (SW9060)	Perchlorate (6850)	VOCs [c] (SW8260B)	DO (field reading)	ORP (field reading)	pH (field reading)	Alkalinity (2320B)	Anions [b] (E300.0)	Ethene (RSK-175)	Ethane (RSK-175)	Methane (RSK-175)	DHC (qPCR)	Bromide (E300.0)	TOC (SW9060)	Perchlorate (6850)	VOCs [c] (SW8260B)	DO (field reading)	ORP (field reading)	pH (field reading)	Alkalinity (2320B)	Anions [b] (E300.0)	Ethene (RSK-175)	Ethane (RSK-175)	Methane (RSK-175)	Bromide (E300.0)	TOC (SW9060)
16RW08	Performance data within the biobarrier	✓	✓	✓	✓	✓																									
16IW10	Performance data within the biobarrier	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
16RW06	Upgradient well for monitoring influent concentrations	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓									✓	✓	✓	✓	✓							
16RW07	Upgradient well for monitoring influent concentrations	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓									✓	✓	✓	✓	✓							
16RW09	Downgradient well to monitor effluent concentrations and biobarrier effectiveness	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓							✓	✓	✓	✓	✓	✓	✓			✓	✓	✓		✓
16RW10	Downgradient well to monitor effluent concentrations and biobarrier effectiveness	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓							✓	✓	✓	✓	✓	✓	✓			✓	✓	✓		✓

Notes:

[a] To be conducted within 15 to 30 days of the completion of substrate injection. A second event will be collected between 45 and 60 days if the results from the first event were inconclusive.

[b] Anions include nitrate and sulfate.

[c] VOCs include trichloroethene (TCE); cis-1,2-dichloroethene (DCE); 1,1-DCE; 1,2-dichloroethane (DCA); 1,1,2-trichloroethane (TCA); Vinyl Chloride (VC); and methylene chloride.

✓ Indicates that sample will be collected and analyzed for the listed analyte.

ISB - in-situ bioremediation

Table 4-7
ISB Performance Monitoring Plan (Years 1 and 2) – Bayou Biobarrier

Monitoring Locations	Primary Rationale for Well Selection	Year 1 (Quarterly)																		Year 2 (Quarterly)											
		DO (field reading)	ORP (field reading)	pH (field reading)	Bromide (E300.0)	TOC (SW9060)	Perchlorate (6850)	VOCs [c] (SW8260B)	DO (field reading)	ORP (field reading)	pH (field reading)	Alkalinity (2320B)	Anions [b] (E300.0)	Ethene (RSK-175)	Ethane (RSK-175)	Methane (RSK-175)	DHC (qPCR)	Bromide (E300.0)	TOC (SW9060)	Perchlorate (6850)	VOCs [c] (SW8260B)	DO (field reading)	ORP (field reading)	pH (field reading)	Alkalinity (2320B)	Anions [b] (E300.0)	Ethene (RSK-175)	Ethane (RSK-175)	Methane (RSK-175)	Bromide (E300.0)	TOC (SW9060)
16RW11	Performance data within the biobarrier	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓									✓	✓	✓	✓	✓							
16IW20	Performance data within the biobarrier	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓
16RW12	Performance data downgradient of biobarrier	✓	✓	✓	✓	✓																									
16WW39	Upgradient well for monitoring influent concentrations	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓									✓	✓	✓	✓	✓							
16WW12	Upgradient well to monitor effluent concentrations and biobarrier effectiveness	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓							✓	✓	✓	✓	✓	✓	✓							
16WW22	Upgradient well to monitor effluent concentrations and biobarrier effectiveness	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓							✓	✓	✓	✓	✓	✓	✓							
16WW40	Downgradient well to monitor effluent concentrations and biobarrier effectiveness	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓							✓	✓	✓	✓	✓	✓	✓			✓	✓	✓		✓

Notes:

[a] To be conducted within 15 to 30 days of the completion of substrate injection. A second event will be collected between 45 and 60 days if the results from the first event were inconclusive.

[b] Anions include nitrate and sulfate.

[c] VOCs include trichloroethene (TCE); cis-1,2-dichloroethene (DCE); 1,1-DCE; 1,2-dichloroethane (DCA); 1,1,2-trichloroethane (TCA); Vinyl Chloride (VC); and methylene chloride.

✓ Indicates that sample will be collected and analyzed for the listed analyte.

ISB - in-situ bioremediation

Table 4-8
ISB Performance Monitoring Plan (Years 1 and 2) – Mid-Plume ISB

Monitoring Locations	Primary Rationale for Well Selection	Year 1 (Quarterly)																	Year 2 (Quarterly)											
		DO (field reading)	ORP (field reading)	pH (field reading)	Bromide (E300.0)	TOC (SW9060)	Perchlorate (6850)	VOCs [c] (SW8260B)	DO (field reading)	ORP (field reading)	pH (field reading)	Alkalinity (2320B)	Anions [b] (E300.0)	Ethene (RSK-175)	Ethane (RSK-175)	Methane (RSK-175)	DHC (qPCR)	Bromide (E300.0)	TOC (SW9060)	Perchlorate (6850)	VOCs [c] (SW8260B)	DO (field reading)	ORP (field reading)	pH (field reading)	Alkalinity (2320B)	Anions [b] (E300.0)	Ethene (RSK-175)	Ethane (RSK-175)	Methane (RSK-175)	Bromide (E300.0)	TOC (SW9060)
16EW01	Performance data for injection ISB area - Shallow Zone	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
16EW02	Performance data for injection ISB area - Shallow Zone	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓							
16EW03	Performance data for injection ISB area - Shallow Zone	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓									✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
16EW04	Performance data for injection ISB area - Shallow Zone	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓									✓	✓	✓	✓	✓							
16EW05	Performance Data for Injection Well – Intermediate Zone	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
16EW06	Performance data for injection well - Intermediate Zone	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓									✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
16EW07	Performance data for injection well - Intermediate Zone	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓									✓	✓	✓	✓	✓							
16EW08	Performance data for injection well - Intermediate Zone	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓							✓	✓	✓	✓	✓	✓	✓							
16WW48	Performance data for downgradient - Shallow Zone (proposed)						✓	✓	✓	✓	✓							✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
16WW30	Performance data for downgradient - Shallow Zone						✓	✓	✓	✓	✓							✓	✓	✓	✓	✓	✓	✓							
16WW39	Performance data for downgradient - Shallow Zone						✓	✓	✓	✓	✓							✓	✓	✓	✓	✓	✓	✓							
16WW29	Performance data for downgradient well - Intermediate Zone						✓	✓	✓	✓	✓							✓	✓	✓	✓	✓	✓	✓							
16WW49	Performance data for downgradient well - Intermediate Zone (proposed)						✓	✓	✓	✓	✓							✓	✓	✓	✓	✓	✓	✓							
16WW51	Performance data for downgradient well - Intermediate Zone (proposed)						✓	✓	✓	✓	✓							✓	✓	✓	✓	✓	✓	✓							
16WW21	Performance data for downgradient well in Upper Deep Zone						✓	✓	✓	✓	✓							✓	✓	✓	✓	✓	✓	✓							

Notes:

[a] To be conducted within 15 to 30 days of the completion of substrate injection. A second event will be collected between 45 and 60 days if the results from the first event were inconclusive.

[b] Anions include nitrate and sulfate.

[c] VOCs include trichloroethene (TCE); cis-1,2-dichloroethene (DCE); 1,1-DCE; 1,2-dichloroethane (DCA); 1,1,2-trichloroethane (TCA); Vinyl Chloride (VC); and methylene chloride.

✓ Indicates that sample will be collected and analyzed for the listed analyte.

ISB - in-situ bioremediation

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Table 4-9
MNA and LTM Performance Monitoring Plan – LHAAP-16

Monitoring Locations	Groundwater Zone	Proposed Analyses								
		VOCs [a] (SW8260B)	Perchlorate (6850)	Anions [b] (E300.0)	Dissolved Gases [c] (RSK-175)	Alkalinity (2320B)	TOC (SW9060)	DHC (qPCR)	Bromide (E300.0)	Field Parameters [d]
16WW44	Shallow	✓	✓							✓
16WW38	Shallow	✓	✓							✓
16WW16	Shallow	✓	✓	✓	✓	✓	✓	✓	✓	✓
16WW14	Shallow	✓	✓							✓
16WW36	Shallow	✓	✓	✓	✓	✓	✓	✓	✓	✓
16WW26	Shallow	✓	✓	✓	✓	✓	✓	✓	✓	✓
16WW42	Shallow	✓	✓							✓
16WW43	Shallow	✓	✓							✓
16WW30	Shallow	✓	✓							✓
16WW40	Shallow	✓	✓							✓
16WW22	Shallow	✓	✓	✓	✓	✓	✓	✓	✓	✓
16WW46	Shallow	✓	✓							✓
16WW32	Shallow	✓	✓							✓
16WW34	Shallow	✓	✓							✓
16WW24	Shallow	✓	✓							✓
16WW48	Shallow	✓	✓	✓	✓	✓	✓	✓	✓	✓
16WW39	Shallow	✓	✓							✓
16WW55	Shallow	✓	✓	✓	✓	✓	✓	✓	✓	✓
16WW56	Shallow	✓	✓	✓	✓	✓	✓	✓	✓	✓
16WW57	Shallow	✓	✓	✓	✓	✓	✓	✓	✓	✓
16WW58	Shallow	✓	✓	✓	✓	✓	✓	✓	✓	✓
16WW37	Intermediate	✓	✓							✓
16WW35	Intermediate	✓	✓	✓	✓	✓	✓	✓	✓	✓
16WW13	Intermediate	✓	✓							✓
16WW23	Intermediate	✓	✓							✓
16WW25	Intermediate	✓	✓	✓	✓	✓	✓	✓	✓	✓
16WW27	Intermediate	✓	✓							✓
16WW29	Intermediate	✓	✓	✓	✓	✓	✓	✓	✓	✓
16WW41	Intermediate	✓	✓	✓	✓	✓	✓	✓	✓	✓
16WW31	Intermediate	✓	✓							✓
16WW33	Intermediate	✓	✓							✓
16WW49	Intermediate	✓	✓							✓
16WW51	Intermediate	✓	✓							✓
16WW21	Upper Deep	✓	✓							✓

Notes:

This schedule assumes sampling of the extraction wells will be continued annualy until the remedy is implemented; therefore, only 16EW02 will be sampled during baseline monitoring.

[a] VOCs include trichloroethene (TCE); cis-1,2-dichloroethene (DCE); 1,1-DCE; 1,2-dichloroethane (DCA); 1,1,2-trichloroethane (TCA); Vinyl Chloride (VC); and methylene chloride.

[b] Anions include nitrate and sulfate.

[c] Dissolved gasses include ethene, ethane, and methane.

[d] Field Parameters include dissolved oxygen, oxidation reduction potential, and pH.

✓ Indicates that sample will be collected and analyzed for the listed analyte.

DHC - Dehalococcoides (microbial analysis)

LTM - long-term monitoring

TOC - total organic carbon

VOCs - volatile organic compounds

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Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code		16EW01											
			Sample ID	16EW01-200716		16EW01-201020		16EW01-210125		16EW01-210421		16EW01-210713		16EW01-211020		16EW01-220113	
			Sample Date	7/16/2020		10/20/2020		1/25/2021		4/21/2021		7/13/2021		10/20/2021		1/13/2022	
			Groundwater Zone	SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW	
Analyte	Units	MCL/PCL		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																	
Dehalococcoides	cells/mL	NV		0.2	J	0.4	J	292		NA		NA		NA		NA	
Field Measurements																	
Dissolved oxygen	mg/L	NV		0.79		0.34		0.6		0.28		1.59		0.28		0.67	
Oxidation Reduction Potential	mV	NV		58		22		46.2		-18		12		77		42	
pH	SU	NV		5.88		6.33		6.61		6.55		6.18		5.93		6.3	
Dissolved Gases (RSK-175)																	
Ethane	µg/L	NV		0.603	J	< 2.5	U	< 0.47	U	< 0.5	U	< 0.25	U	< 0.5	U	< 0.5	U
Ethylene	µg/L	NV		105		112		9.1		102	J	20.2	J	50.9	J	51.8	J
Methane	µg/L	NV		177		182		11		406		89		122	J	122	
General Chemistry (2320B/SM5310B/SW9056A)																	
Alkalinity	mg/L	NV		418		517		891		529		397		610		598	
Bromide	mg/L	NV		6.04		7.02		13.5		8.22		7.26		10.1		0.85	
Nitrate	mg/L	NV		< 0.5	U	< 0.5	U	1.46		0.494	J	1.66		< 0.5	U	0.22	J
Sulfate	mg/L	NV		3510		3960		4270		3420		2290		3150		3410	
Total organic carbon	mg/L	NV		13.7		14.4		19.4		16.8		12.1		19.5		18.8	
Perchlorate (EPA 6850)																	
Perchlorate	µg/L	17		28.4		27.5		180	J	41.9		29		40.3		61	
Volatile Organic Compounds (8260C)																	
1,1,2-Trichloroethane	µg/L	5		< 20	U	< 12	U	< 10	U	< 25	U	< 10	U	< 10	U	< 10	U
1,1-Dichloroethene	µg/L	7		36		29		24		22	J	7.4	J	6.8	J	9.6	J
1,2-Dichloroethane	µg/L	5		27		25		16		18	J	7.1	J	8	J	9.6	J
cis-1,2-Dichloroethene	µg/L	70		6800		7600		7200		6000		2000		3400		3600	
Methylene chloride	µg/L	5		< 20	U	< 25	U	< 20	U	< 50	U	< 10	U	< 10	U	< 20	U
Trichloroethene	µg/L	5		4700		5400		4100		3500		990		970		1800	
Vinyl chloride	µg/L	2		780		630		820		720		100		180		260	

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code	16EW02												
			Sample ID	16EW02-181009		16EW02-190918		16EW02-200716		16EW02-200716-FD		16EW02-201021		16EW02-210126		16EW02-210419	
			Sample Date	10/9/2018		9/18/2019		7/16/2020		7/16/2020		10/21/2020		1/26/2021		4/19/2021	
			Groundwater Zone	SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW	
Analyte	Units	MCL/PCL		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																	
Dehalococcoides	cells/mL	NV		0.2	J	NA		5.9		NA		406		3600		NA	
Field Measurements																	
Dissolved oxygen	mg/L	NV		1.16		1.11		0.37		0.37		0.02		0.67		0.15	
Oxidation Reduction Potential	mV	NV		80.2		171		191		191		43		65.6		43	
pH	SU	NV		6.00		6.16		5.96		5.96		6.25		6.19		6.37	
Dissolved Gases (RSK-175)																	
Ethane	µg/L	NV		1.16		NA		0.275	J	0.349	J	< 0.25	U	0.71		NA	
Ethylene	µg/L	NV		8.81		NA		0.627	J	1.12		1.54		26		NA	
Methane	µg/L	NV		33.6		NA		5.65		6.34		9.39		130		NA	
General Chemistry (2320B/SM5310B/SW9056A)																	
Alkalinity	mg/L	NV		438		NA		407		411		328		473		NA	
Bromide	mg/L	NV		2.66		NA		12.7		11.9		6.87		7.05		NA	
Nitrate	mg/L	NV		< 0.1	U	NA		< 0.1	U	< 0.1	U	< 0.5	U	< 0.2	U	NA	
Sulfate	mg/L	NV		2130		NA		1650		1590		1380		2950		NA	
Total organic carbon	mg/L	NV		10.3		NA		8.37		8.3		7.36		12		NA	
Perchlorate (EPA 6850)																	
Perchlorate	µg/L	17		< 2	U	< 2	U	16.2		9.34		< 0.05	U	< 0.5	U	0.53	
Volatile Organic Compounds (8260C)																	
1,1,2-Trichloroethane	µg/L	5		< 25	U	< 12	U	< 25	U	< 25	U	< 25	U	< 25	U	< 25	U
1,1-Dichloroethene	µg/L	7		100		110		97		86		110		140		64	
1,2-Dichloroethane	µg/L	5		< 25	U	51		43		39		48	J	55		35	
cis-1,2-Dichloroethene	µg/L	70		16000		25000		22000		21000		26000		35000		18000	
Methylene chloride	µg/L	5		< 50	U	< 25	U	< 25	U	< 25	U	< 50	U	< 50	U	41	J
Trichloroethene	µg/L	5		24000		42000		37000		35000		26000		38000		23000	
Vinyl chloride	µg/L	2		470		650		39		28		51		930		45	

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code	16EW02						16EW03							
			Sample ID	16EW02-210726		16EW02-211020		16EW02-220112		16EW03-200325		16EW03-200728		16EW03-201022		16EW03-210202	
			Sample Date	7/26/2021		10/20/2021		1/12/2022		3/25/2020		7/28/2020		10/22/2020		2/2/2021	
			Groundwater Zone	SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW	
Analyte	Units	MCL/PCL		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																	
Dehalococcoides	cells/mL	NV		NA		NA		NA		NA		NA		NA		NA	
Field Measurements																	
Dissolved oxygen	mg/L	NV		0.58		0.26		0.76		0.24		2.25		0.02		0.09	
Oxidation Reduction Potential	mV	NV		36		15		69		-98		-263		-73		-189	
pH	SU	NV		6.38		6.11		6.42		6.97		6.39		6.18		6.25	
Dissolved Gases (RSK-175)																	
Ethane	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Ethylene	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Methane	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
General Chemistry (2320B/SM5310B/SW9056A)																	
Alkalinity	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Bromide	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Nitrate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Sulfate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Total organic carbon	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Perchlorate (EPA 6850)																	
Perchlorate	µg/L	17		0.984	J	2.53		1.6		< 10	U	2.09		< 0.1	U	< 0.5	UJ
Volatile Organic Compounds (8260C)																	
1,1,2-Trichloroethane	µg/L	5		< 25	U	7.2	J	< 25	U	< 2.5	U	< 25	U	1.3		< 5	U
1,1-Dichloroethene	µg/L	7		58		65		50		< 2.5	U	< 12	U	1.2		4	J
1,2-Dichloroethane	µg/L	5		29		37		35		4.5	J	< 12	U	3.4		< 2.5	U
cis-1,2-Dichloroethene	µg/L	70		18000		22000		16000		1700	J-	440		1400		1100	
Methylene chloride	µg/L	5		< 25	U	< 10	U	< 50	U	< 5	U	< 25	U	< 1	U	< 10	U
Trichloroethene	µg/L	5		25000		23000		19000		170		60		130		290	
Vinyl chloride	µg/L	2		42		630		340		750		< 12	U	200		780	

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code	16EW03								16EW04					
			Sample ID	16EW03-210421		16EW03-210722		16EW03-211020		16EW03-220127		16EW04-200728		16EW04-201020		16EW04-210202	
			Sample Date	4/21/2021		7/22/2021		10/20/2021		1/27/2022		7/28/2020		10/20/2020		2/2/2021	
			Groundwater Zone	SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW	
Analyte	Units	MCL/PCL		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																	
Dehalococcoides	cells/mL	NV		NA		NA		NA		NA		NA		NA		NA	
Field Measurements																	
Dissolved oxygen	mg/L	NV		0.54		0.52		0.11		0.3		0.11		0.02		0.03	
Oxidation Reduction Potential	mV	NV		-104		-43		-81		-95		82		-105		-54	
pH	SU	NV		6.80		6.61		5.45		7.09		5.91		6.70		5.66	
Dissolved Gases (RSK-175)																	
Ethane	µg/L	NV		< 0.5	U	< 0.25	U	< 0.5	U	< 0.5	U	NA		NA		NA	
Ethylene	µg/L	NV		527	J	701	J	131	J	175	J	NA		NA		NA	
Methane	µg/L	NV		528		1140		164	J	574		NA		NA		NA	
General Chemistry (2320B/SM5310B/SW9056A)																	
Alkalinity	mg/L	NV		961		1140		1050		1160		NA		NA		NA	
Bromide	mg/L	NV		5.93		3.7		9.02		7.37		NA		NA		NA	
Nitrate	mg/L	NV		< 0.5	U	< 0.5	U	< 0.5	U	< 0.1	U	NA		NA		NA	
Sulfate	mg/L	NV		1090		1350		1860		1920		NA		NA		NA	
Total organic carbon	mg/L	NV		12.2		14.8		67		20.9		NA		NA		NA	
Perchlorate (EPA 6850)																	
Perchlorate	µg/L	17		< 0.05	U	< 0.5	U	< 0.2	U	< 0.2	U	1.42		< 0.05	U	< 0.5	UJ
Volatile Organic Compounds (8260C)																	
1,1,2-Trichloroethane	µg/L	5		< 5	U	< 10	U	< 10	U	< 5	U	< 25	U	< 5	UJ	< 10	U
1,1-Dichloroethene	µg/L	7		3.1	J	< 5	U	< 5	U	< 2.5	U	20	J	5.9	J-	16	
1,2-Dichloroethane	µg/L	5		2.8	J	< 5	U	< 5	U	< 2.5	U	13	J	< 5	UJ	13	
cis-1,2-Dichloroethene	µg/L	70		1200		1500		270		1000		4300		4400		4800	
Methylene chloride	µg/L	5		< 10	U	15	UB	< 10	U	< 10	U	< 25	U	< 10	UJ	< 20	U
Trichloroethene	µg/L	5		250		77		54		84		15000		520	J-	17000	
Vinyl chloride	µg/L	2		460		310		92		230		15	J	< 5	UJ	29	

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code	16EW04								16EW05					
			Sample ID	16EW04-210419		16EW04-210726		16EW04-211020		16EW04-220112		16EW05-181011		16EW05-200330		16EW05-200716	
			Sample Date	4/19/2021		7/26/2021		10/20/2021		1/12/2022		10/11/2018		3/30/2020		7/16/2020	
			Groundwater Zone	SHALLOW		SHALLOW		SHALLOW		SHALLOW		INTERMEDIATE		INTERMEDIATE		INTERMEDIATE	
Analyte	Units	MCL/PCL		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																	
Dehalococcoides	cells/mL	NV		NA		NA		NA		NA		NA		5060		5040	
Field Measurements																	
Dissolved oxygen	mg/L	NV		0.15		1.45		0.34		0.79		0.74		0.07		0.04	
Oxidation Reduction Potential	mV	NV		73		117		115		43		189.9		-47		-32	
pH	SU	NV		5.81		5.70		5.95		6.11		6.17		5.25		5.65	
Dissolved Gases (RSK-175)																	
Ethane	µg/L	NV		NA		NA		NA		NA		NA		9.16		NA	
Ethylene	µg/L	NV		NA		NA		NA		NA		NA		2.22		NA	
Methane	µg/L	NV		NA		NA		NA		NA		NA		248		NA	
General Chemistry (2320B/SM5310B/SW9056A)																	
Alkalinity	mg/L	NV		NA		NA		NA		NA		NA		102	U	66.2	
Bromide	mg/L	NV		NA		NA		NA		NA		3.1		5	U	19.8	
Nitrate	mg/L	NV		NA		NA		NA		NA		NA		5	U	0.995	U
Sulfate	mg/L	NV		NA		NA		NA		NA		NA		25	U	64.7	
Total organic carbon	mg/L	NV		NA		NA		NA		NA		NA		300			
Perchlorate (EPA 6850)																	
Perchlorate	µg/L	17		< 0.05	U	< 0.5	U	< 0.2	U	< 0.2	U			< 20	U	0.16	J
Volatile Organic Compounds (8260C)																	
1,1,2-Trichloroethane	µg/L	5		< 10	U	< 5	U	< 10	U	< 10	U			< 50	UJ	< 100	U
1,1-Dichloroethene	µg/L	7		11		3.2	J	5.6	J	5.5	J			< 50	UJ	< 100	U
1,2-Dichloroethane	µg/L	5		6.2	J	< 2.5	U	< 5	U	< 5	U			< 50	UJ	< 100	U
cis-1,2-Dichloroethene	µg/L	70		2600		640		1300		1300				< 50	UJ	< 100	U
Methylene chloride	µg/L	5		17	J	< 5	U	< 10	U	< 20	U			< 100	UJ	< 100	U
Trichloroethene	µg/L	5		9500		3100		5100		3400				< 50	UJ	< 100	U
Vinyl chloride	µg/L	2		11		2.5	J	15		11				< 50	UJ	< 100	U

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

		Location Code	16EW05								16EW06					
		Sample ID	16EW05-211021		16EW05-211021-FD		16EW05-220127		16EW05-220127-FD		16EW06-181009		16EW06-190918		16EW06-200325	
		Sample Date	10/21/2021		10/21/2021		1/27/2022		1/27/2022		10/9/2018		9/18/2019		3/25/2020	
		Groundwater Zone	INTERMEDIATE		INTERMEDIATE		INTERMEDIATE		INTERMEDIATE		INTERMEDIATE		INTERMEDIATE		INTERMEDIATE	
Analyte	Units	MCL/PCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																
Dehalococcoides	cells/mL	NV	NA		NA		NA				1.7		NA		NA	
Field Measurements									NA							
Dissolved oxygen	mg/L	NV	0.4		0.4		0.35		0.35		0.95		0.53		0.02	
Oxidation Reduction Potential	mV	NV	-78		-78		63		63		59.3		58		29	
pH	SU	NV	5.19		5.19		5.27		5.27		5.84		6.18		4.52	
Dissolved Gases (RSK-175)																
Ethane	µg/L	NV	NA		NA		34.2		35.2	J	0.31	J	NA		NA	
Ethylene	µg/L	NV	NA		NA		26.1	J	29.2	J	3.76		NA		NA	
Methane	µg/L	NV	NA		NA		6440		7470		8.39		NA		NA	
General Chemistry (2320B/SM5310B/SW9056A)																
Alkalinity	mg/L	NV	324		298		346	J	501	J	438		NA		NA	
Bromide	mg/L	NV	74		72.3		70.2		70.1		3.38		NA		NA	
Nitrate	mg/L	NV	< 0.5	U	< 0.5	U	< 0.2	U	0.156	J	< 0.2	U	NA		NA	
Sulfate	mg/L	NV	3.95	J	1.8	J	104	J	2.4	J	6120		NA		NA	
Total organic carbon	mg/L	NV	21900		20800		161000		165000		31		NA		NA	
Perchlorate (EPA 6850)																
Perchlorate	µg/L	17	0.164	J	< 0.2	U	0.16	J	0.19	J	< 2	U	42		< 10	U
Volatile Organic Compounds (8260C)																
1,1,2-Trichloroethane	µg/L	5	< 10000	UJ	< 10000	UJ	< 5000	U	< 5000	U	< 2.5	U	< 12	U	< 50	U
1,1-Dichloroethene	µg/L	7	< 5000	UJ	< 5000	UJ	< 2500	U	< 2500	U	25		22	J	< 50	U
1,2-Dichloroethane	µg/L	5	< 5000	UJ	< 5000	UJ	< 2500	U	< 2500	U	4.6	J	< 12	U	< 50	U
cis-1,2-Dichloroethene	µg/L	70	< 5000	UJ	< 5000	UJ	< 2500	U	< 2500	U	3700		3700		160	
Methylene chloride	µg/L	5	< 10000	UJ	< 10000	UJ	< 10000	U	< 10000	U	< 5	U	< 25	U	< 100	U
Trichloroethene	µg/L	5	< 5000	UJ	< 5000	UJ	< 2500	U	< 2500	U	5500		6500		< 50	U
Vinyl chloride	µg/L	2	< 5000	UJ	< 5000	UJ	< 2500	U	< 2500	U	240		190		< 50	U

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code		16EW06											
			Sample ID	16EW06-200716		16EW06-201021		16EW06-201021-FD		16EW06-210202		16EW06-210202-FD		16EW06-210422		16EW06-211021	
			Sample Date	7/16/2020		10/21/2020		10/21/2020		2/2/2021		2/2/2021		4/22/2021		10/21/2021	
			Groundwater Zone	INTERMEDIATE		INTERMEDIATE		INTERMEDIATE		INTERMEDIATE		INTERMEDIATE		INTERMEDIATE		INTERMEDIATE	
Analyte	Units	MCL/PCL		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																	
Dehalococcoides	cells/mL	NV		NA		NA		NA		NA		NA		NA		NA	
Field Measurements																	
Dissolved oxygen	mg/L	NV		0.08		0.11		0.11		0.07		0.07		0.05		0.08	
Oxidation Reduction Potential	mV	NV		-41		-49		-49		-59		-59		-70		-105	
pH	SU	NV		5.87		5.93		5.93		5.87		5.87		5.73		5.2	
Dissolved Gases (RSK-175)																	
Ethane	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Ethylene	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Methane	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
General Chemistry (2320B/SM5310B/SW9056A)																	
Alkalinity	mg/L	NV		NA		NA		NA		NA		NA		10	U	NA	
Bromide	mg/L	NV		NA		NA		NA		NA		NA		9.89	U	NA	
Nitrate	mg/L	NV		NA		NA		NA		NA		NA		9.89	U	NA	
Sulfate	mg/L	NV		NA		NA		NA		NA		NA		49.4	U	NA	
Total organic carbon	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Perchlorate (EPA 6850)																	
Perchlorate	µg/L	17		< 0.75	U	< 0.75	U	< 0.75	U	< 0.75	U	< 0.75	U	< 7.5	U	< 0.2	UJ
Volatile Organic Compounds (8260C)																	
1,1,2-Trichloroethane	µg/L	5		< 100	U	< 250	U	< 500	U	< 500	U	< 500	U	< 1000	U	< 5000	UJ
1,1-Dichloroethene	µg/L	7		< 100	U	< 250	U	< 250	U	< 250	U	< 250	U	< 500	U	< 2500	UJ
1,2-Dichloroethane	µg/L	5		< 100	U	< 250	U	< 250	U	< 250	U	< 250	U	< 500	U	< 2500	UJ
cis-1,2-Dichloroethene	µg/L	70		470		750		520		400	J	520		< 500	U	6800	J
Methylene chloride	µg/L	5		82	J	< 500	U	< 500	U	< 1000	U	< 1000	U	< 2000	U	< 5000	UJ
Trichloroethene	µg/L	5		40	J	< 250	U	< 250	U	< 250	U	< 250	U	< 500	U	3000	J
Vinyl chloride	µg/L	2		370		510		< 250	U	250	J	240	J	< 500	U	< 2500	UJ

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code	16EW06	16EW07									
			Sample ID	16EW06-220127	16EW07-181013		16EW07-200325		16EW07-200728		16EW07-201022		16EW07-210202		16EW07-210415	
			Sample Date	1/27/2022	10/13/2018		3/25/2020		7/28/2020		10/22/2020		2/2/2021		4/15/2021	
			Groundwater Zone	INTERMEDIATE	INTERMEDIATE		INTERMEDIATE		INTERMEDIATE		INTERMEDIATE		INTERMEDIATE		INTERMEDIATE	
Analyte	Units	MCL/PCL		Result	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																
Dehalococcoides	cells/mL	NV		NA	NA		NA		NA		NA		NA		NA	
Field Measurements																
Dissolved oxygen	mg/L	NV		0.27	1.62		0.05		0.33		0.47		0.4		0.38	
Oxidation Reduction Potential	mV	NV		25	-130.9		-37		-247		-261		-257		-261	
pH	SU	NV		5.89	7.12		5.10		5.53		5.59		5.45		5.37	
Dissolved Gases (RSK-175)																
Ethane	µg/L	NV		NA	NA		NA		NA		NA		NA		NA	
Ethylene	µg/L	NV		NA	NA		NA		NA		NA		NA		NA	
Methane	µg/L	NV		NA	NA		NA		NA		NA		NA		NA	
General Chemistry (2320B/SM5310B/SW9056A)																
Alkalinity	mg/L	NV		10	NA		NA		NA		NA		NA		NA	
Bromide	mg/L	NV		0.996	2.14		NA		NA		NA		NA		NA	
Nitrate	mg/L	NV		0.449	NA		NA		NA		NA		NA		NA	
Sulfate	mg/L	NV		4.98	NA		NA		NA		NA		NA		NA	
Total organic carbon	mg/L	NV		NA	NA		NA		NA		NA		NA		NA	
Perchlorate (EPA 6850)																
Perchlorate	µg/L	17		< 1	NA		< 10	U	4.68	J	< 0.75	U	< 0.75	U	0.375	J
Volatile Organic Compounds (8260C)																
1,1,2-Trichloroethane	µg/L	5		< 4900	NA		< 50	U	< 980	U	< 500	U	< 500	U	< 1000	U
1,1-Dichloroethene	µg/L	7		< 2400	NA		< 50	U	10000	J-	< 250	U	< 250	U	< 500	U
1,2-Dichloroethane	µg/L	5		< 2400	NA		< 50	U	< 980	U	< 250	U	< 250	U	< 500	U
cis-1,2-Dichloroethene	µg/L	70		< 2400	NA		< 50	U	4100	J-	< 250	U	< 250	U	< 500	U
Methylene chloride	µg/L	5		< 9800	NA		< 100	U	< 980	U	< 500	U	< 1000	U	< 2000	U
Trichloroethene	µg/L	5		< 2400	NA		100		5000	J-	490	J	< 250	U	< 500	U
Vinyl chloride	µg/L	2		< 2400	NA		< 50	U	< 980	U	< 250	U	< 250	U	< 500	U

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code	16EW07						16EW08							
			Sample ID	16EW07-210727		16EW07-211021		16EW07-220125		16EW08-181013		16EW08-200331		16EW08-200728		16EW08-201020	
			Sample Date	7/27/2021		10/21/2021		1/25/2022		10/13/2018		3/31/2020		7/28/2020		10/20/2020	
			Groundwater Zone	INTERMEDIATE		INTERMEDIATE		INTERMEDIATE		INTERMEDIATE		INTERMEDIATE		INTERMEDIATE		INTERMEDIATE	
Analyte	Units	MCL/PCL		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																	
Dehalococcoides	cells/mL	NV		NA		NA		NA		NA		NA		NA		NA	
Field Measurements																	
Dissolved oxygen	mg/L	NV		0.43		0.14		0.35		0.48		0.07		0.26		0.03	
Oxidation Reduction Potential	mV	NV		-197		-6		14		-16		-27		-243		74	
pH	SU	NV		5.31		5.47		5.43		6.23		5.20		5.85		4.97	
Dissolved Gases (RSK-175)																	
Ethane	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Ethylene	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Methane	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
General Chemistry (2320B/SM5310B/SW9056A)																	
Alkalinity	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Bromide	mg/L	NV		NA		NA		NA		1.11		< 0.5	U	16		9.59	
Nitrate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Sulfate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Total organic carbon	mg/L	NV		NA		NA		NA		NA		800		711		332	
Perchlorate (EPA 6850)																	
Perchlorate	µg/L	17		< 0.75	U	0.22	J	< 2	U	NA		< 20	U	0.0836	J	< 0.05	U
Volatile Organic Compounds (8260C)																	
1,1,2-Trichloroethane	µg/L	5		< 1000	UJ	< 10000	UJ	< 10000	U	NA		< 100	U	< 50	U	< 0.5	U
1,1-Dichloroethene	µg/L	7		< 500	UJ	< 5000	UJ	< 5000	U	NA		< 50	U	< 25	U	< 0.5	U
1,2-Dichloroethane	µg/L	5		< 500	UJ	< 5000	UJ	< 5000	U	NA		< 50	U	< 25	U	< 0.5	U
cis-1,2-Dichloroethene	µg/L	70		< 500	UJ	< 5000	UJ	< 5000	U	NA		< 50	U	< 25	U	1.7	
Methylene chloride	µg/L	5		< 1000	UJ	< 10000	UJ	< 20000	U	NA		< 100	U	< 50	U	< 1	U
Trichloroethene	µg/L	5		< 500	UJ	< 5000	UJ	< 5000	U	NA		52	J	< 25	U	1.6	
Vinyl chloride	µg/L	2		< 500	UJ	< 5000	UJ	< 5000	U	NA		< 50	U	< 25	U	< 0.5	U

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code	16EW08										16IW03			
			Sample ID	16EW08-210202		16EW08-210419		16EW08-210726		16EW08-211020		16EW08-220112		16IW03-200123		16IW03-200325	
			Sample Date	2/2/2021		4/19/2021		7/26/2021		10/20/2021		1/12/2022		1/23/2020		3/25/2020	
			Groundwater Zone	INTERMEDIATE		INTERMEDIATE		INTERMEDIATE		INTERMEDIATE		INTERMEDIATE		SHALLOW		SHALLOW	
Analyte	Units	MCL/PCL		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																	
Dehalococcoides	cells/mL	NV		NA		NA		NA		NA		NA		NA		866	
Field Measurements																	
Dissolved oxygen	mg/L	NV		0.06		0.02		0.45		0.21		0.47		0.04		0.1	
Oxidation Reduction Potential	mV	NV		-122		-15		15		19		76		-78		-53	
pH	SU	NV		5.00		5.26		5.350		4.95		5.5		7.25		5.21	
Dissolved Gases (RSK-175)																	
Ethane	µg/L	NV		NA		NA		NA		NA		NA		NA		1.38	
Ethylene	µg/L	NV		NA		NA		NA		NA		NA		NA		4.6	
Methane	µg/L	NV		NA		NA		NA		NA		NA		NA		12.4	
General Chemistry (2320B/SM5310B/SW9056A)																	
Alkalinity	mg/L	NV		NA		NA		NA		NA		NA		NA		502	
Bromide	mg/L	NV		7.93		NA		NA		NA		NA		0.66		0.582	
Nitrate	mg/L	NV		NA		NA		NA		NA		NA		NA		0.325	
Sulfate	mg/L	NV		NA		NA		NA		NA		NA		NA		6.92	J-
Total organic carbon	mg/L	NV		445		NA		NA		NA		NA		222		650	
Perchlorate (EPA 6850)																	
Perchlorate	µg/L	17		< 0.05	UJ	< 0.05	U	< 0.05	U	< 0.2	U	< 0.2	U	NA		< 2	U
Volatile Organic Compounds (8260C)																	
1,1,2-Trichloroethane	µg/L	5		< 1	U	< 1	U	< 1	U	< 5	U	< 1	U	NA		< 5	U
1,1-Dichloroethene	µg/L	7		< 0.5	U	< 0.5	U	< 0.5	U	< 2.5	U	< 0.5	U	NA		37	
1,2-Dichloroethane	µg/L	5		< 0.5	U	< 0.5	U	< 0.5	U	< 2.5	U	< 0.5	U	NA		< 5	U
cis-1,2-Dichloroethene	µg/L	70		1	J	0.84	J	1.3		14		11		NA		14000	
Methylene chloride	µg/L	5		< 2	U	< 2	U	< 1	U	< 5	U	< 2	U	NA		< 10	U
Trichloroethene	µg/L	5		3.1		2.6		1.8		3.3	J	3.4		NA		8000	
Vinyl chloride	µg/L	2		< 0.5	U	< 0.5	U	< 0.5	U	< 2.5	U	< 0.5	U	NA		160	

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code	16IW03												
			Sample ID	16IW03-200728		16IW03-201013		16IW03-210126		16IW03-210126-FD		16IW03-210420		16IW03-210722		16IW03-211021	
			Sample Date	7/28/2020		10/13/2020		1/26/2021		1/26/2021		4/20/2021		7/22/2021		10/21/2021	
			Groundwater Zone	SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW	
Analyte	Units	MCL/PCL		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																	
Dehalococcoides	cells/mL	NV		817		634		976		NA		NA		NA		NA	
Field Measurements																	
Dissolved oxygen	mg/L	NV		0.04		0.04		1.38		1.38		0.18		0.45		0.18	
Oxidation Reduction Potential	mV	NV		-97		-103		49.9		49.9		-58		-27		19	
pH	SU	NV		5.41		5.35		5.33		5.33		5.21		5.16		5.13	
Dissolved Gases (RSK-175)																	
Ethane	µg/L	NV		7.46		4.98	J+	2.7		2.8		< 0.5	U	< 0.25	UJ	< 0.5	U
Ethylene	µg/L	NV		50		57.7	J+	500		530		819	J	1640	J	714	J
Methane	µg/L	NV		946		685		610		630		1330		2930	J	1740	J
General Chemistry (2320B/SM5310B/SW9056A)																	
Alkalinity	mg/L	NV		NA		771		1390		1240		1700		1580		1510	
Bromide	mg/L	NV		0.973		1.27		5.17		4.2		6.6		3.3		3.1	
Nitrate	mg/L	NV		0.851		0.665	J+	< 0.1	UJ	0.152	J	< 0.5	U	< 0.5	U	< 0.5	U
Sulfate	mg/L	NV		18.7	J-	10.9	J-	11.6	J	18.1	J	44.3		1.3	J	< 2.5	U
Total organic carbon	mg/L	NV		47.8		1190		< 1	U	< 1	U	2860		2750		2610	
Perchlorate (EPA 6850)																	
Perchlorate	µg/L	17		1.85		0.0876	J	< 0.5	U	< 0.5	U	0.754	J	< 0.5	U	< 0.2	U
Volatile Organic Compounds (8260C)																	
1,1,2-Trichloroethane	µg/L	5		< 25	U	4.1	J	< 10	U	< 10	U	< 10	U	< 10	U	< 20	UJ
1,1-Dichloroethene	µg/L	7		51		38		49		48		46		38		38	J
1,2-Dichloroethane	µg/L	5		< 12	U	5.4		5.9	J	5.7	J	6.2	J	6.7	J	< 10	UJ
cis-1,2-Dichloroethene	µg/L	70		14000		11000		12000		12000		11000		10000		14000	J
Methylene chloride	µg/L	5		< 25	U	< 5	U	< 20	U	< 20	U	17	J	16	UB	< 20	UJ
Trichloroethene	µg/L	5		13000		10000		8800		8700		8900		8100		9000	J
Vinyl chloride	µg/L	2		460		530		3700		3600		3700		2600		2500	J

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code	16IW03	16IW09									
			Sample ID	16IW03-220127	16IW09-200325		16IW09-200325-FD		16IW09-200716		16IW09-201013		16IW09-210126		16IW09-210422	
			Sample Date	1/27/2022	3/25/2020		3/25/2020		7/16/2020		10/13/2020		1/26/2021		4/22/2021	
			Groundwater Zone	SHALLOW	SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW	
Analyte	Units	MCL/PCL		Result	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																
Dehalococcoides	cells/mL	NV		NA	27.8		NA		5.1	J	< 7.2	U	2.9		NA	
Field Measurements																
Dissolved oxygen	mg/L	NV		0.23	0.09		0.09		1.52		0.09		2.5		0.03	
Oxidation Reduction Potential	mV	NV		35	8		8		143		56		53.2		11	
pH	SU	NV		5.46	4.94		4.94		4.62		5.42		5.56		5.76	
Dissolved Gases (RSK-175)																
Ethane	µg/L	NV		< 0.5	11.4		11.9		17.9		< 0.25	U	< 0.47	U	< 0.5	U
Ethylene	µg/L	NV		876	10.2		7.93		16.6		1.25		< 0.55	U	< 0.5	UJ
Methane	µg/L	NV		3210	1340		1110		3970		< 0.25	U	5200		3500	
General Chemistry (2320B/SM5310B/SW9056A)																
Alkalinity	mg/L	NV		1320	432		440		428		698		610		598	
Bromide	mg/L	NV		12.6	11.6		11.3		13.4		7.76		4.65		4.13	
Nitrate	mg/L	NV		< 0.2	< 0.1	U	< 0.1	U	< 2	U	0.499		0.615		0.0908	J
Sulfate	mg/L	NV		< 1	1.43		1.48		4.44	J	11.2		7.11		4.75	
Total organic carbon	mg/L	NV		2630	820		820		1840		1250		787		572	
Perchlorate (EPA 6850)																
Perchlorate	µg/L	17		< 1	< 2	UJ	< 2	U	0.184	J	0.0381	J	< 0.25	U	< 0.05	U
Volatile Organic Compounds (8260C)																
1,1,2-Trichloroethane	µg/L	5		< 25	< 5	UJ	< 5	U	< 50	U	< 0.5	U	< 1	U	< 1	U
1,1-Dichloroethene	µg/L	7		42	< 5	UJ	< 5	U	< 25	U	< 0.5	U	< 0.5	U	< 0.5	U
1,2-Dichloroethane	µg/L	5		< 12	< 5	UJ	< 5	UJ	< 25	U	< 0.5	U	< 0.5	U	< 0.5	U
cis-1,2-Dichloroethene	µg/L	70		15000	< 5	UJ	< 5	UJ	< 25	U	4.1		2.8		3.1	
Methylene chloride	µg/L	5		< 50	< 10	UJ	< 10	UJ	< 50	U	< 1	U	< 2	U	< 2	U
Trichloroethene	µg/L	5		5600	< 5	UJ	< 5	U	< 25	U	5.8		1		0.62	J
Vinyl chloride	µg/L	2		3000	< 5	UJ	< 5	UJ	< 25	U	< 0.5	U	< 0.5	U	< 0.5	U

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code	16IW09						16IW10							
			Sample ID	16IW09-210714		16IW09-211020		16IW09-220125		16IW10-200325		16IW10-200714		16IW10-201013		16IW10-210126	
			Sample Date	7/14/2021		10/20/2021		1/25/2022		3/25/2020		7/14/2020		10/13/2020		1/26/2021	
			Groundwater Zone	SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW	
Analyte	Units	MCL/PCL		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																	
Dehalococcoides	cells/mL	NV		NA		NA		NA		9120		6110		59500		370000	
Field Measurements																	
Dissolved oxygen	mg/L	NV		0.38		0.2		0.58		0.09		0.05		0.13		1.1	
Oxidation Reduction Potential	mV	NV		-2		-3		65		-21		-17		-83		61.1	
pH	SU	NV		5.65		6.15		6.29		5.19		5.72		6.37		6.11	
Dissolved Gases (RSK-175)																	
Ethane	µg/L	NV		< 0.25	U	< 0.5	U	< 0.5	U	6.46		7.51		< 0.25	U	< 0.47	U
Ethylene	µg/L	NV		< 0.5	UJ	< 0.5	UJ	6.6	J	48.3		66.7		19.1		9.9	
Methane	µg/L	NV		1460		2540	J	936		1450		4650		1470		1200	J
General Chemistry (2320B/SM5310B/SW9056A)																	
Alkalinity	mg/L	NV		649		774		782		2390		1760		1680		1320	
Bromide	mg/L	NV		4.02		3.89		5.23		143		119		94.8		83.6	
Nitrate	mg/L	NV		< 0.1	U	< 0.1	U	0.0407	J	< 0.1	U	< 0.1	U	< 0.5	U	< 0.2	U
Sulfate	mg/L	NV		1.44		1.34		2.38		3.19		4.43		5.73		6.59	
Total organic carbon	mg/L	NV		381		140		102		2720		< 2	U	1220		836	
Perchlorate (EPA 6850)																	
Perchlorate	µg/L	17		< 1	U	< 0.2	U	0.16	J	< 2	U	< 0.5	U	< 0.1	U	< 0.5	U
Volatile Organic Compounds (8260C)																	
1,1,2-Trichloroethane	µg/L	5		< 1	U	< 1	U	< 1	U	< 5	U	< 1	U	< 1	U	< 1	U
1,1-Dichloroethene	µg/L	7		< 0.5	U	< 0.5	U	< 0.5	U	< 5	U	1.5		0.67	J	< 0.5	U
1,2-Dichloroethane	µg/L	5		< 0.5	U	< 0.5	U	< 0.5	U	< 5	U	0.96	J	0.98	J	< 0.5	U
cis-1,2-Dichloroethene	µg/L	70		4.6		3.5		2.4		110		110		220		23	
Methylene chloride	µg/L	5		< 1	U	< 1	U	< 2	U	< 10	U	< 1	U	< 1	U	< 2	U
Trichloroethene	µg/L	5		3.8		0.99	J	< 0.5	U	200		190		46		31	
Vinyl chloride	µg/L	2		< 0.5	U	< 0.5	U	< 0.5	U	< 5	U	8.4		53		8.3	

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code	16IW10										16IW20			
			Sample ID	16IW10-210126-FD		16IW10-210421		16IW10-210722		16IW10-211020		16IW10-220125		16IW20-200721		16IW20-201021	
			Sample Date	1/26/2021		4/21/2021		7/22/2021		10/20/2021		1/25/2022		7/21/2020		10/21/2020	
			Groundwater Zone	SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW	
Analyte	Units	MCL/PCL		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																	
Dehalococcoides	cells/mL	NV		NA		NA		NA		NA		NA		1.1		55400	
Field Measurements																	
Dissolved oxygen	mg/L	NV		1.1		0.03		0.36		0.32		0.51		0.04		0.07	
Oxidation Reduction Potential	mV	NV		61.1		-40		-41		-65		-16		-211		-23	
pH	SU	NV		6.11		6.08		6.10		6.55		6.52		6.00		6.20	
Dissolved Gases (RSK-175)																	
Ethane	µg/L	NV		< 0.47	U	< 0.5	UJ	< 0.25	UJ	< 0.5	U	< 0.5	UJ	3.87		4	
Ethylene	µg/L	NV		7.6		6.83	J	2.68	J	13.2	J	3.28	J	9.89		30.9	
Methane	µg/L	NV		780	J	733		257		2520	J	343		1450		2400	
General Chemistry (2320B/SM5310B/SW9056A)																	
Alkalinity	mg/L	NV		1320		1190		1050		1110		1130		870		877	
Bromide	mg/L	NV		84.5		88.1		79.1		59.6	J	56.5		37.5		34.9	
Nitrate	mg/L	NV		< 0.2	U	1.26	J	< 0.5	U	< 0.2	U	< 0.2	U	< 0.1	U	< 0.1	U
Sulfate	mg/L	NV		6.79		< 1	U	< 2.5	U	< 1	U	< 1	U	214		165	
Total organic carbon	mg/L	NV		857		746		630		203	J	211		8.4		14.4	
Perchlorate (EPA 6850)																	
Perchlorate	µg/L	17		< 0.5	U	< 0.1	U	< 0.1	U	< 0.2	U	0.13	J	0.562	J	< 0.05	U
Volatile Organic Compounds (8260C)																	
1,1,2-Trichloroethane	µg/L	5		< 1	U	< 1	U	< 1	U	< 10	U	< 1	U	< 1	U	< 1	U
1,1-Dichloroethene	µg/L	7		< 0.5	U	< 0.5	U	< 0.5	U	< 5	U	< 0.5	U	3.5		1.6	
1,2-Dichloroethane	µg/L	5		< 0.5	U	< 0.5	U	< 0.5	U	< 5	U	< 0.5	U	4.4		2.7	
cis-1,2-Dichloroethene	µg/L	70		22		15		19		11		2		170		170	
Methylene chloride	µg/L	5		< 2	U	< 2	U	< 1	U	< 10	U	< 2	U	< 1	U	< 1	U
Trichloroethene	µg/L	5		29		5.4		13		< 5	U	0.91	J	280		130	
Vinyl chloride	µg/L	2		8.3		2.5		1.3		< 5	U	< 0.5	U	< 0.5	U	< 0.5	U

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code	16IW20										16PM02			
			Sample ID	16IW20-210127		16IW20-210421		16IW20-210722		16IW20-211021		16IW20-220125		16PM02-200123		16PM02-200317	
			Sample Date	1/27/2021		4/21/2021		7/22/2021		10/21/2021		1/25/2022		1/23/2020		3/17/2020	
			Groundwater Zone	SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW	
Analyte	Units	MCL/PCL		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																	
Dehalococcoides	cells/mL	NV		2100		NA		NA		NA		NA		NA		NA	
Field Measurements																	
Dissolved oxygen	mg/L	NV		0.5		0.04		0.39		0.15		0.44		0.08		0.09	
Oxidation Reduction Potential	mV	NV		-41.2		26		11		47		83		53		102	
pH	SU	NV		6.44		5.98		6.12		5.98		6.4		7.15		5.91	
Dissolved Gases (RSK-175)																	
Ethane	µg/L	NV		1.1		< 0.5	U	< 0.25	U	< 0.5	U	< 0.5	U	NA		NA	
Ethylene	µg/L	NV		22		20.2	J	16	J	6.77	J	11.1	J	NA		NA	
Methane	µg/L	NV		2900		2240		2170		1370	J	2080		NA		NA	
General Chemistry (2320B/SM5310B/SW9056A)																	
Alkalinity	mg/L	NV		1110		550		429		547		361		NA		NA	
Bromide	mg/L	NV		46.7		12.3		6.43		13.3		6.27		0.774		NA	
Nitrate	mg/L	NV		0.0802	J	0.0503	J	< 0.5	U	< 0.5	U	0.09	J	NA		NA	
Sulfate	mg/L	NV		105		95.2		125		254		227		NA		NA	
Total organic carbon	mg/L	NV		20.1		10.6		7.63		8.46		9.73		6.58		NA	
Perchlorate (EPA 6850)																	
Perchlorate	µg/L	17		< 0.5	UJ	< 0.05	U	< 0.5	U	< 0.2	U	< 0.2	U	NA		< 2	U
Volatile Organic Compounds (8260C)																	
1,1,2-Trichloroethane	µg/L	5		< 1	U	< 1	U	< 1	U	< 1	UJ	< 1	U	NA		< 25	U
1,1-Dichloroethene	µg/L	7		< 0.5	UJ	< 0.5	U	< 0.5	U	< 0.5	UJ	< 0.5	U	NA		32	J
1,2-Dichloroethane	µg/L	5		0.92	J	0.7	J	0.56	J	< 0.5	UJ	< 0.5	U	NA		< 25	U
cis-1,2-Dichloroethene	µg/L	70		47	J	30		7.2		1.9	J	1.1		NA		3200	
Methylene chloride	µg/L	5		< 2	U	< 2	U	< 1	U	< 1	UJ	< 2	U	NA		< 50	U
Trichloroethene	µg/L	5		13		5.7		7.6		1.2	J	0.96	J	NA		21000	
Vinyl chloride	µg/L	2		7.2	J	9.1		10		3.2	J	4.6		NA		51	

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code		16PM02											
			Sample ID	16PM02-200720		16PM02-201026		16PM02-210122		16PM02-210414		16PM02-210713		16PM02-211025		16PM02-220124	
			Sample Date	7/20/2020		10/26/2020		1/22/2021		4/14/2021		7/13/2021		10/25/2021		1/24/2022	
			Groundwater Zone	SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW	
Analyte	Units	MCL/PCL		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																	
Dehalococcoides	cells/mL	NV		NA		NA		NA		NA		NA		NA		NA	
Field Measurements																	
Dissolved oxygen	mg/L	NV		0.03		0.11		0.49		0.07		0.55		0.23		0.78	
Oxidation Reduction Potential	mV	NV		136		74		133		150		64		97		245	
pH	SU	NV		5.42		5.59		5.91		5.33		5.21		5.64		5.42	
Dissolved Gases (RSK-175)																	
Ethane	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Ethylene	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Methane	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
General Chemistry (2320B/SM5310B/SW9056A)																	
Alkalinity	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Bromide	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Nitrate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Sulfate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Total organic carbon	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Perchlorate (EPA 6850)																	
Perchlorate	µg/L	17		0.0686	J	< 0.05	U	< 0.05	UJ	0.0372	J	< 2.5	U	< 0.2	U	< 0.2	U
Volatile Organic Compounds (8260C)																	
1,1,2-Trichloroethane	µg/L	5		< 25	U	< 25	U	< 25	U	< 25	U	< 25	U	< 25	U	< 25	U
1,1-Dichloroethene	µg/L	7		44		74		34		27		32		21	J	48	
1,2-Dichloroethane	µg/L	5		25		60		13	J	14	J	15	J	16	J	23	J
cis-1,2-Dichloroethene	µg/L	70		4800		8800		2700		2200		3400		2500		4500	
Methylene chloride	µg/L	5		< 25	U	< 50	U	< 50	U	< 50	U	< 25	U	< 25	U	< 50	U
Trichloroethene	µg/L	5		31000		65000		23000		15000		17000		16000		31000	
Vinyl chloride	µg/L	2		110		240		50		40		43		35		99	

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code		16PM03											
			Sample ID	16PM03-200123		16PM03-200317		16PM03-200720		16PM03-201026		16PM03-210122		16PM03-210414		16PM03-210414-FD	
			Sample Date	1/23/2020		3/17/2020		7/20/2020		10/26/2020		1/22/2021		4/14/2021		4/14/2021	
			Groundwater Zone	SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW	
Analyte	Units	MCL/PCL		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																	
Dehalococcoides	cells/mL	NV		NA		NA		NA		NA		NA		NA		NA	
Field Measurements																	
Dissolved oxygen	mg/L	NV		0.02		0.06		3.7		0.02		0.51		0.13		0.13	
Oxidation Reduction Potential	mV	NV		18		74		117		48		107.6		80		80	
pH	SU	NV		7.06		6.35		5.57		6.28		6.38		6.06		6.06	
Dissolved Gases (RSK-175)																	
Ethane	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Ethylene	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Methane	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
General Chemistry (2320B/SM5310B/SW9056A)																	
Alkalinity	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Bromide	mg/L	NV		4.55		NA		NA		NA		NA		NA		NA	
Nitrate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Sulfate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Total organic carbon	mg/L	NV		4.88		NA		NA		NA		NA		NA		NA	
Perchlorate (EPA 6850)																	
Perchlorate	µg/L	17		NA		400		245		360		330	J	193		189	
Volatile Organic Compounds (8260C)																	
1,1,2-Trichloroethane	µg/L	5		NA		< 5	U	< 20	U	< 10	U	< 10	U	< 25	U	< 25	U
1,1-Dichloroethene	µg/L	7		NA		66		50		40		31		37		37	
1,2-Dichloroethane	µg/L	5		NA		21		25		23		18		23	J	23	J
cis-1,2-Dichloroethene	µg/L	70		NA		6600		9300		5700		5300		6800		7100	
Methylene chloride	µg/L	5		NA		< 10	U	< 20	U	17	J	< 20	U	< 50	U	< 50	U
Trichloroethene	µg/L	5		NA		9700		9100		12000		9800		8800		9000	
Vinyl chloride	µg/L	2		NA		370		320		370		310		220		240	

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code	16PM03										16PM06			
			Sample ID	16PM03-210713		16PM03-210713-FD		16PM03-211025		16PM03-211025-FD		16PM03-220124		16PM06-200123		16PM06-200123-FD	
			Sample Date	7/13/2021		7/13/2021		10/25/2021		10/25/2021		1/24/2022		1/23/2020		1/23/2020	
			Groundwater Zone	SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW	
Analyte	Units	MCL/PCL		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																	
Dehalococcoides	cells/mL	NV		NA		NA		NA		NA		NA		NA		NA	
Field Measurements																	
Dissolved oxygen	mg/L	NV		0.49		0.49		0.15		0.15		0.6		0.08		0.08	
Oxidation Reduction Potential	mV	NV		38		38		112		112		187		-21		-21	
pH	SU	NV		5.86		5.86		5.97		5.97		6.03		6.85		6.85	
Dissolved Gases (RSK-175)																	
Ethane	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Ethylene	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Methane	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
General Chemistry (2320B/SM5310B/SW9056A)																	
Alkalinity	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Bromide	mg/L	NV		NA		NA		NA		NA		NA		2.74		2.74	
Nitrate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Sulfate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Total organic carbon	mg/L	NV		NA		NA		NA		NA		NA		9.03		9.01	
Perchlorate (EPA 6850)																	
Perchlorate	µg/L	17		118		117		220		264		278		NA		NA	
Volatile Organic Compounds (8260C)																	
1,1,2-Trichloroethane	µg/L	5		< 10	U	< 10	U	< 10	U	< 10	U	< 10	U	NA		NA	
1,1-Dichloroethene	µg/L	7		37		36		21		21		31		NA		NA	
1,2-Dichloroethane	µg/L	5		20		20		21		21		25		NA		NA	
cis-1,2-Dichloroethene	µg/L	70		8300		8000		7400		7500		7100		NA		NA	
Methylene chloride	µg/L	5		< 10	U	< 10	U	< 10	U	< 10	U	10	J	NA		NA	
Trichloroethene	µg/L	5		8400		8400		6300		6300		6800		NA		NA	
Vinyl chloride	µg/L	2		220		230		120		120		200		NA		NA	

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code	16PM06												
			Sample ID	16PM06-200720		16PM06-201026		16PM06-210202		16PM06-210413		16PM06-210713		16PM06-211026		16PM06-220124	
			Sample Date	7/20/2020		10/26/2020		2/2/2021		4/13/2021		7/13/2021		10/26/2021		1/24/2022	
			Groundwater Zone	SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW	
Analyte	Units	MCL/PCL		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																	
Dehalococcoides	cells/mL	NV		NA		NA		NA		NA		NA		NA		NA	
Field Measurements																	
Dissolved oxygen	mg/L	NV		0.05		0.02		0.03		0.1		1.4		0.22		0.48	
Oxidation Reduction Potential	mV	NV		1		-1		-108		-33		-10		43		120	
pH	SU	NV		5.87		5.93		5.37		6.29		5.55		5.81		5.84	
Dissolved Gases (RSK-175)																	
Ethane	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Ethylene	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Methane	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
General Chemistry (2320B/SM5310B/SW9056A)																	
Alkalinity	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Bromide	mg/L	NV		6.08		4.26		6.17		NA		NA		NA		NA	
Nitrate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Sulfate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Total organic carbon	mg/L	NV		8.08		6.88		8.53		NA		NA		NA		NA	
Perchlorate (EPA 6850)																	
Perchlorate	µg/L	17		< 0.5	U	< 0.05	U	< 0.5	UJ	< 0.5	U	0.0474	J	< 0.2	U	< 0.2	U
Volatile Organic Compounds (8260C)																	
1,1,2-Trichloroethane	µg/L	5		< 25	U	< 25	U	< 25	U	< 100	U	< 50	U	< 50	U	< 25	U
1,1-Dichloroethene	µg/L	7		150		140		65	J	120		100		36	J	36	
1,2-Dichloroethane	µg/L	5		50		55		40	J	54	J	35	J	40	J	33	
cis-1,2-Dichloroethene	µg/L	70		49000		47000		33000	J	42000		38000		11000		17000	
Methylene chloride	µg/L	5		< 25	U	< 50	U	< 50	U	< 200	U	< 50	U	< 50	U	< 50	U
Trichloroethene	µg/L	5		58000		85000		49000	J	77000		57000		19000		28000	
Vinyl chloride	µg/L	2		2100		1800		790	J	1800		930		390		350	

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code		16PM09											
			Sample ID	16PM09-200123		16PM09-200720		16PM09-201026		16PM09-210122		16PM09-210413		16PM09-210722		16PM09-211026	
			Sample Date	1/23/2020		7/20/2020		10/26/2020		1/22/2021		4/13/2021		7/22/2021		10/26/2021	
			Groundwater Zone	SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW	
Analyte	Units	MCL/PCL		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																	
Dehalococcoides	cells/mL	NV		NA		NA		NA		NA		NA		NA		NA	
Field Measurements																	
Dissolved oxygen	mg/L	NV		0.03		0.06		0.1		0.67		0.12		0.55		0.14	
Oxidation Reduction Potential	mV	NV		175		77		95		152.7		138		132		185	
pH	SU	NV		6.73		5.76		5.22		6.15		5.88		5.41		5.36	
Dissolved Gases (RSK-175)																	
Ethane	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Ethylene	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Methane	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
General Chemistry (2320B/SM5310B/SW9056A)																	
Alkalinity	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Bromide	mg/L	NV		0.744		NA		NA		NA		NA		NA		NA	
Nitrate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Sulfate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Total organic carbon	mg/L	NV		7.58		NA		NA		NA		NA		NA		NA	
Perchlorate (EPA 6850)																	
Perchlorate	µg/L	17		NA		< 0.05	U	0.0253	J	< 0.05	UJ	0.0355	J	< 0.05	U	< 0.2	U
Volatile Organic Compounds (8260C)																	
1,1,2-Trichloroethane	µg/L	5		NA		< 5	U	< 5	U	1.8		0.82	J	0.79	J	< 5	U
1,1-Dichloroethene	µg/L	7		NA		30		50		33		13		11		20	
1,2-Dichloroethane	µg/L	5		NA		< 2.5	U	< 2.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 2.5	U
cis-1,2-Dichloroethene	µg/L	70		NA		520		1000		560		210		200		520	
Methylene chloride	µg/L	5		NA		< 5	U	< 5	U	< 2	U	< 2	U	< 1	U	< 5	U
Trichloroethene	µg/L	5		NA		1400		2000		1300		640		370		770	
Vinyl chloride	µg/L	2		NA		23		47		32		10		9.1		23	

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code	16PM09		16PM14											
			Sample ID	16PM09-220124		16PM14-200123		16PM14-200720		16PM14-201026		16PM14-201026-FD		16PM14-210202		16PM14-210413	
			Sample Date	1/24/2022		1/23/2020		7/20/2020		10/26/2020		10/26/2020		2/2/2021		4/13/2021	
			Groundwater Zone	SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW	
Analyte	Units	MCL/PCL		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																	
Dehalococcoides	cells/mL	NV		NA		NA		NA		NA		NA		NA		NA	
Field Measurements																	
Dissolved oxygen	mg/L	NV		0.52		0.04		0.2		0.26		0.26		0.08		0.18	
Oxidation Reduction Potential	mV	NV		137		6		132		133		133		25		169	
pH	SU	NV		5.41		6.81		5.97		6.20		6.20		5.69		6.03	
Dissolved Gases (RSK-175)																	
Ethane	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Ethylene	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Methane	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
General Chemistry (2320B/SM5310B/SW9056A)																	
Alkalinity	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Bromide	mg/L	NV		NA		2.99		5.04		2.01		2.93		7.54		NA	
Nitrate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Sulfate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Total organic carbon	mg/L	NV		NA		10.4		9.97		8.93		8.88		9.84		NA	
Perchlorate (EPA 6850)																	
Perchlorate	µg/L	17		< 0.2	U	NA		0.435	J	< 0.1	U	< 0.1	U	0.648	J	0.259	J
Volatile Organic Compounds (8260C)																	
1,1,2-Trichloroethane	µg/L	5		3.7	J	NA		< 10	U	< 10	U	< 5	U	< 10	U	< 20	U
1,1-Dichloroethene	µg/L	7		52		NA		21		25		22		18		14	J
1,2-Dichloroethane	µg/L	5		< 2.5	U	NA		24		26		25		23	J	22	
cis-1,2-Dichloroethene	µg/L	70		950		NA		3300		3200		3500		3500		2900	
Methylene chloride	µg/L	5		< 10	U	NA		< 10	U	< 10	U	< 10	U	< 20	U	< 40	U
Trichloroethene	µg/L	5		1300		NA		5100		5400		5800		3800		4300	
Vinyl chloride	µg/L	2		84		NA		150		140		140		130		110	

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code	16PM14						16RW01							
			Sample ID	16PM14-210722		16PM14-211026		16PM14-220124		16RW01-200312		16RW01-200727		16RW01-201020		16RW01-210122	
			Sample Date	7/22/2021		10/26/2021		1/24/2022		3/12/2020		7/27/2020		10/20/2020		1/22/2021	
			Groundwater Zone	SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW	
Analyte	Units	MCL/PCL		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																	
Dehalococcoides	cells/mL	NV		NA		NA		NA		NA		NA		NA		NA	
Field Measurements																	
Dissolved oxygen	mg/L	NV		0.63		0.26		0.63		0.08		0.05		0.52		0.73	
Oxidation Reduction Potential	mV	NV		118		151		176		151		304		94		185.6	
pH	SU	NV		6.17		6		6.06		5.49		5.15		5.08		5.31	
Dissolved Gases (RSK-175)																	
Ethane	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Ethylene	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Methane	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
General Chemistry (2320B/SM5310B/SW9056A)																	
Alkalinity	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Bromide	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Nitrate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Sulfate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Total organic carbon	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Perchlorate (EPA 6850)																	
Perchlorate	µg/L	17		< 0.5	U	< 0.2	U	< 0.2	U	< 2	U	1.63		< 0.05	U	< 0.05	UJ
Volatile Organic Compounds (8260C)																	
1,1,2-Trichloroethane	µg/L	5		< 10	U	< 10	U	< 10	U	< 2.5	U	< 5	U	< 10	U	< 10	U
1,1-Dichloroethene	µg/L	7		15		9.5	J	13		< 2.5	U	3.1	J	< 5	U	< 5	U
1,2-Dichloroethane	µg/L	5		21		18		21		< 2.5	U	< 2.5	U	< 5	U	< 5	U
cis-1,2-Dichloroethene	µg/L	70		3700		2900		3100		120		150		120		120	
Methylene chloride	µg/L	5		< 10	U	< 10	U	< 20	U	< 5	U	< 5	U	< 10	U	< 20	U
Trichloroethene	µg/L	5		3700		2200		2300		3300		4200		4000		2900	
Vinyl chloride	µg/L	2		110		56		81		4	J	5.7		< 5	U	< 5	U

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code	16RW01								16RW02					
			Sample ID	16RW01-210414		16RW01-210726		16RW01-211026		16RW01-220124		16RW02-200312		16RW02-200721		16RW02-201022	
			Sample Date	4/14/2021		7/26/2021		10/26/2021		1/24/2022		3/12/2020		7/21/2020		10/22/2020	
			Groundwater Zone	SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW	
Analyte	Units	MCL/PCL		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																	
Dehalococcoides	cells/mL	NV		NA		NA		NA		NA		NA		NA		NA	
Field Measurements																	
Dissolved oxygen	mg/L	NV		0.21		0.97		0.63		0.54		0.69		0.02		0.26	
Oxidation Reduction Potential	mV	NV		289		160		311		210		119		170		100	
pH	SU	NV		4.84		5.46		4.97		4.84		5.26		5.24		5.17	
Dissolved Gases (RSK-175)																	
Ethane	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Ethylene	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Methane	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
General Chemistry (2320B/SM5310B/SW9056A)																	
Alkalinity	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Bromide	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Nitrate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Sulfate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Total organic carbon	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Perchlorate (EPA 6850)																	
Perchlorate	µg/L	17		0.0618	J	< 0.5	U	< 0.2	U	0.053	J	< 2	U	< 0.05	U	< 0.05	U
Volatile Organic Compounds (8260C)																	
1,1,2-Trichloroethane	µg/L	5		< 10	U	< 5	U	< 5	U	< 5	U	< 0.5	U	< 1	U	< 0.5	U
1,1-Dichloroethene	µg/L	7		< 5	U	< 2.5	U	< 2.5	U	< 2.5	U	< 0.5	U	< 0.5	U	0.65	J
1,2-Dichloroethane	µg/L	5		< 5	U	< 2.5	U	< 2.5	U	< 2.5	U	< 0.5	U	< 0.5	U	< 0.5	U
cis-1,2-Dichloroethene	µg/L	70		130		84		81		64		< 0.5	U	1		1.5	
Methylene chloride	µg/L	5		< 20	U	< 5	U	< 5	U	< 10	U	< 1	U	< 1	U	< 1	U
Trichloroethene	µg/L	5		3000		2300		2200		1200		2.3		4.8		6.7	
Vinyl chloride	µg/L	2		< 5	U	< 2.5	U	2.3	J	< 2.5	U	< 0.5	U	< 0.5	U	< 0.5	U

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code	16RW02											16RW04	
			Sample ID	16RW02-210122		16RW02-210414		16RW02-210726		16RW02-211013		16RW02-220124		16RW02-220124-FD		16RW04-200728	
			Sample Date	1/22/2021		4/14/2021		7/26/2021		10/13/2021		1/24/2022		1/24/2022		7/28/2020	
			Groundwater Zone	SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW	
Analyte	Units	MCL/PCL		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																	
Dehalococcoides	cells/mL	NV		NA		NA		NA		NA		NA		NA		NA	
Field Measurements																	
Dissolved oxygen	mg/L	NV		0.83		0.2		0.69		0.24		0.76		0.76		0.04	
Oxidation Reduction Potential	mV	NV		164.5		206		118		257		226		226		198	
pH	SU	NV		6.04		5.30		5.54		4.84		4.98		4.98		5.33	
Dissolved Gases (RSK-175)																	
Ethane	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Ethylene	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Methane	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
General Chemistry (2320B/SM5310B/SW9056A)																	
Alkalinity	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Bromide	mg/L	NV		NA		NA		NA		NA		NA		NA		2.41	
Nitrate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Sulfate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Total organic carbon	mg/L	NV		NA		NA		NA		NA		NA		NA		3.34	
Perchlorate (EPA 6850)																	
Perchlorate	µg/L	17		< 0.05	UJ	0.0612	J	0.0255	J	< 0.2	U	< 0.2	U	< 0.2	U	2.08	
Volatile Organic Compounds (8260C)																	
1,1,2-Trichloroethane	µg/L	5		< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 10	U
1,1-Dichloroethene	µg/L	7		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 5	U
1,2-Dichloroethane	µg/L	5		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 5	U
cis-1,2-Dichloroethene	µg/L	70		< 0.5	U	< 0.5	U	< 0.5	U	0.8	J	0.67	J	< 0.5	U	150	
Methylene chloride	µg/L	5		< 2	U	< 2	U	< 1	U	< 1	U	< 2	U	< 2	U	< 10	U
Trichloroethene	µg/L	5		1.9		3.1		2.1		2.7		2.7		2.6		3500	
Vinyl chloride	µg/L	2		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	4.1	J

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code		16RW04											
			Sample ID	16RW04-201021		16RW04-201021-FD		16RW04-210128		16RW04-210414		16RW04-210726		16RW04-211020		16RW04-220124	
			Sample Date	10/21/2020		10/21/2020		1/28/2021		4/14/2021		7/26/2021		10/20/2021		1/24/2022	
			Groundwater Zone	SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW	
Analyte	Units	MCL/PCL		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																	
Dehalococcoides	cells/mL	NV		NA		NA		NA		NA		NA		NA		NA	
Field Measurements																	
Dissolved oxygen	mg/L	NV		0.03		0.03		0.52		0.09		0.34		0.24		0.57	
Oxidation Reduction Potential	mV	NV		156		156		-3.6		283		159		220		222	
pH	SU	NV		5.00		5.00		5.62		4.71		4.85		4.7		4.93	
Dissolved Gases (RSK-175)																	
Ethane	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Ethylene	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Methane	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
General Chemistry (2320B/SM5310B/SW9056A)																	
Alkalinity	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Bromide	mg/L	NV		1.21		1.19		1.53		NA		NA		NA		NA	
Nitrate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Sulfate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Total organic carbon	mg/L	NV		2.7		2.67		2.84		NA		NA		NA		NA	
Perchlorate (EPA 6850)																	
Perchlorate	µg/L	17		< 0.05	U	< 0.05	U	0.328	J	< 0.05	U	< 0.5	U	< 0.2	U	< 0.2	U
Volatile Organic Compounds (8260C)																	
1,1,2-Trichloroethane	µg/L	5		< 2.5	U	< 5	U	< 10	U	< 5	U	< 1	U	< 10	U	< 1	U
1,1-Dichloroethene	µg/L	7		4.1	J	3.2	J	< 5	U	< 2.5	U	1.1		< 5	U	0.64	J
1,2-Dichloroethane	µg/L	5		< 2.5	U	< 2.5	U	< 5	U	< 2.5	U	< 0.5	U	< 5	U	< 0.5	U
cis-1,2-Dichloroethene	µg/L	70		140		140		130		62		80		88		66	
Methylene chloride	µg/L	5		< 5	U	< 5	U	< 20	U	< 10	U	< 1	U	< 10	U	< 2	U
Trichloroethene	µg/L	5		3400		3600		2800		1100		1200		1600		970	
Vinyl chloride	µg/L	2		5.3		5.6		< 5	U	< 2.5	U	2		< 5	U	1.2	

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code		16RW05											
			Sample ID	16RW05-200312		16RW05-200716		16RW05-201022		16RW05-210129		16RW05-210419		16RW05-210714		16RW05-211018	
			Sample Date	3/12/2020		7/16/2020		10/22/2020		1/29/2021		4/19/2021		7/14/2021		10/18/2021	
			Groundwater Zone	SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW	
Analyte	Units	MCL/PCL		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																	
Dehalococcoides	cells/mL	NV		NA		NA		NA		NA		NA		NA		NA	
Field Measurements																	
Dissolved oxygen	mg/L	NV		0.03		0.05		0.05		2.51		0.03		0.26		0.11	
Oxidation Reduction Potential	mV	NV		-97		-207		-55		73.8		-3.44		-122		-43	
pH	SU	NV		6.36		5.79		6.68		7.25		7.25		6.83		6.73	
Dissolved Gases (RSK-175)																	
Ethane	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Ethylene	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Methane	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
General Chemistry (2320B/SM5310B/SW9056A)																	
Alkalinity	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Bromide	mg/L	NV		52.8		55.2		44		45.8		NA		NA		NA	
Nitrate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Sulfate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Total organic carbon	mg/L	NV		500		416		117		34.8		NA		NA		NA	
Perchlorate (EPA 6850)																	
Perchlorate	µg/L	17		< 2	U	1.77		< 0.05	U	< 0.5	U	< 0.1	U	< 2	U	< 0.2	U
Volatile Organic Compounds (8260C)																	
1,1,2-Trichloroethane	µg/L	5		< 0.5	U	< 10	U	< 0.5	U	< 1	U	< 1	U	< 1	U	< 1	U
1,1-Dichloroethene	µg/L	7		< 0.5	U	< 5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,2-Dichloroethane	µg/L	5		< 0.5	U	< 5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
cis-1,2-Dichloroethene	µg/L	70		7.8		8	J	9.3		1.5		< 0.5	U	0.69	J	< 0.5	U
Methylene chloride	µg/L	5		< 1	U	< 10	U	< 1	U	< 2	U	< 2	U	< 1	U	< 1	U
Trichloroethene	µg/L	5		3		< 5	U	0.89	J	< 0.5	U	0.52	J	1.1		< 0.5	U
Vinyl chloride	µg/L	2		< 0.5	U	< 5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code	16RW05	16RW06											
			Sample ID	16RW05-220124	16RW06-200317		16RW06-200714		16RW06-201026		16RW06-210122		16RW06-210419		16RW06-210727	
			Sample Date	1/24/2022	3/17/2020		7/14/2020		10/26/2020		1/22/2021		4/19/2021		7/27/2021	
			Groundwater Zone	SHALLOW	SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW	
Analyte	Units	MCL/PCL		Result	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																
Dehalococcoides	cells/mL	NV		NA	NA		NA		NA		NA		NA		NA	
Field Measurements																
Dissolved oxygen	mg/L	NV		0.69	0.73		1.68		0.27		0.55		0.49		0.85	
Oxidation Reduction Potential	mV	NV		117	134		136		69		91.1		-236		100	
pH	SU	NV		7.01	5.99		5.94		6.27		6.61		5.61		5.80	
Dissolved Gases (RSK-175)																
Ethane	µg/L	NV		NA	NA		NA		NA		NA		NA		NA	
Ethylene	µg/L	NV		NA	NA		NA		NA		NA		NA		NA	
Methane	µg/L	NV		NA	NA		NA		NA		NA		NA		NA	
General Chemistry (2320B/SM5310B/SW9056A)																
Alkalinity	mg/L	NV		NA	NA		NA		NA		NA		NA		NA	
Bromide	mg/L	NV		NA	NA		NA		NA		NA		NA		NA	
Nitrate	mg/L	NV		NA	NA		NA		NA		NA		NA		NA	
Sulfate	mg/L	NV		NA	NA		NA		NA		NA		NA		NA	
Total organic carbon	mg/L	NV		NA	NA		NA		NA		NA		NA		NA	
Perchlorate (EPA 6850)																
Perchlorate	µg/L	17		< 0.2	< 2	U	< 0.5	U	< 0.1	U	< 0.25	UJ	< 0.5	U	< 1	U
Volatile Organic Compounds (8260C)																
1,1,2-Trichloroethane	µg/L	5		< 1	< 0.5	U	< 1	U	< 0.5	U	< 1	U	< 1	U	< 1	UJ
1,1-Dichloroethene	µg/L	7		< 0.5	0.9	J	1		1.3		1.3		0.82	J	< 0.5	UJ
1,2-Dichloroethane	µg/L	5		< 0.5	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	UJ
cis-1,2-Dichloroethene	µg/L	70		0.86	1.9		2.4		4.8		3.3		1.7		4.4	J
Methylene chloride	µg/L	5		< 2	< 1	U	< 1	U	< 1	U	< 2	U	< 2	U	< 1	UJ
Trichloroethene	µg/L	5		0.81	86		77	J+	110		95		60		64	J
Vinyl chloride	µg/L	2		0.9	0.84	J	1.2		2.5		2.2		< 0.5	U	< 0.5	UJ

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code	16RW06			16RW07									
			Sample ID	16RW06-211025		16RW06-220125	16RW07-200317		16RW07-200714		16RW07-200714-FD		16RW07-201026		16RW07-210122	
			Sample Date	10/25/2021		1/25/2022	3/17/2020		7/14/2020		7/14/2020		10/26/2020		1/22/2021	
			Groundwater Zone	SHALLOW		SHALLOW	SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW	
Analyte	Units	MCL/PCL		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																	
Dehalococcoides	cells/mL	NV		NA		NA		NA		NA		NA		NA		NA	
Field Measurements																	
Dissolved oxygen	mg/L	NV		0.37		0.57		0.09		0.48		0.48		0.91		0.58	
Oxidation Reduction Potential	mV	NV		135		59		-26		86		86		143		70.1	
pH	SU	NV		5.75		6.03		6.41		5.96		5.96		5.60		6.52	
Dissolved Gases (RSK-175)																	
Ethane	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Ethylene	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Methane	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
General Chemistry (2320B/SM5310B/SW9056A)																	
Alkalinity	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Bromide	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Nitrate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Sulfate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Total organic carbon	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Perchlorate (EPA 6850)																	
Perchlorate	µg/L	17		< 0.2	U	0.089	J	4.9		2.45		2.33		0.391		0.638	J
Volatile Organic Compounds (8260C)																	
1,1,2-Trichloroethane	µg/L	5		< 1	U	< 1	U	< 2.5	U	< 5	U	< 5	U	< 1	U	< 5	U
1,1-Dichloroethene	µg/L	7		< 0.5	U	< 0.5	U	12		13		15		6.4		13	
1,2-Dichloroethane	µg/L	5		< 0.5	U	< 0.5	U	< 2.5	U	< 2.5	U	< 2.5	U	< 0.5	U	< 2.5	U
cis-1,2-Dichloroethene	µg/L	70		6.8		5.3		120		110		100		38		120	
Methylene chloride	µg/L	5		< 1	U	< 2	U	< 5	U	< 5	U	< 5	U	< 1	U	< 10	U
Trichloroethene	µg/L	5		34		37		1900		2100		2300		1100		2000	
Vinyl chloride	µg/L	2		< 0.5	U	1.2		76		89		95		28		90	

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code	16RW07								16RW09					
			Sample ID	16RW07-210419		16RW07-210727		16RW07-211025		16RW07-220125		16RW09-200714		16RW09-201026		16RW09-210202	
			Sample Date	4/19/2021		7/27/2021		10/25/2021		1/25/2022		7/14/2020		10/26/2020		2/2/2021	
			Groundwater Zone	SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW	
Analyte	Units	MCL/PCL		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																	
Dehalococcoides	cells/mL	NV		NA		NA		NA		NA		NA		NA		NA	
Field Measurements																	
Dissolved oxygen	mg/L	NV		0.98		1.4		0.86		0.48		0.03		0.14		0.11	
Oxidation Reduction Potential	mV	NV		-195		107		117		87		128		208		-14	
pH	SU	NV		5.73		6.01		6.23		6.07		5.95		5.56		5.65	
Dissolved Gases (RSK-175)																	
Ethane	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Ethylene	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Methane	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
General Chemistry (2320B/SM5310B/SW9056A)																	
Alkalinity	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Bromide	mg/L	NV		NA		NA		NA		NA		6.98		5.38		5.84	
Nitrate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Sulfate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Total organic carbon	mg/L	NV		NA		NA		NA		NA		2.56		1.58		2.28	
Perchlorate (EPA 6850)																	
Perchlorate	µg/L	17		1		< 0.5	U	0.262	J	0.27		0.491	J	0.12	J	0.459	J
Volatile Organic Compounds (8260C)																	
1,1,2-Trichloroethane	µg/L	5		< 1	U	< 1	UJ	< 5	U	< 1	U	< 5	U	< 0.5	U	< 5	U
1,1-Dichloroethene	µg/L	7		4.8		4.1	J	4.1	J	3.4		9.9		7.5		6.8	
1,2-Dichloroethane	µg/L	5		< 0.5	U	< 0.5	UJ	< 2.5	U	< 0.5	U	< 2.5	U	< 0.5	U	< 2.5	U
cis-1,2-Dichloroethene	µg/L	70		46		35	J	35		38		45		290		230	
Methylene chloride	µg/L	5		< 2	U	< 1	UJ	< 5	U	< 2	U	< 5	U	< 1	U	< 10	U
Trichloroethene	µg/L	5		900		760	J	700		540		1300		980		690	
Vinyl chloride	µg/L	2		29		15	J	15		15		52		33		25	

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code	16RW09										16RW10			
			Sample ID	16RW09-210420		16RW09-210714		16RW09-210727		16RW09-211026		16RW09-220126		16RW10-200720		16RW10-201026	
			Sample Date	4/20/2021		7/14/2021		7/27/2021		10/26/2021		1/26/2022		7/20/2020		10/26/2020	
			Groundwater Zone	SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW	
Analyte	Units	MCL/PCL		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																	
Dehalococcoides	cells/mL	NV		NA		NA		NA		NA		NA		NA		NA	
Field Measurements																	
Dissolved oxygen	mg/L	NV		0.16		0.16		0.48		0.31		0.41		0.07		0.04	
Oxidation Reduction Potential	mV	NV		127		127		23		54		230		94		52	
pH	SU	NV		5.82		5.82		6.61		6.08		5.89		6.35		6.34	
Dissolved Gases (RSK-175)																	
Ethane	µg/L	NV		< 0.5	U	NA		< 0.25	U	< 0.5	U	< 0.5	U	NA		NA	
Ethylene	µg/L	NV		1.97	J	NA		1.25	J	2.6	J	2.54	J	NA		NA	
Methane	µg/L	NV		144		NA		255	J	180		95.8		NA		NA	
General Chemistry (2320B/SM5310B/SW9056A)																	
Alkalinity	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Bromide	mg/L	NV		NA		NA		NA		NA		NA		8.29		< 0.1	U
Nitrate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Sulfate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Total organic carbon	mg/L	NV		2.28		NA		2.52		2.58		6.29		4.58		4.1	
Perchlorate (EPA 6850)																	
Perchlorate	µg/L	17		0.241		< 2	U	< 1	U	< 0.2	U	< 0.2	U	62.7		8.11	
Volatile Organic Compounds (8260C)																	
1,1,2-Trichloroethane	µg/L	5		< 1	U	< 1	U	< 5	U	< 5	U	< 1	U	< 5	U	< 2.5	U
1,1-Dichloroethene	µg/L	7		4.8		< 0.5	U	9.6		5.4		4.4		17		21	
1,2-Dichloroethane	µg/L	5		< 0.5	U	< 0.5	U	< 2.5	U	< 2.5	U	< 0.5	U	4	J	4.6	J
cis-1,2-Dichloroethene	µg/L	70		160		0.69	J	180		340		160		290		390	
Methylene chloride	µg/L	5		< 2	U	< 1	U	< 5	U	< 5	U	< 2	U	< 5	U	5.5	J
Trichloroethene	µg/L	5		810		1.1		1400		610		730		1800		2000	
Vinyl chloride	µg/L	2		33		< 0.5	U	59		28		25		80		100	

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code	16RW10										16RW11			
			Sample ID	16RW10-210202		16RW10-210420		16RW10-210727		16RW10-211026		16RW10-220126		16RW11-200317		16RW11-200721	
			Sample Date	2/2/2021		4/20/2021		7/27/2021		10/26/2021		1/26/2022		3/17/2020		7/21/2020	
			Groundwater Zone	SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW	
Analyte	Units	MCL/PCL		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																	
Dehalococcoides	cells/mL	NV		NA		NA		NA		NA		NA		NA		NA	
Field Measurements																	
Dissolved oxygen	mg/L	NV		0.09		0.16		0.6		0.2		0.61		0.07		0.24	
Oxidation Reduction Potential	mV	NV		-30		58		129		97		221		-82		-66	
pH	SU	NV		6.16		6.25		6.15		6.2		6.26		6.28		6.46	
Dissolved Gases (RSK-175)																	
Ethane	µg/L	NV		NA		< 0.5	U	< 0.25	U	< 0.5	U	2.83		NA		NA	
Ethylene	µg/L	NV		NA		26.1	J	10.4	J	5.19	J	5.76	J	NA		NA	
Methane	µg/L	NV		NA		330		416	J	216		413		NA		NA	
General Chemistry (2320B/SM5310B/SW9056A)																	
Alkalinity	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Bromide	mg/L	NV		7.4		NA		NA		NA		NA		NA		NA	
Nitrate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Sulfate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Total organic carbon	mg/L	NV		3.24		4.84		5.15		5.9		5.35		NA		NA	
Perchlorate (EPA 6850)																	
Perchlorate	µg/L	17		125	J	36.5		18.7		27.8		4.1		< 2	U	< 0.05	U
Volatile Organic Compounds (8260C)																	
1,1,2-Trichloroethane	µg/L	5		< 10	U	< 5	U	< 5	U	< 5	U	< 5	U	< 0.5	U	< 1	U
1,1-Dichloroethene	µg/L	7		14		14		8.5		3.9	J	6.7		0.56	J	< 0.5	U
1,2-Dichloroethane	µg/L	5		66		24		16		15		18		1.6		1.6	
cis-1,2-Dichloroethene	µg/L	70		1200		710		670		500		620		73		60	J-
Methylene chloride	µg/L	5		< 20	U	8.7	J	< 5	U	< 5	U	16		< 1	U	< 1	U
Trichloroethene	µg/L	5		5300		2400		2000		950		1300		20		8.9	J-
Vinyl chloride	µg/L	2		50		93		49		25		49		< 0.5	U	< 0.5	U

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code		16RW11											
			Sample ID	16RW11-201021		16RW11-201021-FD		16RW11-210203		16RW11-210421		16RW11-210421-FD		16RW11-210722		16RW11-210722-FD	
			Sample Date	10/21/2020		10/21/2020		2/3/2021		4/21/2021		4/21/2021		7/22/2021		7/22/2021	
			Groundwater Zone	SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW	
Analyte	Units	MCL/PCL		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																	
Dehalococcoides	cells/mL	NV		NA		NA		NA		NA		NA		NA		NA	
Field Measurements																	
Dissolved oxygen	mg/L	NV		0.04		0.04		0.04		0.03		0.03		0.29		0.29	
Oxidation Reduction Potential	mV	NV		-18		-18		-220		-118		-118		-102		-102	
pH	SU	NV		6.24		6.24		6.68		6.79		6.79		6.91		6.91	
Dissolved Gases (RSK-175)																	
Ethane	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Ethylene	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Methane	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
General Chemistry (2320B/SM5310B/SW9056A)																	
Alkalinity	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Bromide	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Nitrate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Sulfate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Total organic carbon	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Perchlorate (EPA 6850)																	
Perchlorate	µg/L	17		< 0.05	U	< 0.05	U	< 0.25	UJ	0.0617	J	< 0.1	U	< 0.5	U	< 0.5	U
Volatile Organic Compounds (8260C)																	
1,1,2-Trichloroethane	µg/L	5		< 1	U	< 0.5	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U
1,1-Dichloroethene	µg/L	7		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,2-Dichloroethane	µg/L	5		0.73	J	0.91	J	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
cis-1,2-Dichloroethene	µg/L	70		3.5		3.3		0.92	J	0.85	J	0.75	J	1.1		0.97	J
Methylene chloride	µg/L	5		< 1	U	< 1	U	< 2	U	< 2	U	< 2	U	< 1	U	< 1	U
Trichloroethene	µg/L	5		3.7		3.3		2.2		2		1.9		2.3		2.1	
Vinyl chloride	µg/L	2		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	0.77	J	0.79	J

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code	16RW11								16WW12					
			Sample ID	16RW11-211021		16RW11-211021-FD		16RW11-220126		16RW11-220126-FD		16WW12-181012		16WW12-190918		16WW12-200311	
			Sample Date	10/21/2021		10/21/2021		1/26/2022		1/26/2022		10/12/2018		9/18/2019		3/11/2020	
			Groundwater Zone	SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW	
Analyte	Units	MCL/PCL		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																	
Dehalococcoides	cells/mL	NV		NA		NA		NA		NA		NA		NA		NA	
Field Measurements																	
Dissolved oxygen	mg/L	NV		0.27		0.27		0.36		0.27		0.36		0.34		0.61	
Oxidation Reduction Potential	mV	NV		-11		-11		101		-11		130.1		163.3		158	
pH	SU	NV		6.19		6.19		6.58		6.19		5.74		5.79		6.41	
Dissolved Gases (RSK-175)																	
Ethane	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Ethylene	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Methane	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
General Chemistry (2320B/SM5310B/SW9056A)																	
Alkalinity	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Bromide	mg/L	NV		NA		NA		NA		NA		3.9		NA		3.71	
Nitrate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Sulfate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Total organic carbon	mg/L	NV		NA		NA		NA		NA		NA		NA		7.08	
Perchlorate (EPA 6850)																	
Perchlorate	µg/L	17		< 0.2	U	< 0.2	U	< 0.2	U	< 0.2	U	12		120		53	
Volatile Organic Compounds (8260C)																	
1,1,2-Trichloroethane	µg/L	5		< 1	UJ	< 1	UJ	< 1	U	< 1	U	< 5	U	< 2.5	U	< 2.5	U
1,1-Dichloroethene	µg/L	7		< 0.5	UJ	< 0.5	UJ	< 0.5	U	< 0.5	U	< 5	U	4.9	J	3.6	J
1,2-Dichloroethane	µg/L	5		< 0.5	UJ	< 0.5	UJ	< 0.5	U	< 0.5	U	16		9.2		7.5	
cis-1,2-Dichloroethene	µg/L	70		< 0.5	UJ	< 0.5	UJ	< 0.5	U	< 0.5	U	86		52		48	
Methylene chloride	µg/L	5		< 1	UJ	< 1	UJ	< 2	U	< 2	U	< 10	U	< 5	U	< 5	U
Trichloroethene	µg/L	5		1.3	J	1.2	J	1.1		0.83	J	4100		2100		1700	
Vinyl chloride	µg/L	2		< 0.5	UJ	< 0.5	UJ	< 0.5	U	< 0.5	U	12		5.5		3.4	J

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code		16WW12											
			Sample ID	16WW12-200721		16WW12-201021		16WW12-210203		16WW12-210421		16WW12-210728		16WW12-211021		16WW12-220126	
			Sample Date	7/21/2020		10/21/2020		2/3/2021		4/21/2021		7/28/2021		10/21/2021		1/26/2022	
			Groundwater Zone	SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW	
Analyte	Units	MCL/PCL		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																	
Dehalococcoides	cells/mL	NV		NA		NA		NA		NA		NA		NA		NA	
Field Measurements																	
Dissolved oxygen	mg/L	NV		0.07		0.25		0.08		0.03		0.78		0.27		0.49	
Oxidation Reduction Potential	mV	NV		68		72		55		130		82		165		93	
pH	SU	NV		6.01		6.02		5.82		6.35		6.21		5.75		6.47	
Dissolved Gases (RSK-175)																	
Ethane	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Ethylene	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Methane	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
General Chemistry (2320B/SM5310B/SW9056A)																	
Alkalinity	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Bromide	mg/L	NV		6.16		5.76		5.7		NA		NA		NA		NA	
Nitrate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Sulfate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Total organic carbon	mg/L	NV		8.72		3.98		3.73		NA		NA		NA		NA	
Perchlorate (EPA 6850)																	
Perchlorate	µg/L	17		61.5		18.5		24.1	J	42.1		16		23.2		30.5	
Volatile Organic Compounds (8260C)																	
1,1,2-Trichloroethane	µg/L	5		< 5	U	< 5	U	< 1	U	< 10	U	< 5	U	< 10	UJ	< 5	U
1,1-Dichloroethene	µg/L	7		7.5		3.8	J	3.2		5.4	J	4	J	< 5	UJ	< 2.5	U
1,2-Dichloroethane	µg/L	5		12		5.5		4.3		7.3	J	5.8		5.1	J	4.8	J
cis-1,2-Dichloroethene	µg/L	70		71		67		84		76		64		69	J	77	
Methylene chloride	µg/L	5		< 5	U	< 5	U	< 2	U	< 20	U	< 5	U	< 10	UJ	5.1	J
Trichloroethene	µg/L	5		2800		1500		1100		2100		1700		1000	J	1100	
Vinyl chloride	µg/L	2		8.1		5.8		4.8		8.2	J	5.5		4.6	J	5	J

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code		16WW13											
			Sample ID	16WW13-181012		16WW13-190918		16WW13-200312		16WW13-200723		16WW13-200723-FD		16WW13-201022		16WW13-210122	
			Sample Date	10/12/2018		9/18/2019		3/12/2020		7/23/2020		7/23/2020		10/22/2020		1/22/2021	
			Groundwater Zone	INTERMEDIATE		INTERMEDIATE		INTERMEDIATE		INTERMEDIATE		INTERMEDIATE		INTERMEDIATE		INTERMEDIATE	
Analyte	Units	MCL/PCL		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																	
Dehalococcoides	cells/mL	NV		NA		NA		NA		NA		NA		NA		NA	
Field Measurements																	
Dissolved oxygen	mg/L	NV		1.02		0.16		2.47		0.07		0.07		0.32		5.7	
Oxidation Reduction Potential	mV	NV		225.7		190		161		183		183		137		156.7	
pH	SU	NV		4.68		5.52		5.58		5.58		5.58		4.69		6.04	
Dissolved Gases (RSK-175)																	
Ethane	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Ethylene	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Methane	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
General Chemistry (2320B/SM5310B/SW9056A)																	
Alkalinity	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Bromide	mg/L	NV		0.929		NA		NA		NA		NA		NA		NA	
Nitrate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Sulfate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Total organic carbon	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Perchlorate (EPA 6850)																	
Perchlorate	µg/L	17		< 2	U	< 2	U	< 2	U	0.134		< 0.1	U	< 0.05	U	< 0.05	UJ
Volatile Organic Compounds (8260C)																	
1,1,2-Trichloroethane	µg/L	5		< 5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U	< 0.5	U	< 1	U
1,1-Dichloroethene	µg/L	7		< 5	U	0.7	J	< 0.5	U	< 0.5	U	0.61	J	1.3		< 0.5	U
1,2-Dichloroethane	µg/L	5		< 5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
cis-1,2-Dichloroethene	µg/L	70		1700		210		18		180		200		620		190	
Methylene chloride	µg/L	5		< 10	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 2	U
Trichloroethene	µg/L	5		4400		630		7.5		190		190		1100		97	
Vinyl chloride	µg/L	2		51		5.6		< 0.5	U	4		3.9		8.8		1.1	

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code	16WW13								16WW14					
			Sample ID	16WW13-210419		16WW13-210726		16WW13-211026		16WW13-220127		16WW14-181010		16WW14-190916		16WW14-200317	
			Sample Date	4/19/2021		7/26/2021		10/26/2021		1/27/2022		10/10/2018		9/16/2019		3/17/2020	
			Groundwater Zone	INTERMEDIATE		INTERMEDIATE		INTERMEDIATE		INTERMEDIATE		SHALLOW		SHALLOW		SHALLOW	
Analyte	Units	MCL/PCL		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																	
Dehalococcoides	cells/mL	NV		NA		NA		NA		NA		NA		NA		NA	
Field Measurements																	
Dissolved oxygen	mg/L	NV		0.89		0.51		0.63		0.56		0.44		0.88		0.03	
Oxidation Reduction Potential	mV	NV		139		125		218		239		57.1		24		52	
pH	SU	NV		5.54		5.47		5.2		5.47		5.93		6.17		6.41	
Dissolved Gases (RSK-175)																	
Ethane	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Ethylene	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Methane	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
General Chemistry (2320B/SM5310B/SW9056A)																	
Alkalinity	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Bromide	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Nitrate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Sulfate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Total organic carbon	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Perchlorate (EPA 6850)																	
Perchlorate	µg/L	17		0.292		< 0.5	U	< 0.2	U	< 1	U	< 2	U	< 2	U	< 2	U
Volatile Organic Compounds (8260C)																	
1,1,2-Trichloroethane	µg/L	5		< 1	U	< 5	U	< 5	U	< 10	U	< 0.5	U	< 0.5	U	< 0.5	U
1,1-Dichloroethene	µg/L	7		< 0.5	U	< 2.5	U	< 2.5	U	< 5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,2-Dichloroethane	µg/L	5		< 0.5	U	< 2.5	U	< 2.5	U	< 5	U	< 0.5	U	< 0.5	U	< 0.5	U
cis-1,2-Dichloroethene	µg/L	70		140		560		680		690		2.6		0.79	J	1.2	
Methylene chloride	µg/L	5		< 2	U	< 5	U	< 5	U	< 20	U	< 1	U	< 1	U	< 1	U
Trichloroethene	µg/L	5		22		1500		2800		2300		42		25		33	
Vinyl chloride	µg/L	2		0.87	J	9.6		10		10		1.1		< 0.5	U	0.4	J

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code	16WW14												
			Sample ID	16WW14-200720		16WW14-201019		16WW14-210122		16WW14-210412		16WW14-210712		16WW14-211025		16WW14-220110	
			Sample Date	7/20/2020		10/19/2020		1/22/2021		4/12/2021		7/12/2021		10/25/2021		1/10/2022	
			Groundwater Zone	SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW	
Analyte	Units	MCL/PCL		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																	
Dehalococcoides	cells/mL	NV		NA		NA		NA		NA		NA		NA		NA	
Field Measurements																	
Dissolved oxygen	mg/L	NV		0.26		0.37		0.93		0.47		0.73		0.36		0.42	
Oxidation Reduction Potential	mV	NV		95		96		103.5		129		120		196		165	
pH	SU	NV		6.24		6.02		6.67		5.97		5.72		5.82		5.17	
Dissolved Gases (RSK-175)																	
Ethane	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Ethylene	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Methane	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
General Chemistry (2320B/SM5310B/SW9056A)																	
Alkalinity	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Bromide	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Nitrate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Sulfate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Total organic carbon	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Perchlorate (EPA 6850)																	
Perchlorate	µg/L	17		0.544	J	< 0.05	U	< 0.05	UJ	< 0.05	U	0.21		< 0.2	U	0.21	
Volatile Organic Compounds (8260C)																	
1,1,2-Trichloroethane	µg/L	5		< 1	U	< 0.5	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U
1,1-Dichloroethene	µg/L	7		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,2-Dichloroethane	µg/L	5		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
cis-1,2-Dichloroethene	µg/L	70		1.4		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	0.63	J
Methylene chloride	µg/L	5		< 1	U	< 1	U	< 2	U	< 2	U	< 1	U	< 1	U	< 2	U
Trichloroethene	µg/L	5		42		25		18		17		8.4		12		17	
Vinyl chloride	µg/L	2		0.61	J	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code		16WW16											
			Sample ID	16WW16-181010		16WW16-190916		16WW16-200311		16WW16-200714		16WW16-201008		16WW16-210120		16WW16-210415	
			Sample Date	10/10/2018		9/16/2019		3/11/2020		7/14/2020		10/8/2020		1/20/2021		4/15/2021	
			Groundwater Zone	SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW	
Analyte	Units	MCL/PCL		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																	
Dehalococcoides	cells/mL	NV		0	U	NA		5.1		2.3		0.5		1.1		0.1	J
Field Measurements																	
Dissolved oxygen	mg/L	NV		0.96		0.28		0.44		0.76		0.02		0.99		1.36	
Oxidation Reduction Potential	mV	NV		193.6		58.9		113		104		75		162.1		173	
pH	SU	NV		6.10		6.12		6.59		6.48		6.36		6.59		6.08	
Dissolved Gases (RSK-175)																	
Ethane	µg/L	NV		2.31		NA		4.87		5.33		5.64		0.75		2.4	
Ethylene	µg/L	NV		4.98		NA		10.2		10.4		11.6		2.8		3.44	J
Methane	µg/L	NV		403		NA		1210		997		907		380		437	J
General Chemistry (2320B/SM5310B/SW9056A)																	
Alkalinity	mg/L	NV		362		NA		397		400		391		344		338	
Bromide	mg/L	NV		4.69		NA		4.51		5.82		6.75		5.92		3.97	
Nitrate	mg/L	NV		< 0.1	U	NA		< 0.1	U	< 0.1	U	< 0.5	U	0.741		< 0.1	U
Sulfate	mg/L	NV		722		NA		433		521		491		849		367	
Total organic carbon	mg/L	NV		4.34		NA		4.85		18.4		3.35		4.07		4.71	
Perchlorate (EPA 6850)																	
Perchlorate	µg/L	17		420		460		510		442		480		309		288	
Volatile Organic Compounds (8260C)																	
1,1,2-Trichloroethane	µg/L	5		< 25	U	< 12	U	< 12	U	< 25	U	< 25	U	< 5	U	< 50	U
1,1-Dichloroethene	µg/L	7		< 25	U	25		37		50		59		12		33	J
1,2-Dichloroethane	µg/L	5		< 25	U	19	J	30		32		33		8.6		32	J
cis-1,2-Dichloroethene	µg/L	70		8500		6600		13000		16000		17000		2800		13000	
Methylene chloride	µg/L	5		< 50	U	< 25	U	< 25	U	< 25	U	44	J	< 10	U	< 100	U
Trichloroethene	µg/L	5		21000		13000		27000		28000		32000		5700		28000	
Vinyl chloride	µg/L	2		330		220		300		430		470		110		260	

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code	16WW16						16WW21							
			Sample ID	16WW16-210720		16WW16-211013		16WW16-220111		16WW21-181012		16WW21-200316		16WW21-200316-FD		16WW21-200715	
			Sample Date	7/20/2021		10/13/2021		1/11/2022		10/12/2018		3/16/2020		3/16/2020		7/15/2020	
			Groundwater Zone	SHALLOW		SHALLOW		SHALLOW		UPPER DEEP		UPPER DEEP		UPPER DEEP		UPPER DEEP	
Analyte	Units	MCL/PCL		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																	
Dehalococcoides	cells/mL	NV		0.5	J	0.1	J	0.4	J	NA		NA		NA		NA	
Field Measurements																	
Dissolved oxygen	mg/L	NV		0.93		0.41		0.73		0.82		0.88		0.88		0.41	
Oxidation Reduction Potential	mV	NV		107		128		191		166.4		50		50		153	
pH	SU	NV		6.15		5.83		6.14		5.52		7.89		7.89		5.67	
Dissolved Gases (RSK-175)																	
Ethane	µg/L	NV		2.23		2.29		2.63		NA		NA		NA		NA	
Ethylene	µg/L	NV		4.11	J	3.29	J	3.93	J	NA		NA		NA		NA	
Methane	µg/L	NV		407		406		490	J	NA		NA		NA		NA	
General Chemistry (2320B/SM5310B/SW9056A)																	
Alkalinity	mg/L	NV		363		365		365		NA		NA		NA		NA	
Bromide	mg/L	NV		4.32		< 0.1	U	2.54		0.218		0.206		0.209		1.3	
Nitrate	mg/L	NV		< 0.2	U	< 0.1	U	0.0442	J	NA		NA		NA		NA	
Sulfate	mg/L	NV		428		192		372		NA		NA		NA		NA	
Total organic carbon	mg/L	NV		4.46		6.66		4.69	J	NA		< 0.2	UJ	< 0.2	UJ	0.89	
Perchlorate (EPA 6850)																	
Perchlorate	µg/L	17		408		555		561		< 2	U	< 2	U	< 2	U	0.25	
Volatile Organic Compounds (8260C)																	
1,1,2-Trichloroethane	µg/L	5		< 25	U	< 25	U	< 25	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U
1,1-Dichloroethene	µg/L	7		29		33		25		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,2-Dichloroethane	µg/L	5		33		41		35		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
cis-1,2-Dichloroethene	µg/L	70		15000		18000		14000		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Methylene chloride	µg/L	5		35	UB	< 25	U	< 50	U	< 1	U	< 1	U	< 1	U	< 1	U
Trichloroethene	µg/L	5		30000		34000		29000		< 0.5	U	1.3		1.1		0.55	J
Vinyl chloride	µg/L	2		170		200		170		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code	16WW21												
			Sample ID	16WW21-201014		16WW21-201014-FD		16WW21-210203		16WW21-210203-FD		16WW21-210415		16WW21-210720		16WW21-211019	
			Sample Date	10/14/2020		10/14/2020		2/3/2021		2/3/2021		4/15/2021		7/20/2021		10/19/2021	
			Groundwater Zone	UPPER DEEP		UPPER DEEP		UPPER DEEP		UPPER DEEP		UPPER DEEP		UPPER DEEP		UPPER DEEP	
Analyte	Units	MCL/PCL		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																	
Dehalococcoides	cells/mL	NV		NA		NA		NA		NA		NA		NA		NA	
Field Measurements																	
Dissolved oxygen	mg/L	NV		0.23		0.23		0.12		0.12		0.41		0.84		0.64	
Oxidation Reduction Potential	mV	NV		17		17		-152		-152		84		30		33	
pH	SU	NV		6.55		6.55		6.50		6.50		5.51		6.17		6.18	
Dissolved Gases (RSK-175)																	
Ethane	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Ethylene	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Methane	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
General Chemistry (2320B/SM5310B/SW9056A)																	
Alkalinity	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Bromide	mg/L	NV		0.864		0.895		0.578		0.62		NA		NA		NA	
Nitrate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Sulfate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Total organic carbon	mg/L	NV		0.58		0.12	J	< 0.2	U	< 0.2	U	NA		NA		NA	
Perchlorate (EPA 6850)																	
Perchlorate	µg/L	17		< 0.05	U	< 0.05	U	< 0.05	UJ	< 0.05	UJ	< 0.05	U	< 0.5	U	< 0.2	U
Volatile Organic Compounds (8260C)																	
1,1,2-Trichloroethane	µg/L	5		< 0.5	U	< 0.5	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U
1,1-Dichloroethene	µg/L	7		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,2-Dichloroethane	µg/L	5		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
cis-1,2-Dichloroethene	µg/L	70		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Methylene chloride	µg/L	5		< 1	U	< 1	U	< 2	U	< 2	U	< 2	U	< 1	U	< 1	U
Trichloroethene	µg/L	5		1.5		1.9		< 0.5	U	< 0.5	U	1.1		1		0.56	J
Vinyl chloride	µg/L	2		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code	16WW21		16WW22											
			Sample ID	16WW21-220113		16WW22-181010		16WW22-190917		16WW22-200316		16WW22-200715		16WW22-201014		16WW22-210125	
			Sample Date	1/13/2022		10/10/2018		9/17/2019		3/16/2020		7/15/2020		10/14/2020		1/25/2021	
			Groundwater Zone	UPPER DEEP		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW	
Analyte	Units	MCL/PCL		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																	
Dehalococcoides	cells/mL	NV		NA		5.2		NA		4.6		4		11.1		28.3	
Field Measurements																	
Dissolved oxygen	mg/L	NV		0.88		0.89		0.23		0.05		0.05		0.62		0.78	
Oxidation Reduction Potential	mV	NV		112		68.3		-17.7		-5		51		8		51.1	
pH	SU	NV		5.93		5.86		6.05		6.39		6.21		6.27		6.30	
Dissolved Gases (RSK-175)																	
Ethane	µg/L	NV		NA		< 1	U	NA		0.288	J	< 0.25	U	< 0.25	U	< 0.47	U
Ethylene	µg/L	NV		NA		1.56		NA		1.68		1.16		< 0.5	U	< 0.55	U
Methane	µg/L	NV		NA		2.46		NA		2.98		2.04		2.04		0.91	J
General Chemistry (2320B/SM5310B/SW9056A)																	
Alkalinity	mg/L	NV		NA		239		NA		168		204		183		200	
Bromide	mg/L	NV		NA		4.46		NA		4		5.77		5.26		5.54	
Nitrate	mg/L	NV		NA		< 0.1	U	NA		< 0.5	U	< 0.1	U	< 0.1	U	0.186	J
Sulfate	mg/L	NV		NA		772		NA		368		283		163		307	
Total organic carbon	mg/L	NV		NA		2.62		NA		2.35		1.23		0.81		1.13	
Perchlorate (EPA 6850)																	
Perchlorate	µg/L	17		< 0.2	U	5.5		< 2	U	< 2	U	0.442	J	< 0.05	U	0.246	J
Volatile Organic Compounds (8260C)																	
1,1,2-Trichloroethane	µg/L	5		< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U	< 1	U
1,1-Dichloroethene	µg/L	7		< 0.5	U	1.9		< 0.5	U	0.65	J	< 0.5	U	< 0.5	U	< 0.5	U
1,2-Dichloroethane	µg/L	5		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
cis-1,2-Dichloroethene	µg/L	70		< 0.5	U	19		2.7		4.2		2.7		3		3.2	
Methylene chloride	µg/L	5		< 2	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 2	U
Trichloroethene	µg/L	5		0.95	J	150		34		52		24		7.8		30	
Vinyl chloride	µg/L	2		< 0.5	U	4.5		0.44	J	0.69	J	< 0.5	U	< 0.5	U	0.49	J

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code	16WW22								16WW23					
			Sample ID	16WW22-210415		16WW22-210720		16WW22-211019		16WW22-220111		16WW23-181012		16WW23-190917		16WW23-200331	
			Sample Date	4/15/2021		7/20/2021		10/19/2021		1/11/2022		10/12/2018		9/17/2019		3/31/2020	
			Groundwater Zone	SHALLOW		SHALLOW		SHALLOW		SHALLOW		INTERMEDIATE		INTERMEDIATE		INTERMEDIATE	
Analyte	Units	MCL/PCL		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																	
Dehalococcoides	cells/mL	NV		13.7	J	24.9		51.1		38		NA		NA		NA	
Field Measurements																	
Dissolved oxygen	mg/L	NV		0.04		0.64		0.19		0.61		1.23		0.14		0.08	
Oxidation Reduction Potential	mV	NV		110		100		146		139		13.2		8		2	
pH	SU	NV		5.99		6.10		5.45		6.33		5.49		6.07		4.53	
Dissolved Gases (RSK-175)																	
Ethane	µg/L	NV		< 0.5	U	< 0.25	U	< 0.5	U	< 0.5	U	NA		NA		NA	
Ethylene	µg/L	NV		1.24	J	0.673	J	0.951	J	1.04	J	NA		NA		NA	
Methane	µg/L	NV		0.981		2.51		1.11		1.86	J	NA		NA		NA	
General Chemistry (2320B/SM5310B/SW9056A)																	
Alkalinity	mg/L	NV		252		243		205		214		NA		NA		NA	
Bromide	mg/L	NV		4.62		4.85		1.8		3.44		NA		NA		NA	
Nitrate	mg/L	NV		0.0682	J	< 0.2	U	< 0.2	UJ	0.0496	J	NA		NA		NA	
Sulfate	mg/L	NV		209		209		166		157		NA		NA		NA	
Total organic carbon	mg/L	NV		1.49		2.39		3.04		6.19		NA		NA		NA	
Perchlorate (EPA 6850)																	
Perchlorate	µg/L	17		0.471		0.148		0.486		0.4		< 2	U	< 2	U	< 20	U
Volatile Organic Compounds (8260C)																	
1,1,2-Trichloroethane	µg/L	5		< 1	U	< 1	U	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 1	U
1,1-Dichloroethene	µg/L	7		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,2-Dichloroethane	µg/L	5		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
cis-1,2-Dichloroethene	µg/L	70		2		2.2		2.5		2.9		< 0.5	U	< 0.5	U	< 0.5	U
Methylene chloride	µg/L	5		< 2	U	< 1	U	< 1	U	< 2	U	< 1	U	< 1	U	< 1	U
Trichloroethene	µg/L	5		12		13		7.6		13		< 0.5	U	< 0.5	U	< 0.5	U
Vinyl chloride	µg/L	2		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code		16WW23											
			Sample ID	16WW23-200727		16WW23-201008		16WW23-210128		16WW23-210422		16WW23-210714		16WW23-211013		16WW23-220127	
			Sample Date	7/27/2020		10/8/2020		1/28/2021		4/22/2021		7/14/2021		10/13/2021		1/27/2022	
			Groundwater Zone	INTERMEDIATE		INTERMEDIATE		INTERMEDIATE		INTERMEDIATE		INTERMEDIATE		INTERMEDIATE		INTERMEDIATE	
Analyte	Units	MCL/PCL		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																	
Dehalococcoides	cells/mL	NV		NA		NA		NA		NA		NA		NA		NA	
Field Measurements																	
Dissolved oxygen	mg/L	NV		0.03		0.04		1.37		3.42		0.47		0.23		0.5	
Oxidation Reduction Potential	mV	NV		17		-23		56.7		53		12		-5		90	
pH	SU	NV		5.67		5.96		5.61		5.57		5.20		5.87		6.3	
Dissolved Gases (RSK-175)																	
Ethane	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Ethylene	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Methane	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
General Chemistry (2320B/SM5310B/SW9056A)																	
Alkalinity	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Bromide	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Nitrate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Sulfate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Total organic carbon	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Perchlorate (EPA 6850)																	
Perchlorate	µg/L	17		< 0.05	U	< 0.05	U	0.346	J	< 0.05	U	< 2	U	< 0.2	UJ	< 1	U
Volatile Organic Compounds (8260C)																	
1,1,2-Trichloroethane	µg/L	5		< 1	U	< 0.5	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U
1,1-Dichloroethene	µg/L	7		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,2-Dichloroethane	µg/L	5		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
cis-1,2-Dichloroethene	µg/L	70		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Methylene chloride	µg/L	5		< 1	U	< 1	U	< 2	U	< 2	U	< 1	U	< 1	U	< 2	U
Trichloroethene	µg/L	5		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	1.8		< 0.5	U
Vinyl chloride	µg/L	2		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code		16WW24											
			Sample ID	16WW24-181009		16WW24-181009-FD		16WW24-190917		16WW24-200331		16WW24-200331-FD		16WW24-200727		16WW24-201008	
			Sample Date	10/9/2018		10/9/2018		9/17/2019		3/31/2020		3/31/2020		7/27/2020		10/8/2020	
			Groundwater Zone	SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW	
Analyte	Units	MCL/PCL		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																	
Dehalococcoides	cells/mL	NV		1.6		NA		NA		NA		NA		NA		NA	
Field Measurements																	
Dissolved oxygen	mg/L	NV		0.17		0.17		0.44		0.04		0.04		1.71		0.03	
Oxidation Reduction Potential	mV	NV		282.6		282.6		357		356		356		402		225	
pH	SU	NV		3.54		3.54		3.76		4.78		4.78		4.03		3.89	
Dissolved Gases (RSK-175)																	
Ethane	µg/L	NV		0.256	J	0.555	J	NA		NA		NA		NA		NA	
Ethylene	µg/L	NV		1.39	J	1.24		NA		NA		NA		NA		NA	
Methane	µg/L	NV		1.65		3.27		NA		NA		NA		NA		NA	
General Chemistry (2320B/SM5310B/SW9056A)																	
Alkalinity	mg/L	NV		< 5	U	< 5	U	NA		NA		NA		NA		NA	
Bromide	mg/L	NV		1.26		1.32		NA		NA		NA		NA		NA	
Nitrate	mg/L	NV		< 0.1	U	< 0.1	U	NA		NA		NA		NA		NA	
Sulfate	mg/L	NV		905		898		NA		NA		NA		NA		NA	
Total organic carbon	mg/L	NV		2.76		2.65		NA		NA		NA		NA		NA	
Perchlorate (EPA 6850)																	
Perchlorate	µg/L	17		< 2	U	< 2	U	< 2	U	< 2	U	< 2	U	2.38		< 0.05	U
Volatile Organic Compounds (8260C)																	
1,1,2-Trichloroethane	µg/L	5		< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U	< 1	U	< 0.5	U
1,1-Dichloroethene	µg/L	7		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,2-Dichloroethane	µg/L	5		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
cis-1,2-Dichloroethene	µg/L	70		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Methylene chloride	µg/L	5		< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U
Trichloroethene	µg/L	5		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Vinyl chloride	µg/L	2		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code	16WW24										16WW25			
			Sample ID	16WW24-210128		16WW24-210422		16WW24-210714		16WW24-211013		16WW24-220127		16WW25-181009		16WW25-190919	
			Sample Date	1/28/2021		4/22/2021		7/14/2021		10/13/2021		1/27/2022		10/9/2018		9/19/2019	
			Groundwater Zone	SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		INTERMEDIATE		INTERMEDIATE	
Analyte	Units	MCL/PCL		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																	
Dehalococcoides	cells/mL	NV		NA		NA		NA		NA		NA		0	U	NA	
Field Measurements																	
Dissolved oxygen	mg/L	NV		2.09		0.43		0.61		1		0.72		0.31		0.2	
Oxidation Reduction Potential	mV	NV		189.3		482		262		327		312		-13.4		-18.2	
pH	SU	NV		3.44		3.31		3.30		3.52		3.76		5.95		5.68	
Dissolved Gases (RSK-175)																	
Ethane	µg/L	NV		NA		NA		NA		NA		NA		0.316	J	NA	
Ethylene	µg/L	NV		NA		NA		NA		NA		NA		0.954	J	NA	
Methane	µg/L	NV		NA		NA		NA		NA		NA		13.7		NA	
General Chemistry (2320B/SM5310B/SW9056A)																	
Alkalinity	mg/L	NV		NA		NA		NA		NA		NA		69		NA	
Bromide	mg/L	NV		NA		NA		NA		NA		NA		2.86		NA	
Nitrate	mg/L	NV		NA		NA		NA		NA		NA		< 0.1	U	NA	
Sulfate	mg/L	NV		NA		NA		NA		NA		NA		5710		NA	
Total organic carbon	mg/L	NV		NA		NA		NA		NA		NA		23.8		NA	
Perchlorate (EPA 6850)																	
Perchlorate	µg/L	17		< 0.5	U	< 0.05	U	< 0.5	U	< 0.2	U	< 0.2	U	< 2	U	< 2	U
Volatile Organic Compounds (8260C)																	
1,1,2-Trichloroethane	µg/L	5		< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 0.5	U	< 0.5	U
1,1-Dichloroethene	µg/L	7		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,2-Dichloroethane	µg/L	5		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
cis-1,2-Dichloroethene	µg/L	70		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Methylene chloride	µg/L	5		< 2	U	< 2	U	< 1	U	< 1	U	< 2	U	< 1	U	< 1	U
Trichloroethene	µg/L	5		< 0.5	U	< 0.5	U	< 0.5	U	1.2		< 0.5	U	< 0.5	U	< 0.5	U
Vinyl chloride	µg/L	2		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code		16WW25											
			Sample ID	16WW25-190919-FD		16WW25-200316		16WW25-200721		16WW25-201014		16WW25-210121		16WW25-210121-FD		16WW25-210420	
			Sample Date	9/19/2019		3/16/2020		7/21/2020		10/14/2020		1/21/2021		1/21/2021		4/20/2021	
			Groundwater Zone	INTERMEDIATE		INTERMEDIATE		INTERMEDIATE		INTERMEDIATE		INTERMEDIATE		INTERMEDIATE		INTERMEDIATE	
Analyte	Units	MCL/PCL		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																	
Dehalococcoides	cells/mL	NV		NA		6.2		1.9		3.5		7		NA		< 0.5	U
Field Measurements																	
Dissolved oxygen	mg/L	NV		0.2		0.05		0.02		0.02		0.69		0.69		0.06	
Oxidation Reduction Potential	mV	NV		-18.2		-38		-16		-14		-37.4		-37.4		-34	
pH	SU	NV		5.68		6.20		5.97		6.10		6.27		6.27		6.28	
Dissolved Gases (RSK-175)																	
Ethane	µg/L	NV		NA		0.371	J	0.284	J	< 0.25	U	< 0.47	U	< 0.47	U	< 0.5	U
Ethylene	µg/L	NV		NA		2.26		0.845	J	< 0.5	U	< 0.55	U	< 0.55	U	< 0.5	UJ
Methane	µg/L	NV		NA		22.1		15.6		15.3		9.9		9.6		16.7	
General Chemistry (2320B/SM5310B/SW9056A)																	
Alkalinity	mg/L	NV		NA		32.4		52.8		52.7		28.7		32.3		86.5	
Bromide	mg/L	NV		NA		3.71	J	2.69		2.11		2.67		2.67		3.13	
Nitrate	mg/L	NV		NA		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Sulfate	mg/L	NV		NA		5000		5550		5270		2160		2050		5500	
Total organic carbon	mg/L	NV		NA		31.2		27.9		27.7	J-	13.1	J	12.5		39.1	
Perchlorate (EPA 6850)																	
Perchlorate	µg/L	17		< 2	U	< 2	U	0.512	J	0.077	J	< 0.5	U	< 0.5	U	< 0.25	U
Volatile Organic Compounds (8260C)																	
1,1,2-Trichloroethane	µg/L	5		< 0.5	U	< 0.5	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U
1,1-Dichloroethene	µg/L	7		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,2-Dichloroethane	µg/L	5		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
cis-1,2-Dichloroethene	µg/L	70		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Methylene chloride	µg/L	5		< 1	U	< 1	U	< 1	U	< 1	U	< 2	U	< 2	U	< 2	U
Trichloroethene	µg/L	5		< 0.5	U	0.85	J	0.58	J	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Vinyl chloride	µg/L	2		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code		16WW25											
			Sample ID	16WW25-210420-FD		16WW25-210713		16WW25-210713-FD		16WW25-211014		16WW25-211014-FD		16WW25-220112		16WW25-220112-FD	
			Sample Date	4/20/2021		7/13/2021		7/13/2021		10/14/2021		10/14/2021		1/12/2022		1/12/2022	
			Groundwater Zone	INTERMEDIATE		INTERMEDIATE		INTERMEDIATE		INTERMEDIATE		INTERMEDIATE		INTERMEDIATE		INTERMEDIATE	
Analyte	Units	MCL/PCL		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																	
Dehalococcoides	cells/mL	NV		NA		5.3		NA		3.7		NA		3.2		NA	
Field Measurements																	
Dissolved oxygen	mg/L	NV		0.06		0.65		0.65		0.33		0.33		0.62		0.62	
Oxidation Reduction Potential	mV	NV		-34		-13		-13		27		27		40		40	
pH	SU	NV		6.28		5.92		5.92		5.82		5.82		6.42		6.42	
Dissolved Gases (RSK-175)																	
Ethane	µg/L	NV		< 0.5	U	< 0.25	U	< 0.25	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Ethylene	µg/L	NV		< 0.5	UJ	0.657	J	< 0.5	UJ	< 0.5	UJ	1.94	J	< 0.5	UJ	< 0.5	UJ
Methane	µg/L	NV		15.3		14.5		14		12	J	7.66	J	16.6		16.9	
General Chemistry (2320B/SM5310B/SW9056A)																	
Alkalinity	mg/L	NV		77.5		60		54.3		76.7	J	110	J	44.7	J	65.1	J
Bromide	mg/L	NV		2.75		2.63		2.5		< 0.5	U	< 0.5	U	< 5	U	< 5	U
Nitrate	mg/L	NV		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	0.324	J	0.201	J
Sulfate	mg/L	NV		5560		5570		5340		4250		4070		4840		4780	
Total organic carbon	mg/L	NV		37		37.8		37.3		28.3		26.1		33.8		32.6	
Perchlorate (EPA 6850)																	
Perchlorate	µg/L	17		< 0.25	U	< 1	U	< 1	U	< 0.2	U	< 0.2	U	< 0.2	U	< 0.2	U
Volatile Organic Compounds (8260C)																	
1,1,2-Trichloroethane	µg/L	5		< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U
1,1-Dichloroethene	µg/L	7		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,2-Dichloroethane	µg/L	5		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
cis-1,2-Dichloroethene	µg/L	70		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Methylene chloride	µg/L	5		< 2	U	< 1	U	< 1	U	< 1	U	< 1	U	< 2	U	< 2	U
Trichloroethene	µg/L	5		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Vinyl chloride	µg/L	2		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code	16WW26												
			Sample ID	16WW26-181009		16WW26-190917		16WW26-190917-FD		16WW26-200721		16WW26-201014		16WW26-210121		16WW26-210420	
			Sample Date	10/9/2018		9/17/2019		9/18/2019		7/21/2020		10/14/2020		1/21/2021		4/20/2021	
			Groundwater Zone	SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW	
Analyte	Units	MCL/PCL		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																	
Dehalococcoides	cells/mL	NV		0.3	J	NA		NA		5.4		21.9		7.6		2.9	
Field Measurements																	
Dissolved oxygen	mg/L	NV		0.66		0.44		0.44		0.05		0.71		0.97		0.88	
Oxidation Reduction Potential	mV	NV		50.4		-1.6		-1.6		189		68		99.9		279	
pH	SU	NV		5.08		5.21		5.21		5.02		5.48		5.25		4.86	
Dissolved Gases (RSK-175)																	
Ethane	µg/L	NV		0.591	J	NA		NA		0.239	J	< 0.25	U	< 0.47	U	< 0.5	U
Ethylene	µg/L	NV		2.59		NA		NA		1.38		< 0.5	U	< 0.55	U	< 0.5	UJ
Methane	µg/L	NV		10.5		NA		NA		5.1		4.5		2.5		1.18	
General Chemistry (2320B/SM5310B/SW9056A)																	
Alkalinity	mg/L	NV		12		NA		NA		21.5		38.4		15		< 5	U
Bromide	mg/L	NV		< 0.1	U	NA		NA		0.774		0.638		1.11		1.52	
Nitrate	mg/L	NV		< 0.1	U	NA		NA		< 0.1	U	< 0.1	U	0.22		< 0.5	U
Sulfate	mg/L	NV		1170		NA		NA		665		375	J-	354		749	
Total organic carbon	mg/L	NV		5.03		NA		NA		3.05		2.11		1.65		3.54	
Perchlorate (EPA 6850)																	
Perchlorate	µg/L	17		< 2	U	< 2	U	< 2	U	0.025	J	< 0.05	U	< 0.05	U	< 0.05	U
Volatile Organic Compounds (8260C)																	
1,1,2-Trichloroethane	µg/L	5		< 2.5	U	< 0.5	U	< 0.5	U	< 1	U	< 0.5	U	< 1	U	< 1	U
1,1-Dichloroethene	µg/L	7		< 2.5	U	1.4		1.6		1.7		2.5		1.5		0.7	J
1,2-Dichloroethane	µg/L	5		< 2.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
cis-1,2-Dichloroethene	µg/L	70		290		35		36		38		78		54		8.7	
Methylene chloride	µg/L	5		< 5	U	< 1	U	< 1	U	< 1	U	< 1	U	< 2	U	< 2	U
Trichloroethene	µg/L	5		2400		380		440		490		850		1000		130	
Vinyl chloride	µg/L	2		5	J	< 0.5	U	< 0.5	U	0.88	J	1.9		1.4		< 0.5	U

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code	16WW26								16WW27					
			Sample ID	16WW26-210713		16WW26-211014		16WW26-220112		16WW26-220112-FD		16WW27-181012		16WW27-190917		16WW27-200312	
			Sample Date	7/13/2021		10/14/2021		1/12/2022		1/12/2022		10/12/2018		9/17/2019		3/12/2020	
			Groundwater Zone	SHALLOW		SHALLOW		SHALLOW		SHALLOW		INTERMEDIATE		INTERMEDIATE		INTERMEDIATE	
Analyte	Units	MCL/PCL		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																	
Dehalococcoides	cells/mL	NV		5.4		26.4		35.7		NA		NA		NA		NA	
Field Measurements																	
Dissolved oxygen	mg/L	NV		0.66		0.48		0.59		0.59		0.98		0.04		0.05	
Oxidation Reduction Potential	mV	NV		175		243		155		155		-11.4		-26		-52	
pH	SU	NV		4.50		4.49		5.04		5.04		5.54		5.99		6.17	
Dissolved Gases (RSK-175)																	
Ethane	µg/L	NV		< 0.25	U	< 0.5	U	< 0.5	U	< 0.5	U	NA		NA		NA	
Ethylene	µg/L	NV		0.852	J	2.18	J	0.997	J	< 0.5	UJ	NA		NA		NA	
Methane	µg/L	NV		1.54		5.49		4.01		3.86		NA		NA		NA	
General Chemistry (2320B/SM5310B/SW9056A)																	
Alkalinity	mg/L	NV		15.2		24.3		43		44.3		NA		NA		NA	
Bromide	mg/L	NV		0.282		< 0.1	U	0.457		0.522		NA		NA		NA	
Nitrate	mg/L	NV		< 0.1	U	< 0.1	U	0.0479	J	0.0376	J	NA		NA		NA	
Sulfate	mg/L	NV		341		342		372		370		NA		NA		NA	
Total organic carbon	mg/L	NV		3.18		4.31		4.58	J	6.48	J	NA		NA		NA	
Perchlorate (EPA 6850)																	
Perchlorate	µg/L	17		< 1	U	< 0.2	U	< 0.2	U	< 0.2	U	< 2	U	< 2	U	< 2	U
Volatile Organic Compounds (8260C)																	
1,1,2-Trichloroethane	µg/L	5		< 1	U	< 1	U	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U
1,1-Dichloroethene	µg/L	7		< 0.5	U	0.77	J	0.79	J	0.76	J	< 0.5	U	< 0.5	U	< 0.5	U
1,2-Dichloroethane	µg/L	5		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
cis-1,2-Dichloroethene	µg/L	70		3.7		36		44		41		< 0.5	U	< 0.5	U	< 0.5	U
Methylene chloride	µg/L	5		< 1	U	< 1	U	< 2	U	< 2	U	< 1	U	< 1	U	< 1	U
Trichloroethene	µg/L	5		26		500		440		380		< 0.5	U	< 0.5	U	1.1	
Vinyl chloride	µg/L	2		< 0.5	U	< 0.5	U	0.65	J	0.69	J	< 0.5	U	< 0.5	U	< 0.5	U

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code		16WW27											
			Sample ID	16WW27-200312-FD		16WW27-200723		16WW27-201022		16WW27-201022-FD		16WW27-210128		16WW27-210422		16WW27-210728	
			Sample Date	3/12/2020		7/23/2020		10/22/2020		10/22/2020		1/28/2021		4/22/2021		7/28/2021	
			Groundwater Zone	INTERMEDIATE		INTERMEDIATE		INTERMEDIATE		INTERMEDIATE		INTERMEDIATE		INTERMEDIATE		INTERMEDIATE	
Analyte	Units	MCL/PCL		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																	
Dehalococcoides	cells/mL	NV		NA		NA		NA		NA		NA		NA		NA	
Field Measurements																	
Dissolved oxygen	mg/L	NV		0.05		0.03		0.03		0.03		0.67		0.3		1.19	
Oxidation Reduction Potential	mV	NV		-52		2		4		4		-28.8		-20		23	
pH	SU	NV		6.17		5.83		5.99		5.99		5.87		6.0		5.47	
Dissolved Gases (RSK-175)																	
Ethane	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Ethylene	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Methane	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
General Chemistry (2320B/SM5310B/SW9056A)																	
Alkalinity	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Bromide	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Nitrate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Sulfate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Total organic carbon	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Perchlorate (EPA 6850)																	
Perchlorate	µg/L	17		< 2	U	< 0.5	U	< 0.05	U	< 0.05	U	< 0.5	U	< 0.05	U	< 0.25	U
Volatile Organic Compounds (8260C)																	
1,1,2-Trichloroethane	µg/L	5		< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U	< 1	U
1,1-Dichloroethene	µg/L	7		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,2-Dichloroethane	µg/L	5		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
cis-1,2-Dichloroethene	µg/L	70		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Methylene chloride	µg/L	5		< 1	U	< 1	U	< 1	U	< 1	U	< 2	U	< 2	U	< 1	U
Trichloroethene	µg/L	5		1.3		< 0.5	U	1.2		1.1		< 0.5	U	< 0.5	U	< 0.5	U
Vinyl chloride	µg/L	2		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code	16WW27				16WW29									
			Sample ID	16WW27-211018		16WW27-220125		16WW29-181015		16WW29-190918		16WW29-200330		16WW29-200715		16WW29-201014	
			Sample Date	10/18/2021		1/25/2022		10/15/2018		9/18/2019		3/30/2020		7/15/2020		10/14/2020	
			Groundwater Zone	INTERMEDIATE		INTERMEDIATE		INTERMEDIATE		INTERMEDIATE		INTERMEDIATE		INTERMEDIATE		INTERMEDIATE	
Analyte	Units	MCL/PCL		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																	
Dehalococcoides	cells/mL	NV		NA		NA		0.5		NA		10.1		7.5		32.2	
Field Measurements																	
Dissolved oxygen	mg/L	NV		4.72		0.68		1.16		0.42		0.04		0.07		3.01	
Oxidation Reduction Potential	mV	NV		11		63		25.1		-39.1		-44		-6		-2	
pH	SU	NV		5.62		6.14		6.19		5.85		4.96		5.77		5.99	
Dissolved Gases (RSK-175)																	
Ethane	µg/L	NV		NA		NA		< 1	U	NA		0.275	J	0.26	J	< 0.25	U
Ethylene	µg/L	NV		NA		NA		1.87		NA		0.864	J	1.14		1.13	
Methane	µg/L	NV		NA		NA		2.41		NA		35.5		31.3		15.3	
General Chemistry (2320B/SM5310B/SW9056A)																	
Alkalinity	mg/L	NV		NA		NA		45.9		NA		65.2		24.4		71.8	
Bromide	mg/L	NV		NA		NA		0.218		NA		1.16		2.62		1.37	
Nitrate	mg/L	NV		NA		NA		< 0.1	U	NA		< 0.1	U	< 0.2	U	< 0.2	U
Sulfate	mg/L	NV		NA		NA		99.2		NA		1560		1900		1200	
Total organic carbon	mg/L	NV		NA		NA		1.8		NA		16		15.3		11.2	
Perchlorate (EPA 6850)																	
Perchlorate	µg/L	17		< 0.2	U	< 0.2	U	< 2		< 2	U	< 2	U	< 0.5	U	< 0.05	U
Volatile Organic Compounds (8260C)																	
1,1,2-Trichloroethane	µg/L	5		< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 0.5	U
1,1-Dichloroethene	µg/L	7		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,2-Dichloroethane	µg/L	5		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
cis-1,2-Dichloroethene	µg/L	70		< 0.5	U	< 0.5	U	8.4		< 0.5	U	< 0.5	U	< 0.5	U	1.1	
Methylene chloride	µg/L	5		< 1	U	< 2	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U
Trichloroethene	µg/L	5		< 0.5	U	< 0.5	U	3.3		2.7		< 0.5	U	< 0.5	U	< 0.5	U
Vinyl chloride	µg/L	2		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code		16WW29											
			Sample ID	16WW29-210121		16WW29-210420		16WW29-210420-FD		16WW29-210720		16WW29-210720-FD		16WW29-211014		16WW29-211014-FD	
			Sample Date	1/21/2021		4/20/2021		4/20/2021		7/20/2021		7/20/2021		10/14/2021		10/14/2021	
			Groundwater Zone	INTERMEDIATE		INTERMEDIATE		INTERMEDIATE		INTERMEDIATE		INTERMEDIATE		INTERMEDIATE		INTERMEDIATE	
Analyte	Units	MCL/PCL		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																	
Dehalococcoides	cells/mL	NV		7.2		19.9		NA		25.1		NA		32.4		NA	
Field Measurements																	
Dissolved oxygen	mg/L	NV		4.79		0.04		0.04		0.47		0.47		0.43		0.43	
Oxidation Reduction Potential	mV	NV		138.3		-86		-86		-48		-48		-9		-9	
pH	SU	NV		5.97		6.42		6.42		6.50		6.50		6.1		6.1	
Dissolved Gases (RSK-175)																	
Ethane	µg/L	NV		< 0.47	U	< 0.5	U	< 0.5	U	< 0.25	U	< 0.25	U	< 0.5	U	< 0.5	U
Ethylene	µg/L	NV		< 0.55	U	< 0.5	UJ	1.36	J	< 0.5	UJ	1.72	J	3.66	J	2.32	J
Methane	µg/L	NV		8		30.6		30.2		21.5		22.3		19.8		21.4	
General Chemistry (2320B/SM5310B/SW9056A)																	
Alkalinity	mg/L	NV		26.2		41.4		35.4		36.5	J	22.5	J	24		26.5	
Bromide	mg/L	NV		0.886		2.35		2.23		0.897		0.916		< 0.2	U	< 0.2	U
Nitrate	mg/L	NV		0.273		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.2	U	< 0.2	U
Sulfate	mg/L	NV		462		1800		1850		1790		1790		1700		1890	
Total organic carbon	mg/L	NV		4.47		16.9		16.9		17.4		17		16.8		18	
Perchlorate (EPA 6850)																	
Perchlorate	µg/L	17		< 0.05	U	< 0.05	U	< 0.05	U	< 0.25	U	< 0.25	U	< 0.2	U	< 0.2	U
Volatile Organic Compounds (8260C)																	
1,1,2-Trichloroethane	µg/L	5		< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U
1,1-Dichloroethene	µg/L	7		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,2-Dichloroethane	µg/L	5		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
cis-1,2-Dichloroethene	µg/L	70		1.8		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Methylene chloride	µg/L	5		< 2	U	< 2	U	< 2	U	< 1	U	< 1	U	< 1	U	< 1	U
Trichloroethene	µg/L	5		0.99	J	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	0.64	J	< 0.5	U
Vinyl chloride	µg/L	2		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code		16WW30											
			Sample ID	16WW29-220112		16WW30-181012		16WW30-190918		16WW30-200330		16WW30-200715		16WW30-201014		16WW30-210121	
			Sample Date	1/12/2022		10/12/2018		9/18/2019		3/30/2020		7/15/2020		10/14/2020		1/21/2021	
			Groundwater Zone	INTERMEDIATE		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW	
Analyte	Units	MCL/PCL		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																	
Dehalococcoides	cells/mL	NV		43.8		NA		NA		NA		NA		NA		NA	
Field Measurements																	
Dissolved oxygen	mg/L	NV		0.44		1.3		0.22		0.06		0.07		0.08		0.52	
Oxidation Reduction Potential	mV	NV		-12		50.1		-54.3		152		2		-27		-28.3	
pH	SU	NV		6.74		5.83		6.14		4.40		5.81		6.19		6.23	
Dissolved Gases (RSK-175)																	
Ethane	µg/L	NV		< 0.5	U	NA		NA		NA		NA		NA		NA	
Ethylene	µg/L	NV		0.859	J	NA		NA		NA		NA		NA		NA	
Methane	µg/L	NV		29.1		NA		NA		NA		NA		NA		NA	
General Chemistry (2320B/SM5310B/SW9056A)																	
Alkalinity	mg/L	NV		23.4		NA		NA		NA		NA		NA		NA	
Bromide	mg/L	NV		< 0.5	U	3.22		NA		1.05		3.79		3.56		4.18	
Nitrate	mg/L	NV		0.254	J	NA		NA		NA		NA		NA		NA	
Sulfate	mg/L	NV		1950		NA		NA		NA		NA		NA		NA	
Total organic carbon	mg/L	NV		22		NA		NA		5.23		2.35		2.13		1.01	
Perchlorate (EPA 6850)																	
Perchlorate	µg/L	17		< 0.2	U	< 2	U	< 2	U	< 2	U	0.309	J	< 0.05	U	< 0.05	U
Volatile Organic Compounds (8260C)																	
1,1,2-Trichloroethane	µg/L	5		< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 0.5	U	< 1	U
1,1-Dichloroethene	µg/L	7		< 0.5	U	< 0.5	U	0.82	J	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,2-Dichloroethane	µg/L	5		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
cis-1,2-Dichloroethene	µg/L	70		< 0.5	U	< 0.5	U	79		< 0.5	U	< 0.5	U	< 0.5	U	0.77	J
Methylene chloride	µg/L	5		< 2	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 2	U
Trichloroethene	µg/L	5		< 0.5	U	1.8		360		14		3.5		5.7		2.2	
Vinyl chloride	µg/L	2		< 0.5	U	< 0.5	U	0.41	J	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code	16WW30								16WW31					
			Sample ID	16WW30-210420		16WW30-210720		16WW30-211014		16WW30-220112		16WW31-181010		16WW31-181010-FD		16WW31-200312	
			Sample Date	4/20/2021		7/20/2021		10/14/2021		1/12/2022		10/10/2018		10/10/2018		3/12/2020	
			Groundwater Zone	SHALLOW		SHALLOW		SHALLOW		SHALLOW		INTERMEDIATE		INTERMEDIATE		INTERMEDIATE	
Analyte	Units	MCL/PCL		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																	
Dehalococcoides	cells/mL	NV		NA		NA		NA		NA		NA		NA		NA	
Field Measurements																	
Dissolved oxygen	mg/L	NV		0.18		0.54		0.24		0.68		0.71		0.71		0.04	
Oxidation Reduction Potential	mV	NV		40		-34		11		67		219.1		219.1		101	
pH	SU	NV		5.83		6.42		5.91		6.28		5.32		5.32		6.30	
Dissolved Gases (RSK-175)																	
Ethane	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Ethylene	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Methane	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
General Chemistry (2320B/SM5310B/SW9056A)																	
Alkalinity	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Bromide	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Nitrate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Sulfate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Total organic carbon	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Perchlorate (EPA 6850)																	
Perchlorate	µg/L	17		< 0.05	U	< 0.05	U	< 0.2	UJ	< 0.2	U	< 2	U	< 2	U	< 2	U
Volatile Organic Compounds (8260C)																	
1,1,2-Trichloroethane	µg/L	5		< 1	U	< 1	U	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U
1,1-Dichloroethene	µg/L	7		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,2-Dichloroethane	µg/L	5		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
cis-1,2-Dichloroethene	µg/L	70		< 0.5	U	< 0.5	U	1.2		1.1	J	< 0.5	U	< 0.5	U	< 0.5	U
Methylene chloride	µg/L	5		< 2	U	< 1	U	< 1	U	< 2	U	< 1	U	< 1	U	< 1	U
Trichloroethene	µg/L	5		11		12		32		31		< 0.5	U	< 0.5	U	1.1	
Vinyl chloride	µg/L	2		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code		16WW31											
			Sample ID	16WW31-200727		16WW31-201019		16WW31-210119		16WW31-210412		16WW31-210712		16WW31-211018		16WW31-220111	
			Sample Date	7/27/2020		10/19/2020		1/19/2021		4/12/2021		7/12/2021		10/18/2021		1/11/2022	
			Groundwater Zone	INTERMEDIATE		INTERMEDIATE		INTERMEDIATE		INTERMEDIATE		INTERMEDIATE		INTERMEDIATE		INTERMEDIATE	
Analyte	Units	MCL/PCL		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																	
Dehalococcoides	cells/mL	NV		NA		NA		NA		NA		NA		NA		NA	
Field Measurements																	
Dissolved oxygen	mg/L	NV		0.22		0.12		0.98		0.86		0.58		0.57		0.64	
Oxidation Reduction Potential	mV	NV		129		89		182.5		217		168		190		172	
pH	SU	NV		6.47		6.27		6.05		5.60		5.61		5.4		5.82	
Dissolved Gases (RSK-175)																	
Ethane	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Ethylene	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Methane	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
General Chemistry (2320B/SM5310B/SW9056A)																	
Alkalinity	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Bromide	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Nitrate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Sulfate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Total organic carbon	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Perchlorate (EPA 6850)																	
Perchlorate	µg/L	17		1.31		< 0.05	U	< 0.05	U	< 0.05	U	< 2.5	U	< 0.2	U	< 0.2	U
Volatile Organic Compounds (8260C)																	
1,1,2-Trichloroethane	µg/L	5		< 1	U	< 0.5	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U
1,1-Dichloroethene	µg/L	7		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,2-Dichloroethane	µg/L	5		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
cis-1,2-Dichloroethene	µg/L	70		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Methylene chloride	µg/L	5		< 1	U	< 1	U	< 2	U	< 2	U	< 1	U	< 1	U	< 2	U
Trichloroethene	µg/L	5		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Vinyl chloride	µg/L	2		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code		16WW32											
			Sample ID	16WW32-181011		16WW32-200312		16WW32-200727		16WW32-201019		16WW32-210119		16WW32-210412		16WW32-210712	
			Sample Date	10/11/2018		3/12/2020		7/27/2020		10/19/2020		1/19/2021		4/12/2021		7/12/2021	
			Groundwater Zone	SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW	
Analyte	Units	MCL/PCL		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																	
Dehalococcoides	cells/mL	NV		NA		NA		NA		NA		NA		NA		NA	
Field Measurements																	
Dissolved oxygen	mg/L	NV		1.94		0.64		2		0.34		1.04		0.66		0.66	
Oxidation Reduction Potential	mV	NV		115.4		19		78		70		142.2		190		149	
pH	SU	NV		5.64		6.71		6.58		6.52		6.40		5.76		5.88	
Dissolved Gases (RSK-175)																	
Ethane	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Ethylene	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Methane	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
General Chemistry (2320B/SM5310B/SW9056A)																	
Alkalinity	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Bromide	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Nitrate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Sulfate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Total organic carbon	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Perchlorate (EPA 6850)																	
Perchlorate	µg/L	17		< 2		< 2	U	< 0.05	U	< 0.05	U	< 0.05	U	< 0.05	U	< 5	U
Volatile Organic Compounds (8260C)																	
1,1,2-Trichloroethane	µg/L	5		< 0.5	U	< 0.5	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U
1,1-Dichloroethene	µg/L	7		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,2-Dichloroethane	µg/L	5		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
cis-1,2-Dichloroethene	µg/L	70		< 0.5	U	0.8	J	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Methylene chloride	µg/L	5		< 1	U	< 1	U	< 1	U	< 1	U	< 2	U	< 2	U	< 1	U
Trichloroethene	µg/L	5		< 0.5	U	9.9		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Vinyl chloride	µg/L	2		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code	16WW32				16WW33									
			Sample ID	16WW32-211018		16WW32-220110		16WW33-181010		16WW33-200312		16WW33-200723		16WW33-200723-FD		16WW33-201019	
			Sample Date	10/18/2021		1/10/2022		10/10/2018		3/12/2020		7/23/2020		7/23/2020		10/19/2020	
			Groundwater Zone	SHALLOW		SHALLOW		INTERMEDIATE		INTERMEDIATE		INTERMEDIATE		INTERMEDIATE		INTERMEDIATE	
Analyte	Units	MCL/PCL		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																	
Dehalococcoides	cells/mL	NV		NA		NA		NA		NA		NA		NA		NA	
Field Measurements																	
Dissolved oxygen	mg/L	NV		0.39		0.76		1.39		0.06		0.03		0.03		0.11	
Oxidation Reduction Potential	mV	NV		133		105		132.3		63		99		99		116	
pH	SU	NV		5.8		6.69		6.49		6.51		6.33		6.33		6.09	
Dissolved Gases (RSK-175)																	
Ethane	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Ethylene	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Methane	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
General Chemistry (2320B/SM5310B/SW9056A)																	
Alkalinity	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Bromide	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Nitrate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Sulfate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Total organic carbon	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Perchlorate (EPA 6850)																	
Perchlorate	µg/L	17		< 0.2	U	0.089	J	< 2	U	< 2	U	< 0.5	U	< 0.5	U	0.0259	J
Volatile Organic Compounds (8260C)																	
1,1,2-Trichloroethane	µg/L	5		< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U	< 0.5	U
1,1-Dichloroethene	µg/L	7		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,2-Dichloroethane	µg/L	5		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
cis-1,2-Dichloroethene	µg/L	70		< 0.5	U	< 0.5	U	< 0.5	U	13		< 0.5	U	< 0.5	U	< 0.5	U
Methylene chloride	µg/L	5		< 1	U	< 2	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U
Trichloroethene	µg/L	5		< 0.5	U	< 0.5	U	< 0.5	U	79		< 0.5	U	< 0.5	U	< 0.5	U
Vinyl chloride	µg/L	2		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code	16WW33										16WW34			
			Sample ID	16WW33-210203		16WW33-210412		16WW33-210712		16WW33-211018		16WW33-220110		16WW34-181010		16WW34-200312	
			Sample Date	2/3/2021		4/12/2021		7/12/2021		10/18/2021		1/10/2022		10/10/2018		3/12/2020	
			Groundwater Zone	INTERMEDIATE		INTERMEDIATE		INTERMEDIATE		INTERMEDIATE		INTERMEDIATE		SHALLOW		SHALLOW	
Analyte	Units	MCL/PCL		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																	
Dehalococcoides	cells/mL	NV		NA		NA		NA		NA		NA		NA		NA	
Field Measurements																	
Dissolved oxygen	mg/L	NV		0.11		0.08		0.69		0.38		0.44		0.92		0.85	
Oxidation Reduction Potential	mV	NV		-56		239		190		152		117		13.2		-18	
pH	SU	NV		6.26		5.25		5.67		5.37		6.63		6.15		6.86	
Dissolved Gases (RSK-175)																	
Ethane	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Ethylene	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Methane	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
General Chemistry (2320B/SM5310B/SW9056A)																	
Alkalinity	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Bromide	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Nitrate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Sulfate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Total organic carbon	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Perchlorate (EPA 6850)																	
Perchlorate	µg/L	17		< 0.05	UJ	< 0.05	U	< 5	U	< 0.2	U	0.12	J	< 2	U	< 2	U
Volatile Organic Compounds (8260C)																	
1,1,2-Trichloroethane	µg/L	5		< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 0.5	U	< 0.5	U
1,1-Dichloroethene	µg/L	7		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,2-Dichloroethane	µg/L	5		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
cis-1,2-Dichloroethene	µg/L	70		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	31	
Methylene chloride	µg/L	5		< 2	U	< 2	U	< 1	U	< 1	U	< 2	U	< 1	U	< 1	U
Trichloroethene	µg/L	5		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	130	
Vinyl chloride	µg/L	2		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code	16WW34													
			Sample ID	16WW34-200723		16WW34-201019		16WW34-201019-FD		16WW34-210203		16WW34-210203-FD		16WW34-210412		16WW34-210412-FD	
			Sample Date	7/23/2020		10/19/2020		10/19/2020		2/3/2021		2/3/2021		4/12/2021		4/12/2021	
			Groundwater Zone	SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW	
Analyte	Units	MCL/PCL		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																	
Dehalococcoides	cells/mL	NV		NA		NA		NA		NA		NA		NA		NA	
Field Measurements																	
Dissolved oxygen	mg/L	NV		0.57		0.36		0.36		0.04		0.04		0.33		0.33	
Oxidation Reduction Potential	mV	NV		77		139		139		-2		-2		154		154	
pH	SU	NV		6.37		5.76		5.76		5.72		5.72		5.55		5.55	
Dissolved Gases (RSK-175)																	
Ethane	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Ethylene	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Methane	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
General Chemistry (2320B/SM5310B/SW9056A)																	
Alkalinity	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Bromide	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Nitrate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Sulfate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Total organic carbon	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Perchlorate (EPA 6850)																	
Perchlorate	µg/L	17		< 0.5	U	< 0.05	U	< 0.05	U	< 0.05	UJ	< 0.05	UJ	< 0.05	U	< 0.05	U
Volatile Organic Compounds (8260C)																	
1,1,2-Trichloroethane	µg/L	5		< 1	U	< 1	U	< 0.5	U	< 1	U	< 1	U	< 1	U	< 1	U
1,1-Dichloroethene	µg/L	7		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,2-Dichloroethane	µg/L	5		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
cis-1,2-Dichloroethene	µg/L	70		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Methylene chloride	µg/L	5		< 1	U	< 1	U	< 1	U	< 2	U	< 2	U	< 2	U	< 2	U
Trichloroethene	µg/L	5		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Vinyl chloride	µg/L	2		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code	16WW34												16WW35	
			Sample ID	16WW34-210712		16WW34-210712-FD		16WW34-211018		16WW34-211018-FD		16WW34-220110		16WW34-220110-FD		16WW35-181010	
			Sample Date	7/12/2021		7/12/2021		10/18/2021		10/18/2021		1/10/2022		1/10/2022		10/10/2018	
			Groundwater Zone	SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		INTERMEDIATE	
Analyte	Units	MCL/PCL		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																	
Dehalococcoides	cells/mL	NV		NA		NA		NA		NA		NA		NA		33.9	
Field Measurements																	
Dissolved oxygen	mg/L	NV		1.46		1.46		0.36		0.36		0.61		0.61		0.42	
Oxidation Reduction Potential	mV	NV		166		166		171		171		132		132		158.6	
pH	SU	NV		5.91		5.91		5.34		5.34		6.4		6.4		6.17	
Dissolved Gases (RSK-175)																	
Ethane	µg/L	NV		NA		NA		NA		NA		NA		NA		0.644	J
Ethylene	µg/L	NV		NA		NA		NA		NA		NA		NA		4.38	
Methane	µg/L	NV		NA		NA		NA		NA		NA		NA		55	
General Chemistry (2320B/SM5310B/SW9056A)																	
Alkalinity	mg/L	NV		NA		NA		NA		NA		NA		NA		969	
Bromide	mg/L	NV		NA		NA		NA		NA		NA		NA		< 0.2	U
Nitrate	mg/L	NV		NA		NA		NA		NA		NA		NA		< 0.2	U
Sulfate	mg/L	NV		NA		NA		NA		NA		NA		NA		8400	
Total organic carbon	mg/L	NV		NA		NA		NA		NA		NA		NA		44	
Perchlorate (EPA 6850)																	
Perchlorate	µg/L	17		< 2.5	U	< 2.5	U	< 0.2	U	< 0.2	U	0.14	J	0.13	J	420	
Volatile Organic Compounds (8260C)																	
1,1,2-Trichloroethane	µg/L	5		< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 25	U
1,1-Dichloroethene	µg/L	7		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	190	
1,2-Dichloroethane	µg/L	5		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 25	U
cis-1,2-Dichloroethene	µg/L	70		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	19000	
Methylene chloride	µg/L	5		< 1	U	< 1	U	< 1	U	< 1	U	< 2	U	< 2	U	< 50	U
Trichloroethene	µg/L	5		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	0.51	J	< 0.5	U	21000	
Vinyl chloride	µg/L	2		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	170	

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code	16WW35													
			Sample ID	16WW35-190918		16WW35-200311		16WW35-200714		16WW35-201013		16WW35-210120		16WW35-210413		16WW35-210714	
			Sample Date	9/18/2019		3/11/2020		7/14/2020		10/13/2020		1/20/2021		4/13/2021		7/14/2021	
			Groundwater Zone	INTERMEDIATE		INTERMEDIATE		INTERMEDIATE		INTERMEDIATE		INTERMEDIATE		INTERMEDIATE		INTERMEDIATE	
Analyte	Units	MCL/PCL		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																	
Dehalococcoides	cells/mL	NV		NA		516		36.6		76.2		61.4		30		21.1	
Field Measurements																	
Dissolved oxygen	mg/L	NV		0.26		0.07		0.18		0.16		0.89		0.07		0.59	
Oxidation Reduction Potential	mV	NV		143		122		137		181		147.9		105		100	
pH	SU	NV		6.64		6.85		6.62		6.63		6.89		6.88		6.64	
Dissolved Gases (RSK-175)																	
Ethane	µg/L	NV		NA		1.2		0.824	J	1.01		0.2	J	< 0.5	U	1.47	
Ethylene	µg/L	NV		NA		10.9		9.31		9.34		2.6		8.75	J	11.8	J
Methane	µg/L	NV		NA		140		114		96.9		53		102	J	15.4	
General Chemistry (2320B/SM5310B/SW9056A)																	
Alkalinity	mg/L	NV		NA		1140		1180		1140		886		1090		1080	
Bromide	mg/L	NV		NA		< 1	U	< 1	U	< 0.5	U	3.46		< 0.5	U	< 0.5	U
Nitrate	mg/L	NV		NA		< 1	U	< 1	U	< 0.5	U	< 0.2	U	< 0.5	U	< 0.5	U
Sulfate	mg/L	NV		NA		8660		9850		9510		7880		9810		4850	
Total organic carbon	mg/L	NV		NA		58.5		67		65.5		27.8		59.1		68.7	
Perchlorate (EPA 6850)																	
Perchlorate	µg/L	17		410		560		451		565		< 0.5	U	367		352	
Volatile Organic Compounds (8260C)																	
1,1,2-Trichloroethane	µg/L	5		< 12	U	< 5	U	< 10	U	< 2.5	U	7.2	J	< 10	U	< 10	U
1,1-Dichloroethene	µg/L	7		120		96		81		93		120		85		100	
1,2-Dichloroethane	µg/L	5		< 12	U	< 5	U	< 5	U	< 2.5	U	8.2	J	< 5	U	< 5	U
cis-1,2-Dichloroethene	µg/L	70		8800		4000		1700		1600		12000		2100		2000	
Methylene chloride	µg/L	5		< 25	U	< 10	U	< 10	U	< 5	U	< 20	U	17	J	< 10	U
Trichloroethene	µg/L	5		13000		11000		9500		11000		13000		9300		8100	
Vinyl chloride	µg/L	2		75		82		93		97		60		90		74	

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code	16WW35				16WW36									
			Sample ID	16WW35-211013		16WW35-220111		16WW36-181009		16WW36-190916		16WW36-200123		16WW36-200311		16WW36-200714	
			Sample Date	10/13/2021		1/11/2022		10/9/2018		9/16/2019		1/23/2020		3/11/2020		7/14/2020	
			Groundwater Zone	INTERMEDIATE		INTERMEDIATE		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW	
Analyte	Units	MCL/PCL		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																	
Dehalococcoides	cells/mL	NV		52.2		59.2		202		NA		NA		1500		892	
Field Measurements																	
Dissolved oxygen	mg/L	NV		0.27		0.45		0.39		0.21		0.07		0.1		2.42	
Oxidation Reduction Potential	mV	NV		158		125		116.1		87.4		152		101		105	
pH	SU	NV		6.04		7.14		6.07		5.98		7.14		6.61		6.29	
Dissolved Gases (RSK-175)																	
Ethane	µg/L	NV		< 0.5	U	< 0.5	U	< 1	U	NA		NA		2.16		3.38	
Ethylene	µg/L	NV		5.3	J	3.47	J	12.3		NA		NA		18.9		26.1	
Methane	µg/L	NV		49.8		76.6	J	175		NA		NA		749		944	
General Chemistry (2320B/SM5310B/SW9056A)																	
Alkalinity	mg/L	NV		1020		1000		613		NA		NA		614		580	
Bromide	mg/L	NV		< 0.5	U	< 0.5	U	2.7		NA		1.4		0.91		2.85	
Nitrate	mg/L	NV		< 0.5	U	0.262	J	< 0.2	U	NA		NA		< 0.5	U	< 0.5	U
Sulfate	mg/L	NV		8550		8090		6290		NA		NA		2670		3330	
Total organic carbon	mg/L	NV		52.2		53.1		33		NA		21	J	19.7		18.6	
Perchlorate (EPA 6850)																	
Perchlorate	µg/L	17		366		342		< 2	U	< 2	U	NA		< 2	U	< 0.5	U
Volatile Organic Compounds (8260C)																	
1,1,2-Trichloroethane	µg/L	5		< 10	U	< 10	U	< 25	U	< 12	U	NA		< 12	U	< 25	U
1,1-Dichloroethene	µg/L	7		72		77		450		190		NA		160		290	
1,2-Dichloroethane	µg/L	5		< 5	U	< 5	U	34	J	13	J	NA		13	J	20	J
cis-1,2-Dichloroethene	µg/L	70		5100		4400		66000		19000		NA		19000		29000	
Methylene chloride	µg/L	5		< 10	U	< 20	U	< 50	U	< 25	U	NA		< 25	U	< 25	U
Trichloroethene	µg/L	5		9700		11000		22000		15000		NA		18000		25000	
Vinyl chloride	µg/L	2		39		58		610		230		NA		180		320	

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code	16WW36											16WW37	
			Sample ID	16WW36-201013		16WW36-210120		16WW36-210413		16WW36-210714		16WW36-211013		16WW36-220111		16WW37-181010	
			Sample Date	10/13/2020		1/20/2021		4/13/2021		7/14/2021		10/13/2021		1/11/2022		10/10/2018	
			Groundwater Zone	SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		INTERMEDIATE	
Analyte	Units	MCL/PCL		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																	
Dehalococcoides	cells/mL	NV		1680		7.9		620		1200		1020		1200		NA	
Field Measurements																	
Dissolved oxygen	mg/L	NV		0.25		2.77		0.7		0.53		0.19		0.54		0.57	
Oxidation Reduction Potential	mV	NV		223		141.1		179		100		149		154		48.3	
pH	SU	NV		6.06		6.72		6.20		6.07		5.65		6.58		6.73	
Dissolved Gases (RSK-175)																	
Ethane	µg/L	NV		1.09		< 0.47	U	< 0.5	U	1.51		< 0.5	U	< 0.5	U	NA	
Ethylene	µg/L	NV		10.1		0.81	J	4.9	J	11.7	J	2.54	J	3.3	J	NA	
Methane	µg/L	NV		273		240		151	J	325		65.7		101	J	NA	
General Chemistry (2320B/SM5310B/SW9056A)																	
Alkalinity	mg/L	NV		563		465		479		462		482		490		NA	
Bromide	mg/L	NV		2.41		0.503		1.96		0.931		< 0.5	U	< 0.5	U	NA	
Nitrate	mg/L	NV		< 0.5	U	0.074	J	< 0.5	U	0.48	J	< 0.5	U	0.225	J	NA	
Sulfate	mg/L	NV		2840		180		1850		2940		2910		2310		NA	
Total organic carbon	mg/L	NV		18.3		10.2		15.1		19.5		21.6		21.7		NA	
Perchlorate (EPA 6850)																	
Perchlorate	µg/L	17		0.167		< 0.05	U	1.26		0.438	J	0.291	J	0.098	J	< 2	U
Volatile Organic Compounds (8260C)																	
1,1,2-Trichloroethane	µg/L	5		< 50	U	0.94	J	< 25	U	5.7	J	< 10	U	< 10	U	< 0.5	U
1,1-Dichloroethene	µg/L	7		170		15		74		180		39		39		< 0.5	U
1,2-Dichloroethane	µg/L	5		< 25	U	0.85	J	< 12	U	13	J	10		8	J	< 0.5	U
cis-1,2-Dichloroethene	µg/L	70		26000		980		9000		17000		8700		6700		5.2	
Methylene chloride	µg/L	5		< 50	U	< 2	U	43	J	< 10	U	< 10	U	< 20	U	< 1	U
Trichloroethene	µg/L	5		22000		1500		10000		15000		8100		8100		84	
Vinyl chloride	µg/L	2		180		17		78		140		43		49		< 0.5	U

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code		16WW37											
			Sample ID	16WW37-200317		16WW37-200723		16WW37-201019		16WW37-210120		16WW37-210412		16WW37-210712		16WW37-211025	
			Sample Date	3/17/2020		7/23/2020		10/19/2020		1/20/2021		4/12/2021		7/12/2021		10/25/2021	
			Groundwater Zone	INTERMEDIATE		INTERMEDIATE		INTERMEDIATE		INTERMEDIATE		INTERMEDIATE		INTERMEDIATE		INTERMEDIATE	
Analyte	Units	MCL/PCL		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																	
Dehalococcoides	cells/mL	NV		NA		NA		NA		NA		NA		NA		NA	
Field Measurements																	
Dissolved oxygen	mg/L	NV		0.08		0.67		0.15		0.58		0.19		0.88		0.54	
Oxidation Reduction Potential	mV	NV		-11		72		50		23.4		166		136		216	
pH	SU	NV		7.17		6.96		6.23		6.82		5.96		6.36		5.79	
Dissolved Gases (RSK-175)																	
Ethane	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Ethylene	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Methane	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
General Chemistry (2320B/SM5310B/SW9056A)																	
Alkalinity	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Bromide	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Nitrate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Sulfate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Total organic carbon	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Perchlorate (EPA 6850)																	
Perchlorate	µg/L	17		< 2	U	< 0.5	U	0.393		0.786		1.6		2.74		168	
Volatile Organic Compounds (8260C)																	
1,1,2-Trichloroethane	µg/L	5		< 0.5	U	< 1	U	< 0.5	U	< 1	U	< 1	U	< 1	U	< 1	U
1,1-Dichloroethene	µg/L	7		0.82	J	0.76	J	0.64	J	0.7	J	0.9	J	< 0.5	U	< 0.5	U
1,2-Dichloroethane	µg/L	5		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
cis-1,2-Dichloroethene	µg/L	70		6.1		5.7		5.9		6.5		5.8		5.4		15	
Methylene chloride	µg/L	5		< 1	U	< 1	U	< 1	U	< 2	U	< 2	U	< 1	U	< 1	U
Trichloroethene	µg/L	5		110		87		120		99		110		89		190	
Vinyl chloride	µg/L	2		2.1		0.41	J	1.4		3.1		2.2		< 0.5	U	4.2	

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code		16WW38											
			Sample ID	16WW37-220110	16WW38-181010		16WW38-200317		16WW38-200723		16WW38-201019		16WW38-210120		16WW38-210412	
			Sample Date	1/10/2022	10/10/2018		3/17/2020		7/23/2020		10/19/2020		1/20/2021		4/12/2021	
			Groundwater Zone	INTERMEDIATE	SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW	
Analyte	Units	MCL/PCL		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																	
Dehalococcoides	cells/mL	NV		NA		NA		NA		NA		NA		NA		NA	
Field Measurements																	
Dissolved oxygen	mg/L	NV		0.63		0.38		0.07		1.17		0.13		0.65		0.04	
Oxidation Reduction Potential	mV	NV		180		-44.9		-16		45		33		101.3		97	
pH	SU	NV		5.24		5.94		6.50		6.37		6.35		6.51		5.62	
Dissolved Gases (RSK-175)																	
Ethane	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Ethylene	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Methane	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
General Chemistry (2320B/SM5310B/SW9056A)																	
Alkalinity	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Bromide	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Nitrate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Sulfate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Total organic carbon	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Perchlorate (EPA 6850)																	
Perchlorate	µg/L	17		55.3		< 2	U	< 2	U	< 0.5	U	< 0.05	U	< 0.05	U	< 0.05	U
Volatile Organic Compounds (8260C)																	
1,1,2-Trichloroethane	µg/L	5		< 1	U	< 5	U	< 2.5	U	< 5	U	< 5	U	< 1	U	< 10	U
1,1-Dichloroethene	µg/L	7		< 0.5	U	21		13		17		20		12		11	
1,2-Dichloroethane	µg/L	5		< 0.5	U	< 5	U	< 2.5	U	< 2.5	U	< 5	U	< 0.5	U	< 5	U
cis-1,2-Dichloroethene	µg/L	70		13		240		200		940		1100		210		600	
Methylene chloride	µg/L	5		< 2	U	< 10	U	< 5	U	< 5	U	< 10	U	< 2	U	16	UB
Trichloroethene	µg/L	5		180		4400		3000		2400		3800		2300		2100	
Vinyl chloride	µg/L	2		4.9		160		95		57		100		94		39	

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code	16WW38						16WW39							
			Sample ID	16WW38-210712		16WW38-211025		16WW38-220110		16WW39-181010		16WW39-190917		16WW39-200316		16WW39-200715	
			Sample Date	7/12/2021		10/25/2021		1/10/2022		10/10/2018		9/17/2019		3/16/2020		7/15/2020	
			Groundwater Zone	SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW	
Analyte	Units	MCL/PCL		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																	
Dehalococcoides	cells/mL	NV		NA		NA		NA		NA		NA		NA		NA	
Field Measurements																	
Dissolved oxygen	mg/L	NV		0.76		0.29		0.58		0.48		0.23		0.08		0.05	
Oxidation Reduction Potential	mV	NV		67		49		158		115.9		24.1		122		92	
pH	SU	NV		6.25		6.15		5.07		5.74		5.97		6.50		5.94	
Dissolved Gases (RSK-175)																	
Ethane	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Ethylene	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Methane	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
General Chemistry (2320B/SM5310B/SW9056A)																	
Alkalinity	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Bromide	mg/L	NV		NA		NA		NA		4.2		NA		4.84		7.98	
Nitrate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Sulfate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Total organic carbon	mg/L	NV		NA		NA		NA		NA		NA		4.57		2.61	
Perchlorate (EPA 6850)																	
Perchlorate	µg/L	17		< 2.5	U	< 0.2	U	0.17	J	120		130		62		15.1	
Volatile Organic Compounds (8260C)																	
1,1,2-Trichloroethane	µg/L	5		< 5	U	< 5	U	< 1	U	< 5	U	< 0.5	U	< 0.5	U	< 1	U
1,1-Dichloroethene	µg/L	7		14		10		5.1		< 5	U	2.7		2.3		2	
1,2-Dichloroethane	µg/L	5		< 2.5	U	< 2.5	U	< 0.5	U	< 5	U	2		1.7		1.2	
cis-1,2-Dichloroethene	µg/L	70		1000		870		380		220		110		98		74	
Methylene chloride	µg/L	5		< 5	U	< 5	U	< 2	U	< 10	U	< 1	U	< 1	U	< 1	U
Trichloroethene	µg/L	5		2000		1200		1200		3900		1200		1100		560	
Vinyl chloride	µg/L	2		37		48		30		15		7.1		5.3		3.3	

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code		16WW39										16WW40	
			Sample ID	16WW39-201014		16WW39-210203		16WW39-210415		16WW39-210728		16WW39-211025		16WW39-220111		16WW40-181012	
			Sample Date	10/14/2020		2/3/2021		4/15/2021		7/28/2021		10/25/2021		1/11/2022		10/12/2018	
			Groundwater Zone	SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW	
Analyte	Units	MCL/PCL		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																	
Dehalococcoides	cells/mL	NV		NA		NA		NA		NA		NA		NA		NA	
Field Measurements																	
Dissolved oxygen	mg/L	NV		0.25		0.03		0.14		0.46		0.14		0.51		0.3	
Oxidation Reduction Potential	mV	NV		47		-50		117		120		111		176		-44.1	
pH	SU	NV		6.13		5.38		5.56		5.57		5.9		5.87		5.90	
Dissolved Gases (RSK-175)																	
Ethane	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Ethylene	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Methane	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
General Chemistry (2320B/SM5310B/SW9056A)																	
Alkalinity	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Bromide	mg/L	NV		7.9		8.44		NA		NA		NA		NA		5.57	
Nitrate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Sulfate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Total organic carbon	mg/L	NV		2.31		1.62	J	NA		NA		NA		NA		NA	
Perchlorate (EPA 6850)																	
Perchlorate	µg/L	17		1.08		3.64	J	7.87		6.76		9.07		4		< 2	U
Volatile Organic Compounds (8260C)																	
1,1,2-Trichloroethane	µg/L	5		< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 0.5	U
1,1-Dichloroethene	µg/L	7		1.7		0.84	J	0.75	J	0.58	J	0.61	J	< 0.5	U	3.5	
1,2-Dichloroethane	µg/L	5		1.3		0.72	J	0.72	J	0.58	J	< 0.5	U	< 0.5	U	3.8	
cis-1,2-Dichloroethene	µg/L	70		73		37		39		29		28		10		220	
Methylene chloride	µg/L	5		< 1	U	< 2	UJ	< 2	U	< 1	U	< 1	U	< 2	U	< 1	U
Trichloroethene	µg/L	5		350		300		330		230		210	J	120		660	
Vinyl chloride	µg/L	2		5		2		1.1		0.97	J	1.8		0.73	J	4.5	

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code		16WW40											
			Sample ID	16WW40-181012-FD		16WW40-190917		16WW40-200721		16WW40-201021		16WW40-210203		16WW40-210203-FD		16WW40-210421	
			Sample Date	10/12/2018		9/17/2019		7/21/2020		10/21/2020		2/3/2021		2/3/2021		4/21/2021	
			Groundwater Zone	SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW	
Analyte	Units	MCL/PCL		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																	
Dehalococcoides	cells/mL	NV		NA		NA		NA		NA		NA		NA		NA	
Field Measurements																	
Dissolved oxygen	mg/L	NV		0.3		2.09		0.04		0.04		0.04		0.04		0.02	
Oxidation Reduction Potential	mV	NV		-44.1		7.8		-107		22		47		47		135	
pH	SU	NV		5.90		5.88		6.12		6.21		5.46		5.46		5.64	
Dissolved Gases (RSK-175)																	
Ethane	µg/L	NV		NA		NA		NA		NA		NA		NA		< 0.5	U
Ethylene	µg/L	NV		NA		NA		NA		NA		NA		NA		1.25	J
Methane	µg/L	NV		NA		NA		NA		NA		NA		NA		9.57	
General Chemistry (2320B/SM5310B/SW9056A)																	
Alkalinity	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Bromide	mg/L	NV		5.72		NA		8.9		6.97		9.31		8.78		NA	
Nitrate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Sulfate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Total organic carbon	mg/L	NV		NA		NA		8.66		7.35		7.61		7.57		11.3	
Perchlorate (EPA 6850)																	
Perchlorate	µg/L	17		< 2	U	< 2	U	0.898	J	0.24		1.31	J	0.85	J	0.88	
Volatile Organic Compounds (8260C)																	
1,1,2-Trichloroethane	µg/L	5		< 0.5	U	< 0.5	U	< 5	U	< 2.5	U	< 5	U	< 5	U	< 5	U
1,1-Dichloroethene	µg/L	7		3.5		3.7		7		7.5		5.3		4.3	J	2.8	J
1,2-Dichloroethane	µg/L	5		3.8		3.8		6.1		6		7	J	6.8		5.6	
cis-1,2-Dichloroethene	µg/L	70		240		130		220		230		150		160		210	
Methylene chloride	µg/L	5		< 1	U	< 1	U	< 5	U	< 5	U	< 10	U	< 10	U	< 10	U
Trichloroethene	µg/L	5		640		740		1700		1700		1500		1400		1000	
Vinyl chloride	µg/L	2		4.2		3		5.3		6.3		4.4	J	4.5	J	5.4	

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code	16WW40						16WW41							
			Sample ID	16WW40-210727		16WW40-211021		16WW40-220126		16WW41-181009		16WW41-190917		16WW41-200316		16WW41-200715	
			Sample Date	7/27/2021		10/21/2021		1/26/2022		10/9/2018		9/17/2019		3/16/2020		7/15/2020	
			Groundwater Zone	SHALLOW		SHALLOW		SHALLOW		INTERMEDIATE		INTERMEDIATE		INTERMEDIATE		INTERMEDIATE	
Analyte	Units	MCL/PCL		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																	
Dehalococcoides	cells/mL	NV		NA		NA		NA		0	U	NA		< 0.5	U	0.15	J
Field Measurements																	
Dissolved oxygen	mg/L	NV		0.45		0.27		0.35		0.79		0.27		0.09		0.06	
Oxidation Reduction Potential	mV	NV		60		89		85		266		109.5		82		149	
pH	SU	NV		6.33		6		6.42		6.21		6.18		6.59		6.32	
Dissolved Gases (RSK-175)																	
Ethane	µg/L	NV		0.953	J	1.67		< 0.5	U	0.281	J	NA		0.374	J	< 0.25	U
Ethylene	µg/L	NV		1.6	J	2.88	J	< 0.5	UJ	3.04		NA		9.96		10.2	
Methane	µg/L	NV		309	J	616	J	214		6.55		NA		16.3		16.6	
General Chemistry (2320B/SM5310B/SW9056A)																	
Alkalinity	mg/L	NV		NA		NA		NA		951		NA		1010		1040	
Bromide	mg/L	NV		NA		NA		NA		3.35		NA		< 0.5	U	5.9	
Nitrate	mg/L	NV		NA		NA		NA		< 0.2	U	NA		< 0.5	U	< 1	U
Sulfate	mg/L	NV		NA		NA		NA		9260		NA		8060		8830	
Total organic carbon	mg/L	NV		10.1		11.3		10.2		58		NA		44.8		42	
Perchlorate (EPA 6850)																	
Perchlorate	µg/L	17		0.693	J	0.622		0.55		60		< 2	U	310		155	
Volatile Organic Compounds (8260C)																	
1,1,2-Trichloroethane	µg/L	5		< 1	U	< 10	UJ	< 1	U	< 5	U	< 5	U	< 2.5	U	< 20	U
1,1-Dichloroethene	µg/L	7		7		< 5	UJ	1.5		17		11		14		24	J+
1,2-Dichloroethane	µg/L	5		6.4		5.2	J	3.7		< 5	U	< 5	U	4	J	< 10	U
cis-1,2-Dichloroethene	µg/L	70		190		170	J	120		1200		1300		2000		2000	J+
Methylene chloride	µg/L	5		< 1	U	< 10	UJ	< 2	U	< 10	U	< 10	U	< 5	U	< 20	U
Trichloroethene	µg/L	5		1900		1000	J	540		9800		3900		6400		6200	
Vinyl chloride	µg/L	2		9		< 5	UJ	2.9		110		80		120		160	J+

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code	16WW41											16WW42	
			Sample ID	16WW41-201014		16WW41-210125		16WW41-210415		16WW41-210720		16WW41-211019		16WW41-220113		16WW42-181012	
			Sample Date	10/14/2020		1/25/2021		4/15/2021		7/20/2021		10/19/2021		1/13/2022		10/12/2018	
			Groundwater Zone	INTERMEDIATE		INTERMEDIATE		INTERMEDIATE		INTERMEDIATE		INTERMEDIATE		INTERMEDIATE		SHALLOW	
Analyte	Units	MCL/PCL		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																	
Dehalococcoides	cells/mL	NV		0.3	J	0.3	J	< 0.5	UJ	0.4	J	< 0.5	U	0.5	J	NA	
Field Measurements																	
Dissolved oxygen	mg/L	NV		0.28		0.67		0.02		0.6		0.2		0.56		1.21	
Oxidation Reduction Potential	mV	NV		10		61.5		143		110		208		44		113.6	
pH	SU	NV		6.63		6.61		6.65		6.72		5.84		6.57		5.27	
Dissolved Gases (RSK-175)																	
Ethane	µg/L	NV		< 0.25	U	0.54	J	< 0.5	U	< 0.25	U	< 0.5	U	< 0.5	U	NA	
Ethylene	µg/L	NV		10.7		110		14.3	J	13.8	J	4.41	J	8.32	J	NA	
Methane	µg/L	NV		14.5		180		16		13.5		3.37		7.22		NA	
General Chemistry (2320B/SM5310B/SW9056A)																	
Alkalinity	mg/L	NV		1000		1010		1040		983		850		908		NA	
Bromide	mg/L	NV		< 0.5	U	< 1	U	9.79		1.92		< 0.5	U	< 1	U	0.182	
Nitrate	mg/L	NV		< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 0.5	U	0.188	J	NA	
Sulfate	mg/L	NV		9220		9300		7890		7670		1450		6990		NA	
Total organic carbon	mg/L	NV		40.8		49.6		47.6		52.4		37.9		43		NA	
Perchlorate (EPA 6850)																	
Perchlorate	µg/L	17		81.2		3.71	J	212		107		66.5		59.1		< 2	U
Volatile Organic Compounds (8260C)																	
1,1,2-Trichloroethane	µg/L	5		< 5	U	< 10	U	< 5	U	< 10	U	< 10	U	< 10	U	< 0.5	U
1,1-Dichloroethene	µg/L	7		17		20		19		17		< 5	U	12		< 0.5	U
1,2-Dichloroethane	µg/L	5		5.7	J	< 5	U	4.2	J	< 5	U	< 5	U	< 5	U	< 0.5	U
cis-1,2-Dichloroethene	µg/L	70		2400		2400		2600		2300		920		1600		42	
Methylene chloride	µg/L	5		< 10	U	< 20	U	< 10	U	14	UB	< 10	U	< 20	U	< 1	U
Trichloroethene	µg/L	5		5400		5400		6200		5400		1900		3800		6	
Vinyl chloride	µg/L	2		230		340		330		270		59		210		< 0.5	U

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code		16WW42											
			Sample ID	16WW42-190916		16WW42-200723		16WW42-200723-FD		16WW42-201022		16WW42-210128		16WW42-210419		16WW42-210726	
			Sample Date	9/16/2019		7/23/2020		7/23/2020		10/22/2020		1/28/2021		4/19/2021		7/26/2021	
			Groundwater Zone	SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW	
Analyte	Units	MCL/PCL		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																	
Dehalococcoides	cells/mL	NV		NA		NA		NA		NA		NA		NA		NA	
Field Measurements																	
Dissolved oxygen	mg/L	NV		1.89		0.04		0.04		0.04		2.94		0.15		0.56	
Oxidation Reduction Potential	mV	NV		-31.4		9		9		21		215.1		143		42	
pH	SU	NV		6.10		5.70		5.70		5.94		5.37		5.88		5.48	
Dissolved Gases (RSK-175)																	
Ethane	µg/L	NV		NA		NA		NA		NA		NA		< 0.5	U	< 0.25	
Ethylene	µg/L	NV		NA		NA		NA		NA		NA		< 0.5	UJ	0.83	J
Methane	µg/L	NV		NA		NA		NA		NA		NA		3.45		5.17	
General Chemistry (2320B/SM5310B/SW9056A)																	
Alkalinity	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Bromide	mg/L	NV				2.45		2.43		2.74		2.03		NA		NA	
Nitrate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Sulfate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Total organic carbon	mg/L	NV		NA		4.16		4.33		4.31		2.12		2.55		5.52	
Perchlorate (EPA 6850)																	
Perchlorate	µg/L	17		< 2	U	< 0.05	U	< 0.05	U	< 0.05	U	< 0.05	U	< 0.05	U	< 0.05	U
Volatile Organic Compounds (8260C)																	
1,1,2-Trichloroethane	µg/L	5		< 0.5	U	< 1	U	< 1	U	< 0.5	U	< 1	U	< 1	U	< 1	U
1,1-Dichloroethene	µg/L	7		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,2-Dichloroethane	µg/L	5		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
cis-1,2-Dichloroethene	µg/L	70		240		24	J+	20		180		98		66		67	
Methylene chloride	µg/L	5		< 1	U	< 1	U	< 1	U	< 1	U	< 2	U	< 2	U	< 1	U
Trichloroethene	µg/L	5		29		1.3		1.2		3.2		0.59	J	0.97	J	1.1	
Vinyl chloride	µg/L	2		1.1		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code	16WW42			16WW43									
			Sample ID	16WW42-211026		16WW42-220127	16WW43-181009		16WW43-190917		16WW43-200312		16WW43-200723		16WW43-201022	
			Sample Date	10/26/2021		1/27/2022	10/9/2018		9/17/2019		3/12/2020		7/23/2020		10/22/2020	
			Groundwater Zone	SHALLOW		SHALLOW	SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW	
Analyte	Units	MCL/PCL		Result	Val Qual	Result	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																
Dehalococcoides	cells/mL	NV		NA		NA	2.1		NA		NA		NA		NA	
Field Measurements																
Dissolved oxygen	mg/L	NV		0.31		0.46	1.46		0.09		1.37		0.05		0.04	
Oxidation Reduction Potential	mV	NV		82		223	-1.7		42		62		56		15	
pH	SU	NV		5.7		5.54	6.12		5.92		6.24		5.83		5.92	
Dissolved Gases (RSK-175)																
Ethane	µg/L	NV		< 0.5	U	< 0.5	< 1	U	NA		NA		NA		NA	
Ethylene	µg/L	NV		< 0.5	UJ	< 0.5	2.28		NA		NA		NA		NA	
Methane	µg/L	NV		12.1		8.45	133		NA		NA		NA		NA	
General Chemistry (2320B/SM5310B/SW9056A)																
Alkalinity	mg/L	NV		NA		NA	104		NA		NA		NA		NA	
Bromide	mg/L	NV		NA		NA	0.173		NA		NA		NA		NA	
Nitrate	mg/L	NV		NA		NA	< 0.1	U	NA		NA		NA		NA	
Sulfate	mg/L	NV		NA		NA	6.35		NA		NA		NA		NA	
Total organic carbon	mg/L	NV		6.91	J	6.93	9.46		NA		NA		NA		NA	
Perchlorate (EPA 6850)																
Perchlorate	µg/L	17		< 0.2	U	< 1	< 2	U	< 2	U	< 2	U	0.0428	J	< 0.05	U
Volatile Organic Compounds (8260C)																
1,1,2-Trichloroethane	µg/L	5		< 10	U	< 5	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U
1,1-Dichloroethene	µg/L	7		< 5	U	< 2.5	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,2-Dichloroethane	µg/L	5		< 5	U	< 2.5	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
cis-1,2-Dichloroethene	µg/L	70		980		1200	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Methylene chloride	µg/L	5		< 10	U	< 10	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U
Trichloroethene	µg/L	5		180		190	< 0.5	U	< 0.5	U	0.61	J	< 0.5	U	0.94	J
Vinyl chloride	µg/L	2		< 5	U	< 2.5	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code	16WW43										16WW44			
			Sample ID	16WW43-210128		16WW43-210422		16WW43-210728		16WW43-211018		16WW43-220125		16WW44-181010		16WW44-200317	
			Sample Date	1/28/2021		4/22/2021		7/28/2021		10/18/2021		1/25/2022		10/10/2018		3/17/2020	
			Groundwater Zone	SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW	
Analyte	Units	MCL/PCL		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																	
Dehalococcoides	cells/mL	NV		NA		NA		NA		NA		NA		NA		NA	
Field Measurements																	
Dissolved oxygen	mg/L	NV		3.24		0.38		0.54		0.39		0.76		1.8		0.03	
Oxidation Reduction Potential	mV	NV		-6.8		136		1		34		127		53.5		4	
pH	SU	NV		6.30		5.20		5.94		5.47		5.46		5.99		6.42	
Dissolved Gases (RSK-175)																	
Ethane	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Ethylene	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Methane	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
General Chemistry (2320B/SM5310B/SW9056A)																	
Alkalinity	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Bromide	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Nitrate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Sulfate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Total organic carbon	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Perchlorate (EPA 6850)																	
Perchlorate	µg/L	17		0.0777	J	< 0.25	U	< 0.05	U	< 0.2	U	< 0.2	U	< 2	U	< 2	U
Volatile Organic Compounds (8260C)																	
1,1,2-Trichloroethane	µg/L	5		< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 0.5	U	< 0.5	U
1,1-Dichloroethene	µg/L	7		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,2-Dichloroethane	µg/L	5		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
cis-1,2-Dichloroethene	µg/L	70		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Methylene chloride	µg/L	5		< 2	U	< 2	U	< 1	U	< 1	U	< 2	U	< 1	U	< 1	U
Trichloroethene	µg/L	5		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Vinyl chloride	µg/L	2		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code		16WW44											
			Sample ID	16WW44-200720		16WW44-201019		16WW44-210122		16WW44-210412		16WW44-210712		16WW44-211025		16WW44-220110	
			Sample Date	7/20/2020		10/19/2020		1/22/2021		4/12/2021		7/12/2021		10/25/2021		1/10/2022	
			Groundwater Zone	SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW	
Analyte	Units	MCL/PCL		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																	
Dehalococcoides	cells/mL	NV		NA		NA		NA		NA		NA		NA		NA	
Field Measurements																	
Dissolved oxygen	mg/L	NV		0.2		0.08		0.67		0.3		0.91		0.31		0.8	
Oxidation Reduction Potential	mV	NV		107		22		-45.1		157		162		156		267	
pH	SU	NV		5.55		6.05		6.46		5.79		5.13		5.28		3.98	
Dissolved Gases (RSK-175)																	
Ethane	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Ethylene	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Methane	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
General Chemistry (2320B/SM5310B/SW9056A)																	
Alkalinity	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Bromide	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Nitrate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Sulfate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Total organic carbon	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Perchlorate (EPA 6850)																	
Perchlorate	µg/L	17		< 0.05	U	< 0.05	U	< 0.05	UJ	0.134		1.35		< 0.2	U	3.2	
Volatile Organic Compounds (8260C)																	
1,1,2-Trichloroethane	µg/L	5		< 1	U	< 0.5	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U
1,1-Dichloroethene	µg/L	7		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,2-Dichloroethane	µg/L	5		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
cis-1,2-Dichloroethene	µg/L	70		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Methylene chloride	µg/L	5		< 1	U	< 1	U	< 2	U	< 2	U	< 1	U	< 1	U	< 2	U
Trichloroethene	µg/L	5		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	0.5	J
Vinyl chloride	µg/L	2		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code		16WW46											
			Sample ID	16WW46-181012		16WW46-200312		16WW46-200727		16WW46-200727-FD		16WW46-201019		16WW46-210119		16WW46-210412	
			Sample Date	10/12/2018		3/12/2020		7/27/2020		7/27/2020		10/19/2020		1/19/2021		4/12/2021	
			Groundwater Zone	SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW	
Analyte	Units	MCL/PCL		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																	
Dehalococcoides	cells/mL	NV		NA		NA		NA		NA		NA		NA		NA	
Field Measurements																	
Dissolved oxygen	mg/L	NV		0.49		0.61		0.02		0.02		0.16		0.74		0.85	
Oxidation Reduction Potential	mV	NV		43.9		70		3		3		85		-12		127	
pH	SU	NV		6.24		6.88		6.42		6.42		5.89		6.52		6.70	
Dissolved Gases (RSK-175)																	
Ethane	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Ethylene	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Methane	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
General Chemistry (2320B/SM5310B/SW9056A)																	
Alkalinity	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Bromide	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Nitrate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Sulfate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Total organic carbon	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Perchlorate (EPA 6850)																	
Perchlorate	µg/L	17		< 2	U	< 2	U	4.07		3.31		< 0.05	U	< 0.05	U	< 0.5	U
Volatile Organic Compounds (8260C)																	
1,1,2-Trichloroethane	µg/L	5		< 0.5	U	< 0.5	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U
1,1-Dichloroethene	µg/L	7		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,2-Dichloroethane	µg/L	5		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
cis-1,2-Dichloroethene	µg/L	70		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Methylene chloride	µg/L	5		< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 2	U	< 2	U
Trichloroethene	µg/L	5		3		2.7		0.57	J	0.66	J	0.66	J	< 0.5	U	< 0.5	U
Vinyl chloride	µg/L	2		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code	16WW46						16WW48							
			Sample ID	16WW46-210727		16WW46-211018		16WW46-220111		16WW48-181018		16WW48-190918		16WW48-200330		16WW48-200330-FD	
			Sample Date	7/27/2021		10/18/2021		1/11/2022		10/18/2018		9/18/2019		3/30/2020		3/30/2020	
			Groundwater Zone	SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW	
Analyte	Units	MCL/PCL		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																	
Dehalococcoides	cells/mL	NV		NA		NA		NA		0.3	J	NA		1		NA	
Field Measurements																	
Dissolved oxygen	mg/L	NV		0.53		0.48		0.52		0.98		0.25		0.08		0.08	
Oxidation Reduction Potential	mV	NV		-29		94		128		173.1		124.7		33		33	
pH	SU	NV		6.71		5.7		6.38		5.75		5.80		5.60		5.60	
Dissolved Gases (RSK-175)																	
Ethane	µg/L	NV		NA		NA		NA		0.174	J	NA		< 0.5	U	< 0.5	U
Ethylene	µg/L	NV		NA		NA		NA		2.19		NA		0.244	J	0.546	J
Methane	µg/L	NV		NA		NA		NA		2.21		NA		1.12		1.48	
General Chemistry (2320B/SM5310B/SW9056A)																	
Alkalinity	mg/L	NV		NA		NA		NA		259		NA		312		313	
Bromide	mg/L	NV		NA		NA		NA		4.33		NA		4.55		4.62	
Nitrate	mg/L	NV		NA		NA		NA		< 0.2		NA		< 0.5	U	< 0.5	U
Sulfate	mg/L	NV		NA		NA		NA		1770		NA		2020		2010	
Total organic carbon	mg/L	NV		NA		NA		NA		8.78		NA		9.82		9.5	
Perchlorate (EPA 6850)																	
Perchlorate	µg/L	17		< 1	U	< 0.2	U	0.098	J	14		< 2	U	120		110	
Volatile Organic Compounds (8260C)																	
1,1,2-Trichloroethane	µg/L	5		< 1	UJ	< 1	U	< 1	U	< 0.5		< 2.5	U	< 10	U	< 10	U
1,1-Dichloroethene	µg/L	7		< 0.5	UJ	< 0.5	U	< 0.5	U	11		7		12	J	13	J
1,2-Dichloroethane	µg/L	5		< 0.5	UJ	< 0.5	U	< 0.5	U	12		7		19	J	18	J
cis-1,2-Dichloroethene	µg/L	70		< 0.5	UJ	< 0.5	U	< 0.5	U	2600		1800		5000		4800	
Methylene chloride	µg/L	5		< 1	UJ	< 1	U	< 2	U	< 1		< 5	U	< 20	U	< 20	U
Trichloroethene	µg/L	5		0.63	J	< 0.5	U	0.82	J	8800		3700		7100		6900	
Vinyl chloride	µg/L	2		< 0.5	UJ	< 0.5	U	< 0.5	U	15		7.4		< 10	U	< 10	U

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code	16WW48												
			Sample ID	16WW48-200715		16WW48-201020		16WW48-210121		16WW48-210422		16WW48-210713		16WW48-211019		16WW48-220113	
			Sample Date	7/15/2020		10/20/2020		1/21/2021		4/22/2021		7/13/2021		10/19/2021		1/13/2022	
			Groundwater Zone	SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW	
Analyte	Units	MCL/PCL		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																	
Dehalococcoides	cells/mL	NV		0.5		1.9		25.8		192		4.6		923		563	
Field Measurements																	
Dissolved oxygen	mg/L	NV		0.04		0.03		1.78		0.47		0.8		0.46		0.7	
Oxidation Reduction Potential	mV	NV		158		59		40.9		168		170		200		66	
pH	SU	NV		5.57		6.26		6.37		6.20		5.79		5.97		6.33	
Dissolved Gases (RSK-175)																	
Ethane	µg/L	NV		0.249	J	< 0.25	UJ	< 0.47	U	< 0.5	U	< 0.25	U	2.36		< 0.5	U
Ethylene	µg/L	NV		1.6		1.23	J-	< 0.55	U	< 0.5	UJ	6.87	J	23.3	J	< 0.5	UJ
Methane	µg/L	NV		2.69		3.53	J-	1.2	J	2.83		3.5		6.74		2.69	
General Chemistry (2320B/SM5310B/SW9056A)																	
Alkalinity	mg/L	NV		312		351		358		356		379		409		411	
Bromide	mg/L	NV		9.4		7.35		7.43		7.59		7.85		< 0.2	U	3.48	
Nitrate	mg/L	NV		< 0.2	U	< 0.5	U	0.408		< 0.5	U	< 0.2	U	< 0.2	U	0.212	J
Sulfate	mg/L	NV		2330		2490		2380		2300		2550		2530		3130	
Total organic carbon	mg/L	NV		8.9		8.44		7.81		13.2		12.4		15.7		13.7	
Perchlorate (EPA 6850)																	
Perchlorate	µg/L	17		157		167		122		94.7		53.7		37.9		14.8	
Volatile Organic Compounds (8260C)																	
1,1,2-Trichloroethane	µg/L	5		< 20	U	< 25	U	< 10	U	< 25	U	< 10	U	< 10	U	< 10	U
1,1-Dichloroethene	µg/L	7		27		32		36		38		40		37		29	
1,2-Dichloroethane	µg/L	5		34		44		36		39		34		35		33	
cis-1,2-Dichloroethene	µg/L	70		9500		16000		15000		17000		18000		17000		13000	
Methylene chloride	µg/L	5		< 20	U	< 25	U	< 20	U	< 50	U	< 10	U	< 10	U	< 20	U
Trichloroethene	µg/L	5		9000		14000	J+	13000		15000		13000		15000		13000	
Vinyl chloride	µg/L	2		22		57		20		16	J	110		170		48	

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code	16WW49													
			Sample ID	16WW49-190919		16WW49-200316		16WW49-200727		16WW49-201020		16WW49-210129		16WW49-210422		16WW49-210728	
			Sample Date	9/19/2019		3/16/2020		7/27/2020		10/20/2020		1/29/2021		4/22/2021		7/28/2021	
			Groundwater Zone	INTERMEDIATE		INTERMEDIATE		INTERMEDIATE		INTERMEDIATE		INTERMEDIATE		INTERMEDIATE		INTERMEDIATE	
Analyte	Units	MCL/PCL		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																	
Dehalococcoides	cells/mL	NV		NA		NA		NA		NA		NA		NA		NA	
Field Measurements																	
Dissolved oxygen	mg/L	NV		0.44		0.08		0.04		0.09		1.48		1.11		0.94	
Oxidation Reduction Potential	mV	NV		-27.3		-38		28		-23		-11.4		130		143	
pH	SU	NV		6.16		6.51		6.23		6.39		6.67		6.21		5.82	
Dissolved Gases (RSK-175)																	
Ethane	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Ethylene	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Methane	µg/L	NV		NA		NA		NA		NA		NA		NA		NA	
General Chemistry (2320B/SM5310B/SW9056A)																	
Alkalinity	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Bromide	mg/L	NV		NA		2.16		3.01		2.66		3.12		NA		NA	
Nitrate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Sulfate	mg/L	NV		NA		NA		NA		NA		NA		NA		NA	
Total organic carbon	mg/L	NV		NA		5.22		4.11		3.74		3.81		NA		NA	
Perchlorate (EPA 6850)																	
Perchlorate	µg/L	17		< 2	U	< 2	U	2.41		< 0.05	U	< 0.5	U	< 0.05	U	0.0291	J
Volatile Organic Compounds (8260C)																	
1,1,2-Trichloroethane	µg/L	5		< 0.5	U	< 0.5	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U
1,1-Dichloroethene	µg/L	7		< 0.5	U	0.77	J	0.77	J	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,2-Dichloroethane	µg/L	5		0.86	J	0.85	J	0.77	J	0.66	J	< 0.5	U	< 0.5	U	< 0.5	U
cis-1,2-Dichloroethene	µg/L	70		130		270		170		190		120		100		77	
Methylene chloride	µg/L	5		< 1	U	< 1	U	< 1	U	< 1	U	< 2	U	< 2	U	< 1	U
Trichloroethene	µg/L	5		260		8.3		36		4.8		2.5		11		19	
Vinyl chloride	µg/L	2		< 0.5	U	< 0.5	U	0.41	J	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

		Location Code	16WW49				16WW51									
		Sample ID	16WW49-211019		16WW49-220113		16WW51-190206		16WW51-190918		16WW51-200317		16WW51-200727		16WW51-200727-FD	
		Sample Date	10/19/2021		1/13/2022		2/6/2019		9/18/2019		3/17/2020		7/27/2020		7/27/2020	
		Groundwater Zone	INTERMEDIATE		INTERMEDIATE		INTERMEDIATE		INTERMEDIATE		INTERMEDIATE		INTERMEDIATE		INTERMEDIATE	
Analyte	Units	MCL/PCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																
Dehalococcoides	cells/mL	NV	NA		NA		NA		NA		NA		NA		NA	
Field Measurements																
Dissolved oxygen	mg/L	NV	0.35		0.45		NM		0		0.07		0.1		0.1	
Oxidation Reduction Potential	mV	NV	140		100		NM		-90.8		-84		21		21	
pH	SU	NV	5.44		5.96		NM		6.06		6.32		5.99		5.99	
Dissolved Gases (RSK-175)																
Ethane	µg/L	NV	NA		NA		NA		NA		NA		NA		NA	
Ethylene	µg/L	NV	NA		NA		NA		NA		NA		NA		NA	
Methane	µg/L	NV	NA		NA		NA		NA		NA		NA		NA	
General Chemistry (2320B/SM5310B/SW9056A)																
Alkalinity	mg/L	NV	NA		NA		NA		NA		NA		NA		NA	
Bromide	mg/L	NV	NA		NA		4.72		NA		3.71		5.27		5.26	
Nitrate	mg/L	NV	NA		NA		NA		NA		NA		NA		NA	
Sulfate	mg/L	NV	NA		NA		NA		NA		NA		NA		NA	
Total organic carbon	mg/L	NV	NA		NA		NA		NA		4.43		4.55		4.57	
Perchlorate (EPA 6850)																
Perchlorate	µg/L	17	< 0.2	U	< 0.2	U	NA		< 2	U	< 2	U	2.86		2.82	
Volatile Organic Compounds (8260C)																
1,1,2-Trichloroethane	µg/L	5	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 5	U	< 5	U
1,1-Dichloroethene	µg/L	7	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	1.4		2.8	J	3.4	J
1,2-Dichloroethane	µg/L	5	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 2.5	U	< 2.5	U
cis-1,2-Dichloroethene	µg/L	70	72		60		58		9.1		25		54		57	
Methylene chloride	µg/L	5	< 1	U	< 2	U	< 0.5	U	< 1	U	< 1	U	< 5	U	< 5	U
Trichloroethene	µg/L	5	30		46		68		90		830		1300		1300	
Vinyl chloride	µg/L	2	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 2.5	U	< 2.5	U

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code	16WW51											16WW55	
			Sample ID	16WW51-201020		16WW51-210129		16WW51-210415		16WW51-210720		16WW51-211019		16WW51-220113		16WW55-181015	
			Sample Date	10/20/2020		1/29/2021		4/15/2021		7/20/2021		10/19/2021		1/13/2022		10/15/2018	
			Groundwater Zone	INTERMEDIATE		INTERMEDIATE		INTERMEDIATE		INTERMEDIATE		INTERMEDIATE		INTERMEDIATE		SHALLOW	
Analyte	Units	MCL/PCL		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																	
Dehalococcoides	cells/mL	NV		NA		NA		NA		NA		NA		NA		0	U
Field Measurements																	
Dissolved oxygen	mg/L	NV		0.18		0.54		0.51		0.63		0.52		0.54		2.08	
Oxidation Reduction Potential	mV	NV		41		-58.3		70		-39		-24		57		319.9	
pH	SU	NV		5.49		6.14		5.45		6.25		6.04		6.11		6.19	
Dissolved Gases (RSK-175)																	
Ethane	µg/L	NV		NA		NA		NA		NA		NA		NA		0.749	J
Ethylene	µg/L	NV		NA		NA		NA		NA		NA		NA		3.79	
Methane	µg/L	NV		NA		NA		NA		NA		NA		NA		136	
General Chemistry (2320B/SM5310B/SW9056A)																	
Alkalinity	mg/L	NV		NA		NA		NA		NA		NA		NA		347	
Bromide	mg/L	NV		4.65		5.58		NA		NA		NA		NA		2.12	
Nitrate	mg/L	NV		NA		NA		NA		NA		NA		NA		< 0.1	U
Sulfate	mg/L	NV		NA		NA		NA		NA		NA		NA		1110	
Total organic carbon	mg/L	NV		4.52		3.9		NA		NA		NA		NA		7.32	
Perchlorate (EPA 6850)																	
Perchlorate	µg/L	17		< 0.05	U	< 0.5	U	0.306		< 0.05	U	< 0.2	U	< 0.2	U	400	
Volatile Organic Compounds (8260C)																	
1,1,2-Trichloroethane	µg/L	5		< 2.5	U	< 1	U	< 1	U	< 5	U	< 5	U	< 10	U	< 5	U
1,1-Dichloroethene	µg/L	7		< 2.5	U	1.3		0.83	J	2.6	J	< 2.5	U	< 5	U	< 5	U
1,2-Dichloroethane	µg/L	5		< 2.5	U	< 0.5	U	< 0.5	U	< 2.5	U	< 2.5	U	< 5	U	< 5	U
cis-1,2-Dichloroethene	µg/L	70		50		86		44		71		140		220		540	
Methylene chloride	µg/L	5		< 5	U	< 2	U	< 2	U	6.8	UB	< 5	U	< 20	U	< 10	U
Trichloroethene	µg/L	5		1700		1000		560		1800		2500		3200		5900	
Vinyl chloride	µg/L	2		< 2.5	U	< 0.5	U	< 0.5	U	< 2.5	U	< 2.5	U	< 5	U	< 5	U

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code		16WW55											
			Sample ID	16WW55-190917		16WW55-200325		16WW55-200714		16WW55-201013		16WW55-210120		16WW55-210420		16WW55-210713	
			Sample Date	9/17/2019		3/25/2020		7/14/2020		10/13/2020		1/20/2021		4/20/2021		7/13/2021	
			Groundwater Zone	SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW	
Analyte	Units	MCL/PCL		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																	
Dehalococcoides	cells/mL	NV		NA		0.3	J	3.8		< 0.5	U	0.8		0.2	J	0.3	J
Field Measurements																	
Dissolved oxygen	mg/L	NV		0.2		0.05		0.52		0.56		0.69		0.34		0.59	
Oxidation Reduction Potential	mV	NV		90.7		134		182		60		153.5		189		136	
pH	SU	NV		6.17		6.24		6.21		6.14		6.52		5.82		5.71	
Dissolved Gases (RSK-175)																	
Ethane	µg/L	NV		NA		0.607	J	0.682	J	< 0.25	U	0.25	J	< 0.5	U	0.642	J
Ethylene	µg/L	NV		NA		2.06		2.76		1.07		0.92		< 0.5	UJ	< 0.5	UJ
Methane	µg/L	NV		NA		70.1		82.2		30.1		63		7.09		18.2	
General Chemistry (2320B/SM5310B/SW9056A)																	
Alkalinity	mg/L	NV		NA		381		358		355		325		321		333	
Bromide	mg/L	NV		NA		3.78		5.53		4.75		6.06		7.73		7.42	
Nitrate	mg/L	NV		NA		1.21		< 0.1	U	< 0.1	U	0.861		1.1		0.214	
Sulfate	mg/L	NV		NA		770		982		745		1020		862		932	
Total organic carbon	mg/L	NV				5.21		5.58		4.98		4.25		6.21		7.07	
Perchlorate (EPA 6850)																	
Perchlorate	µg/L	17		480		360		263		287		259		198		125	
Volatile Organic Compounds (8260C)																	
1,1,2-Trichloroethane	µg/L	5		< 5	U	< 2.5	U	< 10	U	< 5	U	< 5	U	< 5	U	< 5	U
1,1-Dichloroethene	µg/L	7		9.1	J	10		12		< 5	U	7.1		5.4		5.8	
1,2-Dichloroethane	µg/L	5		5.3	J	5.8		6.9	J	12		4	J	3.6	J	3.3	J
cis-1,2-Dichloroethene	µg/L	70		310		380		440		450		340		270		270	
Methylene chloride	µg/L	5		< 10	U	< 5	U	< 10	U	< 10	U	< 10	U	< 10	U	< 5	U
Trichloroethene	µg/L	5		3200		4300		4500		4400		2900		2200		1900	
Vinyl chloride	µg/L	2		37		25		32		26		26		18		14	

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code	16WW55				16WW56									
			Sample ID	16WW55-211014		16WW55-220112		16WW56-190206		16WW56-190917		16WW56-200316		16WW56-200715		16WW56-201021	
			Sample Date	10/14/2021		1/12/2022		2/6/2019		9/17/2019		3/16/2020		7/15/2020		10/21/2020	
			Groundwater Zone	SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW	
Analyte	Units	MCL/PCL		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																	
Dehalococcoides	cells/mL	NV		< 0.5	U	< 0.5	U	3.8		NA		8.8		27.4		41.5	
Field Measurements																	
Dissolved oxygen	mg/L	NV		0.61		0.89		NM		0.22		0.55		1.48		0.31	
Oxidation Reduction Potential	mV	NV		183		64		NM		33.7		2		105		233	
pH	SU	NV		5.9		6.07		NM		6.05		6.75		6.67		6.40	
Dissolved Gases (RSK-175)																	
Ethane	µg/L	NV		< 0.5	U	< 0.5	U	< 1	U	NA		0.417	J	< 0.25	U	< 0.25	U
Ethylene	µg/L	NV		1.45	J	2.22	J	0.953	J	NA		5.17		0.93	J	2.01	J+
Methane	µg/L	NV		10.9		26.8		1.26		NA		4.94		1.39		1.26	
General Chemistry (2320B/SM5310B/SW9056A)																	
Alkalinity	mg/L	NV		303		305		187		NA		389		178		233	
Bromide	mg/L	NV		< 0.2	U	3.67		5.06		NA		3.19		5.2		3.95	J+
Nitrate	mg/L	NV		0.311		0.364		< 0.1	U	NA		< 0.5	U	< 0.1	U	< 0.1	U
Sulfate	mg/L	NV		638		581		307		NA		2090		140		1190	
Total organic carbon	mg/L	NV		5.54		5.05		4.26		NA		10.7		0.93		0.72	
Perchlorate (EPA 6850)																	
Perchlorate	µg/L	17		363		297		NA		< 2	U	< 2	U	< 0.5	U	0.309	
Volatile Organic Compounds (8260C)																	
1,1,2-Trichloroethane	µg/L	5		< 5	U	< 10	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 0.5	U
1,1-Dichloroethene	µg/L	7		5.5		< 5	U	< 0.5	U	< 0.5	U	2.9		< 0.5	U	1.5	
1,2-Dichloroethane	µg/L	5		28		24		< 0.5	U	< 0.5	U	3.4		< 0.5	U	0.66	J
cis-1,2-Dichloroethene	µg/L	70		660		470		3.1		1.7		44		< 0.5	U	20	J+
Methylene chloride	µg/L	5		< 5	U	< 20	U	< 0.5	U	< 1	U	< 1	U	< 1	U	< 1	U
Trichloroethene	µg/L	5		2900		2500		40		27		520		9.3		270	
Vinyl chloride	µg/L	2		< 2.5	U	8.2	J	< 0.5	U	0.41	J	6.3		< 0.5	U	2.8	

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code	16WW56										16WW57			
			Sample ID	16WW56-210125		16WW56-210415		16WW56-210720		16WW56-211019		16WW56-220111		16WW57-190815		16WW57-190918	
			Sample Date	1/25/2021		4/15/2021		7/20/2021		10/19/2021		1/11/2022		8/15/2019		9/18/2019	
			Groundwater Zone	SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW	
Analyte	Units	MCL/PCL		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																	
Dehalococcoides	cells/mL	NV		65.3		21.9	J	28.6		5.85		1.6		NA		35.3	
Field Measurements																	
Dissolved oxygen	mg/L	NV		0.64		0.48		0.87		0.33		0.69		NM		0.17	
Oxidation Reduction Potential	mV	NV		204.7		199		160		253		131		NM		13.6	
pH	SU	NV		6.33		5.82		5.78		5.32		6.07		NM		5.69	
Dissolved Gases (RSK-175)																	
Ethane	µg/L	NV		< 0.47	U	< 0.5	U	< 0.25	U	< 0.5	UJ	< 0.5	U	NA		0.246	J
Ethylene	µg/L	NV		0.36	J	< 0.5	UJ	0.714	J	< 0.5	UJ	1.19	J	NA		1.18	
Methane	µg/L	NV		0.57	J	1.02	J	1.68	J	0.952	J	2.29	J	NA		2.44	
General Chemistry (2320B/SM5310B/SW9056A)																	
Alkalinity	mg/L	NV		188		170		168		186		165		NA		133	
Bromide	mg/L	NV		5.1		5.19		4.29		1.55		3.42		NA		3.16	
Nitrate	mg/L	NV		0.213		0.249		< 0.2	U	< 0.2	UJ	0.0514	J	NA		< 0.1	U
Sulfate	mg/L	NV		252		137		123		137		106		NA		2310	
Total organic carbon	mg/L	NV		1.17		1.8		1.78		1.34	J	1.14		NA		10.9	
Perchlorate (EPA 6850)																	
Perchlorate	µg/L	17		< 0.1	UJ	0.0783	J	< 0.05	U	< 0.2	U	0.13	J	< 2	U	< 2	U
Volatile Organic Compounds (8260C)																	
1,1,2-Trichloroethane	µg/L	5		< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 0.5	U	< 0.5	U
1,1-Dichloroethene	µg/L	7		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	0.6	J	0.56	J
1,2-Dichloroethane	µg/L	5		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
cis-1,2-Dichloroethene	µg/L	70		3.7		1.2		1.5		0.76	J	0.67	J	< 0.5	U	< 0.5	U
Methylene chloride	µg/L	5		< 2	U	< 2	U	< 1	U	< 1	U	< 2	U	< 1	U	< 1	U
Trichloroethene	µg/L	5		29		14		12		6.2		7		25		24	
Vinyl chloride	µg/L	2		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code		16WW57											
			Sample ID	16WW57-200717		16WW57-201008		16WW57-210127		16WW57-210413		16WW57-210714		16WW57-211013		16WW57-220113	
			Sample Date	8/17/2020		10/8/2020		1/27/2021		4/13/2021		7/14/2021		10/13/2021		1/13/2022	
			Groundwater Zone	SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW	
Analyte	Units	MCL/PCL		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																	
Dehalococcoides	cells/mL	NV		1.3		2.6		4.3		3.1		4.7		6.7		9.9	
Field Measurements																	
Dissolved oxygen	mg/L	NV		0.04		0.04		0.44		0.36		0.56		0.26		0.58	
Oxidation Reduction Potential	mV	NV		45		2		14.9		54		26		-21		106	
pH	SU	NV		5.79		5.85		6.02		5.83		5.28		5.54		5.74	
Dissolved Gases (RSK-175)																	
Ethane	µg/L	NV		< 0.25		< 0.25	U	< 0.47	U	< 0.5	U	< 0.25	U	< 0.5	U	< 0.5	U
Ethylene	µg/L	NV		< 0.5		1.25		< 0.55	U	< 0.5	UJ	1.08	J	1.95	J	1.45	J
Methane	µg/L	NV		2.19		2.99		0.86	J	1.41	J	3.14		1.43		2.6	J
General Chemistry (2320B/SM5310B/SW9056A)																	
Alkalinity	mg/L	NV		138		77.6		131		175		126		164		191	
Bromide	mg/L	NV		4.7		5.69		4.96		4.78		1.96		< 0.5	U	< 0.5	UJ
Nitrate	mg/L	NV		< 0.5		< 1	U	< 0.5	U	< 0.5	U	< 0.2	U	< 0.5	U	0.215	J
Sulfate	mg/L	NV		2610		2440		2520		2360		1660		2250		2650	J
Total organic carbon	mg/L	NV		13.2		13.1		12.6		16.8		17.1		19		19.8	
Perchlorate (EPA 6850)																	
Perchlorate	µg/L	17		0.454		< 0.05	U	< 0.5	UJ	0.171	J	< 0.5	U	< 0.2	UJ	0.099	J
Volatile Organic Compounds (8260C)																	
1,1,2-Trichloroethane	µg/L	5		< 1		< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U
1,1-Dichloroethene	µg/L	7		1.5		1.3		0.94	J	1		1.1		1.2		1.1	
1,2-Dichloroethane	µg/L	5		< 0.5		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
cis-1,2-Dichloroethene	µg/L	70		< 0.5		< 0.5	U	< 0.5	U	< 0.5	U	0.8	J	< 0.5	U	0.66	J
Methylene chloride	µg/L	5		< 1		< 1	U	< 2	U	< 2	U	< 1	U	< 1	U	< 2	U
Trichloroethene	µg/L	5		69		72		65	J	57		60		75		85	
Vinyl chloride	µg/L	2		< 0.5		< 0.5	U	< 0.5	UJ	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code		16WW58											
			Sample ID	16WW58-190815		16WW58-190815-FD		16WW58-190918		16WW58-190918-FD		16WW58-200717		16WW58-201008		16WW58-210127	
			Sample Date	8/15/2019		8/15/2019		9/18/2019		9/18/2019		8/17/2020		10/8/2020		1/27/2021	
			Groundwater Zone	SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW		SHALLOW	
Analyte	Units	MCL/PCL		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)																	
Dehalococcoides	cells/mL	NV		NA		NA		17.8		NA		1.1		10.3		28	
Field Measurements																	
Dissolved oxygen	mg/L	NV		0.34		0.34		0.16		0.16		0.03		0.06		0.47	
Oxidation Reduction Potential	mV	NV		-91.1		-91.1		-78.1		-78.1		-23		-73		-39.2	
pH	SU	NV		6.36		6.36		5.98		5.98		5.69		6.23		6.21	
Dissolved Gases (RSK-175)																	
Ethane	µg/L	NV		NA		NA		0.332	J	0.318	J	< 0.25	U	< 0.25	U	< 0.47	U
Ethylene	µg/L	NV		NA		NA		1.51		1.43		1.71		0.645	J	0.44	J
Methane	µg/L	NV		NA		NA		3.62		4.37		9.69		6.59		7.7	
General Chemistry (2320B/SM5310B/SW9056A)																	
Alkalinity	mg/L	NV		NA		NA		94		107		97.8		41.9		85.6	
Bromide	mg/L	NV		NA		NA		3.52		3.48		3.42		4.33		3.7	
Nitrate	mg/L	NV		NA		NA		< 0.1	U	< 0.1	U	< 0.1	U	< 0.5	U	0.234	
Sulfate	mg/L	NV		NA		NA		394		396		348		383		367	
Total organic carbon	mg/L	NV		NA		NA		4.21		4.27		4.56		4.13		3.53	
Perchlorate (EPA 6850)																	
Perchlorate	µg/L	17		< 2	U	< 2	U	< 2	U	< 2	U	< 0.5	U	< 0.05	U	< 0.25	U
Volatile Organic Compounds (8260C)																	
1,1,2-Trichloroethane	µg/L	5		< 5	U	< 5	U	< 2.5	U	< 2.5	U	< 5	U	< 2.5	U	< 5	U
1,1-Dichloroethene	µg/L	7		< 5	U	< 5	U	3.9	J	3.9	J	2.9	J	3.3	J	< 2.5	U
1,2-Dichloroethane	µg/L	5		< 5	U	< 5	U	< 2.5	U	< 2.5	U	< 2.5	U	< 2.5	U	< 2.5	U
cis-1,2-Dichloroethene	µg/L	70		78		76		170		180		110		140		94	
Methylene chloride	µg/L	5		< 10	U	< 10	U	< 5	U	< 5	U	< 5	U	5.7	J	< 10	U
Trichloroethene	µg/L	5		2700		2700		4300		4100		3400		4400		2700	
Vinyl chloride	µg/L	2		< 5	U	< 5	U	< 2.5	U	< 2.5	U	< 2.5	U	< 2.5	U	< 2.5	U

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

			Location Code	16WW58							
			Sample ID	16WW58-210413		16WW58-210714		16WW58-211013		16WW58-220113	
			Sample Date	4/13/2021		7/14/2021		10/13/2021		1/13/2022	
			Groundwater Zone	SHALLOW		SHALLOW		SHALLOW		SHALLOW	
Analyte	Units	MCL/PCL		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Dechlorinating Bacteria (Census)											
Dehalococcoides	cells/mL	NV		13		6.9		8.05		21.6	
Field Measurements											
Dissolved oxygen	mg/L	NV		0.05		0.63		0.34		0.77	
Oxidation Reduction Potential	mV	NV		10		17		-53		118	
pH	SU	NV		5.53		5.22		5.11		5.91	
Dissolved Gases (RSK-175)											
Ethane	µg/L	NV		< 0.5	U	< 0.25	U	< 0.5	U	< 0.5	U
Ethylene	µg/L	NV		< 0.5	UJ	2.15	J	3.14	J	3.72	J
Methane	µg/L	NV		6.29	J	8.35		1.67		4.57	
General Chemistry (2320B/SM5310B/SW9056A)											
Alkalinity	mg/L	NV		98.4		99.2		162		144	
Bromide	mg/L	NV		2.5		2.3		< 0.1	U	2.24	
Nitrate	mg/L	NV		< 0.1	U	< 0.1	U	< 0.1	U	0.0416	J
Sulfate	mg/L	NV		282		162		194		594	
Total organic carbon	mg/L	NV		3.43		4.68		5.5		9.26	
Perchlorate (EPA 6850)											
Perchlorate	µg/L	17		0.0348	J	< 1	U	< 0.2	UJ	< 0.2	U
Volatile Organic Compounds (8260C)											
1,1,2-Trichloroethane	µg/L	5		< 1	U	< 5	U	< 5	U	< 10	U
1,1-Dichloroethene	µg/L	7		1.1		< 2.5	U	< 2.5	U	< 5	U
1,2-Dichloroethane	µg/L	5		< 0.5	U	< 2.5	U	< 2.5	U	< 5	U
cis-1,2-Dichloroethene	µg/L	70		49		52		120		170	
Methylene chloride	µg/L	5		< 2	U	< 5	U	< 5	U	< 20	U
Trichloroethene	µg/L	5		1100		1000		3300		5500	
Vinyl chloride	µg/L	2		< 0.5	U	< 2.5	U	< 2.5	U	< 5	U

Table 3
2018 to 2022 LHAAP-16 Groundwater Analytical Results

Notes:

[a] Cleanup Level for manganese identifed in Table 1-1 of the Remedial Action Work Plan is the 95% upper tolerance limit value from the *Final Evaluation of Perimeter Well Data for Use as Groundwater Background* (Shaw, 2007)

[b] Due to high viscosity of the samples collected from 16EW05, 16EW06, and 16EW07, the volatile organic compound analyses were performed at high dilutions. The TOC and alkalinity analyses could not be performed on the sample from 16EW06. Dissolved gases analyses could not be performed on samples from 16EW05 or 16EW06.

Blue highlighting indicates the concentration (bolded) or detection level (unbolded) exceeds the MCL/PCL

Some samples have been diluted due to the concentration(s) of one or more analytes exceeding the upper limit of the calibration curve.

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

UJ – Undetected estimated. The analyte was analyzed for but, was not detected. Even though the analyte was not detected, certain discrepancies in meeting analyte specific quality control were not met.

U - Undetected: The analyte was analyzed for, but not detected.

MCL - Maximum Contaminant Limit

PCL – Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level (used for perchlorate, manganese, and nickel where no MCL has been established)

mg/L - milligrams per liter

µg/L - micrograms per liter

ID - Identification

REG - Regular sample

FD - Field duplicate sample

< - The analyte was not detected above the concentration shown

NV - No MCL/PCL is shown for analytes that are not contaminants of concern

NA - not analyzed

SU - standard pH Units

mV - millivolts

cells/mL - cells per milliliter

UTL - upper tolerance limit

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Table B-3
Groundwater Analytical Results
February/March 2009

		LOCATION_CODE	130							17WW01							17WW02							17WW03						
		SAMPLE_NO	MW-130-030409							17WW01-030409							17WW02-030509							17WW03-030509						
		SAMPLE_DATE	4-Mar-09							4-Mar-09							5-Mar-09							5-Mar-09						
		PURPOSE	REG							REG							REG							REG						
Test Group	Parameter	Units	Result	Qual	ValQual	RC	DF	DL	MDL	Result	Qual	ValQual	RC	DF	DL	MDL	Result	Qual	ValQual	RC	DF	DL	MDL	Result	Qual	ValQual	RC	DF	DL	MDL
DHE	Dehalococcoides	cells/ml	6600				1	10	10	10	U			1.81	18	10	10	U			1	10	10	9800	D			1.47	15	10
GASES	Ethane	ug/L	1	U	U		1	5	1	1	U	U		1	5	1	1	U			1	5	1	1	U	U		1	5	1
GASES	Ethylene	ug/L	1	U	U		1	5	1	1	U	U		1	5	1	1	U	U		1	5	1	1	U	U		1	5	1
GASES	Methane	ug/L	5.15				1	5	1	66.7				1	5	1	5.1				1	5	1	19				1	5	1
GEN CHEMISTRY	Chloride	mg/L															817				25	5	2.5	794				25	5	2.5
GEN CHEMISTRY	Nitrate	mg/L	1.86	J	J	15	5	3	0.5	1	U	U		10	6	1	0.5	U	U		5	3	0.5	0.5	U	U		5	3	0.5
GEN CHEMISTRY	Nitrite	mg/L	0.5	U	U		5	2	0.5	1	U	U		10	4	1	0.5	U	U		5	2	0.5	0.5	U	U		5	2	0.5
GEN CHEMISTRY	ORTHOPHOSPHATE	mg/L	0.0341	J	J	15	1	0.05	0.025	0.025	U	U		1	0.05	0.025	0.025	U	U		1	0.05	0.025	0.025	U	U		1	0.05	0.025
GEN CHEMISTRY	Perchlorate	ug/L	1700				25	25	2.8	56000				1000	1000	110	160000				2500	2500	280	0.44	U	U		4	4	0.44
GEN CHEMISTRY	Sulfate	mg/L	170				5	5	2.5	90				10	10	5	124				5	5	2.5	44.8				5	5	2.5
GEN CHEMISTRY	Sulfide	mg/L	0.5	U	U		1	1	0.5	0.5	U	U		1	1	0.5	0.5	U	U		1	1	0.5	0.5	U	U		1	1	0.5
GEN CHEMISTRY	Total Alkalinity	mg/L	608				5	50	25	184				1	10	5	256				1	10	5	132				1	10	5
GEN CHEMISTRY	Total Organic Carbon	mg/L	9.37				1	1	0.5	6.6				1	1	0.5	5.67				3	3	1.5	4.17				2	2	1
METALS	Antimony	mg/L															0.00125	U	U		5	0.005	0.00125							
METALS	Arsenic	mg/L	0.00427				1	0.001	0.00025																					
METALS	Chromium	mg/L															0.0198				5	0.01	0.0025							
METALS	Nickel	mg/L																												
METALS	Thallium	mg/L								0.00005	U	U		1	0.0002	0.00005	0.00025	U	U		5	0.001	0.00025	0.00025	U	U		5	0.001	0.00025
VOLATILES	1,1,1,2-Tetrachloroethane	ug/L	0.25	U	U		1	1	0.25	12.5	U	U		50	50	12.5	1.25	U	U		5	5	1.25	0.25	U	U		1	1	0.25
VOLATILES	1,1,1-Trichloroethane	ug/L	0.25	U	U		1	1	0.25	12.5	U	U		50	50	12.5	1.25	U	U		5	5	1.25	0.25	U	U		1	1	0.25
VOLATILES	1,1,2,2-Tetrachloroethane	ug/L	0.125	U	U		1	1	0.125	6.25	U	U		50	50	6.25	0.625	U	U		5	5	0.625	0.125	U	U		1	1	0.125
VOLATILES	1,1,2-Trichloroethane	ug/L	0.25	U	U		1	1	0.25	12.5	U	U		50	50	12.5	1.25	U	U		5	5	1.25	0.25	U	U		1	1	0.25
VOLATILES	1,1-Dichloroethane	ug/L	0.125	U	U		1	1	0.125	29.6	J	J	15	50	50	6.25	0.625	U	U		5	5	0.625	0.125	U	U		1	1	0.125
VOLATILES	1,1-Dichloroethene	ug/L	0.5	U	U		1	1	0.5	70				50	50	25	6.22				5	5	2.5	0.5	U	U		1	1	0.5
VOLATILES	1,1-Dichloropropene	ug/L	0.25	U	U		1	1	0.25	12.5	U	U		50	50	12.5	1.25	U	U		5	5	1.25	0.25	U	U		1	1	0.25
VOLATILES	1,2,3-Trichlorobenzene	ug/L	0.15	U	U		1	1	0.15	7.5	U	U		50	50	7.5	0.75	U	U		5	5	0.75	0.15	U	U		1	1	0.15
VOLATILES	1,2,3-Trichloropropane	ug/L	0.5	U	U		1	1	0.5	25	U	U		50	50	25	2.5	U	U		5	5	2.5	0.5	U	U		1	1	0.5
VOLATILES	1,2,4-Trichlorobenzene	ug/L	0.2	U	U		1	1	0.2	10	U	U		50	50	10	1	U	U		5	5	1	0.2	U	U		1	1	0.2
VOLATILES	1,2,4-Trimethylbenzene	ug/L	0.25	U	U		1	1	0.25	12.5	U	U		50	50	12.5	1.25	U	U		5	5	1.25	0.25	U	U		1	1	0.25
VOLATILES	1,2-Dibromo-3-chloropropane	ug/L	1	U	U		1	5	1	50	U	U		50	250	50	5	U	U		5	25	5	1	U	U		1	5	1
VOLATILES	1,2-Dibromoethane	ug/L	0.25	U	U		1	1	0.25	12.5	U	U		50	50	12.5	1.25	U	U		5	5	1.25	0.25	U	U		1	1	0.25
VOLATILES	1,2-Dichlorobenzene	ug/L	0.125	U	U		1	1	0.125	6.25	U	U		50	50	6.25	0.625	U	U		5	5	0.625	0.125	U	U		1	1	0.125
VOLATILES	1,2-Dichloroethane	ug/L	4.29				1	1	0.25	35.8	J	J	15	50	50	12.5	34.5				5	5	1.25	0.26	J	J	15	1	1	0.25
VOLATILES	1,2-Dichloropropane	ug/L	0.2	U	U		1	1	0.2	10	U	U		50	50	10	1	U	U		5	5	1	0.2	U	U		1	1	0.2
VOLATILES	1,2-Dimethylbenzene (o-Xylene)	ug/L	0.25	U	U		1	1	0.25	12.5	U	U		50	50	12.5	1.25	U	U		5	5	1.25	0.25	U	U		1	1	0.25
VOLATILES	1,3,5-Trimethylbenzene	ug/L	0.25	U	U		1	1	0.25	12.5	U	U		50	50	12.5	1.25	U	U		5	5	1.25	0.25	U	U		1	1	0.25
VOLATILES	1,3-Dichlorobenzene	ug/L	0.25	U	U		1	1	0.25	12.5	U	U		50	50	12.5	1.25	U	U		5	5	1.25	0.25	U	U		1	1	0.25
VOLATILES	1,3-Dichloropropane	ug/L	0.2	U	U		1	1	0.2	10	U	U		50	50	10	1	U	U		5	5	1	0.2	U	U		1	1	0.2
VOLATILES	1,4-Dichlorobenzene	ug/L	0.125	U	U		1	1	0.125	6.25	U	U		50	50	6.25	0.625	U	U		5	5	0.625	0.125	U	U		1	1	0.125
VOLATILES	2,2-Dichloropropane	ug/L	0.25	U	U		1	1	0.25	12.5	U	U		50	50	12.5	1.25	U	U		5	5	1.25	0.25	U	U		1	1	0.25
VOLATILES	2-Butanone	ug/L	2.5	U	U		1	10	2.5	125	U	U		50	500	125	12.5	U	U		5	50	12.5	2.5	U	U		1	10	2.5
VOLATILES	2-Chloroethyl vinyl ether	ug/L	2	U	U		1	10	2	100	U	U		50	500	100	10	U	U		5	50	10	2	U	U		1	10	2
VOLATILES	2-Chlorotoluene	ug/L	0.125	U	U		1	1	0.125	6.25	U	U		50	50	6.25	0.625	U	U		5	5	0.625	0.125	U	U		1	1	0.125
VOLATILES	2-Hexanone	ug/L	2.5	U	U		1	10	2.5	125	U	U		50	500	125	12.5	U	U		5	50	12.5	2.5	U	U		1	10	2.5
VOLATILES	4-Chlorotoluene	ug/L	0.25	U	U		1	1	0.25	12.5	U	U		50	50	12.5	1.25	U	U		5	5	1.25	0.25	U	U		1	1	0.25
VOLATILES	Acetone	ug/L	2.5	U	U		1	10	2.5	125	U	U		50	500	125	12.5	U	U		5	50	12.5	2.5	U	U		1	10	2.5
VOLATILES	Benzene	ug/L	0.125	U	U		1	1	0.125	6.25	U	U		50	50	6.25	0.625	U	U		5	5	0.625	0.125	U	U		1	1	0.125
VOLATILES	Bromobenzene	ug/L	0.125	U	U		1	1	0.125	6.25	U	U		50	50	6.25	0.625	U	U		5	5	0.625	0.125	U	U		1	1	0.125
VOLATILES	Bromochloromethane	ug/L	0.2	U	U		1	1	0.2	10	U	U		50	50	10	1	U	U		5	5	1	0.2	U	U		1	1	0.2
VOLATILES	Bromodichloromethane	ug/L	0.25	U	U		1	1	0.25	12.5	U	U		50	50	12.5	1.25	U	U		5	5	1.25	0.25	U	U		1	1	0.25
VOLATILES	Bromoform	ug/L	0.5	U	U		1	1	0.5	25	U	U		50	50	25	2.5	U	U		5	5	2.5	0.5	U	U		1	1	0.5
VOLATILES	Bromomethane	ug/L	0.5	U	U		1	1	0.5	25	U	U		50	50	25	2.5	U	U		5	5	2.5	0.5	U	U		1	1	0.5
VOLATILES	Carbon disulfide	ug/L	0.5	U	U		1	1	0.5	25	U	U		50	50	25	2.5	U	U		5	5	2.5	0.5	U	U		1	1	0.5
VOLATILES	Carbon tetrachloride	ug/L	0.25	U	U		1	1	0.25	12.5	U	U		50	50	12.5	1.25	U	U		5	5	1.25	0.25	U	U		1	1	0.25

Table B-3
Groundwater Analytical Results
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		LOCATION_CODE	130							17WW01							17WW02							17WW03						
		SAMPLE_NO	MW-130-030409							17WW01-030409							17WW02-030509							17WW03-030509						
		SAMPLE_DATE	4-Mar-09							4-Mar-09							5-Mar-09							5-Mar-09						
		PURPOSE	REG							REG							REG							REG						
Test Group	Parameter	Units	Result	Qual	ValQual	RC	DF	DL	MDL	Result	Qual	ValQual	RC	DF	DL	MDL	Result	Qual	ValQual	RC	DF	DL	MDL	Result	Qual	ValQual	RC	DF	DL	MDL
VOLATILES	Chlorobenzene	ug/L	0.125	U	U		1	1	0.125	6.25	U	U		50	50	6.25	0.625	U	U		5	5	0.625	0.125	U	U		1	1	0.125
VOLATILES	Chloroethane	ug/L	0.5	U	U		1	1	0.5	25	U	U		50	50	25	2.5	U	U		5	5	2.5	0.5	U	U		1	1	0.5
VOLATILES	Chloroform	ug/L	0.125	U	U		1	1	0.125	6.25	U	U		50	50	6.25	0.625	U	U		5	5	0.625	0.125	U	U		1	1	0.125
VOLATILES	Chloromethane	ug/L	0.25	U	U		1	1	0.25	12.5	U	U		50	50	12.5	1.25	U	U		5	5	1.25	0.25	U	U		1	1	0.25
VOLATILES	cis-1,2-Dichloroethene	ug/L	0.606	J	J	15	1	1	0.25	107				50	50	12.5	8.11				5	5	1.25	1.58				1	1	0.25
VOLATILES	cis-1,3-Dichloropropene	ug/L	0.25	U	U		1	1	0.25	12.5	U	U		50	50	12.5	1.25	U	U		5	5	1.25	0.25	U	U		1	1	0.25
VOLATILES	Dibromochloromethane	ug/L	0.25	U	U		1	1	0.25	12.5	U	U		50	50	12.5	1.25	U	U		5	5	1.25	0.25	U	U		1	1	0.25
VOLATILES	Dibromomethane	ug/L	0.25	U	U		1	1	0.25	12.5	U	U		50	50	12.5	1.25	U	U		5	5	1.25	0.25	U	U		1	1	0.25
VOLATILES	Dichlorodifluoromethane	ug/L	0.25	U	U		1	1	0.25	12.5	U	U		50	50	12.5	1.25	U	U		5	5	1.25	0.25	U	U		1	1	0.25
VOLATILES	Ethylbenzene	ug/L	0.25	U	U		1	1	0.25	12.5	U	U		50	50	12.5	1.25	U	U		5	5	1.25	0.25	U	U		1	1	0.25
VOLATILES	Hexachlorobutadiene	ug/L	0.25	U	U		1	1	0.25	12.5	U	U		50	50	12.5	1.25	U	U		5	5	1.25	0.25	U	U		1	1	0.25
VOLATILES	Isopropylbenzene	ug/L	0.25	U	U		1	1	0.25	12.5	U	U		50	50	12.5	1.25	U	U		5	5	1.25	0.25	U	U		1	1	0.25
VOLATILES	m,p-Xylenes	ug/L	0.5	U	U		1	1	0.5	25	U	U		50	50	25	2.5	U	U		5	5	2.5	0.5	U	U		1	1	0.5
VOLATILES	Methyl isobutyl ketone	ug/L	2.5	U	U		1	10	2.5	125	U	U		50	500	125	12.5	U	U		5	50	12.5	2.5	U	U		1	10	2.5
VOLATILES	Methylene chloride	ug/L	0.25	U	U		1	5	0.25	12.5	U	U		50	250	12.5	1.25	U	U		5	25	1.25	0.25	U	U		1	5	0.25
VOLATILES	Naphthalene	ug/L	0.2	U	U		1	1	0.2	10	U	U		50	50	10	1	U	U		5	5	1	0.2	U	U		1	1	0.2
VOLATILES	n-BUTYLBENZENE	ug/L	0.25	U	U		1	1	0.25	12.5	U	U		50	50	12.5	1.25	U	U		5	5	1.25	0.25	U	U		1	1	0.25
VOLATILES	n-PROPYLBENZENE	ug/L	0.125	U	U		1	1	0.125	6.25	U	U		50	50	6.25	0.625	U	U		5	5	0.625	0.125	U	U		1	1	0.125
VOLATILES	p-ISOPROPYLTOLUENE	ug/L	0.25	U	U		1	1	0.25	12.5	U	U		50	50	12.5	1.25	U	U		5	5	1.25	0.25	U	U		1	1	0.25
VOLATILES	sec-BUTYLBENZENE	ug/L	0.25	U	U		1	1	0.25	12.5	U	U		50	50	12.5	1.25	U	U		5	5	1.25	0.25	U	U		1	1	0.25
VOLATILES	Styrene	ug/L	0.125	U	U		1	1	0.125	6.25	U	U		50	50	6.25	0.625	U	U		5	5	0.625	0.125	U	U		1	1	0.125
VOLATILES	tert-BUTYLBENZENE	ug/L	0.25	U	U		1	1	0.25	12.5	U	U		50	50	12.5	1.25	U	U		5	5	1.25	0.25	U	U		1	1	0.25
VOLATILES	Tetrachloroethene	ug/L	0.25	U	U		1	1	0.25	12.5	U	U		50	50	12.5	1.25	U	U		5	5	1.25	0.25	U	U		1	1	0.25
VOLATILES	Toluene	ug/L	0.25	U	U		1	1	0.25	12.5	U	U		50	50	12.5	1.25	U	U		5	5	1.25	0.25	U	U		1	1	0.25
VOLATILES	trans-1,2-Dichloroethene	ug/L	0.25	U	U		1	1	0.25	20.1	J	J	15	50	50	12.5	1.54	J	J	15	5	5	1.25	0.25	U	U		1	1	0.25
VOLATILES	trans-1,3-Dichloropropene	ug/L	0.5	U	U		1	1	0.5	25	U	U		50	50	25	2.5	U	U		5	5	2.5	0.5	U	U		1	1	0.5
VOLATILES	Trichloroethene	ug/L	31.1				1	1	0.25	6090				50	50	12.5	867				5	5	1.25	12.8				1	1	0.25
VOLATILES	Trichlorofluoromethane	ug/L	0.25	U	U		1	1	0.25	12.5	U	U		50	50	12.5	1.25	U	U		5	5	1.25	0.25	U	U		1	1	0.25
VOLATILES	Vinyl acetate	ug/L	2.5	U	U		1	10	2.5	125	U	U		50	500	125	12.5	U	U		5	50	12.5	2.5	U	U		1	10	2.5
VOLATILES	Vinyl chloride	ug/L	0.25	U	U		1	1	0.25	12.5	U	U		50	50	12.5	1.25	U	U		5	5	1.25	0.25	U	U		1	1	0.25

Table B-3
Groundwater Analytical Results
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		LOCATION_CODE	17WW04							17WW05							17WW06							17WW07						
		SAMPLE_NO	17WW04-030209							17WW05-022509							17WW06-030509							17WW07-022509						
		SAMPLE_DATE	2-Mar-09							25-Feb-09							5-Mar-09							25-Feb-09						
		PURPOSE	REG							REG							REG							REG						
Test Group	Parameter	Units	Result	Qual	ValQual	RC	DF	DL	MDL	Result	Qual	ValQual	RC	DF	DL	MDL	Result	Qual	ValQual	RC	DF	DL	MDL	Result	Qual	ValQual	RC	DF	DL	MDL
DHE	Dehalococcoides	cells/ml															730				1	10	10							
GASES	Ethane	ug/L															1	U	U		1	5	1							
GASES	Ethylene	ug/L															1	U	U		1	5	1							
GASES	Methane	ug/L															9.16				1	5	1							
GEN CHEMISTRY	Chloride	mg/L															1040				50	10	5							
GEN CHEMISTRY	Nitrate	mg/L															1	U	U		10	6	1							
GEN CHEMISTRY	Nitrite	mg/L															1	U	U		10	4	1							
GEN CHEMISTRY	ORTHOPHOSPHATE	mg/L															0.025	U	U		1	0.05	0.025							
GEN CHEMISTRY	Perchlorate	ug/L	0.22	U	U		2	2	0.22	0.55	U	U		5	5	0.55	74000				1000	1000	110	0.22	U	U		2	2	0.22
GEN CHEMISTRY	Sulfate	mg/L															111				10	10	5							
GEN CHEMISTRY	Sulfide	mg/L															0.5	U	U		1	1	0.5							
GEN CHEMISTRY	Total Alkalinity	mg/L															274				1	10	5							
GEN CHEMISTRY	Total Organic Carbon	mg/L															5.02				3	3	1.5							
METALS	Antimony	mg/L	0.00025	U	U		1	0.001	0.00025																					
METALS	Arsenic	mg/L																												
METALS	Chromium	mg/L															0.129				5	0.01	0.0025							
METALS	Nickel	mg/L																												
METALS	Thallium	mg/L	0.00005	U	U		1	0.0002	0.00005	0.00005	U	U		1	0.0002	0.00005	0.00025	U	U		5	0.001	0.00025	0.00005	U	U		1	0.0002	0.00005
VOLATILES	1,1,1,2-Tetrachloroethane	ug/L	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25
VOLATILES	1,1,1-Trichloroethane	ug/L	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25
VOLATILES	1,1,2,2-Tetrachloroethane	ug/L	0.125	U	U		1	1	0.125	0.125	U	U		1	1	0.125	0.125	U	U		1	1	0.125	0.125	U	U		1	1	0.125
VOLATILES	1,1,2-Trichloroethane	ug/L	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25
VOLATILES	1,1-Dichloroethane	ug/L	0.125	U	U		1	1	0.125	0.125	U	U		1	1	0.125	1.28				1	1	0.125	0.125	U	U		1	1	0.125
VOLATILES	1,1-Dichloroethene	ug/L	0.5	U	U		1	1	0.5	0.5	U	U		1	1	0.5	7				1	1	0.5	0.5	U	U		1	1	0.5
VOLATILES	1,1-Dichloropropene	ug/L	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25
VOLATILES	1,2,3-Trichlorobenzene	ug/L	0.15	U	U		1	1	0.15	0.15	U	U		1	1	0.15	0.15	U	U		1	1	0.15	0.15	U	U		1	1	0.15
VOLATILES	1,2,3-Trichloropropane	ug/L	0.5	U	U		1	1	0.5	0.5	U	U		1	1	0.5	0.5	U	U		1	1	0.5	0.5	U	U		1	1	0.5
VOLATILES	1,2,4-Trichlorobenzene	ug/L	0.2	U	U		1	1	0.2	0.2	U	U		1	1	0.2	0.2	U	U		1	1	0.2	0.2	U	U		1	1	0.2
VOLATILES	1,2,4-Trimethylbenzene	ug/L	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25
VOLATILES	1,2-Dibromo-3-chloropropane	ug/L	1	U	U		1	5	1	1	U	U		1	5	1	1	U	U		1	5	1	1	U	U		1	5	1
VOLATILES	1,2-Dibromoethane	ug/L	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25
VOLATILES	1,2-Dichlorobenzene	ug/L	0.125	U	U		1	1	0.125	0.125	U	U		1	1	0.125	0.125	U	U		1	1	0.125	0.125	U	U		1	1	0.125
VOLATILES	1,2-Dichloroethane	ug/L	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25	5.68				1	1	0.25	0.25	U	U		1	1	0.25
VOLATILES	1,2-Dichloropropane	ug/L	0.2	U	U		1	1	0.2	0.2	U	U		1	1	0.2	0.2	U	U		1	1	0.2	0.2	U	U		1	1	0.2
VOLATILES	1,2-Dimethylbenzene (o-Xylene)	ug/L	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25
VOLATILES	1,3,5-Trimethylbenzene	ug/L	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25
VOLATILES	1,3-Dichlorobenzene	ug/L	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25
VOLATILES	1,3-Dichloropropane	ug/L	0.2	U	U		1	1	0.2	0.2	U	U		1	1	0.2	0.2	U	U		1	1	0.2	0.2	U	U		1	1	0.2
VOLATILES	1,4-Dichlorobenzene	ug/L	0.125	U	U		1	1	0.125	0.125	U	U		1	1	0.125	0.125	U	U		1	1	0.125	0.125	U	U		1	1	0.125
VOLATILES	2,2-Dichloropropane	ug/L	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25
VOLATILES	2-Butanone	ug/L	2.5	U	U		1	10	2.5	2.5	U	U		1	10	2.5	2.5	U	U		1	10	2.5	2.5	U	U		1	10	2.5
VOLATILES	2-Chloroethyl vinyl ether	ug/L	2	U	U		1	10	2	2	U	U		1	10	2	2	U	U		1	10	2	2	U	U		1	10	2
VOLATILES	2-Chlorotoluene	ug/L	0.125	U	U		1	1	0.125	0.125	U	U		1	1	0.125	0.125	U	U		1	1	0.125	0.125	U	U		1	1	0.125
VOLATILES	2-Hexanone	ug/L	2.5	U	U		1	10	2.5	2.5	U	U		1	10	2.5	2.5	U	U		1	10	2.5	2.5	U	U		1	10	2.5
VOLATILES	4-Chlorotoluene	ug/L	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25
VOLATILES	Acetone	ug/L	2.5	U	U		1	10	2.5	2.5	U	U		1	10	2.5	2.5	U	U		1	10	2.5	2.5	U	U		1	10	2.5
VOLATILES	Benzene	ug/L	0.125	U	U		1	1	0.125	0.125	U	U		1	1	0.125	0.177	J	J		15	1	1	0.125	0.125	U	U		1	1	0.125
VOLATILES	Bromobenzene	ug/L	0.125	U	U		1	1	0.125	0.125	U	U		1	1	0.125	0.125	U	U		1	1	0.125	0.125	U	U		1	1	0.125
VOLATILES	Bromochloromethane	ug/L	0.2	U	U		1	1	0.2	0.2	U	U		1	1	0.2	0.2	U	U		1	1	0.2	0.2	U	U		1	1	0.2
VOLATILES	Bromodichloromethane	ug/L	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25
VOLATILES	Bromoform	ug/L	0.5	U	U		1	1	0.5	0.5	U	U		1	1	0.5	0.5	U	U		1	1	0.5	0.5	U	U		1	1	0.5
VOLATILES	Bromomethane	ug/L	0.5	U	U		1	1	0.5	0.5	U	U		1	1	0.5	0.5	U	U		1	1	0.5	0.5	U	U		1	1	0.5
VOLATILES	Carbon disulfide	ug/L	0.5	U	U		1	1	0.5	0.5	U	U		1	1	0.5	0.5	U	U		1	1	0.5	0.5	U	U		1	1	0.5
VOLATILES	Carbon tetrachloride	ug/L	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25

Table B-3
Groundwater Analytical Results
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		LOCATION_CODE	17WW04							17WW05							17WW06							17WW07						
		SAMPLE_NO	17WW04-030209							17WW05-022509							17WW06-030509							17WW07-022509						
		SAMPLE_DATE	2-Mar-09							25-Feb-09							5-Mar-09							25-Feb-09						
		PURPOSE	REG							REG							REG							REG						
Test Group	Parameter	Units	Result	Qual	ValQual	RC	DF	DL	MDL	Result	Qual	ValQual	RC	DF	DL	MDL	Result	Qual	ValQual	RC	DF	DL	MDL	Result	Qual	ValQual	RC	DF	DL	MDL
VOLATILES	Chlorobenzene	ug/L	0.125	U	U		1	1	0.125	0.125	U	U		1	1	0.125	0.125	U	U		1	1	0.125	0.125	U	U		1	1	0.125
VOLATILES	Chloroethane	ug/L	0.5	U	U		1	1	0.5	0.5	U	U		1	1	0.5	0.5	U	U		1	1	0.5	0.5	U	U		1	1	0.5
VOLATILES	Chloroform	ug/L	0.125	U	U		1	1	0.125	0.125	U	U		1	1	0.125	0.125	U	U		1	1	0.125	0.125	U	U		1	1	0.125
VOLATILES	Chloromethane	ug/L	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25
VOLATILES	cis-1,2-Dichloroethene	ug/L	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25	13				1	1	0.25	0.25	U	U		1	1	0.25
VOLATILES	cis-1,3-Dichloropropene	ug/L	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25
VOLATILES	Dibromochloromethane	ug/L	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25
VOLATILES	Dibromomethane	ug/L	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25
VOLATILES	Dichlorodifluoromethane	ug/L	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25
VOLATILES	Ethylbenzene	ug/L	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25
VOLATILES	Hexachlorobutadiene	ug/L	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25
VOLATILES	Isopropylbenzene	ug/L	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25
VOLATILES	m,p-Xylenes	ug/L	0.5	U	U		1	1	0.5	0.5	U	U		1	1	0.5	0.5	U	U		1	1	0.5	0.5	U	U		1	1	0.5
VOLATILES	Methyl isobutyl ketone	ug/L	2.5	U	U		1	10	2.5	2.5	U	U		1	10	2.5	2.5	U	U		1	10	2.5	2.5	U	U		1	10	2.5
VOLATILES	Methylene chloride	ug/L	0.25	U	U		1	5	0.25	0.25	U	U		1	5	0.25	0.25	U	U		1	5	0.25	0.25	U	U		1	5	0.25
VOLATILES	Naphthalene	ug/L	0.2	U	U		1	1	0.2	0.2	U	U		1	1	0.2	0.2	U	U		1	1	0.2	0.2	U	U		1	1	0.2
VOLATILES	n-BUTYLBENZENE	ug/L	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25
VOLATILES	n-PROPYLBENZENE	ug/L	0.125	U	U		1	1	0.125	0.125	U	U		1	1	0.125	0.125	U	U		1	1	0.125	0.125	U	U		1	1	0.125
VOLATILES	p-ISOPROPYLTOLUENE	ug/L	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25
VOLATILES	sec-BUTYLBENZENE	ug/L	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25
VOLATILES	Styrene	ug/L	0.125	U	U		1	1	0.125	0.125	U	U		1	1	0.125	0.125	U	U		1	1	0.125	0.125	U	U		1	1	0.125
VOLATILES	tert-BUTYLBENZENE	ug/L	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25
VOLATILES	Tetrachloroethene	ug/L	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25
VOLATILES	Toluene	ug/L	0.25	U	U		1	1	0.25	0.451	J	J		15	1	1	0.25	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25
VOLATILES	trans-1,2-Dichloroethene	ug/L	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25	2.38				1	1	0.25	0.25	U	U		1	1	0.25
VOLATILES	trans-1,3-Dichloropropene	ug/L	0.5	U	U		1	1	0.5	0.5	U	U		1	1	0.5	0.5	U	U		1	1	0.5	0.5	U	U		1	1	0.5
VOLATILES	Trichloroethene	ug/L	0.914	J	J		15	1	1	0.25	0.25	U	U		1	1	0.25	176				2	2	0.5	0.25	U	U		1	1	0.25
VOLATILES	Trichlorofluoromethane	ug/L	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25
VOLATILES	Vinyl acetate	ug/L	2.5	U	U		1	10	2.5	2.5	U	U		1	10	2.5	2.5	U	U		1	10	2.5	2.5	U	U		1	10	2.5
VOLATILES	Vinyl chloride	ug/L	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25	0.25	U	U		1	1	0.25

Table 3-2
Groundwater Analytical Results

	Sample ID		130-111417		17WW01-111517		17WW02-111517		17WW03-111417		17WW04-111617		17WW05-111617		17WW06-111617		17WW07-111417	
	Sample Date		11/14/2017		11/14/2017		11/15/2017		11/14/2017		11/16/2017		11/16/2017		11/16/2017		11/14/2017	
	Location Description		Shallow Zone, impacted, outside site boundary		Shallow Zone impacted, within site boundary		Shallow Zone, impacted, within site boundary		Shallow Zone, impacted, within site boundary		Shallow Zone, unimpacted, outside site boundary		Deep Zone, unimpacted, outside site boundary		Shallow Zone, impacted, outside site boundary		Intermediate Zone, unimpacted, within site boundary	
Parameter	Units	MCL / PCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Perchlorate	µg/L	17	2.5	J	< 4	U	**2,500**	J	< 4	U	< 4	U	< 4	U	**110,000**		< 4	U
1,1-Dichloroethene	µg/L	7	< 1	U	**240**		< 1	U	< 1	U	< 1	U	< 1	U	**7.6**		< 1	U
1,2-Dichloroethane	µg/L	5	< 1	U	**87**		3.3		< 1	U	< 1	U	< 1	U	**8.4**		< 1	U
cis-1,2-Dichloroethene	µg/L	70	< 1	U	**3,700**		2.5		0.7	J	< 1	U	< 1	U	9.4		< 1	U
Trichloroethene	µg/L	5	2.1		**6,100**	J	**6.2**		**5.3**		< 1	U	< 1	U	**260**		< 1	U
Vinyl Chloride	µg/L	2	< 1	U	**4**		< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U

Notes:

Blue highlighted results in **bold** indicate concentrations above the MCL/PCL.

Some samples may have been diluted due to the concentration(s) of one or more analytes exceeding the upper limit of the calibration curve.

µg/L - micrograms per liter

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

U - Undetected: The analyte was analyzed for, but not detected.

ID - identification

MCL - maximum contaminant limit

NA - not analyzed

PCL – Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level

Val Qual - qualifiers applied by APTIM chemist during data validation.

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Table 2-3

Groundwater Monitoring Analytical Results (April – November 2022)

Location ID:	Units	PCL	17WW01	17WW01	17WW01	17WW01
Sample Date:			4/8/2022	8/31/2022	10/7/2022	11/10/2022
Perchlorate	µg/L	17	**239**	**1,740**	**24.5***	**0.549**
Location ID:	**Units**	**PCL**	**17WW02**	**17WW02**	**17WW02**	**17WW02**
Sample Date:			**4/8/2022**	**8/31/2022**	**10/7/2022**	**11/10/2022**
Perchlorate	µg/L	17	**5,250**	**16,400**	**19,000**	**17,200**
Location ID:	**Units**	**PCL**	**17WW03**	**17WW03**	**17WW03**	**17WW03**
Sample Date:			**4/8/2022**	**8/31/2022**	**10/7/2022**	**11/10/2022**
Perchlorate	µg/L	17	**44.7**	**0.0694 J**	**0.0559 J**	**0.0271 J**
Location ID:	**Units**	**PCL**	**17WW06**	**17WW06**	**17WW06**	**17WW06**
Sample Date:			**4/8/2022**	**8/31/2022**	**10/7/2022**	**11/10/2022**
Perchlorate	µg/L	17	**120,000**	**101,000**	**104,000**	**89,900**
Location ID:	**Units**	**PCL**	**130**	**130**	**130**	**130**
Sample Date:			**4/8/2022**	**8/31/2022**	**10/7/2022**	**11/10/2022**
Perchlorate	µg/L	17	**15**	**0.0640 J**	**0.0750 J**	**0.463**

Notes:

PCL - Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level

Highlighted results exceed the perchlorate PCL

µg/L - micrograms per liter

J - Estimated Value. Concentration found below the limit of quantitation.

* - The higher value of the duplicate sample is reported.

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Table 7. Weekly Perchlorate Sample Results
2nd Quarter 2018 Groundwater Treatment Plant Report
Longhorn Army Ammunition Plant

Sample Identification	Lab Package	Date Sampled	Sample Location	Effluent Discharge Point	Harrison Bayou Maximum Allowable Daily Discharge Perchlorate Concentration (µg/L)	INF Pond Discharge Criteria for Perchlorate (µg/L)	Reporting Limit	Influent Perchlorate (6850)	Effluent Perchlorate (6850)		Does Concentration Meet Discharge Limit? (Yes/No)	No Daily Maximum Concentrat		
								Result (µg/L)	Result (µg/L)	DVQ		Ammonia as N (350.3) (mg/L)	Ortho-Phosphate (365.3) (mg/L)	Orga Carb (415 (mg
LH18/24-SP650_040418 (BIX)	HS18040240	4/4/2018	TK-650	Harrison Bayou	589	17	4	NA	**2.3**	J	Yes	**12**	**3.74**	**40**
LH18/24-SP650_041118 (BIX)	HS18040597	4/11/2018	TK-650	Harrison Bayou	589	17	4	NA	**6.9**		Yes	**11**	**1.19**	**13.4**
LH18/24-SP650_041118 (Monthly) (BIX)	HS18040595	4/11/2018	TK-650	Harrison Bayou	589	17	4	NA	**12**		Yes	--	--	--
LH18/24-SP140_041118 (Monthly) (BIX)	HS18040596	4/11/2018	TK-140	--	--	--	NA	**6,400**	NA		NA	--	--	--
LH18/24-SP650_041818 (BIX)	HS18040989	4/18/2018	TK-650	Harrison Bayou	589	17	4	NA	**55**		Yes	**28**	**2.42**	**17.7**
LH18/24-SP650_042518 (BIX)	HS18041331	4/25/2018	TK-650	Harrison Bayou	589	17	4	NA	**46**		Yes	**17**	**2.24**	**44.3**
LH18/24-SP650_050318 (BIX)	HS18050220	5/3/2018	TK-650	Harrison Bayou	589	17	4	NA	**4.9**		Yes	**22**	**3.78**	**87.6**
LH18/24-SP650_051718 (BIX)	HS18050925	5/17/2018	TK-650	Harrison Bayou	589	17	4	NA	< 2.0	U	Yes	**49**	**4.3**	**233**
LH18/24-SP650_052418 (Monthly) (BIX)	HS18051260	5/24/2018	TK-650	Harrison Bayou	589	17	4	NA	**23**		Yes	**15**	**2.4**	**19.2**
LH18/24-SP650_052418 (Monthly) (BIX)	HS18051257	5/24/2018	TK-650	Harrison Bayou	589	17	4	NA	**34**		Yes	--	--	--
LH18/24-SP140_052418 (Monthly) (BIX)	HS18051255	5/24/2018	TK-140	Harrison Bayou	589	17	NA	**12,000**	NA		NA	--	--	--
LH18/24-SP650_053018	HS18051489	5/30/2018	TK-650	--	--	--	--	--	--		--	**18**	**3**	**150**
LH18/24-SP650_053018_Before IX	HS18051489	5/30/2018	TK-650	Harrison Bayou	589	17	4	NA	**18**		Yes	--	--	--
LH18/24-SP650_053018_After IX	HS18051489	5/30/2018	TK-650	Harrison Bayou	589	17	4	NA	**2.2**	J	Yes	--	--	--
LH18/24-SP650_060618 (AIX)	HS18060310	6/6/2018	TK-650	Harrison Bayou	589	17	4	NA	< 10	U	Yes	**20**	**2.59**	**161**
LH18/24-SP650_060618 (Monthly) (AIX)	HS18060306	6/6/2018	TK-650	Harrison Bayou	589	17	4	NA	< 10	U	Yes	--	--	--
LH18/24-SP140_060618 (Monthly) (AIX)	HS18060308	6/6/2018	TK-140	--	--	--	NA	**21,000**	NA		NA	--	--	--
LH18/24-SP650_061218 (rush) (AIX)	HS18060609	6/12/2018	TK-650	Harrison Bayou	589	17	4	NA	< 10	U	Yes	--	--	--
LH18/24-SP650_061318 (AIX)	HS18060661	6/13/2018	TK-650	Harrison Bayou	589	17	4	NA	< 10	U	Yes	**36**	**2.17**	**165**
LH18/24-SP650_061818 (rush) (AIX)	HS18060892	6/18/2018	TK-650	INF Pond	589	17	4	NA	< 10	U	Yes	--	--	--
LH18/24-SP650_062018 (quarterly) (BIX)	HS18061039	6/20/2018	TK-650	INF Pond	589	17	4	NA	**15**		Yes	--	--	--
LH18/24_SP140_062018 (quarterly) (BIX)	HS18061036	6/20/2018	TK-140	--	--	--	NA	**9,400**	NA		NA	--	--	--
LH18/24-SP650_062018 (BIX)	HS18061031	6/20/2018	TK-650	INF Pond	589	17	4	NA	**13**		Yes	**16**	**3.34**	**18.4**
LH18/24-SP650_062618 (rush) (AIX)	HS18061367	6/26/2018	TK-650	INF Pond	589	17	4	NA	< 10	U	Yes	**--**	**--**	**--**
LH18/24-SP650_062718 (AIX)	HS18061423	6/27/2018	TK-650	INF Pond	589	17	4	NA	NA		NA	**12**	**2.84**	**34**

Notes:
Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level (PCL)
SP140 samples are influent samples.
µg/L - micrograms per liter
DVQ - data validation qualifier
J - Estimated concentration
NA - not applicable
U - non detect
AIX - After ion exchange
BIX - before ion exchange
mg/L - milligrams per liter

Table E.18-B - LHAAP-18/24

Table 8. Bi-Weekly GWTP Analytical Sampling Results for April 2018
2nd Quarter 2018 Groundwater Treatment Plant Report
Longhorn Army Ammunition Plant

Sample Location				EFFLUENT - Biweekly		EFFLUENT - Biweekly		EFFLUENT - Monthly		INFLUENT - Monthly*		Does Concentration Meet Effluent Discharge Limits? (Yes/No)
Sample Identification				LH18/24-SP650_040418		LH18/24-SP650_041818		LH18/24-SP650_041118		LH18/24-SP140_041118		
Lab Package				HS18040244		HS18040991		HS18040595		HS18040596		
Sample Date				4/4/2018		4/18/2018		4/11/2018		4/11/2018		
Sample Type				GRAB		GRAB		GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Table 2 of ROD											
	Daily Average Concentration	Daily Maximum Concentration	Reporting Limit	Result	DVQ	Result	DVQ	Result	DVQ	Result	DVQ	
VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		**µg/L**		
1,1,1-Trichloroethane	3,417	7,230	1	< 0.5	U	< 0.5	U	< 0.5	U	NA		Yes
1,1,2-Trichloroethane	102.5	216.9	1	< 0.5	U	< 0.5	U	< 0.5	U	NA		Yes
1,1-Dichloroethane	6,633	14,032	1	< 0.5	U	< 0.5	U	< 0.5	U	NA		Yes
1,1-Dichloroethene	119	253	1	< 0.5	U	< 0.5	U	< 0.5	U	NA		Yes
1,2-Dichloroethane	85	181	1	< 0.5	U	< 0.5	U	< 0.5	U	NA		Yes
1,2-Dichloropropane	NA	NA	1	< 0.5	U	< 0.5	U	< 0.5	U	NA		Yes
Acetone	1,132	2,395	2	< 1.0	U	**3.0**		**2.9**		NA		Yes
Benzene	85	181	1	< 0.5	U	< 0.5	U	< 0.5	U	NA		Yes
Carbon Tetrachloride	85	181	1	< 0.5	U	< 0.5	U	< 0.5	U	NA		Yes
Chlorobenzene	22,300	47,180	1	< 0.5	U	< 0.5	U	< 0.5	U	NA		Yes
Chloroform	1,708	3,615	1	< 0.5	U	< 0.5	U	< 0.5	U	NA		Yes
Ethylbenzene	26,954	57,025	1	< 0.5	U	< 0.5	U	< 0.5	U	NA		Yes
m,p-Xylenes	39.5	83.6	2	< 1.0	U	< 1.0	U	< 1.0	U	NA		Yes
Methylene Chloride	803	1,699	2	< 1.0	U	< 1.0	U	< 1.0	U	NA		Yes
o-Xylene	39.5	83.6	1	< 0.5	U	< 0.5	U	< 0.5	U	NA		Yes
Styrene	2,829	5,987	1	< 0.5	U	< 0.5	U	< 0.5	U	NA		Yes
Tetrachloroethene	85.4	180.7	1	< 0.5	U	< 0.5	U	< 0.5	U	NA		Yes
Toluene	1,980	4,189	1	< 0.5	U	< 0.5	U	< 0.5	U	NA		Yes
Trichloroethene	85	181	1	**4.1**		**4.6**		**4.8**		NA		Yes
Vinyl Chloride	34	72	1	< 0.5	U	< 0.5	U	< 0.5	U	NA		Yes
ANIONS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		**mg/L**		
Chloride	NA	NA	10	**293**		**387**		NA		NA		NA
Sulfate	NA	NA	10	**48.1**		**151**		NA		NA		NA
PERCHLORATE	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		**µg/L**		
Perchlorate	278	589	4	NA		NA		**12**		**6,400**		Yes
METALS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		**mg/L**		
Hexavalent Chromium	0.058	0.124	0.010	NA		NA		< 0.0100	U	< 0.0100	U	Yes
Barium	1	2	0.004	NA		NA		**0.124**		NA		Yes
Lead	0.0022	0.0046	0.002	NA		NA		< 0.00200	U	NA		Yes
Selenium	0.0057	0.0120	0.002	NA		NA		< 0.00200	U	< 0.00200	U	Yes
Silver	0.0014	0.0030	0.002	NA		NA		< 0.00200	U	< 0.00200	U	Yes
SEMI-VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		**µg/L**		
1,4-Dioxane**	NA	134.2	1	NA		NA		**3.6**		NA		Yes

Notes:

µg/L - micrograms per liter
mg/L - milligrams per liter
DVQ - data validation qualifier
NA - not applicable or not analyzed
GWTP - Groundwater Treatment Plant
ROD - Record of Decision

Grab samples are compared to the daily maximum and composite samples to the daily average.

U - not detected; J - estimated concentration

Protective Concentration Level (PCL).

*Influent sample not compared to discharge limits

** Calculated Effluent Limit

Table E.18-C - LHAAP-18/24

Table 9. Bi-Weekly GWTP Analytical Sampling Results for May 2018
2nd Quarter 2018 Groundwater Treatment Plant Report
Longhorn Army Ammunition Plant

				Sample Location	EFFLUENT - Biweekly		EFFLUENT - Biweekly		EFFFLUENT - Monthly		INFLUENT - Monthly*		EFFLUENT - Biweekly		Does Concentration Meet Effluent Discharge Limits? (Yes/No)
				Sample Identification	LH18/24-SP650_050318		LH18/24-SP650_051718		LH18/24-SP650_052418		LH18/24-SP140_052418		LH18/24-SP650_0530218		
				Lab Package	HS18050260		HS18050932		HS18051257		HS18051255		HS18051472		
				Sample Date	5/3/2018		5/17/2018		5/24/2018		5/24/2018		5/30/2018		
				Sample Type	GRAB		GRAB		GRAB		GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Table 2 of ROD														
	Daily Average Concentration	Daily Maximum Concentration	Detection Limit	Result	DVQ	Result	DVQ	Result	DVQ	Result	DVQ	Result	DVQ	
VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		**µg/L**		**µg/L**		
1,1,1-Trichloroethane	3,417	7,230	1	< 0.5	U	< 0.5	U	< 2.5	U	NA		< 2.5	U	Yes
1,1,2-Trichloroethane	102.5	216.9	1	< 0.5	U	< 0.5	U	< 2.5	U	NA		< 2.5	U	Yes
1,1-Dichloroethane	6,633	14,032	1	< 0.5	U	< 0.5	U	< 2.5	U	NA		< 2.5	U	Yes
1,1-Dichloroethene	119	253	1	< 0.5	U	< 0.5	U	< 2.5	U	NA		< 2.5	U	Yes
1,2-Dichloroethane	85	181	1	< 0.5	U	< 0.5	U	< 2.5	U	NA		< 2.5	U	Yes
1,2-Dichloropropane	NA	NA	1	< 0.5	U	< 0.5	U	< 2.5	U	NA		< 2.5	U	Yes
Acetone	1,132	2,395	2	**11**		**21**		< 5.0	U	NA		**35**		Yes
Benzene	85	181	1	< 0.5	U	< 0.5	U	< 2.5	U	NA		< 2.5	U	Yes
Carbon Tetrachloride	85	181	1	< 0.5	U	< 0.5	U	< 2.5	U	NA		< 2.5	U	Yes
Chlorobezene	22,300	47,180	1	< 0.5	U	< 0.5	U	< 2.5	U	NA		< 2.5	U	Yes
Chloroform	1,708	3,615	1	< 0.5	U	< 0.5	U	< 2.5	U	NA		< 2.5	U	Yes
Ethylbenzene	26,954	57,025	1	< 0.5	U	< 0.5	U	< 2.5	U	NA		< 2.5	U	Yes
m,p-Xylenes	39.5	83.6	2	< 1.0	U	< 1.0	U	< 5.0	U	NA		< 5.0	U	Yes
Methylene Chloride	803	1,699	2	< 1.0	U	< 1.0	U	< 5.0	U	NA		< 5.0	U	Yes
o-Xylene	39.5	83.6	1	< 0.5	U	< 0.5	U	< 2.5	U	NA		< 2.5	U	Yes
Styrene	2,829	5,987	1	< 0.5	U	< 0.5	U	< 2.5	U	NA		< 2.5	U	Yes
Tetrachloroethene	85.4	180.7	1	< 0.5	U	< 0.5	U	< 2.5	U	NA		< 2.5	U	Yes
Toluene	1,980	4,189	1	**0.32**	J	**0.44**	J	< 2.5	U	NA		< 2.5	U	Yes
Trichloroethene	85	181	1	**2.3**		**2.1**		< 2.5	U	NA		< 2.5	U	Yes
Vinyl Chloride	34	72	1	< 0.5	U	< 0.5	U	< 2.5	U	NA		< 2.5	U	Yes
ANIONS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		**mg/L**		**mg/L**		
Chloride	NA	NA	10	**429**		**492**		NA		NA		**634**		NA
Sulfate	NA	NA	10	**116**		**153**		NA		NA		**87.9**		NA
PERCHLORATE	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		**µg/L**		**µg/L**		
Perchlorate	278	589	4	NA		NA		**34**		**12,000**		NA		Yes
METALS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		**mg/L**		**mg/L**		
Hexavalent Chromium	0.058	0.124	0.010	NA		NA		< 0.0100	U	< 0.0100	U	NA		Yes
Barium	1	2	0.004	NA		NA		**0.186**		NA		NA		Yes
Lead	0.0022	0.0046	0.002	NA		NA		< 0.00100	U	NA		NA		Yes
Selenium	0.0057	0.0120	0.002	NA		NA		< 0.00200	U	< 0.00200	U	NA		Yes
Silver	0.0014	0.0030	0.002	NA		NA		< 0.00100	U	< 0.00100	U	NA		Yes
SEMI-VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		**µg/L**		**µg/L**		
1,4-Dioxane**	NA	134.2	1	NA		NA		**11**		NA		NA		Yes

Notes:
µg/L - micrograms per liter
mg/L - milligrams per liter
U - non detect; J - estimated concentration
DVQ - data validation qualifier
ROD - Record of Decision
Grab samples are compared to the daily maximum and composite samples to the daily average.
GWTP - Groundwater Treatment Plant
*Influent sample not compared to discharge limits
* *Calculated Effluent Limit
NA - not applicable or not analyzed

Table E.18-D - LHAAP-18/24

Table 10. Bi-Weekly Analytical GWTP Sampling Results for June 2018
2nd Quarter 2018 Groundwater Treatment Plant Report
Longhorn Army Ammunition Plant

			Sample Location	EFFLUENT - Monthly		INFLUENT - Monthly*		EFFLUENT - Biweekly		EFFLUENT - Biweekly		Does Concentration Meet Effluent Discharge Limits? (Yes/No)
			Sample Identification	LH18/24-SP650_060618		LH18/24-SP140_060618		LH18/24-SP650_061318		LH18/24-SP650_062718		
			Lab Package	HS18060306		HS18060308		HS18060751		HS18061470		
			Sample Date	6/6/2018		6/6/2018		6/13/2018		6/27/2018		
			Sample Type	GRAB		GRAB		GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Table 2 of ROD											
	Daily Average Concentration	Daily Maximum Concentration	Detection Limit	Result	DVQ	Result	DVQ	Result	DVQ	Result	DVQ	
VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**				**µg/L**		
1,1,1-Trichloroethane	3,417	7,230	1	< 0.5	U	NA		< 0.5	U	< 0.5	U	Yes
1,1,2-Trichloroethane	102.5	216.9	1	< 0.5	U	NA		< 0.5	U	< 0.5	U	Yes
1,1-Dichloroethane	6,633	14,032	1	< 0.5	U	NA		< 0.5	U	< 0.5	U	Yes
1,1-Dichloroethene	119	253	1	< 0.5	U	NA		< 0.5	U	< 0.5	U	Yes
1,2-Dichloroethane	85	181	1	< 0.5	U	NA		< 0.5	U	**0.56**	J	Yes
1,2-Dichloropropane	NA	NA	1	< 0.5	U	NA		< 0.5	U	< 0.5	U	Yes
Acetone	1,132	2,395	2	**9.7**		NA		**7.7**		**6.0**		Yes
Benzene	85	181	1	< 0.5	U	NA		< 0.5	U	< 0.5	U	Yes
Carbon Tetrachloride	85	181	1	< 0.5	U	NA		< 0.5	U	< 0.5	U	Yes
Chlorobenzene	22,300	47,180	1	< 0.5	U	NA		< 0.5	U	< 0.5	U	Yes
Chloroform	1,708	3,615	1	< 0.5	U	NA		< 0.5	U	< 0.5	U	Yes
Ethylbenzene	26,954	57,025	1	< 0.5	U	NA		< 0.5	U	< 0.5	U	Yes
m,p-Xylenes	39.5	83.6	2	< 1.0	U	NA		< 1.0	U	< 1.0	U	Yes
Methylene Chloride	803	1,699	2	< 1.0	U	NA		< 1.0	U	< 1.0	U	Yes
o-Xylene	39.5	83.6	1	< 0.5	U	NA		< 0.5	U	< 0.5	U	Yes
Styrene	2,829	5,987	1	< 0.5	U	NA		< 0.5	U	< 0.5	U	Yes
Tetrachloroethene	85.4	180.7	1	< 0.5	U	NA		< 0.5	U	< 0.5	U	Yes
Toluene	1,980	4,189	1	**0.36**	J	NA		**0.40**	J	< 0.5	U	Yes
Trichloroethene	85	181	1	**4.2**		NA		**1.2**		**1.9**		Yes
Vinyl Chloride	34	72	1	**1.5**		NA		< 0.5	U	< 0.5	U	Yes
ANIONS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		**mg/L**		
Chloride	NA	NA	10	NA		NA		**473**		**536**		NA
Sulfate	NA	NA	10	NA		NA		**40.2**		**87.9**		NA
PERCHLORATE	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		**µg/L**		
Perchlorate	278	589	4	< 10	U	**21,000**		NA		NA		Yes
METALS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		**mg/L**		
Hexavalent Chromium	0.058	0.124	0.010	< 0.0100	U	< 0.0100	U	NA		NA		Yes
Barium	1	2	0.004	**0.0999**		NA		NA		NA		Yes
Lead	0.0022	0.0046	0.002	< 0.00100 U	U	NA		NA		NA		Yes
Selenium	0.0057	0.0120	0.002	**0.00111**	J	< 0.00200 U	U	NA		NA		Yes
Silver	0.0014	0.0030	0.002	< 0.00100 U	U	< 0.00100 U	U	NA		NA		Yes
SEMI-VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		**µg/L**		
1,4-Dioxane**	NA	134.2	1	**4.8**		NA		NA		NA		Yes

Notes:
µg/L - micrograms per liter
DVQ - data validation qualifier
GWTP - Groundwater Treatment Plant
J - estimated concentration
mg/L - milligrams per liter
U - Non detect
NA - not applicable or not analyzed
Grab samples are compared to the daily maximum and composite samples to the daily average
*Influent sample not compared to discharge limits
** Calculated Effluent Limit

Table 11. Quarterly GWTP Analytical Sampling Results
2nd Quarter 2018 Groundwater Treatment Plant Report
Longhorn Army Ammunition Plant

			Sample Location	EFFLUENT*		INFLUENT		Does Concentrati Meet Discharge Limits? (Yes/No)
			Sample Identification	LH18/24-SP650_062018		LH18/24_SP140_062018		
			Lab Package	HS18061039		HS18061036		
			Sample Date	6/20/2018		6/20/2018		
			Sample Type	GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Protocol			Result	DVQ	Result	DVQ	
	Daily Average Concentration	Daily Maximum Concentration	Reporting Limit					
VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		
1,1,1-Trichloroethane	3,417	7,230	1	< 0.5	U	< 10	U	Yes
1,1,2-Trichloroethane	102.5	216.9	1	< 0.5	U	< 10	U	Yes
1,1-Dichloroethane	6,633	14,032	1	< 0.5	U	**8.9**	J	Yes
1,1-Dichloroethene	119	253	1	< 0.5	U	< 10	U	Yes
1,2-Dichloroethane	85	181	1	**0.59**	J	**56**		Yes
1,2-Dichloropropane	NA	NA	1	< 0.5	U	< 10	U	Yes
Acetone	1,132	2,395	2	< 1.0	U	< 10	U	Yes
Benzene	85	181	1	< 0.5	U	< 10	U	Yes
Carbon Tetrachloride	85	181	1	< 0.5	U	< 10	U	Yes
Chlorobenzene	22,300	47,180	1	< 0.5	U	< 10	U	Yes
Chloroform	1,708	3,615	1	< 0.5	U	< 10	U	Yes
Ethylbenzene	26,954	57,025	1	< 0.5	U	< 10	U	Yes
m,p-Xylenes	39.5	83.6	2	< 1.0	U	< 20	U	Yes
Methylene Chloride	803	1,699	2	< 1.0	U	**28**	J	Yes
o-Xylene	39.5	83.6	1	< 0.5	U	< 10	U	Yes
Styrene	2,829	5,987	1	< 0.5	U	< 10	U	Yes
Tetrachloroethene	85.4	180.7	1	< 0.5	U	**51**		Yes
Toluene	1,980	4,189	1	< 0.5	U	< 10	U	Yes
Trichloroethene	85	181	1	**2.2**		**6,000**		Yes
Vinyl Chloride	34	72	1	< 0.5	U	**33**		Yes
ANIONS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		
Chloride	NA	NA	10	**427**		**374**		NA
Sulfate	NA	NA	10	**7.17**		**50.6**		NA
PERCHLORATE	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		
Perchlorate	278	589	4	**15**		**9,400**		Yes
METALS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		
Aluminum	0.777	1.644	0.0100	0.0170	UB	0.0160	UB	Yes
Antimony	NA	NA	0.00200	< 0.00100	U	**0.000585**	J	NA
Arsenic	0.365	0.772	0.00200	**0.00110**	J	**0.000735**	J	Yes

Table 11. Quarterly GWTP Analytical Sampling Results
2nd Quarter 2018 Groundwater Treatment Plant Report
Longhorn Army Ammunition Plant

			Sample Location	EFFLUENT*		INFLUENT		Does Concentration Meet Discharge Limits? (Yes/No)
			Sample Identification	LH18/24-SP650_062018		LH18/24_SP140_062018		
			Lab Package	HS18061039		HS18061036		
			Sample Date	6/20/2018		6/20/2018		
			Sample Type	GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Protocol			Result	DVQ	Result	DVQ	
	Daily Average Concentration	Daily Maximum Concentration	Reporting Limit					
Barium	1	2	0.00400	**0.0709**		**0.440**		Yes
Beryllium	NA	NA	0.00200	< 0.00100	U	< 0.00100	U	NA
Cadmium	0.0016	0.0034	0.00200	**0.000222**	J	**0.00103**	J	Yes
Calcium	NA	NA	0.500	**7.66**		**33.4**		NA
Chromium	0.355	0.752	0.00400	**0.00540**		**0.00147**	J	Yes
Cobalt	5.433	11.495	0.00500	**0.00222**	J	**0.0128**		Yes
Iron	1.132	2.395	0.200	**0.261**		**0.283**		Yes
Lead	0.0022	0.0046	0.00200	< 0.00100	U	< 0.00100	U	Yes
Magnesium	NA	NA	0.200	**19.0**		**25.0**		NA
Manganese	7.323	15.494	0.00500	**0.0777**		**0.637**		Yes
Nickel	0.087	0.184	0.00200	**0.0125**		**0.0296**		Yes
Potassium	NA	NA	0.200	**1.82**		**1.63**		NA
Selenium	0.0057	0.012	0.00200	**0.00150**	J	**0.00199**	J	Yes
Silver	0.0014	0.003	0.00200	< 0.00100	U	< 0.00100	U	Yes
Sodium	NA	NA	1.00	**334**		**177**		NA
Thallium	NA	NA	0.00200	< 0.00100	U	**0.000338**	J	NA
Vanadium	1.698	3.592	0.00500	**0.00143**	J	< 0.00100	U	Yes
Zinc	0.146	0.31	0.00400	**0.455**		**0.651**		No
Mercury	NA	NA	0.000200	< 0.0000500	U	**0.0000640**	J	NA
1,4-DIOXANE	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		
1,4-Dioxane	NA	134.2	1	**4.5**		**13**		Yes
CHEMICAL OXYGEN DEMAND (COD)	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		
COD	NA	200	75	**66**		**12**	J	Yes
OIL AND GREASE (O&G)	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		
O&G	NA	15	2	**2.92**		**0.625**	J	Yes

Notes:
µg/L - micrograms per liter
DVQ - data validation qualifier
Grab samples are compared to the daily maximum and composite samples to the daily average
UB - considered non detect due to blank contamination
* only Effluent sample is compared to discharge limits
GWTP - Groundwater Treatment Plant
J - Estimated concentration
mg/L - milligrams per liter
NA - not applicable
ROD - Record of Decision
U - non detect

Table 6. Weekly Perchlorate Sample Results

Sample Identification	Lab Package	Date Sampled	Sample Location	Effluent Discharge Point	Harrison Bayou Maximum Allowable Daily Discharge Perchlorate Concentration (µg/L)	INF Pond Discharge Criteria for Perchlorate (µg/L)*	Reporting Limit	Influent Perchlorate (6850)	Effluent Perchlorate (6850)		Does Concentration Meet Discharge Limit? (Yes/No)	No Daily Maximum Concentration		
								Result (µg/L)	Result (µg/L)	DVQ		Ammonia as N (350.3) (mg/L)	Ortho-Phosphate (365.3) (mg/L)	Organic Carbon (415.1) (mg/L)
LH18/24-SP650_070618 (BIX)	HS18070297	7/6/2018	TK-650	INF Pond	589	17	4	NA	**4.9**		Yes	**30**	**5.28**	**12.7**
LH18/24-SP650_070618 (Monthly) (BIX)	HS18070295	7/6/2018	TK-650	INF Pond	589	17	4	NA	< 2.0	U	Yes	--	--	--
LH18/24-SP140_070618 (Monthly)	HS18070296	7/6/2018	TK-140	--	--	--	NA	**15,000**	NA		NA	--	--	--
LH18/24-SP650_072618 (BIX)	HS18071383/ HS18071386	7/26/2018	TK-650	INF Pond	589	17	4	NA	< 2.0	U	Yes	**10**	**2.88**	**26.9**
LH18/24_SP650_080618	HS18080340/ HS18080375	8/6/2018	TK-650	Harrison Bayou	589	17	4	NA	< 2.0	U	Yes	**37**	**7.19**	**79.3**
LH18/24-SP650_081518	HS18080783/ HS18080840	8/15/2018	TK-650	Harrison Bayou	589	17	4	NA	< 2.0	U	Yes	**27**	**4.57**	**36.4**
LH18/24-SP650_082318	HS18081206	8/23/2018	TK-650	Harrison Bayou	589	17	4	NA	< 10.0	UJ	Yes	**35**	**5.26**	**26**
LH18/24-SP650_082718	HS18081379	8/27/2018	TK-650	Harrison Bayou	589	17	4	NA	< 10.0	U	Yes	--	--	--
LH18/24-SP650_083018	HS18081539	8/30/2018	TK-650	Harrison Bayou	589	17	4	NA	< 2.0	U	Yes	**36**	**6.54**	**18**
LH18/24-SP650_083018 (Monthly) (BIX)	HS18081540	8/30/2018	TK-650	INF Pond	589	17	4	NA	< 2.0	U	Yes	--	--	--
LH18/24-SP140_083018 (Monthly)	HS18081541	8/30/2018	TK-140	--	--	--	NA	**4,800**	NA		NA	--	--	--
LH18/24-SP650_090618	HS18090275/ HS18090255	9/6/2018	TK-650	Harrison Bayou	589	17	4	NA	< 2.0	U	Yes	**15**	**2.4**	**20.4**
LH18/24-SP650_091318_AIX (Monthly)	HS18090654	9/13/2018	TK-650	Harrison Bayou	589	17	4	NA	< 20	U	Yes	--	--	--
LH18/24-SP140_091318 (Monthly)	HS18090658	9/13/2018	TK-140	--	--	--	NA	**7,100**	NA		NA	--	--	--
LH18/24-SP650_091318_BIX	HS18090657	9/13/2018	TK-650	INF Pond	589	17	4	NA	< 20	U	Yes	**89**	**2.8**	**935**

Table E.18-F - LHAAP-18/24

GWTP Quarterly Evaluation Report – 3rd Quarter 2018

Longhorn Army Ammunition Plant

Sample Identification	Lab Package	Date Sampled	Sample Location	Effluent Discharge Point	Harrison Bayou Maximum Allowable Daily Discharge Perchlorate Concentration (µg/L)	INF Pond Discharge Criteria for Perchlorate (µg/L)*	Reporting Limit	Influent Perchlorate (6850)	Effluent Perchlorate (6850)		Does Concentration Meet Discharge Limit? (Yes/No)	No Daily Maximum Concentration		
								Result (µg/L)	Result (µg/L)	DVQ		Ammonia as N (350.3) (mg/L)	Ortho-Phosphate (365.3) (mg/L)	Organic Carbon (415.1) (mg/L)
LH18/24-SP650_091318_AIX	HS18090657 (rerun for lower detection limits)	9/13/2018	TK-650	Harrison Bayou	589	17	4	NA	**0.44**		Yes	--	--	--
LH18/24-SP650_091918_AIX	HS18091005	9/19/2018	TK-650	Harrison Bayou	589	17	4	NA	< 20	U	Yes	**27**	**1.94**	**370**
LH18/24-SP650_092718_BIX (quarterly)	HS18091521	9/27/2018	TK-650	INF Pond	589	17	4	NA	< 2.0	U	Yes	--	--	--
LH18/24-SP140_092718 (quarterly)	HS18091519	9/27/2018	TK-140	--	--	--	NA	**8,800**	NA			--	--	--
LH18/24-SP650_092718_BIX	HS18091522	9/27/2018	TK-650	INF Pond	589	17	4	NA	< 2.0	U	Yes	**13**	**1.57**	**11.9**

Notes: *Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level (PCL)

SP140 samples are influent samples.

µg/L - micrograms per liter

DVQ - data validation qualifier

NA - not applicable

U - non detect at the limit of detection (presented)

UJ - Estimated, non-detected

AIX - After ion exchange

BIX - before ion exchange

mg/L - milligrams per liter

Table 7. Bi-Weekly GWTP Analytical Sampling Results for July 2018

Sample Location				EFFLUENT - Biweekly		EFFLUENT - Monthly		INFLUENT - Monthly*		Does Concentration Meet Effluent Discharge Limits? (Yes/No)
Sample Identification				LH18/24-SP650_072618		LH18/24-SP650_070618		LH18/24-SP140_070618		
Lab Package				HS18071388		HS18070295		HS18070296		
Sample Date				7/26/2018		7/6/2018		7/6/2028		
Sample Type				GRAB		GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Table 2 of ROD			Result	DVQ	Result	DVQ	Result	DVQ	
	Daily Average Concentration	Daily Maximum Concentration	Reporting Limit							
VOLATILES	µg/L	µg/L	µg/L	µg/L		µg/L		µg/L		
1,1,1-Trichloroethane	3,417	7,230	1	< 0.5	U	< 0.5	U	NA		Yes
1,1,2-Trichloroethane	102.5	216.9	1	< 0.5	U	< 0.5	U	NA		Yes
1,1-Dichloroethane	6,633	14,032	1	< 0.5	U	< 0.5	U	NA		Yes
1,1-Dichloroethene	119	253	1	< 0.5	U	< 0.5	U	NA		Yes
1,2-Dichloroethane	85	181	1	< 0.5	U	**0.77**	**J**	NA		Yes
1,2-Dichloropropane	NA	NA	1	< 0.5	U	< 0.5	U	NA		Yes
Acetone	1,132	2,395	2	< 1.0	U	< 1.0	U	NA		Yes
Benzene	85	181	1	< 0.5	U	< 0.5	U	NA		Yes
Carbon Tetrachloride	85	181	1	< 0.5	U	< 0.5	U	NA		Yes
Chlorobenzene	22,300	47,180	1	< 0.5	U	< 0.5	U	NA		Yes
Chloroform	1,708	3,615	1	< 0.5	U	< 0.5	U	NA		Yes
Ethylbenzene	26,954	57,025	1	< 0.5	U	< 0.5	U	NA		Yes
m,p-Xylenes	39.5	83.6	2	< 1.0	U	< 1.0	U	NA		Yes
Methylene Chloride	803	1,699	2	< 1.0	U	< 1.0	U	NA		Yes
o-Xylene	39.5	83.6	1	< 0.5	U	< 0.5	U	NA		Yes
Styrene	2,829	5,987	1	< 0.5	U	< 0.5	U	NA		Yes
Tetrachloroethene	85.4	180.7	1	< 0.5	U	< 0.5	U	NA		Yes
Toluene	1,980	4,189	1	< 0.5	U	< 0.5	U	NA		Yes
Trichloroethene	85	181	1	**1.9**		**2.5**		NA		Yes
Vinyl Chloride	34	72	1	< 0.5	U	< 0.5	U	NA		Yes

Table E.18-G - LHAAP-18/24

GWTP Quarterly Evaluation Report – 3rd Quarter 2018

Longhorn Army Ammunition Plant

	Sample Location	EFFLUENT - Biweekly		EFFLUENT - Monthly		INFLUENT - Monthly*		Does Concentration Meet Effluent Discharge Limits? (Yes/No)
	Sample Identification	LH18/24-SP650_072618		LH18/24-SP650_070618		LH18/24-SP140_070618		
	Lab Package	HS18071388		HS18070295		HS18070296		
	Sample Date	7/26/2018		7/6/2018		7/6/2028		
	Sample Type	GRAB		GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Table 2 of ROD							
	Daily Average Concentration	Daily Maximum Concentration	Reporting Limit	Result	DVQ	Result	DVQ	Result	DVQ	
ANIONS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		
Chloride	NA	NA	10	**659**		NA		NA		NA
Sulfate	NA	NA	10	**25.9**		NA		NA		NA
PERCHLORATE	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		
Perchlorate	278	589	4	NA		< 2.0	U	**15,000**		Yes
METALS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		
Hexavalent Chromium	0.058	0.124	0.010	NA		< 0.0100	U	< 0.0100	U	Yes
Barium	1	2	0.004	NA		**0.0943**		NA		Yes
Lead	0.0022	0.0046	0.002	NA		< 0.00100	U	NA		Yes
Selenium	0.0057	0.0120	0.002	NA		< 0.00200	U	< 0.00200	U	Yes
Silver	0.0014	0.0030	0.002	NA		< 0.00100	U	< 0.00100	U	Yes
SEMI-VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		
1,4-Dioxane**	NA	134.2	1	NA		**1.4**		NA		Yes

Notes:

µg/L - micrograms per liter

mg/L - milligrams per liter

DVQ - data validation qualifier

NA - not applicable or not analyzed

Grab samples are compared to the daily maximum and composite samples to the daily average.

U - not detected at limit of detection (presented); J - estimated concentration

*Influent sample not compared to discharge limits

** Calculated Effluent Limit

Table 8. Bi-Weekly GWTP Analytical Sampling Results for August 2018

Sample Location				EFFLUENT - Biweekly		EFFFLUENT - Monthly		INFLUENT - Monthly*		Does Concentration Meet Effluent Discharge Limits? (Yes/No)
Sample Identification				LH18/24-SP650_081518		LH18/24-SP650_083018		LH18/24-SP140_052418		
Lab Package				HS18080789		HS18081540		HS18081541		
Sample Date				8/15/2018		8/30/2018		8/30/2018		
Sample Type				GRAB		GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Table 2 of ROD									
	Daily Average Concentration	Daily Maximum Concentration	Detection Limit	Result	DVQ	Result	DVQ	Result	DVQ	
VOLATILES	µg/L	µg/L	µg/L	µg/L		µg/L		µg/L		
1,1,1-Trichloroethane	3,417	7,230	1	< 0.5	U	< 0.5	U	NA		Yes
1,1,2-Trichloroethane	102.5	216.9	1	< 0.5	U	< 0.5	U	NA		Yes
1,1-Dichloroethane	6,633	14,032	1	< 0.5	U	< 0.5	U	NA		Yes
1,1-Dichloroethene	119	253	1	< 0.5	U	< 0.5	U	NA		Yes
1,2-Dichloroethane	85	181	1	< 0.5	U	< 0.5	U	NA		Yes
1,2-Dichloropropane	NA	NA	1	< 0.5	U	< 0.5	U	NA		Yes
Acetone	1,132	2,395	2	**4.1**		< 1.0	U	NA		Yes
Benzene	85	181	1	< 0.5	U	< 0.5	U	NA		Yes
Carbon Tetrachloride	85	181	1	< 0.5	U	< 0.5	U	NA		Yes
Chlorobezene	22,300	47,180	1	< 0.5	U	< 0.5	U	NA		Yes
Chloroform	1,708	3,615	1	< 0.5	U	< 0.5	U	NA		Yes
Ethylbenzene	26,954	57,025	1	< 0.5	U	< 0.5	U	NA		Yes
m,p-Xylenes	39.5	83.6	2	< 1.0	U	< 1.0	U	NA		Yes
Methylene Chloride	803	1,699	2	< 1.0	U	< 1.0	U	NA		Yes
o-Xylene	39.5	83.6	1	< 0.5	U	< 0.5	U	NA		Yes
Styrene	2,829	5,987	1	< 0.5	U	< 0.5	U	NA		Yes
Tetrachloroethene	85.4	180.7	1	< 0.5	U	< 0.5	U	NA		Yes
Toluene	1,980	4,189	1	< 0.5	U	< 0.5	U	NA		Yes
Trichloroethene	85	181	1	< 0.5	U	< 0.5	U	NA		Yes
Vinyl Chloride	34	72	1	**2.0**		**1.4**		NA		Yes

Table E.18-H - LHAAP-18/24

GWTP Quarterly Evaluation Report – 3rd Quarter 2018

Longhorn Army Ammunition Plant

				Sample Location	EFFLUENT - Biweekly		EFFFLUENT - Monthly		INFLUENT - Monthly*		Does Concentration Meet Effluent Discharge Limits? (Yes/No)
				Sample Identification	LH18/24-SP650_081518		LH18/24-SP650_083018		LH18/24-SP140_052418		
				Lab Package	HS18080789		HS18081540		HS18081541		
				Sample Date	8/15/2018		8/30/2018		8/30/2018		
				Sample Type	GRAB		GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Table 2 of ROD										
	Daily Average Concentration	Daily Maximum Concentration	Detection Limit	Result	DVQ	Result	DVQ	Result	DVQ	
ANIONS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		
Chloride	NA	NA	10	**705**		NA		NA		NA
Sulfate	NA	NA	10	**23.8**		NA		NA		NA
PERCHLORATE	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		
Perchlorate	278	589	4	NA		< 2.0	U	**4,800**		Yes
METALS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		
Hexavalent Chromium	0.058	0.124	0.010	NA		< 0.0100	U	< 0.0100	U	Yes
Barium	1	2	0.004	NA		**0.137**		NA		Yes
Lead	0.0022	0.0046	0.002	NA		< 0.00100	U	NA		Yes
Selenium	0.0057	0.0120	0.002	NA		< 0.00200	U	< 0.00200	U	Yes
Silver	0.0014	0.0030	0.002	NA		< 0.00100	U	< 0.00100	U	Yes
SEMI-VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		
1,4-Dioxane**	NA	134.2	1	NA		**6.1**		NA		Yes

Notes:

µg/L - micrograms per liter
mg/L - milligrams per liter
U - non detect at limit of detection (presented); J - estimated concentration
DVQ - data validation qualifier
Grab samples are compared to the daily maximum and composite samples to the daily average.
NA - not applicable or not analyzed
*Influent sample not compared to discharge limits
* *Calculated Effluent Limit

Table 9. Bi-Weekly GWTP Analytical Sampling Results for September 2018

Sample Location				EFFLUENT - Monthly		INFLUENT - Monthly*		EFFLUENT - Biweekly		EFFLUENT - Biweekly		Does Concentration Meet Effluent Discharge Limits? (Yes/No)
Sample Identification				LH18/24-SP650_091318		LH18/24-SP140_091318		LH18/24-SP650_090618		LH18/24-SP650_091918		
Lab Package				HS18090654		HS18090658		HS18090257		HS18091007		
Sample Date				9/13/2018		9/13/2018		9/6/2018		9/19/2018		
Sample Type				GRAB		GRAB		GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Table 2 of ROD			Result	DVQ	Result	DVQ	Result	DVQ	Result	DVQ	
	Daily Average Concentration	Daily Maximum Concentration	Detection Limit									
VOLATILES	µg/L	µg/L	µg/L	µg/L		µg/L				µg/L		
1,1,1-Trichloroethane	3,417	7,230	1	< 0.5	U	NA		< 0.5	U	< 0.5	U	Yes
1,1,2-Trichloroethane	102.5	216.9	1	< 0.5	U	NA		< 0.5	U	< 0.5	U	Yes
1,1-Dichloroethane	6,633	14,032	1	< 0.5	U	NA		< 0.5	U	< 0.5	U	Yes
1,1-Dichloroethene	119	253	1	< 0.5	U	NA		< 0.5	U	< 0.5	U	Yes
1,2-Dichloroethane	85	181	1	< 0.5	U	NA		< 0.5	U	< 0.5	U	Yes
1,2-Dichloropropane	NA	NA	1	< 0.5	U	NA		< 0.5	U	< 0.5	U	Yes
Acetone	1,132	2,395	2	**270**		NA		3.2	UB	**180**		Yes
Benzene	85	181	1	< 0.5	U	NA		< 0.5	U	< 0.5	U	Yes
Carbon Tetrachloride	85	181	1	< 0.5	U	NA		< 0.5	U	< 0.5	U	Yes
Chlorobenzene	22,300	47,180	1	< 0.5	U	NA		< 0.5	U	< 0.5	U	Yes
Chloroform	1,708	3,615	1	< 0.5	U	NA		< 0.5	U	< 0.5	U	Yes
Ethylbenzene	26,954	57,025	1	< 0.5	U	NA		< 0.5	U	< 0.5	U	Yes
m,p-Xylenes	39.5	83.6	2	< 1.0	U	NA		< 1.0	U	< 1.0	U	Yes
Methylene Chloride	803	1,699	2	< 1.0	U	NA		< 1.0	U	< 1.0	U	Yes
o-Xylene	39.5	83.6	1	< 0.5	U	NA		< 0.5	U	< 0.5	U	Yes
Styrene	2,829	5,987	1	< 0.5	U	NA		< 0.5	U	< 0.5	U	Yes
Tetrachloroethene	85.4	180.7	1	< 0.5	U	NA		< 0.5	U	< 0.5	U	Yes
Toluene	1,980	4,189	1	< 0.5	U	NA		< 0.5	U	**0.73**	J	Yes
Trichloroethene	85	181	1	< 0.5	U	NA		**0.77**	J	< 0.5	U	Yes
Vinyl Chloride	34	72	1	**1.1**		NA		< 0.5	U	< 0.5	U	Yes

Table E.18-I - LHAAP-18/24

GWTP Quarterly Evaluation Report – 3RD Quarter 2018

Longhorn Army Ammunition Plant

			Sample Location	EFFLUENT - Monthly		INFLUENT - Monthly*		EFFLUENT - Biweekly		EFFLUENT - Biweekly		Does Concentration Meet Effluent Discharge Limits? (Yes/No)
			Sample Identification	LH18/24-SP650_091318		LH18/24-SP140_091318		LH18/24-SP650_090618		LH18/24-SP650_091918		
			Lab Package	HS18090654		HS18090658		HS18090257		HS18091007		
			Sample Date	9/13/2018		9/13/2018		9/6/2018		9/19/2018		
			Sample Type	GRAB		GRAB		GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Table 2 of ROD			Result	DVQ	Result	DVQ	Result	DVQ	Result	DVQ	
	Daily Average Concentration	Daily Maximum Concentration	Detection Limit									
ANIONS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		**mg/L**		
Chloride	NA	NA	10	NA		NA		**568**		**661**		NA
Sulfate	NA	NA	10	NA		NA		**15.6**		**65.6**		NA
PERCHLORATE	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		**µg/L**		
Perchlorate	278	589	4	< 20	U	**7,100**		NA		NA		Yes
METALS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		**mg/L**		
Hexavalent Chromium	0.058	0.124	0.010	**0.00700**	J	< 0.0500	U	NA		NA		Yes
Barium	1	2	0.004	**0.180**		NA		NA		NA		Yes
Lead	0.0022	0.0046	0.002	< 0.00100	U	NA		NA		NA		Yes
Selenium	0.0057	0.0120	0.002	< 0.00200	U	**0.00126**	J	NA		NA		Yes
Silver	0.0014	0.0030	0.002	< 0.00100	U	< 0.00100	U	NA		NA		Yes
SEMI-VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		**µg/L**		
1,4-Dioxane**	NA	134.2	1	**3**		NA		NA		NA		Yes

Notes:
µg/L - micrograms per liter
DVQ - data validation qualifier
mg/L - milligrams per liter
J - estimated concentration
U - not detected at limit of detection (presented)
NA - not applicable or not analyzed
Grab samples are compared to the daily maximum and composite samples to the daily average
*Influent sample not compared to discharge limits
** Calculated Effluent Limit

Table 10. Quarterly GWTP Analytical Sampling Results for 3rd Quarter 2018

				Sample Location	EFFLUENT*		INFLUENT		Does Concentration Meet Discharge Limits? (Yes/No)
				Sample Identification	LH18/24-SP650_092718		LH18/24-SP140_092718		
				Lab Package	HS18091521		HS18091519		
				Sample Date	9/27/2018		9/27/2018		
				Sample Type	GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Protocol			Result	DVQ	Result	DVQ	
	Daily Average Concentration	Daily Maximum Concentration	Reporting Limit					
VOLATILES	µg/L	µg/L	µg/L	µg/L		µg/L		
1,1,1-Trichloroethane	3,417	7,230	1	< 0.5	U	**1.6**		Yes
1,1,2-Trichloroethane	102.5	216.9	1	< 0.5	U	**3.2**		Yes
1,1-Dichloroethane	6,633	14,032	1	< 0.5	U	**14**		Yes
1,1-Dichloroethene	119	253	1	< 0.5	U	**76**		Yes
1,2-Dichloroethane	85	181	1	< 0.5	U	**48**		Yes
1,2-Dichloropropane	NA	NA	1	< 0.5	U	< 0.5	U	Yes
Acetone	1,132	2,395	2	< 1.0	U	< 2.0	U	Yes
Benzene	85	181	1	< 0.5	U	**2.9**		Yes
Carbon Tetrachloride	85	181	1	< 0.5	U	**3.1**		Yes
Chlorobenzene	22,300	47,180	1	< 0.5	U	< 0.5	U	Yes
Chloroform	1,708	3,615	1	< 0.5	U	**18**		Yes
Ethylbenzene	26,954	57,025	1	< 0.5	U	< 0.5	U	Yes
m,p-Xylenes	39.5	83.6	2	< 1.0	U	< 1.0	U	Yes
Methylene Chloride	803	1,699	2	< 1.0	U	**5,800**	J	Yes
o-Xylene	39.5	83.6	1	< 0.5	U	< 0.5	U	Yes
Styrene	2,829	5,987	1	< 0.5	U	< 0.5	U	Yes
Tetrachloroethene	85.4	180.7	1	< 0.5	U	**41**		Yes
Toluene	1,980	4,189	1	< 0.5	U	**2.7**		Yes
Trichloroethene	85	181	1	**0.82**	J	**6,500**	J	Yes
Vinyl Chloride	34	72	1	< 0.5	U	**170**		Yes

Table E.18-J - LHAAP-18/24

GWTP Quarterly Evaluation Report – 3rd Quarter 2018

Longhorn Army Ammunition Plant

			Sample Location	EFFLUENT*		INFLUENT		Does Concentration Meet Discharge Limits? (Yes/No)
			Sample Identification	LH18/24-SP650_092718		LH18/24-SP140_092718		
			Lab Package	HS18091521		HS18091519		
			Sample Date	9/27/2018		9/27/2018		
			Sample Type	GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Protocol			Result	DVQ	Result	DVQ	
	Daily Average Concentration	Daily Maximum Concentration	Reporting Limit					
ANIONS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		
Chloride	NA	NA	10	**572**		**564**		NA
Sulfate	NA	NA	10	**41.4**		**38.4**		NA
PERCHLORATE	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		
Perchlorate	278	589	4	< 2.0	U	**8,800**		Yes
METALS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		
Aluminum	0.777	1.644	0.0100	0.00919	UB	**0.0375**		Yes
Antimony	NA	NA	0.00200	< 0.00100	U	< 0.00100	U	NA
Arsenic	0.365	0.772	0.00200	**0.000643**	J	**0.00148**	J	Yes
Barium	1	2	0.00400	**0.149**		**0.901**		Yes
Beryllium	NA	NA	0.00200	< 0.00100	U	**0.000371**	J	NA
Cadmium	0.0016	0.0034	0.00200	< 0.00100	U	**0.000374**	J	Yes
Calcium	NA	NA	0.500	**12.9**		**52.1**		NA
Chromium	0.355	0.752	0.00400	**0.00120**	J	**0.00284**	J	Yes
Cobalt	5.433	11.495	0.00500	**0.000427**	J	**0.0137**		Yes
Iron	1.132	2.395	0.200	**0.0997**	J	**1.50**		Yes
Lead	0.0022	0.0046	0.00200	< 0.00100	U	< 0.00100	U	Yes
Magnesium	NA	NA	0.200	**32**		**41.9**		NA
Manganese	7.323	15.494	0.00500	**0.107**		**0.888**		Yes
Nickel	0.087	0.184	0.00200	**0.00353**		**0.0201**		Yes
Potassium	NA	NA	0.200	**1.57**		**1.34**		NA
Selenium	0.0057	0.012	0.00200	< 0.00200	U	< 0.00200	U	Yes
Silver	0.0014	0.003	0.00200	< 0.00100	U	< 0.00100	U	Yes

				Sample Location	EFFLUENT*		INFLUENT		Does Concentration Meet Discharge Limits? (Yes/No)
				Sample Identification	LH18/24-SP650_092718		LH18/24-SP140_092718		
				Lab Package	HS18091521		HS18091519		
				Sample Date	9/27/2018		9/27/2018		
				Sample Type	GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Protocol								
	Daily Average Concentration	Daily Maximum Concentration	Reporting Limit		Result	DVQ	Result	DVQ	
Sodium	NA	NA	1.00		**433**		**245**		NA
Thallium	NA	NA	0.00200		< 0.00100	U	< 0.00100	U	NA
Vanadium	1.698	3.592	0.00500		**0.000853**	J	**0.00145**	J	Yes
Zinc	0.146	0.31	0.00400		**0.0130**		**0.0317**		No
Mercury	NA	NA	0.000200		< 0.0000100	U	< 0.0000100	U	NA
1,4-DIOXANE	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		
1,4-Dioxane	NA	134.2	1		**7.5**		**5.7**		Yes
CHEMICAL OXYGEN DEMAND	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		
COD	NA	200	75		**47**		**10.0**	J	Yes
OIL AND GREASE (O&G)	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		
O&G	NA	15	2		**6.2**		< 1.00	U	Yes

Notes:
µg/L - micrograms per liter mg/L - milligrams per liter
DVQ - data validation qualifier J - Estimated concentration
NA - not applicable
Grab samples are compared to the daily maximum and composite samples to the daily average
U - non detect at the limit of detection (presented)
UB - considered non detect due to blank contamination
* only Effluent sample is compared to discharge limits

Table 7. Weekly Perchlorate Sample Results – 4th Quarter 2018

Sample Identification	Lab Package	Date Sampled	Sample Location	Effluent Discharge Point	Harrison Bayou Maximum Allowable Daily Discharge Perchlorate Concentration (µg/L)	INF Pond Discharge Criteria for Perchlorate (µg/L)	Reporting Limit	Influent Perchlorate (6850)	Effluent Perchlorate (6850)		Does Concentration Meet Discharge Limit? (Yes/No)	No Daily Maximum Concentration		
								Result (µg/L)	Result (µg/L)	DVQ		Ammonia as N (350.3) (mg/L)	Ortho-Phosphate (365.3) (mg/L)	Organic Carbon (415.1) (mg/L)
LH18/24-SP650_100418/BIX	HS18100278	10/4/2018	TK-650	INF Pond	589	17	4	NA	< 2.0	U	Yes	**11**	**2.36**	**7.7**
LH18/24-SP650_101018/AIX	HS18100546	10/10/2018	TK-650	Harrison Bayou	589	17	4	NA	< 2.0	U	Yes	**19**	**0.48**	**242 J**
LH18/24-SP650_101018/AIX (monthly)	HS18100544	10/10/2018	TK-650	Harrison Bayou	589	17	4	NA	< 2.0	U	Yes	--	--	--
LH18/24-SP140_101018 (monthly)	HS18100549	10/10/2018	TK-140	--	--	--	NA	**7,500**	NA		NA	--	--	--
LH18/24-SP650_101718/BIX	HS18100975	10/17/2018	TK-650	INF Pond	589	17	4	NA	< 2.0	U	Yes	**8.8**	**1.92**	**10.6**
LH18/24-SP650_102318/BIX	HS18101286	10/23/2018	TK-650	INF Pond	589	17	4	NA	< 2.0	U	Yes	**6**	**1.71**	**7.9**
LH18/24-SP650_103018/BIX	HS18101687	10/30/2018	TK-650	INF Pond	589	17	4	NA	< 2.0	U	Yes	**11**	**2.5**	**6.32**
LH18/24_SP650_113018/BIX	HS18120299	11/30/2018	TK-650	INF Pond	589	17	4	NA	< 2.0	U	Yes	**81 J**	**2.55 J**	**69.4**
LH18/24-SP650_120618/BIX	HS18120380	12/6/2018	TK-650	INF Pond	589	17	4	NA	**2.2**	J	Yes	**24**	**4.76**	**16**
LH18/24-SP650_120618_BIX (Monthly)	HS18120375	12/6/2018	TK-650	INF Pond	589	17	4	NA	**2.0**	J	Yes	--	--	--
LH18/24-SP140_120618 (Monthly)	HS18120379	12/6/2018	TK-140	--	--	--	NA	**4,900**	NA		NA	--	--	--
LH18/24-SP650_121218	HS18120731	12/12/2018	TK-650	INF Pond	589	17	4	NA	**2.6**	J	Yes	**14**	**2.23 J**	**24.7**
LH18/24-SP650_121818/BIX	HS18121078	12/18/2018	TK-650	INF Pond	589	17	4	NA	< 2.0	U	Yes	**7.9**	**1.53**	**12.2**
LH18/24-SP650_121818_BIX (quarterly)	HS18120194	12/18/2018	TK-650	INF Pond	589	17	4	NA	< 2.0	U	Yes	--	--	--
LH18/24-SP140_121818 (quarterly)	HS18120193	12/18/2018	TK-140	--	--	--	NA	**5,700**	NA			--	--	--

Notes: Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level (PCL)
SP140 samples are influent samples.
µg/L - micrograms per liter, mg/L – milligrams per liter, NA – not applicable, AIX – after ion exchange, BIX – before ion exchange
DVQ - data validation qualifier
J - Estimated concentration between the detection limit and limit of quantitation and/or due to quality control discrepancies
U - non detect and reported to the limit of detection

Table E.18-L -LHAAP-18/24

Table 8. Bi-Weekly GWTP Sampling Results for October 2018

Sample Location				EFFLUENT - Biweekly		EFFLUENT - Biweekly		EFFLUENT - Biweekly		EFFLUENT - Monthly		INFLUENT - Monthly*		Does Concentration Meet Effluent Discharge Limits? (Yes/No)
Sample Identification				LH18/24-SP650_100418		LH18/24-SP650_101718		LH18/24-SP650_103018		LH18/24-SP650_101018/AIX+		LH18/24-SP140_101018		
Lab Package				HS18100281		HS18100977		HS18101733		HS18100544		HS18100549		
Sample Date				10/4/2018		10/17/2018		10/30/2018		10/10/2018		10/10/2018		
Sample Type				GRAB		GRAB		GRAB		GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Table 2 of ROD			Result	DVQ	Result	DVQ	Result	DVQ	Result	DVQ	Result	DVQ	
	Daily Average Concentration	Daily Maximum Concentration	Reporting Limit											
VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**						**µg/L**		**µg/L**		
1,1,1-Trichloroethane	3,417	7,230	1	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	NA		Yes
1,1,2-Trichloroethane	102.5	216.9	1	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	NA		Yes
1,1-Dichloroethane	6,633	14,032	1	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	NA		Yes
1,1-Dichloroethene	119	253	1	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	NA		Yes
1,2-Dichloroethane	85	181	1	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	NA		Yes
1,2-Dichloropropane	NA	NA	1	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	NA		Yes
Acetone	1,132	2,395	2	< 1.0	U	< 1.0	U	< 1.0	U	< 1.0	U	NA		Yes
Benzene	85	181	1	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	NA		Yes
Carbon Tetrachloride	85	181	1	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	NA		Yes
Chlorobenzene	22,300	47,180	1	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	NA		Yes
Chloroform	1,708	3,615	1	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	NA		Yes
Ethylbenzene	26,954	57,025	1	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	NA		Yes
m,p-Xylenes	39.5	83.6	2	< 1.0	U	< 1.0	U	< 1.0	U	< 1.0	U	NA		Yes
Methylene Chloride	803	1,699	2	< 1.0	U	< 1.0	U	< 1.0	U	< 1.0	U	NA		Yes
o-Xylene	39.5	83.6	1	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	NA		Yes
Styrene	2,829	5,987	1	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	NA		Yes
Tetrachloroethene	85.4	180.7	1	< 1.0	U	< 1.0	U	< 1.0	U	< 1.0	U	NA		Yes
Toluene	1,980	4,189	1	< 0.5	U	< 0.5	U	< 0.5	U	**0.68**	J	NA		Yes
Trichloroethene	85	181	1	**1.4**		< 0.5	U	< 0.5	U	< 0.5	U	NA		Yes
Vinyl Chloride	34	72	1	< 0.5	U	**1.7**		< 0.5	U	< 0.5	U	NA		Yes

Table E.18-L -LHAAP-18/24

	Effluent Limitation for Discharge (µg/L) per Table 2 of ROD			Sample Location		EFFLUENT - Biweekly		EFFLUENT - Biweekly		EFFLUENT - Biweekly		EFFLUENT - Monthly		INFLUENT - Monthly*		Does Concentration Meet Effluent Discharge Limits? (Yes/No)
				Sample Identification		LH18/24-SP650_100418		LH18/24-SP650_101718		LH18/24-SP650_103018		LH18/24-SP650_101018/AIX+		LH18/24-SP140_101018		
				Lab Package		HS18100281		HS18100977		HS18101733		HS18100544		HS18100549		
				Sample Date		10/4/2018		10/17/2018		10/30/2018		10/10/2018		10/10/2018		
				Sample Type		GRAB		GRAB		GRAB		GRAB		GRAB		
	Daily Average Concentration	Daily Maximum Concentration	Reporting Limit	Result	DVQ	Result	DVQ	Result	DVQ	Result	DVQ	Result	DVQ	Result	DVQ	
ANIONS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		**mg/L**		**mg/L**		**mg/L**		
Chloride	NA	NA	10	**518**		**496**		**524**		NA		NA		NA		NA
Sulfate	NA	NA	10	**79.3**		**34.6**		**124**		NA		NA		NA		NA
PERCHLORATE	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		**µg/L**		**µg/L**		**µg/L**		
Perchlorate	278	589	4	NA		NA		NA		< 2.0	U	**7,500**				Yes
METALS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		**mg/L**		**mg/L**		**mg/L**		
Hexavalent Chromium	0.058	0.124	0.010	NA		NA		NA		< 0.0100	U	< 0.0100	U			Yes
Barium	1	2	0.004	NA		NA		NA		**0.174**		NA				Yes
Lead	0.0022	0.0046	0.002	NA		NA		NA		< 0.00100	U	NA				Yes
Selenium	0.0057	0.0120	0.002	NA		NA		NA		< 0.00200	U	< 0.00200	U			Yes
Silver	0.0014	0.0030	0.002	NA		NA		NA		< 0.00100	U	< 0.00100	U			Yes
SEMI-VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		**µg/L**		**µg/L**		**µg/L**		
1,4-Dioxane**	NA	134.2	1	NA		NA		NA		NA		**3.5**	J	NA		Yes

Notes:
µg/L - micrograms per liter, mg/L – milligrams per liter, NA – not applicable or not analyzed, DVQ – data validation qualifier
Grab samples are compared to the daily maximum and composite samples to the daily average.
U - not detected and reported to the limit of detection
J - estimated concentration and/or due to quality control discrepancies
*Influent sample not compared to discharge limits
AIX - after ion exchange vessel
** Calculated Effluent Limit
+ Perchlorate sample designated by AIX

Table E.18-M -LHAAP-18/24

Table 9. Bi-Weekly GWTP Sampling Results for December 2018

Sample Location				EFFLUENT - Monthly		INFLUENT - Monthly*		EFFLUENT - Biweekly		Does Concentration Meet Effluent Discharge Limits? (Yes/No)
Sample Identification				LH18/24-SP650_120618/BIX+		LH18/24-SP140_120618		LH18/24_SP650_121218		
Lab Package				HS18120375		HS18120379		HS18120734		
Sample Date				12/6/2018		12/6/2018		12/12/2018		
Sample Type				GRAB		GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Table 2 of ROD			Result	DVQ	Result	DVQ	Result	DVQ	
	Daily Average Concentration	Daily Maximum Concentration	Detection Limit							
VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**				
1,1,1-Trichloroethane	3,417	7,230	1	< 0.5	U	NA		< 0.5	U	Yes
1,1,2-Trichloroethane	102.5	216.9	1	< 0.5	U	NA		< 0.5	U	Yes
1,1-Dichloroethane	6,633	14,032	1	< 0.5	U	NA		< 0.5	U	Yes
1,1-Dichloroethene	119	253	1	< 0.5	U	NA		< 0.5	U	Yes
1,2-Dichloroethane	85	181	1	< 0.5	U	NA		< 0.5	U	Yes
1,2-Dichloropropane	NA	NA	1	< 0.5	U	NA		< 0.5	U	Yes
Acetone	1,132	2,395	2	< 1.0	U	NA		3.2	U	Yes
Benzene	85	181	1	< 0.5	U	NA		< 0.5	U	Yes
Carbon Tetrachloride	85	181	1	< 0.5	U	NA		< 0.5	U	Yes
Chlorobenzene	22,300	47,180	1	< 0.5	U	NA		< 0.5	U	Yes
Chloroform	1,708	3,615	1	< 0.5	U	NA		< 0.5	U	Yes
Ethylbenzene	26,954	57,025	1	< 0.5	U	NA		< 0.5	U	Yes
m,p-Xylenes	39.5	83.6	2	< 1.0	U	NA		< 1.0	U	Yes
Methylene Chloride	803	1,699	2	< 1.0	U	NA		< 1.0	U	Yes
o-Xylene	39.5	83.6	1	< 0.5	U	NA		< 0.5	U	Yes
Styrene	2,829	5,987	1	< 0.5	U	NA		< 0.5	U	Yes
Tetrachloroethene	85.4	180.7	1	< 0.5	U	NA		< 0.5	U	Yes
Toluene	1,980	4,189	1	< 0.5	U	NA		< 0.5	U	Yes
Trichloroethene	85	181	1	**0.89**	J	NA		**0.88**	J	Yes
Vinyl Chloride	34	72	1	< 0.5	U	NA		< 0.5	U	Yes
ANIONS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		
Chloride	NA	NA	10	NA		NA		**387**		NA
Sulfate	NA	NA	10	NA		NA		**18.4**		NA
PERCHLORATE	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		
Perchlorate	278	589	4	**2**	J	**4,900**		NA		Yes

Table E.18-M -LHAAP-18/24

			Sample Location	EFFLUENT - Monthly		INFLUENT - Monthly*		EFFLUENT - Biweekly		Does Concentration Meet Effluent Discharge Limits? (Yes/No)
			Sample Identification	LH18/24-SP650_120618/BIX+		LH18/24-SP140_120618		LH18/24_SP650_121218		
			Lab Package	HS18120375		HS18120379		HS18120734		
			Sample Date	12/6/2018		12/6/2018		12/12/2018		
			Sample Type	GRAB		GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Table 2 of ROD			Result	DVQ	Result	DVQ	Result	DVQ	
	Daily Average Concentration	Daily Maximum Concentration	Detection Limit							
METALS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		
Hexavalent Chromium	0.058	0.124	0.010	< 0.0100	U	< 0.0100	U	NA		Yes
Barium	1	2	0.004	**0.227**		NA		NA		Yes
Lead	0.0022	0.0046	0.002	< 0.00100	U	NA		NA		Yes
Selenium	0.0057	0.0120	0.002	< 0.00200	U	< 0.00200	U	NA		Yes
Silver	0.0014	0.0030	0.002	< 0.00100	U	< 0.00100	U	NA		Yes
SEMI-VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		
1,4-Dioxane**	NA	134.2	1	**3.4**		NA		NA		Yes

Notes:
µg/L - micrograms per liter
DVQ - data validation qualifier
GWTP - Groundwater Treatment Plant
U - Non detect reported to the limit of detection
mg/L - milligrams per liter
+ Perchlorate sample designated by BIX
J - estimated concentration between the detection limit and limit of quantitation and/or due to quality control discrepancy
NA - not applicable or not analyzed
Grab samples are compared to the daily maximum and composite samples to the daily average
*Influent sample not compared to discharge limits
** Calculated Effluent Limit
BIX - before ion exchange vessel

Table 10. Quarterly GWTP Analytical Sampling Results for 4th Quarter 2018

	Effluent Limitation for Discharge (µg/L) per Protocol			EFFLUENT*		INFLUENT		Does Concentration Meet Discharge Limits? (Yes/No)
Sample Location				LH18/24-SP650_121818		LH18/24-SP140_121818		
Sample Identification				HS18120194		HS18120193		
Lab Package				12/18/2018		12/18/2018		
Sample Date				GRAB		GRAB		
Sample Type	Daily Average Concentration	Daily Maximum Concentration	Reporting Limit	Result	DVQ	Result	DVQ	
VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		
1,1,1-Trichloroethane	3,417	7,230	1	< 0.5	U	< 2.5	U	Yes
1,1,2-Trichloroethane	102.5	216.9	1	< 0.5	U	< 2.5	U	Yes
1,1-Dichloroethane	6,633	14,032	1	< 0.5	U	**6.7**		Yes
1,1-Dichloroethene	119	253	1	< 0.5	U	< 2.5	U	Yes
1,2-Dichloroethane	85	181	1	< 0.5	U	**29**		Yes
1,2-Dichloropropane	NA	NA	1	< 0.5	U	< 2.5	U	Yes
Acetone	1,132	2,395	2	< 1.0	U	< 10	U	Yes
Benzene	85	181	1	< 0.5	U	< 2.5	U	Yes
Carbon Tetrachloride	85	181	1	< 0.5	U	< 2.5	U	Yes
Chlorobenzene	22,300	47,180	1	< 0.5	U	< 2.5	U	Yes
Chloroform	1,708	3,615	1	< 0.5	U	**6.9**		Yes
Ethylbenzene	26,954	57,025	1	< 0.5	U	< 2.5	U	Yes
m,p-Xylenes	39.5	83.6	2	< 1.0	U	< 5.0	U	Yes
Methylene Chloride	803	1,699	2	< 1.0	U	**9.3**	J	Yes
o-Xylene	39.5	83.6	1	< 0.5	U	< 2.5	U	Yes
Styrene	2,829	5,987	1	< 0.5	U	< 2.5	U	Yes
Tetrachloroethene	85.4	180.7	1	< 0.5	U	**6.8**		Yes
Toluene	1,980	4,189	1	< 0.5	U	< 2.5	U	Yes
Trichloroethene	85	181	1	**1.2**		**2,200**		Yes
Vinyl Chloride	34	72	1	< 0.5	U	**910**		Yes
ANIONS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		
Chloride	NA	NA	10	**404**		**408**		NA
Sulfate	NA	NA	10	**30.8**		**233**		NA
PERCHLORATE	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		
Perchlorate	278	589	4	< 2.0	U	**5,700**		Yes
METALS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		
Aluminum	0.777	1.644	0.0100	**0.0279**		**0.0516**		Yes
Antimony	NA	NA	0.00200	**0.000591**	J	**0.000654**	J	NA
Arsenic	0.365	0.772	0.00200	**0.000557**	J	**0.00273**		Yes
Barium	1	2	0.00400	**0.245**		**0.231**		Yes
Beryllium	NA	NA	0.00200	< 0.00100	U	0.00100	U	NA
Cadmium	0.0016	0.0034	0.00200	< 0.00100	U	0.00100	U	Yes
Calcium	NA	NA	0.500	**26.8**		**72.6**		NA

Table E.18-N - LHAAP-18/24

	Effluent Limitation for Discharge (µg/L) per Protocol			Sample Location	EFFLUENT*		INFLUENT		Does Concentration Meet Discharge Limits? (Yes/No)
				Sample Identification	LH18/24-SP650_121818		LH18/24-SP140_121818		
				Lab Package	HS18120194		HS18120193		
				Sample Date	12/18/2018		12/18/2018		
				Sample Type	GRAB		GRAB		
	Daily Average Concentration	Daily Maximum Concentration	Reporting Limit		Result	DVQ	Result	DVQ	
Chromium	0.355	0.752	0.00400		**0.00182**	J	**0.00681**		Yes
Cobalt	5.433	11.495	0.00500		**0.000808**	J	**0.00650**		Yes
Iron	1.132	2.395	0.200		**0.208**		**3.02**		Yes
Lead	0.0022	0.0046	0.00200		< 0.00100	U	< 0.00100	U	Yes
Magnesium	NA	NA	0.200		**23.2**		**55.4**		NA
Manganese	7.323	15.494	0.00500		**0.163**		**0.438**		Yes
Nickel	0.087	0.184	0.00200		**0.00209**		**0.0130**		Yes
Potassium	NA	NA	0.200		**1.48**		**1.74**		NA
Selenium	0.0057	0.012	0.00200		< 0.00100	U	< 0.00100	U	Yes
Silver	0.0014	0.003	0.00200		< 0.00100	U	< 0.00100	U	Yes
Sodium	NA	NA	1.00		**262**		**447**		NA
Thallium	NA	NA	0.00200		< 0.00100	U	< 0.00100	U	NA
Vanadium	1.698	3.592	0.00500		**0.00128**	J	**0.00123**	J	Yes
Zinc	0.146	0.31	0.00400		**0.0249**		**0.108**		Yes
Mercury	NA	NA	0.000200		< 0.000100	U	< 0.000100	U	NA
1,4-DIOXANE	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		
1,4-Dioxane	NA	134.2	1		**2.0**		**3.6**		Yes
CHEMICAL OXYGEN DEMAND (COD)	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		
COD	NA	200	75		**45**		**8.0**	J	Yes
OIL AND GREASE (O&G)	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		
O&G	NA	15	2		< 1.0	U	< 1.0	U	Yes

Notes:
µg/L - micrograms per liter
DVQ - data validation qualifier
Grab samples are compared to the daily maximum and composite samples to the daily average
* only Effluent sample is compared to discharge limits
J - Estimated concentration between the detection limit and limit of quantitation and/or due to quality control discrepancy
U - non detect and reported to the limit of detection
mg/L - milligrams per liter
NA - not applicable
GWTP - Groundwater Treatment Plant

Table 7. Weekly Perchlorate Sample Results

Sample Identification	Lab Package	Date Sampled	Sample Location	Effluent Discharge Point	Harrison Bayou Maximum Allowable Daily Discharge Perchlorate Concentration (µg/L)	INF Pond Discharge Criteria for Perchlorate (µg/L)	Reporting Limit	Influent Perchlorate (6850)	Effluent Perchlorate (6850)		Does Concentration Meet Discharge Limit? (Yes/No)	No Daily Maximum Concentration		
								Result (µg/L)	Result (µg/L)	DVQ		Ammonia as N (350.3) (mg/L)	Ortho-Phosphate (365.3) (mg/L)	Organic Carbon (415.1) (mg/L)
LH18/24-SP650_040419/BIX	HS19040313	4/4/2019	TK-650	INF Pond	589	17	4	NA	< 2.0	U	Yes	**17**	**3.63**	**2.23**
LH18/24-SP650_041019/BIX	HS19040653	4/10/2019	TK-650	INF Pond	589	17	4	NA	< 2.0	U	Yes	**15**	**3.92**	**2.37**
LH18/24-SP650_041719/BIX	HS19041072	4/17/2019	TK-650	INF Pond	589	17	4	NA	< 2.0	U	Yes	**17**	**4.37**	**1.89**
LH18/24-SP650_041019/BIX (monthly)	HS19040652	4/10/2019	TK-650	INF Pond	589	17	4	NA	< 2.0	U	Yes	--	--	--
LH18/24-SP140_041019 (monthly)	HS19040654	4/10/2019	TK-140	--	--	--	NA	**5,600**	NA		NA	--	--	--
LH18/24-SP650_050119/BIX	HS19050126	5/1/2019	TK-650	INF Pond	589	17	4	NA	**1.1**	J	Yes	**24**	**6.2**	**1.51**
LH18/24-SP650_050719/BIX	HS19050397	5/7/2019	TK-650	INF Pond	589	17	4	NA	< 2.0	U	Yes	**21**	**4.95**	**1.46**
LH18/24-SP650_050719 (monthly)	HS19050398	5/7/2019	TK-650	INF Pond	589	17	4	NA	< 2.0	U	Yes	--	--	--
LH18/24-SP140_050719 (monthly)	HS19050401	5/7/2019	TK-140	--	--	--	NA	**4,200**	NA		NA	--	--	--
LH18/24-SP650_051419/BIX	HS19050886	5/14/2019	TK-650	INF Pond	589	17	4	NA	< 2.0	U	NA	**14**	**4.22**	**1.64**
LH18/24-SP650_052119/BIX	HS19051289	5/21/2019	TK-650	INF Pond	589	17	4	NA	< 2.0	U	Yes	**11**	**2.47**	**1.65**
LH18/24-SP650_052919/BIX	HS19051856	5/29/2019	TK-650	INF Pond	589	17	4	NA	< 2.0	U	Yes	**10**	**2.21**	**2.12**
LH18/24-SP650_052919/BIX (quarterly)	HS19051859	5/29/2019	TK-650	INF Pond	589	17	4	NA	< 2.0	U	Yes	--	--	--
LH18/24-SP140_052919 (quarterly)	HS19051863	5/29/2019	TK-140	--	--	--	NA	**4,900**	NA		NA	--	--	--
LH18/24-SP650_060419/BIX	HS19060172	6/4/2019	TK-650	INF Pond	589	17	4	NA	< 2.0	U	Yes	**7.5**	**2.11**	**2.21**
LH18/24-SP650_060419/BIX (monthly)	HS19060168	6/4/2019	TK-650	INF Pond	589	17	4	NA	< 2.0	U	Yes	--	--	--
LH18/24-SP140_060419 (monthly)	HS19060174	6/4/2019	TK-140	--	--	--	NA	**6,800**	NA		NA	--	--	--
LH18/24-SP650_061219/BIX	HS19060672	6/12/2019	TK-650	INF Pond	589	17	4	NA	< 2.0	U	Yes	**10**	**2.37**	**2.04**

Notes:

Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level (PCL)

SP140 samples are influent samples.

µg/L - micrograms per liter

DVQ - data validation qualifier

J - Estimated concentration between the detection limit and limit of quantitation and/or due to quality control discrepancies

NA - not applicable

U - non detect and reported to the limit of detection

BIX - before ion exchange

mg/L - milligrams per liter

Table 8. Bi-Weekly GWTP Analytical Sampling Results for April 2019

Sample Location				EFFLUENT - Biweekly		EFFLUENT - Monthly		INFLUENT - Monthly*		EFFLUENT - Biweekly		Does Concentration Meet Effluent Discharge Limits? (Yes/No)
Sample Identification				LH18/24-SP650_040419		LH18/24-SP650_041019		LH18/24-SP140_041019		LH18/24-SP650_041719		
Lab Package				HS19040319		HS19040652		HS19040654		HS19041158		
Sample Date				4/4/2019		4/10/2019		4/10/2019		4/17/2019		
Sample Type				GRAB		GRAB		GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Table 2 of ROD			Result	DVQ	Result	DVQ	Result	DVQ	Result	DVQ	
	Daily Average Concentration	Daily Maximum Concentration	Reporting Limit									
VOLATILES	**µg/L**	**µg/L**	**µg/L**			**µg/L**		**µg/L**		**µg/L**		
1,1,1-Trichloroethane	3,417	7,230	1	< 0.5	U	< 0.5	U	NA		< 0.5	U	Yes
1,1,2-Trichloroethane	102.5	216.9	1	< 0.5	U	< 0.5	U	NA		< 0.5	U	Yes
1,1-Dichloroethane	6,633	14,032	1	< 0.5	U	< 0.5	U	NA		< 0.5	UJ	Yes
1,1-Dichloroethene	119	253	1	< 0.5	U	< 0.5	U	NA		< 0.5	U	Yes
1,2-Dichloroethane	85	181	1	**0.58**	J	**.67**	J	NA		< 0.5	U	Yes
1,2-Dichloropropane	NA	NA	1	< 0.5	U	< 0.5	U	NA		< 0.5	U	Yes
Acetone	1,132	2,395	2	< 1.0	U	< 1.0	U	NA		< 1.0	U	Yes
Benzene	85	181	1	< 0.5	U	< 0.5	U	NA		< 0.5	UJ	Yes
Carbon Tetrachloride	85	181	1	< 0.5	UJ	< 0.5	UJ	NA		< 0.5	U	Yes
Chlorobenzene	22,300	47,180	1	< 0.5	U	< 0.5	U	NA		< 0.5	UJ	Yes
Chloroform	1,708	3,615	1	< 0.5	U	< 0.5	U	NA		< 0.5	UJ	Yes
Ethylbenzene	26,954	57,025	1	< 0.5	U	< 0.5	U	NA		< 0.5	U	Yes
m,p-Xylenes	39.5	83.6	2	< 1.0	U	< 1.0	U	NA		< 1.0	U	Yes
Methylene Chloride	803	1,699	2	< 1.0	U	< 1.0	U	NA		< 1.0	UJ	Yes
o-Xylene	39.5	83.6	1	< 0.5	U	< 0.5	U	NA		< 0.5	U	Yes
Styrene	2,829	5,987	1	< 0.5	U	< 0.5	U	NA		**37**	J	Yes
Tetrachloroethene	85.4	180.7	1	< 0.5	UJ	< 0.5	UJ	NA		< 0.5	UJ	Yes
Toluene	1,980	4,189	1	< 0.5	U	< 0.5	U	NA		**1.8**	J	Yes
Trichloroethene	85	181	1	**0.78**	J	**.82**	J	NA		< 0.5	U	Yes
Vinyl Chloride	34	72	1	< 0.5	U	< 0.5	U	NA		< 0.5	U	Yes
ANIONS	**mg/L**	**mg/L**	**mg/L**			**mg/L**		**mg/L**		**mg/L**		
Chloride	NA	NA	10	**377**	J	NA		NA		**344**		NA
Sulfate	NA	NA	10	**29.6**		NA		NA		**25.6**		NA
PERCHLORATE	**µg/L**	**µg/L**	**µg/L**			**µg/L**		**µg/L**		**µg/L**		
Perchlorate	278	589	4	NA		< 2.0	U	**5,600**		NA		Yes
METALS	**mg/L**	**mg/L**	**mg/L**			**mg/L**		**mg/L**		**mg/L**		
Hexavalent Chromium	0.058	0.124	0.010	NA		< 0.0100	U	< 0.0100	U	NA		Yes
Barium	1	2	0.004	NA		**.154**		NA		NA		Yes
Lead	0.0022	0.0046	0.002	NA		< 0.00100	U	NA		NA		Yes
Selenium	0.0057	0.0120	0.002	NA		< 0.00250	U	< 0.00250	U	NA		Yes
Silver	0.0014	0.0030	0.002	A		< 0.000500	U	< 0.000500	U	NA		Yes
SEMI-VOLATILES	**µg/L**	**µg/L**	**µg/L**			**µg/L**		**µg/L**		**µg/L**		
1,4-Dioxane**	NA	134.2	1	NA		**7.9**		NA		NA		Yes

Notes:

µg/L - micrograms per liter
mg/L - milligrams per liter
DVQ - data validation qualifier
NA - not applicable or not analyzed
GWTP - Groundwater Treatment Plant
ROD - Record of Decision

Grab samples are compared to the daily maximum and composite samples to the daily average.

U - not detected and reported to the limit of detection
J - estimated concentration and/or due to QC discrepancies

UJ - estimated non detected due to QC issue(s)

*Influent sample not compared to discharge limits

** Calculated Effluent Limit

Table 9. Bi-Weekly GWTP Analytical Sampling Results for May 2019

			Sample Location	EFFLUENT - Biweekly		EFFLUENT - Monthly		INFLUENT - Monthly*		EFFLUENT - Biweekly		EFFLUENT - Biweekly		Does Concentration Meet Effluent Discharge Limits? (Yes/No)
			Sample Identification	LH18/24-SP650_050119		LH18/24-SP650_050719		LH18/24-SP140_050719		LH 18/24-SP650_051419		LH18/24-SP650_052919		
			Lab Package	HS19050138		HS19050398		HS19050401		HS19050920		HS19051866		
			Sample Date	5/1/2019		5/7/2019		5/7/2019		5/14/2019		5/29/2019		
			Sample Type	GRAB		GRAB		GRAB		GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Table 2 of ROD													
	Daily Average Concentration	Daily Maximum Concentration	Detection Limit	Result	DVQ	Result	DVQ	Result	DVQ	Result	DVQ	Result	DVQ	
VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		**µg/L**		**µg/L**		
1,1,1-Trichloroethane	3,417	7,230	1	< 0.5	U	< 0.5	U	NA		< 0.5	U	< 0.5	U	Yes
1,1,2-Trichloroethane	102.5	216.9	1	< 0.5	U	< 0.5	U	NA		< 0.5	U	< 0.5	U	Yes
1,1-Dichloroethane	6,633	14,032	1	< 0.5	U	< 0.5	U	NA		< 0.5	U	< 0.5	U	Yes
1,1-Dichloroethene	119	253	1	< 0.5	U	< 0.5	U	NA		< 0.5	U	< 0.5	U	Yes
1,2-Dichloroethane	85	181	1	**0.51**	J	**0.51**	J	NA		< 0.5	U	< 0.5	U	Yes
1,2-Dichloropropane	NA	NA	1	< 0.5	U	< 0.5	U	NA		< 0.5	U	< 0.5	U	Yes
Acetone	1,132	2,395	2	< 1.0	U	< 1.0	U	NA		< 1.0	U	< 1.0	U	Yes
Benzene	85	181	1	< 0.5	U	< 0.5	U	NA		< 0.5	U	< 0.5	U	Yes
Carbon Tetrachloride	85	181	1	< 0.5	U	< 0.5	U	NA		< 0.5	U	< 0.5	U	Yes
Chlorobezene	22,300	47,180	1	< 0.5	U	< 0.5	U	NA		< 0.5	U	< 0.5	U	Yes
Chloroform	1,708	3,615	1	< 0.5	U	< 0.5	U	NA		< 0.5	U	< 0.5	U	Yes
Ethylbenzene	26,954	57,025	1	< 0.5	U	< 0.5	U	NA		< 0.5	U	< 0.5	U	Yes
m,p-Xylenes	39.5	83.6	2	< 1.0	U	< 1.0	U	NA		< 1.0	U	< 1.0	U	Yes
Methylene Chloride	803	1,699	2	< 1.0	U	< 1.0	U	NA		< 1.0	U	< 1.0	U	Yes
o-Xylene	39.5	83.6	1	< 0.5	U	< 0.5	U	NA		< 0.5	U	< 0.5	U	Yes
Styrene	2,829	5,987	1	< 0.5	U	< 0.5	U	NA		< 0.5	U	< 0.5	U	Yes
Tetrachloroethene	85.4	180.7	1	< 0.5	U	< 0.5	U	NA		< 0.5	U	< 0.5	U	Yes
Toluene	1,980	4,189	1	< 0.5	U	< 0.5	U	NA		< 0.5	U	< 0.5	U	Yes
Trichloroethene	85	181	1	**0.65**	J	**0.65**	J	NA		**0.56**	J	**0.85**	J	Yes
Vinyl Chloride	34	72	1	< 0.5	U	< 0.5	U	NA		< 0.5	U	< 0.5	U	Yes
ANIONS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		**mg/L**		**mg/L**		
Chloride	NA	NA	10	**30**		NA		NA		**31**		**5**		NA
Sulfate	NA	NA	10	**15**		NA		NA		**24.1**		**34**		NA
PERCHLORATE	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		**µg/L**		**µg/L**		
Perchlorate	278	589	4	NA		< 2.0	U	**4,200**		NA		NA		Yes
METALS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		**mg/L**		**mg/L**		
Hexavalent Chromium	0.058	0.124	0.010	NA		< 0.0100	U	< 0.0100	U	NA		NA		Yes
Barium	1	2	0.004	NA		**0.136**		NA		NA		NA		Yes
Lead	0.0022	0.0046	0.002	NA		< 0.00100	U	NA		NA		NA		Yes
Selenium	0.0057	0.0120	0.002	NA		< 0.00250	U	< 0.00250	U	NA		NA		Yes
Silver	0.0014	0.0030	0.002	NA		< 0.000500	U	< 0.000500	U	NA		NA		Yes
SEMI-VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		**µg/L**		**µg/L**		
1,4-Dioxane**	NA	134.2	1	NA		**21**		NA		NA		NA		Yes

Notes:

µg/L - micrograms per liter
mg/L - milligrams per liter
DVQ - data validation qualifier
ROD - Record of Decision
GWTP - Groundwater Treatment Plant
*Influent sample not compared to discharge limits
NA - not applicable or not analyzed
U - not detected and reported to the limit of detection
Grab samples are compared to the daily maximum and composite samples to the daily average.
** Calculated Effluent Limit
J - estimated concentration and/or due to QC discrepancies

Table 10. Bi-Weekly Analytical GWTP Sampling Results for June 2019

			Sample Location	EFFLUENT - Monthly		INFLUENT - Monthly*		EFFLUENT - Biweekly		Does Concentration Meet Effluent Discharge Limits? (Yes/No)
			Sample Identification	LH18/24-SP650_060419		LH18/24-SP140_060419		LH18/24-SP650_061219		
			Lab Package	HS19060168		HS19060174		HS19060699		
			Sample Date	6/4/2019		6/4/2019		6/12/2019		
			Sample Type	GRAB		GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Table 2 of ROD			Result	DVQ	Result	DVQ	Result	DVQ	
	Daily Average Concentration	Daily Maximum Concentration	Detection Limit							
VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**						
1,1,1-Trichloroethane	3,417	7,230	1	< 0.5	U	NA		< 0.5	U	Yes
1,1,2-Trichloroethane	102.5	216.9	1	< 0.5	U	NA		< 0.5	U	Yes
1,1-Dichloroethane	6,633	14,032	1	< 0.5	U	NA		< 0.5	U	Yes
1,1-Dichloroethene	119	253	1	< 0.5	U	NA		< 0.5	U	Yes
1,2-Dichloroethane	85	181	1	< 0.5	U	NA		**0.46**	J	Yes
1,2-Dichloropropane	NA	NA	1	< 0.5	U	NA		< 0.5	U	Yes
Acetone	1,132	2,395	2	< 1.0	U	NA		< 1.0	UJ	Yes
Benzene	85	181	1	< 0.5	U	NA		< 0.5	U	Yes
Carbon Tetrachloride	85	181	1	< 0.5	U	NA		< 0.5	U	Yes
Chlorobenzene	22,300	47,180	1	< 0.5	U	NA		< 0.5	U	Yes
Chloroform	1,708	3,615	1	< 0.5	U	NA		< 0.5	U	Yes
Ethylbenzene	26,954	57,025	1	< 0.5	U	NA		< 0.5	U	Yes
m,p-Xylenes	39.5	83.6	2	< 1.0	U	NA		< 1.0	U	Yes
Methylene Chloride	803	1,699	2	< 0.5	U	NA		< 0.5	U	Yes
o-Xylene	39.5	83.6	1	< 0.5	U	NA		< 0.5	U	Yes
Styrene	2,829	5,987	1	< 0.5	U	NA		< 0.5	U	Yes
Tetrachloroethene	85.4	180.7	1	< 0.5	U	NA		< 0.5	U	Yes
Toluene	1,980	4,189	1	< 0.5	U	NA		< 0.5	U	Yes
Trichloroethene	85	181	1	**0.76**	J	NA		**0.64**	J	Yes
Vinyl Chloride	34	72	1	< 0.5	U	NA		< 0.5	U	Yes
ANIONS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		
Chloride	NA	NA	10	NA		NA		**362**		NA
Sulfate	NA	NA	10	NA		NA		**33.4**		NA
PERCHLORATE	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		
Perchlorate	278	589	4	< 2.0	U	**6,800**		NA		Yes
METALS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		
Hexavalent Chromium	0.058	0.124	0.010	< 0.0100	U	< 0.0100	U	NA		Yes
Barium	1	2	0.004	**0.175**		NA		NA		Yes
Lead	0.0022	0.0046	0.002	< 0.00100	U	NA		NA		Yes
Selenium	0.0057	0.0120	0.002	< 0.00250	UJ	< 0.00250	U	NA		Yes
Silver	0.0014	0.0030	0.002	< 0.000500	U	< 0.000500	U	NA		Yes
SEMI-VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		
1,4-Dioxane**	NA	134.2	1	**6.2**		NA		NA		Yes

Notes:
µg/L - micrograms per liter
DVQ - data validation qualifier
GWTP - Groundwater Treatment Plant
U - Non detect reported to the limit of detection
mg/L - milligrams per liter
J - estimated concentration between the detection limit and limit of quantitation and/or due to quality control discrepancy
*Influent sample not compared to discharge limits
** Calculated Effluent Limit
Grab samples are compared to the daily maximum and composite samples to the daily average.
ROD - Record of Decision
NA - not applicable or not analyzed

Table 11. Quarterly GWTP Analytical Sampling Results

			Sample Location	EFFLUENT		INFLUENT*		Does Concentration Meet Discharge Limits? (Yes/No)
			Sample Identification	LH18/24-SP650_052919		LH18/24-SP140_052919		
			Lab Package	HS19051859		HS19051863		
			Sample Date	5/29/2019		5/29/2019		
			Sample Type	GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Protocol			Result	DVQ	Result	DVQ	
	Daily Average Concentration	Daily Maximum Concentration	Reporting Limit					
VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		
1,1,1-Trichloroethane	3,417	7,230	1	< 0.5	U	< 50	U	Yes
1,1,2-Trichloroethane	102.5	216.9	1	< 0.5	U	< 50	U	Yes
1,1-Dichloroethane	6,633	14,032	1	< 0.5	U	< 50	U	Yes
1,1-Dichloroethene	119	253	1	< 0.5	U	< 50	U	Yes
1,2-Dichloroethane	85	181	1	< 0.5	U	**53**	J	Yes
1,2-Dichloropropane	NA	NA	1	< 0.5	U	< 50	U	Yes
Acetone	1,132	2,395	2	< 2.0	U	< 100	U	Yes
Benzene	85	181	1	< 0.5	U	< 50	U	Yes
Carbon Tetrachloride	85	181	1	< 0.5	U	< 50	U	Yes
Chlorobenzene	22,300	47,180	1	< 0.5	U	< 50	U	Yes
Chloroform	1,708	3,615	1	< 0.5	U	< 50	U	Yes
Ethylbenzene	26,954	57,025	1	< 0.5	U	< 50	U	Yes
m,p-Xylenes	39.5	83.6	2	< 1.0	U	< 100	U	Yes
Methylene Chloride	803	1,699	2	< 0.5	U	**3,900**		Yes
o-Xylene	39.5	83.6	1	< 0.5	U	< 50	U	Yes
Styrene	2,829	5,987	1	< 0.5	U	< 50	U	Yes
Tetrachloroethene	85.4	180.7	1	< 0.5	U	**62**	J	Yes
Toluene	1,980	4,189	1	< 0.5	U	< 50	U	Yes
Trichloroethene	85	181	1	**0.92**	J	**5,600**		Yes
Vinyl Chloride	34	72	1	< 0.5	U	< 50	U	Yes
ANIONS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		
Chloride	NA	NA	10	**253**		**240**		NA
Sulfate	NA	NA	10	**33**		**37.4**		NA
PERCHLORATE	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		
Perchlorate	278	589	4	< 2.0	U	**4,900**		Yes
METALS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		
Aluminum	0.777	1.644	0.0100	**0.0422**		**0.165**		Yes
Antimony	NA	NA	0.00200	< 0.000500	U	< 0.000500	U	NA
Arsenic	0.365	0.772	0.00200	**0.000699**	J	**0.00138**	J	Yes

Table 11. Quarterly GWTP Analytical Sampling Results

			Sample Location	EFFLUENT		INFLUENT*		Does Concentration Meet Discharge Limits? (Yes/No)
			Sample Identification	LH18/24-SP650_052919		LH18/24-SP140_052919		
			Lab Package	HS19051859		HS19051863		
			Sample Date	5/29/2019		5/29/2019		
			Sample Type	GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Protocol			Result	DVQ	Result	DVQ	
	Daily Average Concentration	Daily Maximum Concentration	Reporting Limit					
Barium	1	2	0.00400	**0.114**		**0.448**		Yes
Beryllium	NA	NA	0.00200	< 0.000500	U	< 0.000500	U	NA
Cadmium	0.0016	0.0034	0.00200	< 0.000500	U	< 0.000500	U	Yes
Calcium	NA	NA	0.500	**8.42**		**22.2**		NA
Chromium	0.355	0.752	0.00400	**0.00105**	J	**0.00112**	J	Yes
Cobalt	5.433	11.495	0.00500	**0.00105**	J	**0.00904**		Yes
Iron	1.132	2.395	0.200	**0.195**	J	**1.04**		Yes
Lead	0.0022	0.0046	0.00200	< 0.00100	U	< 0.00100	U	Yes
Magnesium	NA	NA	0.200	**10.7**		**20.1**		NA
Manganese	7.323	15.494	0.00500	**0.0833**		**0.428**		Yes
Nickel	0.087	0.184	0.00200	**0.00257**		**0.00947**		Yes
Potassium	NA	NA	0.200	**1.46**		**1.41**		NA
Selenium	0.0057	0.012	0.00200	< 0.00250	U	< 0.00250	U	Yes
Silver	0.0014	0.003	0.00200	< 0.000500	U	< 0.000500	U	Yes
Sodium	NA	NA	1.00	**280**		**140**		NA
Thallium	NA	NA	0.00200	< 0.000500	U	< 0.000500	U	NA
Vanadium	1.698	3.592	0.00500	**0.000969**	J	**0.00202**	J	Yes
Zinc	0.146	0.31	0.00400	**0.0228**		**0.0260**		No
Mercury	NA	NA	0.000200	**0.0000900**	J	< 0.000100	U	NA
1,4-DIOXANE	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		
1,4-Dioxane	NA	134.2	1	**5.1**		**8.6**		Yes
CHEMICAL OXYGEN DEMAND (COD)	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		
COD	NA	200	75	**16**		**15**		Yes
OIL AND GREASE (O&G)	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		
O&G	NA	15	2	**1.46**	J	**6.56**		Yes

Notes:
µg/L - micrograms per liter
DVQ - data validation qualifier
Grab samples are compared to the daily maximum and composite samples to the daily average
* only Effluent sample is compared to discharge limits
J - Estimated concentration between the detection limit and limit of quantitation and/or due to quality control discrepancy
U - non detect and reported to the limit of detection
mg/L - milligrams per liter
NA - not applicable
GWTP - Groundwater Treatment Plant

Table 6. Weekly Perchlorate Sample Results

Sample Identification	Lab Package	Date Sampled	Sample Location	Effluent Discharge Point	Harrison Bayou Maximum Allowable Daily Discharge Perchlorate Concentration (µg/L)	INF Pond Discharge Criteria for Perchlorate (µg/L)	Perchlorate Reporting Limit	Influent Perchlorate (6850)	Effluent Perchlorate (6850)		Does Concentration Meet Discharge Limit? (Yes/No)	No Daily Maximum Concentration		
								Result (µg/L)	Result (µg/L)	DVQ		Ammonia as N (350.3) (mg/L)	Ortho-Phosphate (365.3) (mg/L)	Organic Carbon (SM5310C) (mg/L)
LH18/24-SP650_070919/BIX	HS19070423	7/9/2019	TK-650	Harrison Bayou	589	17	4	NA	**5.8**		Yes	**6.9**	**2.19**	**5.09 J**
LH18/24-SP650_071619/BIX	HS19070827	7/16/2019	TK-650	Harrison Bayou	589	17	4	NA	< 2.0	U	Yes	**7.5**	**0.276**	**2.52**
LH18/24-SP650_071619/BIX (monthly)	HS19070824	7/16/2019	TK-650	Harrison Bayou	589	17	4	NA	< 2.0	U	Yes	--	--	--
LH18/24-SP140_071619 (monthly)	HS19070822	7/16/2019	TK-140	--	--	--	NA	**6,900**	NA		NA	--	--	--
LH18/24-SP650_072319/BIX	HS19071160	7/23/2019	TK-650	Harrison Bayou	589	17	4	NA	**42**		Yes	**9.2**	**2.68**	**1.96**
LH18/24-SP650_073019/BIX	HS19071544	7/30/2019	TK-650	Harrison Bayou	589	17	4	NA	< 2.0	U		**7.2**	**0.19**	**2.33**
LH18/24-SP650_080619/BIX	HS19080284	8/6/2019	TK-650	Harrison Bayou	589	17	4	NA	< 2.0	U	Yes	**11**	**3.16**	**2.25**
LH18/24-SP650_081419/BIX	HS19080736	8/14/2019	TK-650	Harrison Bayou	589	17	4	NA	**10**		Yes	**11**	**2.25**	**19**
LH18/24-SP650_081419/BIX (monthly)	HS19080732	8/14/2019	TK-650	Harrison Bayou	589	17	4	NA	**12**		Yes	--	--	--
LH18/24-SP140_081419 (monthly)	HS19080735	8/14/2019	TK-140	--	--	--	NA	**8,800**	NA		NA	--	--	--
LH18/24-SP650_082019/BIX	HS19081044	8/20/2019	TK-650	INF Pond	589	17	4	NA	< 2.0	U	NA	**8.9**	**2.53**	**2.3**
LH18/24-SP650_082019/AIX	HS19081046	8/20/2019	TK-650	INF Pond	589	17	4	NA	< 2.0	U	NA	--	--	--
LH18/24-SP650_082719/AIX	HS19081495	8/27/2019	TK-650	INF Pond	589	17	4	NA	< 2.0	U	Yes	**1.0**	**2.04**	**0.72**
LH18/24-SP650_090419/AIX	HS19090166	9/4/2019	TK-650	INF Pond	589	17	4	NA	< 2.0	U	Yes	**7.9**	**3.03**	**0.81**
LH18/24-SP650_091019/AIX	HS19090456	9/10/2019	TK-650	INF Pond	589	17	4	NA	< 2.0	U	Yes	**9.1**	**2.83**	**1.5**
LH18/24-SP650_091019/AIX (monthly)	HS19090454	9/10/2019	TK-650	INF Pond	589	17	4	NA	< 2.0	U	Yes	--	--	--
LH18/24-SP140_091019 (monthly)	HS19090455	9/10/2019	TK-140	--	--	--	NA	**4,900**	NA		NA	--	--	--
LH18/24-SP650_091719/AIX	HS19090804	9/17/2019	TK-650	INF Pond	589	17	4	NA	< 2.0	U	Yes	**6.1**	**1.9**	**1.14**
LH18/24-SP650_092419/AIX	HS19091201	9/24/2019	TK-650	INF Pond	589	17	4	NA	< 2.0	U	Yes	**10**	**2.23**	**1.64 J**
LH18/24-SP650_092419/AIX (quarterly)	HS19091234	9/24/2019	TK-650	INF Pond	589	17	4	NA	< 2.0	U	Yes	--	--	--
LH18/24-SP140_092419 (quarterly)	HS19091233	9/24/2019	TK-140	--	--	--	NA	**15,000**	NA		NA	--	--	--

Notes:

Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level (PCL)

SP140 samples are influent samples.

µg/L - micrograms per liter

DVQ - data validation qualifier

J - Estimated concentration between the detection limit and limit of quantitation and/or due to quality control discrepancies

NA - not applicable

U - non detect and reported to the limit of detection

BIX - before ion exchange

mg/L - milligrams per liter

AIX - after the ion exchange

Table 7. Bi-Weekly GWTP Analytical Sampling Results for July 2019

Sample Location				EFFLUENT - Biweekly		EFFLUENT - Monthly		INFLUENT - Monthly*		EFFLUENT - Biweekly		Does Concentration Meet Effluent Discharge Limits? (Yes/No)
Sample Identification				LH18/24-SP650_070919		LH18/24-SP650_071619		LH18/24-SP140_071619		LH18/24-SP650_072319		
Lab Package				HS1907043		HS19070824		HS19070822		HS19071164		
Sample Date				7/9/2019		7/16/2019		7/16/2019		7/23/2019		
Sample Type				GRAB		GRAB		GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Table 2 of ROD			Result	DVQ	Result	DVQ	Result	DVQ	Result	DVQ	
	Daily Average Concentration	Daily Maximum Concentration	Reporting Limit									
VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		**µg/L**		
1,1,1-Trichloroethane	3,417	7,230	1	< 0.5	U	< 0.5	U	NA		< 0.5	U	Yes
1,1,2-Trichloroethane	102.5	216.9	1	< 0.5	U	< 0.5	U	NA		< 0.5	U	Yes
1,1-Dichloroethane	6,633	14,032	1	< 0.5	U	< 0.5	U	NA		< 0.5	U	Yes
1,1-Dichloroethene	119	253	1	< 0.5	U	< 0.5	U	NA		< 0.5	U	Yes
1,2-Dichloroethane	85	181	1	< 0.5	U	**0.52**	J	NA		< 0.5	U	Yes
1,2-Dichloropropane	NA	NA	1	< 0.5	U	< 0.5	U	NA		< 0.5	U	Yes
Acetone	1,132	2,395	2	< 1.0	U	**7.4**		NA		**4.6**		Yes
Benzene	85	181	1	< 0.5	U	< 0.5	U	NA		< 0.5	U	Yes
Carbon Tetrachloride	85	181	1	< 0.5	U	< 0.5	U	NA		< 0.5	U	Yes
Chlorobenzene	22,300	47,180	1	< 0.5	U	< 0.5	U	NA		< 0.5	U	Yes
Chloroform	1,708	3,615	1	< 0.5	U	< 0.5	U	NA		< 0.5	U	Yes
Ethylbenzene	26,954	57,025	1	< 0.5	U	< 0.5	U	NA		< 0.5	U	Yes
m,p-Xylenes	39.5	83.6	2	< 1.0	U	< 1.0	U	NA		< 1.0	U	Yes
Methylene Chloride	803	1,699	2	< 1.0	U	< 1.0	U	NA		< 1.0	U	Yes
o-Xylene	39.5	83.6	1	< 0.5	U	< 0.5	U	NA		< 0.5	U	Yes
Styrene	2,829	5,987	1	< 0.5	U	< 0.5	U	NA		< 0.5	U	Yes
Tetrachloroethene	85.4	180.7	1	< 0.5	U	< 0.5	U	NA		< 0.5	U	Yes
Toluene	1,980	4,189	1	< 0.5	U	< 0.5	U	NA		< 0.5	U	Yes
Trichloroethene	85	181	1	**1.0**		**0.99**	J	NA		**0.88**	**J**	Yes
Vinyl Chloride	34	72	1	< 0.5	U	< 0.5	U	NA		< 0.5	U	Yes
ANIONS	**mg/L**	**mg/L**	**mg/L**			**mg/L**		**mg/L**		**mg/L**		
Chloride	NA	NA	10	**9**		NA		NA		**494**		NA
Sulfate	NA	NA	10	**9.9**		NA		NA		**32.3**		NA
PERCHLORATE	**µg/L**	**µg/L**	**µg/L**			**µg/L**		**µg/L**		**µg/L**		
Perchlorate	278	589	4	NA		< 2.0	U	**6,900**		NA		Yes
METALS	**mg/L**	**mg/L**	**mg/L**			**mg/L**		**mg/L**		**mg/L**		
Hexavalent Chromium	0.058	0.124	0.010	NA		**0.0100**		< 0.0100	U	NA		Yes
Barium	1	2	0.004	NA		**0.0903**		NA		NA		Yes
Lead	0.0022	0.0046	0.002	NA		< 0.00100	U	NA		NA		Yes
Selenium	0.0057	0.0120	0.002	NA		< 0.00250	U	< 0.00250	U	NA		Yes
Silver	0.0014	0.0030	0.002	NA		< 0.000500	U	< 0.00250	U	NA		Yes
SEMI-VOLATILES	**µg/L**	**µg/L**	**µg/L**			**µg/L**		**µg/L**		**µg/L**		
1,4-Dioxane**	NA	134.2	1	NA		**1**		NA		NA		Yes

Notes:

µg/L - micrograms per liter
mg/L - milligrams per liter
DVQ - data validation qualifier
NA - not applicable or not analyzed
GWTP - Groundwater Treatment Plant
ROD - Record of Decision
Grab samples are compared to the daily maximum and composite samples to the daily average.
U - not detected and reported to the limit of detection
J - estimated concentration and/or due to QC discrepancies
UJ - estimated non detected due to QC issue(s)
*Influent sample not compared to discharge limits
** Calculated Effluent Limit

Table 8. Bi-Weekly GWTP Analytical Sampling Results for August 2019

			Sample Location	EFFLUENT - Biweekly		EFFLUENT - Monthly		INFLUENT - Monthly*		EFFLUENT - Biweekly		Does Concentration Meet Effluent Discharge Limits? (Yes/No)
			Sample Identification	LH18/24-SP650_080619		LH18/24-SP650_081419		LH18/24-SP140_081419		LH18/24-SP650_082019		
			Lab Package	HS19080343		HS19080732		HS19080735		HS19081048		
			Sample Date	8/6/2019		8/14/2019		8/14/2019		8/20/2019		
			Sample Type	GRAB		GRAB		GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Table 2 of ROD											
	Daily Average Concentration	Daily Maximum Concentration	Detection Limit	Result	DVQ	Result	DVQ	Result	DVQ	Result	DVQ	
VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		**µg/L**		
1,1,1-Trichloroethane	3,417	7,230	1	< 0.5	U	< 0.5	U	NA		< 0.5	U	Yes
1,1,2-Trichloroethane	102.5	216.9	1	< 0.5	U	< 0.5	U	NA		< 0.5	U	Yes
1,1-Dichloroethane	6,633	14,032	1	< 0.5	U	< 0.5	U	NA		< 0.5	U	Yes
1,1-Dichloroethene	119	253	1	< 0.5	U	< 0.5	U	NA		< 0.5	U	Yes
1,2-Dichloroethane	85	181	1	**0.42**	J	< 0.5	U	NA		**0.53**	J	Yes
1,2-Dichloropropane	NA	NA	1	< 0.5	U	< 0.5	U	NA		< 0.5	U	Yes
Acetone	1,132	2,395	2	**5.6**		**3.4**		NA		< 1.0	U	Yes
Benzene	85	181	1	< 0.5	U	< 0.5	U	NA		< 0.5	U	Yes
Carbon Tetrachloride	85	181	1	< 0.5	U	< 0.5	U	NA		< 0.5	U	Yes
Chlorobezene	22,300	47,180	1	< 0.5	U	< 0.5	U	NA		< 0.5	U	Yes
Chloroform	1,708	3,615	1	< 0.5	U	< 0.5	U	NA		< 0.5	U	Yes
Ethylbenzene	26,954	57,025	1	< 0.5	U	< 0.5	U	NA		< 0.5	U	Yes
m,p-Xylenes	39.5	83.6	2	< 1.0	U	< 1.0	U	NA		< 1.0	U	Yes
Methylene Chloride	803	1,699	2	**.95**	J	< 1.0	U	NA		< 1.0	U	Yes
o-Xylene	39.5	83.6	1	< 0.5	U	< 0.5	U	NA		< 0.5	U	Yes
Styrene	2,829	5,987	1	< 0.5	U	< 0.5	U	NA		< 0.5	U	Yes
Tetrachloroethene	85.4	180.7	1	< 0.5	U	< 0.5	U	NA		< 0.5	U	Yes
Toluene	1,980	4,189	1	< 0.5	U	< 0.5	U	NA		< 0.5	U	Yes
Trichloroethene	85	181	1	**0.75**	J	**0.93**	J	NA		**1.2**		Yes
Vinyl Chloride	34	72	1	< 0.5	U	< 0.5	U	NA		< 0.5	U	Yes
ANIONS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		**mg/L**		
Chloride	NA	NA	10	**338**		NA		NA		**444**		NA
Sulfate	NA	NA	10	**37.6**		NA		NA		**36.7**		NA
PERCHLORATE	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		**µg/L**		
Perchlorate	278	589	4	NA		**12**		**8,800**		NA		Yes
METALS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		**mg/L**		
Hexavalent Chromium	0.058	0.124	0.010	NA		< 0.0100	U	< 0.0100	U	NA		Yes
Barium	1	2	0.004	NA		**.138**		NA		NA		Yes
Lead	0.0022	0.0046	0.002	NA		< 0.00100	U	NA		NA		Yes
Selenium	0.0057	0.0120	0.002	NA		< 0.00250	U	< 0.00250	U	NA		Yes
Silver	0.0014	0.0030	0.002	NA		< 0.000500	U	< 0.000500	U	NA		Yes
SEMI-VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		**µg/L**		
1,4-Dioxane**	NA	134.2	1	NA		**0.49**		NA		NA		Yes

Notes:

µg/L - micrograms per liter
mg/L - milligrams per liter
DVQ - data validation qualifier
ROD - Record of Decision
GWTP - Groundwater Treatment Plant
*Influent sample not compared to discharge limits
NA - not applicable or not analyzed
U - not detected and reported to the limit of detection
Grab samples are compared to the daily maximum and composite samples to the daily average.
** Calculated Effluent Limit
J - estimated concentration and/or due to QC discrepancies

Table 9. Bi-Weekly Analytical GWTP Sampling Results for September 2019

			Sample Location	EFFLUENT - Biweekly		INFLUENT - Monthly*		EFFLUENT - Monthly		EFFLUENT - Biweekly		Does Concentration Meet Effluent Discharge Limits? (Yes/No)
			Sample Identification	LH18/24-SP650_090419		LH18/24-SP140_091019		LH18/24-SP650_091019		LH18/24-SP650_091719		
			Lab Package	HS19090191		HS19090455		HS19090454		HS19090847		
			Sample Date	9/4/2019		9/10/2019		9/10/2019		9/17/2019		
			Sample Type	GRAB		GRAB		GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Table 2 of ROD											
	Daily Average Concentration	Daily Maximum Concentration	Detection Limit	Result	DVQ	Result	DVQ	Result	DVQ	Result	DVQ	
VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		**µg/L**		
1,1,1-Trichloroethane	3,417	7,230	1	< 0.5	U	NA		< 0.5	U	< 0.5	U	Yes
1,1,2-Trichloroethane	102.5	216.9	1	< 0.5	U	NA		< 0.5	U	< 0.5	U	Yes
1,1-Dichloroethane	6,633	14,032	1	< 0.5	U	NA		< 0.5	U	< 0.5	U	Yes
1,1-Dichloroethene	119	253	1	< 0.5	U	NA		< 0.5	U	< 0.5	U	Yes
1,2-Dichloroethane	85	181	1	**.51**	J	NA		< 0.5	U	< 0.5	U	Yes
1,2-Dichloropropane	NA	NA	1	< 0.5	U	NA		< 0.5	U	< 0.5	U	Yes
Acetone	1,132	2,395	2	< 2.0	U	NA		< 2.0	U	< 2.0	U	Yes
Benzene	85	181	1	< 0.5	U	NA		< 0.5	U	< 0.5	U	Yes
Carbon Tetrachloride	85	181	1	< 0.5	U	NA		< 0.5	U	< 0.5	U	Yes
Chlorobenzene	22,300	47,180	1	< 0.5	U	NA		< 0.5	U	< 0.5	U	Yes
Chloroform	1,708	3,615	1	< 0.5	U	NA		< 0.5	U	< 0.5	U	Yes
Ethylbenzene	26,954	57,025	1	< 0.5	U	NA		< 0.5	U	< 0.5	U	Yes
m,p-Xylenes	39.5	83.6	2	< 1.0	U	NA		< 1.0	U	< 1.0	U	Yes
Methylene Chloride	803	1,699	2	< 0.5	U	NA		< 0.5	U	< 0.5	U	Yes
o-Xylene	39.5	83.6	1	< 0.5	U	NA		< 0.5	U	< 0.5	U	Yes
Styrene	2,829	5,987	1	< 0.5	U	NA		< 0.5	U	< 0.5	U	Yes
Tetrachloroethene	85.4	180.7	1	< 0.5	U	NA		< 0.5	U	< 0.5	U	Yes
Toluene	1,980	4,189	1	< 0.5	U	NA		< 0.5	U	< 0.5	U	Yes
Trichloroethene	85	181	1	**1.2**		NA		**1.1**		**1.0**		Yes
Vinyl Chloride	34	72	1	< 0.5	U	NA		< 0.5	U	< 0.5	U	Yes
ANIONS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		**mg/L**		
Chloride	NA	NA	10	**557**		NA		NA		**606**		NA
Sulfate	NA	NA	10	**113**		NA		NA		**214**		NA
PERCHLORATE	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		**µg/L**		
Perchlorate	278	589	4	NA		**4,90**		< 2.0	U	NA		Yes
METALS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		**mg/L**		
Hexavalent Chromium	0.058	0.124	0.010	NA		< 0.0100	U	< 0.0100	U	NA		Yes
Barium	1	2	0.004	NA		NA		**.155**		NA		Yes
Lead	0.0022	0.0046	0.002	NA		NA		< 0.00100	U	NA		Yes
Selenium	0.0057	0.0120	0.002	NA		< 0.00250	U	< 0.00250	U	NA		Yes
Silver	0.0014	0.0030	0.002	NA		< 0.000500	U	< 0.000500	U	NA		Yes
SEMI-VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		**µg/L**		
1,4-Dioxane**	NA	134.2	1	NA		NA		**13**		NA		Yes

Notes:

µg/L - micrograms per liter

DVQ - data validation qualifier

GWTP - Groundwater Treatment Plant

U - Non detect reported to the limit of detection

mg/L - milligrams per liter

J - estimated concentration between the detection limit and limit of quantitation and/or due to quality control discrepancy

*Influent sample not compared to discharge limits

** Calculated Effluent Limit

Grab samples are compared to the daily maximum and composite samples to the daily average.

ROD - Record of Decision

NA - not applicable or not analyzed

Table 10. Quarterly GWTP Analytical Sampling Results

			Sample Location	EFFLUENT		INFLUENT*		Does Concentration Meet Discharge Limits? (Yes/No)
			Sample Identification	LH18/24-SP650_092419		LH18/24-SP140_092419		
			Lab Package	HS19091234		HS19091233		
			Sample Date	9/24/2019		9/24/2019		
			Sample Type	GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Protocol			Result	DVQ	Result	DVQ	
	Daily Average Concentration	Daily Maximum Concentration	Reporting Limit					
VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		
1,1,1-Trichloroethane	3,417	7,230	1	< 0.5	U	< 12	U	Yes
1,1,2-Trichloroethane	102.5	216.9	1	< 0.5	U	< 12	U	Yes
1,1-Dichloroethane	6,633	14,032	1	< 0.5	U	< 12	U	Yes
1,1-Dichloroethene	119	253	1	< 0.5	U	< 12	U	Yes
1,2-Dichloroethane	85	181	1	< 0.5	U	**53**		Yes
1,2-Dichloropropane	NA	NA	1	< 0.5	U	< 12	U	Yes
Acetone	1,132	2,395	2	< 2.0	U	< 25	U	Yes
Benzene	85	181	1	< 0.5	U	< 12	U	Yes
Carbon Tetrachloride	85	181	1	< 0.5	U	< 12	U	Yes
Chlorobenzene	22,300	47,180	1	< 0.5	U	< 12	U	Yes
Chloroform	1,708	3,615	1	< 0.5	U	< 12	U	Yes
Ethylbenzene	26,954	57,025	1	< 0.5	U	< 12	U	Yes
m,p-Xylenes	39.5	83.6	2	< 1.0	U	< 25	U	Yes
Methylene Chloride	803	1,699	2	< 0.5	U	**10,000**		Yes
o-Xylene	39.5	83.6	1	< 0.5	U	< 12	U	Yes
Styrene	2,829	5,987	1	< 0.5	U	< 12	U	Yes
Tetrachloroethene	85.4	180.7	1	< 0.5	U	**73**		Yes
Toluene	1,980	4,189	1	< 0.5	U	< 12	U	Yes
Trichloroethene	85	181	1	**1.0**		**8,900**		Yes
Vinyl Chloride	34	72	1	< 0.5	U	**49**		Yes
ANIONS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		
Chloride	NA	NA	10	**538**		**439**		NA
Sulfate	NA	NA	10	**172**		**39.2**		NA
PERCHLORATE	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		
Perchlorate	278	589	4	< 2.0	U	**15,000**		Yes
METALS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		
Aluminum	0.777	1.644	0.0100	**0.0117**		**0.0495**		Yes
Antimony	NA	NA	0.00200	**0.00251**		**0.000427**	J	NA
Arsenic	0.365	0.772	0.00200	**0.000691**	J	**0.00102**	J	Yes

Table 10. Quarterly GWTP Analytical Sampling Results

			Sample Location	EFFLUENT		INFLUENT*		Does Concentration Meet Discharge Limits? (Yes/No)
			Sample Identification	LH18/24-SP650_092419		LH18/24-SP140_092419		
			Lab Package	HS19091234		HS19091233		
			Sample Date	9/24/2019		9/24/2019		
			Sample Type	GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Protocol							
	Daily Average Concentration	Daily Maximum Concentration	Reporting Limit	Result	DVQ	Result	DVQ	
Barium	1	2	0.00400	**0.104**		**0.973**		Yes
Beryllium	NA	NA	0.00200	< 0.00100	U	< 0.00100	U	NA
Cadmium	0.0016	0.0034	0.00200	< 0.00100	U	**0.000289**	J	Yes
Calcium	NA	NA	0.500	**6.84**		**44.1**		NA
Chromium	0.355	0.752	0.00400	**0.000534**	J	**0.00146**	J	Yes
Cobalt	5.433	11.495	0.00500	**0.000436**	J	**0.0120**		Yes
Iron	1.132	2.395	0.200	**0.0772**	J	**1.00**		Yes
Lead	0.0022	0.0046	0.00200	< 0.00100	U	< 0.00100	U	Yes
Magnesium	NA	NA	0.200	**20.4**		**35.3**		NA
Manganese	7.323	15.494	0.00500	**0.0231**		**0.714**		Yes
Nickel	0.087	0.184	0.00200	**0.00102**	J	**0.0141**		Yes
Potassium	NA	NA	0.200	**1.61**		**1.29**		NA
Selenium	0.0057	0.012	0.00200	< 0.00250	U	< 0.00250	U	Yes
Silver	0.0014	0.003	0.00200	< 0.00100	U	< 0.00100	U	Yes
Sodium	NA	NA	1.00	**504**		**223**		NA
Thallium	NA	NA	0.00200	**0.000337**	J	**0.000424**	J	NA
Vanadium	1.698	3.592	0.00500	< 0.00100	U	< 0.00100	U	Yes
Zinc	0.146	0.31	0.00400	**0.00863**		**0.0354**		Yes
Mercury	NA	NA	0.000200	< 0.000100	U	< 0.000100	U	NA
1,4-DIOXANE	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		
1,4-Dioxane	NA	134.2	1	**12.0**		**20**		Yes
CHEMICAL OXYGEN DEMAND (COD)	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		
COD	NA	200	75	**6.0**	J	**18**		Yes
OIL AND GREASE (O&G)	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		
O&G	NA	15	2	< 1.0	U	< 1.0	U	Yes

Notes:
µg/L - micrograms per liter
DVQ - data validation qualifier
Grab samples are compared to the daily maximum and composite samples to the daily average
* only Effluent sample is compared to discharge limits
J - Estimated concentration between the detection limit and limit of quantitation and/or due to quality control discrepancy
U - non detect and reported to the limit of detection
mg/L - milligrams per liter
NA - not applicable
GWTP - Groundwater Treatment Plant

Table 7. Weekly Perchlorate Sample Results-4th Quarter 2019

Sample Identification	Lab Package	Date Sampled	Sample Location	Harrison Bayou Maximum Allowable Daily Discharge Perchlorate Concentration (µg/L)	INF Pond Discharge Criteria for Perchlorate (µg/L)	Reporting Limit	Influent Perchlorate (6850)	Effluent Perchlorate (6850)		Does Concentration Meet Discharge Limit? (Yes/No)	No Daily Maximum Concentration		
							Result (µg/L)	Result (µg/L)	DVQ		Ammonia as N (350.3) (mg/L)	Ortho-Phosphate (365.3) (mg/L)	Organic Carbon (SM5310C) (mg/L)
LH18/24-SP650_100119/AIX	S19100171	10/1/2019	TK-650	589	17	4	NA	< 2.0	U	Yes	**5.2**	**1.33**	**1.83**
LH18/24-SP650_100819/AIX	S19100472	10/8/2019	TK-650	589	17	4	NA	**6.9**		Yes	**0.32**	**3.36**	**2.14**
LH18/24-SP650_100819/AIX (monthly)	S19100471	10/8/2019	TK-650	589	17	4	NA	**6.0**		Yes	--	--	--
LH18/24-SP140_100819 (monthly)	S19100469	10/8/2019	TK-140	--	--	NA	**12,000**	NA		NA	--	--	--
LH18/24-SP650_101519/AIX	HS19100916	10/15/2019	TK-650	589	17	4	NA	< 2.0	U	Yes	**18**	**2.54**	**1.3**
LH18/24-SP650_102219/AIX	HS19101325	10/22/2019	TK-650	589	17	4	NA	**1.7**	J	Yes	**5.9**	**4.06**	**1.56**
LH18/24-SP650_102919	S19101768	10/29/2019	TK-650	589	17	4	NA	NA		NA	**7.8**	**2.17**	**4.2**
LH18/24-SP650_102919_AIX	S19101773	10/29/2019	TK-650	589	17	4	NA	< 2.0	U	Yes	--	--	--
LH18/24-SP650_110519	S19110208	11/5/2019	TK-650	589	17	4	NA	< 2.0	U	Yes	**13**	**2.2**	**1.98**
LH18/24-SP650_110519_AIX (monthly)	S19110211	11/5/2019	TK-650	589	17	4	NA	< 2.0	U	Yes	--	--	--
LH18/24-SP140_110519 (monthly)	S19110207	11/5/2019	TK-140	--	--	NA	**10,000**	NA		NA	--	--	--
LH18/24-SP650_111219/AIX	S19110615	11/12/2019	TK-650	589	17	4	NA	< 2.0	U	Yes	**7.5**	**1.59**	**1.23**
LH18/24-SP650_112019/AIX	HS19111039	11/20/2019	TK-650	589	17	4	NA	**11**		Yes	**4.6**	**0.833**	**0.90**
LH18/24-SP650_112619/AIX	HS19111389	11/26/2019	TK-650	589	17	4	NA	< 2.0	U	Yes	**3.5**	**0.518**	**1.3**
LH18/24-SP650_120319/AIX	HS19120110	12/3/2019	TK-650	589	17	4	NA	**1.2**	J	Yes	**3.9**	**0.733**	**1.5**
LH18/24-SP650_120319_AIX (monthly)	S19120107	12/3/2019	TK-650	589	17	4	NA	**1.3**	J	Yes	--	--	--
LH18/24-SP140_120319 (monthly)	S19120109	12/3/2019	TK-140	--	--	NA	**11,000**	NA		NA	--	--	--
LH18/24-SP650_121219/AIX	S19120679	12/12/2019	TK-650	589	17	4	NA	< 2.0	U	Yes	**8**	**1.23**	**0.99 J**
LH18/24-SP650_121719/BIX	S19121001	12/17/2019	TK-650	589	17	4	NA	**1.7**	J	Yes	**0.35**	**0.0110 J**	**2.19**
LH18/24-SP650_121719_BIX (quarterly)	S19121029	12/17/2019	TK-650	589	17	4	NA	**1.9**	J	Yes	--	--	--
LH18/24-SP140_121719 (quarterly)	S19121028	12/17/2019	TK-140	--	--	NA	**14,000**	NA		NA	--	--	--
LH18/24-SP650_122319/BIX	S19121315	12/23/2019	TK-650	589	17	4	NA	**6.7**		Yes	**4.3**	**0.613**	**2.46**
LH18/24-SP650_123019/BIX	S19121486	12/30/2019	TK-650	589	17	4	NA	< 2.0	U	Yes	**2.1**	**0.537**	**2.13**

Notes:

Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level (PCL)

SP140 samples are influent samples.

µg/L - micrograms per liter

DVQ - data validation qualifier

J - Estimated concentration between the detection limit and limit of quantitation and/or due to quality control discrepancies

NA - not applicable

U - non detect and reported to the limit of detection

BIX - before ion exchange

mg/L - milligrams per liter

AIX - after the ion exchange

Table E.18-Z - LHAAP-18/24

GWTP QUARTERLY EVALUATION REPORT –4TH QUARTER 2019
LONGHORN ARMY AMMUNITION PLANT

Table 8. Bi-Weekly GWTP Analytical Sampling Results for October 2019

Sample Location				EFFLUENT-Biweekly		EFFLUENT-Monthly		INFLUENT-Monthly*		EFFLUENT-Biweekly		EFFLUENT-Biweekly		EFFLUENT-Biweekly		EFFLUENT-Biweekly		EFFLUENT-Biweekly		Does Concentration Meet Effluent Discharge Limits? (Yes/No)
Sample Identification				LH18/24-SP650_100119		LH18/24-SP650_100819		LH18/24-SP140_100819		LH18/24-SP650_101019		LH18/24-SP650_101519		LH18/24-SP650_101719		LH18/24-SP650_102419		LH18/24-SP650_102919		
Lab Package				HS19100181		HS19100471		HS19100469		HS19100680		HS19100919		HS19101087		HS19101506		HS19101774		
Sample Date				10/1/2019		10/8/2019		10/8/2019		10/10/2019		10/15/2019		10/17/2019		10/24/2019		10/29/2019***		
Sample Type				GRAB		GRAB		GRAB		GRAB		GRAB		GRAB		GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Table 2 of ROD			Result	DVQ	Result	DVQ	Result	DVQ	Result	DVQ	Result	DVQ	Result	DVQ	Result	DVQ	Result	DVQ	
	Daily Average Concentration	Daily Maximum Concentration	INF Pond MCL																	
VOLATILES	µg/L	µg/L	µg/L			µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		
1,1,1-Trichloroethane	3,417	7,230	200	1.0	U	0.5	U	NA		1.0	U	NA		0.50	U	0.50	U	0.50	U	Yes
1,1,2-Trichloroethane	102.5	216.9	5	1.0	U	0.5	U	NA		1.0	U	NA		0.50	U	0.50	U	0.50	U	Yes
1,1-Dichloroethane	6,633	14,032	NV	1.0	U	0.5	U	NA		1.0	U	NA		0.50	UJ	0.50	U	0.50	U	Yes
1,1-Dichloroethene	119	253	7	1.0	U	0.5	U	NA		1.0	U	NA		0.50	U	0.50	U	0.50	U	Yes
1,2-Dichloroethane	85	181	5	0.37	UB	0.5	U	NA		1.0	U	NA		**1.2**		**1.4**		**1.0**		Yes
1,2-Dichloropropane	NA	NA	5	1.0	U	0.5	U	NA		1.0	U	NA		0.50	UJ	0.50	U	0.50	U	Yes
Acetone	1,132	2,395	NV	5.1	UB	44	UB	NA		**5.3**		NA		0.50	U	0.50	U	0.50	U	Yes
Benzene	85	181	5	1.0	U	0.5	U	NA		1.0	U	NA		0.50	U	0.50	U	0.50	U	Yes
Carbon Tetrachloride	85	181	5	1.0	U	0.5	U	NA		1.0	U	NA		0.50	U	0.50	U	0.50	U	Yes
Chlorobenzene	22,300	47,180	100	1.0	U	0.5	U	NA		1.0	U	NA		0.50	U	0.50	U	0.50	U	Yes
Chloroform	1,708	3,615	NV	1.0	U	0.5	U	NA		1.0	U	NA		0.50	UJ	0.50	U	0.50	U	Yes
cis-1,2-Dichloroethene	NV	NV	70	**.2**		**1.8**		NA		**.4**		NA		**12**	J	**21**		**30**		Yes
Ethylbenzene	26,954	57,025	700	1.0	U	0.5	U	NA		1.0	U	NA		0.50	U	0.50	U	0.50	U	Yes
m,p-Xylenes	39.5	83.6	NV	2.0	U	1.0	U	NA		2.0	U	NA		1.0	U	1.0	U	0.50	U	Yes
Methylene Chloride	803	1,699	5	1.0	U	1.0	U	NA		1.0	U	NA		1.0	U			**14**		Yes
o-Xylene	39.5	83.6	NV	1.0	U	0.5	U	NA		1.0	U	NA		0.50	U	0.50	U	0.50	U	Yes
Styrene	2,829	5,987	100	1.0	U	0.5	U	NA		1.0	U	NA		0.50	U	0.50	U	0.50	U	Yes
Tetrachloroethene	85.4	180.7	5	1.0	U	0.5	U	NA		1.0	U	NA		0.50	U	0.50	U	0.50	U	Yes
Toluene	1,980	4,189	10	1.0	U	0.5	U	NA		1.0	U	NA		0.50	U	0.50	U	0.50	U	Yes
Trichloroethene	85	181	5	**0.98**	J	**0.80**	J	NA		**1.2**		NA		**1.0**		**1.7**		**5.1**		Yes
Vinyl Chloride	34	72	2	1.0	U	0.5	U	NA		1.0	U	NA		0.50	U	**1.3**		**1.2**		Yes
ANIONS	mg/L	mg/L	mg/L			mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		
Chloride	NV	NV	NV	**496**		NA		NA		NA		**444**		NA		NA		**548**		NA
Sulfate	NV	NV	NV	**101**		NA		NA		NA		**118**		NA		NA		**62.6**		NA
PERCHLORATE	µg/L	µg/L	µg/L			µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		
Perchlorate	278	589	17	NA		**6**		**12,000**		NA		NA		NA		NA		NA		Yes
METALS	mg/L	mg/L	mg/L			mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		
Hexavalent Chromium	0.058	0.124	NV	NA		**0.00900**	J	< 0.0100	U	NA		NA		NA		NA		NA		Yes
Barium	1	2	2	NA		**0.0770**		NA		NA		NA		NA		NA		NA		Yes
Lead	0.0022	0.0046	0.015	NA		< 0.00100	U	NA		NA		NA		NA		NA		NA		Yes
Selenium	0.0057	0.0120	0.05	NA		< 0.00250	U	< 0.00250	U	NA		NA		NA		NA		NA		Yes
Silver	0.0014	0.0030	0.1	NA		< 0.000500	U	< 0.000500	U	NA		NA		NA		NA		NA		Yes
SEMI-VOLATILES	µg/L	µg/L	µg/L			µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		
1,4-Dioxane**	NV	134.2	NV	NA		**3**		NA		NA		NA		NA		NA		NA		Yes

Notes:

µg/L - micrograms per liter
mg/L - milligrams per liter
DVQ - data validation qualifier
NA - not applicable or not analyzed
GWTP - Groundwater Treatment Plant
ROD - Record of Decision
Grab samples are compared to the daily maximum and composite samples to the daily average.
U - not detected and reported to the limit of detection
J - estimated concentration and/or due to QC discrepancies
UJ - estimated not detected due to QC discrepancies and reported to the limit of detection
*Influent sample not compared to discharge limits
NV - no value
** Calculated Effluent Limit
***no exceedances; released to Harrison Bayou
UB - considered an artifact of blank contamination
MCL - Maximum Contaminant Level

Table 9. Bi-Weekly GWTP Analytical Sampling Results for November 2019

Sample Location				EFFLUENT - Monthly		EFFLUENT - Monthly		EFFLUENT - Monthly		INFLUENT - Monthly*		EFFLUENT - Biweekly		EFFLUENT - Biweekly		Does Concentration Meet Effluent Discharge Limits? (Yes/No)
Sample Identification				LH18/24-SP650_BIX		LH18/24-SP650_AIX		LH18/24-SP650_110519		LH18/24-SP140_110519		LH18/24-SP650_111219		LH18/24-SP650_112619		
Lab Package				HS19110215		HS19110215		HS19110211		HS19110207		HS19110613		HS19111401		
Sample Date				11/5/2019		11/5/2019		11/5/2019		11/5/2019		11/12/2019		11/26/2019***		
Sample Type				GRAB		GRAB		GRAB		GRAB		GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Table 2 of ROD			Result	DVQ	Result	DVQ	Result	DVQ	Result	DVQ	Result	DVQ	Result	DVQ	
	Daily Average Concentration	Daily Maximum Concentration	INF Pond MCL													
VOLATILES	µg/L	µg/L	µg/L	µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		
1,1,1-Trichloroethane	3,417	7,230	200	0.50	U	0.50	U	NA		NA		0.50	U	0.50	U	Yes
1,1,2-Trichloroethane	102.5	216.9	5	0.50	U	0.50	U	NA		NA		0.50	U	0.50	U	Yes
1,1-Dichloroethane	6,633	14,032	NV	0.50	UJ	0.50	U	NA		NA		0.50	U	0.50	U	Yes
1,1-Dichloroethene	119	253	7	0.50	U	0.50	U	NA		NA		0.50	U	0.50	U	Yes
1,2-Dichloroethane	85	181	5	**2.8**		**1.3**		NA		NA		**2.1**		**1.7**		Yes
1,2-Dichloropropane	NA	NA	5	0.50	UJ	0.50	U	NA		NA		0.50	U	0.50	U	Yes
Acetone	1,132	2,395	NV	1.0	U	1.0	U	NA		NA		1.0	U	1.0	U	Yes
Benzene	85	181	5	0.50	UJ	0.50	U	NA		NA		0.50	U	0.50	U	Yes
Carbon Tetrachloride	85	181	5	0.50	U	0.50	U	NA		NA		0.50	U	0.50	U	Yes
Chlorobenzene	22,300	47,180	100	0.50	U	0.50	U	NA		NA		0.50	U	0.50	U	Yes
Chloroform	1,708	3,615	NV	0.50	U	0.50	U	NA		NA		0.50	U	0.50	U	Yes
cis-1,2-Dichloroethene	NV	NV	70	**53**		**38**		NA		NA		**64**		**63**		Yes
Ethylbenzene	26,954	57,025	700	0.50	U	0.50	U	NA		NA		0.50	U	0.50	U	Yes
m,p-Xylenes	39.5	83.6	NV	1.0	U	1.0	U	NA		NA		1.0	U	1.0	U	Yes
Methylene Chloride	803	1,699	5	**21**		**16**		NA		NA		**16**		**6.0**	U	No
o-Xylene	39.5	83.6	NV	0.50	U	0.50	U	NA		NA		0.50	U	0.50	U	Yes
Styrene	2,829	5,987	100	0.50	U	0.50	U	NA		NA		0.50	U	0.50	U	Yes
Tetrachloroethene	85.4	180.7	5	0.50	U	0.50	U	NA		NA		0.50	U	0.50	U	Yes
Toluene	1,980	4,189	10	0.50	U	0.50	U	NA		NA		0.50	U	0.50	U	Yes
Trichloroethene	85	181	5	**15**		**7.1**		NA		NA		**12**		**12**		No
Vinyl Chloride	34	72	2	0.50	U	**0.87**	J	NA		NA		**1.7**		**0.66**	J	Yes
ANIONS	mg/L	mg/L	mg/L	mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		
Chloride	NV	NV	NV	NA		NA		NA		NA		**528**		**403**		NA
Sulfate	NV	NV	NV	NA		NA		NA		NA		**34.8**		**33.5**		NA
PERCHLORATE	µg/L	µg/L	µg/L	µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		
Perchlorate	278	589	17	NA		NA		< 2.0	U	**10,000**		NA		NA		Yes
METALS	mg/L	mg/L	mg/L	mg/L		mg/L		mg/L		mg/L		mg/L		mg/L		
Hexavalent Chromium	0.058	0.124	NV	NA		NA		< 0.0100	U	< 0.0100	U	NA		NA		Yes
Barium	1	2	2	NA		NA		**0.214**		NA		NA		NA		Yes
Lead	0.0022	0.0046	0.015	NA		NA		< 0.00100	U	NA		NA		NA		Yes
Selenium	0.0057	0.0120	0.05	NA		NA		< 0.00250	U	< 0.00250	U	NA		NA		Yes
Silver	0.0014	0.0030	0.1	NA		NA		< 0.000500	U	< 0.000500	U	NA		NA		Yes
SEMI-VOLATILES	µg/L	µg/L	µg/L	µg/L		µg/L		µg/L		µg/L		µg/L		µg/L		
1,4-Dioxane**	NV	134.2	NV	NA		NA		**11**		NA		NA		NA		Yes

Notes:

µg/L - micrograms per liter
mg/L - milligrams per liter
DVQ - data validation qualifier
ROD - Record of Decision
GWTP - Groundwater Treatment Plant
*Influent sample not compared to discharge limits
NA - not applicable or not analyzed
U - not detected and reported to the limit of detection
Grab samples are compared to the daily maximum and composite samples to the daily average.
** Calculated Effluent Limit
***released to INF Pond
J - estimated concentration and/or due to QC discrepancies
Exceeded Maximum Contaminant Level (MCL); discharged to INF Pond

Table 10. Bi-Weekly Analytical GWTP Sampling Results for December 2019

Sample Location				INFLUENT - Monthly*		EFFLUENT - Monthly		EFFLUENT - Biweekly***		EFFLUENT - Biweekly***		INF Pond Inlet***		EFFLUENT - Biweekly	
Sample Identification				LH18/24-SP140_120319		LH18/24-SP650_120319		LH18/24-SP650_120419_BIX		LH18/24-SP650_120419_AIX		INF Inlet_120419		LH18/24-SP650_121219	
Lab Package				HS19120109		HS19120107		HS19120180		HS19120180		HS19120180		HS19120678	
Sample Date				12/3/2019		12/3/2019		12/4/2019		12/4/2019		12/4/2019		12/12/2019	
Sample Type				GRAB		GRAB		GRAB		GRAB		GRAB		GRAB	
	Effluent Limitation for Discharge (µg/L) per Table 2 of ROD			Result	VQ	Result	VQ	Result	DVQ	Result	DVQ	Result	VQ	Result	VQ
	Daily Average Concentration	Daily Maximum Concentration	INF Pond MCL												
VOLATILES	µg/L	µg/L	µg/L					µg/L							
1,1,1-Trichloroethane	3,417	7,230	200	NA		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,1,2-Trichloroethane	102.5	216.9	5	NA		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,1-Dichloroethane	6,633	14,032	NV	NA		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,1-Dichloroethene	119	253	7	NA		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	UJ
1,2-Dichloroethane	85	181	5	NA		**1.4**		**1.9**		**1.5**		< 0.5	U	**1.3**	
1,2-Dichloropropane	NA	NA	5	NA		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Acetone	1,132	2,395	NV	NA		< 2.0	U	< 2.0	U	< 2.0	U	< 2.0	U	< 2.0	U
Benzene	85	181	5	NA		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Carbon Tetrachloride	85	181	5	NA		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Chlorobenzene	22,300	47,180	100	NA		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Chloroform	1,708	3,615	NV	NA		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
cis-1,2-Dichloroethene	NV	NV	70	NA		**46**		**41**		**55**		**2.8**		**38**	
Ethylbenzene	26,954	57,025	700	NA		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
m,p-Xylenes	39.5	83.6	NV	NA		< 1.0	U	< 1.0	U	< 1.0	U	< 1.0	U	< 1.0	U
Methylene Chloride	803	1,699	5	NA		**4.1**		**7.0**		**4.3**		< 0.5	U	**1.9**	J
o-Xylene	39.5	83.6	NV	NA		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Styrene	2,829	5,987	100	NA		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Tetrachloroethene	85.4	180.7	5	NA		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Toluene	1,980	4,189	10	NA		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Trichloroethene	85	181	5	NA		**9.3**		**6.8**		**9.5**		< 0.5	U	**6.8**	
Vinyl Chloride	34	72	2	NA		**0.65**	J	**0.54**	J	**0.62**	J	< 0.5	U	**0.49**	J
ANIONS	mg/L	mg/L	mg/L	mg/L		mg/L		mg/L		mg/L		mg/L		mg/L	
Chloride	NV	NV	NV	NA		NA		NA		NA		NA		**425**	
Sulfate	NV	NV	NV	NA		NA		NA		NA		NA		**36.5**	
PERCHLORATE	µg/L	µg/L	µg/L	µg/L		µg/L		µg/L		µg/L		µg/L		µg/L	
Perchlorate	278	589	17	**11,000**		**1.3**	J	NA		NA		NA		NA	
METALS	mg/L	mg/L	mg/L	mg/L		mg/L		mg/L		mg/L		mg/L		mg/L	
Hexavalent Chromium	0.058	0.124	NV	< 0.0100	U	< 0.0100	U	NA		NA		NA		NA	
Barium	1	2	2	NA		**0.117**	J	NA		NA		NA		NA	
Lead	0.0022	0.0046	0.015	NA		< 0.00100	UJ	NA		NA		NA		NA	
Selenium	0.0057	0.0120	0.05	**0.00126**	J	< 0.00250	U	NA		NA		NA		NA	
Silver	0.0014	0.0030	0.1	< 0.000500	U	< 0.000500	UJ	NA		NA		NA		NA	
SEMI-VOLATILES	µg/L	µg/L	µg/L	µg/L		µg/L		µg/L		µg/L		µg/L		µg/L	
1,4-Dioxane**	NV	134.2	NV	NA		**20**		NA		NA		NA		NA	

Notes:

µg/L - micrograms per liter; mg/L - milligrams per liter

DVQ - data validation qualifier; ROD - Record of Decision

GWTP - Groundwater Treatment Plant; NA - Not applicable or not analyzed

U - Non detect reported to the limit of detection

UJ - estimated not detected due to QC discrepancies and reported to the limit of detection

J - estimated concentration between the detection limit and limit of quantitation and/or due to quality control discrepancy

Grab samples are compared to the daily maximum and composite samples to the daily average.

*Influent sample not compared to discharge limits

** Calculated Effluent Limit

***The biweekly effluent results for methylene chloride and trichloroethene (TCE) exceeded the screening criteria for discharge to the INF Pond on 11/26/19 and the monthly effluent result for TCE exceeded on 12/3/19. These samples were collected to evaluate the Ion Exchange Vessel's ability to remove these contaminants after the rotation of the air stripper blower was changed to correct the improper orientation by the manufacturer.

Table 10. Bi-Weekly Analytical GWTP Sampling Results for December 2019

Sample Location				EFFLUENT - Biweekly		EFFLUENT - Biweekly		EFFLUENT - Biweekly		Does Concentration Meet Effluent Discharge Limits? (Yes/No)
Sample Identification				LH18/24-SP650_122319		LH18/24-SP650_122719		LH18/24-SP650_123019		
Lab Package				HS19121316		HS19121433		HS19121484		
Sample Date				12/23/2019		12/27/2019		12/30/2019		
Sample Type				GRAB		GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Table 2 of ROD			Result	VQ	Result	VQ 2-32	Result	DVQ	
	Daily Average Concentration	Daily Maximum Concentration	INF Pond MCL							
VOLATILES	**µg/L**	**µg/L**	**µg/L**							
1,1,1-Trichloroethane	3,417	7,230	200	< 0.5	U	< 0.5	U	< 0.5	U	Yes
1,1,2-Trichloroethane	102.5	216.9	5	< 0.5	U	< 0.5	U	< 0.5	U	Yes
1,1-Dichloroethane	6,633	14,032	NV	< 0.5	U	< 0.5	U	< 0.5	U	Yes
1,1-Dichloroethene	119	253	7	< 0.5	U	< 0.5	U	< 0.5	U	Yes
1,2-Dichloroethane	85	181	5	**1.5**		**1.6**		**1.5**		Yes
1,2-Dichloropropane	NA	NA	5	< 0.5	U	< 0.5	U	< 0.5	U	Yes
Acetone	1,132	2,395	NV	< 2.0	U	< 2.0	U	< 2.0	U	Yes
Benzene	85	181	5	< 0.5	U	< 0.5	U	< 0.5	U	Yes
Carbon Tetrachloride	85	181	5	< 0.5	U	< 0.5	U	< 0.5	U	Yes
Chlorobenzene	22,300	47,180	100	< 0.5	U	< 0.5	U	< 0.5	U	Yes
Chloroform	1,708	3,615	NV	< 0.5	U	< 0.5	U	< 0.5	U	Yes
cis-1,2-Dichloroethene	NV	NV	70	**35**		**40**		**32**		Yes
Ethylbenzene	26,954	57,025	700	< 0.5	U	< 0.5	U	< 0.5	U	Yes
m,p-Xylenes	39.5	83.6	NV	< 1.0	U	< 1.0	U	< 1.0	U	Yes
Methylene Chloride	803	1,699	5	**1.4**	J	**1.1**	J	< 1.0	U	Yes
o-Xylene	39.5	83.6	NV	< 0.5	U	< 0.5	U	< 0.5	U	Yes
Styrene	2,829	5,987	100	< 0.5	U	< 0.5	U	< 0.5	U	Yes
Tetrachloroethene	85.4	180.7	5	< 0.5	U	< 0.5	U	< 0.5	U	Yes
Toluene	1,980	4,189	10	< 0.5	U	< 0.5	U	< 0.5	U	Yes
Trichloroethene	85	181	5	**5.4**		**6.5**		**4.8**		Yes
Vinyl Chloride	34	72	2	**0.45**	J	**0.52**	J	< 0.5	U	Yes
ANIONS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		
Chloride	NV	NV	NV	**457**		NA		NA		NA
Sulfate	NV	NV	NV	**27.8**		NA		NA		NA
PERCHLORATE	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		
Perchlorate	278	589	17	NA		NA		NA		Yes
METALS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		
Hexavalent Chromium	0.058	0.124	NV	NA		NA		NA		Yes
Barium	1	2	2	NA		NA		NA		Yes
Lead	0.0022	0.0046	0.015	NA		NA		NA		Yes
Selenium	0.0057	0.0120	0.05	NA		NA		NA		Yes
Silver	0.0014	0.0030	0.1	NA		NA		NA		Yes
SEMI-VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		
1,4-Dioxane**	NV	134.2	NV	NA		NA		NA		Yes

Notes:

µg/L - micrograms per liter; mg/L - milligrams per liter

DVQ - data validation qualifier; ROD - Record of Decision

GWTP - Groundwater Treatment Plant; NA - Not applicable or not analyzed

U - Non detect reported to the limit of detection

UJ - estimated not detected due to QC discrepancies and reported to the limit of detection

J - estimated concentration between the detection limit and limit of quantitation and/or due to quality control discrepancy

Grab samples are compared to the daily maximum and composite samples to the daily average.

*Influent sample not compared to discharge limits

** Calculated Effluent Limit

***The biweekly effluent results for methylene chloride and trichloroethene (TCE) exceeded the screening criteria for discharge to the INF Pond on 11/26/19 and the monthly effluent result for TCE exceeded on 12/3/19. These samples were collected to evaluate the Ion Exchange Vessel's ability to remove these contaminants after the rotation of the air stripper blower was changed to correct the improper orientation by the manufacturer.

Table 11. Quarterly GWTP Analytical Sampling Results

				Sample Location	EFFLUENT		INFLUENT*		Does Concentration Meet Discharge Limits? (Yes/No)
				Sample Identification	LH18/24-SP650_121719/BIX		LH18/24-SP140_121719		
				Lab Package	HS19121029		HS19121028		
				Sample Date	12/17/2019		12/17/2019		
				Sample Type	GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Protocol								
	Daily Average Concentration	Daily Maximum Concentration	Reporting Limit	Result	DVQ	Result	DVQ	
VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		
1,1,1-Trichloroethane	3,417	7,230	1	< 0.5	U	< 10	U	Yes
1,1,2-Trichloroethane	102.5	216.9	1	< 0.5	U	< 10	U	Yes
1,1-Dichloroethane	6,633	14,032	1	< 0.5	U	**8.5**	J	Yes
1,1-Dichloroethene	119	253	1	< 0.5	U	< 10	U	Yes
1,2-Dichloroethane	85	181	1	**1.5**		**43**		Yes
1,2-Dichloropropane	NA	NA	1	< 0.5	U	< 10	U	Yes
Acetone	1,132	2,395	2	< 2.0	U	< 20	U	Yes
Benzene	85	181	1	< 0.5	U	< 10	U	Yes
Carbon Tetrachloride	85	181	1	< 0.5	U	< 10	U	Yes
Chlorobenzene	22,300	47,180	1	< 0.5	U	< 10	U	Yes
Chloroform	1,708	3,615	1	< 0.5	U	< 10	U	Yes
Ethylbenzene	26,954	57,025	1	< 0.5	U	< 10	U	Yes
m,p-Xylenes	39.5	83.6	2	< 1.0	U	< 20	U	Yes
Methylene Chloride	803	1,699	2	**1.7**	J	**510**		Yes
o-Xylene	39.5	83.6	1	< 0.5	U	< 10	U	Yes
Styrene	2,829	5,987	1	< 0.5	U	< 10	U	Yes
Tetrachloroethene	85.4	180.7	1	< 0.5	U	**35**		Yes
Toluene	1,980	4,189	1	< 0.5	U	< 10	U	Yes
Trichloroethene	85	181	1	**6.8**		**5,400**		Yes
Vinyl Chloride	34	72	1	**0.48**	J	**130**		Yes
ANIONS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		
Chloride	NA	NA	10	**453**		**446**		NA
Sulfate	NA	NA	10	**28.8**		**26.6**		NA
PERCHLORATE	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		
Perchlorate	278	589	4	**1.9**	J	**14,000**		Yes
METALS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		
Aluminum	0.777	1.644	0.0100	**0.0194**		**0.0275**		Yes
Antimony	NA	NA	0.00200	< 0.000500	U	< 0.000500	U	NA
Arsenic	0.365	0.772	0.00200	**0.000634**	J	**0.000872**	J	Yes

Table 11. Quarterly GWTP Analytical Sampling Results

			Sample Location	EFFLUENT		INFLUENT*		Does Concentration Meet Discharge Limits? (Yes/No)
			Sample Identification	LH18/24-SP650_121719/BIX		LH18/24-SP140_121719		
			Lab Package	HS19121029		HS19121028		
			Sample Date	12/17/2019		12/17/2019		
			Sample Type	GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Protocol							
	Daily Average Concentration	Daily Maximum Concentration	Reporting Limit	Result	DVQ	Result	DVQ	
Barium	1	2	0.00400	**0.0888**		**0.766**		Yes
Beryllium	NA	NA	0.00200	< 0.000500	U	< 0.000500	U	NA
Cadmium	0.0016	0.0034	0.00200	< 0.000500	U	**0.000223**	J	Yes
Calcium	NA	NA	0.500	**7.99**		**44.3**		NA
Chromium	0.355	0.752	0.00400	**0.000428**	J	**0.00121**	J	Yes
Cobalt	5.433	11.495	0.00500	**0.00149**	J	**0.00820**		Yes
Iron	1.132	2.395	0.200	**0.108**	J	**0.478**		Yes
Lead	0.0022	0.0046	0.00200	< 0.00100	U	< 0.00100	U	Yes
Magnesium	NA	NA	0.200	**24.0**		**34.2**		NA
Manganese	7.323	15.494	0.00500	**0.104**		**0.542**		Yes
Nickel	0.087	0.184	0.00200	**0.00372**	J	**0.0146**		Yes
Potassium	NA	NA	0.200	**1.29**		**1.21**		NA
Selenium	0.0057	0.012	0.00200	< 0.00250	U	< 0.00250	U	Yes
Silver	0.0014	0.003	0.00200	< 0.000500	U	< 0.000500	U	Yes
Sodium	NA	NA	1.00	**339**		**211**		NA
Thallium	NA	NA	0.00200	< 0.000500	U	**0.000326**	J	NA
Vanadium	1.698	3.592	0.00500	< 0.00100	U	< 0.00100	U	Yes
Zinc	0.146	0.31	0.00400	**0.0172**		**0.0549**		Yes
Mercury	NA	NA	0.000200	< 0.000100	U	< 0.000100	U	NA
1,4-DIOXANE	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		
1,4-Dioxane	NA	134.2	1	**20.0**		**20**		Yes
CHEMICAL OXYGEN DEMAND (COD)	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		
COD	NA	200	75	**22**		**15**		Yes
OIL AND GREASE (O&G)	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		
O&G	NA	15	2	< 1.0	U	< 1.0	U	Yes

Notes:
µg/L - micrograms per liter
DVQ - data validation qualifier
Grab samples are compared to the daily maximum and composite samples to the daily average
* only Effluent sample is compared to discharge limits
J - Estimated concentration between the detection limit and limit of quantitation and/or due to quality control discrepancy
U - non detect and reported to the limit of detection
mg/L - milligrams per liter
NA - not applicable
GWTP - Groundwater Treatment Plant

Table 6. Weekly Perchlorate Sample Results

Sample Identification	Lab Package	Date Sampled	Sample Location	Harrison Bayou Maximum Allowable Daily Discharge Perchlorate Concentration (µg/L)	INF Pond Discharge Criteria for Perchlorate (µg/L)	Reporting Limit	Influent Perchlorate (6850)	Effluent Perchlorate (6850)		Does Concentration Meet Discharge Limit? (Yes/No)	No Daily Maximum Concentration		
							Result (µg/L)	Result (µg/L)	DVQ		Ammonia as N (350.3) (mg/L)	Ortho-Phosphate (365.3) (mg/L)	Organic Carbon (SM5310C) (mg/L)
LH18/24-SP650_010720/BIX	HS20010261	1/7/2020	TK-650	589	17	4	NA	**2.0**	J	Yes	**0.79**	**0.171**	**2.01**
LH18/24-SP650_010720_BIX (monthly)	HS20010259	1/7/2020	TK-650	589	17	4	NA	**2.0**	J	Yes	--	--	--
LH18/24-SP140_010720 (monthly)	HS20010258	1/7/2020	TK-140	--	--	NA	**13,000**	NA		NA	--	--	--
LH18/24-SP650_012320/BIX	HS20011091	1/23/2020	TK-650	589	17	4	NA	**0.136**		Yes	**9.1**	**1.96**	**2.02**
LH18/24-SP650_012820/BIX	HS20011311	1/28/2020	TK-650	589	17	4	NA	**0.322**		Yes	**0.21**	< 0.0250 U	**2.2**
LH18/24-SP650_020420/BIX	HS20020147	2/4/2020	TK-650	589	17	4	NA	**0.14**		Yes	**4.7**	**1.06**	**2.44**
LH18/24-SP650_021120/BIX	HS20020473	2/11/2020	TK-650	589	17	4	NA	< 2.0	U	Yes	**3.6**	**0.97**	**1.66**
LH18/24-SP650_021120_BIX (monthly)	HS20020474	2/11/2020	TK-650	589	17	4	NA	< 2.0	U	Yes	--	--	--
LH18/24-SP140_021120 (monthly)	HS20020472	2/11/2020	TK-140	--	--	NA	**11,000**	NA		NA	--	--	--
LH18/24-SP650_021920/BIX	HS20020832	2/19/2020	TK-650	589	17	4	NA	< 2.0	U	Yes	**3.7**	**0.486**	**1.71**
LH18/24-SP650_022520/BIX	HS20021115	2/25/2020	TK-650	589	17	4	NA	**0.161**		Yes	< 0.10 U	**0.0110 J**	**1.3**
LH18/24-SP650_022520_BIX (quarterly)	HS20021120	2/25/2020	TK-650	589	17	4	NA	**0.0969**	J	Yes	--	--	--
LH18/24-SP140_022520 (quarterly)	HS20021121	2/25/2020	TK-140	--	--	NA	**10,400**	NA		NA	--	--	--
LH18/24-SP650_030420/BIX	HS20030169	3/4/2020	TK-650	589	17	4	NA	< 0.0500	U	Yes	**4.7**	**2.16**	**1.78**
LH18/24-SP650_031020/BIX (monthly)	HS20030425	3/10/2020	TK-650	589	17	4	NA	< 0.0500	U	Yes	--	--	--
LH18/24-SP140_031020 (monthly)	HS20030427	3/10/2020	TK-140	--	--	NA	**14,000**	NA		NA	--	--	--
LH18/24-SP650_031020/BIX	HS20030430	3/10/2020	TK-650	589	17	4	NA	< 0.0500	U	Yes	**6.6**	**1.45**	**2.31**
LH18/24-SP650_031720/BIX	HS20030840	3/17/2020	TK-650	589	17	4	NA	< 0.0500	U	Yes	**0.35**	< 0.0250 U	**2.07**
LH18/24-SP650_032420/BIX	HS20031081	3/24/2020	TK-650	589	17	4	NA	**0.0720**	J	Yes	**2.2**	**0.461**	**1.97**
LH18/24-SP650_033120/BIX	HS20040018	3/31/2020	TK-650	589	17	4	NA	< 0.0500	U	Yes	**7.8**	**2.26**	**2.92**

Notes:

Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level (PCL)

SP140 samples are influent samples.

µg/L - micrograms per liter

DVQ - data validation qualifier

J - Estimated concentration between the detection limit and limit of quantitation and/or due to quality control discrepancies

NA - not applicable

U - non detect and reported to the limit of detection

BIX - before ion exchange

mg/L - milligrams per liter

Table E.18-EE - LHAAP-18/24

GWTP Quarterly Evaluation Report – 1st Quarter 2020

Longhorn Army Ammunition Plant

Table 7. Bi-Weekly GWTP Analytical Sampling Results for January 2020

Sample Location				EFFLUENT - Monthly		INFLUENT - Monthly*		EFFLUENT - Biweekly		EFFLUENT - Biweekly		Does Concentration Meet Effluent Discharge Limits? (Yes/No)
Sample Identification				LH18/24-SP650_010720/BIX		LH18/24-SP140_010720		LH18/24-SP650_012320		LH18/24-SP650_012820		
Lab Package				HS20010259		HS20010258		HS20011089		HS20011312		
Sample Date				1/7/2020		1/7/2020		1/23/2020		1/28/2020		
Sample Type				GRAB		GRAB		GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Table 2 of ROD			Result	DVQ	Result	DVQ	Result	DVQ	Result	DVQ	
	Daily Average Concentration	Daily Maximum Concentration	INF Pond MCL									
VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		**µg/L**		
1,1,1-Trichloroethane	3,417	7,230	200	0.5	U	NA		0.5	U	0.5	U	Yes
1,1,2-Trichloroethane	102.5	216.9	5	0.5	U	NA		0.5	U	0.5	U	Yes
1,1-Dichloroethane	6,633	14,032	NV	0.5	U	NA		0.5	U	0.5	U	Yes
1,1-Dichloroethene	119	253	7	0.5	U	NA		0.5	U	0.5	U	Yes
1,2-Dichloroethane	85	181	5	**1.5**		NA		**1.2**		**1.3**		Yes
1,2-Dichloropropane	NA	NA	5	0.5	U	NA		0.5	U	0.5	U	Yes
Acetone	1,132	2,395	NV	1.0	U	NA		1.0	U	1.0	U	Yes
Benzene	85	181	5	0.5	U	NA		0.5	U	0.5	U	Yes
Carbon Tetrachloride	85	181	5	0.5	U	NA		0.5	U	0.5	U	Yes
Chlorobenzene	22,300	47,180	100	0.5	U	NA		0.5	U	0.5	U	Yes
Chloroform	1,708	3,615	NV	0.5	U	NA		0.5	U	0.5	U	Yes
cis-1,2-Dichloroethene	NV	NV	70	**29**		NA		**23**		**27**		Yes
Ethylbenzene	26,954	57,025	700	0.5	U	NA		0.5	U	0.5	U	Yes
m,p-Xylenes	39.5	83.6	NV	1.0	U	NA		1.0	U	1.0	U	Yes
Methylene Chloride	803	1,699	5	1.0	U	NA		1.0	U	1.0	U	Yes
o-Xylene	39.5	83.6	NV	0.5	U	NA		0.5	U	0.5	U	Yes
Styrene	2,829	5,987	100	0.5	U	NA		0.5	U	0.5	U	Yes
Tetrachloroethene	85.4	180.7	5	0.5	U	NA		0.5	U	0.5	U	Yes
Toluene	1,980	4,189	10	0.5	U	NA		0.5	U	0.5	U	Yes
Trichloroethene	85	181	5	**5.0**		NA		**3.7**		**5.0**		Yes
Vinyl Chloride	34	72	2	0.5	U	NA		0.5	U	0.5	U	Yes
ANIONS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		**mg/L**		
Chloride	NV	NV	NV	NA		NA		**463**		NA		NA
Sulfate	NV	NV	NV	NA		NA		**29.7**		NA		NA
PERCHLORATE	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		**µg/L**		
Perchlorate	278	589	17	**2.0**	J	**13,000**		NA		NA		Yes
METALS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		**mg/L**		
Hexavalent Chromium	0.058	0.124	NV	< 0.0100	U	< 0.0100	U	NA		NA		Yes
Barium	1	2	2	**0.0666**		NA		NA		NA		Yes
Lead	0.0022	0.0046	0.015	< 0.00100	U	NA		NA		NA		Yes
Selenium	0.0057	0.0120	0.05	< 0.00250	U	< 0.00250	U	NA		NA		Yes
Silver	0.0014	0.0030	0.1	< 0.000500	U	< 0.000500	U	NA		NA		Yes
SEMI-VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		**µg/L**		
1,4-Dioxane	NV	134.2	NV	**18**		NA		NA		NA		Yes

Notes:

µg/L - micrograms per liter
mg/L - milligrams per liter
DVQ - data validation qualifier
NA - not applicable or not analyzed
GWTP - Groundwater Treatment Plant
ROD - Record of Decision
BIX - Before ion exchange
MCL - Maximum Contaminant Level
Grab samples are compared to the daily maximum and composite samples to the daily average.
U - not detected and reported to the limit of detection
J - estimated concentration and/or due to QC discrepancies
Influent sample not compared to discharge limits
NV - no value
Calculated Effluent Limit
No exceedances; all effluent released to Harrison Bayou in January 2020
UB - considered an artifact of blank contamination

Table 8. Bi-Weekly GWTP Analytical Sampling Results for February 2020

				Sample Location	EFFLUENT - Biweekly		EFFLUENT - Monthly		INFLUENT - Monthly*		EFFLUENT - Biweekly		Does Concentration Meet Effluent Discharge Limits? (Yes/No)
				Sample Identification	LH18/24-SP650_020420		LH18/24-SP650_021120/BIX		LH18/24-SP140_021120		LH18/24-SP650_021920		
				Lab Package	HS20020146		HS20020474		HS20020472		HS20020835		
				Sample Date	2/4/2020		2/11/2020		2/11/2020		2/19/2020		
				Sample Type	GRAB		GRAB		GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Table 2 of ROD												
	Daily Average Concentration	Daily Maximum Concentration	INF Pond MCL	Result	DVQ	Result	DVQ	Result	DVQ	Result	DVQ	
VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		**µg/L**		
1,1,1-Trichloroethane	3,417	7,230	200	0.50	U	0.50	U	NA		0.50	U	Yes
1,1,2-Trichloroethane	102.5	216.9	5	0.50	U	0.50	U	NA		0.50	U	Yes
1,1-Dichloroethane	6,633	14,032	NV	0.50	U	0.50	U	NA		0.50	U	Yes
1,1-Dichloroethene	119	253	7	0.50	U	0.50	U	NA		0.50	U	Yes
1,2-Dichloroethane	85	181	5	**1.4**		**1.3**		NA		**1.3**		Yes
1,2-Dichloropropane	NA	NA	5	0.50	U	0.50	U	NA		0.50	U	Yes
Acetone	1,132	2,395	NV	1.0	U	1.0	U	NA		1.0	U	Yes
Benzene	85	181	5	0.50	U	0.50	U	NA		0.50	U	Yes
Carbon Tetrachloride	85	181	5	0.50	U	0.50	U	NA		0.50	U	Yes
Chlorobezene	22,300	47,180	100	0.50	U	0.50	U	NA		0.50	U	Yes
Chloroform	1,708	3,615	NV	0.50	U	0.50	U	NA		0.50	U	Yes
cis-1,2-Dichloroethene	NV	NV	70	**28**		**25**		NA		**24**		Yes
Ethylbenzene	26,954	57,025	700	0.50	U	0.50	U	NA		0.50	U	Yes
m,p-Xylenes	39.5	83.6	NV	1.0	U	1.0	U	NA		1.0	U	Yes
Methylene Chloride	803	1,699	5	1.0	U	1.0	U	NA		**1.1**	J	Yes
o-Xylene	39.5	83.6	NV	0.50	U	0.50	U	NA		0.50	U	Yes
Styrene	2,829	5,987	100	0.50	U	0.50	U	NA		0.50	U	Yes
Tetrachloroethene	85.4	180.7	5	0.50	U	0.50	U	NA		0.50	U	Yes
Toluene	1,980	4,189	10	0.50	U	0.50	U	NA		0.50	U	Yes
Trichloroethene	85	181	5	**5.6**		**5.1**		NA		**5.0**		Yes
Vinyl Chloride	34	72	2	0.50	UJ	0.50	U	NA		0.50	UJ	Yes
ANIONS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		**mg/L**		
Chloride	NV	NV	NV	**501**		NA		NA		**447**		NA
Sulfate	NV	NV	NV	**25.8**		NA		NA		**23.3**		NA
PERCHLORATE	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		**µg/L**		
Perchlorate	278	589	17	NA		< 2.0	U	**11,000**		NA		Yes
METALS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		**mg/L**		
Hexavalent Chromium	0.058	0.124	NV	NA		< 0.0100	UJ	< 0.0100	U	NA		Yes
Barium	1	2	2	NA		**0.304**		NA		NA		Yes
Lead	0.0022	0.0046	0.015	NA		< 0.00100	U	NA		NA		Yes
Selenium	0.0057	0.0120	0.05	NA		< 0.00250	U	< 0.00250	U	NA		Yes
Silver	0.0014	0.0030	0.1	NA		< 0.000500	U	**0.000314**	J	NA		Yes
SEMI-VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		**µg/L**		
1,4-Dioxane	NV	134.2	NV	NA		**24**		NA		NA		Yes

Notes:

µg/L - micrograms per liter
mg/L - milligrams per liter
DVQ - data validation qualifier
NA - not applicable or not analyzed
GWTP - Groundwater Treatment Plant
ROD - Record of Decision
BIX - Before ion exchange
MCL - Maximum Contaminant Level
Grab samples are compared to the daily maximum and composite samples to the daily average.
U - not detected and reported to the limit of detection
J - estimated concentration and/or due to QC discrepancies
Influent sample not compared to discharge limits
NV - no value

Table E.18-GG - LHAAP-18/24

GWTP Quarterly Evaluation Report – 1ST Quarter 2020

Longhorn Army Ammunition Plant

Table 9. Bi-Weekly Analytical GWTP Sampling Results for March 2020

Sample Location				EFFLUENT - Biweekly		INFLUENT - Monthly*		EFFLUENT - Monthly		EFFLUENT - Biweekly		EFFLUENT - Biweekly		EFFLUENT - Biweekly		Does Concentration Meet Effluent Discharge Limits? (Yes/No)
Sample Identification				LH18/24-SP650_030420		LH18/24-SP140_031020		LH18/24-SP650_031020		LH18/24-SP650_031720		LH18/24-SP650-032420		LH18/24-SP650_033120		
Lab Package				HS20030172		HS20030427		HS20030425		HS20030838		HS20031080		HS20040019		
Sample Date				3/4/2020		3/10/2020		3/10/2020		3/17/2020		3/24/2020		3/31/2020		
Sample Type				GRAB		GRAB		GRAB		GRAB		GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Table 2 of ROD															
	Daily Average Concentration	Daily Maximum Concentration	INF Pond MCL	Result	DVQ	Result	DVQ	Result	DVQ	Result	DVQ	Result	DVQ	Result	DVQ	
VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**												
1,1,1-Trichloroethane	3,417	7,230	200	< 0.5	U	NA		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	Yes
1,1,2-Trichloroethane	102.5	216.9	5	< 0.5	U	NA		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	Yes
1,1-Dichloroethane	6,633	14,032	NV	< 0.5	U	NA		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	Yes
1,1-Dichloroethene	119	253	7	< 0.5	U	NA		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	Yes
1,2-Dichloroethane	85	181	5	**1.2**		NA		**1.2**		**1.2**		**1.0**		**1.0**		Yes
1,2-Dichloropropane	NA	NA	5	< 0.5	U	NA		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	Yes
Acetone	1,132	2,395	NV	< 1.0	U	NA		< 1.0	U	< 1.0	U	< 2.0	U	< 2.0	U	Yes
Benzene	85	181	5	< 0.5	U	NA		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	Yes
Carbon Tetrachloride	85	181	5	< 0.5	U	NA		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	Yes
Chlorobenzene	22,300	47,180	100	< 0.5	U	NA		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	Yes
Chloroform	1,708	3,615	NV	< 0.5	U	NA		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	Yes
cis-1,2-Dichloroethene	NV	NV	70	**27**		NA		**27**		**27**		**26**		**22**		Yes
Ethylbenzene	26,954	57,025	700	< 0.5	U	NA		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	Yes
m,p-Xylenes	39.5	83.6	NV	< 1.0	U	NA		< 1.0	U	< 1.0	U	< 1.0	U	< 1.0	U	Yes
Methylene Chloride	803	1,699	5	< 1.0	U	NA		< 1.0	U	< 1.0	U	< 0.5	U	< 0.5	U	Yes
o-Xylene	39.5	83.6	NV	< 0.5	U	NA		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	Yes
Styrene	2,829	5,987	100	< 0.5	U	NA		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	Yes
Tetrachloroethene	85.4	180.7	5	< 0.5	U	NA		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	Yes
Toluene	1,980	4,189	10	< 0.5	U	NA		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	Yes
Trichloroethene	85	181	5	**5.1**		NA		**5.0**		**5.0**		**5.4**		**4.0**		Yes
Vinyl Chloride	34	72	2	< 0.5	U	NA		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	Yes
ANIONS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		**mg/L**		**mg/L**		**mg/L**		
Chloride	NV	NV	NV	**376.0**		NA		NA		**363**		NA		**326**		NA
Sulfate	NV	NV	NV	**28.5**		NA		NA		**32.8**		NA		**29**		NA
PERCHLORATE	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		**µg/L**		**µg/L**		**µg/L**		
Perchlorate	278	589	17	NA		**14,000**		< 0.0500	U	NA		NA		NA		Yes
METALS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		**mg/L**		**mg/L**		**mg/L**		
Hexavalent Chromium	0.058	0.124	NV	NA		**0.00900**	J	< 0.0100	U	NA		NA		NA		Yes
Barium	1	2	2	NA		NA		**0.115**		NA		NA		NA		Yes
Lead	0.0022	0.0046	0.015	NA		NA		< 0.00100	U	NA		NA		NA		Yes
Selenium	0.0057	0.0120	0.05	NA		< 0.00250	U	< 0.00250	U	NA		NA		NA		Yes
Silver	0.0014	0.0030	0.1	NA		< 0.000500	U	< 0.000500	U	NA		NA		NA		Yes
SEMI-VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		**µg/L**		**µg/L**		**µg/L**		
1,4-Dioxane	NV	134.2	NV	NA		NA		**29**		NA		NA		NA		Yes

Notes:

µg/L - micrograms per liter

mg/L - milligrams per liter

DVQ - data validation qualifier

GWTP - Groundwater Treatment Plant

MCL - Maximum Contaminant Level

U - Non detect reported to the limit of detection

J - estimated concentration between the detection limit and limit of quantitation and/or due to quality control discrepancy

Influent sample not compared to discharge limits

Calculated Effluent Limit

Grab samples are compared to the daily maximum and composite samples to the daily average.

ROD - Record of Decision

NA - not applicable or not analyzed

No exceedances; all effluent released to Harrison Bayou in March 2020

Table 10. Quarterly GWTP Analytical Sampling Results

	Effluent Limitation for Discharge (µg/L) per Protocol			Sample Location: EFFLUENT		Sample Location: INFLUENT*		Does Concentration Meet Discharge Limits? (Yes/No)
				Sample Identification: LH18/24-SP650_022520/BIX		Sample Identification: LH18/24-SP140_022520		
				Lab Package: HS20021120		Lab Package: HS20021121		
				Sample Date: 2/25/2020		Sample Date: 2/25/2020		
				Sample Type: GRAB		Sample Type: GRAB		
	Daily Average Concentration	Daily Maximum Concentration	Reporting Limit	Result	DVQ	Result	DVQ	
VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		
1,1,1-Trichloroethane	3,417	7,230	1	< 0.5	U	< 10	U	Yes
1,1,2-Trichloroethane	102.5	216.9	1	< 0.5	U	< 10	U	Yes
1,1-Dichloroethane	6,633	14,032	1	< 0.5	U	< 10	U	Yes
1,1-Dichloroethene	119	253	1	< 0.5	U	< 10	U	Yes
1,2-Dichloroethane	85	181	1	**1.2**		**39**	J	Yes
1,2-Dichloropropane	NA	NA	1	< 0.5	U	< 10	U	Yes
Acetone	1,132	2,395	2	< 1.0	U	< 20	U	Yes
Benzene	85	181	1	< 0.5	U	< 10	U	Yes
Carbon Tetrachloride	85	181	1	< 0.5	U	< 10	U	Yes
Chlorobenzene	22,300	47,180	1	< 0.5	U	< 10	U	Yes
Chloroform	1,708	3,615	1	< 0.5	U	< 10	U	Yes
Ethylbenzene	26,954	57,025	1	< 0.5	U	< 10	U	Yes
m,p-Xylenes	39.5	83.6	2	< 1.0	U	< 20	U	Yes
Methylene Chloride	803	1,699	2	< 1.0	UJ	**2,200**	J	Yes
o-Xylene	39.5	83.6	1	< 0.5	U	< 10	U	Yes
Styrene	2,829	5,987	1	< 0.5	U	< 10	U	Yes
Tetrachloroethene	85.4	180.7	1	< 0.5	U	**52**	J	Yes
Toluene	1,980	4,189	1	< 0.5	U	< 10	U	Yes
Trichloroethene	85	181	1	**4.9**		**4,900**		Yes
Vinyl Chloride	34	72	1	< 0.5	U	**68**	J	Yes
ANIONS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		
Chloride	NA	NA	10	**386**		**357**		NA
Sulfate	NA	NA	10	**24**		**26**		NA
PERCHLORATE	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		
Perchlorate	278	589	4	**0.0969**	J	**10,400**		Yes
METALS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		
Aluminum	0.777	1.644	0.0100	**0.175**		**0.301**		Yes
Antimony	NA	NA	0.00200	**0.000607**	J	**0.00262**	J	NA
Arsenic	0.365	0.772	0.00200	**0.000698**	J	**0.000888**	J	Yes

Table E.18-HH - LHAAP-18/24

GWTP Quarterly Evaluation Report – 1st Quarter 2020
Longhorn Army Ammunition Plant

Table 10. Quarterly GWTP Analytical Sampling Results

			Sample Location	EFFLUENT		INFLUENT*		Does Concentration Meet Discharge Limits? (Yes/No)
			Sample Identification	LH18/24-SP650_022520/BIX		LH18/24-SP140_022520		
			Lab Package	HS20021120		HS20021121		
			Sample Date	2/25/2020		2/25/2020		
			Sample Type	GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Protocol							
	Daily Average Concentration	Daily Maximum Concentration	Reporting Limit	Result	DVQ	Result	DVQ	
Barium	1	2	0.00400	**0.197**	J	**0.579**		Yes
Beryllium	NA	NA	0.00200	< 0.000500	U	**0.000206**	J	NA
Cadmium	0.0016	0.0034	0.00200	**0.000317**	J	**0.000947**	J	Yes
Calcium	NA	NA	0.500	**15.8**		**42.4**		NA
Chromium	0.355	0.752	0.00400	**0.0159**		**0.0170**		Yes
Cobalt	5.433	11.495	0.00500	**0.00231**	J	**0.00827**		Yes
Iron	1.132	2.395	0.200	**0.716**		**0.829**		Yes
Lead	0.0022	0.0046	0.00200	< 0.00100	U	< 0.00100	U	Yes
Magnesium	NA	NA	0.200	**19.2**		**25.9**		NA
Manganese	7.323	15.494	0.00500	**0.149**		**0.520**		Yes
Nickel	0.087	0.184	0.00200	**0.0136**		**0.0385**		Yes
Potassium	NA	NA	0.200	**1.38**		**1.18**		NA
Selenium	0.0057	0.012	0.00200	< 0.00250	U	< 0.00250	U	Yes
Silver	0.0014	0.003	0.00200	< 0.000500	U	< 0.000500	U	Yes
Sodium	NA	NA	1.00	**314**		**176**		NA
Thallium	NA	NA	0.00200	**0.000428**	J	< 0.000500	U	NA
Vanadium	1.698	3.592	0.00500	< 0.00100	U	< 0.00100	U	Yes
Zinc	0.146	0.31	0.00400	**0.282**		**0.689**		Yes
Mercury	NA	NA	0.000200	< 0.000100	U	< 0.000100	U	NA
1,4-DIOXANE	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		
1,4-Dioxane	NA	134.2	1	**0.39**		**0.45**		Yes
CHEMICAL OXYGEN DEMAND (COD)	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		
COD	NA	200	75	**10**	J	**5.0**	J	Yes
OIL AND GREASE (O&G)	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		
O&G	NA	15	2	< 1.0	U	< 1.0	U	Yes

Notes:
µg/L - micrograms per liter
DVQ - data validation qualifier
Grab samples are compared to the daily maximum and composite samples to the daily average
only Effluent sample is compared to discharge limits
J - Estimated concentration between the detection limit and limit of quantitation and/or due to quality control discrepancy
U - non detect and reported to the limit of detection
UJ - estimated non-detect due to quality control issues and reported to the limit of detection
mg/L - milligrams per liter
NA - not applicable
GWTP - Groundwater Treatment Plant

Table 7. Weekly Perchlorate Sample Results - 2nd Quarter 2020

Sample Identification	Lab Package	Date Sampled	Sample Location	Harrison Bayou Maximum Allowable Daily Discharge Perchlorate Concentration (µg/L)	INF Pond Discharge Criteria for Perchlorate (µg/L)	Reporting Limit	Influent Perchlorate (6850)	Effluent Perchlorate (6850)		Does Concentration Meet Discharge Limit? (Yes/No)	No Daily Maximum Concentration		
							Result (µg/L)	Result (µg/L)	DVQ		Ammonia as N (350.3) (mg/L)	Ortho-Phosphate (365.3) (mg/L)	Organic Carbon (SM5310C) (mg/L)
LH18/24-SP650_040720/BIX	HS20040289	4/7/2020	TK-650	589	7	0.1	NA	< 0.0500	U	Yes	**1.6**	**0.125**	**2.72**
LH18/24-SP650_040720_BIX (monthly)	HS20040284	4/7/2020	TK-650	589	7	0.1	NA	< 0.0500	U	Yes	--	--	--
LH18/24-SP140_040720 (monthly)	HS20040287	4/7/2020	TK-140	--	--	NA	**10,600**	NA		NA	--	--	--
LH18/24-SP650_041620/BIX	HS20040700	4/16/2020	TK-650	589	7	0.1	NA	< 0.0500	U	Yes	**20**	**1.11**	**3.12**
LH18/24-SP650_042120/BIX	HS20040851	4/21/2020	TK-650	589	7	0.1	NA	< 0.0500	U	Yes	**4.6**	**0.792**	**2.41**
LH18/24-SP650_042820/BIX	HS20041130	4/28/2020	TK-650	589	7	0.1	NA	< 0.0500	U	Yes	**21**	**1.96**	**2.18**
LH18/24-SP650_050520/BIX	HS20050178	5/5/2020	TK-650	589	7	0.1	NA	< 0.0500	U	Yes	**3.7**	**0.804 J**	**2.34**
LH18/24-SP650_050520_BIX (monthly)	HS20050176	5/5/2020	TK-650	589	7	0.1	NA	< 0.0500	U	Yes	--	--	--
LH18/24-SP140_050520 (monthly)	HS20050177	5/5/2020	TK-140	--	--	NA	**6,740**	NA		NA	--	--	--
LH18/24-SP650_051220/BIX	HS20050454	5/12/2020	TK-650	589	7	0.1	NA	< 0.0500	U	Yes	**11**	**1.89**	**2.63**
LH18/24-SP650_051920-BIX	HS20050737	5/19/2020	TK-650	589	7	0.1	NA	< 0.0500	U	Yes	**11**	**1.89**	**2.19**
LH18/24-SP650_051920_BIX (quarterly)	HS20050757	5/19/2020	TK-650	589	7	0.1	NA	< 0.0500	U	Yes	--	--	--
LH18/24-SP140_051920 (quarterly)	HS20050754	5/19/2020	TK-140	--	--	NA	**9,250**	NA		NA	--	--	--
LH18/24-SP650_052820/BIX	HS20051122	5/28/2020	TK-650	589	7	0.1	NA	< 0.0500	U	Yes	**11**	**0.96**	**2.96**
LH18/24-SP650_060220/BIX	HS20060115	6/2/2020	TK-650	589	7	0.1	NA	< 0.0500	U	Yes	**7.8**	**1.47**	**2.17 J**
LH18/24-SP650_060220/BIX (monthly)	HS20060114	6/2/2020	TK-650	589	7	0.1	NA	< 0.0500	U	Yes	--	--	--
LH18/24-SP140_060220 (monthly)	HS20060116	6/2/2020	TK-140	--	--	NA	**8,290**	NA		NA	--	--	--
LH18/24-SP650_060920/BIX	HS20060451	6/9/2020	TK-650	589	7	0.1	NA	**0.0890**	J	Yes	**16**	**2.64**	**2.01**
LH18/24-SP650_061620/BIX	HS20060840	6/16/2020	TK-650	589	7	0.1	NA	< 0.0500	U	Yes	**9**	**1.96**	**1.82**
LH18/24-SP650_062320/BIX	HS20061177	6/23/2020	TK-650	589	7	0.1	NA	< 0.0500	U	Yes	**14**	**1.83**	**2.1**
LH18/24-SP650_063020/BIX	HS20070018	6/30/2020	TK-650	589	7	0.1	NA	< 0.0500	U	Yes	**8.9**	**1.64**	**2.56**

Notes:

Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level (PCL)

SP140 samples are influent samples.

µg/L - micrograms per liter

DVQ - data validation qualifier

J - Estimated concentration between the detection limit and limit of quantitation and/or due to quality control discrepancies

NA - not applicable

U - non detect and reported to the limit of detection

BIX - before ion exchange

mg/L - milligrams per liter

Table 8. Bi-Weekly GWTP Analytical Sampling Results for April 2020

Sample Location				EFFLUENT - Monthly		INFLUENT - Monthly*		EFFLUENT - Biweekly		EFFLUENT - Biweekly		Does Concentration Meet Effluent Discharge Limits? (Yes/No)
Sample Identification				LH18/24-SP650_040720		LH18/24-SP140_040720		LH18/24-SP650_041620		LH18/24-SP650_042820		
Lab Package				HS20040284		HS20040287		HS20040699		HS20041127		
Sample Date				4/7/2020		4/7/2020		4/16/2020		4/28/2020		
Sample Type				GRAB		GRAB		GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Table 2 of ROD			Result	DVQ	Result	DVQ	Result	DVQ	Result	DVQ	
	Daily Average Concentration	Daily Maximum Concentration	INF Pond MCL									
VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		**µg/L**		
1,1,1-Trichloroethane	3,417	7,230	200	0.5	U	NA		0.5	U	0.5	U	Yes
1,1,2-Trichloroethane	102.5	216.9	5	1.0	U	NA		1.0	U	1.0	U	Yes
1,1-Dichloroethane	6,633	14,032	NV	0.5	U	NA		0.5	U	0.5	U	Yes
1,1-Dichloroethene	119	253	7	0.5	U	NA		0.5	U	0.5	U	Yes
1,2-Dichloroethane	85	181	5	**1.0**		NA		**0.73**	J	**1.1**		Yes
1,2-Dichloropropane	NA	NA	5	1.0	U	NA		1.0	U	1.0	U	Yes
Acetone	1,132	2,395	NV	1.0	U	NA		1.0	U	1.0	U	Yes
Benzene	85	181	5	0.5	U	NA		0.5	U	0.5	U	Yes
Carbon Tetrachloride	85	181	5	1.0	U	NA		1.0	U	1.0	U	Yes
Chlorobenzene	22,300	47,180	100	1.0	U	NA		1.0	U	1.0	U	Yes
Chloroform	1,708	3,615	NV	0.5	U	NA		0.5	U	0.5	U	Yes
cis-1,2-Dichloroethene	NV	NV	70	**23**		NA		**21**		**28**		Yes
Ethylbenzene	26,954	57,025	700	1.0	U	NA		1.0	U	1.0	U	Yes
m,p-Xylenes	39.5	83.6	NV	1.0	U	NA		1.0	U	1.0	U	Yes
Methylene Chloride	803	1,699	5	1.0	U	NA		1.0	U	1.0	U	Yes
o-Xylene	39.5	83.6	NV	1.0	U	NA		1.0	U	1.0	U	Yes
Styrene	2,829	5,987	100	1.0	U	NA		1.0	U	1.0	U	Yes
Tetrachloroethene	85.4	180.7	5	1.0	U	NA		1.0	U	1.0	U	Yes
Toluene	1,980	4,189	10	0.5	U	NA		0.5	U	0.5	U	Yes
Trichloroethene	85	181	5	**4.4**		NA		**3.3**		**4.4**		Yes
Vinyl Chloride	34	72	2	0.5	U	NA		0.5	U	0.5	U	Yes
ANIONS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		**mg/L**		
Chloride	NV	NV	NV	NA		NA		**295**		**294**		NA
Sulfate	NV	NV	NV	NA		NA		**37.1**		**41.3**		NA
PERCHLORATE	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		**µg/L**		
Perchlorate	278	589	17	0.0500	U	**10,600**		NA		NA		Yes
METALS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		**mg/L**		
Hexavalent Chromium	0.058	0.124	NV	< 0.0100	U	< 0.0100	UJ	NA		NA		Yes
Barium	1	2	2	**0.0926**		NA		NA		NA		Yes
Lead	0.0022	0.0046	0.015	< 0.00100	U	NA		NA		NA		Yes
Selenium	0.0057	0.0120	0.05	< 0.00250	U	< 0.00250	U	NA		NA		Yes
Silver	0.0014	0.0030	0.1	< 0.000500	U	< 0.000500	U	NA		NA		Yes
SEMI-VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		**µg/L**		
1,4-Dioxane**	NV	134.2	NV	**33**		NA		NA		NA		Yes

Notes:

µg/L - micrograms per liter
mg/L - milligrams per liter
DVQ - data validation qualifier
NA - not applicable or not analyzed
GWTP - Groundwater Treatment Plant
ROD - Record of Decision

Grab samples are compared to the daily maximum and composite samples to the daily average.

U - not detected and reported to the limit of detection
J - estimated concentration and/or due to QC discrepancies
UJ - esimtated not detected due to QC discrepancies and reported to the limit of detection
*Influent sample not compared to discharge limits
NV - no value
** Calculated Effluent Limit

Table 9. Bi-Weekly GWTP Analytical Sampling Results for May 2020

			Sample Location	EFFLUENT - Monthly		INFLUENT - Monthly*		EFFLUENT - Biweekly		EFFLUENT - Biweekly		Does Concentration Meet Effluent Discharge Limits? (Yes/No)
			Sample Identification	LH18/24-SP650_050520		LH18/24-SP140_050520		LH 18/24-SP650_051220		LH18/24-SP650_052820		
			Lab Package	HS20050176		HS20050177		HS20050456		HS20051138		
			Sample Date	5/5/2020		5/5/2020		5/12/2020		5/28/2020		
			Sample Type	GRAB		GRAB		GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Table 2 of ROD			Result	DVQ	Result	DVQ	Result	DVQ	Result	DVQ	
	Daily Average Concentration	Daily Maximum Concentration	INF Pond MCL									
VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		**µg/L**		
1,1,1-Trichloroethane	3,417	7,230	200	0.50	U	NA		0.50	U	0.50	U	Yes
1,1,2-Trichloroethane	102.5	216.9	5	1.0	U	NA		1.0	U	1.0	U	Yes
1,1-Dichloroethane	6,633	14,032	NV	0.50	U	NA		0.50	U	0.50	U	Yes
1,1-Dichloroethene	119	253	7	0.50	U	NA		0.50	U	0.50	U	Yes
1,2-Dichloroethane	85	181	5	**0.94**	J	NA		**0.97**	J	**0.8**	J	Yes
1,2-Dichloropropane	NA	NA	5	1.0	U	NA		1.0	U	1.0	U	Yes
Acetone	1,132	2,395	NV	1.0	U	NA		1.0	U	1.0	U	Yes
Benzene	85	181	5	0.50	U	NA		0.50	U	0.50	U	Yes
Carbon Tetrachloride	85	181	5	1.0	U	NA		1.0	U	1.0	U	Yes
Chlorobezene	22,300	47,180	100	1.0	U	NA		1.0	U	1.0	U	Yes
Chloroform	1,708	3,615	NV	0.50	U	NA		0.50	U	0.50	U	Yes
cis-1,2-Dichloroethene	NV	NV	70	**21**		NA		**20**		**15**		Yes
Ethylbenzene	26,954	57,025	700	1.0	U	NA		1.0	U	1.0	U	Yes
m,p-Xylenes	39.5	83.6	NV	1.0	U	NA		1.0	U	1.0	U	Yes
Methylene Chloride	803	1,699	5	1.0	U	NA		1.0	U	1.0	U	Yes
o-Xylene	39.5	83.6	NV	1.0	U	NA		1.0	U	1.0	U	Yes
Styrene	2,829	5,987	100	1.0	U	NA		1.0	U	1.0	U	Yes
Tetrachloroethene	85.4	180.7	5	1.0	U	NA		1.0	U	1.0	U	Yes
Toluene	1,980	4,189	10	0.50	U	NA		0.50	U	0.50	U	Yes
Trichloroethene	85	181	5	**3.8**		NA		**4.0**		**2.7**		Yes
Vinyl Chloride	34	72	2	0.50	U	NA		0.50	U	0.50	U	Yes
ANIONS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		**mg/L**		
Chloride	NV	NV	NV	NA		NA		**400**		**313**		NA
Sulfate	NV	NV	NV	NA		NA		**31.6**		**31.5**		NA
PERCHLORATE	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		**µg/L**		
Perchlorate	278	589	17	0.05	U	**6,740**		NA		NA		Yes
METALS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		**mg/L**		
Hexavalent Chromium	0.058	0.124	NV	0.0100	U	**0.00600**	J	NA		NA		Yes
Barium	1	2	2	**0.0644**		NA		NA		NA		Yes
Lead	0.0022	0.0046	0.015	0.00100	U	NA		NA		NA		Yes
Selenium	0.0057	0.0120	0.05	0.00250	U	0.00250	U	NA		NA		Yes
Silver	0.0014	0.0030	0.1	0.000500	U	0.000500	U	NA		NA		Yes
SEMI-VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		**µg/L**		
1,4-Dioxane**	NV	134.2	NV	**34**		NA		NA		NA		Yes

Notes:

µg/L - micrograms per liter
mg/L - milligrams per liter
DVQ - data validation qualifier
ROD - Record of Decision
GWTP - Groundwater Treatment Plant
*Influent sample not compared to discharge limits
NA - not applicable or not analyzed
U - not detected and reported to the limit of detection
Grab samples are compared to the daily maximum and composite samples to the daily average.
** Calculated Effluent Limit
J - estimated concentration and/or due to QC discrepancies

Table 10. Bi-Weekly GWTP Analytical Sampling Results for June 2020

Sample Location				INFLUENT - Monthly*		EFFLUENT - Monthly		EFFLUENT - Biweekly		EFFLUENT - Biweekly		Does Concentration Meet Effluent Discharge Limits? (Yes/No)
Sample Identification				LH18/24-SP140_060220		LH18/24-SP650_060220		LH18/24-SP650_060920		LH18/24-SP650_062320		
Lab Package				HS20060116		HS20060114		HS20060453		HS20061179		
Sample Date				6/2/2020		6/2/2020		6/9/2020		6/23/2020		
Sample Type				GRAB		GRAB		GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Table 2 of ROD			Result	DVQ	Result	DVQ	Result	DVQ	Result	DVQ	
	Daily Average Concentration	Daily Maximum Concentration	INF Pond MCL									
VOLATILES	**µg/L**	**µg/L**	**µg/L**					**µg/L**				
1,1,1-Trichloroethane	3,417	7,230	200	NA		< 0.50	U	0.50	U	0.50	U	Yes
1,1,2-Trichloroethane	102.5	216.9	5	NA		< 1.0	U	1.0	U	1.0	U	Yes
1,1-Dichloroethane	6,633	14,032	NV	NA		< 0.50	U	0.50	U	0.50	U	Yes
1,1-Dichloroethene	119	253	7	NA		< 0.50	U	0.50	U	0.50	U	Yes
1,2-Dichloroethane	85	181	5	NA		**0.84**	J	**0.81**	J	**0.84**	J	Yes
1,2-Dichloropropane	NA	NA	5	NA		< 1.0	U	1.0	U	1.0	U	Yes
Acetone	1,132	2,395	NV	NA		< 1.0	U	1.0	U	1.0	U	Yes
Benzene	85	181	5	NA		< 0.50	U	0.50	U	0.50	U	Yes
Carbon Tetrachloride	85	181	5	NA		< 1.0	U	1.0	U	1.0	U	Yes
Chlorobenzene	22,300	47,180	100	NA		< 1.0	U	1.0	U	1.0	U	Yes
Chloroform	1,708	3,615	NV	NA		< 0.50	U	0.50	U	0.50	U	Yes
cis-1,2-Dichloroethene	NV	NV	70	NA		**17**		**17**		**20**		Yes
Ethylbenzene	26,954	57,025	700	NA		< 1.0	U	1.0	U	1.0	U	Yes
m,p-Xylenes	39.5	83.6	NV	NA		< 1.0	U	1.0	U	1.0	U	Yes
Methylene Chloride	803	1,699	5	NA		< 1.0	U	1.0	U	1.0	U	Yes
o-Xylene	39.5	83.6	NV	NA		< 1.0	U	1.0	U	1.0	U	Yes
Styrene	2,829	5,987	100	NA		< 1.0	U	1.0	U	1.0	U	Yes
Tetrachloroethene	85.4	180.7	5	NA		< 1.0	U	1.0	U	1.0	U	Yes
Toluene	1,980	4,189	10	NA		< 0.50	U	0.50	U	0.50	U	Yes
Trichloroethene	85	181	5	NA		**3.2**		**3.4**		**3.8**		Yes
Vinyl Chloride	34	72	2	NA		< 0.50	U	0.50	U	0.50	U	Yes
ANIONS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		**mg/L**		
Chloride	NV	NV	NV	NA		NA		**316**		**354**		NA
Sulfate	NV	NV	NV	NA		NA		**31.5**		**31.5**		NA
PERCHLORATE	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		**µg/L**		
Perchlorate	278	589	17	**8,290**		< 0.0500	U	NA		NA		Yes
METALS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		**mg/L**		
Hexavalent Chromium	0.058	0.124	NV	< 0.0100	U	< 0.0100	U	NA		NA		Yes
Barium	1	2	2	NA		**0.144**		NA		NA		Yes
Lead	0.0022	0.0046	0.015	NA		< 0.00100	U	NA		NA		Yes
Selenium	0.0057	0.0120	0.05	< 0.00250	U	< 0.00250	U	NA		NA		Yes
Silver	0.0014	0.0030	0.1	< 0.000500	U	< 0.000500	U	NA		NA		Yes
SEMI-VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		**µg/L**		
1,4-Dioxane**	NV	134.2	NV	NA		**0.48**		NA		NA		Yes

Notes:

µg/L - micrograms per liter; mg/L - milligrams per liter

DVQ - data validation qualifier

GWTP - Groundwater Treatment Plant

U - Non detect reported to the limit of detection

J - estimated concentration between the detection limit and limit of quantitation and/or due to quality control discrepancy

*Influent sample not compared to discharge limits

** Calculated Effluent Limit

Grab samples are compared to the daily maximum and composite samples to the daily average.

ROD - Record of Decision

NA - not applicable or not analyzed

Table 11. Quarterly GWTP Analytical Sampling Results - 2nd Quarter 2020

			Sample Location	EFFLUENT		INFLUENT*		Does Concentration Meet Discharge Limits? (Yes/No)
			Sample Identification	LH18/24-SP650_051920		LH18/24-SP140_051920		
			Lab Package	HS20050757		HS20050754		
			Sample Date	5/19/2020		5/19/2020		
			Sample Type	GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Protocol			Result	DVQ	Result	DVQ	
	Daily Average Concentration	Daily Maximum Concentration	Reporting Limit					
VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		
1,1,1-Trichloroethane	3,417	7,230	1	0.5	U	**2.3**		Yes
1,1,2-Trichloroethane	102.5	216.9	1	1.0	U	**2.1**		Yes
1,1-Dichloroethane	6,633	14,032	1	0.5	U	**9.6**		Yes
1,1-Dichloroethene	119	253	1	0.5	U	0.5	U	Yes
1,2-Dichloroethane	85	181	1	**0.91**	**J**	**50**		Yes
1,2-Dichloropropane	NA	NA	1	1.0	U	1.0	U	Yes
Acetone	1,132	2,395	2	1.0	U	1.0	U	Yes
Benzene	85	181	1	0.5	U	**2.5**		Yes
Carbon Tetrachloride	85	181	1	1.0	U	**7.3**		Yes
Chlorobenzene	22,300	47,180	1	1.0	U	1.0	U	Yes
Chloroform	1,708	3,615	1	0.5	U	**13**		Yes
Ethylbenzene	26,954	57,025	1	1.0	U	**1.5**		Yes
m,p-Xylenes	39.5	83.6	2	1.0	U	**1.0**	J	Yes
Methylene Chloride	803	1,699	2	1.0	U	**4,300**		Yes
o-Xylene	39.5	83.6	1	1.0	U	**0.76**	J	Yes
Styrene	2,829	5,987	1	1.0	U	**1.7**		Yes
Tetrachloroethene	85.4	180.7	1	1.0	U	**77**	J	Yes
Toluene	1,980	4,189	1	0.5	U	**2.3**		Yes
Trichloroethene	85	181	1	**4.0**		**5,900**		Yes
Vinyl Chloride	34	72	1	0.5	U	**99**		Yes
ANIONS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		
Chloride	NA	NA	10	**326**		**239**		NA
Sulfate	NA	NA	10	**32.5**		**31.6**		NA
PERCHLORATE	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		
Perchlorate	278	589	4	0.0500	U	**9,250**		Yes
METALS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		
Aluminum	0.777	1.644	0.0100	**0.0440**		**0.187**		Yes
Antimony	NA	NA	0.00200	**0.000560**	J	**0.00116**	J	NA
Arsenic	0.365	0.772	0.00200	**0.000722**	J	**0.00118**	J	Yes

Table 11. Quarterly GWTP Analytical Sampling Results - 2nd Quarter 2020

			Sample Location	EFFLUENT		INFLUENT*		Does Concentration Meet Discharge Limits? (Yes/No)
			Sample Identification	LH18/24-SP650_051920		LH18/24-SP140_051920		
			Lab Package	HS20050757		HS20050754		
			Sample Date	5/19/2020		5/19/2020		
			Sample Type	GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Protocol							
	Daily Average Concentration	Daily Maximum Concentration	Reporting Limit	Result	DVQ	Result	DVQ	
Barium	1	2	0.00400	**0.0980**		**0.417**		Yes
Beryllium	NA	NA	0.00200	0.000500	U	0.000500	U	NA
Cadmium	0.0016	0.0034	0.00200	0.000500	U	0.000500	U	Yes
Calcium	NA	NA	0.500	**8.42**		**24.2**		NA
Chromium	0.355	0.752	0.00400	**0.00262**	J	**0.00118**	J	Yes
Cobalt	5.433	11.495	0.00500	**0.00148**	J	**0.00597**		Yes
Iron	1.132	2.395	0.200	**0.248**		**0.896**		Yes
Lead	0.0022	0.0046	0.00200	0.00100	U	0.00100	U	Yes
Magnesium	NA	NA	0.200	**11.9**		**18.5**		NA
Manganese	7.323	15.494	0.00500	**0.0987**		**0.376**		Yes
Nickel	0.087	0.184	0.00200	**0.00369**	J	**0.00839**		Yes
Potassium	NA	NA	0.200	**1.48**		**1.05**		NA
Selenium	0.0057	0.012	0.00200	0.00250	U	0.00250	U	Yes
Silver	0.0014	0.003	0.00200	0.000500	U	0.000500	U	Yes
Sodium	NA	NA	1.00	**320**		**139**		NA
Thallium	NA	NA	0.00200	0.000500	U	0.000500	U	NA
Vanadium	1.698	3.592	0.00500	0.00100	U	0.00100	U	Yes
Zinc	0.146	0.31	0.00400	**0.0341**		**0.0227**		Yes
Mercury	NA	NA	0.000200	**0.0000410**	J	**0.0000310**	J	NA
1,4-DIOXANE	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		
1,4-Dioxane	NA	134.2	1	**33.0**		**37**		Yes
CHEMICAL OXYGEN DEMAND (COD)	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		
COD	NA	200	75	**17**		**19**		Yes
OIL AND GREASE (O&G)	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		
O&G	NA	15	2	**0.612**	J	2.0	U	Yes

Notes:
µg/L - micrograms per liter
DVQ - data validation qualifier
Grab samples are compared to the daily maximum and composite samples to the daily average
* only Effluent sample is compared to discharge limits
J - Estimated concentration between the detection limit and limit of quantitation and/or due to quality control discrepancy
U - non detect and reported to the limit of detection
mg/L - milligrams per liter
NA - not applicable
GWTP - Groundwater Treatment Plant

Table 6. Weekly Perchlorate Sample Results

Sample Identification	Lab Package	Date Sampled	Sample Location	Harrison Bayou Maximum Allowable Daily Discharge Perchlorate Concentration (µg/L)	INF Pond Discharge Criteria for Perchlorate (µg/L)	Reporting Limit	Influent Perchlorate (6850)	Effluent Perchlorate (6850)		Does Concentration Meet Discharge Limit? (Yes/No)	No Daily Maximum Concentration		
							Result (µg/L)	Result (µg/L)	DVQ		Ammonia as N (350.3) (mg/L)	Ortho-Phosphate (365.3) (mg/L)	Organic Carbon (SM5310C) (mg/L)
LH18/24-SP650_070920/BIX	HS20070398	7/9/2020	TK-650	589	17	0.1	NA	0.975		Yes	13	2.17	2.28
LH18/24-SP650_071420_BIX (monthly)	HS20070623	7/14/2020	TK-650	589	17	0.1	NA	0.106		Yes	--	--	--
LH18/24-SP140_071420 (monthly)	HS20070621	7/14/2020	TK-140	--	--	NA	6,780	NA		NA	--	--	--
LH18/24-SP650_071420/BIX	HS20070615	7/14/2020	TK-650	589	17	0.1	NA	1.08		Yes	12	1.87	2.13
LH18/24-SP650_072120/BIX	HS20070982	7/21/2020	TK-650	589	17	0.1	NA	0.627		Yes	12	1.65	2.02
LH18/24-SP650_072820/BIX	HS20071309	7/28/2020	TK-650	589	17	0.1	NA	35.9		Yes	15	2.57	2.77
LH18/24-SP650_080520/BIX	HS20080196	8/5/2020	TK-650	589	17	0.1	NA	0.923	J	Yes	9.9	2.20	2.01
LH18/24-SP650_081120_BIX (monthly)	HS20080473	8/11/2020	TK-650	589	17	0.1	NA	0.256	J	Yes	--	--	--
LH18/24-SP140_081120 (monthly)	HS20080475	8/11/2020	TK-140	--	--	NA	8,310	NA		NA	--	--	--
LH18/24-SP650_081120/BIX	HS20080474	8/11/2020	TK-650	589	17	0.1	NA	< 0.0500	U	Yes	12	2.76	2.11
LH18/24-SP650_081820-AIX	HS20080794	8/18/2020	TK-650	589	17	0.1	NA	0.207		Yes	11	2.58	1.85
LH18/24-SP650_082520_AIX(quarterly)	HS20081151	8/25/2020	TK-650	589	17	0.1	NA	0.319		Yes	--	--	--
LH18/24-SP140_082520 (quarterly)	HS20081150	8/25/2020	TK-140	--	--	NA	11,500	NA		NA	--	--	--
LH18/24-SP650_082520/AIX	HS20081133	8/25/2020	TK-650	589	17	0.1	NA	1.08		Yes	11	2.65	1.13
LH18/24-SP650_090120/AIX	HS20090080	9/1/2020	TK-650	589	17	0.1	NA	0.157	J	Yes	10	3.94	2.14
LH18/24-SP650_090920/AIX	HS20090475	9/9/2020	TK-650	589	17	0.1	NA	2.49		Yes	9.1	2.64	2.43
LH18/24-SP650_091520/AIX (monthly)	HS20090748	9/15/2020	TK-650	589	17	0.1	NA	5.69		Yes	--	--	--
LH18/24-SP140_091520 (monthly)	HS20090744	9/15/2020	TK-140	--	--	NA	8,350	NA		NA	--	--	--
LH18/24-SP650_091520/BIX	HS20090747	9/15/2020	TK-650	589	17	0.1	NA	0.583		Yes	15	3.06	2.34
LH18/24-SP650_091520-AIX	HS20090747	9/15/2020	TK-650	589	17	0.1	NA	6.49		Yes	--	--	--
LH18/24-SP650_092220/AIX	HS20091027	9/22/2020	TK-650	589	17	0.1	NA	2.09		Yes	19	3.50	3.60
LH18/24-SP650_092920/BIX	HS20091394	9/29/2020	TK-650	589	17	0.1	NA	< 0.0500	U	Yes	15	3.20	2.17

Sample Identification	Lab Package	Date Sampled	Sample Location	Harrison Bayou Maximum Allowable Daily Discharge Perchlorate Concentration (µg/L)	INF Pond Discharge Criteria for Perchlorate (µg/L)	Reporting Limit	Influent Perchlorate (6850)	Effluent Perchlorate (6850)		Does Concentration Meet Discharge Limit? (Yes/No)	No Daily Maximum Concentration		
							Result (µg/L)	Result (µg/L)	DVQ		Ammonia as N (350.3) (mg/L)	Ortho-Phosphate (365.3) (mg/L)	Organic Carbon (SM5310C) (mg/L)
LH18/24-SP650_092920-Between	HS20091394	9/29/2020	TK-650	589	17	0.1	NA	0.591	J	Yes	--	--	--
LH18/24-SP650_092920-AIX	HS20091394	9/29/2020	TK-650	589	17	0.1	NA	< 0.0500	U	Yes	--	--	--

Notes:
Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level (PCL)
SP140 samples are influent samples.
µg/L - micrograms per liter
DVQ - data validation qualifier
J - Estimated concentration between the detection limit and limit of quantitation and/or due to quality control discrepancies
NA - not applicable
U - non detect and reported to the limit of detection
BIX - before ion exchange/AIX - after ion exchange
mg/L - milligrams per liter

Table 7. Bi-Weekly GWTP Analytical Sampling Results for July 2020

				Sample Location	EFFLUENT - Biweekly		EFFLUENT - Monthly		INFLUENT - Monthly*		EFFLUENT - Biweekly		Does Concentration Meet Effluent Discharge Limits? (Yes/No)
				Sample Identification	LH18/24-SP650_070920		LH18/24-SP650_071420		LH18/24-SP140_071420		LH18/24-SP650_072120		
				Lab Package	HS20070399		HS20070623		HS20070621		HS20070984		
				Sample Date	7/9/2020		7/14/2020		7/14/2020		7/21/2020		
				Sample Type	GRAB		GRAB		GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Table 2 of ROD			Result	DVQ	Result	DVQ	Result	DVQ	Result	DVQ	
	Daily Average Concentration	Daily Maximum Concentration	INF Pond MCL									
VOLATILES	µg/L	µg/L	µg/L	µg/L		µg/L		µg/L		µg/L		
1,1,1-Trichloroethane	3,417	7,230	200	0.5	U	0.5	U	NA		0.5	U	Yes
1,1,2-Trichloroethane	102.5	216.9	5	1.0	U	1.0	U	NA		1.0	U	Yes
1,1-Dichloroethane	6,633	14,032	NV	0.5	U	0.5	U	NA		0.5	U	Yes
1,1-Dichloroethene	119	253	7	0.5	U	0.5	U	NA		0.5	U	Yes
1,2-Dichloroethane	85	181	5	**0.89**	J	**0.77**	J	NA		**0.75**	J	Yes
1,2-Dichloropropane	NA	NA	5	1.0	U	1.0	U	NA		1.0	U	Yes
Acetone	1,132	2,395	NV	1.0	U	1.0	U	NA		1.0	U	Yes
Benzene	85	181	5	0.5	U	0.5	U	NA		0.5	U	Yes
Carbon Tetrachloride	85	181	5	1.0	U	1.0	U	NA		1.0	U	Yes
Chlorobenzene	22,300	47,180	100	1.0	U	1.0	U	NA		1.0	U	Yes
Chloroform	1,708	3,615	NV	0.5	U	0.5	U	NA		0.5	U	Yes
cis-1,2-Dichloroethene	NV	NV	70	**16**		**15**		NA		**19**		Yes
Ethylbenzene	26,954	57,025	700	1.0	U	1.0	U	NA		1.0	U	Yes
m,p-Xylenes	39.5	83.6	NV	1.0	U	1.0	U	NA		1.0	U	Yes
Methylene Chloride	803	1,699	5	1.0	U	1.0	U	NA		1.0	U	Yes
o-Xylene	39.5	83.6	NV	1.0	U	1.0	U	NA		1.0	U	Yes
Styrene	2,829	5,987	100	1.0	U	1.0	U	NA		1.0	U	Yes
Tetrachloroethene	85.4	180.7	5	1.0	U	1.0	U	NA		1.0	U	Yes
Toluene	1,980	4,189	10	0.5	U	0.5	U	NA		0.68	UB	Yes
Trichloroethene	85	181	5	**2.8**		**3.4**		NA		**3.8**		Yes

			Sample Location	EFFLUENT - Biweekly		EFFLUENT - Monthly		INFLUENT - Monthly*		EFFLUENT - Biweekly		Does Concentration Meet Effluent Discharge Limits? (Yes/No)
			Sample Identification	LH18/24-SP650_070920		LH18/24-SP650_071420		LH18/24-SP140_071420		LH18/24-SP650_072120		
			Lab Package	HS20070399		HS20070623		HS20070621		HS20070984		
			Sample Date	7/9/2020		7/14/2020		7/14/2020		7/21/2020		
			Sample Type	GRAB		GRAB		GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Table 2 of ROD			Result	DVQ	Result	DVQ	Result	DVQ	Result	DVQ	
	Daily Average Concentration	Daily Maximum Concentration	INF Pond MCL									
Vinyl Chloride	34	72	2	0.5	U	0.5	U	NA		0.5	U	Yes
ANIONS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		**mg/L**		
Chloride	NV	NV	NV	**301**		NA		NA		**294**		NA
Sulfate	NV	NV	NV	**31.4**		NA		NA		**31.8**		NA
PERCHLORATE	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		**µg/L**		
Perchlorate	278	589	17	NA		**0.1060**		**6,780**		NA		Yes
METALS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		**mg/L**		
Hexavalent Chromium	0.058	0.124	NV	NA		0.0100	U	0.0100	UJ	NA		Yes
Barium	1	2	2	NA		**0.276**		NA		NA		Yes
Lead	0.0022	0.0046	0.015	NA		0.00100	U	NA		NA		Yes
Selenium	0.0057	0.0120	0.05	NA		0.00250	U	0.00250	U	NA		Yes
Silver	0.0014	0.0030	0.1	NA		0.000500	U	0.000500	U	NA		Yes
SEMI-VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		**µg/L**		
1,4-Dioxane**	NV	134.2	NV	NA		**15**		NA		NA		Yes

Notes:
µg/L - micrograms per liter
mg/L - milligrams per liter
DVQ - data validation qualifier
U - not detected and reported to the limit of detection
UJ - estimated - not detected due to QC discrepancies and reported to the limit of detection
J - estimated concentration and/or due to QC discrepancies
NV - no value
NA - not applicable or not analyzed
ROD - Record of Decision
GWTP - Groundwater Treatment Plant
Grab samples are compared to the daily maximum and composite samples to the daily average.
*Influent sample not compared to discharge limits
** Calculated Effluent Limit

Table 8. Bi-Weekly GWTP Analytical Sampling Results for August 2020

			Sample Location	EFFLUENT - Biweekly		EFFLUENT - Monthly		INFLUENT - Monthly*		EFFLUENT - Biweekly		Does Concentration Meet Effluent Discharge Limits? (Yes/No)
			Sample Identification	LH18/24-SP650_080520		LH18/24-SP650_081120		LH18/24-SP140_081120		LH18/24-SP650_081820		
			Lab Package	HS20080212		HS20080473		HS20080475		HS20080801		
			Sample Date	8/5/2020		8/11/2020		8/11/2020		8/18/2020		
			Sample Type	GRAB		GRAB		GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Table 2 of ROD			Result	DVQ	Result	DVQ	Result	DVQ	Result	DVQ	
	Daily Average Concentration	Daily Maximum Concentration	INF Pond MCL									
VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		**µg/L**		
1,1,1-Trichloroethane	3,417	7,230	200	0.50	U	0.50	U	NA		0.50	U	Yes
1,1,2-Trichloroethane	102.5	216.9	5	1.0	U	1.0	U	NA		1.0	U	Yes
1,1-Dichloroethane	6,633	14,032	NV	0.50	U	0.50	U	NA		0.50	U	Yes
1,1-Dichloroethene	119	253	7	0.50	U	0.50	U	NA		0.50	U	Yes
1,2-Dichloroethane	85	181	5	**0.74**	J	**0.70**	J	NA		**0.64**	J	Yes
1,2-Dichloropropane	NA	NA	5	1.0	U	1.0	U	NA		1.0	U	Yes
Acetone	1,132	2,395	NV	1.0	U	1.0	U	NA		1.0	U	Yes
Benzene	85	181	5	0.50	U	0.50	U	NA		0.50	U	Yes
Carbon Tetrachloride	85	181	5	1.0	U	1.0	U	NA		1.0	U	Yes
Chlorobezene	22,300	47,180	100	1.0	U	1.0	U	NA		1.0	U	Yes
Chloroform	1,708	3,615	NV	0.50	U	0.50	U	NA		0.50	U	Yes
cis-1,2-Dichloroethene	NV	NV	70	**20**		**17**		NA		**16**		Yes
Ethylbenzene	26,954	57,025	700	1.0	U	1.0	U	NA		1.0	U	Yes
m,p-Xylenes	39.5	83.6	NV	1.0	U	1.0	U	NA		1.0	U	Yes
Methylene Chloride	803	1,699	5	1.0	U	1.0	U	NA		1.0	U	No
o-Xylene	39.5	83.6	NV	1.0	U	1.0	U	NA		1.0	U	Yes
Styrene	2,829	5,987	100	1.0	U	1.0	U	NA		1.0	U	Yes
Tetrachloroethene	85.4	180.7	5	1.0	U	1.0	U	NA		1.0	U	Yes
Toluene	1,980	4,189	10	0.50	U	0.50	U	NA		0.50	U	Yes
Trichloroethene	85	181	5	**4.6**	J	**3.7**	J	NA		**3.4**	J	No
Vinyl Chloride	34	72	2	0.50	U	0.50	U	NA		0.50	U	Yes

			Sample Location	EFFLUENT - Biweekly		EFFLUENT - Monthly		INFLUENT - Monthly*		EFFLUENT - Biweekly		Does Concentration Meet Effluent Discharge Limits? (Yes/No)
			Sample Identification	LH18/24-SP650_080520		LH18/24-SP650_081120		LH18/24-SP140_081120		LH18/24-SP650_081820		
			Lab Package	HS20080212		HS20080473		HS20080475		HS20080801		
			Sample Date	8/5/2020		8/11/2020		8/11/2020		8/18/2020		
			Sample Type	GRAB		GRAB		GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Table 2 of ROD			Result	DVQ	Result	DVQ	Result	DVQ	Result	DVQ	
	Daily Average Concentration	Daily Maximum Concentration	INF Pond MCL									
ANIONS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		**mg/L**		
Chloride	NV	NV	NV	**312**		NA		NA		**332**		NA
Sulfate	NV	NV	NV	**31.3**		NA		NA		**32.8**		NA
PERCHLORATE	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		**µg/L**		
Perchlorate	278	589	17	NA		**0.256**	J	**8,310**		NA		Yes
METALS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		**mg/L**		
Hexavalent Chromium	0.058	0.124	NV	NA		0.0100	U	0.0100	U	NA		Yes
Barium	1	2	2	NA		**0.553**		NA		NA		Yes
Lead	0.0022	0.0046	0.015	NA		0.00100	U	NA		NA		Yes
Selenium	0.0057	0.0120	0.05	NA		0.00250	U	0.00250	U	NA		Yes
Silver	0.0014	0.0030	0.1	NA		0.000500	U	0.000500	U	NA		Yes
SEMI-VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		**µg/L**		
1,4-Dioxane**	NV	134.2	NV	NA		**2.2**		NA		NA		Yes

Notes:
µg/L - micrograms per liter
mg/L - milligrams per liter
DVQ - data validation qualifier
NA - not applicable or not analyzed
U - not detected and reported to the limit of detection
J - estimated concentration and/or due to QC discrepancies

GWTP - Groundwater Treatment Plant
ROD - Record of Decision
*Influent sample not compared to discharge limits
** Calculated Effluent Limit
Grab samples are compared to the daily maximum and composite samples to the daily average.

Table 9. Bi-Weekly GWTP Analytical Sampling Results for September 2020

			Sample Location	EFFLUENT - Biweekly		INFLUENT - Monthly*		EFFLUENT - Monthly		EFFLUENT - Biweekly		Does Concentration Meet Effluent Discharge Limits? (Yes/No)
			Sample Identification	LH18/24-SP650_090920		LH18/24-SP140_091520		LH18/24-SP650_091520		LH18/24-SP650_092220		
			Lab Package	HS20090534		HS20090744		HS20090748		HS20091030		
			Sample Date	9/9/2020		9/15/2020		9/15/2020		9/22/2020		
			Sample Type	GRAB		GRAB		GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Table 2 of ROD			Result	DVQ	Result	DVQ	Result	DVQ	Result	DVQ	
	Daily Average Concentration	Daily Maximum Concentration	INF Pond MCL									
VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**								
1,1,1-Trichloroethane	3,417	7,230	200	0.50	U	NA		0.50	U	0.50	U	Yes
1,1,2-Trichloroethane	102.5	216.9	5	1.0	U	NA		1.0	U	1.0	U	Yes
1,1-Dichloroethane	6,633	14,032	NV	0.50	U	NA		0.50	U	0.50	U	Yes
1,1-Dichloroethene	119	253	7	0.50	U	NA		0.50	U	0.50	U	Yes
1,2-Dichloroethane	85	181	5	0.50	U	NA		0.50	U	0.50	U	Yes
1,2-Dichloropropane	NA	NA	5	1.0	U	NA		1.0	U	1.0	U	Yes
Acetone	1,132	2,395	NV	1.0	U	NA		1.0	U	1.0	U	Yes
Benzene	85	181	5	0.50	U	NA		0.50	U	0.50	U	Yes
Carbon Tetrachloride	85	181	5	1.0	U	NA		1.0	U	1.0	U	Yes
Chlorobenzene	22,300	47,180	100	1.0	U	NA		1.0	U	1.0	U	Yes
Chloroform	1,708	3,615	NV	0.50	U	NA		0.50	U	0.50	U	Yes
cis-1,2-Dichloroethene	NV	NV	70	**22**		NA		**20**		**19**		Yes
Ethylbenzene	26,954	57,025	700	1.0	U	NA		1.0	U	1.0	U	Yes
m,p-Xylenes	39.5	83.6	NV	1.0	U	NA		1.0	U	1.0	U	Yes
Methylene Chloride	803	1,699	5	1.0	U	NA		1.0	U	1.0	U	Yes
o-Xylene	39.5	83.6	NV	1.0	U	NA		1.0	U	1.0	U	Yes
Styrene	2,829	5,987	100	1.0	U	NA		1.0	U	1.0	U	Yes
Tetrachloroethene	85.4	180.7	5	1.0	U	NA		1.0	U	1.0	U	Yes
Toluene	1,980	4,189	10	0.50	U	NA		0.50	U	0.50	U	Yes
Trichloroethene	85	181	5	**4.1**		NA		**1.3**		**1.0**		Yes
Vinyl Chloride	34	72	2	**0.89**	J	NA		0.50	U	0.50	U	Yes

GWTP Quarterly Evaluation Report – 3rd Quarter 2020
Longhorn Army Ammunition Plant

			Sample Location	EFFLUENT - Biweekly		INFLUENT - Monthly*		EFFLUENT - Monthly		EFFLUENT - Biweekly		Does Concentration Meet Effluent Discharge Limits? (Yes/No)
			Sample Identification	LH18/24-SP650_090920		LH18/24-SP140_091520		LH18/24-SP650_091520		LH18/24-SP650_092220		
			Lab Package	HS20090534		HS20090744		HS20090748		HS20091030		
			Sample Date	9/9/2020		9/15/2020		9/15/2020		9/22/2020		
			Sample Type	GRAB		GRAB		GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Table 2 of ROD			Result	DVQ	Result	DVQ	Result	DVQ	Result	DVQ	
	Daily Average Concentration	Daily Maximum Concentration	INF Pond MCL									
ANIONS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		**mg/L**		
Chloride	NV	NV	NV	**422**		NA		NA		**570**		NA
Sulfate	NV	NV	NV	**34.5**		NA		NA		**46.6**		NA
PERCHLORATE	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		**µg/L**		
Perchlorate	278	589	17	NA		**8,350**		**5.69**		NA		Yes
METALS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		**mg/L**		
Hexavalent Chromium	0.058	0.124	NV	NA		0.0100	U	0.0100	U	NA		Yes
Barium	1	2	2	NA		NA		**0.155**		NA		Yes
Lead	0.0022	0.0046	0.015	NA		NA		0.000679	UB	NA		Yes
Selenium	0.0057	0.0120	0.05	NA		0.00250	U	0.00250	U	NA		Yes
Silver	0.0014	0.0030	0.1	NA		0.000500	U	0.000500	UJ	NA		Yes
SEMI-VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		**µg/L**		
1,4-Dioxane**	NV	134.2	NV	NA		NA		**5.7**		NA		Yes

Notes:
µg/L - micrograms per liter
mg/L - milligrams per liter
DVQ - data validation qualifier
UB - considered an artifact of blank contamination
UJ - estimated non-detect
U - Non detect reported to the limit of detection
J - estimated concentration between the detection limit and limit of quantitation and/or due to quality control discrepancy
NA - not applicable or not analyzed
GWTP - Groundwater Treatment Plant
*Influent sample not compared to discharge limits
** Calculated Effluent Limit
Grab samples are compared to the daily maximum and composite samples to the daily average.
ROD - Record of Decision

Table 10. Quarterly GWTP Analytical Sampling Results for 3rd Quarter 2020

Sample Location				**EFFLUENT**		**INFLUENT***		**Does Concentration Meet Discharge Limits? (Yes/No)**
Sample Identification				**LH18/24-SP650_082520**		**LH18/24-SP140_082520**		
Lab Package				**HS20081151**		**HS20081150**		
Sample Date				**8/25/2020**		**8/25/2020**		
Sample Type				**GRAB**		**GRAB**		
	Effluent Limitation for Discharge (µg/L) per Protocol			**Result**	**DVQ**	**Result**	**DVQ**	
	Daily Average Concentration	**Daily Maximum Concentration**	**Reporting Limit**					
VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		
1,1,1-Trichloroethane	3,417	7,230	1	0.5	U	2.5	U	Yes
1,1,2-Trichloroethane	102.5	216.9	1	1.0	U	3.3	J	Yes
1,1-Dichloroethane	6,633	14,032	1	0.5	U	17		Yes
1,1-Dichloroethene	119	253	1	0.5	U	2.5	U	Yes
1,2-Dichloroethane	85	181	1	**0.52**	**J**	**66**		Yes
1,2-Dichloropropane	NA	NA	1	1.0	U	5.0	U	Yes
Acetone	1,132	2,395	2	1.0	U	5.0	U	Yes
Benzene	85	181	1	0.5	U	**4.0**	J	Yes
Carbon Tetrachloride	85	181	1	1.0	U	**8.2**		Yes
Chlorobenzene	22,300	47,180	1	1.0	U	5.0	U	Yes
Chloroform	1,708	3,615	1	0.5	U	20		Yes
cis-1,2-Dichloroethene	NV	NV	1	**21**	**J**	**6300**		NA
Ethylbenzene	26,954	57,025	1	1.0	U	5.0	U	Yes
m,p-Xylenes	39.5	83.6	2	1.0	U	5.0	U	Yes
Methylene Chloride	803	1,699	2	1.0	U	**3,200**		Yes
o-Xylene	39.5	83.6	1	1.0	U	5.0	U	Yes
Styrene	2,829	5,987	1	1.0	U	5.0	U	Yes
Tetrachloroethene	85.4	180.7	1	1.0	U	**81**		Yes
Toluene	1,980	4,189	1	0.5	U	**3.6**	**J**	Yes
Trichloroethene	85	181	1	**3.4**	**J**	**9,200**		Yes

			Sample Location	EFFLUENT		INFLUENT*		Does Concentration Meet Discharge Limits? (Yes/No)
			Sample Identification	LH18/24-SP650_082520		LH18/24-SP140_082520		
			Lab Package	HS20081151		HS20081150		
			Sample Date	8/25/2020		8/25/2020		
			Sample Type	GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Protocol			Result	DVQ	Result	DVQ	
	Daily Average Concentration	Daily Maximum Concentration	Reporting Limit					
Vinyl Chloride	34	72	1	0.5	U	130		Yes
ANIONS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		
Chloride	NA	NA	10	350		383		NA
Sulfate	NA	NA	10	24.7		32.2		NA
PERCHLORATE	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		
Perchlorate	278	589	4	0.3190		11,500		Yes
METALS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		
Aluminum	0.777	1.644	0.0100	0.00864	UB	**0.0427**		Yes
Antimony	NA	NA	0.00200	**0.000883**	**J**	0.00100	U	NA
Arsenic	0.365	0.772	0.00200	**0.000732**	**J**	**0.00127**	**J**	Yes
Barium	1	2	0.00400	**0.702**		**0.737**		Yes
Beryllium	NA	NA	0.00200	0.000500	U	0.000500	U	NA
Cadmium	0.0016	0.0034	0.00200	0.000500	U	0.000500	U	Yes
Calcium	NA	NA	0.500	**41.6**		**36.1**		**NA**
Chromium	0.355	0.752	0.00400	**0.000428**	**J**	**0.00138**	**J**	Yes
Cobalt	5.433	11.495	0.00500	**0.000288**	**J**	**0.00855**		Yes
Iron	1.132	2.395	0.200	**0.0815**	**J**	**0.998**		Yes
Lead	0.0022	0.0046	0.00200	0.00100	U	0.00100	U	Yes
Magnesium	NA	NA	0.200	**28.9**		**26.5**		NA
Manganese	7.323	15.494	0.00500	**0.0565**		**0.559**		Yes
Nickel	0.087	0.184	0.00200	**0.00124**	**J**	**0.00928**		Yes
Potassium	NA	NA	0.200	**1.20**		**1.23**		NA

			Sample Location	EFFLUENT		INFLUENT*		Does Concentration Meet Discharge Limits? (Yes/No)
			Sample Identification	LH18/24-SP650_082520		LH18/24-SP140_082520		
			Lab Package	HS20081151		HS20081150		
			Sample Date	8/25/2020		8/25/2020		
			Sample Type	GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Protocol							
	Daily Average Concentration	Daily Maximum Concentration	Reporting Limit	Result	DVQ	Result	DVQ	
Selenium	0.0057	0.012	0.00200	0.00250	U	0.00250	U	Yes
Silver	0.0014	0.003	0.00200	0.000500	U	0.000500	U	Yes
Sodium	NA	NA	1.00	**173**		**180**		NA
Thallium	NA	NA	0.00200	0.000500	U	0.000500	U	NA
Vanadium	1.698	3.592	0.00500	0.00100	U	**0.000758**	**J**	Yes
Zinc	0.146	0.31	0.00400	**0.0129**		**0.0263**		No
Mercury	NA	NA	0.000200	0.000100	U	0.000100	U	NA
1,4-DIOXANE	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		
1,4-Dioxane	NA	134.2	1	**6.4**		1.0	U	Yes
CHEMICAL OXYGEN DEMAND (COD)	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		
COD	NA	200	75	**8.00**	**J**	**15.0**		Yes
OIL AND GREASE (O&G)	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		
O&G	NA	15	2	1.0	U	1.0	U	Yes

Notes:
µg/L - micrograms per liter
mg/L - milligrams per liter
DVQ - data validation qualifier
UB - considered an artifact of blank contamination
J - Estimated concentration between the detection limit and limit of quantitation and/or due to quality control discrepancy
U - non detect and reported to the limit of detection
Grab samples are compared to the daily maximum and composite samples to the daily average
* only Effluent sample is compared to discharge limits
NA - not applicable
GWTP - Groundwater Treatment Plant
NV - no value

Table 7. Weekly Perchlorate Sample Results

Sample Identification	Lab Package	Date Sampled	Sample Location	Harrison Bayou Maximum Allowable Daily Discharge Perchlorate Concentration (µg/L)	INF Pond Discharge Criteria for Perchlorate (µg/L)	Reporting Limit	Influent Perchlorate (6850)	Effluent Perchlorate (6850)		Does Concentration Meet Discharge Limit? (Yes/No)	No Daily Maximum Concentration		
							Result (µg/L)	Result (µg/L)	DVQ		Ammonia as N (350.3) (mg/L)	Ortho-Phosphate (365.3) (mg/L)	Organic Carbon (SM5310C) (mg/L)
LH18/24-SP650_100620_BIX	HS20100285	10/6/2020	TK-650	589	17	0.1	NA	< 0.0500	U	Yes	**11**	**2.86**	**2.13**
LH18/24-SP650_100620_AIX	HS20100285	10/6/2020	TK-650	589	17	0.1	NA	< 0.0500	U	Yes	--	--	--
LH18/24-SP650_101320_AIX (monthly)	HS20100694	10/13/2020	TK-650	589	17	0.1	NA	**1.04**		Yes	--	--	--
LH18/24-SP140_101320 (monthly)	HS20100695	10/13/2020	TK-140	--	--	NA	**6,260**	NA		NA	--	--	--
LH18/24-SP650_101320_AIX	HS20100717	10/13/2020	TK-650	589	17	0.1	NA	**0.964**		Yes	**16**	**3.03**	**1.58**
LH18/24-SP650_102120_AIX	HS20101139	10/21/2020	TK-650	589	17	0.1	NA	< 0.0500	U	Yes	**7.8**	**2.11**	**0.93**
LH18/24-SP650_102720-Between	HS20101403	10/27/2020	TK-650	589	17	0.1	NA	**6.64**		Yes	**12**	**2.93**	**1.68**
LH18/24-SP650_102720_AIX	HS20101403	10/27/2020	TK-650	589	17	0.1	NA	< 0.0500	U	Yes	--	--	--
LH18/24-SP650_110320_AIX	HS20110120	11/3/2020	TK-650	589	17	0.1	NA	< 0.0500	U	Yes	**13**	**2.59**	**1.2**
LH18/24-SP650_111020_AIX (monthly)	HS20110505	11/10/2020	TK-650	589	17	0.1	NA	**6.67**		Yes	--	--	--
LH18/24-SP140_111020 (monthly)	HS20110507	11/10/2020	TK-140	--	--	NA	**9,440**	NA		NA	--	--	--
LH18/24-SP650_111020_AIX	HS20110510	11/10/2020	TK-650	589	17	0.1	NA	**7.40**		Yes	**14**	**3.10**	**1.25**
LH18/24-SP650_111720_AIX	HS20110936	11/17/2020	TK-650	589	17	0.1	NA	**6.90**		Yes	**8.4**	**2.75**	**1.87**
LH18/24-SP650_112420_AIX (quarterly)	HS20111260	11/24/2020	TK-650	589	17	0.1	NA	< 0.250	U	Yes	--	--	--
LH18/24-SP140_112420 (quarterly)	HS20111258	11/24/2020	TK-140	--	--	NA	**8,900**	NA		NA	--	--	--
LH18/24-SP650_112420_AIX	HS20111255	11/24/2020	TK-650	589	17	0.1	NA	< 0.250	U	Yes	**4.8**	**2.82**	**1.20**
LH18/24-SP650_120220_AIX	HS20120241	12/2/2020	TK-650	589	17	0.1	NA	< 0.250	U	Yes	**0.48**	**1.76**	**1.14**
LH18/24-SP650_120220-Between	HS20120241	12/2/2020	TK-650	589	17	0.1	NA	**3.17**		Yes	--	--	--
LH18/24-SP650_120820_BIX	HS20120450	12/8/2020	TK-650	589	17	0.1	NA	< 0.250	U	Yes	**7.4**	**2.07**	**1.15**
LH18/24-SP650_120820_BIX (monthly)	HS20120455	12/8/2020	TK-650	589	17	0.1	NA	< 0.250	U	Yes	--	--	--
LH18/24-SP140_120820 (monthly)	HS20120449	12/8/2020	TK-140	--	--	NA	**7,770 J**	NA		NA	--	--	--
LH18/24-SP650_121520_BIX	HS20120802	12/15/2020	TK-650	589	17	0.1	NA	< 0.0500	U	Yes	**3.3**	**0.880 J**	**0.89**
LH18/24-SP650_122220_BIX	HS20121203	12/22/2020	TK-650	589	17	0.1	NA	**0.595**		Yes	**7.8**	**1.96**	**0.79**
LH18/24-SP650_122920_BIX	HS20121336	12/29/2020	TK-650	589	17	0.1	NA	**0.292**	**J**	Yes	**4.4**	**1.00**	**0.71**

Notes:
Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level (PCL)
SP140 samples are influent samples.
µg/L - micrograms per liter
DVQ - data validation qualifier
J - Estimated concentration between the detection limit and limit of quantitation and/or due to quality control discrepancies
NA - not applicable
U - non detect and reported to the limit of detection
BIX - before ion exchange/AIX - after ion exchange
mg/L - milligrams per liter

Table 8. Bi-Weekly GWTP Analytical Sampling Results for October 2020

Sample Location				EFFLUENT - Biweekly		EFFLUENT - Monthly		INFLUENT - Monthly*		EFFLUENT - Biweekly		Does Concentration Meet Effluent Discharge Limits? (Yes/No)
Sample Identification				LH18/24-SP650_100620		LH18/24-SP650_101320		LH18/24-SP140_101320		LH18/24-SP650_102120		
Lab Package				HS20100334		HS20100694		HS20100695		HS20101149		
Sample Date				10/6/2020		10/13/2020		10/13/2020		10/21/2020		
Sample Type				GRAB		GRAB		GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Table 2 of ROD			Result	DVQ	Result	DVQ	Result	DVQ	Result	DVQ	
	Daily Average Concentration	Daily Maximum Concentration	INF Pond MCL									
VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		**µg/L**		
1,1,1-Trichloroethane	3,417	7,230	200	0.5	U	0.5	U	NA		0.5	U	Yes
1,1,2-Trichloroethane	102.5	216.9	5	1.0	U	1.0	U	NA		1.0	U	Yes
1,1-Dichloroethane	6,633	14,032	NV	0.5	U	0.5	U	NA		0.5	U	Yes
1,1-Dichloroethene	119	253	7	0.5	U	0.5	U	NA		0.5	U	Yes
1,2-Dichloroethane	85	181	5	0.5	U	0.5	U	NA		0.5	U	Yes
1,2-Dichloropropane	NA	NA	5	1.0	U	1.0	U	NA		1.0	U	Yes
Acetone	1,132	2,395	NV	1.0	U	1.0	U	NA		1.0	U	Yes
Benzene	85	181	5	0.5	U	0.5	U	NA		0.5	U	Yes
Carbon Tetrachloride	85	181	5	1.0	U	1.0	U	NA		1.0	U	Yes
Chlorobenzene	22,300	47,180	100	1.0	U	1.0	U	NA		1.0	U	Yes
Chloroform	1,708	3,615	NV	0.5	U	0.5	U	NA		0.5	U	Yes
cis-1,2-Dichloroethene	NV	NV	70	**16**		**15**		NA		**13**		Yes
Ethylbenzene	26,954	57,025	700	1.0	U	1.0	U	NA		1.0	U	Yes
m,p-Xylene	39.5	83.6	NV	1.0	U	1.0	U	NA		1.0	U	Yes
Methylene Chloride	803	1,699	5	1.0	U	1.0	U	NA		1.0	U	Yes
o-Xylene	39.5	83.6	NV	1.0	U	1.0	U	NA		0.5	U	Yes
Styrene	2,829	5,987	100	1.0	U	1.0	U	NA		0.5	U	Yes
Tetrachloroethene	85.4	180.7	5	1.0	U	1.0	U	NA		0.5	U	Yes
Toluene	1,980	4,189	10	0.5	U	0.5	U	NA		0.5	U	Yes
Trichloroethene	85	181	5	**2.8**		**1.3**		NA		**.2**		Yes
Vinyl Chloride	34	72	2	**0.46**	J	0.5	U	NA		0.5	U	Yes
ANIONS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		**mg/L**		
Chloride	NV	NV	NV	**583**		NA		NA		**561**		NA
Sulfate	NV	NV	NV	**33.8**		NA		NA		**32.2**		NA
PERCHLORATE	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		**µg/L**		
Perchlorate	278	589	17	NA		**1.04**		**6,260**		NA		Yes
METALS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		**mg/L**		
Hexavalent Chromium	0.058	0.124	NV	NA		0.0100	U	0.0100	U	NA		Yes
Barium	1	2	2	NA		**0.181**		NA		NA		Yes
Lead	0.0022	0.0046	0.015	NA		0.00100	U	NA		NA		Yes
Selenium	0.0057	0.0120	0.05	NA		0.00250	U	0.00250	U	NA		Yes
Silver	0.0014	0.0030	0.1	NA		0.000500	U	0.000500	U	NA		Yes
SEMI-VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		**µg/L**		
1,4-Dioxane**	NV	134.2	NV	NA		**3.0**		NA		NA		Yes

Notes:

µg/L - micrograms per liter
mg/L - milligrams per liter
DVQ - data validation qualifier
NA - not applicable or not analyzed
GWTP - Groundwater Treatment Plant
ROD - Record of Decision
Grab samples are compared to the daily maximum and composite samples to the daily average.
U - not detected and reported to the limit of detection
J - estimated concentration and/or due to QC discrepancies
*Influent sample not compared to discharge limits
NV - no value
** Calculated Effluent Limit
no exceedances; released to Harrison Bayou
UJ - esimtated not detected due to QC discrepancies and reported to the limit of detection

Table 9. Bi-Weekly GWTP Analytical Sampling Results for November 2020

			Sample Location	EFFLUENT - Biweekly		EFFLUENT - Monthly		INFLUENT - Monthly*		EFFLUENT - Biweekly		Does Concentration Meet Effluent Discharge Limits? (Yes/No)
			Sample Identification	LH18/24-SP650_110320		LH18/24-SP650_111020		LH18/24-SP140_111020		LH18/24-SP650_111720		
			Lab Package	HS20110121		HS20110505		HS20110507		HS20110952		
			Sample Date	11/3/2020		11/10/2020		11/10/2020		11/17/2020		
			Sample Type	GRAB		GRAB		GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Table 2 of ROD			Result	DVQ	Result	DVQ	Result	DVQ	Result	DVQ	
	Daily Average Concentration	Daily Maximum Concentration	INF Pond MCL									
VOLATILES	µg/L	µg/L	µg/L	µg/L		µg/L		µg/L		µg/L		
1,1,1-Trichloroethane	3,417	7,230	200	0.50	U	0.50	U	NA		0.50	U	Yes
1,1,2-Trichloroethane	102.5	216.9	5	1.0	U	1.0	U	NA		1.0	U	Yes
1,1-Dichloroethane	6,633	14,032	NV	0.50	U	0.50	U	NA		0.50	U	Yes
1,1-Dichloroethene	119	253	7	0.50	U	0.50	U	NA		0.50	U	Yes
1,2-Dichloroethane	85	181	5	0.50	U	0.50	U	NA		0.50	U	Yes
1,2-Dichloropropane	NA	NA	5	1.0	U	1.0	U	NA		1.0	U	Yes
Acetone	1,132	2,395	NV	1.0	U	1.0	U	NA		1.0	U	Yes
Benzene	85	181	5	0.50	U	0.50	U	NA		0.50	U	Yes
Carbon Tetrachloride	85	181	5	1.0	U	1.0	U	NA		1.0	U	Yes
Chlorobezene	22,300	47,180	100	1.0	U	1.0	U	NA		1.0	U	Yes
Chloroform	1,708	3,615	NV	0.50	U	0.50	U	NA		0.50	U	Yes
cis-1,2-Dichloroethene	NV	NV	70	**12**		**8.9**		NA		**8.4**		Yes
Ethylbenzene	26,954	57,025	700	1.0	U	1.0	U	NA		0.50	U	Yes
m,p-Xylene	39.5	83.6	NV	1.0	U	1.0	U	NA		1.0	U	Yes
Methylene Chloride	803	1,699	5	1.0	U	1.0	U	NA		1.0	U	No
o-Xylene	39.5	83.6	NV	1.0	U	1.0	U	NA		1.0	U	Yes
Styrene	2,829	5,987	100	1.0	U	1.0	U	NA		0.50	U	Yes
Tetrachloroethene	85.4	180.7	5	1.0	U	1.0	U	NA		0.50	U	Yes
Toluene	1,980	4,189	10	0.50	U	0.50	U	NA		0.50	U	Yes
Trichloroethene	85	181	5	**1.3**		**0.88**	J	NA		**1.1**		No
Vinyl Chloride	34	72	2	0.50	U	0.50	U	NA		0.50	U	Yes
ANIONS	mg/L	mg/L	mg/L	mg/L		mg/L		mg/L		mg/L		
Chloride	NV	NV	NV	**620**		NA		NA		**628**		NA
Sulfate	NV	NV	NV	**34.4**		NA		NA		**31.4**		NA
PERCHLORATE	µg/L	µg/L	µg/L	µg/L		µg/L		µg/L		µg/L		
Perchlorate	278	589	17	NA		**6.67**		**9,440**		NA		Yes
METALS	mg/L	mg/L	mg/L	mg/L		mg/L		mg/L		mg/L		
Hexavalent Chromium	0.058	0.124	NV	NA		0.0100	U	0.0100	U	NA		Yes
Barium	1	2	2	NA		**0.280**		NA		NA		Yes
Lead	0.0022	0.0046	0.015	NA		0.00100	U	NA		NA		Yes
Selenium	0.0057	0.0120	0.05	NA		0.00250	U	0.00250	U	NA		Yes
Silver	0.0014	0.0030	0.1	NA		0.000500	U	0.000500	U	NA		Yes
SEMI-VOLATILES	µg/L	µg/L	µg/L	µg/L		µg/L		µg/L		µg/L		
1,4-Dioxane**	NV	134.2	NV	NA		**3.3**		NA		NA		Yes

Notes:

µg/L - micrograms per liter
mg/L - milligrams per liter
DVQ - data validation qualifier
ROD - Record of Decision
GWTP - Groundwater Treatment Plant
*Influent sample not compared to discharge limits
NA - not applicable or not analyzed
U - not detected and reported to the limit of detection
Grab samples are compared to the daily maximum and composite samples to the daily average.
** Calculated Effluent Limit
no exceedances; released to Harrison Bayou
J - estimated concentration and/or due to QC discrepancies

Table 10. Bi-Weekly Analytical GWTP Sampling Results for December 2020

Sample Location				EFFLUENT - Biweekly		INFLUENT - Monthly*		EFFLUENT - Monthly		EFFLUENT - Biweekly		EFFLUENT - Biweekly		Does Concentration Meet Effluent Discharge Limits? (Yes/No)
Sample Identification				LH18/24-SP650_120220		LH18/24-SP140_120820		LH18/24-SP650_120820		LH18/24-SP650_121520		LH18/24-SP650_122920		
Lab Package				HS20120243		HS20120449		HS20120455		HS20120803		HS20121361		
Sample Date				12/2/2020		12/8/2020		12/8/2020		12/15/2020		12/29/2020		
Sample Type				GRAB		GRAB		GRAB		GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Table 2 of ROD			Result	VQ	Result	VQ	Result	VQ	Result	VQ	Result	VQ	
	Daily Average Concentration	Daily Maximum Concentration	INF Pond MCL											
VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**										
1,1,1-Trichloroethane	3,417	7,230	200	0.50	U	NA		0.50	U	0.50	U	0.50	U	Yes
1,1,2-Trichloroethane	102.5	216.9	5	0.50	U	NA		0.50	U	1.0	U	0.50	U	Yes
1,1-Dichloroethane	6,633	14,032	NV	0.50	UJ	NA		0.50	U	0.50	U	0.50	U	Yes
1,1-Dichloroethene	119	253	7	0.50	UJ	NA		0.50	U	0.50	U	0.50	U	Yes
1,2-Dichloroethane	85	181	5	0.50	U	NA		0.50	U	0.50	U	0.50	U	Yes
1,2-Dichloropropane	NA	NA	5	1.0	U	NA		0.50	U	0.50	U	0.50	U	Yes
Acetone	1,132	2,395	NV	1.0	U	NA		1.0	U	1.0	UJ	1.0	UJ	Yes
Benzene	85	181	5	0.50	U	NA		0.50	U	0.50	U	0.50	U	Yes
Carbon Tetrachloride	85	181	5	0.50	U	NA		0.50	U	0.50	U	0.50	U	Yes
Chlorobenzene	22,300	47,180	100	0.50	U	NA		0.50	U	0.50	U	0.50	U	Yes
Chloroform	1,708	3,615	NV	0.50	U	NA		0.50	U	0.50	U	0.50	U	Yes
cis-1,2-Dichloroethene	NV	NV	70	**7.7**		NA		**6.9**		**7.2**		**6.8**		Yes
Ethylbenzene	26,954	57,025	700	1.0	U	NA		1.0	U	1.0	U	1.0	U	Yes
m,p-Xylene	39.5	83.6	NV	1.0	U	NA		1.0	U	1.0	U	1.0	U	Yes
Methylene Chloride	803	1,699	5	1.0	UJ	NA		1.0	U	1.0	U	1.0	U	Yes
o-Xylene	39.5	83.6	NV	1.0	U	NA		0.50	U	1.0	U	0.50	U	Yes
Styrene	2,829	5,987	100	1.0	U	NA		0.50	U	1.0	U	0.50	U	Yes
Tetrachloroethene	85.4	180.7	5	0.50	U	NA		0.50	U	0.50	U	0.50	U	Yes
Toluene	1,980	4,189	10	0.50	U	NA		0.50	U	0.50	U	0.50	U	Yes
Trichloroethene	85	181	5	**1.2**		NA		**2.3**		**2.1**		**2.1**		Yes
Vinyl Chloride	34	72	2	**0.41**	J	NA		0.50	U	0.50	U	0.50	U	Yes
ANIONS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		**mg/L**		**mg/L**		
Chloride	NV	NV	NV	**678**	J	NA		NA		**740**		**705**		NA
Sulfate	NV	NV	NV	**29.4**		NA		NA		**23.6**		**22.8**		NA
PERCHLORATE	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		**µg/L**		**µg/L**		
Perchlorate	278	589	17	NA		**7,770**	J	0.250	U	NA		NA		Yes
METALS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		**mg/L**		**mg/L**		
Hexavalent Chromium	0.058	0.124	NV	NA		0.0100	U	0.0100	U	NA		NA		Yes
Barium	1	2	2	NA		NA		**0.343**		NA		NA		Yes
Lead	0.0022	0.0046	0.015	NA		NA		0.00100	U	NA		NA		Yes
Selenium	0.0057	0.0120	0.05	NA		0.00250	U	0.00250	U	NA		NA		Yes
Silver	0.0014	0.0030	0.1	NA		0.000500	U	0.000500	U	NA		NA		Yes
SEMI-VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		**µg/L**		**µg/L**		
1,4-Dioxane**	NV	134.2	NV	NA		NA		**1.3**		NA		NA		Yes

Notes:

µg/L - micrograms per liter

DVQ - data validation qualifier

GWTP - Groundwater Treatment Plant

no exceedances; released to Harrison Bayou

U - Non detect reported to the limit of detection

UJ - estimated non-detect due to quality control issues

mg/L - milligrams per liter

J - estimated concentration between the detection limit and limit of quantitation and/or due to quality control discrepancy

*Influent sample not compared to discharge limits

** Calculated Effluent Limit

Grab samples are compared to the daily maximum and composite samples to the daily average.

ROD - Record of Decision

NA - not applicable or not analyzed

Table 11. Quarterly GWTP Analytical Sampling Results

			Sample Location	EFFLUENT		INFLUENT*		Does Concentration Meet Discharge Limits? (Yes/No)
			Sample Identification	LH18/24-SP650_112420		LH18/24-SP140_112420		
			Lab Package	HS20111260		HS20111258		
			Sample Date	11/24/2020		11/24/2020		
			Sample Type	GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Protocol			Result	DVQ	Result	DVQ	
	Daily Average Concentration	Daily Maximum Concentration	Reporting Limit					
VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		
1,1,1-Trichloroethane	3,417	7,230	1	0.5	U	**0.62**	J	Yes
1,1,2-Trichloroethane	102.5	216.9	1	0.5	U	**0.87**	J	Yes
1,1-Dichloroethane	6,633	14,032	1	0.5	U	**2.8**		Yes
1,1-Dichloroethene	119	253	1	0.5	U	**52**		Yes
1,2-Dichloroethane	85	181	1	0.5	U	**21**		Yes
1,2-Dichloropropane	NA	NA	1	0.5	U	0.50	U	Yes
Acetone	1,132	2,395	2	**140**		**160**		Yes
Benzene	85	181	1	0.5	U	**1.3**		Yes
Carbon Tetrachloride	85	181	1	7.8	UB	3.0	UB	Yes
Chlorobenzene	22,300	47,180	1	0.5	U	0.50	U	Yes
Chloroform	1,708	3,615	1	0.5	U	**5.2**		Yes
Ethylbenzene	26,954	57,025	1	1.0	U	1.0	U	Yes
m,p-Xylene	39.5	83.6	2	1.0	U	1.0	U	Yes
Methylene Chloride	803	1,699	2	1.0	U	**500**		Yes
o-Xylene	39.5	83.6	1	1.0	U	1.0	U	Yes
Styrene	2,829	5,987	1	1.0	U	1.0	U	Yes
Tetrachloroethene	85.4	180.7	1	0.5	U	**28**		Yes
Toluene	1,980	4,189	1	0.5	U	**0.84**	J	Yes
Trichloroethene	85	181	1	0.5	U	**1,900**		Yes
Vinyl Chloride	34	72	1	0.5	U	**69**		Yes
ANIONS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		
Chloride	NA	NA	10	**653**		**368**		NA
Sulfate	NA	NA	10	**27.9**		**23.9**		NA
PERCHLORATE	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		
Perchlorate	278	589	4	0.250	U	**8,900**		Yes
METALS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		
Aluminum	0.777	1.644	0.0100	**0.0394**		**0.124**	J	Yes
Antimony	NA	NA	0.00200	0.00100	U	0.000879	UB	NA
Arsenic	0.365	0.772	0.00200	**0.000419**	J	**0.000811**	J	Yes

Table 11. Quarterly GWTP Analytical Sampling Results

			Sample Location	EFFLUENT		INFLUENT*		Does Concentration Meet Discharge Limits? (Yes/No)
			Sample Identification	LH18/24-SP650_112420		LH18/24-SP140_112420		
			Lab Package	HS20111260		HS20111258		
			Sample Date	11/24/2020		11/24/2020		
			Sample Type	GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Protocol							
	Daily Average Concentration	Daily Maximum Concentration	Reporting Limit	Result	DVQ	Result	DVQ	
Barium	1	2	0.00400	**0.220**		**0.663**		Yes
Beryllium	NA	NA	0.00200	0.000500	U	0.000500	U	NA
Cadmium	0.0016	0.0034	0.00200	0.000500	U	**0.000361**	J	Yes
Calcium	NA	NA	0.500	**11.0**		**35.5**		NA
Chromium	0.355	0.752	0.00400	**0.00665**		**0.00248**	J	Yes
Cobalt	5.433	11.495	0.00500	**0.00152**	J	**0.00459**	J	Yes
Iron	1.132	2.395	0.200	**0.434**		**0.798**		Yes
Lead	0.0022	0.0046	0.00200	0.00100	U	0.00100	UJ	Yes
Magnesium	NA	NA	0.200	**16.3**		**24.8**		NA
Manganese	7.323	15.494	0.00500	**0.131**		**0.352**		Yes
Nickel	0.087	0.184	0.00200	**0.00353**	J	**0.0132**	J	Yes
Potassium	NA	NA	0.200	**1.89**		**1.41**		NA
Selenium	0.0057	0.012	0.00200	0.00250	U	0.00250	U	Yes
Silver	0.0014	0.003	0.00200	0.000500	U	0.000500	UJ	Yes
Sodium	NA	NA	1.00	**4.17**		**173**		NA
Thallium	NA	NA	0.00200	0.000500	U	**0.000241**	J	NA
Vanadium	1.698	3.592	0.00500	0.00100	U	0.00100	U	Yes
Zinc	0.146	0.31	0.00400	**0.0501**		**0.157**	J	No
Mercury	NA	NA	0.000200	0.000100	U	0.000100	U	NA
1,4-DIOXANE	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		
1,4-Dioxane	NA	134.2	1	**5.0**		**4.2**		Yes
CHEMICAL OXYGEN DEMAND (COD)	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		
COD	NA	200	75	**14.0**	J	**8.00**	J	Yes
OIL AND GREASE (O&G)	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		
O&G	NA	15	2	2.00	U	2.00	U	Yes

Notes:
µg/L - micrograms per liter
DVQ - data validation qualifier
Grab samples are compared to the daily maximum and composite samples to the daily average
* only Effluent sample is compared to discharge limits
J - Estimated concentration between the detection limit and limit of quantitation and/or due to quality control discrepancy
U - non detect and reported to the limit of detection
UB - considered an artifact of blank contamination
mg/L - milligrams per liter
NA - not applicable
GWTP - Groundwater Treatment Plant
NV - no value
UJ - estimated non-detect due to quality control discrepancies

Table 6. Weekly Perchlorate Sample Results

Sample Identification	Lab Package	Date Sampled	Sample Location	Harrison Bayou Maximum Allowable Daily Discharge Perchlorate Concentration (µg/L)	INF Pond Discharge Criteria for Perchlorate (µg/L)	Influent Perchlorate (6850)	Effluent Perchlorate (6850)		Does Concentration Meet Discharge Limit? (Yes/No)	No Daily Maximum Concentration		
						Result (µg/L)	Result (µg/L)	DVQ		Ammonia as N (350.3) (mg/L)	Ortho-Phosphate (365.3) (mg/L)	Organic Carbon (SM5310C) (mg/L)
LH18/24-SP650_010521-BIX	HS21010123	1/5/2021	TK-650	589	17	NA	**0.386**	J	Yes	**7.1**	**1.69**	**1.15**
LH18/24-SP650_010521_BIX (monthly)	HS21010127	1/5/2021	TK-650	589	17	NA	**0.198**	J	Yes	--	--	--
LH18/24-SP140_010521 (monthly)	HS21010126	1/5/2021	TK-140	--	--	**11,500**	NA		NA	--	--	--
LH18/24-SP650_011321-BIX	HS21010527	1/13/2021	TK-650	589	17	NA	**3.48**		Yes	**27**	**2.44**	**1.31 J**
LH18/24-SP650_012021_BIX	HS21010776	1/20/2021	TK-650	589	17	NA	**0.0304**	J	Yes	**6.1**	**0.860**	**1.16**
LH18/24-SP650_012621_BIX	HS21011039	1/26/2021	TK-650	589	17	NA	< 0.250	U	Yes	**1.6**	**0.306 J**	**1.20**
LH18/24-SP650_020221_BIX (monthly)	HS21020135	2/2/2021	TK-650	589	17	NA	< 0.500	U	Yes	--	--	--
LH18/24-SP140_020221 (monthly)	HS21020133	2/2/2021	TK-140	--	--	**8,800**	NA		NA	--	--	--
LH18/24-SP650_020221_BIX	HS21020132	2/2/2021	TK-650	589	17	NA	**0.0448**	J	Yes	**3.0**	**1.56**	**0.40 J**
LH18/24-SP650_020921_BIX	HS21020460	2/9/2021	TK-650	589	17	NA	**0.313**	J	Yes	**1.1**	**0.0330**	**2.37 J**
LH18/24-SP650_032221_BIX	HS21031144	3/22/2021	TK-650	589	17	NA	< 0.0500	U	Yes	--	--	--
LH18/24-SP650_033021_BIX	HS21031605	3/30/2021	TK-650	589	17	NA	**18.8**		Yes	**0.40**	**0.0480 J**	**23.9**

Notes:

Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level (PCL)
SP140 samples are influent samples.
µg/L - micrograms per liter
mg/L - milligrams per liter
DVQ - data validation qualifier
J - Estimated concentration between the detection limit and limit of quantitation and/or due to quality control discrepancies
NA - not applicable
U - non detect and reported to the limit of detection
BIX - before ion exchange
Bold font means analyte was detected.

Table 7. Bi-Weekly GWTP Analytical Sampling Results for January 2021

Sample Location				EFFLUENT - Biweekly		EFFLUENT - Monthly		INFLUENT - Monthly*		EFFLUENT - Biweekly		Does Concentration Meet Effluent Discharge Limits? (Yes/No)
Sample Identification				LH18/24-SP650_011321		LH18/24-SP650_010521		LH18/24-SP140_010521		LH18/24-SP650_012621		
Lab Package				HS21010551		HS21010127		HS21010126		HS21011068		
Sample Date				1/13/2021		1/5/2021		1/5/2021		1/26/2021		
Sample Type				GRAB		GRAB		GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Table 2 of ROD			Result	DVQ	Result	DVQ	Result	DVQ	Result	DVQ	
	Daily Average Concentration	Daily Maximum Concentration	INF Pond MCL									
VOLATILES	µg/L	µg/L	µg/L	µg/L		µg/L		µg/L		µg/L		
1,1,1-Trichloroethane	3,417	7,230	200	0.50	U	0.50	U	NA		0.50	U	Yes
1,1,2-Trichloroethane	102.5	216.9	5	1.0	U	1.0	U	NA		1.0	U	Yes
1,1-Dichloroethane	6,633	14,032	NV	0.50	U	0.50	U	NA		0.50	U	Yes
1,1-Dichloroethene	119	253	7	0.50	U	0.50	U	NA		0.50	U	Yes
1,2-Dichloroethane	85	181	5	0.50	U	0.50	U	NA		0.50	U	Yes
1,2-Dichloropropane	NA	NA	5	1.0	U	1.0	U	NA		1.0	U	Yes
Acetone	1,132	2,395	NV	2.0	U	2.0	U	NA		2.0	U	Yes
Benzene	85	181	5	0.50	U	0.50	U	NA		0.50	U	Yes
Carbon Tetrachloride	85	181	5	1.0	U	1.0	U	NA		1.0	U	Yes
Chlorobenzene	22,300	47,180	100	1.0	U	1.0	U	NA		1.0	U	Yes
Chloroform	1,708	3,615	NV	0.50	U	0.50	U	NA		0.50	U	Yes
cis-1,2-Dichloroethene	NV	NV	70	**5.2**		**7.1**		NA		**7.3**		Yes
Ethylbenzene	26,954	57,025	700	1.0	U	1.0	U	NA		1.0	U	Yes
m,p-Xylene	39.5	83.6	NV	1.0	U	1.0	U	NA		1.0	U	Yes
Methylene Chloride	803	1,699	5	2.0	U	2.0	U	NA		2.0	U	Yes
o-Xylene	39.5	83.6	NV	1.0	U	1.0	U	NA		1.0	U	Yes
Styrene	2,829	5,987	100	1.0	U	1.0	U	NA		1.0	U	Yes
Tetrachloroethene	85.4	180.7	5	1.0	U	1.0	U	NA		1.0	U	Yes
Toluene	1,980	4,189	10	0.50	U	0.50	U	NA		0.50	U	Yes
Trichloroethene	85	181	5	**1.8**		**.3**		NA		**.4**		Yes
Vinyl Chloride	34	72	2	0.50	U	0.50	U	NA		0.50	U	Yes
ANIONS	mg/L	mg/L	mg/L	mg/L		mg/L		mg/L		mg/L		
Chloride	NV	NV	NV	**630**		NA		NA		**391**		NA
Sulfate	NV	NV	NV	**23.3**		NA		NA		**2.0**		NA
PERCHLORATE	µg/L	µg/L	µg/L	µg/L		µg/L		µg/L		µg/L		
Perchlorate	278	589	17	NA		**0.198**	J	**11,500**		NA		Yes
METALS	mg/L	mg/L	mg/L	mg/L		mg/L		mg/L		mg/L		
Hexavalent Chromium	0.058	0.124	NV	NA		0.0100	U	0.0100	U	NA		Yes
Barium	1	2	2	NA		**0.240**		NA		NA		Yes
Lead	0.0022	0.0046	0.015	NA		0.00100	U	NA		NA		Yes
Selenium	0.0057	0.0120	0.05	NA		0.00250	U	0.00250	U	NA		Yes
Silver	0.0014	0.0030	0.1	NA		0.000500	U	0.000500	U	NA		Yes
SEMI-VOLATILES	µg/L	µg/L	µg/L	µg/L		µg/L		µg/L		µg/L		
1,4-Dioxane**	NV	134.2	NV	NA		**0.036**		NA		NA		Yes

Notes:

µg/L - micrograms per liter

mg/L - milligrams per liter

DVQ - data validation qualifier

NA - not applicable or not analyzed

GWTP - Groundwater Treatment Plant

ROD - Record of Decision

Grab samples are compared to the daily maximum and composite samples to the daily average.

J - estimated concentration and/or due to QC discrepancies

U - not detected and reported to the limit of detection

NV - no value

*Influent sample not compared to discharge limits

** Calculated Effluent Limit no exceedances; released to Harrison Bayou

UJ - esimtated not detected due to QC discrepancies and reported to the limit of detection

Table 8. Bi-Weekly GWTP Analytical Sampling Results for February 2021

				Sample Location	EFFLUENT - Monthly		INFLUENT - Monthly*		EFFLUENT - Biweekly		Does Concentration Meet Effluent Discharge Limits? (Yes/No)
				Sample Identification	LH18/24-SP650_020221		LH18/24-SP140_020221		LH18/24-SP650_020921		
				Lab Package	HS21020135		HS21020133		HS21020464		
				Sample Date	2/2/2021		2/2/2021		2/9/2021		
				Sample Type	GRAB		GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Table 2 of ROD										
	Daily Average Concentration	Daily Maximum Concentration	INF Pond MCL	Result	DVQ	Result	DVQ	Result	DVQ	
VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		
1,1,1-Trichloroethane	3,417	7,230	200	0.50	U	NA		0.50	U	Yes
1,1,2-Trichloroethane	102.5	216.9	5	1.0	U	NA		1.0	U	Yes
1,1-Dichloroethane	6,633	14,032	NV	0.50	U	NA		0.50	U	Yes
1,1-Dichloroethene	119	253	7	0.50	U	NA		0.50	U	Yes
1,2-Dichloroethane	85	181	5	0.50	U	NA		0.50	U	Yes
1,2-Dichloropropane	NA	NA	5	1.0	U	NA		1.0	U	Yes
Acetone	1,132	2,395	NV	2.0	UJ	NA		2.0	UJ	Yes
Benzene	85	181	5	0.50	U	NA		0.50	U	Yes
Carbon Tetrachloride	85	181	5	1.0	U	NA		1.0	U	Yes
Chlorobezene	22,300	47,180	100	1.0	U	NA		1.0	U	Yes
Chloroform	1,708	3,615	NV	0.50	U	NA		0.50	U	Yes
cis-1,2-Dichloroethene	NV	NV	70	**6.0**		NA		**6.1**		Yes
Ethylbenzene	26,954	57,025	700	1.0	U	NA		1.0	U	Yes
m,p-Xylene	39.5	83.6	NV	1.0	U	NA		1.0	U	Yes
Methylene Chloride	803	1,699	5	2.0	U	NA		2.0	U	Yes
o-Xylene	39.5	83.6	NV	1.0	U	NA		1.0	U	Yes
Styrene	2,829	5,987	100	1.0	U	NA		1.0	U	Yes
Tetrachloroethene	85.4	180.7	5	1.0	U	NA		1.0	U	Yes
Toluene	1,980	4,189	10	0.50	U	NA		0.50	U	Yes
Trichloroethene	85	181	5	**2.3**		NA		**.4**		Yes
Vinyl Chloride	34	72	2	0.50	U	NA		0.50	U	Yes
ANIONS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		
Chloride	NV	NV	NV	NA		NA		**465**		NA
Sulfate	NV	NV	NV	NA		NA		**4.6**		NA
PERCHLORATE	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		
Perchlorate	278	589	17	0.500	U	**8,800**		NA		Yes
METALS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		
Hexavalent Chromium	0.058	0.124	NV	0.0100	U	0.0100	U	NA		Yes
Barium	1	2	2	**0.220**		NA		NA		Yes
Lead	0.0022	0.0046	0.015	0.00100	U	NA		NA		Yes
Selenium	0.0057	0.0120	0.05	0.00250	U	0.00250	U	NA		Yes
Silver	0.0014	0.0030	0.1	0.000500	U	0.000500	U	NA		Yes
SEMI-VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		
1,4-Dioxane**	NV	134.2	NV	**0.30**		NA		NA		Yes

Notes:

µg/L - micrograms per liter
DVQ - data validation qualifier
GWTP - Groundwater Treatment Plant
NA - not applicable or not analyzed
Grab samples are compared to the daily maximum and composite samples to the daily average.
** Calculated Effluent Limit no exceedances; released to Harrison Bayou
J - estimated concentration and/or due to QC discrepancies
mg/L - milligrams per liter
ROD - Record of Decision
*Influent sample not compared to discharge limits
U - not detected and reported to the limit of detection

Table 9. Bi-Weekly Analytical GWTP Sampling Results for March 2021

			Sample Location	EFFLUENT - Biweekly		INFLUENT - Monthly*		EFFLUENT - Monthly		Does Concentration Meet Effluent Discharge Limits? (Yes/No)
			Sample Identification							
			Lab Package							
			Sample Date							
			Sample Type	GRAB		GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Table 2 of ROD			Result	DVQ	Result	DVQ	Result	DVQ	
	Daily Average Concentration	Daily Maximum Concentration	INF Pond MCL							
VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**						
1,1,1-Trichloroethane	3,417	7,230	200	Plant Down; no data to report						NA
1,1,2-Trichloroethane	102.5	216.9	5							NA
1,1-Dichloroethane	6,633	14,032	NV							NA
1,1-Dichloroethene	119	253	7							NA
1,2-Dichloroethane	85	181	5							NA
1,2-Dichloropropane	NA	NA	5							NA
Acetone	1,132	2,395	NV							NA
Benzene	85	181	5							NA
Carbon Tetrachloride	85	181	5							NA
Chlorobenzene	22,300	47,180	100							NA
Chloroform	1,708	3,615	NV							NA
cis-1,2-Dichloroethene	NV	NV	70							NA
Ethylbenzene	26,954	57,025	700							NA
m,p-Xylene	39.5	83.6	NV							NA
Methylene Chloride	803	1,699	5							NA
o-Xylene	39.5	83.6	NV							NA
Styrene	2,829	5,987	100							NA
Tetrachloroethene	85.4	180.7	5							NA
Toluene	1,980	4,189	10							NA
Trichloroethene	85	181	5							NA
Vinyl Chloride	34	72	2							NA
ANIONS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		
Chloride	NV	NV	NV							NA
Sulfate	NV	NV	NV							NA
PERCHLORATE	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		
Perchlorate	278	589	17							NA
METALS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		
Hexavalent Chromium	0.058	0.124	NV							NA
Barium	1	2	2							NA
Lead	0.0022	0.0046	0.015							NA
Selenium	0.0057	0.0120	0.05							NA
Silver	0.0014	0.0030	0.1							NA
SEMI-VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		
1,4-Dioxane**	NV	134.2	NV							NA

Notes:

DVQ - data validation qualifier

UJ - estimated non-detect due to quality control issues

GWTP - Groundwater Treatment Plant

U - Non detect reported to the limit of detection

mg/L - milligrams per liter

J - estimated concentration between the detection limit and limit of quantitation and/or due to quality control discrepancy

*Influent sample not compared to discharge limits

** Calculated Effluent Limit no exceedances; released to Harrison Bayou

Grab samples are compared to the daily maximum and composite samples to the daily average.

ROD - Record of Decision

NA - not applicable or not analyzed

Table 10. Quarterly GWTP Analytical Sampling Results

			Sample Location	EFFLUENT		INFLUENT*		Does Concentration Meet Discharge Limits? (Yes/No)
			Sample Identification	LH18/24-SP650_033021		LH18/24-SP140_033021		
			Lab Package	HS21031608		HS21031613		
			Sample Date	3/30/2021		3/30/2021		
			Sample Type	GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L)							
	Daily Average Concentration	Daily Maximum Concentration		Result	DVQ	Result	DVQ	
VOLATILES	**µg/L**	**µg/L**		**µg/L**		**µg/L**		
1,1,1-Trichloroethane	3,417	7,230		0.50	U	5.0	U	Yes
1,1,2-Trichloroethane	102.5	216.9		1.0	U	10.0	U	Yes
1,1-Dichloroethane	6,633	14,032		0.50	U	5.0	U	Yes
1,1-Dichloroethene	119	253		0.50	U	5.0	U	Yes
1,2-Dichloroethane	85	181		0.50	U	**20**		Yes
1,2-Dichloropropane	NA	NA		1.0	U	10.0	U	NA
Acetone	1,132	2,395		2.0	UJ	20	UJ	Yes
Benzene	85	181		0.50	U	5.0	U	Yes
Carbon Tetrachloride	85	181		1.0	U	10	U	Yes
Chlorobenzene	22,300	47,180		1.0	U	10	U	Yes
Chloroform	1,708	3,615		0.50	U	5.0	U	Yes
cis-1,2-dichloroethene	NV	70		**7.5**		**390**		No
Ethylbenzene	26,954	57,025		1.0	U	10	U	Yes
m,p-Xylene	39.5	83.6		1.0	U	10	U	Yes
Methylene Chloride	803	1,699		2.0	U	**970**		Yes
o-Xylene	39.5	83.6		1.0	U	10	U	Yes
Styrene	2,829	5,987		1.0	U	10	U	Yes
Tetrachloroethene	85.4	180.7		1.0	U	10	U	Yes
Toluene	1,980	4,189		0.50	U	5.0	U	Yes
Trichloroethene	85	181		**2.7**		**2,000**		Yes
Vinyl Chloride	34	72		0.50	U	5.0	U	Yes
ANIONS	**mg/L**	**mg/L**		**mg/L**		**mg/L**		
Chloride	NA	NA		**581**		**300**		NA
Sulfate	NA	NA		**23.9**		**30.0**		NA
PERCHLORATE	**µg/L**	**µg/L**		**µg/L**		**µg/L**		
Perchlorate	278	589		**22.0**		**4,800**		Yes
METALS	**mg/L**	**mg/L**		**mg/L**		**mg/L**		
Aluminum	0.777	1.644		**0.0722**		**0.113**		Yes
Antimony	NA	NA		0.000749	UB	0.00100	U	NA
Arsenic	0.365	0.772		**0.00109**	J	**0.000921**	J	Yes

Table 10. Quarterly GWTP Analytical Sampling Results

			Sample Location	EFFLUENT		INFLUENT*		Does Concentration Meet Discharge Limits? (Yes/No)
			Sample Identification	LH18/24-SP650_033021		LH18/24-SP140_033021		
			Lab Package	HS21031608		HS21031613		
			Sample Date	3/30/2021		3/30/2021		
			Sample Type	GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L)							
	Daily Average Concentration	Daily Maximum Concentration		Result	DVQ	Result	DVQ	
Barium	1	2		**0.174**		**0.340**		Yes
Beryllium	NA	NA		0.000500	U	0.000500	U	NA
Cadmium	0.0016	0.0034		0.000500	U	0.000500	U	Yes
Calcium	NA	NA		**9.07**		**21.6**		NA
Chromium	0.355	0.752		**0.00641**		**0.00304**	J	Yes
Cobalt	5.433	11.495		**0.00205**	J	**0.00305**	J	Yes
Iron	1.132	2.395		**0.468**		**0.486**		Yes
Lead	0.0022	0.0046		0.00100	U	0.00100	U	Yes
Magnesium	NA	NA		**8.15**		**15.4**		NA
Manganese	7.323	15.494		**0.0793**		**0.197**		Yes
Nickel	0.087	0.184		**0.00825**		**0.00949**		Yes
Potassium	NA	NA		**1.55**		**1.35**		NA
Selenium	0.0057	0.012		0.00250	U	0.00250	U	Yes
Silver	0.0014	0.003		0.000500	U	0.000500	U	Yes
Sodium	NA	NA		**252**		**215**		NA
Thallium	NA	NA		**0.000939**	J	0.000500	U	NA
Vanadium	1.698	3.592		**0.000811**	J	**0.000911**	J	Yes
Zinc	0.146	0.31		**0.0424**		**0.0508**		Yes
Mercury	NA	NA		0.000100	U	0.000100	U	NA
1,4-DIOXANE	**µg/L**	**µg/L**		**µg/L**		**µg/L**		
1,4-Dioxane	NA	134.2		**0.67**		**1.3**		Yes
CHEMICAL OXYGEN DEMAND (COD)	**mg/L**	**mg/L**		**mg/L**		**mg/L**		
COD	NA	200		**64.0**		**9.00**	J	Yes
OIL AND GREASE (O&G)	**mg/L**	**mg/L**		**mg/L**		**mg/L**		
O&G	NA	15		**0.858**	J	1.00	U	Yes

Notes:
DVQ - data validation qualifier
UB - considered an artifact of blank contamination
Grab samples are compared to the daily maximum and composite samples to the daily average
* only Effluent sample is compared to discharge limits
J - Estimated concentration between the detection limit and limit of quantitation and/or due to quality control discrepancy
U - non detect and reported to the limit of detection
mg/L - milligrams per liter
NA - not applicable
GWTP - Groundwater Treatment Plant
NV - no value
UJ - estimated non-detect due to quality control discrepancies

Table 7. Weekly Perchlorate Sample Results – 2nd Quarter 2021

Sample Identification	Lab Package	Date Sampled	Sample Location	Harrison Bayou Maximum Allowable Daily Discharge Perchlorate Concentration (µg/L)	INF Pond Discharge Criteria for Perchlorate (µg/L)	Influent Perchlorate (6850)	Effluent Perchlorate (6850)		Does Concentration Meet Discharge Limit? (Yes/No)	No Daily Maximum Concentration		
						Result (µg/L)	Result (µg/L)	DVQ		Ammonia as N (350.3) (mg/L)	Ortho-Phosphate (365.3) (mg/L)	Organic Carbon (415.1) (mg/L)
LH18/24-SP650_040621-BIX	S21040287	4/6/2021	TK-650	589	17	NA	**5.74**		Yes	**5.5**	**1.46**	**20.3**
LH18/24-SP650_041321_BIX (monthly)	S21040694	4/13/2021	TK-650	589	17	NA	**1.46**		Yes	--	--	--
LH18/24-SP140_041321 (monthly)	S21040697	4/13/2021	TK-140	--	--	**9,760**	NA		NA	--	--	--
LH18/24-SP650_041321-BIX	S21040699	4/13/2021	TK-650	589	17	NA	**1.33**		Yes	**3.9**	**1.81**	**4.13**
LH18/24-SP650_042021_BIX	S21041083	4/20/2021	TK-650	589	17	NA	**17.3**		Yes	**0.23**	**0.083**	**8.29**
LH18/24-SP650_042721_BIX	S21041458	4/27/2021	TK-650	589	17	NA	**9.27**		Yes	**0.69**	**0.031**	**2.06**
LH18/24-SP650_050421_BIX	S21050177	5/4/2021	TK-650	589	17	NA	**1.04**	J	Yes	**24**	**5.51**	**2.24**
LH18/24-SP650_051121_BIX (monthly)	S21050553	5/11/2021	TK-650	589	17	NA	**0.799**	J	Yes	--	--	--
LH18/24-SP140_051121 (monthly)	S21050554	5/11/2021	TK-140	--	--	**9,020**	NA		NA	--	--	--
LH18/24-SP650_051121_BIX	S21050555	5/11/2021	TK-650	589	17	NA	**0.771**	J	Yes	**22**	**4.58**	**2.31**
LH18/24-SP650_051821_BIX	S21050897	5/18/2021	TK-650	589	17	NA	**3.12**		Yes	**16**	**6.01**	**2.37**
LH18/24-SP650_052521_BIX	S21051310	44341.00	TK-650	589.00	17.00	NA	**49.90**		Yes	**19**	**4.81**	**2.46**
LH18/24-SP650_060221_BIX	S21060148	6/2/2021	TK-650	589	17	NA	**1,470**		No	**13**	**4.24**	**2.39**
LH18/24-SP650_060821_BIX (monthly)	S21060462	6/8/2021	TK-650	589	17	NA	**88.8**		Yes	--	--	--
LH18/24-SP140_060821 (monthly)	S21060460	6/8/2021	TK-140	--	--	**7,960**	NA		NA	--	--	--
LH18/24-SP650_060821_BIX	S21060467	6/8/2021	TK-650	589	17	NA	**87.9**		Yes	**19**	**4.75**	**4.01**
LH18/24-SP650_061521_BIX	S21060845	6/15/2021	TK-650	589	17	NA	**58.2**		Yes	**19**	**3.27**	**2.36**
LH18/24-SP650_062221_BIX	S21061265	6/22/2021	TK-650	589	17	NA	**33.5**		Yes	**21**	**5.72**	**2.45**
LH18/24-SP650_062921_BIX	S21061657	6/29/2021	TK-650	589	17	NA	**168**		Yes	**24**	**6.44**	**2.54**

Notes:
Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level (PCL)
SP140 samples are influent samples.
µg/L - micrograms per liter
mg/L - milligrams per liter
DVQ - data validation qualifier
J - Estimated concentration between the detection limit and limit of quantitation and/or due to quality control discrepancies
NA - not applicable
U - non detect and reported to the limit of detection
BIX - before ion exchange
Bold font means analyte was detected.

Table 8. Bi-Weekly GWTP Analytical Sampling Results for April 2021

Sample Location				EFFLUENT - Biweekly		EFFLUENT - Monthly		INFLUENT - Monthly*		EFFLUENT - Biweekly		Does Concentration Meet Effluent Discharge Limits? (Yes/No)
Sample Identification				LH18/24-SP650_040621		LH18/24-SP650_041321		LH18/24-SP140_041321		LH18/24-SP650_042021		
Lab Package				HS21040321		HS21040694		HS21040697		HS21041086		
Sample Date				4/6/2021		4/13/2021		4/13/2021		4/20/2021		
Sample Type				GRAB		GRAB		GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Table 2 of ROD			Result	DVQ	Result	DVQ	Result	DVQ	Result	DVQ	
	Daily Average Concentration	Daily Maximum Concentration	INF Pond MCL									
VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		**µg/L**		
1,1,1-Trichloroethane	3,417	7,230	200	0.50	U	0.50	U	NA		0.50	U	Yes
1,1,2-Trichloroethane	102.5	216.9	5	1.0	U	1.0	U	NA		1.0	U	Yes
1,1-Dichloroethane	6,633	14,032	NV	0.50	U	0.50	U	NA		0.50	U	Yes
1,1-Dichloroethene	119	253	7	0.50	U	0.50	U	NA		0.50	U	Yes
1,2-Dichloroethane	85	181	5	0.50	U	0.50	U	NA		0.50	U	Yes
1,2-Dichloropropane	NA	NA	5	1.0	U	1.0	U	NA		1.0	U	Yes
Acetone	1,132	2,395	NV	2.0	U	2.0	U	NA		2.0	U	Yes
Benzene	85	181	5	0.50	U	0.50	U	NA		0.50	U	Yes
Carbon Tetrachloride	85	181	5	1.0	U	1.0	U	NA		1.0	U	Yes
Chlorobenzene	22,300	47,180	100	1.0	U	1.0	U	NA		1.0	U	Yes
Chloroform	1,708	3,615	NV	0.50	U	0.50	U	NA		0.50	U	Yes
cis-1,2-Dichloroethene	NV	NV	70	0.50	U	**8.7**		NA		**8.4**		Yes
Ethylbenzene	26,954	57,025	700	1.0	U	1.0	U	NA		1.0	U	Yes
m,p-Xylene	39.5	83.6	NV	1.0	U	1.0	U	NA		1.0	U	Yes
Methylene Chloride	803	1,699	5	2.0	U	2.0	U	NA		2.0	U	Yes
o-Xylene	39.5	83.6	NV	1.0	U	1.0	U	NA		1.0	U	Yes
Styrene	2,829	5,987	100	1.0	U	1.0	U	NA		1.0	U	Yes
Tetrachloroethene	85.4	180.7	5	1.0	U	1.0	U	NA		1.0	U	Yes
Toluene	1,980	4,189	10	0.50	U	0.50	U	NA		0.50	U	Yes
Trichloroethene	85	181	5	0.50	U	**2.9**		NA		**2.7**		Yes
Vinyl Chloride	34	72	2	0.50	U	0.50	U	NA		0.50	U	Yes
ANIONS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		**mg/L**		
Chloride	NV	NV	NV	**553**		NA		NA		**565**		NA
Sulfate	NV	NV	NV	**24.4**		NA		NA		**27.7**		NA
PERCHLORATE	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		**µg/L**		
Perchlorate	278	589	17	NA		**1.46**		**9,760**		NA		Yes
METALS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		**mg/L**		
Hexavalent Chromium	0.058	0.124	NV	NA		0.0100	U	0.0100	U	NA		Yes
Barium	1	2	2	NA		**.119**		NA		NA		Yes
Lead	0.0022	0.0046	0.015	NA		0.00100	U	NA		NA		Yes
Selenium	0.0057	0.0120	0.05	NA		0.00250	U	0.00250	U	NA		Yes
Silver	0.0014	0.0030	0.1	NA		0.000500	U	0.000500	U	NA		Yes
SEMI-VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		**µg/L**		
1,4-Dioxane**	NV	134.2	NV	NA		**1.4**		NA		NA		Yes

Notes:

µg/L - micrograms per liter

mg/L - milligrams per liter

DVQ - data validation qualifier

NA - not applicable or not analyzed

GWTP - Groundwater Treatment Plant

ROD - Record of Decision

Grab samples are compared to the daily maximum and composite samples to the daily average.

J - estimated concentration and/or due to QC discrepancies

U - not detected and reported to the limit of detection

NV - no value

*Influent sample not compared to discharge limits

** Calculated Effluent Limit

no exceedances; released to Harrison Bayou

Table 9. Bi-Weekly GWTP Analytical Sampling Results for May 2021

			Sample Location	EFFLUENT - Biweekly		EFFLUENT - Monthly		INFLUENT - Monthly*		EFFLUENT - Biweekly		Does Concentration Meet Effluent Discharge Limits? (Yes/No)
			Sample Identification	LH18/24-SP650_050421		LH18/24-SP650_051121		LH18/24-SP140_051121		LH18/24-SP650_051821		
			Lab Package	HS21050180		HS21050553		HS21050554		HS21050898		
			Sample Date	5/4/2021		5/11/2021		5/11/2021		5/18/2021		
			Sample Type	GRAB		GRAB		GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Table 2 of ROD			Result	DVQ	Result	DVQ	Result	DVQ	Result	DVQ	
	Daily Average Concentration	Daily Maximum Concentration	INF Pond MCL									
VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		**µg/L**		
1,1,1-Trichloroethane	3,417	7,230	200	0.50	U	0.50	U	NA		0.50	U	Yes
1,1,2-Trichloroethane	102.5	216.9	5	1.0	U	1.0	U	NA		1.0	U	Yes
1,1-Dichloroethane	6,633	14,032	NV	0.50	U	0.50	U	NA		0.50	U	Yes
1,1-Dichloroethene	119	253	7	0.50	U	0.50	U	NA		0.50	U	Yes
1,2-Dichloroethane	85	181	5	0.50	U	0.50	U	NA		0.50	U	Yes
1,2-Dichloropropane	NA	NA	5	1.0	U	1.0	U	NA		1.0	U	Yes
Acetone	1,132	2,395	NV	2.0	U	2.0	UJ	NA		2.0	U	Yes
Benzene	85	181	5	0.50	U	0.50	U	NA		0.50	U	Yes
Carbon Tetrachloride	85	181	5	1.0	U	1.0	U	NA		1.0	U	Yes
Chlorobezene	22,300	47,180	100	1.0	U	1.0	U	NA		1.0	U	Yes
Chloroform	1,708	3,615	NV	0.50	U	0.50	U	NA		0.50	U	Yes
cis-1,2-Dichloroethene	NV	NV	70	**8.9**		**8.2**		NA		**7.8**		Yes
Ethylbenzene	26,954	57,025	700	1.0	U	1.0	U	NA		1.0	U	Yes
m,p-Xylene	39.5	83.6	NV	1.0	U	1.0	U	NA		1.0	U	Yes
Methylene Chloride	803	1,699	5	2.0	U	2.0	U	NA		2.0	U	Yes
o-Xylene	39.5	83.6	NV	1.0	U	1.0	U	NA		1.0	U	Yes
Styrene	2,829	5,987	100	1.0	U	1.0	U	NA		1.0	U	Yes
Tetrachloroethene	85.4	180.7	5	1.0	U	1.0	U	NA		1.0	U	Yes
Toluene	1,980	4,189	10	0.50	U	0.50	U	NA		0.50	U	Yes
Trichloroethene	85	181	5	**3.1**		**.8**		NA		**.6**		Yes
Vinyl Chloride	34	72	2	0.50	U	0.50	U	NA		0.50	U	Yes
ANIONS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		**mg/L**		
Chloride	NV	NV	NV	**507**		NA		NA		**429**		NA
Sulfate	NV	NV	NV	**9.7**		NA		NA		**8.4**		NA
PERCHLORATE	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		**µg/L**		
Perchlorate	278	589	17	NA		**0.799**	J	**9,020**		NA		Yes
METALS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		**mg/L**		
Hexavalent Chromium	0.058	0.124	NV	NA		0.0100	U	0.0100	U	NA		Yes
Barium	1	2	2	NA		**0.104**		NA		NA		Yes
Lead	0.0022	0.0046	0.015	NA		0.00100	U	NA		NA		Yes
Selenium	0.0057	0.0120	0.05	NA		0.00250	U	0.00250	U	NA		Yes
Silver	0.0014	0.0030	0.1	NA		0.000500	U	0.000500	U	NA		Yes
SEMI-VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		**µg/L**		
1,4-Dioxane**	NV	134.2	NV	NA		**1.7**		NA		NA		Yes

Notes:

µg/L - micrograms per liter
DVQ - data validation qualifier
GWTP - Groundwater Treatment Plant
NA - not applicable or not analyzed
Grab samples are compared to the daily maximum and composite samples to the daily average.
** Calculated Effluent Limit no exceedances; released to Harrison Bayou
J - estimated concentration and/or due to QC discrepancies
UJ - esimtated not detected due to QC discrepancies and reported to the limit of detection
mg/L - milligrams per liter
ROD - Record of Decision
*Influent sample not compared to discharge limits
U - not detected and reported to the limit of detection

Table 10. Bi-Weekly Analytical GWTP Sampling Results for June 2021

Sample Location				EFFLUENT - Biweekly		EFFLUENT - Monthly		INFLUENT - Monthly*		EFFLUENT - Biweekly		EFFLUENT - Biweekly		Does Concentration Meet Effluent Discharge Limits? (Yes/No)
Sample Identification				LH18/24-SP650_060221		LH18/24-SP650_060821		LH18/24-SP140_060821		LH18/24-SP650_061521		LH18/24-SP650_062921		
Lab Package				HS21060186		HS21060462		HS21060460		HS21060847		HS21061658		
Sample Date				6/2/2021		6/8/2021		6/8/2021		6/15/2021		6/29/2021		
Sample Type				GRAB		GRAB		GRAB		GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Table 2 of ROD			Result	DVQ	Result	DVQ	Result	DVQ	Result	DVQ	Result	DVQ	
	Daily Average Concentration	Daily Maximum Concentration	INF Pond MCL											
VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**										
1,1,1-Trichloroethane	3,417	7,230	200	0.50	U	0.50	U	NA		0.50	U	0.50	U	NA
1,1,2-Trichloroethane	102.5	216.9	5	1.0	U	1.0	U	NA		1.0	U	1.0	U	NA
1,1-Dichloroethane	6,633	14,032	NV	0.50	U	0.50	U	NA		0.50	U	0.50	U	NA
1,1-Dichloroethene	119	253	7	0.50	U	0.50	U	NA		0.50	U	0.50	U	NA
1,2-Dichloroethane	85	181	5	0.50	U	0.50	U	NA		0.50	U	0.50	U	NA
1,2-Dichloropropane	NA	NA	5	1.0	U	1.0	U	NA		1.0	U	1.0	U	NA
Acetone	1,132	2,395	NV	2.0	U	2.0	U	NA		2.0	U	2.0	U	NA
Benzene	85	181	5	0.50	U	0.50	U	NA		0.50	U	0.50	U	NA
Carbon Tetrachloride	85	181	5	1.0	U	1.0	U	NA		1.0	U	1.0	U	NA
Chlorobenzene	22,300	47,180	100	1.0	U	1.0	U	NA		1.0	U	1.0	U	NA
Chloroform	1,708	3,615	NV	0.50	U	0.50	U	NA		0.50	U	0.50	U	NA
cis-1,2-Dichloroethene	NV	NV	70	**8.9**		**9.8**		NA		**10**		**10**		NA
Ethylbenzene	26,954	57,025	700	1.0	U	1.0	U	NA		1.0	U	1.0	U	NA
m,p-Xylene	39.5	83.6	NV	1.0	U	1.0	U	NA		1.0	U	1.0	U	NA
Methylene Chloride	803	1,699	5	2.0	U	2.0	U	NA		2.0	U	2.0	U	NA
o-Xylene	39.5	83.6	NV	1.0	U	1.0	U	NA		1.0	U	1.0	U	NA
Styrene	2,829	5,987	100	1.0	U	1.0	U	NA		1.0	U	1.0	U	NA
Tetrachloroethene	85.4	180.7	5	1.0	U	1.0	U	NA		1.0	U	1.0	U	NA
Toluene	1,980	4,189	10	0.50	U	0.50	U	NA		0.50	U	0.50	U	NA
Trichloroethene	85	181	5	**3.5**		**3.8**		NA		**4.4**		**4.1**		NA
Vinyl Chloride	34	72	2	**0.75**	J	0.50	U	NA		0.50	U	0.50	U	NA
ANIONS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		**mg/L**		**mg/L**		
Chloride	NV	NV	NV	**237**		NA		NA		**187**		**272**		NA
Sulfate	NV	NV	NV	**26.0**		NA		NA		**23.7**		**30.6**		NA
PERCHLORATE	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		**µg/L**		**µg/L**		
Perchlorate	278	589	17	NA		**88.8**		**7,960**		NA		NA		NA
METALS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		**mg/L**		**mg/L**		
Hexavalent Chromium	0.058	0.124	NV	NA		0.0100	U	0.0100	U	NA		NA		NA
Barium	1	2	2	NA		**0.0799**		NA		NA		**NA**		NA
Lead	0.0022	0.0046	0.015	NA		0.00100	U	NA		NA		NA		NA
Selenium	0.0057	0.0120	0.05	NA		0.00250	U	0.00250	U	NA		NA		NA
Silver	0.0014	0.0030	0.1	NA		0.000500	U	0.000500	U	NA		NA		NA
SEMI-VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		**µg/L**		**µg/L**		
1,4-Dioxane**	NV	134.2	NV	NA		**13.0**		NA		NA		NA		NA

Notes:
DVQ - data validation qualifier
UJ - estimated non-detect due to quality control issues
GWTP - Groundwater Treatment Plant
U - Non detect reported to the limit of detection
mg/L - milligrams per liter
J - estimated concentration between the detection limit and limit of quantitation and/or due to quality control discrepancy
*Influent sample not compared to discharge limits
** Calculated Effluent Limit no exceedances; released to Harrison Bayou
Grab samples are compared to the daily maximum and composite samples to the daily average.
ROD - Record of Decision
NA - not applicable or not analyzed

Table 11. Quarterly GWTP Analytical Sampling Results

	Sample Location	EFFLUENT		INFLUENT*		Does Concentration Meet Discharge Limits? (Yes/No)
	Sample Identification	LH18/24-SP650_052521		LH18/24-SP140_052521		
	Lab Package	HS21051312		HS21051314		
	Sample Date	5/25/2021		5/25/2021		
	Sample Type	GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L)					
	Daily Average Concentration	Daily Maximum Concentration	Result	DVQ	Result	DVQ	
VOLATILES	**µg/L**	**µg/L**	**µg/L**		**µg/L**		
1,1,1-Trichloroethane	3,417	7,230	0.50	U	5.0	U	Yes
1,1,2-Trichloroethane	102.5	216.9	1.0	U	10.0	U	Yes
1,1-Dichloroethane	6,633	14,032	0.50	U	**4.1**	J	Yes
1,1-Dichloroethene	119	253	0.50	U	**30**		Yes
1,2-Dichloroethane	85	181	0.50	U	**24**		Yes
1,2-Dichloropropane	NA	NA	1.0	U	10.0	U	NA
Acetone	1,132	2,395	2.0	U	20	U	Yes
Benzene	85	181	0.50	U	5.0	U	Yes
Carbon Tetrachloride	85	181	1.0	U	10	U	Yes
Chlorobenzene	22,300	47,180	1.0	U	10	U	Yes
Chloroform	1,708	3,615	0.50	U	5.0	U	Yes
cis-1,2-dichloroethene	NV	70	**9.0**		**880**		Yes
Ethylbenzene	26,954	57,025	1.0	U	10	U	Yes
m,p-Xylene	39.5	83.6	1.0	U	10	U	Yes
Methylene Chloride	803	1,699	2.0	U	**720**		Yes
o-Xylene	39.5	83.6	1.0	U	10	U	Yes
Styrene	2,829	5,987	1.0	U	10	U	Yes
Tetrachloroethene	85.4	180.7	1.0	U	**23**		Yes
Toluene	1,980	4,189	0.50	U	5.0	U	Yes
Trichloroethene	85	181	**3.3**		**3,200**		Yes
Vinyl Chloride	34	72	**0.89**	J	**33**		Yes
ANIONS	**mg/L**	**mg/L**	**mg/L**		**mg/L**		
Chloride	NA	NA	**320**		**169**		NA
Sulfate	NA	NA	**26.7**		**25.4**		NA
PERCHLORATE	**µg/L**	**µg/L**	**µg/L**		**µg/L**		
Perchlorate	278	589	**55.3**		**6,010**		Yes
METALS	**mg/L**	**mg/L**	**mg/L**		**mg/L**		
Aluminum	0.777	1.644	**0.0414**		**0.276**		Yes
Antimony	NA	NA	0.00100	U	0.00100	U	NA
Arsenic	0.365	0.772	**0.000919**	J	**0.000852**	J	Yes

Table 11. Quarterly GWTP Analytical Sampling Results

	Sample Location		EFFLUENT		INFLUENT*		Does Concentration Meet Discharge Limits? (Yes/No)
	Sample Identification		LH18/24-SP650_052521		LH18/24-SP140_052521		
	Lab Package		HS21051312		HS21051314		
	Sample Date		5/25/2021		5/25/2021		
	Sample Type		GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L)						
	Daily Average Concentration	Daily Maximum Concentration	Result	DVQ	Result	DVQ	
Barium	1	2	**0.0774**		**0.312**		Yes
Beryllium	NA	NA	0.000500	U	0.000500	U	NA
Cadmium	0.0016	0.0034	0.000500	U	0.000500	U	Yes
Calcium	NA	NA	**4.31**		**17.1**		NA
Chromium	0.355	0.752	**0.00202**	J	**0.00275**	J	Yes
Cobalt	5.433	11.495	**0.000643**	J	**0.00311**	J	Yes
Iron	1.132	2.395	**0.182**	J	**0.754**		Yes
Lead	0.0022	0.0046	0.00100	U	0.00100	U	Yes
Magnesium	NA	NA	**6.17**		**12.8**		NA
Manganese	7.323	15.494	**0.0412**		**0.183**		Yes
Nickel	0.087	0.184	**0.00291**	J	**0.00822**		Yes
Potassium	NA	NA	**1.25**		**0.988**		NA
Selenium	0.0057	0.012	0.00250	U	0.00250	U	Yes
Silver	0.0014	0.003	0.000500	U	0.000500	U	Yes
Sodium	NA	NA	**367**		**122**		NA
Thallium	NA	NA	0.000500	U	0.000500	U	NA
Vanadium	1.698	3.592	0.00100	U	**0.00102**	J	Yes
Zinc	0.146	0.31	**0.0179**		**0.0520**		Yes
Mercury	NA	NA	**0.0000470**	J	**0.0000450**	J	NA
1,4-DIOXANE	**µg/L**	**µg/L**	**µg/L**		**µg/L**		
1,4-Dioxane	NA	134.2	**0.15**		**0.15**		Yes
CHEMICAL OXYGEN DEMAND (COD)	**mg/L**	**mg/L**	**mg/L**		**mg/L**		
COD	NA	200	**8.00**	J	**7.00**	J	Yes
OIL AND GREASE (O&G)	**mg/L**	**mg/L**	**mg/L**		**mg/L**		
O&G	NA	15	1.00	U	1.00	U	Yes

Notes:
DVQ - data validation qualifier
Grab samples are compared to the daily maximum and composite samples to the daily average
* only Effluent sample is compared to discharge limits
J - Estimated concentration between the detection limit and limit of quantitation and/or due to quality control discrepancy
U - non detect and reported to the limit of detection
mg/L - milligrams per liter
NA - not applicable
GWTP - Groundwater Treatment Plant
NV - no value

Table 6. Weekly Perchlorate Sample Results - 3rd Quarter 2021

Sample Identification	Lab Package	Date Sampled	Sample Location	Harrison Bayou Maximum Allowable Daily Discharge Perchlorate Concentration (µg/L) [1]	INF Pond Discharge Criteria for Perchlorate (µg/L) [2]	Influent Perchlorate (6850)	Effluent Perchlorate (6850)		Does Concentration Meet Discharge Limit? (Yes/No)	No Daily Maximum Concentration		
						Result (µg/L)	Result (µg/L)	DVQ		Ammonia as N (350.3) (mg/L)	Ortho-Phosphate (365.3) (mg/L)	Organic Carbon (415.1) (mg/L)
LH18/24-SP650_070721_BIX	HS21070319	7/7/2021	TK-650	589	17	NA	**113**		Yes	**39**	**8.33**	**3.5**
LH18/24-SP650_070721_BIX (monthly)	HS21070323	7/7/2021	TK-650	589	17	NA	**109**		Yes	--	--	--
LH18/24-SP140_070721 (monthly)	HS21070321	7/7/2021	TK-140	--	--	**10,300**	NA		NA	--	--	--
LH18/24-SP650_072021_BIX	HS21071036	7/20/2021	TK-650	589	17	NA	**2,770**		No	**41**	**7.34**	**3.09**
LH18/24-SP650_072721_BIX	HS21071443	7/27/2021	TK-650	589	17	NA	0.0500	U	Yes	**34**	**6.46**	**11.9**
LH18/24-SP650_080421_BIX	HS21080187	8/4/2021	TK-650	589	17	NA	**1,030**		No	**84**	**14.7**	**2.29**
LH18/24-SP650_080421_BIX (monthly)	HS21080185	8/4/2021	TK-650	589	17	NA	**1,070**		No	--	--	--
LH18/24-SP140_080421 (monthly)	HS21080183	8/4/2021	TK-140	--	--	**10,800**	NA		NA	--	--	--
LH18/24-SP650_081121_BIX	HS21080541	8/11/2021	TK-650	589	17	NA	0.100	U	Yes	--	--	--
LH18/24-SP650_081721_BIX	HS21080827	8/17/2021	TK-650	589	17	NA	**52.1**		Yes	**77**	**11.8**	**2.74**
LH18/24-SP650_082421_BIX	HS21081235	8/24/2021	TK-650	589	17	NA	**13.1**		Yes	**100**	**17.8**	**2.56**
LH18/24-SP650_090221_BIX	HS21090158	9/2/2021	TK-650	589	17	NA	**36.8** [3]		Yes	**71**	**3.84**	**5.85**
LH18/24-SP650_091021_Between	HS21090546	9/10/2021	TK-650	589	17	NA	0.500	U	Yes	--	--	--
LH18/24-SP650_091021_AIX	HS21090546	9/10/2021	TK-650	589	17	NA	0.250	U	Yes	--	--	--
LH18/24-SP650_091421_BIX	HS21090625	9/14/2021	TK-650	589	17	NA	**76.7** [3]		Yes	**8.2**	**3.14**	**2.34**
LH18/24-SP650_091421_BIX (quarterly)	HS21090680	9/14/2021	TK-650	589	17	NA	**33.5** [3]		Yes	**21**	**5.72**	**2.45**
LH18/24-SP140_091421 (quarterly)	HS21090678	9/14/2021	TK-140	--	--	**7,210**	NA		NA	--	--	--
LH18/24-SP650_092721_AIX	E2102148	9/27/2021	TK-650	589	17	NA	0.0500	U	Yes	--	--	--

Notes:

[1] Effluent Limitation for Discharge (µg/L) per Table 2 of ROD

[2] Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level (PCL)

[3] Groundwater above the PCL was run through the ion exchange vessels prior to discharge to the INF Pond. Samples collected on 9/10/2021 and 9/27/2021 confirm that perchlorate was not detected in groundwater discharged to the INF Pond on 9/13/2021 and 9/27-9/30/2021.

SP140 samples are influent samples.

Bold font means analyte was detected.

Highlighted results exceeds the Harrison Bayou Maximum Allowable Daily Discharge

BIX - before ion exchange/AIX - after ion exchange

DVQ - data validation qualifier

J - Estimated concentration between the detection limit and limit of quantitation and/or due to quality control discrepancies

µg/L - micrograms per liter

mg/L - milligrams per liter

NA - not applicable

Table 7. Bi-Weekly GWTP Analytical Sampling Results for July 2021

			Sample Location	EFFLUENT - Monthly [3]		INFLUENT - Monthly [1]		EFFLUENT - Biweekly [3]		Does Concentration Meet Effluent Discharge Limits? (Yes/No)
			Sample Identification	LH18/24-SP650_070721		LH18/24-SP140_070721		LH18/24-SP650_072721		
			Lab Package	HS21070323		HS21070321		HS21071481		
			Sample Date	7/7/2021		7/7/2021		7/27/2021		
			Sample Type	GRAB		GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Table 2 of ROD [4]			Result	DVQ	Result	DVQ	Result	DVQ	
	Daily Average Concentration	Daily Maximum Concentration	INF Pond MCL							
VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		
1,1,1-Trichloroethane	3,417	7,230	200	0.50	U	NA		0.50	U	Yes
1,1,2-Trichloroethane	102.5	216.9	5	1.0	U	NA		1.0	U	Yes
1,1-Dichloroethane	6,633	14,032	NV	0.50	U	NA		0.50	U	Yes
1,1-Dichloroethene	119	253	7	0.50	U	NA		0.50	U	Yes
1,2-Dichloroethane	85	181	5	0.50	U	NA		0.50	U	Yes
1,2-Dichloropropane	NA	NA	5	1.0	U	NA		1.0	U	Yes
Acetone	1,132	2,395	NV	2.0	U	NA		2.0	U	Yes
Benzene	5	181	5	0.50	U	NA		0.50	U	Yes
Carbon Tetrachloride	5	181	5	1.0	U	NA		1.0	U	Yes
Chlorobenzene	22,300	47,180	100	1.0	U	NA		1.0	U	Yes
Chloroform	1,70	3,615	NV	0.50	U	NA		0.50	U	Yes
cis-1,2-Dichloroethene	NV	NV	70	**11**		NA		**1**		Yes
Ethylbenzene	26,954	57,025	700	1.0	U	NA		1.0	U	Yes
m,p-Xylene	39.5	83.6	NV	1.0	U	NA		1.0	U	Yes
Methylene Chloride	803	1,699	5	2.0	U	NA		1.0	U	Yes
o-Xylene	39.5	83.6	NV	1.0	U	NA		1.0	U	Yes
Styrene	2,829	5,987	100	1.0	U	NA		1.0	U	Yes
Tetrachloroethene	5.4	180.7	5	1.0	U	NA		1.0	U	Yes
Toluene	1,980	4,189	10	0.50	U	NA		0.50	U	Yes
Trichloroethene	85	181	5	**4.3**		NA		**4.2**		Yes
Vinyl Chloride	34	72	2	0.50	U	NA		0.50	U	Yes
ANIONS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		
Chloride	NV	NV	NV	NA		NA		**406**		NA
Sulfate	NV	NV	NV	NA		NA		**10.0**		NA
PERCHLORATE	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		
Perchlorate	27	589	17	**109**		**10,300**		NA		Yes
METALS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		
Hexavalent Chromium	0.05	0.124	NV	0.0100	U	0.0100	U	NA		Yes
Barium	1	2	2	**0.141**		NA		NA		Yes
Lead	0.0022	0.0046	0.015	0.00100	U	NA		NA		Yes
Selenium	0.0057	0.0120	0.05	0.00250	U	0.00250	U	NA		Yes
Silver	0.0014	0.0030	0.1	0.000500	U	0.000500	U	NA		Yes
SEMI-VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		
1,4-Dioxane [2]	NV	134.2	NV	**7.6**		NA		NA		Yes

Notes:

[1] Influent sample not compared to discharge limits

[2] Calculated Effluent Limit

[3] During the reporting period there were no exceedances of the discharge limits or INF pond MCLs.

[4] Grab samples are compared to the daily maximum and composite samples to the daily average for water discharged to the Bayou. Grab samples are compared to the MCL for water discharged to the INF Ponc

Bold font means analyte was detected.

DVQ - data validation qualifier

GWTP - Groundwater Treatment Plant

J - estimated concentration and/or due to QC discrepancies

µg/L - micrograms per liter

mg/L - milligrams per liter

NA - not applicable or not analyzed

NV - no value

Table 8. Bi-Weekly GWTP Analytical Sampling Results for August 2021

Sample Location				EFFLUENT - Monthly		INFLUENT - Monthly [1]		EFFLUENT - Biweekly		Does Concentration Meet Effluent Discharge Limits? (Yes/No)
Sample Identification				LH18/24-SP650_080421		LH18/24-SP140_080421		LH18/24-SP650_082421		
Lab Package				HS21080185		HS21080183		HS21081237		
Sample Date				8/4/2021		8/4/2021		8/24/2021		
Sample Type				GRAB		GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Table 2 of ROD [3]			Result	DVQ	Result	DVQ	Result	DVQ	
	Daily Average Concentration	Daily Maximum Concentration	INF Pond MCL							
VOLATILES	µg/L	µg/L	µg/L	µg/L		µg/L		µg/L		
1,1,1-Trichloroethane	3,417	7,230	200	0.50	U	NA		0.50	U	Yes
1,1,2-Trichloroethane	102.5	216.9	5	1.0	U	NA		1.0	U	Yes
1,1-Dichloroethane	6,633	14,032	NV	0.50	U	NA		0.50	UJ	Yes
1,1-Dichloroethene	119	253	7	0.50	U	NA		0.50	U	Yes
1,2-Dichloroethane	85	181	5	0.50	U	NA		0.50	U	Yes
1,2-Dichloropropane	NA	NA	5	1.0	U	NA		1.0	U	Yes
Acetone	1,132	2,395	NV	2.0	UJ	NA		2.0	U	Yes
Benzene	85	181	5	0.50	U	NA		0.50	U	Yes
Carbon Tetrachloride	85	181	5	1.0	U	NA		1.0	U	Yes
Chlorobezene	22,300	47,180	100	1.0	U	NA		1.0	U	Yes
Chloroform	1,708	3,615	NV	0.50	U	NA		0.50	UJ	Yes
cis-1,2-Dichloroethene	NV	NV	70	**2.8**		NA		**2.6**	J	Yes
Ethylbenzene	26,954	57,025	700	1.0	U	NA		1.0	U	Yes
m,p-Xylene	39.5	83.6	NV	1.0	U	NA		1.0	U	Yes
Methylene Chloride	803	1,699	5	1.0	U	NA		1.0	UJ	Yes
o-Xylene	39.5	83.6	NV	1.0	U	NA		1.0	U	Yes
Styrene	2,829	5,987	100	1.0	U	NA		1.0	U	Yes
Tetrachloroethene	85.4	180.7	5	1.0	U	NA		1.0	U	Yes
Toluene	1,980	4,189	10	0.50	U	NA		0.50	U	Yes
Trichloroethene	85	181	5	**1.1**		NA		**0.95**	J	Yes
Vinyl Chloride	34	72	2	0.50	U	NA		0.50	U	Yes
ANIONS	mg/L	mg/L	mg/L	mg/L		mg/L		mg/L		
Chloride	NV	NV	NV	NA		NA		**842**		NA
Sulfate	NV	NV	NV	NA		NA		**30.3**		NA
PERCHLORATE	µg/L	µg/L	µg/L	µg/L		µg/L		µg/L		
Perchlorate	278	589	17	**1,070** [4]		**1 ,8**		NA		No
METALS	mg/L	mg/L	mg/L	mg/L		mg/L		mg/L		
Hexavalent Chromium	0.058	0.124	NV	0.0100	U	0.0100	U	NA		Yes
Barium	1	2	2	**.195**		NA		NA		Yes
Lead	0.0022	0.0046	0.015	0.00100	U	NA		NA		Yes
Selenium	0.0057	0.0120	0.05	0.00250	U	0.00250	U	NA		Yes
Silver	0.0014	0.0030	0.1	0.000500	U	0.000500	U	NA		Yes
SEMI-VOLATILES	µg/L	µg/L	µg/L	µg/L		µg/L		µg/L		
1,4-Dioxane [2]	NV	134.2	NV	**2.0**		NA		NA		Yes

Notes:

[1] Influent sample not compared to discharge limits

[2] Calculated Effluent Limit

[3] Grab samples are compared to the daily maximum and composite samples to the daily average for water discharged to the Bayou. Grab samples are compared to the MCL for water discharged to

[4] The effluent water was not dscharged to the Harrison Bayou as the system was placed on re-cycle until effluent samples were confirmed to be below the discharge limit.

U - not detected and reported to the limit of detection

Bold font means analyte was detected.

Highlighted result exceeds the Effluent Limitation for Discharge

DVQ - data validation qualifier

GWTP - Groundwater Treatment Plant

J - estimated concentration and/or due to QC discrepancies

µg/L - micrograms per liter

Table 9. Bi-Weekly Analytical GWTP Sampling Results for September 2021

Sample Location				EFFLUENT - Biweekly		EFFLUENT - Monthly		INFLUENT - Monthly [1]		Does Concentration Meet Effluent Discharge Limits? (Yes/No)
Sample Identification				Not collected		Not collected		Not collected		
Lab Package										
Sample Date										
Sample Type				GRAB		GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Table 2 of ROD			Result	DVQ	Result	DVQ	Result	DVQ	
	Daily Average Concentration	Daily Maximum Concentration	INF Pond MCL							
VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**						
1,1,1-Trichloroethane	3,417	7,230	200	Plant was not operational due to power failure and acid pump malfunction. No data to report.						NA
1,1,2-Trichloroethane	102.5	216.9	5							NA
1,1-Dichloroethane	6,633	14,032	NV							NA
1,1-Dichloroethene	119	253	7							NA
1,2-Dichloroethane	85	181	5							NA
1,2-Dichloropropane	NA	NA	5							NA
Acetone	1,132	2,395	NV							NA
Benzene	85	181	5							NA
Carbon Tetrachloride	85	181	5							NA
Chlorobenzene	22,300	47,180	100							NA
Chloroform	1,708	3,615	NV							NA
cis-1,2-Dichloroethene	NV	NV	70							NA
Ethylbenzene	26,954	57,025	700							NA
m,p-Xylene	39.5	83.6	NV							NA
Methylene Chloride	803	1,699	5							NA
o-Xylene	39.5	83.6	NV							NA
Styrene	2,829	5,987	100							NA
Tetrachloroethene	85.4	180.7	5							NA
Toluene	1,980	4,189	10							NA
Trichloroethene	85	181	5							NA
Vinyl Chloride	34	72	2							NA
ANIONS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		
Chloride	NV	NV	NV							NA
Sulfate	NV	NV	NV							NA
PERCHLORATE	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		
Perchlorate	278	589	17							NA
METALS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		
Hexavalent Chromium	0.058	0.124	NV							NA
Barium	1	2	2							NA
Lead	0.0022	0.0046	0.015							NA
Selenium	0.0057	0.0120	0.05							NA
Silver	0.0014	0.0030	0.1							NA
SEMI-VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		
1,4-Dioxane [2]	NV	134.2	NV							NA

Notes:
DVQ - data validation qualifier
UJ - estimated non-detect due to quality control issues
GWTP - Groundwater Treatment Plant
U - Non detect reported to the limit of detection
mg/L - milligrams per liter
J - estimated concentration between the detection limit and limit of quantitation and/or due to quality control discrepancy
[1] Influent sample not compared to discharge limits
[2] Calculated Effluent Limit
Grab samples are compared to the daily maximum and composite samples to the daily average.
ROD - Record of Decision
NA - not applicable or not analyzed

Table 10. Quarterly GWTP Analytical Sampling Results - 3rd Quarter 2021

			Sample Location	EFFLUENT		INFLUENT [1]		Does Concentration Meet Discharge Limits? (Yes/No)
			Sample Identification	LH18/24-SP650_091421		LH18/24-SP140_052521		
			Lab Package	HS21090680		HS21090678		
			Sample Date	9/14/2021		9/14/2021		
			Sample Type	GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Protocol [2]		Result	DVQ	Result	DVQ	
	Daily Average Concentration	Daily Maximum Concentration					
VOLATILES	**µg/L**	**µg/L**	**µg/L**		**µg/L**		
1,1,1-Trichloroethane	3,417	7,230	0.50	U	0.50	U	Yes
1,1,2-Trichloroethane	102.5	216.9	1.0	U	1.0	U	Yes
1,1-Dichloroethane	6,633	14,032	0.50	U	**1.3**		Yes
1,1-Dichloroethene	119	253	0.50	U	0.50	U	Yes
1,2-Dichloroethane	85	181	0.50	U	**9.6**		Yes
1,2-Dichloropropane	NA	NA	1.0	U	1.0	U	NA
Acetone	1,132	2,395	2.0	U	2.0	U	Yes
Benzene	85	181	0.50	U	0.50	U	Yes
Carbon Tetrachloride	85	181	1.0	U	**0.82**	J	Yes
Chlorobenzene	22,300	47,180	1.0	U	1.0	U	Yes
Chloroform	1,708	3,615	0.50	U	**1.9**		Yes
cis-1,2-dichloroethene	NV	70	**3.0**		**250**		Yes
Ethylbenzene	26,954	57,025	1.0	U	1.0	U	Yes
m,p-Xylene	39.5	83.6	1.0	U	1.0	U	Yes
Methylene Chloride	803	1,699	1.0	U	1.0	U	Yes
o-Xylene	39.5	83.6	1.0	U	1.0	U	Yes
Styrene	2,829	5,987	1.0	U	1.0	U	Yes
Tetrachloroethene	85.4	180.7	1.0	U	**2.9**		Yes
Toluene	1,980	4,189	0.50	U	0.50	U	Yes
Trichloroethene	85	181	**0.90**	J	**730**		Yes
Vinyl Chloride	34	72	0.50	U	**4.2**		Yes
ANIONS	**mg/L**	**mg/L**	**mg/L**		**mg/L**		
Chloride	NA	NA	**1,370**		**279**		NA
Sulfate	NA	NA	**36.7**		**31.6**		NA
PERCHLORATE	**µg/L**	**µg/L**	**µg/L**		**µg/L**		
Perchlorate	278	589	**81.1**		**7,210**		Yes
METALS	**mg/L**	**mg/L**	**mg/L**		**mg/L**		
Aluminum	0.777	1.644	**0.0126**		**0.0522**		Yes
Antimony	NA	NA	0.00100	U	**0.000938**	J	NA
Arsenic	0.365	0.772	**0.000597**	J	**0.00209**	J	Yes

Table 10. Quarterly GWTP Analytical Sampling Results

			Sample Location	EFFLUENT		INFLUENT [1]		Does Concentration Meet Discharge Limits? (Yes/No)
			Sample Identification	LH18/24-SP650_091421		LH18/24-SP140_052521		
			Lab Package	HS21090680		HS21090678		
			Sample Date	9/14/2021		9/14/2021		
			Sample Type	GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Protocol [2]		Result	DVQ	Result	DVQ	
	Daily Average Concentration	Daily Maximum Concentration					
Barium	1	2	**2.66** [3]		**0.330**		No
Beryllium	NA	NA	0.000500	U	0.000500	U	NA
Cadmium	0.0016	0.0034	0.000500	U	0.000500	U	Yes
Calcium	NA	NA	**197**		**24.6**		NA
Chromium	0.355	0.752	0.00100	U	**0.00384**	J	Yes
Cobalt	5.433	11.495	**0.000100**	J	**0.000912**	J	Yes
Iron	1.132	2.395	**0.0218**	J	**0.429**		Yes
Lead	0.0022	0.0046	0.00100	U	0.00100	U	Yes
Magnesium	NA	NA	**39.0**		**14.8**		NA
Manganese	7.323	15.494	**0.0644**		**0.0437**		Yes
Nickel	0.087	0.184	**0.00224**	J	**0.00914**		Yes
Potassium	NA	NA	**3.08**		**1.85**		NA
Selenium	0.0057	0.012	0.00250	U	0.00250	U	Yes
Silver	0.0014	0.003	0.000500	U	0.000500	U	Yes
Sodium	NA	NA	**640**		**245**		NA
Thallium	NA	NA	0.000500	U	0.000500	U	NA
Vanadium	1.698	3.592	0.00100	U	**0.00189**	J	Yes
Zinc	0.146	0.31	**0.00274**	J	**0.0659**		Yes
Mercury	NA	NA	0.000100	U	0.000100	U	NA
1,4-DIOXANE	**µg/L**	**µg/L**	**µg/L**		**µg/L**		
1,4-Dioxane	NA	134.2	**9.8**		**24**		Yes
CHEMICAL OXYGEN DEMAND (COD)	**mg/L**	**mg/L**	**mg/L**		**mg/L**		
COD	NA	200	**21**		**13.0**	J	Yes
OIL AND GREASE (O&G)	**mg/L**	**mg/L**	**mg/L**		**mg/L**		
O&G	NA	15	**1.40**	J	1.00	U	Yes

Notes:

[1] Influent sample not compared to discharge limits

[2] Grab samples are compared to the daily maximum and composite samples to the daily average

[3] Barium detection may be a result of the sand change out in the sand filter.

Bold font means analyte was detected.

Highlighted result exceeds the Effluent Limitation for Discharge.

DVQ - data validation qualifier

GWTP - Groundwater Treatment Plant

J - Estimated concentration between the detection limit and limit of quantitation and/or due to quality control discrepancy

µg/L - micrograms per liter

mg/L - milligrams per liter

NA - not applicable

U - non detect and reported to the limit of detection

Table 7. Weekly Perchlorate Sample Results-4th Quarter 2021

Sample Identification	Lab Package	Date Sampled	Sample Location	Harrison Bayou Maximum Allowable Daily Discharge Perchlorate Concentration (µg/L)	INF Pond Discharge Criteria for Perchlorate (µg/L)	Reporting Limit	Influent Perchlorate (6850)	Effluent Perchlorate (6850)		Does Concentration Meet Discharge Limit? (Yes/No)	No Daily Maximum Concentration		
							Result (µg/L)	Result (µg/L)	DVQ		Ammonia as N (350.3) (mg/L)	Ortho-Phosphate (365.3) (mg/L)	Organic Carbon (415.1) (mg/L)
LH18/24-SP650_102021_BIX	HS21101165	10/20/2021	TK-650	589	17	0.1	NA	**3,020**[1]		No	**88**	**8.07**	**5.65**
LH18/24-SP650_102521_AIX	E2101141	10/25/2021	TK-650	589	17	0.1	NA	**0.0536**	J	Yes	--	--	--
LH18/24-SP650_110221_AIX	HS21110123	11/2/2021	TK-650	589	17	0.1	NA	< 0.0500	U	Yes	**140**	**9.26**	**9.65**
LH18/24-SP650_110921_AIX (monthly)	HS21110552	11/9/2021	TK-650	589	17	0.1	NA	< 0.250	U	Yes	--	--	--
LH18/24-SP140_110921 (monthly)	HS21110553	11/9/2021	TK-140	--	--	NA	**8,400**	NA		NA	--	--	--
LH18/24-SP650_110921_AIX	HS21110557	11/9/2021	TK-650	589	17	0.1	NA	< 0.250	U	Yes	**120**	**8.49**	**7.95**
LH18/24-SP650_112321_AIX	HS21111479	11/23/2021	TK-650	589	17	0.1	NA	< 0.0500	U	Yes	**110**	**8.0**	**7.12**
LH18/24-SP650_120321_AIX	E2101253	12/3/2021	TK-650	589	17	0.1	NA	< 0.0500	U	Yes	--	--	--
LH18/24-SP650_121421_AIX(quarterly)	HS21120888	12/14/2021	TK-650	589	17	0.1	NA	< 0.250	U	Yes	--	--	--
LH18/24-SP140_121421 (quarterly)	HS21120895	12/14/2021	TK-140	--	--	NA	**9,910**	NA		NA	--	--	--
LH18/24-SP650_121421_AIX	HS21120849	12/14/2021	TK-650	589	17	0.1	NA	< 0.250	U	Yes	**120**	**9.65**	**12.6**
LH18/24-SP650_122121_AIX	HS21121302	12/21/2021	TK-650	589	17	0.1	NA	**0.168**		Yes	**72**	**11.1**	**8.04**
LH18/24-SP650_122821_AIX	HS21121521	12/28/2021	TK-650	589	17	0.1	NA	**0.0932**	J	Yes	**90**	**7.2**	**14.5**

Notes:

Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level (PCL)

SP140 samples are influent samples.

µg/L - micrograms per liter

DVQ - data validation qualifier

J - Estimated concentration between the detection limit and limit of quantitation and/or due to quality control discrepancies

Detected analytes are in **bold**.

Blue highlighting indicates concentrations above the INF Pond Discharge Criteria for Perchlorate

NA - not applicable

U - non detect and reported to the limit of detection

BIX - before ion exchange/AIX - after ion exchange

mg/L - milligrams per liter

[1] Groundwater above the PCL (10/20/2021) was run through the ion exchange vessels prior to discharge to the INF Pond. The sample collected on 10/25/2021 confirmed that perchlorate was not detected in groudwater discharged to the INF Pond.

Table 6. Weekly Perchlorate Sample Results
1st Quarter 2022 Groundwater Treatment Plant Report
Longhorn Army Ammunition Plant

Sample Identification	Lab Package	Date Sampled	Sample Location	Harrison Bayou Maximum Allowable Daily Discharge Perchlorate Concentration (µg/L)	INF Pond Discharge Criteria for Perchlorate (µg/L)	Reporting Limit	Influent Perchlorate (6850)	Effluent Perchlorate (6850)		Does Concentration Meet Discharge Limit? (Yes/No)	No Daily Maximum Concentration		
							Result (µg/L)	Result (µg/L)	DVQ		Ammonia as N (350.3) (mg/L)	Ortho-Phosphate (365.3) (mg/L)	Organic Carbon (415.1) (mg/L)
LH18/24-SP650_010522_AIX	HS22010166	1/5/2022	TK-650	589	17	0.1	NA	**0.117**	J	No	**60**	**9.27**	**7.91**
LH18/24-SP650_010522_AIX (monthly)	HS22010172	1/5/2022	TK-650	589	17	0.1	NA	**0.0890**	J	Yes	--	--	--
LH18/24-SP140_010522 (monthly)	HS22010170	1/5/2022	TK-140	--	--	NA	**10,700**	NA		NA	--	--	--
LH18/24-SP650_011122_AIX	HS22010419	1/11/2022	TK-650	589	17	0.1	NA	**0.0882**	J	No	**57**	**4.45**	**3.84**
LH18/24-SP650_011922_AIX	HS22010825	1/19/2022	TK-650	589	17	0.1	NA	< 0.0500	U	No	**49**	**11.2**	**14.7**
LH18/24-SP650_012522_AIX	HS22011130	1/25/2022	TK-650	589	17	0.1	NA	< 0.0500	U	Yes	**32**	**12.6**	**23.6**
LH18/24-SP650_020222_AIX	HS22020282	2/2/2022	TK-650	589	17	0.1	NA	< 0.0500	U	Yes	**25**	**0.967 J**	**22.6**
LH18/24-SP650_020222_AIX (monthly)	HS22020280	2/2/2022	TK-650	589	17	0.1	NA	< 0.0500	U	Yes	--	--	--
LH18/24-SP140_020222 (monthly)	HS22020283	2/2/2022	TK-140	--	--	NA	**18,900**	NA		NA	--	--	--
LH18/24-SP650_021022_AIX	HS22020588	2/10/2022	TK-650	589	17	0.1	NA	< 0.0500	U	Yes	**28**	**8.38**	**0.5**
LH18/24-SP650_021522_AIX	HS22020807	2/15/2022	TK-650	589	17	0.1	NA	< 0.0500	U	Yes	**11**	**9.20**	**22.9**
LH18/24-SP650_021522_AIX (quarterly)	HS22020822	2/15/2022	TK-650	589	17	0.1	NA	< 0.0500	U	Yes	--	--	--
LH18/24-SP140_021522 (quarterly)	HS22020823	2/15/2022	TK-140	--	--	NA	**15,300**	NA		NA	--	--	--
LH18/24-SP650_022222_AIX	HS22021124	2/22/2022	TK-650	589	17	0.1	NA	**0.626**		Yes	**13**	**21.5 J**	**36.1**
LH18/24-SP650_030122_AIX (monthly)	HS22030083	3/1/2022	TK-650	589	17	0.1	NA	< 0.0500	U	Yes	**--**	**--**	**--**
LH18/24-SP140_030122 (monthly)	HS22030082	3/1/2022	TK-140	--	--	NA	**16,800**	NA		NA	**--**	**--**	**--**
LH18/24-SP650_030122_AIX	HS22030081	3/1/2022	TK-650	589	17	0.1	NA	< 0.0500	U	Yes	**13**	**12.6**	**30.3**
LH18/24-SP650_030822_BIX/AIX	HS22030443	3/8/2022	TK-650	589	17	0.1	NA	**1,630/0.221**		Yes	**22**	**9.45**	**10.7**
LH18/24-SP650_031522_BIX/AIX	HS22030820	3/15/2022	TK-650	589	17	0.1	NA	**903**/< 0.0500 U		Yes	**31**	**5.6**	**2.32**
LH18/24-SP650_032222_BIX/AIX	HS22031203	3/22/2022	TK-650	589	17	0.1	NA	**577**/< 0.0500 U		Yes	**38**	**5.94**	**4.18**
LH18/24-SP650_032922_BIX/AIX	HS22031664	3/29/2022	TK-650	589	17	0.1	NA	**605/0.102**		Yes	**40**	**6.00**	**4.57**

Notes:

Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level (PCL)

SP140 samples are influent samples.

µg/L - micrograms per liter

DVQ - data validation qualifier

J - Estimated concentration between the detection limit and limit of quantitation and/or due to quality control discrepancies

Detected analytes are in **bold**.

Blue highlighting indicates concentrations above the INF Pond Discharge Criteria for Perchlorate

NA - not applicable

U - non detect and reported to the limit of detection

BIX - before ion exchange/AIX - after ion exchange

mg/L - milligrams per liter

Table E.18-OOO - LHAAP-18/24

Table 7. Bi-Weekly GWTP Analytical Sampling Results for January 2022
1st Quarter 2022 Groundwater Treatment Plant Report
Longhorn Army Ammunition Plant

Sample Location				EFFLUENT - Monthly		INFLUENT - Monthly*		EFFLUENT - Biweekly		EFFLUENT - Biweekly		Does Concentration Meet Effluent Discharge Limits? (Yes/No)
Sample Identification				LH18/24-SP650_010522		LH18/24-SP140_010522		LH18/24-SP650_011122		LH18/24-SP650_012522		
Lab Package				HS22010172		HS22010170		HS22010420		HS22011131		
Sample Date				1/5/2022		1/5/2022		1/11/2022		1/25/2022		
Sample Type				GRAB		GRAB		GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Table 2 of ROD			Result	DVQ	Result	DVQ	Result	DVQ	Result	DVQ	
	Daily Average Concentration	Daily Maximum Concentration	INF Pond MCL									
VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**								
1,1,1-Trichloroethane	3,417	7,230	200	< 0.50	U	NA		< 0.50	U	< 0.50	U	Yes
1,1,2-Trichloroethane	102.5	216.9	5	< 1.0	U	NA		< 1.0	U	< 1.0	U	Yes
1,1-Dichloroethane	6,633	14,032	NV	< 0.50	U	NA		< 0.50	U	< 0.50	U	Yes
1,1-Dichloroethene	119	253	7	< 0.50	U	NA		< 0.50	U	< 0.50	U	Yes
1,2-Dichloroethane	85	181	5	< 0.50	U	NA		< 0.50	U	< 0.50	U	Yes
1,2-Dichloropropane	NV	NV	5	< 1.0	U	NA		< 1.0	U	< 1.0	U	Yes
Acetone	1,132	2,395	NV	< 2.0	U	NA		< 2.0	U	< 2.0	U	Yes
Benzene	85	181	5	< 0.50	U	NA		< 0.50	U	< 0.50	U	Yes
Carbon Tetrachloride	85	181	5	< 1.0	U	NA		< 1.0	U	< 1.0	U	Yes
Chlorobenzene	22,300	47,180	100	< 1.0	U	NA		< 1.0	U	< 1.0	U	Yes
Chloroform	1,708	3,615	NV	< 0.50	U	NA		< 0.50	U	< 0.50	U	Yes
cis-1,2-Dichloroethene	NV	NV	70	**1.6**		NA		**1.6**		**1.3**		Yes
Ethylbenzene	26,954	57,025	700	< 1.0	U	NA		< 1.0	U	< 1.0	U	Yes
m,p-Xylenes	39.5	83.6	NV	< 1.0	U	NA		< 1.0	U	< 1.0	U	Yes
Methylene Chloride	803	1,699	5	< 2.0	U	NA		<2.0	U	< 2.0	U	Yes
o-Xylene	39.5	83.6	NV	< 1.0	U	NA		< 1.0	U	< 1.0	U	Yes
Styrene	2,829	5,987	100	< 1.0	U	NA		< 1.0	U	< 1.0	U	Yes
Tetrachloroethene	85.4	180.7	5	< 1.0	U	NA		< 1.0	U	< 1.0	U	Yes
Toluene	1,980	4,189	10	< 0.50	U	NA		< 0.50	U	< 0.50	U	Yes
Trichloroethene	85	181	5	< 0.50	U	NA		< 0.50	U	< 0.50	U	Yes
Vinyl Chloride	34	72	2	< 0.50	U	NA		< 0.50	U	< 0.50	U	Yes
ANIONS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		**mg/L**		
Chloride	NV	NV	NV	NA		NA		**799**		**929**		NA
Sulfate	NV	NV	NV	NA		NA		**33.7**		**56.5**		NA
PERCHLORATE	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		**µg/L**		
Perchlorate	278	589	17	**0.0890**	J	**10,700**		NA		NA		Yes
METALS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		**mg/L**		
Hexavalent Chromium	0.058	0.124	NV	< 0.0100	U	< 0.0100	U	NA		NA		Yes
Barium	1	2	2	**0.375**		NA		NA		NA		Yes
Lead	0.0022	0.0046	0.015	< 0.00100	U	NA		NA		NA		Yes
Selenium	0.0057	0.0120	0.05	< 0.00250	U	< 0.00250	U	NA		NA		Yes
Silver	0.0014	0.0030	0.1	< 0.000500	U	< 0.000500	U	NA		NA		Yes
SEMI-VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		**µg/L**		
1,4-Dioxane**	NV	134.2	NV	**11**		NA		NA		NA		Yes

Notes:

µg/L - micrograms per liter

DVQ - data validation qualifier

GWTP - Groundwater Treatment Plant

U - Non detect reported to the limit of detection

mg/L - milligrams per liter

J - estimated concentration between the detection limit and limit of quantitation and/or due to quality control discrepancy

*Influent sample not compared to discharge limits

** Calculated Effluent Limit

Grab samples are compared to the daily maximum and composite samples to the daily average.

ROD - Record of Decision

NA - not applicable or not analyzed

NV - No value

MCL - Maximum Contaminant Level

Table 8. Bi-Weekly GWTP Analytical Sampling Results for February 2022
1st Quarter 2022 Groundwater Treatment Plant Report
Longhorn Army Ammunition Plant

			Sample Location	EFFLUENT - Monthly		INFLUENT - Monthly*		EFFLUENT - Biweekly		EFFLUENT - Biweekly		Does Concentration Meet Effluent Discharge Limits? (Yes/No)
			Sample Identification	LH18/24-SP650_02022		LH18/24-SP140_02022		LH18/24-SP650_021022		LH18/24-SP650_022		
			Lab Package	HS22020280		HS22020283		HS22020621		HS22021133		
			Sample Date	2/2/2022		2/2/2022		2/10/2022		2/22/2022		
			Sample Type	GRAB		GRAB		GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Table 2 of ROD											
	Daily Average Concentration	Daily Maximum Concentration	INF Pond MCL	Result	DVQ	Result	DVQ	Result	DVQ	Result	DVQ	
VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		**µg/L**		
1,1,1-Trichloroethane	3,417	7,230	200	< 0.50	U	NA		< 0.50	U	< 0.50	U	Yes
1,1,2-Trichloroethane	102.5	216.9	5	< 1.0	U	NA		< 1.0	U	< 1.0	U	Yes
1,1-Dichloroethane	6,633	14,032	NV	< 0.50	U	NA		< 0.50	U	< 0.50	U	Yes
1,1-Dichloroethene	119	253	7	< 0.50	U	NA		< 0.50	U	< 0.50	U	Yes
1,2-Dichloroethane	85	181	5	< 0.50	U	NA		< 0.50	U	< 0.50	U	Yes
1,2-Dichloropropane	NV	NV	5	< 1.0	U	NA		< 1.0	U	< 1.0	U	Yes
Acetone	1,132	2,395	NV	< 2.0	U	NA		< 2.0	U	< 2.0	U	Yes
Benzene	85	181	5	< 0.50	U	NA		< 0.50	U	< 0.50	U	Yes
Carbon Tetrachloride	85	181	5	< 1.0	U	NA		< 1.0	U	< 1.0	U	Yes
Chlorobezene	22,300	47,180	100	< 1.0	U	NA		< 1.0	U	< 1.0	U	Yes
Chloroform	1,708	3,615	NV	< 0.50	U	NA		< 0.50	U	< 0.50	U	Yes
cis-1,2-Dichloroethene	NV	NV	70	**1.6**		NA		**1.4**		**1.0**	J	Yes
Ethylbenzene	26,954	57,025	700	< 1.0	U	NA		< 1.0	U	< 1.0	U	Yes
m,p-Xylenes	39.5	83.6	NV	< 1.0	U	NA		< 1.0	U	< 1.0	U	Yes
Methylene Chloride	803	1,699	5	< 2.0	U	NA		< 2.0	U	< 2.0	U	Yes
o-Xylene	39.5	83.6	NV	< 1.0	U	NA		< 1.0	U	< 1.0	U	Yes
Styrene	2,829	5,987	100	< 1.0	U	NA		< 1.0	U	< 1.0	U	Yes
Tetrachloroethene	85.4	180.7	5	< 1.0	U	NA		< 1.0	U	< 1.0	U	Yes
Toluene	1,980	4,189	10	< 0.50	U	NA		< 0.50	U	< 0.50	U	Yes
Trichloroethene	85	181	5	< 0.50	U	NA		< 0.50	U	< 0.50	U	Yes
Vinyl Chloride	34	72	2	< 0.50	U	NA		< 0.50	U	< 0.50	U	Yes
ANIONS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		**mg/L**		
Chloride	NV	NV	NV	NA		NA		**916**		**863**		NA
Sulfate	NV	NV	NV	NA		NA		**43.1**		**8.9**		NA
PERCHLORATE	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		**µg/L**		
Perchlorate	278	589	17	< 0.0500	U	**18,900**		NA		NA		Yes
METALS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		**mg/L**		
Hexavalent Chromium	0.058	0.124	NV	< 0.0100	UJ	< 0.0100	UJ	NA		NA		Yes
Barium	1	2	2	**0.838**		NA		NA		NA		Yes
Lead	0.0022	0.0046	0.015	< 0.00100	U	NA		NA		NA		Yes
Selenium	0.0057	0.0120	0.05	< 0.00250	U	< 0.00250	U	NA		NA		Yes
Silver	0.0014	0.0030	0.1	< 0.000500	U	< 0.000500	U	NA		NA		Yes
SEMI-VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		**µg/L**		
1,4-Dioxane**	NV	134.2	NV	**8**		NA		NA		NA		Yes

Notes:

µg/L - micrograms per liter
mg/L - milligrams per liter
NV - No value
DVQ - data validation qualifier
ROD - Record of Decision
MCL - Maximum Contaminant Level
GWTP - Groundwater Treatment Plant
*Influent sample not compared to discharge limits
NA - not applicable or not analyzed
U - not detected and reported to the limit of detection
Grab samples are compared to the daily maximum and composite samples to the daily average.
** Calculated Effluent Limit
J - estimated concentration between the detection limit and limit of quantitation and/or due to quality control discrepancy
UJ - estimated non-detect due to quality control discrepancy

Table 9. Bi-Weekly Analytical GWTP Sampling Results for March 2022
1st Quarter 2022 Groundwater Treatment Plant Report
Longhorn Army Ammunition Plant

			Sample Location	EFFLUENT - Monthly		INFLUENT - Monthly*		EFFLUENT - Biweekly		EFFLUENT - Biweekly		Does Concentration Meet Effluent Discharge Limits? (Yes/No)
			Sample Identification	LH18/24-SP650_030122		LH18/24-SP140_030122		LH18/24-SP650_030822		LH18/24-SP650_032222		
			Lab Package	HS22030083		HS22030082		HS22030465		HS22031243		
			Sample Date	3/1/2022		3/1/2022		3/8/2022		3/22/2022		
			Sample Type	GRAB		GRAB		GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Table 2 of ROD											
	Daily Average Concentration	Daily Maximum Concentration	INF Pond MCL	Result	DVQ	Result	DVQ	Result	DVQ	Result	DVQ	
VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**								
1,1,1-Trichloroethane	3,417	7,230	200	< 0.50	U	NA		< 0.50	U	< 0.50	U	Yes
1,1,2-Trichloroethane	102.5	216.9	5	< 1.0	U	NA		< 1.0	U	< 1.0	U	Yes
1,1-Dichloroethane	6,633	14,032	NV	< 0.50	U	NA		< 0.50	U	< 0.50	U	Yes
1,1-Dichloroethene	119	253	7	< 0.50	U	NA		< 0.50	U	< 0.50	U	Yes
1,2-Dichloroethane	85	181	5	< 0.50	U	NA		< 0.50	U	< 0.50	U	Yes
1,2-Dichloropropane	NV	NV	5	< 1.0	U	NA		< 1.0	U	< 1.0	U	Yes
Acetone	1,132	2,395	NV	< 2.0	U	NA		< 2.0	U	< 2.0	U	Yes
Benzene	85	181	5	< 0.50	U	NA		< 0.50	U	< 0.50	U	Yes
Carbon Tetrachloride	85	181	5	< 1.0	U	NA		< 1.0	U	< 1.0	U	Yes
Chlorobenzene	22,300	47,180	100	< 1.0	U	NA		< 1.0	U	< 1.0	U	Yes
Chloroform	1,708	3,615	NV	< 0.50	U	NA		< 0.50	U	< 0.50	U	Yes
cis-1,2-Dichloroethene	NV	NV	70	**0.62**	J	NA		**1.5**		**1.2**		Yes
Ethylbenzene	26,954	57,025	700	< 1.0	U	NA		< 1.0	U	< 1.0	U	Yes
m,p-Xylenes	39.5	83.6	NV	< 1.0	U	NA		< 1.0	U	< 1.0	U	Yes
Methylene Chloride	803	1,699	5	< 2.0	U	NA		<2.0	U	< 2.0	U	Yes
o-Xylene	39.5	83.6	NV	< 1.0	U	NA		< 1.0	U	< 1.0	U	Yes
Styrene	2,829	5,987	100	< 1.0	U	NA		< 1.0	U	< 1.0	U	Yes
Tetrachloroethene	85.4	180.7	5	< 1.0	U	NA		< 1.0	U	< 1.0	U	Yes
Toluene	1,980	4,189	10	< 0.50	U	NA		< 0.50	U	< 0.50	U	Yes
Trichloroethene	85	181	5	< 0.50	U	NA		< 0.50	U	< 0.50	U	Yes
Vinyl Chloride	34	72	2	< 0.50	U	NA		< 0.50	U	< 0.50	U	Yes
ANIONS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		**mg/L**		
Chloride	NV	NV	NV	NA		NA		**853**		**834**		NA
Sulfate	NV	NV	NV	NA		NA		**32.6**		**34.8**		NA
PERCHLORATE	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		**µg/L**		
Perchlorate	278	589	17	< 0.0500	U	**16,800**		**NA**		**NA**		Yes
METALS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		**mg/L**		
Hexavalent Chromium	0.058	0.124	NV	< 0.0100	U	< 0.0100	U	NA		NA		Yes
Barium	1	2	2	**0.785**		NA		NA		NA		Yes
Lead	0.0022	0.0046	0.015	< 0.00100	U	NA		NA		NA		Yes
Selenium	0.0057	0.0120	0.05	< 0.00250	U	< 0.00250	U	NA		NA		Yes
Silver	0.0014	0.0030	0.1	< 0.000500	U	< 0.000500	U	NA		NA		Yes
SEMI-VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		**µg/L**		
1,4-Dioxane**	NV	134.2	NV	**14**		NA		NA		NA		Yes

Notes:
µg/L - micrograms per liter
DVQ - data validation qualifier
GWTP - Groundwater Treatment Plant
U - Non detect reported to the limit of detection
mg/L - milligrams per liter
J - estimated concentration between the detection limit and limit of quantitation and/or due to quality control discrepancy
*Influent sample not compared to discharge limits
** Calculated Effluent Limit
Grab samples are compared to the daily maximum and composite samples to the daily average.
ROD - Record of Decision
NA - not applicable or not analyzed
NV - No Value
MCL - Maximum Contaminant Level

Table 10. Quarterly GWTP Analytical Sampling Results
1st Quarter 2022 Groundwater Treatment Plant Report
Longhorn Army Ammunition Plant

			Sample Location	EFFLUENT		INFLUENT*		Does Concentration Meet Discharge Limits? (Yes/No)
			Sample Identification	LH18/24-SP650_021522		LH18/24-SP140_021522		
			Lab Package	HS22020822		HS22020823		
			Sample Date	2/15/2022		2/15/2022		
			Sample Type	GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Protocol			Result	DVQ	Result	DVQ	
	Daily Average Concentration	Daily Maximum Concentration	INF Pond MCL					
VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		
1,1,1-Trichloroethane	3,417	7,230	200	< 0.50	U	< 5.0	U	Yes
1,1,2-Trichloroethane	102.5	216.9	5	< 1.0	U	< 10	U	Yes
1,1-Dichloroethane	6,633	14,032	NV	< 0.50	U	< 5.0	U	Yes
1,1-Dichloroethene	119	253	7	< 0.50	U	**24**		Yes
1,2-Dichloroethane	85	181	5	< 0.50	U	**21**		Yes
1,2-Dichloropropane	NV	NV	5	< 1.0	U	< 10	U	Yes
Acetone	1,132	2,395	NV	< 2.0	U	< 20	U	Yes
Benzene	85	181	5	< 0.50	U	< 5.0	U	Yes
Carbon Tetrachloride	85	181	5	< 1.0	U	**12**		Yes
Chlorobenzene	22,300	47,180	100	< 1.0	U	< 10	U	Yes
Chloroform	1,708	3,615	NV	< 0.50	U	< 5.0		Yes
cis-1,2-dichloroethene	NV	NV	70	**0.61**	J	**930**		
Ethylbenzene	26,954	57,025	700	< 1.0	U	< 10	U	Yes
m,p-Xylenes	39.5	83.6	NV	< 1.0	U	< 10	U	Yes
Methylene Chloride	803	1,699	5	< 2.0	U	**220**		Yes
o-Xylene	39.5	83.6	NV	< 1.0	U	< 10	U	Yes
Styrene	2,829	5,987	100	< 1.0	U	< 10	U	Yes
Tetrachloroethene	85.4	180.7	5	< 1.0	U	< 10	U	Yes
Toluene	1,980	4,189	10	< 0.50	U	< 5.0	U	Yes
Trichloroethene	85	181	5	< 0.50	U	**3,500**		Yes
Vinyl Chloride	34	72	2	< 0.50	U	**22**		Yes
ANIONS	**mg/L**	**mg/L**	**mg/**	**mg/L**		**mg/L**		
Chloride	NA	NA	NV	**878**		**407**		NA
Sulfate	NA	NA	NV	**41.7**		**40.3**		NA
PERCHLORATE	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		
Perchlorate	278	589	17	< 0.0500	U	**15,300**		Yes
METALS	**mg/L**	**mg/L**	**mg/**	**mg/L**		**mg/L**		
Aluminum	0.777	1.644	NV	**0.0254**	UB	**0.0720**		Yes
Antimony	NV	NV	0.006	< 0.00100	U	**0.00109**	J	NA
Arsenic	0.365	0.772	0.01	**0.000415**	J	**0.00131**	J	Yes

Table 10. Quarterly GWTP Analytical Sampling Results
1st Quarter 2022 Groundwater Treatment Plant Report
Longhorn Army Ammunition Plant

				Sample Location	EFFLUENT		INFLUENT*		Does Concentration Meet Discharge Limits? (Yes/No)
				Sample Identification	LH18/24-SP650_021522		LH18/24-SP140_021522		
				Lab Package	HS22020822		HS22020823		
				Sample Date	2/15/2022		2/15/2022		
				Sample Type	GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Protocol								
	Daily Average Concentration	Daily Maximum Concentration	INF Pond MCL	Result	DVQ	Result	DVQ	
Barium	1	2	2	**1.05**		**0.491**		Yes
Beryllium	NV	NV	0.004	< 0.000500	U	< 0.000500	U	NA
Cadmium	0.0016	0.0034	0.005	< 0.000500	U	< 0.000500	U	Yes
Calcium	NV	NV	NV	**66.5**		**33.2**		NA
Chromium	0.355	0.752	0.1	**0.00206**	J	**0.00354**	J	Yes
Cobalt	5.433	11.495	NV	**0.000898**	J	**0.00182**	J	Yes
Iron	1.132	2.395	NV	**0.159**	J	**0.260**	J	Yes
Lead	0.0022	0.0046	0.015	< 0.00100	U	**0.00101**	J	Yes
Magnesium	NV	NV	NV	**17.7**		**22.8**		NA
Manganese	7.323	15.494	NV	**0.165**		**0.110**		Yes
Nickel	0.087	0.184	NV	0.00254	UB	**0.00950**		Yes
Potassium	NV	NV	NV	**1.72**		**1.35**		NA
Selenium	0.0057	0.012	0.05	< 0.00250	U	< 0.00250	U	Yes
Silver	0.0014	0.003	NV	< 0.000500	U	< 0.000500	U	Yes
Sodium	NV	NV	NV	**579**		**288**		NA
Thallium	NV	NV	NV	< 0.000500	U	< 0.000500	U	NA
Vanadium	1.698	3.592	NV	**0.000900**	J	**0.00208**	J	Yes
Zinc	0.146	0.31	NV	**0.0257**		**0.0344**		Yes
Mercury	NV	NV	0.002	**0.0000580**	J	**0.0000540**	J	NA
1,4-DIOXANE	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		
1,4-Dioxane	NV	134.2	NV	**4.5**		**12**		Yes
CHEMICAL OXYGEN DEMAND (COD)	**mg/**	**mg/**	**mg/**	**mg/**		**mg/L**		
COD	NV	200	NV	**61.0**		**14.0**	J	Yes
OIL AND GREASE (O&G)	**mg/**	**mg/**	**mg/**	**mg/**		**mg/L**		
O&G	NV	15	NV	< 1.00	U	< 1.00	U	Yes

Notes:
µg/L - micrograms per liter
DVQ - data validation qualifier
Grab samples are compared to the daily maximum and composite samples to the daily average
* only Effluent sample is compared to discharge limits
J - Estimated concentration between the detection limit and limit of quantitation and/or due to quality control discrepancy
U - non detect and reported to the limit of detection
UB - considered an artifact of blank contamination
mg/L - milligrams per liter
GWTP - Groundwater Treatment Plant
NV - no value

Table 6. Weekly Perchlorate Sample Results
2nd Quarter 2022 Groundwater Treatment Plant Report
Longhorn Army Ammunition Plant

Sample Identification	Lab Package	Date Sampled	Sample Location	Harrison Bayou Maximum Allowable Daily Discharge Perchlorate Concentration (µg/L)	INF Pond Discharge Criteria for Perchlorate (µg/L)	Reporting Limit	Influent Perchlorate (6850)	Effluent Perchlorate (6850)		Does Concentration Meet Discharge Limit? (Yes/No)	No Daily Maximum Concentration		
							Result (µg/L)	Result (µg/L) BIX/AIX	DVQ		Ammonia as N (350.3) (mg/L)	Ortho-Phosphate (365.3) (mg/L)	Organic Carbon (415.1) (mg/L)
LH18/24-SP650_040522_BIX/AIX	HS22040256	4/5/2022	TK-650	589	17	0.1	NA	**195/1.32**		Yes	**20**	**6.52**	**10.7**
LH18/24-SP650_041222_AIX (monthly)	HS22040627	4/12/2022	TK-650	589	17	0.1	NA	**15.70**		Yes	--	--	--
LH18/24-SP140_041222 (monthly)	HS22040626	4/12/2022	TK-140	--	--	NA	**6,370**	NA		NA	--	--	--
LH18/24-SP650_041222_BIX/AIX	HS22040624	4/12/2022	TK-650	589	17	0.1	NA	**273/11.7**		Yes	**22**	**7.04**	**9.64**
LH18/24-SP650_042022_BIX/AIX	HS22041044	4/20/2022	TK-650	589	17	0.1	NA	**92.1/0.963**		Yes	**40**	**6.88**	**3.30**
LH18/24-SP650_042622_BIX/AIX	HS22041334	4/26/2022	TK-650	589	17	0.1	NA	**37.5/1.31**		Yes	**24**	**6.96**	**4.93**
LH18/24-SP650_051722_BIX/AIX	HS22050786	5/17/2022	TK-650	589	17	0.1	NA	**68.1/0.931**		Yes	**28**	**5.90**	**5.74**
LH18/24-SP650_052522_BIX/AIX	HS22051188	5/24/2022	TK-650	589	17	0.1	NA	**56.8/0.433 J**		Yes	**24**	**5.09**	**10.2**
LH18/24-SP650_052422_AIX (quarterly)	HS22051211	5/24/2022	TK-650	589	17	0.1	NA	**0.232**		Yes	--	--	--
LH18/24-SP140_052422 (quarterly)	HS22051205	5/24/2022	TK-140	--	--	NA	**6,990**	NA		NA	--	--	--
LH18/24-SP650_060322_BIX/AIX	HS22060246	6/3/2022	TK-650	589	17	0.1	NA	**3.97/34.9***		Yes	**31**	**6.07**	**9.66**
LH18/24-SP650_060722_AIX (monthly)	HS22060383	6/7/2022	TK-650	589	17	0.1	NA	**0.244**		Yes	**--**	**--**	**--**
LH18/24-SP140_060722 (monthly)	HS22060385	6/7/2022	TK-140	--	--	NA	**7,010**	NA		NA	**--**	**--**	**--**
LH18/24-SP650_060722_BIX/AIX	HS22060382	6/7/2022	TK-650	589	17	0.1	NA	**24.8/0.505**		Yes	**23**	**5.13**	**7.3**
LH18/24-SP650_061422_BIX/AIX	HS22060773	6/14/2022	TK-650	589	17	0.1	NA	**26.1/0.0960 J**		Yes	**13**	**8.01 J**	**17.8**
LH18/24-SP650_062122_AIX	HS22061138	6/21/2022	TK-650	589	17	0.1	NA	**0.246**		Yes	**17**	**0.308**	**16.6**
LH18/24-SP650_062822_AIX	HS22061602	6/28/2022	TK-650	589	17	0.1	NA	< 0.0500	U	Yes	**16**	**4.15**	**12.1**

Notes:

Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level (PCL)

SP140 samples are influent samples.

µg/L - micrograms per liter

DVQ - data validation qualifier

J - Estimated concentration between the detection limit and limit of quantitation and/or due to quality control discrepancies

Detected analytes are in **bold**.

U - non detect and reported to the limit of detection

BIX - before ion exchange/AIX - after ion exchange

mg/L - milligrams per liter

*Labels most likely switched

NA - Not applicable

Table E-18-TTT - LHAAP-18/24

Table 7. Bi-Weekly GWTP Analytical Sampling Results for April 2022
2nd Quarter 2022 Groundwater Treatment Plant Report
Longhorn Army Ammunition Plant

Sample Location				EFFLUENT - Biweekly		EFFLUENT - Monthly		INFLUENT - Monthly [1]		EFFLUENT - Biweekly		Does Concentration Meet Effluent Discharge Limits? (Yes/No)
Sample Identification				LH18/24-SP650_040522		LH18/24-SP650_041222		LH18/24-SP140_041222		LH18/24-SP650_042022		
Lab Package				HS22040258		HS22040627		HS22040626		HS22041050		
Sample Date				4/5/2022		4/12/2022		4/12/2022		4/20/2022		
Sample Type				GRAB		GRAB		GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Table 2 of ROD			Result	DVQ	Result	DVQ	Result	DVQ	Result	DVQ	
	Daily Average Concentration	Daily Maximum Concentration	INF Pond MCL									
VOLATILES	**µg/L**	**µg/L**	**µg/L**			**µg/L**						
1,1,1-Trichloroethane	3,417	7,230	200	< 0.50	U	< 0.50	U	NA		< 0.50	U	Yes
1,1,2-Trichloroethane	102.5	216.9	5	< 1.0	U	< 1.0	U	NA		< 0.50	U	Yes
1,1-Dichloroethane	6,633	14,032	NV	< 0.50	U	< 0.50	U	NA		< 0.50	U	Yes
1,1-Dichloroethene	119	253	7	< 0.50	U	< 0.50	U	NA		< 0.50	U	Yes
1,2-Dichloroethane	85	181	5	< 0.50	U	< 0.50	U	NA		< 0.50	U	Yes
1,2-Dichloropropane	NV	NV	5	< 1.0	U	< 1.0	U	NA		< 0.50	U	Yes
Acetone	1,132	2,395	NV	< 2.0	U	< 2.0	U	NA		< 2.0	U	Yes
Benzene	85	181	5	< 0.50	U	< 0.50	U	NA		< 0.50	U	Yes
Carbon Tetrachloride	85	181	5	< 1.0	U	< 1.0	U	NA		< 0.50	U	Yes
Chlorobenzene	22,300	47,180	100	< 1.0	U	< 1.0	U	NA		< 0.50	U	Yes
Chloroform	1,708	< 0.50	NV	< 0.50	U	< 0.50	U	NA		< 0.50	U	Yes
cis-1,2-Dichloroethene	NV	NV	70	**1.6**		**2.0**		NA		**1.7**		Yes
Ethylbenzene	26,954	57,025	700	< 1.0	U	< 1.0	U	NA		< 0.50	U	Yes
m,p-Xylenes	39.5	83.6	NV	< 1.0	U	< 1.0	U	NA		< 1.0	U	Yes
Methylene Chloride	803	1,699	5	< 2.0	U	< 2.0	U	NA		< 2.0	U	Yes
o-Xylene	39.5	83.6	NV	< 1.0	U	< 1.0	U	NA		< 0.50	U	Yes
Styrene	2,829	5,987	100	< 1.0	U	< 1.0	U	NA		< 0.50	U	Yes
Tetrachloroethene	85.4	180.7	5	< 1.0	U	< 1.0	U	NA		< 0.50	U	Yes
Toluene	1,980	4,189	10	< 0.50	U	< 0.50	U	NA		< 0.50	U	Yes
Trichloroethene	85	181	5	< 0.50	U	< 0.50	U	NA		< 0.50	U	Yes
Vinyl Chloride	34	72	2	< 0.50	U	< 0.50	U	NA		< 0.50	U	Yes
ANIONS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		**mg/L**		
Chloride	NV	NV	NV	**794**		NA		NA		**749**		NA
Sulfate	NV	NV	NV	**29.2**		NA		NA		**53.6**		NA
PERCHLORATE	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		**µg/L**		
Perchlorate [2]	278	589	17	NA		**15.7**		**6,37**		NA		Yes
METALS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		**mg/L**		
Hexavalent Chromium	0.058	0.124	NV	NA		< 0.00600	U	< 0.00600	U	NA		Yes
Barium	1	2	2	NA		**0.282**		NA		NA		Yes
Lead	0.0022	0.0046	0.015	NA		< 0.00125	U	NA		NA		Yes
Selenium	0.0057	0.0120	0.05	NA		< 0.00250	U	< 0.00250	U	NA		Yes
Silver	0.0014	0.0030	0.1	NA		< 0.000500	U	< 0.000500	U	NA		Yes
SEMI-VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		**µg/L**		
1,4-Dioxane [3]	NV	134.2	NV	NA		**12**		NA		NA		Yes

Notes:
µg/L - micrograms per liter
DVQ - data validation qualifier
GWTP - Groundwater Treatment Plant
U - Non detect reported to the limit of detection
mg/L - milligrams per liter
[1] Influent sample not compared to discharge limits
[2] Weekly perchlorate samples are collected on the same or comparable dates and presented on Table 6 (Weekly Perchlorate Sample Results).
[3] Calculated Effluent Limit
Grab samples are compared to the daily maximum and composite samples to the daily average.
ROD - Record of Decision
NA - Not applicable or not analyzed
NV - No value
MCL - Maximum Contaminant Level(s)

Table 8. Bi-Weekly GWTP Analytical Sampling Results for May 2022
2nd Quarter 2022 Groundwater Treatment Plant Report
Longhorn Army Ammunition Plant

	Sample Location	EFFLUENT - Bi-weekly				Does Concentration Meet Effluent Discharge Limits? (Yes/No)
	Sample Identification	LH18/24-SP650_051722				
	Lab Package	HS22050817				
	Sample Date	5/17/2022				
	Sample Type	GRAB				
	Effluent Limitation for Discharge (µg/L) per Table 2 of ROD			Result	DVQ	
	Daily Average Concentration	Daily Maximum Concentration	INF Pond MCL			
VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**		
1,1,1-Trichloroethane	3,417	7,230	200	< 0.50	U	Yes
1,1,2-Trichloroethane	102.5	216.9	5	< 0.50	U	Yes
1,1-Dichloroethane	6,633	14,032	NV	< 0.50	U	Yes
1,1-Dichloroethene	119	253	7	< 0.50	U	Yes
1,2-Dichloroethane	85	181	5	< 0.50	U	Yes
1,2-Dichloropropane	NV	NV	5	< 0.50	U	Yes
Acetone	1,132	2,395	NV	< 2.0	U	Yes
Benzene	85	181	5	< 0.50	U	Yes
Carbon Tetrachloride	85	181	5	< 0.50	U	Yes
Chlorobezene	22,300	47,180	100	< 0.50	U	Yes
Chloroform	1,708	3,615	NV	< 0.50	U	Yes
cis-1,2-Dichloroethene	NV	NV	70	**2.2**		Yes
Ethylbenzene	26,954	57,025	700	< 0.50	U	Yes
m,p-Xylenes	39.5	83.6	NV	< 1.0	U	Yes
Methylene Chloride	803	1,699	5	< 2.0	U	Yes
o-Xylene	39.5	83.6	NV	< 0.50	U	Yes
Styrene	2,829	5,987	100	< 0.50	U	Yes
Tetrachloroethene	85.4	180.7	5	< 0.50	U	Yes
Toluene	1,980	4,189	10	< 0.50	U	Yes
Trichloroethene	85	181	5	< 0.50	U	Yes
Vinyl Chloride	34	72	2	< 0.50	U	Yes
ANIONS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		
Chloride	NV	NV	NV	**770**		NA
Sulfate	NV	NV	NV	**9.7**		NA
PERCHLORATE	**µg/L**	**µg/L**	**µg/L**	**µg/L**		
Perchlorate [1]	278	589	17	NA		Yes
METALS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		
Hexavalent Chromium	0.058	0.124	NV	NA		Yes
Barium	1	2	2	NA		Yes
Lead	0.0022	0.0046	0.015	NA		Yes
Selenium	0.0057	0.0120	0.05	NA		Yes
Silver	0.0014	0.0030	0.1	NA		Yes
SEMI-VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**		
1,4-Dioxane [2]	NV	134.2	NV	< 0.50		Yes

Notes:

µg/L - micrograms per liter
mg/L - milligrams per liter
DVQ - data validation qualifier
ROD - Record of Decision
GWTP - Groundwater Treatment Plant
NA - not applicable or not analyzed
U - not detected and reported to the limit of detection
Grab samples are compared to the daily maximum and composite samples to the daily average.

[1] Weekly perchlorate samples are collected on the same or comparable dates and presented on Table 6 (Weekly Perchlorate Sample Results).

[2] Calculated Effluent Limit

NV - No Value
MCL - Maximum Contaminant Level(s)

Table 9. Bi-Weekly Analytical GWTP Sampling Results for June 2022
2nd Quarter 2022 Groundwater Treatment Plant Report
Longhorn Army Ammunition Plant

Sample Location				EFFLUENT - Biweekly		EFFLUENT - Monthly		INFLUENT - Monthly [1]		EFFLUENT - Biweekly		EFFLUENT - Biweekly		Does Concentration Meet Effluent Discharge Limits? (Yes/No)
Sample Identification				LH18/24-SP650_060322		LH18/24-SP650_060722		LH18/24-SP140_06072		LH18/24-SP650_061422		LH18/24-SP650_062122		
Lab Package				HS22060250		HS22060383		HS22060385		HS22060792		HS22061142		
Sample Date				6/3/2022		6/7/2022		6/7/2022		6/14/2022		6/21/2022		
Sample Type				GRAB		GRAB		GRAB		GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Table 2 of ROD			Result	DVQ	Result	DVQ	Result	DVQ	Result	DVQ	Result	DVQ	
	Daily Average Concentration	Daily Maximum Concentration	INF Pond MCL											
VOLATILES	**µg/L**	**µg/L**	**µg/L**											
1,1,1-Trichloroethane	3,417	7,230	200	< 0.50	U	< 0.50	U	NA		< 0.50	U	< 0.50	U	Yes
1,1,2-Trichloroethane	102.5	216.9	5	< 1.0	U	< 1.0	U	NA		< 1.0	U	< 1.0	U	Yes
1,1-Dichloroethane	6,633	14,032	NV	< 0.50	U	< 0.50	U	NA		< 0.50	U	< 0.50	U	Yes
1,1-Dichloroethene	119	253	7	< 0.50	U	< 0.50	U	NA		< 0.50	U	< 0.50	U	Yes
1,2-Dichloroethane	85	181	5	< 0.50	U	< 0.50	U	NA		< 0.50	U	< 0.50	U	Yes
1,2-Dichloropropane	NV	NV	5	< 1.0	U	< 1.0	U	NA		< 1.0	U	< 1.0	U	Yes
Acetone	1,132	2,395	NV	< 2.0	U	< 2.0	U	NA		< 2.0	U	< 2.0	U	Yes
Benzene	85	181	5	< 0.50	U	< 0.50	U	NA		< 0.50	U	< 0.50	U	Yes
Carbon Tetrachloride	85	181	5	< 1.0	U	< 1.0	U	NA		< 1.0	U	< 1.0	U	Yes
Chlorobenzene	22,300	47,180	100	< 1.0	U	< 1.0	U	NA		< 1.0	U	< 1.0	U	Yes
Chloroform	1,708	3,615	NV	< 0.50	U	< 0.50	U	NA		< 0.50	U	< 0.50	U	Yes
cis-1,2-Dichloroethene	NV	NV	70	**2.4**		**.5**		NA		**.7**		**.8**		Yes
Ethylbenzene	26,954	57,025	700	< 1.0	U	< 1.0	U	NA		< 1.0	U	< 1.0	U	Yes
m,p-Xylenes	39.5	83.6	NV	< 1.0	U	< 1.0	U	NA		< 1.0	U	< 1.0	U	Yes
Methylene Chloride	803	1,699	5	< 2.0	U	< 1.0	U	NA		< 2.0	U	< 2.0	U	Yes
o-Xylene	39.5	83.6	NV	< 1.0	U	< 1.0	U	NA		< 1.0	U	< 1.0	U	Yes
Styrene	2,829	5,987	100	< 1.0	U	< 1.0	U	NA		< 1.0	U	< 1.0	U	Yes
Tetrachloroethene	85.4	180.7	5	< 1.0	U	< 1.0	U	NA		< 1.0	U	< 1.0	U	Yes
Toluene	1,980	4,189	10	< 0.50	U	< 0.50	U	NA		< 0.50	U	< 0.50	U	Yes
Trichloroethene	85	181	5	< 0.50	U	< 0.50	U	NA		< 0.50	U	< 0.50	U	Yes
Vinyl Chloride	34	72	2	< 0.50	U	< 0.50	U	NA		< 0.50	U	< 0.50	U	Yes
ANIONS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		**mg/L**		**mg/L**		
Chloride	NV	NV	NV	**840**		NA		NA		**84**		**89**		NA
Sulfate	NV	NV	NV	**6.9**		NA		NA		**.5**		**18.5**		NA
PERCHLORATE	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		**µg/L**		**µg/L**		
Perchlorate [2]	278	589	17	**NA**		**0.244**		**7,010**		**NA**		**NA**		Yes
METALS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		**mg/L**		**mg/L**		
Hexavalent Chromium	0.058	0.124	NV	NA		< 0.00600	U	< 0.00600	U	NA		NA		Yes
Barium	1	2	2	NA		**0.315**		NA		NA		NA		Yes
Lead	0.0022	0.0046	0.015	NA		< 0.00125	U	NA		NA		NA		Yes
Selenium	0.0057	0.0120	0.05	NA		< 0.00250	U	< 0.00250	U	NA		NA		Yes
Silver	0.0014	0.0030	0.1	NA		< 0.000500	U	< 0.000500	U	NA		NA		Yes
SEMI-VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		**µg/L**		**µg/L**		
1,4-Dioxane [3]	NV	134.2	NV	NA		**15**		NA		NA		NA		Yes

Notes:

µg/L - micrograms per liter

DVQ - data validation qualifier

GWTP - Groundwater Treatment Plant

U - Non detect reported to the limit of detection

mg/L - milligrams per liter

[1] Influent sample not compared to discharge limits

[2] Weekly perchlorate samples are collected on the same or comparable dates and presented on Table 6 (Weekly Perchlorate Sample Results).

[3] Calculated Effluent Limit

Table E.18-WWW - LHAAP-18/24

Table 10. Quarterly GWTP Analytical Sampling Results
2nd Quarter 2022 Groundwater Treatment Plant Report
Longhorn Army Ammunition Plant

			Sample Location	EFFLUENT		INFLUENT*		Does Concentration Meet Discharge Limits? (Yes/No)
			Sample Identification	LH18/24-SP650_052422		LH18/24-SP140_052422		
			Lab Package	HS22051211		HS22051205		
			Sample Date	5/24/2022		5/24/2022		
			Sample Type	GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Protocol			Result	DVQ	Result	DVQ	
	Daily Average Concentration	Daily Maximum Concentration	INF Pond MCL					
VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		
1,1,1-Trichloroethane	3,417	7,230	200	< 0.50	U	< 5.0	U	Yes
1,1,2-Trichloroethane	102.5	216.9	5	< 1.0	U	< 10	U	Yes
1,1-Dichloroethane	6,633	14,032	NV	< 0.50	U	**9.7**	J	Yes
1,1-Dichloroethene	119	253	7	< 0.50	U	< 5.0	U	Yes
1,2-Dichloroethane	85	181	5	< 0.50	U	**25**		Yes
1,2-Dichloropropane	NV	NV	5	< 1.0	U	< 10	U	Yes
Acetone	1,132	2,395	NV	< 2.0	U	< 20	U	Yes
Benzene	85	181	5	< 0.50	U	< 5.0	U	Yes
Carbon Tetrachloride	85	181	5	< 1.0	U	< 10	U	Yes
Chlorobenzene	22,300	47,180	100	< 1.0	U	< 10	U	Yes
Chloroform	1,708	3,615	NV	< 0.50	U	**9.9**	J	Yes
cis-1,2-dichloroethene	NV	NV	70	**2.4**		**3,200**		Yes
Ethylbenzene	26,954	57,025	700	< 1.0	U	< 10	U	Yes
m,p-Xylenes	39.5	83.6	NV	< 1.0	U	< 10	U	Yes
Methylene Chloride	803	1,699	5	< 2.0	U	**2,400**		Yes
o-Xylene	39.5	83.6	NV	< 1.0	U	< 10	U	Yes
Styrene	2,829	5,987	100	< 1.0	U	< 10	U	Yes
Tetrachloroethene	85.4	180.7	5	< 1.0	U	**36**		Yes
Toluene	1,980	4,189	10	< 0.50	U	< 5.0	U	Yes
Trichloroethene	85	181	5	< 0.50	U	**3,900**		Yes
Vinyl Chloride	34	72	2	< 0.50	U	**300**		Yes
ANIONS	**mg/**	**mg/**	**mg/**	**mg/**		**mg/L**		
Chloride	NA	NA	NV	**793**		**290**		NA
Sulfate	NA	NA	NV	**31.4**		**26.7**		NA
PERCHLORATE	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		
Perchlorate	278	589	17	**0.232**		**6,990**		Yes
METALS	**mg/**	**mg/**	**mg/**	**mg/**		**mg/L**		
Aluminum	0.777	1.644	NV	**0.0189**		**0.126**		Yes
Antimony	NV	NV	0.006	< 0.00100	U	**0.000693**	J	NA
Arsenic	0.365	0.772	0.01	**0.000735**	J	**0.00186**	J	Yes

Table 10. Quarterly GWTP Analytical Sampling Results
2nd Quarter 2022 Groundwater Treatment Plant Report
Longhorn Army Ammunition Plant

				Sample Location	EFFLUENT		INFLUENT*		Does Concentration Meet Discharge Limits? (Yes/No)
				Sample Identification	LH18/24-SP650_052422		LH18/24-SP140_052422		
				Lab Package	HS22051211		HS22051205		
				Sample Date	5/24/2022		5/24/2022		
				Sample Type	GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Protocol			Result	DVQ	Result	DVQ	
	Daily Average Concentration	Daily Maximum Concentration	INF Pond MCL					
Barium	1	2	2	**0.331**		**0.622**		Yes
Beryllium	NV	NV	0.004	< 0.000500	U	< 0.000500	U	NA
Cadmium	0.0016	0.0034	0.005	< 0.000500	U	< 0.000500	U	Yes
Calcium	NV	NV	NV	**17.3**		**27.5**		NA
Chromium	0.355	0.752	0.1	**0.000529**	J	**0.00200**	J	Yes
Cobalt	5.433	11.495	NV	< 0.000500	U	**0.00621**		Yes
Iron	1.132	2.395	NV	**0.0721**	J	**2.31**		Yes
Lead	0.0022	0.0046	0.015	< 0.00100	U	<0.00100	U	Yes
Magnesium	NV	NV	NV	**12.4**		**21.4**		NA
Manganese	7.323	15.494	NV	**0.0629**		**0.506**		Yes
Nickel	0.087	0.184	NV	**0.00132**	J	**0.0122**		Yes
Potassium	NV	NV	NV	**1.71**	J	**1.14**		NA
Selenium	0.0057	0.012	0.05	**0.00142**	J	**0.00189**	J	Yes
Silver	0.0014	0.003	NV	< 0.000500	U	< 0.000500	U	Yes
Sodium	NV	NV	NV	**442**		**178**		NA
Thallium	NV	NV	NV	< 0.000500	U	< 0.000500	U	NA
Vanadium	1.698	3.592	NV	**0.00149**	J	**0.00133**	J	Yes
Zinc	0.146	0.31	NV	0.00651	UB	**0.0332**		Yes
Mercury	NV	NV	0.002	< 0.000100	U	**0.0000330**	J	NA
1,4-DIOXANE	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		
1,4-Dioxane	NV	134.2	NV	**8.3**		**13**		Yes
CHEMICAL OXYGEN DEMAND (COD)	**mg/**	**mg/**	**mg/**	**mg/**		**mg/L**		
COD	NV	200	NV	**49.0**		**16.0**		Yes
OIL AND GREASE (O&G)	**mg/**	**mg/**	**mg/**	**mg/**		**mg/L**		
O&G	NV	15	NV	< 1.00	U	< 1.00	U	Yes

Notes:
µg/L - micrograms per liter
DVQ - data validation qualifier
Grab samples are compared to the daily maximum and composite samples to the daily average.
* only Effluent sample is compared to discharge limits
J - Estimated concentration between the detection limit and limit of quantitation and/or due to quality control discrepancy
U - non detect and reported to the limit of detection
UB - considered an artifact of blank contamination
mg/L - milligrams per liter
GWTP - Groundwater Treatment Plant
NV - No value
MCL - Maximum Contaminant Level

Table 7. Weekly Perchlorate Sample Results
3rd Quarter 2022 Groundwater Treatment Plant Report
Longhorn Army Ammunition Plant

Sample Identification	Lab Package	Date Sampled	Sample Location	Harrison Bayou Maximum Allowable Daily Discharge Perchlorate Concentration (µg/L)	INF Pond Discharge Criteria for Perchlorate (µg/L)	Reporting Limit	Influent Perchlorate (6850)	Effluent Perchlorate (6850)	Does Concentration Meet Discharge Limit? (Yes/No)	No Daily Maximum Concentration		
							Result (µg/L)	Result (µg/L) BIX/AIX		Ammonia as N (350.3) (mg/L)	Ortho-Phosphate (365.3) (mg/L)	Organic Carbon (415.1) (mg/L)
LH18/24-SP650_070622_BIX/AIX	HS22070252	7/6/2022	TK-650	589	17	0.1	NA	**9.16**/< 0.0500 U	Yes	**13**	**4.57**	**15.5**
LH18/24-SP650_071222 (monthly)	HS22070567	7/12/2022	TK-650	589	17	0.1	NA	**0.186**	Yes	--	--	--
LH18/24-SP140_071222 (monthly)	HS22070568	7/12/2022	TK-140	--	--	NA	**8,330**	NA	NA	--	--	--
LH18/24-SP650_071222_BIX/AIX	HS22070566	7/12/2022	TK-650	589	17	0.1	NA	**0.285/0.0318 J**	Yes	**18**	**3.96**	**30.9**
LH18/24-SP650_071922_BIX/AIX	HS22070986	7/19/2022	TK-650	589	17	0.1	NA	**7.86/1.32**	Yes	**24**	**8.05**	**13.0**
LH18/24-SP650_072622_BIX/AIX	HS22071367	7/26/2022	TK-650	589	17	0.1	NA	**0.0964 J/0.0476 J**	Yes	**17**	**2.9**	**24.3**
LH18/24-SP650_080222_BIX/AIX	HS22080124	8/2/2022	TK-650	589	17	0.1	NA	**0.909/0.0287 J**	Yes	**18**	**6.98**	**17.4**
LH18/24-SP650_080922_BIX/AIX	HS22080474	8/9/2022	TK-650	589	17	0.1	NA	**31.3/1.99**	Yes	**17**	**4.5**	**7.06**
LH18/24-SP650_080922_AIX (monthly)	HS22080472	8/9/2022	TK-650	589	17	0.1	NA	**1.98**	Yes	--	--	--
LH18/24-SP140_080922 (monthly)	HS22080473	8/9/2022	TK-140	--	--	NA	**14,700**	NA	NA	--	--	--
LH18/24-SP650_081622_BIX/AIX	HS22080872	8/16/2022	TK-650	589	17	0.1	NA	**48.8/0.206**	Yes	**1.9**	**3.91**	**9.88**
LH18/24-SP650_082422_BIX/AIX	HS22081350	8/24/2022	TK-650	589	17	0.1	NA	**11.4/0.626**	Yes	**16**	**4.74**	**6.32**
LH18/24-SP650_082422 (quarterly)	HS22081354	8/24/2022	TK-650	589	17	0.1	NA	**0.672**	Yes	--	--	--
LH18/24-SP140_082422 (quarterly)	HS22081352	8/24/2022	TK-140	--	--	NA	**12,700**	NA	NA	--	--	--
LH18/24-SP650_083022_BIX/AIX	HS22081683	8/30/2022	TK-650	589	17	0.1	NA	< 0.0500 U/< 0.0500 U	Yes	**18**	**2.98**	**12.1**
LH18/24-SP650_090722_BIX/AIX	HS22090344	9/7/2022	TK-650	589	17	0.1	NA	**0.698/0.0494 J**	Yes	**12**	**5.28**	**6.92**
LH18/24-SP650_090722 (monthly)	HS22090337	9/7/2022	TK-650	589	17	0.1	NA	< 0.0500 U	Yes	**--**	**--**	**--**
LH18/24-SP140_090722 (monthly)	HS22090343	9/7/2022	TK-140	--	--	NA	**22,900**	NA	NA	**--**	**--**	**--**
LH18/24-SP650_091422_BIX/AIX	HS22090729	9/14/2022	TK-650	589	17	0.1	NA	**2.43/0.105**	Yes	**10**	**3.25**	**6.76**
LH18/24-SP650_092122_BIX/AIX	HS22091050	9/21/2022	TK-650	589	17	0.1	NA	**0.0438 J/0.338**	Yes	**21**	**6.90**	**8.78**
LH18/24-SP650_092722_BIX/AIX	HS22091362	9/27/2022	TK-650	589	17	0.1	NA	**3.89/0.166**	Yes	**25**	**3.03**	**20.8**

Notes:

Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level (PCL)

SP140 samples are influent samples.

µg/L - micrograms per liter

DVQ - data validation qualifier

J - Estimated concentration between the detection limit and limit of quantitation and/or due to quality control discrepancies

Detected analytes are in **bold**.

Blue highlighted text indicates concentrations above the INF Pond Discharge Criteria for Perchlorate

NA - not applicable

U - non detect and reported to the limit of detection

BIX - before ion exchange/AIX - after ion exchange

mg/L - milligrams per liter

Table 6. Weekly Perchlorate Sample Results
4th Quarter 2022 Groundwater Treatment Plant Report
Longhorn Army Ammunition Plant

Sample Identification	Lab Package	Date Sampled	Sample Location	Harrison Bayou Maximum Allowable Daily Discharge Perchlorate Concentration (µg/L)	INF Pond Discharge Criteria for Perchlorate (µg/L)	Reporting Limit	Influent Perchlorate (6850)	Effluent Perchlorate (6850)	Does Concentration Meet Discharge Limit? (Yes/No)	No Daily Maximum Concentration		
							Result (µg/L)	Result (µg/L) BIX/AIX		Ammonia as N (350.3) (mg/L)	Ortho-Phosphate (365.3) (mg/L)	Organic Carbon (415.1) (mg/L)
LH18/24-SP650_100422_BIX/AIX	HS22100184	10/4/2022	TK-650	589	17	0.1	NA	**14.4/0.0813 J**	Yes	**11**	**3.57**	**7.73**
LH18/24-SP650_100422_AIX (monthly)	HS22100181	10/4/2022	TK-650	589	17	0.1	NA	**0.0703 J**	Yes	--	--	--
LH18/24-SP140_100422 (monthly)	HS22100180	10/4/2022	TK-140	--	--	NA	**56,800**	NA	NA	--	--	--
LH18/24-SP650_101122_BIX/AIX	HS22100562	10/11/2022	TK-650	589	17	0.1	NA	**1.43/**< 0.0500 U	Yes	**16**	**3.59**	**7.21**
LH18/24-SP650_101822_BIX/AIX	HS22100969	10/18/2022	TK-650	589	17	0.1	NA	**0.732/**< 0.0500 U	Yes	**12**	**3.91**	**6.97**
LH18/24-SP650_102622_BIX/AIX	HS22101488	10/26/2022	TK-650	589	17	0.1	NA	**1.38/0.123**	Yes	**7**	**3.22**	**3.1**
LH18/24-SP650_110122_BIX/AIX	HS22110109	11/1/2022	TK-650	589	17	0.1	NA	**34.7/**< 0.0500 U	Yes	**13**	**4.82**	**4.81**
LH18/24-SP650_110122_AIX (monthly)	HS22110111	11/1/2022	TK-650	589	17	0.1	NA	< 0.0500 U	Yes	--	--	--
LH18/24-SP140_110122 (monthly)	HS22110108	11/1/2022	TK-140	--	--	NA	**29,600**	NA	NA	--	--	--
LH18/24-SP650_110822_BIX/AIX	HS22110511	11/8/2022	TK-650	589	17	0.1	NA	**15.9/0.0441 J**	Yes	**3.5**	**2.99**	**6.68**
LH18/24-SP650_111822_BIX/AIX	E2201127	11/18/2022	TK-650	589	17	0.1	NA	**12,400/0.620**	Yes	--	--	--
LH18/24-SP650_121322_BIX/AIX	E2201187	12/13/2022	TK-650	589	17	0.1	NA	< 0.0500 U**/1.41**	Yes	--	--	--

Notes:

Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level (PCL)

SP140 samples are influent samples.

µg/L - micrograms per liter

J - Estimated concentration between the detection limit and limit of quantitation and/or due to quality control discrepancies

Detected analytes are in bold.

Red font indicates concentrations above the INF Pond Discharge Criteria for Perchlorate

NA - not applicable

U - non detect and reported to the limit of detection

BIX - before ion exchange/AIX - after ion exchange

mg/L - milligrams per liter

Table 7. Bi-Weekly GWTP Analytical Sampling Results for October 2022
4th Quarter 2022 Groundwater Treatment Plant Report
Longhorn Army Ammunition Plant

Sample Location				EFFLUENT - Monthly		INFLUENT - Monthly*		EFFLUENT - Bi-weekly		EFFLUENT - Bi-weekly		Does Concentration Meet Effluent Discharge Limits? (Yes/No)
Sample Identification				LH18/24-SP650_100422_AIX		LH18/24-SP140_100422		LH18/24-SP650_101122		LH18/24-SP650_102622		
Lab Package				HS22100181		HS22100180		HS22100565		HS22101489		
Sample Date				10/4/2022		10/4/2022		10/11/2022		10/26/2022		
Sample Type				GRAB		GRAB		GRAB		GRAB		
	Effluent Limitation for Discharge (µg/L) per Table 2 of ROD			Result	DVQ	Result	DVQ	Result	DVQ	Result	DVQ	
	Daily Average Concentration	Daily Maximum Concentration	INF Pond MCL									
VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**								
1,1,1-Trichloroethane	3,417	7,230	200	< 1.0	U	NA		< 0.50	U	< 1.0	U	Yes
1,1,2-Trichloroethane	102.5	216.9	5	< 1.0	U	NA		< 1.0	U	< 1.0	U	Yes
1,1-Dichloroethane	6,633	14,032	NV	< 1.0	U	NA		< 0.50	U	< 1.0	U	Yes
1,1-Dichloroethene	119	253	7	< 1.0	U	NA		< 0.50	U	< 1.0	U	Yes
1,2-Dichloroethane	85	181	5	< 1.0	U	NA		< 0.50	U	< 1.0	U	Yes
1,2-Dichloropropane	NV	NV	5	< 1.0	U	NA		< 1.0	U	< 1.0	U	Yes
Acetone	1,132	2,395	NV	< 1.0	U	NA		< 2.0	U	< 1.0	U	Yes
Benzene	85	181	5	< 1.0	U	NA		< 0.50	U	< 1.0	U	Yes
Carbon Tetrachloride	85	181	5	< 1.0	U	NA		< 1.0	U	< 1.0	U	Yes
Chlorobenzene	22,300	47,180	100	< 1.0	U	NA		< 1.0	U	< 1.0	U	Yes
Chloroform	1,708	3,615	NV	< 1.0	U	NA		< 0.50	U	< 1.0	U	Yes
cis-1,2-Dichloroethene	NV	NV	70	**2.3**		NA		**2.3**		**.1**		Yes
Ethylbenzene	26,954	57,025	700	< 1.0	U	NA		< 1.0	U	< 1.0	U	Yes
m,p-Xylenes	39.5	83.6	NV	< 1.0	U	NA		< 1.0	U	< 1.0	U	Yes
Methylene Chloride	803	1,699	5	< 1.0	U	NA		< 2.0	U	< 1.0	U	Yes
o-Xylene	39.5	83.6	NV	< 1.0	U	NA		< 1.0	U	< 1.0	U	Yes
Styrene	2,829	5,987	100	< 1.0	U	NA		< 1.0	U	< 1.0	U	Yes
Tetrachloroethene	85.4	180.7	5	< 1.0	U	NA		< 1.0	U	< 1.0	U	Yes
Toluene	1,980	4,189	10	< 1.0	U	NA		< 0.50	U	< 1.0	U	Yes
Trichloroethene	85	181	5	< 1.0	U	NA		< 0.50	U	< 1.0	U	Yes
Vinyl Chloride	34	72	2	< 1.0	U	NA		< 0.50	U	< 1.0	U	Yes
ANIONS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		**mg/L**		
Chloride	NV	NV	NV	NA		NA		**1,260**		**1,130**		NA
Sulfate	NV	NV	NV	NA		NA		**49.8**		**50.0**		NA
PERCHLORATE	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		**µg/L**		
Perchlorate**	278	589	17	**0.0703**	J	**56,800**		NA		NA		Yes
METALS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		**mg/L**		
Hexavalent Chromium	0.058	0.124	NV	< 0.00600	U	< 0.00600	U	NA		NA		Yes
Barium	1	2	2	**0.228**		NA		NA		NA		Yes
Lead	0.0022	0.0046	0.015	< 0.00125	U	NA		NA		NA		Yes
Selenium	0.0057	0.0120	0.05	< 0.00250	U	< 0.00250	U	NA		NA		Yes
Silver	0.0014	0.0030	0.1	< 0.000500	U	< 0.000500	U	NA		NA		Yes
SEMI-VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		**µg/L**		
1,4-Dioxane***	NV	134.2	NV	**0.10**		NA		NA		NA		Yes

Notes:

µg/L - micrograms per liter
DVQ - Data validation qualifier
GWTP - Groundwater Treatment Plant
U - Non detect reported to the limit of detection
mg/L - milligrams per liter
J - Estimated concentration between the detection limit and limit of quantitation and/or due to quality control discrepancy
*Influent sample not compared to discharge limits
**-Perchlorate is also collected weekly and reported on the Weekly Results Table
*** Calculated Effluent Limit
Grab samples are compared to the daily maximum
ROD - Record of Decision
NA - not applicable or not analyzed
NV - No value
MCL - Maximum Contaminant Level

Table 8. Bi-Weekly GWTP Analytical Sampling Results for November 2022
4th Quarter 2022 Groundwater Treatment Plant Report
Longhorn Army Ammunition Plant

Sample Location				**EFFLUENT - Monthly**		**INFLUENT - Monthly***		**EFFLUENT - Biweekly**		**Does Concentration Meet Effluent Discharge Limits? (Yes/No)**
Sample Identification				**LH18/24-SP650_110122**		**LH18/24-SP140_110122**		**LH18/24-SP650_110822**		
Lab Package				**HS22110111**		**HS22110108**		**HS22110517**		
Sample Date				**11/1/2022**		**11/1/2022**		**11/8/2022**		
Sample Type				**GRAB**		**GRAB**		**GRAB**		
	Effluent Limitation for Discharge (µg/L)									
	Daily Average Concentration	**Daily Maximum Concentration**	**INF Pond MCL**	**Result**	**DVQ**	**Result**	**DVQ**	**Result**	**DVQ**	
VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**				**µg/L**		
1,1,1-Trichloroethane	3,417	7,230	200	< 1.0	U	NA		< 0.50	U	Yes
1,1,2-Trichloroethane	102.5	216.9	5	< 1.0	U	NA		< 1.0	U	Yes
1,1-Dichloroethane	6,633	14,032	NV	< 1.0	U	NA		< 0.50	U	Yes
1,1-Dichloroethene	119	253	7	< 1.0	U	NA		< 0.50	U	Yes
1,2-Dichloroethane	85	181	5	< 1.0	U	NA		< 0.50	U	Yes
1,2-Dichloropropane	NV	NV	5	< 1.0	U	NA		< 1.0	U	Yes
Acetone	1,132	2,395	NV	< 1.0	U	NA		< 2.0	U	Yes
Benzene	85	181	5	< 1.0	U	NA		< 0.50	U	Yes
Carbon Tetrachloride	85	181	5	< 1.0	U	NA		< 1.0	U	Yes
Chlorobenzene	22,300	47,180	100	< 1.0	U	NA		< 1.0	U	Yes
Chloroform	1,708	3,615	NV	< 1.0	U	NA		< 0.50	U	Yes
cis-1,2-Dichloroethene	NV	NV	70	**1.6**		NA		**1.3**		Yes
Ethylbenzene	26,954	57,025	700	< 1.0	U	NA		< 1.0	U	Yes
m,p-Xylenes	39.5	83.6	NV	< 1.0	U	NA		< 1.0	U	Yes
Methylene Chloride	803	1,699	5	< 1.0	U	NA		< 2.0	U	Yes
o-Xylene	39.5	83.6	NV	< 1.0	U	NA		< 1.0	U	Yes
Styrene	2,829	5,987	100	< 1.0	U	NA		< 1.0	U	Yes
Tetrachloroethene	85.4	180.7	5	< 1.0	U	NA		< 1.0	U	Yes
Toluene	1,980	4,189	10	< 1.0	U	NA		< 0.50	U	Yes
Trichloroethene	85	181	5	< 1.0	U	NA		< 0.50	U	Yes
Vinyl Chloride	34	72	2	< 1.0	U	NA		< 0.50	U	Yes
ANIONS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		
Chloride	NV	NV	NV	NA		NA		**1,060**		NA
Sulfate	NV	NV	NV	NA		NA		**56.3**		NA
PERCHLORATE	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		
Perchlorate**	278	589	17	< 0.0500	U	**29,600**		NA		Yes
METALS	**mg/L**	**mg/L**	**mg/L**	**mg/L**		**mg/L**		**mg/L**		
Hexavalent Chromium	0.058	0.124	NV	< 0.00600	U	< 0.00600	U	NA		Yes
Barium	1	2	2	**0.0946**		NA		NA		Yes
Lead	0.0022	0.0046	0.015	< 0.00125	U	NA		NA		Yes
Selenium	0.0057	0.0120	0.05	< 0.00250	U	< 0.00250	U	NA		Yes
Silver	0.0014	0.0030	0.1	< 0.000500	U	< 0.000500	U	NA		Yes
SEMI-VOLATILES	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**		**µg/L**		
1,4-Dioxane***	NV	134.2	NV	**0.11**		NA		NA		Yes

Notes:

µg/L - micrograms per liter
mg/L - milligrams per liter
GWTP - Groundwater Treatment Plant
DVQ - Data validation qualifier
NV - No value
NA - Not applicable or Not analyzed
Grab samples are compared to the daily maximum and composite samples to the daily average.
*Influent sample not compared to discharge limits
**Perchlorate is also collected weekly and reported on the Weekly Results Table
*** Calculated Effluent Limit
J - Estimated concentration between the detection limit and limit of quantitation and/or due to quality control discrepancy
U - Non detect reported to the limit of detection
MCL - Maximum Contaminant Level

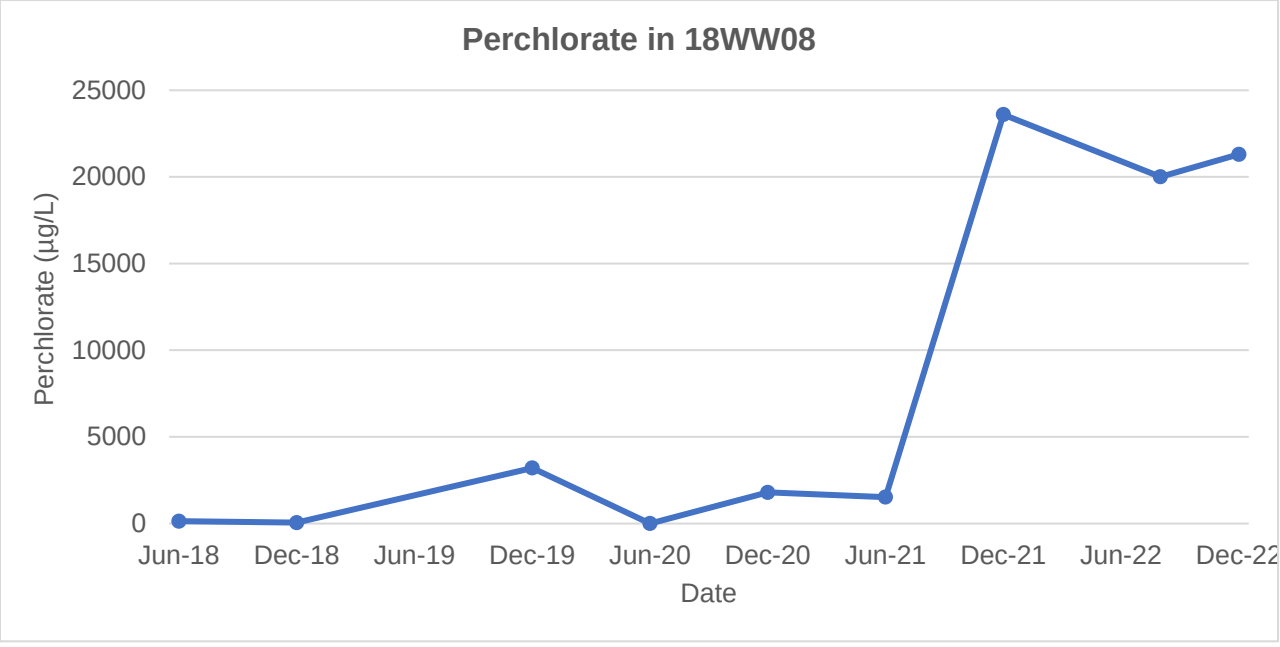
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Table E.19 - LHAAP-18/24

Mann-Kendall Trend Analysis
Well 18WW08
Perchlorate

Date	Perchlorate (µg/L)
06/07/18	130
12/19/18	45
12/11/19	3200
06/30/20	0.425
12/14/20	1790
06/24/21	1520
12/13/21	23600
08/11/22	20000
12/21/22	21300

n	9
alpha	0.05
MK-stat	18
s.e.	9.59166
z-stat	1.77237
p-value	0.03817
trend	yes



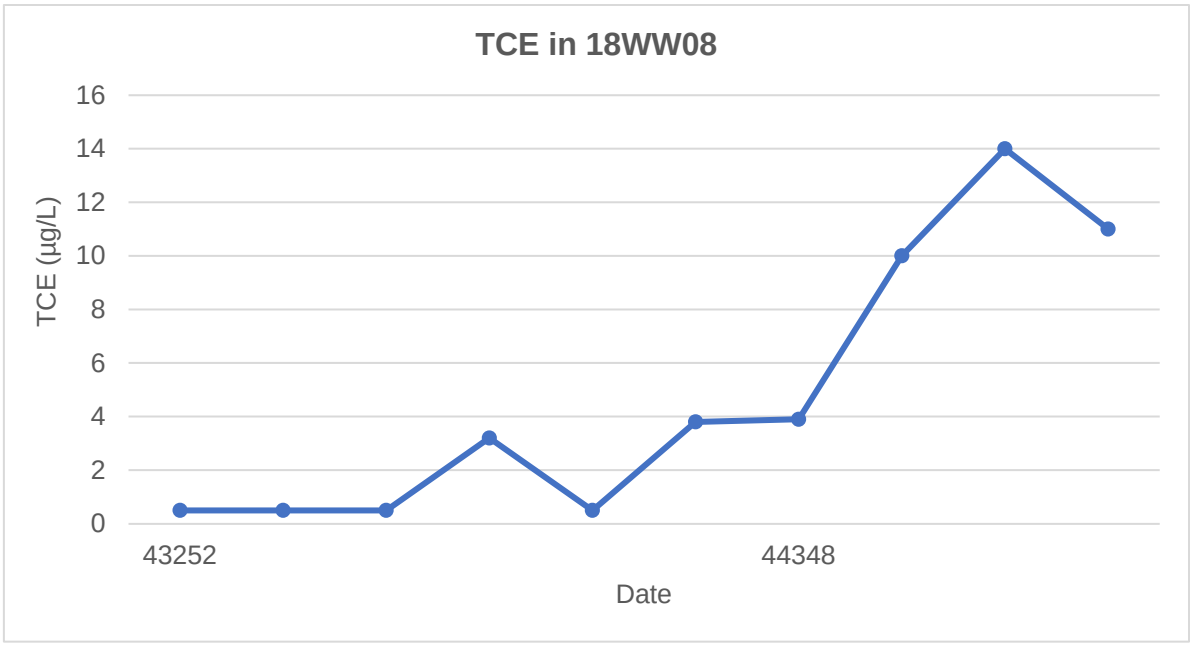
Notes:
Blue highlighted values exceed the screening level of 17 µg/L.
µg/L - Micrograms per liter

Table E.19 - LHAAP-18/24

Mann-Kendall Trend Analysis
Well 18WW08
TCE

Date	TCE (µg/L)
Jun-18	0.5
Dec-18	0.5
Jun-19	0.5
Dec-19	3.2
Jun-20	0.5
Dec-20	3.8
Jun-21	3.9
Dec-21	10
22-Aug	14
22-Dec	11

n	10
alpha	0.05
MK-stat	35
s.e.	10.7858
z-stat	3.15229
p-value	0.00162
trend	yes



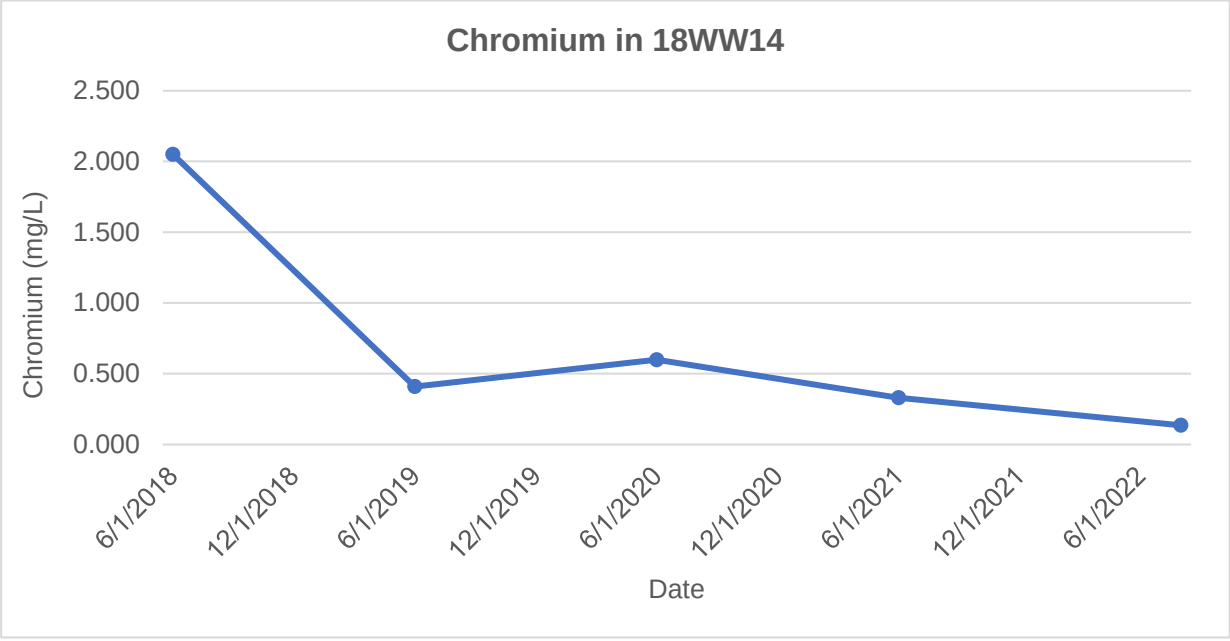
Notes:
Blue highlighted values exceed the screening level of 5 µg/L.
µg/L - Micrograms per liter
Yellow highlighted values were non-detects; value shown is a placeholder set to below the lowest detected value.

Table E.19 - LHAAP-18/24

Mann-Kendall Trend Analysis
Well 18WW14
Chromium

Date	Chromium (mg/L)
06/19/18	2.050
06/17/19	0.409
06/02/20	0.598
06/17/21	0.330
08/17/22	0.136

n	5
alpha	0.05
MK-stat	-8
s.e.	4.08248
z-stat	-1.71464
p-value	0.04321
trend	yes



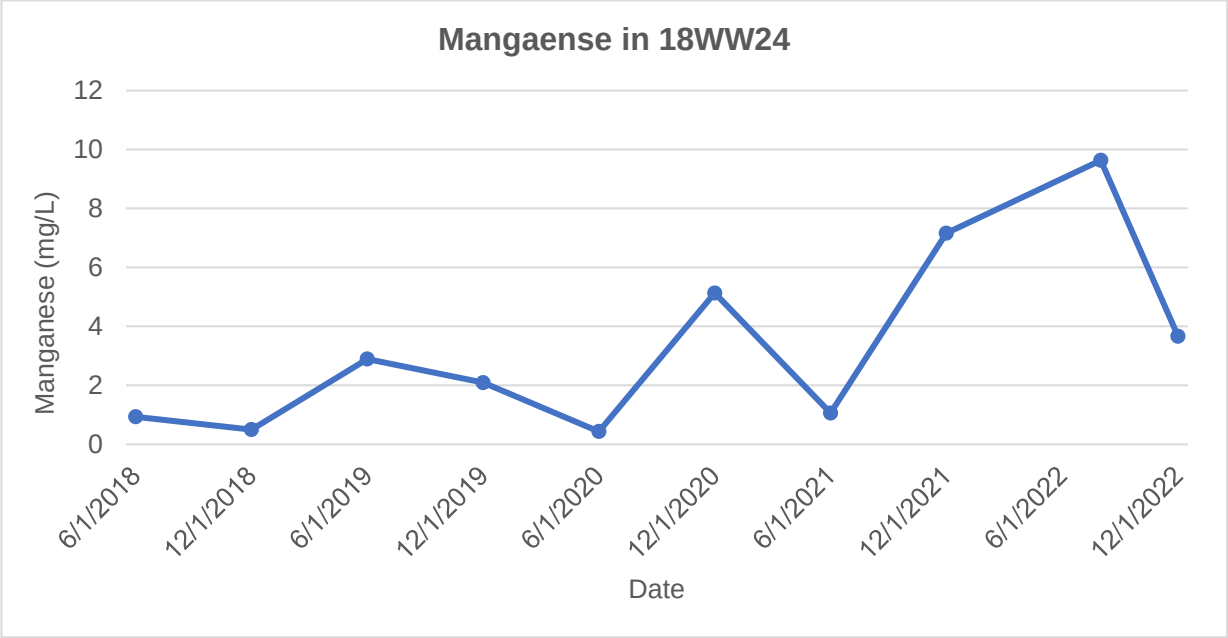
Notes:
Blue highlighted values exceed the screening level of 0.1 mg/L.
mg/L - Milligrams per liter

Table E.19 - LHAAP-18/24

Mann-Kendall Trend Analysis
Well 18WW24
Manganese

Date	Manganese (mg/L)
6/4/2018	0.932
12/26/2018	0.498
6/26/2019	2.89
12/11/2019	2.09
6/2/2020	0.433
12/8/2020	5.13
6/23/2021	1.06
12/15/2021	7.16
8/8/2022	9.63
12/21/2022	3.66

n	10
alpha	0.05
MK-stat	21
s.e.	11.1803
z-stat	1.78885
p-value	0.03682
trend	yes



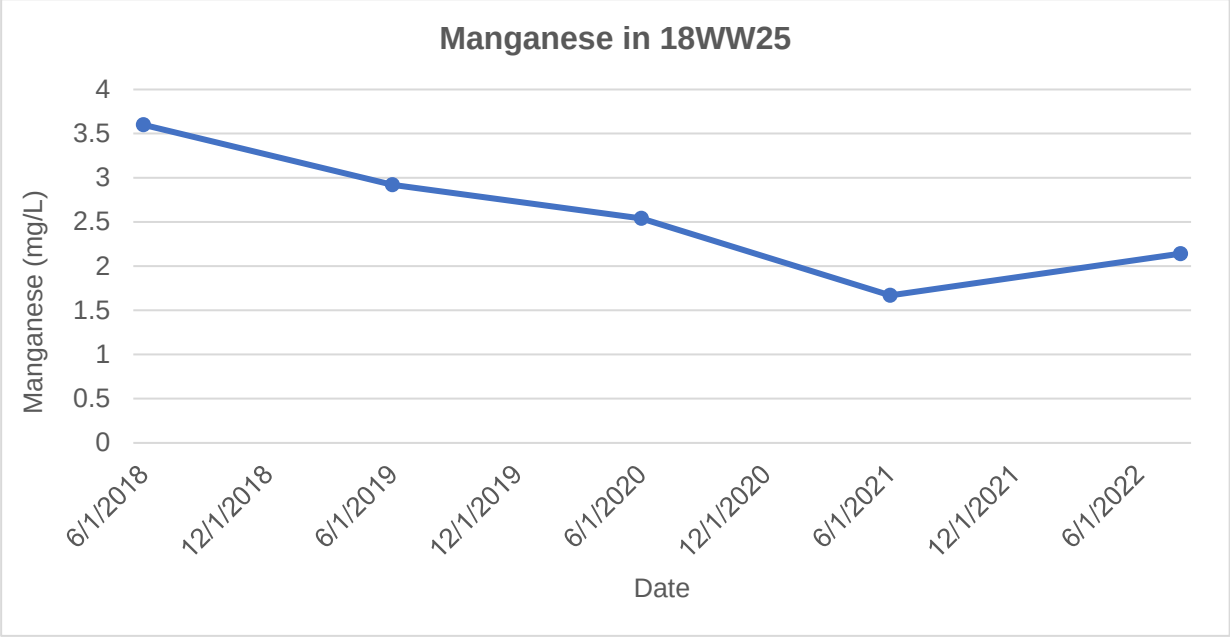
Notes:
Blue highlighted values exceed the screening level of 1.1 mg/L.
mg/L - Milligrams per liter

Table E.19 - LHAAP-18/24

Mann-Kendall Trend Analysis
Well 18WW25
Manganese

Date	Manganese (mg/L)
6/4/2018	3.6
6/27/2019	2.92
6/4/2020	2.54
6/23/2021	1.67
8/15/2022	2.14

n	5
alpha	0.05
MK-stat	-8
s.e.	4.08248
z-stat	-1.71464
p-value	0.04321
trend	yes



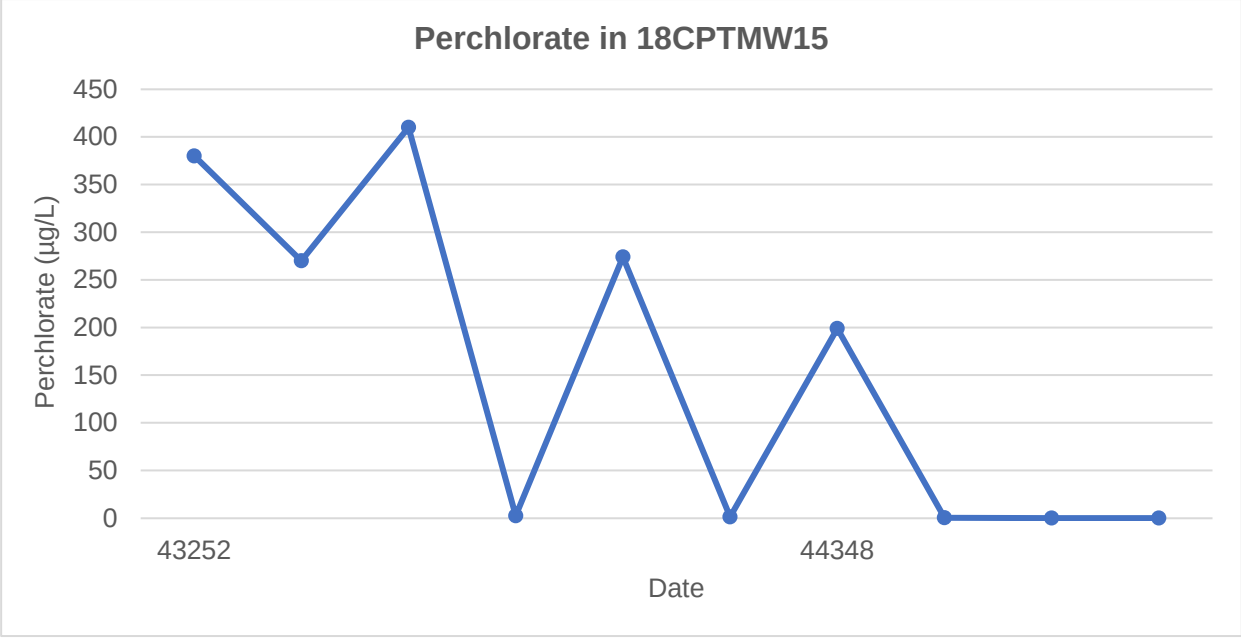
Notes:
Blue highlighted values exceed the screening level of 1.1 mg/L.
mg/L - Milligrams per liter

Table E.19 - LHAAP-18/24

Mann-Kendall Trend Analysis
Well 18CPTMW15
Perchlorate

Date	Perchlorate (µg/L)
Jun-18	380
Dec-18	270
Jun-19	410
Dec-19	2.5
Jun-20	274
Dec-20	1.31
Jun-21	199
Dec-21	0.364
22-Aug	0.075
22-Dec	0.04

n	10
alpha	0.05
MK-stat	-33
s.e.	11.1803
z-stat	-2.86217
p-value	0.00421
trend	yes



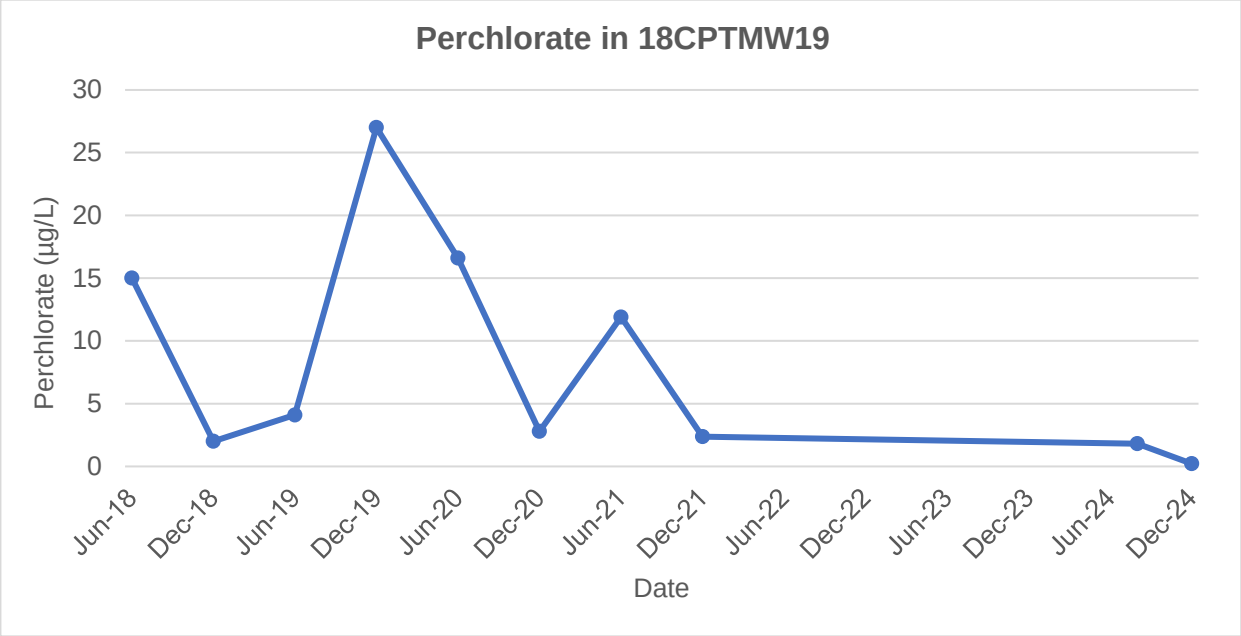
Notes:
Blue highlighted values exceed the screening level of 5 µg/L.
µg/L - Micrograms per liter

Table E.19 - LHAAP-18/24

Mann-Kendall Trend Analysis
Well 18CPTMW19
Perchlorate

Date	Perchlorate (µg/L)
Jun-18	15
Dec-18	2
Jun-19	4.1
Dec-19	27
Jun-20	16.6
Dec-20	2.79
Jun-21	11.9
Dec-21	2.37
22-Aug	1.81
22-Dec	0.226

n	10
alpha	0.05
MK-stat	-21
s.e.	11.1803
z-stat	-1.78885
p-value	0.03682
trend	yes



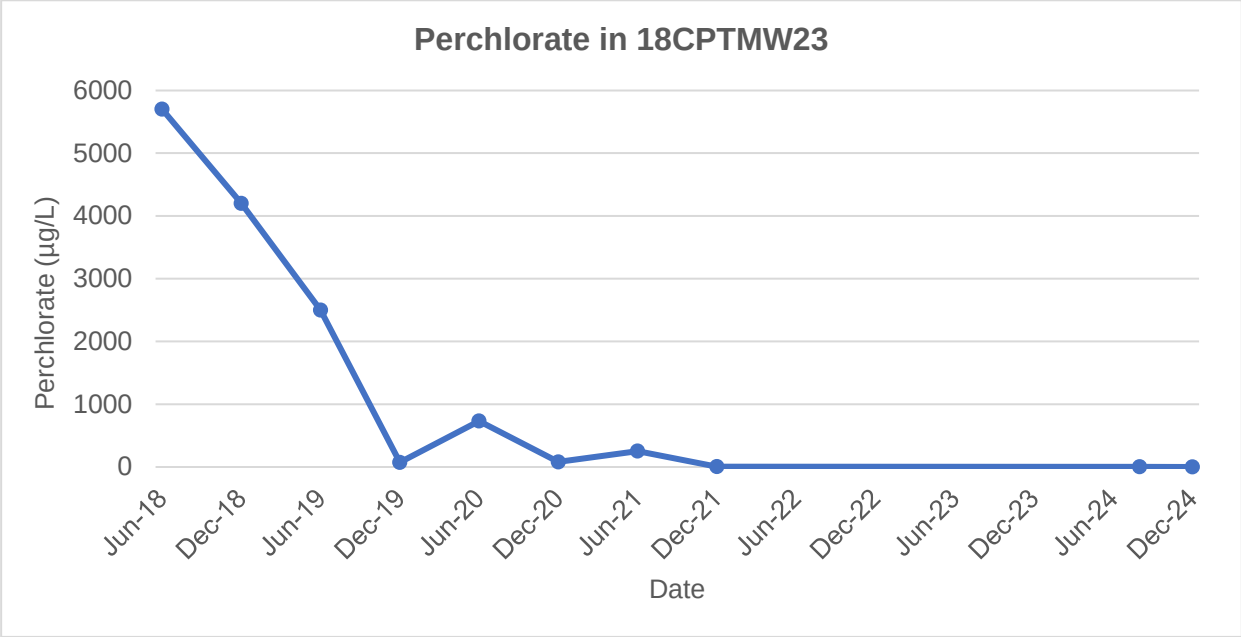
Notes:
Blue highlighted values exceed the screening level of 5 µg/L.
µg/L - Micrograms per liter
Yellow highlighted values were non-detects; value shown is a placeholder set to below the lowest detected value.

Table E.19 - LHAAP-18/24

Mann-Kendall Trend Analysis
Well 18CPTMW23
Perchlorate

Date	Perchlorate (µg/L)
Jun-18	5700
Dec-18	4200
Jun-19	2500
Dec-19	73
Jun-20	732
Dec-20	80.8
Jun-21	253
Dec-21	4.63
22-Aug	2.98
22-Dec	0.0426

n	10
alpha	0.05
MK-stat	-37
s.e.	11.1803
z-stat	-3.21994
p-value	0.00128
trend	yes



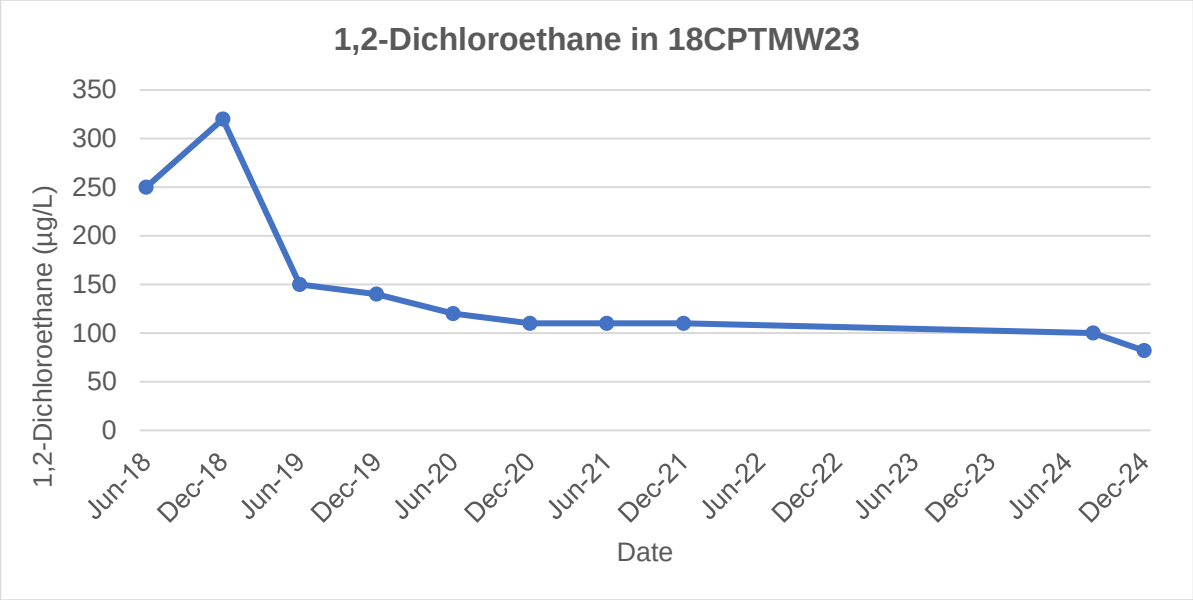
Notes:
Blue highlighted values exceed the screening level of 5 µg/L.
µg/L - Micrograms per liter
Yellow highlighted values were non-detects; value shown is a placeholder set to below the lowest detected value.

Table E.19 - LHAAP-18/24

Mann-Kendall Trend Analysis
Well 18CPTMW23
1,2-Dichloroethane

Date	1,2-Dichloroethane (µg/L)
Jun-18	250
Dec-18	320
Jun-19	150
Dec-19	140
Jun-20	120
Dec-20	110
Jun-21	110
Dec-21	110
22-Aug	100
22-Dec	82

n	10
alpha	0.05
MK-stat	-40
s.e.	11.0151
z-stat	-3.54058
p-value	0.0004
trend	yes



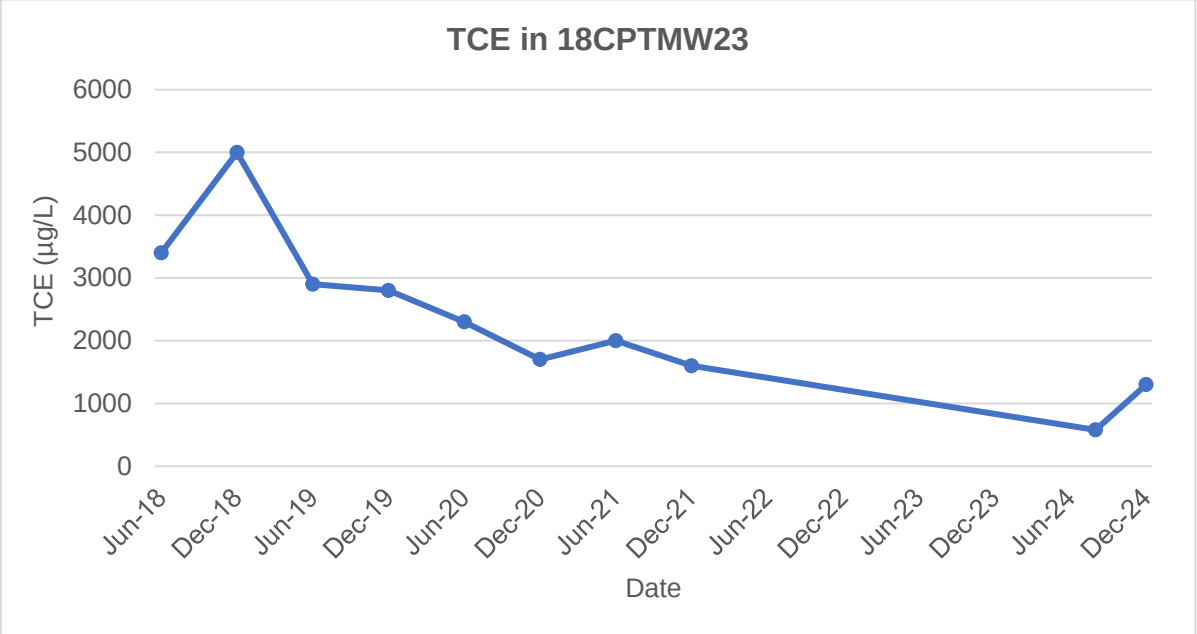
Notes:
Blue highlighted values exceed the screening level of 5 µg/L.
µg/L - Micrograms per liter

Table E.19 - LHAAP-18/24

Mann-Kendall Trend Analysis
Well 18CPTMW23
TCE

Date	TCE (µg/L)
Jun-18	3400
Dec-18	5000
Jun-19	2900
Dec-19	2800
Jun-20	2300
Dec-20	1700
Jun-21	2000
Dec-21	1600
22-Aug	580
22-Dec	1300

n	10
alpha	0.05
MK-stat	-39
s.e.	11.1803
z-stat	-3.39882
p-value	0.00068
trend	yes



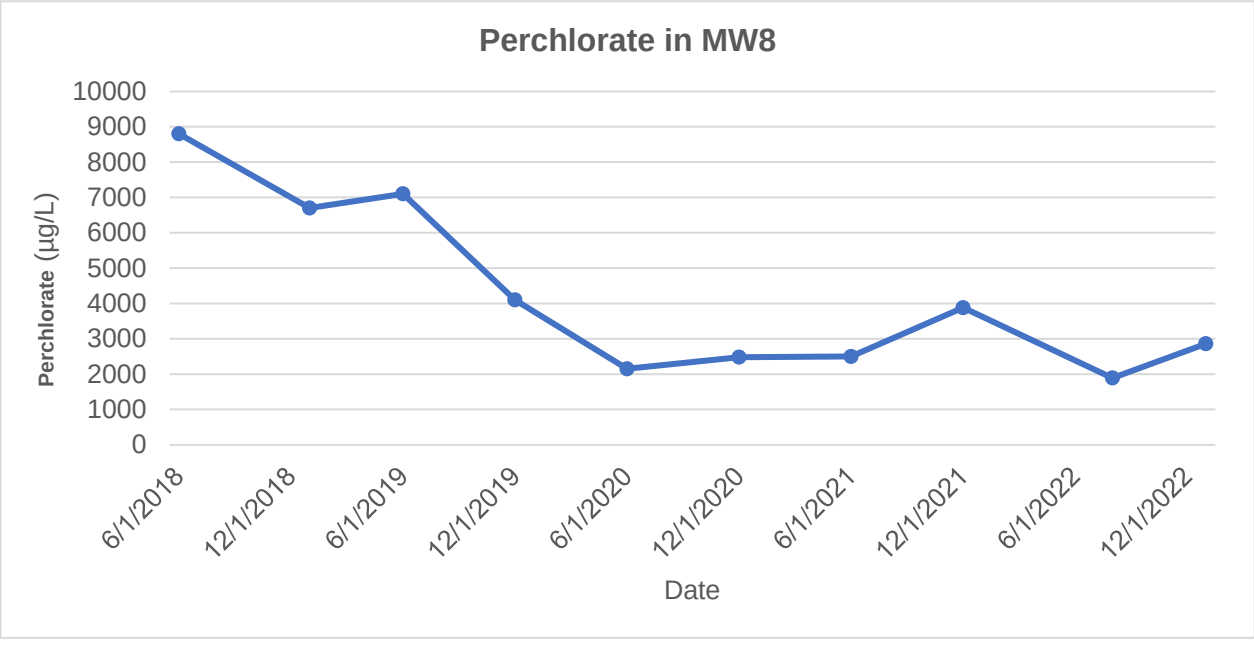
Notes:
Blue highlighted values exceed the screening level of 5 µg/L.
µg/L - Micrograms per liter

Table E.19 - LHAAP-18/24

Mann-Kendall Trend Analysis
Well MW8
Perchlorate

Date	Perchlorate (µg/L)
6/5/2018	8800
1/7/2019	6,700
6/21/2019	7,100
12/5/2019	4,100
6/1/2020	2,150
12/17/2020	2,480
6/23/2021	2,500
12/20/2021	3,880
8/8/2022	1,890
1/9/2023	2,860

n	10
alpha	0.05
MK-stat	-23
s.e.	11.1803
z-stat	-1.96774
p-value	0.0491
trend	yes



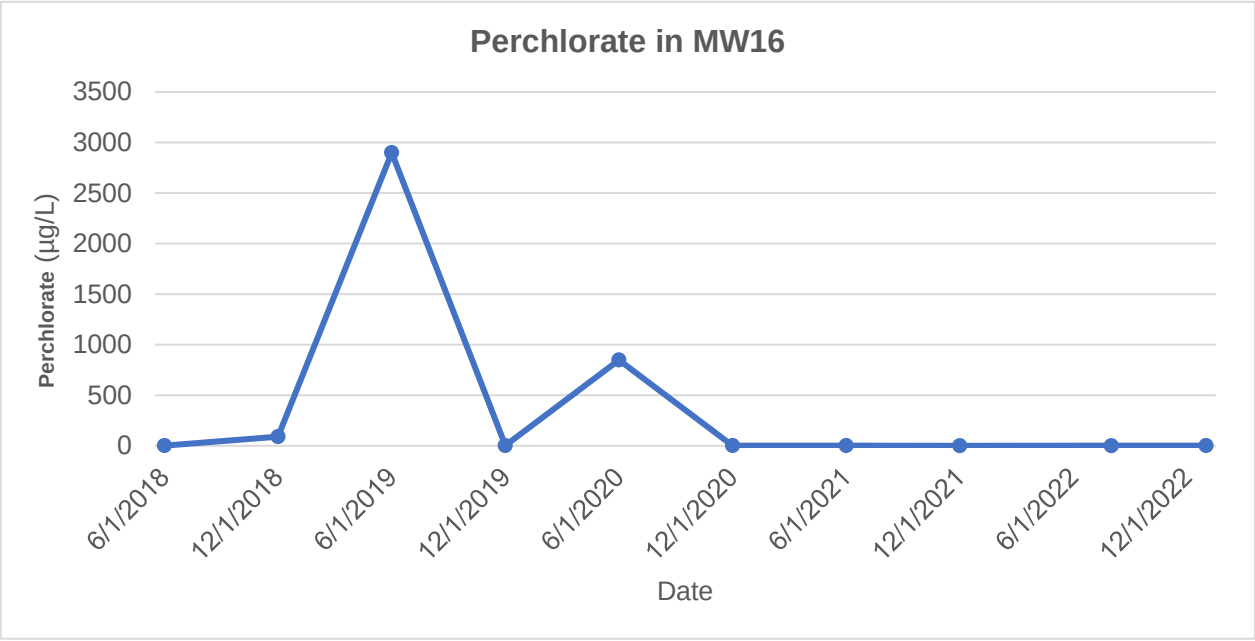
Notes:
Blue highlighted values exceed the screening level of 17 µg/L.
µg/L - Micrograms per liter

Table E.19 - LHAAP-18/24

Mann-Kendall Trend Analysis
Well MW16
Perchlorate

Date	Perchlorate (µg/L)
6/13/2018	1
12/26/2018	90
6/26/2019	2,900
12/9/2019	1.8
6/9/2020	848
12/8/2020	1.07
6/23/2021	1
12/15/2021	0.0269
8/16/2022	0.0518
1/11/2023	1

n	10
alpha	0.05
MK-stat	-20
s.e.	11.0151
z-stat	-1.7249
p-value	0.04227
trend	yes



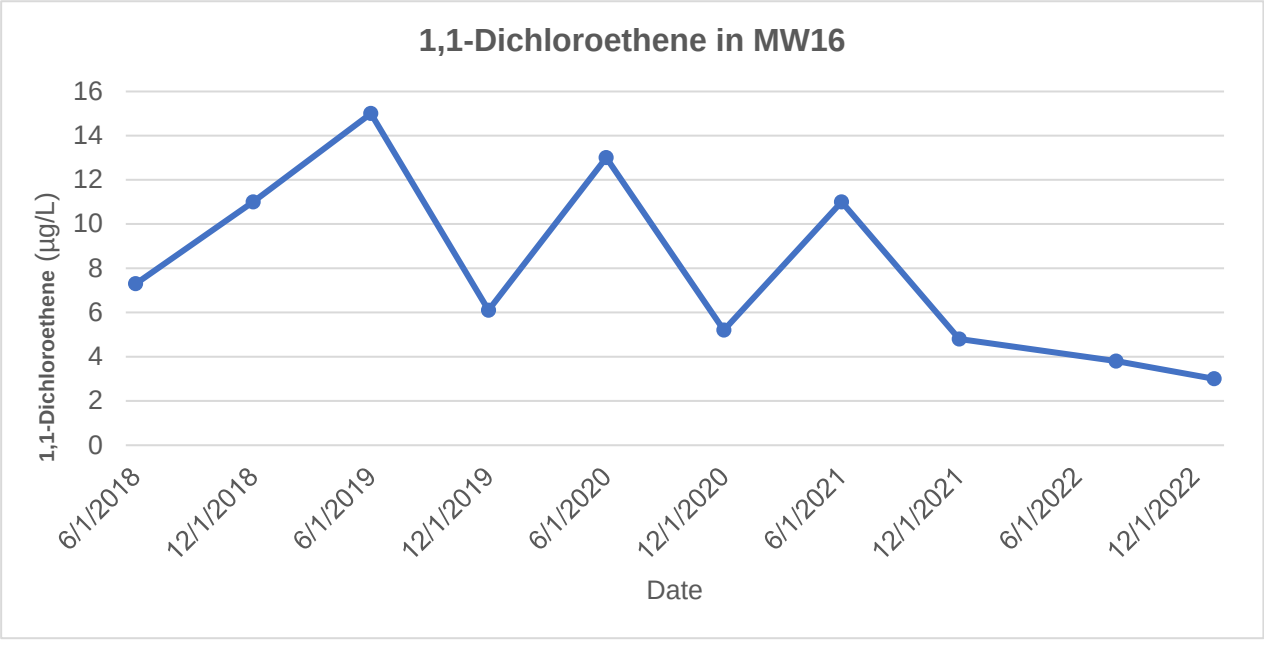
Notes:
Blue highlighted values exceed the screening level of 17 µg/L.
Yellow highlighted values were non-detects; value shown is a placeholder set to below the lowest detected value.
µg/L - Micrograms per liter

Table E.19 - LHAAP-18/24

Mann-Kendall Trend Analysis
Well MW16
1,1-Dichloroethene

Date	1,1-Dichloroethene (µg/L)
6/13/2018	7.3
12/26/2018	11
6/26/2019	15
12/9/2019	6.1
6/9/2020	13
12/8/2020	5.2
6/23/2021	11
12/15/2021	4.8
8/16/2022	3.8
1/11/2023	3

n	10
alpha	0.05
MK-stat	-26
s.e.	11.1355
z-stat	-2.24507
p-value	0.02476
trend	yes



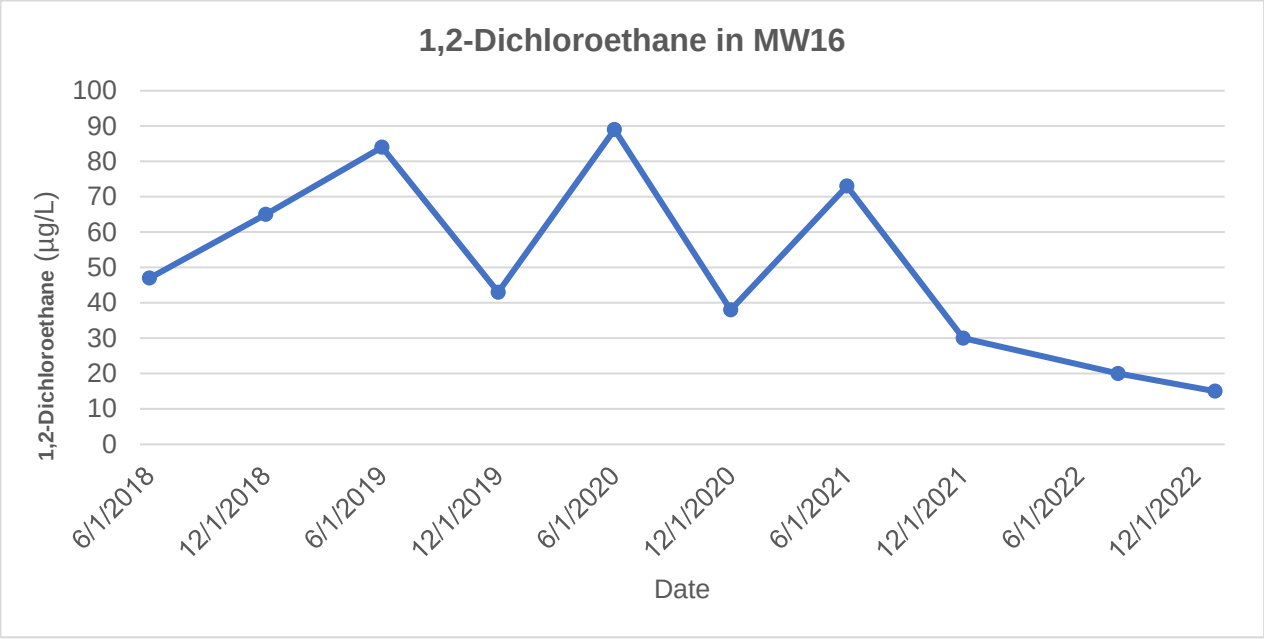
Notes:
Blue highlighted values exceed the screening level of 7 µg/L.
µg/L - Micrograms per liter

Table E.19 - LHAAP-18/24

Mann-Kendall Trend Analysis
Well MW16
1,2-Dichloroethane

Date	1,2-Dichloroethane (µg/L)
6/13/2018	47
12/26/2018	65
6/26/2019	84
12/9/2019	43
6/9/2020	89
12/8/2020	38
6/23/2021	73
12/15/2021	30
8/16/2022	20
1/11/2023	15

n	10
alpha	0.05
MK-stat	-23
s.e.	11.1803
z-stat	-1.96774
p-value	0.0491
trend	yes



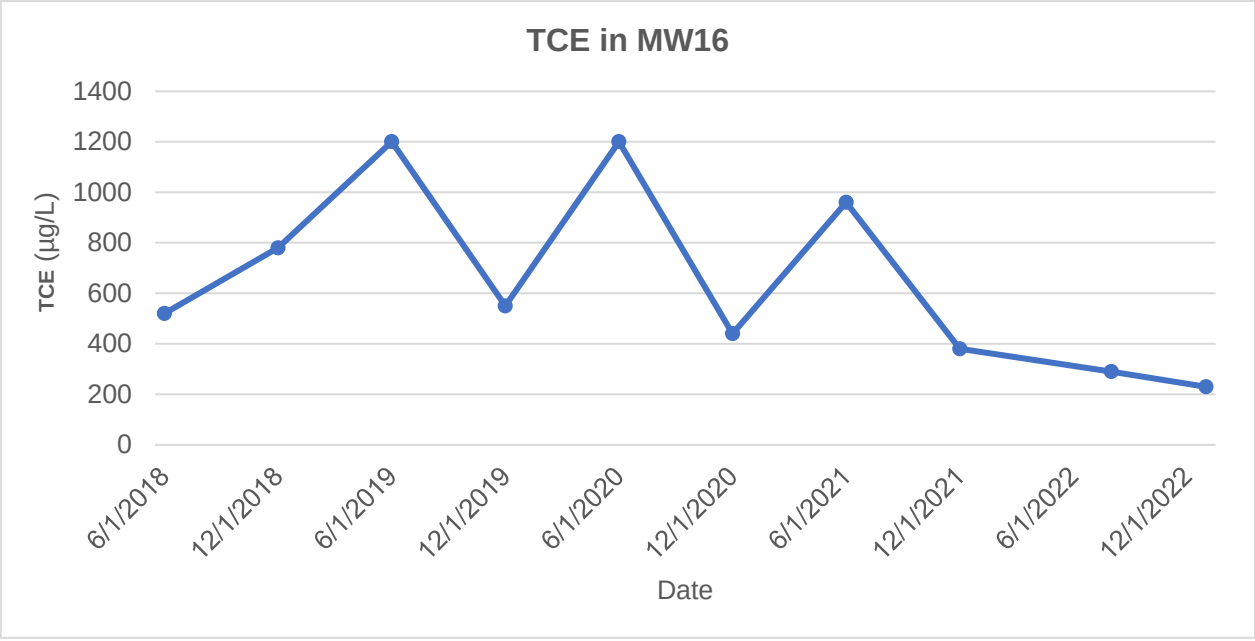
Notes:
Blue highlighted values exceed the screening level of 5 µg/L.
µg/L - Micrograms per liter

Table E.19 - LHAAP-18/24

Mann-Kendall Trend Analysis
Well MW16
TCE

Date	TCE (µg/L)
6/13/2018	520
12/26/2018	780
6/26/2019	1,200
12/9/2019	550
6/9/2020	1,200
12/8/2020	440
6/23/2021	960
12/15/2021	380
8/16/2022	290
1/11/2023	230

n	10
alpha	0.05
MK-stat	-22
s.e.	11.1355
z-stat	-1.88586
p-value	0.02966
trend	yes



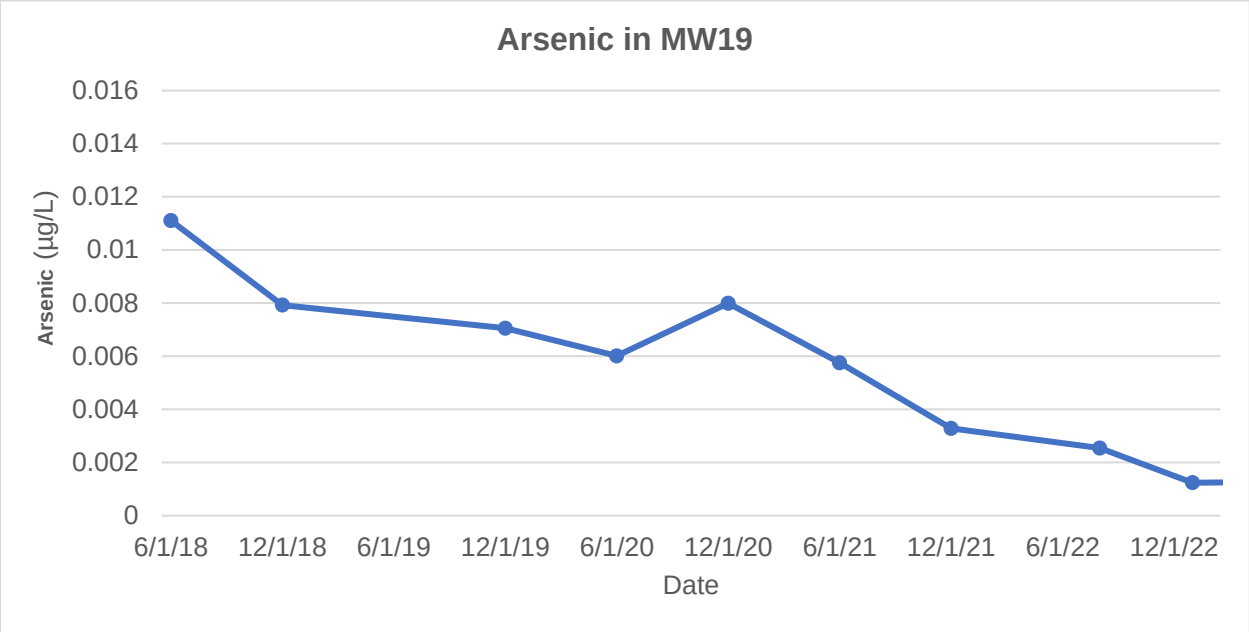
Notes:
Blue highlighted values exceed the screening level of 5 µg/L.
µg/L - Micrograms per liter

Table E.19 - LHAAP-18/24

Mann-Kendall Trend Analysis
Well MW19
Arsenic

Date	Arsenic (mg/L)
6/14/18	0.0111
12/26/18	0.00792
6/1/19	0.0137
12/9/19	0.00705
6/16/20	0.00601
12/10/20	0.00799
6/24/21	0.00575
12/7/21	0.00328
8/9/22	0.00254
1/10/23	0.00124

n	10
alpha	0.05
MK-stat	-35
s.e.	11.1803
z-stat	-3.04105
p-value	0.00236
trend	yes



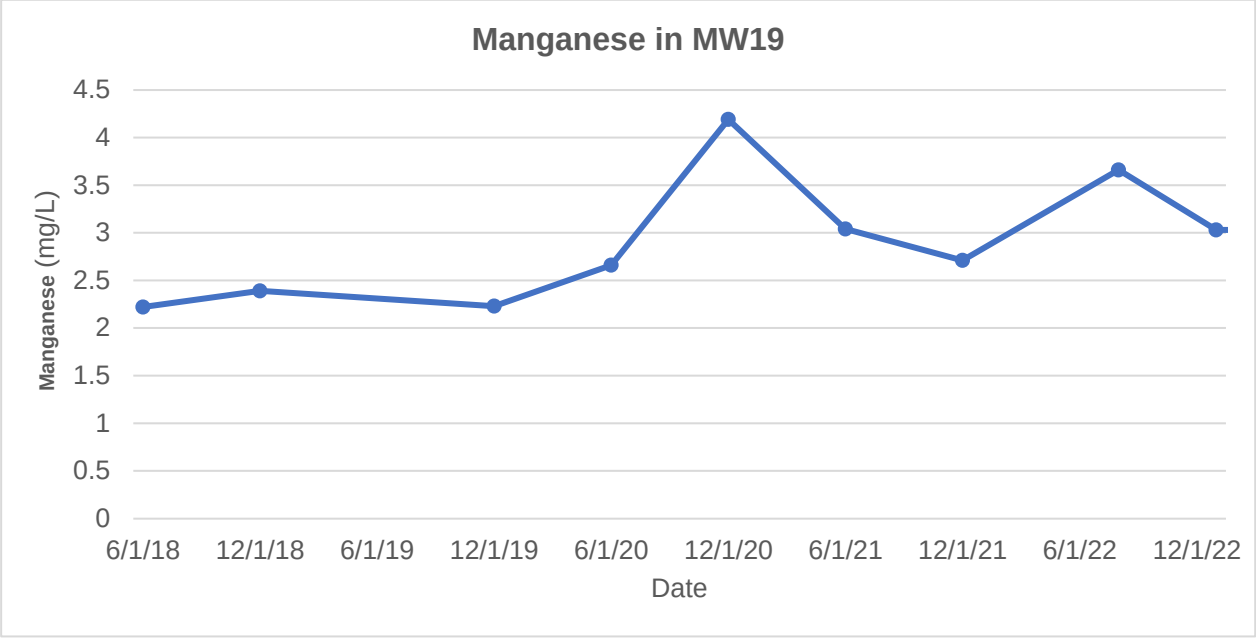
Notes:
Blue highlighted values exceed the screening level of 0.01 µg/L.
mg/L - Milligrams per liter

Table E.19 - LHAAP-18/24

Mann-Kendall Trend Analysis
Well MW19
Manganese

Date	Manganese (mg/L)
6/14/18	2.22
12/26/18	2.39
6/1/19	1.5
12/9/19	2.23
6/16/20	2.66
12/10/20	4.19
6/24/21	3.04
12/7/21	2.71
8/9/22	3.66
1/10/23	3.03

n	10
alpha	0.05
MK-stat	25
s.e.	11.1803
z-stat	2.14663
p-value	0.03182
trend	yes



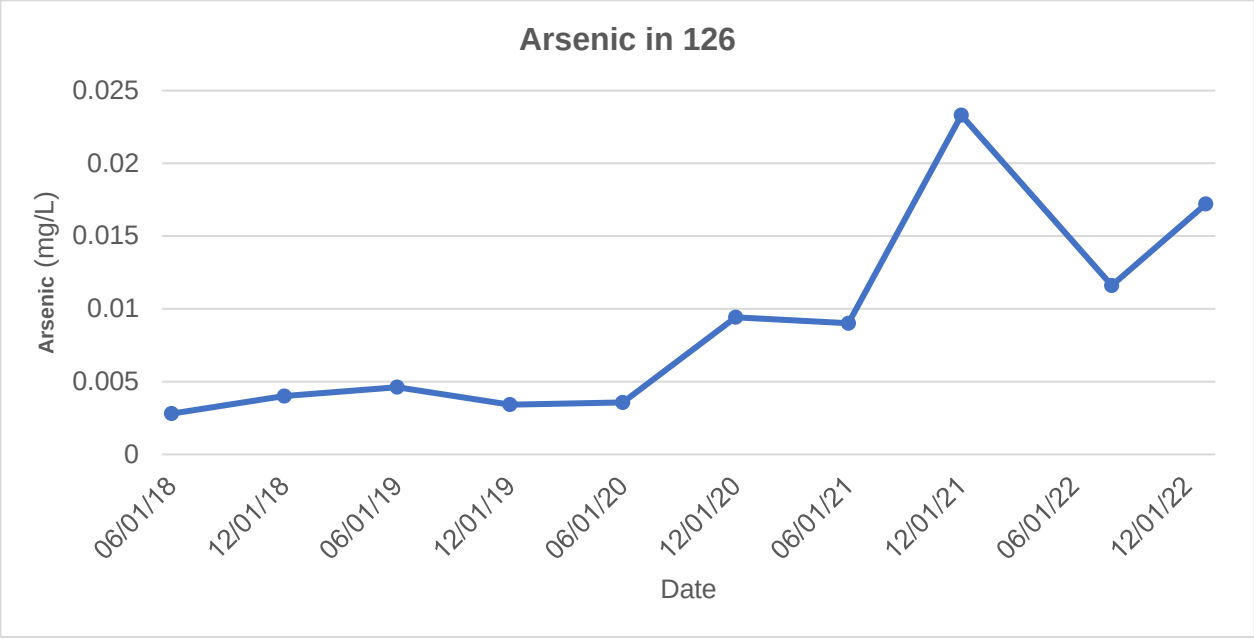
Notes:
Blue highlighted values exceed the screening level of 1.1 mg/L.
mg/L - Milligrams per liter

Table E.19 - LHAAP-18/24

Mann-Kendall Trend Analysis
Well 126
Arsenic

Date	Arsenic (mg/L)
06/15/18	0.00281
12/26/18	0.00401
06/24/19	0.00462
12/17/19	0.00342
06/11/20	0.00357
12/17/20	0.00942
06/08/21	0.00901
12/14/21	0.0233
08/17/22	0.0116
01/11/23	0.0172

n	10
alpha	0.05
MK-stat	31
s.e.	11.1803
z-stat	2.68328
p-value	0.00729
trend	yes



Notes:
Blue highlighted values exceed the screening level of 0.01 mg/L.
mg/L - Milligrams per liter

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Table 2-5
COC Concentrations 1994–2022

Location Code			35BSW01								35BSW02								35BWW01							
Sample ID			35BSW01-101713		35BSW01-021218		35BSW01-181116		35BSW01-200511		35BSW02-101713		35BSW02-021218		35BSW02-181116		35BSW02-200511		35BWW01-981108		35BWW01-040910		35BWW01-060810		35BWW01-061217	
Sample Date			10/17/2013		2/12/2018		11/16/2018		5/11/2020		10/17/2013		2/12/2018		11/16/2018		5/11/2020		11/8/1998		9/10/2004		8/10/2006		12/17/2006	
Sample Purpose			REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG	
Location Description			Surface Water Location, Upgradient		Surface Water Location, Upgradient		Surface Water Location, Upgradient		Surface Water Location, Upgradient		Surface Water Location, Downgradient		Surface Water Location, Downgradient		Surface Water Location, Downgradient		Surface Water Location, Downgradient		Shallow zone, unimpacted, within site boundary		Shallow zone, unimpacted, within site boundary		Shallow zone, unimpacted, within site boundary		Shallow zone, unimpacted, within site boundary	
Parameter	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Tetrachloroethene	µg/L	5	0.5	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U	0.5	U	1	U	1	U	5	U	5	U	5	U
Trichloroethene	µg/L	5	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	5	U	5	U	5	U
1,1-Dichloroethene	µg/L	7	1	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U	0.5	U	1	U	5	U	5	U	5	U
cis-1,2-Dichloroethene	µg/L	70	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	5	U	10	U	10	U
Vinyl chloride	µg/L	2	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	5	U	10	U	10	U

Table 2-5
COC Concentrations 1994–2022

Location Code			35BWW01																				
Sample ID			35BWW01-081916		35BWW01-110817		35BWW01-021418		35BWW01-180524		35BWW01-180524FD		35BWW01-180816		35BWW01-180816-FD		35BWW01-181115		35BWW01-190212		35BWW01-190212-FD		35BWW01-190520	
Sample Date			8/19/2016		11/8/2017		2/14/2018		5/24/2018		5/24/2018		8/16/2018		8/16/2018		11/15/2018		2/12/2019		2/12/2019		5/20/2019	
Sample Purpose			REG		REG		REG		REG		FD		REG		FD		REG		REG		FD		REG	
Location Description			Shallow zone, unimpacted, within site boundary		Shallow zone, unimpacted, within site boundary		Shallow zone, unimpacted, within site boundary		Shallow zone, unimpacted, within site boundary		Shallow zone, unimpacted, within site boundary		Shallow zone, unimpacted, within site boundary		Shallow zone, unimpacted, within site boundary		Shallow zone, unimpacted, within site boundary		Shallow zone, unimpacted, within site boundary		Shallow zone, unimpacted, within site boundary		Shallow zone, unimpacted, within site boundary	
Parameter	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Tetrachloroethene	µg/L	5	0.5	U	1	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Trichloroethene	µg/L	5	0.5	U	1	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
1,1-Dichloroethene	µg/L	7	1	U	1	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
cis-1,2-Dichloroethene	µg/L	70	0.5	U	1	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Vinyl chloride	µg/L	2	0.5	U	1	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U

Table 2-5
COC Concentrations 1994–2022

Location Code			35BWW01																			35BWW02	
Sample ID			35BWW01-190520-FD		35BWW01-190805		35BWW01-190805-FD		35BWW01-191121		35BWW01-200506		35BWW01-200506-FD		35BWW01-201109		35BWW01-210513		35BWW01-211115		35BWW01-220517		35BWW02-981105FD	
Sample Date			5/20/2019		8/5/2019		8/5/2019		11/21/2019		5/6/2020		5/6/2020		11/9/2020		5/13/2021		11/15/2021		5/17/2022		11/5/1998	
Sample Purpose			FD		REG		FD		REG		REG		FD		REG		REG		REG		REG		FD	
Location Description			Shallow zone, unimpacted, within site boundary		Shallow zone, unimpacted, within site boundary		Shallow zone, unimpacted, within site boundary		Shallow zone, unimpacted, within site boundary		Shallow zone, unimpacted, within site boundary		Shallow zone, unimpacted, within site boundary		Shallow zone, unimpacted, within site boundary		Shallow zone, unimpacted, within site boundary		Shallow zone, unimpacted, within site boundary		Shallow zone, unimpacted, within site boundary			
Parameter	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Tetrachloroethene	µg/L	5	0.5	U	0.5	U	0.5	U	0.5	U	1	U	1	U	0.5	U	1	U	1	U	0.5	U	1	U
Trichloroethene	µg/L	5	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U
1,1-Dichloroethene	µg/L	7	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U
cis-1,2-Dichloroethene	µg/L	70	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U
Vinyl chloride	µg/L	2	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U

Table 2-5
COC Concentrations 1994–2022

Location Code			35BWW02		35BWW03														35BWW04					
Sample ID			35BWW02-981108		35BWW03-040910		35BWW03-060809		35BWW03-060809FD		35BWW03-061216		35BWW03-100513		35BWW03-081816		35BWW03FD-081816		35BWW03-211115		35BWW04-061216		35BWW04-100313		35BWW04-081716	
Sample Date			11/8/1998		9/10/2004		8/9/2006		8/9/2006		12/16/2006		10/5/2013		8/18/2016		8/18/2016		11/15/2021		12/16/2006		10/3/2013		8/17/2016	
Sample Purpose			REG		REG		REG		FD		REG		REG		REG		FD		REG		REG		REG		REG	
Location Description					Shallow zone, unimpacted, within site boundary		Shallow zone, unimpacted, within site boundary		Shallow zone, unimpacted, within site boundary		Shallow zone, unimpacted, within site boundary		Shallow zone, unimpacted, within site boundary		Shallow zone, unimpacted, within site boundary		Shallow zone, unimpacted, within site boundary		Shallow zone, unimpacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary	
Parameter	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Tetrachloroethene	µg/L	5	1	U	5	U	5	U	5	U	5	U	0.5	U	0.5	U	0.5	U	1	U	30.1		66.5	J	6.1	
Trichloroethene	µg/L	5	1	U	5	U	5	U	5	U	5	U	0.5	U	0.5	U	0.5	U	0.5	U	10.8		11.4	J	0.786	J
1,1-Dichloroethene	µg/L	7	1	U	5	U	5	U	5	U	5	U	1	U	1	U	1	U	0.5	U	3.34	J	2.3	J	1	U
cis-1,2-Dichloroethene	µg/L	70	1	U	5	U	10	U	10	U	10	U	0.5	U	0.5	U	0.5	U	0.5	U	0.846	J	0.673	J	0.5	U
Vinyl chloride	µg/L	2	1	U	5	U	10	U	10	U	10	U	0.5	U	0.5	U	0.5	U	0.5	U	10	U	0.5	U	0.5	U

Table 2-5
COC Concentrations 1994–2022

Location Code			35BWW04																					
Sample ID			35BWW04-110917		35BWW04-110917-FD		35BWW04-021418		35BWW04-021418-FD		35BWW04-180522		35BWW04-180822		35BWW04-181120		35BWW04-181120-FD		35BWW04-190213		35BWW04-190520		35BWW04-190805		35BWW04-191121	
Sample Date			11/9/2017		11/9/2017		2/14/2018		2/14/2018		5/22/2018		8/22/2018		11/20/2018		11/20/2018		2/13/2019		5/20/2019		8/5/2019		11/21/2019	
Sample Purpose			REG		FD		REG		FD		REG		REG		REG		FD		REG		REG		REG		REG	
Location Description			Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary	
Parameter	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Tetrachloroethene	µg/L	5	7.3		8.2		10		10		5.3		2.2		6.3		5.3		5.3		4.7		7.9		8.3	
Trichloroethene	µg/L	5	1		1.1		1.3		1.2		0.5	U	0.5	U	0.95	J	0.73	J	0.59	J	0.58	J	0.93	J	0.93	J
1,1-Dichloroethene	µg/L	7	1	U	1	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
cis-1,2-Dichloroethene	µg/L	70	1	U	1	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Vinyl chloride	µg/L	2	1	U	1	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U

Table 2-5
COC Concentrations 1994–2022

Location Code			35BWW04													35BWW05									
Sample ID			35BWW04-191121-FD		35BWW04-200506		35BWW04-201110		35BWW04-210513		35BWW04-211117		35BWW04-220517		35BWW04-220517-FD		35BWW05-061214		35BWW05-100413		35BWW05-081816		35BWW05-110817		35BWW05-021618	
Sample Date			11/21/2019		5/6/2020		11/10/2020		5/13/2021		11/17/2021		5/17/2022		5/17/2022		12/14/2006		10/4/2013		8/18/2016		11/8/2017		2/16/2018	
Sample Purpose			FD		REG		REG		REG		REG		REG		FD		REG		REG		REG		REG		REG	
Location Description			Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary	
Parameter	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Tetrachloroethene	µg/L	5	7.7		6.4		5.2		6.8		6.3		3.9		3.6		1	J	1.57		1.25		1.5		2.8	
Trichloroethene	µg/L	5	0.93	J	0.71	J	0.72	J	0.61	J	0.88	J	0.5	U	0.5	U	12.9		14		8.87		7		10	
1,1-Dichloroethene	µg/L	7	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	5	U	1	U	1	U	1	U	0.5	U
cis-1,2-Dichloroethene	µg/L	70	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	10	U	0.295	J	0.497	J	1	U	0.5	U
Vinyl chloride	µg/L	2	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	10	U	0.5	U	0.5	U	1	U	0.5	U

Table 2-5
COC Concentrations 1994–2022

Location Code			35BWW05																						
Sample ID			35BWW05-180521		35BWW05-180821		35BWW05-181118		35BWW05-190213		35BWW05-190521		35BWW05-190806		35BWW05-191125		35BWW05-200506		35BWW05-201109		35BWW05-210513		35BWW05-211115		35BWW05-220516	
Sample Date			5/21/2018		8/21/2018		11/18/2018		2/13/2019		5/21/2019		8/6/2019		11/25/2019		5/6/2020		11/9/2020		5/13/2021		11/15/2021		5/16/2022	
Sample Purpose			REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG	
Location Description			Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary	
Parameter	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Tetrachloroethene	µg/L	5	2		1.7		2.7		1.9		1.1		1.9		1.4		2.4		2.1		2.5		1.8		4.1	
Trichloroethene	µg/L	5	8.5		7.3		12		9.6		5.5		8.6		6		7.3		5.5		6.3		3.5		1.8	
1,1-Dichloroethene	µg/L	7	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
cis-1,2-Dichloroethene	µg/L	70	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Vinyl chloride	µg/L	2	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U

Table 2-5
COC Concentrations 1994–2022

Location Code			35BWW06																		35BWW07			
Sample ID			35BWW06-061214		35BWW06-100413		35BWW06-081816		35BWW06FD-081816		35BWW06-110817		35BWW06-021618		35BWW06-180521		35BWW06-180821		35BWW06-181118		35BWW06-211115		35BWW07-091407		35BWW07-100513	
Sample Date			12/14/2006		10/4/2013		8/18/2016		8/18/2016		11/8/2017		2/16/2018		5/21/2018		8/21/2018		11/18/2018		11/15/2021		9/14/2007		10/5/2013	
Sample Purpose			REG		REG		REG		FD		REG		REG		REG		REG		REG		REG		REG		REG	
Location Description			Lower shallow zone, unimpacted, within site boundary		Lower shallow zone, unimpacted, within site boundary		Lower shallow zone, unimpacted, within site boundary		Lower shallow zone, unimpacted, within site boundary		Lower shallow zone, unimpacted, within site boundary		Lower shallow zone, unimpacted, within site boundary		Lower shallow zone, unimpacted, within site boundary		Lower shallow zone, unimpacted, within site boundary		Lower shallow zone, unimpacted, within site boundary		Lower shallow zone, unimpacted, within site boundary		Shallow zone, unimpacted downgradient		Shallow zone, unimpacted downgradient	
Parameter	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Tetrachloroethene	µg/L	5	5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	1		0.5	U
Trichloroethene	µg/L	5	5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	1		0.5	U
1,1-Dichloroethene	µg/L	7	5	U	1	U	1	U	1	U	1	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	1		1	U
cis-1,2-Dichloroethene	µg/L	70	10	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	1		0.5	U
Vinyl chloride	µg/L	2	10	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	1		0.5	U

Table 2-5
COC Concentrations 1994–2022

Location Code			35BWW07																						
Sample ID			35BWW07-081916		35BWW07-110917		35BWW07-021318		35BWW07-180523		35BWW07-180820		35BWW07-181118		35BWW07-190214		35BWW07-190522		35BWW07-190805		35BWW07-191125		35BWW07-200511		35BWW07-201111	
Sample Date			8/19/2016		11/9/2017		2/13/2018		5/23/2018		8/20/2018		11/18/2018		2/14/2019		5/22/2019		8/5/2019		11/25/2019		5/11/2020		11/11/2020	
Sample Purpose			REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG	
Location Description			Shallow zone, unimpacted downgradient		Shallow zone, unimpacted downgradient		Shallow zone, unimpacted downgradient		Shallow zone, unimpacted downgradient		Shallow zone, unimpacted downgradient		Shallow zone, unimpacted downgradient		Shallow zone, unimpacted downgradient		Shallow zone, unimpacted downgradient		Shallow zone, unimpacted downgradient		Shallow zone, unimpacted downgradient		Shallow zone, unimpacted downgradient		Shallow zone, unimpacted downgradient	
Parameter	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Tetrachloroethene	µg/L	5	0.5	U	1	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U
Trichloroethene	µg/L	5	0.5	U	1	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
1,1-Dichloroethene	µg/L	7	1	U	1	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
cis-1,2-Dichloroethene	µg/L	70	0.5	U	1	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Vinyl chloride	µg/L	2	0.5	U	1	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U

Table 2-5
COC Concentrations 1994–2022

Location Code			35BWW07								35BWW08													
Sample ID			35BWW07-210517		35BWW07-211117		35BWW07-211117-FD		35BWW07-220516		35BWW08-091407		35BWW08-091407FD		35BWW08-100913		35BWW08-081716		35BWW08-110717		35BWW08-021418		35BWW08-180523		35BWW08-180822	
Sample Date			5/17/2021		11/17/2021		11/17/2021		5/16/2022		9/14/2007		9/14/2007		10/9/2013		8/17/2016		11/7/2017		2/14/2018		5/23/2018		8/22/2018	
Sample Purpose			REG		REG		FD		REG		REG		FD		REG		REG		REG		REG		REG		REG	
Location Description			Shallow zone, unimpacted downgradient		Shallow zone, unimpacted downgradient		Shallow zone, unimpacted downgradient		Shallow zone, unimpacted downgradient		Shallow zone, unimpacted, within site boundary		Shallow zone, unimpacted, within site boundary		Shallow zone, unimpacted, within site boundary		Shallow zone, unimpacted, within site boundary		Shallow zone, unimpacted, within site boundary		Shallow zone, unimpacted, within site boundary		Shallow zone, unimpacted, within site boundary		Shallow zone, unimpacted, within site boundary	
Parameter	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Tetrachloroethene	µg/L	5	1	U	1	U	1	U	1.1		0.981	J	0.955	J	0.5	U	0.5	U	1	U	0.5	U	0.5	U	0.5	U
Trichloroethene	µg/L	5	0.5	U	0.5	U	0.5	U	3.7		150		151		43.8		1.01		0.89	J	0.5	U	0.5	U	0.5	U
1,1-Dichloroethene	µg/L	7	0.5	U	0.5	U	0.5	U	0.5	U	1		1		1	U	1	U	1	U	0.5	U	0.5	U	0.5	U
cis-1,2-Dichloroethene	µg/L	70	0.5	U	0.5	U	0.5	U	0.5	U	0.407		0.388	J	0.5	U	0.5	U	1	U	0.5	U	0.5	U	0.5	U
Vinyl chloride	µg/L	2	0.5	U	0.5	U	0.5	U	0.5	U	1		1		0.5	U	0.5	U	1	U	0.5	U	0.5	U	0.5	U

Table 2-5
COC Concentrations 1994–2022

Location Code			35BWW08																				35BWW09	
Sample ID			35BWW08-181120		35BWW08-190212		35BWW08-190520		35BWW08-190805		35BWW08-191121		35BWW08-200506		35BWW08-201111		35BWW08-201111-FD		35BWW08-210513		35BWW08-211117		35BWW08-220517		35BWW09-100813	
Sample Date			11/20/2018		2/12/2019		5/20/2019		8/5/2019		11/21/2019		5/6/2020		11/11/2020		11/11/2020		5/13/2021		11/7/2021		5/17/2022		10/8/2013	
Sample Purpose			REG		REG		REG		REG		REG		REG		REG		FD		REG		REG		REG		REG	
Location Description			Shallow zone, unimpacted, within site boundary		Shallow zone, unimpacted, within site boundary		Shallow zone, unimpacted, within site boundary		Shallow zone, unimpacted, within site boundary		Shallow zone, unimpacted, within site boundary		Shallow zone, unimpacted, within site boundary		Shallow zone, unimpacted, within site boundary		Shallow zone, unimpacted, within site boundary		Shallow zone, unimpacted, within site boundary		Shallow zone, unimpacted, within site boundary		Shallow zone, unimpacted, within site boundary		Shallow zone, impacted outside site boundary	
Parameter	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Tetrachloroethene	µg/L	5	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	1	U	1	U	1	U	1	U	0.5	U	0.5	U
Trichloroethene	µg/L	5	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	49	
1,1-Dichloroethene	µg/L	7	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U
cis-1,2-Dichloroethene	µg/L	70	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.529	J
Vinyl chloride	µg/L	2	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U

Table 2-5
COC Concentrations 1994–2022

Location Code			35BWW09																						
Sample ID			35BWW09-081616		35BWW09-110717		35BWW09-021318		35BWW09-180521		35BWW09-180816		35BWW09-181119		35BWW09-190213		35BWW09-190521		35BWW09-190805		35BWW09-191126		35BWW09-200511		35BWW09-201109	
Sample Date			8/16/2016		11/7/2017		2/13/2018		5/21/2018		8/16/2018		11/19/2018		2/13/2019		5/21/2019		8/5/2019		11/26/2019		5/11/2020		11/9/2020	
Sample Purpose			REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG	
Location Description			Shallow zone, impacted outside site boundary		Shallow zone, impacted outside site boundary		Shallow zone, impacted outside site boundary		Shallow zone, impacted outside site boundary		Shallow zone, impacted outside site boundary		Shallow zone, impacted outside site boundary		Shallow zone, impacted outside site boundary		Shallow zone, impacted outside site boundary		Shallow zone, impacted outside site boundary		Shallow zone, impacted outside site boundary		Shallow zone, impacted outside site boundary		Shallow zone, impacted outside site boundary	
Parameter	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Tetrachloroethene	µg/L	5	0.5	U	1	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	41		0.5	U	0.5	U	1	U	0.5	U
Trichloroethene	µg/L	5	149		180		180		240		180		580		410		20		70	J	47		42		23	
1,1-Dichloroethene	µg/L	7	1	U	0.84	J	0.5	U	0.5	U	0.5	U	0.78	J	0.5	U	5.5		0.5	U	0.5	U	0.5	U	0.5	U
cis-1,2-Dichloroethene	µg/L	70	0.759	J	1.7		0.5	U	0.96	J	0.84	J	1.9		1.1		1.8		0.5	U	0.5	U	0.5	U	0.5	U
Vinyl chloride	µg/L	2	0.5	U	1	U	0.5	U	0.5	U	0.5	U	0.6	J	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U

Table 2-5
COC Concentrations 1994–2022

Location Code			35BWW09						35BWW10															
Sample ID			35BWW09-210517		35BWW09-211115		35BWW09-220518		35BWW10-100413		35BWW10FD-100413		35BWW10-081816		35BWW10-110717		35BWW10-021618		35BWW10-180524		35BWW10-180817		35BWW10-181118		35BWW10-190212	
Sample Date			5/17/2021		11/15/2021		5/18/2022		10/4/2013		10/4/2013		8/18/2016		11/7/2017		2/16/2018		5/24/2018		8/17/2018		11/18/2018		2/12/2019	
Sample Purpose			REG		REG		REG		REG		FD		REG		REG		REG		REG		REG		REG		REG	
Location Description			Shallow zone, impacted outside site boundary		Shallow zone, impacted outside site boundary		Shallow zone, impacted outside site boundary		Shallow, impacted, within site boundary		Shallow, impacted, within site boundary		Shallow, impacted, within site boundary		Shallow, impacted, within site boundary		Shallow, impacted, within site boundary		Shallow, impacted, within site boundary		Shallow, impacted, within site boundary		Shallow, impacted, within site boundary		Shallow, impacted, within site boundary	
Parameter	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Tetrachloroethene	µg/L	5	1	U	1.1		0.5	U	4.45		4.52		21		31		29		30		24		45		37	
Trichloroethene	µg/L	5	13		23		34		56.3		56.9		23.9		33		39		36		28		53		50	
1,1-Dichloroethene	µg/L	7	0.5	U	0.5	U	0.5	U	1	U	1	U	1	U	1	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
cis-1,2-Dichloroethene	µg/L	70	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Vinyl chloride	µg/L	2	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U

Table 2-5
COC Concentrations 1994–2022

Location Code			35BWW10																35BWW11							
Sample ID			35BWW10-190520		35BWW10-190806		35BWW10-191126		35BWW10-200506		35BWW10-201109		35BWW10-210513		35BWW10-211115		35BWW10-220516		35BWW11-100813		35BWW11-081816		35BWW11-110817		35BWW11-021218	
Sample Date			5/20/2019		8/6/2019		11/26/2019		5/6/2020		11/9/2020		5/13/2021		11/15/2021		5/16/2022		10/8/2013		8/18/2016		11/8/2017		2/12/2018	
Sample Purpose			REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG	
Location Description			Shallow, impacted, within site boundary		Shallow, impacted, within site boundary		Shallow, impacted, within site boundary		Shallow, impacted, within site boundary		Shallow, impacted, within site boundary		Shallow, impacted, within site boundary		Shallow, impacted, within site boundary		Shallow, impacted, within site boundary		Shallow zone, unimpacted, within site boundary		Shallow zone, unimpacted, within site boundary		Shallow zone, unimpacted, within site boundary		Shallow zone, unimpacted, within site boundary	
Parameter	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Tetrachloroethene	µg/L	5	5.5		1.6		0.84	J	1	U	0.5	U	1	U	1	U	0.5	U	0.252	J	0.798	J	1	U	0.5	U
Trichloroethene	µg/L	5	9.4		2.6		0.9	J	0.64	J	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U
1,1-Dichloroethene	µg/L	7	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	1	U	1	U	0.5	U
cis-1,2-Dichloroethene	µg/L	70	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U
Vinyl chloride	µg/L	2	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U

Table 2-5
COC Concentrations 1994–2022

Location Code			35BWW11																					
Sample ID			35BWW11-180521		35BWW11-180817		35BWW11-181118		35BWW11-190213		35BWW11-190521		35BWW11-190807		35BWW11-191121		35BWW11-200506		35BWW11-201109		35BWW11-210517		35BWW11-211117		35BWW11-220517	
Sample Date			5/21/2018		8/17/2018		11/18/2018		2/13/2019		5/21/2019		8/7/2019		11/21/2019		5/6/2020		11/9/2020		5/17/2021		11/17/2021		5/17/2022	
Sample Purpose			REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG	
Location Description			Shallow zone, unimpacted, within site boundary		Shallow zone, unimpacted, within site boundary		Shallow zone, unimpacted, within site boundary		Shallow zone, unimpacted, within site boundary		Shallow zone, unimpacted, within site boundary		Shallow zone, unimpacted, within site boundary		Shallow zone, unimpacted, within site boundary		Shallow zone, unimpacted, within site boundary		Shallow zone, unimpacted, within site boundary		Shallow zone, unimpacted, within site boundary		Shallow zone, unimpacted, within site boundary		Shallow zone, unimpacted, within site boundary	
Parameter	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Tetrachloroethene	µg/L	5	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U	1	U	1	U	0.5	U
Trichloroethene	µg/L	5	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
1,1-Dichloroethene	µg/L	7	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
cis-1,2-Dichloroethene	µg/L	70	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Vinyl chloride	µg/L	2	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U

Table 2-5
COC Concentrations 1994–2022

Location Code			35BWW12																					
Sample ID			35BWW12-100313		35BWW12-081716		35BWW12-110917		35BWW12-021418		35BWW12-180523		35BWW12-180523FD		35BWW12-180822		35BWW12-180822FD		35BWW12-181120		35BWW12-190213		35BWW12-190213-FD		35BWW12-190521	
Sample Date			10/3/2013		8/17/2016		11/9/2017		2/14/2018		5/23/2018		5/23/2018		8/22/2018		8/22/2018		11/20/2018		2/13/2019		2/13/2019		5/21/2019	
Sample Purpose			REG		REG		REG		REG		REG		FD		REG		FD		REG		REG		FD		REG	
Location Description			Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary	
Parameter	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Tetrachloroethene	µg/L	5	15.3		4.06		4.8		7.1		6.2		7		7.3		7.6		8.7		8		8.2		6.2	
Trichloroethene	µg/L	5	2.04		0.473	J	0.62	J	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.92	J	0.91	J	0.88	J	0.55	J
1,1-Dichloroethene	µg/L	7	1	U	1	U	1	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
cis-1,2-Dichloroethene	µg/L	70	0.5	U	0.5	U	1	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Vinyl chloride	µg/L	2	0.5	U	0.5	U	1	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U

Table 2-5
COC Concentrations 1994–2022

Location Code			35BWW12																			
Sample ID			35BWW12-190521-FD		35BWW12-190805		35BWW12-190805-FD		35BWW12-191125		35BWW12-200506		35BWW12-200506-FD		35BWW12-201111		35BWW12-210518		35BWW12-210518-FD		35BWW12-211122		35BWW12-220518	
Sample Date			5/21/2019		8/5/2019		8/5/2019		11/25/2019		5/6/2020		5/6/2020		11/11/2020		5/18/2021		5/18/2021		11/22/2021		5/18/2022	
Sample Purpose			FD		REG		FD		REG		REG		FD		REG		REG		FD		REG		REG	
Location Description			Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary	
Parameter	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Tetrachloroethene	µg/L	5	5.7		5.8		6.3		5.8		8.5		8.5		3.1		3.4		3.6		2.1		2	
Trichloroethene	µg/L	5	0.53	J	0.5	U	0.53	J	0.55	J	0.61	J	0.72	J	0.5	U	0.5	U	0.5	U	1	U	0.5	U
1,1-Dichloroethene	µg/L	7	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U
cis-1,2-Dichloroethene	µg/L	70	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U
Vinyl chloride	µg/L	2	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U

Table 2-5
COC Concentrations 1994–2022

Location Code			35BWW13																						
Sample ID			35BWW13-100713		35BWW13-081916		35BWW13-110717		35BWW13-110717-FD		35BWW13-021318		35BWW13-021318		35BWW13-021318FD		35BWW13-180524		35BWW13-180821		35BWW13-181116		35BWW13-190214		35BWW13-190522	
Sample Date			10/7/2013		8/19/2016		11/7/2017		11/7/2017		2/13/2018		2/13/2018		2/13/2018		5/24/2018		8/21/2018		11/16/2018		2/14/2019		5/22/2019	
Sample Purpose			REG		REG		REG		FD		REG		FD		FD		REG		REG		REG		REG		REG	
Location Description			Shallow zone, unimpacted, crossgradient		Shallow zone, unimpacted, crossgradient		Shallow zone, unimpacted, crossgradient		Shallow zone, unimpacted, crossgradient		Shallow zone, unimpacted, crossgradient		Shallow zone, unimpacted, crossgradient		Shallow zone, unimpacted, crossgradient		Shallow zone, unimpacted, crossgradient		Shallow zone, unimpacted, crossgradient		Shallow zone, unimpacted, crossgradient		Shallow zone, unimpacted, crossgradient		Shallow zone, unimpacted, crossgradient	
Parameter	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Tetrachloroethene	µg/L	5	4.14		0.5	U	0.99	J	0.84	J	1.9		1.9		1.9		0.5	U	0.5	U	1.1		0.5	U	0.5	U
Trichloroethene	µg/L	5	1.84		0.5	U	1	U	1	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
1,1-Dichloroethene	µg/L	7	1	U	1	U	1	U	1	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
cis-1,2-Dichloroethene	µg/L	70	0.5	U	0.5	U	1	U	1	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Vinyl chloride	µg/L	2	0.5	U	0.5	U	1	U	1	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U

Table 2-5
COC Concentrations 1994–2022

Location Code			35BWW13													35BWW14								
Sample ID			35BWW13-190806		35BWW13-191125		35BWW13-200507		35BWW13-201111		35BWW13-210517		35BWW13-211117		35BWW13-220516		35BWW14-100913		35BWW14-081716		35BWW14-110717		35BWW14-021518		35BWW14-180522	
Sample Date			8/6/2019		11/25/2019		5/7/2020		11/11/2020		5/17/2021		11/17/2021		5/16/2022		10/9/2013		8/17/2016		11/7/2017		2/15/2018		5/22/2018	
Sample Purpose			REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG	
Location Description			Shallow zone, unimpacted, crossgradient		Shallow zone, unimpacted, crossgradient		Shallow zone, unimpacted, crossgradient		Shallow zone, unimpacted, crossgradient		Shallow zone, unimpacted, crossgradient		Shallow zone, unimpacted, crossgradient		Shallow zone, unimpacted, crossgradient		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary	
Parameter	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Tetrachloroethene	µg/L	5	0.5	U	0.5	U	1	U	1	U	1	U	1	U	0.5	U	19		20.1		53		44		30	
Trichloroethene	µg/L	5	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	82.8		39.7		24		20		23	
1,1-Dichloroethene	µg/L	7	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	57.2		10		8.4		0.5	U	5.1	
cis-1,2-Dichloroethene	µg/L	70	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	14.3		3.44		2.4		1.1		2.6	
Vinyl chloride	µg/L	2	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	5.09		0.301	J	1	U	0.5	U	0.5	U

Table 2-5
COC Concentrations 1994–2022

Location Code			35BWW14																					35BWW15	
Sample ID			35BWW14-180822		35BWW14-181120		35BWW14-190212		35BWW14-190521		35BWW14-190806		35BWW14-191125		35BWW14-200507		35BWW14-201110		35BWW14-210518		35BWW14-211122		35BWW14-220518		35BWW15-011414	
Sample Date			8/22/2018		11/20/2018		2/12/2019		5/21/2019		8/6/2019		11/25/2019		5/7/2020		11/10/2020		5/18/2021		11/22/2021		5/18/2022		1/14/2014	
Sample Purpose			REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG	
Location Description			Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary	
Parameter	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Tetrachloroethene	µg/L	5	31		37		37		0.5	U	38		38		40		23		27		24		19		8.69	
Trichloroethene	µg/L	5	12		9.1		22		110		15		16		14		7.7		6.9		6.1		5.1		43.5	
1,1-Dichloroethene	µg/L	7	2.2		2.2		5.6		0.5	U	4.2		4.6		3.6		2.1		1.8		1.3		1.3		35.5	
cis-1,2-Dichloroethene	µg/L	70	1.4		0.91	J	2.1		0.66	J	1.3		1.5		1.2		0.64	J	0.5	U	0.5	J	0.5	U	6.25	
Vinyl chloride	µg/L	2	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U	3.42	

Table 2-5
COC Concentrations 1994–2022

Location Code			35BWW15																						
Sample ID			35BWW15-081916		35BWW15-110717		35BWW15-021318		35BWW15-180521		35BWW15-180820		35BWW15-181116		35BWW15-181116-FD		35BWW15-190214		35BWW15-190522		35BWW15-190807		35BWW15-191122		35BWW15-191122-FD	
Sample Date			8/19/2016		11/7/2017		2/13/2018		5/21/2018		8/20/2018		11/16/2018		11/16/2018		2/14/2019		5/22/2019		8/7/2019		11/22/2019		11/22/2019	
Sample Purpose			REG		REG		REG		REG		REG		REG		FD		REG		REG		REG		REG		FD	
Location Description			Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary	
Parameter	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Tetrachloroethene	µg/L	5	14.5		12		12		13		11		11		10		12		7.8		9.7		11		11	
Trichloroethene	µg/L	5	20.5		15		14		13		9.2		12		12		11		7.1		7.6		7.8		7.6	
1,1-Dichloroethene	µg/L	7	6.63		4.2		2.2		3.4		1.7		2.6		2.2		1.9		0.5	U	1.1		1.2		1.1	
cis-1,2-Dichloroethene	µg/L	70	1.73		1.1		0.5	U	0.5	U	0.5	U	0.68	J	0.5	U	0.65	J	0.5	U	0.39	J	0.5	U	0.5	U
Vinyl chloride	µg/L	2	0.5	U	1	U	0.5	U	0.5	U	0.5	U	0.63	J	0.63	J	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U

Table 2-5
COC Concentrations 1994–2022

Location Code			35BWW15														35BWW16									
Sample ID			35BWW15-200507		35BWW15-201110		35BWW15-210518		35BWW15-211122		35BWW15-211122-FD		35BWW15-220518		35BWW15-220518-FD		35BWW16-100713		35BWW16FD-100713		35BWW16-081916		35BWW16-110717		35BWW16-021318	
Sample Date			5/7/2020		11/10/2020		5/18/2021		11/22/2021		11/22/2021		5/18/2022		5/18/2022		10/7/2013		10/7/2013		8/19/2016		11/7/2017		2/13/2018	
Sample Purpose			REG		REG		REG		REG		FD		REG		FD		REG		FD		REG		REG		REG	
Location Description			Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, outside site boundary		Shallow zone, impacted, outside site boundary		Shallow zone, impacted, outside site boundary		Shallow zone, impacted, outside site boundary		Shallow zone, impacted, outside site boundary	
Parameter	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Tetrachloroethene	µg/L	5	13		11		14		13		13		9.8		10		0.447	J	0.447	J	5.13		9.2		12	
Trichloroethene	µg/L	5	7.7		5.4		6.2		5.1		5.2		4.9		4.8		2.57		2.45		3.43		4.2		5.8	
1,1-Dichloroethene	µg/L	7	0.87	J	0.74	J	0.63	J	1	U	1	U	0.5	U	0.5	U	0.865	J	0.846	J	0.787	J	1.1		0.5	U
cis-1,2-Dichloroethene	µg/L	70	0.5	U	0.5	U	0.5	U	1	U	1	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U
Vinyl chloride	µg/L	2	0.5	U	0.5	U	0.5	U	1	U	1	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U

Table 2-5
COC Concentrations 1994–2022

Location Code			35BWW16																						
Sample ID			35BWW16-180524		35BWW16-180817		35BWW16-181116		35BWW16-190215		35BWW16-190523		35BWW16-190807		35BWW16-191121		35BWW16-200507		35BWW16-201111		35BWW16-210518		35BWW16-211117		35BWW16-220516	
Sample Date			5/24/2018		8/17/2018		11/16/2018		2/15/2019		5/23/2019		8/7/2019		11/21/2019		5/7/2020		11/11/2020		5/18/2021		11/17/2021		5/16/2022	
Sample Purpose			REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG	
Location Description			Shallow zone, impacted, outside site boundary		Shallow zone, impacted, outside site boundary		Shallow zone, impacted, outside site boundary		Shallow zone, impacted, outside site boundary		Shallow zone, impacted, outside site boundary		Shallow zone, impacted, outside site boundary		Shallow zone, impacted, outside site boundary		Shallow zone, impacted, outside site boundary		Shallow zone, impacted, outside site boundary		Shallow zone, impacted, outside site boundary		Shallow zone, impacted, outside site boundary		Shallow zone, impacted, outside site boundary	
Parameter	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Tetrachloroethene	µg/L	5	7.8		6.6		15		11		9.5		9.8		8.1		9.9		4.4		6		4.8		0.5	U
Trichloroethene	µg/L	5	4		3.3		6.5		4.7		3.6		3.5		3.2		3.3		1.8		2.1		1.7		0.5	U
1,1-Dichloroethene	µg/L	7	0.5	U	0.5	U	1.5		1		0.5	U	0.79	J	0.75	J	0.61	J	0.5	U	0.5	U	0.5	U	0.5	U
cis-1,2-Dichloroethene	µg/L	70	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Vinyl chloride	µg/L	2	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U

Table 2-5
COC Concentrations 1994–2022

Location Code			35BWW17																						
Sample ID			35BWW17-020414		35BWW17-081916		35BWW17-110717		35BWW17-021318		35BWW17-180524		35BWW17-180821		35BWW17-181116		35BWW17-190214		35BWW17-190523		35BWW17-190807		35BWW17-191121		35BWW17-200507	
Sample Date			2/4/2014		8/19/2016		11/7/2017		2/13/2018		5/24/2018		8/21/2018		11/16/2018		2/14/2019		5/22/2019		8/7/2019		11/21/2019		5/7/2020	
Sample Purpose			REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG	
Location Description			Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary	
Parameter	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Tetrachloroethene	µg/L	5	0.512	J	0.5	U	2.6		7.5		0.5	U	0.5	U	5.4		0.5	U	0.5	U	0.5	U	0.5	U	1	U
Trichloroethene	µg/L	5	0.5	U	0.5	U	1.1		2.9		0.5	U	0.5	U	1.8		0.5	U	0.5	U	0.5	UJ	0.5	U	0.5	U
1,1-Dichloroethene	µg/L	7	1	U	1	U	1	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	UJ	0.5	U	0.5	U
cis-1,2-Dichloroethene	µg/L	70	0.5	U	0.5	U	1	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	UJ	0.5	U	0.5	U
Vinyl chloride	µg/L	2	0.5	U	0.5	U	1	UJ	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U

Table 2-5
COC Concentrations 1994–2022

Location Code			35BWW17										35BWW18											
Sample ID			35BWW17-201111		35BWW17-210518		35BWW17-210518-FD		35BWW17-211122		35BWW17-220516		35BWW18-100213		35BWWU18-100213		35BWW18-081616		35BWW18-110717		35BWW18-021318		35BWW18-180521		35BWW18-180816	
Sample Date			11/11/2020		5/18/2021		5/18/2021		11/22/2021		5/16/2022		10/2/2013		10/2/2013		8/16/2016		11/7/2017		2/13/2018		5/21/2018		8/16/2018	
Sample Purpose			REG		REG		FD		REG		REG		REG		REG		REG		REG		REG		REG		REG	
Location Description			Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, unimpacted, outside site boundary		Shallow zone, unimpacted, outside site boundary		Shallow zone, unimpacted, outside site boundary		Shallow zone, unimpacted, outside site boundary		Shallow zone, unimpacted, outside site boundary		Shallow zone, unimpacted, outside site boundary		Shallow zone, unimpacted, outside site boundary	
Parameter	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Tetrachloroethene	µg/L	5	1	U	1	U	1	U	1	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U	0.5	U
Trichloroethene	µg/L	5	0.5	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U	0.5	U
1,1-Dichloroethene	µg/L	7	0.5	U	0.5	U	0.5	U	1	U	0.5	U	1	U	1	U	1	U	1	U	0.5	U	0.5	U	0.5	U
cis-1,2-Dichloroethene	µg/L	70	0.5	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U	0.5	U
Vinyl chloride	µg/L	2	0.5	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U	0.5	U

Table 2-5
COC Concentrations 1994–2022

Location Code			35BWW18																			35BWW19			
Sample ID			35BWW18-181119		35BWW18-190214		35BWW18-190520		35BWW18-190805		35BWW18-191126		35BWW18-200511		35BWW18-201109		35BWW18-210518		35BWW18-211115		35BWW18-220518		35BWW19-100713		35BWW19-081616	
Sample Date			11/19/2018		2/14/2019		5/20/2019		8/5/2019		11/26/2019		5/11/2020		11/9/2020		5/18/2021		11/15/2021		5/18/2022		10/7/2013		8/16/2016	
Sample Purpose			REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG	
Location Description			Shallow zone, unimpacted, outside site boundary		Shallow zone, unimpacted, outside site boundary		Shallow zone, unimpacted, outside site boundary		Shallow zone, unimpacted, outside site boundary		Shallow zone, unimpacted, outside site boundary		Shallow zone, unimpacted, outside site boundary		Shallow zone, unimpacted, outside site boundary		Shallow zone, unimpacted, outside site boundary		Shallow zone, unimpacted, outside site boundary		Shallow zone, unimpacted, outside site boundary		Shallow zone, unimpacted, outside site boundary		Shallow zone, unimpacted, outside site boundary	
Parameter	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Tetrachloroethene	µg/L	5	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U	1	U	1	U	0.5	U	0.5	U	0.5	U
Trichloroethene	µg/L	5	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
1,1-Dichloroethene	µg/L	7	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	1	U
cis-1,2-Dichloroethene	µg/L	70	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Vinyl chloride	µg/L	2	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U

Table 2-5
COC Concentrations 1994–2022

Location Code			35BWW19																					
Sample ID			35BWW19-110717		35BWW19-021318		35BWW19-180521		35BWW19-180816		35BWW19-181119		35BWW19-190214		35BWW19-190520		35BWW19-190805		35BWW19-191126		35BWW19-200511		35BWW19-201109		35BWW19-210518	
Sample Date			11/7/2017		2/13/2018		5/21/2018		8/16/2018		11/19/2018		2/14/2019		5/20/2019		8/5/2019		11/26/2019		5/11/2020		11/9/2020		5/18/2021	
Sample Purpose			REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG	
Location Description			Shallow zone, unimpacted, outside site boundary		Shallow zone, unimpacted, outside site boundary		Shallow zone, unimpacted, outside site boundary		Shallow zone, unimpacted, outside site boundary		Shallow zone, unimpacted, outside site boundary		Shallow zone, unimpacted, outside site boundary		Shallow zone, unimpacted, outside site boundary		Shallow zone, unimpacted, outside site boundary		Shallow zone, unimpacted, outside site boundary		Shallow zone, unimpacted, outside site boundary		Shallow zone, unimpacted, outside site boundary		Shallow zone, unimpacted, outside site boundary	
Parameter	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Tetrachloroethene	µg/L	5	1	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U	1	U
Trichloroethene	µg/L	5	1	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
1,1-Dichloroethene	µg/L	7	1	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
cis-1,2-Dichloroethene	µg/L	70	1	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Vinyl chloride	µg/L	2	1	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U

Table 2-5
COC Concentrations 1994–2022

Location Code			35BWW19		35BWW19		35BWW20																	
Sample ID			35BWW19-211115		35BWW19-220518		35BWW20-100413		35BWW20-081816		35BWW20-110817		35BWW20-021218		35BWW20-180524		35BWW20-180820		35BWW20-181118		35BWW20-190213		35BWW20-190522		35BWW20-190522-FD	
Sample Date			11/15/2021		5/18/2022		10/4/2013		8/18/2016		11/8/2017		2/12/2018		5/24/2018		8/20/2018		11/18/2018		2/13/2019		5/22/2019		5/22/2019	
Sample Purpose			REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		FD	
Location Description			Shallow zone, unimpacted, outside site boundary		Shallow zone, unimpacted, outside site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary	
Parameter	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Tetrachloroethene	µg/L	5	1	U	0.5	U	31.1		26.7		25		34		29		19		34		34		12		12	
Trichloroethene	µg/L	5	0.5	U	0.5	U	7.04		6.75		4.7		5.7		6.3		3.6		6.4		6		2.8		2.9	
1,1-Dichloroethene	µg/L	7	0.5	U	0.5	U	1	U	1	U	1	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
cis-1,2-Dichloroethene	µg/L	70	0.5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Vinyl chloride	µg/L	2	0.5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U

Table 2-5
COC Concentrations 1994–2022

Location Code			35BWW20																				35BWW23			
Sample ID			35BWW20-190806		35BWW20-190806-FD		35BMW20-191122		35BWW20-200511		35BWW20-200511-FD		35BWW20-201109		35BWW20-201109-FD		35BWW20-210513		35BWW20-211117		35BWW20-220517		35BWW23-070114		35BWW23-081716	
Sample Date			8/6/2019		8/6/2019		11/22/2019		5/11/2020		5/11/2020		11/9/2020		11/9/2020		5/13/2021		11/17/2021		5/17/2022		7/1/2014		8/17/2016	
Sample Purpose			REG		FD		REG		REG		FD		REG		FD		REG		REG		REG		REG		REG	
Location Description			Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, unimpacted, outside site boundary		Shallow zone, unimpacted, outside site boundary	
Parameter	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Tetrachloroethene	µg/L	5	7.5		7.6		15		12		12		12		13		6.1		5.4		9.4		0.5	U	0.5	U
Trichloroethene	µg/L	5	2.1		2		3.1		2.9		2.9		2.2		2.3		1.8		1.3		1.8		0.5	U	0.5	U
1,1-Dichloroethene	µg/L	7	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	1	U
cis-1,2-Dichloroethene	µg/L	70	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Vinyl chloride	µg/L	2	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U

Table 2-5
COC Concentrations 1994–2022

Location Code			35BWW23																					
Sample ID			35BWW23-110917		35BWW23-021518		35BWW23-180522		35BWW23-180822		35BWW23-181120		35BWW23-190212		35BWW23-190521		35BWW23-190806		35BWW23-191125		35BWW23-200507		35BWW23-201110		35BWW23-210518	
Sample Date			11/9/2017		2/15/2018		5/22/2018		8/22/2018		11/20/2018		2/12/2019		5/21/2019		8/6/2019		11/25/2019		5/7/2020		11/10/2020		5/18/2021	
Sample Purpose			REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG	
Location Description			Shallow zone, unimpacted, outside site boundary		Shallow zone, unimpacted, outside site boundary		Shallow zone, unimpacted, outside site boundary		Shallow zone, unimpacted, outside site boundary		Shallow zone, unimpacted, outside site boundary		Shallow zone, unimpacted, outside site boundary		Shallow zone, unimpacted, outside site boundary		Shallow zone, unimpacted, outside site boundary		Shallow zone, unimpacted, outside site boundary		Shallow zone, unimpacted, outside site boundary		Shallow zone, unimpacted, outside site boundary		Shallow zone, unimpacted, outside site boundary	
Parameter	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Tetrachloroethene	µg/L	5	1	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U	1	U
Trichloroethene	µg/L	5	1	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
1,1-Dichloroethene	µg/L	7	1	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
cis-1,2-Dichloroethene	µg/L	70	1	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Vinyl chloride	µg/L	2	1	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U

Table 2-5
COC Concentrations 1994–2022

Location Code			35BWW23		35BWW23		35BWW24																	
Sample ID			35BWW23-211122		35BWW23-220518		35BWW24-081916		35BWW24-110817		35BWW24-021618		35BWW24-180524		35BWW24-180821		35BWW24-181116		35BWW24-190215		35BWW24-190522		35BWW24-190807		35BWW24-191125	
Sample Date			11/22/2021		5/18/2022		8/19/2016		11/8/2017		2/16/2018		5/24/2018		8/21/2018		11/16/2018		2/15/2019		5/22/2019		8/7/2019		11/25/2019	
Sample Purpose			REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG	
Location Description			Shallow zone, unimpacted, outside site boundary		Shallow zone, unimpacted, outside site boundary		Shallow zone, unimpacted, outside site boundary		Shallow zone, unimpacted, outside site boundary		Shallow zone, unimpacted, outside site boundary		Shallow zone, unimpacted, outside site boundary		Shallow zone, unimpacted, outside site boundary		Shallow zone, unimpacted, outside site boundary		Shallow zone, unimpacted, outside site boundary		Shallow zone, unimpacted, outside site boundary		Shallow zone, unimpacted, outside site boundary		Shallow zone, unimpacted, outside site boundary	
Parameter	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Tetrachloroethene	µg/L	5	1	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Trichloroethene	µg/L	5	1	U	0.5	U	0.415	J	1	U	0.5	U	0.5	U	0.5	U	2.9		2.6		1.1		1.7		1.8	
1,1-Dichloroethene	µg/L	7	1	U	0.5	U	1	U	1	U	0.5	U	0.5	U	0.5	U	0.67	J	0.5	U	0.5	U	0.5	U	0.5	U
cis-1,2-Dichloroethene	µg/L	70	1	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Vinyl chloride	µg/L	2	1	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U

Table 2-5
COC Concentrations 1994–2022

Location Code			35BWW24												35BWW25							
Sample ID			35BWW24-200507		35BWW24-201110		35BWW24-210517		35BWW24-210517-FD		35BWW24-211122		35BWW24-220516		35BWW24-220516-FD		35BWW25-081916		35BWW25FD-081916		35BWW25-110817		35BWW25-110817-FD	
Sample Date			5/7/2020		11/10/2020		5/17/2021		5/17/2021		11/22/2021		5/16/2022		5/16/2022		8/19/2016		8/19/2016		11/8/2017		11/8/2017	
Sample Purpose			REG		REG		REG		FD		REG		REG		FD		REG		FD		REG		FD	
Location Description			Shallow zone, unimpacted, outside site boundary		Shallow zone, unimpacted, outside site boundary		Shallow zone, unimpacted, outside site boundary		Shallow zone, unimpacted, outside site boundary		Shallow zone, unimpacted, outside site boundary		Shallow zone, unimpacted, outside site boundary		Shallow zone, unimpacted, outside site boundary		Shallow zone, impacted, outside site boundary		Shallow zone, impacted, outside site boundary		Shallow zone, impacted, outside site boundary		Shallow zone, impacted, outside site boundary	
Parameter	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Tetrachloroethene	µg/L	5	1	U	0.5	U	1	U	1	U	1	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	1	U
Trichloroethene	µg/L	5	2.3		1.7		2.4		2.3		2.9		3.9		3.9		5.55		5.94		7.6		7.5	
1,1-Dichloroethene	µg/L	7	0.54	J	0.5	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U	1	U	1	U	1	U	1	U
cis-1,2-Dichloroethene	µg/L	70	0.5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	1	U
Vinyl chloride	µg/L	2	0.5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	1	U

Table 2-5
COC Concentrations 1994–2022

Location Code			35BWW25																				
Sample ID			35BWW25-021618		35BWW25-021618-FD		35BWW25-180523		35BWW25-180523FD		35BWW25-180820		35BWW25-180820-FD		35BWW25-181116		35BWW25-190215		35BWW25-190215-FD		35BWW25-190522		35BWW25-190807	
Sample Date			2/16/2018		2/16/2018		5/23/2018		5/23/2018		8/20/2018		8/20/2018		11/16/2018		2/15/2019		2/15/2019		5/22/2019		8/7/2019	
Sample Purpose			REG		FD		REG		FD		REG		FD		REG		REG		FD		REG		REG	
Location Description			Shallow zone, impacted, outside site boundary		Shallow zone, impacted, outside site boundary		Shallow zone, impacted, outside site boundary		Shallow zone, impacted, outside site boundary		Shallow zone, impacted, outside site boundary		Shallow zone, impacted, outside site boundary		Shallow zone, impacted, outside site boundary		Shallow zone, impacted, outside site boundary		Shallow zone, impacted, outside site boundary		Shallow zone, impacted, outside site boundary		Shallow zone, impacted, outside site boundary	
Parameter	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Tetrachloroethene	µg/L	5	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.33	J
Trichloroethene	µg/L	5	11		11		5.5		5.1		5.3		5.3		19		14		14		6.3		15	
1,1-Dichloroethene	µg/L	7	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
cis-1,2-Dichloroethene	µg/L	70	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Vinyl chloride	µg/L	2	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U

Table 2-5
COC Concentrations 1994–2022

Location Code			35BWW25														35BWW26									
Sample ID			35BWW25-191122		35BWW25-191122-FD		35BWW25-200507		35BWW25-201110		35BWW25-210517		35BWW25-211122		35BWW25-220516		35BWW26-081716		35BWW26-110917		35BWW26-021418		35BWW26-180522		35BWW26-180822	
Sample Date			11/22/2019		11/22/2019		5/7/2020		11/10/2020		5/17/2021		11/22/2021		5/16/2022		8/17/2016		11/9/2017		2/14/2018		5/22/2018		8/22/2018	
Sample Purpose			REG		FD		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG	
Location Description			Shallow zone, impacted, outside site boundary		Shallow zone, impacted, outside site boundary		Shallow zone, impacted, outside site boundary		Shallow zone, impacted, outside site boundary		Shallow zone, impacted, outside site boundary		Shallow zone, impacted, outside site boundary		Shallow zone, impacted, outside site boundary		Shallow zone, unimpacted, within site boundary		Shallow zone, unimpacted, within site boundary		Shallow zone, unimpacted, within site boundary		Shallow zone, unimpacted, within site boundary		Shallow zone, unimpacted, within site boundary	
Parameter	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Tetrachloroethene	µg/L	5	0.5	U	0.5	U	1	U	0.5	U	1	U	0.53	J	0.69	J	0.5	U	1	U	0.5	U	0.5	U	0.5	U
Trichloroethene	µg/L	5	13		13		13		10		8.5		10		10		0.5	U	1	U	0.5	U	0.5	U	0.5	U
1,1-Dichloroethene	µg/L	7	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U	1	U	1	U	0.5	U	0.5	U	0.5	U
cis-1,2-Dichloroethene	µg/L	70	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U	0.5	U
Vinyl chloride	µg/L	2	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U	0.5	U

Table 2-5
COC Concentrations 1994–2022

Location Code			35BWW26																				
Sample ID			35BWW26-181120		35BWW26-190212		35BWW26-190520		35BWW26-190806		35BWW26-191121		35BWW26-200506		35BWW26-201110		35BWW26-210513		35BWW26-211117		35BWW26-211117-FD		35BWW26-220517	
Sample Date			11/20/2018		2/12/2019		5/20/2019		8/6/2019		11/21/2019		5/6/2020		11/10/2020		5/13/2021		11/17/2021		11/17/2021		5/17/2022	
Sample Purpose			REG		REG		REG		REG		REG		REG		REG		REG		REG		FD		REG	
Location Description			Shallow zone, unimpacted, within site boundary		Shallow zone, unimpacted, within site boundary		Shallow zone, unimpacted, within site boundary		Shallow zone, unimpacted, within site boundary		Shallow zone, unimpacted, within site boundary		Shallow zone, unimpacted, within site boundary		Shallow zone, unimpacted, within site boundary		Shallow zone, unimpacted, within site boundary		Shallow zone, unimpacted, within site boundary		Shallow zone, unimpacted, within site boundary		Shallow zone, unimpacted, within site boundary	
Parameter	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Tetrachloroethene	µg/L	5	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U	0.5	U	1	U	1	U	1	U	0.5	U
Trichloroethene	µg/L	5	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
1,1-Dichloroethene	µg/L	7	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
cis-1,2-Dichloroethene	µg/L	70	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Vinyl chloride	µg/L	2	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U

Table 2-5
COC Concentrations 1994–2022

Location Code			LHSMW58																						
Sample ID			LHSMW58-941211		LHSMW58-941211FD		LHSMW58-960210		LHSMW58-960821		LHSMW58-980520		LHSMW58-040910		LHSMW58-060809		LHSMW58-061216		LHSMW58-100313		LHSMW58-081816		LHSMW58-110817		LHSMW58-021218	
Sample Date			12/11/1994		12/11/1994		2/10/1996		8/21/1996		5/20/1998		9/10/2004		8/9/2006		12/16/2006		10/3/2013		8/18/2016		11/8/2017		2/12/2018	
Sample Purpose			REG		FD		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG	
Location Description			Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary	
Parameter	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Tetrachloroethene	µg/L	5	21		34		8		7.9		9.5		20		21.8	J	9.01		20.3		19.9		20		14	
Trichloroethene	µg/L	5	26				9		11.5		9.4		33		21.8	J	13.7		4.26		1.93		1.6		0.5	U
1,1-Dichloroethene	µg/L	7	58		53		18		25.4		4.2		4	J	2.11	JH	3.17	J	1	U	1	U	1	U	0.5	U
cis-1,2-Dichloroethene	µg/L	70					1.8		2.1		0.53	J	5	U	0.716	JH	0.629	J	0.5	U	0.5	U	1	U	0.5	U
Vinyl chloride	µg/L	2							0.24	U	1	U	5	U	10	U	10	U	0.5	U	0.5	U	1	U	0.5	U

Table 2-5
COC Concentrations 1994–2022

Location Code			LHSMW58																						
Sample ID			LHSMW58-180524		LHSMW58-180820		LHSMW58-181118		LHSMW58-181118-FD		LHSMW58-190213		LHSMW58-190522		LHSMW58-190807		LHSMW58-191122		LHSMW58-200511		LHSMW58-201109		LHSMW58-210513		LHSMW58-211115	
Sample Date			5/24/2018		8/20/2018		11/18/2018		11/18/2018		2/13/2019		5/22/2019		8/7/2019		11/22/2019		5/11/2020		11/9/2020		5/13/2021		11/15/2021	
Sample Purpose			REG		REG		REG		FD		REG		REG		REG		REG		REG		REG		REG		REG	
Location Description			Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary	
Parameter	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Tetrachloroethene	µg/L	5	12		26		26		25		6.1		3.6		6.8		4.2		14		9.5		19		13	
Trichloroethene	µg/L	5	1.4		2.2		1.8		1.8		0.5	U	0.5	U	0.59	J-	0.5	U	0.88	J	0.81	J	1.1		1	
1,1-Dichloroethene	µg/L	7	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	UJ	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
cis-1,2-Dichloroethene	µg/L	70	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	UJ	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Vinyl chloride	µg/L	2	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U

Table 2-5
COC Concentrations 1994–2022

Location Code			LHSMW58		LHSMW59														
Sample ID			LHSMW58-220517		LHSMW59-941211		LHSMW59-941211FD		LHSMW59-960210		LHSMW59-960821		LHSMW59-980520		LHSMW59-040910		LHSMW59-060810		LHSMW59-061213	
Sample Date			5/17/2022		12/11/1994		12/11/1994		2/10/1996		8/21/1996		5/20/1998		9/10/2004		8/10/2006		12/13/2006	
Sample Purpose			REG		REG		FD		REG		REG		REG		REG		REG		REG	
Location Description			Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary	
Parameter	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Tetrachloroethene	µg/L	5	9.5		11		11		16		16.9		7		3	J	1.19	J	1.15	J
Trichloroethene	µg/L	5	0.5	U	120				249		327		330		180		135		166	
1,1-Dichloroethene	µg/L	7	0.5	U	5	U	5	U	1	U	2.2		1	U	5	U	5	U	5	U
cis-1,2-Dichloroethene	µg/L	70	0.5	U					1	U	0.2	U	1	U	5	U	0.521	J	0.463	J
Vinyl chloride	µg/L	2	0.5	U							0.24	U	1	U	5	U	10	U	10	U

Table 2-4
COC Concentrations 1994–2022

Notes:

Blue highlighting indicates concentrations above the MCL.

Some samples may have been diluted due to the concentration(s) of one or more analytes exceeding the upper limit of the calibration curve.

µg/L - micrograms per liter

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

U - Undetected: The analyte was analyzed for, but not detected.

COC - contaminant of concern

FD - field duplicate

ID - identifier

MCL - Maximum Contaminant Limit

NR - not reported by laboratory

REG - regular sample

Val Qual - validation qualifier

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Table 2-2
Year 7 Annual RA-O Sampling Locations

Well ID	Groundwater Zone	VOC	Field Parameters	MNA	Water Present
46WW01	Shallow	X	X		No
46WW04	Shallow	X	X		No
46WW10	Shallow	X	X		No
46WW11	Shallow	X	X	X	Yes
46WW12	Shallow	X	X		No
46WW13	Shallow	X	X		No
46WW15	Shallow	X	X		No
46WW17	Shallow/ Intermediate	X	X		Yes
LHSMW17	Shallow	X	X		No
LHSMW18 [a]	Shallow	X	X		No
LHSMW19	Shallow	X	X		Yes
LHSMW20	Shallow	Groundwater Elevation Only			
LHSMW21	Shallow	X	X	X	Yes
LHSMW22	Shallow	X	X		No
LHSMW24	Shallow	Groundwater Elevation Only			
46WW02	Intermediate	X	X	X	Yes
46WW05	Intermediate	X	X	X	Yes
46WW06	Intermediate	X	X		Yes
46WW07	Intermediate	X	X		Yes
46WW08	Intermediate	X	X		Yes
46WW09	Intermediate	X	X	X	Yes
46WW14	Intermediate	X	X		Yes
46WW16	Intermediate	X	X	X	Yes
LHSMW23R	Intermediate	X	X		Yes
LHSMW25	Intermediate	X	X		Yes
46WW03	Deep	X	X		Yes
46SW10 [b]	Surface Water	X	X		NS

Notes:

Field parameters to be monitored for all wells: pH, temperature, conductivity, turbidity, oxidation-reduction potential (ORP), and dissolved oxygen (DO).

MNA parameters include nitrate, sulfate, chloride, TOC, dissolved iron (field), and dissolved gases (methane, ethane, ethene, carbon dioxide).

[a] LHSMW18 only sampled if LHSMW17 is dry.

[b] 46SW10 is only sampled if surface water is present and the GW elevation at either LHSMW21 or 46WW16 exceeds 197 feet.

X - well will be analyzed for that parameter

GW - groundwater

ID - identification

MNA - monitored natural attenuation

NS - not sampled due to water level was below the creek bottom

RA-O - remedial action operation

TOC - total organic carbon

VOC - volatile organic compounds

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Table 2-3
Groundwater Elevation Data

Well ID	Zone	Sampling Date	Screen Interval (ft BTOC)		Top of Casing Elevation (ft MSL)	Ground Surface Elevation (ft MSL)	Depth to Water (ft BTOC)	Groundwater Elevation (ft MSL)
			Top	Bottom				
46WW01	S	1/16/2002	17.07	27.07	212.82	209.75	Dry	Dry
		3/15/2002	17.07	27.07	212.82	209.75	Dry	Dry
		2/13/2005	17.07	27.07	212.82	209.75	26.00	186.82
		5/15/2005	17.07	27.07	212.82	209.75	Dry	Dry
		2/19/2007	17.07	27.07	212.82	209.75	22.65	190.16
		3/16/2008	17.07	27.07	212.82	209.75	25.45	187.37
		5/15/2008	17.07	27.07	212.82	209.75	Dry	Dry
		10/13/2008	17.07	27.07	212.82	209.75	Dry	Dry
		05/02/13	17.07	27.07	212.82	209.75	26.00	186.82
		05/28/13	17.07	27.07	212.82	209.75	Dry	Dry
		08/10/13	17.07	27.07	212.82	209.75	Dry	Dry
		09/20/13	17.07	27.07	212.82	209.75	Dry	Dry
		01/25/14	17.07	27.07	212.82	209.75	Dry	Dry
		07/15/14	17.07	27.07	212.82	209.75	Dry	Dry
		11/18/14	17.07	27.07	212.82	209.75	Dry	Dry
		02/03/15	17.07	27.07	212.82	209.75	Dry	Dry
		05/05/15	17.07	27.07	212.82	209.75	Dry	Dry
		08/05/15	17.07	27.07	212.82	209.75	Dry	Dry
		02/01/16	17.07	27.07	212.82	209.75	Dry	Dry
		03/28/16	17.07	27.07	212.82	209.75	24.85	187.97
		08/03/16	17.07	27.07	212.82	209.75	25.45	187.37
		02/20/18	17.07	27.07	212.82	209.75	Dry	Dry
		08/27/18	17.07	27.07	212.82	209.75	Dry	Dry
		02/20/19	17.07	27.07	212.82	209.75	Dry	Dry
		08/12/19	17.07	27.07	212.82	209.75	Dry	Dry
		02/19/20	17.07	27.07	212.82	209.75	Dry	Dry
		03/18/21	17.07	27.07	212.82	209.75	Dry	Dry
46WW02	I	1/16/2002	38.05	48.05	212.21	209.16	37.11	175.10
		5/15/2002	38.05	48.05	212.21	209.16	37.30	174.91
		2/13/2005	38.05	48.05	212.21	209.16	35.90	176.31
		6/15/2005	38.05	48.05	212.21	209.16	37.00	175.21
		2/20/2007	38.05	48.05	212.21	209.16	31.49	180.72
		4/7/2008	38.05	48.05	212.21	209.16	32.30	179.91

Table 2-3
Groundwater Elevation Data

Well ID	Zone	Sampling Date	Screen Interval (ft BTOC)		Top of Casing Elevation (ft MSL)	Ground Surface Elevation (ft MSL)	Depth to Water (ft BTOC)	Groundwater Elevation (ft MSL)
			Top	Bottom				
46WW02	I	4/16/2008	38.05	48.05	212.21	209.16	37.25	174.96
		5/15/2008	38.05	48.05	212.21	209.16	37.03	175.18
		05/02/13	38.05	48.05	212.21	209.16	35.90	176.31
		05/28/13	38.05	48.05	212.21	209.16	35.85	176.36
		08/14/13	38.05	48.05	212.21	209.16	36.15	176.06
		08/17/13	38.05	48.05	212.21	209.16	36.20	176.01
		09/19/13	38.05	48.05	212.21	209.16	36.33	175.88
		01/27/14	38.05	48.05	212.21	209.16	36.52	175.69
		07/15/14	38.05	48.05	212.21	209.16	36.63	175.58
		11/18/14	38.05	48.05	212.21	209.16	37.37	174.84
		02/05/15	38.05	48.05	212.21	209.16	37.30	174.91
		05/06/15	38.05	48.05	212.21	209.16	37.00	175.21
		08/05/15	38.05	48.05	212.21	209.16	37.03	175.18
		02/01/16	38.05	48.05	212.21	209.16	37.11	175.10
		08/04/16	38.05	48.05	212.21	209.16	37.25	174.96
		02/20/18	38.05	48.05	212.21	209.16	37.76	174.45
		08/29/18	38.05	48.05	212.21	209.16	38.25	173.96
		02/21/19	38.05	48.05	212.21	209.16	46WW02 contained water and a sample was collected. The sample collection log was misplaced and no water level information is available.	
		08/12/19	38.05	48.05	212.21	209.16	38.23	173.98
		02/13/20	38.05	48.05	212.21	209.16	38.74	173.47
		03/16/21	38.05	48.05	212.21	209.16	38.57	173.64
46WW03	D	3/16/2002	92.67	102.67	212.47	209.80	40.69	171.78
		5/15/2002	92.67	102.67	212.47	209.80	40.60	171.87
		6/15/2005	92.67	102.67	212.47	209.80	40.32	172.15
		4/16/2008	92.67	102.67	212.47	209.80	40.77	171.70
		5/15/2008	92.67	102.67	212.47	209.80	40.71	171.76
		05/30/13	92.67	102.67	212.47	209.80	39.81	172.66
		08/17/13	92.67	102.67	212.47	209.80	40.34	172.13
		09/26/13	92.67	102.67	212.47	209.80	46.48	165.99
		01/25/14	92.67	102.67	212.47	209.80	40.61	171.86

Table 2-3
Groundwater Elevation Data

Well ID	Zone	Sampling Date	Screen Interval (ft BTOC)		Top of Casing Elevation (ft MSL)	Ground Surface Elevation (ft MSL)	Depth to Water (ft BTOC)	Groundwater Elevation (ft MSL)
			Top	Bottom				
46WW03	D	07/17/14	92.67	102.67	212.47	209.80	40.47	172.00
		11/20/14	92.67	102.67	212.47	209.80	41.00	171.47
		02/05/15	92.67	102.67	212.47	209.80	40.60	171.87
		05/06/15	92.67	102.67	212.47	209.80	40.32	172.15
		08/05/15	92.67	102.67	212.47	209.80	40.71	171.76
		02/03/16	92.67	102.67	212.47	209.80	40.69	171.78
		08/04/16	92.67	102.67	212.47	209.80	40.77	171.70
		02/26/18	92.67	102.67	212.47	209.80	41.47	171.00
		08/27/18	92.67	102.67	212.47	209.80	42.05	170.42
		02/20/19	92.67	102.67	212.47	209.80	41.20	171.27
		08/12/19	92.67	102.67	212.47	209.80	41.19	171.28
		02/19/20	92.67	102.67	212.47	209.80	41.75	170.72
		03/18/21	92.67	102.67	212.47	209.80	41.50	170.97
46WW04	S	2/16/2002	16.92	26.92	215.39	212.47	25.67	189.72
		3/15/2002	16.92	26.92	215.39	212.47	Dry	Dry
		2/13/2005	16.92	26.92	215.39	212.47	24.86	190.53
		5/15/2005	16.92	26.92	215.39	212.47	24.48	190.91
		2/19/2007	16.92	26.92	215.39	212.47	21.31	194.08
		3/16/2008	16.92	26.92	215.39	212.47	25.04	190.35
		4/15/2008	16.92	26.92	215.39	212.47	24.13	191.26
		9/13/2008	16.92	26.92	215.39	212.47	25.48	189.91
		05/02/13	16.92	26.92	215.39	212.47	24.86	190.53
		05/24/13	16.92	26.92	215.39	212.47	24.90	190.49
		08/09/13	16.92	26.92	215.39	212.47	25.48	189.91
		09/20/13	16.92	26.92	215.39	212.47	26.00	189.39
		01/25/14	16.92	26.92	215.39	212.47	25.90	189.49
		07/17/14	16.92	26.92	215.39	212.47	24.68	190.71
		11/19/14	16.92	26.92	215.39	212.47	26.00	189.39
		02/03/15	16.92	26.92	215.39	212.47	Dry	Dry
		05/05/15	16.92	26.92	215.39	212.47	24.48	190.91
		08/04/15	16.92	26.92	215.39	212.47	24.13	191.26
		02/02/16	16.92	26.92	215.39	212.47	25.67	189.72
		08/03/16	16.92	26.92	215.39	212.47	25.04	190.35

Table 2-3
Groundwater Elevation Data

Well ID	Zone	Sampling Date	Screen Interval (ft BTOC)		Top of Casing Elevation (ft MSL)	Ground Surface Elevation (ft MSL)	Depth to Water (ft BTOC)	Groundwater Elevation (ft MSL)
			Top	Bottom				
46WW04	S	02/22/18	16.92	26.92	215.39	212.47	Dry	Dry
		08/29/18	16.92	26.92	215.39	212.47	Dry	Dry
		02/20/19	16.92	26.92	215.39	212.47	Dry	Dry
		08/13/19	16.92	26.92	215.39	212.47	Dry	Dry
		02/18/20	16.92	26.92	215.39	212.47	Dry	Dry
		03/15/21	16.92	26.92	215.39	212.47	Dry	Dry
46WW05	I	1/16/2002	36.65	46.65	208.24	205.59	38.08	170.16
		5/15/2002	36.65	46.65	208.24	205.59	37.45	170.79
		5/15/2005	36.65	46.65	208.24	205.59	38.03	170.21
		3/16/2008	36.65	46.65	208.24	205.59	38.35	169.89
		6/15/2008	36.65	46.65	208.24	205.59	37.05	171.19
		05/30/13	36.65	46.65	208.24	205.59	37.25	170.99
		08/14/13	36.65	46.65	208.24	205.59	37.65	170.59
		08/17/13	36.65	46.65	208.24	205.59	37.73	170.51
		09/24/13	36.65	46.65	208.24	205.59	37.75	170.49
		01/28/14	36.65	46.65	208.24	205.59	38.20	170.04
		07/16/14	36.65	46.65	208.24	205.59	37.83	170.41
		11/19/14	36.65	46.65	208.24	205.59	38.48	169.76
		02/05/15	36.65	46.65	208.24	205.59	37.45	170.79
		05/05/15	36.65	46.65	208.24	205.59	38.03	170.21
		08/06/15	36.65	46.65	208.24	205.59	37.05	171.19
		02/01/16	36.65	46.65	208.24	205.59	38.08	170.16
		08/03/16	36.65	46.65	208.24	205.59	38.35	169.89
		02/26/18	36.65	46.65	208.24	205.59	39.03	169.21
		08/28/18	36.65	46.65	208.24	205.59	39.25	168.99
		02/25/19	36.65	46.65	208.24	205.59	39.14	169.10
		08/13/19	36.65	46.65	208.24	205.59	38.45	169.79
		02/13/20	36.65	46.65	208.24	205.59	39.32	168.92
		03/16/21	36.65	46.65	208.24	205.59	39.00	169.24

Table 2-3
Groundwater Elevation Data

Well ID	Zone	Sampling Date	Screen Interval (ft BTOC)		Top of Casing Elevation (ft MSL)	Ground Surface Elevation (ft MSL)	Depth to Water (ft BTOC)	Groundwater Elevation (ft MSL)
			Top	Bottom				
46WW06	I	2/16/2002	40.60	50.60	213.84	211.24	39.76	174.08
		6/15/2002	40.60	50.60	213.84	211.24	39.93	173.91
		1/15/2005	40.60	50.60	213.84	211.24	39.91	173.93
		4/15/2008	40.60	50.60	213.84	211.24	39.90	173.94
		4/16/2008	40.60	50.60	213.84	211.24	40.23	173.61
		05/24/13	40.60	50.60	213.84	211.24	38.98	174.86
		08/16/13	40.60	50.60	213.84	211.24	39.12	174.72
		09/25/13	40.60	50.60	213.84	211.24	39.10	174.74
		01/25/14	40.60	50.60	213.84	211.24	39.28	174.56
		07/17/14	40.60	50.60	213.84	211.24	39.55	174.29
		11/19/14	40.60	50.60	213.84	211.24	39.91	173.93
		02/06/15	40.60	50.60	213.84	211.24	39.93	173.91
		05/01/15	40.60	50.60	213.84	211.24	39.91	173.93
		08/04/15	40.60	50.60	213.84	211.24	39.90	173.94
		02/02/16	40.60	50.60	213.84	211.24	39.76	174.08
		08/04/16	40.60	50.60	213.84	211.24	40.23	173.61
		02/26/18	40.60	50.60	213.84	211.24	39.91	173.93
		08/27/18	40.60	50.60	213.84	211.24	41.10	172.74
		02/20/19	40.60	50.60	213.84	211.24	41.05	172.79
		08/13/19	40.60	50.60	213.84	211.24	39.80	174.04
		02/18/20	40.60	50.60	213.84	211.24	41.77	172.07
		03/15/21	40.60	50.60	213.84	211.24	41.55	172.29
46WW07	I	2/16/2002	41.50	51.00	207.87	205.37	35.70	172.17
		3/15/2002	41.50	51.00	207.87	205.37	35.95	171.92
		1/15/2005	41.50	51.00	207.87	205.37	35.62	172.25
		2/16/2008	41.50	51.00	207.87	205.37	35.96	171.91
		4/15/2008	41.50	51.00	207.87	205.37	35.68	172.19
		05/25/13	41.50	51.00	207.87	205.37	35.28	172.59
		08/16/13	41.50	51.00	207.87	205.37	35.60	172.27
		09/19/13	41.50	51.00	207.87	205.37	35.70	172.17
		01/27/14	41.50	51.00	207.87	205.37	36.72	171.15
		07/18/14	41.50	51.00	207.87	205.37	35.47	172.40
		11/19/14	41.50	51.00	207.87	205.37	36.25	171.62

Table 2-3
Groundwater Elevation Data

Well ID	Zone	Sampling Date	Screen Interval (ft BTOC)		Top of Casing Elevation (ft MSL)	Ground Surface Elevation (ft MSL)	Depth to Water (ft BTOC)	Groundwater Elevation (ft MSL)
			Top	Bottom				
46WW07	I	02/03/15	41.50	51.00	207.87	205.37	35.95	171.92
		05/01/15	41.50	51.00	207.87	205.37	35.62	172.25
		08/04/15	41.50	51.00	207.87	205.37	35.68	172.19
		02/02/16	41.50	51.00	207.87	205.37	35.70	172.17
		08/02/16	41.50	51.00	207.87	205.37	35.96	171.91
		03/23/18	41.50	51.00	207.87	205.37	36.77	171.10
		08/27/18	41.50	51.00	207.87	205.37	31.15	176.72
		02/20/19	41.50	51.00	207.87	205.37	36.51	171.36
		08/12/19	41.50	51.00	207.87	205.37	36.42	171.45
		02/18/20	41.50	51.00	207.87	205.37	36.81	171.06
		03/18/21	41.50	51.00	207.87	205.37	36.68	171.19
46WW08	I	3/15/2002	35.72	45.22	211.73	209.51	21.85	189.88
		3/16/2002	35.72	45.22	211.73	209.51	21.75	189.98
		1/15/2005	35.72	45.22	211.73	209.51	20.94	190.79
		2/16/2008	35.72	45.22	211.73	209.51	21.37	190.36
		4/15/2008	35.72	45.22	211.73	209.51	21.02	190.71
		05/25/13	35.72	45.22	211.73	209.51	21.35	190.38
		08/16/13	35.72	45.22	211.73	209.51	21.55	190.18
		09/21/13	35.72	45.22	211.73	209.51	21.75	189.98
		01/28/14	35.72	45.22	211.73	209.51	21.85	189.88
		07/18/14	35.72	45.22	211.73	209.51	21.30	190.43
		11/20/14	35.72	45.22	211.73	209.51	22.06	189.67
		02/03/15	35.72	45.22	211.73	209.51	21.85	189.88
		05/01/15	35.72	45.22	211.73	209.51	20.94	190.79
		08/04/15	35.72	45.22	211.73	209.51	21.02	190.71
		02/03/16	35.72	45.22	211.73	209.51	21.75	189.98
		08/02/16	35.72	45.22	211.73	209.51	21.37	190.36
		02/23/18	35.72	45.22	211.73	209.51	22.43	189.30
		08/27/18	35.72	45.22	211.73	209.51	22.76	188.97
		02/20/19	35.72	45.22	211.73	209.51	22.00	189.73
		08/13/19	35.72	45.22	211.73	209.51	20.59	191.14
		02/18/20	35.72	45.22	211.73	209.51	22.15	189.58
		03/15/21	35.72	45.22	211.73	209.51	21.55	190.18

Table 2-3
Groundwater Elevation Data

Well ID	Zone	Sampling Date	Screen Interval (ft BTOC)		Top of Casing Elevation (ft MSL)	Ground Surface Elevation (ft MSL)	Depth to Water (ft BTOC)	Groundwater Elevation (ft MSL)
			Top	Bottom				
46WW09	I	2/16/2002	31.48	40.98	210.19	207.71	37.35	172.84
		5/15/2002	31.48	40.98	210.19	207.71	35.90	174.29
		5/15/2005	31.48	40.98	210.19	207.71	36.55	173.64
		3/16/2008	31.48	40.98	210.19	207.71	37.83	172.36
		6/15/2008	31.48	40.98	210.19	207.71	37.47	172.72
		05/30/13	31.48	40.98	210.19	207.71	34.50	175.69
		08/13/13	31.48	40.98	210.19	207.71	36.95	173.24
		08/17/13	31.48	40.98	210.19	207.71	36.03	174.16
		09/24/13	31.48	40.98	210.19	207.71	32.50	177.69
		01/27/14	31.48	40.98	210.19	207.71	33.05	177.14
		07/15/14	31.48	40.98	210.19	207.71	38.18	172.01
		11/19/14	31.48	40.98	210.19	207.71	36.99	173.20
		02/05/15	31.48	40.98	210.19	207.71	35.90	174.29
		05/05/15	31.48	40.98	210.19	207.71	36.55	173.64
		08/06/15	31.48	40.98	210.19	207.71	37.47	172.72
		02/02/16	31.48	40.98	210.19	207.71	37.35	172.84
		08/03/16	31.48	40.98	210.19	207.71	37.83	172.36
		02/22/18	31.48	40.98	210.19	207.71	38.65	171.54
		08/28/18	31.48	40.98	210.19	207.71	38.81	171.38
		02/25/19	31.48	40.98	210.19	207.71	38.81	171.38
		08/12/19	31.48	40.98	210.19	207.71	38.40	171.79
		02/13/20	31.48	40.98	210.19	207.71	38.95	171.24
		03/16/21	31.48	40.98	210.19	207.71	38.60	171.59
46WW10	S	2/16/2002	14.19	23.69	213.69	211.40	24.08	189.61
		3/15/2002	14.19	23.69	213.69	211.40	23.95	189.74
		5/15/2005	14.19	23.69	213.69	211.40	23.80	189.89
		3/16/2008	14.19	23.69	213.69	211.40	24.17	189.52
		4/15/2008	14.19	23.69	213.69	211.40	23.57	190.12
		9/13/2008	14.19	23.69	213.69	211.40	22.00	191.69
		05/24/13	14.19	23.69	213.69	211.40	23.20	190.49
		08/09/13	14.19	23.69	213.69	211.40	22.00	191.69
		09/20/13	14.19	23.69	213.69	211.40	23.42	190.27
		01/25/14	14.19	23.69	213.69	211.40	23.61	190.08

Table 2-3
Groundwater Elevation Data

Well ID	Zone	Sampling Date	Screen Interval (ft BTOC)		Top of Casing Elevation (ft MSL)	Ground Surface Elevation (ft MSL)	Depth to Water (ft BTOC)	Groundwater Elevation (ft MSL)
			Top	Bottom				
46WW10	S	07/17/14	14.19	23.69	213.69	211.40	23.57	190.12
		11/19/14	14.19	23.69	213.69	211.40	23.83	189.86
		02/03/15	14.19	23.69	213.69	211.40	23.95	189.74
		05/05/15	14.19	23.69	213.69	211.40	23.80	189.89
		08/04/15	14.19	23.69	213.69	211.40	23.57	190.12
		02/02/16	14.19	23.69	213.69	211.40	24.08	189.61
		08/03/16	14.19	23.69	213.69	211.40	24.17	189.52
		02/22/18	14.19	23.69	213.69	211.40	Dry	Dry
		08/29/18	14.19	23.69	213.69	211.40	Dry	Dry
		02/20/19	14.19	23.69	213.69	211.40	Dry	Dry
		08/13/19	14.19	23.69	213.69	211.40	Dry	Dry
		02/18/20	14.19	23.69	213.69	211.40	Dry	Dry
		03/15/21	14.19	23.69	213.69	211.40	Dry	Dry
46WW11	S	1/16/2002	22.25	32.25	212.22	209.97	25.25	186.97
		4/15/2002	22.25	32.25	212.22	209.97	25.37	186.85
		6/15/2005	22.25	32.25	212.22	209.97	24.48	187.74
		3/16/2008	22.25	32.25	212.22	209.97	25.02	187.20
		5/15/2008	22.25	32.25	212.22	209.97	24.37	187.85
		05/25/13	22.25	32.25	212.22	209.97	Dry	Dry
		08/14/13	22.25	32.25	212.22	209.97	25.63	186.59
		09/19/13	22.25	32.25	212.22	209.97	25.98	186.24
		01/28/14	22.25	32.25	212.22	209.97	25.35	186.87
		07/16/14	22.25	32.25	212.22	209.97	24.76	187.46
		11/18/14	22.25	32.25	212.22	209.97	25.80	186.42
		02/04/15	22.25	32.25	212.22	209.97	25.37	186.85
		05/06/15	22.25	32.25	212.22	209.97	24.48	187.74
		08/05/15	22.25	32.25	212.22	209.97	24.37	187.85
		02/01/16	22.25	32.25	212.22	209.97	25.25	186.97
		08/03/16	22.25	32.25	212.22	209.97	25.02	187.20
		02/20/18	22.25	32.25	212.22	209.97	25.95	186.27
		08/29/18	22.25	32.25	212.22	209.97	27.30	184.92

Table 2-3
Groundwater Elevation Data

Well ID	Zone	Sampling Date	Screen Interval (ft BTOC)		Top of Casing Elevation (ft MSL)	Ground Surface Elevation (ft MSL)	Depth to Water (ft BTOC)	Groundwater Elevation (ft MSL)
			Top	Bottom				
46WW11	S	02/21/19	22.25	32.25	212.22	209.97	46WW11 contained water and a sample was collected. The sample collection log was misplaced and no water level information is available.	
		08/12/19	22.25	32.25	212.22	209.97	24.62	187.60
		02/13/20	22.25	32.25	212.22	209.97	25.72	186.50
		03/16/21	22.25	32.25	212.22	209.97	25.22	187.00
46WW12	S	1/16/2002	18.97	28.47	209.57	207.10	Dry	Dry
		3/15/2002	18.97	28.47	209.57	207.10	Dry	Dry
		5/15/2005	18.97	28.47	209.57	207.10	Dry	Dry
		4/15/2008	18.97	28.47	209.57	207.10	Dry	Dry
		4/16/2008	18.97	28.47	209.57	207.10	Dry	Dry
		10/13/2008	18.97	28.47	209.57	207.10	Dry	Dry
		05/28/13	18.97	28.47	209.57	207.10	Dry	Dry
		08/10/13	18.97	28.47	209.57	207.10	Dry	Dry
		09/20/13	18.97	28.47	209.57	207.10	Dry	Dry
		01/25/14	18.97	28.47	209.57	207.10	Dry	Dry
		07/15/14	18.97	28.47	209.57	207.10	Dry	Dry
		11/19/14	18.97	28.47	209.57	207.10	Dry	Dry
		02/03/15	18.97	28.47	209.57	207.10	Dry	Dry
		05/05/15	18.97	28.47	209.57	207.10	Dry	Dry
		08/04/15	18.97	28.47	209.57	207.10	Dry	Dry
		02/01/16	18.97	28.47	209.57	207.10	Dry	Dry
		08/04/16	18.97	28.47	209.57	207.10	Dry	Dry
		02/20/18	18.97	28.47	209.57	207.10	Dry	Dry
		08/27/18	18.97	28.47	209.57	207.10	Dry	Dry
		02/20/19	18.97	28.47	209.57	207.10	Dry	Dry
		08/13/19	18.97	28.47	209.57	207.10	Dry	Dry
		02/18/20	18.97	28.47	209.57	207.10	Dry	Dry
		03/15/21	18.97	28.47	209.57	207.10	Dry	Dry

Table 2-3
Groundwater Elevation Data

Well ID	Zone	Sampling Date	Screen Interval (ft BTOC)		Top of Casing Elevation (ft MSL)	Ground Surface Elevation (ft MSL)	Depth to Water (ft BTOC)	Groundwater Elevation (ft MSL)
			Top	Bottom				
46WW13	S	1/16/2002	21.42	30.92	208.38	205.96	Dry	Dry
		3/15/2002	21.42	30.92	208.38	205.96	Dry	Dry
		5/15/2005	21.42	30.92	208.38	205.96	Dry	Dry
		4/16/2008	21.42	30.92	208.38	205.96	Dry	Dry
		5/15/2008	21.42	30.92	208.38	205.96	Dry	Dry
		05/28/13	21.42	30.92	208.38	205.96	30.05	178.33
		08/13/13	21.42	30.92	208.38	205.96	30.20	178.18
		09/23/13	21.42	30.92	208.38	205.96	30.35	178.03
		01/27/14	21.42	30.92	208.38	205.96	Dry	Dry
		07/15/14	21.42	30.92	208.38	205.96	Dry	Dry
		11/19/14	21.42	30.92	208.38	205.96	Dry	Dry
		02/03/15	21.42	30.92	208.38	205.96	Dry	Dry
		05/05/15	21.42	30.92	208.38	205.96	Dry	Dry
		08/05/15	21.42	30.92	208.38	205.96	Dry	Dry
		02/01/16	21.42	30.92	208.38	205.96	Dry	Dry
		08/04/16	21.42	30.92	208.38	205.96	Dry	Dry
		02/20/18	21.42	30.92	208.38	205.96	Dry	Dry
		08/27/18	21.42	30.92	208.38	205.96	Dry	Dry
		02/20/19	21.42	30.92	208.38	205.96	Dry	Dry
		08/13/19	21.42	30.92	208.38	205.96	Dry	Dry
		02/18/20	21.42	30.92	208.38	205.96	Dry	Dry
		03/15/21	21.42	30.92	208.38	205.96	Dry	Dry
46WW14	I	03/15/21	44.60	54.10	204.40	201.80	33.15	171.25
46WW15	S	05/29/13	20.45	29.95	206.96	205.01	Dry	Dry
		08/10/13	20.45	29.95	206.96	205.01	Dry	Dry
		09/24/13	20.45	29.95	206.96	205.01	Dry	Dry
		01/25/14	20.45	29.95	206.96	205.01	Dry	Dry
		07/15/14	20.45	29.95	206.96	205.01	Dry	Dry
		11/19/14	20.45	29.95	206.96	205.01	Dry	Dry
		02/03/15	20.45	29.95	206.96	205.01	Dry	Dry
		05/05/15	20.45	29.95	206.96	205.01	Dry	Dry
		08/04/15	20.45	29.95	206.96	205.01	Dry	Dry
		02/01/16	20.45	29.95	206.96	205.01	Dry	Dry

Table 2-3
Groundwater Elevation Data

Well ID	Zone	Sampling Date	Screen Interval (ft BTOC)		Top of Casing Elevation (ft MSL)	Ground Surface Elevation (ft MSL)	Depth to Water (ft BTOC)	Groundwater Elevation (ft MSL)
			Top	Bottom				
46WW15	S	08/04/16	20.45	29.95	206.96	205.01	Dry	Dry
		02/20/19	20.45	29.95	206.96	205.01	Dry	Dry
		08/13/19	20.45	29.95	206.96	205.01	Dry	Dry
		02/18/20	20.45	29.95	206.96	205.01	Dry	Dry
		03/15/21	20.45	29.95	206.96	205.01	Dry	Dry
46WW16	I	4/15/2002	40.66	50.46	208.23	205.57	37.31	170.92
		5/15/2005	40.66	50.46	208.23	205.57	37.31	170.92
		1/14/2007	40.66	50.46	208.23	205.57	37.00	171.23
		6/15/2008	40.66	50.46	208.23	205.57	37.35	170.88
		07/01/14	40.66	50.46	208.23	205.57	37.00	171.23
		07/16/14	40.66	50.46	208.23	205.57	37.15	171.08
		11/18/14	40.66	50.46	208.23	205.57	38.00	170.23
		02/04/15	40.66	50.46	208.23	205.57	37.31	170.92
		05/05/15	40.66	50.46	208.23	205.57	37.31	170.92
		08/06/15	40.66	50.46	208.23	205.57	37.35	170.88
		02/22/18	40.66	50.46	208.23	205.57	38.33	169.9
		08/28/18	40.66	50.46	208.23	205.57	38.62	169.61
		02/21/19	40.66	50.46	208.23	205.57	46WW16 contained water and a sample was collected. The sample collection log was misplaced and no water level information is available.	
		08/13/19	40.66	50.46	208.23	205.57	37.95	170.28
		02/13/20	40.66	50.46	208.23	205.57	38.62	169.61
		03/16/21	40.66	50.46	208.23	205.57	38.15	170.08
46WW17	S/I	07/07/20	27.69	37.69	202.54	199.85	33.95	168.59
		03/15/21	27.69	37.69	202.54	199.85	30.63	171.91
LHSMW08	I	12/1/1994	25.52	35.52	211.73	209.51	13.52	198.21
		2/1/1996	25.52	35.52	211.73	209.51	15.24	196.49
		12/1/1996	25.52	35.52	211.73	209.51	15.24	196.49
		4/7/2008	25.52	35.52	211.73	209.51	25.78	185.95
		9/13/2008	25.52	35.52	211.73	209.51	32.50	179.23
		05/29/13	25.52	35.52	211.73	209.51	30.48	181.25
		08/09/13	25.52	35.52	211.73	209.51	32.50	179.23
		09/21/13	25.52	35.52	211.73	209.51	31.70	180.03

Table 2-3
Groundwater Elevation Data

Well ID	Zone	Sampling Date	Screen Interval (ft BTOC)		Top of Casing Elevation (ft MSL)	Ground Surface Elevation (ft MSL)	Depth to Water (ft BTOC)	Groundwater Elevation (ft MSL)
			Top	Bottom				
LHSMW11	S	12/1/1994	17.02	27.02	212.91	209.89	13.54	199.37
		2/1/1996	17.02	27.02	212.91	209.89	15.40	197.51
		12/1/1996	17.02	27.02	212.91	209.89	15.40	197.51
		3/16/2002	17.02	27.02	212.91	209.89	Dry	Dry
		5/16/2008	17.02	27.02	212.91	209.89	26.46	186.45
		10/13/2008	17.02	27.02	212.91	209.89	Dry	Dry
		05/24/13	17.02	27.02	212.91	209.89	Dry	Dry
		08/10/13	17.02	27.02	212.91	209.89	Dry	Dry
		09/20/13	17.02	27.02	212.91	209.89	Dry	Dry
		01/25/14	17.02	27.02	212.91	209.89	Dry	Dry
		02/03/16	17.02	27.02	212.91	209.89	Dry	Dry
		08/05/16	17.02	27.02	212.91	209.89	26.46	186.45
		02/25/19	17.02	27.02	212.91	209.89	Dry	Dry
LHSMW12	S	12/1/1994	6.64	16.64	209.02	205.98	9.66	199.36
		2/1/1996	6.64	16.64	209.02	205.98	10.48	198.54
		12/1/1996	6.64	16.64	209.02	205.98	10.48	198.54
		3/16/2002	6.64	16.64	209.02	205.98	Dry	Dry
		5/16/2008	6.64	16.64	209.02	205.98	Dry	Dry
		10/13/2008	6.64	16.64	209.02	205.98	Dry	Dry
		05/24/13	6.64	16.64	209.02	205.98	Dry	Dry
		08/10/13	6.64	16.64	209.02	205.98	Dry	Dry
		09/20/13	6.64	16.64	209.02	205.98	Dry	Dry
		01/25/14	6.64	16.64	209.02	205.98	Dry	Dry
		02/03/16	6.64	16.64	209.02	205.98	Dry	Dry
		08/05/16	6.64	16.64	209.02	205.98	Dry	Dry
		02/25/19	6.64	16.64	209.02	205.98	Dry	Dry
LHSMW14	S	12/1/1994	10.51	20.51	244.78	241.67	9.80	234.98
		2/1/1996	10.51	20.51	244.78	241.67	9.94	234.84
		12/1/1996	10.51	20.51	244.78	241.67	9.94	234.84
		3/16/2002	10.51	20.51	244.78	241.67	9.55	235.23
		9/13/2008	10.51	20.51	244.78	241.67	14.92	229.86

Table 2-3
Groundwater Elevation Data

Well ID	Zone	Sampling Date	Screen Interval (ft BTOC)		Top of Casing Elevation (ft MSL)	Ground Surface Elevation (ft MSL)	Depth to Water (ft BTOC)	Groundwater Elevation (ft MSL)
			Top	Bottom				
LHSMW14	S	05/24/13	10.51	20.51	244.78	241.67	12.81	231.97
		08/09/13	10.51	20.51	244.78	241.67	14.92	229.86
		09/24/13	10.51	20.51	244.78	241.67	15.5	229.28
		02/03/16	10.51	20.51	244.78	241.67	9.55	235.23
		02/25/19	10.51	20.51	244.78	241.67	8.47	236.31
LHSMW15	S	12/1/1994	14.57	24.57	226.65	223.68	16.05	210.60
		2/1/1996	14.57	24.57	226.65	223.68	16.60	210.05
		12/1/1996	14.57	24.57	226.65	223.68	16.60	210.05
		3/16/2002	14.57	24.57	226.65	223.68	Dry	Dry
		5/16/2008	14.57	24.57	226.65	223.68	Dry	Dry
		10/13/2008	14.57	24.57	226.65	223.68	Dry	Dry
		05/25/13	14.57	24.57	226.65	223.68	Dry	Dry
		08/10/13	14.57	24.57	226.65	223.68	Dry	Dry
		09/20/13	14.57	24.57	226.65	223.68	Dry	Dry
		01/25/14	14.57	24.57	226.65	223.68	Dry	Dry
		02/03/16	14.57	24.57	226.65	223.68	Dry	Dry
		08/05/16	14.57	24.57	226.65	223.68	Dry	Dry
		02/25/19	14.57	24.57	226.65	223.68	Dry	Dry
LHSMW16	S	12/1/1994	14.49	24.49	232.19	229.30	8.25	223.94
		2/1/1996	14.49	24.49	232.19	229.30	9.96	222.23
		12/1/1996	14.49	24.49	232.19	229.30	9.96	222.23
		3/16/2002	14.49	24.49	232.19	229.30	14.22	217.97
		4/15/2002	14.49	24.49	232.19	229.30	Dry	Dry
		5/15/2005	14.49	24.49	232.19	229.30	Dry	Dry
		5/15/2008	14.49	24.49	232.19	229.30	Dry	Dry
		5/16/2008	14.49	24.49	232.19	229.30	11.25	220.94
		10/13/2008	14.49	24.49	232.19	229.30	18.80	213.39
		05/29/13	14.49	24.49	232.19	229.30	16.70	215.49
		08/10/13	14.49	24.49	232.19	229.30	18.80	213.39
		09/25/13	14.49	24.49	232.19	229.30	20.95	211.24
		01/29/14	14.49	24.49	232.19	229.30	20.54	211.65
		11/19/14	14.49	24.49	232.19	229.30	21.26	210.93
		02/04/15	14.49	24.49	232.19	229.30	NM	NM
		05/05/15	14.49	24.49	232.19	229.30	NM	NM

Table 2-3
Groundwater Elevation Data

Well ID	Zone	Sampling Date	Screen Interval (ft BTOC)		Top of Casing Elevation (ft MSL)	Ground Surface Elevation (ft MSL)	Depth to Water (ft BTOC)	Groundwater Elevation (ft MSL)
			Top	Bottom				
LHSMW16	S	08/05/15	14.49	24.49	232.19	229.30	NM	NM
		02/03/16	14.49	24.49	232.19	229.30	14.22	217.97
		08/05/16	14.49	24.49	232.19	229.30	11.25	220.94
		02/22/18	14.49	24.49	232.19	229.30	Dry	Dry
		08/28/18	14.49	24.49	232.19	229.30	Dry	Dry
		02/25/19	14.49	24.49	232.19	229.30	10.32	221.87
LHSMW17	S	12/1/1994	16.68	26.68	214.58	211.50	11.24	203.34
		2/1/1996	16.68	26.68	214.58	211.50	13.15	201.43
		12/1/1996	16.68	26.68	214.58	211.50	13.15	201.43
		2/16/2002	16.68	26.68	214.58	211.50	Dry	Dry
		3/15/2002	16.68	26.68	214.58	211.50	Dry	Dry
		5/15/2005	16.68	26.68	214.58	211.50	Dry	Dry
		3/16/2008	16.68	26.68	214.58	211.50	Dry	Dry
		5/15/2008	16.68	26.68	214.58	211.50	Dry	Dry
		11/18/14	16.68	26.68	214.58	211.50	Dry	Dry
		02/03/15	16.68	26.68	214.58	211.50	Dry	Dry
		05/05/15	16.68	26.68	214.58	211.50	NM	NM
		08/05/15	16.68	26.68	214.58	211.50	Dry	Dry
		02/02/16	16.68	26.68	214.58	211.50	Dry	Dry
		08/03/16	16.68	26.68	214.58	211.50	Dry	Dry
		02/22/18	16.68	26.68	214.58	211.50	Dry	Dry
		08/29/18	16.68	26.68	214.58	211.50	Dry	Dry
		02/20/19	16.68	26.68	214.58	211.50	Dry	Dry
		08/13/19	16.68	26.68	214.58	211.50	Dry	Dry
		02/18/20	16.68	26.68	214.58	211.50	Dry	Dry
		03/15/21	16.68	26.68	214.58	211.50	Dry	Dry
LHSMW18	S	12/1/1994	17.47	27.47	215.35	212.38	13.68	201.67
		2/1/1996	17.47	27.47	215.35	212.38	15.07	200.28
		12/1/1996	17.47	27.47	215.35	212.38	15.07	200.28
		2/16/2002	17.47	27.47	215.35	212.38	Dry	Dry
		3/15/2002	17.47	27.47	215.35	212.38	Dry	Dry
		5/15/2005	17.47	27.47	215.35	212.38	Dry	Dry
		2/20/2007	17.47	27.47	215.35	212.38	22.47	192.88
		3/16/2008	17.47	27.47	215.35	212.38	24.66	190.69

Table 2-3
Groundwater Elevation Data

Well ID	Zone	Sampling Date	Screen Interval (ft BTOC)		Top of Casing Elevation (ft MSL)	Ground Surface Elevation (ft MSL)	Depth to Water (ft BTOC)	Groundwater Elevation (ft MSL)
			Top	Bottom				
LHSMW18	S	5/15/2008	17.47	27.47	215.35	212.38	Dry	Dry
		10/13/2008	17.47	27.47	215.35	212.38	Dry	Dry
		05/28/13	17.47	27.47	215.35	212.38	25.62	189.73
		08/10/13	17.47	27.47	215.35	212.38	Dry	Dry
		09/20/13	17.47	27.47	215.35	212.38	Dry	Dry
		01/25/14	17.47	27.47	215.35	212.38	Dry	Dry
		07/17/14	17.47	27.47	215.35	212.38	Dry	Dry
		11/20/14	17.47	27.47	215.35	212.38	NM	NM
		02/03/15	17.47	27.47	215.35	212.38	Dry	Dry
		05/05/15	17.47	27.47	215.35	212.38	Dry	Dry
		08/05/15	17.47	27.47	215.35	212.38	Dry	Dry
		02/02/16	17.47	27.47	215.35	212.38	Dry	Dry
		03/28/16	17.47	27.47	215.35	212.38	25.15	190.20
		08/03/16	17.47	27.47	215.35	212.38	24.66	190.69
		02/22/18	17.47	27.47	215.35	212.38	Dry	Dry
		08/29/18	17.47	27.47	215.35	212.38	Dry	Dry
		02/20/19	17.47	27.47	215.35	212.38	Dry	Dry
		08/13/19	17.47	27.47	215.35	212.38	Dry	Dry
		02/18/20	17.47	27.47	215.35	212.38	Dry	Dry
		03/15/21	17.47	27.47	215.35	212.38	Dry	Dry
LHSMW19	S	12/1/1994	19.76	29.76	212.96	209.80	11.15	201.81
		2/1/1996	19.76	29.76	212.96	209.80	12.35	200.61
		12/1/1996	19.76	29.76	212.96	209.80	12.35	200.61
		1/16/2002	19.76	29.76	212.96	209.80	24.91	188.05
		4/15/2002	19.76	29.76	212.96	209.80	24.90	188.06
		6/15/2005	19.76	29.76	212.96	209.80	24.25	188.71
		2/20/2007	19.76	29.76	212.96	209.80	20.90	192.06
		3/16/2008	19.76	29.76	212.96	209.80	24.84	188.12
		5/15/2008	19.76	29.76	212.96	209.80	24.36	188.60
		05/28/13	19.76	29.76	212.96	209.80	24.50	188.46
		08/13/13	19.76	29.76	212.96	209.80	25.13	187.83
		09/23/13	19.76	29.76	212.96	209.80	26.38	186.58
		01/28/14	19.76	29.76	212.96	209.80	24.90	188.06
		07/16/14	19.76	29.76	212.96	209.80	24.55	188.41

Table 2-3
Groundwater Elevation Data

Well ID	Zone	Sampling Date	Screen Interval (ft BTOC)		Top of Casing Elevation (ft MSL)	Ground Surface Elevation (ft MSL)	Depth to Water (ft BTOC)	Groundwater Elevation (ft MSL)
			Top	Bottom				
LHSMW19	S	11/18/14	19.76	29.76	212.96	209.80	25.33	187.63
		02/04/15	19.76	29.76	212.96	209.80	24.90	188.06
		05/06/15	19.76	29.76	212.96	209.80	24.25	188.71
		08/05/15	19.76	29.76	212.96	209.80	24.36	188.60
		02/01/16	19.76	29.76	212.96	209.80	24.91	188.05
		08/03/16	19.76	29.76	212.96	209.80	24.84	188.12
		02/20/18	19.76	29.76	212.96	209.80	25.91	187.05
		08/28/18	19.76	29.76	212.96	209.80	26.61	186.35
		02/20/19	19.76	29.76	212.96	209.80	25.55	187.41
		08/12/19	19.76	29.76	212.96	209.80	24.70	188.26
		02/19/20	19.76	29.76	212.96	209.80	25.35	187.61
		03/18/21	19.76	29.76	212.96	209.80	25.08	187.88
LHSMW20	S	12/1/1994	15.08	25.08	209.29	206.21	12.60	196.69
		2/1/1996	15.08	25.08	209.29	206.21	12.84	196.45
		12/1/1996	15.08	25.08	209.29	206.21	12.84	196.45
		05/28/13	15.08	25.08	209.29	206.21	24.2	185.09
		08/10/13	15.08	25.08	209.29	206.21	Dry	Dry
		09/20/13	15.08	25.08	209.29	206.21	Dry	Dry
		01/25/14	15.08	25.08	209.29	206.21	Dry	Dry
		07/17/14	15.08	25.08	209.29	206.21	Dry	Dry
		11/20/14	15.08	25.08	209.29	206.21	Dry	Dry
		02/03/15	15.08	25.08	209.29	206.21	Dry	Dry
		05/05/15	15.08	25.08	209.29	206.21	Dry	Dry
		08/04/15	15.08	25.08	209.29	206.21	Dry	Dry
		02/01/16	15.08	25.08	209.29	206.21	Dry	Dry
		08/04/16	15.08	25.08	209.29	206.21	Dry	Dry
		02/20/19	15.08	25.08	209.29	206.21	Dry	Dry
		08/13/19	15.08	25.08	209.29	206.21	Dry	Dry
		03/18/21	15.08	25.08	209.29	206.21	Dry	Dry

Table 2-3
Groundwater Elevation Data

Well ID	Zone	Sampling Date	Screen Interval (ft BTOC)		Top of Casing Elevation (ft MSL)	Ground Surface Elevation (ft MSL)	Depth to Water (ft BTOC)	Groundwater Elevation (ft MSL)
			Top	Bottom				
LHSMW21	S	12/1/1994	19.61	29.61	207.67	204.66	10.92	196.75
		2/1/1996	19.61	29.61	207.67	204.66	11.70	195.97
		12/1/1996	19.61	29.61	207.67	204.66	11.70	195.97
		05/28/13	19.61	29.61	207.67	204.66	19.87	187.80
		08/10/13	19.61	29.61	207.67	204.66	22.40	185.27
		09/25/13	19.61	29.61	207.67	204.66	23.60	184.07
		02/02/16	19.61	29.61	207.67	204.66	22.15	185.52
		08/05/16	19.61	29.61	207.67	204.66	21.12	186.55
		02/25/19	19.61	29.61	207.67	204.66	22.22	185.45
		08/13/19	19.61	29.61	207.67	204.66	20.55	187.12
		02/13/20	19.61	29.61	207.67	204.66	21.30	186.37
		03/16/21	19.61	29.61	207.67	204.66	18.53	189.14
LHSMW22	S	12/1/1994	18.69	28.69	209.60	206.41	13.89	195.71
		2/1/1996	18.69	28.69	209.60	206.41	15.08	194.52
		12/1/1996	18.69	28.69	209.60	206.41	15.08	194.52
		1/16/2002	18.69	28.69	209.60	206.41	Dry	Dry
		3/15/2002	18.69	28.69	209.60	206.41	Dry	Dry
		5/15/2005	18.69	28.69	209.60	206.41	Dry	Dry
		2/19/2007	18.69	28.69	209.60	206.41	25.21	184.39
		4/15/2008	18.69	28.69	209.60	206.41	Dry	Dry
		4/16/2008	18.69	28.69	209.60	206.41	Dry	Dry
		10/13/2008	18.69	28.69	209.60	206.41	Dry	Dry
		05/28/13	18.69	28.69	209.60	206.41	Dry	Dry
		08/10/13	18.69	28.69	209.60	206.41	Dry	Dry
		09/20/13	18.69	28.69	209.60	206.41	Dry	Dry
		01/25/14	18.69	28.69	209.60	206.41	Dry	Dry
		07/17/14	18.69	28.69	209.60	206.41	Dry	Dry
		11/20/14	18.69	28.69	209.60	206.41	Dry	Dry
		02/03/15	18.69	28.69	209.60	206.41	Dry	Dry
		05/05/15	18.69	28.69	209.60	206.41	Dry	Dry
		08/04/15	18.69	28.69	209.60	206.41	Dry	Dry
		02/01/16	18.69	28.69	209.60	206.41	Dry	Dry
		08/04/16	18.69	28.69	209.60	206.41	Dry	Dry
		02/20/18	18.69	28.69	209.60	206.41	Dry	Dry

Table 2-3
Groundwater Elevation Data

Well ID	Zone	Sampling Date	Screen Interval (ft BTOC)		Top of Casing Elevation (ft MSL)	Ground Surface Elevation (ft MSL)	Depth to Water (ft BTOC)	Groundwater Elevation (ft MSL)
			Top	Bottom				
LHSMW22	S	08/28/18	18.69	28.69	209.60	206.41	Dry	Dry
		02/20/19	18.69	28.69	209.60	206.41	Dry	Dry
		08/13/19	18.69	28.69	209.60	206.41	Dry	Dry
		02/18/20	18.69	28.69	209.60	206.41	Dry	Dry
		03/15/21	18.69	28.69	209.60	206.41	Dry	Dry
LHSMW23	I	12/1/1994	21.42	41.42	208.82	205.80	15.53	193.29
		2/1/1996	21.42	41.42	208.82	205.80	17.02	191.80
		12/1/1996	21.42	41.42	208.82	205.80	17.02	191.80
		1/16/2002	21.42	41.42	208.82	205.80	Dry	Dry
		3/15/2002	21.42	41.42	208.82	205.80	Dry	Dry
		5/15/2005	21.42	41.42	208.82	205.80	Dry	Dry
		2/19/2007	21.42	41.42	208.82	205.80	26.55	182.27
		04/07/08	21.42	41.42	208.82	205.80	27.64	181.18
		04/15/08	21.42	41.42	208.82	205.80	Dry	Dry
		04/16/08	21.42	41.42	208.82	205.80	Dry	Dry
		10/13/08	21.42	41.42	208.82	205.80	Dry	Dry
		05/25/13	21.42	41.42	208.82	205.80	Dry	Dry
		08/10/13	21.42	41.42	208.82	205.80	Dry	Dry
		09/20/13	21.42	41.42	208.82	205.80	Dry	Dry
		01/25/14	21.42	41.42	208.82	205.80	Dry	Dry
		07/17/14	21.42	41.42	208.82	205.80	Dry	Dry
		11/20/14	21.42	41.42	208.82	205.80	Dry	Dry
		02/03/15	21.42	41.42	208.82	205.80	Dry	Dry
		05/05/15	21.42	41.42	208.82	205.80	Dry	Dry
		08/04/15	21.42	41.42	208.82	205.80	Dry	Dry
		02/01/16	21.42	41.42	208.82	205.80	Dry	Dry
		03/28/16	21.42	41.42	208.82	205.80	Dry	Dry
		08/04/16	21.42	41.42	208.82	205.80	Dry	Dry
		02/20/18	21.42	41.42	208.82	205.80	Dry	Dry
		08/28/18	21.42	41.42	208.82	205.80	Dry	Dry
		02/20/19	21.42	41.42	208.82	205.80	Dry	Dry
		08/13/19	21.42	41.42	208.82	205.80	Dry	Dry

Table 2-3
Groundwater Elevation Data

Well ID	Zone	Sampling Date	Screen Interval (ft BTOC)		Top of Casing Elevation (ft MSL)	Ground Surface Elevation (ft MSL)	Depth to Water (ft BTOC)	Groundwater Elevation (ft MSL)
			Top	Bottom				
LHSMW23R	I	09/03/19	23.09	43.09	208.84	205.75	35.80	173.04
		02/19/20	23.09	43.09	208.84	205.75	35.90	172.94
		03/18/21	23.09	43.09	208.84	205.75	35.95	172.89
LHSMW24	S	12/1/1994	18.96	28.96	203.84	200.52	11.90	191.94
		02/01/96	18.96	28.96	203.84	200.52	13.84	190.00
		12/1/1996	18.96	28.96	203.84	200.52	13.84	190.00
		2/16/2002	18.96	28.96	203.84	200.52	27.88	175.96
		5/16/2008	18.96	28.96	203.84	200.52	Dry	Dry
		10/13/2008	18.96	28.96	203.84	200.52	Dry	Dry
		05/28/13	18.96	28.96	203.84	200.52	Dry	Dry
		08/10/13	18.96	28.96	203.84	200.52	Dry	Dry
		09/20/13	18.96	28.96	203.84	200.52	Dry	Dry
		01/25/14	18.96	28.96	203.84	200.52	Dry	Dry
		07/17/14	18.96	28.96	203.84	200.52	Dry	Dry
		02/02/16	18.96	28.96	203.84	200.52	27.88	175.96
		08/05/16	18.96	28.96	203.84	200.52	Dry	Dry
		02/25/19	18.96	28.96	203.84	200.52	Dry	Dry
		03/18/21	18.96	28.96	203.84	200.52	Dry	Dry
LHSMW25	I	12/1/1994	22.10	42.10	201.97	199.07	15.75	186.22
		2/1/1996	22.10	42.10	201.97	199.07	17.10	184.87
		12/1/1996	22.10	42.10	201.97	199.07	17.10	184.87
		4/7/2008	22.10	42.10	201.97	199.07	25.50	176.47
		02/22/18	22.10	42.10	201.97	199.07	30.90	171.07
		08/27/18	22.10	42.10	201.97	199.07	31.33	170.64
		02/25/19	22.10	42.10	201.97	199.07	30.93	171.04
		08/12/19	22.10	42.10	201.97	199.07	29.85	172.12
		02/19/20	22.10	42.10	201.97	199.07	31.22	170.75
		03/15/21	22.10	42.10	201.97	199.07	30.82	171.15
LHSMW27	S	12/1/1994	10.50	20.50	202.10	199.20	12.19	189.91
		2/1/1996	10.50	20.50	202.10	199.20	14.05	188.05
		12/1/1996	10.50	20.50	202.10	199.20	14.05	188.05
		2/16/2002	10.50	20.50	202.10	199.20	17.82	184.28
		5/16/2008	10.50	20.50	202.10	199.20	Dry	Dry
		10/13/2008	10.50	20.50	202.10	199.20	Dry	Dry

Table 2-3
Groundwater Elevation Data

Well ID	Zone	Sampling Date	Screen Interval (ft BTOC)		Top of Casing Elevation (ft MSL)	Ground Surface Elevation (ft MSL)	Depth to Water (ft BTOC)	Groundwater Elevation (ft MSL)
			Top	Bottom				
LHSMW27	S	05/28/13	10.50	20.50	202.10	199.20	Dry	Dry
		08/10/13	10.50	20.50	202.10	199.20	Dry	Dry
		09/20/13	10.50	20.50	202.10	199.20	Dry	Dry
		01/25/14	10.50	20.50	202.10	199.20	Dry	Dry
		07/18/14	10.50	20.50	202.10	199.20	Dry	Dry
		02/02/16	10.50	20.50	202.10	199.20	17.82	184.28
		08/05/16	10.50	20.50	202.10	199.20	Dry	Dry
		02/25/19	10.50	20.50	202.10	199.20	19.17	182.93

Notes:
bgs - below ground surface
BTOC - below top of casing
D - Deep
ft - feet
I - Intermediate
ID - identifier
MSL - mean seal level
NM - not measured
S - shallow

Table 2-5
COC Concentrations

Location Code			46WW01												46WW02									
Sample ID			46WW01-981001		46WW01-981107		46WW01-981107FD		46WW01-FEB2007		46WW01-032916		46WW01-080416		46WW02-981106		46WW02-FEB2007		46WW02-102808		46WW02-052813		46WW02-091913	
Sample Date			10/1/1998		11/7/1998		11/7/1998		2/19/2007		3/29/2016		8/4/2016		11/6/1998		2/20/2007		10/28/2008		5/28/2013		9/19/2013	
Location Description			Site 46 - Central, inside site boundary. Shallow Zone.												Site 46 - Central, inside site boundary. Intermediate Zone.									
Analyte	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
cis-1,2-Dichloroethene	µg/L	70	1.2		< 1	U	< 1	U	< 0.83	U	< 0.5	U	< 0.5	U	1		1.4	J	1.45		1.76		1.91	
Trichloroethene	µg/L	5	6.6		< 1	U	< 1	U	< 0.63	U	< 0.5	U	< 0.5	U	24		28.9		31.2		30		37.4	
Vinyl chloride	µg/L	2	< 1	U	< 1	U	< 1	U	< 0.32	U	< 0.5	U	< 0.5	U	< 1	U	< 0.32	U	< 0.25	U	0.495	J	0.465	J

Notes:

Blue Highlighting Indicates concentrations above the MCL/PCL.

Some samples may have been diluted due to the concentration(s) of one or more analytes exceeding the upper limit of the calibration curve.

µg/L - micrograms per liter

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

U - Undetected: The analyte was analyzed for, but not detected.

MCL - Maximum Contaminant Limit

mg/L - milligrams per liter

PCL - Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level

Val Qual - validation qualifier

Table 2-5
COC Concentrations

Location Code			46WW02																					
Sample ID			46WW02-012714		46WW02-071514		46WW02-111814		46WW02-020515		46WW02-050615		46WW02-080515		46WW02-020116		46WW02-080416		46WW02-022018		46WW02-180829		46WW02-190221	
Sample Date			1/27/2014		7/15/2014		11/18/2014		2/5/2015		5/6/2015		8/5/2015		2/1/2016		8/4/2016		2/20/2018		8/29/2018		2/21/2019	
Location Description			Site 46 - Central, inside site boundary. Intermediate Zone.																					
Analyte	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
cis-1,2-Dichloroethene	µg/L	70	2.09		1.72		1.97		2.08		1.44		1.37		1.28		1.31		0.52	J	1.4		1	
Trichloroethene	µg/L	5	35.2		32.8		38.2		37.6		24		20.3		16.6		20.7		21		24		16	
Vinyl chloride	µg/L	2	0.556	J	0.493	J	0.501	J	0.432	J	< 0.5	U	< 0.5	U	< 0.5	U	0.259	J	< 0.5	U	< 0.5	U	< 0.5	U

Notes:

Blue Highlighting Indicates concentrations above the MCL/PCL.

Some samples may have been diluted due to the concentration(s) of one or more analytes exceeding the upper limit of the calibration curve.

µg/L - micrograms per liter

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

U - Undetected: The analyte was analyzed for, but not detected.

MCL - Maximum Contaminant Limit

mg/L - milligrams per liter

PCL - Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level

Val Qual - validation qualifier

Table 2-5
COC Concentrations

Location Code			46WW02						46WW03													
Sample ID			46WW02-190812		46WW02-200213		46WW02-210316		46WW03-981106		46WW03-053013		46WW03-053013-FD		46WW03-092613		46WW03-012514		46WW03FD-012514		46WW03-071714		46WW03-112014	
Sample Date			8/12/2019		2/13/2020		3/16/2021		11/6/1998		5/30/2013		5/30/2013		9/26/2013		1/25/2014		1/25/2014		7/17/2014		11/20/2014	
Location Description			Site 46 - Central, inside site boundary. Intermediate Zone.						Site 46 - Central, inside site boundary. Deep Zone													
Analyte	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
cis-1,2-Dichloroethene	µg/L	70	1.1		1.6		1.4		< 1	U	< 0.25	U	< 0.25	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Trichloroethene	µg/L	5	17		15		25		< 1	U	< 0.25	U	< 0.25	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Vinyl chloride	µg/L	2	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 0.25	U	< 0.25	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U

Notes:

Blue Highlighting Indicates concentrations above the MCL/PCL.

Some samples may have been diluted due to the concentration(s) of one or more analytes exceeding the upper limit of the calibration curve.

µg/L - micrograms per liter

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

U - Undetected: The analyte was analyzed for, but not detected.

MCL - Maximum Contaminant Limit

mg/L - milligrams per liter

PCL - Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level

Val Qual - validation qualifier

Table 2-5
COC Concentrations

Location Code			46WW03																			
Sample ID			46WW03FD-112014		46WW03-020515		46WW03-050615		46WW03-080515		46WW03FD-080515		46WW03-020316		46WW03-080416		46WW03-022618		46WW03-180827		46WW03-190220		46WW03-190812	
Sample Date			11/20/2014		2/5/2015		5/6/2015		8/5/2015		8/5/2015		2/3/2016		8/4/2016		2/26/2018		8/27/2018		2/20/2019		8/12/2019	
Location Description			Site 46 - Central, inside site boundary. Deep Zone.																					
Analyte	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
cis-1,2-Dichloroethene	µg/L	70	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Trichloroethene	µg/L	5	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Vinyl chloride	µg/L	2	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U

Notes:

Blue Highlighting Indicates concentrations above the MCL/PCL.

Some samples may have been diluted due to the concentration(s) of one or more analytes exceeding the upper limit of the calibration curve.

µg/L - micrograms per liter

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

U - Undetected: The analyte was analyzed for, but not detected.

MCL - Maximum Contaminant Limit

mg/L - milligrams per liter

PCL - Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level

Val Qual - validation qualifier

Table 2-5
COC Concentrations

	Location Code	46WW03				46WW04						
	Sample ID	46WW03-200219	46WW03-200219-FD	46WW03-210318	46WW03-210318-FD	46WW04-981107	46WW04-FEB2007	46WW04F-052413	46WW04-092113	46WW04-012514	46WW04-071814	46WW04-050615
	Sample Date	2/19/2020	2/19/2020	3/18/2021	3/18/2021	11/7/1998	2/19/2007	5/24/2013	9/21/2013	1/25/2014	7/18/2014	5/6/2015
	Location Description	Site 46 - Central, inside site boundary. Deep Zone.				Site 46 - West, inside site boundary. Shallow Zone.						
Analyte	Units	MCL	Result / Val Qual	Result / Val Qual	Result / Val Qual	Result / Val Qual	Result / Val Qual	Result / Val Qual	Result / Val Qual	Result / Val Qual	Result / Val Qual	Result / Val Qual
cis-1,2-Dichloroethene	µg/L	70	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 1 U	< 0.83 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Trichloroethene	µg/L	5	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	0.71 J	< 0.63 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Vinyl chloride	µg/L	2	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 1 U	< 0.32 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U

Notes:

Blue Highlighting Indicates concentrations above the MCL/PCL.

Some samples may have been diluted due to the concentration(s) of one or more analytes exceeding the upper limit of the calibration curve.

µg/L - micrograms per liter

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

U - Undetected: The analyte was analyzed for, but not detected.

MCL - Maximum Contaminant Limit

mg/L - milligrams per liter

PCL - Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level

Val Qual - validation qualifier

Table 2-5
COC Concentrations

Location Code			46WW04				46WW05															
Sample ID			46WW04-080515		46WW04-020316		46WW05-100908		46WW05-053013		46WW05-092413		46WW05-012814		46WW05-071614		46WW05-111914		46WW05-020515		46WW05-050515		46WW05-080615	
Sample Date			8/5/2015		2/3/2016		10/9/2008		5/30/2013		9/24/2013		1/28/2014		7/16/2014		11/19/2014		2/5/2015		5/5/2015		8/6/2015	
Location Description			Site 46 - West, inside site boundary. Shallow Zone.				Site 46 - N, inside site boundary. Intermediate Zone.															
Analyte	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
cis-1,2-Dichloroethene	µg/L	70	< 0.5	U	< 0.5	U	1.72		10.2		8.12		10.3		9.74		9.55		10.9		7		3.87	
Trichloroethene	µg/L	5	< 0.5	U	< 0.5	U	5.9		144		112		131		130		128		143		80.5		34	
Vinyl chloride	µg/L	2	< 0.5	U	< 0.5	U	< 0.25	U	2.14		1.79		2.53		2.09		1.59		1.72		0.956	J	0.274	J

Notes:

Blue Highlighting Indicates concentrations above the MCL/PCL.

Some samples may have been diluted due to the concentration(s) of one or more analytes exceeding the upper limit of the calibration curve.

µg/L - micrograms per liter

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

U - Undetected: The analyte was analyzed for, but not detected.

MCL - Maximum Contaminant Limit

mg/L - milligrams per liter

PCL - Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level

Val Qual - validation qualifier

Table 2-5
COC Concentrations

Location Code			46WW05																		46WW06			
Sample ID			46WW05-020116		46WW05-080316		46WW05-022618		46WW05-022618-FD		46WW05-180828		46WW05-190225		46WW05-190813		46WW05-200213		46WW05-210316		46WW06-100908		46WW06-052413	
Sample Date			2/1/2016		8/3/2016		2/26/2018		2/26/2018		8/28/2018		2/25/2019		8/13/2019		2/13/2020		3/16/2021		10/9/2008		5/24/2013	
Location Description			Site 46 - N, inside site boundary. Intermediate Zone.																		Site 46 - W, inside site boundary. Intermediate Zone.			
Analyte	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
cis-1,2-Dichloroethene	µg/L	70	3.12		1.86		< 0.5	U	0.62	J	< 0.5	U	2.2		4.8		1.6		1.6		< 0.25	U	< 0.5	U
Trichloroethene	µg/L	5	46.4		23.6		14		14		6.4		27		62		19		20		< 0.25	U	< 0.5	U
Vinyl chloride	µg/L	2	0.832	J	0.522	J	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	1.2		0.65	J	< 0.5	U	< 0.25	U	< 0.5	U

Notes:

Blue Highlighting Indicates concentrations above the MCL/PCL.

Some samples may have been diluted due to the concentration(s) of one or more analytes exceeding the upper limit of the calibration curve.

µg/L - micrograms per liter

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

U - Undetected: The analyte was analyzed for, but not detected.

MCL - Maximum Contaminant Limit

mg/L - milligrams per liter

PCL - Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level

Val Qual - validation qualifier

Table 2-5
COC Concentrations

Location Code			46WW06																			
Sample ID			46WW06-092513		46WW06-012514		46WW06-071714		46WW06FD-071714		46WW06-111914		46WW06FD-111914		46WW06-020615		46WW06-050115		46WW06-080415		46WW06-020216		46WW06-080416	
Sample Date			9/25/2013		1/25/2014		7/17/2014		7/17/2014		11/19/2014		11/19/2014		2/6/2015		5/1/2015		8/4/2015		2/2/2016		8/4/2016	
Location Description			Site 46 - W, inside site boundary. Intermediate Zone.																			
Analyte	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
cis-1,2-Dichloroethene	µg/L	70	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Trichloroethene	µg/L	5	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Vinyl chloride	µg/L	2	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U

Notes:

Blue Highlighting Indicates concentrations above the MCL/PCL.

Some samples may have been diluted due to the concentration(s) of one or more analytes exceeding the upper limit of the calibration curve.

µg/L - micrograms per liter

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

U - Undetected: The analyte was analyzed for, but not detected.

MCL - Maximum Contaminant Limit

mg/L - milligrams per liter

PCL - Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level

Val Qual - validation qualifier

Table 2-5
COC Concentrations

Location Code			46WW06														46WW07							
Sample ID			46WW06FD-080416		46WW06-022618		46WW06-180827		46WW06-190220		46WW06-190813		46WW06-200219		46WW06-210315		46WW07-052513		46WW07-052513-FD		46WW07-091913		46WW07-012714	
Sample Date			8/4/2016		2/26/2018		8/27/2018		2/20/2019		8/13/2019		2/19/2020		3/15/2021		5/25/2013		5/25/2013		9/21/2013		1/27/2014	
Location Description			Site 46 - W, inside site boundary. Intermediate Zone.														Site 46 - N, inside site boundary. Intermediate Zone.							
Analyte	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
cis-1,2-Dichloroethene	µg/L	70	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Trichloroethene	µg/L	5	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	0.65	J	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Vinyl chloride	µg/L	2	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U

Notes:

Blue Highlighting Indicates concentrations above the MCL/PCL.

Some samples may have been diluted due to the concentration(s) of one or more analytes exceeding the upper limit of the calibration curve.

µg/L - micrograms per liter

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

U - Undetected: The analyte was analyzed for, but not detected.

MCL - Maximum Contaminant Limit

mg/L - milligrams per liter

PCL - Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level

Val Qual - validation qualifier

Table 2-5
COC Concentrations

Location Code			46WW07																			
Sample ID			46WW07-071814		46WW07FD-071814		46WW07-112014		46WW07-020315		46WW07-050115		46WW07-080415		46WW07-020216		46WW07-080216		46WW07-022318		46WW07-180827		46WW07-190220	
Sample Date			7/18/2014		7/18/2014		11/20/2014		2/3/2015		5/1/2015		8/4/2015		2/2/2016		8/2/2016		2/23/2018		8/27/2018		2/20/2019	
Location Description			Site 46 - N, inside site boundary. Intermediate Zone.																			
Analyte	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
cis-1,2-Dichloroethene	µg/L	70	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Trichloroethene	µg/L	5	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Vinyl chloride	µg/L	2	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U

Notes:

Blue Highlighting Indicates concentrations above the MCL/PCL.

Some samples may have been diluted due to the concentration(s) of one or more analytes exceeding the upper limit of the calibration curve.

µg/L - micrograms per liter

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

U - Undetected: The analyte was analyzed for, but not detected.

MCL - Maximum Contaminant Limit

mg/L - milligrams per liter

PCL - Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level

Val Qual - validation qualifier

Table 2-5
COC Concentrations

Location Code			46WW07										46WW08									
Sample ID			46WW07-190812		46WW07-200218		46WW07-200218-FD		46WW07-210318		46WW07-210318-FD		46WW08-052513		46WW08-092113		46WW08-092113-FD		46WW08-012814		46WW08FD-012814		46WW08-071814	
Sample Date			8/12/2019		2/18/2020		2/18/2020		3/18/2021		3/18/2021		5/25/2013		9/21/2013		9/21/2013		1/28/2014		1/28/2014		7/18/2014	
Location Description			Site 46 - N, inside site boundary. Intermediate Zone.										Site 46 - NNW, inside site boundary. Intermediate Zone.											
Analyte	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
cis-1,2-Dichloroethene	µg/L	70	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Trichloroethene	µg/L	5	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Vinyl chloride	µg/L	2	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U

Notes:

Blue Highlighting Indicates concentrations above the MCL/PCL.

Some samples may have been diluted due to the concentration(s) of one or more analytes exceeding the upper limit of the calibration curve.

µg/L - micrograms per liter

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

U - Undetected: The analyte was analyzed for, but not detected.

MCL - Maximum Contaminant Limit

mg/L - milligrams per liter

PCL - Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level

Val Qual - validation qualifier

Table 2-5
COC Concentrations

Location Code			46WW08																					
Sample ID			46WW08-112014		46WW08-020315		46WW08FD-020315		46WW08-050115		46WW08FD-050115		46WW08-080415		46WW08-020316		46WW08-080216		46WW08-022318		46WW08-022318-FD		46WW08-180827	
Sample Date			11/20/2014		2/3/2015		2/3/2015		5/1/2015		5/1/2015		8/4/2015		2/3/2016		8/2/2016		2/23/2018		2/23/2018		8/27/2018	
Location Description			Site 46 - NNW, inside site boundary. Intermediate Zone.																					
Analyte	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
cis-1,2-Dichloroethene	µg/L	70	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Trichloroethene	µg/L	5	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Vinyl chloride	µg/L	2	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U

Notes:

Blue Highlighting Indicates concentrations above the MCL/PCL.

Some samples may have been diluted due to the concentration(s) of one or more analytes exceeding the upper limit of the calibration curve.

µg/L - micrograms per liter

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

U - Undetected: The analyte was analyzed for, but not detected.

MCL - Maximum Contaminant Limit

mg/L - milligrams per liter

PCL - Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level

Val Qual - validation qualifier

Table 2-5
COC Concentrations

Location Code			46WW08												46WW09									
Sample ID			46WW08-180827FD		46WW08-190220		46WW08-190813		46WW08-190813-FD		46WW08-200218		46WW08-210315		46WW09-092413		46WW09-012714		46WW09-071514		46WW09-111914		46WW09-020515	
Sample Date			8/27/2018		2/20/2019		8/13/2019		8/13/2019		2/18/2020		3/15/2021		9/24/2013		1/27/2014		7/15/2014		11/19/2014		2/5/2015	
Location Description			Site 46 - NNW, inside site boundary. Intermediate Zone.												Site 46 - Central, within site boundary. Intermediate Zone.									
Analyte	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
cis-1,2-Dichloroethene	µg/L	70	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Trichloroethene	µg/L	5	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Vinyl chloride	µg/L	2	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U

Notes:

Blue Highlighting Indicates concentrations above the MCL/PCL.

Some samples may have been diluted due to the concentration(s) of one or more analytes exceeding the upper limit of the calibration curve.

µg/L - micrograms per liter

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

U - Undetected: The analyte was analyzed for, but not detected.

MCL - Maximum Contaminant Limit

mg/L - milligrams per liter

PCL - Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level

Val Qual - validation qualifier

Table 2-5
COC Concentrations

Location Code			46WW09																			
Sample ID			46WW09-050515		46WW09-080615		46WW09-020216		46WW09-080316		46WW09-022218		46WW09-180828		46WW09-190225		46WW09-190225-FD		46WW09-190812		46WW09-200213	
Sample Date			5/5/2015		8/6/2015		2/2/2016		8/3/2016		2/22/2018		8/28/2018		2/25/2019		2/25/2019		8/12/2019		2/13/2020	
Location Description			Site 46 - Central, within site boundary. Intermediate Zone.																			
Analyte	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
cis-1,2-Dichloroethene	µg/L	70	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Trichloroethene	µg/L	5	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Vinyl chloride	µg/L	2	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U

Notes:

Blue Highlighting Indicates concentrations above the MCL/PCL.

Some samples may have been diluted due to the concentration(s) of one or more analytes exceeding the upper limit of the calibration curve.

µg/L - micrograms per liter

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

U - Undetected: The analyte was analyzed for, but not detected.

MCL - Maximum Contaminant Limit

mg/L - milligrams per liter

PCL - Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level

Val Qual - validation qualifier

Table 2-5
COC Concentrations

Location Code			46WW10																					
Sample ID			46WW10-052513		46WW10-092113		46WW10-012514		46WW10-071714		46WW10-112014		46WW10-020415		46WW10-050615		46WW10FD-050615		46WW10-080515		46WW10-020316		46WW10-080416	
Sample Date			5/25/2013		9/21/2013		1/25/2014		7/17/2014		11/20/2014		2/4/2015		5/6/2015		5/6/2015		8/5/2015		2/3/2016		8/4/2016	
Location Description			Site 46 - West, inside site boundary. Shallow Zone.																					
Analyte	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
cis-1,2-Dichloroethene	µg/L	70	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Trichloroethene	µg/L	5	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Vinyl chloride	µg/L	2	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U

Notes:

Blue Highlighting Indicates concentrations above the MCL/PCL.

Some samples may have been diluted due to the concentration(s) of one or more analytes exceeding the upper limit of the calibration curve.

µg/L - micrograms per liter

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

U - Undetected: The analyte was analyzed for, but not detected.

MCL - Maximum Contaminant Limit

mg/L - milligrams per liter

PCL - Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level

Val Qual - validation qualifier

Table 2-5
COC Concentrations

Location Code			46WW11																					
Sample ID			46WW11-081413		46WW11-091913		46WW11-012814		46WW11-071614		46WW11-111814		46WW11-020415		46WW11-050615		46WW11-080515		46WW11-020116		46WW11-080316		46WW11-022018	
Sample Date			8/14/2013		9/19/2013		1/28/2014		7/16/2014		11/18/2014		2/4/2015		5/6/2015		8/5/2015		2/1/2016		8/3/2016		2/20/2018	
Location Description			Site 46 - Central, within site boundary. Shallow Zone.																					
Analyte	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
cis-1,2-Dichloroethene	µg/L	70	1.56		1.11		2.04		2.12		1.28		1.99		1.4		0.749	J	0.578	J	0.325	J	< 0.5	U
Trichloroethene	µg/L	5	85.9		79.8		87.5		90.6		70.7		63.6		45.3		26.3		20.5		21.2		18	
Vinyl chloride	µg/L	2	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U

Notes:

Blue Highlighting Indicates concentrations above the MCL/PCL.

Some samples may have been diluted due to the concentration(s) of one or more analytes exceeding the upper limit of the calibration curve.

µg/L - micrograms per liter

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

U - Undetected: The analyte was analyzed for, but not detected.

MCL - Maximum Contaminant Limit

mg/L - milligrams per liter

PCL - Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level

Val Qual - validation qualifier

Table 2-5
COC Concentrations

Location Code			46WW11																		46WW13			
Sample ID			46WW11-180829		46WW11-180829FD		46WW11-190221		46WW11-190812		46WW11-190812-FD		46WW11-200213		46WW11-200213-FD		46WW11-210316		46WW11-210316-FD		46WW13-052913		46WW13-092413	
Sample Date			8/29/2018		8/29/2018		2/21/2019		8/12/2019		8/12/2019		2/13/2020		2/13/2020		3/16/2021		3/16/2021		5/29/2013		9/24/2013	
Location Description			Site 46 - Central, within site boundary. Shallow Zone.																		Site 46 - SE, within site boundary. Shallow Zone.			
Analyte	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
cis-1,2-Dichloroethene	µg/L	70	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	37.3		35.5	
Trichloroethene	µg/L	5	13		12		13		24		24		14		14		19		19		107		103	
Vinyl chloride	µg/L	2	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	13.1		9.83	

Notes:

Blue Highlighting Indicates concentrations above the MCL/PCL.

Some samples may have been diluted due to the concentration(s) of one or more analytes exceeding the upper limit of the calibration curve.

µg/L - micrograms per liter

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

U - Undetected: The analyte was analyzed for, but not detected.

MCL - Maximum Contaminant Limit

mg/L - milligrams per liter

PCL - Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level

Val Qual - validation qualifier

Table 2-5
COC Concentrations

Location Code			46WW14																			
Sample ID			46WW14-052913		46WW14-091913		46WW14-012714		46WW14-071514		46WW14-111914		46WW14-020615		46WW14FD-020615		46WW14-050515		46WW14-020216		46WW14FD-020216		46WW14-080216	
Sample Date			5/29/2013		9/19/2013		1/27/2014		7/15/2014		11/19/2014		2/6/2015		2/6/2015		5/5/2015		2/2/2016		2/2/2016		8/2/2016	
Location Description			Site 46 - NE, within site boundary. Intermediate Zone.																			
Analyte	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
cis-1,2-Dichloroethene	µg/L	70	< 0.25	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Trichloroethene	µg/L	5	< 0.25	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Vinyl chloride	µg/L	2	< 0.25	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U

Notes:

Blue Highlighting Indicates concentrations above the MCL/PCL.

Some samples may have been diluted due to the concentration(s) of one or more analytes exceeding the upper limit of the calibration curve.

µg/L - micrograms per liter

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

U - Undetected: The analyte was analyzed for, but not detected.

MCL - Maximum Contaminant Limit

mg/L - milligrams per liter

PCL - Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level

Val Qual - validation qualifier

Table 2-5
COC Concentrations

Location Code			46WW14				46WW16															
Sample ID			46WW14FD-080216		46WW14-210315		46WW16-070114		46WW16-071614		46WW16-111814		46WW16-050515		46WW16-080615		46WW16-020116		46WW16-080316		46WW16-022218		46WW16-180828	
Sample Date			8/2/2016		3/15/2021		7/1/2014		7/16/2014		11/18/2014		5/5/2015		8/6/2015		2/1/2016		8/3/2016		2/22/2018		8/28/2018	
Location Description			Site 46 - NE, within site boundary. Intermediate Zone.				Site 46 - N, within site boundary. Intermediate Zone.															
Analyte	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
cis-1,2-Dichloroethene	µg/L	70	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Trichloroethene	µg/L	5	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Vinyl chloride	µg/L	2	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U

Notes:

Blue Highlighting Indicates concentrations above the MCL/PCL.

Some samples may have been diluted due to the concentration(s) of one or more analytes exceeding the upper limit of the calibration curve.

µg/L - micrograms per liter

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

U - Undetected: The analyte was analyzed for, but not detected.

MCL - Maximum Contaminant Limit

mg/L - milligrams per liter

PCL - Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level

Val Qual - validation qualifier

Table 2-5
COC Concentrations

Location Code			46WW16								46MW17				LHSMW08							
Sample ID			46WW16-190221		46WW16-190813		46WW16-200213		46WW16-210316		46WW17-200707		46WW17-210315		LHSMW08-960813		LHSMW08-960813FD		LHSMW08-980513		LHSMW08-092113	
Sample Date			2/21/2019		8/13/2019		2/13/2020		3/16/2021		7/7/2020		3/15/2021		8/13/1996		8/13/1996		5/13/1998		9/21/2013	
Location Description			Site 46 - N, within site boundary. Intermediate Zone.								Site 46 - Northeast, Within Site Boundary, Shallow/Intermediate Zone.				Site 46 - South, outside of site boundary. Intermediate Zone.							
Analyte	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
cis-1,2-Dichloroethene	µg/L	70	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	UJ	0.5	U	< 0.5	U	< 0.2	U	< 0.2	U	< 1	U	< 0.5	U
Trichloroethene	µg/L	5	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	0.5	U	< 0.5	U	< 0.25	U	< 0.25	U	< 1	U	< 0.5	U
Vinyl chloride	µg/L	2	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	0.5	U	< 0.5	U	< 0.24	U	< 0.24	U	< 1	U	< 0.5	U

Notes:

Blue Highlighting Indicates concentrations above the MCL/PCL.

Some samples may have been diluted due to the concentration(s) of one or more analytes exceeding the upper limit of the calibration curve.

µg/L - micrograms per liter

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

U - Undetected: The analyte was analyzed for, but not detected.

MCL - Maximum Contaminant Limit

mg/L - milligrams per liter

PCL - Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level

Val Qual - validation qualifier

Table 2-5
COC Concentrations

Location Code			LHSMW11								LHSMW12				LHSMW14							
Sample ID			LHSMW11-960813		LHSMW11-980514		LHSMW11-980514FD		LHSMW11-031508		LHSMW12-960813		LHSMW12-980514		LHSMW14-941129		LHSMW14-960206		LHSMW14-960814		LHSMW14-960814FD	
Sample Date			8/13/1996		5/14/1998		5/14/1998		3/15/2008		8/13/1996		5/14/1998		11/29/1994		2/6/1996		8/14/1996		8/14/1996	
Location Description			Site 46 - South, outside of site boundary. Shallow Zone.								Site 46 - South, outside of site boundary. Shallow Zone.				Site 46 - West, outside of site boundary. Shallow Zone.							
Analyte	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
cis-1,2-Dichloroethene	µg/L	70	< 0.2	U	< 1	U	< 1	U	< 0.25	U	< 0.2	U	< 1	U			< 1	U	< 0.2	U	< 0.2	U
Trichloroethene	µg/L	5	< 0.25	U	< 1	U	< 1	U	< 0.25	U	< 0.25	U	< 1	U	< 5	U	< 1	U	< 0.25	U	< 0.25	U
Vinyl chloride	µg/L	2	< 0.24	U	< 1	U	< 1	U	< 0.25	U	< 0.24	U	< 1	U			< 1	U	< 0.24	U	< 0.24	U

Notes:

Blue Highlighting Indicates concentrations above the MCL/PCL.

Some samples may have been diluted due to the concentration(s) of one or more analytes exceeding the upper limit of the calibration curve.

µg/L - micrograms per liter

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

U - Undetected: The analyte was analyzed for, but not detected.

MCL - Maximum Contaminant Limit

mg/L - milligrams per liter

PCL - Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level

Val Qual - validation qualifier

Table 2-5
COC Concentrations

Location Code			LHSMW14				LHSMW15								LHSMW16							
Sample ID			LHSMW14-980514		LHSMW14-092413		LHSMW15-960206		LHSMW15-960815		LHSMW15-980514		LHSMW15-102708		LHSMW16-941129		LHSMW16-960206		LHSMW16-960815		LHSMW16-980514	
Sample Date			5/14/1998		9/24/2013		2/6/1996		8/15/1996		5/14/1998		10/27/2008		11/29/1994		2/6/1996		8/15/1996		5/14/1998	
Location Description			Site 46 - West, outside of site boundary. Shallow Zone.				Site 46 - West, outside of site boundary. Shallow Zone.								Site 46 - West, outside of site boundary. Shallow Zone.							
Analyte	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
cis-1,2-Dichloroethene	µg/L	70	< 1	U	< 0.5	U	< 1	U	< 0.2	U	< 1	U	< 0.25	U			< 1	U	< 0.2	U	< 1	U
Trichloroethene	µg/L	5	< 1	U	< 0.5	U	< 1	U	< 0.25	U	< 1	U	< 0.25	U	< 5	U	< 1	U	< 0.25	U	< 1	U
Vinyl chloride	µg/L	2	< 1	U	< 0.5	U	< 1	U	< 0.24	U	< 1	U	< 0.25	U			< 1	U	< 0.24	U	< 1	U

Notes:

Blue Highlighting Indicates concentrations above the MCL/PCL.

Some samples may have been diluted due to the concentration(s) of one or more analytes exceeding the upper limit of the calibration curve.

µg/L - micrograms per liter

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

U - Undetected: The analyte was analyzed for, but not detected.

MCL - Maximum Contaminant Limit

mg/L - milligrams per liter

PCL - Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level

Val Qual - validation qualifier

Table 2-5
COC Concentrations

Location Code			LHSMW17														LHSMW18							
Sample ID			LHSMW17-960212		LHSMW17-960815		LHSMW17-980514		LHSMW17-000524		LHSMW17-000524FD		LHSMW17-001002FD		LHSMW17-001003		LHSMW18-941202		LHSMW18-960212		LHSMW18-960815		LHSMW18-980514	
Sample Date			2/12/1996		8/15/1996		5/14/1998		5/24/2000		5/24/2000		10/2/2000		10/3/2000		12/2/1994		2/12/1996		8/15/1996		5/14/1998	
Location Description			Site 46 - SW, inside site boundary. Shallow Zone.														Site 46 - Central, inside site boundary. Shallow Zone.							
Analyte	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
cis-1,2-Dichloroethene	µg/L	70	< 1	U	< 0.2	U	< 1	U	< 1	U	100	J	< 1	U	< 1	U			4.5		6.1		9.8	
Trichloroethene	µg/L	5	< 1	U	< 0.25	U	< 1	U	< 1	U	1		< 1	U	< 1	U	14		21		27.5		38	
Vinyl chloride	µg/L	2	< 1	U	< 0.24	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U			< 1	U	0.68		0.71	J

Notes:

Blue Highlighting Indicates concentrations above the MCL/PCL.

Some samples may have been diluted due to the concentration(s) of one or more analytes exceeding the upper limit of the calibration curve.

µg/L - micrograms per liter

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

U - Undetected: The analyte was analyzed for, but not detected.

MCL - Maximum Contaminant Limit

mg/L - milligrams per liter

PCL - Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level

Val Qual - validation qualifier

Table 2-5
COC Concentrations

Location Code			LHSMW18				LHSMW19															
Sample ID			LHSMW18-FEB2007		LHSMW18-032916		LHSMW19-941202		LHSMW19-960206		LHSMW19-960815		LHSMW19-980515		LHSMW19-FEB2007		LHSMW19-110620		LHSMW19-052813		LHSMW19-092413		LHSMW19-012814	
Sample Date			2/20/2007		3/29/2016		12/2/1994		2/6/1996		8/15/1996		5/15/1998		2/20/2007		6/20/2011		5/28/2013		9/24/2013		1/28/2014	
Location Description			Site 46 - Central, inside site boundary. Shallow Zone.				Site 46 - Central, within site boundary. Shallow Zone.															
Analyte	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
cis-1,2-Dichloroethene	µg/L	70	1.5	J	1.28				< 3	U	< 0.2	U	< 1	U	< 0.83	U	2.98		1.45		2.44		2.15	
Trichloroethene	µg/L	5	4.8		3.35		26		77		47.1		70		85.5		66.4		32.3		40.9		33.5	
Vinyl chloride	µg/L	2	< 0.32	U	< 0.5	U			< 3	U	< 0.24	U	< 1	U	< 0.32	U	< 0.25	U	< 0.25	U	< 0.5	U	< 0.5	U

Notes:

Blue Highlighting Indicates concentrations above the MCL/PCL.

Some samples may have been diluted due to the concentration(s) of one or more analytes exceeding the upper limit of the calibration curve.

µg/L - micrograms per liter

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

U - Undetected: The analyte was analyzed for, but not detected.

MCL - Maximum Contaminant Limit

mg/L - milligrams per liter

PCL - Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level

Val Qual - validation qualifier

Table 2-5
COC Concentrations

Location Code			LHSMW19																					
Sample ID			LHSMW19-071614		LHSMW19-111814		LHSMW19-020415		LHSMW19-050615		LHSMW19-080515		LHSMW19-020116		LHSMW19-080316		LHSMW19-022018		LHSMW19-180828		LHSMW19-190220		LHSMW19-190812	
Sample Date			7/16/2014		11/18/2014		2/4/2015		5/6/2015		8/5/2015		2/1/2016		8/3/2016		2/20/2018		8/28/2018		2/20/2019		8/12/2019	
Location Description			Site 46 - Central, within site boundary. Shallow Zone.																					
Analyte	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
cis-1,2-Dichloroethene	µg/L	70	1.52		1.59		1.9		0.944	J	2.3		1.92		0.967	J	< 0.5	U	1.7		3.9		4.2	
Trichloroethene	µg/L	5	28.6		31.2		31.3		13.4		26.2		24.2		8.53		2.4		8.8		16		13	
Vinyl chloride	µg/L	2	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U

Notes:

Blue Highlighting Indicates concentrations above the MCL/PCL.

Some samples may have been diluted due to the concentration(s) of one or more analytes exceeding the upper limit of the calibration curve.

µg/L - micrograms per liter

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

U - Undetected: The analyte was analyzed for, but not detected.

MCL - Maximum Contaminant Limit

mg/L - milligrams per liter

PCL - Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level

Val Qual - validation qualifier

Table 2-5
COC Concentrations

Location Code			LHSMW19				LHSMW20								LHSMW21									
Sample ID			LHSMW19-200219		LHSMW19-210318		LHSMW20-960207		LHSMW20-960815		LHSMW20-980515		LHSMW20-102708		LHSMW21-960207		LHSMW21-960815		LHSMW21-980515		LHSMW21-092513		LHSMW21-190225	
Sample Date			2/19/2020		3/18/2021		2/7/1996		8/15/1996		5/15/1998		10/27/2008		2/7/1996		8/15/1996		5/15/1998		9/25/2013		2/25/2019	
Location Description			Site 46 - Central, within site boundary. Shallow Zone.				Site 46 - N, inside site boundary. Shallow Zone.								Site 46 - NE, inside site boundary. Shallow Zone.									
Analyte	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
cis-1,2-Dichloroethene	µg/L	70	5.6		3.9		< 1	U	< 0.2	U	< 1	U	< 0.25	U	< 1	U	< 0.2	U	< 1	U	30.6		100	
Trichloroethene	µg/L	5	19		13		< 1	U	< 0.25	U	< 1	U	< 0.25	U	< 1	U	< 0.25	U	< 1	U	1.64		20	
Vinyl chloride	µg/L	2	< 0.5	U	< 0.5	U	< 1	U	< 0.24	U	< 1	U	< 0.25	U	< 1	U	< 0.24	U	< 1	U	1.44		< 0.5	U

Notes:

Blue Highlighting Indicates concentrations above the MCL/PCL.

Some samples may have been diluted due to the concentration(s) of one or more analytes exceeding the upper limit of the calibration curve.

µg/L - micrograms per liter

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

U - Undetected: The analyte was analyzed for, but not detected.

MCL - Maximum Contaminant Limit

mg/L - milligrams per liter

PCL - Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level

Val Qual - validation qualifier

Table 2-5
COC Concentrations

Location Code			LHSMW21						LHSMW22								LHSMW23							
Sample ID			LHSMW21-190813		LHSMW21-200213		LHSMW21-210316		LHSMW22-960207		LHSMW22-960815		LHSMW22-980515		LHSMW22-FEB2007		LHSMW23-941204		LHSMW23-941204FD		LHSMW23-960206		LHSMW23-960815	
Sample Date			8/13/2019		2/13/2020		3/16/2021 & 4/29/2021		2/7/1996		8/15/1996		5/15/1998		2/19/2007		12/4/1994		12/4/1994		2/6/1996		8/15/1996	
Location Description			Site 46 - NE, inside site boundary. Shallow Zone.						Site 46 - Central, inside site boundary. Shallow Zone.								Site 46 - SE, inside site boundary. Intermediate Zone.							
Analyte	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
cis-1,2-Dichloroethene	µg/L	70	170		170		130		< 1	U	0.54		1.1		< 0.83	U					< 1	U	< 0.2	U
Trichloroethene	µg/L	5	41		36		33		1		1.7		3.1		< 0.63	U	< 5	U	< 5	U	< 1	U	< 0.25	U
Vinyl chloride	µg/L	2	0.97	J	2.4		3.7		< 1	U	< 0.24	U	< 1	U	< 0.32	U					< 1	U	< 0.24	U

Notes:

Blue Highlighting Indicates concentrations above the MCL/PCL.

Some samples may have been diluted due to the concentration(s) of one or more analytes exceeding the upper limit of the calibration curve.

µg/L - micrograms per liter

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

U - Undetected: The analyte was analyzed for, but not detected.

MCL - Maximum Contaminant Limit

mg/L - milligrams per liter

PCL - Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level

Val Qual - validation qualifier

Table 2-5
COC Concentrations

Location Code			LHSMW23						LHSMW23R						LHSMW24							
Sample ID			LHSMW23-980515		LHSMW23-FEB2007		LHSMW23-102808		LHSMW23R-190903		LHSMW23R-200219		LHSMW25-210315		LHSMW24-941204		LHSMW24-960207		LHSMW24-960820		LHSMW24-980515	
Sample Date			5/15/1998		2/19/2007		10/28/2008		9/3/2019		2/19/20		3/15/2021		12/4/1994		2/7/1996		8/20/1996		5/15/1998	
Location Description			Site 46 - SE, inside site boundary. Intermediate Zone.						Site 46 - East, Within Site Boundary, Intermediate Zone.						Site 46 - E, outside of site boundary. Shallow Zone.							
Analyte	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
cis-1,2-Dichloroethene	µg/L	70	< 1	U	< 0.83	U	0.614	J	0.5	U	0.71	J	< 0.5	U			< 1	U	< 0.2	U	< 1	U
Trichloroethene	µg/L	5	1.3		1.4	J	2.51		0.5	U	0.65	J	< 0.5	U	< 5	U	< 1	U	< 0.25	U	< 1	U
Vinyl chloride	µg/L	2	< 1	U	< 0.32	U	0.412	J,H	0.5	U	< 0.5	U	< 0.5	U			< 1	U	< 0.24	U	< 1	U

Notes:

Blue Highlighting Indicates concentrations above the MCL/PCL.

Some samples may have been diluted due to the concentration(s) of one or more analytes exceeding the upper limit of the calibration curve.

µg/L - micrograms per liter

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

U - Undetected: The analyte was analyzed for, but not detected.

MCL - Maximum Contaminant Limit

mg/L - milligrams per liter

PCL - Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level

Val Qual - validation qualifier

Table 2-5
COC Concentrations

Location Code			LHSMW25																					
Sample ID			LHSMW25-941204		LHSMW25-960207		LHSMW25-960820		LHSMW25-980515		LHSMW25-102808		LHSMW25-102808-QA		LHSMW25-052513		LHSMW25-092513		LHSMW25-092513-FD		LHSMW25-012514		LHSMW25-071814	
Sample Date			12/4/1994		2/7/1996		8/20/1996		5/15/1998		10/28/2008		10/28/2008		5/25/2013		9/25/2013		9/25/2013		1/25/2014		7/18/2014	
Location Description			Site 46 - E, within site boundary. Intermediate zone.																					
Analyte	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
cis-1,2-Dichloroethene	µg/L	70			< 1	U	< 0.2	U	< 1	U	< 0.25	U	< 0.25	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Trichloroethene	µg/L	5	< 5	U	< 1	U	< 0.25	U	< 1	U	< 0.25	U	< 0.25	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Vinyl chloride	µg/L	2			< 1	U	< 0.24	U	< 1	U	< 0.25	UJ,H	< 0.25	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U

Notes:

Blue Highlighting Indicates concentrations above the MCL/PCL.

Some samples may have been diluted due to the concentration(s) of one or more analytes exceeding the upper limit of the calibration curve.

µg/L - micrograms per liter

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

U - Undetected: The analyte was analyzed for, but not detected.

MCL - Maximum Contaminant Limit

mg/L - milligrams per liter

PCL - Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level

Val Qual - validation qualifier

Table 2-5
COC Concentrations

Location Code			LHSMW25																			
Sample ID			LHSMW25-112014		LHSMW25-020615		LHSMW25-050115		LHSMW25-080415		LHSMW25FD-080415		LHSMW25-020216		LHSMW25FD-020216		LHSMW25-080416		LHSMW25-022218		LHSMW25-180827		LHSMW25-190225	
Sample Date			11/20/2014		2/6/2015		5/1/2015		8/4/2015		8/4/2015		2/2/2016		2/2/2016		8/4/2016		2/22/2018		8/27/2018		2/25/2019	
Location Description			Site 46 - E, within site boundary. Intermediate zone.																					
Analyte	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
cis-1,2-Dichloroethene	µg/L	70	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Trichloroethene	µg/L	5	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Vinyl chloride	µg/L	2	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U

Notes:

Blue Highlighting Indicates concentrations above the MCL/PCL.

Some samples may have been diluted due to the concentration(s) of one or more analytes exceeding the upper limit of the calibration curve.

µg/L - micrograms per liter

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

U - Undetected: The analyte was analyzed for, but not detected.

MCL - Maximum Contaminant Limit

mg/L - milligrams per liter

PCL - Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level

Val Qual - validation qualifier

Table 2-5
COC Concentrations

Location Code			LHSMW25						LHSMW27					
Sample ID			LHSMW25-190812		LHSMW25-200219		LHSMW25-210315		LHSMW27-960208		LHSMW27-960820		LHSMW27-980515	
Sample Date			8/12/2019		2/19/2020		3/15/2021		2/8/1996		8/20/1996		5/15/1998	
Location Description			Site 46 - E, within site boundary. Intermediate zone.						Site 46 - SE, outside of site boundary. Shallow Zone.					
Analyte	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
cis-1,2-Dichloroethene	µg/L	70	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 0.2	U	< 1	U
Trichloroethene	µg/L	5	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 0.25	U	< 1	U
Vinyl chloride	µg/L	2	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 0.24	U	< 1	U

Notes:

Blue Highlighting Indicates concentrations above the MCL/PCL.

Some samples may have been diluted due to the concentration(s) of one or more analytes exceeding the upper limit of the calibration curve.

µg/L - micrograms per liter

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

U - Undetected: The analyte was analyzed for, but not detected.

MCL - Maximum Contaminant Limit

mg/L - milligrams per liter

PCL - Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level

Val Qual - validation qualifier

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Table 3-1
Mann-Kendall Trend Summary

Monitoring Well	Groundwater Zone	Statistical TCE Trend	Statistical 1,2-DCE Trend	Statistical VC Trend	Confidence Factor
46WW11	Shallow	Decreasing	NA	NA	> 99.9%
LHSMW19	Shallow	Decreasing	NA	NA	99.9%
LHSMW21	Shallow	Increasing	Increasing	Increasing	98.9%, 99.3%, 99.6%
46WW02	Intermediate	Decreasing	NA	NA	99.5%
46WW05	Intermediate	Decreasing	NA	NA	> 99.9%

Notes:

> greater than

DCE - dichloroethene

MCL - Maximum Contaminant Level

NA - Trend not calculated because chemical was not detected above the MCL

TCE - trichloroethene

VC - vinyl chloride

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Table 2-5
Historical COC Concentrations, LHAAP-50

	Sample ID	50SW06-021715		50SW06-052215		50SW06-111315		50WW01-031314		50WW01-052715		50WW01-082015		50WW01-051216		50WW02-980930		50WW02-981022		50WW02-000524	
	Sample Date	2/17/2015		5/22/2015		11/13/2015		3/13/2014		5/27/2015		8/20/2015		5/12/2016		9/30/1998		10/22/1998		5/24/2000	
	Well Completion Zone	Surface Water		Surface Water		Surface Water		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow	
Analyte	Units	MCL/PCL [a]	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Perchlorate	µg/L	17	0.684		0.218	J	1.44	J	<0.2	U	<0.2	U	<0.2	U	0.2	U	NA		18,000		4,190	
1,1-Dichloroethene	µg/L	7	<1	U	<1	U	<1	U	<1	U	<1	U	<1	U	1	U	50		NA		<350	U
1,2-Dichloroethane	µg/L	5	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	0.5	U	98		NA		<350	U
cis-1,2-Dichloroethene	µg/L	70	<0.5	U	<0.5	U	<0.5	U	<0.5	U	0.372	J	0.41	J	0.67	J	2,100		NA		3,100	
Tetrachloroethene	µg/L	5	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	0.5	U	35		NA		<350	U
Trichloroethene	µg/L	5	<0.5	U	<0.5	U	<0.5	U	<0.5	U	0.685	J	0.543	J	0.81	J	2,900		NA		18,000	
Vinyl Chloride	µg/L	2	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	0.5	U	100		NA		<350	U

Notes:

Blue Highlighting indicates analyte detected above MCL/PCL.

[a] Cleanup goal is MCL except for perchlorate. For perchlorate, Texas Risk Reduction Program groundwater residential PCL is used.

[b] Only limited data validation possible; Not used in plume delineation.

µg/L - micrograms per liter

J - estimated value; analyte concentration was less than the limit of quantification.

U - Not detected. The analyte was analyzed for, but not detected above the limit of detection.

COC - contaminants of concern

ID - identifier

MCL - maximum contaminant level

NA - not analyzed

PCL - Texas residential groundwater protective concentration level

Val Qual - validation qualifier

Table 2-5
Historical COC Concentrations, LHAAP-50

Sample ID			50WW02-001003		50WW02-010209		50WW02-020311		50WW02-020921		50WW02-040830		50WW02-050511		50WW02-FEB2007		50WW02-040309		50WW03-980930		50WW03-000522	
Sample Date			10/3/2000		2/9/2001		3/11/2002		9/21/2002		8/30/2004		5/11/2005		2/23/2007		4/3/2009		9/30/1998		5/22/2000	
Well Completion Zone			Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow	
Analyte	Units	MCL/PCL [a]	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Perchlorate	µg/L	17	9,950		10,000		6,840		7,600		2,500		1,630		532		110		NA		810	
1,1-Dichloroethene	µg/L	7	<200	U	NA		NA		NA		20		4.81		6.5		<50	U	<1	U	NA	
1,2-Dichloroethane	µg/L	5	79		NA		NA		NA		58		20.2		18.8		18	J	<1	U	NA	
cis-1,2-Dichloroethene	µg/L	70	4,060		NA		NA		NA		1,800	J	954		855		978		<1	U	NA	
Tetrachloroethene	µg/L	5	<200	U	NA		NA		NA		28		6.87		9.3		<50	U	<1	U	NA	
Trichloroethene	µg/L	5	16,100		NA		NA		NA		9,200	J	4,840		5,420		8,050		0.57		NA	
Vinyl Chloride	µg/L	2	<200	U	NA		NA		NA		36		8.56		15.2		<50	U	<1	U	NA	

Notes:

Blue Highlighting indicates analyte detected above MCL/PCL.

[a] Cleanup goal is MCL except for perchlorate. For perchlorate, Texas Risk Reduction Program groundwater residential PCL is used.

[b] Only limited data validation possible; Not used in plume delineation.

µg/L - micrograms per liter

J - estimated value; analyte concentration was less than the limit of quantification.

U - Not detected. The analyte was analyzed for, but not detected above the limit of detection.

COC - contaminants of concern

ID - identifier

MCL - maximum contaminant level

NA - not analyzed

PCL - Texas residential groundwater protective concentration level

Val Qual - validation qualifier

Table 2-5
Historical COC Concentrations, LHAAP-50

Sample ID			50WW03-001002		50WW03-010209		50WW03-020312		50WW03-020921		50WW03-040830		50WW03-050511		50WW03-FEB2007		50WW04-980930		50WW04-981022		50WW04-000522	
Sample Date			10/2/2000		2/9/2001		3/12/2002		9/21/2002		8/30/2004		5/11/2005		2/24/2007		9/30/1998		10/22/1998		5/22/2000	
Well Completion Zone			Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow	
Analyte	Units	MCL/PCL [a]	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Perchlorate	µg/L	17	<8	U	<1.4	U	<4	U	<4	U	<1	U	<4	U	<10	U	NA		<1	U	<1	U
1,1-Dichloroethene	µg/L	7	NA		NA		NA		NA		<5	U	<1	U	<2	U	<1	U	NA		NA	
1,2-Dichloroethane	µg/L	5	NA		NA		NA		NA		<5	U	<1	U	<2	U	<1	U	NA		NA	
cis-1,2-Dichloroethene	µg/L	70	NA		NA		NA		NA		<5	U	<1	U	<2	U	0.64		NA		NA	
Tetrachloroethene	µg/L	5	NA		NA		NA		NA		<5	U	<1	U	<2	U	<1	U	NA		NA	
Trichloroethene	µg/L	5	NA		NA		NA		NA		8		<1	U	<2	U	9.4		NA		NA	
Vinyl Chloride	µg/L	2	NA		NA		NA		NA		<5	U	<1	U	<2	U	<1	U	NA		NA	

Notes:

Blue Highlighting indicates analyte detected above MCL/PCL.

[a] Cleanup goal is MCL except for perchlorate. For perchlorate, Texas Risk Reduction Program groundwater residential PCL is used.

[b] Only limited data validation possible; Not used in plume delineation.

µg/L - micrograms per liter

J - estimated value; analyte concentration was less than the limit of quantification.

U - Not detected. The analyte was analyzed for, but not detected above the limit of detection.

COC - contaminants of concern

ID - identifier

MCL - maximum contaminant level

NA - not analyzed

PCL - Texas residential groundwater protective concentration level

Val Qual - validation qualifier

Table 2-5
Historical COC Concentrations, LHAAP-50

Sample ID			50WW04-001002		50WW04-020312		50WW04-020921		50WW04-040831		50WW04-050510		50WW05-020921		50WW05-050511		50WW05-FEB2007		50WW05-040409		50WW05-100805	
Sample Date			10/2/2000		3/12/2002		9/21/2002		8/31/2004		5/10/2005		9/21/2002		5/11/2005		2/23/2007		4/4/2009		8/5/2010	
Well Completion Zone			Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow	
Analyte	Units	MCL/PCL [a]	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Perchlorate	µg/L	17	<16	U	<4	U	<4	U	<1	U	<5	U	5850		719		27.8		<4	U	0.189	J
1,1-Dichloroethene	µg/L	7	NA		NA		NA		<5	U	<1	U	NA		21.6		12.9		4.61	J	5.73	
1,2-Dichloroethane	µg/L	5	NA		NA		NA		<5	U	<1	U	NA		24.1		13.5		7.39		7.91	
cis-1,2-Dichloroethene	µg/L	70	NA		NA		NA		<5	U	<1	U	NA		66.3		48.2		29		30.1	
Tetrachloroethene	µg/L	5	NA		NA		NA		<5	U	<1	U	NA		6.76		5.1		1.61	J	2.64	J
Trichloroethene	µg/L	5	NA		NA		NA		2	J	<1	U	NA		3,130		1,460		601		788	
Vinyl Chloride	µg/L	2	NA		NA		NA		<5	U	<1	U	NA		3.69		2.5		<5	U	1.48	J

Notes:

Blue Highlighting indicates analyte detected above MCL/PCL.

[a] Cleanup goal is MCL except for perchlorate. For perchlorate, Texas Risk Reduction Program groundwater residential PCL is used.

[b] Only limited data validation possible; Not used in plume delineation.

µg/L - micrograms per liter

J - estimated value; analyte concentration was less than the limit of quantification.

U - Not detected. The analyte was analyzed for, but not detected above the limit of detection.

COC - contaminants of concern

ID - identifier

MCL - maximum contaminant level

NA - not analyzed

PCL - Texas residential groundwater protective concentration level

Val Qual - validation qualifier

Table 2-5
Historical COC Concentrations, LHAAP-50

Sample ID			50WW05-110613		50WW05-031714		50WW05-062014		50WW05-111114		50WW05-021315		50WW05FD-021315		50WW05-052615		50WW05-081915		50WW05FD-081915		50WW05-111315	
Sample Date			11/6/2013		3/17/2014		6/20/2014		11/11/2014		2/13/2015		2/13/2015		5/26/2015		8/19/2015		8/19/2015		11/13/2015	
Well Completion Zone			Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow	
Analyte	Units	MCL/PCL [a]	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Perchlorate	µg/L	17	0.397	J	<0.2	U	20.5		<0.2	U	<0.2	U	<0.2	U	<0.2	U	1.69		1.64		0.7	J
1,1-Dichloroethene	µg/L	7	2.57		2.12		2.67		2.68		1.76	J	1.91	J	1.77	J	2.02		2.08		1.42	J
1,2-Dichloroethane	µg/L	5	2.81		2.54		2.82		2.97		1.58		1.62		1.9		1.6		1.66		1.93	
cis-1,2-Dichloroethene	µg/L	70	12.4		10.5		12.6		15.7		11.7		12.6		9.81		29.1		28.1		17.2	
Tetrachloroethene	µg/L	5	1.54		1.01		1.48		1.6		0.963	J	0.888	J	0.86	J	0.787	J	0.651	J	0.848	J
Trichloroethene	µg/L	5	280		204		270		329		193		196		197		200		200		210	
Vinyl Chloride	µg/L	2	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U

Notes:

Blue Highlighting indicates analyte detected above MCL/PCL.

[a] Cleanup goal is MCL except for perchlorate. For perchlorate, Texas Risk Reduction Program groundwater residential PCL is used.

[b] Only limited data validation possible; Not used in plume delineation.

µg/L - micrograms per liter

J - estimated value; analyte concentration was less than the limit of quantification.

U - Not detected. The analyte was analyzed for, but not detected above the limit of detection.

COC - contaminants of concern

ID - identifier

MCL - maximum contaminant level

NA - not analyzed

PCL - Texas residential groundwater protective concentration level

Val Qual - validation qualifier

Table 2-5
Historical COC Concentrations, LHAAP-50

Sample ID			50WW05-051116		50WW05-110316		50WW05-111017		[illegible] FD		50WW05-180515		50WW05-181203		50WW05-190507		50WW05-191108		50WW06-040830		50WW06-050511	
Sample Date			5/11/2016		11/03/2016		11/10/2017		11/10/2017		5/15/2018		12/3/2018		5/7/2019		11/8/2019		8/30/2004		5/11/2005	
Well Completion Zone			Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Lower Shallow		Lower Shallow	
Analyte	Units	MCL/PCL [a]	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Perchlorate	µg/L	17	1.67	J	0.2	U	4	U	4	U	2	U	< 4	U	< 4	U	< 2	U	6.7		24.8	
1,1-Dichloroethene	µg/L	7	1.33		1.78	J	1.5		1.4		1.9		1.2		1.2		4.8		<5	U	<1	U
1,2-Dichloroethane	µg/L	5	27.2		1.56		1.3		1.3		1.5		1.2		0.94	J	2.7		<5	U	<1	U
cis-1,2-Dichloroethene	µg/L	70	0.565	J	66.7		16	J	13	J	44		18		28		200		<5	U	0.332	J
Tetrachloroethene	µg/L	5	0.5	U	0.637	J	0.91	J	0.83	J	0.5	U	0.86	J	< 0.5	U	1.2		<5	U	<1	U
Trichloroethene	µg/L	5	129		184		180		160		170		150		110		290		15		4.7	
Vinyl Chloride	µg/L	2	0.5	U	0.5	U	1	U	1	U	0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	<5	U	<1	U

Notes:

Blue Highlighting indicates analyte detected above MCL/PCL.

[a] Cleanup goal is MCL except for perchlorate. For perchlorate, Texas Risk Reduction Program groundwater residential PCL is used.

[b] Only limited data validation possible; Not used in plume delineation.

µg/L - micrograms per liter

J - estimated value; analyte concentration was less than the limit of quantification.

U - Not detected. The analyte was analyzed for, but not detected above the limit of detection.

COC - contaminants of concern

ID - identifier

MCL - maximum contaminant level

NA - not analyzed

PCL - Texas residential groundwater protective concentration level

Val Qual - validation qualifier

Table 2-5
Historical COC Concentrations, LHAAP-50

Sample ID			50WW06-FEB2007		50WW06-100807		50WW06-100807-FD		50WW06-102813		50WW06-031114		50WW06-062514		50WW06-110414		50WW06-021715		50WW06-052015		50WW06-081815	
Sample Date			2/22/2007		8/7/2010		8/7/2010		10/28/2013		3/11/2014		6/25/2014		11/4/2014		2/17/2015		5/20/2015		8/18/2015	
Well Completion Zone			Lower Shallow		Lower Shallow		Lower Shallow		Lower Shallow		Lower Shallow		Lower Shallow		Lower Shallow		Lower Shallow		Lower Shallow		Lower Shallow	
Analyte	Units	MCL/PCL [a]	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Perchlorate	µg/L	17	<10	U	113		131		670		2,090		700		1,510		2,490		3,000		2,050	
1,1-Dichloroethene	µg/L	7	<2	U	<1	U	<1	U	<1	U	<1	U	<1	U	<1	U	<1	U	<1	U	<1	U
1,2-Dichloroethane	µg/L	5	<2	U	<1	U	<1	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U
cis-1,2-Dichloroethene	µg/L	70	<2	U	<1	U	<1	U	0.994	J	0.39	J	0.299	J	1.61		0.572	J	0.637	J	0.874	J
Tetrachloroethene	µg/L	5	<2	U	<1	U	<1	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U
Trichloroethene	µg/L	5	2		3.33		3.28		20.9		36.5		27.4		36.1		53.9		49.1		34.7	
Vinyl Chloride	µg/L	2	<2	U	<1	U	<1	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U

Notes:

Blue Highlighting indicates analyte detected above MCL/PCL.

[a] Cleanup goal is MCL except for perchlorate. For perchlorate, Texas Risk Reduction Program groundwater residential PCL is used.

[b] Only limited data validation possible; Not used in plume delineation.

µg/L - micrograms per liter

J - estimated value; analyte concentration was less than the limit of quantification.

U - Not detected. The analyte was analyzed for, but not detected above the limit of detection.

COC - contaminants of concern

ID - identifier

MCL - maximum contaminant level

NA - not analyzed

PCL - Texas residential groundwater protective concentration level

Val Qual - validation qualifier

Table 2-5
Historical COC Concentrations, LHAAP-50

	Sample ID	50WW06-111215		50WW06-051016		50WW06-110116		50WW06-111317		50WW06-180508		50WW06-181129		50WW06-190506		50WW06-191112		50WW07-021908		50WW07-040409	
	Sample Date	11/12/2015		5/10/2016		11/1/2016		11/13/2017		5/8/2018		11/29/2018		5/6/2019		11/12/2019		2/19/2008		4/4/2009	
	Well Completion Zone	Lower Shallow		Lower Shallow		Lower Shallow		Lower Shallow		Lower Shallow		Lower Shallow		Lower Shallow				Upper Shallow		Upper Shallow	
Analyte	Units	MCL/PCL [a]	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Perchlorate	µg/L	17	5,860		2,140		5,240		950		220		24		4.3		4,300		NA		<4	U
1,1-Dichloroethene	µg/L	7	<1	U	1	U	1	U	1	U	0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	<1	U	<1	U
1,2-Dichloroethane	µg/L	5	0.25	J	0.5	U	0.5	U	1	U	0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	<1	U	<1	U
cis-1,2-Dichloroethene	µg/L	70	1.04		0.388	J	2.37		1.9		0.5	U	< 0.5	U	< 0.5	U	1.2		<1	U	<1	U
Tetrachloroethene	µg/L	5	<0.5	U	0.5	U	0.5	U	1	U	0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	<1	U	<1	U
Trichloroethene	µg/L	5	59.4		29.5		54.2		13		14		14		1.4		41		<1	U	<1	U
Vinyl Chloride	µg/L	2	<0.5	U	0.5	U	0.5	U	1	U	0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	<1	U	<1	U

Notes:

Blue Highlighting indicates analyte detected above MCL/PCL.

[a] Cleanup goal is MCL except for perchlorate. For perchlorate, Texas Risk Reduction Program groundwater residential PCL is used.

[b] Only limited data validation possible; Not used in plume delineation.

µg/L - micrograms per liter

J - estimated value; analyte concentration was less than the limit of quantification.

U - Not detected. The analyte was analyzed for, but not detected above the limit of detection.

COC - contaminants of concern

ID - identifier

MCL - maximum contaminant level

NA - not analyzed

PCL - Texas residential groundwater protective concentration level

Val Qual - validation qualifier

Table 2-5
Historical COC Concentrations, LHAAP-50

Sample ID			50WW07-100807		50WW07-110513		50WW07-032514		50WW07-062014		50WW07-110714		50WW07-021315		50WW07-052615		50WW07-082115		50WW07-110915		50WW07-051116	
Sample Date			8/7/2010		11/5/2013		3/25/2014		6/20/2014		11/7/2014		2/13/2015		5/26/2015		8/21/2015		11/9/2015		5/11/16	
Well Completion Zone			Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow	
Analyte	Units	MCL/PCL [a]	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Perchlorate	µg/L	17	0.262		<0.2	U	<0.2	U	<0.2	U	<0.2	U	<0.2	U	<0.2	U	<0.2	U	<1	U	1.08	
1,1-Dichloroethene	µg/L	7	<1	U	<1	U	<1	U	<1	U	<1	U	<1	U	<1	U	<1	U	<1	U	1	U
1,2-Dichloroethane	µg/L	5	<1	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	0.5	U
cis-1,2-Dichloroethene	µg/L	70	<1	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	0.5	U
Tetrachloroethene	µg/L	5	<1	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	0.5	U
Trichloroethene	µg/L	5	<1	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	0.42	J	<0.5	U	<0.5	U	0.5	U
Vinyl Chloride	µg/L	2	<1	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	0.5	U

Notes:

Blue Highlighting indicates analyte detected above MCL/PCL.

[a] Cleanup goal is MCL except for perchlorate. For perchlorate, Texas Risk Reduction Program groundwater residential PCL is used.

[b] Only limited data validation possible; Not used in plume delineation.

µg/L - micrograms per liter

J - estimated value; analyte concentration was less than the limit of quantification.

U - Not detected. The analyte was analyzed for, but not detected above the limit of detection.

COC - contaminants of concern

ID - identifier

MCL - maximum contaminant level

NA - not analyzed

PCL - Texas residential groundwater protective concentration level

Val Qual - validation qualifier

Table 2-5
Historical COC Concentrations, LHAAP-50

Sample ID			50WW08-103013 [b]		50WW08-031114		50WW08-062414		50WW08-110614		50WW08-021715		50WW08-052115		50WW08-081715		50WW08-111615		50WW08-050316		50WW08-110216	
Sample Date			10/30/2013		3/11/2014		6/24/2014		11/6/2014		2/17/2015		5/21/2015		8/17/2015		11/16/2015		5/3/2016		11/2/2016	
Well Completion Zone			Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow	
Analyte	Units	MCL/PCL [a]	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Perchlorate	µg/L	17	6,404		91.5		132		56.3		99		200		157		32.4	J	146		126	
1,1-Dichloroethene	µg/L	7	<5	U	1.71	J	<5	U	<2.5	U	<2.5	U	<2.5	U	<2.5	U	<1	U	0.812	J	2.5	U
1,2-Dichloroethane	µg/L	5	<5	U	5.73		4.36	J	2.12	J	3.59		3.6		2.63		1.26		3.23		2.41	J
cis-1,2-Dichloroethene	µg/L	70	30.6		103		86		48.5		70.5		62.1		45.4		17.7		48.1		38	
Tetrachloroethene	µg/L	5	<5	U	2.15		2.03	J	1.9	J	2.55		2	J	1.2	J	1.21		1.66		1.11	J
Trichloroethene	µg/L	5	247		845		814		685		852		712		375		288		383		379	
Vinyl Chloride	µg/L	2	<2	U	0.517	J	<2.5	U	<1.25	U	<1.25	U	<1.25	U	<1.25	U	<0.5	U	0.374	J	1.25	U

Notes:

Blue Highlighting indicates analyte detected above MCL/PCL.

[a] Cleanup goal is MCL except for perchlorate. For perchlorate, Texas Risk Reduction Program groundwater residential PCL is used.

[b] Only limited data validation possible; Not used in plume delineation.

µg/L - micrograms per liter

J - estimated value; analyte concentration was less than the limit of quantification.

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ID - identifier

MCL - maximum contaminant level

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Val Qual - validation qualifier

Table 2-5
Historical COC Concentrations, LHAAP-50

Sample ID			50WW08-111317		50WW08-111317-FD		50WW08-180508		50WW08-181128		50WW08-190507		50WW08-191112		50WW09-110113		50WW09-031414		50WW09-061914		50WW09-111214	
Sample Date			11/13/2017		11/13/2017		5/8/2018		11/28/2018		5/7/2019		11/12/2019		11/1/2013		3/14/2014		6/19/2014		11/12/2014	
Well Completion Zone			Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Lower Shallow		Lower Shallow		Lower Shallow		Lower Shallow	
Analyte	Units	MCL/PCL [a]	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Perchlorate	µg/L	17	27		25		140		51		230		83		<0.2	U	<0.2	U	<0.2	U	0.593	
1,1-Dichloroethene	µg/L	7	1	U	1	U	0.5	U	0.62	J	< 0.5	U	1.2		<1	U	<1	U	<1	U	<1	U
1,2-Dichloroethane	µg/L	5	0.98	J	1.2	J	1.6		1.5		2.1		2.2		<0.5	U	<0.5	U	<0.5	U	<0.5	U
cis-1,2-Dichloroethene	µg/L	70	19		23		15		20		20		39		<0.5	U	0.579	J	1.16		0.36	J
Tetrachloroethene	µg/L	5	1		1.1		0.5	U	1.1		0.75	J	1.3		<0.5	U	<0.5	U	<0.5	U	<0.5	U
Trichloroethene	µg/L	5	180	J	240	J	130		240	J	210		420		0.26	J	20.2		36.3		19.8	
Vinyl Chloride	µg/L	2	1	U	1	U	0.5	U	0.66	J	< 0.5	U	< 0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U

Notes:

Blue Highlighting indicates analyte detected above MCL/PCL.

[a] Cleanup goal is MCL except for perchlorate. For perchlorate, Texas Risk Reduction Program groundwater residential PCL is used.

[b] Only limited data validation possible; Not used in plume delineation.

µg/L - micrograms per liter

J - estimated value; analyte concentration was less than the limit of quantification.

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COC - contaminants of concern

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MCL - maximum contaminant level

NA - not analyzed

PCL - Texas residential groundwater protective concentration level

Val Qual - validation qualifier

Table 2-5
Historical COC Concentrations, LHAAP-50

Sample ID			50WW09-021315		50WW09-052315		50WW09-082115		50WW09FD-082115		50WW09-111115		50WW09FD-111115		50WW09-051216		50WW09-110316		50WW09-111017		50WW09-180515	
Sample Date			2/13/2015		5/23/2015		8/21/2015		8/21/2015		11/11/2015		11/11/2015		5/12/2016		11/3/2016		11/10/2017		5/15/2018	
Well Completion Zone			Lower Shallow		Lower Shallow		Lower Shallow		Lower Shallow		Lower Shallow		Lower Shallow		Lower Shallow		Lower Shallow		Lower Shallow		Lower Shallow	
Analyte	Units	MCL/PCL [a]	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Perchlorate	µg/L	17	<0.2	U	0.196	J	<0.2	U	<0.2	U	<1	U	<1	U	0.2	U	0.2	U	4	U	2.7	J
1,1-Dichloroethene	µg/L	7	<1	U	<1	U	<1	U	<1	U	<1	U	<1	U	1	U	1	U	1	U	0.5	U
1,2-Dichloroethane	µg/L	5	<0.5	U	1.11		1.66		1.83		1.09		1.05		0.688	J	0.519	J	1	U	0.5	U
cis-1,2-Dichloroethene	µg/L	70	1.04		19.7		29.4		29.5		16.3		16		15.1		10.8		1	U	2.4	
Tetrachloroethene	µg/L	5	0.353	J	0.423	J	0.536	J	0.34	J	0.404	J	0.393	J	0.452	J	0.344	J	1	U	0.5	U
Trichloroethene	µg/L	5	57	J	202		235		228		173		170		154		126		4.9		83	
Vinyl Chloride	µg/L	2	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	0.5	U	0.5	U	1	U	0.5	U

Notes:

Blue Highlighting indicates analyte detected above MCL/PCL.

[a] Cleanup goal is MCL except for perchlorate. For perchlorate, Texas Risk Reduction Program groundwater residential PCL is used.

[b] Only limited data validation possible; Not used in plume delineation.

µg/L - micrograms per liter

J - estimated value; analyte concentration was less than the limit of quantification.

U - Not detected. The analyte was analyzed for, but not detected above the limit of detection.

COC - contaminants of concern

ID - identifier

MCL - maximum contaminant level

NA - not analyzed

PCL - Texas residential groundwater protective concentration level

Val Qual - validation qualifier

Table 2-5
Historical COC Concentrations, LHAAP-50

Sample ID			50WW09-180515FD		50WW09-181203		50WW09-190507		50WW09-190507-FD		50WW09-191111		50WW10-110513		50WW10FD-110513		50WW10-031414		50WW10-061914		50WW10FD-061914	
Sample Date			5/15/2018		12/3/2018		5/7/2019		5/7/2019		11/11/2019		11/5/2013		11/5/2013		3/14/2014		6/19/2014		6/19/2014	
Well Completion Zone			Lower Shallow		Lower Shallow		Lower Shallow		Lower Shallow		Lower Shallow		Intermediate		Intermediate		Intermediate		Intermediate		Intermediate	
Analyte	Units	MCL/PCL [a]	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Perchlorate	µg/L	17	2.8	J	< 4	U	7.2		7.8		6.6		0.906		0.924		0.272	J	0.499		1.46	
1,1-Dichloroethene	µg/L	7	0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	<1	U	<1	U	<1	U	<1	U	<1	U
1,2-Dichloroethane	µg/L	5	0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U
cis-1,2-Dichloroethene	µg/L	70	2.2		7.3		2.2		2.1		4.1		<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U
Tetrachloroethene	µg/L	5	0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U
Trichloroethene	µg/L	5	74		120		16		16		30		<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U
Vinyl Chloride	µg/L	2	0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U

Notes:

Blue Highlighting indicates analyte detected above MCL/PCL.

[a] Cleanup goal is MCL except for perchlorate. For perchlorate, Texas Risk Reduction Program groundwater residential PCL is used.

[b] Only limited data validation possible; Not used in plume delineation.

µg/L - micrograms per liter

J - estimated value; analyte concentration was less than the limit of quantification.

U - Not detected. The analyte was analyzed for, but not detected above the limit of detection.

COC - contaminants of concern

ID - identifier

MCL - maximum contaminant level

NA - not analyzed

PCL - Texas residential groundwater protective concentration level

Val Qual - validation qualifier

Table 2-5
Historical COC Concentrations, LHAAP-50

Sample ID			50WW10-111214		50WW10-021315		50WW10-052315		50WW10-082115		50WW10-111115		50WW10-051216		50WW10-110316		50WW10-111017		50WW10-180515		50WW10-181203	
Sample Date			11/12/2014		2/13/2015		5/23/2015		8/21/2015		11/11/2015		5/12/2016		11/03/2016		11/10/2017		5/15/2018		12/3/2018	
Well Completion Zone			Intermediate		Intermediate		Intermediate		Intermediate		Intermediate		Intermediate		Intermediate		Intermediate		Intermediate		Intermediate	
Analyte	Units	MCL/PCL [a]	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Perchlorate	µg/L	17	<0.2	U	<0.2	U	<0.2	U	<0.2	U	<0.2	U	0.2	U	0.2	U	4	U	2	U	< 4	U
1,1-Dichloroethene	µg/L	7	<1	U	<1	U	<1	U	<1	U	<1	U	1	U	1	U	1	U	0.5	U	< 0.5	U
1,2-Dichloroethane	µg/L	5	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	0.5	U	0.5	U	1	U	0.5	U	< 0.5	U
cis-1,2-Dichloroethene	µg/L	70	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	0.5	U	0.5	U	1	U	0.5	U	< 0.5	U
Tetrachloroethene	µg/L	5	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	0.5	U	0.5	U	1	U	0.5	U	< 0.5	U
Trichloroethene	µg/L	5	<0.5	U	<0.5	U	0.549	J	0.494	J	0.766	J	0.5	U	0.5	U	1	U	0.5	U	< 0.5	U
Vinyl Chloride	µg/L	2	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	0.5	U	0.5	U	1	U	0.5	U	< 0.5	U

Notes:

Blue Highlighting indicates analyte detected above MCL/PCL.

[a] Cleanup goal is MCL except for perchlorate. For perchlorate, Texas Risk Reduction Program groundwater residential PCL is used.

[b] Only limited data validation possible; Not used in plume delineation.

µg/L - micrograms per liter

J - estimated value; analyte concentration was less than the limit of quantification.

U - Not detected. The analyte was analyzed for, but not detected above the limit of detection.

COC - contaminants of concern

ID - identifier

MCL - maximum contaminant level

NA - not analyzed

PCL - Texas residential groundwater protective concentration level

Val Qual - validation qualifier

Table 2-5
Historical COC Concentrations, LHAAP-50

	Sample ID	50WW10-190507		50WW11-102813		50WW11-031314		50WW11-062514		50WW11-110514		50WW11-021715		50WW11-052015		50WW11-081815		50WW11-111215		50WW11-051016	
	Sample Date	5/7/2019		10/28/2013		3/13/2014		6/25/2014		11/5/2014		2/17/2015		5/20/2015		8/18/2015		11/12/2015		5/10/2016	
	Well Completion Zone	Intermediate		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow	
Analyte	Units	MCL/PCL [a]	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Perchlorate	µg/L	17	< 4	U	21,700		2,570		8,910		22,300		2,690		1,140		17,600		22,800		1,300	
1,1-Dichloroethene	µg/L	7	< 0.5	U	17.4		1.88	J	7.35		27.9		2.47	J	1.03	J	13.1		17.5	J	1.5	J
1,2-Dichloroethane	µg/L	5	< 0.5	U	15.2		2.28	J	6.01		24.3		2.42		1.2		16.7		22.9		1.84	
cis-1,2-Dichloroethene	µg/L	70	< 0.5	U	43.9		4.46		12.6		70.8		6.86		2.4		36.3		54.1		5.35	
Tetrachloroethene	µg/L	5	< 0.5	U	2.76		<1.25	U	0.678	J	5.03		0.951	J	0.275	J	2.48		<10	U	0.417	J
Trichloroethene	µg/L	5	< 0.5	U	2,750		362		831		3,550		512		230		1,550		2,670		254	
Vinyl Chloride	µg/L	2	< 0.5	U	1.95		<1.25	U	0.516	J	3.53	J	<1	U	<0.5	U	1.29		<10	U	0.5	U

Notes:

Blue Highlighting indicates analyte detected above MCL/PCL.

[a] Cleanup goal is MCL except for perchlorate. For perchlorate, Texas Risk Reduction Program groundwater residential PCL is used.

[b] Only limited data validation possible; Not used in plume delineation.

µg/L - micrograms per liter

J - estimated value; analyte concentration was less than the limit of quantification.

U - Not detected. The analyte was analyzed for, but not detected above the limit of detection.

COC - contaminants of concern

ID - identifier

MCL - maximum contaminant level

NA - not analyzed

PCL - Texas residential groundwater protective concentration level

Val Qual - validation qualifier

Table 2-5
Historical COC Concentrations, LHAAP-50

Sample ID			50WW11-110116		50WW11-111317		50WW11-180509		50WW11-181128		50WW11-181128-FD		50WW11-190506		50WW11-191112		50WW12-102313		50WW12-031114		50WW12-062614	
Sample Date			11/01/2016		11/13/2017		5/9/2018		11/28/2018		11/28/2018		5/6/2019		11/12/2019		10/23/2013		3/11/2014		6/26/2014	
Well Completion Zone			Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow	
Analyte	Units	MCL/PCL [a]	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Perchlorate	µg/L	17	13,400		20,000		1,000		2,900		3,200		450		8,000		23,600		35,700		35,500	
1,1-Dichloroethene	µg/L	7	21.4		33		1.7		5.5		5.5		< 0.5	U	26		<1	U	<1	U	<1	U
1,2-Dichloroethane	µg/L	5	26.1		30		2		5.6		5.4		0.75	J	28		<0.5	U	<0.5	U	<0.5	U
cis-1,2-Dichloroethene	µg/L	70	67.4		78		11		18		17		3.1		58		<0.5	U	<0.5	U	<0.5	U
Tetrachloroethene	µg/L	5	4.91		10	U	0.5	U	1.7		1.7		< 0.5	U	< 5	U	<0.5	U	<0.5	U	<0.5	U
Trichloroethene	µg/L	5	2,880		4,700		280		700	J	710	J	95		3,300		<0.5	U	0.257	J	0.411	J
Vinyl Chloride	µg/L	2	1.9		10	U	0.5	U	0.99	J	1		< 0.5	U	< 5	U	<0.5	U	<0.5	U	<0.5	U

Notes:

Blue Highlighting indicates analyte detected above MCL/PCL.

[a] Cleanup goal is MCL except for perchlorate, Texas Risk Reduction Program groundwater residential PCL is used.

[b] Only limited data validation possible; Not used in plume delineation.

µg/L - micrograms per liter

J - estimated value; analyte concentration was less than the limit of quantification.

U - Not detected. The analyte was analyzed for, but not detected above the limit of detection.

COC - contaminants of concern

ID - identifier

MCL - maximum contaminant level

NA - not analyzed

PCL - Texas residential groundwater protective concentration level

Val Qual - validation qualifier

Table 2-5
Historical COC Concentrations, LHAAP-50

Sample ID			50WW12-110414		50WW12-021815		50WW12-052015		50WW12-081815		50WW12-111215		50WW12-051016		50WW12-110116		50WW12-111417		50WW12-180508		50WW12-180508FD	
Sample Date			11/4/2014		2/18/2015		5/20/2015		8/18/2015		11/12/2015		5/10/2016		11/1/2016		11/14/2017		5/8/2018		5/8/2018	
Well Completion Zone			Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow	
Analyte	Units	MCL/PCL [a]	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Perchlorate	µg/L	17	14,300		30,600		59,200		17,300		37,900		87,800		25,300		21,000		91,000		89,000	
1,1-Dichloroethene	µg/L	7	<1	U	<1	U	0.878	J	<1	U	<1	U	7.35		1.57	J	0.81	J	1.3		1.1	
1,2-Dichloroethane	µg/L	5	<0.5	U	<0.5	U	0.389	J	<0.5	U	<0.5	U	3.93		0.952	J	0.55	J	0.95	J	1	
cis-1,2-Dichloroethene	µg/L	70	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	0.78	J	0.5	U	1	U	0.5	U	0.5	U
Tetrachloroethene	µg/L	5	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U
Trichloroethene	µg/L	5	<0.5	U	<0.5	U	33.9		5.59		17.6		417		109		41		79		74	
Vinyl Chloride	µg/L	2	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	0.5	U	0.5	U	1	U	0.5	U	0.5	U

Notes:

Blue Highlighting indicates analyte detected above MCL/PCL.

[a] Cleanup goal is MCL except for perchlorate. For perchlorate, Texas Risk Reduction Program groundwater residential PCL is used.

[b] Only limited data validation possible; Not used in plume delineation.

µg/L - micrograms per liter

J - estimated value; analyte concentration was less than the limit of quantification.

U - Not detected. The analyte was analyzed for, but not detected above the limit of detection.

COC - contaminants of concern

ID - identifier

MCL - maximum contaminant level

NA - not analyzed

PCL - Texas residential groundwater protective concentration level

Val Qual - validation qualifier

Table 2-5
Historical COC Concentrations, LHAAP-50

Sample ID			50WW12-181128		50WW12-190516		50WW12-190516-FD		50WW12-191112		50WW13-103013 [(1)]		50WW13-031214		50WW13-062514		50WW13-110514		50WW13-021715		50WW13-052015	
Sample Date			11/28/2018		5/16/2019		5/16/2019		11/12/2019		10/30/2013		3/12/2014		6/25/2014		11/5/2014		2/17/2015		5/20/2015	
Well Completion Zone			Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow	
Analyte	Units	MCL/PCL [a]	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Perchlorate	µg/L	17	47,000		65,000		76,000		47,000		14.7		510		3,110		11,700		648		126	
1,1-Dichloroethene	µg/L	7	0.83	J	2.2		2.2		4.6		16.6		2.54		4.95	J	20.6		<5	U	0.978	J
1,2-Dichloroethane	µg/L	5	0.56	J	1.5		1.5		2.7		42		4.45		10.6		42.4		4.99	J	1.78	
cis-1,2-Dichloroethene	µg/L	70	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	205		25		56.3		239		32.1		10.7	
Tetrachloroethene	µg/L	5	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	7.2		1.06		1.39	J	7.05	J	1.89	J	0.554	J
Trichloroethene	µg/L	5	41	J	170		170		280		3000		823		1,840		9,150		1,080		433	
Vinyl Chloride	µg/L	2	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	<2	U	<0.5	U	<2.5	U	3.36	J	<2.5	U	<0.5	U

Notes:

Blue Highlighting indicates analyte detected above MCL/PCL.

[a] Cleanup goal is MCL except for perchlorate. For perchlorate, Texas Risk Reduction Program groundwater residential PCL is used.

[b] Only limited data validation possible; Not used in plume delineation.

µg/L - micrograms per liter

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COC - contaminants of concern

ID - identifier

MCL - maximum contaminant level

NA - not analyzed

PCL - Texas residential groundwater protective concentration level

Val Qual - validation qualifier

Table 2-5
Historical COC Concentrations, LHAAP-50

Sample ID			50WW13-081915		50WW13-111215		50WW13D-051316		50WW13T-051316		50WW13-110116		50WW13-111317		50WW13-180509		50WW13-181129		50WW13-190506		50WW13-191113	
Sample Date			8/19/2015		11/12/2015		5/13/2016		5/13/2016		11/1/2016		11/13/2017		5/9/2018		11/29/2018		5/6/2019		11/13/2019	
Well Completion Zone			Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow	
Analyte	Units	MCL/PCL [a]	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Perchlorate	µg/L	17	9,300		11,400		256		493		8,650		13,000		640		1,100		160		4,900	
1,1-Dichloroethene	µg/L	7	13.5		<50	U	0.74	J	1.23	J	50	U	50	U	1.4		5.4		0.57	J	17	J
1,2-Dichloroethane	µg/L	5	31.5		43.4	J	2.24		4.31		36.7	J	83		5.6		12		1.3		39	
cis-1,2-Dichloroethene	µg/L	70	184		231		15.8		25		228		410		32		100		12		230	
Tetrachloroethene	µg/L	5	6.19		<25	U	0.555	J	0.846	J	25	U	50	U	1.6		4.6		< 0.5	U	< 12	U
Trichloroethene	µg/L	5	5,700		7,710	J	322		529		6,050		13,000		620		2,700		250		7,300	
Vinyl Chloride	µg/L	2	2.31	J	<25	U	0.5	U	0.259	J	25	U	50	U	0.5	U	1.4		< 0.5	U	< 12	U

Notes:

Blue Highlighting indicates analyte detected above MCL/PCL.

[a] Cleanup goal is MCL except for perchlorate. For perchlorate, Texas Risk Reduction Program groundwater residential PCL is used.

[b] Only limited data validation possible; Not used in plume delineation.

µg/L - micrograms per liter

J - estimated value; analyte concentration was less than the limit of quantification.

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COC - contaminants of concern

ID - identifier

MCL - maximum contaminant level

NA - not analyzed

PCL - Texas residential groundwater protective concentration level

Val Qual - validation qualifier

Table 2-5
Historical COC Concentrations, LHAAP-50

Sample ID			50WW14-102813		50WW14-031214		50WW14-062514		50WW14-110514		50WW14-021715		50WW14-052015		50WW14-081915		50WW14-111215		50WW14-050316		50WW14-110116	
Sample Date			10/28/2013		3/12/2014		6/25/2014		11/5/2014		2/17/2015		5/20/2015		8/19/2015		11/12/2015		5/3/2016		11/01/2016	
Well Completion Zone			Lower Shallow		Lower Shallow		Lower Shallow		Lower Shallow		Lower Shallow		Lower Shallow		Lower Shallow		Lower Shallow		Lower Shallow		Lower Shallow	
Analyte	Units	MCL/PCL [a]	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Perchlorate	µg/L	17	5.45		0.256	J	0.121	J	5.37		0.381	J	2.06		2.19		7.5		0.47		0.2	U
1,1-Dichloroethene	µg/L	7	<1	U	<1	U	<1	U	<1	U	<1	U	<1	U	<1	U	<1	U	1	U	1	U
1,2-Dichloroethane	µg/L	5	1.16		<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	0.5	U	0.5	U
cis-1,2-Dichloroethene	µg/L	70	6.52		1.33		0.826	J	2.39		13.5		5.66		7.56		14.2		1.41		2.76	
Tetrachloroethene	µg/L	5	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	0.5	U	0.5	U
Trichloroethene	µg/L	5	93.8		37.4		21.9		26.7		9.14		6.05		12		5.78		1.75		10.9	
Vinyl Chloride	µg/L	2	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	0.5	U	0.5	U

Notes:

Blue Highlighting indicates analyte detected above MCL/PCL.

[a] Cleanup goal is MCL except for perchlorate. For perchlorate, Texas Risk Reduction Program groundwater residential PCL is used.

[b] Only limited data validation possible; Not used in plume delineation.

µg/L - micrograms per liter

J - estimated value; analyte concentration was less than the limit of quantification.

U - Not detected. The analyte was analyzed for, but not detected above the limit of detection.

COC - contaminants of concern

ID - identifier

MCL - maximum contaminant level

NA - not analyzed

PCL - Texas residential groundwater protective concentration level

Val Qual - validation qualifier

Table 2-5
Historical COC Concentrations, LHAAP-50

Sample ID			50WW14-111317		50WW14-180509		50WW14-181129		50WW14-190506		50WW15-102513		50WW15-031714		50WW15-061914		50WW15-110714		50WW15-021215		[illegible] 021215	
Sample Date			11/13/2017		5/9/2018		11/29/2018		5/6/2019		10/25/2013		3/17/2014		6/19/2014		11/7/2014		2/12/2015		2/12/2015	
Well Completion Zone			Lower Shallow		Lower Shallow		Lower Shallow		Lower Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow	
Analyte	Units	MCL/PCL [a]	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Perchlorate	µg/L	17	4	U	2	U	1.9	J	< 4	U	<0.2	U	<0.2	U	<0.2	U	<0.2	U	0.942	J	1.34	J
1,1-Dichloroethene	µg/L	7	1	U	0.5	U	< 0.5	U	< 0.5	U	<1	U	<1	U	<1	U	<1	U	<1	U	<1	U
1,2-Dichloroethane	µg/L	5	1	U	1.2		< 0.5	U	< 0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	0.258	J	<0.5	U
cis-1,2-Dichloroethene	µg/L	70	2.7		3.9		3.2		1.9		11.9		13.8		12.9		14.3		14.3		14.2	
Tetrachloroethene	µg/L	5	1	U	0.5	U	< 0.5	U	< 0.5	U	3.25		3.33		3.05		3.34		3.31		3.24	
Trichloroethene	µg/L	5	8.2		33		12		27		17.3		23.5		18.9		35.4		48.3		46.9	
Vinyl Chloride	µg/L	2	1	U	0.5	U	< 0.5	U	< 0.5	U	3.24		3.09		2.76		2.69		2.2		2.27	

Notes:

Blue Highlighting indicates analyte detected above MCL/PCL.

[a] Cleanup goal is MCL except for perchlorate. For perchlorate, Texas Risk Reduction Program groundwater residential PCL is used.

[b] Only limited data validation possible; Not used in plume delineation.

µg/L - micrograms per liter

J - estimated value; analyte concentration was less than the limit of quantification.

U - Not detected. The analyte was analyzed for, but not detected above the limit of detection.

COC - contaminants of concern

ID - identifier

MCL - maximum contaminant level

NA - not analyzed

PCL - Texas residential groundwater protective concentration level

Val Qual - validation qualifier

Table 2-5
Historical COC Concentrations, LHAAP-50

Sample ID			50WW15-052315		50WW15-082015		50WW15FD-082015		50WW15-111115		50WW15FD-111115		50WW15-051116		50WW15-110216		50WW15-111017		50WW15-180507		50WW15-181130	
Sample Date			5/23/2015		8/20/2015		8/20/2015		11/11/2015		11/11/2015		5/12/2016		11/02/2016		11/10/2017		5/7/2018		11/30/2018	
Well Completion Zone			Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow	
Analyte	Units	MCL/PCL [a]	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Perchlorate	µg/L	17	<0.2	U	0.237	J	0.155	J	<1	U	<1	U	0.2	U	0.2	U	4	U	2	U	< 4	U
1,1-Dichloroethene	µg/L	7	<1	U	<1	U	<1	U	<1	U	<1	U	1	U	1	U	1	U	0.5	U	< 0.5	U
1,2-Dichloroethane	µg/L	5	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	0.5	U	0.5	U	1	U	0.5	U	< 0.5	U
cis-1,2-Dichloroethene	µg/L	70	10.8		10.1		10.4		7.16		6.89		6.31		6.63		4.2		3.1		5.9	
Tetrachloroethene	µg/L	5	2.96		1.92		2.01		1.83		1.76		1.86		1.89		1.3		1.5		2	
Trichloroethene	µg/L	5	13		15.2		15.1		8.2		8.05		5.32		9.52		3.6		3.5		9.1	
Vinyl Chloride	µg/L	2	1.91		1.25		1.38		0.966	J	0.923	J	0.5	U	1.18		0.85	J	0.5	U	1.5	

Notes:

Blue Highlighting indicates analyte detected above MCL/PCL.

[a] Cleanup goal is MCL except for perchlorate. For perchlorate, Texas Risk Reduction Program groundwater residential PCL is used.

[b] Only limited data validation possible; Not used in plume delineation.

µg/L - micrograms per liter

J - estimated value; analyte concentration was less than the limit of quantification.

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COC - contaminants of concern

ID - identifier

MCL - maximum contaminant level

NA - not analyzed

PCL - Texas residential groundwater protective concentration level

Val Qual - validation qualifier

Table 2-5
Historical COC Concentrations, LHAAP-50

Sample ID			50WW15-190523		50WW15-191108		50WW16-102513		50WW16-032514		50WW16-062614		50WW16FD-062614		50WW16-111214		50WW16-021315		50WW16-052215		50WW16-082015	
Sample Date			5/23/2019		11/8/2019		10/25/2013		3/25/2014		6/26/2014		6/26/2014		11/12/2014		2/13/2015		5/22/2015		8/20/2015	
Well Completion Zone			Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow	
Analyte	Units	MCL/PCL [a]	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Perchlorate	µg/L	17	< 4	U	< 2	U	0.284	J	<0.2	U	0.725		0.682		<0.2	U	<0.2	U	<0.2	U	<0.2	U
1,1-Dichloroethene	µg/L	7	< 0.5	U	< 0.5	U	<1	U	<1	U	<1	U	<1	U	<1	U	<1	U	<1	U	<1	U
1,2-Dichloroethane	µg/L	5	< 0.5	U	< 0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U
cis-1,2-Dichloroethene	µg/L	70	2.9		5.5		0.656	J	0.548	J	0.471	J	0.456	J	<0.5	U	<0.5	U	<0.5	U	<0.5	U
Tetrachloroethene	µg/L	5	0.87	J	2.1		<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U
Trichloroethene	µg/L	5	2.3		7.2		18.1		11.4		12		11.6		1.05		0.391	J	<0.5	U	1.5	
Vinyl Chloride	µg/L	2	< 0.5	U	1.7		<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U

Notes:

Blue Highlighting indicates analyte detected above MCL/PCL.

[a] Cleanup goal is MCL except for perchlorate. For perchlorate, Texas Risk Reduction Program groundwater residential PCL is used.

[b] Only limited data validation possible; Not used in plume delineation.

µg/L - micrograms per liter

J - estimated value; analyte concentration was less than the limit of quantification.

U - Not detected. The analyte was analyzed for, but not detected above the limit of detection.

COC - contaminants of concern

ID - identifier

MCL - maximum contaminant level

NA - not analyzed

PCL - Texas residential groundwater protective concentration level

Val Qual - validation qualifier

Table 2-5
Historical COC Concentrations, LHAAP-50

Sample ID			50WW16-111315		50WW16-051116		50WW16-110216		50WW16-111417		50WW16-180509		50WW16-181128		50WW16-190506		50WW17-102513		50WW17-032514		50WW17-062014	
Sample Date			11/13/2015		5/11/2016		11/2/2016		11/14/2017		5/9/2018		11/28/2018		5/6/2019		10/25/2013		3/25/2014		6/20/2014	
Well Completion Zone			Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Fully Penetrating Shallow		Fully Penetrating Shallow		Fully Penetrating Shallow	
Analyte	Units	MCL/PCL [a]	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Perchlorate	µg/L	17	<0.2	U	0.101	J	0.846		4	U	2	U	< 4	U	< 4	U	0.51		<0.2	U	1.76	
1,1-Dichloroethene	µg/L	7	<1	U	1	U	1	U	1	U	0.5	U	< 0.5	U	< 0.5	U	<1	U	<1	U	<1	U
1,2-Dichloroethane	µg/L	5	<0.5	U	0.5	U	0.5	U	1	U	0.5	U	< 0.5	U	< 0.5	U	<0.5	U	<0.5	U	<0.5	U
cis-1,2-Dichloroethene	µg/L	70	<0.5	U	0.5	U	0.5	U	1	U	0.5	U	< 0.5	U	< 0.5	U	<0.5	U	<0.5	U	<0.5	U
Tetrachloroethene	µg/L	5	<0.5	U	0.5	U	0.5	U	1	U	0.5	U	< 0.5	U	< 0.5	U	<0.5	U	<0.5	U	<0.5	U
Trichloroethene	µg/L	5	0.986	J	0.287	J	2.72		1.7	U	0.5	U	1.9	J	0.61	J	<0.5	U	<0.5	U	0.516	J
Vinyl Chloride	µg/L	2	<0.5	U	0.5	U	0.5	U	1	U	0.5	U	< 0.5	U	< 0.5	U	<0.5	U	<0.5	U	<0.5	U

Notes:

Blue Highlighting indicates analyte detected above MCL/PCL.

[a] Cleanup goal is MCL except for perchlorate. For perchlorate, Texas Risk Reduction Program groundwater residential PCL is used.

[b] Only limited data validation possible; Not used in plume delineation.

µg/L - micrograms per liter

J - estimated value; analyte concentration was less than the limit of quantification.

U - Not detected. The analyte was analyzed for, but not detected above the limit of detection.

COC - contaminants of concern

ID - identifier

MCL - maximum contaminant level

NA - not analyzed

PCL - Texas residential groundwater protective concentration level

Val Qual - validation qualifier

Table 2-5
Historical COC Concentrations, LHAAP-50

Sample ID			50WW17-111114		50WW17-021315		50WW17-052215		50WW17-081915		50WW17-110915		50WW17B-051316		50WW17M-051316		50WW17T-051316		50WW17-110416		50WW17-111017	
Sample Date			11/11/2014		2/13/2015		5/22/2015		8/19/2015		11/9/2015		5/13/16		5/13/16		5/13/16		11/4/2016		11/10/2017	
Well Completion Zone			Fully Penetrating Shallow		Fully Penetrating Shallow		Fully Penetrating Shallow		Fully Penetrating Shallow		Fully Penetrating Shallow		Fully Penetrating Shallow		Fully Penetrating Shallow		Fully Penetrating Shallow		Fully Penetrating Shallow		Fully Penetrating Shallow	
Analyte	Units	MCL/PCL [a]	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Perchlorate	µg/L	17	<0.2	U	<0.2	U	<0.2	U	0.193	J	<0.4	U	0.2	U	0.119	J	0.149	J	0.2	U	4	U
1,1-Dichloroethene	µg/L	7	<1	U	<1	U	<1	U	<1	U	<1	U	1	U	1	U	1	U	1	U	1	U
1,2-Dichloroethane	µg/L	5	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U
cis-1,2-Dichloroethene	µg/L	70	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U
Tetrachloroethene	µg/L	5	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U
Trichloroethene	µg/L	5	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U
Vinyl Chloride	µg/L	2	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	1	U

Notes:

Blue Highlighting indicates analyte detected above MCL/PCL.

[a] Cleanup goal is MCL except for perchlorate. For perchlorate, Texas Risk Reduction Program groundwater residential PCL is used.

[b] Only limited data validation possible; Not used in plume delineation.

µg/L - micrograms per liter

J - estimated value; analyte concentration was less than the limit of quantification.

U - Not detected. The analyte was analyzed for, but not detected above the limit of detection.

COC - contaminants of concern

ID - identifier

MCL - maximum contaminant level

NA - not analyzed

PCL - Texas residential groundwater protective concentration level

Val Qual - validation qualifier

Table 2-5
Historical COC Concentrations, LHAAP-50

	Sample ID	50WW17-180515		50WW17-181130		50WW17-190516		50WW17-191108		50WW18-102313		50WW18-032614		50WW18-062414		50WW18-110414		50WW18-021815		50WW18-052815	
	Sample Date	5/15/2018		11/30/2018		5/16/2019		11/8/2019		10/23/2013		3/26/2014		6/24/2014		11/4/2014		2/18/2015		5/28/2015	
	Well Completion Zone	Fully Penetrating Shallow		Fully Penetrating Shallow		Fully Penetrating Shallow		Fully Penetrating Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow	
Analyte	Units	MCL/PCL [a]	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Perchlorate	µg/L	17	2	U	< 4	U	< 4	U	2	U	<0.2	U	<0.2	U	0.172	J	<0.2	U	0.258	J	<0.2	U
1,1-Dichloroethene	µg/L	7	0.5	U	< 0.5	U	< 0.5	U	0.5	U	<1	U	<1	U	<1	U	<1	U	<1	U	<1	U
1,2-Dichloroethane	µg/L	5	0.5	U	< 0.5	U	< 0.5	U	0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U
cis-1,2-Dichloroethene	µg/L	70	0.5	U	< 0.5	U	< 0.5	U	0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U
Tetrachloroethene	µg/L	5	0.5	U	< 0.5	U	< 0.5	U	0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U
Trichloroethene	µg/L	5	0.5	U	< 0.5	U	< 0.5	U	0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U
Vinyl Chloride	µg/L	2	0.5	U	< 0.5	U	< 0.5	U	0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U

Notes:

Blue Highlighting indicates analyte detected above MCL/PCL.

[a] Cleanup goal is MCL except for perchlorate. For perchlorate, Texas Risk Reduction Program groundwater residential PCL is used.

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MCL - maximum contaminant level

NA - not analyzed

PCL - Texas residential groundwater protective concentration level

Val Qual - validation qualifier

Table 2-5
Historical COC Concentrations, LHAAP-50

	Sample ID	50WW18-081715		50WW18-111615		50WW18-050316		50WW18-110316		50WW18-111017		50WW18-180507		50WW18-181130		50WW18-190516		50WW18-191108		50WW19-011414	
	Sample Date	8/17/2015		11/16/2015		5/3/2016		11/03/2016		11/10/2017		5/7/2018		11/30/2018		5/16/2019		11/8/2019		1/14/2014	
	Well Completion Zone	Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Fully Penetrating Shallow	
Analyte	Units	MCL/PCL [a]	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Perchlorate	µg/L	17	0.144	J	<1	U	0.2	U	0.2	U	4	U	2	U	< 4	U	< 4	U	< 2	U	<0.2	U
1,1-Dichloroethene	µg/L	7	<1	U	<1	U	1	U	1	U	1	U	0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	<1	U
1,2-Dichloroethane	µg/L	5	<0.5	U	<0.5	U	0.5	U	0.5	U	1	U	0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	<0.5	U
cis-1,2-Dichloroethene	µg/L	70	<0.5	U	<0.5	U	0.5	U	0.5	U	1	U	0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	<0.5	U
Tetrachloroethene	µg/L	5	<0.5	U	<0.5	U	0.5	U	0.5	U	1	UJ	0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	<0.5	U
Trichloroethene	µg/L	5	<0.5	U	<0.5	U	0.5	U	0.5	U	1	U	0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	<0.5	U
Vinyl Chloride	µg/L	2	<0.5	U	<0.5	U	0.5	U	0.5	U	1	U	0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	<0.5	U

Notes:

Blue Highlighting indicates analyte detected above MCL/PCL.

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Table 2-5
Historical COC Concentrations, LHAAP-50

Sample ID			50WW19-032514		50WW19-062014		50WW19-111114		50WW19-021315		50WW19-052215		50WW19FD-052215 5/22/2015		50WW19-082115		50WW19-110915		50WW19B-051316		50WW19M-051316	
Sample Date			3/25/2014		6/20/2014		11/11/2014		2/13/2015		5/22/2015		5/22/2015		8/21/2015		11/9/2015		5/3/2016		5/13/2016	
Well Completion Zone			Fully Penetrating Shallow		Fully Penetrating Shallow		Fully Penetrating Shallow		Fully Penetrating Shallow		Fully Penetrating Shallow		Fully Penetrating Shallow		Fully Penetrating Shallow		Fully Penetrating Shallow		Fully Penetrating Shallow		Fully Penetrating Shallow	
Analyte	Units	MCL/PCL [a]	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Perchlorate	µg/L	17	<0.2	U	0.48		<0.2	U	<0.2	U	0.305	J	0.198	J	<0.2	U	<0.2	U	0.2	U	0.2	U
1,1-Dichloroethene	µg/L	7	<1	U	<1	U	<1	U	<1	U	<1	U	<1	U	<1	U	<1	U	1	U	1	U
1,2-Dichloroethane	µg/L	5	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	0.5	U	0.5	U
cis-1,2-Dichloroethene	µg/L	70	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	0.5	U	0.5	U
Tetrachloroethene	µg/L	5	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	0.5	U	0.5	U
Trichloroethene	µg/L	5	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	0.5	U	0.5	U
Vinyl Chloride	µg/L	2	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	0.5	U	0.5	U

Notes:

Blue Highlighting indicates analyte detected above MCL/PCL.

[a] Cleanup goal is MCL except for perchlorate. For perchlorate, Texas Risk Reduction Program groundwater residential PCL is used.

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MCL - maximum contaminant level

NA - not analyzed

PCL - Texas residential groundwater protective concentration level

Val Qual - validation qualifier

Table 2-5
Historical COC Concentrations, LHAAP-50

Sample ID			50WW19T-051316		50WW19-110416		50WW20-110713		50WW20-031314		50WW20FD-031314		50WW20-061914		50WW20-111114		50WW20FD-111114		50WW20-021215		50WW20-052615	
Sample Date			5/13/2016		11/04/2016		11/7/2013		3/13/2014		3/13/2014		6/19/2014		11/11/2014		11/11/2014		2/12/2015		5/26/2015	
Well Completion Zone			Fully Penetrating Shallow		Fully Penetrating Shallow		Fully Penetrating Shallow		Fully Penetrating Shallow		Fully Penetrating Shallow		Fully Penetrating Shallow		Fully Penetrating Shallow		Fully Penetrating Shallow		Fully Penetrating Shallow		Fully Penetrating Shallow	
Analyte	Units	MCL/PCL [a]	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Perchlorate	µg/L	17	0.338	J	0.2	U	<0.2	U	0.697		0.673		<0.2	U	<0.2	U	<0.2	U	0.168	J	<0.2	U
1,1-Dichloroethene	µg/L	7	1	U	1	U	<1	U	<1	U	<1	U	<1	U	<1	U	<1	U	<1	U	<1	U
1,2-Dichloroethane	µg/L	5	0.5	U	0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U
cis-1,2-Dichloroethene	µg/L	70	0.5	U	0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U
Tetrachloroethene	µg/L	5	0.5	U	0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U
Trichloroethene	µg/L	5	0.5	U	0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U
Vinyl Chloride	µg/L	2	0.5	U	0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U

Notes:

Blue Highlighting indicates analyte detected above MCL/PCL.

[a] Cleanup goal is MCL except for perchlorate. For perchlorate, Texas Risk Reduction Program groundwater residential PCL is used.

[b] Only limited data validation possible; Not used in plume delineation.

µg/L - micrograms per liter

J - estimated value; analyte concentration was less than the limit of quantification.

U - Not detected. The analyte was analyzed for, but not detected above the limit of detection.

COC - contaminants of concern

ID - identifier

MCL - maximum contaminant level

NA - not analyzed

PCL - Texas residential groundwater protective concentration level

Val Qual - validation qualifier

Table 2-5
Historical COC Concentrations, LHAAP-50

Sample ID			50WW20-082115		50WW20-111015		50WW20-51116		50WW21-102513		50WW21FD-102513		50WW21-032514		50WW21-062014		50WW21FD-062014 6/20/2014		50WW21-111314		50WW21FD-111314	
Sample Date			8/21/2015		11/10/2015		5/11/2016		10/25/2013		10/25/2013		3/25/2014		6/20/2014				11/13/2014		11/13/2014	
Well Completion Zone			Fully Penetrating Shallow		Fully Penetrating Shallow		Fully Penetrating Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow	
Analyte	Units	MCL/PCL [a]	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Perchlorate	µg/L	17	<0.2	U	<0.2	U	0.2	U	0.731		0.818		0.606		0.964		0.934		0.779		0.779	
1,1-Dichloroethene	µg/L	7	<1	U	<1	U	1	U	<1	U	<1	U	<1	U	<1	U	<1	U	<1	U	<1	U
1,2-Dichloroethane	µg/L	5	<0.5	U	<0.5	U	0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U
cis-1,2-Dichloroethene	µg/L	70	<0.5	U	<0.5	U	0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U
Tetrachloroethene	µg/L	5	<0.5	U	<0.5	U	0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U
Trichloroethene	µg/L	5	<0.5	U	<0.5	U	0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U
Vinyl Chloride	µg/L	2	<0.5	U	<0.5	U	0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U

Notes:

Blue Highlighting indicates analyte detected above MCL/PCL.

[a] Cleanup goal is MCL except for perchlorate. For perchlorate, Texas Risk Reduction Program groundwater residential PCL is used.

[b] Only limited data validation possible; Not used in plume delineation.

µg/L - micrograms per liter

J - estimated value; analyte concentration was less than the limit of quantification.

U - Not detected. The analyte was analyzed for, but not detected above the limit of detection.

COC - contaminants of concern

ID - identifier

MCL - maximum contaminant level

NA - not analyzed

PCL - Texas residential groundwater protective concentration level

Val Qual - validation qualifier

Table 2-5
Historical COC Concentrations, LHAAP-50

Sample ID			50WW21-021215		50WW21-052315		50WW21FD-052315		50WW21-082015		50WW21-111015		50WW21-051216		50WW21-110316		50WW21-111017		50WW21-180507		50WW21-181130	
Sample Date			2/12/2015		5/23/2015		5/23/2015		8/20/2015		11/10/2015		5/12/2016		11/03/2016		11/10/2017		5/7/2018		11/30/2018	
Well Completion Zone			Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow	
Analyte	Units	MCL/PCL [a]	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Perchlorate	µg/L	17	0.878		0.502		0.516		0.67		1.21	J	0.398	J	0.418		4	U	2	U	< 4	U
1,1-Dichloroethene	µg/L	7	<1	U	<1	U	<1	U	<1	U	<1	U	1	U	1	U	1	U	0.5	U	< 0.5	U
1,2-Dichloroethane	µg/L	5	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	0.5	U	0.5	U	1	U	0.5	U	< 0.5	U
cis-1,2-Dichloroethene	µg/L	70	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	0.5	U	0.5	U	1	U	0.5	U	< 0.5	U
Tetrachloroethene	µg/L	5	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	0.5	U	0.5	U	1	U	0.5	U	< 0.5	U
Trichloroethene	µg/L	5	<0.5	U	0.447	J	<0.5	U	<0.5	U	<0.5	U	0.5	U	0.5	U	1	U	0.5	U	< 0.5	U
Vinyl Chloride	µg/L	2	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	0.5	U	0.5	U	1	U	0.5	U	< 0.5	U

Notes:

Blue Highlighting indicates analyte detected above MCL/PCL.

[a] Cleanup goal is MCL except for perchlorate. For perchlorate, Texas Risk Reduction Program groundwater residential PCL is used.

[b] Only limited data validation possible; Not used in plume delineation.

µg/L - micrograms per liter

J - estimated value; analyte concentration was less than the limit of quantification.

U - Not detected. The analyte was analyzed for, but not detected above the limit of detection.

COC - contaminants of concern

ID - identifier

MCL - maximum contaminant level

NA - not analyzed

PCL - Texas residential groundwater protective concentration level

Val Qual - validation qualifier

Table 2-5
Historical COC Concentrations, LHAAP-50

	Sample ID	50WW21-190516		50WW22-102313		50WW22-031214		50WW22-062414		50WW22-110614		50WW22-021715		50WW22-052115		50WW22-081815		50WW22-111615		50WW22-051016	
	Sample Date	5/16/2019		10/23/2013		3/12/2014		6/24/2014		11/6/2014		2/17/2015		5/21/2015		8/18/2015		11/16/2015		5/10/2016	
	Well Completion Zone	Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow	
Analyte	Units	MCL/PCL [a]	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Perchlorate	µg/L	17	< 4	U	6.97		1.54		2.29		1.06		1.51		2.92		3.62		0.642	J	1.46	
1,1-Dichloroethene	µg/L	7	< 0.5	U	<1	U	<1	U	<1	U	<1	U	<1	U	<1	U	<1	U	<1	U	1	U
1,2-Dichloroethane	µg/L	5	< 0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	0.5	U
cis-1,2-Dichloroethene	µg/L	70	< 0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	0.5	U
Tetrachloroethene	µg/L	5	< 0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	0.5	U
Trichloroethene	µg/L	5	< 0.5	U	<0.5	U	<0.5	U	<0.5	U	0.339	J	<0.5	U	<0.5	U	<0.5	U	0.454	J	0.5	U
Vinyl Chloride	µg/L	2	< 0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	0.5	U

Notes:

Blue Highlighting indicates analyte detected above MCL/PCL.

[a] Cleanup goal is MCL except for perchlorate. For perchlorate, Texas Risk Reduction Program groundwater residential PCL is used.

[b] Only limited data validation possible; Not used in plume delineation.

µg/L - micrograms per liter

J - estimated value; analyte concentration was less than the limit of quantification.

U - Not detected. The analyte was analyzed for, but not detected above the limit of detection.

COC - contaminants of concern

ID - identifier

MCL - maximum contaminant level

NA - not analyzed

PCL - Texas residential groundwater protective concentration level

Val Qual - validation qualifier

Table 2-5
Historical COC Concentrations, LHAAP-50

Sample ID			50WW22-110216		50WW22-111317		50WW22-180509		50WW22-181203		50WW22-190506		50WW22-191112		50WW23-102913		50WW23-031314		50WW23-062614		50WW23-110414	
Sample Date			11/2/2016		11/13/2017		5/9/2018		12/3/2018		5/6/2019		11/12/2019		10/29/2013		3/13/2014		6/26/2014		11/4/2014	
Well Completion Zone			Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow	
Analyte	Units	MCL/PCL [a]	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Perchlorate	µg/L	17	1.02		4	U	1.1	J	< 4	U	< 4	U	< 2	U	0.336	J	0.227	J	0.182	J	<0.2	U
1,1-Dichloroethene	µg/L	7	1	U	1	U	0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	<1	U	<1	U	<1	U	<1	U
1,2-Dichloroethane	µg/L	5	0.5	U	1	U	0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U
cis-1,2-Dichloroethene	µg/L	70	0.5	U	1	U	0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U
Tetrachloroethene	µg/L	5	0.5	U	1	U	0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U
Trichloroethene	µg/L	5	0.5	U	1	U	0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U
Vinyl Chloride	µg/L	2	0.5	U	1	U	0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U

Notes:

Blue Highlighting indicates analyte detected above MCL/PCL.

[a] Cleanup goal is MCL except for perchlorate. For perchlorate, Texas Risk Reduction Program groundwater residential PCL is used.

[b] Only limited data validation possible; Not used in plume delineation.

µg/L - micrograms per liter

J - estimated value; analyte concentration was less than the limit of quantification.

U - Not detected. The analyte was analyzed for, but not detected above the limit of detection.

COC - contaminants of concern

ID - identifier

MCL - maximum contaminant level

NA - not analyzed

PCL - Texas residential groundwater protective concentration level

Val Qual - validation qualifier

Table 2-5
Historical COC Concentrations, LHAAP-50

	Sample ID	50WW23-021815		50WW23-052015		50WW23-081715		50WW23-111615		50WW23-051016		50WW23-110116		50WW23-111417		50WW23-180515		50WW23-181203		50WW23-190507	
	Sample Date	2/18/2015		5/20/2015		8/17/2015		11/16/2015		5/10/2016		11/01/2016		11/14/2017		5/15/2018		12/3/2018		5/7/2019	
	Well Completion Zone	Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow	
Analyte	Units	MCL/PCL [a]	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Perchlorate	µg/L	17	<0.2	U	23.3		0.527		<1	U	2.15		4.76		4	U	2	U	< 4	U	< 4	U
1,1-Dichloroethene	µg/L	7	<1	U	<1	U	<1	U	<1	U	1	U	1	U	1	U	0.5	U	< 0.5	U	< 0.5	U
1,2-Dichloroethane	µg/L	5	<0.5	U	<0.5	U	<0.5	U	<0.5	U	0.5	U	0.5	U	1	U	0.5	U	< 0.5	U	< 0.5	U
cis-1,2-Dichloroethene	µg/L	70	<0.5	U	<0.5	U	<0.5	U	<0.5	U	0.5	U	0.5	U	1	U	0.5	U	< 0.5	U	< 0.5	UJ
Tetrachloroethene	µg/L	5	<0.5	U	<0.5	U	<0.5	U	<0.5	U	0.5	U	0.5	U	1	U	0.5	U	< 0.5	U	< 0.5	U
Trichloroethene	µg/L	5	<0.5	U	<0.5	U	<0.5	U	<0.5	U	0.5	U	0.5	U	1	U	0.5	U	< 0.5	U	< 0.5	U
Vinyl Chloride	µg/L	2	<0.5	U	<0.5	U	<0.5	U	<0.5	U	0.5	U	0.5	U	1	U	0.5	U	< 0.5	U	< 0.5	U

Notes:

Blue Highlighting indicates analyte detected above MCL/PCL.

[a] Cleanup goal is MCL except for perchlorate. For perchlorate, Texas Risk Reduction Program groundwater residential PCL is used.

[b] Only limited data validation possible; Not used in plume delineation.

µg/L - micrograms per liter

J - estimated value; analyte concentration was less than the limit of quantification.

U - Not detected. The analyte was analyzed for, but not detected above the limit of detection.

COC - contaminants of concern

ID - identifier

MCL - maximum contaminant level

NA - not analyzed

PCL - Texas residential groundwater protective concentration level

Val Qual - validation qualifier

Table 2-5
Historical COC Concentrations, LHAAP-50

	Sample ID	50WW23-190507		50WW24-102913		50WW24-032614		50WW24-062614		50WW24-110414		50WW24-021815		50WW24-052815		50WW24-081715		50WW24-111615		50WW24-051016	
	Sample Date	11/13/2019		10/29/2013		3/26/2014		6/26/2014		11/4/2014		2/18/2015		5/28/2015		8/17/2015		11/16/2015		5/10/2016	
	Well Completion Zone	Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow	
Analyte	Units	MCL/PCL [a]	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Perchlorate	µg/L	17	< 2	U	0.479		<0.2	U	110		<0.2	U	<0.2	U	<0.2	U	<0.2	U	<1	U	36.8	
1,1-Dichloroethene	µg/L	7	< 0.5	U	<1	U	<1	U	<1	U	<1	U	<1	U	<1	U	<1	U	<1	U	1	U
1,2-Dichloroethane	µg/L	5	< 0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	0.5	U
cis-1,2-Dichloroethene	µg/L	70	< 0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	0.5	U
Tetrachloroethene	µg/L	5	< 0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	0.5	U
Trichloroethene	µg/L	5	< 0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	0.268	J	<0.5	U	<0.5	U	0.5	U
Vinyl Chloride	µg/L	2	< 0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	0.5	U

Notes:

Blue Highlighting indicates analyte detected above MCL/PCL.

[a] Cleanup goal is MCL except for perchlorate. For perchlorate, Texas Risk Reduction Program groundwater residential PCL is used.

[b] Only limited data validation possible; Not used in plume delineation.

µg/L - micrograms per liter

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COC - contaminants of concern

ID - identifier

MCL - maximum contaminant level

NA - not analyzed

PCL - Texas residential groundwater protective concentration level

Val Qual - validation qualifier

Table 2-5
Historical COC Concentrations, LHAAP-50

	Sample ID	50WW24-110316		50WW24-111017		50WW24-180507		50WW24-181130		50WW24-190507		50WW24-191108		50WW25-102313		50WW25-032614		50WW25-062414		50WW25-110614	
	Sample Date	11/3/2016		11/10/2017		5/7/2018		11/30/2018		5/7/2019		11/8/2019		10/23/2013		3/26/2014		6/24/2014		11/6/2014	
	Well Completion Zone	Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow	
Analyte	Units	MCL/PCL [a]	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Perchlorate	µg/L	17	0.2	U	4	U	2	U	< 4	U	< 4	U	2	U	<0.2	U	9.13		31.8		17.8	
1,1-Dichloroethene	µg/L	7	1	U	1	U	0.5	U	< 0.5	U	< 0.5	U	0.5	U	<1	U	<1	U	<1	U	<1	U
1,2-Dichloroethane	µg/L	5	0.5	U	1	U	0.5	U	< 0.5	U	< 0.5	U	0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U
cis-1,2-Dichloroethene	µg/L	70	0.5	U	1	U	0.5	U	< 0.5	U	< 0.5	U	0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U
Tetrachloroethene	µg/L	5	0.5	U	1	U	0.5	U	< 0.5	U	< 0.5	U	0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U
Trichloroethene	µg/L	5	0.5	U	1	U	0.5	U	< 0.5	U	< 0.5	U	0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U
Vinyl Chloride	µg/L	2	0.5	U	1	U	0.5	U	< 0.5	U	< 0.5	U	0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U

Notes:

Blue Highlighting indicates analyte detected above MCL/PCL.

[a] Cleanup goal is MCL except for perchlorate. For perchlorate, Texas Risk Reduction Program groundwater residential PCL is used.

[b] Only limited data validation possible; Not used in plume delineation.

µg/L - micrograms per liter

J - estimated value; analyte concentration was less than the limit of quantification.

U - Not detected. The analyte was analyzed for, but not detected above the limit of detection.

COC - contaminants of concern

ID - identifier

MCL - maximum contaminant level

NA - not analyzed

PCL - Texas residential groundwater protective concentration level

Val Qual - validation qualifier

Table 2-5
Historical COC Concentrations, LHAAP-50

Sample ID			50WW25-021815		50WW25-052815		50WW26-110613		50WW26FD-110613 11/6/2013		50WW26-032614		50WW26FD-032614		50WW26-062014		50WW26-111314		50WW26-021315		50WW26-052315	
Sample Date			2/18/2015		5/28/2015		11/6/2013				3/26/2014		3/26/2014		6/20/2014		11/13/2014		2/13/2015		5/23/2015	
Well Completion Zone			Upper Shallow		Upper Shallow		Lower Shallow		Lower Shallow		Lower Shallow		Lower Shallow		Lower Shallow		Lower Shallow		Lower Shallow		Lower Shallow	
Analyte	Units	MCL/PCL [a]	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Perchlorate	µg/L	17	42.2		15		<0.2	U	<0.2	U	<0.2	U	<0.2	U	<0.2	U	<0.2	U	<0.2	U	<0.2	U
1,1-Dichloroethene	µg/L	7	<1	U	<1	U	<1	U	<1	U	<1	U	<1	U	<1	U	<1	U	<1	U	<1	U
1,2-Dichloroethane	µg/L	5	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U
cis-1,2-Dichloroethene	µg/L	70	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U
Tetrachloroethene	µg/L	5	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U
Trichloroethene	µg/L	5	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U
Vinyl Chloride	µg/L	2	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U

Notes:

Blue Highlighting indicates analyte detected above MCL/PCL.

[a] Cleanup goal is MCL except for perchlorate. For perchlorate, Texas Risk Reduction Program groundwater residential PCL is used.

[b] Only limited data validation possible; Not used in plume delineation.

µg/L - micrograms per liter

J - estimated value; analyte concentration was less than the limit of quantification.

U - Not detected. The analyte was analyzed for, but not detected above the limit of detection.

COC - contaminants of concern

ID - identifier

MCL - maximum contaminant level

NA - not analyzed

PCL - Texas residential groundwater protective concentration level

Val Qual - validation qualifier

Table 2-5
Historical COC Concentrations, LHAAP-50

Sample ID			50WW26-082015		50WW26-111015		50WW26FD-111015		50WW26-050316		50WW26-110216		50WW27-110613		50WW27-031714		50WW27FD-031714		50WW27-061914		50WW27-110714	
Sample Date			8/20/2015		11/10/2015		11/10/2015		5/3/2016		11/2/2016		11/6/2013		3/17/2014		3/17/2014		6/19/2014		11/7/2014	
Well Completion Zone			Lower Shallow		Lower Shallow		Lower Shallow		Lower Shallow		Lower Shallow		Lower Shallow		Lower Shallow		Lower Shallow		Lower Shallow		Lower Shallow	
Analyte	Units	MCL/PCL [a]	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Perchlorate	µg/L	17	<0.2	U	<1	U	<1	U	0.2	U	0.2	U	<0.2	U	<0.2	U	<0.2	U	<0.2	U	<0.2	U
1,1-Dichloroethene	µg/L	7	<1	U	<1	U	<1	U	1	U	1	U	<1	U	<1	U	<1	U	<1	U	<1	U
1,2-Dichloroethane	µg/L	5	<0.5	U	<0.5	U	<0.5	U	0.5	U	0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U
cis-1,2-Dichloroethene	µg/L	70	<0.5	U	<0.5	U	<0.5	U	0.5	U	0.515	J	<0.5	U	0.611	J	0.518	J	0.871	J	0.529	J
Tetrachloroethene	µg/L	5	<0.5	U	<0.5	U	<0.5	U	0.5	U	0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U
Trichloroethene	µg/L	5	<0.5	U	<0.5	U	<0.5	U	0.5	U	0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U
Vinyl Chloride	µg/L	2	<0.5	U	<0.5	U	<0.5	U	0.5	U	0.5	U	<0.5	U	<0.5	U	<0.5	U	0.251	J	<0.5	U

Notes:

Blue Highlighting indicates analyte detected above MCL/PCL.

[a] Cleanup goal is MCL except for perchlorate. For perchlorate, Texas Risk Reduction Program groundwater residential PCL is used.

[b] Only limited data validation possible; Not used in plume delineation.

µg/L - micrograms per liter

J - estimated value; analyte concentration was less than the limit of quantification.

U - Not detected. The analyte was analyzed for, but not detected above the limit of detection.

COC - contaminants of concern

ID - identifier

MCL - maximum contaminant level

NA - not analyzed

PCL - Texas residential groundwater protective concentration level

Val Qual - validation qualifier

Table 2-5
Historical COC Concentrations, LHAAP-50

Sample ID			50WW27FD-110714		50WW27-021215		50WW27-052315		50WW27-082015		50WW27-111115		50WW27-051216		50WW27-110216		50WW27-111017		50WW27-180507		50WW27-181203	
Sample Date			11/7/2014		2/12/2015		5/23/2015		8/20/2015		11/11/2015		5/12/2016		11/2/2016		11/10/2017		5/7/2018		12/3/2018	
Well Completion Zone			Lower Shallow		Lower Shallow		Lower Shallow		Lower Shallow		Lower Shallow		Lower Shallow		Lower Shallow		Lower Shallow		Lower Shallow		Lower Shallow	
Analyte	Units	MCL/PCL [a]	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Perchlorate	µg/L	17	<0.2	U	<0.2	U	<0.2	U	<0.2	U	<1	U	0.2	U	0.124	J	4	U	2	U	< 4	U
1,1-Dichloroethene	µg/L	7	<1	U	<1	U	<1	U	<1	U	<1	U	1	U	1	U	1	U	0.5	U	< 0.5	U
1,2-Dichloroethane	µg/L	5	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	0.5	U	0.5	U	1	U	0.5	U	< 0.5	U
cis-1,2-Dichloroethene	µg/L	70	0.493	J	0.691	J	0.709	J	0.33	J	0.581	J	0.515	J	0.498	J	1	U	0.5	U	< 0.5	U
Tetrachloroethene	µg/L	5	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	0.5	U	0.5	U	1	U	0.5	U	< 0.5	U
Trichloroethene	µg/L	5	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	0.5	U	0.5	U	1	U	0.5	U	< 0.5	U
Vinyl Chloride	µg/L	2	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	0.5	U	0.5	U	1	U	0.5	U	0.66	J

Notes:

Blue Highlighting indicates analyte detected above MCL/PCL.

[a] Cleanup goal is MCL except for perchlorate. For perchlorate, Texas Risk Reduction Program groundwater residential PCL is used.

[b] Only limited data validation possible; Not used in plume delineation.

µg/L - micrograms per liter

J - estimated value; analyte concentration was less than the limit of quantification.

U - Not detected. The analyte was analyzed for, but not detected above the limit of detection.

COC - contaminants of concern

ID - identifier

MCL - maximum contaminant level

NA - not analyzed

PCL - Texas residential groundwater protective concentration level

Val Qual - validation qualifier

Table 2-5
Historical COC Concentrations, LHAAP-50

	Sample ID	50WW27-181203-FD		50WW27-190523		50WW27-191108		50WW28-070914		50WW28-111214		50WW28-021715		50WW28FD-021715		50WW28-052615		50WW28FD-052615	
	Sample Date	12/3/2018		5/23/2019		11/8/2019		7/9/2014		11/12/2014		2/17/2015		2/17/2015		5/26/2015		5/26/2015	
	Well Completion Zone	Lower Shallow		Lower Shallow		Lower Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow	
Analyte	Units	MCL/PCL [a]	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Perchlorate	µg/L	17	< 4	U	< 4	U	2	U	2.57		2.01	J	1.44		1.44		1.04		1.05	
1,1-Dichloroethene	µg/L	7	< 0.5	U	< 0.5	U	0.5	U	<1	U	<1	U	<1	U	<1	U	<1	U	<1	U
1,2-Dichloroethane	µg/L	5	< 0.5	U	< 0.5	U	0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U
cis-1,2-Dichloroethene	µg/L	70	< 0.5	U	0.74	J	0.92	J	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U
Tetrachloroethene	µg/L	5	< 0.5	U	< 0.5	U	0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U
Trichloroethene	µg/L	5	< 0.5	U	< 0.5	U	0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U
Vinyl Chloride	µg/L	2	0.66	J	< 0.5	U	0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U

Notes:

Blue Highlighting indicates analyte detected above MCL/PCL.

[a] Cleanup goal is MCL except for perchlorate. For perchlorate, Texas Risk Reduction Program groundwater residential PCL is used.

[b] Only limited data validation possible; Not used in plume delineation.

µg/L - micrograms per liter

J - estimated value; analyte concentration was less than the limit of quantification.

U - Not detected. The analyte was analyzed for, but not detected above the limit of detection.

COC - contaminants of concern

ID - identifier

MCL - maximum contaminant level

NA - not analyzed

PCL - Texas residential groundwater protective concentration level

Val Qual - validation qualifier

Table 2-5
Historical COC Concentrations, LHAAP-50

Sample ID			50WW28-082015		50WW28-051116		50WW28-111315		50WW29-191111		GPW1-021715		GPW1-050815		GPW1-052215		GPW1-111315		GPW1-2/11/2016		GPW1-5/13/2016	
Sample Date			8/20/2015		5/11/2016		11/13/2015		11/11/2019		2/17/2015		5/8/2015		5/22/2015		11/13/2015					
Well Completion Zone			Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water	
Analyte	Units	MCL/PCL [a]	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Perchlorate	µg/L	17	0.688		1.12		1.64		2	U	0.737		0.156	J	0.213	J	0.139	J	0.447		6.59	
1,1-Dichloroethene	µg/L	7	<1	U	1	U	<1	U	0.5	U	<1	U	<1	U	<1	U	<1	U	NA		NA	
1,2-Dichloroethane	µg/L	5	<0.5	U	0.5	U	<0.5	U	0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	NA		NA	
cis-1,2-Dichloroethene	µg/L	70	<0.5	U	0.5	U	<0.5	U	0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	NA		NA	
Tetrachloroethene	µg/L	5	<0.5	U	0.5	U	<0.5	U	0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	NA		NA	
Trichloroethene	µg/L	5	<0.5	U	0.5	U	<0.5	U	0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	NA		NA	
Vinyl Chloride	µg/L	2	<0.5	U	0.5	U	<0.5	U	0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	NA		NA	

Notes:

Blue Highlighting indicates analyte detected above MCL/PCL.

[a] Cleanup goal is MCL except for perchlorate. For perchlorate, Texas Risk Reduction Program groundwater residential PCL is used.

[b] Only limited data validation possible; Not used in plume delineation.

µg/L - micrograms per liter

J - estimated value; analyte concentration was less than the limit of quantification.

U - Not detected. The analyte was analyzed for, but not detected above the limit of detection.

COC - contaminants of concern

ID - identifier

MCL - maximum contaminant level

NA - not analyzed

PCL - Texas residential groundwater protective concentration level

Val Qual - validation qualifier

Table 2-5
Historical COC Concentrations, LHAAP-50

Sample ID			GPW1-081016		GPW1-111316		GPW1A-021715		GPW1A-050815		GPW1A-021116		GPW1A-050116		GPW1A-081016		GPW1A-110116		[illegible] 941209		[illegible] 960212	
Sample Date			8/1/2016		11/13/2016		2/17/2015		5/8/2015		2/11/2016		5/1/2016		8/1/16		11/1/2016		12/9/1994		2/12/1996	
Well Completion Zone			Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Upper Shallow		Upper Shallow	
Analyte	Units	MCL/PCL [a]	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Perchlorate	µg/L	17	0.162	J	0.301	J	38.2		16		NA		NA		0.137	J	NA		NA		NA	
1,1-Dichloroethene	µg/L	7	NA		NA		<1	U	<1	U	NA		NA		NA		NA		<5	U	NA	
1,2-Dichloroethane	µg/L	5	NA		NA		<0.5	U	<0.5	U	NA		NA		NA		NA		<5	U	NA	
cis-1,2-Dichloroethene	µg/L	70	NA		NA		<0.5	U	<0.5	U	NA		NA		NA		NA		NA		NA	
Tetrachloroethene	µg/L	5	NA		NA		<0.5	U	<0.5	U	NA		NA		NA		NA		<5	U	NA	
Trichloroethene	µg/L	5	NA		NA		<0.5	U	<0.5	U	NA		NA		NA		NA		12		11	
Vinyl Chloride	µg/L	2	NA		NA		<0.5	U	<0.5	U	NA		NA		NA		NA		NA		NA	

Notes:

Blue Highlighting indicates analyte detected above MCL/PCL.

[a] Cleanup goal is MCL except for perchlorate, Texas Risk Reduction Program groundwater residential PCL is used.

[b] Only limited data validation possible; Not used in plume delineation.

µg/L - micrograms per liter

J - estimated value; analyte concentration was less than the limit of quantification.

U - Not detected. The analyte was analyzed for, but not detected above the limit of detection.

COC - contaminants of concern

ID - identifier

MCL - maximum contaminant level

NA - not analyzed

PCL - Texas residential groundwater protective concentration level

Val Qual - validation qualifier

Table 2-5
Historical COC Concentrations, LHAAP-50

Sample ID			LHSMW54-960821		LHSMW54-980520		LHSMW54-000521		LHSMW54-020309		LHSMW54-020921		LHSMW54-100806		LHSMW54-101707		LHSMW54-110713	
Sample Date			8/21/1996		5/20/1998		5/21/2000		3/9/2002		9/21/2002		8/6/2010		10/17/2007		11/7/2013	
Well Completion Zone			Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow		Upper Shallow	
Analyte	Units	MCL/PCL [a]	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Perchlorate	µg/L	17	NA		NA		<1	U	<4	U	<4	U	<0.2	U	<1	U	<0.2	U
1,1-Dichloroethene	µg/L	7	<0.2	U	<1	U	NA		NA		NA		<2.5	U	<1	U	<1	U
1,2-Dichloroethane	µg/L	5	<0.31	U	<1	U	NA		NA		NA		<2.5	U	<1	U	<0.5	U
cis-1,2-Dichloroethene	µg/L	70	<0.2	U	0.7		NA		NA		NA		0.657	J	1.59		0.392	J
Tetrachloroethene	µg/L	5	<0.25	U	<1	U	NA		NA		NA		<2.5	U	<1	U	<0.5	U
Trichloroethene	µg/L	5	15.7		210		NA		NA		NA		369		601		112	
Vinyl Chloride	µg/L	2	<0.24	U	<1	U	NA		NA		NA		<2.5	U	<1	U	<0.5	U

Notes:

Blue Highlighting indicates analyte detected above MCL/PCL.

[a] Cleanup goal is MCL except for perchlorate. For perchlorate, Texas Risk Reduction Program groundwater residential PCL is used.

[b] Only limited data validation possible; Not used in plume delineation.

µg/L - micrograms per liter

J - estimated value; analyte concentration was less than the limit of quantification.

U - Not detected. The analyte was analyzed for, but not detected above the limit of detection.

COC - contaminants of concern

ID - identifier

MCL - maximum contaminant level

NA - not analyzed

PCL - Texas residential groundwater protective concentration level

Val Qual - validation qualifier

Table 2-5
Historical COC Concentrations, LHAAP-50

	Sample ID	LHSMW54-021815		LHSMW54-052715		LHSMW54-111315	
	Sample Date	2/18/2015		5/27/2015		11/13/2015	
	Well Completion Zone	Upper Shallow		Upper Shallow		Upper Shallow	
Analyte	Units	MCL/PCL [a]	Result	Val Qual	Result	Val Qual	Result	Val Qual
Perchlorate	µg/L	17	0.271	J	<0.2	U	<1	UJ
1,1-Dichloroethene	µg/L	7	<1	U	<1	U	<1	U
1,2-Dichloroethane	µg/L	5	<0.5	U	<0.5	U	<0.5	U
cis-1,2-Dichloroethene	µg/L	70	0.316	J	0.261	J	0.323	J
Tetrachloroethene	µg/L	5	<0.5	U	<0.5	U	<0.5	U
Trichloroethene	µg/L	5	93.8		95.9		88.3	
Vinyl Chloride	µg/L	2	<0.5	U	<0.5	U	<0.5	U

Notes:

Blue Highlighting indicates analyte detected above MCL/PCL.

[a] Cleanup goal is MCL except for perchlorate, Texas Risk Reduction Program groundwater residential PCL is used.

[b] Only limited data validation possible; Not used in plume delineation.

µg/L - micrograms per liter

J - estimated value; analyte concentration was less than the limit of quantification.

U - Not detected. The analyte was analyzed for, but not detected above the limit of detection.

COC - contaminants of concern

ID - identifier

MCL - maximum contaminant level

NA - not analyzed

PCL - Texas residential groundwater protective concentration level

Val Qual - validation qualifier

Table 4
Historical Monitoring Well COC Concentrations
LHAAP-58, Longhorn Army Ammunition Plan, Karnack, Texas
Year 7 RA(O) Report

Sample Identification: / Sample Date:	Units	MCL	03WW01-11/24/2008		03WW01-5/9/2011		03WW01-082013 8/20/2013		03WW01-101013 10/10/2013		03WW01-12914 1/29/2014		03WW01-052114 5/21/2014		03WW01-102814 10/28/2014		03WW01-012115 1/21/2015		03WW01-041515 4/15/2015		03WW01-070815 7/8/2015		03WW01-100815 10/8/2015		03WW01-041316 4/13/2016		03WW01-100416 10/4/2016		03WW01-111517 11/15/2017	
1,1-DICHLOROETHENE	µg/L	7	<20	U	<2.5	U	<2	U	<5	U	<10	U	<10	U	<100	U	<100	U	<50	U	<100	U	<100	U	<25	U	<10	U	<2.5	U
CIS-1,2-DICHLOROETHENE	µg/L	70	<20	U	1.1		0.978		<2.5	U	<5	U	3.3		<50	U	<50	U	21.4		<50	U	<50	U	117		<5	U	<2.5	U
TETRACHLOROETHENE	µg/L	5	2,570		418		368		172		172		154		48.6		32.8		15.9		31.4		36.4		6.49		<5	U	<2.5	U
TRANS-1,2-DICHLOROETHENE	µg/L	100	<20	U	<2.5	U	<1	U	<2.5	U	<5	U	<5	U	<50	U	<50	U	<25	U	<50	U	<50	U	<12.5	U	<5	U	<2.5	U
TRICHLOROETHENE	µg/L	5	196		69.1		94.8		42.1		58.4		71.2		223		216		131		65.6		51.8		<12.5	U	<5	U	<2.5	U
VINYL CHLORIDE	µg/L	2	<20	U	<2.5	U	<1	U	<2.5	U	<5	U	<5	U	<50	U	<50	U	<25	U	<50	U	<50	U	<12.5	U	<5	U	<2.5	U

Notes:
Blue Highlighting Indicates Analyte Detected Above MCL
µg/L - micrograms per liter
MCL - Maximum Contaminant Level
NA - not analyzed
J - Estimated value; analyte concentration was less than the limit of quantification
U - Analyte was not detected.
UJ - The analysis was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample. 'UJ' not detects are not definite; the analyte may be present.

Table 4
Historical Monitoring Well COC Concentrations
LHAAP-58, Longhorn Army Ammunition Plan, Karnack, Texas
Year 7 RA(O) Report

Sample Identification: / Sample Date:	Units	MCL	03WW01-071818 7/18/2018		03WW01_121218 12/12/2018		03WW01_060419 6/4/2019		03WW01_121819 12/18/2019		03WW01_062320 6/23/2020		03WW01_120120 12/1/20		03WW01_060221 6/02/21		03WW01_060622 6/06/22		35ASW03-101713 10/17/2013		35ASW03-020314 2/3/2014		35ASW03-052814 5/28/2014		35ASW03-012315 1/23/2015		35ASW03-041015 4/10/2015	
1,1-DICHLOROETHENE	µg/L	7	<0.5	U	<0.5	U	<2.5	U	<5.0	U	< 2.5	U	< 5.0	U	< 5.0	U	< 0.5	U	<1	U	<1	U	<1	U	<1	U	<1	U
CIS-1,2-DICHLOROETHENE	µg/L	70	5.3		22		41		14		17		7.2	J	11		7.3		<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U
TETRACHLOROETHENE	µg/L	5	<0.5	U	15		3.2		<5.0	U	4.5	J	< 5.0	U	11		9.9		<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U
TRANS-1,2-DICHLOROETHENE	µg/L	100	<0.5	U	<0.5	U	<2.5	U	<5.0	U	< 2.5	U	< 5.0	U	< 5.0	U	0.74	J	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U
TRICHLOROETHENE	µg/L	5	<0.5	U	5.7		2.9		<5.0	U	4.5	J	24		3.0		10		<0.5	U	<0.5	U	<0.5	U	<0.5	U	0.259	J
VINYL CHLORIDE	µg/L	2	4.8		7.6		11		5.4	J	7.2		< 5.0	U	1.6		<0.50	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U

Notes:
Blue Highlighting Indicates Analyte Detected Above MCL
µg/L - micrograms per liter
MCL - Maximum Contaminant Level
NA - not analyzed
J - Estimated value; analyte concentration was less than the limit of quantification
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Table 4
Historical Monitoring Well COC Concentrations
LHAAP-58, Longhorn Army Ammunition Plan, Karnack, Texas
Year 7 RA(O) Report

Sample Identification: / Sample Date:	Units	MCL	35ASW03-041316 4/13/2016	35ASW03_060321 6/03/21	35AWW01-981108 11/8/1998	35AWW01-981108FD 11/8/1998	35AWW01-040909 9/9/2004	35AWW01-020608 2/6/2008	35AWW01-111908 11/19/2008	35AWW01-101113 10/11/2013	35AWW01-013114 1/31/2014	35AWW01FD-013114 1/31/2014	35AWW01-052914 5/29/2014	35AWW01-103114 10/31/2014
1,1-DICHLOROETHENE	µg/L	7	<1 U	<1 U	<1 U	<1 U	<5 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U
CIS-1,2-DICHLOROETHENE	µg/L	70	<0.5 U	<0.5 U	<1 U	<1 U	<5 U	<1 U	<1 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
TETRACHLOROETHENE	µg/L	5	<0.5 U	<0.5 U	<1 U	<1 U	<5 U	<1 U	<1 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
TRANS-1,2-DICHLOROETHENE	µg/L	100	<0.5 U	<0.5 U	<1 U	<1 U	<5 U	<1 U	<1 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
TRICHLOROETHENE	µg/L	5	<0.5 U	<0.5 U	<1 U	<1 U	<5 U	<1 U	<1 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
VINYL CHLORIDE	µg/L	2	<0.5 U	<0.5 U	<1 U	<1 U	<5 U	<1 U	<1 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U

Notes:
Blue Highlighting Indicates Analyte Detected Above MCL
µg/L - micrograms per liter
MCL - Maximum Contaminant Level
NA - not analyzed
J - Estimated value; analyte concentration was less than the limit of quantification
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Table 4
Historical Monitoring Well COC Concentrations
LHAAP-58, Longhorn Army Ammunition Plan, Karnack, Texas
Year 7 RA(O) Report

Sample Identification: / Sample Date:	Units	MCL	35AWW01-012715 1/27/2015	35AWW01-041015 4/10/2015	35AWW01FD-041015 4/10/2015	35AWW01-071015 7/10/2015	35AWW01FD-071015 7/10/2015	35AWW01-100615 10/6/2015	35AWW01FD-100615 10/6/2015	35AWW01-041216 4/12/2016	35AWW01FD-041216 4/12/2016	35AWW01-100516 10/5/2016	35WW01-111617 11/16/2017	35AWW01-070218 7/2/2018
1,1-DICHLOROETHENE	µg/L	7	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<0.5 U	<0.5 UJ
CIS-1,2-DICHLOROETHENE	µg/L	70	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 UJ
TETRACHLOROETHENE	µg/L	5	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
TRANS-1,2-DICHLOROETHENE	µg/L	100	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
TRICHLOROETHENE	µg/L	5	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
VINYL CHLORIDE	µg/L	2	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 UJ

Notes:
Blue Highlighting Indicates Analyte Detected Above MCL
µg/L - micrograms per liter
MCL - Maximum Contaminant Level
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Table 4
Historical Monitoring Well COC Concentrations
LHAAP-58, Longhorn Army Ammunition Plan, Karnack, Texas
Year 7 RA(O) Report

Sample Identification: / Sample Date:	Units	MCL	35AWW01_121 318 12/13/2018	35AWW01_061 019 6/10/2019	35AWW01_122 019 12/20/2019	35AWW01_06 2520 6/25/2020	35AWW01_06 2520-a 6/25/2020	35AWW01_120 720 12/7/20	35AWW01_06 0121 6/01/21	35AWW01_06 0121-a 6/01/21	35AWW01_0606 22 6/06/22	35AWW01_060 622-a 6/06/22	35AWW02- 981108 11/8/1998	35AWW02- 040910 9/10/2004	35AWW02- 112608 11/26/2008	35AWW02- 112608-FD 11/26/2008
1,1-DICHLOROETHENE	µg/L	7	<0.5 U	<0.5 U	<0.5 UJ	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1 U	<5 U	<1 U	<1 U
CIS-1,2-DICHLOROETHENE	µg/L	70	<0.5 U	<0.5 U	<0.5 UJ	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1 U	<5 U	<1 U	<1 U
TETRACHLOROETHENE	µg/L	5	<0.5 U	<0.5 U	<0.5 UJ	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1 U	<5 U	<1 U	<1 U
TRANS-1,2-DICHLOROETHENE	µg/L	100	<0.5 U	<0.5 U	<0.5 UJ	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1 U	<5 U	<1 U	<1 U
TRICHLOROETHENE	µg/L	5	<0.5 U	<0.5 U	<0.5 UJ	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1 U	<5 U	<1 U	<1 U
VINYL CHLORIDE	µg/L	2	<0.5 U	<0.5 U	<0.5 UJ	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1 U	<5 U	<1 U	<1 U

Notes:
Blue Highlighting Indicates Analyte Detected Above MCL
µg/L - micrograms per liter
MCL - Maximum Contaminant Level
NA - not analyzed
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Table 4
Historical Monitoring Well COC Concentrations
LHAAP-58, Longhorn Army Ammunition Plan, Karnack, Texas
Year 7 RA(O) Report

Sample Identification: / Sample Date:	Units	MCL	35AWW02-102213 10/22/2013	35AWW05-040908 9/8/2004	35AWW05-112108 11/21/2008	35AWW05-101613 10/16/2013	35AWW05-020114 2/1/2014	35AWW05-052214 5/22/2014	35AWW05FD-052214 5/22/2014	35AWW05-102114 10/21/2014	35AWW05-012315 1/23/2015	35AWW05FD-012315 1/23/2015	35AWW05-040815 4/8/2015	35AWW05-071015 7/10/2015
1,1-DICHLOROETHENE	µg/L	7	<1 U	<5 U	0.551 J	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U
CIS-1,2-DICHLOROETHENE	µg/L	70	<0.5 U	<5 U	<1 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
TETRACHLOROETHENE	µg/L	5	<0.5 U	<5 U	<1 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
TRANS-1,2-DICHLOROETHENE	µg/L	100	<0.5 U	<5 U	<1 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
TRICHLOROETHENE	µg/L	5	<0.5 U	<5 U	<1 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
VINYL CHLORIDE	µg/L	2	<0.5 U	<5 U	<1 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U

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µg/L - micrograms per liter
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Table 4
Historical Monitoring Well COC Concentrations
LHAAP-58, Longhorn Army Ammunition Plan, Karnack, Texas
Year 7 RA(O) Report

Sample Identification: / Sample Date:	Units	MCL	35AWW05-100515 10/2/2015	35AWW05-041416 4/14/2016	35AWW05-100516 10/5/2016	35AWW05-111317 11/13/2017	35AWW05-070218 7/2/2018	35AWW05-070218_a 7/2/2018	35AWW05_121218 12/12/2018	35AWW05_061019 6/10/2019	35AWW05_120320 12/3/20	35AWW05_060221 6/02/21	35AWW05_120221 12/2/21	35AWW05_060922 6/09/22	35AWW06-120308 12/3/2008	35AWW06-110509 5/9/2011
1,1-DICHLOROETHENE	µg/L	7	<1 U	<1 U	<1 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	57.6	21.3
CIS-1,2-DICHLOROETHENE	µg/L	70	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	0.37 J	<1 U
TETRACHLOROETHENE	µg/L	5	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	7.19	<1 U
TRANS-1,2-DICHLOROETHENE	µg/L	100	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1 U	<1 U
TRICHLOROETHENE	µg/L	5	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	0.811 J	<1 U
VINYL CHLORIDE	µg/L	2	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1 U	<1 U

Notes:
Blue Highlighting Indicates Analyte Detected Above MCL
µg/L - micrograms per liter
MCL - Maximum Contaminant Level
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Table 4
Historical Monitoring Well COC Concentrations
LHAAP-58, Longhorn Army Ammunition Plan, Karnack, Texas
Year 7 RA(O) Report

Sample Identification: / Sample Date:	Units	MCL	35AWW06-101513 10/15/2013	35AWW06-013014 1/30/2014	35AWW06-052114 5/21/2014	35AWW06-102914 10/29/2014	35AWW06-012815 1/28/2015	35AWW06-041515 4/15/2015	35AWW06-070715 7/7/2015	35AWW06-100715 10/7/2015	35AWW06-041116 4/11/2016	35AWW06-100316 10/3/2016	35AWW06-111417 11/14/2017	35AWW06-71818 7/18/2018
1,1-DICHLOROETHENE	µg/L	7	15.8	14.2	12	16	13.5	4.17	18.6	12.8	13	7.48	3.9	<0.5 UJ
CIS-1,2-DICHLOROETHENE	µg/L	70	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 UJ
TETRACHLOROETHENE	µg/L	5	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 UJ
TRANS-1,2-DICHLOROETHENE	µg/L	100	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 UJ
TRICHLOROETHENE	µg/L	5	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 UJ
VINYL CHLORIDE	µg/L	2	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 UJ

Notes:
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LHAAP-58, Longhorn Army Ammunition Plan, Karnack, Texas
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Sample Identification: Sample Date:	Units	MCL	35AWW06_092 618 9/26/2018	35AWW06_121 118 12/11/2018	35AWW06_031 919 03/19/2019	35AWW06_031 919_a 03/19/2019	35AWW06_060 419 6/4/2019	35AWW06_091 119 9/11/2019	35AWW06_091 119_a 9/11/2019	35AWW06_121 919 12/19/2019	35AWW06_032 420 03/24/2020	35AWW06_062 420 6/24/2020	35AWW06_120 120 12/1/20	35AWW06_060 321 6/03/21	35AWW06_12 0121 12/1/21	35AWW06_06 0822 6/08/22	35AWW07R- 101613 10/16/2013
1,1-DICHLOROETHENE	µg/L	7	<0.5 U	3.4	<0.5 U	1.4	<0.5 U	0.92 J	0.88 J	<0.5 UJ	0.78 J	0.99 J	0.78 J	0.9 J	1.4	1 J	<1 U
CIS-1,2-DICHLOROETHENE	µg/L	70	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 UJ	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	0.709 J
TETRACHLOROETHENE	µg/L	5	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 UJ	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	0.586 J
TRANS-1,2-DICHLOROETHENE	µg/L	100	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 UJ	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
TRICHLOROETHENE	µg/L	5	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 UJ	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	1.03
VINYL CHLORIDE	µg/L	2	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 UJ	<0.5 U	0.51 J	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U

Notes:
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µg/L - micrograms per liter
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Table 4
Historical Monitoring Well COC Concentrations
LHAAP-58, Longhorn Army Ammunition Plan, Karnack, Texas
Year 7 RA(O) Report

Sample Identification: / Sample Date:	Units	MCL	35AWW08-112408 11/24/2008		35AWW08-110509 5/9/2011		35AWW08-082013 8/20/2013		35AWW08-101013 10/10/2013		35AWW08-012914 1/29/2014		35AWW08-052014 5/20/2014		35AWW08-102714 10/27/2014		35AWW08-012115 1/21/2015		35AWW08-041515 4/15/2015		35AWW08-070815 7/8/2015	
1,1-DICHLOROETHENE	µg/L	7	<100	U	<25	U	<10	U	<10	U	<10	U	<10	U	<50	U	<50	U	<50	U	<100	U
CIS-1,2-DICHLOROETHENE	µg/L	70	<100	U	13.4	J	9.35	J	<5	U	55.9		47.2		38.6	J	27.2	J	30.7	J	73.5	J
TETRACHLOROETHENE	µg/L	5	9,590		6,480		1,640		603	J	599		204		112		119		110		110	
TRANS-1,2-DICHLOROETHENE	µg/L	100	<100	U	<25	U	<5	U	<5	U	<5	U	2.82	J	<25	U	<25	U	<25	U	<50	U
TRICHLOROETHENE	µg/L	5	675		1,150		544		149	J	895		953		653		491		607		746	
VINYL CHLORIDE	µg/L	2	<100	U	<25	U	<5	U	<5	U	<5	U	<5	U	<25	U	<25	U	<25	U	<50	U

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J - Estimated value; analyte concentration was less than the limit of quantification
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Table 4
Historical Monitoring Well COC Concentrations
LHAAP-58, Longhorn Army Ammunition Plan, Karnack, Texas
Year 7 RA(O) Report

Sample Identification: / Sample Date:	Units	MCL	35AWW08-100815 10/8/2015		35AWW08-041316 4/13/2016		35AWW08-100416 10/4/2016		35AWW08-111517 11/15/2017		35AWW08-071818 7/18/2018		35AWW08-111517 12/12/2018		35AWW08-071818 6/4/2019		35AWW08_121819 12/18/2019		35AWW08_062320 6/23/2020		35AWW08_120120 12/1/20		35AWW08_060221 6/02/21		35AWW08_060622 6/06/22		35AWW09-082913 8/29/2013	
1,1-DICHLOROETHENE	µg/L	7	<25	U	<25	U	<10	U	<5	U	<2.5	UJ	<0.5	U	<2.5	U	< 5.0	U	< 2.5	U	< 5.0	U	< 12	U	< 2.5	U	<1	U
CIS-1,2-DICHLOROETHENE	µg/L	70	79.6		60.9		41.7		38		12	J	8.9	J	<2.5	U	< 5.0	U	7.3		18		30		< 2.5	U	<0.5	U
TETRACHLOROETHENE	µg/L	5	79		80.1		36.9		12		<2.5	UJ	< 5.0	U	4.8	J	< 5.0	U	6.7		< 5.0	U	< 25	U	< 5.0	U	21.9	
TRANS-1,2-DICHLOROETHENE	µg/L	100	<12.5	U	<12.5	U	<5	U	<5	U	<2.5	U	<0.5	U	<2.5	U	< 5.0	U	4.5	J	< 5.0	U	< 12	U	3.9	J	<0.5	U
TRICHLOROETHENE	µg/L	5	581		234		235		33		19	J	12		13		< 5.0	U	17		< 5.0	U	53		< 2.5	U	11.9	
VINYL CHLORIDE	µg/L	2	<12.5	U	14.2	J	7.46	J	<5	U	9.0	J	<0.5	U	<2.5	U	< 5.0	U	<2.5	U	6.1	J	24	J	< 2.5	U	<0.5	U

Notes:
Blue Highlighting Indicates Analyte Detected Above MCL
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Table 4
Historical Monitoring Well COC Concentrations
LHAAP-58, Longhorn Army Ammunition Plan, Karnack, Texas
Year 7 RA(O) Report

Sample Identification: / Sample Date:	Units	MCL	35AWW09-101013 10/10/2013		35AWW09-012914 1/29/2014		35AWW09-052014 5/20/2014		35AWW09-102714 10/27/2014		35AWW09-012115 1/21/2015		35AWW09-041415 4/14/2015		35AWW09-070715 7/7/2015		35AWW09-100715 10/7/2015		35AWW09-041216 4/12/2016		35AWW09-100316 10/3/2016		35AWW09-111517 11/15/2017		35AWW09-071618 7/12/2018	
1,1-DICHLOROETHENE	µg/L	7	<1	UJ	<1	U	<1	U	<1	U	<1	U	<1	U	<1	U	<1	U	<1	U	<1	U	<0.5	U	2.7	
CIS-1,2-DICHLOROETHENE	µg/L	70	<0.5	UJ	0.317	J	0.502	J	0.703	J	0.486	J	0.483	J	0.622	J	0.717	J	0.515	J	0.437	J	0.78	J	0.94	J
TETRACHLOROETHENE	µg/L	5	57.6	J	125		128		254		183		155		194		283		172		173		450		130	
TRANS-1,2-DICHLOROETHENE	µg/L	100	<0.5	UJ	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U
TRICHLOROETHENE	µg/L	5	8.97	J	37.3		41.7		93		64.3		45		59.5		81.3		55.7		48.2		150		38	
VINYL CHLORIDE	µg/L	2	<0.5	UJ	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U

Notes:
Blue Highlighting Indicates Analyte Detected Above MCL
µg/L - micrograms per liter
MCL - Maximum Contaminant Level
NA - not analyzed
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Historical Monitoring Well COC Concentrations
LHAAP-58, Longhorn Army Ammunition Plan, Karnack, Texas
Year 7 RA(O) Report

Sample Identification: / Sample Date:	Units	MCL	35AWW09_121 118 12/11/2018		35AWW09_060 319 6/3/2019		35AWW09_121 819 12/18/2019		35AWW09_062 320 6/23/2020		35AWW09_120 720 12/7/20		35AWW09_060 221 6/02/21		35AWW09_060 221-a 6/02/21		35AWW09_06 0622 6/06/22		35AWW10- 082913 8/29/2013		35AWW10- 101013 10/10/2013		35AWW10- 012914 1/29/2014		35AWW10- 052014 5/20/2014		35AWW10- 102814 10/28/2014	
1,1-DICHLOROETHENE	µg/L	7	<0.5	U	<0.5	U	<0.5	U	<0.5	U	< 5.0	U	< 5.0	U	< 5.0	U	< 5.0	U	<1	U	<1	U	<1	U	<1	U	<1	U
CIS-1,2-DICHLOROETHENE	µg/L	70	0.94	J	<0.5	U	1.1		1.1		1.1		0.88	J	0.89	J	1.1		<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U
TETRACHLOROETHENE	µg/L	5	150		130		500		440		370		350		310		380		<0.5	U	<0.5	U	<0.5	U	<0.5	U	0.401	J	<0.5	U
TRANS-1,2-DICHLOROETHENE	µg/L	100	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U
TRICHLOROETHENE	µg/L	5	150		38		160		140		140		130	J	130	J	140		<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U
VINYL CHLORIDE	µg/L	2	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U

Notes:
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Table 4
Historical Monitoring Well COC Concentrations
LHAAP-58, Longhorn Army Ammunition Plan, Karnack, Texas
Year 7 RA(O) Report

Sample Identification: / Sample Date:	Units	MCL	35AWW10-012715 1/27/2015	35AWW10-041415 4/14/2015	35AWW10-070715 7/7/2015	35AWW10-100715 10/7/2015	35AWW10-041316 4/13/2016	35AWW10-100316 10/3/2016	35AWW10-111517 11/15/2017	35AWW10-071218 07/12/2018	35AWW10_121218 12/12/18	35AWW10_121218_a 12/12/2018	35AWW10_060419 6/4/2019	35AWW10_060419_a 6/4/2019
1,1-DICHLOROETHENE	µg/L	7	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
CIS-1,2-DICHLOROETHENE	µg/L	70	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
TETRACHLOROETHENE	µg/L	5	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
TRANS-1,2-DICHLOROETHENE	µg/L	100	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
TRICHLOROETHENE	µg/L	5	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
VINYL CHLORIDE	µg/L	2	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U

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LHAAP-58, Longhorn Army Ammunition Plan, Karnack, Texas
Year 7 RA(O) Report

Sample Identification: / Sample Date:	Units	MCL	35AWW10_121919 12/19/2019	35AWW10_121919-a 12/19/2019	35AWW10_062920 6/29/2020	35AWW10_120720 12/7/20	35AWW10_120720-a 12/7/20	35AWW10_060121 6/01/21	35AWW10_060622 6/06/22	35AWW11-101513 10/15/2013	35AWW11-020314 2/3/2014	35AWW11-052114 5/21/2014	35AWW11-102914 10/29/2014	35AWW11-012715 1/27/2015	35AWW11-041415 4/14/2015
1,1-DICHLOROETHENE	µg/L	7	<0.5 UJ	<0.5 UJ	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	7.7	10.1	11.6	21.9	12.5	13.5
CIS-1,2-DICHLOROETHENE	µg/L	70	<0.5 UJ	<0.5 UJ	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
TETRACHLOROETHENE	µg/L	5	<0.5 UJ	<0.5 UJ	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
TRANS-1,2-DICHLOROETHENE	µg/L	100	<0.5 UJ	<0.5 UJ	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
TRICHLOROETHENE	µg/L	5	<0.5 UJ	<0.5 UJ	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
VINYL CHLORIDE	µg/L	2	<0.5 UJ	<0.5 UJ	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	0.442 J	<0.5 U	<0.5 U	0.369 J	<0.5 U	0.273 J

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Table 4
Historical Monitoring Well COC Concentrations
LHAAP-58, Longhorn Army Ammunition Plan, Karnack, Texas
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Sample Identification: / Sample Date:	Units	MCL	35AWW11-070815 7/8/2015		35AWW11-100715 10/7/2015		35AWW11-041216 4/12/2016		35AWW11-100316 10/3/2016		35AWW11-111417 11/14/2017		35AWW11-071618 07/16/2018		35AWW11_092718 9/27/2018		35AWW11_121118 12/11/2018		35AWW11_031919 03/19/2019		35AWW11_060319 6/3/2019		35AWW11_091119 9/11/2019		35AWW11_121819 12/18/2019	
1,1-DICHLOROETHENE	µg/L	7	16.8		14.7		21.3		16		12		9		2.3		1.6		<0.5	U	<0.5	U	<0.5	U	<0.5	U
CIS-1,2-DICHLOROETHENE	µg/L	70	0.292	J	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U
TETRACHLOROETHENE	µg/L	5	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U
TRANS-1,2-DICHLOROETHENE	µg/L	100	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U
TRICHLOROETHENE	µg/L	5	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U
VINYL CHLORIDE	µg/L	2	<0.5	U	<0.5	U	0.532	J	0.328	J	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U

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LHAAP-58, Longhorn Army Ammunition Plan, Karnack, Texas
Year 7 RA(O) Report

Sample Identification: / Sample Date:	Units	MCL	35AWW11_032420 03/24/2020	35AWW11_032420-a 03/24/2020	35AWW11_062320 6/23/2020	35AWW11_120120 12/1/20	35AWW11_120120_a 12/1/20	35AWW11_060221 6/02/21	35AWW11_120121 12/1/21	35AWW11_060822 6/08/22	35AWW12-101813 10/18/2013	35AWW12FD-101813 10/18/2013	35AWW12-013114 1/31/2014	35AWW12FD-013114 1/31/2014	35AWW12-052914 5/29/2014	35AWW12-103014 10/30/2014
1,1-DICHLOROETHENE	µg/L	7	<0.5 U	<0.5 U	<0.5 U	0.53 J	<0.5 U	0.62 J	1.5	2.1 J	<0.5 U	<1 U	<1 U	<1 U	<1 U	<1 U
CIS-1,2-DICHLOROETHENE	µg/L	70	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
TETRACHLOROETHENE	µg/L	5	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1.0 U	<1.0 U	<1.0 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	0.343 J
TRANS-1,2-DICHLOROETHENE	µg/L	100	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
TRICHLOROETHENE	µg/L	5	1.4	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
VINYL CHLORIDE	µg/L	2	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U

Notes:
Blue Highlighting Indicates Analyte Detected Above MCL
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LHAAP-58, Longhorn Army Ammunition Plan, Karnack, Texas
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Sample Identification: Sample Date:	Units	MCL	35AWW12-012815 1/28/2015	35AWW12-040715 4/7/2015	35AWW12FD-040715 4/7/2015	35AWW12-070915 7/9/2015	35AWW12-100515 10/5/2015	35AWW12FD-100515 10/5/2015	35AWW12-041216 4/12/2016	35AWW12-100516 10/5/2016	35AWW12FD-100516 10/5/2016	35AWW12-111617 11/16/2017	35AWW12-062918 06/29/2018	35AWW12_121418 12/14/2018
1,1-DICHLOROETHENE	µg/L	7	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<0.5 U	<0.5 U	<0.5 U
CIS-1,2-DICHLOROETHENE	µg/L	70	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 UJ	<0.5 UJ	<0.5 U
TETRACHLOROETHENE	µg/L	5	0.326 J	0.279 J	0.251 J	<0.5 U	0.511 J	0.426 J	<0.5 U	<0.5 U	<0.5 U	<0.5 UJ	<0.5 UJ	<0.5 U
TRANS-1,2-DICHLOROETHENE	µg/L	100	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 UJ	<0.5 UJ	<0.5 U
TRICHLOROETHENE	µg/L	5	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 UJ	<0.5 UJ	<0.5 U
VINYL CHLORIDE	µg/L	2	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U

Notes:
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Historical Monitoring Well COC Concentrations
LHAAP-58, Longhorn Army Ammunition Plan, Karnack, Texas
Year 7 RA(O) Report

Sample Identification: / Sample Date:	Units	MCL	35AWW12_121418 12/14/2018	35AWW12_061019a 6/10/2019	35AWW12_121819 12/18/2019	35AWW12_062520 6/25/2020	35AWW12_120720 12/7/20	35AWW12_060221 6/02/21	35AWW12_060622 06/06/22	35AWW12_060622-a 6/06/22	35AWW13-101113 10/11/2013	35AWW13FD-101113 10/11/2013	35AWW13-020314 2/3/2014	35AWW13-052214 5/22/2014	35AWW13-102114 10/21/2014	35AWW13FD-102114 10/21/2014
1,1-DICHLOROETHENE	µg/L	7	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U
CIS-1,2-DICHLOROETHENE	µg/L	70	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
TETRACHLOROETHENE	µg/L	5	<0.5 U	<0.5 U	<0.5 U	<1.0 U	<0.5 U	<1.0 U	<0.5 U	<1.0 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
TRANS-1,2-DICHLOROETHENE	µg/L	100	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
TRICHLOROETHENE	µg/L	5	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
VINYL CHLORIDE	µg/L	2	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U

Notes:
Blue Highlighting Indicates Analyte Detected Above MCL
µg/L - micrograms per liter
MCL - Maximum Contaminant Level
NA - not analyzed
J - Estimated value; analyte concentration was less than the limit of quantification
U - Analyte was not detected.
UJ - The analysis was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample. 'UJ' not detects are not definite; the analyte may be present.

Table 4
Historical Monitoring Well COC Concentrations
LHAAP-58, Longhorn Army Ammunition Plan, Karnack, Texas
Year 7 RA(O) Report

Sample Identification: / Sample Date:	Units	MCL	35AWW13-012315 1/23/2015		35AWW13-040815 4/8/2015		35AWW13-070915 7/9/2015		35AWW13-100615 10/6/2015		35AWW13-041316 4/13/2016		35AWW13-100616 10/6/2016		35AWW13-111617 11/16/2017		35AWW13-062818 06/29/2018		35AWW13_121118 12/11/2018		35AWW13_060719 6/7/2019		35AWW13_121819 12/18/2019		35AWW13_062920 6/29/2020	
1,1-DICHLOROETHENE	µg/L	7	<1	U	<1	U	<1	U	<1	U	<1	U	<1	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U
CIS-1,2-DICHLOROETHENE	µg/L	70	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U
TETRACHLOROETHENE	µg/L	5	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U
TRANS-1,2-DICHLOROETHENE	µg/L	100	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U
TRICHLOROETHENE	µg/L	5	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U
VINYL CHLORIDE	µg/L	2	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U

Notes:
Blue Highlighting Indicates Analyte Detected Above MCL
µg/L - micrograms per liter
MCL - Maximum Contaminant Level
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Table 4
Historical Monitoring Well COC Concentrations
LHAAP-58, Longhorn Army Ammunition Plan, Karnack, Texas
Year 7 RA(O) Report

Sample Identification: / Sample Date:	Units	MCL	35AWW13_120720 12/7/20	35AWW13_060121 6/01/21	35AWW13_060622 6/06/22	35AWW14-101813 10/18/2013	35AWW14-013114 1/31/2014	35AWW14-052814 5/28/2014	35AWW14FD-052814 5/28/2014	35AWW14-103014 10/30/2014	35AWW14-012115 1/21/2015	35AWW14-040715 4/7/2015	35AWW14-070915 7/9/2015	35AWW14-100215 10/2/2015	35AWW14-041316 4/13/2016
1,1-DICHLOROETHENE	µg/L	7	<0.5 U	<0.5 U	<0.5 U	1.63 J	1.63 J	1.22 J	1.07 J	1.57 J	1.8 J	1.78 J	1.7 J	2.47	3.25
CIS-1,2-DICHLOROETHENE	µg/L	70	<0.5 U	<0.5 U	<0.5 U	2.04	1.75	1.46	1.47	1.94	1.91	2.08	1.7	1.96	1.78
TETRACHLOROETHENE	µg/L	5	<0.5 U	<1.0 U	<1.0 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
TRANS-1,2-DICHLOROETHENE	µg/L	100	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
TRICHLOROETHENE	µg/L	5	<0.5 U	<0.5 U	<0.5 U	0.663 J	0.669 J	0.612 J	0.565 J	0.806 J	0.707 J	0.786 J	0.632 J	1.06	1.79
VINYL CHLORIDE	µg/L	2	<0.5 U	<0.5 U	<0.5 U	0.272 J	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U

Notes:
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µg/L - micrograms per liter
MCL - Maximum Contaminant Level
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Table 4
Historical Monitoring Well COC Concentrations
LHAAP-58, Longhorn Army Ammunition Plan, Karnack, Texas
Year 7 RA(O) Report

Sample Identification: / Sample Date:	Units	MCL	35AWW14-100616 10/6/2016		35AWW14-111717 11/17/2017		35AWW14-071818 07/18/2018		35AWW14_121318 12/13/2018		35AWW14_060719 6/7/19		35AWW14_121919 12/19/2019		35AWW14_062520 6/25/2020		35AWW14_120720 12/7/20		35AWW14_060121 6/01/21		35AWW14_060622 6/06/22		35AWW15-101613 10/16/2013		35AWW15FD-101613 10/16/2013		35AWW15-020114 2/1/2014	
1,1-DICHLOROETHENE	µg/L	7	10.4		8.7		9.7	J	10		12		15	J	9.3		9.4		10		9.6		<1	U	<1	U	<1	U
CIS-1,2-DICHLOROETHENE	µg/L	70	5.09		3.5		4.0	J	4.6		5.2		3.7	J	4.6		4.5		5.0		5.0		<0.5	U	<0.5	U	<0.5	U
TETRACHLOROETHENE	µg/L	5	<0.5	U	<0.5	U	<0.5	UJ	<0.5	U	<0.5	U	<0.5	UJ	<1.0	U	<0.5	U	<1.0	U	<1.0	U	<0.5	U	<0.5	U	<0.5	U
TRANS-1,2-DICHLOROETHENE	µg/L	100	<0.5	U	<0.5	U	<0.5	UJ	<0.5	U	<0.5	U	<0.5	UJ	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U
TRICHLOROETHENE	µg/L	5	10.2		7.4		8.4	J	9.4		12		11	J	11		11		14		13		<0.5	U	<0.5	U	<0.5	U
VINYL CHLORIDE	µg/L	2	0.303	J	0.303	J	<0.5	UJ	1.3		<0.5	U	0.75	J	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U

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Table 4
Historical Monitoring Well COC Concentrations
LHAAP-58, Longhorn Army Ammunition Plan, Karnack, Texas
Year 7 RA(O) Report

Sample Identification: / Sample Date:	Units	MCL	35AWW15-052814 5/28/2014	35AWW15-102114 10/21/2014	35AWW15-012315 1/23/2015	35AWW15-041015 4/10/2015	35AWW15-071015 7/10/2015	35AWW15-100615 10/6/2015	35AWW15-041416 4/14/2016	35AWW15-100516 10/5/2016	35AWW15-111617 11/16/2017	35AWW15-071818 07/18/2018	35AWW15-071818_a 07/18/2018	35AWW15_121218 12/12/2018
1,1-DICHLOROETHENE	µg/L	7	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<0.5 U	<0.5 UJ	<0.5 UJ	<0.5 U
CIS-1,2-DICHLOROETHENE	µg/L	70	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 UJ	<0.5 UJ	<0.5 U
TETRACHLOROETHENE	µg/L	5	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 UJ	<0.5 UJ	<0.5 U
TRANS-1,2-DICHLOROETHENE	µg/L	100	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 UJ	<0.5 UJ	<0.5 U
TRICHLOROETHENE	µg/L	5	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 UJ	<0.5 UJ	<0.5 U
VINYL CHLORIDE	µg/L	2	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 UJ	<0.5 UJ	<0.5 U

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Table 4
Historical Monitoring Well COC Concentrations
LHAAP-58, Longhorn Army Ammunition Plan, Karnack, Texas
Year 7 RA(O) Report

Sample Identification: / Sample Date:	Units	MCL	35AWW15_060719 6/7/2019	35AWW15_122019 12/20/2019	35AWW15_062520 6/25/2020	35AWW15_120120 12/1/20	35AWW15_060121 6/01/21	35AWW15_120221 12/2/21	35AWW15_060922 6/09/22	35AWW16-102213 10/22/2013	35AWW16-013114 1/31/2014	35AWW16-052814 5/28/2014	35AWW16-103014 10/30/2014	35AWW16-012715 1/27/2015	35AWW16FD-012715 1/27/2015	35AWW16-040715 4/7/2015
1,1-DICHLOROETHENE	µg/L	7	<0.5 U	<0.5 UJ	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U
CIS-1,2-DICHLOROETHENE	µg/L	70	<0.5 U	<0.5 UJ	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
TETRACHLOROETHENE	µg/L	5	<0.5 U	<0.5 UJ	<1.0 U	<0.5 U	<1.0 U	<0.5 U	<1.0 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
TRANS-1,2-DICHLOROETHENE	µg/L	100	<0.5 U	<0.5 UJ	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
TRICHLOROETHENE	µg/L	5	<0.5 U	<0.5 UJ	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
VINYL CHLORIDE	µg/L	2	<0.5 U	<0.5 UJ	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U

Notes:
Blue Highlighting Indicates Analyte Detected Above MCL
µg/L - micrograms per liter
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Table 4
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LHAAP-58, Longhorn Army Ammunition Plan, Karnack, Texas
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Sample Identification: / Sample Date:	Units	MCL	35AWW16-070915 7/9/2015	35AWW16FD-070915 7/9/2015	35AWW16-100615 10/6/2015	35AWW16-041216 4/12/2016	35AWW16-100416 10/4/2016	35AWW16FD-100416 10/4/2016	35AWW16-111317 11/13/2017	35AWW16-111317_a 11/13/2017	35AWW16-062918 06/29/2018	35AWW16-062918_a 06/29/2018	35AWW16_121218 12/12/2018	35AWW16_061019 6/10/2019
1,1-DICHLOROETHENE	µg/L	7	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	1.4
CIS-1,2-DICHLOROETHENE	µg/L	70	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
TETRACHLOROETHENE	µg/L	5	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
TRANS-1,2-DICHLOROETHENE	µg/L	100	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
TRICHLOROETHENE	µg/L	5	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
VINYL CHLORIDE	µg/L	2	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U

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LHAAP-58, Longhorn Army Ammunition Plan, Karnack, Texas
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1,1-DICHLOROETHENE	µg/L	7	<0.5	UJ	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<1	U	<1	U	<1	U	<1	U	<1	U	<1	U	<1	UJ	<1	U
CIS-1,2-DICHLOROETHENE	µg/L	70	<0.5	UJ	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	UJ	<0.5	U
TETRACHLOROETHENE	µg/L	5	<0.5	UJ	<1.0	U	<0.5	U	<1.0	U	<1.0	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	UJ	<0.5	U
TRANS-1,2-DICHLOROETHENE	µg/L	100	<0.5	UJ	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	UJ	<0.5	U
TRICHLOROETHENE	µg/L	5	<0.5	UJ	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	UJ	<0.5	U
VINYL CHLORIDE	µg/L	2	<0.5	UJ	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	UJ	<0.5	U

Notes:
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LHAAP-58, Longhorn Army Ammunition Plan, Karnack, Texas
Year 7 RA(O) Report

Sample Identification: / Sample Date:	Units	MCL	35AWW17-041116 4/11/2016	35AWW17-100316 10/3/2016	35AWW17-111317 11/13/2017	35AWW17-062918 06/29/2018	35AWW17_121718 12/17/2018	35AWW17_061019 6/10/2019	35AWW17_121819 12/18/2019	35AWW17_062920 6/29/2020	35AWW17_120120 12/1/20	35AWW17_060321 6/03/21	35AWW17_060922 6/09/22	35AWW18-101813 10/18/2013	35AWW18-020114 2/1/2014
1,1-DICHLOROETHENE	µg/L	7	<1 U	<1 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1 U	<1 U
CIS-1,2-DICHLOROETHENE	µg/L	70	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
TETRACHLOROETHENE	µg/L	5	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1.0 U	<0.5 U	<1.0 U	<1.0 U	<0.5 U	<0.5 U
TRANS-1,2-DICHLOROETHENE	µg/L	100	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
TRICHLOROETHENE	µg/L	5	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
VINYL CHLORIDE	µg/L	2	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U

Notes:
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Table 4
Historical Monitoring Well COC Concentrations
LHAAP-58, Longhorn Army Ammunition Plan, Karnack, Texas
Year 7 RA(O) Report

Sample Identification: / Sample Date:	Units	MCL	35AWW18-052914 5/29/2014	35AWW18-103114 10/31/2014	35AWW18-012815 1/28/2015	35AWW18-041015 4/10/2015	35AWW18-071015 7/10/2015	35AWW18-100515 10/2/2015	35AWW18-041116 4/11/2016	35AWW18FD-041116 4/11/2016	35AWW18-100516 10/5/2016	35AWW18-111317 11/13/2017	35AWW18-062918 06/29/2018	35AWW18_121718 12/17/2018
1,1-DICHLOROETHENE	µg/L	7	<1 U	0.792 J	0.726 J	0.78 J	<1 UJ	<1 U	2.13	2.09	0.97 J	<0.5 U	1.2	2
CIS-1,2-DICHLOROETHENE	µg/L	70	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 UJ	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
TETRACHLOROETHENE	µg/L	5	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 UJ	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
TRANS-1,2-DICHLOROETHENE	µg/L	100	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 UJ	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
TRICHLOROETHENE	µg/L	5	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 UJ	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
VINYL CHLORIDE	µg/L	2	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 UJ	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U

Notes:
Blue Highlighting Indicates Analyte Detected Above MCL
µg/L - micrograms per liter
MCL - Maximum Contaminant Level
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Historical Monitoring Well COC Concentrations
LHAAP-58, Longhorn Army Ammunition Plan, Karnack, Texas
Year 7 RA(O) Report

Sample Identification: / Sample Date:	Units	MCL	35AWW18_121718_a 12/17/2018		35AWW18_060419 6/4/2019		35AWW18_121819 12/18/2019		35AWW18_062520 6/25/2020		35AWW18_120120 12/1/20		35AWW18_120120_a 12/1/20		35AWW18_060121 6/01/21		35AWW18_060922 6/09/22		35AWW19-102213 10/22/2013		35AWW19-013114 1/31/2014		35AWW19-052814 5/28/2014		35AWW19-103014 10/30/2014		35AWW19-012115 1/21/2015		35AWW19-040715 4/7/2015	
1,1-DICHLOROETHENE	µg/L	7	2.3		3.5		4.1		18		22		22		20		15		6.45		9.31		9.98		10.9		17.4		17.5	
CIS-1,2-DICHLOROETHENE	µg/L	70	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U
TETRACHLOROETHENE	µg/L	5	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<1.0	U	<1.0	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U
TRANS-1,2-DICHLOROETHENE	µg/L	100	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U
TRICHLOROETHENE	µg/L	5	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	0.379	J	0.619	J	0.596	J	0.81	J	0.941	J	1.13	
VINYL CHLORIDE	µg/L	2	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U

Notes:
Blue Highlighting Indicates Analyte Detected Above MCL
µg/L - micrograms per liter
MCL - Maximum Contaminant Level
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Historical Monitoring Well COC Concentrations
LHAAP-58, Longhorn Army Ammunition Plan, Karnack, Texas
Year 7 RA(O) Report

Sample Identification: / Sample Date:	Units	MCL	35AWW19-070915 7/9/2015		35AWW19FD-070915 7/9/2015		35AWW19-100215 10/2/2015		35AWW19-041216 4/13/2016		35AWW19-100616 10/6/2016		35AWW19-111717 11/17/2017		35AWW19-071818 07/18/2018		35AWW19_092718 9/27/2018		35AWW19_121018 12/10/2018		35AWW19_031919 03/19/2019		35AWW19_060319 6/3/2019		35AWW19_091119 9/11/2019	
1,1-DICHLOROETHENE	µg/L	7	13.4		11.7		14.7		13.5		12.9		7.7		13	J	8.8		7.5		3.6		2.6		5.3	
CIS-1,2-DICHLOROETHENE	µg/L	70	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	UJ	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U
TETRACHLOROETHENE	µg/L	5	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	UJ	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U
TRANS-1,2-DICHLOROETHENE	µg/L	100	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	UJ	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U
TRICHLOROETHENE	µg/L	5	0.807	J	0.751	J	0.939	J	0.899	J	0.754	J	<0.5	U	<0.5	UJ	0.59	J	0.59	J	<0.5	U	<0.5	U	<0.5	U
VINYL CHLORIDE	µg/L	2	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	UJ	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U

Notes:
Blue Highlighting Indicates Analyte Detected Above MCL
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Table 4
Historical Monitoring Well COC Concentrations
LHAAP-58, Longhorn Army Ammunition Plan, Karnack, Texas
Year 7 RA(O) Report

Sample Identification: / Sample Date:	Units	MCL	35AWW19_121 819 12/18/2019		35AWW19_032 420 03/24/2020		35AWW19_062 420 6/24/2020		35AWW19_120 320 12/3/20		35AWW19_060 321 6/03/21		35AWW19_120 121 12/1/21		35AWW19_060 822 6/08/22		35AWW20-101513 10/15/2013		35AWW20-020314 2/3/2014		35AWW20-052114 5/21/2014		35AWW20-102914 10/29/2014		35AWW20-012715 1/27/2015		35AWW20-041515 4/15/2015		35AWW20-070815 7/8/2015	
1,1-DICHLOROETHENE	µg/L	7	4.5		4.4		4.6		3.2		2.9		2.4		2.9		3,230		2,950		5,060		4,910		5,660		4,640		4,780	
CIS-1,2-DICHLOROETHENE	µg/L	70	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	110		87.7		110		119		123		120		118	
TETRACHLOROETHENE	µg/L	5	<0.5	U	<0.5	U	<1.0	U	<0.5	U	<1.0	U	<0.5	U	<1.0	U	1.65		1.53		<10	U	<10	U	<10	U	<12.5	U	<12.5	U
TRANS-1,2-DICHLOROETHENE	µg/L	100	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	3.77		3.52		<10	U	<10	U	<10	U	<12.5	U	<12.5	U
TRICHLOROETHENE	µg/L	5	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	513		479		695		843		820		718		636	
VINYL CHLORIDE	µg/L	2	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	105		62.4		65.7		102		122		90.6		151	

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Historical Monitoring Well COC Concentrations
LHAAP-58, Longhorn Army Ammunition Plan, Karnack, Texas
Year 7 RA(O) Report

Sample Identification: / Sample Date:	Units	MCL	35AWW20-100815 10/8/2015		35AWW20-041316 4/13/2016		35AWW20-100416 10/4/2016		35AWW20-111417 11/14/2017		35AWW20-111417_a 11/14/2017		35AWW20-071618 07/16/2018		35AWW20_092618 9/26/2018		35AWW20_092618-a 9/26/2018		35AWW20_121018 12/10/2018		35AWW20_031919 03/19/2019		35AWW20_060419 6/4/2019		35AWW20_091119 9/11/2019	
1,1-DICHLOROETHENE	µg/L	7	3,630		5,460		3,440		1,900		2,000		1,400		1,100		970		2,700		1,500		1,800		3,900	
CIS-1,2-DICHLOROETHENE	µg/L	70	105		126		115		53		50		69		45		40		120		49	J	79		110	
TETRACHLOROETHENE	µg/L	5	<12.5	U	<12.5	U	<10	U	0.80	J	0.77	J	<0.5	U	0.81	J	0.71	J	1.3		<0.5	UJ	<2.5	U	<0.5	U
TRANS-1,2-DICHLOROETHENE	µg/L	100	<12.5	U	5.16	J	<10	U	6.7		5.6		2.9		1.8		1.7		6.1		4.9	J	13		14	
TRICHLOROETHENE	µg/L	5	582		707		594		320		320		270		170		140		570		180		230		350	
VINYL CHLORIDE	µg/L	2	126		216		166		78		75		71		<0.5	U	<0.5	U	110		54	J	140		790	

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LHAAP-58, Longhorn Army Ammunition Plan, Karnack, Texas
Year 7 RA(O) Report

Sample Identification: / Sample Date:	Units	MCL	35AWW20_121 919 12/19/2019		35AWW20_032 420 03/24/2020		35AWW20_062 420 6/24/2020		35AWW20_120 320 12/3/20		35AWW20_060 321 6/03/21		35AWW20_120 121 12/1/21		35AWW20_06 0822 6/08/22		35AWW21- 101613 10/16/2013		35AWW21- 020414 2/4/2014		35AWW21- 052214 5/22/2014		35AWW21- 102114 10/21/2014		35AWW21- 012315 1/23/2015		35AWW21- 040815 4/8/2015		35AWW21- 070915 7/9/2015	
1,1-DICHLOROETHENE	µg/L	7	970	J	1,300		1,100		950		1,600		1,100		1,600		<1	U	<1	U	<1	U	<1	U	<1	U	<1	U	<1	U
CIS-1,2-DICHLOROETHENE	µg/L	70	70	J	71		63		63		87		86		89		<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U
TETRACHLOROETHENE	µg/L	5	<5.0	UJ	<2.5	U	0.61	J	<0.5	U	<10	U	0.66	J	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U
TRANS-1,2-DICHLOROETHENE	µg/L	100	9.1	J	6.6		7.2		6.7		<5.0	U	4.9		6.4	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U
TRICHLOROETHENE	µg/L	5	99	J	120		94		91		190		100		150		<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U
VINYL CHLORIDE	µg/L	2	2,800	J	1,500		2,000		1,800		780		650		840		<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U

Notes:
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Table 4
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LHAAP-58, Longhorn Army Ammunition Plan, Karnack, Texas
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Sample Identification: Sample Date:	Units	MCL	35AWW21-100615 10/6/2015	35AWW21-041316 4/13/2016	35AWW21FD-041316 4/13/2016	35AWW21-100416 10/4/2016	35AWW21FD-100416 10/4/2016	35AWW21-111317 11/13/2017	35AWW21-062918 06/29/2018	34AWW21_121318 12/13/2018	35AWW21_060419 6/4/2019	34AWW21_122019 12/20/2019	34AWW21_122019-a 12/20/2019	34AWW21_062920 6/29/2020
1,1-DICHLOROETHENE	µg/L	7	<1 U	<1 U	<1 U	<1 U	<1 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
CIS-1,2-DICHLOROETHENE	µg/L	70	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
TETRACHLOROETHENE	µg/L	5	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1.0 U
TRANS-1,2-DICHLOROETHENE	µg/L	100	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
TRICHLOROETHENE	µg/L	5	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
VINYL CHLORIDE	µg/L	2	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U

Notes:
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LHAAP-58, Longhorn Army Ammunition Plan, Karnack, Texas
Year 7 RA(O) Report

Sample Identification: / Sample Date:	Units	MCL	34AWW21_062920_a 6/29/2020	34AWW21_120720 12/7/20	34AWW21_060121 6/01/21	34AWW21_060922 6/09/22	35AWW22-102213 10/22/2013	35AWW22-013114 1/31/2014	35AWW22-052914 5/29/2014	35AWW22-103014 10/30/2014	35AWW22FD-103014 10/30/2014	35AWW22-012115 1/21/2015	35AWW22FD-012115 1/21/2015	35AWW22-040715 4/7/2015	35AWW22-070915 7/9/2015
1,1-DICHLOROETHENE	µg/L	7	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U
CIS-1,2-DICHLOROETHENE	µg/L	70	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
TETRACHLOROETHENE	µg/L	5	<1.0 U	<0.5 U	<1.0 U	<1.0 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
TRANS-1,2-DICHLOROETHENE	µg/L	100	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
TRICHLOROETHENE	µg/L	5	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
VINYL CHLORIDE	µg/L	2	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U

Notes:
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Historical Monitoring Well COC Concentrations
LHAAP-58, Longhorn Army Ammunition Plan, Karnack, Texas
Year 7 RA(O) Report

Sample Identification: / Sample Date:	Units	MCL	35AWW22-100515 10/5/2015	35AWW22-041316 4/13/2016	35AWW22-100616 10/6/2016	35AWW22-111717 11/17/2017	35AWW22-071818 07/18/2018	35AWW22_121418 12/14/2018	35AWW22_061019 6/10/2019	35AWW22_121819 12/18/2019	35AWW22_062420 6/24/2020	35AWW22_120720 12/7/20	35AWW22_060221 6/02/21	35AWW22_060622 6/06/22	35AWW23-071718 07/17/2018
1,1-DICHLOROETHENE	µg/L	7	<1 U	<1 U	<1 U	<0.5 U	<0.5 UJ	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	2.1
CIS-1,2-DICHLOROETHENE	µg/L	70	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 UJ	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	12
TETRACHLOROETHENE	µg/L	5	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 UJ	<0.5 U	<0.5 U	<0.5 U	<1.0 U	<0.5 U	<1.0 U	<1.0 U	<0.5 U
TRANS-1,2-DICHLOROETHENE	µg/L	100	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 UJ	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
TRICHLOROETHENE	µg/L	5	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 UJ	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	2.6
VINYL CHLORIDE	µg/L	2	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 UJ	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U

Notes:
Blue Highlighting Indicates Analyte Detected Above MCL
µg/L - micrograms per liter
MCL - Maximum Contaminant Level
NA - not analyzed
J - Estimated value; analyte concentration was less than the limit of quantification
U - Analyte was not detected.
UJ - The analysis was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample. 'UJ' not detects are not definite; the analyte may be present.

Table 4
Historical Monitoring Well COC Concentrations
LHAAP-58, Longhorn Army Ammunition Plan, Karnack, Texas
Year 7 RA(O) Report

Sample Identification: / Sample Date:	Units	MCL	35AWW23_121 018 12/10/2018		35AWW23_060 319 6/3/2019		35AWW23_091 119 9/11/2019		35AWW23_121 819 12/18/2019		35AWW23_032 420 03/24/2020		35AWW23_062 420 6/24/2020		35AWW23_120 320 12/3/20		35AWW23_060 321 6/03/21		35AWW23_120 221 12/2/21		35AWW23_06 0822 6/08/22		35AWW24- 071718 07/17/2018		35AWW24_092 718 9/27/2018		35AWW24_121 018 12/10/2018		35AWW24_031 919 03/19/2019	
1,1-DICHLOROETHENE	µg/L	7	2.5		<0.5	U	0.7	J	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	0.81	J
CIS-1,2-DICHLOROETHENE	µg/L	70	20		4.3		7.8		7.6		6.5		5.0		2.7		1.0		0.63	J	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U
TETRACHLOROETHENE	µg/L	5	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<1.0	U	<0.5	U	<1.0	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U
TRANS-1,2-DICHLOROETHENE	µg/L	100	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U
TRICHLOROETHENE	µg/L	5	5.3		1.8		3.8		2.7		1.3		<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U
VINYL CHLORIDE	µg/L	2	<0.5	U	<0.5	U	<0.5	U	1.1		<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U

Notes:
Blue Highlighting Indicates Analyte Detected Above MCL
µg/L - micrograms per liter
MCL - Maximum Contaminant Level
NA - not analyzed
J - Estimated value; analyte concentration was less than the limit of quantification
U - Analyte was not detected.
UJ - The analysis was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample. 'UJ' not detects are not definite; the analyte may be present.

Table 4
Historical Monitoring Well COC Concentrations
LHAAP-58, Longhorn Army Ammunition Plan, Karnack, Texas
Year 7 RA(O) Report

Sample Identification: / Sample Date:	Units	MCL	35AWW24_060319 6/3/2019	35AWW24_121919 12/19/2019	35AWW24_062520 6/25/2020	35AWW24_062520-a 6/25/2020	35AWW24_120320 12/3/20	35AWW24_060121 6/01/21	35AWW24_060121-a 6/01/21	35AWW24_120221 12/2/21	35AWW24_060822 6/08/22	35AWW24_060822-a 6/08/22	LHSMW04-941201 12/1/1994	LHSMW04-960812 8/12/1996	LHSMW04-980513 5/13/1998	LHSMW04-040909 9/9/2004	LHSMW04-FEB2007 2/20/2007
1,1-DICHLOROETHENE	µg/L	7	<0.5 U	<0.5 UJ	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<5 U	<0.2 U	<1 U	<5 U	<2 U
CIS-1,2-DICHLOROETHENE	µg/L	70	<0.5 U	<0.5 UJ	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	NA	<0.2 U	<1 U	<5 U	<2 U
TETRACHLOROETHENE	µg/L	5	<0.5 U	<0.5 UJ	<1.0 U	<1.0 U	<0.5 U	<1.0 U	<1.0 U	<0.5 U	<1.0 U	<1.0 U	<5 U	<0.25 U	<1 U	<5 U	6.4
TRANS-1,2-DICHLOROETHENE	µg/L	100	<0.5 U	<0.5 UJ	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	NA	<0.29 U	<1 U	<5 U	<2 U
TRICHLOROETHENE	µg/L	5	<0.5 U	<0.5 UJ	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<5 U	<0.25 U	<1 U	<5 U	4.6
VINYL CHLORIDE	µg/L	2	<0.5 U	<0.5 UJ	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	NA	<0.24 U	<1 U	<5 U	<2 U

Notes:
Blue Highlighting Indicates Analyte Detected Above MCL
µg/L - micrograms per liter
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U - Analyte was not detected.
UJ - The analysis was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample. 'UJ' not detects are not definite; the analyte may be present.

Table 4
Historical Monitoring Well COC Concentrations
LHAAP-58, Longhorn Army Ammunition Plan, Karnack, Texas
Year 7 RA(O) Report

Sample Identification: / Sample Date:	Units	MCL	LHSMW04-013008 1/30/2008	LHSMW04-112508 11/25/2008	LHSMW04-032916 3/29/2016	LHSMW04-041316 4/13/2016	LHSMW05-941201 12/1/1994	LHSMW05-960131 1/31/1996	LHSMW05-960812 8/12/1996	LHSMW05-980513 5/13/1998	LHSMW05-040909 9/9/2004	LHSMW06-941201 12/1/1994	LHSMW06-960813 8/13/1996	LHSMW06-980513 5/13/1998
1,1-DICHLOROETHENE	µg/L	7	<1 U	<1 U	<1 U	<2.5 U	<5 U	<1 U	<0.2 U	<40 U	<5 U	<5 U	2	1.3
CIS-1,2-DICHLOROETHENE	µg/L	70	<1 U	0.292 J	0.666 J	0.851 J	NA	<1 U	0.21	<40 U	<5 U	NA	0.98	1.4
TETRACHLOROETHENE	µg/L	5	8.74	25.7	419	397	870	4,884	2,700	4,900	5,100 J	<5 U	0.27	0.69
TRANS-1,2-DICHLOROETHENE	µg/L	100	<1 U	<1 U	<0.5 U	<1.25 U	NA	<1 U	<0.29 U	<40 U	<5 U	NA	<0.29 U	<1 U
TRICHLOROETHENE	µg/L	5	5.74	11.3	106	86.1	49	99	39.7	160	230 J	<5 U	0.43	0.53
VINYL CHLORIDE	µg/L	2	<1 U	<1 U	<0.5 U	<1.25 U	NA	<1 U	<0.24 U	<40 U	<5 U	NA	0.62	<1 U

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U - Analyte was not detected.
UJ - The analysis was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample. 'UJ' not detects are not definite; the analyte may be present.

Table 4
Historical Monitoring Well COC Concentrations
LHAAP-58, Longhorn Army Ammunition Plan, Karnack, Texas
Year 7 RA(O) Report

Sample Identification: / Sample Date:	Units	MCL	LHSMW06-040908 9/8/2004	LHSMW06-FEB2007 2/21/2007	LHSMW06-111908 11/19/2008	LHSMW06-101713 10/17/2013	LHSMW06-013114 1/31/2014	LHSMW06-052814 5/28/2014	LHSMW06-103014 10/30/2014	LHSMW06-012115 1/21/2015	LHSMW06-040715 4/7/2015	LHSMW06-070915 7/9/2015	LHSMW06-100215 10/2/2015	LHSMW06-041316 4/13/2016
1,1-DICHLOROETHENE	µg/L	7	<5 U	<2 U	<1 U	1.23 J	0.884 J	1.68 J	4.03	3.28	5.95	8.2	12.1	13.7
CIS-1,2-DICHLOROETHENE	µg/L	70	<5 U	5.1	2.26	4.01	1.85	2.59	5.2	3.25	5.52	7.24	10.4	11.9
TETRACHLOROETHENE	µg/L	5	2 J	<2 U	<1 U	0.663 J	<0.5 U	0.255 J	0.381 J	0.255 J	0.454 J	0.443 J	0.518 J	0.563 J
TRANS-1,2-DICHLOROETHENE	µg/L	100	<5 U	<2 U	<1 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U	<0.5 U
TRICHLOROETHENE	µg/L	5	<5 U	0.77 J	0.486 J	1.87	0.751 J	1.41	2.77	1.75	3.02	3.23	5.66	6.5
VINYL CHLORIDE	µg/L	2	<5 U	<2 U	<1 U	0.627 J	0.5 J	0.597 J	1.15	0.924 J	0.967 J	1.36	2.1	2.38

Notes:
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Table 4
Historical Monitoring Well COC Concentrations
LHAAP-58, Longhorn Army Ammunition Plan, Karnack, Texas
Year 7 RA(O) Report

Sample Identification: / Sample Date:	Units	MCL	LHSMW06-100616 10/6/2016		LHSMW06-111717 11/17/2017		LHSMW06-070218 07/02/2018		LHSMW06_121318 12/13/2018		LHSMW06_121318_a 12/13/2018		LHSMW06_060719 6/7/2019		LHSMW06_122019 12/20/2019		LHSMW06_122019_a 12/20/2019		LHSMW06_062520 6/25/2020		LHSMW06_120320 12/3/20		LHSMW06_060321 6/03/21		LHSMW06_120221 12/02/21		LHSMW06_120221-a 12/2/21		LHSMW06_060922 6/09/22		LHSMW07-941201 12/1/1994	
1,1-DICHLOROETHENE	µg/L	7	19.2		12.0		2.3		19.0		20.0		4.3		19	J	20	J	22		14		11		12		12		9.1		750	
CIS-1,2-DICHLOROETHENE	µg/L	70	19		14		12		55		55		29		68	J	68	J	65		62		71		140		130		81		NA	
TETRACHLOROETHENE	µg/L	5	0.9	J	<0.5	U	1.6		1.5		1.4		<0.5	U	1.9	J	1.9	J	2.1		1.6		2.9		3		3.2		1.9		<5	U
TRANS-1,2-DICHLOROETHENE	µg/L	100	0.391	J	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	1.4	J	1.5	J	1.4		1.3		1.2		1.9		1.9		1.3		NA	
TRICHLOROETHENE	µg/L	5	9.06		5.8		2.8		16.0		16.0		7.5		17	J	17	J	16		14		19		21		20		13		16	
VINYL CHLORIDE	µg/L	2	2.94		2.2		<0.5	U	5.0		5.0		1.2		5.7	J	5.6	J	5.5		4.8		3.2		4.2		4.3		2.3		NA	

Notes:
Blue Highlighting Indicates Analyte Detected Above MCL
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Table 4
Historical Monitoring Well COC Concentrations
LHAAP-58, Longhorn Army Ammunition Plan, Karnack, Texas
Year 7 RA(O) Report

Sample Identification: / Sample Date:	Units	MCL	LHSMW07-941201FD 12/1/1994	LHSMW07-960131 1/31/1996	LHSMW07-960812 8/12/1996	LHSMW07-980513 5/13/1998	LHSMW07-040908 9/8/2004	LHSMW07-FEB2007 2/21/2007	LHSMW07-111908 11/21/2008	LHSMW07-110509 5/9/2011	LHSMW07-101513 10/15/2013	LHSMW07-013014 1/30/2014	LHSMW07-052214 5/22/2014	LHSMW07-102914 10/29/2014	LHSMW07-012815 1/28/2015	LHSMW07-041515 4/15/2015
1,1-DICHLOROETHENE	µg/L	7	660	1,341	311	950	590 J	394	576	669	396	334	558 J	1,140	1,300	1,660
CIS-1,2-DICHLOROETHENE	µg/L	70	NA	NA	2.5	11	6	3.6	7.96	10.1	6.1	4.66	7.17	21	19.3	31.4
TETRACHLOROETHENE	µg/L	5	<5 U	7	2.7	<1 U	<5 U	<2 U	<1 U	0.253 J	<0.5 U	<1 U	<0.5 U	<1 U	<2.5 U	<5 U
TRANS-1,2-DICHLOROETHENE	µg/L	100	NA	NA	<0.29 U	0.73	<5 U	<2 U	0.421 J	0.384 J	0.282 J	<1 U	0.296 J	1.06 J	<2.5 U	<5 U
TRICHLOROETHENE	µg/L	5	19	24	5.9	25	24	15.8	25	41.3	23.9	17.6	23.1	78.1	64.3	82.1
VINYL CHLORIDE	µg/L	2	NA	10	1.1	7.2	9	3	14.4	9.47	15.9	5.43	7.98	35.4	28.8	34.1

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Table 4
Historical Monitoring Well COC Concentrations
LHAAP-58, Longhorn Army Ammunition Plan, Karnack, Texas
Year 7 RA(O) Report

Sample Identification: / Sample Date:	Units	MCL	LHSMW07-070715 7/7/2015		LHSMW07-100815 10/8/2015		LHSMW07-041416 4/14/2016		LHSMW07-100416 10/4/2016		LHSMW07-111417 11/14/2017		LHSMW07-071718 07/17/2018		LHSMW07_092618 9/26/2018		LHSMW07_121018 12/10/2018		LHSMW07_031919 03/19/2019		LHSMW07_060319 6/3/2019		LHSMW07_091119 9/11/2019		LHSMW07_121919 12/19/2019	
1,1-DICHLOROETHENE	µg/L	7	2,100		1,210		1,250		701		600		56		3.1		<0.5	U	<0.5	U	16		46		46	J
CIS-1,2-DICHLOROETHENE	µg/L	70	32.4		22.5		19.6		22.1		11		5.0		1.1		<0.5	U	<0.5	U	0.7	J	1.1		1.2	J
TETRACHLOROETHENE	µg/L	5	<2.5	U	<2.5	U	0.397	J	<2.5	U	<0.5	U	<0.5	U	0.397	J	<2.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	UJ
TRANS-1,2-DICHLOROETHENE	µg/L	100	1.29	J	<2.5	U	0.681	J	<2.5	U	<0.5	U	<0.5	U	0.681	J	<2.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	UJ
TRICHLOROETHENE	µg/L	5	118		84.9		67.5		71.6		39.0		12		2.4		<0.5	U	1.1		1.8		3.1		3.1	J
VINYL CHLORIDE	µg/L	2	69.4	J	37.1		10.8		21.8		15.0		<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	49		42	J

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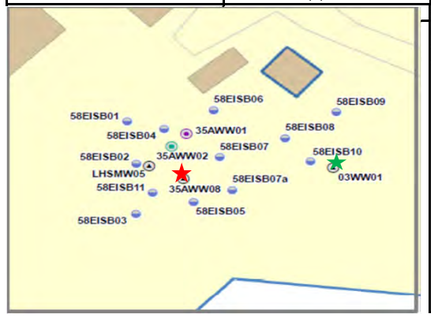
Table 4
Historical Monitoring Well COC Concentrations
LHAAP-58, Longhorn Army Ammunition Plan, Karnack, Texas
Year 7 RA(O) Report

Sample Identification: / Sample Date:	Units	MCL	LHSMW07_032420 03/24/2020		LHSMW07_062420 6/24/2020		LHSMW07_120320 12/3/20		LHSMW07_060221 6/02/21		LHSMW07_120121 12/01/21		LHSMW07_060822 6/08/22	
1,1-DICHLOROETHENE	µg/L	7	94		130		64		12		22		8.8	
CIS-1,2-DICHLOROETHENE	µg/L	70	1.0		1.0		<0.5	U	<0.5	U	<0.5	U	<0.5	U
TETRACHLOROETHENE	µg/L	5	<0.5	U	<0.5	U	<0.5	U	<1.0	U	<1.0	U	<1.0	U
TRANS-1,2-DICHLOROETHENE	µg/L	100	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U	<0.5	U
TRICHLOROETHENE	µg/L	5	2.8		2.5		2.1		0.91	J	0.97	J	0.71	J
VINYL CHLORIDE	µg/L	2	46		44		42		<0.5	U	35	U	<0.5	U

Notes:
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µg/L - micrograms per liter
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Table 5
Enhanced In-situ Bioremediation Performance Data Summary - Eastern Plume
LHAAP-58, Longhorn Army Ammunition Plant, Karnack, Texas
Year 8 RA(O) Report

Monitoring Location	Sample Date	Field Parameters					Electron Donor [1]	cVOCs				Dissolved Gases				Wet Chemistry						Dechlorinating Bacteria [2]	
		pH	DO	ORP	Spec Cond	Turb	TOC	PCE	TCE	cDCE	VC	Ethane	Methane	Ethene	CO_2	Fe^{2+}	NO_3	NO_2	SO_4	Cl^-	Alk	DHC	DHBt
		SU	mg/L	mV	ms/cm	NTU	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	cells/mL	cells/mL
35AWW08	8/20/2013	6.05	NR	NR	8.23	26.9	16.5	1,640	544	9.35 J	< 5 U	< 2 U	10.1	< 2 U	143,000	0.04	< 4 U	< 4 U	1,480	2,510	174	< 0.9 U	< 5.3 U
	10/10/2013	6.7	NR	NR	47.7	4.1	66,400	603 J	149 J	<5	< 5 U	< 2 U	5.38	< 2 U	NA	52.4	12.3 J	<20	703	905	35,600	3.6	1,300
	1/29/2014	6.68	NR	NR	23.4	79.8	43,500	599	895	55.9	< 5 U	< 2 U	345	< 2 U	428,000	144	< 10 U	< 10 U	285	2,190	27,700	< 0.8 U	12,900
	5/20/2014	5.57	NR	NR	18.2	90.4	16,900	204	953	47.2	< 5 U	< 2 U	NA	< 2 U	NA	< 800 U	< 10 U	< 10 U	262	1,590	18,300	4,880	574,000
	10/27/2014	6.86	NR	NR	19.5	213	13,900	112	653	38.6 J	< 25 U	< 2 U	4,420	< 2 U	505,000	478	< 20 U	< 20 U	< 100 U	2,020	11,800 J	70.4	3,050,000 J
	1/21/2015	6.82	NR	NR	18.1	225	6,030	119	491	27.2 J	< 25 U	< 40 U	2,540	< 40 U	152,000 J	10.9 J	< 3 U	< 3 U	< 15 U	1,900	20,400	NA	NA
	4/15/2015	8.06	NR	NR	16.4	448	8,330	110	607	30.7 J	< 25 U	< 20 U	3,380	< 20 U	249,000	< 80 U	< 2 U	< 2 U	< 10 U	2,250	18,800 J	NA	NA
	7/8/2015	8.07	NR	NR	13.9	325	2,540	110	746	73.5 J	< 50 U	< 20 U	5,600	< 20 U	370,000	123	< 2 U	< 2 U	< 10 U	2,250	10,100 J	NA	NA
	10/8/2015	7.22	NR	NR	11.3	300	2,240	79	581	79.6	< 12.5 U	< 20 U	5,510	< 20 U	374,000	21.1	< 5 U	< 5 U	< 25 U	2,130 J	20,600	448	72,900
	4/13/2016	6.86	NR	-162	13.9	74.6	NA	80.1	234	60.9	14.2 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	10/4/2016	6.92	NR	NR	11.8	50.4	918	36.9	235	41.7	7.46 J	< 20 U	7,350	< 20 U	424,000	17.6	< 2 U	< 2 U	< 10 U	2,000	9,160 J	25,600,000	625,000
	11/15/2017	6.58	NR[3]	NR[3]	11.8	63.6	581	12	33	38	< 5 U	< 0.23 U	670	0.56 J	190,000	17.4 J	0.249	< 0.05 U	2.03	2,060	4,360	3,060,000	< 38.5 U
	7/18/2018	7.15	NR[3]	NR[3]	14.9	31.4	484 J	< 2.5 UJ	19 J	12 J	9.0 J	< 0.47 U	920	0.49 J	350,000	13.7 J	< 0.200 UJ	< 0.200 UJ	0.9	2460	3,050 J	1,410,000	47,000
	12/11/2018	7.28	NR[3]	NR[3]	10.9	82.5	392	< 0.5 U	12	8.9 J	< 0.5 U	< 0.47 U	< 1.0 U	< 0.55 U	290,000	21 J	0.147 J	< 0.100 U	4.76	2,240	3,420	1,200,000	173,000
	6/3/2019	8.67	NR[3]	NR[3]	9.93	86.9	306	4.8 J	13	< 2.5 U	< 2.5 U	< 0.47 U	3,000	4.1	260,000	2.03	0.219 J	NA	1.42 J	2,510	NA	3,790,000	139,000
	12/18/2019	6.65	0.04	-161	9.62	60.5	291	<5.0 U	<5.0 U	<5.0 U	<5.0 U	< 0.47 U	760	6.2	240,000	2.55	0.704	NA	<2.5 U	2,290	NA	NA	NA
	6/23/2020	6.77	0.07	-172	8.54	27.3	208	6.7	17	7.3	<2.5 U	< 0.47 U	1,500	12	230,000	NA	< 0.200 U	NA	15.5	2,510	NA	594,000	29,500
	12/1/2020	6.05	0.08	-25	9.67	63.2	165	< 5.0 U	< 5.0 U	18	6.1 J	< 0.47 U	320	5.6	830,000	NA	0.188 J	NA	63.0	2,480	NA	920,000	77,400
	6/2/2021	6.64	0.04	-144	9.29	3.2	119	< 25 U	53	30	24 J	< 0.47 U	1,600	33	430,000	NA	< 0.500 U	NA	148	2430	NA	122,000	4,500
	6/9/2022	6.24	0.05	-74	9.36	18.1	NA	< 5.0 U	< 2.5 U	<2.5 U	<2.5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
03WW01	8/20/2013	6.18	NR	NR	3.64	33	10.5	368	94.8	0.978 J	< 1 U	< 2 U	3.22	< 2 U	143,000	0.04	< 1 U	< 1 U	534	892	142	1.2	0.4 J
	10/10/2013	6.55	NR	NR	39.2	10	49,200	172	42.1	< 2.5 U	< 2.5 U	< 2 U	4.35	< 2 U	NA	35.4	< 20 U	< 20 U	487	398	39,700	< 2.1 U	15.7 J
	1/29/2014	6.58	NR	NR	20.2	256	30,200	172	58.4	< 5 U	< 5 U	< 2 U	5.09	< 2 U	337,000	110	< 10 U	< 10 U	457	906	27,500	< 0.9 U	639,000
	5/21/2014	5.52	NR	NR	16	152	29,100	154	71.2	3.3 J	< 5 U	< 2 U	479	< 2 U	564,000	0.0217	< 10 U	< 10 U	376	780	25,700	2,870	2,700,000
	10/28/2014	5.87	NR	NR	14.2	171	8,440	48.6 J	223	< 50 U	< 50 U	< 2 U	910	< 2 U	564,000 J	107	< 1 U	< 1 U	11	940	12,300 J	10.9	192,000
	1/21/2015	6.51	NR	NR	13.6	93.3	7,720	32.8 J	216	< 50 U	< 50 U	< 10 U	393	< 10 U	333,000	40.6	< 2 U	< 2 U	10.2	881	19,000 J	NA	NA
	4/15/2015	7.11	NR	NR	12.8	387	7,800	15.9 J	131	21.4 J	< 25 U	< 20 U	3,170	< 20 U	396,000	27.8 J	< 1 U	< 1 U	18	976	24,100	NA	NA
	7/8/2015	7.62	NR	NR	11.8	847	3,640	31.4 J	65.6 J	< 50 U	< 50 U	< 20 U	16,100	< 20 U	408,000	96.1	< 1 U	< 1 U	3.62 J	1,020	12,400 J	NA	NA
	10/8/2015	6.65	NR	NR	11.4	525	1,700	36.4 J	51.8 J	< 50 U	< 50 U	< 20 U	5,880	< 20 U	500,000	0.835	< 5 U	< 5 U	< 25 U	1,200	20,300	78	8,800
	4/13/2016	7.19	NR	-127	7.99	127	NA	6.49 J	<12.5U	117	< 12.5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	10/4/2016	6.81	NR	NR	6.38	70	292	< 5 U	< 5 U	< 5 U	< 5 U	<20	5,950	< 20 U	657,000	8.02	< 1 U	< 1 U	< 5 U	762	5,500 J	9,460,000	53,300
	11/15/2017	7.25	NR[3]	NR[3]	6.59	135	191	< 2.5 U	< 2.5 U	< 2.5 U	< 2.5 U	< 0.23 U	620	1.2	310,000	18.9 J	< 0.05 U	< 0.05 U	40.8	1,020	3,310	35,300	< 20.8 U
	7/18/2018	6.8	NR[3]	NR[3]	6.23	9.5	118 J	< 0.5 UJ	< 0.5 UJ	5.3 J	4.8 J	< 0.47 U	590	0.89 J	490,000	40 J	< 0.200 UJ	< 0.200 UJ	161	977	2,290	7.5	6
	12/11/2018	6.24	NR[3]	NR[3]	2	54.1	42	15	5.7	22	7.6	< 0.47 U	1,800	2.3	390,000	27.5 J	< 0.100 U	< 0.100 U	42.8	336	862	10,100	599
	6/3/2019	8.1	NR[3]	NR[3]	4.95	14.8	66	3.2 J	2.9 J	41	11	< 0.47 U	2,900	1.6	520,000	0.84	0.196 J	NA	239	809	NA	6,040	292
	12/18/2019	6.41	0.05	-128	5.62	24.8	92	< 5 U	< 5 U	14	5.4 J	< 0.47 U	540	0.61 J	340,000	3.15	<0.500 U	NA	155	940	NA	22,240	2,480
	6/25/2020	6.44	0.04	-139	4.68	6.3	69.8	4.5 J	4.5 J	17	7.2	< 0.47 U	640	0.46	300,000	1.74	< 0.200 U	NA	231	965	NA	6,500	699
	12/1/2020	6.17	0.10	-50	4.89	10.7	99.9	< 5.0 U	24	7.2 J	< 5.0 U	< 0.47 U	1,700	1.1	460,000	NA	0.069 J	NA	82.7	870	NA	26,600	1,610
	6/2/2021	6.25	0.27	-99	5.24	158	103	11	3.0	11	1.6	< 0.47 U	420	< 0.55 U	830,000	NA	< 0.500 U	NA	180	945	NA	196	249
	6/6/2022	5.95	0.03	-50	4.72	18	NA	9.9	10	7.3	< 5.0 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA



Slight decrease in pH noted during May 2014 sampling event, potentially related to excessive substrate fermentation and organic acid production, need to monitor closely. System has continued to self buffer over time.

-Initial spike in TOC indicates effective substrate distribution.
-Residual electron donor present to support desired biogeochemical reactions.
-Declining TOC concentrations over time indicative of substrate consumption.
-Electron donor nearly depleted.

PCE is degrading fully to VC. Residual degradation products of TCE, cDCE, and VC continue to degrade.

Reduced methane and ethene indicates slowing of reductive dechlorination due to limited substrate and electron acceptors remaining.

Increasing sulfate concentration indicates that reductive dechlorination is starting to stall.

-Initial spike in dechlorinating bacteria counts suggest effective distribution of the bioaugmentation culture.
-Elevated dechlorinating bacteria counts in 2016 indicated rapid proliferation.
-Since 2016 generally declining bacteria counts.

Notes:

1. Electron donor injections completed in Sept. 2013.
2. Bioaugmentation performed in Nov. 2013.
3. Data recorded but not used since bailer was used to collect the sample.

pH = negative log of the hydrogen ion concentration
SU = standard units
DO = dissolved oxygen
mg/L = milligrams per liter
ORP = oxidation-reduction potential
mV = millivolts
Spec Cond = specific conductivity
ms/cm = millisiemens per centimeter
Turb = turbidity
NTU = nephelometric turbidity units
TOC = total organic carbon
cVOC = chlorinated volatile organic compounds
PCE = tetrachloroethene
TCE = trichloroethene
cDCE = cis-1,2-dichloroethene
VC = vinyl chloride
µg/L = micrograms per liter
CO_2 = carbon dioxide
Fe^{2+} = ferrous iron
NO_3 = nitrate
NO_2 = nitrite
SO_4 = sulfate
Cl^- = chloride
Alk = alkalinity
DHC = dehalococcoides
DHBt = dehalobacter spp.
cells/mL = cells per milliliter
NA = not analyzed
NR = not recorded
U - Undetected: The analyte was analyzed for, but not detected and reported to the limit of detection analyte-specific quality control criteria.
J - Estimated: Between the method detection limit and reporting limit and/or due to discrepancies in meeting certain analyte-specific quality control criteria.

Table 6
Enhanced In-situ Bioremediation Performance Data Summary-Western Plume
LHAAP-58, Longhorn Army Ammunition Plant, Karnack, Texas
Year 8 RA(O) Report

Monitoring Location	Sample Date	Field Parameters					Electron Donor	cVOCs				Dissolved Gases				Wet Chemistry						Dechlorinating Bacteria		
		pH	DO	ORP	Spec Cond	Turb	TOC	PCE	TCE	cDCE	VC	Ethane	Methane	Ethene	CO_2	Fe^{2+}	NO_3	NO_2	SO_4	Cl^-	Alk	DHC	DHBt	BAV1 VC
		SU	mg/L	mV	ms/cm	NTU	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	cells/mL	cells/mL	cells/mL
LHSMW07	11/14/2017	5.94	0.09	159	11	40.9	6.81	< 0.5 U	39	11	15	< 0.23 U	18	< 0.22 U	220,000	0.4 J	< 0.0500 U	< 0.100 U	2,940	2,540	750	NA	NA	NA
	3/7/2018	6.1	0.65	180	12.1	5.1	6.67	< 1.0 U	34	11	5	< 0.47 U	3	< 0.55 U	350,000	0.07 J	< 0.0500 U	< 0.0500 U	2,700	2,420	757	11.8	< 4.8 U	NA
	7/17/2018	6.23	0	-389	14.1	13.2	321	< 0.5 U	12	5	< 0.5 U	< 0.47 U	1.4	< 0.55 U	540,000	2.58 J	< 0.200 U	< 0.200 U	1,090	2,270	1,990	17.2	6,570,000	NA
	9/26-27/2018	5.99	0	-222	9.24	20.3	14.2	< 0.50 U	2.4	1.1	< 0.50 U	< 0.47 U	27	4.0	760,000	0.93 J	< 0.200 U	< 0.200 U	1,120	2,180	2,060	11,600	3,540,000	0.8 J
	12/10/2018	6.7	0.02	-324	10.8	10.7	7.53	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	0.46 J	170	28	460,000	0.43 J	< 0.200 U	< 0.200 U	1,530	2,030	1,640	6,080	166,000	<2.1 U
	3/19/2019	6.57	0.17	-311	11	27.5	4.11	< 0.5 U	1.1	< 0.5 U	< 0.5 U	0.52 J	270	25	440,000	0.67	< 0.500 U	NA	2,390	1,980	NA	10,000	61,400	3
	6/3/2019	6.27	0.07	-96	10.4	17.5	4.13	< 0.5 U	1.8	0.70 J	< 0.5 U	0.20 J	78	3.9	660,000	0.25	< 0.500 U	NA	2,470	1,780	NA	7,580	< 9.5 U	<1.0 U
	9/11/2019	6.65	0.05	-48	9.19	5.8	3.42	< 0.5 U	3.1	1.1	49	0.20 J	240	6.1	340,000	1.72	< 0.100 U	< 0.100 U	2,530	1,820	NA	49.8	1,320	<0.5 U
	12/19/2019	6.43	0.09	-47	9.59	6.6	3.48 J	< 0.5 UJ	3.1 J	1.2 J	42 J	< 0.47 U	100	2.8	250,000	1.85	< 0.500 U	NA	2,560	1,770	NA	949	5,230	3
	3/24/2020	6.65	0.06	-87	10.1	0	3.29 J	< 0.5 U	2.8	1.0	46	< 0.47 U	77	2.3	250,000	1.76	< 0.500 U	NA	2,750	1,960	NA	2,280	10,300	5
	6/24/2020	6.37	0.08	-43	9.24	0	3.00	< 1.0 U	2.5	1.0	44	< 0.47 U	140	2.2	250,000	2.07	< 0.100 U	< 0.100 U	3,000	2,010	NA	1,090	42,100	1
	12/3/2020	6.53	0.14	10	9.87	0	2.33	< 0.5 U	2.1	< 0.5 U	42	0.42 J	810	5.9	260,000 J	NA	< 0.200 U	NA	2,650	1,650	NA	7,580	17,500	1
	6/2/2021	6.52	0.13	-144	9.60	0.8	7.94	< 1.0 U	0.91 J	< 0.5 U	< 0.5 U	0.31 J	680	19	300,000	NA	< 0.500 U	NA	2,720	1,760	NA	4,430	3,640	< 0.60 U
	12/1/2021	5.99	0.04	62	9.19	2.1	10.8	< 1.0 U	0.97 J	< 0.5 U	35	<0.250 U	638	6.33	820,000	NA	0.407 J	NA	2,720	1,560	NA	5,720	35,400	0.30 J
	6/8/2022	6.48	0.03	-90	9.69	13.4	6.23	< 1.0 U	0.71 J	< 0.5 U	< 0.5 U	<0.250 U	1,950	38.9	173,000	NA	0.262 J	NA	2,970	1,960	NA	4,680	2,850	0.400 J
35AWW06	11/14/2017	5.86	0.06	197	5.87	8.7	2.29	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.23 U	0.32 J	< 0.22 U	200,000	0.09 J	2.12	< 0.0500 U	1,560	1,040	666	NA	NA	<1.8 U
	3/8/2018	5.67	0.26	136	5.91	4.4	2.32	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 0.47 U	< 1.0 U	< 0.55 U	500,000 J	0.12 J	< 0.0500 U	< 0.0500 U	1,480	1,000	666	1.5	291	<3.8 U
	7/2/2018	4.9	0	-35	5.86	96.7	4,200 J	< 0.5 UJ	< 0.5 UJ	< 0.5 UJ	< 0.5 UJ	< 0.47 U	< 1.0 U	0.58 J	780,000 J	14 J	< 0.200 UJ	< 0.200 UJ	811	904	386	< 1.8 U	52,900	<0.5 U
	9/26-27/2018	4.75	0	78	4.95	55.5	2,860	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.47 UJ	3.0 J	< 0.55 UJ	860,000	27.8 J	< 0.200 U	< 0.200 U	508	910	775	3.60	705,000	<2.5 U
	12/11/2018	5.9	0.02	-177	5.2	36.8	685	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.47 U	890	0.44 J	790,000	88.1 J	< 0.200 U	< 0.200 U	13.4	858	1,210	2.50	144,000	<0.9 U
	3/19/2019	6.39	0.16	-234	5.09	31.8	407	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.47 U	3,100	< 0.55 U	720,000	0.44	< 0.500 U	NA	2.33 J	919	NA	12.3	21,200	<0.8 U
	6/4/2019	6.61	0.06	-99	5.15	46.1	331	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.47 U	1,500	< 0.55 U	750,000	0.65	0.180 J	NA	2.08 J	964	NA	26.8	159	0.8 J
	9/11/2019	6.99	0.06	-120	4.92	57.6	84.9	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.47 U	3,300	< 0.55 U	350,000	3.3	<0.100 U	<0.100 U	1.28 J	921	NA	28.6	<25.6 U	0.7 J
	12/19/2019	6.81	0.05	-152	4.97	86	13.8	<0.5 UJ	<0.5 UJ	<0.5 UJ	<0.5 UJ	< 0.47 U	1,500	< 0.55 U	270,000	3.3	<0.100 U	NA	0.845	935	NA	80.3	<10.2 U	30
	3/24/2020	6.83	0.07	-179	5.5	34	15.6	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.47 U	1,300	< 0.55 U	360,000	2.24	<0.100 U	NA	1.51	968	NA	9.6	1,220	5
	6/24/2020	6.65	0.08	-100	4.93	256	10.2	< 1.0 U	< 0.5 U	< 0.5 U	0.51 J	< 0.47 U	1,400	< 0.55 U	270,000	3.3	< 0.100 U	< 0.100 U	35.1	1,080	NA	3.5	1,990	<0.6 U
	12/1/2020	7.03	0.03	-55	5.33	277	8.67 J	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.47 U	3,300	< 0.55 U	270,000	NA	< 0.200 U	NA	45.6	937	NA	1,060	3,700	< 1.4 U
	6/3/2021	6.5	0.03	29	5.19	313	14.4	< 1.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.47 U	2,200	< 0.55 U	490,000	NA	< 0.200 U	NA	197	940	NA	15	4,170	1.50 J
	12/1/2021	6.53	0.06	21	5.16	204	12.1	< 1.0 U	< 0.5 U	< 0.5 U	< 0.5 U	<0.25 U	3,070	<0.50 U	423,000	NA	0.402 J	NA	343	934	NA	34	2,840	2
	6/8/2022	6.5	0.02	25	5.22	135	10.6	< 1.0 U	< 0.5 U	< 0.5 U	< 0.5 U	<0.25 U	2,740	<0.50 U	391,000	NA	0.0666 J	NA	457	938	NA	7.2	1,070	0.400 J
35AWW11	11/14/2017	5.64	0.37	278	8.88	65.2	5.05	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.23 U	< 0.63 U	< 0.22 U	230,000	0.08 J	< 0.0500 U	< 0.0500 U	1,290	2,650	452	NA	NA	NA
	3/7/2018	5.94	0.59	211	9.49	90.8	5.28	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 0.47 U	16	0.38 J	360,000	0.10 J	< 0.0500 U	< 0.0500 U	1,260	2,530	446	0.6	< 5.0 U	NA
	7/16/2018	5.31	0	-56	8.77	15.5	1,650	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.47 U	0.80 J	< 0.55 U	450,000	27.6 J	< 0.100 U	< 0.100 U	652	2,440	649	4.60	910,000	0.7 J
	9/26-27/2018	5.64	0	-194	8.4	116	1,120	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	0.63	1,300	2.1	320,000	36.5 J	< 0.200 U	< 0.200 U	285	2,110	1,190	2.10	394,000	<0.7 U
	12/11/2018	6.02	0.05	-247	9.31	14.2	701	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.47 U	5.5	< 0.55 U	820,000	20.6 J	< 0.200 U	< 0.200 U	127	2,120	1,430	10.6	220,000	<0.5 U
	3/19/2019	5.92	0.11	-142	9	36.2	485	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.47 U	450	< 0.55 U	940,000	0.43	< 0.500 U	NA	172	2,150	NA	231	818,000	<0.9 U
	6/3/2019	5.7	0.09	-136	7.81	54.6	94.6	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.47 U	590	< 0.55 U	750,000	1.33	< 0.500 U	NA	210	1,920	NA	2,100	2,570,000	<0.5 U
	9/11/2019	6.23	0.07	-100	7.15	39.6	28 J	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.47 U	1,300	< 0.55 U	690,000	2.05	< 0.100 U	< 0.100 U	259	1,990	NA	1,240	115,000	<0.9 U
	12/18/2019	6.28	0.09	-95	7.95	22.1	9.94	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.47 U	750	< 0.55 U	330,000	3.3	< 0.500 U	NA	192	2,080	NA	900	213,000	<0.6 U
	3/24/2020	6.08	0.08	-100	7.82	7.2	7.86	< 0.5 U	1.4	< 0.5 U	< 0.5 U	< 0.47 U	860	< 0.55 U	510,000	1.41	< 0.500 U	NA	282 J	2,110	NA	940	40,600	20
	6/23/2020	6.10	0.05	-46	6.65	5.4	7.28	< 1.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.47 U	1,000	< 0.55 U	390,000	2.45	< 0.100 U	NA	416	2,040	NA	382	41,100	<1.1 U
	12/1/2020	5.99	0.05	4	8.34	21.3	3.81	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.47 U	4,400 J	< 0.55 U	610,000	NA	0.284 J	NA	415 J	2,030	NA	368	52,700	< 1.1 U
	6/2/2021	5.96	0.06	-28	6.51	4.3	11.0	< 1.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.47 U	1,000	< 0.55 U	890,000	NA	< 0.500 U	NA	460	1,790	NA	170	5,830	< 1.0 U
	12/1/2021	5.92	0.09	14	7.45	10.5	9.02	< 1.0 U	< 0.5 U	< 0.5 U	< 0.5 U	<0.250 U	986	6.59	778,000	NA	0.814 J	NA	536	1,970	NA	2.3	3,140	<1.1 U
	6/8/2022	5.71	0.04	-8	6.53	21.2	9.72	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	<0.250 U	1,410	<0.50 U	622,000	NA	0.198 J	NA	485	1,880	NA	1,750	137,000	2
35AWW19	11/17/2017	5.27	NR[3]	NR[3]	5.97	26.5	NA	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	3/8/2018	5.28	NA	NA	6.08	26.4	2.51	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 0.47 U	< 1.0 U	< 0.55 U	97,000	1.10 J	< 0.0500 U	< 0.0500 U	1,220	1,430	159	0.4 J	< 11.9 U	NA
	7/18/2019	6.08	NR[3]	NR[3]	5.67	12	2.38 J	< 0.5 UJ	< 0.5 UJ	< 0.5 UJ	< 0.5 UJ	< 0.47 U	0.65 J	< 0.55 U	180,000 J	2.78 J	< 0.200 UJ	< 0.200 UJ	983	1,370	199	0.30 J	20,400	<0.5 U
	9/26-27/2018	5.77	0.01	42	5.46	36.1	2.21	< 0.5 U	0.59 J	< 0.5 U	< 0.5 U	< 0.47 U	27	0.32 J	250,000	3.99 J	< 0.200 U	< 0.200 U	989	1,230	213	0.8	148,000	<0.5 U
	12/10/2018	5.94	0.04	-72	5.7	5.2	2.17	< 0.5 U	0.59 J	< 0.5 U	< 0.5 U	< 0.47 U	5.7	< 0.55 U	330,000	4.19 J	< 0.200 U	< 0.200 U	998	1,190	198	0.50 J	99,000	<0.5 U
	3/19/2019	5.37	0.14	70	5.67	80.1	2.20	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.47 U	1.3 J	< 0.55 U	790,000	0.38	< 0.500 U	NA	994	1,140	NA	< 0.50 U	91.5	<0.5 U
	6/3/2019	5.69	0.05	93	5.46	16.6	1.88	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.47 U	1.4	< 0.55 U	560,000	0	< 0.500 U	NA	966	1,080	NA	3.30	62,700	<0.5 U
	9/11/2019	6.1	0.19	77	4.91	8.8	1.19	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.47 U	3.0	<0.55 U	230,000	1.62	< 0.100 U	< 0.100 U	1,010	1,050	NA	18.4	23,600	<0.5 U
	12/18/2019	5.97	0.08	37	4.81	73.5	1.75	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.47 U	2.0	<0.55 U	160,000	2.08	< 0.500 U	NA	997	979	NA	14.8	12,200	<0.5 U
	3/24/2020	5.97	0.04	46	4.61	25.5	1.79	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.47 U	3.1	<0.55 U	200,000	1.86	< 0.100 U	NA	989	922	NA	9.4	12,200	2
	6/24/2020	5.89	0.04	56	4.14	34	1.75	< 1.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.47 U	3.0	<0.55 U	160,000	1.97	< 0.100 U	< 0.100 U	1,020	934	NA	2.0	19,700	<0.5 U
	12/3/2020	5.64	0.11	65	4.00	4.5	1.63	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.47 U	4.2	<0.55 U	440,000 J	NA	< 0.100 U	NA	860	786	NA	40.2	30,100	5.5
	6/3/2021	5.32	0.11	122	3.92	10.4	2.38	< 1.0 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.47 U	2.2	<0.55 U	670,000	NA	< 0.200 U	NA	857	746	NA	16.1	24,900	<0.5 U
	12/1/2021	5.26	0.07	181	3.39	6.6	7.05	< 1.0 U	< 0.5 U	< 0.5 U	< 0.5 U	<0.25 U	2.4	0.929 J	744,000	NA	0.162 J	NA	769	625	NA	276	13,400	<0.5 U

Table 6
Enhanced In-situ Bioremediation Performance Data Summary-Western Plume
LHAAP-58, Longhorn Army Ammunition Plant, Karnack, Texas
Year 8 RA(O) Report

Monitoring Location	Sample Date	Field Parameters					Electron Donor	cVOCs				Dissolved Gases				Wet Chemistry						Dechlorinating Bacteria		
		pH	DO	ORP	Spec Cond	Turb	TOC	PCE	TCE	cDCE	VC	Ethane	Methane	Ethene	CO_2	Fe^{2+}	NO_3	NO_2	SO_4	Cl^-	Alk	DHC	DHBt	BAV1 VC
		SU	mg/L	mV	ms/cm	NTU	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	cells/mL	cells/mL	cells/mL
	6/8/2022	5.52	0.04	112	3.10	30.4	2.43	< 1.0 U	< 0.5 U	< 0.5 U	< 0.5 U	2.34	2.9	<0.50 U	520,000	NA	0.0352 J	NA	675	529	NA	138.0	2,960	71
35AWW20	11/14/2017	5.97	0.04	138	7.71	27.5	13.8	0.80 J	320	53	78	< 0.23 U	18	0.41 J	230,000	0.45 J	< 0.0500 U	< 0.0500 U	2,150	1,730	834	NA	NA	NA
	3/7/2018	6.16	0.6	106	7.97	21.3	14.5	< 5.0 U	330	76	110	< 0.47 U	< 1.3 U	< 0.55 U	370,000	0.69 J	< 0.0500 U	< 0.0500 U	1,840	1,510	848	5.5	1,120	NA
	7/16/2018	6.18	0	-357	7.19	0	43	< 0.5 U	270	69	71	< 0.47 U	0.93 J	< 0.55 U	360,000	1.18 J	< 0.100 U	< 0.100 U	882	1,420	1,450	1.50	5,970,000	<0.9 U
	9/26-27/2018	5.95	0	-206	6.34	11.1	53	0.81 J	170	45	< 0.5 U	< 0.47 U	37	0.66 J	770,000	1.41 J	< 0.200 U	< 0.200 U	922	1,220	1,470	< 1.30 U	3,770,000	<1.3 U
	12/10/2018	6.21	0.07	-270	7.14	48.1	19	1.3	570	120	110	< 0.47 U	440	1.3	720,000	5.01 J	< 0.200 U	< 0.200 U	1,010	1,010	1,190	< 1.90 U	283,000	<1.9 U
	3/19/2019	6.26	0.11	-247	6.94	28.1	12	< 0.5 UJ	180	49 J	54 J	< 0.47 UJ	840	1.94 J	890,000	0.17	< 0.500 U	NA	1,120	1,090	NA	< 1.50 U	14,000	<1.5 U
	6/4/2019	6.65	0.1	-56	6.79	47.1	12.9	< 2.5 U	230	79	140	0.19 J	920	1.3	730,000	0.09	0.194 J	NA	1,240	1,180	NA	15,500	< 21.7 U	2,370
	9/11/2019	6.67	0.03	-45	6.03	9.7	15.0	< 0.5 U	350	110	790	0.24 J	640 J	5.9	290,000 J	1.59	< 0.100 U	< 0.100 U	1,200	902	NA	16,000	386	10,300
	12/19/2019	6.4	0.08	-52	5.78	24.2	13.1	< 5.0 UJ	99 J	70 J	2,800 J	< 0.47 U	310	6.3	270,000	1.34	< 0.100 U	NA	1,170	821	NA	27,800	6,070	49,100
	3/24/2020	6.5	0.05	-94	5.45	7.8	18.3	< 2.5 U	120	71	1,500	< 0.47 U	410	6.0 J	260,000	2.29	< 0.100 UJ	NA	1,020 J	718 J	NA	13,000	954	19,800
	6/24/2020	6.33	0.07	-47	5.45	0	13.9	0.61 J	94	63	2,000	< 0.47 U	260	5.5	250,000	2.5	0.747	< 0.100 U	1,270	911	NA	115,000	3,830	18,400
	12/3/2020	6.37	0.61	94	5.14	5.1	12 J	< 0.5 U	91	63	1,800	< 0.47 U	1,000	11.0	370,000 J	NA	< 0.100 U	NA	1070	727	NA	7,800	436	6,550
	6/3/2021	6.25	0.11	84	5.00	13.3	20.5	< 1.0 U	190	87	780	< 0.47 U	1,500	11	690,000	NA	< 0.200 U	NA	955	615	NA	72,200	13,400	55,800
	12/1/2021	6.01	0.05	73	0.473	8.1	19.3	0.66 J	100	86	650	<0.25 U	531	7.5	661,000	NA	0.164 J	NA	963	606	NA	177,000	21,400	41,700
	6/8/2022	6.16	0.02	27	4.87	5.1	17.7	< 5.0 U	150	89	840	<0.25 U	714	16.1	458,000	NA	0.030 J	NA	1,040	668	NA	70,400	18,400	67,400

Table 2-4
Groundwater Results, 2013–2021

		Location Code	67WW01																							
		Sample ID	67WW01-130430		67WW01-050113		67WW01-130531		67WW01-053113		67WW01-130927		67WW01-140123		67WW01-050714		67WW01-140507		67WW01-140725		67WW01-072514		67WW01-141203		67WW01-120314		67WW01-150210	
		Sample Date	4/30/2013		5/1/2013		5/31/2013		5/31/2013		9/27/2013		1/23/2014		5/7/2014		5/7/2014		7/25/2014		7/25/2014		12/3/2014		12/3/2014		2/10/2015	
		Sample Purpose	REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG	
Parameter	Units	MCL/GW-Ind	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
ANIONS																												
Chloride	mg/L	NV													981													
Nitrate	mg/L	10													< 1	U												
Nitrite	mg/L	1													< 1	U												
Sulfate	mg/L	NV													167													
Sulfide	mg/L	NV													< 1	U												
TOTAL ORGANIC CARBON																												
Total Inorganic Carbon	mg/L	NV													23.4													
Total Organic Carbon	mg/L	NV													5.25													
DHC																												
BVC	cells/mL	NV													0.5	U												
Dehalococcoides	cells/mL	NV													4.7													
FIELD TESTS																												
Specific conductivity	µmhos/cm	NV	3.74				3.41		3.41		-	-	-	-	3.57		3.57		3.57		3.57		3.69		3.69		3.36	
Dissolved oxygen	mg/L	NV	2.33				8.62		8.62		-	-	-	-	8.81		8.81		8.79		8.79		-	-			-	-
Ferrous Iron	NA	NV																										
Flow Rate	mL/Min	NV																										
Measured well depth	Ft BTOC	NV																										
Oxidation Reduction Potential	mV	NV	0				15		15		-	-	-	-	85		85		107		107		-13		-13		-101	
pH	SU	NV	5.57				5.84		5.84		-	-	-	-	5.52		5.52		5.91		5.91		6.15		6.15		6.92	
Temperature	C	NV	19.98				28		28			-		-	19.77		19.77		21.9		21.9		17.6		17.6		18.85	
Total Purge	L	NV																										
Turbidity	NTU	NV	116				69.6		69.6		-	-	-	-	36.6		36.6		33		33		23.3		23.3		194	
Water Level at Reading Time	Ft BTOC	NV																										
GASES																												
Carbon dioxide	µg/L	NV																										
Ethane	µg/L	NV													< 2	U												
Ethylene	µg/L	NV													< 2	U												
Methane	µg/L	NV													33.5													
GENERAL CHEMISTRY																												
Alkalinity	mg/L	NV																										
Ferrous Iron	mg/L	NV													5.69													
SEMIVOLATILES																												
1,4-Dioxane	µg/L	26			4.15																							
VOLATILES																												
1,1,1,2-Tetrachloroethane	µg/L	110							< 1	U					< 0.5	U					< 0.5	U			< 0.5	U		
1,1,1-Trichloroethane	µg/L	200							< 1	U					< 0.5	U					< 0.5	U			< 0.5	U		
1,1,2,2-Tetrachloroethane	µg/L	14							< 1	U					< 0.4	U					< 0.4	U			< 0.4	U		
1,1,2-Trichloro-1,2,2-Trifluoroethane	µg/L	3,100,000																										
1,1,2-Trichloroethane	µg/L	5							< 1	U					< 0.5	U					0.29	J			0.483	J		
1,1-Dichloroethane	µg/L	10,000							6.37						11						9.2				14.9			
1,1-Dichloroethene	µg/L	7							139						257						224				349			
1,1-Dichloropropene	µg/L	3							< 1	U					< 0.5	U					< 0.5	U			< 0.5	U		
1,2,3-Trichlorobenzene	µg/L	310							< 1	U					< 0.3	U					< 0.3	U			< 0.3	U		
1,2,3-Trichloropropane	µg/L	0.04							< 2	U					< 1	U					< 1	U			< 1	U		
1,2,4-Trichlorobenzene	µg/L	70							< 1	U					< 0.4	U					< 0.4	U			< 0.4	U		
1,2,4-Trimethylbenzene	µg/L	5,100							< 1	U					< 0.5	U					< 0.5	U			< 0.5	U		
1,2-Dibromo-3-chloropropane	µg/L	0.2							< 5	U					< 2	U					< 2	U			< 2	U		
1,2-Dibromoethane	µg/L	0.1							< 1	U					< 0.5	U					< 0.5	U			< 0.5	U		
1,2-Dichlorobenzene	µg/L	600							< 1	U					< 0.25	U					< 0.25	U			< 0.25	U		
1,2-Dichloroethane	µg/L	5							6.68						12.2						10.7				16.6			
1,2-Dichloropropane	µg/L	5							< 1	U					< 0.4	U					< 0.4	U			< 0.4	U		
1,3,5-Trimethylbenzene	µg/L	5,100							< 1	U					< 0.5	U					< 0.5	U			< 0.5	U		
1,3-Dichlorobenzene	µg/L	3,100							< 1	U					< 0.5	U					< 0.5	U			< 0.5	U		

Table 2-4
Groundwater Results, 2013–2021

		Location Code	67WW01																							
		Sample ID	67WW01-130430		67WW01-050113		67WW01-130531		67WW01-053113		67WW01-130927		67WW01-140123		67WW01-050714		67WW01-140507		67WW01-140725		67WW01-072514		67WW01-141203		67WW01-120314		67WW01-150210	
		Sample Date	4/30/2013		5/1/2013		5/31/2013		5/31/2013		9/27/2013		1/23/2014		5/7/2014		5/7/2014		7/25/2014		7/25/2014		12/3/2014		12/3/2014		2/10/2015	
		Sample Purpose	REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG	
Parameter	Units	MCL/GW-Ind	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
1,3-Dichloropropane	µg/L	29							< 1	U					< 0.4	U					< 0.4	U			< 0.4	U		
1,4-Dichlorobenzene	µg/L	75							< 1	U					< 0.25	U					< 0.25	U			< 0.25	U		
2,2-Dichloropropane	µg/L	42							< 1	U					< 0.5	U					< 0.5	U			< 0.5	U		
2-Butanone	µg/L	61,000							< 10	U					< 5	U					< 5	U			< 5	U		
2-Chlorotoluene	µg/L	2,000							< 1	U					< 0.25	U					< 0.25	U			< 0.25	U		
2-Hexanone	µg/L	6,100							< 10	U					< 5	U					< 5	U			< 5	U		
4-Chlorotoluene	µg/L	2,000							< 1	U					< 0.5	U					< 0.5	U			< 0.5	U		
Acetone	µg/L	92,000							< 10	U					< 5	U					< 5	U			< 5	U		
Benzene	µg/L	5							< 1	U					< 0.25	U					< 0.25	U			< 0.25	U		
Bromobenzene	µg/L	2,000							< 1	U					< 0.25	U					< 0.25	U			< 0.25	U		
Bromochloromethane	µg/L	4,100							< 1	U					< 0.4	U					< 0.4	U			< 0.4	U		
Bromodichloromethane	µg/L	5							< 1	U					< 0.5	U					< 0.5	U			< 0.5	U		
Bromoform	µg/L	36							< 2	U					< 1	U					< 1	U			< 1	U		
Bromomethane	µg/L	140							< 2	U					< 1	U					< 1	U			< 1	U		
Carbon disulfide	µg/L	10,000							< 2	U					< 1	U					< 1	U			< 1	U		
Carbon tetrachloride	µg/L	5							< 1	U					< 0.5	U					< 0.5	U			< 0.5	U		
Chlorobenzene	µg/L	100							< 1	U					< 0.25	U					< 0.25	U			< 0.25	U		
Chloroethane	µg/L	41,000							< 2	U					< 1	U					< 1	U			< 1	U		
Chloroform	µg/L	1,000							< 1	U					< 0.25	U					< 0.25	U			< 0.25	U		
Chloromethane	µg/L	220							< 2	U					< 1	U					< 1	U			< 1	U		
cis-1,2-Dichloroethene	µg/L	70							1.12						1.29						1.02				1.26			
cis-1,3-Dichloropropene	µg/L	5							< 1	U					< 0.5	U					< 0.5	U			< 0.5	U		
Dibromochloromethane	µg/L	34							< 1	U					< 0.5	U					< 0.5	U			< 0.5	U		
Dibromomethane	µg/L	380							< 1	U					< 0.5	U					< 0.5	U			< 0.5	U		
Dichlorodifluoromethane	µg/L	20,000							< 1	U					< 0.5	U					< 0.5	U			< 0.5	U		
Ethylbenzene	µg/L	700							< 1	U					< 0.5	U					< 0.5	U			< 0.5	U		
Hexachlorobutadiene	µg/L	20							< 1	U					< 0.5	U					< 0.5	U			< 0.5	U		
Isopropylbenzene	µg/L	10,000							< 1	U					< 0.5	U					< 0.5	U			< 0.5	U		
m,p-Xylenes	µg/L	10,000							< 2	U					< 1	U					< 1	U			< 1	U		
Methyl isobutyl ketone	µg/L	8,200							< 10	U					< 5	U					< 5	U			< 5	U		
Methylene chloride	µg/L	5							< 1	U					< 0.5	U					< 0.5	U			< 0.5	U		
Naphthalene	µg/L	2,000							< 1	U					< 0.4	U					< 0.4	U			< 0.4	U		
n-Butylbenzene	µg/L	4,100							< 1	U					< 0.5	U					< 0.5	U			< 0.5	U		
n-Propylbenzene	µg/L	4,100							< 1	U					< 0.25	U					< 0.25	U			< 0.25	U		
o-Xylene	µg/L	10,000							< 1	U					< 0.5	U					< 0.5	U			< 0.5	U		
p-Isopropyltoluene	µg/L	10,000							< 1	U					< 0.5	U					< 0.5	U			< 0.5	U		
sec-Butylbenzene	µg/L	4,100							< 1	U					< 0.5	U					< 0.5	U			< 0.5	U		
Styrene	µg/L	100							< 1	U					< 0.25	U					< 0.25	U			< 0.25	U		
tert-Butylbenzene	µg/L	4,100							< 1	U					< 0.5	U					< 0.5	U			< 0.5	U		
Tetrachloroethene	µg/L	5							< 1	U					< 0.5	U					< 0.5	U			< 0.5	U		
Toluene	µg/L	1,000							< 1	U					< 0.5	U					0.473	J			0.398	J		
trans-1,2-Dichloroethene	µg/L	100							< 1	U					< 0.5	U					< 0.5	U			< 0.5	U		
trans-1,3-Dichloropropene	µg/L	29							< 2	U					< 1	U					< 1	U			< 1	U		
Trichloroethene	µg/L	5							2.96						3						2.3				3.36			
Trichlorofluoromethane	µg/L	31,000							< 1	U					< 0.5	U					< 0.5	U			< 0.5	U		
Vinyl chloride	µg/L	2							2.18						2.15						1.16				2.16			

Table 2-4
Groundwater Results, 2013–2021

		Location Code	67WW01																							
		Sample ID	67WW01-021015		67WW01-150519		67WW01-051915		67WW01-151119		67WW01-111915		67WW01-151215		67WW01-160329		67WW01-032916		67WW01-160519		67WW01-051916		67WW01-112817		67WW01-180503		67WW01-181025	
		Sample Date	2/10/2015		5/19/2015		5/19/2015		11/19/2015		11/19/2015		12/15/2015		3/29/2016		3/29/2016		5/19/2016		5/19/2016		11/28/2017		5/3/2018		10/25/2018	
		Sample Purpose	REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG	
Parameter	Units	MCL/GW-Ind	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
ANIONS																												
Chloride	mg/L	NV					988																					
Nitrate	mg/L	10					< 1	U																				
Nitrite	mg/L	1					2.02																					
Sulfate	mg/L	NV					143																					
Sulfide	mg/L	NV					< 1	U																				
TOTAL ORGANIC CARBON																												
Total Inorganic Carbon	mg/L	NV					42.6																					
Total Organic Carbon	mg/L	NV					12.7																					
DHC																												
BVC	cells/mL	NV																										
Dehalococcoides	cells/mL	NV																										
FIELD TESTS																												
Specific conductivity	µmhos/cm	NV	3.36		3.2		3.2		3.95		3.95			-	3.8		3.8		3.9		3.9		3.77		3.37			
Dissolved oxygen	mg/L	NV			-	-			-	-			-	-	-	-			-	-			6.95		9.14			
Ferrous Iron	NA	NV																										
Flow Rate	mL/Min	NV																							0			
Measured well depth	Ft BTOC	NV																					27		27		27	
Oxidation Reduction Potential	mV	NV	-101		-52		-52		-	-			-	-	-	-			-	-			19		73			
pH	SU	NV	6.92		7.11		7.11		6.19		6.19		-	-	5.57		5.57		6.28		6.28		6.47		6.61			
Temperature	C	NV	18.85		21.65		21.65		16.27		16.27		-	-	15.38		15.38		17.86		17.86		17.22		19.98			
Total Purge	L	NV																							0			
Turbidity	NTU	NV	194		161		161		284		284		-	-	50.2		50.2		26.2		26.2		184		67.6			
Water Level at Reading Time	Ft BTOC	NV																					25.99		24			
GASES																												
Carbon dioxide	µg/L	NV																										
Ethane	µg/L	NV					< 2	U																				
Ethylene	µg/L	NV					< 2	U																				
Methane	µg/L	NV					20																					
GENERAL CHEMISTRY																												
Alkalinity	mg/L	NV																										
Ferrous Iron	mg/L	NV					0.0539																					
SEMIVOLATILES																												
1,4-Dioxane	µg/L	26																					17					
VOLATILES																												
1,1,1,2-Tetrachloroethane	µg/L	110	< 0.5	U			< 1.25	U			< 1.25	U					< 0.5	U			< 2.5	U	< 1	U	< 0.5	U		
1,1,1-Trichloroethane	µg/L	200	< 0.5	U			< 1.25	U			< 1.25	U					< 0.5	U			< 2.5	U	< 1	U	< 0.5	U		
1,1,2,2-Tetrachloroethane	µg/L	14	< 0.4	U			< 1	U			< 1	U					< 0.4	U			< 2	U	< 1	U	< 0.5	U		
1,1,2-Trichloro-1,2,2-Trifluoroethane	µg/L	3,100,000																					< 1	U	< 0.5	U		
1,1,2-Trichloroethane	µg/L	5	1.44				1.72	J			2.14	J					2.67				1.62	J	< 1	U	1.2			
1,1-Dichloroethane	µg/L	10,000	23.7				23.5				26.2						38.5				27.6		22		15			
1,1-Dichloroethene	µg/L	7	544				631				694						728				714		250		450			
1,1-Dichloropropene	µg/L	3	< 0.5	U			< 1.25	U			< 1.25	U					< 0.5	U			< 2.5	U	< 1	U	< 0.5	U		
1,2,3-Trichlorobenzene	µg/L	310	< 0.3	U			< 0.75	U			< 0.75	U					< 0.3	U			< 1.5	U	< 1	U	< 0.5	U		
1,2,3-Trichloropropane	µg/L	0.04	< 1	U			< 2.5	U			< 2.5	U					< 1	U			< 5	U	< 1	U	< 0.5	U		
1,2,4-Trichlorobenzene	µg/L	70	< 0.4	U			< 1	U			< 1	U					< 0.4	U			< 2	U	< 1	U	< 0.5	U		
1,2,4-Trimethylbenzene	µg/L	5,100	< 0.5	U			< 1.25	U			< 1.25	U					< 0.5	U			< 2.5	U	< 1	U	< 0.5	U		
1,2-Dibromo-3-chloropropane	µg/L	0.2	< 2	U			< 5	U			< 5	U					< 2	U			< 10	U	< 1	U	< 0.5	U		
1,2-Dibromoethane	µg/L	0.1	< 0.5	U			< 1.25	U			< 1.25	U					< 0.5	U			< 2.5	U	< 1	U	< 0.5	U		
1,2-Dichlorobenzene	µg/L	600	< 0.25	U			< 0.626	U			< 0.626	U					< 0.25	U			< 1.25	U	< 1	U	< 0.5	U		
1,2-Dichloroethane	µg/L	5	28.7				31.4				38.6						52.6				43.3		28		22			
1,2-Dichloropropane	µg/L	5	< 0.4	U			< 1	U			< 1	U					< 0.4	U			< 2	U	< 1	U	< 0.5	U		
1,3,5-Trimethylbenzene	µg/L	5,100	< 0.5	U			< 1.25	U			< 1.25	U					< 0.5	U			< 2.5	U	< 1	U	< 0.5	U		
1,3-Dichlorobenzene	µg/L	3,100	< 0.5	U			< 1.25	U			< 1.25	U					< 0.5	U			< 2.5	U	< 1	U	< 0.5	U		

Table 2-4
Groundwater Results, 2013–2021

		Location Code	67WW01																							
		Sample ID	67WW01-021015		67WW01-150519		67WW01-051915		67WW01-151119		67WW01-111915		67WW01-151215		67WW01-160329		67WW01-032916		67WW01-160519		67WW01-051916		67WW01-112817		67WW01-180503		67WW01-181025	
		Sample Date	2/10/2015		5/19/2015		5/19/2015		11/19/2015		11/19/2015		12/15/2015		3/29/2016		3/29/2016		5/19/2016		5/19/2016		11/28/2017		5/3/2018		10/25/2018	
		Sample Purpose	REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG	
Parameter	Units	MCL/GW-Ind	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
1,3-Dichloropropane	µg/L	29	< 0.4	U			< 1	U			< 1	U					< 0.4	U			< 2	U	< 1	U	< 0.5	U		
1,4-Dichlorobenzene	µg/L	75	< 0.25	U			< 0.626	U			< 0.626	U					< 0.25	U			< 1.25	U	< 1	U	< 0.5	U		
2,2-Dichloropropane	µg/L	42	< 0.5	U			< 1.25	U			< 1.25	U					< 0.5	U			< 2.5	U	< 1	U	< 0.5	U		
2-Butanone	µg/L	61,000	< 5	U			< 12.5	U			< 12.5	U					< 5	U			< 25	U	< 2	U	< 1	U		
2-Chlorotoluene	µg/L	2,000	< 0.25	U			< 0.626	UJ			< 0.626	U					< 0.25	U			< 1.25	U	< 1	U	< 0.5	U		
2-Hexanone	µg/L	6,100	< 5	U			< 12.5	U			< 12.5	U					< 5	U			< 25	U	< 2	U	< 1	U		
4-Chlorotoluene	µg/L	2,000	< 0.5	U			< 1.25	U			< 1.25	U					< 0.5	U			< 2.5	U	< 1	U	< 0.5	U		
Acetone	µg/L	92,000	< 5	U			< 12.5	U			< 12.5	U					< 5	U			< 25	U	< 2	U	< 1	U		
Benzene	µg/L	5	< 0.25	U			< 0.626	U			< 0.626	U					0.168	J			< 1.25	U	< 1	U	< 0.5	U		
Bromobenzene	µg/L	2,000	< 0.25	U			< 0.626	U			< 0.626	U					< 0.25	U			< 1.25	U	< 1	U	< 0.5	U		
Bromochloromethane	µg/L	4,100	< 0.4	U			< 1	U			< 1	U					< 0.4	U			< 2	U	< 1	U	< 0.5	U		
Bromodichloromethane	µg/L	5	< 0.5	U			< 1.25	U			< 1.25	U					< 0.5	U			< 2.5	U	< 1	U	< 0.5	U		
Bromoform	µg/L	36	< 1	U			< 2.5	U			< 2.5	U					< 1	U			< 5	U	< 1	U	< 0.5	U		
Bromomethane	µg/L	140	< 1	UJ			< 2.5	U			< 2.5	U					< 1	U			< 5	U	< 1	U	< 0.5	U		
Carbon disulfide	µg/L	10,000	< 1	U			< 2.5	U			< 2.5	U					< 1	U			< 5	U	< 2	U	< 1	U		
Carbon tetrachloride	µg/L	5	< 0.5	U			< 1.25	U			< 1.25	U					< 0.5	U			< 2.5	U	< 1	U	< 0.5	U		
Chlorobenzene	µg/L	100	< 0.25	U			< 0.626	U			< 0.626	U					< 0.25	U			< 1.25	U	< 1	U	< 0.5	U		
Chloroethane	µg/L	41,000	< 1	U			< 2.5	U			< 2.5	U					< 1	U			< 5	U	< 1	U	< 0.5	U		
Chloroform	µg/L	1,000	< 0.25	U			< 0.626	U			< 0.626	U					< 0.25	U			< 1.25	U	< 1	U	< 0.5	U		
Chloromethane	µg/L	220	< 1	U			< 2.5	U			< 2.5	U					< 1	U			< 5	U	< 1	U	< 0.5	U		
cis-1,2-Dichloroethene	µg/L	70	1.82				1.54	J			1.6	J					2.16				1.47	J	1.3		0.95	J		
cis-1,3-Dichloropropene	µg/L	5	< 0.5	U			< 1.25	U			< 1.25	U					< 0.5	U			< 2.5	U	< 1	U	< 0.5	U		
Dibromochloromethane	µg/L	34	< 0.5	U			< 1.25	U			< 1.25	U					< 0.5	U			< 2.5	U	< 1	U	< 0.5	U		
Dibromomethane	µg/L	380	< 0.5	U			< 1.25	U			< 1.25	U					< 0.5	U			< 2.5	U	< 1	U	< 0.5	U		
Dichlorodifluoromethane	µg/L	20,000	< 0.5	U			< 1.25	U			< 1.25	U					< 0.5	UJ			< 2.5	U	< 1	U	< 0.5	U		
Ethylbenzene	µg/L	700	< 0.5	U			< 1.25	U			< 1.25	U					< 0.5	U			< 2.5	U	< 1	U	< 0.5	U		
Hexachlorobutadiene	µg/L	20	< 0.5	U			< 1.25	U			< 1.25	U					< 0.5	U			< 2.5	UJ	< 1	U	< 0.5	U		
Isopropylbenzene	µg/L	10,000	< 0.5	U			< 1.25	U			< 1.25	U					< 0.5	U			< 2.5	U	< 1	U	< 0.5	U		
m,p-Xylenes	µg/L	10,000	< 1	U			< 2.5	U			< 2.5	U					< 1	U			< 5	U	< 2	U	< 1	U		
Methyl isobutyl ketone	µg/L	8,200	< 5	U			< 12.5	U			< 12.5	U					< 5	U			< 25	U	< 2	U	< 1	U		
Methylene chloride	µg/L	5	< 0.5	U			< 1.25	U			< 1.25	U					< 0.5	U			< 2.5	U	< 2	U	< 1	U		
Naphthalene	µg/L	2,000	< 0.4	U			< 1	U			< 1	U					< 0.4	U			< 2	U	< 1	U	< 0.5	U		
n-Butylbenzene	µg/L	4,100	< 0.5	U			< 1.25	U			< 1.25	U					< 0.5	U			< 2.5	U	< 1	U	< 0.5	U		
n-Propylbenzene	µg/L	4,100	< 0.25	U			< 0.626	U			< 0.626	U					< 0.25	U			< 1.25	U	< 1	U	< 0.5	U		
o-Xylene	µg/L	10,000	< 0.5	U			< 1.25	U			< 1.25	U					< 0.5	U			< 2.5	U	< 1	U	< 0.5	U		
p-Isopropyltoluene	µg/L	10,000	< 0.5	U			< 1.25	U			< 1.25	U					< 0.5	U			< 2.5	U	< 1	U	< 0.5	U		
sec-Butylbenzene	µg/L	4,100	< 0.5	U			< 1.25	U			< 1.25	U					< 0.5	U			< 2.5	U	< 1	U	< 0.5	U		
Styrene	µg/L	100	< 0.25	U			< 0.626	U			< 0.626	U					< 0.25	U			< 1.25	U	< 1	U	< 0.5	U		
tert-Butylbenzene	µg/L	4,100	< 0.5	U			< 1.25	U			< 1.25	U					< 0.5	U			< 2.5	U	< 1	U	< 0.5	U		
Tetrachloroethene	µg/L	5	< 0.5	U			< 1.25	U			< 1.25	U					< 0.5	U			< 2.5	U	< 1	U	< 0.5	U		
Toluene	µg/L	1,000	0.287	J			< 1.25	U			< 1.25	U					< 0.5	U			< 2.5	U	< 1	U	< 0.5	U		
trans-1,2-Dichloroethene	µg/L	100	< 0.5	U			< 1.25	U			< 1.25	U					< 0.5	U			< 2.5	U	< 1	U	< 0.5	U		
trans-1,3-Dichloropropene	µg/L	29	< 1	U			< 2.5	U			< 2.5	U					< 1	U			< 5	U	< 1	U	< 0.5	U		
Trichloroethene	µg/L	5	4.07				3.03				2.84						4				3.28	J	2.1		1.7			
Trichlorofluoromethane	µg/L	31,000	< 0.5	U			< 1.25	U			< 1.25	U					< 0.5	U			< 2.5	U	< 1	U	< 0.5	U		
Vinyl chloride	µg/L	2	2.38				1.86	J			2.38	J					3.64				2.98	J	< 1	U	1.4			

Table 2-4
Groundwater Results, 2013–2021

		Location Code	67WW01								67WW02															
		Sample ID	67WW01-190503		67WW01-191024		67WW01-201103		67WW01-211111		67WW02-130502		67WW02-050213		67WW02-130531		67WW02-053113		67WW02-130927		67WW02-092713		67WW02-140123		67WW02-012314		67WW02-140506	
		Sample Date	5/3/2019		10/24/2019		11/3/2020		11/11/2021		5/2/2013		5/2/2013		5/31/2013		5/31/2013		9/27/2013		9/27/2013		1/23/2014		1/23/2014		5/6/2014	
		Sample Purpose	REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG	
Parameter	Units	MCL/GW-Ind	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
ANIONS																										
Chloride	mg/L	NV																								
Nitrate	mg/L	10																								
Nitrite	mg/L	1																								
Sulfate	mg/L	NV																								
Sulfide	mg/L	NV																								
TOTAL ORGANIC CARBON																										
Total Inorganic Carbon	mg/L	NV																								
Total Organic Carbon	mg/L	NV																								
DHC																										
BVC	cells/mL	NV																								
Dehalococcoides	cells/mL	NV																								
FIELD TESTS																										
Specific conductivity	µmhos/cm	NV	3.67		4.39		4.44		3.31		3.25		3.25		3.02		3.02		2.94		2.94		3.04		3.04		3	
Dissolved oxygen	mg/L	NV	0.46		0.43		0.1		0.55		3.4		3.4		8.68		8.68		10.06		10.06		5.81		5.81		6.54	
Ferrous Iron	NA	NV																								
Flow Rate	mL/Min	NV	100		100		100																			
Measured well depth	Ft BTOC	NV	27.03		26.94																					
Oxidation Reduction Potential	mV	NV	202		99		55		39		92		92		-8		-8		73		73		-65		-65		47	
pH	SU	NV	6.17		5.99		6.23		6.46		5.72		5.72		6.57		6.57		6.69		6.69		6.78		6.78		5.62	
Temperature	C	NV	19.81		21.04		17.90		18.37		20.58		20.58		27.07		27.07		25.23		25.23		16.2		16.2		21.01	
Total Purge	L	NV	3		3.0		3																			
Turbidity	NTU	NV	100		57.3		168		97.7		78.4		78.4		51.4		51.4		21		21		49.7		49.7		106	
Water Level at Reading Time	Ft BTOC	NV	23.23		24.01		25.02																			
GASES																										
Carbon dioxide	µg/L	NV																								
Ethane	µg/L	NV																								
Ethylene	µg/L	NV																								
Methane	µg/L	NV																								
GENERAL CHEMISTRY																										
Alkalinity	mg/L	NV																								
Ferrous Iron	mg/L	NV																								
SEMIVOLATILES																										
1,4-Dioxane	µg/L	26											1.7	J												
VOLATILES																										
1,1,1,2-Tetrachloroethane	µg/L	110	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U							< 1	U			< 0.5	U			< 0.5	U		
1,1,1-Trichloroethane	µg/L	200	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U							< 1	U			< 0.5	U			< 0.5	U		
1,1,2,2-Tetrachloroethane	µg/L	14	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U							< 1	UJ			< 0.4	U			< 0.4	U		
1,1,2-Trichloro-1,2,2-Trifluoroethane	µg/L	3,100,000	< 0.5	U	< 0.5	U	< 1	U	< 1	U																		
1,1,2-Trichloroethane	µg/L	5	1.4		0.53	J	< 0.5	U	< 1	U							< 1	U			< 0.5	U			< 0.5	U		
1,1-Dichloroethane	µg/L	10,000	12		3.4		2.6		1.6								0.507	J			0.508	J			0.406	J		
1,1-Dichloroethene	µg/L	7	280		70		49		23								< 2	U			< 1	U			< 1	U		
1,1-Dichloropropene	µg/L	3	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U							< 1	U			< 0.5	U			< 0.5	U		
1,2,3-Trichlorobenzene	µg/L	310	< 0.5	U	< 0.5	UJ	< 1	U	< 1	U							< 1	U			< 0.3	U			< 0.3	U		
1,2,3-Trichloropropane	µg/L	0.04	< 0.5	U	< 0.5	U	< 1	U	< 1	U							< 2	U			< 1	U			< 1	U		
1,2,4-Trichlorobenzene	µg/L	70	< 0.5	U	< 0.5	U	< 1	U	< 1	U							< 1	U			< 0.4	U			< 0.4	U		
1,2,4-Trimethylbenzene	µg/L	5,100	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U							< 1	U			< 0.5	U			< 0.5	U		
1,2-Dibromo-3-chloropropane	µg/L	0.2	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U							< 5	U			< 2	U			< 2	U		
1,2-Dibromoethane	µg/L	0.1	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U							< 1	U			< 0.5	U			< 0.5	U		
1,2-Dichlorobenzene	µg/L	600	< 0.5	U	< 0.5	U	< 1	U	< 1	U							< 1	U			< 0.25	U			< 0.25	U		
1,2-Dichloroethane	µg/L	5	21		7.6		6.1		3								< 1	U			< 0.5	U			< 0.5	U		
1,2-Dichloropropane	µg/L	5	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U							< 1	U			< 0.4	U			< 0.4	U		
1,3,5-Trimethylbenzene	µg/L	5,100	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U							< 1	U			< 0.5	U			< 0.5	U		
1,3-Dichlorobenzene	µg/L	3,100	< 0.5	U	< 0.5	U	< 1	U	< 1	U							< 1	U			< 0.5	U			< 0.5	U		

Table 2-4
Groundwater Results, 2013–2021

		Location Code	67WW01								67WW02															
		Sample ID	67WW01-190503		67WW01-191024		67WW01-201103		67WW01-211111		67WW02-130502		67WW02-050213		67WW02-130531		67WW02-053113		67WW02-130927		67WW02-092713		67WW02-140123		67WW02-012314		67WW02-140506	
		Sample Date	5/3/2019		10/24/2019		11/3/2020		11/11/2021		5/2/2013		5/2/2013		5/31/2013		5/31/2013		9/27/2013		9/27/2013		1/23/2014		1/23/2014		5/6/2014	
		Sample Purpose	REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG	
Parameter	Units	MCL/GW-Ind	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
1,3-Dichloropropane	µg/L	29	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U							< 1	U			< 0.4	U			< 0.4	U		
1,4-Dichlorobenzene	µg/L	75	< 0.5	U	< 0.5	U	< 1	U	< 1	U							< 1	U			< 0.25	U			< 0.25	U		
2,2-Dichloropropane	µg/L	42	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	UJ							< 1	U			< 0.5	U			< 0.5	U		
2-Butanone	µg/L	61,000	< 1	U	< 1	U	< 1	U	< 1	U							< 10	U			< 5	U			< 5	U		
2-Chlorotoluene	µg/L	2,000	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U							< 1	U			< 0.25	U			< 0.25	U		
2-Hexanone	µg/L	6,100	< 1	U	< 1	U	< 2	U	< 2	U							< 10	U			< 5	U			< 5	U		
4-Chlorotoluene	µg/L	2,000	< 0.5	U	< 0.5	U	< 1	U	< 1	U							< 1	U			< 0.5	U			< 0.5	U		
Acetone	µg/L	92,000	< 1	U	< 1	U	< 1	U	< 2	U							< 10	U			< 5	U			< 5	U		
Benzene	µg/L	5	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U							< 1	U			< 0.25	U			< 0.25	U		
Bromobenzene	µg/L	2,000	< 0.5	U	< 0.5	U	< 1	U	< 1	U							< 1	U			< 0.25	U			< 0.25	U		
Bromochloromethane	µg/L	4,100	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U							< 1	U			< 0.4	U			< 0.4	U		
Bromodichloromethane	µg/L	5	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U							< 1	U			< 0.5	U			< 0.5	U		
Bromoform	µg/L	36	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U							< 2	U			< 1	U			< 1	U		
Bromomethane	µg/L	140	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U							< 2	UJ			< 1	U			< 1	U		
Carbon disulfide	µg/L	10,000	< 1	U	< 1	U	< 1	U	< 2	U							< 2	U			< 1	U			< 1	U		
Carbon tetrachloride	µg/L	5	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U							< 1	U			< 0.5	U			< 0.5	U		
Chlorobenzene	µg/L	100	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U							< 1	U			< 0.25	U			< 0.25	U		
Chloroethane	µg/L	41,000	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U							< 2	U			< 1	U			< 1	U		
Chloroform	µg/L	1,000	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U							< 1	U			< 0.25	U			< 0.25	U		
Chloromethane	µg/L	220	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U							< 2	UJ			< 1	U			< 1	U		
cis-1,2-Dichloroethene	µg/L	70	0.86	J	< 0.5	U	< 0.5	U	< 0.5	U							< 1	U			< 0.5	U			< 0.5	U		
cis-1,3-Dichloropropene	µg/L	5	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U							< 1	U			< 0.5	U			< 0.5	U		
Dibromochloromethane	µg/L	34	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U							< 1	U			< 0.5	U			< 0.5	U		
Dibromomethane	µg/L	380	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U							< 1	U			< 0.5	U			< 0.5	U		
Dichlorodifluoromethane	µg/L	20,000	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U							< 1	U			< 0.5	U			< 0.5	U		
Ethylbenzene	µg/L	700	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U							< 1	U			< 0.5	U			< 0.5	U		
Hexachlorobutadiene	µg/L	20	< 1	U	< 0.5	U	< 1	U	< 1	U							< 1	U			< 0.5	U			< 0.5	U		
Isopropylbenzene	µg/L	10,000	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U							< 1	U			< 0.5	U			< 0.5	U		
m,p-Xylenes	µg/L	10,000	< 1	U	< 1	U	< 1	U	< 1	U							< 2	U			< 1	U			< 1	U		
Methyl isobutyl ketone	µg/L	8,200	< 1	U	< 1	U	< 2	U	< 2	U							< 10	U			< 5	U			< 5	U		
Methylene chloride	µg/L	5	< 1	U	< 1	U	< 1	U	< 2	U							< 1	U			< 0.5	U			< 0.5	U		
Naphthalene	µg/L	2,000	< 0.5	U	< 0.5	UJ	< 0.5	U	< 1	U							< 1	U			< 0.4	U			< 0.4	U		
n-Butylbenzene	µg/L	4,100	< 0.5	U	< 0.5	U	< 1	U	< 1	U							< 1	U			< 0.5	U			< 0.5	U		
n-Propylbenzene	µg/L	4,100	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U							< 1	U			< 0.25	U			< 0.25	U		
o-Xylene	µg/L	10,000	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U							< 1	U			< 0.5	U			< 0.5	U		
p-Isopropyltoluene	µg/L	10,000	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U							< 1	U			< 0.5	U			< 0.5	U		
sec-Butylbenzene	µg/L	4,100	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U							< 1	U			< 0.5	U			< 0.5	U		
Styrene	µg/L	100	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U							< 1	U			< 0.25	U			< 0.25	U		
tert-Butylbenzene	µg/L	4,100	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U							< 1	U			< 0.5	U			< 0.5	U		
Tetrachloroethene	µg/L	5	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U							< 1	U			< 0.5	U			< 0.5	U		
Toluene	µg/L	1,000	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U							< 1	U			< 0.5	U			< 0.5	U		
trans-1,2-Dichloroethene	µg/L	100	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U							< 1	U			< 0.5	U			< 0.5	U		
trans-1,3-Dichloropropene	µg/L	29	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U							< 2	U			< 1	U			< 1	U		
Trichloroethene	µg/L	5	1.3		0.53	J	< 0.5	U	< 0.5	U							< 1	U			< 0.5	U			< 0.5	U		
Trichlorofluoromethane	µg/L	31,000	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U							< 1	U			< 0.5	U			< 0.5	U		
Vinyl chloride	µg/L	2	0.92	J	< 0.5	U	< 0.5	U	< 0.5	U							< 1	U			< 0.5	U			< 0.5	U		

Table 2-4
Groundwater Results, 2013–2021

		Location Code	67WW02																									
		Sample ID	67WW02-050614		67WW02-140724		67WW02-072414		67WW02-141203		67WW02-120314		67WW02-150210		67WW02-021015		67WW02-150511		67WW02-051215		67WW02FD-051215		67WW02-151119		67WW02-111915		67WW02-151215	
		Sample Date	5/6/2014		7/24/2014		7/24/2014		12/3/2014		12/3/2014		2/10/2015		2/10/2015		5/11/2015		5/12/2015		5/12/2015		11/19/2015		11/19/2015		12/15/2015	
		Sample Purpose	REG		REG		REG		REG		REG		REG		REG		REG		REG		FD		REG		REG		REG	
Parameter	Units	MCL/GW-Ind	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
ANIONS																												
Chloride	mg/L	NV																										
Nitrate	mg/L	10																										
Nitrite	mg/L	1																										
Sulfate	mg/L	NV																										
Sulfide	mg/L	NV																										
TOTAL ORGANIC CARBON																												
Total Inorganic Carbon	mg/L	NV																										
Total Organic Carbon	mg/L	NV																										
DHC																												
BVC	cells/mL	NV																										
Dehalococcoides	cells/mL	NV																										
FIELD TESTS																												
Specific conductivity	µmhos/cm	NV	3		2.94		2.94		3.07		3.07		2.92		2.92		3.03						3.33		3.33		3.43	
Dissolved oxygen	mg/L	NV	6.54		8.83		8.83		-	-			-	-			-	-					-	-			0.29	
Ferrous Iron	NA	NV																										
Flow Rate	mL/Min	NV																										
Measured well depth	Ft BTOC	NV																										
Oxidation Reduction Potential	mV	NV	47		192		192		61		61		-30		-30		52						-	-			119	
pH	SU	NV	5.62		7.02		7.02		6.27		6.27		7.25		7.25		6.57						6.29		6.29		6.42	
Temperature	C	NV	21.01		22.38		22.38		19		19		19.49		19.49		19.34						17.57		17.57		20.93	
Total Purge	L	NV																										
Turbidity	NTU	NV	106		11.6		11.6		19.3		19.3		8.9		8.9		23						49.3		49.3		12.3	
Water Level at Reading Time	Ft BTOC	NV																										
GASES																												
Carbon dioxide	µg/L	NV																										
Ethane	µg/L	NV																										
Ethylene	µg/L	NV																										
Methane	µg/L	NV																										
GENERAL CHEMISTRY																												
Alkalinity	mg/L	NV																										
Ferrous Iron	mg/L	NV																										
SEMIVOLATILES																												
1,4-Dioxane	µg/L	26																									2.75	
VOLATILES																												
1,1,1,2-Tetrachloroethane	µg/L	110	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U		
1,1,1-Trichloroethane	µg/L	200	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U		
1,1,2,2-Tetrachloroethane	µg/L	14	< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U	< 0.4	U			< 0.4	U		
1,1,2-Trichloro-1,2,2-Trifluoroethane	µg/L	3,100,000																										
1,1,2-Trichloroethane	µg/L	5	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U		
1,1-Dichloroethane	µg/L	10,000	0.44	J			0.335	J			0.406	J			0.592	J			0.883	J	0.873	J			0.302	J		
1,1-Dichloroethene	µg/L	7	< 1	U			< 1	U			< 1	U			3.59				13.2		13				0.857	J		
1,1-Dichloropropene	µg/L	3	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U		
1,2,3-Trichlorobenzene	µg/L	310	< 0.3	U			< 0.3	U			< 0.3	U			< 0.3	U			< 0.3	U	< 0.3	U			< 0.3	U		
1,2,3-Trichloropropane	µg/L	0.04	< 1	U			< 1	U			< 1	U			< 1	U			< 1	U	< 1	U			< 1	U		
1,2,4-Trichlorobenzene	µg/L	70	< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U	< 0.4	U			< 0.4	U		
1,2,4-Trimethylbenzene	µg/L	5,100	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U		
1,2-Dibromo-3-chloropropane	µg/L	0.2	< 2	U			< 2	U			< 2	U			< 2	U			< 2	U	< 2	U			< 2	U		
1,2-Dibromoethane	µg/L	0.1	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U		
1,2-Dichlorobenzene	µg/L	600	< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U	< 0.25	U			< 0.25	U		
1,2-Dichloroethane	µg/L	5	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U		
1,2-Dichloropropane	µg/L	5	< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U	< 0.4	U			< 0.4	U		
1,3,5-Trimethylbenzene	µg/L	5,100	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U		
1,3-Dichlorobenzene	µg/L	3,100	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U		

Table 2-4
Groundwater Results, 2013–2021

		Location Code	67WW02																							
		Sample ID	67WW02-050614		67WW02-140724		67WW02-072414		67WW02-141203		67WW02-120314		67WW02-150210		67WW02-021015		67WW02-150511		67WW02-051215		67WW02FD-051215		67WW02-151119		67WW02-111915		67WW02-151215	
		Sample Date	5/6/2014		7/24/2014		7/24/2014		12/3/2014		12/3/2014		2/10/2015		2/10/2015		5/11/2015		5/12/2015		5/12/2015		11/19/2015		11/19/2015		12/15/2015	
		Sample Purpose	REG		REG		REG		REG		REG		REG		REG		REG		REG		FD		REG		REG		REG	
Parameter	Units	MCL/GW-Ind	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
1,3-Dichloropropane	µg/L	29	< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U	< 0.4	U			< 0.4	U		
1,4-Dichlorobenzene	µg/L	75	< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U	< 0.25	U			< 0.25	U		
2,2-Dichloropropane	µg/L	42	< 0.5	UJ			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U		
2-Butanone	µg/L	61,000	< 5	U			< 5	U			< 5	U			< 5	U			< 5	UJ	< 5	U			< 5	U		
2-Chlorotoluene	µg/L	2,000	< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U	< 0.25	U			< 0.25	U		
2-Hexanone	µg/L	6,100	< 5	U			< 5	U			< 5	U			< 5	U			< 5	UJ	< 5	UJ			< 5	U		
4-Chlorotoluene	µg/L	2,000	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U		
Acetone	µg/L	92,000	< 5	U			< 5	U			< 5	U			< 5	U			< 5	U	< 5	U			< 5	U		
Benzene	µg/L	5	< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U	< 0.25	U			< 0.25	U		
Bromobenzene	µg/L	2,000	< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U	< 0.25	U			< 0.25	U		
Bromochloromethane	µg/L	4,100	< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U	< 0.4	U			< 0.4	U		
Bromodichloromethane	µg/L	5	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U		
Bromoform	µg/L	36	< 1	U			< 1	U			< 1	U			< 1	U			< 1	U	< 1	U			< 1	U		
Bromomethane	µg/L	140	< 1	U			< 1	U			< 1	U			< 1	UJ			< 1	U	< 1	U			< 1	U		
Carbon disulfide	µg/L	10,000	< 1	U			< 1	U			< 1	U			< 1	U			< 1	U	< 1	U			< 1	U		
Carbon tetrachloride	µg/L	5	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U		
Chlorobenzene	µg/L	100	< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U	< 0.25	U			< 0.25	U		
Chloroethane	µg/L	41,000	< 1	U			< 1	U			< 1	U			< 1	U			< 1	U	< 1	U			< 1	U		
Chloroform	µg/L	1,000	< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U	< 0.25	U			< 0.25	U		
Chloromethane	µg/L	220	< 1	U			< 1	U			< 1	U			< 1	U			< 1	U	< 1	U			< 1	U		
cis-1,2-Dichloroethene	µg/L	70	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U		
cis-1,3-Dichloropropene	µg/L	5	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U		
Dibromochloromethane	µg/L	34	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U		
Dibromomethane	µg/L	380	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U		
Dichlorodifluoromethane	µg/L	20,000	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U		
Ethylbenzene	µg/L	700	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U		
Hexachlorobutadiene	µg/L	20	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U		
Isopropylbenzene	µg/L	10,000	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U		
m,p-Xylenes	µg/L	10,000	< 1	U			< 1	U			< 1	U			< 1	U			< 1	U	< 1	U			< 1	U		
Methyl isobutyl ketone	µg/L	8,200	< 5	U			< 5	U			< 5	U			< 5	U			< 5	UJ	< 5	UJ			< 5	U		
Methylene chloride	µg/L	5	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U		
Naphthalene	µg/L	2,000	< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U	< 0.4	U			< 0.4	U		
n-Butylbenzene	µg/L	4,100	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U		
n-Propylbenzene	µg/L	4,100	< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U	< 0.25	U			< 0.25	U		
o-Xylene	µg/L	10,000	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U		
p-Isopropyltoluene	µg/L	10,000	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U		
sec-Butylbenzene	µg/L	4,100	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U		
Styrene	µg/L	100	< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U	< 0.25	U			< 0.25	U		
tert-Butylbenzene	µg/L	4,100	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U		
Tetrachloroethene	µg/L	5	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U		
Toluene	µg/L	1,000	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U		
trans-1,2-Dichloroethene	µg/L	100	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U		
trans-1,3-Dichloropropene	µg/L	29	< 1	U			< 1	U			< 1	U			< 1	U			< 1	U	< 1	U			< 1	U		
Trichloroethene	µg/L	5	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U		
Trichlorofluoromethane	µg/L	31,000	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U		
Vinyl chloride	µg/L	2	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U		

Table 2-4
Groundwater Results, 2013–2021

		Location Code	67WW02																				67WW03			
		Sample ID	67WW02-160519		67WW02FD-051916		67WW02-051916		67WW02-112817		67WW02-180503		67WW02-180503FD		67WW02-181025		67WW02-190501		67WW02-191024		67WW02-201102		67WW02-211110		67WW03-130927		67WW03-140123	
		Sample Date	5/19/2016		5/19/2016		5/19/2016		11/28/2017		5/3/2018		5/3/2018		10/25/2018		5/1/2019		10/24/2019		11/2/2020		11/10/2021		9/27/2013		1/23/2014	
		Sample Purpose	REG		FD		REG		REG		REG		FD		REG		REG		REG		REG		REG		REG		REG	
Parameter	Units	MCL/GW-Ind	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
ANIONS																												
Chloride	mg/L	NV																										
Nitrate	mg/L	10																										
Nitrite	mg/L	1																										
Sulfate	mg/L	NV																										
Sulfide	mg/L	NV																										
TOTAL ORGANIC CARBON																												
Total Inorganic Carbon	mg/L	NV																										
Total Organic Carbon	mg/L	NV																										
DHC																												
BVC	cells/mL	NV																										
Dehalococcoides	cells/mL	NV																										
FIELD TESTS																												
Specific conductivity	µmhos/cm	NV	3.8				3.8		4.26		3.87				4		4.03		4.12		4.42		4.65			-	-	-
Dissolved oxygen	mg/L	NV	-	-					7.82		8.6				1.27		0.27		0.36		0.17		0.34		-	-	-	-
Ferrous Iron	NA	NV																										
Flow Rate	mL/Min	NV									0				100		100		100		100							
Measured well depth	Ft BTOC	NV							27.78		27.88				27.92		27.8		27.75									
Oxidation Reduction Potential	mV	NV	-	-					90		155				129		73		125		51		108		-	-	-	-
pH	SU	NV	6.08				6.08		6.12		6.37				6.50		5.74		6.26		6.68		5.89		-	-	-	-
Temperature	C	NV	18.37				18.37		15.93		20.69				19.04		24.0		22.60		20.0		18.21		-	-		-
Total Purge	L	NV									0				3		3.0		3		3.0							
Turbidity	NTU	NV	10.6				10.6		20.9		14.3				1.1		0		8.7		20.2		71		-	-	-	-
Water Level at Reading Time	Ft BTOC	NV							23.97		24.15				24.6		22.67		23.22		22.19							
GASES																												
Carbon dioxide	µg/L	NV																										
Ethane	µg/L	NV																										
Ethylene	µg/L	NV																										
Methane	µg/L	NV																										
GENERAL CHEMISTRY																												
Alkalinity	mg/L	NV																										
Ferrous Iron	mg/L	NV																										
SEMIVOLATILES																												
1,4-Dioxane	µg/L	26							0.26																			
VOLATILES																												
1,1,1,2-Tetrachloroethane	µg/L	110			< 0.5	U	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U				
1,1,1-Trichloroethane	µg/L	200			< 0.5	U	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U				
1,1,2,2-Tetrachloroethane	µg/L	14			< 0.4	U	< 0.4	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U				
1,1,2-Trichloro-1,2,2-Trifluoroethane	µg/L	3,100,000							< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U				
1,1,2-Trichloroethane	µg/L	5			< 0.5	U	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	1.2		< 0.5	U	1		0.6	J				
1,1-Dichloroethane	µg/L	10,000			3.25		3.27		< 1	U	7.8		7.7		< 0.5	U	8.4		1.7		7.6		5.2					
1,1-Dichloroethene	µg/L	7			66.3		67.6		< 1	U	190		190		6.9		180		34		220		100					
1,1-Dichloropropene	µg/L	3			< 0.5	U	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U				
1,2,3-Trichlorobenzene	µg/L	310			< 0.3	U	< 0.3	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	UJ	< 0.5	U	< 0.5	U	< 1	U	< 1	U				
1,2,3-Trichloropropane	µg/L	0.04			< 1	U	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U				
1,2,4-Trichlorobenzene	µg/L	70			< 0.4	U	< 0.4	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U				
1,2,4-Trimethylbenzene	µg/L	5,100			< 0.5	U	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U				
1,2-Dibromo-3-chloropropane	µg/L	0.2			< 2	U	< 2	U	< 1	U	< 0.5	U	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U				
1,2-Dibromoethane	µg/L	0.1			< 0.5	U	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U				
1,2-Dichlorobenzene	µg/L	600			< 0.25	U	< 0.25	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U				
1,2-Dichloroethane	µg/L	5			0.321	J	0.377	J	< 1	U	2		1.9		< 0.5	U	4.7		< 0.5	U	5.5		3.2					
1,2-Dichloropropane	µg/L	5			< 0.4	U	< 0.4	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U				
1,3,5-Trimethylbenzene	µg/L	5,100			< 0.5	U	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U				
1,3-Dichlorobenzene	µg/L	3,100			< 0.5	U	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U				

Table 2-4
Groundwater Results, 2013–2021

		Location Code	67WW02																				67WW03			
		Sample ID	67WW02-160519		67WW02FD-051916		67WW02-051916		67WW02-112817		67WW02-180503		67WW02-180503FD		67WW02-181025		67WW02-190501		67WW02-191024		67WW02-201102		67WW02-211110		67WW03-130927		67WW03-140123	
		Sample Date	5/19/2016		5/19/2016		5/19/2016		11/28/2017		5/3/2018		5/3/2018		10/25/2018		5/1/2019		10/24/2019		11/2/2020		11/10/2021		9/27/2013		1/23/2014	
		Sample Purpose	REG		FD		REG		REG		REG		FD		REG		REG		REG		REG		REG		REG		REG	
Parameter	Units	MCL/GW-Ind	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
1,3-Dichloropropane	µg/L	29			< 0.4	U	< 0.4	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U				
1,4-Dichlorobenzene	µg/L	75			< 0.25	U	< 0.25	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U				
2,2-Dichloropropane	µg/L	42			< 0.5	U	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U				
2-Butanone	µg/L	61,000			< 5	U	< 5	U	< 2	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U				
2-Chlorotoluene	µg/L	2,000			< 0.25	U	< 0.25	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U				
2-Hexanone	µg/L	6,100			< 5	U	< 5	U	< 2	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 2	U	< 2	U				
4-Chlorotoluene	µg/L	2,000			< 0.5	U	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U				
Acetone	µg/L	92,000			< 5	U	< 5	U	< 2	U	< 1	U	< 1	U	< 2	U	< 1	U	< 1	U	< 1	U	< 2	U				
Benzene	µg/L	5			< 0.25	U	< 0.25	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U				
Bromobenzene	µg/L	2,000			< 0.25	U	< 0.25	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U				
Bromochloromethane	µg/L	4,100			< 0.4	U	< 0.4	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U				
Bromodichloromethane	µg/L	5			< 0.5	U	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U				
Bromoform	µg/L	36			< 1	U	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U				
Bromomethane	µg/L	140			< 1	UJ	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U				
Carbon disulfide	µg/L	10,000			< 1	U	< 1	U	< 2	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 2	U				
Carbon tetrachloride	µg/L	5			< 0.5	U	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U				
Chlorobenzene	µg/L	100			< 0.25	U	< 0.25	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U				
Chloroethane	µg/L	41,000			< 1	U	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U				
Chloroform	µg/L	1,000			< 0.25	U	< 0.25	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U				
Chloromethane	µg/L	220			< 1	U	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U				
cis-1,2-Dichloroethene	µg/L	70			< 0.5	U	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U				
cis-1,3-Dichloropropene	µg/L	5			< 0.5	U	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U				
Dibromochloromethane	µg/L	34			< 0.5	U	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U				
Dibromomethane	µg/L	380			< 0.5	U	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U				
Dichlorodifluoromethane	µg/L	20,000			< 0.5	U	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U				
Ethylbenzene	µg/L	700			< 0.5	U	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U				
Hexachlorobutadiene	µg/L	20			< 0.5	U	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U	< 0.5	U	< 1	U	< 1	U				
Isopropylbenzene	µg/L	10,000			< 0.5	U	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U				
m,p-Xylenes	µg/L	10,000			< 1	U	< 1	U	< 2	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U				
Methyl isobutyl ketone	µg/L	8,200			< 5	U	< 5	U	< 2	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 2	U	< 2	U				
Methylene chloride	µg/L	5			< 0.5	U	< 0.5	U	< 2	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U				
Naphthalene	µg/L	2,000			< 0.4	U	< 0.4	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	UJ	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U				
n-Butylbenzene	µg/L	4,100			< 0.5	U	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U				
n-Propylbenzene	µg/L	4,100			< 0.25	U	< 0.25	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U				
o-Xylene	µg/L	10,000			< 0.5	U	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U				
p-Isopropyltoluene	µg/L	10,000			< 0.5	U	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U				
sec-Butylbenzene	µg/L	4,100			< 0.5	U	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U				
Styrene	µg/L	100			< 0.25	U	< 0.25	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U				
tert-Butylbenzene	µg/L	4,100			< 0.5	U	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U				
Tetrachloroethene	µg/L	5			< 0.5	U	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U				
Toluene	µg/L	1,000			< 0.5	U	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U				
trans-1,2-Dichloroethene	µg/L	100			< 0.5	U	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U				
trans-1,3-Dichloropropene	µg/L	29			< 1	U	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U				
Trichloroethene	µg/L	5			< 0.5	U	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	0.87	J	< 0.5	U	0.83	J	< 0.5	U				
Trichlorofluoromethane	µg/L	31,000			< 0.5	U	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U				
Vinyl chloride	µg/L	2			0.273	J	0.285	J	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U				

Table 2-4
Groundwater Results, 2013–2021

		Location Code	67WW03																							
		Sample ID	67WW03-140506		67WW03-140723		67WW03-141202		67WW03-150210		67WW03-150511		67WW03-051215		67WW03-151118		67WW03-151215		67WW03-160329		67WW03-032916		67WW03-160519		67WW03-051916		67WW03-180502	
		Sample Date	5/6/2014		7/23/2014		12/2/2014		2/10/2015		5/11/2015		5/12/2015		11/18/2015		12/15/2015		3/29/2016		3/29/2016		5/19/2016		5/19/2016		5/2/2018	
		Sample Purpose	REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG	
Parameter	Units	MCL/GW-Ind	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
ANIONS																												
Chloride	mg/L	NV																										
Nitrate	mg/L	10																										
Nitrite	mg/L	1																										
Sulfate	mg/L	NV																										
Sulfide	mg/L	NV																										
TOTAL ORGANIC CARBON																												
Total Inorganic Carbon	mg/L	NV																										
Total Organic Carbon	mg/L	NV																										
DHC																												
BVC	cells/mL	NV																										
Dehalococcoides	cells/mL	NV																										
FIELD TESTS																												
Specific conductivity	µmhos/cm	NV		-	-	-		-		-	4.56				-	-		-	5.5				5.22					
Dissolved oxygen	mg/L	NV	-	-	-	-	-	-	-	-	-	-			-	-	-	-	-	-			-	-				
Ferrous Iron	NA	NV																										
Flow Rate	mL/Min	NV																										
Measured well depth	Ft BTOC	NV																									24.9	
Oxidation Reduction Potential	mV	NV	-	-	-	-	-	-	-	-	40				-	-	-	-	-	-			-	-				
pH	SU	NV	-	-	-	-	-	-	-	-	6.12				-	-	-	-	4.41				6.26					
Temperature	C	NV	-	-	-	-	-	-		-	18.52				-	-		-	13.21				17.89					
Total Purge	L	NV																										
Turbidity	NTU	NV	-	-	-	-	-	-	-	-	200				-	-	-	-	28.9				9.1					
Water Level at Reading Time	Ft BTOC	NV																										
GASES																												
Carbon dioxide	µg/L	NV																										
Ethane	µg/L	NV																										
Ethylene	µg/L	NV																										
Methane	µg/L	NV																										
GENERAL CHEMISTRY																												
Alkalinity	mg/L	NV																										
Ferrous Iron	mg/L	NV																										
SEMIVOLATILES																												
1,4-Dioxane	µg/L	26																										
VOLATILES																												
1,1,1,2-Tetrachloroethane	µg/L	110											< 0.5	U							< 0.5	U			< 0.5	U		
1,1,1-Trichloroethane	µg/L	200											< 0.5	U							< 0.5	U			< 0.5	U		
1,1,2,2-Tetrachloroethane	µg/L	14											< 0.4	U							< 0.4	U			< 0.4	U		
1,1,2-Trichloro-1,2,2-Trifluoroethane	µg/L	3,100,000																										
1,1,2-Trichloroethane	µg/L	5											< 0.5	U							< 0.5	U			< 0.5	U		
1,1-Dichloroethane	µg/L	10,000											< 0.25	U							< 0.25	U			< 0.25	U		
1,1-Dichloroethene	µg/L	7											< 1	U							< 1	U			< 1	U		
1,1-Dichloropropene	µg/L	3											< 0.5	U							< 0.5	U			< 0.5	U		
1,2,3-Trichlorobenzene	µg/L	310											< 0.3	U							< 0.3	U			< 0.3	U		
1,2,3-Trichloropropane	µg/L	0.04											< 1	U							< 1	U			< 1	U		
1,2,4-Trichlorobenzene	µg/L	70											< 0.4	U							< 0.4	U			< 0.4	U		
1,2,4-Trimethylbenzene	µg/L	5,100											< 0.5	U							< 0.5	U			< 0.5	U		
1,2-Dibromo-3-chloropropane	µg/L	0.2											< 2	U							< 2	U			< 2	U		
1,2-Dibromoethane	µg/L	0.1											< 0.5	U							< 0.5	U			< 0.5	U		
1,2-Dichlorobenzene	µg/L	600											< 0.25	U							< 0.25	U			< 0.25	U		
1,2-Dichloroethane	µg/L	5											< 0.5	U							< 0.5	U			< 0.5	U		
1,2-Dichloropropane	µg/L	5											< 0.4	U							< 0.4	U			< 0.4	U		
1,3,5-Trimethylbenzene	µg/L	5,100											< 0.5	U							< 0.5	U			< 0.5	U		
1,3-Dichlorobenzene	µg/L	3,100											< 0.5	U							< 0.5	U			< 0.5	U		

Table 2-4
Groundwater Results, 2013–2021

		Location Code	67WW03																							
		Sample ID	67WW03-140506		67WW03-140723		67WW03-141202		67WW03-150210		67WW03-150511		67WW03-051215		67WW03-151118		67WW03-151215		67WW03-160329		67WW03-032916		67WW03-160519		67WW03-051916		67WW03-180502	
		Sample Date	5/6/2014		7/23/2014		12/2/2014		2/10/2015		5/11/2015		5/12/2015		11/18/2015		12/15/2015		3/29/2016		3/29/2016		5/19/2016		5/19/2016		5/2/2018	
		Sample Purpose	REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG	
Parameter	Units	MCL/GW-Ind	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
1,3-Dichloropropane	µg/L	29											< 0.4	U							< 0.4	U			< 0.4	U		
1,4-Dichlorobenzene	µg/L	75											< 0.25	U							< 0.25	U			< 0.25	U		
2,2-Dichloropropane	µg/L	42											< 0.5	U							< 0.5	U			< 0.5	U		
2-Butanone	µg/L	61,000											< 5	UJ							< 5	U			< 5	U		
2-Chlorotoluene	µg/L	2,000											< 0.25	U							< 0.25	U			< 0.25	U		
2-Hexanone	µg/L	6,100											< 5	U							< 5	U			< 5	U		
4-Chlorotoluene	µg/L	2,000											< 0.5	U							< 0.5	U			< 0.5	U		
Acetone	µg/L	92,000											< 5	U							< 5	U			< 5	U		
Benzene	µg/L	5											< 0.25	U							< 0.25	U			< 0.25	U		
Bromobenzene	µg/L	2,000											< 0.25	U							< 0.25	U			< 0.25	U		
Bromochloromethane	µg/L	4,100											< 0.4	U							< 0.4	U			< 0.4	U		
Bromodichloromethane	µg/L	5											< 0.5	U							< 0.5	U			< 0.5	U		
Bromoform	µg/L	36											< 1	U							< 1	U			< 1	U		
Bromomethane	µg/L	140											< 1	U							< 1	U			< 1	U		
Carbon disulfide	µg/L	10,000											< 1	U							< 1	U			< 1	U		
Carbon tetrachloride	µg/L	5											< 0.5	U							< 0.5	U			< 0.5	U		
Chlorobenzene	µg/L	100											< 0.25	U							< 0.25	U			< 0.25	U		
Chloroethane	µg/L	41,000											< 1	U							< 1	U			< 1	U		
Chloroform	µg/L	1,000											< 0.25	U							< 0.25	U			< 0.25	U		
Chloromethane	µg/L	220											< 1	U							< 1	U			< 1	U		
cis-1,2-Dichloroethene	µg/L	70											< 0.5	U							< 0.5	U			< 0.5	U		
cis-1,3-Dichloropropene	µg/L	5											< 0.5	U							< 0.5	U			< 0.5	U		
Dibromochloromethane	µg/L	34											< 0.5	U							< 0.5	U			< 0.5	U		
Dibromomethane	µg/L	380											< 0.5	U							< 0.5	U			< 0.5	U		
Dichlorodifluoromethane	µg/L	20,000											< 0.5	U							< 0.5	U			< 0.5	U		
Ethylbenzene	µg/L	700											< 0.5	U							< 0.5	U			< 0.5	U		
Hexachlorobutadiene	µg/L	20											< 0.5	U							< 0.5	U			< 0.5	U		
Isopropylbenzene	µg/L	10,000											< 0.5	U							< 0.5	U			< 0.5	U		
m,p-Xylenes	µg/L	10,000											< 1	U							< 1	U			< 1	U		
Methyl isobutyl ketone	µg/L	8,200											< 5	U							< 5	U			< 5	U		
Methylene chloride	µg/L	5											< 0.5	U							< 0.5	U			< 0.5	U		
Naphthalene	µg/L	2,000											< 0.4	U							< 0.4	U			< 0.4	U		
n-Butylbenzene	µg/L	4,100											< 0.5	U							< 0.5	U			< 0.5	U		
n-Propylbenzene	µg/L	4,100											< 0.25	U							< 0.25	U			< 0.25	U		
o-Xylene	µg/L	10,000											< 0.5	U							< 0.5	U			< 0.5	U		
p-Isopropyltoluene	µg/L	10,000											0.411	J							0.456	J			< 0.5	U		
sec-Butylbenzene	µg/L	4,100											< 0.5	U							< 0.5	U			< 0.5	U		
Styrene	µg/L	100											< 0.25	U							< 0.25	U			< 0.25	U		
tert-Butylbenzene	µg/L	4,100											< 0.5	U							< 0.5	U			< 0.5	U		
Tetrachloroethene	µg/L	5											< 0.5	U							< 0.5	U			< 0.5	U		
Toluene	µg/L	1,000											< 0.5	U							< 0.5	U			< 0.5	U		
trans-1,2-Dichloroethene	µg/L	100											< 0.5	U							< 0.5	U			< 0.5	U		
trans-1,3-Dichloropropene	µg/L	29											< 1	U							< 1	U			< 1	U		
Trichloroethene	µg/L	5											< 0.5	U							< 0.5	U			< 0.5	U		
Trichlorofluoromethane	µg/L	31,000											< 0.5	U							< 0.5	U			< 0.5	U		
Vinyl chloride	µg/L	2											< 0.5	U							< 0.5	U			< 0.5	U		

Table 2-4
Groundwater Results, 2013–2021

		Location Code	67WW03						67WW04																67WW05	
		Sample ID	67WW03-181025		67WW03-190502		67WW03-191028		67WW04-130927		67WW04-140123		67WW04-140506		67WW04-140725		67WW04-141202		67WW04-150210		67WW04-150511		67WW04-151118		67WW04-160518		67WW05-130531	
		Sample Date	10/25/2018		5/2/2019		10/28/2019		9/27/2013		1/23/2014		5/6/2014		7/25/2014		12/2/2014		2/10/2015		5/11/2015		11/18/2015		5/18/2016		5/31/2013	
		Sample Purpose	REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG	
Parameter	Units	MCL/GW-Ind	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
ANIONS																												
Chloride	mg/L	NV																										
Nitrate	mg/L	10																										
Nitrite	mg/L	1																										
Sulfate	mg/L	NV																										
Sulfide	mg/L	NV																										
TOTAL ORGANIC CARBON																												
Total Inorganic Carbon	mg/L	NV																										
Total Organic Carbon	mg/L	NV																										
DHC																												
BVC	cells/mL	NV																										
Dehalococcoides	cells/mL	NV																										
FIELD TESTS																												
Specific conductivity	µmhos/cm	NV							-	-		-		-	-	-	-	-		-		-	-	-		-	2.66	
Dissolved oxygen	mg/L	NV							-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8.72	
Ferrous Iron	NA	NV																										
Flow Rate	mL/Min	NV																										
Measured well depth	Ft BTOC	NV	24.95		24.9		24.87																					
Oxidation Reduction Potential	mV	NV							-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-15	
pH	SU	NV							-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.94	
Temperature	C	NV							-	-	-	-		-		-	-	-		-		-		-	-	-	26.87	
Total Purge	L	NV																										
Turbidity	NTU	NV							-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.5	
Water Level at Reading Time	Ft BTOC	NV																										
GASES																												
Carbon dioxide	µg/L	NV																										
Ethane	µg/L	NV																										
Ethylene	µg/L	NV																										
Methane	µg/L	NV																										
GENERAL CHEMISTRY																												
Alkalinity	mg/L	NV																										
Ferrous Iron	mg/L	NV																										
SEMIVOLATILES																												
1,4-Dioxane	µg/L	26																										
VOLATILES																												
1,1,1,2-Tetrachloroethane	µg/L	110																										
1,1,1-Trichloroethane	µg/L	200																										
1,1,2,2-Tetrachloroethane	µg/L	14																										
1,1,2-Trichloro-1,2,2-Trifluoroethane	µg/L	3,100,000																										
1,1,2-Trichloroethane	µg/L	5																										
1,1-Dichloroethane	µg/L	10,000																										
1,1-Dichloroethene	µg/L	7																										
1,1-Dichloropropene	µg/L	3																										
1,2,3-Trichlorobenzene	µg/L	310																										
1,2,3-Trichloropropane	µg/L	0.04																										
1,2,4-Trichlorobenzene	µg/L	70																										
1,2,4-Trimethylbenzene	µg/L	5,100																										
1,2-Dibromo-3-chloropropane	µg/L	0.2																										
1,2-Dibromoethane	µg/L	0.1																										
1,2-Dichlorobenzene	µg/L	600																										
1,2-Dichloroethane	µg/L	5																										
1,2-Dichloropropane	µg/L	5																										
1,3,5-Trimethylbenzene	µg/L	5,100																										
1,3-Dichlorobenzene	µg/L	3,100																										

Table 2-4
Groundwater Results, 2013–2021

		Location Code	67WW03						67WW04																67WW05	
		Sample ID	67WW03-181025		67WW03-190502		67WW03-191028		67WW04-130927		67WW04-140123		67WW04-140506		67WW04-140725		67WW04-141202		67WW04-150210		67WW04-150511		67WW04-151118		67WW04-160518		67WW05-130531	
		Sample Date	10/25/2018		5/2/2019		10/28/2019		9/27/2013		1/23/2014		5/6/2014		7/25/2014		12/2/2014		2/10/2015		5/11/2015		11/18/2015		5/18/2016		5/31/2013	
		Sample Purpose	REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG	
Parameter	Units	MCL/GW-Ind	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
1,3-Dichloropropane	µg/L	29																										
1,4-Dichlorobenzene	µg/L	75																										
2,2-Dichloropropane	µg/L	42																										
2-Butanone	µg/L	61,000																										
2-Chlorotoluene	µg/L	2,000																										
2-Hexanone	µg/L	6,100																										
4-Chlorotoluene	µg/L	2,000																										
Acetone	µg/L	92,000																										
Benzene	µg/L	5																										
Bromobenzene	µg/L	2,000																										
Bromochloromethane	µg/L	4,100																										
Bromodichloromethane	µg/L	5																										
Bromoform	µg/L	36																										
Bromomethane	µg/L	140																										
Carbon disulfide	µg/L	10,000																										
Carbon tetrachloride	µg/L	5																										
Chlorobenzene	µg/L	100																										
Chloroethane	µg/L	41,000																										
Chloroform	µg/L	1,000																										
Chloromethane	µg/L	220																										
cis-1,2-Dichloroethene	µg/L	70																										
cis-1,3-Dichloropropene	µg/L	5																										
Dibromochloromethane	µg/L	34																										
Dibromomethane	µg/L	380																										
Dichlorodifluoromethane	µg/L	20,000																										
Ethylbenzene	µg/L	700																										
Hexachlorobutadiene	µg/L	20																										
Isopropylbenzene	µg/L	10,000																										
m,p-Xylenes	µg/L	10,000																										
Methyl isobutyl ketone	µg/L	8,200																										
Methylene chloride	µg/L	5																										
Naphthalene	µg/L	2,000																										
n-Butylbenzene	µg/L	4,100																										
n-Propylbenzene	µg/L	4,100																										
o-Xylene	µg/L	10,000																										
p-Isopropyltoluene	µg/L	10,000																										
sec-Butylbenzene	µg/L	4,100																										
Styrene	µg/L	100																										
tert-Butylbenzene	µg/L	4,100																										
Tetrachloroethene	µg/L	5																										
Toluene	µg/L	1,000																										
trans-1,2-Dichloroethene	µg/L	100																										
trans-1,3-Dichloropropene	µg/L	29																										
Trichloroethene	µg/L	5																										
Trichlorofluoromethane	µg/L	31,000																										
Vinyl chloride	µg/L	2																										

Table 2-4
Groundwater Results, 2013–2021

	Location Code	67WW05																							
	Sample ID	67WW05-053113		67WW05-130928		67WW05-092813		67WW05-140123		67WW05-012314		67WW05-140506		67WW05-050614		67WW05-140724		67WW05-072414		67WW05-141203		67WW05-120314		67WW05-150210		67WW05-021015	
	Sample Date	5/31/2013		9/28/2013		9/28/2013		1/23/2014		1/23/2014		5/6/2014		5/6/2014		7/24/2014		7/24/2014		12/3/2014		12/3/2014		2/10/2015		2/10/2015	
	Sample Purpose	REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG	
Parameter	Units	MCL/GW-Ind	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
ANIONS																												
Chloride	mg/L	NV													697													
Nitrate	mg/L	10																										
Nitrite	mg/L	1																										
Sulfate	mg/L	NV																										
Sulfide	mg/L	NV																										
TOTAL ORGANIC CARBON																												
Total Inorganic Carbon	mg/L	NV																										
Total Organic Carbon	mg/L	NV																										
DHC																												
BVC	cells/mL	NV																										
Dehalococcoides	cells/mL	NV																										
FIELD TESTS																												
Specific conductivity	µmhos/cm	NV			2.67				2.75				2.62				2.49				2.61				2.36			
Dissolved oxygen	mg/L	NV			10.02				6.01				7.35				8.31				-	-			-	-		
Ferrous Iron	NA	NV																										
Flow Rate	mL/Min	NV																										
Measured well depth	Ft BTOC	NV																										
Oxidation Reduction Potential	mV	NV			-72				-34				13				221				34				-10			
pH	SU	NV			6.37				6.57				5.56				6.92				5.7				6.83			
Temperature	C	NV			21.75				15.83				22.15				22.72				18.55				19.82			
Total Purge	L	NV																										
Turbidity	NTU	NV			16.2				9.7				8.1				28.5				24.8				22.7			
Water Level at Reading Time	Ft BTOC	NV																										
GASES																												
Carbon dioxide	µg/L	NV																										
Ethane	µg/L	NV																										
Ethylene	µg/L	NV																										
Methane	µg/L	NV																										
GENERAL CHEMISTRY																												
Alkalinity	mg/L	NV																										
Ferrous Iron	mg/L	NV																										
SEMIVOLATILES																												
1,4-Dioxane	µg/L	26																										
VOLATILES																												
1,1,1,2-Tetrachloroethane	µg/L	110	< 1	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U
1,1,1-Trichloroethane	µg/L	200	< 1	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U
1,1,2,2-Tetrachloroethane	µg/L	14	< 1	U			< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U
1,1,2-Trichloro-1,2,2-Trifluoroethane	µg/L	3,100,000																										
1,1,2-Trichloroethane	µg/L	5	< 1	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U
1,1-Dichloroethane	µg/L	10,000	< 1	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U
1,1-Dichloroethene	µg/L	7	< 2	U			< 1	U			< 1	U			< 1	U			< 1	U			< 1	U			< 1	U
1,1-Dichloropropene	µg/L	3	< 1	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U
1,2,3-Trichlorobenzene	µg/L	310	< 1	U			< 0.3	U			< 0.3	U			< 0.3	U			< 0.3	U			< 0.3	U			< 0.3	U
1,2,3-Trichloropropane	µg/L	0.04	< 2	U			< 1	U			< 1	U			< 1	U			< 1	U			< 1	U			< 1	U
1,2,4-Trichlorobenzene	µg/L	70	< 1	U			< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U
1,2,4-Trimethylbenzene	µg/L	5,100	< 1	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U
1,2-Dibromo-3-chloropropane	µg/L	0.2	< 5	U			< 2	U			< 2	U			< 2	U			< 2	U			< 2	U			< 2	U
1,2-Dibromoethane	µg/L	0.1	< 1	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U
1,2-Dichlorobenzene	µg/L	600	< 1	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U
1,2-Dichloroethane	µg/L	5	< 1	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U
1,2-Dichloropropane	µg/L	5	< 1	U			< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U
1,3,5-Trimethylbenzene	µg/L	5,100	< 1	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U
1,3-Dichlorobenzene	µg/L	3,100	< 1	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U

Table 2-4
Groundwater Results, 2013–2021

		Location Code	67WW05																							
		Sample ID	67WW05-053113		67WW05-130928		67WW05-092813		67WW05-140123		67WW05-012314		67WW05-140506		67WW05-050614		67WW05-140724		67WW05-072414		67WW05-141203		67WW05-120314		67WW05-150210		67WW05-021015	
		Sample Date	5/31/2013		9/28/2013		9/28/2013		1/23/2014		1/23/2014		5/6/2014		5/6/2014		7/24/2014		7/24/2014		12/3/2014		12/3/2014		2/10/2015		2/10/2015	
		Sample Purpose	REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG	
Parameter	Units	MCL/GW-Ind	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
1,3-Dichloropropane	µg/L	29	< 1	U			< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U
1,4-Dichlorobenzene	µg/L	75	< 1	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U
2,2-Dichloropropane	µg/L	42	< 1	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U
2-Butanone	µg/L	61,000	< 10	U			< 5	U			< 5	U			< 5	U			< 5	U			< 5	U			< 5	U
2-Chlorotoluene	µg/L	2,000	< 1	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U
2-Hexanone	µg/L	6,100	< 10	U			< 5	U			< 5	U			< 5	U			< 5	U			< 5	U			< 5	U
4-Chlorotoluene	µg/L	2,000	< 1	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U
Acetone	µg/L	92,000	< 10	UJ			< 5	U			< 5	U			< 5	U			< 5	U			< 5	U			< 5	U
Benzene	µg/L	5	< 1	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U
Bromobenzene	µg/L	2,000	< 1	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U
Bromochloromethane	µg/L	4,100	< 1	U			< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U
Bromodichloromethane	µg/L	5	< 1	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U
Bromoform	µg/L	36	< 2	U			< 1	U			< 1	U			< 1	U			< 1	U			< 1	U			< 1	U
Bromomethane	µg/L	140	< 2	U			< 1	U			< 1	U			< 1	U			< 1	U			< 1	U			< 1	UJ
Carbon disulfide	µg/L	10,000	< 2	U			< 1	U			< 1	U			< 1	U			< 1	U			< 1	U			< 1	U
Carbon tetrachloride	µg/L	5	< 1	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U
Chlorobenzene	µg/L	100	< 1	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U
Chloroethane	µg/L	41,000	< 2	U			< 1	U			< 1	U			< 1	U			< 1	U			< 1	U			< 1	U
Chloroform	µg/L	1,000	< 1	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U
Chloromethane	µg/L	220	< 2	U			< 1	U			< 1	U			< 1	U			< 1	U			< 1	U			< 1	U
cis-1,2-Dichloroethene	µg/L	70	< 1	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U
cis-1,3-Dichloropropene	µg/L	5	< 1	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U
Dibromochloromethane	µg/L	34	< 1	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U
Dibromomethane	µg/L	380	< 1	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U
Dichlorodifluoromethane	µg/L	20,000	< 1	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U
Ethylbenzene	µg/L	700	< 1	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U
Hexachlorobutadiene	µg/L	20	< 1	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U
Isopropylbenzene	µg/L	10,000	< 1	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U
m,p-Xylenes	µg/L	10,000	< 2	U			< 1	U			< 1	U			< 1	U			< 1	U			< 1	U			< 1	U
Methyl isobutyl ketone	µg/L	8,200	< 10	U			< 5	U			< 5	U			< 5	U			< 5	U			< 5	U			< 5	U
Methylene chloride	µg/L	5	< 1	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U
Naphthalene	µg/L	2,000	< 1	U			< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U
n-Butylbenzene	µg/L	4,100	< 1	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U
n-Propylbenzene	µg/L	4,100	< 1	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U
o-Xylene	µg/L	10,000	< 1	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U
p-Isopropyltoluene	µg/L	10,000	< 1	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U
sec-Butylbenzene	µg/L	4,100	< 1	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U
Styrene	µg/L	100	< 1	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U
tert-Butylbenzene	µg/L	4,100	< 1	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U
Tetrachloroethene	µg/L	5	< 1	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U
Toluene	µg/L	1,000	< 1	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U
trans-1,2-Dichloroethene	µg/L	100	< 1	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U
trans-1,3-Dichloropropene	µg/L	29	< 2	U			< 1	U			< 1	U			< 1	U			< 1	U			< 1	U			< 1	U
Trichloroethene	µg/L	5	< 1	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U
Trichlorofluoromethane	µg/L	31,000	< 1	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U
Vinyl chloride	µg/L	2	< 1	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U

Table 2-4
Groundwater Results, 2013–2021

		Location Code	67WW05																							
		Sample ID	67WW05-150511		67WW05-051215		67WW05-151119		67WW05-111915		67WW05-160519		67WW05-051916		67WW05-112817		67WW05-180503		67WW05-181025		67WW05-181025-FD		67WW05-190502		67WW05-191024		67WW05-201102	
		Sample Date	5/11/2015		5/12/2015		11/19/2015		11/19/2015		5/19/2016		5/19/2016		11/28/2017		5/3/2018		10/25/2018		10/25/2018		5/2/2019		10/24/2019		11/2/2020	
		Sample Purpose	REG		REG		REG		REG		REG		REG		REG		REG		REG		FD		REG		REG		REG	
Parameter	Units	MCL/GW-Ind	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
ANIONS																										
Chloride	mg/L	NV																								
Nitrate	mg/L	10																								
Nitrite	mg/L	1																								
Sulfate	mg/L	NV																								
Sulfide	mg/L	NV																								
TOTAL ORGANIC CARBON																										
Total Inorganic Carbon	mg/L	NV																								
Total Organic Carbon	mg/L	NV																								
DHC																										
BVC	cells/mL	NV																								
Dehalococcoides	cells/mL	NV																								
FIELD TESTS																										
Specific conductivity	µmhos/cm	NV	2.43				2.83				2.77				2.75		2.45		2.75				2.65		2.58		3.03	
Dissolved oxygen	mg/L	NV	-	-			-	-			-	-			7.47		9.51		0.11				1.99		0.9		0.58	
Ferrous Iron	NA	NV																								
Flow Rate	mL/Min	NV															0		100				100		100		100	
Measured well depth	Ft BTOC	NV													30.13		24.9		30.2				30.13		30.08			
Oxidation Reduction Potential	mV	NV	127				-	-			-	-			133		229		172				247		62		31	
pH	SU	NV	5.74				5.12				5.42				5.26		5.68		5.17				4.11		5.63		6.11	
Temperature	C	NV	19.69				16.33				18.66				16.09		20.63		17.93				20.10		18.35		17.69	
Total Purge	L	NV															0		3.0				3		3		3.0	
Turbidity	NTU	NV	100				129				91.8				301		54		21.3				55.2		48.8		96.1	
Water Level at Reading Time	Ft BTOC	NV													25.6		25.08		26.07				24.68		24.98		23.74	
GASES																										
Carbon dioxide	µg/L	NV																								
Ethane	µg/L	NV																								
Ethylene	µg/L	NV																								
Methane	µg/L	NV																								
GENERAL CHEMISTRY																										
Alkalinity	mg/L	NV																								
Ferrous Iron	mg/L	NV																								
SEMIVOLATILES																										
1,4-Dioxane	µg/L	26													0.53											
VOLATILES																										
1,1,1,2-Tetrachloroethane	µg/L	110			< 0.5	U			< 0.5	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,1,1-Trichloroethane	µg/L	200			< 0.5	U			< 0.5	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,1,2,2-Tetrachloroethane	µg/L	14			< 0.4	U			< 0.4	U			< 0.4	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,1,2-Trichloro-1,2,2-Trifluoroethane	µg/L	3,100,000													< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U
1,1,2-Trichloroethane	µg/L	5			< 0.5	U			< 0.5	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,1-Dichloroethane	µg/L	10,000			< 0.25	U			< 0.25	U			< 0.25	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,1-Dichloroethene	µg/L	7			< 1	U			< 1	U			< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,1-Dichloropropene	µg/L	3			< 0.5	U			< 0.5	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,2,3-Trichlorobenzene	µg/L	310			< 0.3	U			< 0.3	U			< 0.3	U	< 1	U	< 0.5	U	< 0.5	UJ	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U
1,2,3-Trichloropropane	µg/L	0.04			< 1	U			< 1	U			< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U
1,2,4-Trichlorobenzene	µg/L	70			< 0.4	U			< 0.4	U			< 0.4	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U
1,2,4-Trimethylbenzene	µg/L	5,100			< 0.5	U			< 0.5	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,2-Dibromo-3-chloropropane	µg/L	0.2			< 2	U			< 2	U			< 2	U	< 1	U	< 0.5	U	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U
1,2-Dibromoethane	µg/L	0.1			< 0.5	U			< 0.5	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,2-Dichlorobenzene	µg/L	600			< 0.25	U			< 0.25	U			< 0.25	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U
1,2-Dichloroethane	µg/L	5			< 0.5	U			< 0.5	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,2-Dichloropropane	µg/L	5			< 0.4	U			< 0.4	U			< 0.4	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,3,5-Trimethylbenzene	µg/L	5,100			< 0.5	U			< 0.5	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,3-Dichlorobenzene	µg/L	3,100			< 0.5	U			< 0.5	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U

Table 2-4
Groundwater Results, 2013–2021

		Location Code	67WW05																							
		Sample ID	67WW05-150511		67WW05-051215		67WW05-151119		67WW05-111915		67WW05-160519		67WW05-051916		67WW05-112817		67WW05-180503		67WW05-181025		67WW05-181025-FD		67WW05-190502		67WW05-191024		67WW05-201102	
		Sample Date	5/11/2015		5/12/2015		11/19/2015		11/19/2015		5/19/2016		5/19/2016		11/28/2017		5/3/2018		10/25/2018		10/25/2018		5/2/2019		10/24/2019		11/2/2020	
		Sample Purpose	REG		REG		REG		REG		REG		REG		REG		REG		REG		FD		REG		REG		REG	
Parameter	Units	MCL/GW-Ind	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
1,3-Dichloropropane	µg/L	29			< 0.4	U			< 0.4	U			< 0.4	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,4-Dichlorobenzene	µg/L	75			< 0.25	U			< 0.25	U			< 0.25	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U
2,2-Dichloropropane	µg/L	42			< 0.5	U			< 0.5	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
2-Butanone	µg/L	61,000			< 5	U			< 5	U			< 5	U	< 2	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U
2-Chlorotoluene	µg/L	2,000			< 0.25	U			< 0.25	U			< 0.25	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
2-Hexanone	µg/L	6,100			< 5	UJ			< 5	U			< 5	U	< 2	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 2	U
4-Chlorotoluene	µg/L	2,000			< 0.5	U			< 0.5	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U
Acetone	µg/L	92,000			< 5	U			< 5	U			< 5	U	< 2	U	< 1	U	< 2	U	< 2	U	< 1	U	< 1	U	< 1	U
Benzene	µg/L	5			< 0.25	U			< 0.25	U			< 0.25	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Bromobenzene	µg/L	2,000			< 0.25	U			< 0.25	U			< 0.25	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U
Bromochloromethane	µg/L	4,100			< 0.4	U			< 0.4	U			< 0.4	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Bromodichloromethane	µg/L	5			< 0.5	U			< 0.5	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Bromoform	µg/L	36			< 1	U			< 1	U			< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Bromomethane	µg/L	140			< 1	U			< 1	U			< 1	UJ	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Carbon disulfide	µg/L	10,000			< 1	U			< 1	U			< 1	U	< 2	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U
Carbon tetrachloride	µg/L	5			< 0.5	U			< 0.5	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Chlorobenzene	µg/L	100			< 0.25	U			< 0.25	U			< 0.25	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Chloroethane	µg/L	41,000			< 1	U			< 1	U			< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Chloroform	µg/L	1,000			< 0.25	U			< 0.25	U			< 0.25	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Chloromethane	µg/L	220			< 1	U			< 1	U			< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
cis-1,2-Dichloroethene	µg/L	70			< 0.5	U			< 0.5	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
cis-1,3-Dichloropropene	µg/L	5			< 0.5	U			< 0.5	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Dibromochloromethane	µg/L	34			< 0.5	U			< 0.5	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Dibromomethane	µg/L	380			< 0.5	U			< 0.5	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Dichlorodifluoromethane	µg/L	20,000			< 0.5	U			< 0.5	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Ethylbenzene	µg/L	700			< 0.5	U			< 0.5	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Hexachlorobutadiene	µg/L	20			< 0.5	U			< 0.5	U			< 0.5	U	< 1	U	< 0.5	U	< 1	U	< 1	U	< 1	U	< 0.5	U	< 1	U
Isopropylbenzene	µg/L	10,000			< 0.5	U			< 0.5	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
m,p-Xylenes	µg/L	10,000			< 1	U			< 1	U			< 1	U	< 2	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U
Methyl isobutyl ketone	µg/L	8,200			< 5	UJ			< 5	U			< 5	U	< 2	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 2	U
Methylene chloride	µg/L	5			< 0.5	U			< 0.5	U			< 0.5	U	< 2	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U
Naphthalene	µg/L	2,000			< 0.4	U			< 0.4	U			< 0.4	U	< 1	U	< 0.5	U	< 0.5	UJ	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
n-Butylbenzene	µg/L	4,100			< 0.5	U			< 0.5	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U
n-Propylbenzene	µg/L	4,100			< 0.25	U			< 0.25	U			< 0.25	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
o-Xylene	µg/L	10,000			< 0.5	U			< 0.5	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
p-Isopropyltoluene	µg/L	10,000			< 0.5	U			< 0.5	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
sec-Butylbenzene	µg/L	4,100			< 0.5	U			< 0.5	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Styrene	µg/L	100			< 0.25	U			< 0.25	U			< 0.25	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
tert-Butylbenzene	µg/L	4,100			< 0.5	U			< 0.5	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Tetrachloroethene	µg/L	5			< 0.5	U			< 0.5	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Toluene	µg/L	1,000			< 0.5	U			< 0.5	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
trans-1,2-Dichloroethene	µg/L	100			< 0.5	U			< 0.5	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
trans-1,3-Dichloropropene	µg/L	29			< 1	U			< 1	U			< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Trichloroethene	µg/L	5			< 0.5	U			< 0.5	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Trichlorofluoromethane	µg/L	31,000			< 0.5	U			< 0.5	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Vinyl chloride	µg/L	2			< 0.5	U			< 0.5	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U

Table 2-4
Groundwater Results, 2013–2021

		Location Code	67WW05				67WW06																			
		Sample ID	67WW05-211110-FD		67WW05-211110		67WW06-130430		67WW06-043013		67WW06-130531		67WW06-053113		67WW06-053113-FD		67WW06-130928		67WW06-092813		67WW06-140124		67WW06-012414		67WW06-140506		67WW06-140723	
		Sample Date	11/10/2021		11/10/2021		4/30/2013		4/30/2013		5/31/2013		5/31/2013		5/31/2013		9/28/2013		9/28/2013		1/24/2014		1/24/2014		5/6/2014		7/23/2014	
		Sample Purpose	FD		REG		REG		REG		REG		REG		FD		REG		REG		REG		REG		REG		REG	
Parameter	Units	MCL/GW-Ind	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
ANIONS																												
Chloride	mg/L	NV																										
Nitrate	mg/L	10																										
Nitrite	mg/L	1																										
Sulfate	mg/L	NV																										
Sulfide	mg/L	NV																										
TOTAL ORGANIC CARBON																												
Total Inorganic Carbon	mg/L	NV																										
Total Organic Carbon	mg/L	NV																										
DHC																												
BVC	cells/mL	NV																										
Dehalococcoides	cells/mL	NV																										
FIELD TESTS																												
Specific conductivity	µmhos/cm	NV			3.11		6.38		6.38		6.37		6.37				6.45		6.45		7.09		7.09		-	-		-
Dissolved oxygen	mg/L	NV			0.3		0		0		1.57		1.57				0.82		0.82		0.8		0.8		-	-	-	-
Ferrous Iron	NA	NV																										
Flow Rate	mL/Min	NV																										
Measured well depth	Ft BTOC	NV																										
Oxidation Reduction Potential	mV	NV			48		82		82		22		22				13		13		67		67		-	-	-	-
pH	SU	NV			5.95		5.01		5.01		5.27		5.27				5.45		5.45		5.58		5.58		-	-	-	-
Temperature	C	NV			17.77		24.95		24.95		24.28		24.28				20.2		20.2		15.42		15.42			-		-
Total Purge	L	NV																										
Turbidity	NTU	NV			64.1		9.7		9.7		13.4		13.4				5.5		5.5		42.9		42.9		-	-	-	-
Water Level at Reading Time	Ft BTOC	NV																										
GASES																												
Carbon dioxide	µg/L	NV																										
Ethane	µg/L	NV																										
Ethylene	µg/L	NV																										
Methane	µg/L	NV																										
GENERAL CHEMISTRY																												
Alkalinity	mg/L	NV																										
Ferrous Iron	mg/L	NV																										
SEMIVOLATILES																												
1,4-Dioxane	µg/L	26							< 1	U																		
VOLATILES																												
1,1,1,2-Tetrachloroethane	µg/L	110	< 1	U	< 1	U							< 1	U	< 1	U			< 0.5	U			< 0.5	U				
1,1,1-Trichloroethane	µg/L	200	< 0.5	U	< 0.5	U							< 1	U	< 1	U			< 0.5	U			< 0.5	U				
1,1,2,2-Tetrachloroethane	µg/L	14	< 1	U	< 1	U							< 1	U	< 1	U			< 0.4	U			< 0.4	U				
1,1,2-Trichloro-1,2,2-Trifluoroethane	µg/L	3,100,000	< 1	U	< 1	U																						
1,1,2-Trichloroethane	µg/L	5	< 1	U	< 1	U							< 1	U	< 1	U			< 0.5	U			< 0.5	U				
1,1-Dichloroethane	µg/L	10,000	< 0.5	U	< 0.5	U							0.212	J	0.193	J			< 0.25	U			0.234	J				
1,1-Dichloroethene	µg/L	7	0.62	J	< 0.5	U							< 2	U	< 2	U			< 1	U			0.752	J				
1,1-Dichloropropene	µg/L	3	< 1	U	< 1	U							< 1	U	< 1	U			< 0.5	U			< 0.5	U				
1,2,3-Trichlorobenzene	µg/L	310	< 1	U	< 1	U							< 1	U	< 1	U			< 0.3	U			< 0.3	U				
1,2,3-Trichloropropane	µg/L	0.04	< 1	U	< 1	U							< 2	U	< 2	U			< 1	U			< 1	U				
1,2,4-Trichlorobenzene	µg/L	70	< 1	U	< 1	U							< 1	U	< 1	U			< 0.4	U			< 0.4	U				
1,2,4-Trimethylbenzene	µg/L	5,100	< 1	U	< 1	U							< 1	U	< 1	U			< 0.5	U			< 0.5	U				
1,2-Dibromo-3-chloropropane	µg/L	0.2	< 1	U	< 1	U							< 5	U	< 5	U			< 2	U			< 2	U				
1,2-Dibromoethane	µg/L	0.1	< 0.5	U	< 0.5	U							< 1	U	< 1	U			< 0.5	U			< 0.5	U				
1,2-Dichlorobenzene	µg/L	600	< 1	U	< 1	U							< 1	U	< 1	U			< 0.25	U			< 0.25	U				
1,2-Dichloroethane	µg/L	5	< 0.5	U	< 0.5	U							2.25		2.2				1.77				2.03					
1,2-Dichloropropane	µg/L	5	< 1	U	< 1	U							< 1	U	< 1	U			< 0.4	U			< 0.4	U				
1,3,5-Trimethylbenzene	µg/L	5,100	< 1	U	< 1	U							< 1	U	< 1	U			< 0.5	U			< 0.5	U				
1,3-Dichlorobenzene	µg/L	3,100	< 1	U	< 1	U							< 1	U	< 1	U			< 0.5	U			< 0.5	U				

Table 2-4
Groundwater Results, 2013–2021

		Location Code	67WW05				67WW06																			
		Sample ID	67WW05-211110-FD		67WW05-211110		67WW06-130430		67WW06-043013		67WW06-130531		67WW06-053113		67WW06-053113-FD		67WW06-130928		67WW06-092813		67WW06-140124		67WW06-012414		67WW06-140506		67WW06-140723	
		Sample Date	11/10/2021		11/10/2021		4/30/2013		4/30/2013		5/31/2013		5/31/2013		5/31/2013		9/28/2013		9/28/2013		1/24/2014		1/24/2014		5/6/2014		7/23/2014	
		Sample Purpose	FD		REG		REG		REG		REG		REG		FD		REG		REG		REG		REG		REG		REG	
Parameter	Units	MCL/GW-Ind	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
1,3-Dichloropropane	µg/L	29	< 1	U	< 1	U							< 1	U	< 1	U			< 0.4	U			< 0.4	U				
1,4-Dichlorobenzene	µg/L	75	< 1	U	< 1	U							< 1	U	< 1	U			< 0.25	U			< 0.25	U				
2,2-Dichloropropane	µg/L	42	< 0.5	U	< 0.5	U							< 1	U	< 1	U			< 0.5	U			< 0.5	U				
2-Butanone	µg/L	61,000	< 1	U	< 1	U							< 10	U	< 10	U			< 5	U			< 5	U				
2-Chlorotoluene	µg/L	2,000	< 1	U	< 1	U							< 1	U	< 1	U			< 0.25	U			< 0.25	U				
2-Hexanone	µg/L	6,100	< 2	U	< 2	U							< 10	U	< 10	U			< 5	U			< 5	U				
4-Chlorotoluene	µg/L	2,000	< 1	U	< 1	U							< 1	U	< 1	U			< 0.5	U			< 0.5	U				
Acetone	µg/L	92,000	< 2	U	< 2	U							< 10	UJ	< 10	UJ			< 5	U			< 5	U				
Benzene	µg/L	5	< 0.5	U	< 0.5	U							< 1	U	< 1	U			< 0.25	U			< 0.25	U				
Bromobenzene	µg/L	2,000	< 1	U	< 1	U							< 1	U	< 1	U			< 0.25	U			< 0.25	U				
Bromochloromethane	µg/L	4,100	< 0.5	U	< 0.5	U							< 1	U	< 1	U			< 0.4	U			< 0.4	U				
Bromodichloromethane	µg/L	5	< 0.5	U	< 0.5	U							< 1	U	< 1	U			< 0.5	U			< 0.5	U				
Bromoform	µg/L	36	< 1	U	< 1	U							< 2	U	< 2	U			< 1	U			< 1	U				
Bromomethane	µg/L	140	< 1	U	< 1	U							< 2	U	< 2	U			< 1	UJ			< 1	U				
Carbon disulfide	µg/L	10,000	< 2	U	< 2	U							< 2	U	< 2	U			< 1	U			< 1	U				
Carbon tetrachloride	µg/L	5	< 1	U	< 1	U							< 1	U	< 1	U			< 0.5	U			< 0.5	U				
Chlorobenzene	µg/L	100	< 1	U	< 1	U							< 1	U	< 1	U			< 0.25	U			< 0.25	U				
Chloroethane	µg/L	41,000	< 1	U	< 1	U							< 2	U	< 2	U			< 1	U			< 1	U				
Chloroform	µg/L	1,000	< 0.5	U	< 0.5	U							< 1	U	< 1	U			< 0.25	U			< 0.25	U				
Chloromethane	µg/L	220	< 0.5	U	< 0.5	U							< 2	U	< 2	U			< 1	U			< 1	U				
cis-1,2-Dichloroethene	µg/L	70	< 0.5	U	< 0.5	U							< 1	U	< 1	U			< 0.5	U			< 0.5	U				
cis-1,3-Dichloropropene	µg/L	5	< 0.5	U	< 0.5	U							< 1	U	< 1	U			< 0.5	U			< 0.5	U				
Dibromochloromethane	µg/L	34	< 1	U	< 1	U							< 1	U	< 1	U			< 0.5	U			< 0.5	U				
Dibromomethane	µg/L	380	< 0.5	U	< 0.5	U							< 1	U	< 1	U			< 0.5	U			< 0.5	U				
Dichlorodifluoromethane	µg/L	20,000	< 1	U	< 1	U							< 1	U	< 1	U			< 0.5	U			< 0.5	U				
Ethylbenzene	µg/L	700	< 1	U	< 1	U							< 1	U	< 1	U			< 0.5	U			< 0.5	U				
Hexachlorobutadiene	µg/L	20	< 1	U	< 1	U							< 1	U	< 1	U			< 0.5	U			< 0.5	U				
Isopropylbenzene	µg/L	10,000	< 1	U	< 1	U							< 1	U	< 1	U			< 0.5	U			< 0.5	U				
m,p-Xylenes	µg/L	10,000	< 1	U	< 1	U							< 2	U	< 2	U			< 1	U			< 1	U				
Methyl isobutyl ketone	µg/L	8,200	< 2	U	< 2	U							< 10	U	< 10	U			< 5	U			< 5	U				
Methylene chloride	µg/L	5	< 1	U	< 2	U							0.918	J	0.846	J			0.966	J			< 0.5	U				
Naphthalene	µg/L	2,000	< 1	U	< 1	U							< 1	U	< 1	U			< 0.4	U			< 0.4	U				
n-Butylbenzene	µg/L	4,100	< 1	U	< 1	U							< 1	U	< 1	U			< 0.5	U			< 0.5	U				
n-Propylbenzene	µg/L	4,100	< 1	U	< 1	U							< 1	U	< 1	U			< 0.25	U			< 0.25	U				
o-Xylene	µg/L	10,000	< 1	U	< 1	U							< 1	U	< 1	U			< 0.5	U			< 0.5	U				
p-Isopropyltoluene	µg/L	10,000	< 1	U	< 1	U							< 1	U	< 1	U			< 0.5	U			< 0.5	U				
sec-Butylbenzene	µg/L	4,100	< 1	U	< 1	U							< 1	U	< 1	U			< 0.5	U			< 0.5	U				
Styrene	µg/L	100	< 1	U	< 1	U							< 1	U	< 1	U			< 0.25	U			< 0.25	U				
tert-Butylbenzene	µg/L	4,100	< 1	U	< 1	U							< 1	U	< 1	U			< 0.5	U			< 0.5	U				
Tetrachloroethene	µg/L	5	< 1	U	< 1	U							< 1	U	< 1	U			< 0.5	U			< 0.5	U				
Toluene	µg/L	1,000	< 0.5	U	< 0.5	U							< 1	U	< 1	U			< 0.5	U			< 0.5	U				
trans-1,2-Dichloroethene	µg/L	100	< 0.5	U	< 0.5	U							< 1	U	< 1	U			< 0.5	U			< 0.5	U				
trans-1,3-Dichloropropene	µg/L	29	< 0.5	U	< 0.5	U							< 2	U	< 2	U			< 1	U			< 1	U				
Trichloroethene	µg/L	5	< 0.5	U	< 0.5	U							< 1	U	< 1	U			< 0.5	U			< 0.5	U				
Trichlorofluoromethane	µg/L	31,000	< 1	U	< 1	U							< 1	U	< 1	U			< 0.5	U			< 0.5	U				
Vinyl chloride	µg/L	2	< 0.5	U	< 0.5	U							< 1	U	< 1	U			< 0.5	U			< 0.5	U				

Table 2-4
Groundwater Results, 2013–2021

		Location Code	67WW06																67WW07									
		Sample ID	67WW06-141202		67WW06-150210		67WW06-150511		67WW06-151118		67WW06-151216		67WW06-161215		67WW06-160518		67WW06-112917		67WW07-130531		67WW07-053113		67WW07-130927		67WW07-092713		67WW07-140123	
		Sample Date	12/2/2014		2/10/2015		5/11/2015		11/18/2015		12/16/2015		12/16/2015		5/18/2016		11/29/2017		5/31/2013		5/31/2013		9/27/2013		9/27/2013		1/23/2014	
		Sample Purpose	REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG	
Parameter	Units	MCL/GW-Ind	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
ANIONS																												
Chloride	mg/L	NV																										
Nitrate	mg/L	10																										
Nitrite	mg/L	1																										
Sulfate	mg/L	NV																										
Sulfide	mg/L	NV																										
TOTAL ORGANIC CARBON																												
Total Inorganic Carbon	mg/L	NV																										
Total Organic Carbon	mg/L	NV																										
DHC																												
BVC	cells/mL	NV																										
Dehalococcoides	cells/mL	NV																										
FIELD TESTS																												
Specific conductivity	µmhos/cm	NV		-	-	-	-	-		-	6.13		6.13		-	-	5.36		3.99				4.13				4.14	
Dissolved oxygen	mg/L	NV	-	-	-	-	-	-	-	-	0		0		-	-	0.1		8.75				10.55				5.96	
Ferrous Iron	NA	NV																										
Flow Rate	mL/Min	NV															100											
Measured well depth	Ft BTOC	NV															47.17											
Oxidation Reduction Potential	mV	NV	-	-	-	-	-	-	-	-	56		56		-	-	204		35				0				60	
pH	SU	NV	-	-	-	-	-	-	-	-	5.74		5.74		-	-	5.11		5.52				5.78				5.79	
Temperature	C	NV		-		-	-	-	-	-	19.27		19.27			-	18.57		25.72				25.11				14.63	
Total Purge	L	NV															0.91											
Turbidity	NTU	NV	-	-	-	-	-	-	-	-	36.2		36.2		-	-	150		13.9				9.6				54.4	
Water Level at Reading Time	Ft BTOC	NV															24.87											
GASES																												
Carbon dioxide	µg/L	NV																										
Ethane	µg/L	NV																										
Ethylene	µg/L	NV																										
Methane	µg/L	NV																										
GENERAL CHEMISTRY																												
Alkalinity	mg/L	NV																										
Ferrous Iron	mg/L	NV																										
SEMIVOLATILES																												
1,4-Dioxane	µg/L	26											< 1	U			1.7											
VOLATILES																												
1,1,1,2-Tetrachloroethane	µg/L	110															< 1	U			< 1	U			< 0.5	U		
1,1,1-Trichloroethane	µg/L	200															< 1	U			< 1	U			< 0.5	U		
1,1,2,2-Tetrachloroethane	µg/L	14															< 1	U			< 1	UJ			< 0.4	U		
1,1,2-Trichloro-1,2,2-Trifluoroethane	µg/L	3,100,000															< 1	U										
1,1,2-Trichloroethane	µg/L	5															< 1	U			< 1	U			< 0.5	U		
1,1-Dichloroethane	µg/L	10,000															< 1	U			< 1	U			< 0.25	U		
1,1-Dichloroethene	µg/L	7															< 1	U			< 2	U			< 1	U		
1,1-Dichloropropene	µg/L	3															< 1	U			< 1	U			< 0.5	U		
1,2,3-Trichlorobenzene	µg/L	310															< 1	U			< 1	U			< 0.3	U		
1,2,3-Trichloropropane	µg/L	0.04															< 1	U			< 2	U			< 1	U		
1,2,4-Trichlorobenzene	µg/L	70															< 1	U			< 1	U			< 0.4	U		
1,2,4-Trimethylbenzene	µg/L	5,100															< 1	U			< 1	U			< 0.5	U		
1,2-Dibromo-3-chloropropane	µg/L	0.2															< 1	U			< 5	UJ			< 2	U		
1,2-Dibromoethane	µg/L	0.1															< 1	U			< 1	U			< 0.5	U		
1,2-Dichlorobenzene	µg/L	600															< 1	U			< 1	U			< 0.25	U		
1,2-Dichloroethane	µg/L	5															1				1.67				1.77			
1,2-Dichloropropane	µg/L	5															< 1	U			< 1	U			< 0.4	U		
1,3,5-Trimethylbenzene	µg/L	5,100															< 1	U			< 1	U			< 0.5	U		
1,3-Dichlorobenzene	µg/L	3,100															< 1	U			< 1	U			< 0.5	U		

Table 2-4
Groundwater Results, 2013–2021

		Location Code	67WW06																67WW07									
		Sample ID	67WW06-141202		67WW06-150210		67WW06-150511		67WW06-151118		67WW06-151216		67WW06-161215		67WW06-160518		67WW06-112917		67WW07-130531		67WW07-053113		67WW07-130927		67WW07-092713		67WW07-140123	
		Sample Date	12/2/2014		2/10/2015		5/11/2015		11/18/2015		12/16/2015		12/16/2015		5/18/2016		11/29/2017		5/31/2013		5/31/2013		9/27/2013		9/27/2013		1/23/2014	
		Sample Purpose	REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG	
Parameter	Units	MCL/GW-Ind	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
1,3-Dichloropropane	µg/L	29															< 1	U			< 1	U			< 0.4	U		
1,4-Dichlorobenzene	µg/L	75															< 1	U			< 1	U			< 0.25	U		
2,2-Dichloropropane	µg/L	42															< 1	U			< 1	U			< 0.5	U		
2-Butanone	µg/L	61,000															< 2	U			< 10	U			< 5	U		
2-Chlorotoluene	µg/L	2,000															< 1	U			< 1	U			< 0.25	U		
2-Hexanone	µg/L	6,100															< 2	U			< 10	U			< 5	U		
4-Chlorotoluene	µg/L	2,000															< 1	U			< 1	U			< 0.5	U		
Acetone	µg/L	92,000															< 2	U			< 10	U			< 5	U		
Benzene	µg/L	5															< 1	U			< 1	U			< 0.25	U		
Bromobenzene	µg/L	2,000															< 1	U			< 1	U			< 0.25	U		
Bromochloromethane	µg/L	4,100															< 1	U			< 1	U			< 0.4	U		
Bromodichloromethane	µg/L	5															< 1	U			< 1	U			< 0.5	U		
Bromoform	µg/L	36															< 1	U			< 2	U			< 1	U		
Bromomethane	µg/L	140															< 1	U			< 2	UJ			< 1	U		
Carbon disulfide	µg/L	10,000															< 2	U			< 2	U			< 1	U		
Carbon tetrachloride	µg/L	5															< 1	U			< 1	U			< 0.5	U		
Chlorobenzene	µg/L	100															< 1	U			< 1	U			< 0.25	U		
Chloroethane	µg/L	41,000															< 1	U			< 2	U			< 1	U		
Chloroform	µg/L	1,000															< 1	U			< 1	U			< 0.25	U		
Chloromethane	µg/L	220															< 1	U			< 2	U			< 1	U		
cis-1,2-Dichloroethene	µg/L	70															< 1	U			< 1	U			< 0.5	U		
cis-1,3-Dichloropropene	µg/L	5															< 1	U			< 1	U			< 0.5	U		
Dibromochloromethane	µg/L	34															< 1	U			< 1	U			< 0.5	U		
Dibromomethane	µg/L	380															< 1	U			< 1	U			< 0.5	U		
Dichlorodifluoromethane	µg/L	20,000															< 1	U			< 1	UJ			< 0.5	U		
Ethylbenzene	µg/L	700															< 1	U			< 1	U			< 0.5	U		
Hexachlorobutadiene	µg/L	20															< 1	U			< 1	U			< 0.5	U		
Isopropylbenzene	µg/L	10,000															< 1	U			< 1	U			< 0.5	U		
m,p-Xylenes	µg/L	10,000															< 2	U			< 2	U			< 1	U		
Methyl isobutyl ketone	µg/L	8,200															< 2	U			< 10	U			< 5	U		
Methylene chloride	µg/L	5															< 2	U			< 1	U			< 0.5	U		
Naphthalene	µg/L	2,000															< 1	U			< 1	U			< 0.4	U		
n-Butylbenzene	µg/L	4,100															< 1	U			< 1	U			< 0.5	U		
n-Propylbenzene	µg/L	4,100															< 1	U			< 1	U			< 0.25	U		
o-Xylene	µg/L	10,000															< 1	U			< 1	U			< 0.5	U		
p-Isopropyltoluene	µg/L	10,000															< 1	U			< 1	U			< 0.5	U		
sec-Butylbenzene	µg/L	4,100															< 1	U			< 1	U			< 0.5	U		
Styrene	µg/L	100															< 1	U			< 1	U			< 0.25	U		
tert-Butylbenzene	µg/L	4,100															< 1	U			< 1	U			< 0.5	U		
Tetrachloroethene	µg/L	5															< 1	U			< 1	U			< 0.5	U		
Toluene	µg/L	1,000															< 1	U			< 1	U			< 0.5	U		
trans-1,2-Dichloroethene	µg/L	100															< 1	U			< 1	U			< 0.5	U		
trans-1,3-Dichloropropene	µg/L	29															< 1	U			< 2	U			< 1	U		
Trichloroethene	µg/L	5															< 1	U			< 1	U			< 0.5	U		
Trichlorofluoromethane	µg/L	31,000															< 1	U			< 1	U			< 0.5	U		
Vinyl chloride	µg/L	2															< 1	U			< 1	U			< 0.5	U		

Table 2-4
Groundwater Results, 2013–2021

		Location Code	67WW07																							
		Sample ID	67WW07-012314		67WW07-140506		67WW07-050614		67WW07-140725		67WW07-072514		67WW07-141203		67WW07-120314		67WW07-150210		67WW07-021015		67WW07-150511		67WW07-051215		67WW07-151119		67WW07-111915	
		Sample Date	1/23/2014		5/6/2014		5/6/2014		7/25/2014		7/25/2014		12/3/2014		12/3/2014		2/10/2015		2/10/2015		5/11/2015		5/12/2015		11/19/2015		11/19/2015	
		Sample Purpose	REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG	
Parameter	Units	MCL/GW-Ind	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
ANIONS																												
Chloride	mg/L	NV																										
Nitrate	mg/L	10																										
Nitrite	mg/L	1																										
Sulfate	mg/L	NV																										
Sulfide	mg/L	NV																										
TOTAL ORGANIC CARBON																												
Total Inorganic Carbon	mg/L	NV																										
Total Organic Carbon	mg/L	NV																										
DHC																												
BVC	cells/mL	NV																										
Dehalococcoides	cells/mL	NV																										
FIELD TESTS																												
Specific conductivity	µmhos/cm	NV			3.71				3.99				4.06				3.76				3.61				4.08			
Dissolved oxygen	mg/L	NV			6.12				9.24				-	-			-	-			-	-			-	-		
Ferrous Iron	NA	NV																										
Flow Rate	mL/Min	NV																										
Measured well depth	Ft BTOC	NV																										
Oxidation Reduction Potential	mV	NV			36				91				51				-18				31				-	-		
pH	SU	NV			5.45				5.58				5.79				6.41				5.98				6.22			
Temperature	C	NV			26.29				21.89				17.46				18.47				18.5				15.55			
Total Purge	L	NV																										
Turbidity	NTU	NV			30.2				8.8				10.7				6.7				35.3				40.8			
Water Level at Reading Time	Ft BTOC	NV																										
GASES																												
Carbon dioxide	µg/L	NV																										
Ethane	µg/L	NV																										
Ethylene	µg/L	NV																										
Methane	µg/L	NV																										
GENERAL CHEMISTRY																												
Alkalinity	mg/L	NV																										
Ferrous Iron	mg/L	NV																										
SEMIVOLATILES																												
1,4-Dioxane	µg/L	26																										
VOLATILES																												
1,1,1,2-Tetrachloroethane	µg/L	110	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U
1,1,1-Trichloroethane	µg/L	200	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U
1,1,2,2-Tetrachloroethane	µg/L	14	< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U
1,1,2-Trichloro-1,2,2-Trifluoroethane	µg/L	3,100,000																										
1,1,2-Trichloroethane	µg/L	5	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U
1,1-Dichloroethane	µg/L	10,000	< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U
1,1-Dichloroethene	µg/L	7	< 1	U			< 1	U			< 1	U			< 1	U			< 1	U			< 1	U			< 1	U
1,1-Dichloropropene	µg/L	3	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U
1,2,3-Trichlorobenzene	µg/L	310	< 0.3	U			< 0.3	U			< 0.3	U			< 0.3	U			< 0.3	U			< 0.3	U			< 0.3	U
1,2,3-Trichloropropane	µg/L	0.04	< 1	U			< 1	U			< 1	U			< 1	U			< 1	U			< 1	U			< 1	U
1,2,4-Trichlorobenzene	µg/L	70	< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U
1,2,4-Trimethylbenzene	µg/L	5,100	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U
1,2-Dibromo-3-chloropropane	µg/L	0.2	< 2	U			< 2	U			< 2	U			< 2	U			< 2	U			< 2	U			< 2	U
1,2-Dibromoethane	µg/L	0.1	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U
1,2-Dichlorobenzene	µg/L	600	< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U
1,2-Dichloroethane	µg/L	5	1.35				1.44				1.39				1.19				1.04				0.817	J			0.601	J
1,2-Dichloropropane	µg/L	5	< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U
1,3,5-Trimethylbenzene	µg/L	5,100	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U
1,3-Dichlorobenzene	µg/L	3,100	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U

Table 2-4
Groundwater Results, 2013–2021

		Location Code	67WW07																							
		Sample ID	67WW07-012314		67WW07-140506		67WW07-050614		67WW07-140725		67WW07-072514		67WW07-141203		67WW07-120314		67WW07-150210		67WW07-021015		67WW07-150511		67WW07-051215		67WW07-151119		67WW07-111915	
		Sample Date	1/23/2014		5/6/2014		5/6/2014		7/25/2014		7/25/2014		12/3/2014		12/3/2014		2/10/2015		2/10/2015		5/11/2015		5/12/2015		11/19/2015		11/19/2015	
		Sample Purpose	REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG	
Parameter	Units	MCL/GW-Ind	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
1,3-Dichloropropane	µg/L	29	< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U
1,4-Dichlorobenzene	µg/L	75	< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U
2,2-Dichloropropane	µg/L	42	< 0.5	U			< 0.5	UJ			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U
2-Butanone	µg/L	61,000	< 5	U			< 5	U			< 5	U			< 5	U			< 5	U			< 5	U			< 5	U
2-Chlorotoluene	µg/L	2,000	< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U
2-Hexanone	µg/L	6,100	< 5	U			< 5	U			< 5	U			< 5	U			< 5	U			3.18	Q			< 5	U
4-Chlorotoluene	µg/L	2,000	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U
Acetone	µg/L	92,000	< 5	U			< 5	U			< 5	U			< 5	U			< 5	U			< 5	U			< 5	U
Benzene	µg/L	5	< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U
Bromobenzene	µg/L	2,000	< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U
Bromochloromethane	µg/L	4,100	< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U
Bromodichloromethane	µg/L	5	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U
Bromoform	µg/L	36	< 1	U			< 1	U			< 1	U			< 1	U			< 1	U			< 1	U			< 1	U
Bromomethane	µg/L	140	< 1	U			< 1	U			< 1	U			< 1	U			< 1	UJ			< 1	U			< 1	U
Carbon disulfide	µg/L	10,000	< 1	U			< 1	U			< 1	U			< 1	U			< 1	U			< 1	U			< 1	U
Carbon tetrachloride	µg/L	5	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U
Chlorobenzene	µg/L	100	< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U
Chloroethane	µg/L	41,000	< 1	U			< 1	U			< 1	U			< 1	U			< 1	U			< 1	U			< 1	U
Chloroform	µg/L	1,000	< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U
Chloromethane	µg/L	220	< 1	U			< 1	U			< 1	U			< 1	U			< 1	U			< 1	U			< 1	U
cis-1,2-Dichloroethene	µg/L	70	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U
cis-1,3-Dichloropropene	µg/L	5	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U
Dibromochloromethane	µg/L	34	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U
Dibromomethane	µg/L	380	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U
Dichlorodifluoromethane	µg/L	20,000	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U
Ethylbenzene	µg/L	700	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U
Hexachlorobutadiene	µg/L	20	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U
Isopropylbenzene	µg/L	10,000	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U
m,p-Xylenes	µg/L	10,000	< 1	U			< 1	U			< 1	U			< 1	U			< 1	U			< 1	U			< 1	U
Methyl isobutyl ketone	µg/L	8,200	< 5	U			< 5	U			< 5	U			< 5	U			< 5	U			< 5	U			< 5	U
Methylene chloride	µg/L	5	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U
Naphthalene	µg/L	2,000	< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U
n-Butylbenzene	µg/L	4,100	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U
n-Propylbenzene	µg/L	4,100	< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U
o-Xylene	µg/L	10,000	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U
p-Isopropyltoluene	µg/L	10,000	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U
sec-Butylbenzene	µg/L	4,100	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U
Styrene	µg/L	100	< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U
tert-Butylbenzene	µg/L	4,100	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U
Tetrachloroethene	µg/L	5	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U
Toluene	µg/L	1,000	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U
trans-1,2-Dichloroethene	µg/L	100	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U
trans-1,3-Dichloropropene	µg/L	29	< 1	U			< 1	U			< 1	U			< 1	U			< 1	U			< 1	U			< 1	U
Trichloroethene	µg/L	5	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U
Trichlorofluoromethane	µg/L	31,000	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U
Vinyl chloride	µg/L	2	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U

Table 2-4
Groundwater Results, 2013–2021

		Location Code	67WW07																		67WW08							
		Sample ID	67WW07-160519		67WW07-051916		67WW07-112917		67WW07-180503		67WW07-181025		67WW07-190503		67WW07-191028		67WW07-201102		67WW07-211110		67WW08-130603		67WW08-060313		67WW08-131002		67WW08-100213	
		Sample Date	5/19/2016		5/19/2016		11/29/2017		5/3/2018		10/25/2018		5/3/2019		10/28/2019		11/2/2020		11/10/2021		6/3/2013		6/3/2013		10/2/2013		10/2/2013	
		Sample Purpose	REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG	
Parameter	Units	MCL/GW-Ind	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
ANIONS																												
Chloride	mg/L	NV																					1,320				1,360	
Nitrate	mg/L	10																					< 20	U			< 2	U
Nitrite	mg/L	1																					< 20	U			< 2	U
Sulfate	mg/L	NV																					300				297	
Sulfide	mg/L	NV																									< 1	U
TOTAL ORGANIC CARBON																												
Total Inorganic Carbon	mg/L	NV																					10.3				28.9	
Total Organic Carbon	mg/L	NV																					3.61				6.32	
DHC																												
BVC	cells/mL	NV																									0.5	U
Dehalococcoides	cells/mL	NV																					1	U			0.5	U
FIELD TESTS																												
Specific conductivity	µmhos/cm	NV	3.96				3.80		3.56		3.80		3.7		2.06		1.72		1.23		4.85		4.85		5.11		5.11	
Dissolved oxygen	mg/L	NV	-	-			8.55		8.73		0.1		0.07		0.08		0.05		0.85		0		0		0.74		0.74	
Ferrous Iron	NA	NV																										
Flow Rate	mL/Min	NV							0		100		100		100		100											
Measured well depth	Ft BTOC	NV					27.9		27.85		28		27.88		27.85													
Oxidation Reduction Potential	mV	NV	-	-			264		88		200		249		61		38		154		74		74		-165		-165	
pH	SU	NV	6.04				4.72		6.68		5.01		5.05		6.34		6.37		5.43		6.62		6.62		6.47		6.47	
Temperature	C	NV	17.91				17.74		19.86		17.79		20.26		18.36		19.95		19.19		29.25		29.25		21.82		21.82	
Total Purge	L	NV							0		3.0		3.0		3.0		3											
Turbidity	NTU	NV	10.5				3.2		13.3		65.6		31.4		42.9		0		14.1		7.6		7.6		1.5		1.5	
Water Level at Reading Time	Ft BTOC	NV					24.7		24.25		25.19		21.95		23.63		22.3											
GASES																												
Carbon dioxide	µg/L	NV																										
Ethane	µg/L	NV																					< 5	U			< 2	U
Ethylene	µg/L	NV																					1.29	J			< 2	U
Methane	µg/L	NV																					10.6				< 2	
GENERAL CHEMISTRY																												
Alkalinity	mg/L	NV																										
Ferrous Iron	mg/L	NV																					0.0795				0.161	
SEMIVOLATILES																												
1,4-Dioxane	µg/L	26					0.53																					
VOLATILES																												
1,1,1,2-Tetrachloroethane	µg/L	110			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			6.25	R			< 5	U
1,1,1-Trichloroethane	µg/L	200			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 1	U			< 5	U
1,1,2,2-Tetrachloroethane	µg/L	14			< 0.4	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 1	U			< 4	U
1,1,2-Trichloro-1,2,2-Trifluoroethane	µg/L	3,100,000					< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U								
1,1,2-Trichloroethane	µg/L	5			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			4.25				5.08	J
1,1-Dichloroethane	µg/L	10,000			< 0.25	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			37.5	R			46.5	
1,1-Dichloroethene	µg/L	7			< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			940				1,120	
1,1-Dichloropropene	µg/L	3			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 1	U			< 5	U
1,2,3-Trichlorobenzene	µg/L	310			< 0.3	U	< 1	U	< 0.5	U	< 0.5	UJ	< 0.5	U	< 0.5	UJ	< 1	U	< 1	U			< 1	U			< 3	U
1,2,3-Trichloropropane	µg/L	0.04			< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U			< 2	U			< 10	U
1,2,4-Trichlorobenzene	µg/L	70			< 0.4	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U			5	R			< 4	U
1,2,4-Trimethylbenzene	µg/L	5,100			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			6.25	R			< 5	U
1,2-Dibromo-3-chloropropane	µg/L	0.2			< 2	U	< 1	U	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			25	R			< 20	U
1,2-Dibromoethane	µg/L	0.1			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			6.25	R			< 5	U
1,2-Dichlorobenzene	µg/L	600			< 0.25	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U			3.13	R			< 2.5	U
1,2-Dichloroethane	µg/L	5			0.33	J	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			64.3	R			76.5	
1,2-Dichloropropane	µg/L	5			< 0.4	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 1	U			< 4	U
1,3,5-Trimethylbenzene	µg/L	5,100			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 1	U			< 5	U
1,3-Dichlorobenzene	µg/L	3,100			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U			< 1	U			< 5	U

Table 2-4
Groundwater Results, 2013–2021

		Location Code	67WW07																67WW08							
		Sample ID	67WW07-160519		67WW07-051916		67WW07-112917		67WW07-180503		67WW07-181025		67WW07-190503		67WW07-191028		67WW07-201102		67WW07-211110		67WW08-130603		67WW08-060313		67WW08-131002		67WW08-100213	
		Sample Date	5/19/2016		5/19/2016		11/29/2017		5/3/2018		10/25/2018		5/3/2019		10/28/2019		11/2/2020		11/10/2021		6/3/2013		6/3/2013		10/2/2013		10/2/2013	
		Sample Purpose	REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG	
Parameter	Units	MCL/GW-Ind	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
1,3-Dichloropropane	µg/L	29			< 0.4	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 1	U			< 4	U
1,4-Dichlorobenzene	µg/L	75			< 0.25	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U			< 1	U			< 2.5	U
2,2-Dichloropropane	µg/L	42			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			6.25	R			< 5	U
2-Butanone	µg/L	61,000			< 5	U	< 2	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U			< 10	U			< 50	U
2-Chlorotoluene	µg/L	2,000			< 0.25	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 1	U			< 2.5	U
2-Hexanone	µg/L	6,100			< 5	U	< 2	U	< 1	U	< 1	U	< 1	U	< 1	U	< 2	U	< 2	U			62.5	R			< 50	U
4-Chlorotoluene	µg/L	2,000			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U			6.25	R			< 5	U
Acetone	µg/L	92,000			< 5	U	< 2	U	< 1	U	< 2	U	< 1	U	< 1	U	< 1	U	< 2	U			< 10	U			< 50	U
Benzene	µg/L	5			< 0.25	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			0.194	J			< 2.5	U
Bromobenzene	µg/L	2,000			< 0.25	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U			3.13	R			< 2.5	U
Bromochloromethane	µg/L	4,100			< 0.4	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			5	R			< 4	U
Bromodichloromethane	µg/L	5			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 1	U			< 5	U
Bromoform	µg/L	36			< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			12.5	R			< 10	U
Bromomethane	µg/L	140			< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			12.5	R			< 10	U
Carbon disulfide	µg/L	10,000			< 1	U	< 2	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 2	U			12.5	R			< 10	U
Carbon tetrachloride	µg/L	5			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			6.25	R			< 5	U
Chlorobenzene	µg/L	100			< 0.25	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 1	U			< 2.5	U
Chloroethane	µg/L	41,000			< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 2	U			< 10	U
Chloroform	µg/L	1,000			< 0.25	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			3.56				< 2.5	UJ
Chloromethane	µg/L	220			< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			12.5	R			< 10	U
cis-1,2-Dichloroethene	µg/L	70			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			2.18				< 5	U
cis-1,3-Dichloropropene	µg/L	5			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 1	U			< 5	U
Dibromochloromethane	µg/L	34			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 1	U			< 5	U
Dibromomethane	µg/L	380			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 1	U			< 5	U
Dichlorodifluoromethane	µg/L	20,000			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 1	UJ			< 5	U
Ethylbenzene	µg/L	700			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 1	U			< 5	U
Hexachlorobutadiene	µg/L	20			< 0.5	U	< 1	U	< 0.5	U	< 1	U	< 1	U	< 0.5	U	< 1	U	< 1	U			< 1	U			< 5	U
Isopropylbenzene	µg/L	10,000			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 1	U			< 5	U
m,p-Xylenes	µg/L	10,000			< 1	U	< 2	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U			12.5	R			< 10	U
Methyl isobutyl ketone	µg/L	8,200			< 5	U	< 2	U	< 1	U	< 1	U	< 1	U	< 1	U	< 2	U	< 2	U			62.5	R			< 50	U
Methylene chloride	µg/L	5			< 0.5	U	< 2	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 2	U			6.25	R			< 5	U
Naphthalene	µg/L	2,000			< 0.4	U	< 1	U	< 0.5	U	< 0.5	UJ	< 0.5	U	< 0.5	UJ	< 0.5	U	< 1	U			5	R			< 4	U
n-Butylbenzene	µg/L	4,100			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U			< 1	U			< 5	U
n-Propylbenzene	µg/L	4,100			< 0.25	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 1	U			< 2.5	U
o-Xylene	µg/L	10,000			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			6.25	R			< 5	U
p-Isopropyltoluene	µg/L	10,000			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 1	U			< 5	U
sec-Butylbenzene	µg/L	4,100			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 1	U			< 5	U
Styrene	µg/L	100			< 0.25	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 1	U			< 2.5	U
tert-Butylbenzene	µg/L	4,100			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 1	U			< 5	U
Tetrachloroethene	µg/L	5			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 1	U			< 5	U
Toluene	µg/L	1,000			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 1	U			< 5	U
trans-1,2-Dichloroethene	µg/L	100			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			6.25	R			< 5	U
trans-1,3-Dichloropropene	µg/L	29			< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			12.5	R			< 10	U
Trichloroethene	µg/L	5			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			2.86				< 5	U
Trichlorofluoromethane	µg/L	31,000			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			6.25	R			< 5	U
Vinyl chloride	µg/L	2			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			0.951	J			< 5	U

Table 2-4
Groundwater Results, 2013–2021

		Location Code	67WW08																							
		Sample ID	67WW08-012314		67WW08-140123		67WW08-050714		67WW08-140507		67WW08-072414		67WW08-140724		67WW08-141204		67WW08-120414		67WW08-150211		67WW08-021115		67WW08-150519		67WW08-051915		67WW08-151119	
		Sample Date	1/23/2014		1/23/2014		5/7/2014		5/7/2014		7/24/2014		7/24/2014		12/4/2014		12/4/2014		2/11/2015		2/11/2015		5/19/2015		5/19/2015		11/19/2015	
		Sample Purpose	REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG	
Parameter	Units	MCL/GW-Ind	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
ANIONS																												
Chloride	mg/L	NV	1,490				1,380				1,340						1,410	H1			1,250				1,750			
Nitrate	mg/L	10	< 2	U			< 2	U			< 1	U					< 2	U			< 4	U			< 2	U		
Nitrite	mg/L	1	< 2	U			< 2	U			< 1	U					2.04	J			< 4	U			3.95	J		
Sulfate	mg/L	NV	303				365				317						302	J			258				524			
Sulfide	mg/L	NV	< 1	U			< 1	U													< 1	U			< 1	U		
TOTAL ORGANIC CARBON																												
Total Inorganic Carbon	mg/L	NV					80.6				70.9						22.9				160				55.2			
Total Organic Carbon	mg/L	NV	9.95				10.6				7.58						3.68				22.4				8.32			
DHC																												
BVC	cells/mL	NV	0.5	U			0.5	U																				
Dehalococcoides	cells/mL	NV	0.5	U			0.6																					
FIELD TESTS																												
Specific conductivity	µmhos/cm	NV	5.08		5.08		5.43		5.43		4.98		4.98		5.07		5.07		4.38		4.38		5.85		5.85		5.06	
Dissolved oxygen	mg/L	NV	0.38		0.38		0.45		0.45		0		0		0		0		0		0		0.66		0.66		0.44	
Ferrous Iron	NA	NV																										
Flow Rate	mL/Min	NV																										
Measured well depth	Ft BTOC	NV																										
Oxidation Reduction Potential	mV	NV	-90		-90		-32		-32		-7		-7		-1		-1		45		45		-16		-16		113	
pH	SU	NV	6.8		6.8		5.55		5.55		6.89		6.89		6.42		6.42		6.61		6.61		6.53		6.53		6.13	
Temperature	C	NV	17.22		17.22		19.33		19.33		21.72		21.72		19.14		19.14		18.75		18.75		20.12		20.12		19.15	
Total Purge	L	NV																										
Turbidity	NTU	NV	0.6		0.6		9.7		9.7		6.1		6.1		2.7		2.7		3.7		3.7		67.1		67.1		45.3	
Water Level at Reading Time	Ft BTOC	NV																										
GASES																												
Carbon dioxide	µg/L	NV															89,600											
Ethane	µg/L	NV	< 2	U			< 2	U			< 2	U					< 2	U			< 2	U			< 2	U		
Ethylene	µg/L	NV	< 2	U			< 2	U			< 2	U					< 2	U			< 2	U			< 2	U		
Methane	µg/L	NV	7.79				6.97				6.47						14.4				9.4				5.16			
GENERAL CHEMISTRY																												
Alkalinity	mg/L	NV																										
Ferrous Iron	mg/L	NV	0.344				0.282				0.227						0.374				0.0907				0.944			
SEMIVOLATILES																												
1,4-Dioxane	µg/L	26																										
VOLATILES																												
1,1,1,2-Tetrachloroethane	µg/L	110	< 2.5	U			< 5	U			< 5	U					< 5	U			< 5	U			< 5	U		
1,1,1-Trichloroethane	µg/L	200	< 2.5	U			< 5	U			< 5	U					< 5	U			< 5	U			< 5	U		
1,1,2,2-Tetrachloroethane	µg/L	14	< 2	U			< 4	U			< 4	U					< 4	U			< 4	U			< 4	U		
1,1,2-Trichloro-1,2,2-Trifluoroethane	µg/L	3,100,000																										
1,1,2-Trichloroethane	µg/L	5	6.7				5.01	J			7.74	J					7.36	J			6.96	J			4.5	J		
1,1-Dichloroethane	µg/L	10,000	54.4				57.3				56.7						63.9				61.1				52.1			
1,1-Dichloroethene	µg/L	7	1,340				1,590				1,890						2,320				1,930				1,570			
1,1-Dichloropropene	µg/L	3	< 2.5	U			< 5	U			< 5	U					< 5	U			< 5	U			< 5	U		
1,2,3-Trichlorobenzene	µg/L	310	< 1.5	U			< 3	U			< 3	U					< 3	U			< 3	U			< 3	U		
1,2,3-Trichloropropane	µg/L	0.04	< 5	U			< 10	U			< 10	U					< 10	U			< 10	U			< 10	U		
1,2,4-Trichlorobenzene	µg/L	70	< 2	U			< 4	U			< 4	U					< 4	U			< 4	U			< 4	U		
1,2,4-Trimethylbenzene	µg/L	5,100	< 2.5	U			< 5	U			< 5	U					< 5	U			< 5	U			< 5	U		
1,2-Dibromo-3-chloropropane	µg/L	0.2	< 10	U			< 20	U			< 20	U					< 20	U			< 20	U			< 20	U		
1,2-Dibromoethane	µg/L	0.1	< 2.5	U			< 5	U			< 5	U					< 5	U			< 5	U			< 5	U		
1,2-Dichlorobenzene	µg/L	600	< 1.25	U			< 2.5	U			< 2.5	U					< 2.5	U			< 2.5	U			< 2.5	U		
1,2-Dichloroethane	µg/L	5	89.9				101				98.9						106				104				85.6			
1,2-Dichloropropane	µg/L	5	< 2	U			< 4	U			< 4	U					< 4	U			< 4	U			< 4	U		
1,3,5-Trimethylbenzene	µg/L	5,100	< 2.5	U			< 5	U			< 5	U					< 5	U			< 5	U			< 5	U		
1,3-Dichlorobenzene	µg/L	3,100	< 2.5	U			< 5	U			< 5	U					< 5	U			< 5	U			< 5	U		

Table 2-4
Groundwater Results, 2013–2021

		Location Code	67WW08																							
		Sample ID	67WW08-012314		67WW08-140123		67WW08-050714		67WW08-140507		67WW08-072414		67WW08-140724		67WW08-141204		67WW08-120414		67WW08-150211		67WW08-021115		67WW08-150519		67WW08-051915		67WW08-151119	
		Sample Date	1/23/2014		1/23/2014		5/7/2014		5/7/2014		7/24/2014		7/24/2014		12/4/2014		12/4/2014		2/11/2015		2/11/2015		5/19/2015		5/19/2015		11/19/2015	
		Sample Purpose	REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG	
Parameter	Units	MCL/GW-Ind	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
1,3-Dichloropropane	µg/L	29	< 2	U			< 4	U			< 4	U					< 4	U			< 4	U			< 4	U		
1,4-Dichlorobenzene	µg/L	75	< 1.25	U			< 2.5	U			< 2.5	U					< 2.5	U			< 2.5	U			< 2.5	U		
2,2-Dichloropropane	µg/L	42	< 2.5	U			< 5	U			< 5	U					< 5	U			< 5	U			< 5	U		
2-Butanone	µg/L	61,000	< 25	U			< 50	U			< 50	U					< 50	U			< 50	U			< 50	U		
2-Chlorotoluene	µg/L	2,000	< 1.25	U			< 2.5	U			< 2.5	U					< 2.5	U			< 2.5	U			< 2.5	U		
2-Hexanone	µg/L	6,100	< 25	U			< 50	U			< 50	U					< 50	U			< 50	U			< 50	U		
4-Chlorotoluene	µg/L	2,000	< 2.5	U			< 5	U			< 5	U					< 5	U			< 5	U			< 5	U		
Acetone	µg/L	92,000	< 25	U			< 50	U			< 50	U					< 50	U			< 50	U			< 50	U		
Benzene	µg/L	5	< 1.25	U			< 2.5	B			< 2.5	U					< 2.5	U			< 2.5	U			< 2.5	U		
Bromobenzene	µg/L	2,000	< 1.25	U			< 2.5	U			< 2.5	U					< 2.5	U			< 2.5	U			< 2.5	U		
Bromochloromethane	µg/L	4,100	< 2	U			< 4	U			< 4	U					< 4	U			< 4	U			< 4	U		
Bromodichloromethane	µg/L	5	< 2.5	U			< 5	U			< 5	U					< 5	U			< 5	U			< 5	U		
Bromoform	µg/L	36	< 5	U			< 10	U			< 10	U					< 10	U			< 10	U			< 10	U		
Bromomethane	µg/L	140	< 5	U			< 10	U			< 10	U					< 10	U			< 10	U			< 10	U		
Carbon disulfide	µg/L	10,000	< 5	U			< 10	U			< 10	U					< 10	U			< 10	U			< 10	U		
Carbon tetrachloride	µg/L	5	< 2.5	U			< 5	U			< 5	U					< 5	U			< 5	U			< 5	U		
Chlorobenzene	µg/L	100	< 1.25	U			< 2.5	U			< 2.5	U					< 2.5	U			< 2.5	U			< 2.5	U		
Chloroethane	µg/L	41,000	< 5	U			< 10	U			< 10	U					< 10	U			< 10	U			< 10	U		
Chloroform	µg/L	1,000	4.11	J			4.88	J			5.13	J					2.53	J			2.57	J			3.04	J		
Chloromethane	µg/L	220	< 5	U			< 10	U			< 10	U					< 10	U			< 10	U			< 10	U		
cis-1,2-Dichloroethene	µg/L	70	2.73	J			< 5	U			< 5	U					2.69	J			2.71	J			< 5	U		
cis-1,3-Dichloropropene	µg/L	5	< 2.5	U			< 5	U			< 5	U					< 5	U			< 5	U			< 5	U		
Dibromochloromethane	µg/L	34	< 2.5	U			< 5	U			< 5	U					< 5	U			< 5	U			< 5	U		
Dibromomethane	µg/L	380	< 2.5	U			< 5	U			< 5	U					< 5	U			< 5	U			< 5	U		
Dichlorodifluoromethane	µg/L	20,000	< 2.5	U			< 5	U			< 5	U					< 5	U			< 5	U			< 5	U		
Ethylbenzene	µg/L	700	< 2.5	U			< 5	U			< 5	U					< 5	U			< 5	U			< 5	U		
Hexachlorobutadiene	µg/L	20	< 2.5	U			< 5	U			< 5	U					< 5	U			< 5	U			< 5	U		
Isopropylbenzene	µg/L	10,000	< 2.5	U			< 5	U			< 5	U					< 5	U			< 5	U			< 5	U		
m,p-Xylenes	µg/L	10,000	< 5	U			< 10	U			< 10	U					< 10	U			< 10	U			< 10	U		
Methyl isobutyl ketone	µg/L	8,200	< 25	U			< 50	U			< 50	U					< 50	U			< 50	U			< 50	U		
Methylene chloride	µg/L	5	< 2.5	U			< 5	U			< 5	U					3.42	J			< 5	U			< 5	U		
Naphthalene	µg/L	2,000	< 2	U			< 4	U			< 4	U					< 4	U			< 4	U			< 4	U		
n-Butylbenzene	µg/L	4,100	< 2.5	U			< 5	U			< 5	U					< 5	U			< 5	U			< 5	U		
n-Propylbenzene	µg/L	4,100	< 1.25	U			< 2.5	U			< 2.5	U					< 2.5	U			< 2.5	U			< 2.5	U		
o-Xylene	µg/L	10,000	< 2.5	U			< 5	U			< 5	U					< 5	U			< 5	U			< 5	U		
p-Isopropyltoluene	µg/L	10,000	< 2.5	U			< 5	U			< 5	U					< 5	U			< 5	U			< 5	U		
sec-Butylbenzene	µg/L	4,100	< 2.5	U			< 5	U			< 5	U					< 5	U			< 5	U			< 5	U		
Styrene	µg/L	100	< 1.25	U			< 2.5	U			< 2.5	U					< 2.5	U			< 2.5	U			< 2.5	U		
tert-Butylbenzene	µg/L	4,100	< 2.5	U			< 5	U			< 5	U					< 5	U			< 5	U			< 5	U		
Tetrachloroethene	µg/L	5	< 2.5	U			< 5	U			< 5	U					< 5	U			< 5	U			< 5	U		
Toluene	µg/L	1,000	< 2.5	U			< 5	U			< 5	U					< 5	U			< 5	U			< 5	U		
trans-1,2-Dichloroethene	µg/L	100	< 2.5	U			< 5	U			< 5	U					< 5	U			< 5	U			< 5	U		
trans-1,3-Dichloropropene	µg/L	29	< 5	U			< 10	U			< 10	U					< 10	U			< 10	U			< 10	U		
Trichloroethene	µg/L	5	3.12	J			4.41	J			3.14	J					3.55	J			3.15	J			< 5	U		
Trichlorofluoromethane	µg/L	31,000	< 2.5	U			< 5	U			< 5	U					< 5	U			< 5	U			< 5	U		
Vinyl chloride	µg/L	2	< 2.5	U			< 5	U			< 5	U					< 5	U			< 5	U			< 5	U		

Table 2-4
Groundwater Results, 2013–2021

	Location Code	67WW08																					
	Sample ID	67WW08-111915		67WW08-160519		67WW08-051916		67WW08-112817-FD		67WW08-112817		67WW08-180501		67WW08-181023		67WW08-181023-FD		67WW08-190501		67WW08-191028-FD		67WW08-191028		67WW08-201103-FD	
	Sample Date	11/19/2015		5/19/2016		5/19/2016		11/28/2017		11/28/2017		5/1/2018		10/23/2018		10/23/2018		5/1/2019		10/28/2019		10/28/2019		11/3/2020	
	Sample Purpose	REG		REG		REG		FD		REG		REG		REG		FD		REG		FD		REG		FD	
Parameter	Units	MCL/GW-Ind	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
ANIONS																										
Chloride	mg/L	NV	1,400				1,510		1,590		1,600		1,530		1,820		1,770		1,680		1,890		1,920		1,810	
Nitrate	mg/L	10	< 2	U			< 2	U	< 0.1	U	< 0.1	U	< 0.1	U	< 0.2	U	< 0.2	U	< 0.5	U	< 0.2	U	< 0.2	U	< 0.2	U
Nitrite	mg/L	1	< 2	U			< 2	U	< 0.1	U	< 0.1	U	< 0.1	U	< 0.2	U	< 0.2	U								
Sulfate	mg/L	NV	300				365		440		4290		407		499		489		479		513		515		500	
Sulfide	mg/L	NV	< 1	U			< 1	U	1.48	J	1.48	J	< 1.5	U	< 1	U	< 1	U								
TOTAL ORGANIC CARBON																										
Total Inorganic Carbon	mg/L	NV	103				44.2		140		130		150		55		58									
Total Organic Carbon	mg/L	NV	47.5				65.4		4		3.99		4.14		2.86		3.19		2.09		1.23		1.38	J	1.21	
DHC																										
BVC	cells/mL	NV																								
Dehalococcoides	cells/mL	NV							<	U	<	U	0.2		9.3											
FIELD TESTS																										
Specific conductivity	µmhos/cm	NV	5.06		5.42		5.42				5.83		5.49		6.29				6.28				6.57			
Dissolved oxygen	mg/L	NV	0.44		0.82		0.82				0.26		0		0.08				0.08				0.11			
Ferrous Iron	NA	NV											0.11						0.21				0.41			
Flow Rate	mL/Min	NV									100		100		100				100				100			
Measured well depth	Ft BTOC	NV									52		50.9		52.45				51.95				50.9			
Oxidation Reduction Potential	mV	NV	113		129		129				186		260		150				138				126			
pH	SU	NV	6.13		5.79		5.79				5.88		6.18		6.33				5.82				6.05			
Temperature	C	NV	19.15		18.74		18.74				19.04		22.80		18.14				20.44				18.88			
Total Purge	L	NV									0.78		3.5		3.5				3				3.0			
Turbidity	NTU	NV	45.3		9.3		9.3				21.3		5.1		0				0				0			
Water Level at Reading Time	Ft BTOC	NV									24.17		23.11		24.62				21.9				23.04			
GASES																										
Carbon dioxide	µg/L	NV							240,000		290,000		420,000		130,000		130,000		270,000		110,000		130,000		270,000	
Ethane	µg/L	NV	< 2	U			< 2	U	< 0.23	U	< 0.23	U	< 0.47	U	< 0.94	U	< 0.94	U	< 0.47	U	< 0.47	U	< 0.47	U	< 0.47	U
Ethylene	µg/L	NV	< 2	U			< 2	U	< 0.22	U	< 0.22	U	< 0.55	UJ	< 1.1	U	< 1.1	U	< 0.55	U	< 0.55	U	< 0.55	U	< 0.55	U
Methane	µg/L	NV	12.1				11.3		1.6	J	2	J	2.1		5.4		5.5		2.5		2.1		2.5		1	J
GENERAL CHEMISTRY																										
Alkalinity	mg/L	NV													220		221									
Ferrous Iron	mg/L	NV	0.0931				0.0585						0.063	J	0.343		0.27									
SEMIVOLATILES																										
1,4-Dioxane	µg/L	26							29	J	22	J														
VOLATILES																										
1,1,1,2-Tetrachloroethane	µg/L	110	< 5	U			< 5	U	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,1,1-Trichloroethane	µg/L	200	< 5	U			< 5	U	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,1,2,2-Tetrachloroethane	µg/L	14	< 4	U			< 4	U	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,1,2-Trichloro-1,2,2-Trifluoroethane	µg/L	3,100,000							< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U
1,1,2-Trichloroethane	µg/L	5	4.67	J			2.76	J	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,1-Dichloroethane	µg/L	10,000	48.1				31.9		18		15		14		12		12		7.5		7.6		7.7		7.1	
1,1-Dichloroethene	µg/L	7	1,710				1,130		350		340		300		160		160		110		65		63		44	
1,1-Dichloropropene	µg/L	3	< 5	U			< 5	U	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,2,3-Trichlorobenzene	µg/L	310	< 3	U			< 3	U	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	UJ	< 0.5	UJ	< 1	U
1,2,3-Trichloropropane	µg/L	0.04	< 10	U			< 10	U	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U
1,2,4-Trichlorobenzene	µg/L	70	< 4	U			< 4	U	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U
1,2,4-Trimethylbenzene	µg/L	5,100	< 5	U			< 5	U	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,2-Dibromo-3-chloropropane	µg/L	0.2	< 20	U			< 20	U	< 1	U	< 1	U	< 0.5	U	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,2-Dibromoethane	µg/L	0.1	< 5	U			< 5	U	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,2-Dichlorobenzene	µg/L	600	< 2.5	U			< 2.5	U	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U
1,2-Dichloroethane	µg/L	5	77.6				56.1		13		13		11		6.5		6.2		5.1		2.4		2.3		1.6	
1,2-Dichloropropane	µg/L	5	< 4	U			< 4	U	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,3,5-Trimethylbenzene	µg/L	5,100	< 5	U			< 5	U	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,3-Dichlorobenzene	µg/L	3,100	< 5	U			< 5	U	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U

Table 2-4
Groundwater Results, 2013–2021

			Location Code	67WW08																					
			Sample ID	67WW08-111915		67WW08-160519		67WW08-051916		67WW08-112817-FD		67WW08-112817		67WW08-180501		67WW08-181023		67WW08-181023-FD		67WW08-190501		67WW08-191028-FD		67WW08-191028	67WW08-201103-FD	
			Sample Date	11/19/2015		5/19/2016		5/19/2016		11/28/2017		11/28/2017		5/1/2018		10/23/2018		10/23/2018		5/1/2019		10/28/2019		10/28/2019	11/3/2020	
			Sample Purpose	REG		REG		REG		FD		REG		REG		REG		FD		REG		FD		REG	FD	
Parameter	Units	MCL/GW-Ind		Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
1,3-Dichloropropane	µg/L	29		< 4	U			< 4	U	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,4-Dichlorobenzene	µg/L	75		< 2.5	U			< 2.5	U	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U
2,2-Dichloropropane	µg/L	42		< 5	U			< 5	U	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
2-Butanone	µg/L	61,000		< 50	U			< 50	U	< 2	U	< 2	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U
2-Chlorotoluene	µg/L	2,000		< 2.5	U			< 2.5	U	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
2-Hexanone	µg/L	6,100		< 50	U			< 50	U	< 2	U	< 2	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 2	U
4-Chlorotoluene	µg/L	2,000		< 5	U			< 5	U	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U
Acetone	µg/L	92,000		< 50	U			< 50	U	< 2	U	< 2	U	< 1	U	< 2	U	< 2	U	< 1	U	< 1	U	< 1	U	< 1	U
Benzene	µg/L	5		< 2.5	U			< 2.5	U	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Bromobenzene	µg/L	2,000		< 2.5	U			< 2.5	U	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U
Bromochloromethane	µg/L	4,100		< 4	U			< 4	U	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Bromodichloromethane	µg/L	5		< 5	U			< 5	U	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Bromoform	µg/L	36		< 10	U			< 10	U	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Bromomethane	µg/L	140		< 10	U			< 10	U	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Carbon disulfide	µg/L	10,000		< 10	U			< 10	U	< 2	U	< 2	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U
Carbon tetrachloride	µg/L	5		< 5	U			< 5	U	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Chlorobenzene	µg/L	100		< 2.5	U			< 2.5	U	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Chloroethane	µg/L	41,000		< 10	U			< 10	U	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Chloroform	µg/L	1,000		1.61	J			< 2.5	U	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Chloromethane	µg/L	220		< 10	U			< 10	U	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
cis-1,2-Dichloroethene	µg/L	70		< 5	U			< 5	U	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
cis-1,3-Dichloropropene	µg/L	5		< 5	U			< 5	U	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Dibromochloromethane	µg/L	34		< 5	U			< 5	U	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Dibromomethane	µg/L	380		< 5	U			< 5	U	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Dichlorodifluoromethane	µg/L	20,000		< 5	U			< 5	U	< 1	U	< 1	U	< 0.5	U	< 0.5	UJ	< 0.5	UJ	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Ethylbenzene	µg/L	700		< 5	U			< 5	U	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Hexachlorobutadiene	µg/L	20		< 5	U			< 5	UJ	< 1	U	< 1	U	< 0.5	U	< 1	U	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 1	U
Isopropylbenzene	µg/L	10,000		< 5	U			< 5	U	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
m,p-Xylenes	µg/L	10,000		< 10	U			< 10	U	< 2	U	< 2	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U
Methyl isobutyl ketone	µg/L	8,200		< 50	U			< 50	U	< 2	U	< 2	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 2	U
Methylene chloride	µg/L	5		< 5	U			< 5	U	< 2	U	< 2	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U
Naphthalene	µg/L	2,000		< 4	U			< 4	U	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	UJ	< 0.5	UJ	< 0.5	U
n-Butylbenzene	µg/L	4,100		< 5	U			< 5	U	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U
n-Propylbenzene	µg/L	4,100		< 2.5	U			< 2.5	U	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
o-Xylene	µg/L	10,000		< 5	U			< 5	U	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
p-Isopropyltoluene	µg/L	10,000		< 5	U			< 5	U	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
sec-Butylbenzene	µg/L	4,100		< 5	U			< 5	U	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Styrene	µg/L	100		< 2.5	U			< 2.5	U	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
tert-Butylbenzene	µg/L	4,100		< 5	U			< 5	U	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Tetrachloroethene	µg/L	5		< 5	U			< 5	U	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Toluene	µg/L	1,000		< 5	U			< 5	U	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
trans-1,2-Dichloroethene	µg/L	100		< 5	U			< 5	U	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
trans-1,3-Dichloropropene	µg/L	29		< 10	U			< 10	U	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Trichloroethene	µg/L	5		< 5	U			< 5	U	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Trichlorofluoromethane	µg/L	31,000		< 5	U			< 5	U	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Vinyl chloride	µg/L	2		< 5	U			< 5	U	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U

Table 2-4
Groundwater Results, 2013–2021

		Location Code	67WW08				67WW09																			
		Sample ID	67WW08-201103		67WW08-211111		67WW09-130601		67WW10-060113		67WW09-060113		67WW09-130928		67WW09-092813		67WW09-140124		67WW09-012414		67WW09-140506		67WW09-140725		67WW09-072514		67WW09-141204	
		Sample Date	11/3/2020		11/11/2021		6/1/2013		6/1/2013		6/3/2013		9/28/2013		9/28/2013		1/24/2014		1/24/2014		5/6/2014		7/25/2014		7/25/2014		12/4/2014	
		Sample Purpose	REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG	
Parameter	Units	MCL/GW-Ind	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
ANIONS																												
Chloride	mg/L	NV	1,830		1,660																							
Nitrate	mg/L	10	< 0.2	U	0.318	J																						
Nitrite	mg/L	1																										
Sulfate	mg/L	NV	521		471																							
Sulfide	mg/L	NV																										
TOTAL ORGANIC CARBON																												
Total Inorganic Carbon	mg/L	NV																										
Total Organic Carbon	mg/L	NV	1.17		4.71																							
DHC																												
BVC	cells/mL	NV																										
Dehalococcoides	cells/mL	NV																										
FIELD TESTS																												
Specific conductivity	µmhos/cm	NV	6.74		6.41		3.31		3.31				3.47		3.47		3.39		3.39		-	-	3.42		3.42		3.55	
Dissolved oxygen	mg/L	NV	0.32		0.83		0.52		0.52				0.83		0.83		0.86		0.86		-	-	0.61		0.61		0	
Ferrous Iron	NA	NV	1.06		0.28																							
Flow Rate	mL/Min	NV	100																									
Measured well depth	Ft BTOC	NV																										
Oxidation Reduction Potential	mV	NV	62		174		189		189				157		157		136		136		-	-	310		310		166	
pH	SU	NV	5.94		5.73		6.64		6.64				6.31		6.31		6.24		6.24		-	-	5.41		5.41		5.95	
Temperature	C	NV	18.65		18.27		27.95		27.95				22.22		22.22		16.27		16.27		-	-	26.09		26.09		20.48	
Total Purge	L	NV	3.0																									
Turbidity	NTU	NV	0.8		13.8		4.5		4.5				1.7		1.7		0.9		0.9		-	-	4.4		4.4		1.8	
Water Level at Reading Time	Ft BTOC	NV	22.02																									
GASES																												
Carbon dioxide	µg/L	NV	270,000																									
Ethane	µg/L	NV	< 0.47	U	0.151	J																						
Ethylene	µg/L	NV	< 0.55	U	0.304	J																						
Methane	µg/L	NV	1.2	J	1.79	J																						
GENERAL CHEMISTRY																												
Alkalinity	mg/L	NV																										
Ferrous Iron	mg/L	NV																										
SEMIVOLATILES																												
1,4-Dioxane	µg/L	26																										
VOLATILES																												
1,1,1,2-Tetrachloroethane	µg/L	110	< 0.5	U	< 1	U			< 1	UJ	< 1	U			< 0.5	U			< 0.5	U					< 0.5	U		
1,1,1-Trichloroethane	µg/L	200	< 0.5	U	< 0.5	U			< 1	U	< 1	U			< 0.5	U			< 0.5	U					< 0.5	U		
1,1,2,2-Tetrachloroethane	µg/L	14	< 0.5	U	< 1	U			< 1	U	< 1	UJ			< 0.4	U			< 0.4	U					< 0.4	U		
1,1,2-Trichloro-1,2,2-Trifluoroethane	µg/L	3,100,000	< 1	U	< 1	U																						
1,1,2-Trichloroethane	µg/L	5	< 0.5	U	< 1	U			< 1	U	< 1	U			< 0.5	U			< 0.5	U					< 0.5	U		
1,1-Dichloroethane	µg/L	10,000	7.3		4.4				0.39	J	3.6				3.97				4.59						3.03			
1,1-Dichloroethene	µg/L	7	50		18				< 2	U	16.1				17.5				20.8						8.93			
1,1-Dichloropropene	µg/L	3	< 0.5	U	< 1	U			< 1	U	< 1	U			< 0.5	U			< 0.5	U					< 0.5	U		
1,2,3-Trichlorobenzene	µg/L	310	< 1	U	< 1	U			< 1	U	< 1	U			< 0.3	U			< 0.3	U					< 0.3	U		
1,2,3-Trichloropropane	µg/L	0.04	< 1	U	< 1	U			< 2	U	< 2	U			< 1	U			< 1	U					< 1	U		
1,2,4-Trichlorobenzene	µg/L	70	< 1	U	< 1	U			< 1	U	< 1	U			< 0.4	U			< 0.4	U					< 0.4	U		
1,2,4-Trimethylbenzene	µg/L	5,100	< 0.5	U	< 1	U			< 1	U	< 1	U			< 0.5	U			< 0.5	U					< 0.5	U		
1,2-Dibromo-3-chloropropane	µg/L	0.2	< 0.5	U	< 1	U			< 5	UJ	< 5	UJ			< 2	U			< 2	UJ					< 2	U		
1,2-Dibromoethane	µg/L	0.1	< 0.5	U	< 0.5	U			< 1	U	< 1	U			< 0.5	U			< 0.5	U					< 0.5	U		
1,2-Dichlorobenzene	µg/L	600	< 1	U	< 1	U			< 1	U	< 1	U			< 0.25	U			< 0.25	U					< 0.25	U		
1,2-Dichloroethane	µg/L	5	1.8		0.67	J			< 1	U	< 1	U			0.414	J			0.347	J					< 0.5	U		
1,2-Dichloropropane	µg/L	5	< 0.5	U	< 1	U			< 1	U	< 1	U			< 0.4	U			< 0.4	U					< 0.4	U		
1,3,5-Trimethylbenzene	µg/L	5,100	< 0.5	U	< 1	U			< 1	U	< 1	U			< 0.5	U			< 0.5	U					< 0.5	U		
1,3-Dichlorobenzene	µg/L	3,100	< 1	U	< 1	U			< 1	U	< 1	U			< 0.5	U			< 0.5	U					< 0.5	U		

Table 2-4
Groundwater Results, 2013–2021

		Location Code	67WW08				67WW09																			
		Sample ID	67WW08-201103		67WW08-211111		67WW09-130601		67WW10-060113		67WW09-060113		67WW09-130928		67WW09-092813		67WW09-140124		67WW09-012414		67WW09-140506		67WW09-140725		67WW09-072514		67WW09-141204	
		Sample Date	11/3/2020		11/11/2021		6/1/2013		6/1/2013		6/3/2013		9/28/2013		9/28/2013		1/24/2014		1/24/2014		5/6/2014		7/25/2014		7/25/2014		12/4/2014	
		Sample Purpose	REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG	
Parameter	Units	MCL/GW-Ind	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
1,3-Dichloropropane	µg/L	29	< 0.5	U	< 1	U			< 1	U	< 1	U			< 0.4	U			< 0.4	U					< 0.4	U		
1,4-Dichlorobenzene	µg/L	75	< 1	U	< 1	U			< 1	U	< 1	U			< 0.25	U			< 0.25	U					< 0.25	U		
2,2-Dichloropropane	µg/L	42	< 0.5	U	< 0.5	UJ			< 1	U	< 1	U			< 0.5	U			< 0.5	U					< 0.5	U		
2-Butanone	µg/L	61,000	< 1	U	< 1	U			< 10	U	< 10	U			< 5	U			< 5	U					< 5	U		
2-Chlorotoluene	µg/L	2,000	< 0.5	U	< 1	U			< 1	U	< 1	U			< 0.25	U			< 0.25	U					< 0.25	U		
2-Hexanone	µg/L	6,100	< 2	U	< 2	U			< 10	U	< 10	U			< 5	U			< 5	U					< 5	U		
4-Chlorotoluene	µg/L	2,000	< 1	U	< 1	U			< 1	U	< 1	U			< 0.5	U			< 0.5	U					< 0.5	U		
Acetone	µg/L	92,000	< 1	U	< 2	U			< 10	U	< 10	U			< 5	U			< 5	U					< 5	U		
Benzene	µg/L	5	< 0.5	U	< 0.5	U			< 1	U	< 1	U			< 0.25	U			< 0.25	U					< 0.25	U		
Bromobenzene	µg/L	2,000	< 1	U	< 1	U			< 1	U	< 1	U			< 0.25	U			< 0.25	U					< 0.25	U		
Bromochloromethane	µg/L	4,100	< 0.5	U	< 0.5	U			< 1	U	< 1	U			< 0.4	U			< 0.4	U					< 0.4	U		
Bromodichloromethane	µg/L	5	< 0.5	U	< 0.5	U			< 1	U	< 1	U			< 0.5	U			< 0.5	U					< 0.5	U		
Bromoform	µg/L	36	< 0.5	U	< 1	U			< 2	U	< 2	U			< 1	U			< 1	U					< 1	U		
Bromomethane	µg/L	140	< 0.5	U	< 1	U			< 2	UJ	< 2	UJ			< 1	U			< 1	U					< 1	U		
Carbon disulfide	µg/L	10,000	< 1	U	< 2	U			< 2	U	< 2	U			< 1	U			< 1	U					< 1	U		
Carbon tetrachloride	µg/L	5	< 0.5	U	< 1	U			< 1	U	< 1	U			< 0.5	U			< 0.5	U					< 0.5	U		
Chlorobenzene	µg/L	100	< 0.5	U	< 1	U			< 1	U	< 1	U			< 0.25	U			< 0.25	U					< 0.25	U		
Chloroethane	µg/L	41,000	< 0.5	U	< 1	U			< 2	U	< 2	U			< 1	U			< 1	U					< 1	U		
Chloroform	µg/L	1,000	< 0.5	U	< 0.5	U			< 1	U	< 1	U			< 0.25	U			< 0.25	U					< 0.25	U		
Chloromethane	µg/L	220	< 0.5	U	< 0.5	U			< 2	UJ	< 2	U			< 1	U			< 1	U					< 1	U		
cis-1,2-Dichloroethene	µg/L	70	< 0.5	U	< 0.5	U			< 1	U	< 1	U			< 0.5	U			< 0.5	U					< 0.5	U		
cis-1,3-Dichloropropene	µg/L	5	< 0.5	U	< 0.5	U			< 1	U	< 1	U			< 0.5	U			< 0.5	U					< 0.5	U		
Dibromochloromethane	µg/L	34	< 0.5	U	< 1	U			< 1	U	< 1	U			< 0.5	U			< 0.5	U					< 0.5	U		
Dibromomethane	µg/L	380	< 0.5	U	< 0.5	U			< 1	U	< 1	U			< 0.5	U			< 0.5	U					< 0.5	U		
Dichlorodifluoromethane	µg/L	20,000	< 0.5	U	< 1	U			< 1	U	< 1	UJ			< 0.5	U			< 0.5	U					< 0.5	U		
Ethylbenzene	µg/L	700	< 0.5	U	< 1	U			< 1	U	< 1	U			< 0.5	U			< 0.5	U					< 0.5	U		
Hexachlorobutadiene	µg/L	20	< 1	U	< 1	U			< 1	U	< 1	U			< 0.5	U			< 0.5	U					< 0.5	U		
Isopropylbenzene	µg/L	10,000	< 0.5	U	< 1	U			< 1	U	< 1	U			< 0.5	U			< 0.5	U					< 0.5	U		
m,p-Xylenes	µg/L	10,000	< 1	U	< 1	U			< 2	U	< 2	U			< 1	U			< 1	U					< 1	U		
Methyl isobutyl ketone	µg/L	8,200	< 2	U	< 2	U			< 10	U	< 10	U			< 5	U			< 5	U					< 5	U		
Methylene chloride	µg/L	5	< 1	U	< 1	U			< 1	U	< 1	U			< 0.5	U			< 0.5	U					< 0.5	U		
Naphthalene	µg/L	2,000	< 0.5	U	< 1	U			< 1	U	< 1	U			< 0.4	U			< 0.4	U					< 0.4	U		
n-Butylbenzene	µg/L	4,100	< 1	U	< 1	U			< 1	U	< 1	U			< 0.5	U			< 0.5	U					< 0.5	U		
n-Propylbenzene	µg/L	4,100	< 0.5	U	< 1	U			< 1	U	< 1	U			< 0.25	U			< 0.25	U					< 0.25	U		
o-Xylene	µg/L	10,000	< 0.5	U	< 1	U			< 1	U	< 1	U			< 0.5	U			< 0.5	U					< 0.5	U		
p-Isopropyltoluene	µg/L	10,000	< 0.5	U	< 1	U			< 1	U	< 1	U			< 0.5	U			< 0.5	U					< 0.5	U		
sec-Butylbenzene	µg/L	4,100	< 0.5	U	< 1	U			< 1	U	< 1	U			< 0.5	U			< 0.5	U					< 0.5	U		
Styrene	µg/L	100	< 0.5	U	< 1	U			< 1	U	< 1	U			< 0.25	U			< 0.25	U					< 0.25	U		
tert-Butylbenzene	µg/L	4,100	< 0.5	U	< 1	U			< 1	U	< 1	U			< 0.5	U			< 0.5	U					< 0.5	U		
Tetrachloroethene	µg/L	5	< 0.5	U	< 1	U			< 1	U	< 1	U			< 0.5	U			< 0.5	U					< 0.5	U		
Toluene	µg/L	1,000	< 0.5	U	< 0.5	U			< 1	U	< 1	U			< 0.5	U			< 0.5	U					< 0.5	U		
trans-1,2-Dichloroethene	µg/L	100	< 0.5	U	< 0.5	U			< 1	U	< 1	U			< 0.5	U			< 0.5	U					< 0.5	U		
trans-1,3-Dichloropropene	µg/L	29	< 0.5	U	< 0.5	U			< 2	U	< 2	U			< 1	U			< 1	U					< 1	U		
Trichloroethene	µg/L	5	< 0.5	U	< 0.5	U			< 1	U	< 1	U			< 0.5	U			< 0.5	U					< 0.5	U		
Trichlorofluoromethane	µg/L	31,000	< 0.5	U	< 1	U			< 1	U	< 1	U			< 0.5	U			< 0.5	U					< 0.5	U		
Vinyl chloride	µg/L	2	< 0.5	U	< 0.5	U			< 1	U	< 1	U			< 0.5	U			0.472	J					< 0.5	U		

Table 2-4
Groundwater Results, 2013–2021

		Location Code	67WW09																									
		Sample ID	67WW09-120414		67WW09-150211		67WW09FD-021115		67WW09-021115		67WW09-150519		67WW09-051915		67WW09-151118		67WW09-111815		67WW09FD-111815		67WW09-160518		67WW09-051816		67WW09FD-051816		67WW09-112717	
		Sample Date	12/4/2014		2/11/2015		2/11/2015		2/11/2015		5/19/2015		5/19/2015		11/18/2015		11/18/2015		11/18/2015		5/18/2016		5/18/2016		5/18/2016		11/27/2017	
		Sample Purpose	REG		REG		FD		REG		REG		REG		REG		REG		FD		REG		REG		FD		REG	
Parameter	Units	MCL/GW-Ind	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
ANIONS																												
Chloride	mg/L	NV																										
Nitrate	mg/L	10																										
Nitrite	mg/L	1																										
Sulfate	mg/L	NV																										
Sulfide	mg/L	NV																										
TOTAL ORGANIC CARBON																												
Total Inorganic Carbon	mg/L	NV																										
Total Organic Carbon	mg/L	NV																										
DHC																												
BVC	cells/mL	NV																										
Dehalococcoides	cells/mL	NV																										
FIELD TESTS																												
Specific conductivity	µmhos/cm	NV	3.55		3.29				3.29		3.35		3.35		3.98		3.98				3.95		3.95				3.65	
Dissolved oxygen	mg/L	NV	0		1.02				1.02		1.13		1.13		0		0				0.6		0.6				0.09	
Ferrous Iron	NA	NV																										
Flow Rate	mL/Min	NV																									100	
Measured well depth	Ft BTOC	NV																									37.9	
Oxidation Reduction Potential	mV	NV	166		164				164		259		259		224		224				305		305				325	
pH	SU	NV	5.95		6.45				6.45		5.48		5.48		5.63		5.63				5.19		5.19				5.27	
Temperature	C	NV	20.48		18.13				18.13		18.88		18.88		19.88		19.88				18.25		18.25				19.97	
Total Purge	L	NV																									0.78	
Turbidity	NTU	NV	1.8		3.4				3.4		12.5		12.5		0		0				0.8		0.8				31.4	
Water Level at Reading Time	Ft BTOC	NV																									22.29	
GASES																												
Carbon dioxide	µg/L	NV																										
Ethane	µg/L	NV																										
Ethylene	µg/L	NV																										
Methane	µg/L	NV																										
GENERAL CHEMISTRY																												
Alkalinity	mg/L	NV																										
Ferrous Iron	mg/L	NV																										
SEMIVOLATILES																												
1,4-Dioxane	µg/L	26																									1.2	
VOLATILES																												
1,1,1,2-Tetrachloroethane	µg/L	110	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U	< 1	U
1,1,1-Trichloroethane	µg/L	200	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U	< 1	U
1,1,2,2-Tetrachloroethane	µg/L	14	< 0.4	U			< 0.4	U	< 0.4	U			< 0.4	U			< 0.4	U	< 0.4	U			< 0.4	U	< 0.4	U	< 1	U
1,1,2-Trichloro-1,2,2-Trifluoroethane	µg/L	3,100,000																									< 1	U
1,1,2-Trichloroethane	µg/L	5	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U	< 1	U
1,1-Dichloroethane	µg/L	10,000	3.93				2.92		2.93				1.56				1.08		1.08				0.477	J	0.487	J	< 1	U
1,1-Dichloroethene	µg/L	7	11.6				8.29		8.17				2.71				1.66	J	1.62	J			< 1	U	< 1	U	< 1	U
1,1-Dichloropropene	µg/L	3	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U	< 1	U
1,2,3-Trichlorobenzene	µg/L	310	< 0.3	U			< 0.3	U	< 0.3	U			< 0.3	U			< 0.3	U	< 0.3	U			< 0.3	U	< 0.3	U	< 1	U
1,2,3-Trichloropropane	µg/L	0.04	< 1	U			< 1	U	< 1	U			< 1	U			< 1	U	< 1	U			< 1	U	< 1	U	< 1	U
1,2,4-Trichlorobenzene	µg/L	70	< 0.4	U			< 0.4	U	< 0.4	U			< 0.4	U			< 0.4	U	< 0.4	U			< 0.4	U	< 0.4	U	< 1	U
1,2,4-Trimethylbenzene	µg/L	5,100	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U	< 1	U
1,2-Dibromo-3-chloropropane	µg/L	0.2	< 2	U			< 2	U	< 2	U			< 2	U			< 2	U	< 2	U			< 2	U	< 2	U	< 1	U
1,2-Dibromoethane	µg/L	0.1	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U	< 1	U
1,2-Dichlorobenzene	µg/L	600	< 0.25	U			< 0.25	U	< 0.25	U			< 0.25	U			< 0.25	U	< 0.25	U			< 0.25	U	< 0.25	U	< 1	U
1,2-Dichloroethane	µg/L	5	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U	< 1	U
1,2-Dichloropropane	µg/L	5	< 0.4	U			< 0.4	U	< 0.4	U			< 0.4	U			< 0.4	U	< 0.4	U			< 0.4	U	< 0.4	U	< 1	U
1,3,5-Trimethylbenzene	µg/L	5,100	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U	< 1	U
1,3-Dichlorobenzene	µg/L	3,100	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U	< 1	U

Table 2-4
Groundwater Results, 2013–2021

		Location Code	67WW09																							
		Sample ID	67WW09-120414		67WW09-150211		67WW09FD-021115		67WW09-021115		67WW09-150519		67WW09-051915		67WW09-151118		67WW09-111815		67WW09FD-111815		67WW09-160518		67WW09-051816		67WW09FD-051816		67WW09-112717	
		Sample Date	12/4/2014		2/11/2015		2/11/2015		2/11/2015		5/19/2015		5/19/2015		11/18/2015		11/18/2015		11/18/2015		5/18/2016		5/18/2016		5/18/2016		11/27/2017	
		Sample Purpose	REG		REG		FD		REG		REG		REG		REG		REG		FD		REG		REG		FD		REG	
Parameter	Units	MCL/GW-Ind	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
1,3-Dichloropropane	µg/L	29	< 0.4	U			< 0.4	U	< 0.4	U			< 0.4	U			< 0.4	U	< 0.4	U			< 0.4	U	< 0.4	U	< 1	U
1,4-Dichlorobenzene	µg/L	75	< 0.25	U			< 0.25	U	< 0.25	U			< 0.25	U			< 0.25	U	< 0.25	U			< 0.25	U	< 0.25	U	< 1	U
2,2-Dichloropropane	µg/L	42	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U	< 1	U
2-Butanone	µg/L	61,000	< 5	U			< 5	U	< 5	U			< 5	U			< 5	U	< 5	U			< 5	U	< 5	U	< 2	U
2-Chlorotoluene	µg/L	2,000	< 0.25	U			< 0.25	U	< 0.25	U			< 0.25	UJ			< 0.25	U	< 0.25	U			< 0.25	U	< 0.25	U	< 1	U
2-Hexanone	µg/L	6,100	< 5	U			< 5	U	< 5	U			< 5	U			< 5	U	< 5	U			< 5	U	< 5	U	< 2	U
4-Chlorotoluene	µg/L	2,000	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U	< 1	U
Acetone	µg/L	92,000	< 5	U			< 5	U	< 5	U			< 5	U			< 5	U	< 5	U			< 5	U	< 5	U	< 2	U
Benzene	µg/L	5	< 0.25	U			< 0.25	U	< 0.25	U			< 0.25	U			< 0.25	U	< 0.25	U			< 0.25	U	< 0.25	U	< 1	U
Bromobenzene	µg/L	2,000	< 0.25	U			< 0.25	U	< 0.25	U			< 0.25	U			< 0.25	U	< 0.25	U			< 0.25	U	< 0.25	U	< 1	U
Bromochloromethane	µg/L	4,100	< 0.4	U			< 0.4	U	< 0.4	U			< 0.4	U			< 0.4	U	< 0.4	U			< 0.4	U	< 0.4	U	< 1	U
Bromodichloromethane	µg/L	5	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U	< 1	U
Bromoform	µg/L	36	< 1	U			< 1	U	< 1	U			< 1	U			< 1	U	< 1	U			< 1	U	< 1	U	< 1	U
Bromomethane	µg/L	140	< 1	U			< 1	UJ	< 1	UJ			< 1	U			< 1	U	< 1	U			< 1	UJ	< 1	UJ	< 1	U
Carbon disulfide	µg/L	10,000	< 1	U			< 1	U	< 1	U			< 1	U			< 1	U	< 1	U			< 1	U	< 1	U	< 2	U
Carbon tetrachloride	µg/L	5	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U	< 1	U
Chlorobenzene	µg/L	100	< 0.25	U			< 0.25	U	< 0.25	U			< 0.25	U			< 0.25	U	< 0.25	U			< 0.25	U	< 0.25	U	< 1	U
Chloroethane	µg/L	41,000	< 1	U			< 1	U	< 1	U			< 1	U			< 1	U	< 1	U			< 1	U	< 1	U	< 1	U
Chloroform	µg/L	1,000	< 0.25	U			< 0.25	U	< 0.25	U			< 0.25	U			< 0.25	U	< 0.25	U			< 0.25	U	< 0.25	U	< 1	U
Chloromethane	µg/L	220	< 1	U			< 1	U	< 1	U			< 1	U			< 1	U	< 1	U			< 1	U	< 1	U	< 1	U
cis-1,2-Dichloroethene	µg/L	70	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U	< 1	U
cis-1,3-Dichloropropene	µg/L	5	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U	< 1	U
Dibromochloromethane	µg/L	34	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U	< 1	U
Dibromomethane	µg/L	380	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U	< 1	U
Dichlorodifluoromethane	µg/L	20,000	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U	< 1	U
Ethylbenzene	µg/L	700	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U	< 1	U
Hexachlorobutadiene	µg/L	20	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U	< 1	U
Isopropylbenzene	µg/L	10,000	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U	< 1	U
m,p-Xylenes	µg/L	10,000	< 1	U			< 1	U	< 1	U			< 1	U			< 1	U	< 1	U			< 1	U	< 1	U	< 2	U
Methyl isobutyl ketone	µg/L	8,200	< 5	U			< 5	U	< 5	U			< 5	U			< 5	U	< 5	U			< 5	U	< 5	U	< 2	U
Methylene chloride	µg/L	5	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U	< 2	U
Naphthalene	µg/L	2,000	< 0.4	U			< 0.4	U	< 0.4	U			< 0.4	U			< 0.4	U	< 0.4	U			< 0.4	U	< 0.4	U	< 1	U
n-Butylbenzene	µg/L	4,100	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U	< 1	U
n-Propylbenzene	µg/L	4,100	< 0.25	U			< 0.25	U	< 0.25	U			< 0.25	U			< 0.25	U	< 0.25	U			< 0.25	U	< 0.25	U	< 1	U
o-Xylene	µg/L	10,000	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U	< 1	U
p-Isopropyltoluene	µg/L	10,000	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U	< 1	U
sec-Butylbenzene	µg/L	4,100	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U	< 1	U
Styrene	µg/L	100	< 0.25	U			< 0.25	U	< 0.25	U			< 0.25	U			< 0.25	U	< 0.25	U			< 0.25	U	< 0.25	U	< 1	U
tert-Butylbenzene	µg/L	4,100	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U	< 1	U
Tetrachloroethene	µg/L	5	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U	< 1	U
Toluene	µg/L	1,000	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U	< 1	U
trans-1,2-Dichloroethene	µg/L	100	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U	< 1	U
trans-1,3-Dichloropropene	µg/L	29	< 1	U			< 1	U	< 1	U			< 1	U			< 1	U	< 1	U			< 1	U	< 1	U	< 1	U
Trichloroethene	µg/L	5	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U	< 1	U
Trichlorofluoromethane	µg/L	31,000	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U	< 1	U
Vinyl chloride	µg/L	2	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U	< 1	U

Table 2-4
Groundwater Results, 2013–2021

		Location Code	67WW09												67WW09A											
		Sample ID	67WW09-180502		67WW09-181023		67WW09-190503		67WW09-191024		67WW09-201103		67WW09-211111		67WW09A-130927		67WW09A-092713-FD		67WW09A-092713		67WW09A-140123		67WW09A-012314		67WW09A-140506		67WW09A-050614	
		Sample Date	5/2/2018		10/23/2018		5/3/2019		10/24/2019		11/3/2020		11/11/2021		9/27/2013		9/27/2013		9/27/2013		1/23/2014		1/23/2014		5/6/2014		5/6/2014	
		Sample Purpose	REG		REG		REG		REG		REG		REG		REG		FD		REG		REG		REG		REG		REG	
Parameter	Units	MCL/GW-Ind	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
ANIONS																												
Chloride	mg/L	NV																										
Nitrate	mg/L	10																										
Nitrite	mg/L	1																										
Sulfate	mg/L	NV																										
Sulfide	mg/L	NV																										
TOTAL ORGANIC CARBON																												
Total Inorganic Carbon	mg/L	NV																										
Total Organic Carbon	mg/L	NV																										
DHC																												
BVC	cells/mL	NV																										
Dehalococcoides	cells/mL	NV																										
FIELD TESTS																												
Specific conductivity	µmhos/cm	NV	3.48		3.35		3.49		3.22		3.24		3.47		2.45				2.45		2.49		2.49		2.53		2.53	
Dissolved oxygen	mg/L	NV	0.2		0.1		0.13		0.09		0.42		0.5		1.19				1.19		0.59		0.59		0.46		0.46	
Ferrous Iron	NA	NV																										
Flow Rate	mL/Min	NV	100		100		100		100		100																	
Measured well depth	Ft BTOC	NV	37.8		38		37.88		37.8																			
Oxidation Reduction Potential	mV	NV	413		203		250		194		191		234		182				182		18		18		20		20	
pH	SU	NV	5.35		6.23		5.36		6.05		6.17		5.92		5.62				5.62		6.73		6.73		5.55		5.55	
Temperature	C	NV	19.40		18.75		20.04		21.04		17.87		20.08		28.67				28.67		15.63		15.63		19.01		19.01	
Total Purge	L	NV	2.0		3.0		3.0		3		3.0																	
Turbidity	NTU	NV	4.7		0		0		0		0		1.4		21.5				21.5		32.1		32.1		20.7		20.7	
Water Level at Reading Time	Ft BTOC	NV	21.2		22.65		20.06		21.02		20.1																	
GASES																												
Carbon dioxide	µg/L	NV																										
Ethane	µg/L	NV																										
Ethylene	µg/L	NV																										
Methane	µg/L	NV																										
GENERAL CHEMISTRY																												
Alkalinity	mg/L	NV																										
Ferrous Iron	mg/L	NV																										
SEMIVOLATILES																												
1,4-Dioxane	µg/L	26																										
VOLATILES																												
1,1,1,2-Tetrachloroethane	µg/L	110	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U
1,1,1-Trichloroethane	µg/L	200	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U
1,1,2,2-Tetrachloroethane	µg/L	14	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 0.4	U	< 0.4	U			< 0.4	U			< 0.4	U
1,1,2-Trichloro-1,2,2-Trifluoroethane	µg/L	3,100,000	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U														
1,1,2-Trichloroethane	µg/L	5	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	5.5				< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U
1,1-Dichloroethane	µg/L	10,000	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	13				< 0.25	U	< 0.25	U			< 0.25	U			< 0.25	U
1,1-Dichloroethene	µg/L	7	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	UJ			< 1	U	< 1	U			< 1	U			< 1	U
1,1-Dichloropropene	µg/L	3	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U
1,2,3-Trichlorobenzene	µg/L	310	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	UJ	< 1	U	< 1	U			< 0.3	U	< 0.3	U			< 0.3	U			< 0.3	U
1,2,3-Trichloropropane	µg/L	0.04	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U			< 1	U	< 1	U			< 1	U			< 1	U
1,2,4-Trichlorobenzene	µg/L	70	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U			< 0.4	U	< 0.4	U			< 0.4	U			< 0.4	U
1,2,4-Trimethylbenzene	µg/L	5,100	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U
1,2-Dibromo-3-chloropropane	µg/L	0.2	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 2	U	< 2	U			< 2	UJ			< 2	U
1,2-Dibromoethane	µg/L	0.1	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U
1,2-Dichlorobenzene	µg/L	600	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U			< 0.25	U	< 0.25	U			< 0.25	U			< 0.25	U
1,2-Dichloroethane	µg/L	5	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	29				< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U
1,2-Dichloropropane	µg/L	5	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 0.4	U	< 0.4	U			< 0.4	U			< 0.4	U
1,3,5-Trimethylbenzene	µg/L	5,100	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U
1,3-Dichlorobenzene	µg/L	3,100	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U

Table 2-4
Groundwater Results, 2013–2021

		Location Code	67WW09												67WW09A											
		Sample ID	67WW09-180502		67WW09-181023		67WW09-190503		67WW09-191024		67WW09-201103		67WW09-211111		67WW09A-130927		67WW09A-092713-FD		67WW09A-092713		67WW09A-140123		67WW09A-012314		67WW09A-140506		67WW09A-050614	
		Sample Date	5/2/2018		10/23/2018		5/3/2019		10/24/2019		11/3/2020		11/11/2021		9/27/2013		9/27/2013		9/27/2013		1/23/2014		1/23/2014		5/6/2014		5/6/2014	
		Sample Purpose	REG		REG		REG		REG		REG		REG		REG		FD		REG		REG		REG		REG		REG	
Parameter	Units	MCL/GW-Ind	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
1,3-Dichloropropane	µg/L	29	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 0.4	U	< 0.4	U			< 0.4	U			< 0.4	U
1,4-Dichlorobenzene	µg/L	75	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U			< 0.25	U	< 0.25	U			< 0.25	U			< 0.25	U
2,2-Dichloropropane	µg/L	42	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	UJ			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U
2-Butanone	µg/L	61,000	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U			< 5	U	< 5	U			< 5	U			< 5	U
2-Chlorotoluene	µg/L	2,000	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 0.25	U	< 0.25	U			< 0.25	U			< 0.25	U
2-Hexanone	µg/L	6,100	< 1	U	< 1	U	< 1	U	< 1	U	< 2	U	< 2	U			< 5	U	< 5	U			< 5	U			< 5	U
4-Chlorotoluene	µg/L	2,000	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U
Acetone	µg/L	92,000	< 1	U	< 2	U	< 1	U	< 1	U	< 1	U	< 2	U			< 5	U	< 5	U			< 5	U			< 5	U
Benzene	µg/L	5	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 0.25	U	< 0.25	U			< 0.25	U			< 0.25	U
Bromobenzene	µg/L	2,000	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U			< 0.25	U	< 0.25	U			< 0.25	U			< 0.25	U
Bromochloromethane	µg/L	4,100	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 0.4	U	< 0.4	U			< 0.4	U			< 0.4	U
Bromodichloromethane	µg/L	5	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U
Bromoform	µg/L	36	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 1	U	< 1	U			< 1	U			< 1	U
Bromomethane	µg/L	140	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 1	U	< 1	U			< 1	U			< 1	U
Carbon disulfide	µg/L	10,000	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 2	U			< 1	U	< 1	U			< 1	U			< 1	U
Carbon tetrachloride	µg/L	5	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U
Chlorobenzene	µg/L	100	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 0.25	U	< 0.25	U			< 0.25	U			< 0.25	U
Chloroethane	µg/L	41,000	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 1	U	< 1	U			< 1	U			< 1	U
Chloroform	µg/L	1,000	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 0.25	U	< 0.25	U			< 0.25	U			< 0.25	U
Chloromethane	µg/L	220	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 1	U	< 1	U			< 1	U			< 1	U
cis-1,2-Dichloroethene	µg/L	70	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	1.4				< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U
cis-1,3-Dichloropropene	µg/L	5	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U
Dibromochloromethane	µg/L	34	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U
Dibromomethane	µg/L	380	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U
Dichlorodifluoromethane	µg/L	20,000	< 0.5	U	< 0.5	UJ	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U
Ethylbenzene	µg/L	700	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U
Hexachlorobutadiene	µg/L	20	< 0.5	U	< 1	U	< 1	U	< 0.5	U	< 1	U	< 1	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U
Isopropylbenzene	µg/L	10,000	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U
m,p-Xylenes	µg/L	10,000	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U			< 1	U	< 1	U			< 1	U			< 1	U
Methyl isobutyl ketone	µg/L	8,200	< 1	U	< 1	U	< 1	U	< 1	U	< 2	U	< 2	U			< 5	U	< 5	U			< 5	U			< 5	U
Methylene chloride	µg/L	5	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U
Naphthalene	µg/L	2,000	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	UJ	< 0.5	U	< 1	U			< 0.4	U	< 0.4	U			< 0.4	U			< 0.4	U
n-Butylbenzene	µg/L	4,100	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U
n-Propylbenzene	µg/L	4,100	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 0.25	U	< 0.25	U			< 0.25	U			< 0.25	U
o-Xylene	µg/L	10,000	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U
p-Isopropyltoluene	µg/L	10,000	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U
sec-Butylbenzene	µg/L	4,100	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U
Styrene	µg/L	100	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 0.25	U	< 0.25	U			< 0.25	U			< 0.25	U
tert-Butylbenzene	µg/L	4,100	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U
Tetrachloroethene	µg/L	5	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U
Toluene	µg/L	1,000	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U
trans-1,2-Dichloroethene	µg/L	100	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U
trans-1,3-Dichloropropene	µg/L	29	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 1	U	< 1	U			< 1	U			< 1	U
Trichloroethene	µg/L	5	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	1.4				< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U
Trichlorofluoromethane	µg/L	31,000	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U
Vinyl chloride	µg/L	2	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U

Table 2-4
Groundwater Results, 2013–2021

		Location Code	67WW09A																							
		Sample ID	67WW09A-140724		67WW09AFD-072414		67WW09A-072414		67WW09A-141203		67WW09A-120314		67WW09AFD-120314		67WW09A-150210		67WW09A-021015		67WW09A-150512		67WW09A-051215		67WW09A-151118		67WW09A-111815		67WW09A-160518	
		Sample Date	7/24/2014		7/24/2014		7/24/2014		12/3/2014		12/3/2014		12/3/2014		2/10/2015		2/10/2015		5/12/2015		5/12/2015		11/18/2015		11/18/2015		5/18/2016	
		Sample Purpose	REG		FD		REG		REG		REG		FD		REG		REG		REG		REG		REG		REG		REG	
Parameter	Units	MCL/GW-Ind	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
ANIONS																												
Chloride	mg/L	NV																										
Nitrate	mg/L	10																										
Nitrite	mg/L	1																										
Sulfate	mg/L	NV																										
Sulfide	mg/L	NV																										
TOTAL ORGANIC CARBON																												
Total Inorganic Carbon	mg/L	NV																										
Total Organic Carbon	mg/L	NV																										
DHC																												
BVC	cells/mL	NV																										
Dehalococcoides	cells/mL	NV																										
FIELD TESTS																												
Specific conductivity	µmhos/cm	NV	2.36				2.36		2.31		2.31				2.25		2.25		2.02		2.02		2.35		2.35		2.48	
Dissolved oxygen	mg/L	NV	0.12				0.12		0		0				0		0		0.47		0.47		0		0		0.42	
Ferrous Iron	NA	NV																										
Flow Rate	mL/Min	NV																										
Measured well depth	Ft BTOC	NV																										
Oxidation Reduction Potential	mV	NV	26				26		30		30				-12		-12		112		112		127		127		137	
pH	SU	NV	6.89				6.89		6.5		6.5				7.13		7.13		5.67		5.67		5.81		5.81		5.64	
Temperature	C	NV	24.26				24.26		18.75		18.75				17.83		17.83		18.84		18.84		18.3		18.3		18.55	
Total Purge	L	NV																										
Turbidity	NTU	NV	5.8				5.8		4.3		4.3				20.8		20.8		31.3		31.3		12		12		0	
Water Level at Reading Time	Ft BTOC	NV																										
GASES																												
Carbon dioxide	µg/L	NV																										
Ethane	µg/L	NV																										
Ethylene	µg/L	NV																										
Methane	µg/L	NV																										
GENERAL CHEMISTRY																												
Alkalinity	mg/L	NV																										
Ferrous Iron	mg/L	NV																										
SEMIVOLATILES																												
1,4-Dioxane	µg/L	26																										
VOLATILES																												
1,1,1,2-Tetrachloroethane	µg/L	110			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
1,1,1-Trichloroethane	µg/L	200			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
1,1,2,2-Tetrachloroethane	µg/L	14			< 0.4	U	< 0.4	U			< 0.4	U	< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U		
1,1,2-Trichloro-1,2,2-Trifluoroethane	µg/L	3,100,000																										
1,1,2-Trichloroethane	µg/L	5			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
1,1-Dichloroethane	µg/L	10,000			< 0.25	U	< 0.25	U			< 0.25	U	< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U		
1,1-Dichloroethene	µg/L	7			< 1	U	< 1	U			< 1	U	< 1	U			< 1	U			< 1	U			< 1	U		
1,1-Dichloropropene	µg/L	3			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
1,2,3-Trichlorobenzene	µg/L	310			< 0.3	U	< 0.3	U			< 0.3	U	< 0.3	U			< 0.3	U			< 0.3	U			< 0.3	U		
1,2,3-Trichloropropane	µg/L	0.04			< 1	U	< 1	U			< 1	U	< 1	U			< 1	U			< 1	U			< 1	U		
1,2,4-Trichlorobenzene	µg/L	70			< 0.4	U	< 0.4	U			< 0.4	U	< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U		
1,2,4-Trimethylbenzene	µg/L	5,100			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
1,2-Dibromo-3-chloropropane	µg/L	0.2			< 2	U	< 2	U			< 2	U	< 2	U			< 2	U			< 2	U			< 2	U		
1,2-Dibromoethane	µg/L	0.1			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
1,2-Dichlorobenzene	µg/L	600			< 0.25	U	< 0.25	U			< 0.25	U	< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U		
1,2-Dichloroethane	µg/L	5			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
1,2-Dichloropropane	µg/L	5			< 0.4	U	< 0.4	U			< 0.4	U	< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U		
1,3,5-Trimethylbenzene	µg/L	5,100			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
1,3-Dichlorobenzene	µg/L	3,100			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		

Table 2-4
Groundwater Results, 2013–2021

		Location Code	67WW09A																							
		Sample ID	67WW09A-140724		67WW09AFD-072414		67WW09A-072414		67WW09A-141203		67WW09A-120314		67WW09AFD-120314		67WW09A-150210		67WW09A-021015		67WW09A-150512		67WW09A-051215		67WW09A-151118		67WW09A-111815		67WW09A-160518	
		Sample Date	7/24/2014		7/24/2014		7/24/2014		12/3/2014		12/3/2014		12/3/2014		2/10/2015		2/10/2015		5/12/2015		5/12/2015		11/18/2015		11/18/2015		5/18/2016	
		Sample Purpose	REG		FD		REG		REG		REG		FD		REG		REG		REG		REG		REG		REG		REG	
Parameter	Units	MCL/GW-Ind	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
1,3-Dichloropropane	µg/L	29			< 0.4	U	< 0.4	U			< 0.4	U	< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U		
1,4-Dichlorobenzene	µg/L	75			< 0.25	U	< 0.25	U			< 0.25	U	< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U		
2,2-Dichloropropane	µg/L	42			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
2-Butanone	µg/L	61,000			< 5	U	< 5	U			< 5	U	< 5	U			< 5	U			< 5	U			< 5	U		
2-Chlorotoluene	µg/L	2,000			< 0.25	U	< 0.25	U			< 0.25	U	< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U		
2-Hexanone	µg/L	6,100			< 5	U	< 5	U			< 5	U	< 5	U			< 5	U			< 5	U			< 5	U		
4-Chlorotoluene	µg/L	2,000			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
Acetone	µg/L	92,000			< 5	U	< 5	U			< 5	U	< 5	U			< 5	U			< 5	U			< 5	U		
Benzene	µg/L	5			< 0.25	U	< 0.25	U			< 0.25	U	< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U		
Bromobenzene	µg/L	2,000			< 0.25	U	< 0.25	U			< 0.25	U	< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U		
Bromochloromethane	µg/L	4,100			< 0.4	U	< 0.4	U			< 0.4	U	< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U		
Bromodichloromethane	µg/L	5			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
Bromoform	µg/L	36			< 1	U	< 1	U			< 1	U	< 1	U			< 1	U			< 1	U			< 1	U		
Bromomethane	µg/L	140			< 1	U	< 1	U			< 1	U	< 1	U			< 1	UJ			< 1	U			< 1	U		
Carbon disulfide	µg/L	10,000			< 1	U	< 1	U			< 1	U	< 1	U			< 1	U			< 1	U			< 1	U		
Carbon tetrachloride	µg/L	5			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
Chlorobenzene	µg/L	100			< 0.25	U	< 0.25	U			< 0.25	U	< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U		
Chloroethane	µg/L	41,000			< 1	U	< 1	U			< 1	U	< 1	U			< 1	U			< 1	U			< 1	U		
Chloroform	µg/L	1,000			< 0.25	U	< 0.25	U			< 0.25	U	< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U		
Chloromethane	µg/L	220			< 1	U	< 1	U			< 1	U	< 1	U			< 1	U			< 1	U			< 1	U		
cis-1,2-Dichloroethene	µg/L	70			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
cis-1,3-Dichloropropene	µg/L	5			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
Dibromochloromethane	µg/L	34			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
Dibromomethane	µg/L	380			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
Dichlorodifluoromethane	µg/L	20,000			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
Ethylbenzene	µg/L	700			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
Hexachlorobutadiene	µg/L	20			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
Isopropylbenzene	µg/L	10,000			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
m,p-Xylenes	µg/L	10,000			< 1	U	< 1	U			< 1	U	< 1	U			< 1	U			< 1	U			< 1	U		
Methyl isobutyl ketone	µg/L	8,200			< 5	U	< 5	U			< 5	U	< 5	U			< 5	U			< 5	U			< 5	U		
Methylene chloride	µg/L	5			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
Naphthalene	µg/L	2,000			< 0.4	U	< 0.4	U			< 0.4	U	< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U		
n-Butylbenzene	µg/L	4,100			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
n-Propylbenzene	µg/L	4,100			< 0.25	U	< 0.25	U			< 0.25	U	< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U		
o-Xylene	µg/L	10,000			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
p-Isopropyltoluene	µg/L	10,000			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
sec-Butylbenzene	µg/L	4,100			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
Styrene	µg/L	100			< 0.25	U	< 0.25	U			< 0.25	U	< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U		
tert-Butylbenzene	µg/L	4,100			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
Tetrachloroethene	µg/L	5			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
Toluene	µg/L	1,000			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
trans-1,2-Dichloroethene	µg/L	100			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
trans-1,3-Dichloropropene	µg/L	29			< 1	U	< 1	U			< 1	U	< 1	U			< 1	U			< 1	U			< 1	U		
Trichloroethene	µg/L	5			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
Trichlorofluoromethane	µg/L	31,000			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
Vinyl chloride	µg/L	2			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		

Table 2-4
Groundwater Results, 2013–2021

		Location Code	67WW09A																67WW10									
		Sample ID	67WW09A-051816		67WW09A-112917		67WW09A-180503		67WW09A-181025		67WW09A-190502		67WW09A-191028		67WW09A-201102		67WW09A-211110		67WW10-130601		67WW10-130927		67WW10-092713		67WW10-140124		67WW10-012414	
		Sample Date	5/18/2016		11/29/2017		5/3/2018		10/25/2018		5/2/2019		10/28/2019		11/2/2020		11/10/2021		6/1/2013		9/27/2013		9/27/2013		1/24/2014		1/24/2014	
		Sample Purpose	REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG	
Parameter	Units	MCL/GW-Ind	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
ANIONS																												
Chloride	mg/L	NV																										
Nitrate	mg/L	10																										
Nitrite	mg/L	1																										
Sulfate	mg/L	NV																										
Sulfide	mg/L	NV																										
TOTAL ORGANIC CARBON																												
Total Inorganic Carbon	mg/L	NV																										
Total Organic Carbon	mg/L	NV																										
DHC																												
BVC	cells/mL	NV																										
Dehalococcoides	cells/mL	NV																										
FIELD TESTS																												
Specific conductivity	µmhos/cm	NV	2.48		2.87		2.88		3.26		3.42		4.07		4.93		4.77		5.08		6.23		6.23		6.45		6.45	
Dissolved oxygen	mg/L	NV	0.42		0.16		1.21		0.05		0.09		0.04		0.06		0.26		0.11		0.6		0.6		0.54		0.54	
Ferrous Iron	NA	NV																										
Flow Rate	mL/Min	NV			100		100		100		100		100		100													
Measured well depth	Ft BTOC	NV			38.7		38.76		38.71		38.77		37.62															
Oxidation Reduction Potential	mV	NV	137		128		242		138		123		71		75		184		190		-9		-9		29		29	
pH	SU	NV	5.64		5.94		6.32		6.04		6.0		6.22		6.44		5.99		6.27		6.02		6.02		6.07		6.07	
Temperature	C	NV	18.55		19.55		20.30		17.79		20.8		18.51		19.86		21.21		24.32		25.2		25.2		15.1		15.1	
Total Purge	L	NV			0.78		2		3		3		3.0		3.0													
Turbidity	NTU	NV	0		0		6.1		0		24		1.7		0		5.7		4.9		1.6		1.6		0.4		0.4	
Water Level at Reading Time	Ft BTOC	NV			27		25.9		27.26		24.58		25.72		24.98													
GASES																												
Carbon dioxide	µg/L	NV																										
Ethane	µg/L	NV																										
Ethylene	µg/L	NV																										
Methane	µg/L	NV																										
GENERAL CHEMISTRY																												
Alkalinity	mg/L	NV																										
Ferrous Iron	mg/L	NV																										
SEMIVOLATILES																												
1,4-Dioxane	µg/L	26			3.6																							
VOLATILES																												
1,1,1,2-Tetrachloroethane	µg/L	110	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U					< 0.5	U			< 0.5	U
1,1,1-Trichloroethane	µg/L	200	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U					< 0.5	U			< 0.5	U
1,1,2,2-Tetrachloroethane	µg/L	14	< 0.4	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U					< 0.4	U			< 0.4	U
1,1,2-Trichloro-1,2,2-Trifluoroethane	µg/L	3,100,000			< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U										
1,1,2-Trichloroethane	µg/L	5	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U					< 0.5	U			< 0.5	U
1,1-Dichloroethane	µg/L	10,000	< 0.25	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U					0.362	J			0.319	J
1,1-Dichloroethene	µg/L	7	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U					< 1	U			< 1	U
1,1-Dichloropropene	µg/L	3	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U					< 0.5	U			< 0.5	U
1,2,3-Trichlorobenzene	µg/L	310	< 0.3	U	< 1	U	< 0.5	U	< 0.5	UJ	< 0.5	U	< 0.5	UJ	< 1	U	< 1	U					< 0.3	U			< 0.3	U
1,2,3-Trichloropropane	µg/L	0.04	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U					< 1	U			< 1	U
1,2,4-Trichlorobenzene	µg/L	70	< 0.4	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U					< 0.4	U			< 0.4	U
1,2,4-Trimethylbenzene	µg/L	5,100	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U					< 0.5	U			< 0.5	U
1,2-Dibromo-3-chloropropane	µg/L	0.2	< 2	U	< 1	U	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U					< 2	U			< 2	U
1,2-Dibromoethane	µg/L	0.1	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U					< 0.5	U			< 0.5	U
1,2-Dichlorobenzene	µg/L	600	< 0.25	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U					< 0.25	U			< 0.25	U
1,2-Dichloroethane	µg/L	5	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U					< 0.5	U			< 0.5	U
1,2-Dichloropropane	µg/L	5	< 0.4	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U					< 0.4	U			< 0.4	U
1,3,5-Trimethylbenzene	µg/L	5,100	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U					< 0.5	U			< 0.5	U
1,3-Dichlorobenzene	µg/L	3,100	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U					< 0.5	U			< 0.5	U

Table 2-4
Groundwater Results, 2013–2021

		Location Code	67WW09A																67WW10									
		Sample ID	67WW09A-051816		67WW09A-112917		67WW09A-180503		67WW09A-181025		67WW09A-190502		67WW09A-191028		67WW09A-201102		67WW09A-211110		67WW10-130601		67WW10-130927		67WW10-092713		67WW10-140124		67WW10-012414	
		Sample Date	5/18/2016		11/29/2017		5/3/2018		10/25/2018		5/2/2019		10/28/2019		11/2/2020		11/10/2021		6/1/2013		9/27/2013		9/27/2013		1/24/2014		1/24/2014	
		Sample Purpose	REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG	
Parameter	Units	MCL/GW-Ind	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
1,3-Dichloropropane	µg/L	29	< 0.4	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U					< 0.4	U			< 0.4	U
1,4-Dichlorobenzene	µg/L	75	< 0.25	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U					< 0.25	U			< 0.25	U
2,2-Dichloropropane	µg/L	42	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U					< 0.5	U			< 0.5	U
2-Butanone	µg/L	61,000	< 5	U	< 2	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U					< 5	U			< 5	U
2-Chlorotoluene	µg/L	2,000	< 0.25	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U					< 0.25	U			< 0.25	U
2-Hexanone	µg/L	6,100	< 5	U	< 2	U	< 1	U	< 1	U	< 1	U	< 1	U	< 2	U	< 2	U					< 5	U			< 5	U
4-Chlorotoluene	µg/L	2,000	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U					< 0.5	U			< 0.5	U
Acetone	µg/L	92,000	< 5	U	< 2	U	< 1	U	< 2	U	< 1	U	< 1	U	< 1	U	< 2	U					< 5	U			< 5	U
Benzene	µg/L	5	< 0.25	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U					< 0.25	U			< 0.25	U
Bromobenzene	µg/L	2,000	< 0.25	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U					< 0.25	U			< 0.25	U
Bromochloromethane	µg/L	4,100	< 0.4	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U					< 0.4	U			< 0.4	U
Bromodichloromethane	µg/L	5	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U					< 0.5	U			< 0.5	U
Bromoform	µg/L	36	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U					< 1	U			< 1	U
Bromomethane	µg/L	140	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U					< 1	U			< 1	U
Carbon disulfide	µg/L	10,000	< 1	U	< 2	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 2	U					< 1	U			< 1	U
Carbon tetrachloride	µg/L	5	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U					< 0.5	U			< 0.5	U
Chlorobenzene	µg/L	100	< 0.25	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U					< 0.25	U			< 0.25	U
Chloroethane	µg/L	41,000	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U					< 1	U			< 1	U
Chloroform	µg/L	1,000	< 0.25	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U					< 0.25	U			< 0.25	U
Chloromethane	µg/L	220	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U					< 1	U			< 1	U
cis-1,2-Dichloroethene	µg/L	70	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U					< 0.5	U			< 0.5	U
cis-1,3-Dichloropropene	µg/L	5	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U					< 0.5	U			< 0.5	U
Dibromochloromethane	µg/L	34	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U					< 0.5	U			< 0.5	U
Dibromomethane	µg/L	380	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U					< 0.5	U			< 0.5	U
Dichlorodifluoromethane	µg/L	20,000	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U					< 0.5	U			< 0.5	U
Ethylbenzene	µg/L	700	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U					< 0.5	U			< 0.5	U
Hexachlorobutadiene	µg/L	20	< 0.5	U	< 1	U	< 0.5	U	< 1	U	< 1	U	< 0.5	U	< 1	U	< 1	U					< 0.5	U			< 0.5	U
Isopropylbenzene	µg/L	10,000	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U					< 0.5	U			< 0.5	U
m,p-Xylenes	µg/L	10,000	< 1	U	< 2	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U					< 1	U			< 1	U
Methyl isobutyl ketone	µg/L	8,200	< 5	U	< 2	U	< 1	U	< 1	U	< 1	U	< 1	U	< 2	U	< 2	U					< 5	U			< 5	U
Methylene chloride	µg/L	5	< 0.5	U	< 2	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 2	U					< 0.5	U			< 0.5	U
Naphthalene	µg/L	2,000	< 0.4	U	< 1	U	< 0.5	U	< 0.5	UJ	< 0.5	U	< 0.5	UJ	< 0.5	U	< 1	U					< 0.4	U			< 0.4	U
n-Butylbenzene	µg/L	4,100	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U					< 0.5	U			< 0.5	U
n-Propylbenzene	µg/L	4,100	< 0.25	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U					< 0.25	U			< 0.25	U
o-Xylene	µg/L	10,000	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U					< 0.5	U			< 0.5	U
p-Isopropyltoluene	µg/L	10,000	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U					< 0.5	U			< 0.5	U
sec-Butylbenzene	µg/L	4,100	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U					< 0.5	U			< 0.5	U
Styrene	µg/L	100	< 0.25	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U					< 0.25	U			< 0.25	U
tert-Butylbenzene	µg/L	4,100	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U					< 0.5	U			< 0.5	U
Tetrachloroethene	µg/L	5	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U					< 0.5	U			< 0.5	U
Toluene	µg/L	1,000	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U					< 0.5	U			< 0.5	U
trans-1,2-Dichloroethene	µg/L	100	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U					< 0.5	U			< 0.5	U
trans-1,3-Dichloropropene	µg/L	29	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U					< 1	U			< 1	U
Trichloroethene	µg/L	5	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U					< 0.5	U			< 0.5	U
Trichlorofluoromethane	µg/L	31,000	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U					< 0.5	U			< 0.5	U
Vinyl chloride	µg/L	2	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U					< 0.5	U			< 0.5	U

Table 2-4
Groundwater Results, 2013–2021

		Location Code	67WW10																							
		Sample ID	67WW10-140506		67WW10-050614		67WW10-140724		67WW10-072414		67WW10-141203		67WW10-120314		67WW10-150210		67WW10-021015		67WW10-150512		67WW10-051215		67WW10-151118		67WW10-111815		67WW10-160518	
		Sample Date	5/6/2014		5/6/2014		7/24/2014		7/24/2014		12/3/2014		12/3/2014		2/10/2015		2/10/2015		5/12/2015		5/12/2015		11/18/2015		11/18/2015		5/18/2016	
		Sample Purpose	REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG	
Parameter	Units	MCL/GW-Ind	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
ANIONS																												
Chloride	mg/L	NV																										
Nitrate	mg/L	10																										
Nitrite	mg/L	1																										
Sulfate	mg/L	NV																										
Sulfide	mg/L	NV																										
TOTAL ORGANIC CARBON																												
Total Inorganic Carbon	mg/L	NV																										
Total Organic Carbon	mg/L	NV																										
DHC																												
BVC	cells/mL	NV																										
Dehalococcoides	cells/mL	NV																										
FIELD TESTS																												
Specific conductivity	µmhos/cm	NV	6.02		6.02		6.13		6.13		6.09		6.09		5.84		5.84		5.65		5.65		5.95		5.95		6.36	
Dissolved oxygen	mg/L	NV	0.44		0.44		0.52		0.52		0		0		0		0		0.64		0.64		0.1		0.1		0.5	
Ferrous Iron	NA	NV																										
Flow Rate	mL/Min	NV																										
Measured well depth	Ft BTOC	NV																										
Oxidation Reduction Potential	mV	NV	55		55		174		174		83		83		25		25		117		117		68		68		163	
pH	SU	NV	5.29		5.29		5.59		5.59		5.56		5.56		6.18		6.18		5.53		5.53		5.77		5.77		5.02	
Temperature	C	NV	20.2		20.2		22.24		22.24		19.2		19.2		17.33		17.33		18.78		18.78		17.68		17.68		18.66	
Total Purge	L	NV																										
Turbidity	NTU	NV	2.6		2.6		54.7		54.7		9.1		9.1		0		0		217		217		90.8		90.8		30.9	
Water Level at Reading Time	Ft BTOC	NV																										
GASES																												
Carbon dioxide	µg/L	NV																										
Ethane	µg/L	NV																										
Ethylene	µg/L	NV																										
Methane	µg/L	NV																										
GENERAL CHEMISTRY																												
Alkalinity	mg/L	NV																										
Ferrous Iron	mg/L	NV																										
SEMIVOLATILES																												
1,4-Dioxane	µg/L	26																										
VOLATILES																												
1,1,1,2-Tetrachloroethane	µg/L	110			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
1,1,1-Trichloroethane	µg/L	200			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
1,1,2,2-Tetrachloroethane	µg/L	14			< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U		
1,1,2-Trichloro-1,2,2-Trifluoroethane	µg/L	3,100,000																										
1,1,2-Trichloroethane	µg/L	5			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
1,1-Dichloroethane	µg/L	10,000			< 0.25	U			< 0.25	U			0.173	J			< 0.25	U			< 0.25	U			0.14	J		
1,1-Dichloroethene	µg/L	7			< 1	U			< 1	U			< 1	U			< 1	U			< 1	U			< 1	U		
1,1-Dichloropropene	µg/L	3			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
1,2,3-Trichlorobenzene	µg/L	310			< 0.3	U			< 0.3	U			< 0.3	U			< 0.3	U			< 0.3	U			< 0.3	U		
1,2,3-Trichloropropane	µg/L	0.04			< 1	U			< 1	U			< 1	U			< 1	U			< 1	U			< 1	U		
1,2,4-Trichlorobenzene	µg/L	70			< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U		
1,2,4-Trimethylbenzene	µg/L	5,100			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
1,2-Dibromo-3-chloropropane	µg/L	0.2			< 2	U			< 2	U			< 2	U			< 2	U			< 2	U			< 2	U		
1,2-Dibromoethane	µg/L	0.1			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
1,2-Dichlorobenzene	µg/L	600			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U		
1,2-Dichloroethane	µg/L	5			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
1,2-Dichloropropane	µg/L	5			< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U		
1,3,5-Trimethylbenzene	µg/L	5,100			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
1,3-Dichlorobenzene	µg/L	3,100			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		

Table 2-4
Groundwater Results, 2013–2021

		Location Code	67WW10																							
		Sample ID	67WW10-140506		67WW10-050614		67WW10-140724		67WW10-072414		67WW10-141203		67WW10-120314		67WW10-150210		67WW10-021015		67WW10-150512		67WW10-051215		67WW10-151118		67WW10-111815		67WW10-160518	
		Sample Date	5/6/2014		5/6/2014		7/24/2014		7/24/2014		12/3/2014		12/3/2014		2/10/2015		2/10/2015		5/12/2015		5/12/2015		11/18/2015		11/18/2015		5/18/2016	
		Sample Purpose	REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG	
Parameter	Units	MCL/GW-Ind	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
1,3-Dichloropropane	µg/L	29			< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U		
1,4-Dichlorobenzene	µg/L	75			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U		
2,2-Dichloropropane	µg/L	42			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
2-Butanone	µg/L	61,000			< 5	U			< 5	U			< 5	U			< 5	U			< 5	U			< 5	U		
2-Chlorotoluene	µg/L	2,000			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U		
2-Hexanone	µg/L	6,100			< 5	U			< 5	U			< 5	U			< 5	U			< 5	U			< 5	U		
4-Chlorotoluene	µg/L	2,000			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
Acetone	µg/L	92,000			< 5	U			< 5	U			< 5	U			< 5	U			< 5	U			< 5	U		
Benzene	µg/L	5			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U		
Bromobenzene	µg/L	2,000			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U		
Bromochloromethane	µg/L	4,100			< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U		
Bromodichloromethane	µg/L	5			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
Bromoform	µg/L	36			< 1	U			< 1	U			< 1	U			< 1	U			< 1	U			< 1	U		
Bromomethane	µg/L	140			< 1	U			< 1	U			< 1	U			< 1	UJ			< 1	U			< 1	U		
Carbon disulfide	µg/L	10,000			< 1	U			< 1	U			< 1	U			< 1	U			< 1	U			< 1	U		
Carbon tetrachloride	µg/L	5			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
Chlorobenzene	µg/L	100			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U		
Chloroethane	µg/L	41,000			< 1	U			< 1	U			< 1	U			< 1	U			< 1	U			< 1	U		
Chloroform	µg/L	1,000			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U		
Chloromethane	µg/L	220			< 1	U			< 1	U			< 1	U			< 1	U			< 1	U			< 1	U		
cis-1,2-Dichloroethene	µg/L	70			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
cis-1,3-Dichloropropene	µg/L	5			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
Dibromochloromethane	µg/L	34			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
Dibromomethane	µg/L	380			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
Dichlorodifluoromethane	µg/L	20,000			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
Ethylbenzene	µg/L	700			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
Hexachlorobutadiene	µg/L	20			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
Isopropylbenzene	µg/L	10,000			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
m,p-Xylenes	µg/L	10,000			< 1	U			< 1	U			< 1	U			< 1	U			< 1	U			< 1	U		
Methyl isobutyl ketone	µg/L	8,200			< 5	U			< 5	U			< 5	U			< 5	U			< 5	U			< 5	U		
Methylene chloride	µg/L	5			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
Naphthalene	µg/L	2,000			< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U		
n-Butylbenzene	µg/L	4,100			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
n-Propylbenzene	µg/L	4,100			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U		
o-Xylene	µg/L	10,000			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
p-Isopropyltoluene	µg/L	10,000			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
sec-Butylbenzene	µg/L	4,100			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
Styrene	µg/L	100			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U		
tert-Butylbenzene	µg/L	4,100			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
Tetrachloroethene	µg/L	5			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
Toluene	µg/L	1,000			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
trans-1,2-Dichloroethene	µg/L	100			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
trans-1,3-Dichloropropene	µg/L	29			< 1	U			< 1	U			< 1	U			< 1	U			< 1	U			< 1	U		
Trichloroethene	µg/L	5			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
Trichlorofluoromethane	µg/L	31,000			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
Vinyl chloride	µg/L	2			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		

Table 2-4
Groundwater Results, 2013–2021

		Location Code	67WW10																67WW11									
		Sample ID	67WW10-051816		67WW10-112917		67WW10-180503		67WW10-181022		67WW10-190502		67WW10-191028		67WW10-201102		67WW10-211110		67WW11-130601		67WW11-060113-FD		67WW11-060113		67WW11-131002		67WW11-100213	
		Sample Date	5/18/2016		11/29/2017		5/3/2018		10/22/2018		5/2/2019		10/28/2019		11/2/2020		11/10/2021		6/1/2013		6/1/2013		6/1/2013		10/2/2013		10/2/2013	
		Sample Purpose	REG		REG		REG		REG		REG		REG		REG		REG		REG		FD		REG		REG		REG	
Parameter	Units	MCL/GW-Ind	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
ANIONS																												
Chloride	mg/L	NV																										
Nitrate	mg/L	10																									< 2	U
Nitrite	mg/L	1																									< 2	U
Sulfate	mg/L	NV																									375	
Sulfide	mg/L	NV																									< 1	U
TOTAL ORGANIC CARBON																												
Total Inorganic Carbon	mg/L	NV																									17.6	
Total Organic Carbon	mg/L	NV																									5.7	
DHC																												
BVC	cells/mL	NV																									0.5	U
Dehalococcoides	cells/mL	NV																									0.5	U
FIELD TESTS																												
Specific conductivity	µmhos/cm	NV	6.36		5.12		5.53		5.17		5.80		5.1		5.58		5.25		4.27				4.27		4.74		4.74	
Dissolved oxygen	mg/L	NV	0.5		0.32		1.16		0.18		0.06		0.03		0.15		0.27		1.17				1.17		0.63		0.63	
Ferrous Iron	NA	NV																										
Flow Rate	mL/Min	NV			100		100		100		100		100		100													
Measured well depth	Ft BTOC	NV			50.65		50.6		50.9		50.8		50.68															
Oxidation Reduction Potential	mV	NV	163		221		284		178		157		164		115		201		168				168		64		64	
pH	SU	NV	5.02		5.01		5.86		5.51		5.37		5.34		5.62		4.89		6.78				6.78		6.23		6.23	
Temperature	C	NV	18.66		19.32		22.03		18.54		20.46		18.48		19.34		19.67		23.9				23.9		22.65		22.65	
Total Purge	L	NV			0.78		2.0		3.0		3.0		3.0		3													
Turbidity	NTU	NV	30.9		42		22.9		31.2		25.4		160		57.1		78.3		9.6				9.6		4		4	
Water Level at Reading Time	Ft BTOC	NV			25.6		23.93		25.88		22.53		24.3		23.39													
GASES																												
Carbon dioxide	µg/L	NV																										
Ethane	µg/L	NV																									< 2	U
Ethylene	µg/L	NV																									< 2	U
Methane	µg/L	NV																									< 2	J
GENERAL CHEMISTRY																												
Alkalinity	mg/L	NV																										
Ferrous Iron	mg/L	NV																									< 0.04	U
SEMIVOLATILES																												
1,4-Dioxane	µg/L	26			0.23																							
VOLATILES																												
1,1,1,2-Tetrachloroethane	µg/L	110	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 1	U	< 1	U			< 0.5	U
1,1,1-Trichloroethane	µg/L	200	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 1	U	< 1	U			< 0.5	U
1,1,2,2-Tetrachloroethane	µg/L	14	< 0.4	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 1	UJ	< 1	UJ			< 0.4	U
1,1,2-Trichloro-1,2,2-Trifluoroethane	µg/L	3,100,000			< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U										
1,1,2-Trichloroethane	µg/L	5	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 1	U	< 1	U			< 0.5	U
1,1-Dichloroethane	µg/L	10,000	< 0.25	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			10.6		10.6				10.6	
1,1-Dichloroethene	µg/L	7	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			46.8		47.1				42.8	
1,1-Dichloropropene	µg/L	3	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 1	U	< 1	U			< 0.5	U
1,2,3-Trichlorobenzene	µg/L	310	< 0.3	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	UJ	< 1	U	< 1	U			< 1	U	< 1	U			< 0.3	U
1,2,3-Trichloropropane	µg/L	0.04	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U			< 2	U	< 2	U			< 1	U
1,2,4-Trichlorobenzene	µg/L	70	< 0.4	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U			< 1	U	< 1	U			< 0.4	U
1,2,4-Trimethylbenzene	µg/L	5,100	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 1	U	< 1	U			< 0.5	U
1,2-Dibromo-3-chloropropane	µg/L	0.2	< 2	U	< 1	U	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 5	UJ	< 5	UJ			< 2	U
1,2-Dibromoethane	µg/L	0.1	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 1	U	< 1	U			< 0.5	U
1,2-Dichlorobenzene	µg/L	600	< 0.25	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U			< 1	U	< 1	U			< 0.25	U
1,2-Dichloroethane	µg/L	5	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			0.85	J	0.869	J			0.799	J
1,2-Dichloropropane	µg/L	5	< 0.4	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 1	U	< 1	U			< 0.4	U
1,3,5-Trimethylbenzene	µg/L	5,100	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 1	U	< 1	U			< 0.5	U
1,3-Dichlorobenzene	µg/L	3,100	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U			< 1	U	< 1	U			< 0.5	U

Table 2-4
Groundwater Results, 2013–2021

		Location Code	67WW10														67WW11									
		Sample ID	67WW10-051816		67WW10-112917		67WW10-180503		67WW10-181022		67WW10-190502		67WW10-191028		67WW10-201102		67WW10-211110		67WW11-130601		67WW11-060113-FD		67WW11-060113		67WW11-131002		67WW11-100213	
		Sample Date	5/18/2016		11/29/2017		5/3/2018		10/22/2018		5/2/2019		10/28/2019		11/2/2020		11/10/2021		6/1/2013		6/1/2013		6/1/2013		10/2/2013		10/2/2013	
		Sample Purpose	REG		REG		REG		REG		REG		REG		REG		REG		REG		FD		REG		REG		REG	
Parameter	Units	MCL/GW-Ind	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
1,3-Dichloropropane	µg/L	29	< 0.4	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 1	U	< 1	U			< 0.4	U
1,4-Dichlorobenzene	µg/L	75	< 0.25	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U			< 1	U	< 1	U			< 0.25	U
2,2-Dichloropropane	µg/L	42	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 1	U	< 1	U			< 0.5	U
2-Butanone	µg/L	61,000	< 5	U	< 2	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U			< 10	U	< 10	U			< 5	U
2-Chlorotoluene	µg/L	2,000	< 0.25	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 1	U	< 1	U			< 0.25	U
2-Hexanone	µg/L	6,100	< 5	U	< 2	U	< 1	U	< 1	U	< 1	U	< 1	U	< 2	U	< 2	U			< 10	U	< 10	U			< 5	U
4-Chlorotoluene	µg/L	2,000	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U			< 1	U	< 1	U			< 0.5	U
Acetone	µg/L	92,000	< 5	U	< 2	U	< 1	U	< 2	U	< 1	U	< 1	U	< 1	U	< 2	U			< 10	U	< 10	U			33.6	
Benzene	µg/L	5	< 0.25	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 1	U	< 1	U			< 0.25	U
Bromobenzene	µg/L	2,000	< 0.25	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U			< 1	U	< 1	U			< 0.25	U
Bromochloromethane	µg/L	4,100	< 0.4	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 1	U	< 1	U			< 0.4	U
Bromodichloromethane	µg/L	5	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 1	U	< 1	U			< 0.5	U
Bromoform	µg/L	36	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 2	U	< 2	U			< 1	U
Bromomethane	µg/L	140	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 2	UJ	< 2	UJ			< 1	U
Carbon disulfide	µg/L	10,000	< 1	U	< 2	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 2	U			< 2	U	< 2	U			< 1	U
Carbon tetrachloride	µg/L	5	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 1	U	< 1	U			< 0.5	U
Chlorobenzene	µg/L	100	< 0.25	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 1	U	< 1	U			< 0.25	U
Chloroethane	µg/L	41,000	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 2	U	< 2	U			< 1	U
Chloroform	µg/L	1,000	< 0.25	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 1	U	< 1	U			< 0.25	U
Chloromethane	µg/L	220	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 2	U	< 2	UJ			0.536	J
cis-1,2-Dichloroethene	µg/L	70	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 1	U	< 1	U			< 0.5	U
cis-1,3-Dichloropropene	µg/L	5	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 1	U	< 1	U			< 0.5	U
Dibromochloromethane	µg/L	34	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 1	U	< 1	U			< 0.5	U
Dibromomethane	µg/L	380	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 1	U	< 1	U			< 0.5	U
Dichlorodifluoromethane	µg/L	20,000	< 0.5	U	< 1	U	< 0.5	U	< 0.5	UJ	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 1	U	< 1	U			< 0.5	U
Ethylbenzene	µg/L	700	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 1	U	< 1	U			< 0.5	U
Hexachlorobutadiene	µg/L	20	< 0.5	U	< 1	U	< 0.5	U	< 1	U	< 1	U	< 0.5	U	< 1	U	< 1	U			< 1	U	< 1	U			< 0.5	U
Isopropylbenzene	µg/L	10,000	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 1	U	< 1	U			< 0.5	U
m,p-Xylenes	µg/L	10,000	< 1	U	< 2	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U			< 2	U	< 2	U			< 1	U
Methyl isobutyl ketone	µg/L	8,200	< 5	U	< 2	U	< 1	U	< 1	U	< 1	U	< 1	U	< 2	U	< 2	U			< 10	U	< 10	U			< 5	U
Methylene chloride	µg/L	5	< 0.5	U	< 2	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U			< 1	U	< 1	U			< 0.5	U
Naphthalene	µg/L	2,000	< 0.4	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	UJ	< 0.5	U	< 1	U			< 1	U	< 1	U			< 0.4	U
n-Butylbenzene	µg/L	4,100	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U			< 1	U	< 1	U			< 0.5	U
n-Propylbenzene	µg/L	4,100	< 0.25	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 1	U	< 1	U			< 0.25	U
o-Xylene	µg/L	10,000	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 1	U	< 1	U			< 0.5	U
p-Isopropyltoluene	µg/L	10,000	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 1	U	< 1	U			< 0.5	U
sec-Butylbenzene	µg/L	4,100	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 1	U	< 1	U			< 0.5	U
Styrene	µg/L	100	< 0.25	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 1	U	< 1	U			< 0.25	U
tert-Butylbenzene	µg/L	4,100	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 1	U	< 1	U			< 0.5	U
Tetrachloroethene	µg/L	5	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 1	U	< 1	U			< 0.5	U
Toluene	µg/L	1,000	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 1	U	< 1	U			< 0.5	U
trans-1,2-Dichloroethene	µg/L	100	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 1	U	< 1	U			< 0.5	U
trans-1,3-Dichloropropene	µg/L	29	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 2	U	< 2	U			< 1	U
Trichloroethene	µg/L	5	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 1	U	< 1	U			< 0.5	U
Trichlorofluoromethane	µg/L	31,000	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 1	U	< 1	U			< 0.5	U
Vinyl chloride	µg/L	2	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 1	U	< 1	U			< 0.5	U

Table 2-4
Groundwater Results, 2013–2021

		Location Code	67WW11																							
		Sample ID	67WW11 FD-012314		67WW11-140123		67WW11FD-012314		67WW11-012314		67WW11-140506		67WW11-072414		67WW11-140724		67WW11-141204		67WW11-120414		67WW11-150211		67WW11-021115		67WW11-150519		67WW11-051915	
		Sample Date	1/23/2014		1/23/2014		1/23/2014		1/23/2014		5/6/2014		7/24/2014		7/24/2014		12/4/2014		12/4/2014		2/11/2015		2/11/2015		5/19/2015		5/19/2015	
		Sample Purpose	FD		REG		FD		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG	
Parameter	Units	MCL/GW-Ind	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
ANIONS																												
Chloride	mg/L	NV																	1,330				1,350					
Nitrate	mg/L	10											< 1	U					2	J			< 2	U				
Nitrite	mg/L	1											< 1	U					1.97	J			< 2	U				
Sulfate	mg/L	NV											414						424				389					
Sulfide	mg/L	NV																					< 1	U				
TOTAL ORGANIC CARBON																												
Total Inorganic Carbon	mg/L	NV											49.4						140				121					
Total Organic Carbon	mg/L	NV											8.7						9.1	J			12.9					
DHC																												
BVC	cells/mL	NV																										
Dehalococcoides	cells/mL	NV																										
FIELD TESTS																												
Specific conductivity	µmhos/cm	NV			4.77				4.77			-	4.85		4.85		5.17		5.17		4.8		4.8		4.47		4.47	
Dissolved oxygen	mg/L	NV			0.48				0.48		-	-	1.07		1.07		0		0		0		0		0.69		0.69	
Ferrous Iron	NA	NV																										
Flow Rate	mL/Min	NV																										
Measured well depth	Ft BTOC	NV																										
Oxidation Reduction Potential	mV	NV			129				129		-	-	194		194		204		204		165		165		246		246	
pH	SU	NV			5.84				5.84		-	-	6.72		6.72		5.63		5.63		6.04		6.04		5.49		5.49	
Temperature	C	NV			17.25				17.25			-	22		22		19.1		19.1		18.42		18.42		19.2		19.2	
Total Purge	L	NV																										
Turbidity	NTU	NV			1.9				1.9		-	-	2.9		2.9		5.6		5.6		4.7		4.7		105		105	
Water Level at Reading Time	Ft BTOC	NV																										
GASES																												
Carbon dioxide	µg/L	NV																	364,000									
Ethane	µg/L	NV											< 2	U					< 2	U			< 2	U				
Ethylene	µg/L	NV											< 2	U					< 2	U			< 2	U				
Methane	µg/L	NV											< 2	U					2.41	J			1.78	J				
GENERAL CHEMISTRY																												
Alkalinity	mg/L	NV																										
Ferrous Iron	mg/L	NV											< 0.04	U					< 0.04	U			< 0.04	U				
SEMIVOLATILES																												
1,4-Dioxane	µg/L	26																										
VOLATILES																												
1,1,1,2-Tetrachloroethane	µg/L	110	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U					< 0.5	U			< 0.5	U			< 0.5	U
1,1,1-Trichloroethane	µg/L	200	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U					< 0.5	U			< 0.5	U			< 0.5	U
1,1,2,2-Tetrachloroethane	µg/L	14	< 0.4	U			< 0.4	U	< 0.4	U			< 0.4	U					< 0.4	U			< 0.4	U			< 0.4	U
1,1,2-Trichloro-1,2,2-Trifluoroethane	µg/L	3,100,000																										
1,1,2-Trichloroethane	µg/L	5	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U					< 0.5	U			< 0.5	U			< 0.5	U
1,1-Dichloroethane	µg/L	10,000	10.7				10.7		9.83				10.4						11.1				9.81				8.25	
1,1-Dichloroethene	µg/L	7	43				43		38.8				34.5						37.5				30.4				21.6	
1,1-Dichloropropene	µg/L	3	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U					< 0.5	U			< 0.5	U			< 0.5	U
1,2,3-Trichlorobenzene	µg/L	310	< 0.3	U			< 0.3	U	< 0.3	U			< 0.3	U					< 0.3	U			< 0.3	U			< 0.3	U
1,2,3-Trichloropropane	µg/L	0.04	< 1	U			< 1	U	< 1	U			< 1	U					< 1	U			< 1	U			< 1	U
1,2,4-Trichlorobenzene	µg/L	70	< 0.4	U			< 0.4	U	< 0.4	U			< 0.4	U					< 0.4	U			< 0.4	U			< 0.4	U
1,2,4-Trimethylbenzene	µg/L	5,100	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U					< 0.5	U			< 0.5	U			< 0.5	U
1,2-Dibromo-3-chloropropane	µg/L	0.2	< 2	U			< 2	U	< 2	U			< 2	U					< 2	U			< 2	U			< 2	U
1,2-Dibromoethane	µg/L	0.1	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U					< 0.5	U			< 0.5	U			< 0.5	U
1,2-Dichlorobenzene	µg/L	600	< 0.25	U			< 0.25	U	< 0.25	U			< 0.25	U					< 0.25	U			< 0.25	U			< 0.25	U
1,2-Dichloroethane	µg/L	5	0.823	J			0.823	J	0.748	J			0.684	J					0.567	J			0.559	J			0.518	J
1,2-Dichloropropane	µg/L	5	< 0.4	U			< 0.4	U	< 0.4	U			< 0.4	U					< 0.4	U			< 0.4	U			< 0.4	U
1,3,5-Trimethylbenzene	µg/L	5,100	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U					< 0.5	U			< 0.5	U			< 0.5	U
1,3-Dichlorobenzene	µg/L	3,100	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U					< 0.5	U			< 0.5	U			< 0.5	U

Table 2-4
Groundwater Results, 2013–2021

		Location Code	67WW11																							
		Sample ID	67WW11 FD-012314		67WW11-140123		67WW11FD-012314		67WW11-012314		67WW11-140506		67WW11-072414		67WW11-140724		67WW11-141204		67WW11-120414		67WW11-150211		67WW11-021115		67WW11-150519		67WW11-051915	
		Sample Date	1/23/2014		1/23/2014		1/23/2014		1/23/2014		5/6/2014		7/24/2014		7/24/2014		12/4/2014		12/4/2014		2/11/2015		2/11/2015		5/19/2015		5/19/2015	
		Sample Purpose	FD		REG		FD		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG	
Parameter	Units	MCL/GW-Ind	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
1,3-Dichloropropane	µg/L	29	< 0.4	U			< 0.4	U	< 0.4	U			< 0.4	U					< 0.4	U			< 0.4	U			< 0.4	U
1,4-Dichlorobenzene	µg/L	75	< 0.25	U			< 0.25	U	< 0.25	U			< 0.25	U					< 0.25	U			< 0.25	U			< 0.25	U
2,2-Dichloropropane	µg/L	42	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U					< 0.5	U			< 0.5	U			< 0.5	U
2-Butanone	µg/L	61,000	< 5	U			< 5	U	< 5	U			< 5	U					< 5	U			< 5	U			< 5	U
2-Chlorotoluene	µg/L	2,000	< 0.25	U			< 0.25	U	< 0.25	U			< 0.25	U					< 0.25	U			< 0.25	U			< 0.25	U
2-Hexanone	µg/L	6,100	< 5	U			< 5	U	< 5	U			< 5	U					< 5	U			< 5	U			< 5	U
4-Chlorotoluene	µg/L	2,000	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U					< 0.5	U			< 0.5	U			< 0.5	U
Acetone	µg/L	92,000	< 5	U			< 5	U	< 5	U			< 5	U					< 5	U			< 5	U			< 5	U
Benzene	µg/L	5	< 0.25	U			< 0.25	U	< 0.25	U			< 0.25	U					< 0.25	U			< 0.25	U			< 0.25	U
Bromobenzene	µg/L	2,000	< 0.25	U			< 0.25	U	< 0.25	U			< 0.25	U					< 0.25	U			< 0.25	U			< 0.25	U
Bromochloromethane	µg/L	4,100	< 0.4	U			< 0.4	U	< 0.4	U			< 0.4	U					< 0.4	U			< 0.4	U			< 0.4	U
Bromodichloromethane	µg/L	5	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U					< 0.5	U			< 0.5	U			< 0.5	U
Bromoform	µg/L	36	< 1	U			< 1	U	< 1	U			< 1	U					< 1	U			< 1	U			< 1	U
Bromomethane	µg/L	140	< 1	U			< 1	U	< 1	U			< 1	U					< 1	U			< 1	UJ			< 1	U
Carbon disulfide	µg/L	10,000	< 1	U			< 1	U	< 1	U			< 1	U					< 1	U			< 1	U			< 1	U
Carbon tetrachloride	µg/L	5	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U					< 0.5	U			< 0.5	U			< 0.5	U
Chlorobenzene	µg/L	100	< 0.25	U			< 0.25	U	< 0.25	U			< 0.25	U					< 0.25	U			< 0.25	U			< 0.25	U
Chloroethane	µg/L	41,000	< 1	U			< 1	U	< 1	U			< 1	U					< 1	U			< 1	U			< 1	U
Chloroform	µg/L	1,000	< 0.25	U			< 0.25	U	< 0.25	U			< 0.25	U					< 0.25	U			< 0.25	U			< 0.25	U
Chloromethane	µg/L	220	< 1	U			< 1	U	< 1	U			< 1	U					< 1	U			< 1	U			< 1	U
cis-1,2-Dichloroethene	µg/L	70	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U					< 0.5	U			< 0.5	U			< 0.5	U
cis-1,3-Dichloropropene	µg/L	5	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U					< 0.5	U			< 0.5	U			< 0.5	U
Dibromochloromethane	µg/L	34	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U					< 0.5	U			< 0.5	U			< 0.5	U
Dibromomethane	µg/L	380	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U					< 0.5	U			< 0.5	U			< 0.5	U
Dichlorodifluoromethane	µg/L	20,000	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U					< 0.5	U			< 0.5	U			< 0.5	U
Ethylbenzene	µg/L	700	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U					< 0.5	U			< 0.5	U			< 0.5	U
Hexachlorobutadiene	µg/L	20	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U					< 0.5	U			< 0.5	U			< 0.5	U
Isopropylbenzene	µg/L	10,000	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U					< 0.5	U			< 0.5	U			< 0.5	U
m,p-Xylenes	µg/L	10,000	< 1	U			< 1	U	< 1	U			< 1	U					< 1	U			< 1	U			< 1	U
Methyl isobutyl ketone	µg/L	8,200	< 5	U			< 5	U	< 5	U			< 5	U					< 5	U			< 5	U			< 5	U
Methylene chloride	µg/L	5	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U					< 0.5	U			< 0.5	U			< 0.5	U
Naphthalene	µg/L	2,000	< 0.4	U			< 0.4	U	< 0.4	U			< 0.4	U					< 0.4	U			< 0.4	U			< 0.4	U
n-Butylbenzene	µg/L	4,100	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U					< 0.5	U			< 0.5	U			< 0.5	U
n-Propylbenzene	µg/L	4,100	< 0.25	U			< 0.25	U	< 0.25	U			< 0.25	U					< 0.25	U			< 0.25	U			< 0.25	U
o-Xylene	µg/L	10,000	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U					< 0.5	U			< 0.5	U			< 0.5	U
p-Isopropyltoluene	µg/L	10,000	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U					< 0.5	U			< 0.5	U			< 0.5	U
sec-Butylbenzene	µg/L	4,100	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U					< 0.5	U			< 0.5	U			< 0.5	U
Styrene	µg/L	100	< 0.25	U			< 0.25	U	< 0.25	U			< 0.25	U					< 0.25	U			< 0.25	U			< 0.25	U
tert-Butylbenzene	µg/L	4,100	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U					< 0.5	U			< 0.5	U			< 0.5	U
Tetrachloroethene	µg/L	5	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U					< 0.5	U			< 0.5	U			< 0.5	U
Toluene	µg/L	1,000	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U					< 0.5	U			< 0.5	U			< 0.5	U
trans-1,2-Dichloroethene	µg/L	100	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U					< 0.5	U			< 0.5	U			< 0.5	U
trans-1,3-Dichloropropene	µg/L	29	< 1	U			< 1	U	< 1	U			< 1	U					< 1	U			< 1	U			< 1	U
Trichloroethene	µg/L	5	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U					< 0.5	U			< 0.5	U			< 0.5	U
Trichlorofluoromethane	µg/L	31,000	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U					< 0.5	U			< 0.5	U			< 0.5	U
Vinyl chloride	µg/L	2	0.296	J			0.296	J	< 0.5	U			0.271	J					0.302	J			< 0.5	U			< 0.5	U

Table 2-4
Groundwater Results, 2013–2021

	Location Code		67WW11																				67WW12			
	Sample ID		67WW11-151119		67WW11-111915		67WW11-160519		67WW11-051916		67WW11-112717		67WW11-180502		67WW11-181023		67WW11-190501		67WW11-191024		67WW11-201103		67WW11-211111		67WW12-130601		67WW12-060113	
	Sample Date		11/19/2015		11/19/2015		5/19/2016		5/19/2016		11/27/2017		5/2/2018		10/23/2018		5/1/2019		10/24/2019		11/3/2020		11/11/2021		6/1/2013		6/1/2013	
	Sample Purpose		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG	
Parameter	Units	MCL/GW-Ind	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
ANIONS																												
Chloride	mg/L	NV			1,380				1,430																			
Nitrate	mg/L	10			< 2	U			< 2	U																		
Nitrite	mg/L	1			< 2	U			< 2	U																		
Sulfate	mg/L	NV			376				409																			
Sulfide	mg/L	NV			< 1	U			< 1	U																		
TOTAL ORGANIC CARBON																												
Total Inorganic Carbon	mg/L	NV			113				74.8																			
Total Organic Carbon	mg/L	NV			23.1				22.1																			
DHC																												
BVC	cells/mL	NV																										
Dehalococcoides	cells/mL	NV																										
FIELD TESTS																												
Specific conductivity	µmhos/cm	NV	4.89		4.89		5.19		5.19		5.15		4.94		4.99		4.65		4.73		4.87		4.68		4.4		4.4	
Dissolved oxygen	mg/L	NV	0.18		0.18		0.74		0.74		0.19		0.21		0.07		0.5		0.04		0.05		0.76		0.57		0.57	
Ferrous Iron	NA	NV																										
Flow Rate	mL/Min	NV									100		100		100		100		100		100							
Measured well depth	Ft BTOC	NV									46.68		46.63		47.05		46.64		46.6									
Oxidation Reduction Potential	mV	NV	183		183		169		169		291		415		171		195		187		29		172		175		175	
pH	SU	NV	5.61		5.61		5.87		5.87		5.87		5.58		6.45		5.29		6.23		6.38		6.19		6.71		6.71	
Temperature	C	NV	18.49		18.49		18.29		18.29		19.49		19.77		18.02		20.60		21.72		19.92		18.48		27.34		27.34	
Total Purge	L	NV									0.91		1.5		1.5		3.0		3.0		3.0							
Turbidity	NTU	NV	25.9		25.9		1.2		1.2		20.7		8		1.9		7.8		0		0		2.1		2.7		2.7	
Water Level at Reading Time	Ft BTOC	NV									23.77		22.43		24.14		21.44		22.5		21.54							
GASES																												
Carbon dioxide	µg/L	NV																										
Ethane	µg/L	NV			< 2	U			< 2	U																		
Ethylene	µg/L	NV			< 2	U			< 2	U																		
Methane	µg/L	NV			2.11	J			< 2	U																		
GENERAL CHEMISTRY																												
Alkalinity	mg/L	NV																										
Ferrous Iron	mg/L	NV			< 0.04	U			< 0.04	U																		
SEMIVOLATILES																												
1,4-Dioxane	µg/L	26									18																	
VOLATILES																												
1,1,1,2-Tetrachloroethane	µg/L	110			< 0.5	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 1	U
1,1,1-Trichloroethane	µg/L	200			< 0.5	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 1	U
1,1,2,2-Tetrachloroethane	µg/L	14			< 0.4	U			< 0.4	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 1	UJ
1,1,2-Trichloro-1,2,2-Trifluoroethane	µg/L	3,100,000									< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U				
1,1,2-Trichloroethane	µg/L	5			< 0.5	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 1	U
1,1-Dichloroethane	µg/L	10,000			8.54				6.58		3.6		3.3		3.8		1.9	J	1.9		1.3		0.57	J			< 1	U
1,1-Dichloroethene	µg/L	7			28.5				19.3		5.2		5.5		6.1		2.8		1.9		1.2		< 0.5	U			< 2	U
1,1-Dichloropropene	µg/L	3			< 0.5	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 1	U
1,2,3-Trichlorobenzene	µg/L	310			< 0.3	U			< 0.3	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	UJ	< 1	U	< 1	U			< 1	U
1,2,3-Trichloropropane	µg/L	0.04			< 1	U			< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U			< 2	U
1,2,4-Trichlorobenzene	µg/L	70			< 0.4	U			< 0.4	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U			< 1	U
1,2,4-Trimethylbenzene	µg/L	5,100			< 0.5	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 1	U
1,2-Dibromo-3-chloropropane	µg/L	0.2			< 2	U			< 2	U	< 1	U	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 5	UJ
1,2-Dibromoethane	µg/L	0.1			< 0.5	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 1	U
1,2-Dichlorobenzene	µg/L	600			< 0.25	U			< 0.25	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U			< 1	U
1,2-Dichloroethane	µg/L	5			0.513	J			0.396	J	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 1	U
1,2-Dichloropropane	µg/L	5			< 0.4	U			< 0.4	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 1	U
1,3,5-Trimethylbenzene	µg/L	5,100			< 0.5	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 1	U
1,3-Dichlorobenzene	µg/L	3,100			< 0.5	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U			< 1	U

Table 2-4
Groundwater Results, 2013–2021

		Location Code	67WW11																				67WW12			
		Sample ID	67WW11-151119		67WW11-111915		67WW11-160519		67WW11-051916		67WW11-112717		67WW11-180502		67WW11-181023		67WW11-190501		67WW11-191024		67WW11-201103		67WW11-211111		67WW12-130601		67WW12-060113	
		Sample Date	11/19/2015		11/19/2015		5/19/2016		5/19/2016		11/27/2017		5/2/2018		10/23/2018		5/1/2019		10/24/2019		11/3/2020		11/11/2021		6/1/2013		6/1/2013	
		Sample Purpose	REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG	
Parameter	Units	MCL/GW-Ind	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
1,3-Dichloropropane	µg/L	29			< 0.4	U			< 0.4	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 1	U
1,4-Dichlorobenzene	µg/L	75			< 0.25	U			< 0.25	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U			< 1	U
2,2-Dichloropropane	µg/L	42			< 0.5	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	UJ			< 1	U
2-Butanone	µg/L	61,000			< 5	U			< 5	U	< 2	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U			< 10	U
2-Chlorotoluene	µg/L	2,000			< 0.25	U			< 0.25	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 1	U
2-Hexanone	µg/L	6,100			< 5	U			< 5	U	< 2	U	< 1	U	< 1	U	< 1	U	< 1	U	< 2	U	< 2	U			< 10	U
4-Chlorotoluene	µg/L	2,000			< 0.5	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U			< 1	U
Acetone	µg/L	92,000			< 5	U			< 5	U	< 2	U	< 1	U	< 2	U	5.6		< 1	U	< 1	U	< 2	U			< 10	U
Benzene	µg/L	5			< 0.25	U			< 0.25	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 1	U
Bromobenzene	µg/L	2,000			< 0.25	U			< 0.25	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U			< 1	U
Bromochloromethane	µg/L	4,100			< 0.4	U			< 0.4	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	UJ	< 0.5	U	< 0.5	U	< 0.5	U			< 1	U
Bromodichloromethane	µg/L	5			< 0.5	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 1	U
Bromoform	µg/L	36			< 1	U			< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 2	U
Bromomethane	µg/L	140			< 1	U			< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 2	UJ
Carbon disulfide	µg/L	10,000			< 1	U			< 1	U	< 2	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 2	U			< 2	U
Carbon tetrachloride	µg/L	5			< 0.5	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 1	U
Chlorobenzene	µg/L	100			< 0.25	U			< 0.25	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 1	U
Chloroethane	µg/L	41,000			< 1	U			< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 2	U
Chloroform	µg/L	1,000			< 0.25	U			< 0.25	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	UJ	< 0.5	U	< 0.5	U	< 0.5	U			< 1	U
Chloromethane	µg/L	220			< 1	U			< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 2	UJ
cis-1,2-Dichloroethene	µg/L	70			< 0.5	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	UJ	< 0.5	U	< 0.5	U	< 0.5	U			< 1	U
cis-1,3-Dichloropropene	µg/L	5			< 0.5	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 1	U
Dibromochloromethane	µg/L	34			< 0.5	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 1	U
Dibromomethane	µg/L	380			< 0.5	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 1	U
Dichlorodifluoromethane	µg/L	20,000			< 0.5	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	UJ	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 1	U
Ethylbenzene	µg/L	700			< 0.5	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 1	U
Hexachlorobutadiene	µg/L	20			< 0.5	U			< 0.5	UJ	< 1	U	< 0.5	U	< 1	U	< 1	U	< 0.5	U	< 1	U	< 1	U			< 1	U
Isopropylbenzene	µg/L	10,000			< 0.5	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 1	U
m,p-Xylenes	µg/L	10,000			< 1	U			< 1	U	< 2	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U			< 2	U
Methyl isobutyl ketone	µg/L	8,200			< 5	U			< 5	U	< 2	U	< 1	U	< 1	U	< 1	U	< 1	U	< 2	U	< 2	U			< 10	U
Methylene chloride	µg/L	5			< 0.5	U			< 0.5	U	< 2	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 2	U			< 1	U
Naphthalene	µg/L	2,000			< 0.4	U			< 0.4	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	UJ	< 0.5	U	< 1	U			< 1	U
n-Butylbenzene	µg/L	4,100			< 0.5	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U			< 1	U
n-Propylbenzene	µg/L	4,100			< 0.25	U			< 0.25	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 1	U
o-Xylene	µg/L	10,000			< 0.5	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 1	U
p-Isopropyltoluene	µg/L	10,000			< 0.5	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			0.299	J
sec-Butylbenzene	µg/L	4,100			< 0.5	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 1	U
Styrene	µg/L	100			< 0.25	U			< 0.25	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 1	U
tert-Butylbenzene	µg/L	4,100			< 0.5	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 1	U
Tetrachloroethene	µg/L	5			< 0.5	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 1	U
Toluene	µg/L	1,000			< 0.5	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 1	U
trans-1,2-Dichloroethene	µg/L	100			< 0.5	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 1	U
trans-1,3-Dichloropropene	µg/L	29			< 1	U			< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 2	U
Trichloroethene	µg/L	5			< 0.5	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 1	U
Trichlorofluoromethane	µg/L	31,000			< 0.5	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 1	U
Vinyl chloride	µg/L	2			0.333	J			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 1	U

Table 2-4
Groundwater Results, 2013–2021

		Location Code	67WW12																							
		Sample ID	67WW12-131001		67WW12-100113		67WW12-140124		67WW12-012414		67WW12-140506		67WW12-050614		67WW12-140725		67WW12-072514		67WW12-141203		67WW12-120314		67WW12-150210		67WW12-021015		67WW12-150512	
		Sample Date	10/1/2013		10/1/2013		1/24/2014		1/24/2014		5/6/2014		5/6/2014		7/25/2014		7/25/2014		12/3/2014		12/3/2014		2/10/2015		2/10/2015		5/12/2015	
		Sample Purpose	REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG	
Parameter	Units	MCL/GW-Ind	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
ANIONS																												
Chloride	mg/L	NV																										
Nitrate	mg/L	10																										
Nitrite	mg/L	1																										
Sulfate	mg/L	NV																										
Sulfide	mg/L	NV																										
TOTAL ORGANIC CARBON																												
Total Inorganic Carbon	mg/L	NV																										
Total Organic Carbon	mg/L	NV																										
DHC																												
BVC	cells/mL	NV																										
Dehalococcoides	cells/mL	NV																										
FIELD TESTS																												
Specific conductivity	µmhos/cm	NV	4.54		4.54		4.12		4.12		4.56		4.56		4.52		4.52		5.21		5.21		3.37		3.37		3.34	
Dissolved oxygen	mg/L	NV	0.66		0.66		0.62		0.62		0.8		0.8		0.21		0.21		0		0		0.17		0.17		1.23	
Ferrous Iron	NA	NV																										
Flow Rate	mL/Min	NV																										
Measured well depth	Ft BTOC	NV																										
Oxidation Reduction Potential	mV	NV	-119		-119		91		91		43		43		12		12		20		20		139		139		54	
pH	SU	NV	6.31		6.31		6.22		6.22		5.39		5.39		6.36		6.36		6.06		6.06		5.32		5.32		5.41	
Temperature	C	NV	22.99		22.99		15.69		15.69		20.51		20.51		22.61		22.61		19.09		19.09		19.7		19.7		18.55	
Total Purge	L	NV																										
Turbidity	NTU	NV	0.3		0.3		0		0		5.2		5.2		10.8		10.8		0.5		0.5		2.1		2.1		0	
Water Level at Reading Time	Ft BTOC	NV																										
GASES																												
Carbon dioxide	µg/L	NV																										
Ethane	µg/L	NV																										
Ethylene	µg/L	NV																										
Methane	µg/L	NV																										
GENERAL CHEMISTRY																												
Alkalinity	mg/L	NV																										
Ferrous Iron	mg/L	NV																										
SEMIVOLATILES																												
1,4-Dioxane	µg/L	26																										
VOLATILES																												
1,1,1,2-Tetrachloroethane	µg/L	110			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
1,1,1-Trichloroethane	µg/L	200			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
1,1,2,2-Tetrachloroethane	µg/L	14			< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U		
1,1,2-Trichloro-1,2,2-Trifluoroethane	µg/L	3,100,000																										
1,1,2-Trichloroethane	µg/L	5			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
1,1-Dichloroethane	µg/L	10,000			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U		
1,1-Dichloroethene	µg/L	7			< 1	U			< 1	U			< 1	U			< 1	U			< 1	U			< 1	U		
1,1-Dichloropropene	µg/L	3			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
1,2,3-Trichlorobenzene	µg/L	310			< 0.3	U			< 0.3	U			< 0.3	U			< 0.3	U			< 0.3	U			< 0.3	U		
1,2,3-Trichloropropane	µg/L	0.04			< 1	U			< 1	U			< 1	U			< 1	U			< 1	U			< 1	U		
1,2,4-Trichlorobenzene	µg/L	70			< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U		
1,2,4-Trimethylbenzene	µg/L	5,100			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
1,2-Dibromo-3-chloropropane	µg/L	0.2			< 2	UJ			< 2	U			< 2	U			< 2	U			< 2	U			< 2	U		
1,2-Dibromoethane	µg/L	0.1			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
1,2-Dichlorobenzene	µg/L	600			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U		
1,2-Dichloroethane	µg/L	5			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
1,2-Dichloropropane	µg/L	5			< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U		
1,3,5-Trimethylbenzene	µg/L	5,100			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
1,3-Dichlorobenzene	µg/L	3,100			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		

Table 2-4
Groundwater Results, 2013–2021

		Location Code	67WW12																							
		Sample ID	67WW12-131001		67WW12-100113		67WW12-140124		67WW12-012414		67WW12-140506		67WW12-050614		67WW12-140725		67WW12-072514		67WW12-141203		67WW12-120314		67WW12-150210		67WW12-021015		67WW12-150512	
		Sample Date	10/1/2013		10/1/2013		1/24/2014		1/24/2014		5/6/2014		5/6/2014		7/25/2014		7/25/2014		12/3/2014		12/3/2014		2/10/2015		2/10/2015		5/12/2015	
		Sample Purpose	REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG	
Parameter	Units	MCL/GW-Ind	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
1,3-Dichloropropane	µg/L	29			< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U		
1,4-Dichlorobenzene	µg/L	75			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U		
2,2-Dichloropropane	µg/L	42			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
2-Butanone	µg/L	61,000			< 5	U			< 5	U			< 5	U			< 5	U			< 5	U			< 5	U		
2-Chlorotoluene	µg/L	2,000			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U		
2-Hexanone	µg/L	6,100			< 5	U			< 5	U			< 5	U			< 5	U			< 5	U			< 5	U		
4-Chlorotoluene	µg/L	2,000			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
Acetone	µg/L	92,000			< 5	U			< 5	U			< 5	U			< 5	U			< 5	U			< 5	U		
Benzene	µg/L	5			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U		
Bromobenzene	µg/L	2,000			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U		
Bromochloromethane	µg/L	4,100			< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U		
Bromodichloromethane	µg/L	5			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
Bromoform	µg/L	36			< 1	U			< 1	U			< 1	U			< 1	U			< 1	U			< 1	U		
Bromomethane	µg/L	140			< 1	U			< 1	U			< 1	U			< 1	U			< 1	U			< 1	U		
Carbon disulfide	µg/L	10,000			< 1	U			< 1	U			< 1	U			< 1	U			< 1	U			< 1	U		
Carbon tetrachloride	µg/L	5			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
Chlorobenzene	µg/L	100			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U		
Chloroethane	µg/L	41,000			< 1	U			< 1	U			< 1	U			< 1	U			< 1	U			< 1	U		
Chloroform	µg/L	1,000			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U		
Chloromethane	µg/L	220			< 1	U			< 1	U			< 1	U			< 1	U			< 1	U			< 1	U		
cis-1,2-Dichloroethene	µg/L	70			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
cis-1,3-Dichloropropene	µg/L	5			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
Dibromochloromethane	µg/L	34			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
Dibromomethane	µg/L	380			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
Dichlorodifluoromethane	µg/L	20,000			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
Ethylbenzene	µg/L	700			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
Hexachlorobutadiene	µg/L	20			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
Isopropylbenzene	µg/L	10,000			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
m,p-Xylenes	µg/L	10,000			< 1	U			< 1	U			< 1	U			< 1	U			< 1	U			< 1	U		
Methyl isobutyl ketone	µg/L	8,200			< 5	U			< 5	U			< 5	U			< 5	U			< 5	U			< 5	U		
Methylene chloride	µg/L	5			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
Naphthalene	µg/L	2,000			< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U			< 0.4	U		
n-Butylbenzene	µg/L	4,100			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
n-Propylbenzene	µg/L	4,100			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U		
o-Xylene	µg/L	10,000			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
p-Isopropyltoluene	µg/L	10,000			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
sec-Butylbenzene	µg/L	4,100			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
Styrene	µg/L	100			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U			< 0.25	U		
tert-Butylbenzene	µg/L	4,100			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
Tetrachloroethene	µg/L	5			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
Toluene	µg/L	1,000			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
trans-1,2-Dichloroethene	µg/L	100			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
trans-1,3-Dichloropropene	µg/L	29			< 1	U			< 1	U			< 1	U			< 1	U			< 1	U			< 1	U		
Trichloroethene	µg/L	5			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
Trichlorofluoromethane	µg/L	31,000			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		
Vinyl chloride	µg/L	2			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U			< 0.5	U		

Table 2-4
Groundwater Results, 2013–2021

		Location Code	67WW12																					
		Sample ID	67WW12-051215		67WW12FFD-111815		67WW12-151118		67WW12-111815		67WW12-151216		67WW12-161215 DUP		67WW12-161215		67WW12-161215DUP		67WW12-160518		67WW12-051816		67WW12-112917		67WW12-112917-FD	
		Sample Date	5/12/2015		11/18/2015		11/18/2015		11/18/2015		12/16/2015		12/16/2015		12/16/2015		12/16/2015		5/18/2016		5/18/2016		11/29/2017		11/29/2017	
		Sample Purpose	REG		FD		REG		REG		REG		REG		REG		FD		REG		REG		REG		FD	
Parameter	Units	MCL/GW-Ind	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
ANIONS																										
Chloride	mg/L	NV																								
Nitrate	mg/L	10																								
Nitrite	mg/L	1																								
Sulfate	mg/L	NV																								
Sulfide	mg/L	NV																								
TOTAL ORGANIC CARBON																										
Total Inorganic Carbon	mg/L	NV																								
Total Organic Carbon	mg/L	NV																								
DHC																										
BVC	cells/mL	NV																								
Dehalococcoides	cells/mL	NV																								
FIELD TESTS																										
Specific conductivity	µmhos/cm	NV	3.34				3.69		3.69		4.66				4.66				4.06		4.06		5.17			
Dissolved oxygen	mg/L	NV	1.23				0.05		0.05		0				0				0.36		0.36		0.43			
Ferrous Iron	NA	NV																								
Flow Rate	mL/Min	NV																					100			
Measured well depth	Ft BTOC	NV																					36.93			
Oxidation Reduction Potential	mV	NV	54				178		178		50				50				221		221		209			
pH	SU	NV	5.41				5.21		5.21		5.85				5.85				4.96		4.96		5.52			
Temperature	C	NV	18.55				17.95		17.95		19.38				19.38				18.41		18.41		19.71			
Total Purge	L	NV																					0.78			
Turbidity	NTU	NV	0				3.1		3.1		11				11				5.7		5.7		0			
Water Level at Reading Time	Ft BTOC	NV																					26.26			
GASES																										
Carbon dioxide	µg/L	NV																								
Ethane	µg/L	NV																								
Ethylene	µg/L	NV																								
Methane	µg/L	NV																								
GENERAL CHEMISTRY																										
Alkalinity	mg/L	NV																								
Ferrous Iron	mg/L	NV																								
SEMIVOLATILES																										
1,4-Dioxane	µg/L	26											< 1	U	< 1	U	< 1	U					0.6	J	0.48	J
VOLATILES																										
1,1,1,2-Tetrachloroethane	µg/L	110	< 0.5	U	< 0.5	U			< 0.5	U											< 0.5	U	< 1	U	< 1	U
1,1,1-Trichloroethane	µg/L	200	< 0.5	U	< 0.5	U			< 0.5	U											< 0.5	U	< 1	U	< 1	U
1,1,2,2-Tetrachloroethane	µg/L	14	< 0.4	U	< 0.4	U			< 0.4	U											< 0.4	U	< 1	U	< 1	U
1,1,2-Trichloro-1,2,2-Trifluoroethane	µg/L	3,100,000																					< 1	U	< 1	U
1,1,2-Trichloroethane	µg/L	5	< 0.5	U	< 0.5	U			< 0.5	U											< 0.5	U	< 1	U	< 1	U
1,1-Dichloroethane	µg/L	10,000	< 0.25	U	< 0.25	U			< 0.25	U											< 0.25	U	< 1	U	< 1	U
1,1-Dichloroethene	µg/L	7	< 1	U	< 1	U			< 1	U											0.681	J	2.2		1.8	
1,1-Dichloropropene	µg/L	3	< 0.5	U	< 0.5	U			< 0.5	U											< 0.5	U	< 1	U	< 1	U
1,2,3-Trichlorobenzene	µg/L	310	< 0.3	U	< 0.3	U			< 0.3	U											< 0.3	U	< 1	U	< 1	U
1,2,3-Trichloropropane	µg/L	0.04	< 1	U	< 1	U			< 1	U											< 1	U	< 1	U	< 1	U
1,2,4-Trichlorobenzene	µg/L	70	< 0.4	U	< 0.4	U			< 0.4	U											< 0.4	U	< 1	U	< 1	U
1,2,4-Trimethylbenzene	µg/L	5,100	< 0.5	U	< 0.5	U			< 0.5	U											< 0.5	U	< 1	U	< 1	U
1,2-Dibromo-3-chloropropane	µg/L	0.2	< 2	U	< 2	U			< 2	U											< 2	U	< 1	U	< 1	U
1,2-Dibromoethane	µg/L	0.1	< 0.5	U	< 0.5	U			< 0.5	U											< 0.5	U	< 1	U	< 1	U
1,2-Dichlorobenzene	µg/L	600	< 0.25	U	< 0.25	U			< 0.25	U											< 0.25	U	< 1	U	< 1	U
1,2-Dichloroethane	µg/L	5	< 0.5	U	< 0.5	U			< 0.5	U											< 0.5	U	< 1	U	< 1	U
1,2-Dichloropropane	µg/L	5	< 0.4	U	< 0.4	U			< 0.4	U											< 0.4	U	< 1	U	< 1	U
1,3,5-Trimethylbenzene	µg/L	5,100	< 0.5	U	< 0.5	U			< 0.5	U											< 0.5	U	< 1	U	< 1	U
1,3-Dichlorobenzene	µg/L	3,100	< 0.5	U	< 0.5	U			< 0.5	U											< 0.5	U	< 1	U	< 1	U

Table 2-4
Groundwater Results, 2013–2021

		Location Code	67WW12																					
		Sample ID	67WW12-051215		67WW12FFD-111815		67WW12-151118		67WW12-111815		67WW12-151216		67WW12-161215 DUP		67WW12-161215		67WW12-161215DUP		67WW12-160518		67WW12-051816		67WW12-112917		67WW12-112917-FD	
		Sample Date	5/12/2015		11/18/2015		11/18/2015		11/18/2015		12/16/2015		12/16/2015		12/16/2015		12/16/2015		5/18/2016		5/18/2016		11/29/2017		11/29/2017	
		Sample Purpose	REG		FD		REG		REG		REG		REG		REG		FD		REG		REG		REG		FD	
Parameter	Units	MCL/GW-Ind	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
1,3-Dichloropropane	µg/L	29	< 0.4	U	< 0.4	U			< 0.4	U											< 0.4	U	< 1	U	< 1	U
1,4-Dichlorobenzene	µg/L	75	< 0.25	U	< 0.25	U			< 0.25	U											< 0.25	U	< 1	U	< 1	U
2,2-Dichloropropane	µg/L	42	< 0.5	U	< 0.5	U			< 0.5	U											< 0.5	U	< 1	U	< 1	U
2-Butanone	µg/L	61,000	< 5	U	< 5	U			< 5	U											< 5	U	< 2	U	< 2	U
2-Chlorotoluene	µg/L	2,000	< 0.25	U	< 0.25	U			< 0.25	U											< 0.25	U	< 1	U	< 1	U
2-Hexanone	µg/L	6,100	< 5	U	< 5	U			< 5	U											< 5	U	< 2	U	< 2	U
4-Chlorotoluene	µg/L	2,000	< 0.5	U	< 0.5	U			< 0.5	U											< 0.5	U	< 1	U	< 1	U
Acetone	µg/L	92,000	< 5	U	< 5	U			< 5	U											< 5	U	< 2	U	< 2	U
Benzene	µg/L	5	< 0.25	U	< 0.25	U			< 0.25	U											< 0.25	U	< 1	U	< 1	U
Bromobenzene	µg/L	2,000	< 0.25	U	< 0.25	U			< 0.25	U											< 0.25	U	< 1	U	< 1	U
Bromochloromethane	µg/L	4,100	< 0.4	U	< 0.4	U			< 0.4	U											< 0.4	U	< 1	U	< 1	U
Bromodichloromethane	µg/L	5	< 0.5	U	< 0.5	U			< 0.5	U											< 0.5	U	< 1	U	< 1	U
Bromoform	µg/L	36	< 1	U	< 1	U			< 1	U											< 1	U	< 1	U	< 1	U
Bromomethane	µg/L	140	< 1	U	< 1	U			< 1	U											< 1	UJ	< 1	U	< 1	U
Carbon disulfide	µg/L	10,000	< 1	U					< 1	U											< 1	U	< 2	U	< 2	U
Carbon tetrachloride	µg/L	5	< 0.5	U					< 0.5	U											< 0.5	U	< 1	U	< 1	U
Chlorobenzene	µg/L	100	< 0.25	U					< 0.25	U											< 0.25	U	< 1	U	< 1	U
Chloroethane	µg/L	41,000	< 1	U					< 1	U											< 1	U	< 1	U	< 1	U
Chloroform	µg/L	1,000	< 0.25	U					< 0.25	U											< 0.25	U	< 1	U	< 1	U
Chloromethane	µg/L	220	< 1	U					< 1	U											< 1	U	< 1	U	< 1	U
cis-1,2-Dichloroethene	µg/L	70	< 0.5	U					< 0.5	U											< 0.5	U	< 1	U	< 1	U
cis-1,3-Dichloropropene	µg/L	5	< 0.5	U					< 0.5	U											< 0.5	U	< 1	U	< 1	U
Dibromochloromethane	µg/L	34	< 0.5	U					< 0.5	U											< 0.5	U	< 1	U	< 1	U
Dibromomethane	µg/L	380	< 0.5	U					< 0.5	U											< 0.5	U	< 1	U	< 1	U
Dichlorodifluoromethane	µg/L	20,000	< 0.5	U					< 0.5	U											< 0.5	U	< 1	U	< 1	U
Ethylbenzene	µg/L	700	< 0.5	U					< 0.5	U											< 0.5	U	< 1	U	< 1	U
Hexachlorobutadiene	µg/L	20	< 0.5	U					< 0.5	U											< 0.5	U	< 1	U	< 1	U
Isopropylbenzene	µg/L	10,000	< 0.5	U					< 0.5	U											< 0.5	U	< 1	U	< 1	U
m,p-Xylenes	µg/L	10,000	< 1	U					< 1	U											< 1	U	< 2	U	< 2	U
Methyl isobutyl ketone	µg/L	8,200	< 5	UJ	< 5	U			< 5	U											< 5	U	< 2	U	< 2	U
Methylene chloride	µg/L	5	< 0.5	U					< 0.5	U											< 0.5	U	< 2	U	< 2	U
Naphthalene	µg/L	2,000	< 0.4	U					< 0.4	U											< 0.4	U	< 1	U	< 1	U
n-Butylbenzene	µg/L	4,100	< 0.5	U					< 0.5	U											< 0.5	U	< 1	U	< 1	U
n-Propylbenzene	µg/L	4,100	< 0.25	U					< 0.25	U											< 0.25	U	< 1	U	< 1	U
o-Xylene	µg/L	10,000	< 0.5	U					< 0.5	U											< 0.5	U	< 1	U	< 1	U
p-Isopropyltoluene	µg/L	10,000	< 0.5	U					< 0.5	U											< 0.5	U	< 1	U	< 1	U
sec-Butylbenzene	µg/L	4,100	< 0.5	U					< 0.5	U											< 0.5	U	< 1	U	< 1	U
Styrene	µg/L	100	< 0.25	U					< 0.25	U											< 0.25	U	< 1	U	< 1	U
tert-Butylbenzene	µg/L	4,100	< 0.5	U					< 0.5	U											< 0.5	U	< 1	U	< 1	U
Tetrachloroethene	µg/L	5	< 0.5	U					< 0.5	U											< 0.5	U	< 1	U	< 1	U
Toluene	µg/L	1,000	< 0.5	U					< 0.5	U											< 0.5	U	< 1	U	< 1	U
trans-1,2-Dichloroethene	µg/L	100	< 0.5	U					< 0.5	U											< 0.5	U	< 1	U	< 1	U
trans-1,3-Dichloropropene	µg/L	29	< 1	U					< 1	U											< 1	U	< 1	U	< 1	U
Trichloroethene	µg/L	5	< 0.5	U					< 0.5	U											< 0.5	U	< 1	U	< 1	U
Trichlorofluoromethane	µg/L	31,000	< 0.5	U					< 0.5	U											< 0.5	U	< 1	U	< 1	U
Vinyl chloride	µg/L	2	< 0.5	U					< 0.5	U											< 0.5	U	< 1	U	< 1	U

Table 2-4
Groundwater Results, 2013–2021

		Location Code	67WW12												67WW13											
		Sample ID	67WW12-180503		67WW12-181022		67WW12-190502		67WW12-191028		67WW12-201102		67WW12-211110		67WW13-130531		67WW13-053113		67WW13-131001		67WW13-100113		67WW13-140124		67WW13-012414		67WW13FD-012414	
		Sample Date	5/3/2018		10/22/2018		5/2/2019		10/28/2019		11/2/2020		11/10/2021		5/31/2013		5/31/2013		10/1/2013		10/1/2013		1/24/2014		1/24/2014		1/24/2014	
		Sample Purpose	REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		FD	
Parameter	Units	MCL/GW-Ind	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
ANIONS																												
Chloride	mg/L	NV																										
Nitrate	mg/L	10																										
Nitrite	mg/L	1																										
Sulfate	mg/L	NV																										
Sulfide	mg/L	NV																										
TOTAL ORGANIC CARBON																												
Total Inorganic Carbon	mg/L	NV																										
Total Organic Carbon	mg/L	NV																										
DHC																												
BVC	cells/mL	NV																										
Dehalococcoides	cells/mL	NV																										
FIELD TESTS																												
Specific conductivity	µmhos/cm	NV	3.87		5.24		3.56		4.35		5.10		3.42		5.55		5.55		6.65		6.65		6.87		6.87			
Dissolved oxygen	mg/L	NV	0.58		0.29		0.61		0.62		0.07		1.35		1.17		1.17		0.98		0.98		0.16		0.16			
Ferrous Iron	NA	NV																										
Flow Rate	mL/Min	NV	100		100		100		100		100																	
Measured well depth	Ft BTOC	NV	36.93		37.08		36.94		36.85																			
Oxidation Reduction Potential	mV	NV	300		209		187		126		55		244		106		106		37		37		125		125			
pH	SU	NV	5.34		5.68		5.35		5.72		6.31		5.23		6.68		6.68		7.09		7.09		6.76		6.76			
Temperature	C	NV	20.79		18.77		20.12		18.62		19.17		18.82		34.55		34.55		21.97		21.97		15.8		15.8			
Total Purge	L	NV	2.5		3		3.0		3		3.0																	
Turbidity	NTU	NV	0		0		6.3		1.8		0		2.1		0.2		0.2		0.3		0.3		0		0			
Water Level at Reading Time	Ft BTOC	NV	25.01		26.55		24.05		25.12		23.99																	
GASES																												
Carbon dioxide	µg/L	NV																										
Ethane	µg/L	NV																										
Ethylene	µg/L	NV																										
Methane	µg/L	NV																										
GENERAL CHEMISTRY																												
Alkalinity	mg/L	NV																										
Ferrous Iron	mg/L	NV																										
SEMIVOLATILES																												
1,4-Dioxane	µg/L	26																										
VOLATILES																												
1,1,1,2-Tetrachloroethane	µg/L	110	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 10	U			< 0.5	U			< 1.25	U	< 1.25	U
1,1,1-Trichloroethane	µg/L	200	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 10	U			< 0.5	U			< 1.25	U	< 1.25	U
1,1,2,2-Tetrachloroethane	µg/L	14	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 10	U			< 0.4	U			< 1	U	< 1	U
1,1,2-Trichloro-1,2,2-Trifluoroethane	µg/L	3,100,000	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U														
1,1,2-Trichloroethane	µg/L	5	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			2.91	J			3.37				2.99		3.01	
1,1-Dichloroethane	µg/L	10,000	< 0.5	U	< 0.5	U	< 0.5	U	0.51	J	1.1		< 0.5	U			30.6				33.8				32.7		32.4	
1,1-Dichloroethene	µg/L	7	< 0.5	U	4.8		2.1		17		40		6.5				498				515				572		569	
1,1-Dichloropropene	µg/L	3	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 10	U			< 0.5	U			< 1.25	U	< 1.25	U
1,2,3-Trichlorobenzene	µg/L	310	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	UJ	< 1	U	< 1	U			< 1	U			< 0.3	U			< 0.75	U	< 0.75	U
1,2,3-Trichloropropane	µg/L	0.04	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U			< 20	U			< 1	U			< 2.5	U	< 2.5	U
1,2,4-Trichlorobenzene	µg/L	70	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U			< 1	U			< 0.4	U			< 1	U	< 1	U
1,2,4-Trimethylbenzene	µg/L	5,100	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 10	U			< 0.5	U			< 1.25	U	< 1.25	U
1,2-Dibromo-3-chloropropane	µg/L	0.2	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 50	U			< 2	UJ			< 5	UJ	< 5	U
1,2-Dibromoethane	µg/L	0.1	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 10	U			< 0.5	U			< 1.25	U	< 1.25	U
1,2-Dichlorobenzene	µg/L	600	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U			< 10	U			< 0.25	U			< 0.626	U	< 0.626	U
1,2-Dichloroethane	µg/L	5	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			19.9				23.8				22.9		22.9	
1,2-Dichloropropane	µg/L	5	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 10	U			< 0.4	U			< 1	U	< 1	U
1,3,5-Trimethylbenzene	µg/L	5,100	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 1	U			< 0.5	U			< 1.25	U	< 1.25	U
1,3-Dichlorobenzene	µg/L	3,100	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U			< 1	U			< 0.5	U			< 1.25	U	< 1.25	U

Table 2-4
Groundwater Results, 2013–2021

		Location Code	67WW12												67WW13											
		Sample ID	67WW12-180503		67WW12-181022		67WW12-190502		67WW12-191028		67WW12-201102		67WW12-211110		67WW13-130531		67WW13-053113		67WW13-131001		67WW13-100113		67WW13-140124		67WW13-012414		67WW13FD-012414	
		Sample Date	5/3/2018		10/22/2018		5/2/2019		10/28/2019		11/2/2020		11/10/2021		5/31/2013		5/31/2013		10/1/2013		10/1/2013		1/24/2014		1/24/2014		1/24/2014	
		Sample Purpose	REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		FD	
Parameter	Units	MCL/GW-Ind	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
1,3-Dichloropropane	µg/L	29	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 10	U			< 0.4	U			< 1	U	< 1	U
1,4-Dichlorobenzene	µg/L	75	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U			< 10	U			< 0.25	U			< 0.626	U	< 0.626	U
2,2-Dichloropropane	µg/L	42	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 1	U			< 0.5	U			< 1.25	U	< 1.25	U
2-Butanone	µg/L	61,000	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U			< 10	U			< 5	U			< 12.5	U	< 12.5	U
2-Chlorotoluene	µg/L	2,000	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 10	U			< 0.25	U			< 0.626	U	< 0.626	U
2-Hexanone	µg/L	6,100	< 1	U	< 1	U	< 1	U	< 1	U	< 2	U	< 2	U			< 10	U			< 5	U			< 12.5	U	< 12.5	U
4-Chlorotoluene	µg/L	2,000	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U			< 10	U			< 0.5	U			< 1.25	U	< 1.25	U
Acetone	µg/L	92,000	< 1	U	< 2	U	< 1	U	< 1	U	< 1	U	< 2	U			< 100	U			< 5	U			< 12.5	U	< 12.5	U
Benzene	µg/L	5	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 1	U			< 0.25	U			< 0.626	U	< 0.626	U
Bromobenzene	µg/L	2,000	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U			< 1	U			< 0.25	U			< 0.626	U	< 0.626	U
Bromochloromethane	µg/L	4,100	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 10	U			< 0.4	U			< 1	U	< 1	U
Bromodichloromethane	µg/L	5	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 10	U			< 0.5	U			< 1.25	U	< 1.25	U
Bromoform	µg/L	36	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 2	U			< 1	U			< 2.5	U	< 2.5	U
Bromomethane	µg/L	140	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 20	U			< 1	U			< 2.5	U	< 2.5	U
Carbon disulfide	µg/L	10,000	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 2	U			< 20	U			< 1	U			< 2.5	U	< 2.5	U
Carbon tetrachloride	µg/L	5	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 10	U			< 0.5	U			< 1.25	U	< 1.25	U
Chlorobenzene	µg/L	100	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 10	U			< 0.25	U			< 0.626	U	< 0.626	U
Chloroethane	µg/L	41,000	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 2	U			< 1	U			< 2.5	U	< 2.5	U
Chloroform	µg/L	1,000	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			0.462	J			< 0.25	UJ			< 0.626	U	0.359	J
Chloromethane	µg/L	220	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 2	U			< 1	U			< 2.5	U	< 2.5	U
cis-1,2-Dichloroethene	µg/L	70	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			1.68				1.66				1.67	J	1.77	J
cis-1,3-Dichloropropene	µg/L	5	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 1	U			< 0.5	U			< 1.25	U	< 1.25	U
Dibromochloromethane	µg/L	34	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 1	U			< 0.5	U			< 1.25	U	< 1.25	U
Dibromomethane	µg/L	380	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 1	U			< 0.5	U			< 1.25	U	< 1.25	U
Dichlorodifluoromethane	µg/L	20,000	< 0.5	U	< 0.5	UJ	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 10	U			< 0.5	U			< 1.25	U	< 1.25	U
Ethylbenzene	µg/L	700	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 1	U			< 0.5	U			< 1.25	U	< 1.25	U
Hexachlorobutadiene	µg/L	20	< 0.5	U	< 1	U	< 1	U	< 0.5	U	< 1	U	< 1	U			< 1	U			< 0.5	U			< 1.25	U	< 1.25	U
Isopropylbenzene	µg/L	10,000	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 1	U			< 0.5	U			< 1.25	U	< 1.25	U
m,p-Xylenes	µg/L	10,000	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U			< 2	U			< 1	U			< 2.5	U	< 2.5	U
Methyl isobutyl ketone	µg/L	8,200	< 1	U	< 1	U	< 1	U	< 1	U	< 2	U	< 2	U			< 100	U			< 5	U			< 12.5	U	< 12.5	U
Methylene chloride	µg/L	5	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 2	U			< 10	U			< 0.5	U			< 1.25	U	< 1.25	U
Naphthalene	µg/L	2,000	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	UJ	< 0.5	U	< 1	U			< 1	U			< 0.4	U			< 1	U	< 1	U
n-Butylbenzene	µg/L	4,100	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U			< 10	U			< 0.5	U			< 1.25	U	< 1.25	U
n-Propylbenzene	µg/L	4,100	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 10	U			< 0.25	U			< 0.626	U	< 0.626	U
o-Xylene	µg/L	10,000	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 1	U			< 0.5	U			< 1.25	U	< 1.25	U
p-Isopropyltoluene	µg/L	10,000	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 1	U			< 0.5	U			< 1.25	U	< 1.25	U
sec-Butylbenzene	µg/L	4,100	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 1	U			< 0.5	U			< 1.25	U	< 1.25	U
Styrene	µg/L	100	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 1	U			< 0.25	U			< 0.626	U	< 0.626	U
tert-Butylbenzene	µg/L	4,100	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 10	U			< 0.5	U			< 1.25	U	< 1.25	U
Tetrachloroethene	µg/L	5	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 1	U			< 0.5	U			< 1.25	U	< 1.25	U
Toluene	µg/L	1,000	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 10	U			< 0.5	U			< 1.25	U	< 1.25	U
trans-1,2-Dichloroethene	µg/L	100	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 10	U			< 0.5	U			< 1.25	U	< 1.25	U
trans-1,3-Dichloropropene	µg/L	29	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 2	U			< 1	U			< 2.5	U	< 2.5	U
Trichloroethene	µg/L	5	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			3.11				2.81				2.86		2.99	
Trichlorofluoromethane	µg/L	31,000	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 1	U			< 0.5	U			< 1.25	U	< 1.25	U
Vinyl chloride	µg/L	2	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			2.55				2.1				2.37	J	2.37	J

Table 2-4
Groundwater Results, 2013–2021

		Location Code	67WW13																							
		Sample ID	67WW13-140506		67WW13-050614		67WW13FD-050614		67WW13-140725		67WW13FD-072514		67WW13-072514		67WW13-141204		67WW13FD-120414		67WW13-120414		67WW13-150211		67WW13-021115		67WW13-150325		67WW13-032515	
		Sample Date	5/6/2014		5/6/2014		5/6/2014		7/25/2014		7/25/2014		7/25/2014		12/4/2014		12/4/2014		12/4/2014		2/11/2015		2/11/2015		3/25/2015		3/25/2015	
		Sample Purpose	REG		REG		FD		REG		FD		REG		REG		FD		REG		REG		REG		REG		REG	
Parameter	Units	MCL/GW-Ind	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
ANIONS																												
Chloride	mg/L	NV																									1,820	
Nitrate	mg/L	10																									< 2	U
Nitrite	mg/L	1																									< 2	U
Sulfate	mg/L	NV																									334	
Sulfide	mg/L	NV																									< 1	U
TOTAL ORGANIC CARBON																												
Total Inorganic Carbon	mg/L	NV																									144	
Total Organic Carbon	mg/L	NV																									16.8	J
DHC																												
BVC	cells/mL	NV																										
Dehalococcoides	cells/mL	NV																										
FIELD TESTS																												
Specific conductivity	µmhos/cm	NV	6.16		6.16				6.83				6.83		6.81				6.81		6.08		6.08		6.54		6.54	
Dissolved oxygen	mg/L	NV	2.03		2.03				1.19				1.19		0.29				0.29		1.73		1.73		1.55		1.55	
Ferrous Iron	NA	NV																										
Flow Rate	mL/Min	NV																										
Measured well depth	Ft BTOC	NV																										
Oxidation Reduction Potential	mV	NV	122		122				178				178		150				150		145		145		176		176	
pH	SU	NV	5.86		5.86				6.24				6.24		6.46				6.46		7.16		7.16		4.62		4.62	
Temperature	C	NV	25.17		25.17				25.2				25.2		19.85				19.85		16.69		16.69		20.67		20.67	
Total Purge	L	NV																										
Turbidity	NTU	NV	1.2		1.2				0.2				0.2		0				0		0.2		0.2		0		0	
Water Level at Reading Time	Ft BTOC	NV																										
GASES																												
Carbon dioxide	µg/L	NV																										
Ethane	µg/L	NV																									< 2	U
Ethylene	µg/L	NV																									< 2	U
Methane	µg/L	NV																									< 2	U
GENERAL CHEMISTRY																												
Alkalinity	mg/L	NV																										
Ferrous Iron	mg/L	NV																									< 0.04	U
SEMIVOLATILES																												
1,4-Dioxane	µg/L	26																										
VOLATILES																												
1,1,1,2-Tetrachloroethane	µg/L	110			< 1	U	< 1	U			< 0.5	U	< 0.5	U			< 2.5	U	< 2.5	U			< 1.25	U				
1,1,1-Trichloroethane	µg/L	200			< 1	U	< 1	U			< 0.5	U	< 0.5	U			< 2.5	U	< 2.5	U			< 1.25	U				
1,1,2,2-Tetrachloroethane	µg/L	14			< 0.8	U	< 0.8	U			< 0.4	U	< 0.4	U			< 2	U	< 2	U			< 1	U				
1,1,2-Trichloro-1,2,2-Trifluoroethane	µg/L	3,100,000																										
1,1,2-Trichloroethane	µg/L	5			1.99	J	1.95	J			3.56		3.48				4.56	J	4.4	J			4.87					
1,1-Dichloroethane	µg/L	10,000			15.5		14.4				22.1		21.9				27.4		28.8				29.1					
1,1-Dichloroethene	µg/L	7			240		228				362		353				522		572				521					
1,1-Dichloropropene	µg/L	3			< 1	U	< 1	U			< 0.5	U	< 0.5	U			< 2.5	U	< 2.5	U			< 1.25	U				
1,2,3-Trichlorobenzene	µg/L	310			< 0.6	U	< 0.6	U			< 0.3	U	< 0.3	U			< 1.5	U	< 1.5	U			< 0.75	U				
1,2,3-Trichloropropane	µg/L	0.04			< 2	U	< 2	U			< 1	U	< 1	U			< 5	U	< 5	U			< 2.5	U				
1,2,4-Trichlorobenzene	µg/L	70			< 0.8	U	< 0.8	U			< 0.4	U	< 0.4	U			< 2	U	< 2	U			< 1	U				
1,2,4-Trimethylbenzene	µg/L	5,100			< 1	U	< 1	U			< 0.5	U	< 0.5	U			< 2.5	U	< 2.5	U			< 1.25	U				
1,2-Dibromo-3-chloropropane	µg/L	0.2			< 4	U	< 4	U			< 2	U	< 2	U			< 10	U	< 10	U			< 5	U				
1,2-Dibromoethane	µg/L	0.1			< 1	U	< 1	U			< 0.5	U	< 0.5	U			< 2.5	U	< 2.5	U			< 1.25	U				
1,2-Dichlorobenzene	µg/L	600			< 0.5	U	< 0.5	U			< 0.25	U	< 0.25	U			< 1.25	U	< 1.25	U			< 0.626	U				
1,2-Dichloroethane	µg/L	5			13.7		12.9				20.1		19.8				24.6		24.9				26					
1,2-Dichloropropane	µg/L	5			< 0.8	U	< 0.8	U			< 0.4	U	< 0.4	U			< 2	U	< 2	U			< 1	U				
1,3,5-Trimethylbenzene	µg/L	5,100			< 1	U	< 1	U			< 0.5	U	< 0.5	U			< 2.5	U	< 2.5	U			< 1.25	U				
1,3-Dichlorobenzene	µg/L	3,100			< 1	U	< 1	U			< 0.5	U	< 0.5	U			< 2.5	U	< 2.5	U			< 1.25	U				

Table 2-4
Groundwater Results, 2013–2021

		Location Code	67WW13																							
		Sample ID	67WW13-140506		67WW13-050614		67WW13FD-050614		67WW13-140725		67WW13FD-072514		67WW13-072514		67WW13-141204		67WW13FD-120414		67WW13-120414		67WW13-150211		67WW13-021115		67WW13-150325		67WW13-032515	
		Sample Date	5/6/2014		5/6/2014		5/6/2014		7/25/2014		7/25/2014		7/25/2014		12/4/2014		12/4/2014		12/4/2014		2/11/2015		2/11/2015		3/25/2015		3/25/2015	
		Sample Purpose	REG		REG		FD		REG		FD		REG		REG		FD		REG		REG		REG		REG		REG	
Parameter	Units	MCL/GW-Ind	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
1,3-Dichloropropane	µg/L	29			< 0.8	U	< 0.8	U			< 0.4	U	< 0.4	U			< 2	U	< 2	U			< 1	U				
1,4-Dichlorobenzene	µg/L	75			< 0.5	U	< 0.5	U			< 0.25	U	< 0.25	U			< 1.25	U	< 1.25	U			< 0.626	U				
2,2-Dichloropropane	µg/L	42			< 1	UJ	< 1	U			< 0.5	U	< 0.5	U			< 2.5	U	< 2.5	U			< 1.25	U				
2-Butanone	µg/L	61,000			< 10	U	< 10	U			< 5	U	< 5	U			< 25	U	< 25	U			< 12.5	U				
2-Chlorotoluene	µg/L	2,000			< 0.5	U	< 0.5	U			< 0.25	U	< 0.25	U			< 1.25	U	< 1.25	U			< 0.626	U				
2-Hexanone	µg/L	6,100			< 10	U	< 10	U			< 5	U	< 5	U			< 25	U	< 25	U			< 12.5	U				
4-Chlorotoluene	µg/L	2,000			< 1	U	< 1	U			< 0.5	U	< 0.5	U			< 2.5	U	< 2.5	U			< 1.25	U				
Acetone	µg/L	92,000			< 10	U	< 10	U			< 5	U	< 5	U			< 25	U	< 25	U			< 12.5	U				
Benzene	µg/L	5			1.21	J	0.79	J			< 0.25	U	< 0.25	U			< 1.25	U	< 1.25	U			< 0.626	U				
Bromobenzene	µg/L	2,000			< 0.5	U	< 0.5	U			< 0.25	U	< 0.25	U			< 1.25	U	< 1.25	U			< 0.626	U				
Bromochloromethane	µg/L	4,100			< 0.8	U	< 0.8	U			< 0.4	U	< 0.4	U			< 2	U	< 2	U			< 1	U				
Bromodichloromethane	µg/L	5			< 1	U	< 1	U			< 0.5	U	< 0.5	U			< 2.5	U	< 2.5	U			< 1.25	U				
Bromoform	µg/L	36			< 2	U	< 2	U			< 1	U	< 1	U			< 5	U	< 5	U			< 2.5	U				
Bromomethane	µg/L	140			< 2	U	< 2	U			< 1	U	< 1	U			< 5	U	< 5	U			< 2.5	UJ				
Carbon disulfide	µg/L	10,000			< 2	U	< 2	U			< 1	U	< 1	U			< 5	U	< 5	U			< 2.5	U				
Carbon tetrachloride	µg/L	5			< 1	U	< 1	U			< 0.5	U	< 0.5	U			< 2.5	U	< 2.5	U			< 1.25	U				
Chlorobenzene	µg/L	100			< 0.5	U	< 0.5	U			< 0.25	U	< 0.25	U			< 1.25	U	< 1.25	U			< 0.626	U				
Chloroethane	µg/L	41,000			< 2	U	< 2	U			< 1	U	< 1	U			< 5	U	< 5	U			< 2.5	U				
Chloroform	µg/L	1,000			< 0.5	U	< 0.5	U			0.55	J	0.57	J			0.848	J	0.813	J			1.32	J				
Chloromethane	µg/L	220			< 2	U	< 2	U			< 1	U	< 1	U			< 5	U	< 5	U			< 2.5	U				
cis-1,2-Dichloroethene	µg/L	70			0.755	J	0.684	J			1.15		1.19				1.49	J	1.31	J			1.6	J				
cis-1,3-Dichloropropene	µg/L	5			< 1	U	< 1	U			< 0.5	U	< 0.5	U			< 2.5	U	< 2.5	U			< 1.25	U				
Dibromochloromethane	µg/L	34			< 1	U	< 1	U			< 0.5	U	< 0.5	U			< 2.5	U	< 2.5	U			< 1.25	U				
Dibromomethane	µg/L	380			< 1	U	< 1	U			< 0.5	U	< 0.5	U			< 2.5	U	< 2.5	U			< 1.25	U				
Dichlorodifluoromethane	µg/L	20,000			< 1	U	< 1	U			< 0.5	U	< 0.5	U			< 2.5	U	< 2.5	U			< 1.25	U				
Ethylbenzene	µg/L	700			< 1	U	< 1	U			< 0.5	U	< 0.5	U			< 2.5	U	< 2.5	U			< 1.25	U				
Hexachlorobutadiene	µg/L	20			< 1	U	< 1	U			< 0.5	U	< 0.5	U			< 2.5	U	< 2.5	U			< 1.25	U				
Isopropylbenzene	µg/L	10,000			< 1	U	< 1	U			< 0.5	U	< 0.5	U			< 2.5	U	< 2.5	U			< 1.25	U				
m,p-Xylenes	µg/L	10,000			< 2	U	< 2	U			< 1	U	< 1	U			< 5	U	< 5	U			< 2.5	U				
Methyl isobutyl ketone	µg/L	8,200			< 10	U	< 10	U			< 5	U	< 5	U			< 25	U	< 25	U			< 12.5	U				
Methylene chloride	µg/L	5			< 1	U	< 1	U			< 0.5	U	< 0.5	U			2.9	J	2.88	J			< 1.25	U				
Naphthalene	µg/L	2,000			< 0.8	U	< 0.8	U			< 0.4	U	< 0.4	U			< 2	U	< 2	U			< 1	U				
n-Butylbenzene	µg/L	4,100			< 1	U	< 1	U			< 0.5	U	< 0.5	U			< 2.5	U	< 2.5	U			< 1.25	U				
n-Propylbenzene	µg/L	4,100			< 0.5	U	< 0.5	U			< 0.25	U	< 0.25	U			< 1.25	U	< 1.25	U			< 0.626	U				
o-Xylene	µg/L	10,000			< 1	U	< 1	U			< 0.5	U	< 0.5	U			< 2.5	U	< 2.5	U			< 1.25	U				
p-Isopropyltoluene	µg/L	10,000			< 1	U	< 1	U			< 0.5	U	< 0.5	U			< 2.5	U	< 2.5	U			< 1.25	U				
sec-Butylbenzene	µg/L	4,100			< 1	U	< 1	U			< 0.5	U	< 0.5	U			< 2.5	U	< 2.5	U			< 1.25	U				
Styrene	µg/L	100			< 0.5	U	< 0.5	U			< 0.25	U	< 0.25	U			< 1.25	U	< 1.25	U			< 0.626	U				
tert-Butylbenzene	µg/L	4,100			< 1	U	< 1	U			< 0.5	U	< 0.5	U			< 2.5	U	< 2.5	U			< 1.25	U				
Tetrachloroethene	µg/L	5			< 1	U	< 1	U			< 0.5	U	< 0.5	U			< 2.5	U	< 2.5	U			< 1.25	U				
Toluene	µg/L	1,000			< 1	U	< 1	U			< 0.5	U	< 0.5	U			< 2.5	U	< 2.5	U			< 1.25	U				
trans-1,2-Dichloroethene	µg/L	100			< 1	U	< 1	U			< 0.5	U	< 0.5	U			< 2.5	U	< 2.5	U			< 1.25	U				
trans-1,3-Dichloropropene	µg/L	29			< 2	U	< 2	U			< 1	U	< 1	U			< 5	U	< 5	U			< 2.5	U				
Trichloroethene	µg/L	5			1.25	J	1.27	J			1.71		1.72				1.94	J	1.65	J			2.63					
Trichlorofluoromethane	µg/L	31,000			< 1	U	< 1	U			< 0.5	U	< 0.5	U			< 2.5	U	< 2.5	U			< 1.25	U				
Vinyl chloride	µg/L	2			0.644	J	0.619	J			0.728	J	0.707	J			< 2.5	U	< 2.5	U			0.653	J				

Table 2-4
Groundwater Results, 2013–2021

		Location Code	67WW13																							
		Sample ID	67WW13-150519		67WW13-051915		67WW13-151118		67WW13-111815		67WW13-151216		67WW13-161215		67WW13-160519		67WW13-051916		67WW13-112817		67WW13-180501		67WW13-180501FD		67WW13-181023		67WW13-190501-FD	
		Sample Date	5/19/2015		5/19/2015		11/18/2015		11/18/2015		12/16/2015		12/16/2015		5/19/2016		5/19/2016		11/28/2017		5/1/2018		5/1/2018		10/23/2018		5/1/2019	
		Sample Purpose	REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		FD		REG		FD	
Parameter	Units	MCL/GW-Ind	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
ANIONS																												
Chloride	mg/L	NV			1,680												1,660		1,570		1,650		1,520		1,420		1,300	
Nitrate	mg/L	10			< 2	U											< 2	U	< 0.1	U	0.674		< 0.1	U	< 0.2	U	0.657	
Nitrite	mg/L	1			3.4	J											< 2	U	< 0.1	U	< 0.1	U	< 0.1	U	< 0.2	U		
Sulfate	mg/L	NV			344												358		390		405		370		355		318	
Sulfide	mg/L	NV			< 1	U											< 1	U	1.28		< 1.5	U	< 1.5	U	2.28			
TOTAL ORGANIC CARBON																												
Total Inorganic Carbon	mg/L	NV			224												71.9		320		340		350		130			
Total Organic Carbon	mg/L	NV			62.4												93.3		3.4		3.07		3.18		3.99		3.24	
DHC																												
BVC	cells/mL	NV																										
Dehalococcoides	cells/mL	NV																	0.3	NV	0.2				0.4	J		
FIELD TESTS																												
Specific conductivity	µmhos/cm	NV	5.52		5.52		6.27		6.27		5.89		5.89		5.74		5.74		5.73		5.42				5.39			
Dissolved oxygen	mg/L	NV	1.25		1.25		0.28		0.28		0		0		0.55		0.55		0.08		0.6				0.19			
Ferrous Iron	NA	NV																			0.04	UJ						
Flow Rate	mL/Min	NV																	100		100				100			
Measured well depth	Ft BTOC	NV																	28.63		28.48				28.75			
Oxidation Reduction Potential	mV	NV	219		219		158		158		85		85		244		244		303		337				281			
pH	SU	NV	5.95		5.95		6.69		6.69		6.49		6.49		5.38		5.38		5.62		5.66				5.78			
Temperature	C	NV	20.22		20.22		20.18		20.18		18.41		18.41		18.85		18.85		20.23		19.80				18.49			
Total Purge	L	NV																	0.65		2.5				3.0			
Turbidity	NTU	NV	0		0		0		0		1		1		0		0		1		1.2				0			
Water Level at Reading Time	Ft BTOC	NV																	22.16		21.17				22.62			
GASES																												
Carbon dioxide	µg/L	NV																	470,000		870,000		860,000		620,000		860,000	
Ethane	µg/L	NV			< 2	U											< 2	U	< 0.23	U	< 0.47	U	< 0.47	U	< 0.47	U	< 0.47	U
Ethylene	µg/L	NV			< 2	U											< 2	U	< 0.22	U	< 0.55	U	< 0.55	U	< 0.55	U	< 0.55	U
Methane	µg/L	NV			< 2	U											< 2	U	0.32	J	< 1	U	< 1	U	< 1	U	< 1	U
GENERAL CHEMISTRY																												
Alkalinity	mg/L	NV																							368			
Ferrous Iron	mg/L	NV			< 0.04	U											< 0.04	U							0.035	J		
SEMIVOLATILES																												
1,4-Dioxane	µg/L	26											78.3						36									
VOLATILES																												
1,1,1,2-Tetrachloroethane	µg/L	110			< 1.25	U			< 1.25	U							< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,1,1-Trichloroethane	µg/L	200			< 1.25	U			< 1.25	U							< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,1,2,2-Tetrachloroethane	µg/L	14			< 1	U			< 1	U							< 0.8	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,1,2-Trichloro-1,2,2-Trifluoroethane	µg/L	3,100,000																	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,1,2-Trichloroethane	µg/L	5			5.96				7.66								7		5.1		4.8		4.7		6.1		3.8	
1,1-Dichloroethane	µg/L	10,000			30.2				46.3								22.5		19	J	15		15		32		13	
1,1-Dichloroethene	µg/L	7			522				762								274		320		160		170		570		160	
1,1-Dichloropropene	µg/L	3			< 1.25	U			< 1.25	U							< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,2,3-Trichlorobenzene	µg/L	310			< 0.75	U			< 0.75	U							< 0.6	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,2,3-Trichloropropane	µg/L	0.04			< 2.5	U			< 2.5	U							< 2	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,2,4-Trichlorobenzene	µg/L	70			< 1	U			< 1	U							< 0.8	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,2,4-Trimethylbenzene	µg/L	5,100			< 1.25	U			< 1.25	U							< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,2-Dibromo-3-chloropropane	µg/L	0.2			< 5	U			< 5	U							< 4	U	< 1	U	< 0.5	U	< 0.5	U	< 1	U	< 0.5	U
1,2-Dibromoethane	µg/L	0.1			< 1.25	U			< 1.25	U							< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,2-Dichlorobenzene	µg/L	600			< 0.626	U			< 0.626	U							< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,2-Dichloroethane	µg/L	5			30.6				42.6								35.7		32		27		28		43		23	
1,2-Dichloropropane	µg/L	5			< 1	U			< 1	U							< 0.8	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,3,5-Trimethylbenzene	µg/L	5,100			< 1.25	U			< 1.25	U							< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,3-Dichlorobenzene	µg/L	3,100			< 1.25	U			< 1.25	U							< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U

Table 2-4
Groundwater Results, 2013–2021

		Location Code	67WW13																							
		Sample ID	67WW13-150519		67WW13-051915		67WW13-151118		67WW13-111815		67WW13-151216		67WW13-161215		67WW13-160519		67WW13-051916		67WW13-112817		67WW13-180501		67WW13-180501FD		67WW13-181023		67WW13-190501-FD	
		Sample Date	5/19/2015		5/19/2015		11/18/2015		11/18/2015		12/16/2015		12/16/2015		5/19/2016		5/19/2016		11/28/2017		5/1/2018		5/1/2018		10/23/2018		5/1/2019	
		Sample Purpose	REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		FD		REG		FD	
Parameter	Units	MCL/GW-Ind	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
1,3-Dichloropropane	µg/L	29			< 1	U			< 1	U							< 0.8	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,4-Dichlorobenzene	µg/L	75			< 0.626	U			< 0.626	U							< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
2,2-Dichloropropane	µg/L	42			< 1.25	U			< 1.25	U							< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
2-Butanone	µg/L	61,000			< 12.5	U			< 12.5	U							< 10	U	< 2	U	< 1	U	< 1	U	< 1	U	< 1	U
2-Chlorotoluene	µg/L	2,000			< 0.626	UJ			< 0.626	U							< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
2-Hexanone	µg/L	6,100			< 12.5	U			< 12.5	U							< 10	U	< 2	U	< 1	U	< 1	U	< 1	U	< 1	U
4-Chlorotoluene	µg/L	2,000			< 1.25	U			< 1.25	U							< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Acetone	µg/L	92,000			< 12.5	U			< 12.5	U							< 10	U	< 2	U	< 1	U	< 1	U	< 2	U	< 1	U
Benzene	µg/L	5			< 0.626	U			< 0.626	U							< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Bromobenzene	µg/L	2,000			< 0.626	U			< 0.626	U							< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Bromochloromethane	µg/L	4,100			< 1	U			< 1	U							< 0.8	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Bromodichloromethane	µg/L	5			< 1.25	U			< 1.25	U							< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Bromoform	µg/L	36			< 2.5	U			< 2.5	U							< 2	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Bromomethane	µg/L	140			< 2.5	U			< 2.5	U							< 2	U	< 1	UJ	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Carbon disulfide	µg/L	10,000			< 2.5	U			< 2.5	U							< 2	U	< 2	U	< 1	U	< 1	U	< 1	U	< 1	U
Carbon tetrachloride	µg/L	5			< 1.25	U			< 1.25	U							< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Chlorobenzene	µg/L	100			< 0.626	U			< 0.626	U							< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Chloroethane	µg/L	41,000			< 2.5	U			< 2.5	U							< 2	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Chloroform	µg/L	1,000			1.7	J			2.27	J							1.36	J	< 1	U	0.76	J	0.78	J	1.4		< 0.5	U
Chloromethane	µg/L	220			< 2.5	U			< 2.5	U							< 2	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
cis-1,2-Dichloroethene	µg/L	70			2.08	J			2.75								1.55	J	< 1	U	0.99	J	1		1.9		0.81	J
cis-1,3-Dichloropropene	µg/L	5			< 1.25	U			< 1.25	U							< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Dibromochloromethane	µg/L	34			< 1.25	U			< 1.25	U							< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Dibromomethane	µg/L	380			< 1.25	U			< 1.25	U							< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Dichlorodifluoromethane	µg/L	20,000			< 1.25	U			< 1.25	U							< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	UJ	< 0.5	U
Ethylbenzene	µg/L	700			< 1.25	U			< 1.25	U							< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Hexachlorobutadiene	µg/L	20			< 1.25	U			< 1.25	U							< 1	UJ	< 1	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U
Isopropylbenzene	µg/L	10,000			< 1.25	U			< 1.25	U							< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
m,p-Xylenes	µg/L	10,000			< 2.5	U			< 2.5	U							< 2	U	< 2	U	< 1	U	< 1	U	< 1	U	< 1	U
Methyl isobutyl ketone	µg/L	8,200			< 12.5	U			< 12.5	U							< 10	U	< 2	U	< 1	U	< 1	U	< 1	U	< 1	U
Methylene chloride	µg/L	5			< 1.25	U			< 1.25	U							< 1	U	< 2	UJ	< 1	U	< 1	U	< 1	U	< 1	U
Naphthalene	µg/L	2,000			< 1	U			< 1	U							< 0.8	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
n-Butylbenzene	µg/L	4,100			< 1.25	U			< 1.25	U							< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
n-Propylbenzene	µg/L	4,100			< 0.626	U			< 0.626	U							< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
o-Xylene	µg/L	10,000			< 1.25	U			< 1.25	U							< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
p-Isopropyltoluene	µg/L	10,000			< 1.25	U			< 1.25	U							< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
sec-Butylbenzene	µg/L	4,100			< 1.25	U			< 1.25	U							< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Styrene	µg/L	100			< 0.626	U			< 0.626	U							< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
tert-Butylbenzene	µg/L	4,100			< 1.25	U			< 1.25	U							< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Tetrachloroethene	µg/L	5			< 1.25	U			< 1.25	U							< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Toluene	µg/L	1,000			< 1.25	U			< 1.25	U							< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
trans-1,2-Dichloroethene	µg/L	100			< 1.25	U			< 1.25	U							< 1	U	< 1	UJ	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
trans-1,3-Dichloropropene	µg/L	29			< 2.5	U			< 2.5	U							< 2	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Trichloroethene	µg/L	5			2.91				3.32								1.67	J	< 1	U	< 0.5	U	< 0.5	U	2.4		1	
Trichlorofluoromethane	µg/L	31,000			< 1.25	U			< 1.25	U							< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Vinyl chloride	µg/L	2			0.695	J			1.65	J							< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U

Table 2-4
Groundwater Results, 2013–2021

	Location Code	67WW13										67WW14															
	Sample ID	67WW13-190501		67WW13-191028		67WW13-201103		67WW13-211111		67WW13-211111-FD		67WW14-131001		67WW14-100113		67WW14-100113-FD		67WW14-140124		67WW14-012414		67WW14-140507		67WW14-050714		67WW14-140725	
	Sample Date	5/1/2019		10/28/2019		11/3/2020		11/11/2021		11/11/2021		10/1/2013		10/1/2013		10/1/2013		1/24/2014		1/24/2014		5/7/2014		5/7/2014		7/25/2014	
	Sample Purpose	REG		REG		REG		REG		FD		REG		REG		FD		REG		REG		REG		REG		REG	
Parameter	Units	MCL/GW-Ind	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
ANIONS																												
Chloride	mg/L	NV	1,240		1,280		1,270		1,200		1,210																	
Nitrate	mg/L	10	0.697		< 0.2	U	< 0.2	U	0.32	J	0.31	J																
Nitrite	mg/L	1																										
Sulfate	mg/L	NV	284		304		346		268		261																	
Sulfide	mg/L	NV																										
TOTAL ORGANIC CARBON																												
Total Inorganic Carbon	mg/L	NV																										
Total Organic Carbon	mg/L	NV	2.91		1.69		1.45	J	4		4.61																	
DHC																												
BVC	cells/mL	NV																										
Dehalococcoides	cells/mL	NV																										
FIELD TESTS																												
Specific conductivity	µmhos/cm	NV	4.83		4.87		4.97		4.83				1.55		1.55				1.53		1.53		1.68		1.68		1.66	
Dissolved oxygen	mg/L	NV	2.77		0.8		1.28		0.67				1.34		1.34				0.67		0.67		1.17		1.17		0.12	
Ferrous Iron	NA	NV	0.00		0.06		0.9		0.00																			
Flow Rate	mL/Min	NV	100		100		100																					
Measured well depth	Ft BTOC	NV	28.6		28.58																							
Oxidation Reduction Potential	mV	NV	209		185		205		196				-60		-60				-37		-37		-5		-5		210	
pH	SU	NV	5.48		6.26		6.07		6.07				6.47		6.47				6.52		6.52		5.67		5.67		5.34	
Temperature	C	NV	21.37		19.38		15.93		18.03				22.78		22.78				18.42		18.42		19.86		19.86		25.56	
Total Purge	L	NV	3		3		3.0																					
Turbidity	NTU	NV	0		0		0		1.2				3.6		3.6				15.5		15.5		24.8		24.8		17.3	
Water Level at Reading Time	Ft BTOC	NV	20.4		21.21		20.14																					
GASES																												
Carbon dioxide	µg/L	NV	840,000		140,000		350,000																					
Ethane	µg/L	NV	< 0.47	U	< 0.47	U	< 0.47	U	0.794	J	0.293	J																
Ethylene	µg/L	NV	< 0.55	U	< 0.55	U	< 0.55	U	1.02	J	< 0.5	UJ																
Methane	µg/L	NV	< 1	U	< 1	U	< 1	U	2.29		1.72																	
GENERAL CHEMISTRY																												
Alkalinity	mg/L	NV																										
Ferrous Iron	mg/L	NV																										
SEMIVOLATILES																												
1,4-Dioxane	µg/L	26																										
VOLATILES																												
1,1,1,2-Tetrachloroethane	µg/L	110	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U		
1,1,1-Trichloroethane	µg/L	200	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U		
1,1,2,2-Tetrachloroethane	µg/L	14	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U			< 0.4	U	< 0.4	U			< 0.4	U			< 0.4	U		
1,1,2-Trichloro-1,2,2-Trifluoroethane	µg/L	3,100,000	< 0.5	U	< 0.5	U	< 1	U	< 1	U	< 1	U																
1,1,2-Trichloroethane	µg/L	5	3.9		5		5.7		< 1	UJ	5.9	J			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U		
1,1-Dichloroethane	µg/L	10,000	14		31		33		< 0.5	UJ	32	J			0.197	J	0.304	J			0.275	J			0.538	J		
1,1-Dichloroethene	µg/L	7	200		640		720		< 0.5	UJ	410	J			1.82	J	2.22				2.58				4.27			
1,1-Dichloropropene	µg/L	3	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U		
1,2,3-Trichlorobenzene	µg/L	310	< 0.5	U	< 0.5	UJ	< 1	U	< 1	U	< 1	U			< 0.3	U	< 0.3	U			< 0.3	U			< 0.3	U		
1,2,3-Trichloropropane	µg/L	0.04	< 0.5	U	< 0.5	U	< 1	U	< 1	U	< 1	U			< 1	U	< 1	U			< 1	U			< 1	U		
1,2,4-Trichlorobenzene	µg/L	70	< 0.5	U	< 0.5	U	< 1	U	< 1	U	< 1	U			< 0.4	U	< 0.4	U			< 0.4	U			< 0.4	U		
1,2,4-Trimethylbenzene	µg/L	5,100	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U		
1,2-Dibromo-3-chloropropane	µg/L	0.2	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U			< 2	UJ	< 2	UJ			< 2	U			< 2	U		
1,2-Dibromoethane	µg/L	0.1	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U		
1,2-Dichlorobenzene	µg/L	600	< 0.5	U	< 0.5	U	< 1	U	< 1	U	< 1	U			< 0.25	U	< 0.25	U			< 0.25	U			< 0.25	U		
1,2-Dichloroethane	µg/L	5	24		36		44		< 0.5	UJ	43	J			0.692	J	0.849	J			0.666	J			0.897	J		
1,2-Dichloropropane	µg/L	5	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U			< 0.4	U	< 0.4	U			< 0.4	U			< 0.4	U		
1,3,5-Trimethylbenzene	µg/L	5,100	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U		
1,3-Dichlorobenzene	µg/L	3,100	< 0.5	U	< 0.5	U	< 1	U	< 1	U	< 1	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U		

Table 2-4
Groundwater Results, 2013–2021

		Location Code	67WW13										67WW14													
		Sample ID	67WW13-190501		67WW13-191028		67WW13-201103		67WW13-211111		67WW13-211111-FD		67WW14-131001		67WW14-100113		67WW14-100113-FD		67WW14-140124		67WW14-012414		67WW14-140507		67WW14-050714		67WW14-140725	
		Sample Date	5/1/2019		10/28/2019		11/3/2020		11/11/2021		11/11/2021		10/1/2013		10/1/2013		10/1/2013		1/24/2014		1/24/2014		5/7/2014		5/7/2014		7/25/2014	
		Sample Purpose	REG		REG		REG		REG		FD		REG		REG		FD		REG		REG		REG		REG		REG	
Parameter	Units	MCL/GW-Ind	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
1,3-Dichloropropane	µg/L	29	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U			< 0.4	U	< 0.4	U			< 0.4	U			< 0.4	U		
1,4-Dichlorobenzene	µg/L	75	< 0.5	U	< 0.5	U	< 1	U	< 1	U	< 1	U			< 0.25	U	< 0.25	U			< 0.25	U			< 0.25	U		
2,2-Dichloropropane	µg/L	42	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	UJ	< 0.5	UJ			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U		
2-Butanone	µg/L	61,000	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U			9.06	J	7.47	J			< 5	U			< 5	U		
2-Chlorotoluene	µg/L	2,000	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U			< 0.25	U	< 0.25	U			< 0.25	U			< 0.25	U		
2-Hexanone	µg/L	6,100	< 1	U	< 1	U	< 2	U	< 2	U	< 2	U			< 5	U	< 5	U			< 5	U			< 5	U		
4-Chlorotoluene	µg/L	2,000	< 0.5	U	< 0.5	U	< 1	U	< 1	U	< 1	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U		
Acetone	µg/L	92,000	< 1	U	< 1	U	< 1	U	< 2	U	< 2	U			3.27	J	2.59	J			< 5	U			< 5	U		
Benzene	µg/L	5	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 0.25	U	< 0.25	U			< 0.25	U			< 0.25	B		
Bromobenzene	µg/L	2,000	< 0.5	U	< 0.5	U	< 1	U	< 1	U	< 1	U			< 0.25	U	< 0.25	U			< 0.25	U			< 0.25	U		
Bromochloromethane	µg/L	4,100	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 0.4	U	< 0.4	U			< 0.4	U			< 0.4	U		
Bromodichloromethane	µg/L	5	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U		
Bromoform	µg/L	36	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U			< 1	U	< 1	U			< 1	U			< 1	U		
Bromomethane	µg/L	140	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U			< 1	U	< 1	U			< 1	U			< 1	U		
Carbon disulfide	µg/L	10,000	< 1	U	< 1	U	< 1	U	< 2	U	< 2	U			< 1	U	< 1	U			< 1	U			< 1	U		
Carbon tetrachloride	µg/L	5	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U		
Chlorobenzene	µg/L	100	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U			< 0.25	U	< 0.25	U			< 0.25	U			< 0.25	U		
Chloroethane	µg/L	41,000	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U			< 1	U	< 1	U			< 1	U			< 1	U		
Chloroform	µg/L	1,000	< 0.5	U	0.66	J	< 0.5	U	< 0.5	U	< 0.5	U			< 0.25	U	< 0.25	U			< 0.25	U			< 0.25	U		
Chloromethane	µg/L	220	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			0.64	J	< 1	U			< 1	U			< 1	U		
cis-1,2-Dichloroethene	µg/L	70	0.94	J	1.8		1.6		< 0.5	UJ	1.6	J			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U		
cis-1,3-Dichloropropene	µg/L	5	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U		
Dibromochloromethane	µg/L	34	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U		
Dibromomethane	µg/L	380	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U		
Dichlorodifluoromethane	µg/L	20,000	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U		
Ethylbenzene	µg/L	700	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U		
Hexachlorobutadiene	µg/L	20	< 1	U	< 0.5	U	< 1	U	< 1	U	< 1	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U		
Isopropylbenzene	µg/L	10,000	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U		
m,p-Xylenes	µg/L	10,000	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U			< 1	U	< 1	U			< 1	U			< 1	U		
Methyl isobutyl ketone	µg/L	8,200	< 1	U	< 1	U	< 2	U	< 2	U	< 2	U			< 5	U	< 5	U			< 5	U			< 5	U		
Methylene chloride	µg/L	5	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U		
Naphthalene	µg/L	2,000	< 0.5	U	< 0.5	UJ	< 0.5	U	< 1	U	< 1	U			< 0.4	U	< 0.4	U			< 0.4	U			< 0.4	U		
n-Butylbenzene	µg/L	4,100	< 0.5	U	< 0.5	U	< 1	U	< 1	U	< 1	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U		
n-Propylbenzene	µg/L	4,100	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U			< 0.25	U	< 0.25	U			< 0.25	U			< 0.25	U		
o-Xylene	µg/L	10,000	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U		
p-Isopropyltoluene	µg/L	10,000	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U			0.431	J	0.353	J			< 0.5	U			< 0.5	U		
sec-Butylbenzene	µg/L	4,100	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U		
Styrene	µg/L	100	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U			< 0.25	U	< 0.25	U			< 0.25	U			< 0.25	U		
tert-Butylbenzene	µg/L	4,100	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U		
Tetrachloroethene	µg/L	5	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U		
Toluene	µg/L	1,000	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U		
trans-1,2-Dichloroethene	µg/L	100	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U		
trans-1,3-Dichloropropene	µg/L	29	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 1	U	< 1	U			< 1	U			< 1	U		
Trichloroethene	µg/L	5	1.1		2.6		3.1		< 0.5	UJ	2.4	J			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U		
Trichlorofluoromethane	µg/L	31,000	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U		
Vinyl chloride	µg/L	2	< 0.5	U	0.82	J	< 0.5	U	< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U		

Table 2-4
Groundwater Results, 2013–2021

		Location Code	67WW14																							
		Sample ID	67WW14-072514		67WW14-141203		67WW14-120314		67WW14-150210		67WW14-021015		67WW14FD-021015		67WW14-150512		67WW14-051215		67WW14FD-051215		67WW14-151118		67WW14-111815		67WW14-160518		67WW14-051816	
		Sample Date	7/25/2014		12/3/2014		12/3/2014		2/10/2015		2/10/2015		2/10/2015		5/12/2015		5/12/2015		5/12/2015		11/18/2015		11/18/2015		5/18/2016		5/18/2016	
		Sample Purpose	REG		REG		REG		REG		REG		FD		REG		REG		FD		REG		REG		REG		REG	
Parameter	Units	MCL/GW-Ind	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
ANIONS																										
Chloride	mg/L	NV																								
Nitrate	mg/L	10																								
Nitrite	mg/L	1																								
Sulfate	mg/L	NV																								
Sulfide	mg/L	NV																								
TOTAL ORGANIC CARBON																										
Total Inorganic Carbon	mg/L	NV																								
Total Organic Carbon	mg/L	NV																								
DHC																										
BVC	cells/mL	NV																								
Dehalococcoides	cells/mL	NV																								
FIELD TESTS																										
Specific conductivity	µmhos/cm	NV	1.66		1.52		1.52		1.51		1.51				1.47		1.47				2.25		2.25		0.021		0.021	
Dissolved oxygen	mg/L	NV	0.12		0		0		0.63		0.63				0.68		0.68				0.52		0.52		1.04		1.04	
Ferrous Iron	NA	NV																								
Flow Rate	mL/Min	NV																								
Measured well depth	Ft BTOC	NV																								
Oxidation Reduction Potential	mV	NV	210		-8		-8		-13		-13				158		158				136		136		252		252	
pH	SU	NV	5.34		6.34		6.34		6.79		6.79				5.57		5.57				6.58		6.58		5.36		5.36	
Temperature	C	NV	25.56		20.74		20.74		15.24		15.24				20.48		20.48				21.67		21.67		19.84		19.84	
Total Purge	L	NV																								
Turbidity	NTU	NV	17.3		8.1		8.1		7		7				161		161				6.5		6.5		172		172	
Water Level at Reading Time	Ft BTOC	NV																								
GASES																										
Carbon dioxide	µg/L	NV																								
Ethane	µg/L	NV																								
Ethylene	µg/L	NV																								
Methane	µg/L	NV																								
GENERAL CHEMISTRY																										
Alkalinity	mg/L	NV																								
Ferrous Iron	mg/L	NV																								
SEMIVOLATILES																										
1,4-Dioxane	µg/L	26																								
VOLATILES																										
1,1,1,2-Tetrachloroethane	µg/L	110	< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U
1,1,1-Trichloroethane	µg/L	200	< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U
1,1,2,2-Tetrachloroethane	µg/L	14	< 0.4	U			< 0.4	U			< 0.4	U	< 0.4	U			< 0.4	U	< 0.4	U			< 0.4	U			< 0.4	U
1,1,2-Trichloro-1,2,2-Trifluoroethane	µg/L	3,100,000																								
1,1,2-Trichloroethane	µg/L	5	< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U
1,1-Dichloroethane	µg/L	10,000	0.58	J			0.451	J			0.434	J	0.369	J			0.418	J	0.427	J			3.7				2.15	
1,1-Dichloroethene	µg/L	7	3.57				4.73				3.46		3.61				2.77		2.93				26.3				10.8	
1,1-Dichloropropene	µg/L	3	< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U
1,2,3-Trichlorobenzene	µg/L	310	< 0.3	U			< 0.3	U			< 0.3	U	< 0.3	U			< 0.3	U	< 0.3	U			< 0.3	U			< 0.3	U
1,2,3-Trichloropropane	µg/L	0.04	< 1	U			< 1	U			< 1	U	< 1	U			< 1	U	< 1	U			< 1	U			< 1	U
1,2,4-Trichlorobenzene	µg/L	70	< 0.4	U			< 0.4	U			< 0.4	U	< 0.4	U			< 0.4	U	< 0.4	U			< 0.4	U			< 0.4	U
1,2,4-Trimethylbenzene	µg/L	5,100	< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U
1,2-Dibromo-3-chloropropane	µg/L	0.2	< 2	U			< 2	U			< 2	U	< 2	U			< 2	U	< 2	U			< 2	U			< 2	U
1,2-Dibromoethane	µg/L	0.1	< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U
1,2-Dichlorobenzene	µg/L	600	< 0.25	U			< 0.25	U			< 0.25	U	< 0.25	U			< 0.25	U	< 0.25	U			< 0.25	U			< 0.25	U
1,2-Dichloroethane	µg/L	5	1.31				0.79	J			0.64	J	0.657	J			0.799	J	0.815	J			5.83				3.54	
1,2-Dichloropropane	µg/L	5	< 0.4	U			< 0.4	U			< 0.4	U	< 0.4	U			< 0.4	U	< 0.4	U			< 0.4	U			< 0.4	U
1,3,5-Trimethylbenzene	µg/L	5,100	< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U
1,3-Dichlorobenzene	µg/L	3,100	< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U

Table 2-4
Groundwater Results, 2013–2021

		Location Code	67WW14																							
		Sample ID	67WW14-072514		67WW14-141203		67WW14-120314		67WW14-150210		67WW14-021015		67WW14FD-021015		67WW14-150512		67WW14-051215		67WW14FD-051215		67WW14-151118		67WW14-111815		67WW14-160518		67WW14-051816	
		Sample Date	7/25/2014		12/3/2014		12/3/2014		2/10/2015		2/10/2015		2/10/2015		5/12/2015		5/12/2015		5/12/2015		11/18/2015		11/18/2015		5/18/2016		5/18/2016	
		Sample Purpose	REG		REG		REG		REG		REG		FD		REG		REG		FD		REG		REG		REG		REG	
Parameter	Units	MCL/GW-Ind	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
1,3-Dichloropropane	µg/L	29	< 0.4	U			< 0.4	U			< 0.4	U	< 0.4	U			< 0.4	U	< 0.4	U			< 0.4	U			< 0.4	U
1,4-Dichlorobenzene	µg/L	75	< 0.25	U			< 0.25	U			< 0.25	U	< 0.25	U			< 0.25	U	< 0.25	U			< 0.25	U			< 0.25	U
2,2-Dichloropropane	µg/L	42	< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U
2-Butanone	µg/L	61,000	< 5	U			< 5	U			< 5	U	< 5	U			< 5	U	< 5	U			< 5	U			< 5	U
2-Chlorotoluene	µg/L	2,000	< 0.25	U			< 0.25	U			< 0.25	U	< 0.25	U			< 0.25	U	< 0.25	U			< 0.25	U			< 0.25	U
2-Hexanone	µg/L	6,100	< 5	U			< 5	U			< 5	U	< 5	U			< 5	UJ	< 5	UJ			< 5	U			< 5	U
4-Chlorotoluene	µg/L	2,000	< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U
Acetone	µg/L	92,000	< 5	U			< 5	U			< 5	U	< 5	U			4	J	< 5	U			< 5	U			< 5	U
Benzene	µg/L	5	< 0.25	U			< 0.25	U			< 0.25	U	< 0.25	U			< 0.25	U	< 0.25	U			< 0.25	U			< 0.25	U
Bromobenzene	µg/L	2,000	< 0.25	U			< 0.25	U			< 0.25	U	< 0.25	U			< 0.25	U	< 0.25	U			< 0.25	U			< 0.25	U
Bromochloromethane	µg/L	4,100	< 0.4	U			< 0.4	U			< 0.4	U	< 0.4	U			< 0.4	U	< 0.4	U			< 0.4	U			< 0.4	U
Bromodichloromethane	µg/L	5	< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U
Bromoform	µg/L	36	< 1	U			< 1	U			< 1	U	< 1	U			< 1	U	< 1	U			< 1	U			< 1	U
Bromomethane	µg/L	140	< 1	U			< 1	U			< 1	U	< 1	UJ			< 1	U	< 1	U			< 1	U			< 1	UJ
Carbon disulfide	µg/L	10,000	< 1	U			< 1	U			< 1	U	< 1	U			< 1	U	< 1	U			< 1	U			< 1	U
Carbon tetrachloride	µg/L	5	< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U
Chlorobenzene	µg/L	100	< 0.25	U			< 0.25	U			< 0.25	U	< 0.25	U			< 0.25	U	< 0.25	U			< 0.25	U			< 0.25	U
Chloroethane	µg/L	41,000	< 1	U			< 1	U			< 1	U	< 1	U			< 1	U	< 1	U			< 1	U			< 1	U
Chloroform	µg/L	1,000	< 0.25	U			< 0.25	U			< 0.25	U	< 0.25	U			< 0.25	U	< 0.25	U			< 0.25	U			< 0.25	U
Chloromethane	µg/L	220	< 1	U			< 1	U			< 1	U	< 1	U			< 1	U	< 1	U			< 1	U			< 1	U
cis-1,2-Dichloroethene	µg/L	70	< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U
cis-1,3-Dichloropropene	µg/L	5	< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U
Dibromochloromethane	µg/L	34	< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U
Dibromomethane	µg/L	380	< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U
Dichlorodifluoromethane	µg/L	20,000	< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U
Ethylbenzene	µg/L	700	< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U
Hexachlorobutadiene	µg/L	20	< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U
Isopropylbenzene	µg/L	10,000	< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U
m,p-Xylenes	µg/L	10,000	< 1	U			< 1	U			< 1	U	< 1	U			< 1	U	< 1	U			< 1	U			< 1	U
Methyl isobutyl ketone	µg/L	8,200	< 5	U			< 5	U			< 5	U	< 5	U			< 5	U	< 5	U			< 5	U			< 5	U
Methylene chloride	µg/L	5	< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U
Naphthalene	µg/L	2,000	< 0.4	U			< 0.4	U			< 0.4	U	< 0.4	U			< 0.4	U	< 0.4	U			< 0.4	U			< 0.4	U
n-Butylbenzene	µg/L	4,100	< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U
n-Propylbenzene	µg/L	4,100	< 0.25	U			< 0.25	U			< 0.25	U	< 0.25	U			< 0.25	U	< 0.25	U			< 0.25	U			< 0.25	U
o-Xylene	µg/L	10,000	< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U
p-Isopropyltoluene	µg/L	10,000	< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U
sec-Butylbenzene	µg/L	4,100	< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U
Styrene	µg/L	100	< 0.25	U			< 0.25	U			< 0.25	U	< 0.25	U			< 0.25	U	< 0.25	U			< 0.25	U			< 0.25	U
tert-Butylbenzene	µg/L	4,100	< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U
Tetrachloroethene	µg/L	5	< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U
Toluene	µg/L	1,000	< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U
trans-1,2-Dichloroethene	µg/L	100	< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U
trans-1,3-Dichloropropene	µg/L	29	< 1	U			< 1	U			< 1	U	< 1	U			< 1	U	< 1	U			< 1	U			< 1	U
Trichloroethene	µg/L	5	< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U
Trichlorofluoromethane	µg/L	31,000	< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U			< 0.5	U
Vinyl chloride	µg/L	2	< 0.5	U			< 0.5	U			< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U			0.297	J			< 0.5	U

Table 2-4
Groundwater Results, 2013–2021

		Location Code	67WW14														67WW15											
		Sample ID	67WW14-112717		67WW14-180502		67WW14-181022		67WW14-190502		67WW14-191024		67WW14-201102		67WW14-211110		67WW15-160519		67WW15-051916		67WW15-112717		67WW15-180502		67WW15-181023		67WW15-190503	
		Sample Date	11/27/2017		5/2/2018		10/22/2018		5/2/2019		10/24/2019		11/2/2020		11/10/2021		5/19/2016		5/19/2016		11/27/2017		5/2/2018		10/23/2018		5/3/2019	
		Sample Purpose	REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG	
Parameter	Units	MCL/GW-Ind	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
ANIONS																												
Chloride	mg/L	NV																										
Nitrate	mg/L	10																										
Nitrite	mg/L	1																										
Sulfate	mg/L	NV																										
Sulfide	mg/L	NV																										
TOTAL ORGANIC CARBON																												
Total Inorganic Carbon	mg/L	NV																										
Total Organic Carbon	mg/L	NV																										
DHC																												
BVC	cells/mL	NV																										
Dehalococcoides	cells/mL	NV																										
FIELD TESTS																												
Specific conductivity	µmhos/cm	NV	2.09		1.66		2.09		2.17		2.31		2.64		1.82		2.45		2.45		1.52		1.44		1.8		1.93	
Dissolved oxygen	mg/L	NV	1.17		0		0.66		0.27		0.15		0.25		0.58		1.5		1.5		2.2		0		0.16		2.85	
Ferrous Iron	NA	NV																										
Flow Rate	mL/Min	NV	100		100		100		100		100		100								100		100		100		100	
Measured well depth	Ft BTOC	NV	30.58		30.55		30.47		30.62		30.52										47.4		47.35		47.59		47.43	
Oxidation Reduction Potential	mV	NV	250		372		274		228		-44		47		28		228		228		321		395		253		231	
pH	SU	NV	5.85		5.73		5.76		5.89		6.19		5.60		6.09		5.58		5.58		5.28		5.28		5.61		5.43	
Temperature	C	NV	19.19		21.65		21.68		20.83		17.99		16.43		15.58		18.7		18.7		18.3		19.54		18.06		20.33	
Total Purge	L	NV	0.91		2.5		3.0		3		3		3.0								0.65		3		3.0		3	
Turbidity	NTU	NV	20.7		7.2		0		30.6		3.7		0		9		6.8		6.8		40.3		14.2		2.1		0	
Water Level at Reading Time	Ft BTOC	NV	20.75		19.98		21.08		19.02		19.62		18.81								23.96		23.21		24.44		22.23	
GASES																												
Carbon dioxide	µg/L	NV																										
Ethane	µg/L	NV																										
Ethylene	µg/L	NV																										
Methane	µg/L	NV																										
GENERAL CHEMISTRY																												
Alkalinity	mg/L	NV																										
Ferrous Iron	mg/L	NV																										
SEMIVOLATILES																												
1,4-Dioxane	µg/L	26	17																		12							
VOLATILES																												
1,1,1,2-Tetrachloroethane	µg/L	110	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 10	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U
1,1,1-Trichloroethane	µg/L	200	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 10	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U
1,1,2,2-Tetrachloroethane	µg/L	14	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 8	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U
1,1,2-Trichloro-1,2,2-Trifluoroethane	µg/L	3,100,000	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U					< 1	U	< 0.5	U	< 0.5	U	< 0.5	U
1,1,2-Trichloroethane	µg/L	5	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			22.7		5.6		5.6		6		5.4	
1,1-Dichloroethane	µg/L	10,000	< 1	U	< 0.5	U	1.3		1.4		1.8		1.2		0.89	J			46		11		10		13		9.2	
1,1-Dichloroethene	µg/L	7	5.6		4.2		6.6		5.3		7.4		4.9		3				2,460		510		380		670		330	
1,1-Dichloropropene	µg/L	3	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U
1,2,3-Trichlorobenzene	µg/L	310	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U			< 0.3	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U
1,2,3-Trichloropropane	µg/L	0.04	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U			< 20	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U
1,2,4-Trichlorobenzene	µg/L	70	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U			< 0.4	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U
1,2,4-Trimethylbenzene	µg/L	5,100	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 10	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U
1,2-Dibromo-3-chloropropane	µg/L	0.2	< 1	U	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			52.6	J	< 1	U	< 0.5	U	< 1	U	< 0.5	U
1,2-Dibromoethane	µg/L	0.1	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 10	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U
1,2-Dichlorobenzene	µg/L	600	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U			< 5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U
1,2-Dichloroethane	µg/L	5	3.1		1.9		2.5		1.8		1.5		< 0.5	U	0.58	J			117		27		26		30		22	
1,2-Dichloropropane	µg/L	5	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 0.4	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U
1,3,5-Trimethylbenzene	µg/L	5,100	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U
1,3-Dichlorobenzene	µg/L	3,100	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U

Table 2-4
Groundwater Results, 2013–2021

	Location Code	67WW14														67WW15									
	Sample ID	67WW14-112717		67WW14-180502		67WW14-181022		67WW14-190502		67WW14-191024		67WW14-201102		67WW14-211110		67WW15-160519		67WW15-051916		67WW15-112717		67WW15-180502		67WW15-181023		67WW15-190503	
	Sample Date	11/27/2017		5/2/2018		10/22/2018		5/2/2019		10/24/2019		11/2/2020		11/10/2021		5/19/2016		5/19/2016		11/27/2017		5/2/2018		10/23/2018		5/3/2019	
	Sample Purpose	REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG	
Parameter	Units	MCL/GW-Ind	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
1,3-Dichloropropane	µg/L	29	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 0.4	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U
1,4-Dichlorobenzene	µg/L	75	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U			< 5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U
2,2-Dichloropropane	µg/L	42	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U
2-Butanone	µg/L	61,000	< 2	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U			< 100	U	< 2	U	< 1	U	< 1	U	< 1	U
2-Chlorotoluene	µg/L	2,000	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 0.25	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U
2-Hexanone	µg/L	6,100	< 2	U	< 1	U	< 1	U	< 1	U	< 1	U	< 2	U	< 2	U			< 100	U	< 2	U	< 1	U	< 1	U	< 1	U
4-Chlorotoluene	µg/L	2,000	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U			< 10	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U
Acetone	µg/L	92,000	< 2	U	< 1	U	< 2	U	< 1	U	< 1	U	< 1	U	< 2	U			< 100	U	< 2	U	< 1	U	< 2	U	< 1	U
Benzene	µg/L	5	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U
Bromobenzene	µg/L	2,000	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U			< 5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U
Bromochloromethane	µg/L	4,100	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 8	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U
Bromodichloromethane	µg/L	5	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 10	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U
Bromoform	µg/L	36	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U
Bromomethane	µg/L	140	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 20	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U
Carbon disulfide	µg/L	10,000	< 2	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 2	U			< 20	U	< 2	U	< 1	U	< 1	U	< 1	U
Carbon tetrachloride	µg/L	5	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U
Chlorobenzene	µg/L	100	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U
Chloroethane	µg/L	41,000	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U
Chloroform	µg/L	1,000	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U
Chloromethane	µg/L	220	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 20	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U
cis-1,2-Dichloroethene	µg/L	70	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			6.1	J	1.5		1.3		1.7		1.3	
cis-1,3-Dichloropropene	µg/L	5	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U
Dibromochloromethane	µg/L	34	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U
Dibromomethane	µg/L	380	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 10	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U
Dichlorodifluoromethane	µg/L	20,000	< 1	U	< 0.5	U	< 0.5	UJ	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 10	U	< 1	U	< 0.5	U	< 0.5	UJ	< 0.5	U
Ethylbenzene	µg/L	700	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 10	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U
Hexachlorobutadiene	µg/L	20	< 1	U	< 0.5	U	< 1	U	< 1	U	< 0.5	U	< 1	U	< 1	U			< 0.5	UJ	< 1	U	< 0.5	U	< 1	U	< 1	U
Isopropylbenzene	µg/L	10,000	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 10	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U
m,p-Xylenes	µg/L	10,000	< 2	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U			< 1	U	< 2	U	< 1	U	< 1	U	< 1	U
Methyl isobutyl ketone	µg/L	8,200	< 2	U	< 1	U	< 1	U	< 1	U	< 1	U	< 2	U	< 2	U			< 100	U	< 2	U	< 1	U	< 1	U	< 1	U
Methylene chloride	µg/L	5	< 2	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U			< 0.5	U	< 2	U	< 1	U	< 1	U	< 1	U
Naphthalene	µg/L	2,000	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			36.7		< 1	U	< 0.5	U	< 0.5	U	< 0.5	U
n-Butylbenzene	µg/L	4,100	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U			< 10	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U
n-Propylbenzene	µg/L	4,100	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 0.25	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U
o-Xylene	µg/L	10,000	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U
p-Isopropyltoluene	µg/L	10,000	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U
sec-Butylbenzene	µg/L	4,100	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U
Styrene	µg/L	100	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U
tert-Butylbenzene	µg/L	4,100	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 10	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U
Tetrachloroethene	µg/L	5	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 10	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U
Toluene	µg/L	1,000	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 10	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U
trans-1,2-Dichloroethene	µg/L	100	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U
trans-1,3-Dichloropropene	µg/L	29	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U
Trichloroethene	µg/L	5	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			5.48	J	< 1	U	1.2		1.4		1.1	
Trichlorofluoromethane	µg/L	31,000	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U
Vinyl chloride	µg/L	2	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			1.07		< 1	U	< 0.5	U	< 0.5	U	< 0.5	U

Table 2-4
Groundwater Results, 2013–2021

		Location Code	67WW15						67WW16I																67WW17	
		Sample ID	67WW15-191024		67WW15-201103		67WW15-211111		67WW16-160518		67WW16-051816		67WW16I-112917		67WW16I-180503		67WW16I-181025		67WW16I-190501		67WW16I-191024		67WW16I-201103		67WW16I-211111		67WW17-191024	
		Sample Date	10/24/2019		11/3/2020		11/11/2021		5/18/2016		5/18/2016		11/29/2017		5/3/2018		10/25/2018		5/1/2019		10/24/2019		11/3/2020		11/11/2021		10/24/2019	
		Sample Purpose	REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG	
Parameter	Units	MCL/GW-Ind	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
ANIONS																												
Chloride	mg/L	NV																										
Nitrate	mg/L	10																										
Nitrite	mg/L	1																										
Sulfate	mg/L	NV																										
Sulfide	mg/L	NV																										
TOTAL ORGANIC CARBON																												
Total Inorganic Carbon	mg/L	NV																										
Total Organic Carbon	mg/L	NV																										
DHC																												
BVC	cells/mL	NV																										
Dehalococcoides	cells/mL	NV																										
FIELD TESTS																												
Specific conductivity	µmhos/cm	NV	1.80		1.90		1.89		1.53		1.53		1.43		0.982		1.53		1.50		1.32		1.43		1.27		2.36	
Dissolved oxygen	mg/L	NV	0.03		0.56		0.69		0.37		0.37		0.41		0		0.14		1.63		0.06		0.14		0.77		0.95	
Ferrous Iron	NA	NV																										
Flow Rate	mL/Min	NV	100		100								100		100		100		100		100		100				100	
Measured well depth	Ft BTOC	NV	47.3										80.38		80.23		80.49		80.38		80.42						29.04	
Oxidation Reduction Potential	mV	NV	230		224		263		94		94		-2		84		41		18		-53		1		92		87	
pH	SU	NV	5.69		5.37		5.43		4.99		4.99		6.26		6.20		6.24		5.35		5.88		6.41		5.61		6.65	
Temperature	C	NV	21.62		16.91		19.31		18.98		18.98		19.76		19.31		17.69		22.48		21.45		18.41		17.81		20.4	
Total Purge	L	NV	3.5		3								0.78		2.5		3		3.0		3.0		3.0				3.0	
Turbidity	NTU	NV	0		0		4.4		8.7		8.7		6.3		4.2		7.6		1.9		5.8		1.5		33.7		0	
Water Level at Reading Time	Ft BTOC	NV	22.95		21.92								25		22.83		24.22		21.98		22.87		21.84				23.88	
GASES																												
Carbon dioxide	µg/L	NV																										
Ethane	µg/L	NV																										
Ethylene	µg/L	NV																										
Methane	µg/L	NV																										
GENERAL CHEMISTRY																												
Alkalinity	mg/L	NV																										
Ferrous Iron	mg/L	NV																										
SEMIVOLATILES																												
1,4-Dioxane	µg/L	26											0.33															
VOLATILES																												
1,1,1,2-Tetrachloroethane	µg/L	110	< 0.5	U	< 0.5	U	< 1	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 0.5	U
1,1,1-Trichloroethane	µg/L	200	< 0.5	U	< 0.5	U	< 0.5	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,1,2,2-Tetrachloroethane	µg/L	14	< 0.5	U	< 0.5	U	< 1	U			< 0.4	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 0.5	U
1,1,2-Trichloro-1,2,2-Trifluoroethane	µg/L	3,100,000	< 0.5	U	< 1	U	< 1	U					< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U	< 0.5	U
1,1,2-Trichloroethane	µg/L	5	6.4		6.4		5.7				< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 0.5	U
1,1-Dichloroethane	µg/L	10,000	13		14		31				< 0.25	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,1-Dichloroethene	µg/L	7	640	J	730		420				< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,1-Dichloropropene	µg/L	3	< 0.5	U	< 0.5	U	< 1	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 0.5	U
1,2,3-Trichlorobenzene	µg/L	310	< 0.5	UJ	< 1	U	< 1	U			< 0.3	U	< 1	U	< 0.5	U	< 0.5	UJ	< 0.5	U	< 0.5	UJ	< 1	U	< 1	U	< 0.5	U
1,2,3-Trichloropropane	µg/L	0.04	< 0.5	U	< 1	U	< 1	U			< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U	< 0.5	U
1,2,4-Trichlorobenzene	µg/L	70	< 0.5	U	< 1	U	< 1	U			< 0.4	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U	< 0.5	U
1,2,4-Trimethylbenzene	µg/L	5,100	< 0.5	U	< 0.5	U	< 1	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 0.5	U
1,2-Dibromo-3-chloropropane	µg/L	0.2	< 0.5	U	< 0.5	U	< 1	U			< 2	U	< 1	U	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 0.5	U
1,2-Dibromoethane	µg/L	0.1	< 0.5	U	< 0.5	U	< 0.5	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,2-Dichlorobenzene	µg/L	600	< 0.5	U	< 1	U	< 1	U			< 0.25	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U	< 0.5	U
1,2-Dichloroethane	µg/L	5	27		29		43				< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,2-Dichloropropane	µg/L	5	< 0.5	U	< 0.5	U	< 1	U			< 0.4	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 0.5	U
1,3,5-Trimethylbenzene	µg/L	5,100	< 0.5	U	< 0.5	U	< 1	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 0.5	U
1,3-Dichlorobenzene	µg/L	3,100	< 0.5	U	< 1	U	< 1	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U	< 0.5	U

Table 2-4
Groundwater Results, 2013–2021

		Location Code	67WW15						67WW16I																67WW17	
		Sample ID	67WW15-191024		67WW15-201103		67WW15-211111		67WW16-160518		67WW16-051816		67WW16I-112917		67WW16I-180503		67WW16I-181025		67WW16I-190501		67WW16I-191024		67WW16I-201103		67WW16I-211111		67WW17-191024	
		Sample Date	10/24/2019		11/3/2020		11/11/2021		5/18/2016		5/18/2016		11/29/2017		5/3/2018		10/25/2018		5/1/2019		10/24/2019		11/3/2020		11/11/2021		10/24/2019	
		Sample Purpose	REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG		REG	
Parameter	Units	MCL/GW-Ind	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
1,3-Dichloropropane	µg/L	29	< 0.5	U	< 0.5	U	< 1	U			< 0.4	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 0.5	U
1,4-Dichlorobenzene	µg/L	75	< 0.5	U	< 1	U	< 1	U			< 0.25	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U	< 0.5	U
2,2-Dichloropropane	µg/L	42	< 0.5	U	< 0.5	U	< 0.5	UJ			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	UJ	< 0.5	U
2-Butanone	µg/L	61,000	< 1	U	< 1	U	< 1	U			< 5	U	< 2	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U
2-Chlorotoluene	µg/L	2,000	< 0.5	U	< 0.5	U	< 1	U			< 0.25	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 0.5	U
2-Hexanone	µg/L	6,100	< 1	U	< 2	U	< 2	U			< 5	U	< 2	U	< 1	U	< 1	U	< 1	U	< 1	U	< 2	U	< 2	U	< 1	U
4-Chlorotoluene	µg/L	2,000	< 0.5	U	< 1	U	< 1	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U	< 0.5	U
Acetone	µg/L	92,000	< 1	U	< 1	U	< 2	U			< 5	U	< 2	U	< 1	U	< 2	U	3.3		< 1	U	< 1	U	< 2	U	< 1	U
Benzene	µg/L	5	< 0.5	U	< 0.5	U	< 0.5	U			< 0.25	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Bromobenzene	µg/L	2,000	< 0.5	U	< 1	U	< 1	U			< 0.25	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U	< 0.5	U
Bromochloromethane	µg/L	4,100	< 0.5	U	< 0.5	U	< 0.5	U			< 0.4	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Bromodichloromethane	µg/L	5	< 0.5	U	< 0.5	U	< 0.5	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Bromoform	µg/L	36	< 0.5	U	< 0.5	U	< 1	U			< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	2.3	
Bromomethane	µg/L	140	< 0.5	U	< 0.5	U	< 1	U			< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 0.5	U
Carbon disulfide	µg/L	10,000	< 1	U	< 1	U	< 2	U			< 1	U	< 2	U	< 1	U	< 1	U	0.9	J	< 1	U	< 1	U	< 2	U	< 1	U
Carbon tetrachloride	µg/L	5	< 0.5	U	< 0.5	U	< 1	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 0.5	U
Chlorobenzene	µg/L	100	< 0.5	U	< 0.5	U	< 1	U			< 0.25	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 0.5	U
Chloroethane	µg/L	41,000	< 0.5	U	< 0.5	U	< 1	U			< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 0.5	U
Chloroform	µg/L	1,000	< 0.5	U	< 0.5	U	< 0.5	U			< 0.25	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Chloromethane	µg/L	220	< 0.5	U	< 0.5	U	< 0.5	U			< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
cis-1,2-Dichloroethene	µg/L	70	1.7		1.7		1.6				< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
cis-1,3-Dichloropropene	µg/L	5	< 0.5	U	< 0.5	U	< 0.5	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Dibromochloromethane	µg/L	34	< 0.5	U	< 0.5	U	< 1	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	2.2	
Dibromomethane	µg/L	380	< 0.5	U	< 0.5	U	< 0.5	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	0.72	J
Dichlorodifluoromethane	µg/L	20,000	< 0.5	U	< 0.5	U	< 1	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 0.5	U
Ethylbenzene	µg/L	700	< 0.5	U	< 0.5	U	< 1	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 0.5	U
Hexachlorobutadiene	µg/L	20	< 0.5	U	< 1	U	< 1	U			< 0.5	U	< 1	U	< 0.5	U	< 1	U	< 1	U	< 0.5	U	< 1	U	< 1	U	< 0.5	U
Isopropylbenzene	µg/L	10,000	< 0.5	U	< 0.5	U	< 1	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 0.5	U
m,p-Xylenes	µg/L	10,000	< 1	U	< 1	U	< 1	U			< 1	U	< 2	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U
Methyl isobutyl ketone	µg/L	8,200	< 1	U	< 2	U	< 2	U			< 5	U	< 2	U	< 1	U	< 1	U	< 1	U	< 1	U	< 2	U	< 2	U	< 1	U
Methylene chloride	µg/L	5	< 1	U	< 1	U	< 2	U			< 0.5	U	< 2	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U
Naphthalene	µg/L	2,000	< 0.5	UJ	< 0.5	U	< 1	U			< 0.4	U	< 1	U	< 0.5	U	< 0.5	UJ	< 0.5	U	< 0.5	UJ	< 0.5	U	< 1	U	< 0.5	U
n-Butylbenzene	µg/L	4,100	< 0.5	U	< 1	U	< 1	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U	< 0.5	U
n-Propylbenzene	µg/L	4,100	< 0.5	U	< 0.5	U	< 1	U			< 0.25	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 0.5	U
o-Xylene	µg/L	10,000	< 0.5	U	< 0.5	U	< 1	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 0.5	U
p-Isopropyltoluene	µg/L	10,000	< 0.5	U	< 0.5	U	< 1	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 0.5	U
sec-Butylbenzene	µg/L	4,100	< 0.5	U	< 0.5	U	< 1	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 0.5	U
Styrene	µg/L	100	< 0.5	U	< 0.5	U	< 1	U			< 0.25	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 0.5	U
tert-Butylbenzene	µg/L	4,100	< 0.5	U	< 0.5	U	< 1	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 0.5	U
Tetrachloroethene	µg/L	5	< 0.5	U	< 0.5	U	< 1	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 0.5	U
Toluene	µg/L	1,000	< 0.5	U	< 0.5	U	< 0.5	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
trans-1,2-Dichloroethene	µg/L	100	< 0.5	U	< 0.5	U	< 0.5	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
trans-1,3-Dichloropropene	µg/L	29	< 0.5	U	< 0.5	U	< 0.5	U			< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Trichloroethene	µg/L	5	1.5		2		2.2				< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Trichlorofluoromethane	µg/L	31,000	< 0.5	U	< 0.5	U	< 1	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 0.5	U
Vinyl chloride	µg/L	2	< 0.5	U	< 0.5	U	< 0.5	U			< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U

Table 2-4
Groundwater Results, 2013–2021

		Location Code	67WW17						67WW18							
		Sample ID	67WW17-201102		67WW17-201102-FD		67WW17-211110		67WW18-191024		67WW18-191024-FD		67WW18-201102		67WW18-211110	
		Sample Date	11/2/2020		11/2/2020		11/10/2021		10/24/2019		10/24/2019		11/2/2020		11/10/2021	
		Sample Purpose	REG		FD		REG		REG		FD		REG		REG	
Parameter	Units	MCL/GW-Ind	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
ANIONS																
Chloride	mg/L	NV														
Nitrate	mg/L	10														
Nitrite	mg/L	1														
Sulfate	mg/L	NV														
Sulfide	mg/L	NV														
TOTAL ORGANIC CARBON																
Total Inorganic Carbon	mg/L	NV														
Total Organic Carbon	mg/L	NV														
DHC																
BVC	cells/mL	NV														
Dehalococcoides	cells/mL	NV														
FIELD TESTS																
Specific conductivity	µmhos/cm	NV	3.15				3.29		0.974				1.14		1.1	
Dissolved oxygen	mg/L	NV	0.76				0.25		1.54				0.36		0.63	
Ferrous Iron	NA	NV														
Flow Rate	mL/Min	NV	100						100				100			
Measured well depth	Ft BTOC	NV							43.58							
Oxidation Reduction Potential	mV	NV	96				184		125				63		174	
pH	SU	NV	5.76				5.94		6.52				5.92		5.73	
Temperature	C	NV	18.46				18.72		20.26				19.07		18.79	
Total Purge	L	NV	3.0						3.5				3.0			
Turbidity	NTU	NV	0				28.4		8.1				0		4.4	
Water Level at Reading Time	Ft BTOC	NV	22.72						23.81				21.71			
GASES																
Carbon dioxide	µg/L	NV														
Ethane	µg/L	NV														
Ethylene	µg/L	NV														
Methane	µg/L	NV														
GENERAL CHEMISTRY																
Alkalinity	mg/L	NV														
Ferrous Iron	mg/L	NV														
SEMIVOLATILES																
1,4-Dioxane	µg/L	26														
VOLATILES																
1,1,1,2-Tetrachloroethane	µg/L	110	< 0.5	U	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U
1,1,1-Trichloroethane	µg/L	200	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,1,2,2-Tetrachloroethane	µg/L	14	< 0.5	U	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U
1,1,2-Trichloro-1,2,2-Trifluoroethane	µg/L	3,100,000	< 1	U	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U
1,1,2-Trichloroethane	µg/L	5	< 0.5	U	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U
1,1-Dichloroethane	µg/L	10,000	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,1-Dichloroethene	µg/L	7	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,1-Dichloropropene	µg/L	3	< 0.5	U	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U
1,2,3-Trichlorobenzene	µg/L	310	< 1	U	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U
1,2,3-Trichloropropane	µg/L	0.04	< 1	U	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U
1,2,4-Trichlorobenzene	µg/L	70	< 1	U	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U
1,2,4-Trimethylbenzene	µg/L	5,100	< 0.5	U	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U
1,2-Dibromo-3-chloropropane	µg/L	0.2	< 0.5	U	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U
1,2-Dibromoethane	µg/L	0.1	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,2-Dichlorobenzene	µg/L	600	< 1	U	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U
1,2-Dichloroethane	µg/L	5	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
1,2-Dichloropropane	µg/L	5	< 0.5	U	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U
1,3,5-Trimethylbenzene	µg/L	5,100	< 0.5	U	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U
1,3-Dichlorobenzene	µg/L	3,100	< 1	U	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U

Table 2-4
Groundwater Results, 2013–2021

		Location Code	67WW17						67WW18							
		Sample ID	67WW17-201102		67WW17-201102-FD		67WW17-211110		67WW18-191024		67WW18-191024-FD		67WW18-201102		67WW18-211110	
		Sample Date	11/2/2020		11/2/2020		11/10/2021		10/24/2019		10/24/2019		11/2/2020		11/10/2021	
		Sample Purpose	REG		FD		REG		REG		FD		REG		REG	
Parameter	Units	MCL/GW-Ind	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
1,3-Dichloropropane	µg/L	29	< 0.5	U	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U
1,4-Dichlorobenzene	µg/L	75	< 1	U	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U
2,2-Dichloropropane	µg/L	42	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
2-Butanone	µg/L	61,000	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U
2-Chlorotoluene	µg/L	2,000	< 0.5	U	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U
2-Hexanone	µg/L	6,100	< 2	U	< 2	U	< 2	U	< 1	U	< 1	U	< 2	U	< 2	U
4-Chlorotoluene	µg/L	2,000	< 1	U	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U
Acetone	µg/L	92,000	< 1	U	< 1	U	< 2	U	< 1	U	< 1	U	< 1	U	< 2	U
Benzene	µg/L	5	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Bromobenzene	µg/L	2,000	< 1	U	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U
Bromochloromethane	µg/L	4,100	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Bromodichloromethane	µg/L	5	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Bromoform	µg/L	36	< 0.5	U	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U
Bromomethane	µg/L	140	< 0.5	U	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U
Carbon disulfide	µg/L	10,000	< 1	U	< 1	U	< 2	U	< 1	U	< 1	U	< 1	U	< 2	U
Carbon tetrachloride	µg/L	5	< 0.5	U	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U
Chlorobenzene	µg/L	100	< 0.5	U	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U
Chloroethane	µg/L	41,000	< 0.5	U	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U
Chloroform	µg/L	1,000	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Chloromethane	µg/L	220	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
cis-1,2-Dichloroethene	µg/L	70	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
cis-1,3-Dichloropropene	µg/L	5	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Dibromochloromethane	µg/L	34	< 0.5	U	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U
Dibromomethane	µg/L	380	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Dichlorodifluoromethane	µg/L	20,000	< 0.5	U	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U
Ethylbenzene	µg/L	700	< 0.5	U	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U
Hexachlorobutadiene	µg/L	20	< 1	U	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U
Isopropylbenzene	µg/L	10,000	< 0.5	U	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U
m,p-Xylenes	µg/L	10,000	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U
Methyl isobutyl ketone	µg/L	8,200	< 2	U	< 2	U	< 2	U	< 1	U	< 1	U	< 2	U	< 2	U
Methylene chloride	µg/L	5	< 1	U	< 1	U	< 2	U	< 1	U	< 1	U	< 1	U	< 1	U
Naphthalene	µg/L	2,000	< 0.5	U	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U
n-Butylbenzene	µg/L	4,100	< 1	U	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U
n-Propylbenzene	µg/L	4,100	< 0.5	U	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U
o-Xylene	µg/L	10,000	< 0.5	U	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U
p-Isopropyltoluene	µg/L	10,000	< 0.5	U	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U
sec-Butylbenzene	µg/L	4,100	< 0.5	U	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U
Styrene	µg/L	100	< 0.5	U	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U
tert-Butylbenzene	µg/L	4,100	< 0.5	U	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U
Tetrachloroethene	µg/L	5	< 0.5	U	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U
Toluene	µg/L	1,000	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
trans-1,2-Dichloroethene	µg/L	100	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
trans-1,3-Dichloropropene	µg/L	29	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Trichloroethene	µg/L	5	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Trichlorofluoromethane	µg/L	31,000	< 0.5	U	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U
Vinyl chloride	µg/L	2	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U

Notes:

Bold and highlighted results indicate analyte is above the MCL/GW-Ind.

°C - degrees Celsius

µg/L - micrograms per liter

µmhos/cm - micromhos per centimeter

µS/cm - microsiemens per centimeter

< The analyte was not detected above the detection limit shown.

J - estimated value

U - Not detected; The analyte was analyzed for but not detected above the associated method detection limit.

cells/mL - cells per milliliter

CEQ/mL - cell equivalence per milliliter

FD - field duplicate

Ft BTOC - feet below top of casting

GW-Ind - groundwater medium-specific concentration for industrial use

ID - identifier

MCL - maximum contaminant level

mg/L - milligrams per liter

mL/Min - milliliters per minute

mS/cm - millisiemens per centimeter

mV - millivolts

NTU - nephelometric turbidity unit

NV - no value established

REG - regular sample

SU - standard unit

Val Qual - validation qualifier

Table E.28 - PFAS

ARCADIS

Table 7-1 Groundwater PFOS, PFOA, PFBS, PFNA, and PFHxS Analytical Results
USAEC PFAS Preliminary Assessment/Site Inspection
Former Longhorn Army Ammuntion Plant, Texas

AOPI	Location	Sample/ Duplicate ID	Sample Date	Analyte	PFOS (ng/L)		PFOA (ng/L)		PFBS (ng/L)		PFNA (ng/L)		PFHxS (ng/L)	
				OSD Tapwater Risk Screening Level	4		6		601		6		39	
				Sample Type	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Old and New Fire Stations (Buildings 709 and 710)	LHAAP-LHSMW01	LHAAP-LHSMW01-111122	11/11/2022	N	**4.8**		**29**		3.5	U	**700**		**5.2**	
	LHAAP-ONFS-GW-01	LHAAP-ONFS-GW-01-112822	11/28/2022	N	**11**	J+	**25**		3.4	U	**5.6**		3.4	U
	LHAAP-ONFS-GW-02	LHAAP-ONFS-GW-02-111622	11/16/2022	N	4.3	U	**160**		**6.5**		**18**		**5.7**	
	LHAAP-ONFS-GW-03	LHAAP-ONFS-GW-03-111622	11/16/2022	N	**4.4**		**33**		**2.2**	J	**24**		**2.2**	J
	LHAAP-ONFS-GW-04	LHAAP-ONFS-GW-04-112822	11/28/2022	N	3.5	U	**17**		3.5	U	3.5	U	3.5	U
Building 744-A Vehicle Wash Rack (LHAAP-056)	LHAAP-35AWW06	LHAAP-35AWW06-111422	11/14/2022	N	3.7	U	3.7	U	3.7	U	3.7	U	3.7	U
			11/14/2022	FD	3.5	U	3.5	U	3.5	U	3.5	U	3.5	U
	LHAAP-35AWW16	LHAAP-35AWW16-111122	11/11/2022	N	3.4	U	3.4	U	3.4	U	3.4	U	3.4	U
	LHAAP-35AWW20	LHAAP-35AWW20-111122	11/11/2022	N	3.7	U	**2.3**	J	3.7	U	3.7	U	3.7	U
Plant Area 2 (LHAAP-046)	LHAAP-46WW02	LHAAP-46WW02-113022	11/30/2022	N	**17**		**29**		3.8	U	3.8	U	**4.4**	
	LHAAP-46WW06	LHAAP-46WW06-112822	11/28/2022	N	3.6	U	3.6	U	3.6	U	3.6	U	3.6	U
	LHAAP-LHSMW19	LHAAP-LHSMW19-111222	11/12/2022	N	**2.6**	J	3.9	U	**2.6**	J	3.9	U	3.9	U
	LHAAP-LHSMW21	LHAAP-LHSMW21-111222	11/12/2022	N	3.9	U	3.9	U	3.9	U	3.9	U	3.9	U
	LHAAP-LHSMW23R	LHAAP-LHSMW23R-112822	11/28/2022	N	3.8	U	3.8	U	3.8	U	3.8	U	3.8	U
	LHAAP-LHSMW25	LHAAP-LHSMW25-112822	11/28/2022	N	3.5	U	3.5	U	3.5	U	3.5	U	3.5	U
Plant Area 3 (LHAAP-047)	LHAAP-LHSMW41	LHAAP-LHSMW41-112922	11/29/2022	N	3.7	U	3.7	U	3.7	U	3.7	U	3.7	U
	LHAAP-LHSMW44	LHAAP-LHSMW44-112922	11/29/2022	N	3.6	U	3.6	U	3.6	U	3.6	U	3.6	U
	LHAAP-LHSMW45	LHAAP-LHSMW45-113022	11/30/2022	N	3.9	U	3.9	U	3.9	U	3.9	U	3.9	U
	LHAAP-LHSMW54	LHAAP-LHSMW54-112922	11/29/2022	N	3.7	U	3.7	U	3.7	U	3.7	U	3.7	U
			11/29/2022	FD	3.8	U	3.8	U	3.8	U	3.8	U	3.8	U
	LHAAP-LHSMW56R	LHAAP-LHSMW56R-112922	11/29/2022	N	3.6	U	**85**		3.6	U	3.6	U	3.6	U
	LHAAP-35BWW07	LHAAP-35BWW07-112922	11/29/2022	N	3.7	U	3.7	U	3.7	U	3.7	U	3.7	U
			11/29/2022	FD	3.7	U	3.7	U	3.7	U	3.7	U	3.7	U
	LHAAP-47WW19	LHAAP-47WW19-113022	11/30/2022	N	3.7	U	3.7	U	3.7	U	3.7	U	3.7	U
	LHAAP-47WW42	LHAAP-47WW42-113022	11/30/2022	N	3.7	U	**6.2**		3.7	U	3.7	U	3.7	U
			11/30/2022	FD	3.8	U	**5.3**		3.8	U	3.8	U	3.8	U
	LHAAP-47WW48	LHAAP-47WW48-112922	11/29/2022	N	3.6	U	**2.5**	J	3.6	U	3.6	U	3.6	U
	LHAAP-47WW49	LHAAP-47WW49-113022	11/30/2022	N	5.4	U	5.4	U	5.4	U	5.4	U	5.4	U

Table E.28 - PFAS

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Table 7-1 Groundwater PFOS, PFOA, PFBS, PFNA, and PFHxS Analytical Results
USAEC PFAS Preliminary Assessment/Site Inspection
Former Longhorn Army Ammuntion Plant, Texas

AOPI	Location	Sample/ Duplicate ID	Sample Date	Analyte	PFOS (ng/L)		PFOA (ng/L)		PFBS (ng/L)		PFNA (ng/L)		PFHxS (ng/L)	
				OSD Tapwater Risk Screening Level	4		6		601		6		39	
				Sample Type	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Pilot Wastewater Treatment Plant (LHAAP-004)	LHAAP-04WW01	LHAAP-04WW01-111122	11/11/2022	N	3.8	U	3.8	U	3.8	U	3.8	U	3.8	U
	LHAAP-04WW07	LHAAP-04WW07-111122	11/11/2022	N	3.6	U	3.6	U	3.6	U	3.6	U	3.6	U
	LHAAP-04WW08	LHAAP-04WW08-010523	1/5/2023	N	3.9	U	3.9	U	3.9	U	3.9	U	3.9	U
Former Waste Disposal Facility (LHAAP-050)	LHAAP-50WW12	LHAAP-50WW12-111422	11/14/2022	N	3.7	U	3.7	U	3.7	U	3.7	U	3.7	U
	LHAAP-50WW13	LHAAP-50WW13-111422	11/14/2022	N	3.4	U	**22**		3.4	U	3.4	U	3.4	U
Building 811-1 Hazardous Waste Storage Area (LHAAP-045)	LHAAP-HWSA-GW-01	LHAAP-HWSA-GW-01-112922	11/29/2022	N	4.0	UJ	4.0	UJ	4.0	UJ	4.0	UJ	4.0	UJ
			11/29/2022	FD	5.3	UJ	5.3	UJ	5.3	UJ	5.3	UJ	5.3	UJ
Building 31-W Container Storage Area (LHAAP-009)	LHAAP-CSA-GW-01	LHAAP-CSA-GW-01-112922	11/29/2022	N	3.8	U	3.8	U	3.8	U	3.8	U	3.8	U
			11/29/2022	FD	3.7	U	3.7	U	3.7	U	3.7	U	3.7	U
Burning Ground No. 3 (LHAAP-018)	LHAAP-120	LHAAP-120-111522	11/15/2022	N	**3.4**	J	**7.1**		3.8	U	3.8	U	3.8	U
	LHAAP-18CPTMW04	LHAAP-18CPTMW04-111622	11/16/2022	N	**2.8**	J-	**22**	J-	**3.5**	J-	3.7	UJ-	**2.4**	J-
	LHAAP-18CPTMW23	LHAAP-18CPTMW23-111522	11/15/2022	N	3.5	U	**5.2**		3.5	U	3.5	U	3.5	U
Unlined Evaporation Pond (LHAAP-024)	LHAAP-MW1	LHAAP-MW1-111522	11/15/2022	N	**2.9**	J	**23**		**9.5**		3.5	U	**2.2**	J
	LHAAP-MW2	LHAAP-MW2-111622	11/16/2022	N	**29**		**24**		**11**		3.3	U	**5.3**	
	LHAAP-MW3	LHAAP-MW3-111622	11/16/2022	N	**42**		**9.3**		**1.9**	J	3.8	U	**5.6**	
Landfill 12 (LHAAP-012)	LHAAP-12WW01	LHAAP-12WW01-111522	11/15/2022	N	3.5	U	**17**		3.5	U	3.5	U	3.5	U
	LHAAP-12WW02	LHAAP-12WW02-111522	11/15/2022	N	3.5	U	**3.8**		3.5	U	3.5	U	3.5	U
	LHAAP-12WW24	LHAAP-12WW24-111622	11/16/2022	N	3.5	UJ-	**10**	J-	3.5	UJ-	3.5	UJ-	3.5	UJ-
Landfill 16 (LHAAP-016)	LHAAP-16WW13	LHAAP-16WW13-111622	11/16/2022	N	**8.2**		**620**		3.6	U	3.6	U	**4.6**	
	LHAAP-16WW16	LHAAP-16WW16-111622	11/16/2022	N	3.8	U	**2.1**	J	3.8	U	3.8	U	3.8	U
	LHAAP-16WW36	LHAAP-16WW36-111622	11/16/2022	N	40	U	**95**		40	U	40	U	40	U

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Table 7-1 Groundwater PFOS, PFOA, PFBS, PFNA, and PFHxS Analytical Results
USAEC PFAS Preliminary Assessment/Site Inspection
Former Longhorn Army Ammuntion Plant, Texas

Notes:
1. **Bolded** values indicate the result was detected greater than the limit of detection.
2. Gray shaded values indicate the result was detected greater than the 2022 Office of the Secretary of Defense (OSD) risk screening levels, (OSD. 2022. Memorandum: Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program. July).

Acronyms/Abbreviations:
-- = not applicable
AOPI = area of potential interest
FD = field duplicate sample
ID = identification
N = primary sample
ng/L = nanograms per liter (parts per trillion)
PFAS = per- and polyfluoroalkyl substances
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
PFNA = perfluorononanoic acid
PFHxS = perfluorohexane sulfonate
Qual = qualifier

Qualifier	Description
J	The analyte was positively identified; however the associated numerical value is an estimated concentration only.
J-	The result is an estimated quantity; the result may be biased low.
J+	The result is an estimated quantity; the result may be biased high.
U	The analyte was analyzed for but the result was not detected above the limit of quantitation (LOQ).
UJ	The analyte was analyzed for but was not detected. The reported limit of quantitation (LOQ) is approximate and may be inaccurate or imprecise.
UJ-	The analyte was analyzed for but was not detected. The reported limit of quantitation (LOQ) is approximate and may be inaccurate or imprecise.

Table 7-2 Soil PFOS, PFOA, PFBS, PFNA, and PFHxS Analytical Results
USAEC PFAS Preliminary Assessment/Site Inspection
Former Longhorn Army Ammuntion Plant, Texas

AOPI	Location	Sample ID / Duplicate ID	Sample Date	Analyte	PFOS (mg/kg)		PFOA (mg/kg)		PFBS (mg/kg)		PFNA (mg/kg)		PFHxS (mg/kg)	
				OSD Industrial / Commercial Risk Screening Level	0.16		0.25		25		0.25		1.6	
				OSD Residential Risk Screening Level	0.013		0.019		1.9		0.019		0.13	
				Sample Type	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Old and New Fire Stations (Buildings 709 and 710)	LHAAP-ONFS-SO-01	LHAAP-ONFS-SO-01-111522	11/15/2022	N	0.0012	U	0.0012	U	0.0012	U	0.0012	U	0.0012	U
	LHAAP-ONFS-SO-02	LHAAP-ONFS-SO-02-111522	11/15/2022	N	**0.0013**		0.0010	U	0.0010	U	0.0010	U	0.0010	U
	LHAAP-ONFS-SO-03	LHAAP-ONFS-SO-03-111522	11/15/2022	N	0.0011	U	0.0011	U	0.0011	U	0.0011	U	0.0011	U
	LHAAP-ONFS-SO-04	LHAAP-ONFS-SO-04-111522	11/15/2022	N	0.00096	U	0.00096	U	0.00096	U	0.00096	U	0.00096	U
	LHAAP-ONFS-SO-05	LHAAP-ONFS-SO-05-110822	11/08/2022	N	0.0011	U	0.0011	U	0.0011	U	0.0011	U	0.0011	U
	LHAAP-ONFS-SO-06	LHAAP-ONFS-SO-06-110822	11/08/2022	N	0.0010	U	0.0010	U	0.0010	U	**0.0022**		0.0010	U
Building 744-A Vehicle Wash Rack (LHAAP-056)	LHAAP-VWR-SO-01	LHAAP-VWR-SO-01-110822	11/08/2022	N	0.0010	U	0.0010	U	0.0010	U	0.0010	U	0.0010	U
	LHAAP-VWR-SO-02	LHAAP-VWR-SO-02-110822	11/08/2022	N	0.00096	U	0.00096	U	0.00096	U	0.00096	U	0.00096	U
		LHAAP-FD-1-SO-110822	11/08/2022	FD	0.00099	U	0.00099	U	0.00099	U	0.00099	U	0.00099	U
	LHAAP-VWR-SO-03	LHAAP-VWR-SO-03-111422	11/14/2022	N	0.0010	U	0.0010	U	0.0010	U	0.0010	U	0.0010	U
Plant Area 2 (LHAAP-046)	LHAAP-PA2-SO-01	LHAAP-PA2-SO-01-111522	11/15/2022	N	0.0013	U	0.0013	U	0.0013	U	0.0013	U	0.0013	U
	LHAAP-PA2-SO-02	LHAAP-PA2-SO-02-111022	11/10/2022	N	0.0010	U	0.0010	U	0.0010	U	0.0010	U	0.0010	U
	LHAAP-PA2-SO-03	LHAAP-PA2-SO-03-111522	11/15/2022	N	0.00098	U	0.00098	U	0.00098	U	0.00098	U	0.00098	U
	LHAAP-PA2-SO-04	LHAAP-PA2-SO-04-111522	11/15/2022	N	0.0011	U	0.0011	U	0.0011	U	0.0011	U	0.0011	U
	LHAAP-PA2-SO-05	LHAAP-PA2-SO-05-111522	11/15/2022	N	0.0013	U	0.0013	U	0.0013	U	0.0013	U	0.0013	U
	LHAAP-PA2-SO-06	LHAAP-PA2-SO-06-111022	11/10/2022	N	0.0012	U	0.0012	U	0.0012	U	0.0012	U	0.0012	U
	LHAAP-PA2-SO-07	LHAAP-PA2-SO-07-111122	11/11/2022	N	0.0011	U	0.0011	U	0.0011	U	0.0011	U	0.0011	U
	LHAAP-PA2-SO-08	LHAAP-PA2-SO-08-111122	11/11/2022	N	0.0011	U	0.0011	U	0.0011	U	0.0011	U	0.0011	U
	LHAAP-PA2-SO-09	LHAAP-PA2-SO-09-111122	11/11/2022	N	0.0011	U	0.0011	U	0.0011	U	0.0011	U	0.0011	U
	LHAAP-PA2-SO-10	LHAAP-PA2-SO-10-111122	11/11/2022	N	0.0012	U	0.0012	U	0.0012	U	0.0012	U	0.0012	U
	LHAAP-PA2-SO-11	LHAAP-PA2-SO-11-111022	11/10/2022	N	0.0010	U	0.0010	U	0.0010	U	0.0010	U	0.0010	U
	LHAAP-PA2-SO-12	LHAAP-PA2-SO-12-111022	11/10/2022	N	0.0011	U	0.0011	U	0.0011	U	0.0011	U	0.0011	U
	LHAAP-PA2-SO-13	LHAAP-PA2-SO-13-111022	11/10/2022	N	0.0011	U	0.0011	U	0.0011	U	0.0011	U	0.0011	U
Plant Area 3 (LHAAP-047)	LHAAP-PA3-SO-01	LHAAP-PA3-SO-01-110922	11/09/2022	N	0.0011	U	0.0011	U	0.0011	U	0.0011	U	0.0011	U
	LHAAP-PA3-SO-02	LHAAP-PA3-SO-02-110922	11/09/2022	N	0.00096	U	0.00096	U	0.00096	U	0.00096	U	0.00096	U
	LHAAP-PA3-SO-03	LHAAP-PA3-SO-03-110922	11/09/2022	N	0.0011	U	0.0011	U	0.0011	U	0.0011	U	0.0011	U
	LHAAP-PA3-SO-04	LHAAP-PA3-SO-04-110922	11/09/2022	N	0.0010	U	**0.0014**		0.0010	U	0.0010	U	0.0010	U
		LHAAP-PA3-SO-04-112822	11/28/2022	N	0.0011	U	**0.0011**		0.0011	U	0.0011	U	0.0011	U
	LHAAP-PA3-SO-05	LHAAP-PA3-SO-05-110922	11/09/2022	N	0.0011	U	0.0011	U	0.0011	U	0.0011	U	0.0011	U
	LHAAP-PA3-SO-06	LHAAP-PA3-SO-06-110922	11/09/2022	N	0.00095	U	0.00095	U	0.00095	U	0.00095	U	0.00095	U
	LHAAP-PA3-SO-07	LHAAP-PA3-SO-07-111422	11/14/2022	N	0.00097	U	0.00097	U	0.00097	U	0.00097	U	0.00097	U
	LHAAP-PA3-SO-08	LHAAP-PA3-SO-08-110822	11/08/2022	N	0.0011	U	0.0011	U	0.0011	U	0.0011	U	0.0011	U
	LHAAP-PA3-SO-09	LHAAP-PA3-SO-09-110822	11/08/2022	N	0.00094	U	0.00094	U	0.00094	U	0.00094	U	0.00094	U
		LHAAP-FD-2-SO-110922	11/09/2022	FD	0.0012	U	0.0012	U	0.0012	U	0.0012	U	0.0012	U
	LHAAP-PA3-SO-10	LHAAP-PA3-SO-10-110822	11/08/2022	N	0.0012	U	0.0012	U	0.0012	U	0.0012	U	0.0012	U
	LHAAP-PA3-SO-11	LHAAP-PA3-SO-11-110922	11/09/2022	N	0.0011	U	0.0011	U	0.0011	U	0.0011	U	0.0011	U
	LHAAP-PA3-SO-12	LHAAP-PA3-SO-12-110922	11/09/2022	N	0.0011	U	0.0011	U	0.0011	U	0.0011	U	0.0011	U

Table 7-2 Soil PFOS, PFOA, PFBS, PFNA, and PFHxS Analytical Results
USAEC PFAS Preliminary Assessment/Site Inspection
Former Longhorn Army Ammuntion Plant, Texas

AOPI	Location	Sample ID / Duplicate ID	Sample Date	Analyte	PFOS (mg/kg)		PFOA (mg/kg)		PFBS (mg/kg)		PFNA (mg/kg)		PFHxS (mg/kg)	
				OSD Industrial / Commercial Risk Screening Level	0.16		0.25		25		0.25		1.6	
				OSD Residential Risk Screening Level	0.013		0.019		1.9		0.019		0.13	
				Sample Type	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Former Waste Disposal Facility (LHAAP-050)	LHAAP-FWDF-SO-01	LHAAP-FWDF-SO-01-111122	11/11/2022	N	0.0010	UJ	0.0010	U	0.0010	U	0.0010	U	0.0010	U
	LHAAP-FWDF-SO-02	LHAAP-FWDF-SO-02-110922	11/09/2022	N	0.0012	U	0.0012	U	0.0012	U	0.0012	U	0.0012	U
	LHAAP-FWDF-SO-03	LHAAP-FWDF-SO-03-110922	11/09/2022	N	0.0011	U	0.0011	U	0.0011	U	0.0011	U	0.0011	U
Building 811-1 Hazardous Waste Storage Area (LHAAP-045)	LHAAP-HWSA-SO-01	LHAAP-HWSA-SO-01-111222	11/12/2022	N	0.0011	U	0.0011	U	0.0011	U	0.0011	U	0.0011	U
	LHAAP-HWSA-SO-02	LHAAP-HWSA-SO-02-111222	11/12/2022	N	0.0010	U	0.0010	U	0.0010	U	0.0010	U	0.0010	U
	LHAAP-HWSA-SO-03	LHAAP-HWSA-SO-03-111222	11/12/2022	N	0.0011	U	0.0011	U	0.0011	U	0.0011	U	0.0011	U
Building 31-W Container Storage Area (LHAAP-009)	LHAAP-CSA-SO-01	LHAAP-CSA-SO-01-111422	11/14/2022	N	0.0011	U	0.0011	U	0.0011	U	0.0011	U	0.0011	U
	LHAAP-CSA-SO-02	LHAAP-CSA-SO-02-111422	11/14/2022	N	0.0011	U	0.0011	U	0.0011	U	0.0011	U	0.0011	U
		LHAAP-FD-3-SO-111422	11/14/2022	FD	0.0011	U	0.0011	U	0.0011	U	0.0011	U	0.0011	U
	LHAAP-CSA-SO-03	LHAAP-CSA-SO-03-111422	11/14/2022	N	0.0012	U	0.0012	U	0.0012	U	0.0012	U	0.0012	U
Burning Ground No. 3 (LHAAP-018)	LHAAP-BG3-SO-01	LHAAP-BG3-SO-01-111022	11/10/2022	N	0.0012	U	0.0012	U	0.0012	U	0.0012	U	0.0012	U
	LHAAP-BG3-SO-02	LHAAP-BG3-SO-02-111022	11/10/2022	N	0.0011	U	0.0011	U	0.0011	U	0.0011	U	0.0011	U
	LHAAP-BG3-SO-03	LHAAP-BG3-SO-03-111022	11/10/2022	N	0.0011	U	0.0011	U	0.0011	U	0.0011	U	0.0011	U
	LHAAP-BG3-SO-04	LHAAP-BG3-SO-04-111022	11/10/2022	N	0.0011	U	0.0011	U	0.0011	U	0.0011	U	0.0011	U
	LHAAP-BG3-SO-05	LHAAP-BG3-SO-05-111022	11/10/2022	N	0.00097	U	0.00097	U	0.00097	U	0.00097	U	0.00097	U

Table 7-2 Soil PFOS, PFOA, PFBS, PFNA, and PFHxS Analytical Results
USAEC PFAS Preliminary Assessment/Site Inspection
Former Longhorn Army Ammuntion Plant, Texas

Notes:
1. **Bolded** values indicate the result was detected greater than the limit of detection
2. Data are compared to the Office of the Secretary of Defense (OSD) risk screening levels for both the residential as well as the industrial/commercial scenarios (OSD. 2022. Memorandum: Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program. July).

Acronyms/Abbreviations:
-- = not applicable
AOPI = area of potential interest
FD = field duplicate sample
ID = identification
mg/kg = milligrams per kilogram (parts per million)
N = primary sample
PFAS = per- and polyfluoroalkyl substances
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
PFNA = perfluorononanoic acid
PFHxS = perfluorohexane sulfonate
Qual = qualifier

Qualifier	Description
U	The analyte was analyzed for but the result was not detected above the limit of quantitation (LOQ).
UJ	The analyte was analyzed for but was not detected. The reported limit of quantitation (LOQ) is approximate and may be inaccurate or imprecise.

APPENDIX F
LUC DOCUMENTATION

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LHAAP-04

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Annual Land Use Control Compliance Certification Form

In accordance with the Remedial Design dated _____ for LHAAP-04 an inspection of the site was conducted by APTim [indicate transferee] on 5/27/21.

The land use control mechanisms are:

- Groundwater restrictions - The groundwater underlying LHAAP-04 within the LUC boundary shall not be accessed or used for any purpose (except for environmental monitoring and testing) without the prior written approval of U.S. Army, the USEPA and the TCEQ. The LUC to prohibiting groundwater use shall be implemented and shall remain in place at the site until the levels of contaminants of concern (COCs) in soil and groundwater allow for unlimited use and unrestricted exposure.;
- Land use restrictions - restrict land use within the LUC boundary to nonresidential;
- Integrity of remedial and monitoring systems - maintain the integrity of any current or future remedial or monitoring systems until cleanup goals are met.

No unauthorized activities or uses have occurred. Compliance with land use controls and restrictions is as follows:

- No use of groundwater (other than environmental testing and monitoring), installation of new groundwater wells, or tampering with existing monitoring wells;
- No land use other than nonresidential; and
- No activities that would compromise the integrity of the remedial or monitoring systems.

I, the undersigned, do document that the inspection was conducted as indicated above, and that the above information is true and correct to the best of my knowledge, information, and belief.

Date: MAY 27, 2021

Name/Title: Scott Beesinger Senior Field Tech

Signature: Scott Beesinger

Annual compliance certification forms shall be completed no later than March 1 of each year for the previous calendar year, retained in the file and provided to Army, EPA and TCEQ upon request.

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LUC Inspection and Maintenance Checklist

General Information	
Project Name	LUC Inspection and Maintenance, LHAAP-04 Longhorn Army Ammunition Plant, Karnack, TX
Contractor	APTim
Inspector's Name	Scott Beesinger
Inspector's Title	Senior Field Tech
Inspector's Signature	Scott Beesinger
Inspector's Contact Number	(903) 930-6193
Inspection Date	5/27/21
Type of Inspection	☐ Quarterly ☐ Semiannual ☒ Annual ☐ Prior to forecast rain ☐ After a rain event ☐ Other ----------

A. Groundwater Monitoring Wells						
D.1	Are the installed groundwater monitoring wells in poor condition?	NO				
D.2	Is the well cleared of vegetation and accessible?	YES				
D.3	Any other relevant observations?	NO				
D.4	Are there any significant cracks present?	NO				
D.5	Are there any damaged areas?	NO				

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Annual Land Use Control Compliance Certification Form

In accordance with the Remedial Design dated April 3, 2019 for LHAAP-04 an inspection of the site was conducted by Aptim [indicate transferee] on 10/26/22.

The land use control mechanisms are:

- Groundwater restrictions - The groundwater underlying LHAAP-04 within the LUC boundary shall not be accessed or used for any purpose (except for environmental monitoring and testing) without the prior written approval of U.S. Army, the USEPA and the TCEQ. The LUC to prohibiting groundwater use shall be implemented and shall remain in place at the site until the levels of contaminants of concern (COCs) in soil and groundwater allow for unlimited use and unrestricted exposure.;
- Land use restrictions - restrict land use within the LUC boundary to nonresidential;
- Integrity of remedial and monitoring systems - maintain the integrity of any current or future remedial or monitoring systems until cleanup goals are met.

No unauthorized activities or uses have occurred. Compliance with land use controls and restrictions is as follows:

- No use of groundwater (other than environmental testing and monitoring), installation of new groundwater wells, or tampering with existing monitoring wells;
- No land use other than nonresidential; and
- No activities that would compromise the integrity of the remedial or monitoring systems.

I, the undersigned, do document that the inspection was conducted as indicated above, and that the above information is true and correct to the best of my knowledge, information, and belief.

Date: OCTOBER 26, 2022

Name/Title: Scott Beesinger / Senior Field Tech

Signature: Scott Beesinger

Annual compliance certification forms shall be completed no later than March 1 of each year for the previous calendar year, retained in the file and provided to Army, EPA and TCEQ upon request.

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LHAAP-12

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LUC Inspection and Maintenance Log - LHAAP 12

Date	Inspected By	Inspection / Maintenance Activities (Yearly, at a Minimum)					Corrective Action or Repairs Required?	Repairs / Action Taken
		Protect Landfill Integrity				Prevent Human Exposure to Groundwater		
		Vegetative Cover Maintained (i.e., grass mowed at least annually)	Fence and Signage Maintained	Observance of Landfill Cover Degradation (e.g., desiccation cracks, erosion, or gullying)	Continued Compliance Verified for No Digging or Disturbance of Landfill Cover or Contents	Verified No Withdrawal of Use of Groundwater (other than environmental testing)		
7/25/2018	Beesinger, S.	Maintained. Vegetative cover is in good condition.	Fence and signage in good repair.	Cover subsidence observed and found to be in good condition. No erosion, cracks, or gullying was found. There are 4 locations in the center of the cap that have sink holes.	No evidence of animal burrowing in the cap.	Completed and verified.	Top soil needed to fill in the sink holes in center of landfill cap.	Holes were covered with dirt on 2/1/2019.

Notes:
e.g. - for example
i.e. - that is
LUC - land use control

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LUC Inspection and Maintenance Log - LHAAP 12

Date	Inspected By	Inspection / Maintenance Activities (yearly, at a minimum)					Corrective Action or Repairs Required?	Repairs / Action Taken
		Protect Landfill Integrity				Prevent Human Exposure to Groundwater		
		Vegetative Cover Maintained (i.e., grass mowed at least annually)	Fence and Signage Maintained	Observance of Landfill Cover Degradation (e.g., desiccation cracks, erosion, or gullying)	Continued Compliance Verified for No Digging or Disturbance of Landfill Cover or Contents	Verified No Withdrawal of Use of Groundwater (other than environmental testing)		
7/15/2019	Beesinger, S.	Maintained. Vegetative cover is in good condition.	Fence and signage in good repair.	Cover subsidence observed and found to be in good condition. No erosion, cracks, or gullying was found.	No evidence of animal burrowing in the cap.	Completed and verified.	None	None

Notes:
e.g. - for example
i.e. - that is
LUC - land use control

LUC Inspection and Maintenance Log - LHAAP 12

Date	Inspected By	Inspection / Maintenance Activities (yearly, at a minimum)					Corrective Action or Repairs Required?	Repairs / Action Taken
		Protect Landfill Integrity				Prevent Human Exposure to Groundwater		
		Vegetative Cover Maintained (i.e., grass mowed at least annually)	Fence and Signage Maintained	Observance of Landfill Cover Degradation (e.g., desiccation cracks, erosion, or gullying)	Continued Compliance Verified for No Digging or Disturbance of Landfill Cover or Contents	Verified No Withdrawal of Use of Groundwater (other than environmental testing)		
12/21/2020	Beesinger, S.	Maintained. Vegetative cover is in good condition.	Fence and signage in good repair.	Cover subsidence observed and found to be in good condition. No erosion, cracks, or gullying was found.	No evidence of animal burrowing in the cap.	Completed and verified.	None	None

Notes:
e.g. - for example
i.e. - that is
LUC - land use control

LUC Inspection and Maintenance Log - LHAAP 12

Date	Inspected By	Inspection / Maintenance Activities (yearly, at a minimum)					Corrective Action or Repairs Required?	Repairs / Action Taken
		Protect Landfill Integrity				Prevent Human Exposure to Groundwater		
		Vegetative Cover Maintained (i.e., grass mowed at least annually)	Fence and Signage Maintained	Observance of Landfill Cover Degradation (e.g., desiccation cracks, erosion, or gullying)	Continued Compliance Verified for No Digging or Disturbance of Landfill Cover or Contents	Verified No Withdrawal of Use of Groundwater (other than environmental testing)		
3/23/2021	Beesinger, S.	Maintained. Vegetative cover is in good condition.	Fence and signage in good repair.	Cover subsidence observed and found to be in good condition. No erosion, cracks, or gullying was found.	No evidence of animal burrowing in the cap.	Completed and verified.	None	None

Notes:
e.g. - for example
i.e. - that is
LUC - land use control

LUC Inspection and Maintenance Log - LHAAP 12

Date	Inspected By	Inspection / Maintenance Activities (yearly, at a minimum)					Corrective Action or Repairs Required?	Repairs / Action Taken
		Protect Landfill Integrity				Prevent Human Exposure to Groundwater		
		Vegetative Cover Maintained (i.e., grass mowed at least annually)	Fence and Signage Maintained	Observance of Landfill Cover Degradation (e.g., desiccation cracks, erosion, or gullying)	Continued Compliance Verified for No Digging or Disturbance of Landfill Cover or Contents	Verified No Withdrawal of Use of Groundwater (other than environmental testing)		
5/13/2022	Beesinger, S.	Maintained. Vegetative cover is in good condition.	Fence and signage in good repair.	Cover observed for evidence of subsidence and found to be in good condition. No erosion, cracks, or gullying was found.	No evidence of animal burrowing in the cap.	Completed and verified.		Pulled and removed approximately 50 small trees (0.5-1 inch in diameter).

Notes:
e.g. - for example
i.e. - that is
LUC - land use control

LHAAP-16

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Annual Land Use Control Compliance Inspection Form

In accordance with the Remedial Design dated _____ for LHAAP-16 an inspection of the site was conducted by APTim [indicate transferee] on 10/8/20.

The land use control mechanisms are:

- Groundwater restrictions - prohibit access to the contaminated groundwater except for environmental monitoring and testing only until cleanup goals are met;
- Landfill integrity - preserve the integrity of the landfill cap and restrict intrusive activities (e.g., digging) that would degrade or alter the cap;
- Land use restrictions - restrict land use to nonresidential;
- Integrity of remedial and monitoring systems - maintain the integrity of any current or future remedial or monitoring systems until cleanup goals are met.

No unauthorized activities or uses have occurred. Compliance with land use controls and restrictions is as follows:

- No use of groundwater (other than environmental testing and monitoring), installation of new groundwater wells, or tampering with existing monitoring wells;
- No landfill intrusive activities (e.g., digging) that would degrade or alter the landfill cap; maintenance of vegetative cover and repair of soil subsidence or erosion areas on the cap;
- No land use other than nonresidential; and
- No activities that would compromise the integrity of the remedial or monitoring systems.

I, the undersigned, do document that the inspection was conducted as indicated above, and that the above information is true and correct to the best of my knowledge, information, and belief.

Date: OCTOBER 8, 2020

Name/Title: Scott Bressinger / Senior Field Tech

Signature: Scott Bressinger

Annual compliance certification forms shall be completed no later than March 1 of each year for the previous calendar year, retained in the file and provided to Army, EPA and TCEQ upon request.

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Inspection and Maintenance Checklist

General Information	
Project Name	Inspection and Maintenance, LHAAP-16 Landfill, Longhorn Army Ammunition Plant, Karnack, TX
Contractor	APTIM
Inspector's Name	Scott Bessinger
Inspector's Title	Senior Field Tech
Inspector's Signature	Scott Bessinger
Inspector's Contact Number	(903) 930-6193
Inspection Date	10/8/20
Type of Inspection	☐ Quarterly ☐ Semiannual ☒ Annual ☐ Prior to forecast rain ☐ After a rain event ☐ Other ----------

Description		Yes	No	N/A	Comments (Attach photos/location sketches)	Corrective Action (Attach photos)
A. CAP Cover Surface						
A.1	Are there any significant cracks present?		X			
A.2.	Are there any damaged areas?		X			
A.3	Is there any ponded water present?		X			
A.4	Any other relevant observations?		X			
B. CAP Vegetation and Animal Burrows						
B.1	Are there signs of stressed/ dead vegetation?		X			
B.2	Are there any significant bare spots?		X			
B.3	Are deep-rooted plants present?		X			
B.4	Are there signs of animal burrows?		X			
B. 5	Any other relevant observations?		X			

Description		Yes	No	N/A	Comments (Attach photos/location sketches)	Corrective Action (Attach photos)
C. CAP Erosion and Drainage System						
C.1	Is there any evidence of significant/ clearly visible erosion, settlement, or other deterioration?		X			
C.2	Are the drainage systems in poor condition?		X			
C.3	Is there excessive silting or debris clogging?		X			
C.4	Is there erosion of banks and slopes?		X			
C.5	Are there areas of choking by overgrown vegetation?		X			
C.7	Is there pooling of water in or along side a channel or berm?		X			
C.8	Any other relevant observations?		X			
D. Groundwater Monitoring Wells						
D.1	Are the installed groundwater monitoring wells in poor condition?		X			
D.2	Are there any signs of damage, unusual wear, rust and corrosion, vandalism, unauthorized entry/use, or settlement?		X			
D.3	Is well cap and/or locking mechanism not properly functioning?		X			
D.4	Are the well heads and protective casings damaged?		X			
D.5	Is the well cleared of vegetation and accessible?	X				
D.6	Any other relevant observations?		X			

Description		Yes	No	N/A	Comments (Attach photos/location sketches)	Corrective Action (Attach photos)
E. Site Access Features						
E.1	Are the perimeter fence and gates damaged?		X			
E.2	Gate(s) damaged?		X			
E.3	Litter encountered within the area?		X			
E.4	Are the gate locks missing?		X			
E.4	Are signs to prevent unauthorized entry missing?		X			
E.5	Are the access roads in unusable or poor condition?		X			
E.6	Any other relevant observations?		X			
F. Concrete Aprons and Bollards						
F.1	Are there any significant cracks present?		X			
F.2	Are there any damaged areas?		X			
F.3	Any other relevant observations?		X			

Inspection and Maintenance Checklist

General Information	
Project Name	Inspection and Maintenance, LHAAP-16 Landfill, Longhorn Army Ammunition Plant, Karnack, TX
Contractor	APTIM
Inspector's Name	SCOTT BEESINGER
Inspector's Title	SENIOR FIELD TECH
Inspector's Signature	Scott Beesinger
Inspector's Contact Number	(903) 930-6193
Inspection Date	10/25/21
Type of Inspection	☐ Quarterly ☐ Semiannual ☒ Annual ☐ Prior to forecast rain ☐ After a rain event ☐ Other ————

Description		Yes	No	N/A	Comments (Attach photos/location sketches)	Corrective Action (Attach photos)
A. CAP Cover Surface						
A.1	Are there any significant cracks present?		X			
A.2.	Are there any damaged areas?		X			
A.3	Is there any ponded water present?		X			
A.4	Any other relevant observations?		X			
B. CAP Vegetation and Animal Burrows						
B.1	Are there signs of stressed/ dead vegetation?		X			
B.2	Are there any significant bare spots?		X			
B.3	Are deep-rooted plants present?		X			
B.4	Are there signs of animal burrows?		X			
B. 5	Any other relevant observations?		X			

Description		Yes	No	N/A	Comments (Attach photos/location sketches)	Corrective Action (Attach photos)
C. CAP Erosion and Drainage System						
C.1	Is there any evidence of significant/ clearly visible erosion, settlement, or other deterioration?		X			
C.2	Are the drainage systems in poor condition?		X			
C.3	Is there excessive silting or debris clogging?		X			
C.4	Is there erosion of banks and slopes?		X			
C.5	Are there areas of choking by overgrown vegetation?		X			
C.7	Is there pooling of water in or along side a channel or berm?		X			
C.8	Any other relevant observations?		X			
D. Groundwater Monitoring Wells						
D.1	Are the installed groundwater monitoring wells in poor condition?		X			
D.2	Are there any signs of damage, unusual wear, rust and corrosion, vandalism, unauthorized entry/use, or settlement?		X			
D.3	Is well cap and/or locking mechanism not properly functioning?	X				
D.4	Are the well heads and protective casings damaged?		X			
D.5	Is the well cleared of vegetation and accessible?	X				
D.6	Any other relevant observations?		X			

Description		Yes	No	N/A	Comments (Attach photos/location sketches)	Corrective Action (Attach photos)
E. Site Access Features						
E.1	Are the perimeter fence and gates damaged?		X			
E.2	Gate(s) damaged?		X			
E.3	Litter encountered within the area?		X			
E.4	Are the gate locks missing?		X			
E.4	Are signs to prevent unauthorized entry missing?		X			
E.5	Are the access roads in unusable or poor condition?		X			
E.6	Any other relevant observations?		X			
F. Concrete Aprons and Bollards						
F.1	Are there any significant cracks present?		X			
F.2	Are there any damaged areas?		X			
F.3	Any other relevant observations?		X			

Annual Land Use Control Compliance Inspection Form

In accordance with the Remedial Design dated _____ for LHAAP-16 an inspection of the site was conducted by Aptim [indicate transferee] on 10/25/21.

The land use control mechanisms are:

- Groundwater restrictions - prohibit access to the contaminated groundwater except for environmental monitoring and testing only until cleanup goals are met;
- Landfill integrity - preserve the integrity of the landfill cap and restrict intrusive activities (e.g., digging) that would degrade or alter the cap;
- Land use restrictions - restrict land use to nonresidential;
- Integrity of remedial and monitoring systems - maintain the integrity of any current or future remedial or monitoring systems until cleanup goals are met.

No unauthorized activities or uses have occurred. Compliance with land use controls and restrictions is as follows:

- No use of groundwater (other than environmental testing and monitoring), installation of new groundwater wells, or tampering with existing monitoring wells;
- No landfill intrusive activities (e.g., digging) that would degrade or alter the landfill cap; maintenance of vegetative cover and repair of soil subsidence or erosion areas on the cap;
- No land use other than nonresidential; and
- No activities that would compromise the integrity of the remedial or monitoring systems.

I, the undersigned, do document that the inspection was conducted as indicated above, and that the above information is true and correct to the best of my knowledge, information, and belief.

Date: OCTOBER 25, 2021

Name/Title: Scott Beasinger Senior Field Tech

Signature: Scott Beasinger

Annual compliance certification forms shall be completed no later than March 1 of each year for the previous calendar year, retained in the file and provided to Army, EPA and TCEQ upon request.

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LHAAP-35B (37)

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Annual Land Use Control Compliance Certification Documentation

In accordance with the Remedial Action Work Plan dated June 2013 for LHAAP-35B (37) a certification of site was conducted by Aprim [indicate transferee] on 8/16/18.

A summary of land use control mechanism is as follows:

Groundwater restriction – restriction of the use of groundwater to environmental monitoring and testing until cleanup levels are met. A restriction against residential use of groundwater will remain in effect until the levels of the COCs in groundwater and soil allow unrestricted use and unlimited exposure (UUUE).

[Indicate whether groundwater restrictions are still required at LHAAP-35B (37)]

A summary of compliance with land use and restriction covenants is as follows:

No use of groundwater, installation of new groundwater wells, or tampering with existing wells at LHAAP-35B (37).

I, the undersigned, do document that the certification was performed as indicated above, and that the above information is true and correct to the best of my knowledge, information, and belief. I also certify that the non-residential use assumption that forms the basis of the remedy remains the same.

Date: August 16, 2018

Name/Title: Scott Beesinger / Senior Field Tech

Signature: Scott Beesinger

Annual compliance certification forms shall be completed no later than March 1 of each year for the previous calendar year.

Annual Land Use Control Compliance Certification Documentation

In accordance with the Remedial Action Work Plan dated June 2013 for LHAAP-35B (37) a certification of site was conducted by Aptim [indicate transferee] on 2/15/19.

A summary of land use control mechanism is as follows:

Groundwater restriction – restriction of the use of groundwater to environmental monitoring and testing until cleanup levels are met. A restriction against residential use of groundwater will remain in effect until the levels of the COCs in groundwater and soil allow unrestricted use and unlimited exposure (UUUE).

[Indicate whether groundwater restrictions are still required at LHAAP-35B (37)]

A summary of compliance with land use and restriction covenants is as follows:

No use of groundwater, installation of new groundwater wells, or tampering with existing wells at LHAAP-35B (37).

I, the undersigned, do document that the certification was performed as indicated above, and that the above information is true and correct to the best of my knowledge, information, and belief. I also certify that the non-residential use assumption that forms the basis of the remedy remains the same.

Date: 2/15/19

Name/Title: Scott Beesinger/Senior Fieldtech

Signature: Scott Beesinger

Annual compliance certification forms shall be completed no later than March 1 of each year for the previous calendar year.

Annual Land Use Control Compliance Certification Documentation

In accordance with the Remedial Action Work Plan dated June 2013 for LHAAP-35B (37) a certification of site was conducted by APTim [indicate transferee] on 6/29/20.

A summary of land use control mechanism is as follows:

Groundwater restriction – restriction of the use of groundwater to environmental monitoring and testing until cleanup levels are met. A restriction against residential use of groundwater will remain in effect until the levels of the COCs in groundwater and soil allow unrestricted use and unlimited exposure (UUUE).

[Indicate whether groundwater restrictions are still required at LHAAP-35B (37)]

A summary of compliance with land use and restriction covenants is as follows:

No use of groundwater, installation of new groundwater wells, or tampering with existing wells at LHAAP-35B (37).

I, the undersigned, do document that the certification was performed as indicated above, and that the above information is true and correct to the best of my knowledge, information, and belief. I also certify that the non-residential use assumption that forms the basis of the remedy remains the same.

Date: June 29, 2020

Name/Title: Scott Beesinger / Senior Field Tech

Signature: Scott Beesinger

Annual compliance certification forms shall be completed no later than March 1 of each year for the previous calendar year.

Annual Land Use Control Compliance Certification Documentation

In accordance with the Remedial Action Work Plan dated June 2013 for LHAAP-35B (37) a certification of site was conducted by _____ [indicate transferee] on 12/29/20.

A summary of land use control mechanism is as follows:

Groundwater restriction – restriction of the use of groundwater to environmental monitoring and testing until cleanup levels are met. A restriction against residential use of groundwater will remain in effect until the levels of the COCs in groundwater and soil allow unrestricted use and unlimited exposure (UUUE).

[Indicate whether groundwater restrictions are still required at LHAAP-35B (37)]

A summary of compliance with land use and restriction covenants is as follows:

No use of groundwater, installation of new groundwater wells, or tampering with existing wells at LHAAP-35B (37).

I, the undersigned, do document that the certification was performed as indicated above, and that the above information is true and correct to the best of my knowledge, information, and belief. I also certify that the non-residential use assumption that forms the basis of the remedy remains the same.

Date: December 29, 2020

Name/Title: Scott Beesinger Senior FieldTech

Signature: Scott Beesinger

Annual compliance certification forms shall be completed no later than March 1 of each year for the previous calendar year.

Annual Land Use Control Compliance Certification Documentation

In accordance with the Remedial Action Work Plan dated June 2013 for LHAAP-35B (37) a certification of site was conducted by Aptim [indicate transferee] on 5/16/22.

A summary of land use control mechanism is as follows:

Groundwater restriction – restriction of the use of groundwater to environmental monitoring and testing until cleanup levels are met. A restriction against residential use of groundwater will remain in effect until the levels of the COCs in groundwater and soil allow unrestricted use and unlimited exposure (UUUE).

[Indicate whether groundwater restrictions are still required at LHAAP-35B (37)]

A summary of compliance with land use and restriction covenants is as follows:

No use of groundwater, installation of new groundwater wells, or tampering with existing wells at LHAAP-35B (37).

I, the undersigned, do document that the certification was performed as indicated above, and that the above information is true and correct to the best of my knowledge, information, and belief. I also certify that the non-residential use assumption that forms the basis of the remedy remains the same.

Date: MAY 16, 2022

Name/Title: Scott Beesinger Senior Field Tech

Signature: Scott Beesinger

Annual compliance certification forms shall be completed no later than March 1 of each year for the previous calendar year.

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LHAAP-46

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Annual Land Use Control Compliance Certification Documentation

In accordance with the Remedial Design dated September 2011 for LHAAP-46 a certification of site was conducted by Aptim [indicate transferee] on 8/9/19.

A summary of land use control mechanisms is as follows:

Groundwater restriction – restriction of the use of groundwater to environmental monitoring and testing until cleanup levels are met [Indicate whether groundwater restrictions are still required at LHAAP-46]

A summary of compliance with land use and restriction covenants is as follows:

No use of groundwater, installation of new groundwater wells, or tampering with existing wells at LHAAP-46.

I, the undersigned, do document that the certification was performed as indicated above, and that the above information is true and correct to the best of my knowledge, information, and belief.

Date: 8/9/19

Name/Title: William Foss / Aptim Tech Lead

Signature: 

Annual compliance certification forms shall be completed no later than March 1 of each year for the previous calendar year.

Sample Annual Land Use Control Compliance Certification Documentation

In accordance with the Remedial Design dated _____ for LHAAP-46 a certification of site was conducted by ApTim [indicate transferee] on 2/13/20.

A summary of land use control mechanisms is as follows:

Groundwater restriction – restriction of the use of groundwater to environmental monitoring and testing until cleanup levels are met [Indicate whether groundwater restrictions are still required at LHAAP-46]

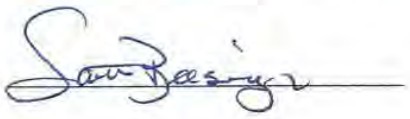
A summary of compliance with land use and restriction covenants is as follows:

No use of groundwater, installation of new groundwater wells, or tampering with existing wells at LHAAP-46.

I, the undersigned, do document that the certification was performed as indicated above, and that the above information is true and correct to the best of my knowledge, information, and belief.

Date: FEBRUARY 13, 2020

Name/Title: SCOTT BEESINGER SENIOR FIELD TECHNICIAN

Signature: 

Annual compliance certification forms shall be completed no later than March 1 of each year for the previous calendar year.

Sample Annual Land Use Control Compliance Certification Documentation

In accordance with the Remedial Design dated _____ for LHAAP-46 a certification of site was conducted by APTim [indicate transferee] on 5/26/21.

A summary of land use control mechanisms is as follows:

Groundwater restriction – restriction of the use of groundwater to environmental monitoring and testing until cleanup levels are met [Indicate whether groundwater restrictions are still required at LHAAP-46]

A summary of compliance with land use and restriction covenants is as follows:

No use of groundwater, installation of new groundwater wells, or tampering with existing wells at LHAAP-46.

I, the undersigned, do document that the certification was performed as indicated above, and that the above information is true and correct to the best of my knowledge, information, and belief.

Date: MAY 26, 2021

Name/Title: Scott Beesinger Senior Field Tech

Signature: Scott Beesinger

Annual compliance certification forms shall be completed no later than March 1 of each year for the previous calendar year.

Sample Annual Land Use Control Compliance Certification Documentation

In accordance with the Remedial Design for LHAAP-46 dated September 30, 2011, a certification of site was conducted by Aptim [indicate transferee] on 8/19/22.

A summary of land use control mechanisms is as follows:

Groundwater restriction – restriction of the use of groundwater to environmental monitoring and testing until cleanup levels are met [Indicate whether groundwater restrictions are still required at LHAAP-46]

A summary of compliance with land use and restriction covenants is as follows:

No use of groundwater, installation of new groundwater wells, or tampering with existing wells at LHAAP-46.

I, the undersigned, do document that the certification was performed as indicated above, and that the above information is true and correct to the best of my knowledge, information, and belief.

Date: August 19, 2022

Name/Title: Scott Bessinger / Senior Field Tech

Signature: Scott Bessinger

Annual compliance certification forms shall be completed no later than March 1 of each year for the previous calendar year.

LHAAP-50

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Annual Land Use Control Compliance Certification Documentation

In accordance with the Remedial Design dated September 2011 for LHAAP-50 a certification of site was conducted by APTIM on 7/25/18.

A summary of land use control mechanisms is as follows:

- Groundwater restriction - restriction of the use of groundwater to environmental monitoring and testing until cleanup levels are met.

A summary of compliance with land use and restriction covenants is as follows:

- No use of groundwater, installation of new groundwater wells, or tampering with existing wells at LHAAP-50.

I, the undersigned, do document that the certification was performed as indicated above, and that the above information is true and correct to the best of my knowledge, information, and belief.

Date: July 25, 2018

Name/Title: Scott Beesinger / Senior Field Tech

Signature: Scott Beesinger

Sample Annual Land Use Control Compliance Certification Documentation

In accordance with the Remedial Design dated September 2011 for LHAAP-50 a certification of site was conducted by APTim [indicate transferee] on 8/14/19.

A summary of land use control mechanisms is as follows:

- Groundwater restriction - restriction of the use of groundwater to environmental monitoring and testing until cleanup levels are met. The restriction against residential use of groundwater will remain in effect until the levels of the COCs in groundwater allow unrestricted use and unlimited exposure (UUUE). [Indicate whether groundwater restrictions are still required at LHAAP-50]

A summary of compliance with land use and restriction covenants is as follows:

- No use of groundwater, installation of new groundwater wells, or tampering with existing wells at LHAAP-50.

I, the undersigned, do document that the certification was performed as indicated above, and that the above information is true and correct to the best of my knowledge, information, and belief.

Date: August 14, 2019

Name/Title: Scott Beesinger / Senior Field Tech

Signature: Scott Beesinger

Annual compliance certification forms shall be completed no later than March 1 of each year for the previous calendar year.

Sample Annual Land Use Control Compliance Certification Documentation

In accordance with the Remedial Design dated _____ for LHAAP-50 a certification of site was conducted by ____APTim____ [indicate transferee] on ____9/15/20____.

A summary of land use control mechanisms is as follows:

- Groundwater restriction - restriction of the use of groundwater to environmental monitoring and testing until cleanup levels are met. The restriction against residential use of groundwater will remain in effect until the levels of the COCs in groundwater allow unrestricted use and unlimited exposure (UUUE). [Indicate whether groundwater restrictions are still required at LHAAP-50]

A summary of compliance with land use and restriction covenants is as follows:

- No use of groundwater, installation of new groundwater wells, or tampering with existing wells at LHAAP-50.

I, the undersigned, do document that the certification was performed as indicated above, and that the above information is true and correct to the best of my knowledge, information, and belief.

Date: SEPTEMBER 15, 2020

Name/Title: SCOTT BEESINGER / SENIOR FIELD TECH

Signature: Scott Beesinger

Annual compliance certification forms shall be completed no later than March 1 of each year for the previous calendar year.

Sample Annual Land Use Control Compliance Certification Documentation

In accordance with the Remedial Design dated September 2011 for LHAAP-50 a certification of site was conducted by Aptim [indicate transferee] on 10/11/21.

A summary of land use control mechanisms is as follows:

- Groundwater restriction - restriction of the use of groundwater to environmental monitoring and testing until cleanup levels are met. The restriction against residential use of groundwater will remain in effect until the levels of the COCs in groundwater allow unrestricted use and unlimited exposure (UUUE). [Indicate whether groundwater restrictions are still required at LHAAP-50]

A summary of compliance with land use and restriction covenants is as follows:

- No use of groundwater, installation of new groundwater wells, or tampering with existing wells at LHAAP-50.

I, the undersigned, do document that the certification was performed as indicated above, and that the above information is true and correct to the best of my knowledge, information, and belief.

Date: OCTOBER 11, 2021

Name/Title: Scott Beesinger / Senior Field Tech

Signature: Scott Beesinger

Annual compliance certification forms shall be completed no later than March 1 of each year for the previous calendar year.

LHAAP-58

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Annual Land Use Control Compliance Certification Documentation

In accordance with the Remedial Design dated September 2011, for LHAAP-58, a certification of site was conducted by Bhate Environmental Associates, Inc. on August 15, 2018

A summary of land use control mechanism is as follows:

- Groundwater restriction – restriction of the use of groundwater to environmental monitoring and testing until cleanup levels are met

A Summary of compliance with land use and restriction covenants is as follows:

- No use of groundwater, installation of new groundwater wells, or tampering with existing wells at LHAAP-58.

I, the undersigned, do document that the certification was performed as indicated above, and that the above information is true and correct to the best of my knowledge, information and belief.

Date: August 15, 2018

Name/Title: Scott Beesinger/Senior Field Tech

Signature: Scott Beesinger

Annual Land Use Control Compliance Certification Documentation

In accordance with the Remedial Design dated September 2011, for LHAAP-58, a certification of site was conducted by Bhate Environmental Associates, Inc. on MAY 13, 2019.

A summary of land use control mechanism is as follows:

- Groundwater restriction – restriction of the use of groundwater to environmental monitoring and testing until cleanup levels are met

A Summary of compliance with land use and restriction covenants is as follows:

- No use of groundwater, installation of new groundwater wells, or tampering with existing wells at LHAAP-58.

I, the undersigned, do document that the certification was performed as indicated above, and that the above information is true and correct to the best of my knowledge, information and belief.

Date: MAY 13, 2019

Name/Title: SCOTT BEESINGER / SENIOR FIELD TECH

Signature: Scott Beesinger

Annual Land Use Control Compliance Certification Documentation

In accordance with the Remedial Design dated September 2011, for LHAAP-58, a certification of site was conducted by Bhate Environmental Associates, Inc. on 6/29/20.

A summary of land use control mechanism is as follows:

- Groundwater restriction – restriction of the use of groundwater to environmental monitoring and testing until cleanup levels are met

A Summary of compliance with land use and restriction covenants is as follows:

- No use of groundwater, installation of new groundwater wells, or tampering with existing wells at LHAAP-58.

I, the undersigned, do document that the certification was performed as indicated above, and that the above information is true and correct to the best of my knowledge, information and belief.

Date: June 29, 2020

Name/Title: Scott Beasinger / Senior Field Tech

Signature: 

Annual Land Use Control Compliance Certification Documentation

In accordance with the Remedial Design dated September 2011, for LHAAP-58, a certification of site was conducted by Bhate Environmental Associates, Inc. on 6/23/21.

A summary of land use control mechanism is as follows:

- Groundwater restriction – restriction of the use of groundwater to environmental monitoring and testing until cleanup levels are met

A Summary of compliance with land use and restriction covenants is as follows:

- No use of groundwater, installation of new groundwater wells, or tampering with existing wells at LHAAP-58.

I, the undersigned, do document that the certification was performed as indicated above, and that the above information is true and correct to the best of my knowledge, information and belief.

Date: June 23, 2021

Name/Title: Kennie Moore / Field Tech

Signature: Kennie Moore

Annual Land Use Control Compliance Certification Documentation

In accordance with the Remedial Design dated September 2011, for LHAAP-58, a certification of site was conducted by Bhate Environmental Associates, Inc. on 7/21/22.

A summary of land use control mechanism is as follows:

- Groundwater restriction – restriction of the use of groundwater to environmental monitoring and testing until cleanup levels are met

A Summary of compliance with land use and restriction covenants is as follows:

- No use of groundwater, installation of new groundwater wells, or tampering with existing wells at LHAAP-58.

I, the undersigned, do document that the certification was performed as indicated above, and that the above information is true and correct to the best of my knowledge, information and belief.

Date: July 21, 2022

Name/Title: Scott Beasinger / Senior Field Tech

Signature: Scott Beasinger

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LHAAP-67

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Annual Land Use Control Compliance Certification Documentation

In accordance with the Remedial Design dated September 2011 for LHAAP-67 a certification of site was conducted by APTIM on 7/25/18.

A summary of land use control mechanisms is as follows:

Groundwater restriction – restriction of the use of groundwater to environmental monitoring and testing until cleanup levels are met

A summary of compliance with land use and restriction covenants is as follows:

No use of groundwater, installation of new groundwater wells, or tampering with existing wells at LHAAP-67.

I, the undersigned, do document that the certification was performed as indicated above, and that the above information is true and correct to the best of my knowledge, information, and belief.

Date: July 25, 2018

Name/Title: Scott Beesinger / Senior Field Tech

Signature: Scott Beesinger

Sample Annual Land Use Control Compliance Certification Documentation

In accordance with the Remedial Design dated SEPTEMBER 2011 for LHAAP-67 a certification of site was conducted by APTim [indicate transferee] on 8/14/19.

A summary of land use control mechanisms is as follows:

Groundwater restriction – restriction of the use of groundwater to environmental monitoring and testing until cleanup levels are met [Indicate whether groundwater restrictions are still required at LHAAP-67]

A summary of compliance with land use and restriction covenants is as follows:

No use of groundwater, installation of new groundwater wells, or tampering with existing wells at LHAAP-67.

I, the undersigned, do document that the certification was performed as indicated above, and that the above information is true and correct to the best of my knowledge, information, and belief.

Date: AUGUST 14, 2019

Name/Title: SCOTT BEASINGER / SENIOR FIELD TECH

Signature: 

Annual compliance certification forms shall be completed no later than March 1 of each year for the previous calendar year.

Sample Annual Land Use Control Compliance Certification Documentation

In accordance with the Remedial Design dated _____ for LHAAP-67 a certification of site was conducted by ApTim [indicate transferee] on 5/13/20.

A summary of land use control mechanisms is as follows:

Groundwater restriction – restriction of the use of groundwater to environmental monitoring and testing until cleanup levels are met [Indicate whether groundwater restrictions are still required at LHAAP-67]

A summary of compliance with land use and restriction covenants is as follows:

No use of groundwater, installation of new groundwater wells, or tampering with existing wells at LHAAP-67.

I, the undersigned, do document that the certification was performed as indicated above, and that the above information is true and correct to the best of my knowledge, information, and belief.

Date: MAY 13, 2020

Name/Title: Scott Bessinger Senior Field Technician

Signature: Scott Bessinger

Annual compliance certification forms shall be completed no later than March 1 of each year for the previous calendar year.

Sample Annual Land Use Control Compliance Certification Documentation

In accordance with the Remedial Design dated _____ for LHAAP-67 a certification of site was conducted by APTim [indicate transferee] on 12/22/20.

A summary of land use control mechanisms is as follows:

Groundwater restriction – restriction of the use of groundwater to environmental monitoring and testing until cleanup levels are met [Indicate whether groundwater restrictions are still required at LHAAP-67]

A summary of compliance with land use and restriction covenants is as follows:

No use of groundwater, installation of new groundwater wells, or tampering with existing wells at LHAAP-67.

I, the undersigned, do document that the certification was performed as indicated above, and that the above information is true and correct to the best of my knowledge, information, and belief.

Date: DECEMBER 22, 2020

Name/Title: Scott Beesinger / Senior Field Tech

Signature: Scott Beesinger

Annual compliance certification forms shall be completed no later than March 1 of each year for the previous calendar year.

Sample Annual Land Use Control Compliance Certification Documentation

In accordance with the Remedial Design dated SEPTEMBER 2011 for LHAAP-67 a certification of site was conducted by Aptim [indicate transferee] on 11/10/21.

A summary of land use control mechanisms is as follows:

Groundwater restriction – restriction of the use of groundwater to environmental monitoring and testing until cleanup levels are met [Indicate whether groundwater restrictions are still required at LHAAP-67]

A summary of compliance with land use and restriction covenants is as follows:

No use of groundwater, installation of new groundwater wells, or tampering with existing wells at LHAAP-67.

I, the undersigned, do document that the certification was performed as indicated above, and that the above information is true and correct to the best of my knowledge, information, and belief.

Date: NOVEMBER 10, 2021

Name/Title: SCOTT BEESINGER SENIOR FIELD TECH

Signature:

Annual compliance certification forms shall be completed no later than March 1 of each year for the previous calendar year.

Sample Annual Land Use Control Compliance Certification Documentation

In accordance with the Remedial Design dated SEPTEMBER 2011 for LHAAP-67 a certification of site was conducted by APTIM [indicate transferee] on NOVEMBER 7, 2022

A summary of land use control mechanisms is as follows:

Groundwater restriction – restriction of the use of groundwater to environmental monitoring and testing until cleanup levels are met [Indicate whether groundwater restrictions are still required at LHAAP-67]

A summary of compliance with land use and restriction covenants is as follows:

No use of groundwater, installation of new groundwater wells, or tampering with existing wells at LHAAP-67.

I, the undersigned, do document that the certification was performed as indicated above, and that the above information is true and correct to the best of my knowledge, information, and belief.

Date: NOVEMBER 7, 2022

Name/Title: Scott Beesinger/Senior Environmental Tech

Signature: Scott Beesinger

Annual compliance certification forms shall be completed no later than March 1 of each year for the previous calendar year.

LHAAP-001-R-01

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LTM Inspection and Maintenance Checklist

General Information	
Project Name	LTM Inspection and Maintenance, LHAAP-001-R and LHAAP-003-R MMRP, Longhorn Army Ammunition Plant, Karnack, TX
Contractor	BHATE ENVIRONMENTAL
Inspector's Name	SCOTT BEESINGER
Inspector's Title	SENIOR TECHNICIAN
Inspector's Signature	Scott Beesinger
Inspector's Contact Number	(903) 930-6193
Inspection Date	12/5/18
Type of Inspection	☐ Quarterly ☐ Semiannual ☒ Annual ☐ Prior to forecast rain ☐ After rain event ☐ Other_____

	Description	Yes	No	N/A	Comments (Attach photos/location sketches)	Corrective Action (Attach photos)
A. Perimeter Signage						
A.1	Are there any damaged signs?		X			
A.2	Are there any missing signs?		X			
A.3	Are all signs legible?	X	~~X~~ SB			
A.4	Is perimeter boundary mowed?	X				

A.5	Are signs visible from one sign to the next sign?	X				
B. LUC Boundary						
B.1	Is the LUC Boundary identifiable?	X				
C. Dig and Intrusive Activities restriction						
C.1	Any observed digging activities or similar intrusive activities within the site boundaries?		X			

Note: Annual compliance inspections shall be conducted no later than March 1 of each year for the previous calendar year and filed onsite.

LAND USE CONTROL COMPLIANCE CERTIFICATION FORM

In accordance with the LUC Plan dated _____ for LHAAP-001-R and LHAAP-003-R, an inspection of the sites was conducted by BHATE ENVIRONMENTAL on 12/5/18.

A summary of land use control mechanisms is as follows:

- Land use restrictions - restrict land use to non-residential.
- Integrity of LUC signage by ensuring signs are present, legible and have visibility from one sign to the next.

A summary of compliance with land use and restriction covenants is as follows:

- The posted signs are properly maintained at LHAAP-001-R and LHAAP-003-R.
- No digging or intrusive activities have taken place within the boundaries identified for LHAAP-001-R and LHAAP-003-R.
- No land use other than non-residential.
- Pamphlets and safety awareness video are being used to educate visitors.

I, the undersigned, do document that the inspections were performed as indicated above, and that the above information is true and correct to the best of my knowledge, information, and belief.

Date: 12/5/18

Name: Scott Bessinger

Signature: Scott Bessinger

Completed annual compliance inspections shall be conducted no later than March 1 of each year for the previous calendar year and filed on site.

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LTM Inspection and Maintenance Checklist

General Information	
Project Name	LTM Inspection and Maintenance, LHAAP-001-R and LHAAP-003-R MMRP, Longhorn Army Ammunition Plant, Karnack, TX
Contractor	BHATE ENVIRONMENTAL
Inspector's Name	SCOTT BEESINGER
Inspector's Title	SENIOR FIELD TECHNICIAN
Inspector's Signature	Scott Beesinger
Inspector's Contact Number	903-930-6193
Inspection Date	JANUARY 30, 2020
Type of Inspection	☐ Quarterly ☐ Semiannual ☒ Annual ☐ Prior to forecast rain ☐ After rain event ☐ Other_____

	Description	Yes	No	N/A	Comments (Attach photos/location sketches)	Corrective Action (Attach photos)
A. Perimeter Signage						
A.1	Are there any damaged signs?		X			
A.2	Are there any missing signs?		X			
A.3	Are all signs legible?	X				
A.4	Is perimeter boundary mowed?	✓				

A.5	Are signs visible from one sign to the next sign?	X				
B. LUC Boundary						
B.1	Is the LUC Boundary identifiable?	X				
C. Dig and Intrusive Activities restriction						
C.1	Any observed digging activities or similar intrusive activities within the site boundaries?		X			

Note: Annual compliance inspections shall be conducted no later than March 1 of each year for the previous calendar year and filed onsite.

LAND USE CONTROL COMPLIANCE CERTIFICATION FORM

In accordance with the LUC Plan dated July 2008 for LHAAP-001-R and LHAAP-003-R, an inspection of the sites was conducted by BHATE Environmental on 1/30/20

A summary of land use control mechanisms is as follows:

- Land use restrictions - restrict land use to non-residential.
- Integrity of LUC signage by ensuring signs are present, legible and have visibility from one sign to the next.

A summary of compliance with land use and restriction covenants is as follows:

- The posted signs are properly maintained at LHAAP-001-R and LHAAP-003-R.
- No digging or intrusive activities have taken place within the boundaries identified for LHAAP-001-R and LHAAP-003-R.
- No land use other than non-residential.
- Pamphlets and safety awareness video are being used to educate visitors.

I, the undersigned, do document that the inspections were performed as indicated above, and that the above information is true and correct to the best of my knowledge, information, and belief.

Date: JANUARY 30, 2020

Name: SCOTT BEESINGER

Signature: Scott Beesinger

Completed annual compliance inspections shall be conducted no later than March 1 of each year for the previous calendar year and filed on site.

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Annual Land Use Control Compliance Certification Documentation

In accordance with the RD/RACR dated May 2018, for LHAAP-0001-R and LHAAP-003-R, an inspection of the sites was conducted by Bhate Environmental Associates, Inc. on 3/23/21.

A summary of land use control mechanism is as follows:

- Land use restrictions – restrict land use to non-residential.
- Integrity of LUC signage by ensuring signs are present, legible and have visibility from one sign to the next.

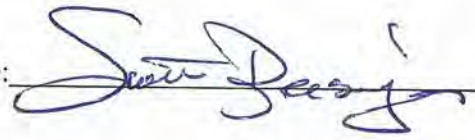
A summary of compliance with land use and restriction covenants is as follows:

- The posted signs are properly maintained and LHAAP-001-R and LHAAP-003-R.
- No digging or intrusive activities have taken place within the boundaries identified for LHAAP-001-R and LHAAP-003-R.
- No land use other than non-residential.
- Pamphlets and safety awareness video are used to educate visitors.

I, the undersigned, do document that the certification was performed as indicated above, and that the above information is true and correct to the best of my knowledge, information and belief.

Date: MARCH 23, 2021

Name/Title: Scott Beesinger Senior Field Tech

Signature: 

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LTM Inspection and Maintenance Checklist

General Information	
Project Name	LTM Inspection and Maintenance, LHAAP-001-R and LHAAP-003-R MMRP, Longhorn Army Ammunition Plant, Karnack, TX
Contractor	BHATE ENVIRONMENTAL
Inspector's Name	SCOTT BEESINGER
Inspector's Title	SENIOR FIELD TECH
Inspector's Signature	Scott Beesinger
Inspector's Contact Number	(903) 930-6193
Inspection Date	MARCH 23, 2021
Type of Inspection	☐ Quarterly ☐ Semiannual ☒ Annual ☐ Prior to forecast rain ☐ After rain event ☐ Other_____

Description		Yes	No	N/A	Comments (Attach photos/location sketches)	Corrective Action (Attach photos)
A. Perimeter Signage						
A.1	Are there any damaged signs?		X			
A.2	Are there any missing signs?		X			
A.3	Are all signs legible?	X				
A.4	Is perimeter boundary mowed?	X				

A.5	Are signs visible from one sign to the next sign?	X				
B. LUC Boundary						
B.1	Is the LUC Boundary identifiable?	X				
C. Dig and Intrusive Activities restriction						
C.1	Any observed digging activities or similar intrusive activities within the site boundaries?		X			

Note: Annual compliance inspections shall be conducted no later than March 1 of each year for the previous calendar year and filed onsite.

LTM Inspection and Maintenance Checklist

General Information	
Project Name	LTM Inspection and Maintenance, LHAAP-001-R and LHAAP-003-R MMRP, Longhorn Army Ammunition Plant, Karnack, TX
Contractor	BHATE ENVIRONMENTAL
Inspector's Name	Scott Beesinger
Inspector's Title	Senior Field Tech
Inspector's Signature	Scott Beesinger
Inspector's Contact Number	(903) 930-6193
Inspection Date	10/6/22
Type of Inspection	☐ Quarterly ☐ Semiannual ☒ Annual ☐ Prior to forecast rain ☐ After rain event ☐ Other_____

	Description	Yes	No	N/A	Comments (Attach photos/location sketches)	Corrective Action (Attach photos)
A. Perimeter Signage						
A.1	Are there any damaged signs?		X			
A.2	Are there any missing signs?		X			
A.3	Are all signs legible?	X				
A.4	Is perimeter boundary mowed?	X				

A.5	Are signs visible from one sign to the next sign?	X				
B. LUC Boundary						
B.1	Is the LUC Boundary identifiable?	X				
C. Dig and Intrusive Activities restriction						
C.1	Any observed digging activities or similar intrusive activities within the site boundaries?		X			

Note: Annual compliance inspections shall be conducted no later than March 1 of each year for the previous calendar year and filed onsite.

LAND USE CONTROL COMPLIANCE CERTIFICATION FORM

In accordance with the LUC Plan dated MAY 2018 for LHAAP-001-R and LHAAP-003-R, an inspection of the sites was conducted by BHATE ENVIRONMENTAL on 10/6/22.

A summary of land use control mechanisms is as follows:

- Land use restrictions - restrict land use to non-residential.
- Integrity of LUC signage by ensuring signs are present, legible and have visibility from one sign to the next.

A summary of compliance with land use and restriction covenants is as follows:

- The posted signs are properly maintained at LHAAP-001-R and LHAAP-003-R.
- No digging or intrusive activities have taken place within the boundaries identified for LHAAP-001-R and LHAAP-003-R.
- No land use other than non-residential.
- Pamphlets and safety awareness video are being used to educate visitors.

I, the undersigned, do document that the inspections were performed as indicated above, and that the above information is true and correct to the best of my knowledge, information, and belief.

Date: OCTOBER 16, 2022

Name: Scott Beesinger

Signature: Scott Beesinger

Completed annual compliance inspections shall be conducted no later than March 1 of each year for the previous calendar year and filed on site.

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LHAAP-003-R-01

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LTM Inspection and Maintenance Checklist

General Information	
Project Name	LTM Inspection and Maintenance, LHAAP-001-R and LHAAP-003-R MMRP, Longhorn Army Ammunition Plant, Karnack, TX
Contractor	BHATE ENVIRONMENTAL
Inspector's Name	Scott Beesinger
Inspector's Title	Senior Technician
Inspector's Signature	Scott Beesinger
Inspector's Contact Number	(903) 930-6193
Inspection Date	12/5/18
Type of Inspection	☐ Quarterly ☐ Semiannual ☒ Annual ☐ Prior to forecast rain ☐ After rain event ☐ Other_____

	Description	Yes	No	N/A	Comments (Attach photos/location sketches)	Corrective Action (Attach photos)
A. Perimeter Signage						
A.1	Are there any damaged signs?		X			
A.2	Are there any missing signs?		X			
A.3	Are all signs legible?	X				
A.4	Is perimeter boundary mowed?	X				

A.5	Are signs visible from one sign to the next sign?	X				
B. LUC Boundary						
B.1	Is the LUC Boundary identifiable?	X				
C. Dig and Intrusive Activities restriction						
C.1	Any observed digging activities or similar intrusive activities within the site boundaries?		X			

Note: Annual compliance inspections shall be conducted no later than March 1 of each year for the previous calendar year and filed onsite.

LAND USE CONTROL COMPLIANCE CERTIFICATION FORM

In accordance with the LUC Plan dated _____ for LHAAP-001-R and LHAAP-003-R, an inspection of the sites was conducted by BHATE ENVIRONMENTAL on 12/5/18.

A summary of land use control mechanisms is as follows:

- Land use restrictions - restrict land use to non-residential.
- Integrity of LUC signage by ensuring signs are present, legible and have visibility from one sign to the next.

A summary of compliance with land use and restriction covenants is as follows:

- The posted signs are properly maintained at LHAAP-001-R and LHAAP-003-R.
- No digging or intrusive activities have taken place within the boundaries identified for LHAAP-001-R and LHAAP-003-R.
- No land use other than non-residential.
- Pamphlets and safety awareness video are being used to educate visitors.

I, the undersigned, do document that the inspections were performed as indicated above, and that the above information is true and correct to the best of my knowledge, information, and belief.

Date: 12/5/18

Name: Scott Bessinger

Signature: Scott Bessinger

Completed annual compliance inspections shall be conducted no later than March 1 of each year for the previous calendar year and filed on site.

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LTM Inspection and Maintenance Checklist

General Information	
Project Name	LTM Inspection and Maintenance, LHAAP-001-R and LHAAP-003-R MMRP, Longhorn Army Ammunition Plant, Karnack, TX
Contractor	BHATE ENVIRONMENTAL
Inspector's Name	SCOTT BEESINGER
Inspector's Title	SENIOR FIELD TECHNICIAN
Inspector's Signature	Scott Beesinger
Inspector's Contact Number	903-930-6193
Inspection Date	JANUARY 30, 2020
Type of Inspection	☐ Quarterly ☐ Semiannual ☒ Annual ☐ Prior to forecast rain ☐ After rain event ☐ Other_____

	Description	Yes	No	N/A	Comments (Attach photos/location sketches)	Corrective Action (Attach photos)
A. Perimeter Signage						
A.1	Are there any damaged signs?		X			
A.2	Are there any missing signs?		X			
A.3	Are all signs legible?	X				
A.4	Is perimeter boundary mowed?	✓				

A.5	Are signs visible from one sign to the next sign?	X				
B. LUC Boundary						
B.1	Is the LUC Boundary identifiable?	X				
C. Dig and Intrusive Activities restriction						
C.1	Any observed digging activities or similar intrusive activities within the site boundaries?		X			

Note: Annual compliance inspections shall be conducted no later than March 1 of each year for the previous calendar year and filed onsite.

LAND USE CONTROL COMPLIANCE CERTIFICATION FORM

In accordance with the LUC Plan dated July 2008 for LHAAP-001-R and LHAAP-003-R, an inspection of the sites was conducted by BHATE Environmental on 1/30/20

A summary of land use control mechanisms is as follows:

- Land use restrictions - restrict land use to non-residential.
- Integrity of LUC signage by ensuring signs are present, legible and have visibility from one sign to the next.

A summary of compliance with land use and restriction covenants is as follows:

- The posted signs are properly maintained at LHAAP-001-R and LHAAP-003-R.
- No digging or intrusive activities have taken place within the boundaries identified for LHAAP-001-R and LHAAP-003-R.
- No land use other than non-residential.
- Pamphlets and safety awareness video are being used to educate visitors.

I, the undersigned, do document that the inspections were performed as indicated above, and that the above information is true and correct to the best of my knowledge, information, and belief.

Date: JANUARY 30, 2020

Name: Scott Beesinger

Signature: Scott Beesinger

Completed annual compliance inspections shall be conducted no later than March 1 of each year for the previous calendar year and filed on site.

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Annual Land Use Control Compliance Certification Documentation

In accordance with the RD/RACR dated May 2018, for LHAAP-0001-R and LHAAP-003-R, an inspection of the sites was conducted by Bhate Environmental Associates, Inc. on 3/23/21.

A summary of land use control mechanism is as follows:

- Land use restrictions – restrict land use to non-residential.
- Integrity of LUC signage by ensuring signs are present, legible and have visibility from one sign to the next.

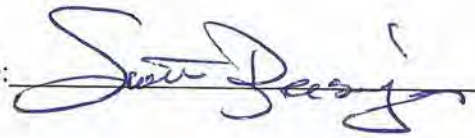
A summary of compliance with land use and restriction covenants is as follows:

- The posted signs are properly maintained and LHAAP-001-R and LHAAP-003-R.
- No digging or intrusive activities have taken place within the boundaries identified for LHAAP-001-R and LHAAP-003-R.
- No land use other than non-residential.
- Pamphlets and safety awareness video are used to educate visitors.

I, the undersigned, do document that the certification was performed as indicated above, and that the above information is true and correct to the best of my knowledge, information and belief.

Date: MARCH 23, 2021

Name/Title: Scott Beesinger Senior Field Tech

Signature: 

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LTM Inspection and Maintenance Checklist

General Information	
Project Name	LTM Inspection and Maintenance, LHAAP-001-R and LHAAP-003-R MMRP, Longhorn Army Ammunition Plant, Karnack, TX
Contractor	BHATE ENVIRONMENTAL
Inspector's Name	SCOTT BEESINGER
Inspector's Title	SENIOR FIELD TECH
Inspector's Signature	Scott Beesinger
Inspector's Contact Number	(903) 930-6193
Inspection Date	MARCH 23, 2021
Type of Inspection	☐ Quarterly ☐ Semiannual ☒ Annual ☐ Prior to forecast rain ☐ After rain event ☐ Other_____

Description		Yes	No	N/A	Comments (Attach photos/location sketches)	Corrective Action (Attach photos)
A. Perimeter Signage						
A.1	Are there any damaged signs?		X			
A.2	Are there any missing signs?		X			
A.3	Are all signs legible?	X				
A.4	Is perimeter boundary mowed?	X				

A.5	Are signs visible from one sign to the next sign?	X				
B. LUC Boundary						
B.1	Is the LUC Boundary identifiable?	X				
C. Dig and Intrusive Activities restriction						
C.1	Any observed digging activities or similar intrusive activities within the site boundaries?		X			

Note: Annual compliance inspections shall be conducted no later than March 1 of each year for the previous calendar year and filed onsite.

LTM Inspection and Maintenance Checklist

General Information	
Project Name	LTM Inspection and Maintenance, LHAAP-001-R and LHAAP-003-R MMRP, Longhorn Army Ammunition Plant, Karnack, TX
Contractor	BHATE ENVIRONMENTAL
Inspector's Name	Scott Beesinger
Inspector's Title	Senior Field Tech
Inspector's Signature	Scott Beesinger
Inspector's Contact Number	(903) 930-6193
Inspection Date	10/6/22
Type of Inspection	☐ Quarterly ☐ Semiannual ☒ Annual ☐ Prior to forecast rain ☐ After rain event ☐ Other_____

	Description	Yes	No	N/A	Comments (Attach photos/location sketches)	Corrective Action (Attach photos)
A. Perimeter Signage						
A.1	Are there any damaged signs?		X			
A.2	Are there any missing signs?		X			
A.3	Are all signs legible?	X				
A.4	Is perimeter boundary mowed?	X				

A.5	Are signs visible from one sign to the next sign?	X				
B. LUC Boundary						
B.1	Is the LUC Boundary identifiable?	X				
C. Dig and Intrusive Activities restriction						
C.1	Any observed digging activities or similar intrusive activities within the site boundaries?		X			

Note: Annual compliance inspections shall be conducted no later than March 1 of each year for the previous calendar year and filed onsite.

LAND USE CONTROL COMPLIANCE CERTIFICATION FORM

In accordance with the LUC Plan dated MAY 2018 for LHAAP-001-R and LHAAP-003-R, an inspection of the sites was conducted by BHATE ENVIRONMENTAL on 10/6/22.

A summary of land use control mechanisms is as follows:

- Land use restrictions - restrict land use to non-residential.
- Integrity of LUC signage by ensuring signs are present, legible and have visibility from one sign to the next.

A summary of compliance with land use and restriction covenants is as follows:

- The posted signs are properly maintained at LHAAP-001-R and LHAAP-003-R.
- No digging or intrusive activities have taken place within the boundaries identified for LHAAP-001-R and LHAAP-003-R.
- No land use other than non-residential.
- Pamphlets and safety awareness video are being used to educate visitors.

I, the undersigned, do document that the inspections were performed as indicated above, and that the above information is true and correct to the best of my knowledge, information, and belief.

Date: OCTOBER 16, 2022

Name: Scott Beesinger

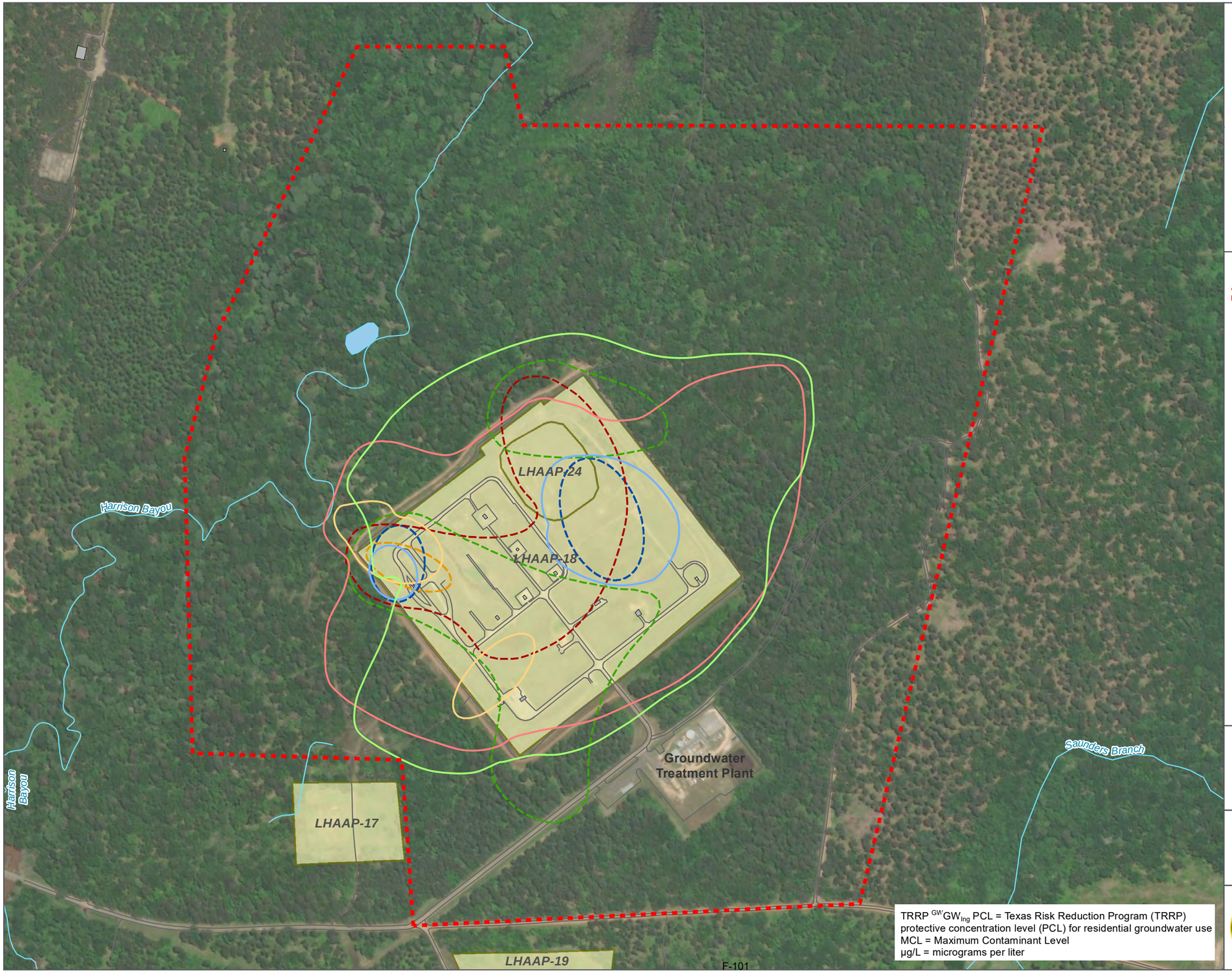
Signature: Scott Beesinger

Completed annual compliance inspections shall be conducted no later than March 1 of each year for the previous calendar year and filed on site.

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LHAAP-18/24 Interim LUC Boundary

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LEGEND

- LHAAP - 18 Preliminary Land Use Control Boundary

Shallow Groundwater Plume

- Perchlorate Contour >= 17 ug/L (TRRP $^{GW}GW_{Ing}$ PCL)
- Trichloroethene Contour >= 5 ug/L (MCL)
- Methylene Chloride Contour >= 5 ug/L (MCL)
- 1,4-Dioxane Contour >= 9.1 ug/L (TRRP $^{GW}GW_{Ing}$ PCL)

Wilcox Groundwater Plume

- Perchlorate Contour >= 17 ug/L (TRRP $^{GW}GW_{Ing}$ PCL)
- Trichloroethene Contour >= 5 ug/L (MCL)
- Methylene Chloride Contour>= 5 ug/L (MCL)
- 1, 4-Dioxane Contour >= 9.1 ug/L (TRRP $^{GW}GW_{Ing}$ PCL)
- Roads
- Buildings
- Site

Source: Final Record of Decision, LHAAP-18/24 Burning Ground No. 3 and Unlined Evaporation Pond, December 2019, Longhorn Army Ammunition Plant, Karnack, Texas

DATA SOURCES: AECOM, 2017. Final Revised Feasibility Study for LHAAP-18/24, Burning Ground No. 3 and Unlined Evaporation Pond, Longhorn Army Ammunition Plant, Karnack, Texas, January.

TRRP $^{GW}GW_{Ing}$ PCL = Texas Risk Reduction Program (TRRP) protective concentration level (PCL) for residential groundwater use
MCL = Maximum Contaminant Level
µg/L = micrograms per liter

PRELIMINARY
LAND USE CONTROL BOUNDARY
LHAAP 18/24
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

N

0 250 500
FEET

PATH: J:\2018\18-025_LHAAP_SITES29_47_18AND24_ROD_(WERNER)\7.2_WORK_IN_PROGRESS\MAP_DOCS\DRAFT\LHAAP18_24\LHAAP_18_24_NOTIFICATION_CONTAMINATIONPLUMES.MXD - USER: KLOFGREN - DATE: 3/11/2020

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APPENDIX G
PAGES FROM GROUNDWATER TREATMENT PLANT QUARTERLY EVALUATION REPORT 4TH QUARTER 2022

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The pretreatment system and air stripper system are equipped with instrument junction boxes and motor starter control panels. The control panels contain a transformer, run indication lights, motor starters, hand or automatic switches, and relays to interface with the central PLC. The control panels have monitors and/or logic to monitor the operating parameters and determine when abnormal conditions occur. Interface relays will indicate to the central PLC that there is a problem within the systems. The central PLC will provide the logic for the proper action required for that specific set of circumstances.

The GWTP was not operational between 24 May 2012 and 6 September 2012, due to malfunction of the scrubber unit associated with the catalytic oxidizer. Since 6 September 2012, the GWTP has operated without air abatement equipment. Although major repairs were conducted on the GWTP (e.g., replacement of level alarms, repair of the hydrochloric acid [HCl] tank, replacement of TK-650, replacement of malfunctioning valves and flow meters, replacement of metering pumps, repair or replacement of various system pumps, rust removal and repainting of various tanks, and replacement and repair of various extraction pumps, motors, and level switches), the GWTP treatment configuration has remained relatively unchanged. The only exception to this is that IX vessels were installed in November 2018 following the FBR to further remove perchlorate prior to discharging to the INF pond.

1.1.1 Historical GWTP Operation

The GWTP was not operational from 24 May 2012 until 6 September 2012. This was related to meltdown of the scrubber system, associated with the catalytic oxidizer, due to system overheating. Overheating occurred when the blower became inoperable after the bearing on the scrubber blower unit was shattered and damaged the blower. This occurred around 1300 on 21 May 2012.

After developing an interim air monitoring plan and obtaining concurrence from the Texas Commission on Environmental Quality (TCEQ) and the United States Environmental Protection Agency (USEPA) to operate the GWTP without use of air abatement equipment, a pilot run of the GWTP was conducted on 6 September 2012. In that first pilot run, 85,170 gallons of water that had been stored in the influent equalization tank (TK-140) were treated. The treated water was re-circulated through the FBR to revive the FBR after 3 months of dormancy. Treated groundwater samples were collected and analyzed, respectively, for perchlorate, metals, and VOCs. Air samples were collected and analyzed for VOCs only.

On 19 September 2012, a second pilot run was performed at the GWTP, and 107,264 gallons of water were treated. Based on the successful re-start of the GWTP, continuous groundwater extraction began again on 24 September 2012. While groundwater extraction occurs on a continuous basis, operation of the GWTP occurs intermittently due to the low volume of water available for treatment with respect to the design capacity of the GWTP. During the 3rd Quarter of 2012, groundwater extraction occurred only from LHAAP-18/24. Groundwater extraction from LHAAP-16 was not performed due to equipment failure. However, extraction from LHAAP-16 began in October 2012 and the extraction volumes increased steadily throughout the 4th Quarter

of 2012, as pumping equipment was gradually repaired/replaced. The GWTP operated under normal conditions until September 2015.

On 14 September 2015, at 1115, the blower on the air stripper (BL-340) malfunctioned during routine operation. The wiring on the blower was repaired and the blower operated for less than 2 hours on 17 September 2015, when the blower malfunctioned again. It was determined that the blower needed to be replaced, and groundwater extraction and operation of the GWTP ceased beginning 18 September 2015, as the influent equalization tank (TK-140) became full. Beginning on 2 October 2015, it was determined that the GWTP could operate without the blower at a reduced extraction rate. The operation of the GWTP allowed extraction of groundwater from ICTs 12E, 13A, 13B, and 13C (13C was changed to 13E on 12 October 2015), which were considered critical ICTs to prevent migration of contaminants to Harrison Bayou. Groundwater extraction was switched frequently between ICTs 12E, 13A, 13B, and 13E to ICTs 14B, 14C, and 14D beginning on 14 December 2015.

Malfunction of the blower on the air stripper (BL-340), on 14 September 2015 and 17 September 2015, disrupted continuous extraction and routine operations of the GWTP, which lasted through 7 January 2016. Prior to this occurrence, the GWTP performed as designed and the GWTP was operated on an as needed basis (i.e., semi-continuous operational basis). During the 4th Quarter of 2015, groundwater was extracted from a limited number of ICTs (ICTs 12E, 13A, 13B, 13C, and/or 13E, or ICTs 14B, 14C, and 14D). Operation of the GWTP occurred on a batch basis through the FBR. After replacement of the blower, attempts were made to restore continuous operations to the FBR, but they remained predominantly on a batch basis throughout January 2016.

On 12 December 2016, flange bolts at TK-380 failed and allowed HCl to drain into the sump. The secondary containment area was washed down, and the sump contents were transferred into the influent equalization tank (TK-140). Because of the acid release, extraction of groundwater from the ICTs was halted, and the GWTP was put into recycle mode (effluent sent back as influent) until the acid was neutralized and perchlorate, metals, and VOCs were below discharge criteria on 17 March 2017. The FBR performance was challenged by the increased chlorides in the neutralized wastewater, but performance gradually returned to normal in the 1st Quarter of 2017. Groundwater extraction was gradually increased to full rates during the 2nd Quarter of 2017.

On 12 August 2017, severe storms caused a power outage at LHAAP-18/24. When electrical service was restored, the main transformer failed due to a manufacturing defect. A portable emergency generator was brought on-site on 21 August 2017, to allow the FBR to operate in full recycle mode. After a replacement transformer was installed on 12 September 2017, extraction began from ICTs 13B, 13C, 13D, 13E, 13F, 7, and EW01 and the FBR was put into normal operation. Beginning on 21 September 2017, groundwater was extracted from all of the ICTs.

On 27 December 2018, severe storms caused a power outage in Karnack, Texas. When electrical service was restored, the main transformer was determined to have failed. A portable emergency generator was brought on-site on 28 December 2018, to allow the FBR to operate in

full recycle mode. On 5 February 2019, the smaller generator mobilized in December 2018 was replaced with a larger generator capable of powering the LHAAP-18/24 well field and the entire GWTP.

On 8 February 2019, the transformer at the GWTP was tested to ensure that it could handle back feeding necessary to power the LHAAP-18/24 well field due to the necessary step-down in power from the generator. Following additional system modifications based upon the testing, the well field at LHAAP-18/24 had power restored on 11 February 2019, using the generator and transformer at the GWTP.

From 11 June to 17 June 2019, a double-walled pipe in the burning grounds (ICTs 14C and 14D) was found to be leaking at a joint and repaired. In addition, the line to well 18WW17 was cut off due to leaks identified following repair of the other section of pipe. The ground was too wet to dig and replace the other double-walled pipe at that time. From 28 October to 31 October 2019, a new double-walled pipe to well 18WW17 was installed by Palmetto Services (Palmetto).

Groundwater is no longer extracted from LHAAP-16 because in situ bioremediation injections were completed in September 2019 as part of the final remedial action. While LHAAP-17 extracted groundwater is treated by the GWTP, the evaluation of that system and monitoring well sampling is completed in separated Remedial Action Operation Reports. This report discusses the extraction system and monitoring well network at LHAAP-18/24 and the GWTP system operations.

On 11 January 2020, a possible tornado and straight-line winds came through the area and damaged the power lines. The breaker was shut off at the transformer until power lines could be repaired on 14 and 15 January 2020, by Ark-La-Tex Electric (Ark-La-Tex). On 18 January 2020, power was lost to the GWTP, and it was discovered that there was a blown fuse on the power lines. Ark-La-Tex was called to the site to replace the fuse and power was restored to the GWTP the same day. On 29 March 2020, there was a power glitch that caused the air compressors to shut down. The air compressors and FBR were restarted on the same day. On 13 April 2020, two trees fell across a power line and caused loss of power to the plant. Ark-La-Tex removed the trees and restored power at 0945 on 14 April 2020. On 2 May 2020, a tree fell across Southwestern Electric Power Company's (SWEPCO's) line inside the plant that feeds the GWTP. SWEPCO came out and removed the tree from the line. Power was restored the same day. On 29 December 2020, housing was built for the acetic acid pump associated with the FBR to prevent rainwater from causing it to shut down.

On 13 February 2021, inclement weather began, and it stayed below freezing until 20 February 2021. The level transmitter on TK-650 froze, making the discharge pump inoperable. The level transmitter was thawed out and pumping was restarted. On 20 February 2021, the air compressors were able to be started again. The FBR began operation in recycle mode, but the oxidation-reduction potential (ORP) was greater than the normal operating requirements. From 21 February through 9 March 2021, repairs from the freeze were made on broken polyvinyl chloride (PVC) pipes, valves, fittings, and level transmitters. The ORP on the FBR remained

elevated and the FBR was in recycle mode until 25 March 2021 when the ORP returned to normal range and discharge to the Harrison Bayou was able to resume.

A power outage occurred on 12 May through 13 May 2021, due to downed power lines. On 14 May 2021, Ark-La-Tex was on-site to replace the broken power pole and repair broken power lines. On 28 May 2021, a power outage occurred at 0430, due to a downed tree. SWEPCO restored power the following day on 29 May 2021. On 2 June 2021, elevated perchlorate effluent results, precipitated replacement on the acetic acid nutrient feed pump. Perchlorate effluent results dropped below discharge limits but not to expected concentrations. As a result, the FBR was placed in recycle mode from 18 June 2021 through the end of the 2nd Quarter 2021.

On 29 July 2021, Envirogen Technologies (Envirogen) mobilized to the site to troubleshoot the FBR. The plant was brought offline to diagnose why perchlorate effluent results remained elevated. Envirogen found the fluidization flow at 230 gallons per minute (gpm) and the inlet pressure to the FBR at 14 pounds per square inch (psi) as satisfactory. Envirogen determined that the inline potential of hydrogen (pH) probe was not calibrating properly, and it was giving an incorrect reading of 7.4. In July 2021, the pH reading was 8.24 which is above the enhanced FBR operating parameters. Ideally, the pH should be between 7.1 and 7.

4 in the FBR. A high pH can inhibit biological activity. Envirogen recommended the installation and calibration of a new pH probe. A new inline pH probe was ordered, and replacement and calibration were completed on 6 April 2022.

Additionally, Envirogen noted that the granulated activated carbon (GAC) settled bed height was 6.33 feet (ft) and the expanded bed height was 9 ft. The design settled bed height for the GAC was 9 ft and the design expanded bed height was 15 ft, with the expanded bed height being a key performance indicator for the FBR. Therefore, Envirogen recommended the addition of two supersacks of GAC media. One supersack of GAC was delivered, pre-wetted, and loaded in the FBR on 29 July 2021. After the addition of one supersack of GAC, the settled bed height was measured at 9.1 ft and the expanded bed height was measured at 11.3 ft. Additional GAC was ordered and added to the FBR. The GWTP was brought back online on 3 August 2021.

Palmetto was on-site from 20 September through 24 September 2021 to replace sand in the sand filter. The sand in the sand filter collects debris that is filtered out of the water as designed. However, over time the debris restricts the flow of water through the filter. Therefore, the GWTP was taken offline on 20 September 2021 to replace the sand. Palmetto removed the sand and screens, acid washed the screens, put the screens back in place, and then added new sand using a crane. Approximately 4.5 tons of 10 x 20 silica sand and 12 tons of 8 x 12 silica sand were placed into the sand filter. While the plant was down for the sand filter activities, the 10-inch PVC line between the clarifier effluent and the sludge tanks was replaced, and the polymer feed line was unclogged. However, before the GWTP could be operated again, the HCl feed pump malfunctioned as discussed below.

On 4 October 2021, the GWTP was unable to operate due to a malfunctioning pump motor on the HCl feed pump (P-390). On 5 October 2021, Bloc Design Build, LLC (BLOC) was on-site to diagnose the problem with the HCl pump motor (P-390) which was seized and inoperable. A new

pump motor was ordered and on 14 October 2021, BLOC returned and installed wiring to the new motor on the HCl pump (P-390).

Upon arrival at the GWTP on 5 October 2021, there was no power at the GWTP. A blown fuse was found on SWEPCO's transformer. SWEPCO replaced the fuse, however, only partial power was restored to the GWTP on 5 October 2021. On 7 October 2021, Ark-La-Tex was on-site to troubleshoot the electrical power issue and determined that the load break switch (commonly referred to as an arc strangler) was blown at the transformer at the GWTP and needed to be replaced. The load break switch malfunction had caused the fuse to fail, cutting power to the GWTP. On 11 October 2021, Ark-La-Tex was on-site to repair the load break switch and restore power to the GWTP. Following the restoration of power, and replacement of the HCl pump, the GWTP operation resumed on 18 October 2021.

In March 2022, a severe storm blew down a tree damaging two power poles, but there was no power loss at the time of the storm event. On 16 March 2022 and 17 March 2022, Ark-La-Tex arrived on-site to replace the power poles and to repair the power lines. As a result, power was shut off at the plant for approximately 24 hours from 16 March to 17 March 2022, to allow Ark-La-Tex to safely work with the power lines.

On the afternoon of 2 May 2022, there was partial power loss to the GWTP. After an inspection of the overhead power lines, a fuse was found blown on SWEPCO's transformer. SWEPCO was alerted and responded on 2 May 2022 to replace the fuse. The GWTP was completely powered down on 2 May 2022 as a safety precaution while SWEPCO addressed the blown fuse. In addition to the blown fuse, there was also a small fire observed on the ground at the base of the transformer load breaker switch at the GWTP. The United States Fish and Wildlife Service was alerted, and the fire was put out with a water sprayer on 2 May 2022. The status of the load breaker switch on the transformer could not be assessed until power was fully restored.

However, before power could be restored to the GWTP, a severe storm on 3 May 2022 knocked down another tree. The downed tree fell on the overhead line, breaking the overhead line and two cross arms. Ark-La-Tex repaired the overhead line, cross arms, and assessed the load breaker switch on 11 May 2022. Power was restored to the GWTP on 11 May 2022 and a new load breaker switch was ordered. Ark-La-Tex returned on 17 May 2022 to install the replacement load breaker switch.

On 10 June 2022, the K-701 air compressors went down due to a power glitch. The air compressors were restarted and FBR returned to normal operating range.

A supersack of GAC (1,000 pounds) was delivered on 17 June 2022. On 20 June 2022, the FBR was topped off with approximately 150 pounds of GAC, expanding the bed height to 15 ft as designed. The expanded bed height is a key performance indicator for optimal performance of the FBR.

On 22 June 2022, a power outage occurred for 1.5 hours on SWEPCO's side. Power was restored and air compressors were restarted and FBR was returned to normal operating range.

During the 3rd Quarter 2022 (July – September), the adjacent LHAAP-17 groundwater extraction system was brought online and integrated into the GWTP. The LHAAP-17 groundwater extraction system was plumbed into the existing underground piping infrastructure that runs between LHAAP-16 and the GWTP. The LHAAP-17 extraction system was started up on 5 August 2022. Details regarding the installation of the groundwater extraction system at LHAAP-17 are included in the Interim-Remedial Action Completion Report (TLI Solutions, December 2022). Through the end of September 2022, 121,411 gallons of groundwater have been pumped from LHAAP-17 to the GWTP. Monthly groundwater extraction quantities from LHAAP-17 are presented in **Table 5**. Monthly performance monitoring completed at LHAAP-17 and an evaluation of the effectiveness of the LHAAP-17 extraction system will be presented in Annual Remedial Action Operation Reports under separate cover.

To address a potential blockage identified during the 2nd Quarter 2022, the GWTP was brought offline and the metals pretreatment process tanks TK-200A, TK-200B, and TK-200C were drained on 12 September 2022. While, each tank had sediment buildup, no blockage was found inside the metals' pretreatment tanks. The blockage is believed to be in the overhead 10-inch steel piping between tanks TK-200B and TK-200C. However, to safely access the overhead piping, which is elevated approximately 15 ft in the air, scaffolding is necessary. Arrangements to procure scaffolding have been made to address the blockage during the 4th Quarter 2022. In the interim, the sediment was removed from the metals' pretreatment tanks and the GWTP was brought back online on 13 September 2022.

1.1.2 4th Quarter 2022 GWTP Operation

During the 4th Quarter 2022 (October - December), the only IC repairs included cleaning the level probes for ICTs 14C and 14E. Previous ICT repairs are summarized in **Table A-2** in **Appendix A.**

In the 4th Quarter 2022, the GWTP processed approximately 1,189,879 gallons of water including influent water from LHAAP-18/24, influent water from LHAAP-17, rainwater from the catch basin, and decanted water from the metals' treatment and solids removal processes. In addition, a suspected blockage restricted flow through the pretreatment process causing a leak prior to Tank 200A. This leak, also captured in the catch basin, is included in the processed volumes.

During the 4th Quarter 2022, the GWTP operated for 126 hours. Due to the sodium hydroxide tank release to the containment area and freezing conditions, the GWTP only operated 27.75 hours in December 2022. Flow rates for the treatment processes for metals and VOCs ranged between 123 and 167 gpm. The lower flow rate was in December and was due to management of other operating repairs. The flow rates in October and November were similar.

On 14 November 2022, a flange on the sodium hydroxide solution tank (TK-100) was identified as being cracked and the material was released within the containment area of the GWTP. The sodium hydroxide (35 percent [%] weight) was transferred into a 1,500-gallon holding tank. Following the repairs, the sodium hydroxide was pumped back into the storage tank (TK-100) for the system starting on 5 December 2022 and finishing up 8 December 2022.

Maintenance performed at the GWTP during the 4th Quarter of 2022 is described in the following subsections.

1.2.1 Major Maintenance

The major maintenance items that were completed at the GWTP during this quarterly reporting period are:

- On 25 October 2022, Ark-La-Tex was onsite to install transformer for Army trailer.
- On 16 December 2022, Ark-La-Tex was onsite to replace blown fuse on overhead power line.
- On 14 November 2022, a flange on the sodium hydroxide solution tank (TK-100) was identified as being cracked and the material was released within the containment area of the GWTP. The sodium hydroxide (35 % weight) was transferred into a 1,500-gallon holding tank. Following the repairs, the sodium hydroxide was pumped back into the storage tank (TK-100) for the system starting on 5 December 2022 and ending on 8 December 2022.
- Starting on 27 December 2022, repairs to freeze commenced and included: replacement of broken valves and piping on air lines; removal of broken fan from K-701; installation of new belts on K-701; replacement of broken 2- inch (“) valve and flanges on level switch on TK-300; cutting of bolts from flanges and install new 6 ” butterfly valve on TK-300; cutting of bolts from flanges on suction and discharge of P-170; replacement of broken 3 ” and 4 ” flange, and elbow on suction of P-170; and replacement of broken 4 ” flange, tee and pipe on discharge of P-170.

1.2.2 Routine Maintenance

The following routine maintenance items were completed at the GWTP during 4th Quarter 2022:

- Performed housekeeping in GWTP office, Army trailer, around GWTP and containment area, and in GWTP Shop
- Mowed grass and trimmed weeds around GWTP office, Army trailer, GWTP and containment area, and around the GWTP Shop
- Removed and cleaned basket from 4-inch strainer on discharge of FBR
- Replaced ¼” tubing on suction side of P-104
- Replaced filter socks in filters before IX vessels
- Installed new 3” sump pump
- Transferred caustic into holding tank to repair broken 2” valve on TK-100
- Replaced air regulator in air line to LV-330
- Repaired broken ¾” air line in GWTP
- Repaired 3” ball check valve on discharge of sump pump
- Set up a 1” diaphragm pump to use a sump pump
- Freeze protection of the GWTP system piping etc.
- Replaced broken valve and flange on TK-100
- Pumped sodium hydroxide from holding tank back into TK-100

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APPENDIX H
RESPONSES TO REGULATORY AGENCY COMMENTS

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Comment Response Matrix
Draft Final Five-Year Review Report, Longhorn Army Ammunition Plant
USACE, Omaha District Five-Year Reviews for U.S. Army Environmental Command
May 2024

Reviewer: USEPA, Superfund/ Remedial Branch, Comments submitted July 31, 2024

#	Comment Location		Comment	Army's Response
	Section	**Page**		
1	Issue Category: Remedy Performance	v	Because acronyms TOC and ORP appear before the acronym list given in the following pages, it is recommended that these are defined.	Concur. The acronyms TOC and ORP were defined in the text.
4	Issues/ recommendations	vi	Recommendations for LHAAP-17 should include addition of LUCs as part of potential remedy change.	Concur. An issue/recommendation was added for LHAAP-17 to develop MEC-specific LUCs after completion of the TCRA and RA.
6	Issue Category: Monitoring	viii	Citing needed for plume map being referred to – is this Figure 2-5	The figure that is associated with this issue is Figure 49. This information was not added to the Issue/Recommendation so that the information is not rolled over into other systems or reports. Figure 49 is also referenced within the text within discussion of this issue in the data review section 11.5.2.
8	Issue Category: Monitoring	ix	Did not find location of 35AWW25 on any site map (figure 66-69). Review/edit.	Concur. Figure 65 was replaced with an updated figure that shows the location of 35AWW25.

Comment Response Matrix
Draft Final Five-Year Review Report, Longhorn Army Ammunition Plant
USACE, Omaha District Five-Year Reviews for U.S. Army Environmental Command
May 2024

Reviewer: USEPA, Superfund/ Remedial Branch, Comments submitted July 31, 2024

#	Comment Location		Comment	Army's Response
	Section	**Page**		
9	Protectiveness statements	x	Has LHAAP-03 protectiveness been reconsidered or confirmed based on updated lead screening levels?	The updated screening levels for lead in soil are not applicable to LHAAP-003 because the RAO and remediation goals are based on protection of groundwater, not direct contact with lead in soil. The groundwater protection remediation goal for lead (180 mg/kg) is actually less than the updated residential lead RSL (200 mg/kg), but direct contact with soil was not identified as a complete/potentially complete exposure pathway.
10	4.2.2 - 2nd paragraph	12	Delete extra period *after "30 Texas Administrative Code (TAC) 335.563(h)(1)"*	Concur. The extra period was removed from the text.
11	4.3.1	12	The screening level for Pb has been updated for residential soils. This should be addressed at sites that have Pb as a COC (i.e. LHAAP-03). While none of the expected uses are residential, has the site been evaluated using the new screening levels?	Please see the response to comment #9. LHAAP-03 is the only subsite with lead as a COC.
12	5.2.2 -3rd paragraph	18	Delete extra period.	Concur. The extra period was removed from the text.
13	5.3.4 – 2nd paragraph	21	Include estimated deadline for the 2022 LUC annual report to completed.	Concur. Review of the 2022 report was conducted and added to Section 5.3.4 with the LUC inspection completion date of October 26, 2022.

Comment Response Matrix
Draft Final Five-Year Review Report, Longhorn Army Ammunition Plant
USACE, Omaha District Five-Year Reviews for U.S. Army Environmental Command
May 2024

Reviewer: USEPA, Superfund/ Remedial Branch, Comments submitted July 31, 2024

#	Comment Location		Comment	Army's Response
	Section	Page		
14	5.7.1 -2nd paragraph/ 3rd line	23	If available, please include civil survey record identifier/number given by the Harrison County Courthouse.	Concur. The following sentence was added to the text: "The document number associated with this filing is 2021-000003203".
15	6.3.3.2	30	Cite annual inspection report of the landfill cover, or include in the FYR appendices.	Concur. LUC inspections, which include landfill cover inspection, were included in Appendix F.
16	LHAAP-12 Figure 14	33	For clarification purposes, include arrows indicating the flow direction of the groundwater.	Figure 14 was generated for the 2021 Annual RA-O Report. The figure data were not available to the Five-Year Review contractor in an editable format.
17	6.9.1 – 1st line	37	Change "other findings" to Other Findings	Concur. The text was revised to capitalize "Other Findings".
18	7.3.3.4	46	Include/cite figure(s) describing fluctuating groundwater elevations and flow directions.	Concur. Figures were added (now Figure 26 and Figure 27) to show the fluctuating groundwater elevations and flow directions.
22	8.3.3.2	81	Due to the delay in the remedial action the GW extraction period was extended until the Remedial Action and TCRA can be completed.	Concur. The following sentence was added to Section 8.3.3.2: "The groundwater extraction period was extended until the Remedial Action and TCRA are completed".

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23	8.3.3.4	81	When the TCRA and RAs are completed MEC specific LUCs will need to be implemented for protectiveness.	Concur. Please see the response to Comment #4. An issue and recommendation were added to the report to develop MEC specific LUCs for implementation after completion of the TCRA and RA.
25	9.3.3	94	The remedial design has been completed and awaiting implementation of the RA.	Concur. The text was revised to read as follows: "The RD was completed in February 2024 and RA implementation is pending".

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26	9.3.3.1	94	There should be further discussion about the GWTP and the long-term solution. With frequent breakdowns and issues any extended use might not be feasible. Additionally, discussions of PFAS and the GWTP should be considered. Could this be a recommendation/ issue?	Concur. The following text was added to the end of Section 9.3.3.1: "The existing GWTP will continue to be operational during the implementation of the 2020 remedy and will continue to hydraulically control migration of contaminants while the soil and groundwater remedial actions are being completed. Army will evaluate if the in-situ remedial technologies specified in the RD sufficiently reduced site COCs to levels amenable to MNA and will determine at that time if a new or modified GWTP is required." The text in section 9.3.4 was revised to read: "The RD states that maintenance for the GWTP is included in the plan until the GWTP is no longer needed to achieve cleanup levels". See section 2.4.1 which addresses sitewide PFAS.
27	Table 34	105	Font size is not uniform.	Concur. The text in the table was adjusted to ensure uniformity.

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28	10.5.2	109	The plume is not defined to the north and is potentially migrating into LHAAP-47. It would be recommended to use current wells and data from both OUs to delineate the plume. With geochemical parameters indicating there is no biotic degradation, delineation needs to be complete to ensure the contamination is not migrating vertically or horizontally.	Concur. This is captured in the Issue and Recommendation pair for LHAAP-35B(37) in Sections 10.8 and 10.9.1. It is possible that data from LHAAP-47 may be used to close this data gap. However, based on feedback from the EM CX, recommendations are phrased to allow flexibility in addressing identified issues, which is why the recommendation does not include that level of specificity.
29	11.4	123	Additional GW studies have been conducted to identify concerns with dry wells. This should be added to the section.	Concur. A sentence was added to Table 42 that reads as follows: "Based on a technical memorandum completed on the dry wells in November 2018, there is no correlation between rainfall and groundwater elevation changes".

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33	General		What is the status of PFAS scoping and investigation at Longhorn? PFAS is included in the list of acronyms and abbreviations, but not at all in the document itself? Please include a section that explains the status of the scoping and investigation. Please include a crosswalk of PFAS sites to investigated and that have been referred forward for further investigation. With new MCLs some sites NFA'd will need to be reconsidered.	Concur. A preliminary assessment/site investigation was completed in August 2023. The 2023 LHAAP PFAS Preliminary Assessment/Site Investigation was reviewed, and sections added to the report, where appropriate, to discuss areas at LHAAP that had PFAS concentrations above the Office of the Secretary of Defense Risk Screening Levels. The following sites now have PFAS discussions: LHAAP-12, LHAAP-16, LHAAP-18/24, LHAAP-46, and LHAAP-50. See section 2.4.1 which addresses sitewide PFAS.

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1	Figures		Add a list of figures after the List of Tables.	Concur. A "List of Figures" was added to the report before the List of Appendices.
2	General		Add Adobe bookmarks and nested bookmarks for each figure and table. For tables, the bookmarks could be added to the relevant sections, or you could develop a separate set of Tables bookmarks between Section 20 and Appendix A. There are several appendices of over 100 pages but no structure to help navigate and review (no adobe bookmarks or page numbers). Please revise. Also add nested bookmarks for each site in Appendices B-F. Add page numbers for the appendices, for example A-1. Note in Appendix B the inspection form is numbered C-1 to C-13 for each site but overall page numbers for the whole appendix are needed.	Concur. Appendices were labeled with page numbers. Bookmarks were added with descriptions of sections and divided into nested site bookmarks. **TCEQ Backcheck Comment:** Thank you for the additional adobe bookmarks to support report navigation (from Comment 2). For the final signed version, please check the bookmarks as one of the last checks. Noting the "clean" file incorrectly has a bookmark for each page of the lists of tables, figures, and acronyms, rather than one bookmark per list. The RLSO does not have this repetition. **Army Response:** DAWSON will ensure bookmarks are correct in the final version of the report.
3	Exec Summary	i, 1st paragraph (P) (also 1.0, and 2.1)	Does the transferred acreage total include the last group of sites from August 2018 ECP VII? Other recent reports note about 1,100 acres remain.	Concur. The original text stating approximately 7,200 acres of the installation have been transferred did not include the group of sites from the August 2018 ECP VII. The text was revised to read: "Approximately 7,300 acres of the installation have been transferred to the USFWS…". **TCEQ Backcheck Comment:** Correct 7,200 to 7,300 (from Comment 3). **Army Response:**

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				Section 2.1 has been corrected to read 7,300 instead of 7,200.
4	Exec summary	ii (and 3)	The paragraph (P) below the table should also discuss the planned Remedial Action for LHAAP-18/24. The GWTP is an interim remedy.	Concur. The following text was inserted in both sections on pages ii and 2/3: "Implementation of the final remedy at LHAAP-18/24 has not yet occurred. A Pre-Design Investigation occurred from March 12 through June 30, 2021, to further define groundwater impacted by 1,4-dioxane, perchlorate, and VOCs. Soil samples were also collected to investigate perchlorate and VOC soil contaminant levels at the contact interval between the clay and sand. Current operation of the GWTP is in accordance with the interim remedial action to treat groundwater extracted from ICTs and extraction wells. The 2020 ROD selected "*enhanced groundwater extraction and treatment as needed, LUCs, enhanced ISB inside and outside containment area and in Wilcox Formation, unsaturated soil excavation, and thermal DNAPL removal*" as the final remedy for LHAAP-18/24 (Army, 2020)".
5	LHAAP-12	i and throughout	LHAAP-12 is generally called Landfill 12. It is not "Active Landfill" as named in the crosswalk on pgs. i and 2. Correct throughout.	Concur. Instances of "Active Landfill" were changed to "Landfill 12".
6	Issues Recommendations		TCEQ generally agrees with issues and recommendations. LHAAP-16 – pg. vi - For 1st "Monitoring" section which is about plume delineation, please remove the word "consider" and change this "Issue category" to	Concur. For LHAAP-16 the word "consider" was removed from the recommendation and the Issue Category has been changed to "Remedy Performance". For LHAAP-16 Monitoring section the world "labels" was removed and "well" was changed to "wells".

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			"Remedy Performance". This is an important issue to address. LHAAP-16 – pg. vi - For 2nd "Monitoring" section "Issue", first sentence beginning "As a result of fluctuating…" remove the word "labels" change "well" to "wells". LHAAP-16 – pg. vii – "Monitoring" section which is about possible source area, please remove the word "consider" and change this "Issue category" to "Remedy Performance". This is an important issue to address. LHAAP-18/24, pg. xii, first sentence should note the "planned remedy". Add a sentence like the last one for LHAAP-17 regarding the timeframe. Wouldn't "Short-Term Protective" be the more appropriate determination?	For LHAAP-16 the word "consider" was removed and the Issue Category was changed to "Remedy Performance". For LHAAP-18/24 the word "planned" was added for discussion of the remedy. The current documentation available at the time of this review does not include timeframes for remedy action completion. The protectiveness determination has not been changed. Per the 2001 guidance and 2016 template the remedy determination for sites without construction complete remedies can only be "Not Protective" or "Will Be Protective". Therefore, the protectiveness determination of "Will Be Protective" was maintained. **TCEQ Backcheck Comment:** LHAAP-18/24, Protectiveness Determination section, first paragraph, please add a sentence regarding the time frame to implement the planned remedy, as requested in the original comment. **Army Response:** Concur. The following statement was added to the protectiveness determination statement for LHAAP-18/24: "It is expected that the final remedial actions will take approximately 7 years to complete, at which time a protectiveness determination will be made".

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7	Site Chronology Tables		Table 10 includes a row for Remedial Action Operation with year began to present. Several of the other sites don't have this row in the chronology tables. Please add this row to all sites with RAO.	Concur. A line was added to appropriate Site Chronology tables for the Remedial Action Operation timeframe.
8	Cleanup Level Tables		In the Cleanup level tables, please revise headings and notes as shown "Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level (PCL)". Several (such as Tables 25 and 31) do not include the complete description. For GWP-Ind MSCs, please revise notes to include "30 TAC 335.558 and 335.559(g)(2)" and/or "Risk Reduction Rules".	Concur. Headings and notes were changed in Cleanup Level tables where appropriate to include suggested information. **TCEQ Backcheck Comment:** Tables 25 and 31 (and in any other Cleanup Levels or Chemicals of Concern Tables)- Revise incorrect statements and reduce redundant information by replacing the new notes a-c in with the text below. Note b is for TRRP PCL, while note c is for Risk Reduction Rule MSC (not TRRP), indicated by different chapters in TAC. Language "Clean-up levels will be based on" is redundant. Revised language for notes: a Safe Drinking Water Act (SDWA) Maximum Contaminant Level (MCL) consistent with 40 CFR §300.430(e)(2)(i)(B&C). b TRRP Tier 1 Residential PCL for groundwater ingestion pathway in accordance with 30 TAC 350 and available at https://www.tceq.texas.gov/remediation/trrp/trrppcls.html. c TCEQ soil medium-specific concentration (MSC) for industrial use based on groundwater protection (GWP-

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				Ind) in accordance with 30 TAC 335.558 and 30 TAC 335.559(g)(2). **Army Response:** Concur. Note under Cleanup Levels or Chemicals of Concern Tables have been updated with the above suggested notes.
9	2.2.2	6	Last P- Wells are in areas that have transferred to USFWS. Sentence beginning "None of these wells" delete "at LHAAP".	Concur. The phrase "at LHAAP" was deleted from the sentence in Section 2.3.2 and it now reads as follows: "None of these three wells are currently used for drinking water, although they may supply water for non-potable uses".
10	3.4	10	TCEQ and EPA also attended the inspection.	Concur. The text was revised to read as follows: "The LHAAP site inspection occurred on February 14 and 15, 2023 and was attended by USACE, Tulsa District; USAEC; Aptim; TCEQ; EPA; Bhate; and DAWSON".
11	4.3.3	13	First P, revise "The excavated areas were expanded".	Concur. The text was revised and reads as follows: "The excavated areas were expanded based on confirmation sample results shown on **Figure 4** and the final extents of each excavation area are shown on **Figure 5".**
12	7.2.4	41	Please revise as shown (or similar) - The extraction system operated intermittently from 1996 through September 27, 2019. Extraction was terminated during the implementation ~~following the completion~~ of the	Concur. The text was revised and reads as follows: "The extraction system operated intermittently from 1996 through September 27, 2019. Extraction was

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			remedy documented in the 2016 ROD (Bhate-Aptim, 2021).	terminated during the implementation of the remedy documented in the 2016 ROD".
13	Tables 14-21		Please add the comma thousands-separator (example 10,000).	Concur. Comma separators were added to appropriate numbers in Tables 15-21.
14	7.7.1	64	Consider revising the first sentence "The remedy is not functioning as intended by the decision document." The later discussion about the cap in 7.7.4 notes the cap portion of the remedy is functioning as intended. The performance of the in-situ remedy to treat groundwater is more complicated, as noted in the recommendations. For comparison, the same section in LHAAP-18/24 presents a nuanced and useful explanation which notes the aspects that are effective and functioning as designed.	Concur. The response to Question A was reordered as follows: The remedy is currently not functioning as intended by the decision document because, the Five-Year Review site inspection observed small pine trees growing on the northeastern portion of the landfill surface that require removal. The TCE plume is not fully delineated to the east but is bound by the monitoring well network to the north and south. The current monitoring well network includes wells located immediately downgradient from the landfill. These wells are currently included in the sampling plan for evaluating upgradient concentrations in groundwater prior to entering the treatment areas. Analysis should also focus on historical trends of COC concentrations to determine if leaching may be occurring from the landfill. Groundwater samples from the wells are analyzed for VOCs and perchlorate. Metals sampling occurred in June/July 2022. Evaluation for this five-year review indicates concentrations of TCE and perchlorate in monitoring wells downgradient from the landfill exhibit either no trend or a decreasing trend, indicating TCE and perchlorate are not migrating or leaching from hazardous substances in the landfill. For those wells where there is no trend and concentrations remain high (e.g., 16WW16,

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				16WW36, 16WW35), it appears the groundwater in contact with the buried waste material continues to provide a mechanism for transportation of COCs away from the landfill. Based on the upgradient concentrations at 16RW02, concentrations at the biobarrier well 16IW09, and downgradient concentrations at 16RW05, the ability to monitor the performance of Biobarrier #1 at this location over two years of quarterly sampling is limited. Years 1 and 2 performance monitoring groundwater data indicate the biobarriers effectiveness at reducing concentrations of VOCs and perchlorate in groundwater is limited. The effectiveness appears to mostly be localized at the biobarriers, most specifically at Biobarrier #3. Additional data are needed to determine the effectiveness of the biobarriers to reduce concentrations downgradient of the biobarriers. Seasonal fluctuations in groundwater flow may result in contaminated groundwater flowing around or past the biobarriers toward Harrison Bayou. In addition, some wells have not maintained geochemical conditions conducive to natural attenuation of COCs. There is also some concern regarding the data quality. The sample collection logs do not provide any observations about the appearance of the samples. Upon further review, numerous wells had samples taken with turbidity readings well above 10 NTUs after limited purge time and volume (less than one well volume). The ROD specified that monitoring for metals (chromium, arsenic, nickel and/or manganese) will be evaluated at the first Five-Year Review to determine if

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				any further monitoring for metals is warranted. Metals sampling occurred in June and July 2022. There were limited detections and exceedances of arsenic, chromium, manganese, and nickel and no detections of thallium. The metals detections do not appear to be associated with widespread contamination from the landfill. However, it is recommended that while active ISB is ongoing that groundwater continue to be analyzed for metals at a frequency of at least every five years due to potential changes in the site-wide geochemistry. LHAAP-16 is mowed annually prior to inspections to allow evaluation of the landfill cap surface, animal burrows, erosion, monitoring wells, and site access. The landfill cap and LUCs prevent exposure to landfill contents and groundwater. Warning signs are in place and cap inspection, maintenance, and repair occur. The groundwater and land use restriction boundary extends beyond the known TCE plume extent, providing a buffer area to ensure groundwater and land use restrictions are in place east of Harrison Bayou. Surface water sampling results indicate COCs are not migrating into Harrison Bayou at levels to cause surface water in Harrison Bayou to exceed surface water criteria. **TCEQ Backcheck Comment:** Please revise the first sentence to: The remedy is currently not functioning as intended by the decision document. Next sentence begins "The TCE plume…"

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				Move the sentence including "observed small pine trees" before the paragraph beginning "LHAAP-16 is mowed…" to keep the cap information together following the groundwater plume discussion. **Army Response:** Concur. The text has been revised to read: "The remedy is currently not functioning as intended by the decision document." The text was also revised to move the following sentence to the beginning of the fifth paragraph: "The site inspection revealed small pine trees growing on the northeastern portion of the landfill that require removal."
15	7.7.1	65	2nd P, first sentence with 16RW02, add "Biobarrier #1" somewhere in this sentence. 2nd P, is this sentence referencing something specific? If not, perhaps 2nd use of "sample" should be plural. "The sample collection logs do not provide any observations about the appearance of the sample." 2nd P, last sentence with "above 10 NTUs", please clarify if this note is about the wells that were impacted by EVO.	Concur. The text was revised to read as follows: "Based on the upgradient concentrations at 16RW02, concentrations at the biobarrier well 16IW09, and downgradient concentrations at 16RW05, the ability to monitor the performance of Biobarrier #1 at this location over two years of quarterly sampling is limited". "The sample collection logs do not provide any observations about the appearance of the samples". The sentence referencing the wells with turbidity above 10 NTUs does not specifically refer to wells with EVO injections. Some of the wells had EVO injections but not

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			Last sentence in this section, agree metals monitoring should continue, frequency at least every FYR.	all the wells with the high turbidity were EVO injection wells. The text was revised to read as follows: "However, it is recommended that while active ISB is ongoing that groundwater continue to be analyzed for metals at a frequency of at least every Five-Year Review due to potential changes in the site-wide geochemistry". **TCEQ Backcheck Comment:** Response included this note - The sentence referencing the wells with turbidity above 10 NTUs does not specifically refer to wells with EVO injections. Some of the wells had EVO injections but not all the wells with the high turbidity were EVO injection wells. Page 65 - Please add this sentence (or something similar) after "(less than one well volume)": The wells with turbidity above 10NTUs includes, but is not limited to, wells with EVO injections. **Army Response:** Concur. The text was revised, and a sentence was added that reads: "The wells with turbidity above 10 NTUs include, but is not limited, wells with EVO injections".
16	8.3.1	74	See 6.2.5 and 7.2.5 and revise this section to be similar. Remove italics and quotes. Add the site COCs and impacted pathways.	Concur. The Basis for Taking Action section for LHAAP-17 (8.2.5) was revised to read as follows:

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				"The COCs for soil include explosives (2,4,6-TNT, 2,4-DNT, and 2,6-DNT) and perchlorate. The COCs for the shallow groundwater zone are perchlorate and VOCs (1,2-DCA, 1,1-DCE, cis-1,2-DCE, TCE, and vinyl chloride). The COCs for the intermediate groundwater zone are TCE and its degradation products (DCE and vinyl chloride). Remedial action is necessary to mitigate potential risks to the future maintenance worker and ecological receptors from contaminated soil and groundwater. A Baseline Human Health Risk Assessment from 2002 concluded that the soil and groundwater at LHAAP-17 both posed unacceptable carcinogenic and non-carcinogenic risk to the hypothetical future maintenance worker". **TCEQ Backcheck Comment:** Relating to tracking changes – Thank you for submitting a RLSO document which generally tracked edits to the narrative. I noted the additional language in this section was not indicated with red font/track changes, only the strike out was red. I noted untracked changes in other places within the report narrative but did not include comments. I understand how this can happen, but it does complicate review. The appendices do not include tracked changes. The actual RSLO tracks the narrative portion - Exec Summary through Section 20. The rest of the document could have been omitted from this file. That would help clarify which changes were tracked in the RLSO.

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				Army Response: Comment noted.
17	8.3.2	76	First sentence, remove quotes and italics.	Army has included italics and quotations because this text is a direct insertion from the ROD. The technical writers guide requires this format as a standard for technical documents.
18	Table 30	89	Add rows for Quarterly Groundwater Treatment Plant Reports 199X to present and Pre-Design Work Plan and Investigation.	Concur. Lines have been added for the Quarterly Evaluation Reports for the Groundwater Treatment Plant and the Final Pre-Design Investigation Work Plan. Army was only able to find documentation for the Quarterly Evaluation Reports dating back to 2012 in the Administrative Record.
19	9.3.1	91	P after RAO bullets, 2nd sentence, add "and" here "This interim remedial action was established to mitigate potential risks posed by high concentrations of chlorinated solvents and heavy metals in shallow groundwater and buried source material…" Same P, "As of March 2015" sentence, can you update the volume treated to more recent than 2015?	Concur. The text was revised to add "and". The estimated 122 million gallons of volume treated by the extraction system the most recent data Army has on this system. **TCEQ Backcheck Comment:** Regarding the total volume treated response - Every quarterly report includes the volume of water extracted and treated. This data is reported on charts, which are created from spreadsheets. Would it be difficult to update the total treated volume, so the FYR isn't referencing a total that is nine years old? If a total doesn't exist in the site record, could the Army's contractor (Bhate PCI) prepare a table and send that to the FYR team so there is something to reference for the

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				5th FYR? If this is not an option, then consider removing the total volume treated sentence. **Army Response:** Concur. The following statement has been added to the text to replace the statement regarding the 2015 volume statement: "As of September 2024, over 162 million gallons of contaminated groundwater has been treated and released".
20	9.3.3.3	95-96	LUC bullets, revise to reference Table 30 (not 33)	Concur. The reference to Table 33 was changed to Table 31, which is the updated table listing the LHAAP-18/24 Cleanup Levels.
21	9.3.4	96	1st P, end of last sentence – revise to add "excerpt from the report" or "relevant sections from the report". Bullets – revise to "Routine maintenance and sampling activities". Add a bullet for influent and effluent sampling.	Concur. The text was revised to read: "A historical summary of the GWTP operations is contained within the 4th quarter 2022 quarterly evaluation report, relevant sections from the report are included as **Appendix G**". The text was also revised to read: "Routine maintenance and sampling activities". A bullet point was added that reads: "Collect influent and effluent samples".
22	9.3.4	97	P beginning "The GWTP has been subject to frequent shutdowns", consider noting that several of the shutdowns have been related to infrastructure failures	Concur. The text was revised to read:

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			or natural events. The shutdowns are not all because the plant is aging. P beginning "The pre-design investigation", 1st and 2nd sentences, add "planned" before "ISB grids".	"The GWTP was subject to frequent shutdowns in the last five years due to plant malfunctions and weather-related incidents". The text was also revised to add "planned" to the statement "ISB grids".
23	9.5.2	99	Section should reference Appendix E but there are no 18/24 tables in Appendix E.	Concur. The text was revised to reference Appendix E and tables and Mann-Kendall analysis have been added to the appendix.
24	9.5.3	102	Table E.18 is missing.	Concur. Table E.18 "LHAAP-18/24 Weekly Perchlorate Sampling Results" was added to Appendix E. **TCEQ Backcheck Comment:** Thank you for adding the list of tables at the beginning of Appendix E and adobe bookmarks. Table E.18 includes many tables from the GWTP reports; please name and list them separately. Suggest including these as E.18.A through E.18.H (or the correct letter) to avoid renumbering all the other tables. Add bookmarks for each table and add each to the list of tables. Table E.17 also combines tables together and should be corrected on the list. **Army Response:** Appendix E has been revised to label and bookmark tables under Table E.18 as Table E.18-A to Table E.18-AAAA. Tables under Table E.17 has been labeled and bookmarked Table E.17-A to Table E.17-C.

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25	9.7.2	103	Replace last sentence with "The cleanup levels established in the 2020 ROD remain valid."	Concur. The last sentence of the text was revised to read as follows: "The cleanup levels established in the 2020 ROD remain valid".
26	10.2.1	106	There are no intact buildings at this site. Remove reference to "administration buildings" or clarify.	Concur. The reference to the administration buildings was updated based on information in the Final Remediation Action Completion Report in 2016 and now reads: "At LHAAP-35B (37) there is a mixture of asphalt-paved roads, parking areas, remnants of concrete foundations and partial walls of administration buildings, the former Chemical Laboratory (Building 29-A), and vegetated areas (AECOM, 2016)".
27	Table 35	107	I realize these values are from the ROD. If you wanted to note an update, the current criteria for 1,1-DCE is 7 µg/L in Table 2 of 30 TAC 307.6(d)(1)	Concur. A note was added under Table 35 that reads as follows: "*1,1-DCE Cleanup Level per 30 TAC 307.6(d)(1) is 7 µg/L". **TCEQ Backcheck Comment:** Note was added to the wrong 1,1-DCE row; should be on the surface water row. Add "Current" to the note. I was pointing out that the surface water cleanup value has increased from 1.63 to 7. **Army Response:** The note was removed from the groundwater 1,1-DCE value and moved to the surface water 1,1-DCE value. "Current" was added to the note below the table so that the note now reads:

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				"Current 1,1-DCE Cleanup Level per 30 TAC 307.6(d)(1) is 7 µg/L".
28	10.5.2	109	Last sentence on this page should reference Table 37.	Concur. The text was revised to reference Table 37 instead of Table 39.
29	13.3.1	140	What is the TCEQ, 2006 reference? Please reference the ROD and ESD. Revise the P beginning "Table 49" to replace the 2nd and 3rd sentences regarding GW cleanup levels. Reference Table 2-6 in the 2010 ROD and add that the perchlorate cleanup level was specified in the RACR and 2019 ESD to be 17 µg/L, the TRRP Tier 1 Residential Groundwater PCL.	Concur. The text was revised to read as follows: " Except for perchlorate, the MCL has been identified as the cleanup levels for COCs as laid out in the 2010 ROD. The perchlorate cleanup level for groundwater was established in the 2016 RACR to be 17 µg/L, which is the TRRP Tier 1 Residential Groundwater PCL (AECOM, 2016a). For perchlorate in soil, the soil medium-specific concentration for industrial use based on groundwater protection (GWP-Ind) value is used as the cleanup level (AECOM, 2016)."
30	13.3.2	142	P after the bullets, remove quotes and italics.	Army has included the format using quotations and italics as a part of the technical guidance as the quoted and italicized information has been directly inserted from the ROD.
31	14.2.1	154	Change 2nd sentence to past case ("was" and "consisted").	Concur. The sentence was revised to read as past tense and now reads as follows: "LHAAP-35A (58) was an industrial area that consisted of the former maintenance complex which included the Shops Area".
32	14.3.3.1	156-157	Please add "former" to the site bullets, especially for LHAAP-69.	Concur. The word "former" was added to the site descriptions.

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33	Table 63	173	Manganese and Strontium don't have MCLs. The older RODs don't have site COC or cleanup tables but you can use Table 67 in the 4th FYR (pg. 144).	Concur. Manganese and strontium were removed from the cleanup level table based on the following information from the ROD: "The metals without MCLs, manganese and strontium represent HQ values of 7.2E-01 and 1.2E-01, respectively. Because these values, and their sum, are below the acceptable HI value of 1, manganese and strontium do not represent unacceptable noncancer hazards for groundwater use as drinking water".
34	15.3.4	175	The 2nd bullet is not an O&M activity, please remove.	Concur. The second bullet point was removed from the list of O&M activities.
35	15.9.2	179	2nd sentence, replace "bind" with "delineate".	Concur. The text was revised to read as follows: "Monitoring wells 67WW17 and 67WW18 have been installed to evaluate and delineate the groundwater plume beyond 67WW02".
36	16.2.1	181	2nd sentence change "include" to "included". It would be good to note the bunkers were also removed/demolished.	Concur. The text was revised to change the world "include" to "included". Army cannot find documentation that the bunkers were removed/demolished so the text referencing the bunkers has not been changed.
37	16.2.3	182	Define WP munitions (first use and not on acronyms list).	Concur. WP was defined as "white phosphorus" in the text and was added to the acronyms list.
38	16.2.4	182	1st sentence revise to clarify which sites are included for "both sites". Do you mean 001-R and 003-R?	Concur. The statement "at both sites" was removed from the text to clarify the discussion is about LHAAP-001-R-01. The text now reads as follows: "Between August and November 2008, a non-time critical MEC removal action was conducted, and

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				surface clearances were performed at LHAAP-001-R-01.".
39	16.9.1 and 17.9.1	186 and 192	This section should reference the 2018 RACR (not RAWP). The ROD only required periodic inspections, not periodic LUC notices. Did the periodic LUC notice come from the MEC removal action (2008-2009)?	Concur. The text was revised to remove reference to the RAWP and add reference to the RACR. Yes, periodic LUC notices are the result of MEC removal and are laid out in the 2018 LUC RD/RACR for sites LHAAP-001R-01 and LHAAP-003-R-01.
40	Extra pages	Pdf pages 251-266	Please remove the extra appendix cover pages before the figures.	Concur. Extra appendices pages will be removed prior to finalization of the document.
41	Figures		LHAAP-18/24 – Figures 36-38, supplement these pages with isopleth and groundwater gradient figures from Appendix D Quarter 1 2023 GWTP Report (or another GWTP report quarter). The figures from the PDI Report are not indicative of the GWTP remedy performance. Also revise 9.5 text to incorporate these revisions.	Concur. Figures 38-39 were replaced with GWTP Isopleths from the first quarter 2023 report. The text was revised to correct table numbers and titles.
42	Appendix B		Check V.C.2 for all sites and remove "intrusive activities" reference for several of them. The landfill and munitions sites have this restriction, other sites generally don't. Pg. 367 of pdf (LHAAP-04), V.C.1. – the LUCs for LHAAP-04 were filed in 2021. Remove text saying they are "pending". Pg. 399 of pdf (LHAAP-16), IX.C. - should N/A be checked? Pg. 404 of pdf (LHAAP-17), III. 1. – check the referenced report. It probably should be the 2019 Remedial Design and Remedial Action Work Plan (or	Concur. References to "intrusive activities" were removed from the Site Inspections forms Section V. The text for LHAAP-04 V.C.1 was revised to read: "Land use restrictions were filed with Harrison County in 2021 and are enforced on site". The box for "N/A" was checked for "Treatment System". The referenced report was changed to the following: "Bhate, 2019. Remedial Design and Remedial Action Work Plan, LHAAP-17 Burning Ground No. 2 /Flashing Area, Group 2, LHAAP, Karnack, TX".

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			2021 Excavation report and the pending RACR/TCRA). Pg. 413 of pdf (LHAAP-17), IX.C.1.Others – revise note to "Fluidized bed reactor at GWTP for perchlorate removal" (and pg. 426 of pdf LHAAP-18/24) Pg. 416 of pdf (LHAAP-18/24), Remedy includes section – clarify that ISB and ISTD (desorption not bioremediation) are in the planned remedy. The remedy evaluated in the FYR is the Interim Remedy which includes GWTP, ICTs (note hydraulic control), and cover over UEP (check cover/containment). Ph. 427 of pdf (LHAAP-18/24), IX.E. Remarks – revise MNA start date to after remedy implementation. Pg. 464 of pdf (LHAAP-49), XI.A. – Replace the first sentence with this language from the last FYR "Mercury-contaminated soil was removed from LHAAP-49. Confirmation sampling showed no residual contamination. The site is classified as No Further Action, so it has no RAOs or remedy beyond the 5-year review site inspection." Pg. 540 of pdf (LHAAP-004), XI.A. - Replace the first sentence with this language which is partially from the last FYR "The RAO was to minimize the potential for human contact with soil containing lead via a soil removal, confirmatory sampling, and backfill with clean soil. The site is classified as No Further Action, so it has no RAOs or remedy beyond the 5-year review site inspection."	For LHAAP-17 and LHAAP-18/24, IX.C.1. Others were revised to "Fluidized bed reactor at GWTP for perchlorate removal". Army confirmed that ISB and ISTD are a part of the planned remedy per the 2019 ROD. LHAAP-18/24 IX.E.Remarks was changed to read as follows: "Remedial Design is still in progress, MNA will commence following finalizing of remedy implementation". LHAAP-49 XI.A was revised to read the following: "Mercury-contaminated soil was removed from LHAAP-49. Confirmation sampling showed no residual contamination. The site was classified as No Further Action, so it has no RAOs or remedy beyond the Five-Year Review site inspection. The Five-Year Review site inspection confirmed land use controls prohibit changes in land use. There were no violations of land use controls observed during the site inspection." LHAAP-004-R-01 XI.A was revised to read the following: "The RAO was to minimize the potential for human contact with soil containing lead via a soil removal, confirmatory sampling, and backfill with clean soil. The site is classified as No Further Action, so it has no RAOs or remedy beyond the Five-Year Review site inspection. The Five-Year Review site inspection confirmed land use controls prohibit changes in land use. There were no violations of land use controls observed during the site inspection." **TCEQ Backcheck Comment:**

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				Now pg. 424 of pdf (B-66), LHAAP-18/24 Remedy includes section - Checkboxes and other narrative include both active and planned remedy components, with no distinction between them. This comment requested clarification (in the FYR Other section) that ISB and ISTD are in the planned remedy. The remedy evaluated in the FYR is the Interim Remedy which includes GWTP, ICTs (note hydraulic control), and cover over UEP (check cover/containment). Soil removal was part of both remedies. MNA is part of the planned remedy. The FYR language by the other checkbox in this section was not clarified to indicate what is part of the PLANNED remedy. The components of the ACTIVE remedy are not noted. The Landfill Cover/Containment box is not checked. **Army Response:** Concur. The "Other" section was revised to read: "In-Situ Bioremediation (planned Remedy), Contaminated Soil Removal, and Thermal In-situ Desorption for DNAPLs (Planned Remedy). Groundwater pump and treatment includes use of interceptor-collection trenches for hydraulic control. Note: MNA is part of the Planned Remedy". The Landfill cover/containment box was checked.
43	Appendix D		Why are names redacted on the interview forms? It is generally public information who works on this site.	Army is required to follow the Army's memo on "Guidance on Making CERCLA Documents Compliant With Personally Identifiable Information (PII) And

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				Freedom of Information Act (FOIA) Requirements". This requirement includes redacting names on the interview forms.
44	Appendix E		After appendix cover page, add a list of the tables included in this appendix, the source document for each table, and page number. Include adobe bookmarks for each table including the site number. For clarity, add the site number by the table number at the top of page. For example: Table E.2 – LHAAP-04. Some tables headings don't include the site number, or it is in various locations (header, footer). Table E.1 is not clear/legible. Please replace if there is a better version of those pages. The trend analysis tables aren't numbered. It would be helpful if those tables were with the other tables for the site, but that would require many table number updates in the text. If you move these tables, pgs. 920-928 belong with LHAAP-35B (37) after pg. 775 and pgs. 929-937 belong with LHAAP-50 after pg. 871. There are no tables for LHAAP-18/24, including Tables E.17 and E.18 and the trend analyses referenced on pg. 99. There are also no tables for LHAAP-17 or LHAAP-67.	Concur. A List of Tables was added to Appendix E. Headings were updated to include Table number and Site Label. Table E.1 is a direct insertion from the document. Trend analysis tables were labeled as Table E.19 and are in their associated site bookmark (LHAAP-18/24). Tables for LHAAP-18/24 were added to Appendix E. Tables for LHAAP-17 and LHAAP-67 were added, labeled, and bookmarked. **TCEQ Backcheck Comment:** Thank you for adding the list of tables at the beginning of Appendix E and adobe bookmarks. Table E.18 includes many tables from the GWTP reports; please name and list them separately. Suggest including these as E.18.A through E.18.H (or the correct letter) to avoid renumbering all the other tables. Add bookmarks for each table and add each to the list of tables. Table E.17 also combines tables together and should be corrected on the list. **Army Response:**

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				Appendix E has been revised to label and bookmark tables under Table E.18 as Table E.18-A to Table E.18-AAAA. Tables under Table E.17 has been labeled and bookmarked Table E.17-A to Table E.17-C.
45	Appendix F		The prior FYR included (by site) a list of the inspections/LUC related work and the Annual LUC Inspection forms for each site for the five-year review period. This appendix currently includes an incomplete set of some of the filed deed notices. I don't understand the purpose of the specific documents included in the appendix to support the FYR. Consider replacing or amending the information in this appendix. At a minimum, add a list of contents. For site deed notices, if necessary, you can reference the Annual LUC Management Plan which includes every filed notice and the supporting documents, organized by site. We probably don't also need these documents in the FYR.	Concur. Appendix F was revised to include available LUC Inspection Forms. A bookmark was added to the pdf for each form "e.g., "May 2021 LUC Inspection"). The Comprehensive LUC Management Plan was referenced in place of including the filed deed notices in Appendix F.
46	Appendix G		Revise title to add "Excerpt from" or "Pages from"	Concur. The appendix cover page for Appendix G was revised to the following: "Pages from Groundwater Treatment Plant Quarterly Evaluation Report 4th Quarter 2022".
47	5.4.1	21	In this section, clarify the recommendation sentence to add the highlighted language "The recommendation in the PA/SI report for…" Noting that several of the new X.4.1 sections for PFAS PASI don't have adobe bookmarks. Please check and add them.	Concur. The text was revised to add "in the PA/SI report" to the sentence. DAWSON will ensure bookmarks are correct in the final version of the report.

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48	Table 28	85	The new row for Issue 3 is a smaller font size.	Concur. The font size in the new row for Issue 3 has been corrected to match the rest of the table.
49	Table 30	91	The new rows for Groundwater Treatment Plant Quarterly Evaluation Reports and Final Pre-Design Investigation Work Plan are a smaller font size.	Concur. The text was revised to increase the font size to match the rest of the table.
50	9.3.4	98	Please revise the last clause of first paragraph to: and relevant sections from the report are included as Appendix G.	Concur. The text was revised to read as follows: "A historical summary of the GWTP operations is contained within the 4th quarter 2022 quarterly evaluation report, and relevant sections from the report are included as **Appendix G".**
51	Table 34 (and others with same issue)	108	The new rows for Final Remedial Action Completion Report and Remedial Action Operation are a smaller font size. Please check the other table insertions for font size consistency. Also noted smaller font additions in Tables 40, 48, and 55 (only date is smaller). Thank you for adding these details in response to Comment 7.	Concur. Text in tables was revised to increase font to match the rest of the table.
52	Table 49	143	Revise the table notes as described in Comment 4 (response to Comment 8).	Concur. Notes were updated to read as follows: "[a] Safe Drinking Water Act (SDWA) Maximum Contaminant Level (MCL), and consistent with 40 CFR §300.430(e)(2)(i)(B&C). [b] TRRP Tier 1 Residential PCL for groundwater ingestion pathway in accordance with 30 TAC 350 and available at

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				https://www.tceq.texas.gov/remediation/trrp/trrppcls.html. [c] TCEQ soil medium-specific concentration (MSC) for industrial use based on groundwater protection (GWP-Ind) in accordance with 30 TAC 335.558 and 30 TAC 335.559(g)(2)."
53	Table 55	157	Correct table number (1155 to 55).	Concur. Table number was corrected from Table 1155 to Table 55.
54	Table 56	159	Revise the table notes as described in Comment 4 (response to Comment 8). The GW-Ind (µg/L) section – Post-dispute, when there is no MCL, the appropriate groundwater clean-up or monitoring standard is the TRRP Tier 1 PCL for groundwater ingestion. Suggest you refer to thew cleanup table in the RACR rather than the ROD. See Table 1-1 of the 2015 RACR, which excludes those COCs from the table. The ROD was pre-dispute and the RACR was post-dispute. The RAO reports compare results to MCL/PCL. Revise these rows to TRRP GW PCLs or remove those three rows.	Concur. The table notes have been revised based on suggested revisions. A reference to the RACR has been added to the notes section of the table and the non-COCs have been removed from the table.
55	15.3.4	179	Remove the space between the bullets (from the deleted bullet).	Concur. The extra space between bullet points was deleted.

*Reviewer: Please provide your name, title, and date of comments.
For example: *John Smith, DAWSON PM, 6-15-2024*

REGION 6
DALLAS, TX 75270

Mr. Michael Bowlby
Environmental Support Manager
U.S. Army Environmental Command
Midwest & Central America Division
2455 Reynolds Road
Fort Sam Houston, TX 78234-7588

Dear Mr. Bowlby,

The U.S. Environmental Protection Agency (EPA) has reviewed the Issues, Recommendations and Protectiveness Statement in the Final Fifth Five-Year Review (FYR) for the Longhorn Army Ammunition Plan (LHAAP) Superfund Site in Karnack, TX. EPA concurs with the identified issues, the recommended actions, and the protectiveness statements for the 15, Operable Units (OUs) covered in the Review.

OU Identifier	OU Description	EPA Independent Protectiveness Statement	PFAS Identified in PA/SI
LHAAP-001-R-01	South Test Area/Bomb Test Area (Site 27)	Protective	
LHAAP-003-R-01	Ground Signal Test Area	Protective	
LHAAP-03	Former Waste Collection Pad Building 722-P Paint shop	Protective	
LHAAP-004-R-01	Pistol Range	Protective	
LHAAP-04	Former Pilot Wastewater Treatment Plant	Protective	
LHAAP-012	Active Landfill (SWMU 12)	Short-term Protective	Yes
LHAAP-016	Old Landfill (SWMU 16)	Short-term Protective	Yes
LHAAP-017	Burning Ground No. 2 Flashing Area, Group 2	Deferred Protectiveness	
LHAAP-018/024	Burning Ground and Washout Pond/Former unlined Evaporation Pond	Will be Protective	Yes

LHAAP-035B (37)	Chemical Laboratory Waste Pad 4	Short-term Protective	
LHAAP-046	Plant 2 Area	Short-term Protective	
LHAAP-049	Former Acid Storage Area	Short-term Protective	
LHAAP-050	Former Waste Disposal Facility	Short-term Protective	Yes
LHAAP-35A (58)	Maintenance Complex	Protective	
LHAAP-067	Above Ground Storage Tank	Short-term Protective	

Protective. The remedies at OUs LHAAP-001-R-01, - 003-R-01, -03, 004-R-01, -04, and -35A (58) are protective of human health and the environment in the long-term. These OUs have legacy contamination in the soils, sediments, and groundwater that can pose a threat to human health and the environment, but the implemented remedy has been effective. Continued monitoring is in place to ensure long-term protectiveness.

Short-term Protective. The remedies at OUs LHAAP-12, -16, -035B (37), -46, -49, -50, and -67 are protective of human health and the environment in the short-term. These OUs have legacy contamination in the soils, sediments, and groundwater that can pose a threat to human health and the environment. Continued investigations and monitoring are in place or planned that will provide data for future long-term protectiveness to be reconsidered.

Protectiveness Deferred. The selected remedies at OU LHAAP-17 were being constructed when potential munitions and explosives of concern (MEC), munition constituents (MC), and Asbestos-Containing Material (ACM) were identified at the OU. All remedial action activities have been paused until the removal of the munitions risk has been addressed. It is expected that these time-critical removal action (TCRA) and the remedial action will take approximately 4 years to complete, at which time a protectiveness determination will be made. The recommendations that will be implemented will be documented in a FYR addendum that will be completed and submitted to EPA for review by September 30, 2028.

Will be Protective. The remedies at OUs LHAAP-18 and -24 will be protective of human health and the environment once the remedial actions from the Record of Decision are implemented at the OUs. It is expected that the final remedial actions will take approximately 7 years to complete, at which time a protectiveness determination will be made.

The sitewide Preliminary Assessment/ Site Inspection identified Per- and Polyfluoroalkyl Substances (PFAS) at multiple OUs at the LHAAP site. Further studies are needed to determine completed exposure pathways to the surrounding human population multiple listed OUs, four of which are covered in this FYR. Past sampling at the site have shown exceedances of the current PFAS maximum contaminant levels (MCLs) at the site and the U.S. Army is planning future PFAS Remedial Investigations to determine whether cleanup actions are necessary.

The USEPA agrees with the different issues and recommendations that are outlined in the FYR that will be documented in the FYR amendment and in future FYR reports.

Sincerely,

RONALD CROSSLAND

Digitally signed by RONALD CROSSLAND
Date: 2025.01.22 11:32:10 -06'00'

Ronald D. Crossland
Director
Superfund and Emergency Management Division

cc:
Greg Gervais, EPA HQ
Monica McEaddy, EPA HQ
Caroline Baier-Anderson, EPA HQ
George Malone, EPA R6
April Palmie, TCEQ

REGION 6
DALLAS, TX 75270

Mr. Michael Bowlby
Environmental Support Manager
U.S. Army Environmental Command
Midwest & Central America Division
2455 Reynolds Road
Fort Sam Houston, TX 78234-7588

Dear Mr. Bowlby,

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OU Identifier	OU Description	EPA Independent Protectiveness Statement	PFAS Identified in PA/SI
LHAAP-001-R-01	South Test Area/Bomb Test Area (Site 27)	Protective	
LHAAP-003-R-01	Ground Signal Test Area	Protective	
LHAAP-03	Former Waste Collection Pad Building 722-P Paint shop	Protective	
LHAAP-004-R-01	Pistol Range	Protective	
LHAAP-04	Former Pilot Wastewater Treatment Plant	Protective	
LHAAP-012	Active Landfill (SWMU 12)	Short-term Protective	Yes
LHAAP-016	Old Landfill (SWMU 16)	Short-term Protective	Yes
LHAAP-017	Burning Ground No. 2 Flashing Area, Group 2	Deferred Protectiveness	
LHAAP-018/024	Burning Ground and Washout Pond/Former unlined Evaporation Pond	Will be Protective	Yes

LHAAP-035B (37)	Chemical Laboratory Waste Pad 4	Short-term Protective	
LHAAP-046	Plant 2 Area	Short-term Protective	
LHAAP-049	Former Acid Storage Area	Short-term Protective	
LHAAP-050	Former Waste Disposal Facility	Short-term Protective	Yes
LHAAP-35A (58)	Maintenance Complex	Protective	
LHAAP-067	Above Ground Storage Tank	Short-term Protective	

Protective. The remedies at OUs LHAAP-001-R-01, - 003-R-01, -03, 004-R-01, -04, and -35A (58) are protective of human health and the environment in the long-term. These OUs have legacy contamination in the soils, sediments, and groundwater that can pose a threat to human health and the environment, but the implemented remedy has been effective. Continued monitoring is in place to ensure long-term protectiveness.

Short-term Protective. The remedies at OUs LHAAP-12, -16, -035B (37), -46, -49, -50, and -67 are protective of human health and the environment in the short-term. These OUs have legacy contamination in the soils, sediments, and groundwater that can pose a threat to human health and the environment. Continued investigations and monitoring are in place or planned that will provide data for future long-term protectiveness to be reconsidered.

Protectiveness Deferred. The selected remedies at OU LHAAP-17 were being constructed when potential munitions and explosives of concern (MEC), munition constituents (MC), and Asbestos-Containing Material (ACM) were identified at the OU. All remedial action activities have been paused until the removal of the munitions risk has been addressed. It is expected that these time-critical removal action (TCRA) and the remedial action will take approximately 4 years to complete, at which time a protectiveness determination will be made. The recommendations that will be implemented will be documented in a FYR addendum that will be completed and submitted to EPA for review by September 30, 2028.

Will be Protective. The remedies at OUs LHAAP-18 and -24 will be protective of human health and the environment once the remedial actions from the Record of Decision are implemented at the OUs. It is expected that the final remedial actions will take approximately 7 years to complete, at which time a protectiveness determination will be made.

The sitewide Preliminary Assessment/ Site Inspection identified Per- and Polyfluoroalkyl Substances (PFAS) at multiple OUs at the LHAAP site. Further studies are needed to determine completed exposure pathways to the surrounding human population multiple listed OUs, four of which are covered in this FYR. Past sampling at the site have shown exceedances of the current PFAS maximum contaminant levels (MCLs) at the site and the U.S. Army is planning future PFAS Remedial Investigations to determine whether cleanup actions are necessary.

The USEPA agrees with the different issues and recommendations that are outlined in the FYR that will be documented in the FYR amendment and in future FYR reports.

Sincerely,

RONALD CROSSLAND

Digitally signed by RONALD CROSSLAND
Date: 2025.01.22 11:32:10 -06'00'

Ronald D. Crossland
Director
Superfund and Emergency Management Division

cc:
Greg Gervais, EPA HQ
Monica McEaddy, EPA HQ
Caroline Baier-Anderson, EPA HQ
George Malone, EPA R6
April Palmie, TCEQ

Subject: Final Minutes, Quarterly Restoration Advisory Board (RAB) Meeting
Longhorn Army Ammunition Plant (LHAAP)
Location of Meeting: Community Center, Karnack, TX
Date of Meeting: 14 November 2024, 5:00-6:00 PM Central Standard Time (CST)

Meeting Participants:

USACE:	Aaron Williams
USAEC:	Mike Bowlby
PCI/Bhate JV:	Zachary Beck, Kelsey Edwards, and Michelle Schwartz
USEPA:	Joel Reyes and Janetta Coats
TCEQ:	April Palmie
APTIM:	Bill Foss
RAB:	Present: Tom Walker, Eugene Byrd, John Fortune, Sharron McAvoy Absent: Judy VanDeventer, Deon Hall, Nigel Shivers, Donna Burney, Terry Britt, and Margaret Roland
Public:	Laura-Ashley Overdyke (Executive Director of the Caddo Lake Institute), Eddy Young, Laura Omer, and Ellen Danielson

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An agenda for the RAB meeting, a color copy of the Poarch Creek Indians [PCI] /Bhate Environmental Associates, Inc. [Bhate] Joint Venture (PCI-Bhate JV) slide presentation, and handouts (see list at end of meeting minutes) were provided for meeting attendees.

Welcome and Introduction

Mr. Mike Bowlby with the United States Army Environmental Command (USAEC) called the RAB meeting to order at 5:05 pm CST. Mr. John Fortune offered the motion to approve the June 2024 RAB meeting minutes and Mr. Eugene Byrd seconded the motion.

Opening Items

Mr. Bowlby encouraged all attendees to join the RAB, which he explained can be done by completing the application found on the website, www.longhornaap.com.

Mr. Bowlby discussed the frequency of in-person RAB meetings, inquiring whether one meeting a year would be better for everyone's schedule compared to three annual meetings (a meeting every three months) as there was very little current information to present at each meeting with them held so frequently. Mr. Fortune asked about getting notifications about any significant developments that may occur on the site. Ms. Laura-Ashley Overdyke, the Executive Director of the Caddo Lake Institute, recommended that a quarterly report be provided for the RAB to keep them informed about any updates on the site. Mr. Bowlby agreed that would be easy to do and requested the RAB provide feedback on the format of the first quarterly report to ensure it met expectations. Ms. Janetta Coats, the Community Involvement Coordinator, with the Environmental Protection Agency (EPA) suggested additional RAB meetings could be held as necessary and that at a minimum an annual meeting should be held.

Mr. Bowlby motioned to change the RAB meetings to once annually and replace the other two RAB meetings with quarterly reports and communication with the RAB as needed. The RAB voted unanimously in favor of this motion to change the RAB meeting frequency.

After agreeing to the reduced RAB meeting frequency, Ms. Overdyke requested that the informational fact sheet and site "cheat sheet" be included in the quarterly reports.

Five Year Review

Mr. Bowlby discussed the status of the Five-Year Review, explaining that the report was drafted and the contractors had received comments back from the Texas Commission on Environmental Quality (TCEQ), but comments were still pending from the EPA. Mr. Bowlby stated the report was nearly complete, and only minor comments and changes were needed before the report was finalized.

Per- and Polyfluoroalkyl Substances (PFAS) Update

Mr. Bowlby discussed that the site visit with potential contractors for the Remedial Investigation (RI) was concluded on 13 November 2024. During this discussion, concern was raised by Mr. Eddy Young and Ms. Overdyke about the deer hunt that had occurred during that day and whether PFAS could potentially be in the deer tissue. Mr. Bowlby explained that the PFAS cleanup was still in its early stages and that only a preliminary assessment and a site investigation had occurred. Ms. April Palmie from TCEQ added that a human health and ecological risk assessment would be included as part of the remedial investigation (RI). Mr. Bill Foss from APTIM explained that the development of risk-based limits for PFAS was still very new and that ecological risk information was still needed to understand the human health risk for scenarios such as consumption of venison.

Groundwater Treatment Plant (GWTP)

Mr. Zachary Beck from PCI-Bhate JV provided the GWTP update for November 2023 - October 2024. Mr. Beck explained the layout of the GWTP and explained the latest updates to the system. Mr. Beck discussed the installation of a bypass line around the metal pretreatment system to yield greater flow rates, yet allowing water to be diverted into the metal pretreatment system if the metal concentrations require treatment. Mr. Beck also stated that the ion exchange resin would be replaced in December 2024.

During his presentation on the GWTP, Mr. Beck also discussed the surface water sampling that was conducted around the site. Mr. Fortune asked where surface water was collected and whether it was sampled from the mouth of the creek. Mr. Beck explained that samples were collected at multiple locations on both Harrison Bayou and Goose Prairie Creek. Mr. Beck pointed out that the surface water sampling locations are located downgradient of sites with perchlorate groundwater detections as well as downgradient of the GWTP discharge point.

LHAAP-16

Mr. Bill Foss presented an update on the conceptual site model for LHAAP-16. Mr. Foss explained that APTIM first conducted a detailed topographic survey to identify areas where surface topography could influence the flow of groundwater in the shallow zone, then showed examples where the influence of the topography and changes in rainfall over time caused changes in the shallow groundwater flow direction. Mr. Foss pointed out that the change in flow direction from eastward to southeastward indicated that there is a possibility of groundwater missing the southern portion of the bio-barrier between the mid-plume area and Harrison Bayou. Mr. Foss stated that additional wells would be needed to determine how far contamination had reached on the east side of Harrison Bayou.

Mr. Foss also discussed the evaluation of newly constructed cross sections of the site. Using soil logs from monitoring well installation, APTIM was able to develop a cross-section of the site and identify the boundaries of the shallow zone aquifer and the intermediate zone aquifer. Within the cross-section along the Harrison Bayou, APTIM identified that at least one well previously considered to be part of the “shallow zone” aquifer was in fact within the intermediate zone aquifer. Mr. Foss identified this as another data gap that would need to be addressed with a new shallow well.

During the discussion, Mr. Eugene Byrd asked about contamination in wildlife, which was previously mentioned during the PFAS RI update. Mr. Foss explained that all surface water samples were non-detect for the contaminants of concern (COCs) at the site and that an ecological risk assessment had been performed for the site. Mr. Aaron Williams from the United States Army Corps of Engineers (USACE) stated that these results had previously been presented at a RAB meeting. Further, Mr. Foss explained that the COCs at this site had very different properties than PFAS and that the contaminants were most likely to volatilize and not bioaccumulate within fish or animals.

LHAAP-17

Mr. Beck presented a status update on LHAAP-17. Mr. Beck explained the history of the site including previous excavation and removal of munitions and explosives of concern (MEC) and ongoing groundwater extraction status. Mr. Beck discussed perchlorate in groundwater at LHAAP-17 has been decreasing steadily once extraction was initiated and explained the difference between excavation (which is the removal of soils and solid material) and extraction (which is the pumping of groundwater). Mr. Fortune asked if perchlorate concentrations were decreasing due to high pumping rates, and Mr. Beck confirmed that to be the case.

Next RAB Meeting Schedule and Closing Remarks

Before adjourning, Mr. Bowlby explained the details for the revised RAB schedule. Mr. Bowlby stated that the quarterly reports would be provided in March, June, and September of each year and the year would conclude with an in-person meeting to be held in November.

Mr. Bowlby also discussed that there was a possibility that a co-chair would need to be elected from the community participants.

Finally, Ms. Overdyke requested that during the property transfer from LHAAP to the U.S. Fish and Wildlife Service that the water rights should also be transferred. Mr. Bowlby said that he would look into the specifics of the property transfer process further.

The next RAB meeting is scheduled for 5:00 pm on 13 November 2025.

Adjourn
Mr. Fortune motioned to adjourn the meeting at 6:10 pm CST. Mr. Bowlby seconded.

November 2024 Meeting Attachments and Handouts:

- Agenda
- Color Copy of PBJV Presentation Slides
- Fact Sheet
- Harrison Bayou and Goose Prairie Creek – Perchlorate Data
- Groundwater Treatment Plant - Processed Groundwater Volumes

U.S. ARMY

LONGHORN ARMY AMMUNITION PLANT (LHAAP)

Restoration Advisory Board Quarterly Update

14 NOVEMBER 2024

AGENDA

Welcome and Introduction

Open Items

- Ongoing Outreach/Website
- Restoration Advisory Board (RAB) Administrative Items
- Minutes (November 2023 RAB Meeting)

Defense Environmental Restoration Program (DERP) Update

- Five-Year Review
- PFAS Update
- Groundwater Treatment Plant Update
- LHAAP-16
- LHAAP-17 Status

Next RAB Meeting Schedule and Closing Remarks

THE ARMY WANTS YOU TO BE INFORMED AND INVOLVED

The Army is committed to protecting human health and the environment.

Key to that commitment is engaging the community and increasing public participation in environmental restoration at the Longhorn Army Ammunition Plant (LHAAP).

You are encouraged to:

- Attend Restoration Advisory Board (RAB) Meetings and/or become a member of the RAB.
- Visit the Longhorn environmental website, which is regularly updated, at http://longhornaap.com/.
- Make suggestions for improving communication – the Army welcomes and appreciates community feedback.

ADMINISTRATIVE ITEMS

Restoration Advisory Board (RAB) Membership Update

- Persons interested in being new members.

Minutes (November 2023 RAB Meeting)

Discuss frequency and scheduling of in-person RAB meetings

FIVE-YEAR REVIEW

Five-Year Review process and report

- Fifth Five-Year Review conducted at LHAAP.
- Purpose is to evaluate the implementation and performance of a remedy in order to determine if the remedy is protective of human health and the environment.

Sites Covered

- LHAAP-001-R-01: South Test Area/Bomb Test Area
- LHAAP-003-R-01: Ground Signal Test Area
- LHAAP-003: Former Waste Collection Pad Building 722-P Paint Shop
- LHAAP-004-R-01: Pistol Range, LHAAP-04: Former Pilot Wastewater Treatment Plant
- LHAAP-012: Active Landfill, LHAAP-016: Old Landfill
- LHAAP-017: Burning Ground No. 2 Flashing Area, Group 2
- LHAAP-018/LHAAP-024: Burning Ground and Washout Pond/Former Unlined Evaporation Pond

FIVE-YEAR REVIEW (CONTINUED)

Sites Covered (continued)

- LHAAP-037: Chemical Laboratory Waste Pad
- LHAAP-046: Plant 2 Area, LHAAP-049: Former Acid Storage Area
- LHAAP-050: Former Waste Disposal Facility
- LHAAP-058: Maintenance Complex
- LHAAP-067: Above Ground Storage Tank

PFAS UPDATE

Preliminary Assessment (PA)/ Site Inspection (SI) Update

- Investigated 12 Areas of Potential Interest (AOPI) based on historical use, storage, and/or disposal, or areas where known or suspected releases to the environment occurred.
- Eight of the 12 AOPIs had PFAS compounds detected in soil and/or groundwater at concentrations greater than the risk-based screening levels and thus are recommended for further remedial investigation.

Next Steps- Remedial Investigation (RI)

To be placed on contract in FY25

LHAAP ENVIRONMENTAL CONTRACTORS

Poarch Creek Indians (PCI)/Bhate Joint Venture:

- LHAAP-04, LHAAP-12, LHAAP-16, LHAAP-35B (37), LHAAP-46, LHAAP-50, LHAAP-35A (58), LHAAP-67, LHAAP-001-R-01, LHAAP-003-R-01, and LHAAP-18/24 (interim remedy).

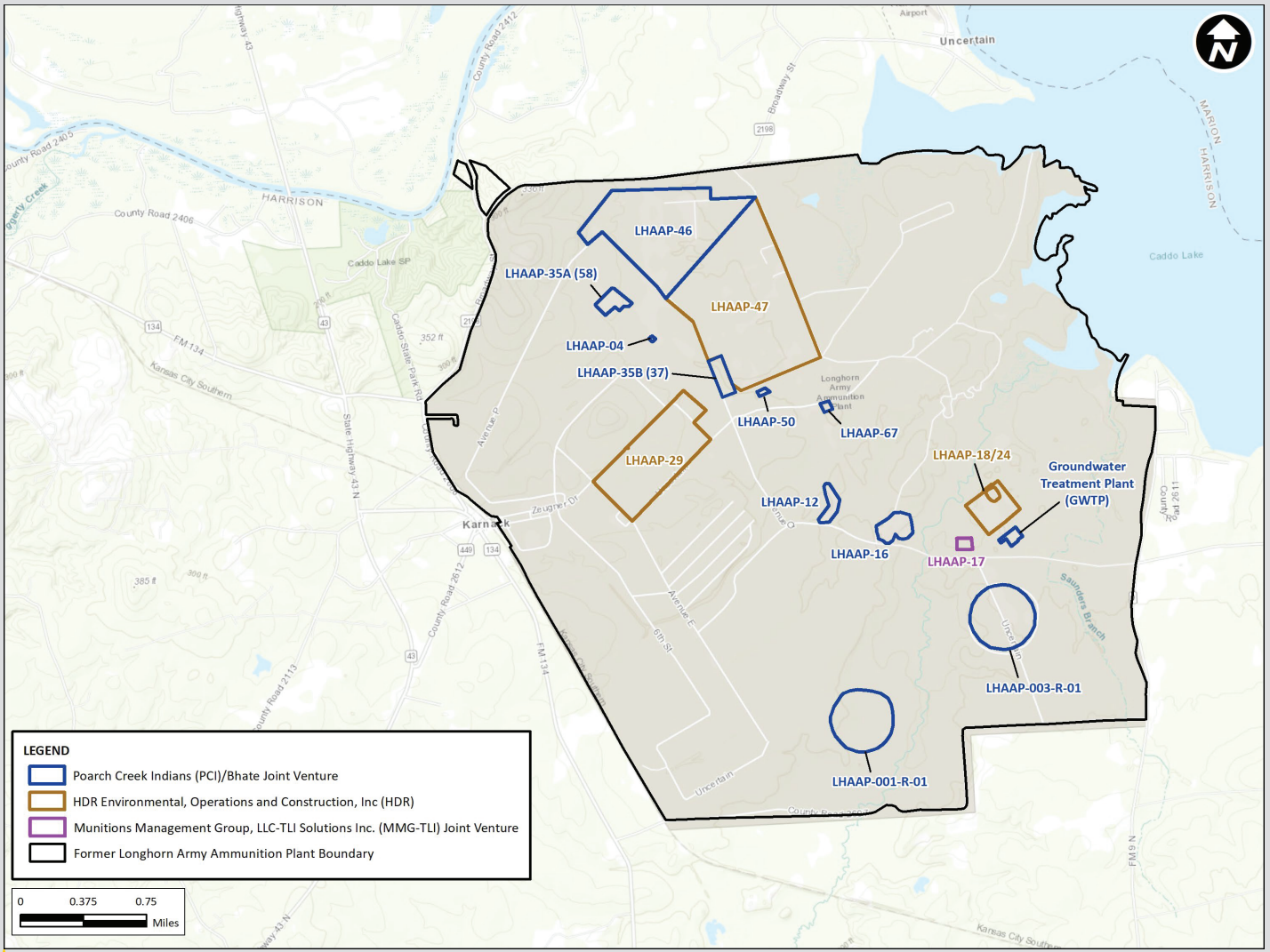
HDR Environmental, Operations and Construction, Inc (HDR)

- LHAAP-18/24, LHAAP-29, and LHAAP-47.

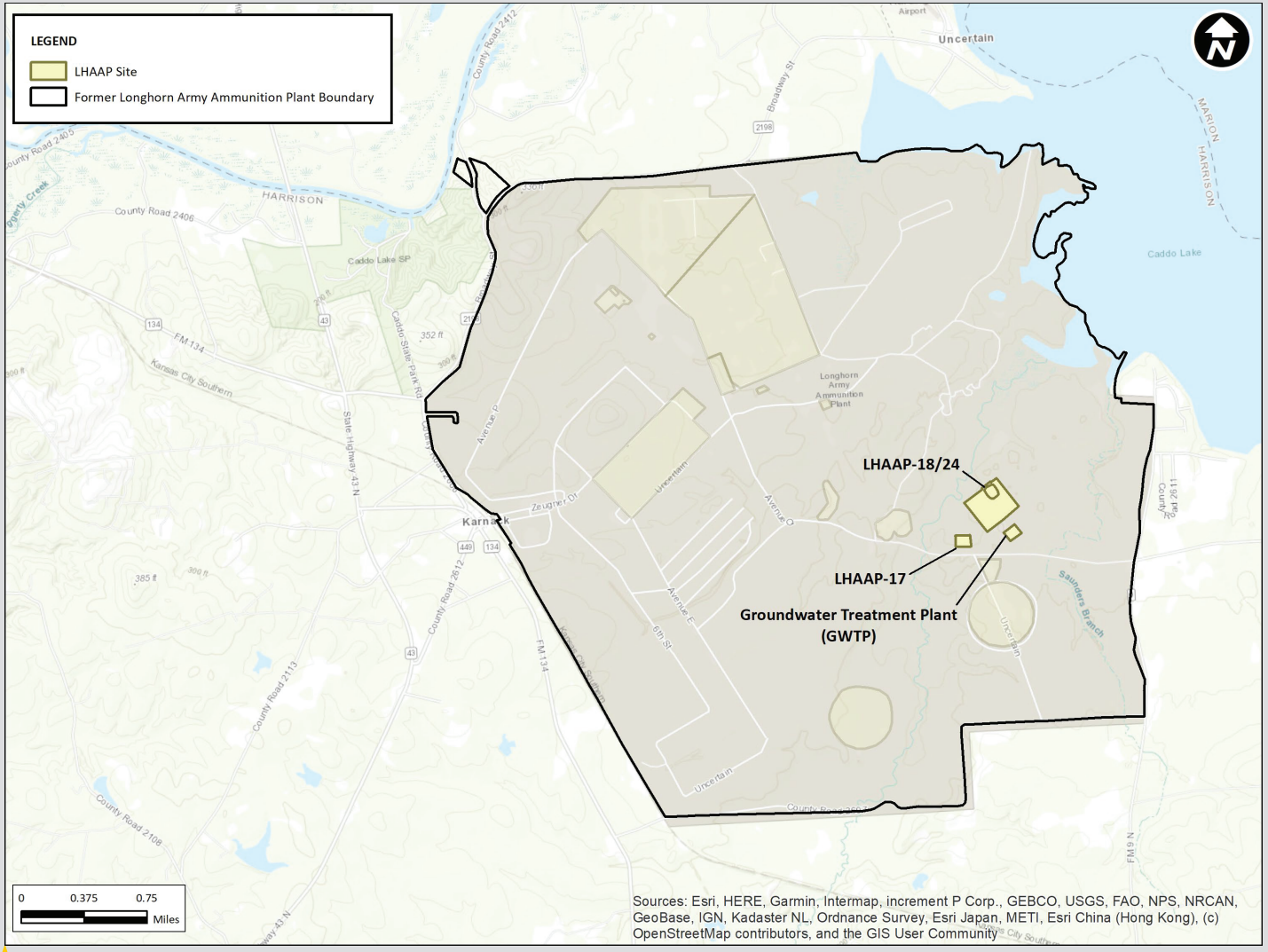
Munitions Management Group, LLC-TLI Solutions Inc. (MMG-TLI) Joint Venture:

- LHAAP-17.

LHAAP SITE MAP



GROUNDWATER TREATMENT PLANT UPDATE



GROUNDWATER TREATMENT PLANT UPDATE

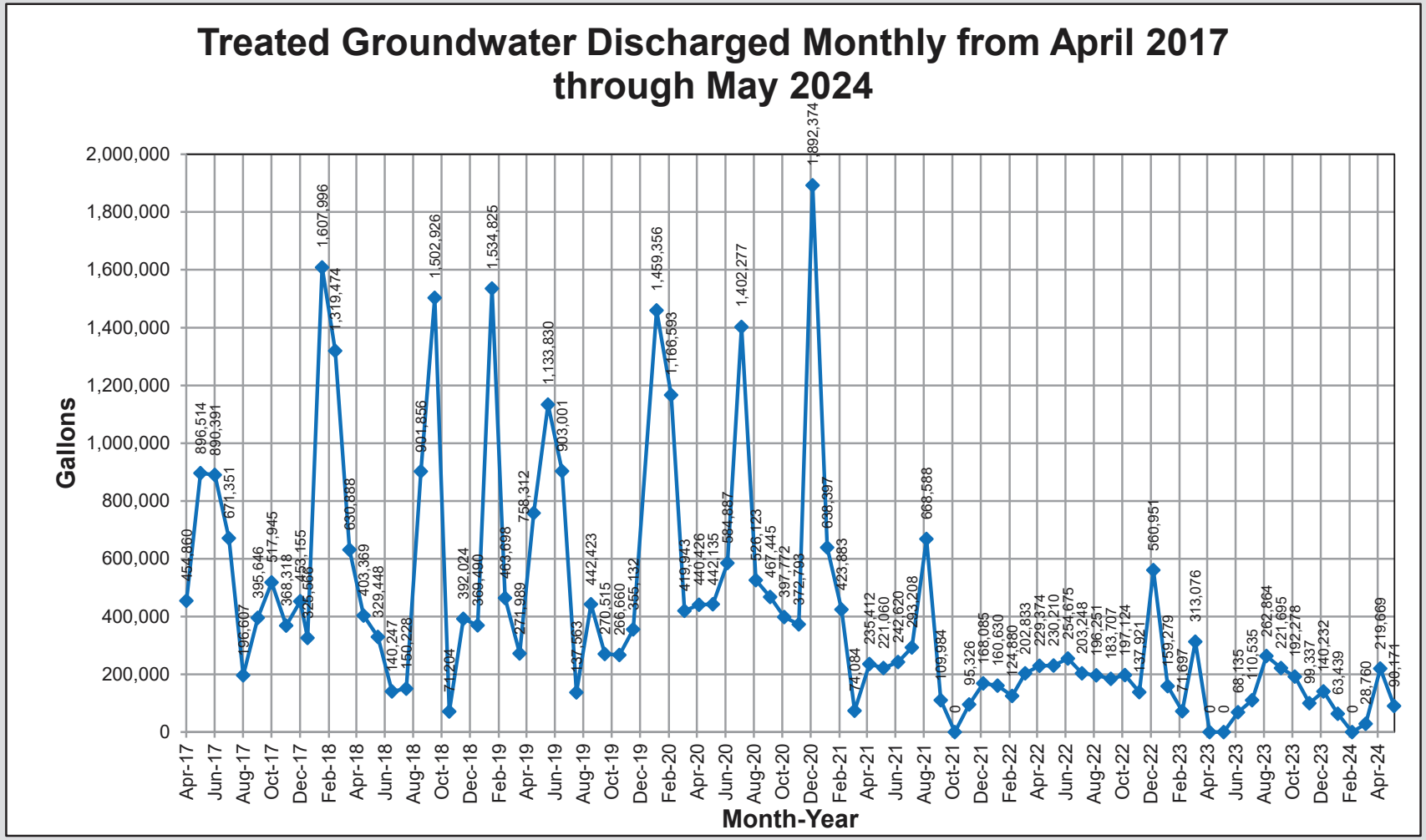
Groundwater Treatment Plant (GWTP) Design

- Metals treatment system
- Volatile organics treated via an air stripper
- Perchlorate treated via a Fluidized Bed Reactor (FBR): Envirogen FBR Video
- Ion exchange system

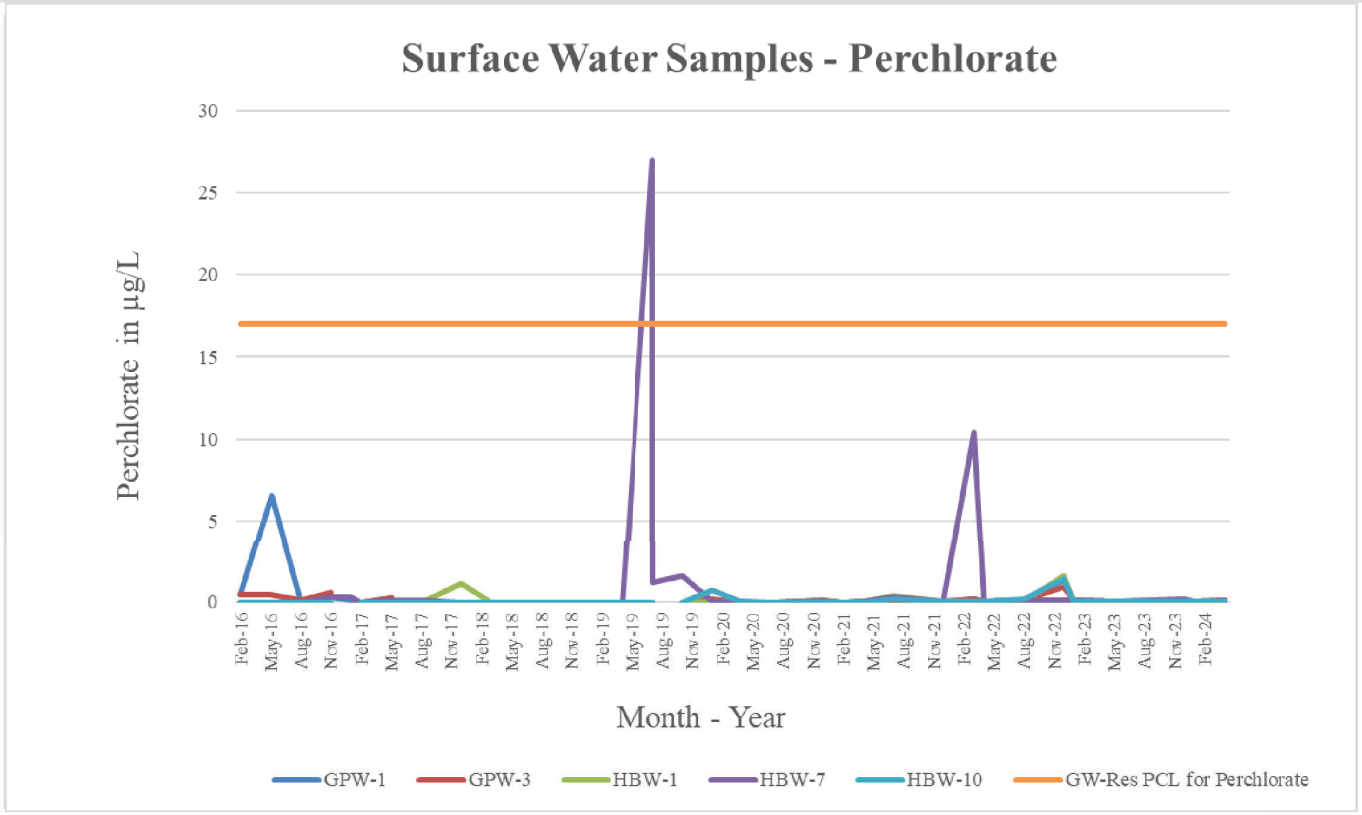
GWTP Operations (November 2023 – June 2024):

- November 2023 – Exterior LED lighting installed.
- Mid-January 2024 – February 2024 – GWTP shutdown due to freeze damage sustained on 16 January 2024.
- March 2024 – GWTP operations restarted after repairs were completed.
  – FBR (re)startup/evaluation
- – GWTP returned to full operation.
- June 2024 – Additional repairs planned including replacement of the ion exchange media.

GROUNDWATER TREATMENT PLANT DISCHARGE UPDATE

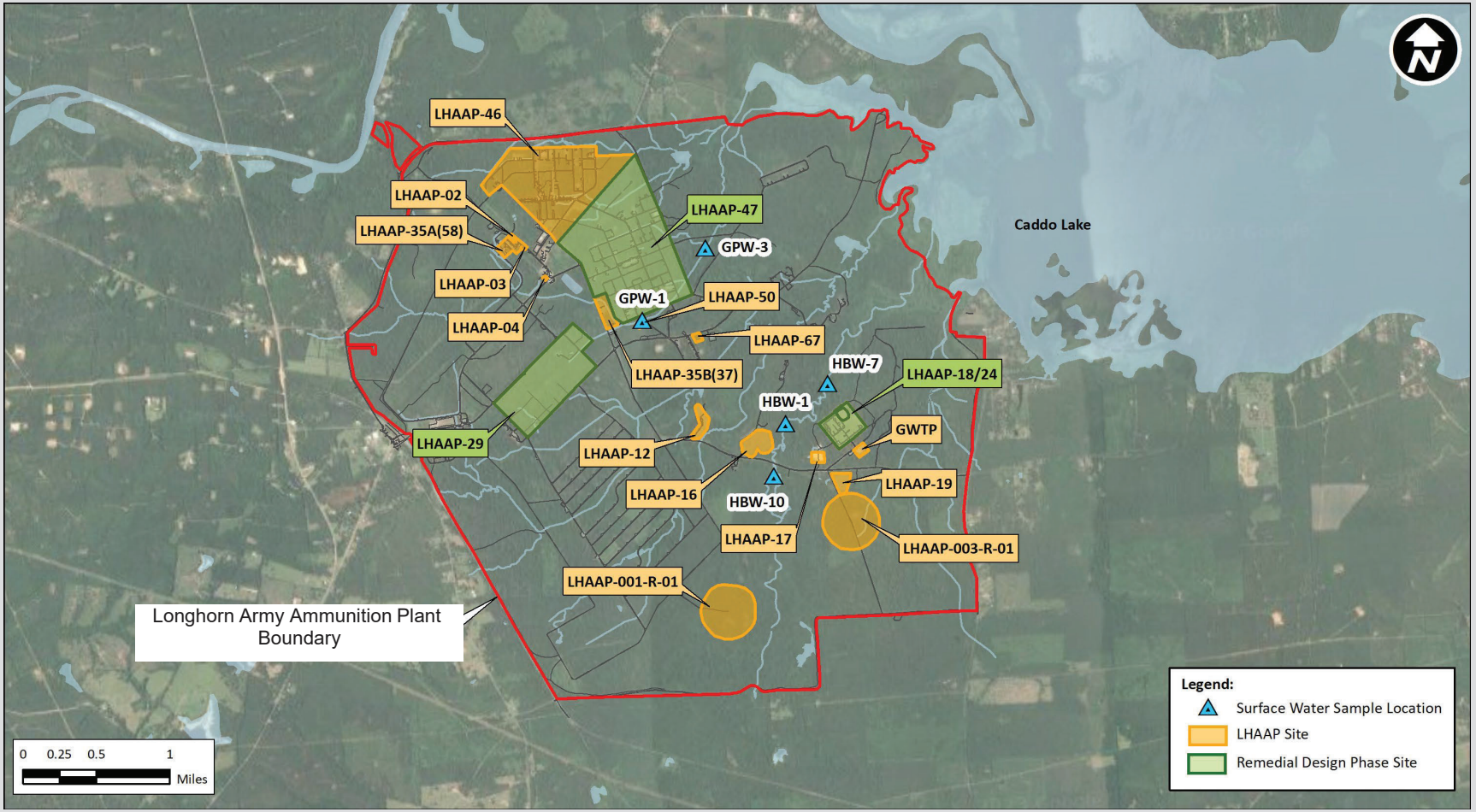


SURFACE WATER SAMPLE RESULTS

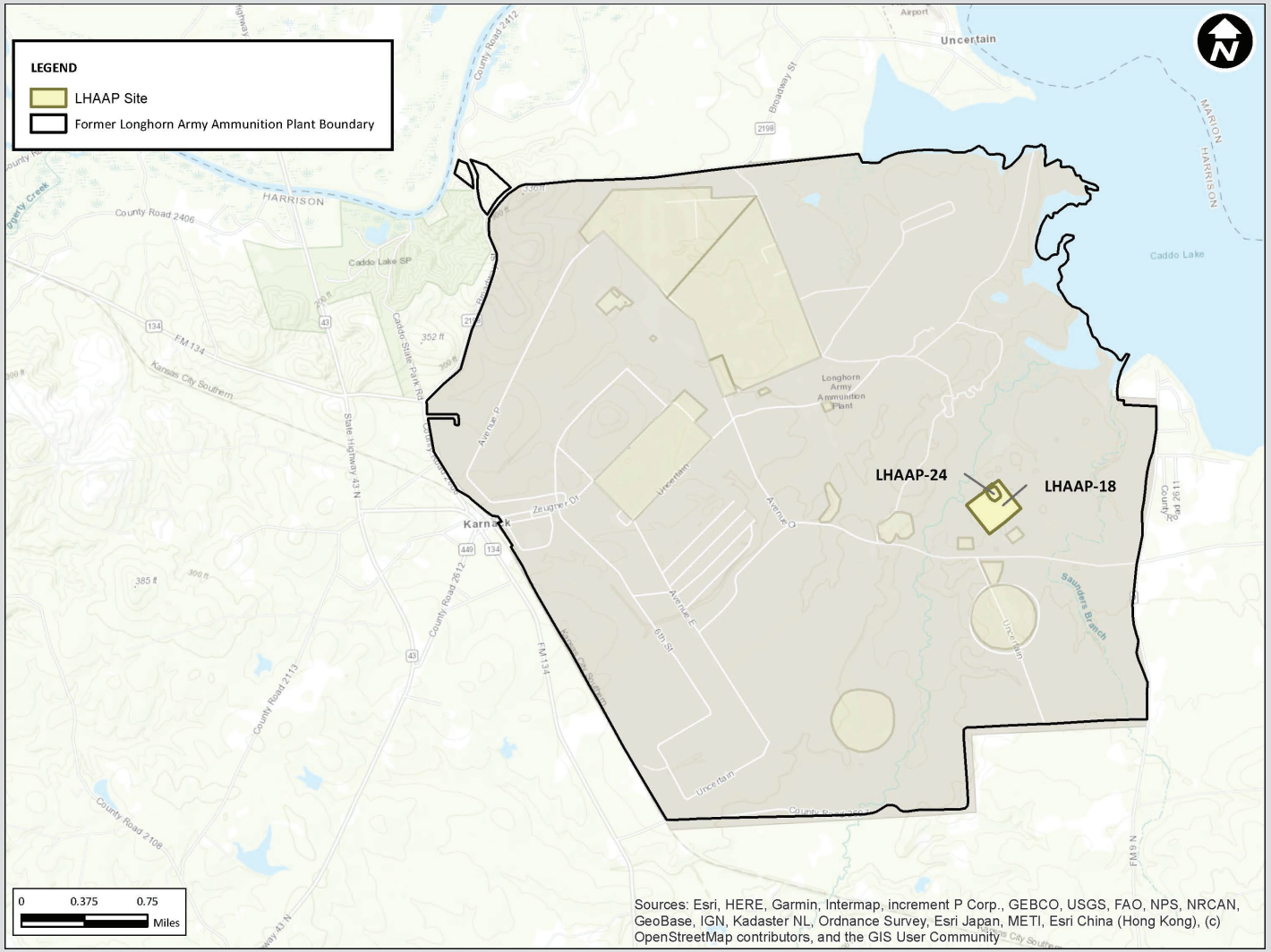


Note: Surface water at HBW-7 had a detection of 27 µg/L from a sample collected on 11 July 2019. Surface water at HBW-7 was resampled 19 days later (30 July 2019) with a detection of 1.2 J (estimated result) µg/L. GPW – Goose Prairie Creek sample location; HBW – Harrison Bayou sample location. GW Res – Groundwater residential limit; MSC – Medium Specific Concentration; PCL – Protective Concentration Level; µg/L – micrograms per liter. No surface water sampling was conducted in the 3rd Quarter 2023 due to dry conditions.

SURFACE WATER SAMPLE LOCATIONS



LHAAP-16 UPDATE

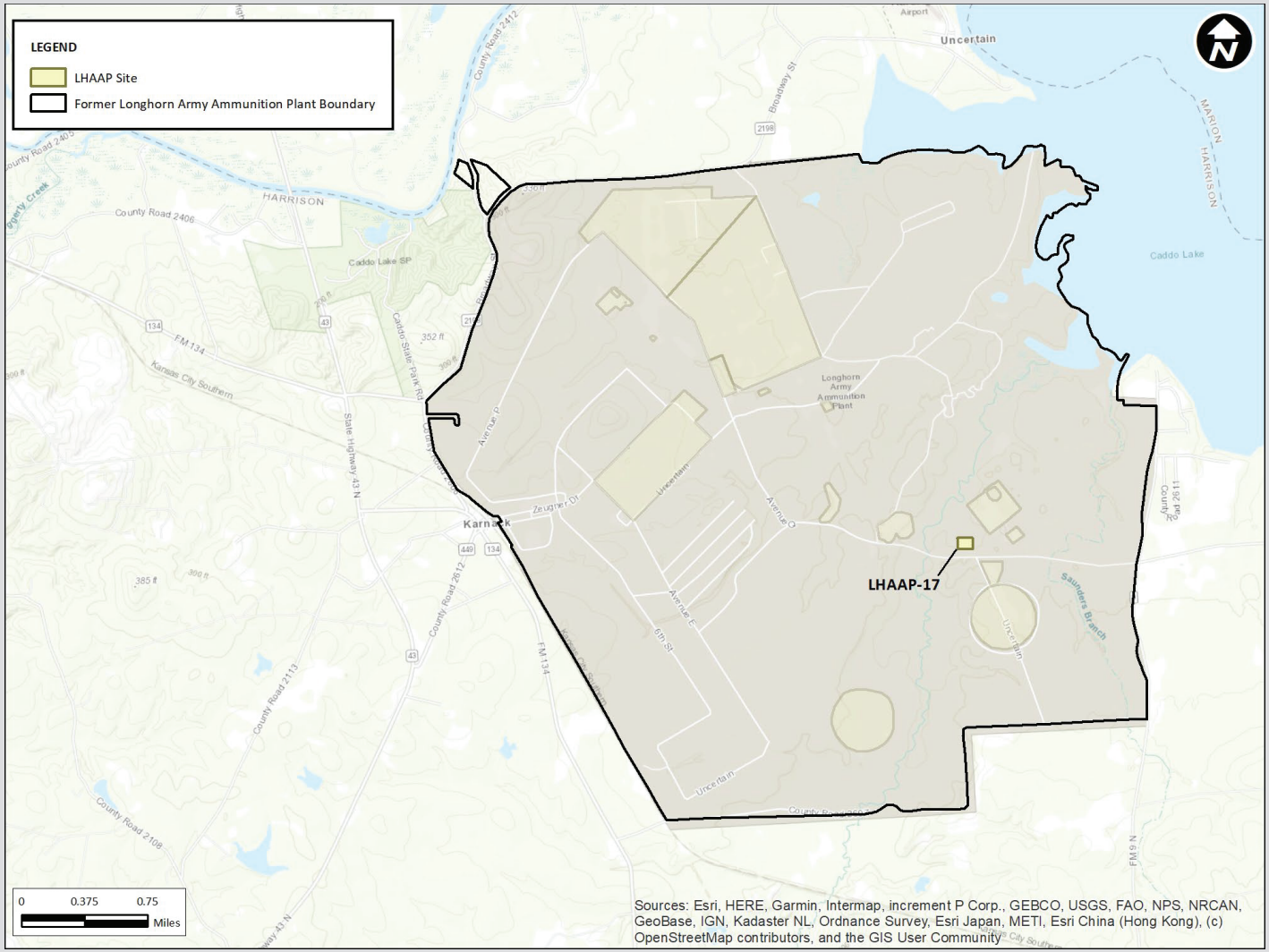


LHAAP-16 UPDATE

Background

- APTIM

LHAAP-17 UPDATE



LHAAP-17 BACKGROUND

Background:

- Burning Ground No. 2/Flashing Area (LHAAP-17) was used as a burning ground from 1959 through 1980. Bulk trinitrotoluene (TNT) and photo flash powder were burned.
- The site was also used as a flashing area to decontaminate recoverable metal byproducts until 1980, when it became inactive.
- The waste residues were reportedly removed from the trenches in 1984, and the site was allowed to revegetate.
- The Record Of Decision, finalized in September 2016, included excavation and off-site disposal of soil, groundwater extraction, monitored natural attenuation (MNA), and land use controls (LUCs) to maintain the remedy and prohibit groundwater use.
- However, during excavation activities, a work stoppage occurred on 30 September 2019, due to the presence of munitions hazards not previously known to be present.
- Time Critical Removal Action (TCRA) determined appropriate.

LHAAP-17 STATUS

Time Critical Removal Action Status:

- Over 4,048 cubic yards of soil were excavated in June 2021 through August 2022 and approximately 2,500 cubic yards of this material have been sifted and transported for off-site disposal.
- All excavations with validated confirmation samples are complete and backfilled.
- 96 Munitions and Explosives of Concern (MEC) items have been disposed of through on-site detonations.
- An estimated 41,000 pounds of non-munitions related debris and 18,700 pounds of munitions debris have been inspected and transported off-site for recycling/disposal.

Groundwater Extraction Status:

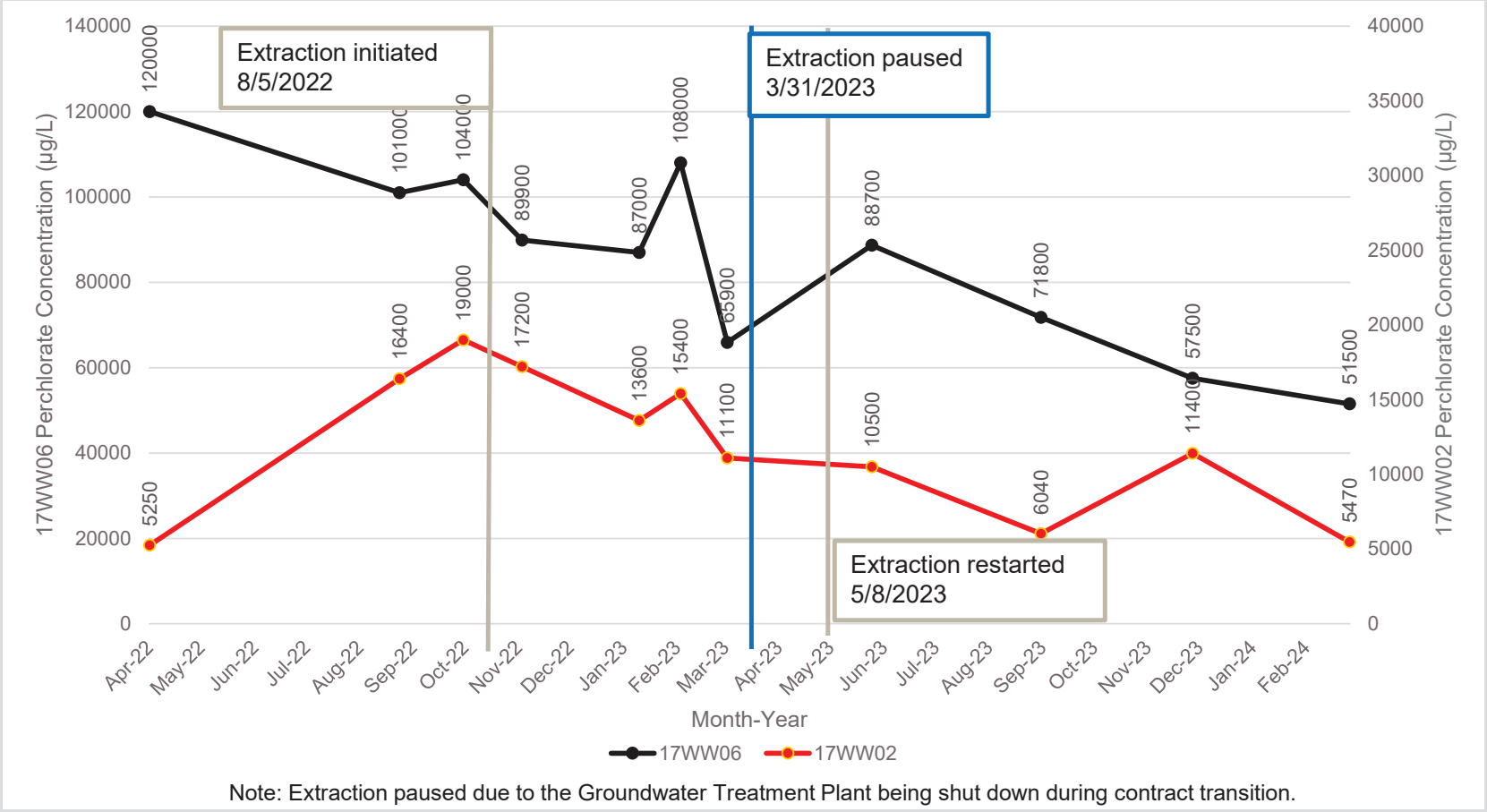
- Groundwater extraction system installation was completed in August 2022 and is operating per the design.
- Performance monitoring is ongoing.

LHAAP-17 PERFORMANCE MONITORING

Performance Monitoring:

- The groundwater extraction remedial action objective is to reduce perchlorate concentrations sitewide below 20,000 micrograms per liter (µg/L). Site will transition to Monitored Natural Attenuation once this threshold is achieved.
- Performance monitoring was completed at 5 sampling locations monthly for 6 months, followed by quarterly sampling for the next 12 months (September 2022 – March 2024).
- All performance monitoring groundwater samples were analyzed for perchlorate. Perchlorate concentrations have decreased across the site with the largest decrease noted at monitoring well 17WW06.
- As of March 2024, perchlorate remains above the remedial action goal (20,000 µg/L) at one well (17WW06).
- The extraction and monitoring period was extended in May 2024 until all parties agree on termination as the Time Critical Removal Action (TCRA) is still ongoing. The next performance monitoring event is scheduled for June 2024.

LHAAP-17 PERCHLORATE GROUNDWATER TRENDS



Note: Extraction paused due to the Groundwater Treatment Plant being shut down during contract transition.

NEXT MEETING SCHEDULE AND CLOSING REMARKS

Schedule Next Restoration Advisory Board Meeting

Other Items/Remarks

Thank You For Coming

Harrison Bayou and Goose Prairie Creek – Perchlorate Data

Surface water samples are collected quarterly from each location in Harrison Bayou and Goose Prairie Creek, unless the sampling location is dry.

Surface Water Sample Data (in micrograms per liter)

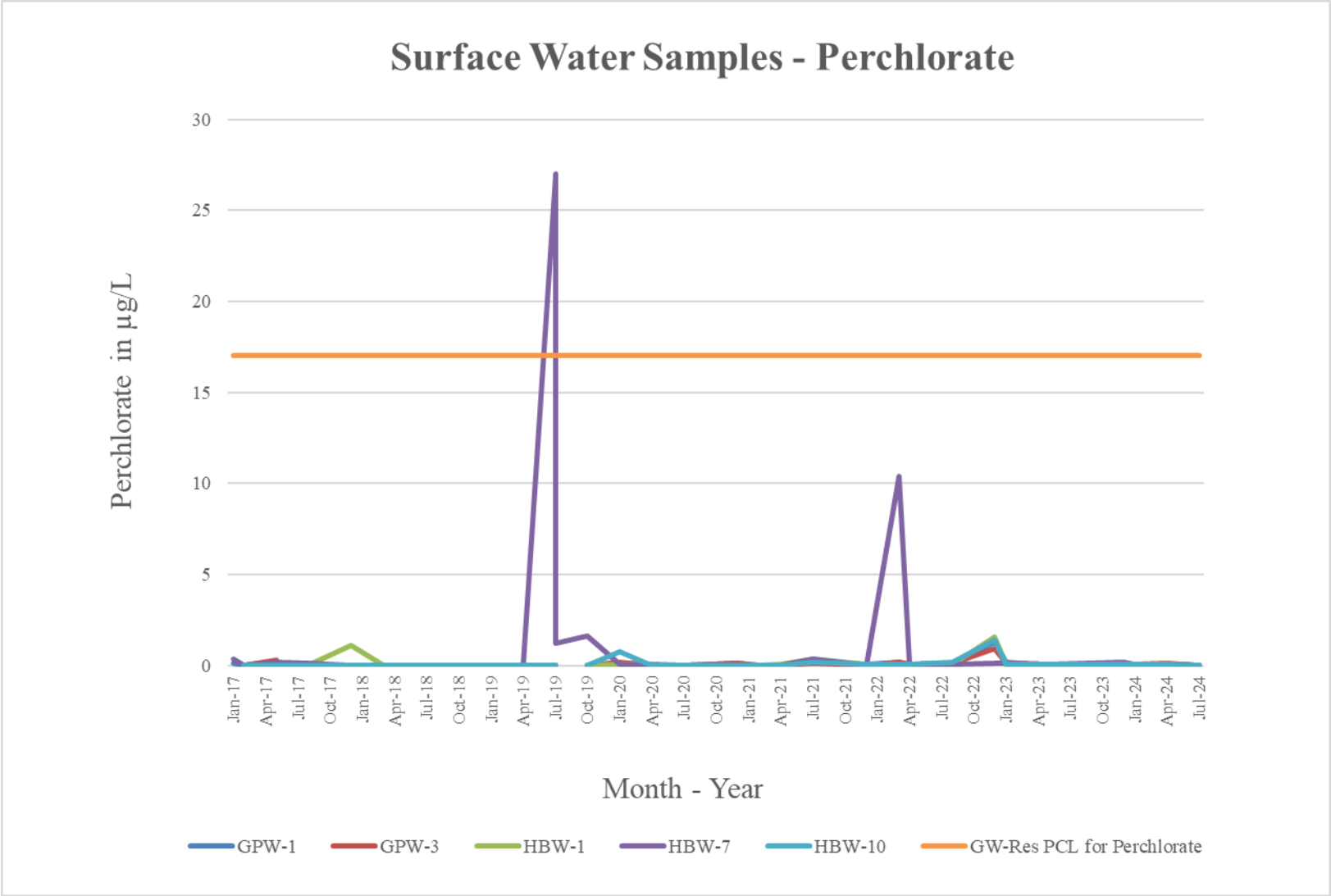
Quarter	1st	2nd	3rd	4th	1st	2nd	3rd
Creek Sample ID	Feb 2017	May 2017	Aug 2017	Dec 2017	Mar 2018	Jun 2018	Aug 2018
GPW-1	<1 U	0.263	Dry	<2.0 U	<2.0 U	Dry	<2.0 U
GPW-3	<1 U	0.274	Dry	<2.0 U	<2.0 U	Dry	<2.0 U
HBW-1	<1 U	<0.2 U	<0.2 U	1.1 J	<2.0 U	Dry	<2.0 U
HBW-7	<1 U	0.155	<0.2 U	<2.0 U	<2.0 U	Dry	<2.0 U
HBW-10	<1 U	<0.2 U	0.111 J	<2.0 U	<2.0 U	Dry	<2.0 U

Quarter	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st
Creek Sample ID	Oct 2018	Jan 2019	Apr 2019	Jul 2019	Oct 2019	Jan 2020	Apr 2020	Jul 2020	Dec 2020	Feb 2021
GPW-1	<2.0 U	<2.0 U	<2.0 U	<2.0 U	<2.0 U	0.163	0.0589 J	<0.05 U	0.110	<0.05 U
GPW-3	<2.0 U	<2.0 U	<2.0 U	<2.0 U	<2.0 U	0.156	0.0662 J	0.0326 J	0.108	<0.05 U
HBW-1	<2.0 U	<2.0 U	<2.0 U	<2.0 U	<2.0 U	0.0600 J	<0.05 U	<0.05 U	0.0374 J	<0.05 U
HBW-7	<2.0 U	<2.0 U	<2.0 U	27 (initial)/ 1.2 J (resample)	1.6 J	0.0761 J	<0.05 U	0.0318 J	0.0265 J	<0.05 U
HBW-10	<2.0 U	<2.0 U	<2.0 U	<2.0 U	<2.0 U	0.0782 J	<0.05 U	<0.05 U	<0.05 U	<0.05 U

Quarter	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th
Creek Sample ID	Apr 2021	Jul 2021	Dec 2021	Mar 2022	Apr 2022	Aug 2022	Dec 2022	Jan 2023	May 2023	Jul-Sep 2023	Dec 2023
GPW-1	0.0268 J	0.154	0.0394 J	0.162	0.042 J	0.104	1.30	0.153	0.0286 J	Dry	0.0973 J
GPW-3	0.0321 J	0.122	0.0344 J	0.198	0.0384 J	0.132	0.938	0.137	< 0.05 U	Dry	0.0382 J
HBW-1	0.0410 J	0.369	0.050 U	0.052 J	<0.05 U	0.0540 J	1.58	0.0568 J	< 0.05 U	Dry	< 0.05 U
HBW-7	0.0373 J	0.348	0.0359 J	10.4	0.0493 J	0.0880 J	0.125	0.133	< 0.05 U	Dry	0.163
HBW-10	<0.05 U	0.207	0.0464 J	<0.05 U	<0.05 U	0.171	1.39	0.0654 J	< 0.05 U	Dry	0.0546 J

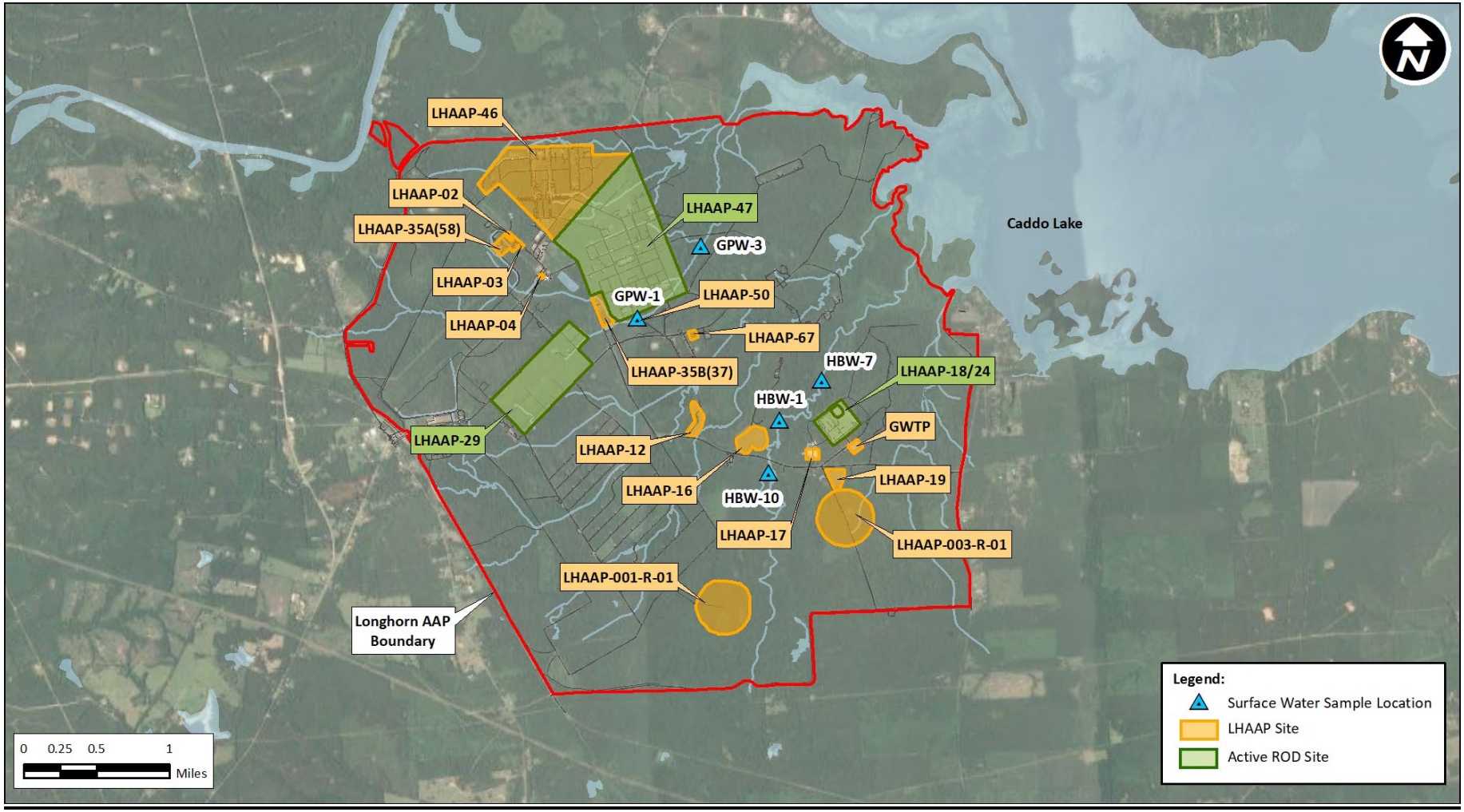
Quarter	1st	2nd	3rd
Creek Sample ID	Jan 2024	Apr 2024	Jul 2024
GPW-1	0.0671 J	0.0907 J	0.0253 J
GPW-3	0.0490 J	0.106	0.0419 J
HBW-1	0.0693 J	0.0368 J	0.0342 J
HBW-7	0.0772 J	< 0.05 U	0.0338 J
HBW-10	0.0565 J	< 0.05 U	0.0306 J

U – non-detect J – Estimated Dry – no surface water



Note: GPW – Goose Prairie Creek sample location; HBW – Harrison Bayou sample location; GW Res – Groundwater residential limit; PCL – Protective Concentration Level; µg/L – micrograms per liter. Surface water at HBW-7 had a detection of 27 µg/L from a sample collected on 11 July 2019. Surface water at HBW-7 was resampled 19 days later (30 July 2019) with a detection of 1.2 J (estimated result) µg/L. No surface water sampling was conducted in the 3rd Quarter 2023 due to dry conditions.

Longhorn Army Ammuntion Plant Creek Sampling Locations



Groundwater Treatment Plant - Processed Groundwater Volumes

The amount of groundwater treated is determined by measuring the number of gallons of processed water discharged.

Processed Water Data (in gallons)

Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18
454,860	896,514	890,391	528,538	195,198	961,324	517,945	368,318	453,155	325,566	1,607,996	1,319,474

Apr-18	May-18	Jun-18	Jul - 18	Aug-18	Sep-18	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19
630,888	403,369	329,448	140,247	150,228	901,856	1,502,926	71,204	392,024	369,490	1,534,825	463,698

Apr-19	May-19	Jun-19	Jul - 19	Aug-19	Sep-19	Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20
271,989	758,312	1,133,830	1,415,203	493,063	442,423	270,515	288,683	355,132	1,459,356	1,166,593	419,943

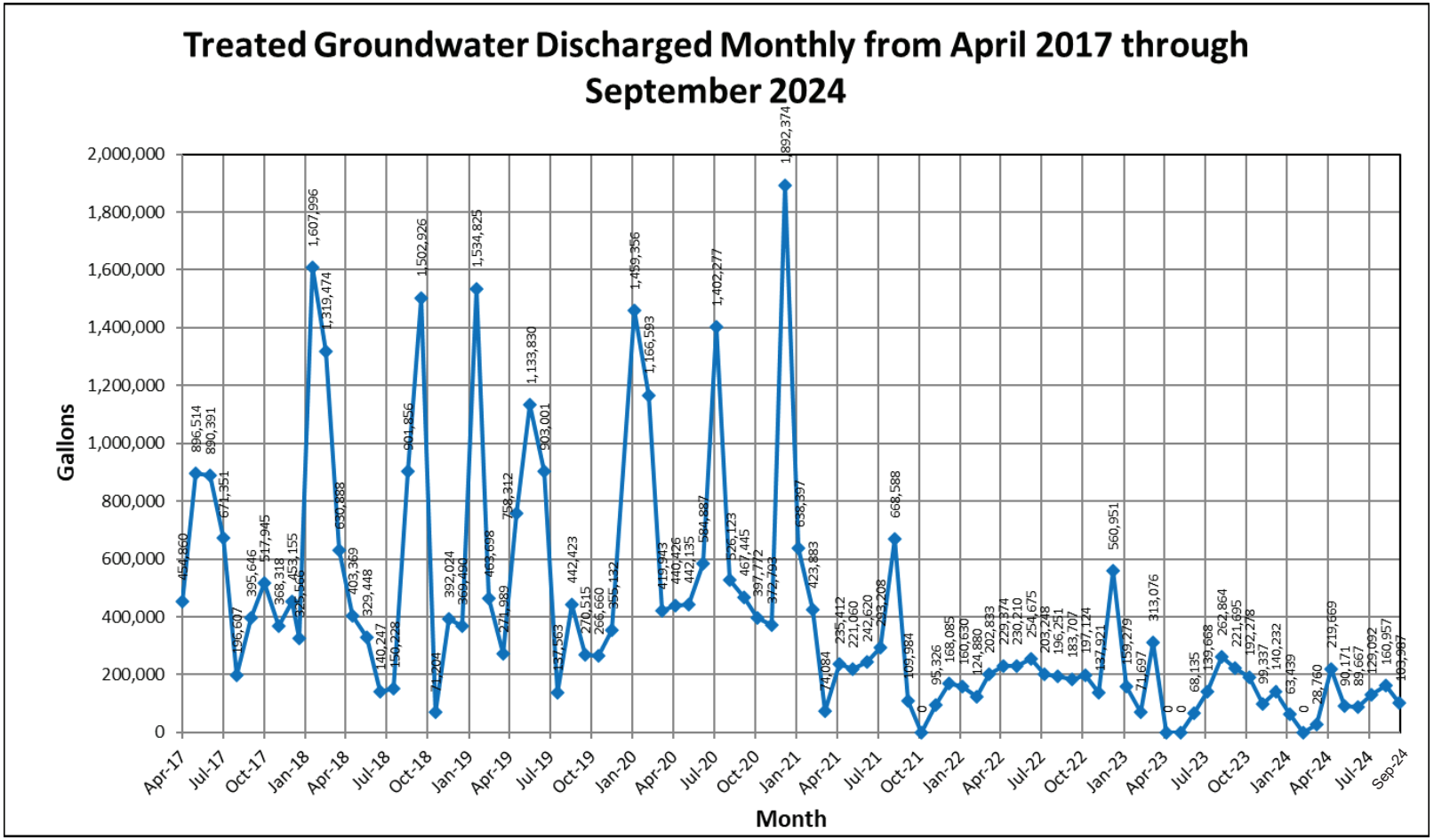
Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Oct-20	Nov-20	Dec-20	Jan-21	Feb-21	Mar-21
440,426	442,135	584,887	1,402,277	539,526	467,445	397,772	372,793	1,832,274	638,397	423,883	74,084

Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22
235,412	1,121,060	242,620	293,208	668,588	109,984	0	95,326	439,585	322,130	124,880	202,833

Apr-22	May-22	Jun-22	Jul-22	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22	Jan-23	Feb-23	Mar-23
229,374	230,210	254,675	203,248	196,251	183,707	197,124	137,921	560,951	159,279	71,697	313,076

Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23	Nov-23	Dec-23	Jan-24	Feb-24	Mar-24
0	0	68,135	110,535	262,864	221,695	192,278	99,337	140,232	63,439	0	28,760

Apr-24	May-24	Jun-24	Jul-24	Aug-24	Sep-24
219,669	90,171	89,667	129,092	160,957	103,987



Notes:
No groundwater discharged in October 2021 due to a power disruption to the GWTP.
No groundwater discharged in April-May 2023 during contract transition.
No groundwater discharged in February 2024 due to freezing temperatures.

Water Discharge Location and Volume (Gallons)					
Month	**Total Combined to Harrison Bayou**	**LHAAP-18/24 Sprinklers**	**GWTP To INF Pond**	**INF Pond to Harrison Bayou**	**Contract Hauled Off-Site**
Apr-17	113,038	0	236,821	0	0
May-17	0	0	534,155	0	0
Jun-17	958,404	0	294,550	490,574	0
Jul-17	0	0	528,538	0	0
Aug-17	0	0	195,197	0	0
Sep-17	651,434	0	309,980	651,434	0
Oct-17	0	0	517,945	0	0
Nov-17	0	0	368,318	0	0
Dec-17	560,350	0	453,155	560,350	0
Jan-18	325,566	0	253,177	325,566	0
Feb-18	1,607,996	0	62,017	1,430,634	0
Mar-18	1,319,474	0	0	870,816	0
Apr-18	630,888	0	0	630,888	0
May-18	403,369	0	0	403,369	0
Jun-18	193,669	0	135,779	0	0
Jul -18	0	0	140,247	0	0
Aug -18	49,409	0	100,819	0	0
Sep-18	585,397	0	316,459	524,484	0
Oct-18	1,409,106	0	93,820	1,016,285	0
Nov-18	71,204	0	0	0	0
Dec-18	392,024	0	0	0	0
Jan-19	369,490	0	0	369,490	0
Feb-19	1,534,825	0	0	1,326,485	0
Mar-19	463,698	0	0	83,250	0
Apr-19	271,989	0	0	0	0
May-19	758,312	0	0	253,817	0
Jun-19	1,133,830	0	0	847,918	0
Jul-19	1,415,203	0	0	903,001	0
Aug-19	374,629	0	118,434	0	0
Sep-19	0	0	442,423	0	0
Oct-19	0	0	270,515	0	0
Nov-19	115,503	0	173,180	0	0
Dec-19	318,248	0	36,884	0	0
Jan-20	1,459,396	0	0	1,115,183	0

Water Discharge Location and Volume (Gallons)					
Month	**Total Combined to Harrison Bayou**	**LHAAP-18/24 Sprinklers**	**GWTP To INF Pond**	**INF Pond to Harrison Bayou**	**Contract Hauled Off-Site**
Feb-20	1,166,593	0	0	741,954	0
Mar-20	419,943	0	0	0	0
Apr-20	440,426	0	0	0	0
May-20	442,135	0	0	0	0
June-20	584,887	0	0	0	0
July-20	1,402,277	0	0	984,393	0
Aug-20	216,197	0	323,359	0	0
Sep-20	0	0	467,445	0	0
Oct-20	0	0	397,772	0	0
Nov-20	0	0	372,793	0	0
Dec-20	1,832,274	0	60,199	1,571,432	0
Jan-21	638,397	0	0	383,318	0
Feb-21	423,883	0	0	259,875	0
Mar-21	74,084	0	0	74,084	0
Apr-21	235,412	0	0	0	0
May-21	1,121,060	0	0	900,000	0
Jun-21	242,620	0	0	0	0
Jul-21	293,208	0	0	243,675	0
Aug-21	668,588	0	0	561,527	0
Sep-21	0	0	109,984	0	0
Oct-21	0	0	0	0	0
Nov-21	0	0	95,326	0	0
Dec-21	271,500	0	168,085	271,500	0
Jan-22	161,500	0	160,630	161,500	0
Feb-22	0	0	124,880	0	0
Mar-22	190,898	0	11,935	0	0
Apr-22	229,374	0	0	0	0
May-22	230,210	0	0	0	0
June-22	254,675	0	0	0	0
July-22	0	0	203,248	0	0
Aug-22	34,115	0	162,136	0	0
Sept-22	83,312	0	100,395	0	0
Oct-22	0	0	197,124	0	0
Nov-22	0	0	137,921	0	0
Dec-22	560,951	0	0	514,515	0

Water Discharge Location and Volume (Gallons)					
Month	**Total Combined to Harrison Bayou**	**LHAAP-18/24 Sprinklers**	**GWTP To INF Pond**	**INF Pond to Harrison Bayou**	**Contract Hauled Off-Site**
Jan-23	159,279	0	0	145,321	0
Feb-23	71,697	0	0	71,697	0
Mar-23	313,076	0	0	313,076	0
Apr-23	0	0	0	0	0
May-23	0	0	0	0	0
June-23	68,135	0	0	0	0
July-23	29,133	0	110,535	0	0
Aug-23	0	0	262,864	0	0
Sept-23	0	0	221,695	0	0
Oct-23	0	0	192,278	0	0
Nov-23	0	0	99,337	0	0
Dec-23	0	0	140,232	0	0
Jan-24	187,463	0	63,439	175,500	0
Feb-24	0	0	0	0	0
Mar-24	28,760	0	0	0	0
Apr-24	219,669	0	0	0	0
May-24	90,171	0	0	0	0
Jun-24	89,667	0	0	0	0
Jul-24	129,092	0	0	0	0
Aug-24	160,957	0	0	0	0
Sept-24	103,987	0	0	0	0

Notes: GWTP – Groundwater Treatment Plant; INF - Intermediate-Range Nuclear Force

Fact Sheet: Active Sites

Longhorn Army Ammunition Plant (LHAAP)

14 November 2024 Restoration Advisory Board Meeting

LHAAP-04 (Former Pilot Wastewater Treatment Plant)

- Contaminants of Concern (COCs): Perchlorate in Groundwater
- Prior Remedial Activities: Excavation, In-Situ Enhanced Bioremediation (ISB)
- Current Remedial Activities: Post-ISB Groundwater monitoring

LHAAP-12 (Landfill 12)

- COCs: Trichloroethene (TCE) in Groundwater
- Prior Remedial Activities: Land Use Controls (LUCs) and monitored natural attenuation (MNA)
- Current Remedial Activities: MNA (sampling and reporting), Long-Term Monitoring (LTM) for groundwater, LUC documentation and reporting

LHAAP-16 (Old Landfill)

- COCs: TCE, cis-1,2-dichloroethene (DCE), Vinyl Chloride (VC), and Perchlorate in Groundwater
- Prior Remedial Activities: ISB, Groundwater extraction
- Current Remedial Activities: Post-ISB Groundwater monitoring

LHAAP-35B (37) (Former Chemical Laboratory)

- COCs: 1,1-DCE, TCE, and Tetrachloroethylene (PCE) in Groundwater
- Prior Remedial Activities: Enhanced ISB
- Current Remedial Activities: LUC documentation and reporting and MNA (sampling and reporting)

LHAAP-46 (Plant 2 Area)

- COCs: TCE, cis-I,2-DCE, and VC in Groundwater
- Prior Remedial Activities: LUCs and MNA
- Current Remedial Activities: LUC documentation and reporting and MNA (sampling and reporting)

Fact Sheet: Active Sites

Longhorn Army Ammunition Plant (LHAAP)

14 November 2024 Restoration Advisory Board Meeting

LHAAP-50 (Former Sump Water Tank)

- COCs: Perchlorate, PCE, TCE, 1,1-DCE, 1,2-Dichloroethane (DCA), cis-1,2-DCE, and VC in Groundwater
- Prior Remedial Activities: MNA, Excavation, ISB
- Current Remedial Activities: Post-ISB Groundwater monitoring

LHAAP-35A (58) (Shops Area)

- COCs: PCE, 1,1-DCE, TCE, and VC in Groundwater
- Prior Remedial Activities: Enhanced ISB
- Current Remedial Activities: MNA (sampling and reporting) and LUC documentation and reporting

LHAAP-67 (Former Aboveground Storage Tank Farm)

- COCs: 1,1-DCE, 1,2-DCA, 1,1,1-trichloroethane (TCA), 1,1,2,-TCA, and TCE in Groundwater
- Prior Remedial Activities: MNA and LUCs
- Current Remedial Activities: MNA (sampling and reporting) and LUC documentation and reporting

LHAAP-001-R-01/-003-R-01 (Site 27, South Test Area, Bomb Test Area/ Site 54, Ground Signal Test Area)

- COCs: None
- Prior Remedial Activities: Removal of surface munition and explosives of concern
- Current Remedial Activities: Limited groundwater monitoring and LUCs

Fact Sheet: Active Sites

Longhorn Army Ammunition Plant (LHAAP)

14 November 2024 Restoration Advisory Board Meeting

LHAAP-18/24 (Burning Ground No. 3 / Unlined Evaporation Pond)

- COCs: Methylene Chloride (MC), TCE, cis-1,2-DCE, PCE, Benzene, 1,1,2-TCA, VC, Bromodichloromethane, 1,3,5-trinitrobenzene (TNB), 1,4-dioxane, arsenic, barium, chromium, cobalt, nickel, and perchlorate in Groundwater; TCE, MC, and PCE in Soil
- Prior Remedial Activities: Excavation
- Final Remedial Design submitted 1 March 2024
- Interim Remedy: Groundwater Treatment Plant operation from 1996 to current
- Selected Remedy: Groundwater extraction and treatment, Enhanced ISB, In-Situ Thermal Desorption (ISTD) of Dense Non-aqueous Phase Liquid (DNAPL), Maintenance of the Unlined Evaporative Pond (UEP) cap, Excavation and off-site disposal, MNA, LTM, and LUCs

LHAAP-29 (Former TNT Production Area)

- COCs: TCE, 1,2-DCA, 1,1-DCE, cis-1,2-DCE, trans-1,2-DCE, MC, VC, 2,4-dinitrotoluene (DNT), 4-nitrotoluene (NT), 2-NT, 3-NT, arsenic, mercury, selenium, nickel, and perchlorate in Groundwater; 2,4,6-trinitrotoluene (TNT), 2-4-DNT, 2,6-DNT, and perchlorate in Soil; 1,3-dinitrobenzene (DNB), 2,4,6-TNT, 2,4-DNT, 2-amino-4,6-DNT, and 4-amino-2,6-DNT in Transite TNT Wastewater Line and Cooling Water Drain Line.
- Prior Remedial Activities: None
- Final Remedial Design submitted 29 February 2024
- Selected Remedy: Flush, inspect, and plug TNT wastewater and cooling water lines, Excavation and off-site disposal, ISTD, MNA, and LUCs

LHAAP-47 (Plant 3 Area)

- COCs: Perchlorate, TCE, cis-1,2-DCE, VC, 1,1-DCE, PCE, 1,2-DCA, acetone, chloroform, trans-1,2-DCE, 2,4,6-TNT, 2,4-DNT, 2,6-DNT, bis(2-ethylhexyl) phthalate, pentachlorophenol, aluminum, antimony, arsenic, cadmium, chromium, cobalt, manganese, nickel, silver, strontium, thallium, tin, and vanadium in Groundwater; Perchlorate and TCE in Soil
- Prior Remedial Activities: Plastic Liner to prevent migration in soil
- Current Remedial Activities: LUCs, Excavation, ISTD, Enhanced ISB, Biobarriers (permeable reactive barrier), and MNA

Fact Sheet: Active Sites

Longhorn Army Ammunition Plant (LHAAP)

14 November 2024 Restoration Advisory Board Meeting

LHAAP-17 (Burning Ground No. 2 / Flashing Area)

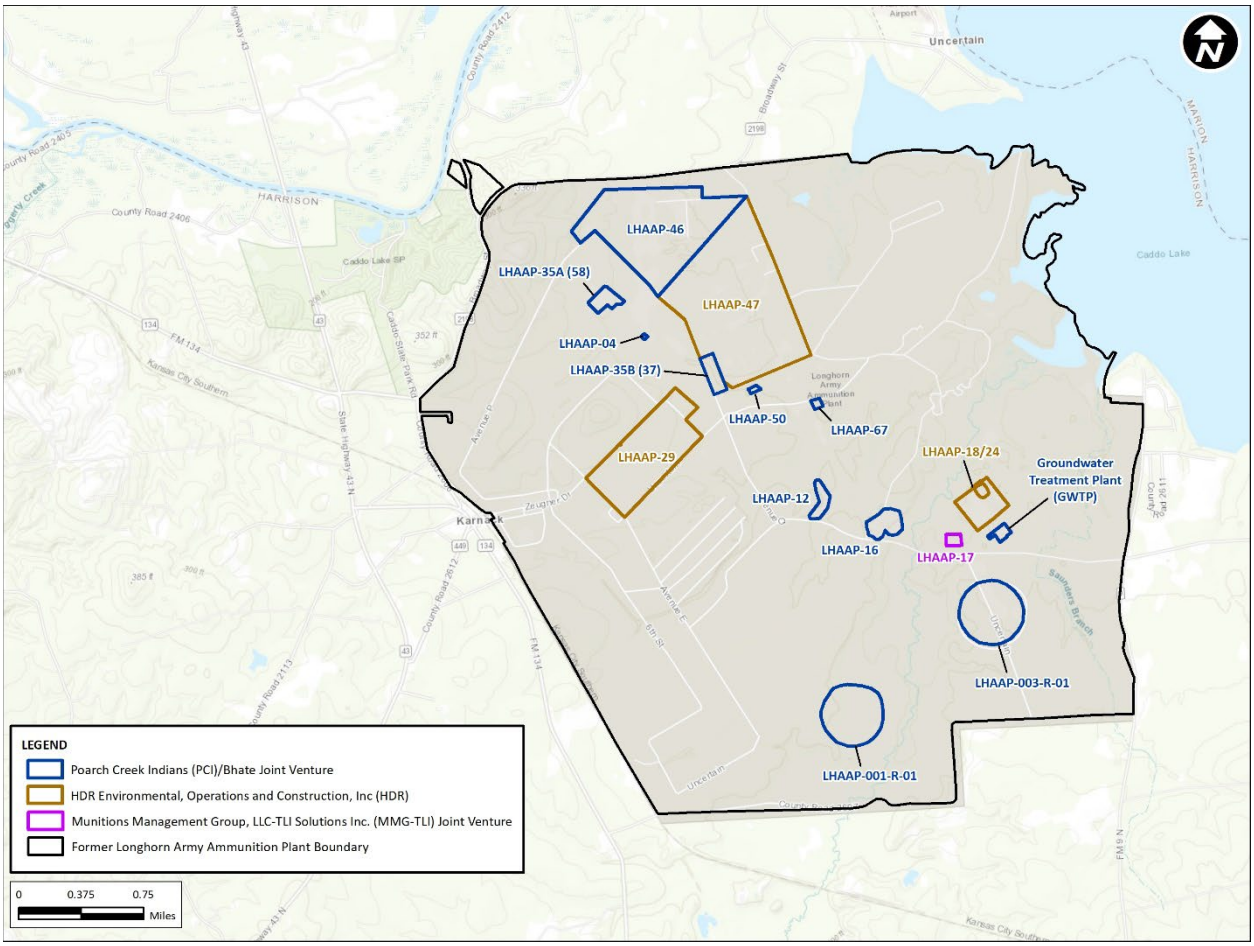
- COCs: Perchlorate, TCE, 1,1-DCE, 1,1-DCA, 1,2-DCA, and VC in Groundwater; Perchlorate, 2,4,6-TNT, 2,4-DNT, and 2,6-DNT in Soil
- Prior Remedial Activities: Excavation
- Current Remedial Activities: Groundwater Extraction and Performance Monitoring

Fact Sheet: Active Sites

Longhorn Army Ammunition Plant (LHAAP)

14 November 2024 Restoration Advisory Board Meeting

LHAAP SITE MAP



Fact Sheet: Active Sites

Longhorn Army Ammunition Plant (LHAAP)

14 November 2024 Restoration Advisory Board Meeting

Definitions

In Situ Bioremediation (ISB) of Groundwater - Bioremediation is an engineered technology that modifies environmental conditions (physical, chemical, biochemical, or microbiological) to encourage microorganisms to destroy or detoxify organic and inorganic contaminants in the environment. The process can be applied above ground in land farms, tanks, biopiles, or other treatment systems (referred to as ex situ) or below ground in the soil or groundwater, referred to as in situ.

More info at Community Guide to Bioremediation (epa.gov)

In situ thermal desorption (ISTD) is an intensive thermally enhanced environmental remediation technology that uses thermal conductive heating (TCH) elements to directly transfer heat to environmental media. The ISTD/TCH process can be applied at low (<100 °C), moderate (~100 °C) and higher (>100 °C) temperature levels to accomplish the remediation of a wide variety of contaminants, both above and below the water table. ISTD/TCH is the only major in situ thermal remediation (ISTR) technology capable of achieving subsurface target treatment temperatures above the boiling point of water and is effective at virtually any depth in almost any media. TCH works in tight soils, clay layers, and soils with wide heterogeneity in permeability or moisture content that are impacted by a broad range of volatile and semi-volatile organic contaminants.

More info at Community Guide to In Situ Thermal Treatment (epa.gov)

Natural attenuation relies on natural processes to decrease or “attenuate” concentrations of contaminants in soil and groundwater. Monitoring typically involves collecting soil and groundwater samples to analyze them for the presence of contaminants and other site characteristics. The entire process is called “monitored natural attenuation” or “MNA.” Natural attenuation occurs at most contaminated sites. However, the right conditions must exist underground to clean sites properly and quickly enough. Regular monitoring must be conducted to ensure that MNA continues to work.

More info at Community Guide to Monitored Natural Attenuation (epa.gov)

Groundwater extraction and treatment or pump and treat is a common method for cleaning up groundwater contaminated with dissolved chemicals, including industrial solvents, metals, and fuel oil. Groundwater is pumped from wells to an above-ground treatment system that removes the contaminants. Pump and treat methods may involve installing one or more wells to extract the contaminated groundwater. Groundwater is pumped from these “extraction wells” to the ground surface, either directly into a treatment system or into a holding tank until treatment can begin. The treatment system may consist of a single cleanup method, such as activated carbon or air stripping, to clean the water. However, treatment often requires several cleanup methods if the groundwater contains different types of contaminants or high concentrations of a single contaminant. The approach to treatment may be modified as contaminant concentrations decrease

Fact Sheet: Active Sites

Longhorn Army Ammunition Plant (LHAAP)

14 November 2024 Restoration Advisory Board Meeting

More info at Community Guide to Pump and Treat (epa.gov)

Bioremediation is the use of microbes to clean up contaminated soil and groundwater. Microbes are very small organisms, such as bacteria, that live naturally in the environment. Bioremediation stimulates the growth of certain microbes that use contaminants as a source of food and energy. Contaminants treated using bioremediation include oil and other petroleum products, solvents and pesticides.

More info at Community Guide to Bioremediation (epa.gov)

Air stripping is the process of moving air through contaminated water in an aboveground treatment system to remove chemicals called "volatile organic compounds" or "VOCs." VOCs are chemicals that easily evaporate, which means they can change from a liquid to a vapor (a gas). The air passed through contaminated water helps evaporate VOCs faster. The chemical vapors are collected, and either treated or vented outside if VOC levels are low enough. Air stripping is commonly used to treat groundwater as part of the pump and treat cleanup method.

More info at Community Guide to Air Stripping (epa.gov)

A permeable reactive barrier, or "PRB," is a wall created below ground to clean up contaminated groundwater. The wall is "permeable," which means that groundwater can flow through it. Water must flow through the PRB to be treated. The "reactive" materials that make up the wall either trap harmful contaminants or make them less harmful. The treated groundwater flows out the other side of the wall.

More info at Community Guide to Permeable Reactive Barriers (epa.gov)

Fact Sheet: Active Sites

Longhorn Army Ammunition Plant (LHAAP)

14 November 2024 Restoration Advisory Board Meeting

Acronyms and Abbreviations

COC	Contaminant of Concern
DCA	Dichloroethane
DCE	Dichloroethene
DNAPL	Dense Non-aqueous Phase Liquid
DNB	Dinitrobenzene
DNT	Dinitrotoluene
ISB	In-Situ Bioremediation
ISTD	In-Situ Thermal Desorption
LHAAP	Longhorn Army Ammunition Plant
LTM	Long Term Monitoring
LUC	Land Use Control
MC	Methylene Chloride
MNA	Monitored Natural Attenuation
NT	Nitrotoluene
PCE	Tetrachloroethene
TCA	Trichloroethane
TCE	Trichloroethene
TNB	Trinitrobenzene
TNT	Trinitrotoluene
UEP	Unlined Evaporative Pond
VC	Vinyl Chloride

DEPARTMENT OF THE ARMY
US ARMY INSTALLATION MANAGEMENT COMMAND
US ARMY ENVIRONMENTAL COMMAND
2455 REYNOLDS ROAD
JOINT BASE SAN ANTONIO FORT SAM HOUSTON, TX 78234-7588

February 4, 2025

SUBJECT: Surface Water Data Transmittal – 2024, Longhorn Army Ammunition Plant (LHAAP), Karnack, Texas, February 2025

Mr. Brian Follin
U.S. Environmental Protection Agency
1201 Elm Street, Suite 500
Dallas, TX 75270-2002

Dear Mr. Follin,

The surface water data, collected as a requirement of the 1999 Perchlorate Dispute Resolution, will be documented in the Administrative Record via data memoranda provided by the Army. The quarterly surface water sampling results along with historical data, are presented in the attached memorandum for your file and does not require your review.

The document was prepared by the PCI-Bhate Joint Venture (PCI-Bhate) team, on behalf of the Army as part of PCI-Bhate's Performance Based Remediation contract for the facility. I ask that Zack Beck, PCI-Bhate's Project Manager, be copied on any communications related to the project.

The point of contact for this action is the undersigned. I may be contacted at (210) 846-8652, or by email at: michael.a.bowlby.civ@army.mil.

Sincerely,

Michael A. Bowlby

Michael Bowlby
Team Lead, EPA Regions 6 and 8
U.S. Army Environmental Command

Electronic copies furnished:
A. Palmie, TCEQ, Austin, TX
J. Reyes, USEPA Region 6, Dallas, TX
E. Duerkop, USFWS, Caddo Lake NWR, TX
C. Montoya, USACE, Tulsa District, OK
A. Williams, USACE, Tulsa District, OK
K. Russell, BRAC, Huntsville, AL
Z. Beck, Bhate, Lakewood, CO
N. Alfino, PCI Environmental, Denver, CO
P. Srivastav, APTIM, Houston, TX

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February 4, 2025

SUBJECT: Surface Water Data Transmittal – 2024, Longhorn Army Ammunition Plant (LHAAP), Karnack, Texas, February 2025

Ms. April Palmie
Texas Commission on Environmental Quality
Superfund Section, MC-136
12100 Park 35 Circle, Bldg D
Austin, TX 78753

Dear Ms. Palmie,

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Sincerely,

Michael A. Bowlby

Michael Bowlby
Team Lead, EPA Regions 6 and 8
U.S. Army Environmental Command

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E. Duerkop, USFWS, Caddo Lake NWR, TX
C. Montoya, USACE, Tulsa District, OK
A. Williams, USACE, Tulsa District, OK
K. Russell, BRAC, Huntsville, AL
Z. Beck, Bhate, Lakewood, CO
N. Alfino, PCI Environmental, Denver, CO
P. Srivastav, APTIM, Houston, TX

bhate

LETTER OF TRANSMITTAL

DATE: February 4, 2025

PROJECT NAME: Remediation of Multiple Sites, Longhorn Army Ammunition Plant, Karnack, Texas

TO:
Mike Bowlby — USAEC Environmental Support Manager
Aaron Williams — USACE Project Engineer

FROM: Zack Beck — PCI|Bhate JV Project Manager

SUBJECT: **Surface Water Data Transmittal - 2024**
Longhorn Army Ammunition Plant (LHAAP), Karnack, Texas (TX)
Contract: W9128F-13-D-0012
Delivery Order: W912BV17F0150

REMARKS

Surface water sampling data for perchlorate is currently collected at the following frequencies except when locations are dry:

Surface Water	Frequency
HBW-1	Harrison Bayou, quarterly
HBW-7	Harrison Bayou, quarterly
HBW-10	Harrison Bayou, quarterly
GPW-1	Goose Prairie Creek, quarterly
GPW-3	Goose Prairie Creek, quarterly

Surface water sampling data is updated and reported to the regulatory agencies and to the public as it is available through handouts reviewed and distributed in association with the quarterly Restoration Advisory Board (RAB) fact sheets and meetings and included in the Administrative Record along with other RAB meeting materials. The attached handouts will be presented in the February 2025 RAB Fact Sheet. Data associated with the 2024 surface water sampling events, including the data validation report (Quality Control Summary Report) for the samples, are attached for your file.

List of Attachments:

Table 1. LHAAP Quarterly Surface Water Sampling - 2024
A Harrison Bayou and Goose Prairie Creek Perchlorate Data Handouts
B Quality Control Summary Report
C Laboratory Data Packages

LHAAP-Quarterly Surface Water Sampling 2024

January 2024 (Quarter 1)

Location ID: / Sample Date:	Units	PCL	HBW1_013024 1/30/24	HBW1_013024_a 1/30/24	HBW7_013024 1/30/24	HBW10_013024 1/30/24	GPW1_013024 1/30/24	GPW3_013024 1/30/24
Perchlorate (6850)			Harrison Bayou				Goose Prairie Creek	
Perchlorate	µg/L	17	**0.0609 J**	**0.0693 J**	**0.0772 J**	**0.0565 J**	**0.0671 J**	**0.0490 J**

April 2024 (Quarter 2)

Location ID: / Sample Date:	Units	PCL	HBW1_041824 4/18/24	HBW7_041824 4/18/24	HBW10_041824 4/18/24	GPW1_041824 4/18/24	GPW1_041824_a 4/18/24	GPW3_041824 4/18/24
Perchlorate (6850)			Harrison Bayou			Goose Prairie Creek		
Perchlorate	µg/L	17	**0.0368 J**	< 0.0500 U	< 0.0500 U	**0.0907 J**	**0.0777 J**	**0.106**

July 2024 (Quarter 3)

Location ID: / Sample Date:	Units	PCL	HBW1_071624 7/16/24	HBW7_071624 7/16/24	HBW10_071624 7/16/24	GPW1_071624 7/16/24	GPW3_071624 7/16/24	GPW3_071624_a 7/16/24
Perchlorate (6850)			Harrison Bayou			Goose Prairie Creek		
Perchlorate	µg/L	17	**0.0342 J**	**0.0338 J**	**0.0306 J**	**0.0253 J**	**0.0419 J**	**0.0259 J**

November 2024 (Quarter 4)

Location ID: / Sample Date:	Units	PCL	HBW1_111924 11/19/24	HBW1_111924-A 11/19/24	HBW7_111924 11/19/24	HBW10_111924 11/19/24	GPW1_111924 11/19/24	GPW3_111924 11/19/24
Perchlorate (6850)			Harrison Bayou				Goose Prairie Creek	
Perchlorate	µg/L	17	< 0.10 U	< 0.10 U	< 0.10 U	< 0.10 U	< 0.10 U	**0.095 J**

PCL – Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level

J - estimated value between the detection limit and limit of quantitation

U - non-detect reported to the limit of detection

Attachment A

Harrison Bayou and Goose Prairie Creek Perchlorate Data Handouts

Harrison Bayou and Goose Prairie Creek – Perchlorate Data

Surface water samples are collected quarterly from each location in Harrison Bayou and Goose Prairie Creek, unless the sampling location is dry.

Surface Water Sample Data (in micrograms per liter)

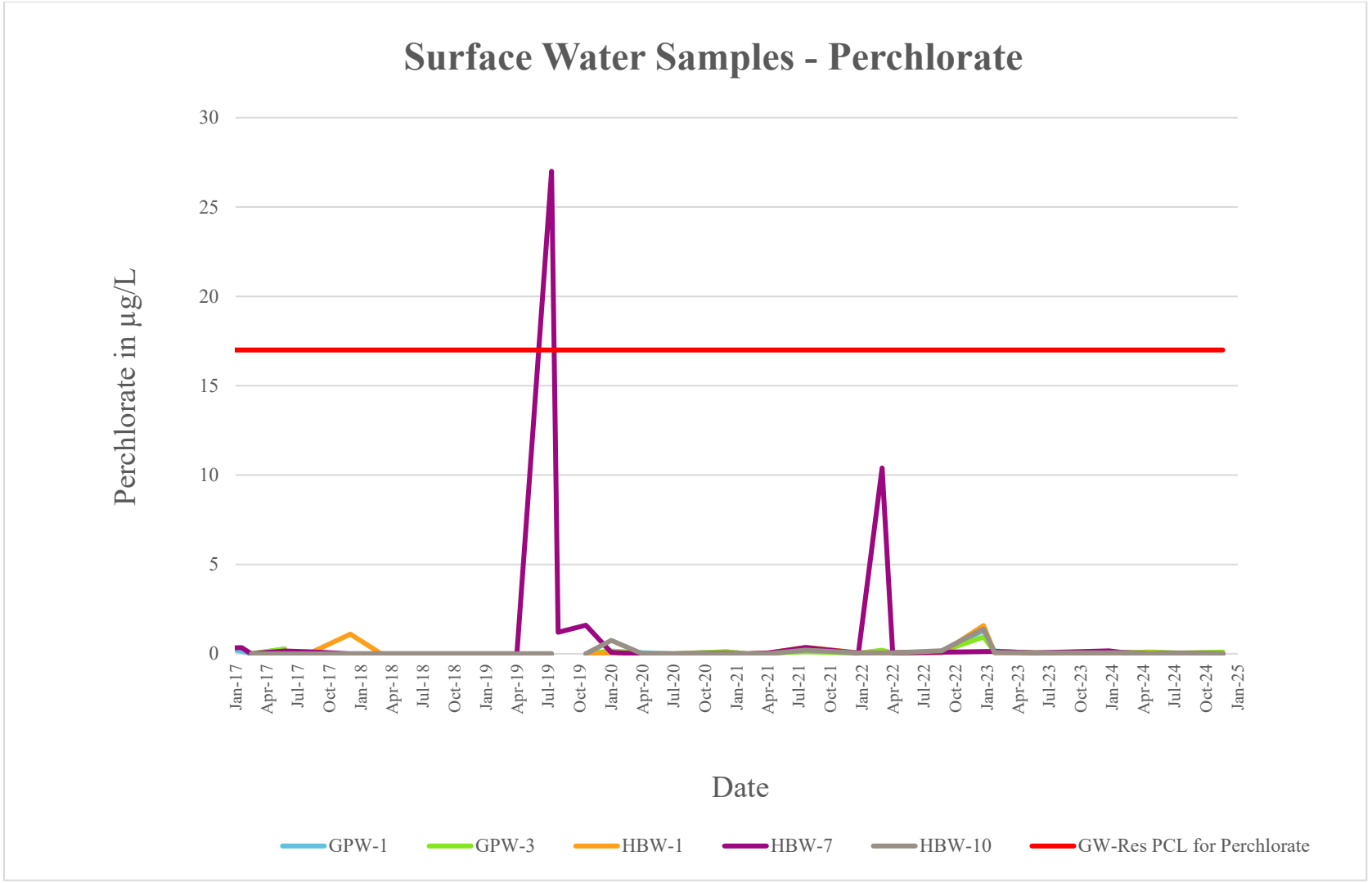
Quarter	1st	2nd	3rd	4th	1st	2nd	3rd
Creek Sample ID	Feb 2017	May 2017	Aug 2017	Dec 2017	Mar 2018	Jun 2018	Aug 2018
GPW-1	<1 U	0.263	Dry	<2.0 U	<2.0 U	Dry	<2.0 U
GPW-3	<1 U	0.274	Dry	<2.0 U	<2.0 U	Dry	<2.0 U
HBW-1	<1 U	<0.2 U	<0.2 U	1.1 J	<2.0 U	Dry	<2.0 U
HBW-7	<1 U	0.155	<0.2 U	<2.0 U	<2.0 U	Dry	<2.0 U
HBW-10	<1 U	<0.2 U	0.111 J	<2.0 U	<2.0 U	Dry	<2.0 U

Quarter	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st
Creek Sample ID	Oct 2018	Jan 2019	Apr 2019	Jul 2019	Oct 2019	Jan 2020	Apr 2020	Jul 2020	Dec 2020	Feb 2021
GPW-1	<2.0 U	<2.0 U	<2.0 U	<2.0 U	<2.0 U	0.163	0.0589 J	<0.05 U	0.110	<0.05 U
GPW-3	<2.0 U	<2.0 U	<2.0 U	<2.0 U	<2.0 U	0.156	0.0662 J	0.0326 J	0.108	<0.05 U
HBW-1	<2.0 U	<2.0 U	<2.0 U	<2.0 U	<2.0 U	0.0600 J	<0.05 U	<0.05 U	0.0374 J	<0.05 U
HBW-7	<2.0 U	<2.0 U	<2.0 U	27 (initial)/ 1.2 J (resample)	1.6 J	0.0761 J	<0.05 U	0.0318 J	0.0265 J	<0.05 U
HBW-10	<2.0 U	<2.0 U	<2.0 U	<2.0 U	<2.0 U	0.0782 J	<0.05 U	<0.05 U	<0.05 U	<0.05 U

Quarter	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th
Creek Sample ID	Apr 2021	Jul 2021	Dec 2021	Mar 2022	Apr 2022	Aug 2022	Dec 2022	Jan 2023	May 2023	Jul-Nov 2023	Dec 2023
GPW-1	0.0268 J	0.154	0.0394 J	0.162	0.042 J	0.104	1.30	0.153	0.0286 J	Dry	0.0973 J
GPW-3	0.0321 J	0.122	0.0344 J	0.198	0.0384 J	0.132	0.938	0.137	<0.05 U	Dry	0.0382 J
HBW-1	0.0410 J	0.369	0.050 U	0.052 J	<0.05 U	0.0540 J	1.58	0.0568 J	<0.05 U	Dry	<0.05 U
HBW-7	0.0373 J	0.348	0.0359 J	10.4	0.0493 J	0.0880 J	0.125	0.133	<0.05 U	Dry	0.163
HBW-10	<0.05 U	0.207	0.0464 J	<0.05 U	<0.05 U	0.171	1.39	0.0654 J	<0.05 U	Dry	0.0546 J

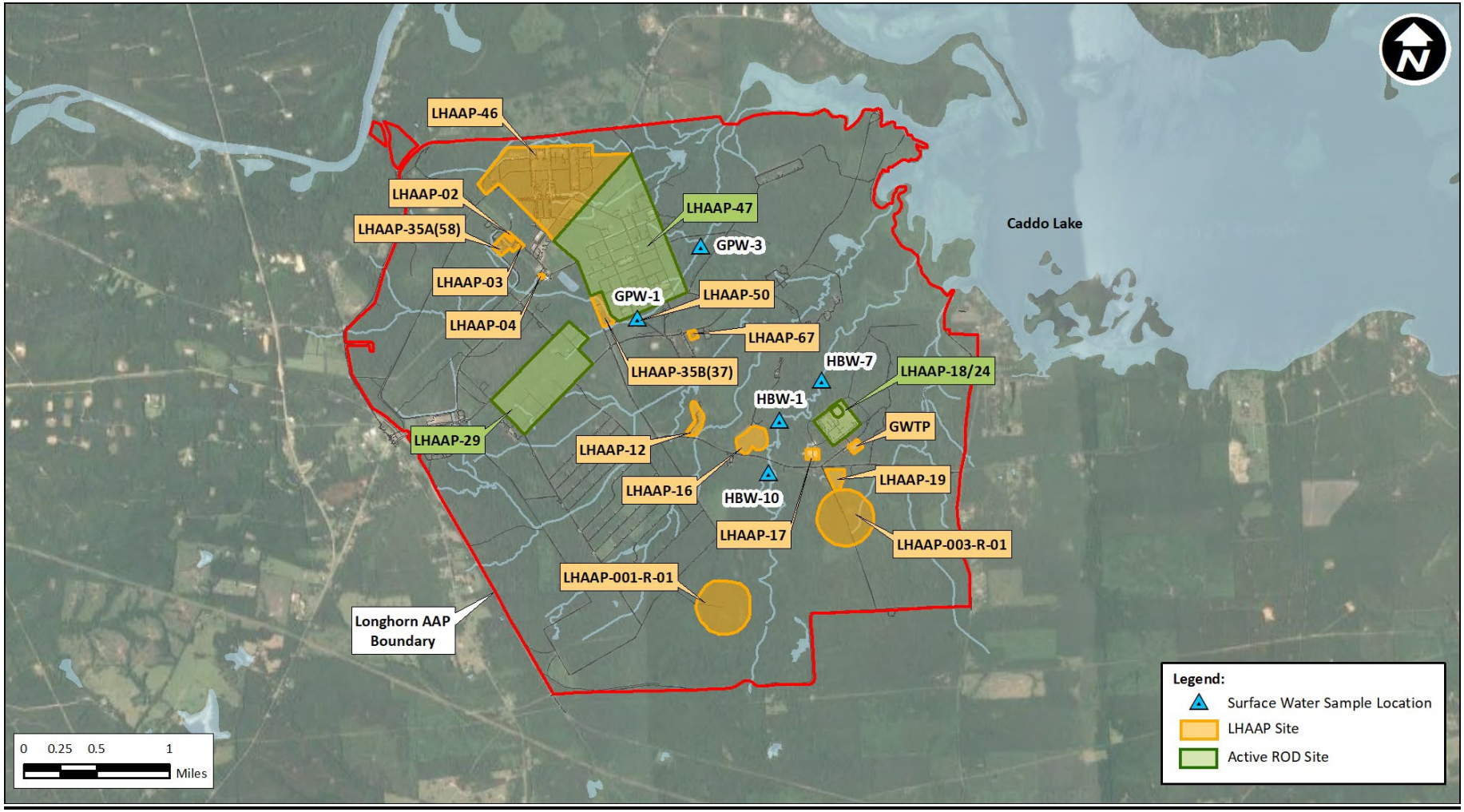
Quarter	1st	2nd	3rd	4th
Creek Sample ID	Jan 2024	Apr 2024	Jul 2024	Nov 2024
GPW-1	0.0671 J	0.0907 J	0.0253 J	< 0.10 U
GPW-3	0.0490 J	0.106	0.0419 J	0.095 J
HBW-1	0.0693 J	0.0368 J	0.0342 J	< 0.10 U
HBW-7	0.0722 J	< 0.05 U	0.0338 J	< 0.10 U
HBW-10	0.0565 J	< 0.05 U	0.0306 J	< 0.10 U

U – non-detect J – Estimated Dry – no surface water ID- Identification



Note: Surface water at HBW-7 had a detection of 27 µg/L from a sample collected on 11 July 2019. Surface water at HBW-7 was resampled 19 days later (30 July 2019) with a detection of 1.2 J (estimated result) µg/L. GPW – Goose Prairie Creek sample location; HBW – Harrison Bayou sample location. GW Res – Groundwater residential limit; MSC – Medium Specific Concentration; PCL – Protective Concentration Level; µg/L – micrograms per liter. Only low-level exceedances were noted during the 2024 sampling event with the highest concentration being 0.106 µg/L during the 2nd Quarter 2024 at GPW-3.

Longhorn Army Ammuntion Plant Creek Sampling Locations



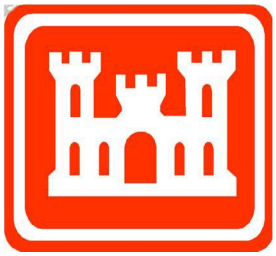
Attachment B

Quality Control Summary Report

QUALITY CONTROL SUMMARY REPORT
2024 SURFACE WATER
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Prepared For:





U.S. Army Corps of Engineers

Prepared By:

bhate

1608 13th Avenue South, Suite 300
Birmingham, Alabama 35205
1-800-806-4001 • www.bhate.com

January 2025

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1 INTRODUCTION

Bhate reviewed three data packages from ALS Environmental, Houston, Texas collected on January 30th, April 18th and July 16th, 2024. One data package was reviewed from SGS Orlando, Florida collected on November 19, 2024. The locations were comprised of Goose Prairie Creek and Harrison Bayou at the Longhorn Army Ammunition Plant (LHAAP), Karnack, TX. Data were reviewed for conformance to the requirements of the following guidance documents: *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review* (USEPA, November 2020) and the *Final Basewide Uniform Federal Policy* [UFP] – *Quality Assurance Project Plan* [QAPP] *Longhorn Army Ammunition Plant* which is in Appendix C of the *Final Installation-Wide Work Plan for Longhorn Army Ammunition Plant Karnack, Texas* (Bhate, May 2018).

1.1 Intended Use of Data

Analyses requested included:

- SW6850 – Perchlorate

Table 1 lists the sample identification (ID) numbers and their associated laboratory ID numbers.

Table 2 lists qualified results with the associated quality control parameter that was exceeded.

1.2 Preservation and Holding Times

Sample ID data were evaluated for agreement with the chain-of-custody (COC). All samples were received in appropriate containers, within the proper temperature range, in good condition, and with the required signatures.

1.3 Calibrations

Initial calibration acceptance criteria are specified in Worksheet 24 of the project-specific QAPP. For perchlorate, the methods criteria are a relative standard deviation (RSD) less than or equal to 20 percent (%) or a correlation coefficient (r^2) $\geq$ 0.99.

All calibrations met the method criteria.

1.3.1 Continuing Calibration Verifications (CCV)

The continuing calibration verification (CCV) acceptance criteria are specified in Worksheet 24 of the project-specific QAPP. For perchlorate, the methods criteria are if the CCV is outside $\pm$15% difference (%D) the lab will reanalyze all samples since last acceptable CCV. If reanalysis cannot be performed, all results for perchlorate in all samples since last acceptable CCV are qualified J or UJ.

All CCVs were within the acceptance criteria.

1.4 Blanks

If the sample result for an associated sample was non-detect or less than 5X (10X for common laboratory contaminants) the analyte concentration in the blank, the corresponding sample result for the analyte was qualified UB. Where the sample result for the affected analyte was greater than 5X (10X) the amount in the blank, no qualifier was applied.

Perchlorate was not detected in the blanks.

1.5 Laboratory Control Sample (LCS)/Laboratory Control Sample Duplicate (LCSD)

LCS/LCSD recoveries were evaluated using limits defined for each method in Worksheet 15 of the project-specific QAPP.

All LCS/LCSD recoveries were within the control limits.

1.6 Matrix Spike (MS)/Matrix Spike Duplicate Sample (MSD)

MS/MSD recoveries were evaluated using limits defined in Worksheet 15 of the project-specific QAPP. When sample results were greater than 4x the spike amount, control limits were not applicable and require no qualification. Furthermore, if a MS/MSD analysis was performed on a batched (unrelated) sample, no qualification was made to the sample data.

The project MS/MSD recoveries were within the control limits.

1.7 Internal Standards

When the percent recovery for an internal standard in a sample is outside the laboratory limits, the associated sample is qualified for the analytes associated with the internal standard(s) outside of the acceptance criteria.

Internal standard recoveries were within the acceptance criteria.

1.8 Field Precision

Precision is the measure of variability of individual sample measurements. Evaluation of field duplicates for precision was done using the Relative Percent Difference (RPD). The RPD is defined as the difference between two duplicate samples divided by the mean and expressed as a percent. Field duplicate RPD limits were set at <30% for groundwater matrices.

The RPD between sample and duplicate was outside control limits for GPW3_071624. Both results were considered estimated and flagged “J”.

2 DATA USABILITY SUMMARY

The data are usable for the intended purposes of the project (see Table 3). The data quality objectives have been met for the project.

Table 1: Field Sample Identification and Laboratory Identification

Client Sample Identification	Laboratory Package	Perchlorate
HBW1_013024	E2400097	X
HBW1_013024_a		X
HBW7_013024		X
HBW10_013024		X
GPW1_013024		X
GPW3_013024		X
HBW1_041824	E2400393	X
HBW7_041824		X
HBW10_041824		X
GPW1_041824		X
GPW1_041824_a		X
GPW3_041824		X
HBW1_071624	E2400830	X
HBW7_071624		X
HBW10_071624		X
GPW1_071624		X
GPW3_071624		X
GPW3_071624_a		X
HBW1_111924	FC20573	X
HBW1_111924-A		X
HBW7_111924		X
HBW10_111924		X
GPW1_111924		X
GPW3_111924		X

Notes:

SW-846 - Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, X – Sample analyzed for indicated parameter

Table 2: Qualified Analytical Data

Client Sample Identification	Laboratory Package	Analyte Name	Data Validation Qualifier	Reason for Qualification
GPW3_071624	E2400830	Perchlorate	0.0419 J	FD RPD
GPW3_071624_a	E2400830	Perchlorate	0.0259 J	FD RPD

FD RPD – field duplicate relative percent difference outside control limits

Table 3: Completeness by Method

Analysis	No. of Rejected Results	% Completeness
Perchlorate	0	100

Attachment C

Laboratory Data Packages

February 08, 2024 Service Request No:E2400097

Marcia Olive
Bhate Environmental Associates, Inc.
445 Union Blvd
Suite 129
Lakewood, CO 80228

Laboratory Results for: LHAAP

Dear Marcia,

Enclosed are the results of the sample(s) submitted to our laboratory February 01, 2024
For your reference, these analyses have been assigned our service request number **E2400097.**

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current TNI standards, where applicable, and except as noted in the laboratory case narrative provided. All results are intended to be considered in their entirety and ALS Environmental is not responsible for use of less than the complete final report. Results apply only to the items submitted to the laboratory, as received for analysis. In accordance with the current TNI Standard, a statement on the estimated uncertainty of measurement of any quantitative analysis will be supplied upon request.

Please contact me if you have any questions. My extension is 2190. You may also contact me via email at hussam.kelany@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

H Kelany

Hussam Kelany
Project Manager

ADDRESS 10450 Stancliff Rd., Suite 210, Houston, TX 77099
PHONE +1 281 530 5656 | FAX +1 281 530 5887
ALS Group USA, Corp.
dba ALS Environmental

Certificate of Analysis

ALS Environmental - Houston Specialties Laboratory
10450 Stancliff Rd., Suite 210, Houston TX 77099
Phone (281)530-5656 Fax (281)530-5887
www.alsglobal.com

Client:	Bhate Environmental Associates, Inc.	**Service Request No.:**	E2400097
Project:	LHAAP	**Date Received:**	02/01/24
Sample Matrix:	Wastewater		

CASE NARRATIVE

All analyses were performed in adherence to the quality assurance program of ALS Environmental. This report contains analytical results for samples designated for Tier IV. When appropriate to the method, method blank results have been reported with each analytical test.

Sample Receipt

Six samples were received for analysis at ALS Environmental in Houston on 02/01/24.

The samples were received in good condition and are consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4°C upon receipt at the laboratory.

Data Validation Notes and Discussion

Precision and Accuracy:

EQ2400070: Laboratory Control Spike/Duplicate Laboratory Control Spike (LCS/DLCS) samples were analyzed and reported in addition to a MS/MSD for this extraction batch.

The batch precision (MS/DMS) measurements were determined on an unrelated sample in the extraction batch. The MS/DMS results are not included in this report.

The results of analyses are given in the attached laboratory report. All results are intended to be considered in their entirety, and ALS Environmental (ALS) is not responsible for utilization of less than the complete report.

Use of ALS group USA Corp dba ALS Environmental (ALS)'s Name. Client shall not use ALS's name or trademark in any marketing or reporting materials, press releases or in any other manner ("Materials") whatsoever and shall not attribute to ALS any test result, tolerance or specification derived from ALS's data ("Attribution") without ALS's prior written consent, which may be withheld by ALS for any reason in its sole discretion. To request ALS's consent, Client shall provide copies of the proposed Materials or Attribution and describe in writing Client's proposed use of such Materials or Attribution. If ALS has not provided written approval of the Materials or Attribution within ten (10) days of receipt from Client, Client's request to use ALS's name or trademark in any Materials or Attribution shall be deemed denied. ALS may, in its discretion, reasonably charge Client for its time in reviewing Materials or Attribution requests. Client acknowledges and agrees that the unauthorized use of ALS's name or trademark may cause ALS to incur irreparable harm for which the recovery of money damages will be inadequate. Accordingly, Client acknowledges and agrees that a violation shall justify preliminary injunctive relief. For questions contact the laboratory.

Client: Bhate Environmental Associates, Inc. **Service Request:**E2400097
Project: LHAAP/JVPCIBH.0001

SAMPLE CROSS-REFERENCE

SAMPLE #	CLIENT SAMPLE ID	DATE	TIME
E2400097-001	HBW7_013024	1/30/2024	0815
E2400097-002	HBW10_013024	1/30/2024	0830
E2400097-003	HBW1_013024	1/30/2024	0845
E2400097-004	HBW1_013024_a	1/30/2024	0845
E2400097-005	GPW1_013024	1/30/2024	0900
E2400097-006	GPW3_013024	1/30/2024	0913

Service Request Summary

Folder #: **E2400097**
Client Name: Bhate Environmental Associates, Inc.
Project Name: LHAAP
Project Number: JVPCIBH.0001

Report To: Marcia Olive
Bhate Environmental Associates, Inc.
445 Union Blvd
Lakewood, CO 80228
USA
Phone Number: 303-597-2450
Cell Number:
Fax Number:
E-mail: molive@bhate.com

Project Chemist: Hussam Kelany
Originating Lab: HOUSTON
Logged By: JCORONADO2
Date Received: 02/01/24
Internal Due Date: 2/13/2024
QAP: LAB QAP
Qualifier Set: Lab Standard
Formset: Lab Standard
Merged?: Y
Report to MDL?: Y
P.O. Number:
EDD: BASIC_WQC_CASNo_LOD

6 120 mL-Plastic Bottle Natural WM Unpreserved
Location: EHRMS-WIC 4B
Pressure Gas:

Lab Samp No.	Client Samp No	Matrix	Collected	HOUSTON ClO4 DOD/6850
E2400097-001	HBW7_013024	Wastewater	01/30/24 0815	**IV**
E2400097-002	HBW10_013024	Wastewater	01/30/24 0830	**IV**
E2400097-003	HBW1_013024	Wastewater	01/30/24 0845	**IV**
E2400097-004	HBW1_013024_a	Wastewater	01/30/24 0845	**IV**
E2400097-005	GPW1_013024	Wastewater	01/30/24 0900	**IV**
E2400097-006	GPW3_013024	Wastewater	01/30/24 0913	**IV**

Service Request Summary

Folder #: **E2400097**
Client Name: Bhate Environmental Associates, Inc.
Project Name: LHAAP
Project Number: JVPCIBH.0001

Report To: Marcia Olive
Bhate Environmental Associates, Inc.
445 Union Blvd
Lakewood, CO 80228
USA
Phone Number: 303-597-2450
Cell Number:
Fax Number:
E-mail: molive@bhate.com

Project Chemist: Hussam Kelany
Originating Lab: HOUSTON
Logged By: JCORONADO2
Date Received: 02/01/24
Internal Due Date: 2/13/2024
QAP: LAB QAP
Qualifier Set: Lab Standard
Formset: Lab Standard
Merged?: Y
Report to MDL?: Y
P.O. Number:
EDD: BASIC_WQC_CASNo_LOD

6 120 mL-Plastic Bottle Natural WM Unpreserved
Location: EHRMS-WIC 4B
Pressure Gas:

Data Qualifiers

Lab Standard

+	Possible Tedlar bag artifact.
A	TIC is a suspected aldol-condensation product
B	Analyte found in the associated method blank as well as in the sample.
BC	Reported results are not blank corrected.
BH	The back section of the tube yielded higher results than the front.
BT	Results indicated possible breakthrough; back section >=10% front section.
C	Result identification confirmed.
D	Compound identified in an analysis at a secondary dilution factor
D	Spike was diluted out
DE	Reported results are corrected for desorption efficiency.
E	Estimated value. Concentration above calibration range
E	The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
F	The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
H	The chromatographic fingerprint of the sample resembles a petroleum product but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
H1	Sample analysis performed past holding time. See case narrative.
H2	Initial analysis within holding time. Reanalysis for the required dilution was past holding time.
H3	Sample was received and analyzed past holding time.
H4	Sample was extracted past required extraction holding time, but analyzed within analysis holding time. See case narrative.
I	(Auto) The reference ion ratio was outside acceptance criteria, which may indicate a potential bias to this result.
I	Internal standard not within the specified limits. See case narrative.
I	The reference ion ratio was outside acceptance criteria, which may indicate a potential bias to this result.
J	Estimated Value. Concentration found below MRL.
K	A deflection in the QC ion may indicate interference with the quantitation of this ion. The concentration of this analyte should be considered as an estimate.
K	Analyte was detected above the method reporting limit prior to normalization.
K	The reference ion ratio was outside acceptance criteria, which may indicate a potential bias to this result.
L	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
L1	Laboratory control sample recovery outside the specified limits; results may be biased high.
L2	Laboratory control sample recovery outside the specified limits; results may be biased low.
L3	Laboratory control sample recovery outside the specified limits.
M	Matrix interference; results may be biased high.
M	The duplicate injection precision not met.

Data Qualifiers

Lab Standard

M1	Matrix interference due to coelution with a non-target compound; results may be biased high.
N	Presumptive evidence of a compound for TICs that have been identified based on a mass spectral library search.
N	The Matrix Spike sample recovery is not within control limits. See case narrative.
O	The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
P	Indicates chlorodiphenyl ether interference present at the retention time of the target compound.
P	Pesticide/Aroclor target analyte > 40% difference for detected concentrations between GC columns
Q	Indicates as estimated value because the P and P + 2 theoretical abundance ratio does not meet method criteria.
R	Duplicate Precision not met.
R1	Duplicate precision not within the specified limits; however, the results are below the MRL and considered estimated.
S	Surrogate recovery not within specified limits.
S	The reported value was determined by the Method of Standard Additions (MSA).
T	Analyte is a tentatively identified compound, result is estimated.
U	Compound was analyzed for, but was not detected (ND).
V1	The continuing calibration verification standard was outside (biased high) the specified limits for this compound.
V2	The continuing calibration verification standard was outside (biased low) the specified limits for this compound.
W	Result quantified, but the corresponding peak was detected outside the generated retention time window.
W	The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
X	See case narrative.
Y	Recovery outside limits
Y	The chromatogram resembles a petroleum product but does not match the calibration standard.
Z	The chromatogram does not resemble a petroleum product.
i	The MRL/MDL has been elevated due to a matrix interference.

ALS Laboratory Group

Acronyms

Cal	Calibration
Conc	CONCentration
Dioxin(s)	Polychlorinated dibenzo-p-dioxin(s)
EDL	Estimated Detection Limit
EMPC	Estimated Maximum Possible Concentration
Flags	Data qualifiers
Furan(s)	Polychlorinated dibenzofuran(s)
g	Grams
ICAL	Initial CALibration
ID	IDentifier
Ions	Masses monitored for the analyte during data acquisition
L	Liter (s)
LCS	Laboratory Control Sample
DLCS	Duplicate Laboratory Control Sample
MB	Method Blank
MCL	Method Calibration Limit
MDL	Method Detection Limit
mL	Milliliters
MS	Matrix Spiked sample
DMS	Duplicate Matrix Spiked sample
NO	Number of peaks meeting all identification criteria
PCDD(s)	Polychlorinated dibenzo-p-dioxin(s)
PCDF(s)	Polychlorinated dibenzofuran(s)
ppb	Parts per billion
ppm	Parts per million
ppq	Parts per quadrillion
ppt	Parts per trillion
QA	Quality Assurance
QC	Quality Control
Ratio	Ratio of areas from monitored ions for an analyte
% Rec.	Percent recovery
RPD	Relative Percent Difference
RRF	Relative Response Factor
RT	Retention Time
SDG	Sample Delivery Group
S/N	Signal-to-noise ratio
TEF	Toxicity Equivalence Factor
TEQ	Toxicity Equivalence Quotient

10450 Stancliff Rd, Houston, TX 77099 | 281-530-5656 | www.alsglobal.com

State Certifications, Accreditations, and Licenses

Agency	Number	Expire Date
Arizona Department of Health Services	AZ0793_2024	5/27/2024
Arkansas Department of Environmental Quality	88-00356	3/27/2024
California State Environmental Laboratory Accreditation Program	2919	4/30/2024
Department of Defense	L22-90	3/31/2024
Department of Defense	L23-358	5/31/2025
Florida Department of Health	E87611-38	6/30/2024
Illinois Environmental Protection Agency	2000322023-11	6/30/2024
Kansas Department of Health and Environment	E-10352 2023-2024	7/31/2024
Louisiana Department of Environmental Quality	03087-2023	6/30/2024
Louisiana Department of Health and Hospitals	LA028-2024	12/31/2024
Maine Department of Health and Human Services	2022017	6/5/2024
Maryland Department of the Environment	343-2023	6/30/2024
Michigan Depratment of Environmental Quality	9971-2023	4/30/2024
Minnesota Department of Health	2645386	12/31/2024
Nebraska Department of Health and Human Services	NE-OS-25-13	4/30/2024
Nevada Division of Environmental Protection	TX026932024-1	7/31/2024
New Hampshire Environmental Laboratory Accreditation Program	209423	4/24/2024
New Jersey Department of Environmental Protection	TX008-2024	6/30/2024
New York Department of Health	11707	3/31/2024
Oklahoma Department of Environmental Quality	2023-140	8/31/2024
Oregon Environmental Laboratory Accreditation Program	TX200002-011	5/15/2024
Pennsylvania Department of Environmental Protection	68-03441-017	6/30/2024
Perry Johnson Laboratory Accreditation	L22-91	3/31/2024
Tennessee Department of Environment and Concervation	TN04016-2023	4/30/2024
Texas Commision on Environmental Quality	T104704231-23-30	4/30/2024
Utah Department of Health Environmental Laboratory Certification	TX026932023-14	7/31/2024
Washington Department of Ecology	C819-23	11/14/2024

Chain of Custody

ALS Environmental - Houston Specialties Laboratory
10450 Stancliff Rd., Suite 210, Houston TX 77099
Phone (281)530-5656 Fax (281)530-5887
www.alsglobal.com

bhate ENVIRONMENTAL CONSTRUCTION ENERGY

1608 13th Avenue South, Suite 300
Birmingham Alabama 35205
Tel: 205-918-4000
Fax: 205-918-4050

Chain of Custody and Analytical Request

Page: _____ of _____

Project/Phase No: JVPCIBH.0001

COC Number(1): _____

LIMS Number: _____

Facility/Base I.D.: LHAAP / **BILL to PCI**

Project/Site Name: LHAAP / Quarterly Surface Water Samples

Client Name:

Collected by: Scott Beesinger

Field Sample ID (30 Characters Max)	ERPIMS LOCID (15 Characters Max)	Date Collected (dd-mmm-yyyy)	Time Collected (Military) (hhmm)	Sample Depth (beginning - ending)	SA Code (2)	Sample Number (3)	Sample Matrix (4)	Sample Analysis Requested (5): Number of containers	PERCHLORATE										Quality Assurance Samples (6): Ambient Blank Lot Control Number	Equipment Blank Lot Control Number	Trip Blank Lot Control Number	Cooler ID
HBW7_013024		30 Jan 2024	08:15	-	N		WS	1	X													
HBW10_013024		30 Jan 2024	08:30	-	N		WS	1	X													
HBW1_013024		30 Jan 2024	08:45	-	N		WS	1	X													
HBW1_013024_a		30 Jan 2024	08:45		FD		WS	1	X													
GPW1_013024		30 Jan 2024	09:00		N		WS	1	X													
GPW3_013024		30 Jan 2024	09:13	-	N		WS	1	X													
				-																		
				-																		
				-																		
				-																		
				-																		

E2400097 5
Bhate Environmental Associates, Inc.
JVPCIBH.0001

COMMENTS:

Standard TAT

Cooler on Blue Temp 4°C Dram 3/ 1.4 CF -0.1

Custody Transfers Prior to Receipt by Laboratory

Relinquished By (Signed)	Date	Time	Received by (signed)	Date	Time
1. Scott Beesinger	1/31/24	1430	1.		
2.			2.		
3.			3. sm	02/01/24	09:10

Sample Delivery Details / Laboratory Receipt

Delivered Directly to Lab: _____ Shipped No.:

_____ Method of Shipment: _____

_____ Fed Ex _____ Airbill Number:

_____ Analytical Lab: ALS 10450 Stancliff Rd. Suite 210 Houston, TX 77099 (281) 530-5656

ATTN: SONIA WEST Lab Recipient: Delivery Date/Time:

1.) Chain of Custody Number = date collected + custody number (e.g. 09-02-1999-01)

2.) Sample Type (SA) Codes: N = Normal Sample, TB = Trip Blank (-c) Sample, FD = Field Duplicate (-a) Samples, FR = Field Replicate (-b) Samples, EB = Equipment Blank (-d) Samples, MS = Matrix Spike, SD = Matrix Spike Duplicate, AB = Ambient Blank (-e)

3.) Sample Number: Unique sample number collected from a particular location per day. (e.g. Groundwater sample collected from MW-1 on 10/10/99 = 01, if sampled again on 10/10/99 = 02, etc.)

4.) Matrix Codes: GS = Soil Gas, WG = Groundwater, WS = Surface Water, SO = Soil, SE = Sediment, SL = Sludge, SS = Surface Soil Samples, WQ = Aqueous Blank Samples (trip, equipment, ambient, etc), SQ = Soil Blanks

5.) Sample Analysis Requested: Analytical method requested and number of containers provided for each.

6.) Quality assurance samples are assigned by date (ddmmyy) and the sample number associated with the sample (01, 02, etc) (e.g. Equipment blank collected in association with MW-1 on 10/10/99 will be designated 10109901 in the Equipment Blank Lot Control

E2400097 5
Bhate Environmental Associates, Inc.
JVPCIBH.0001

10450 Stancliff Road, Suite 210
Houston, TX 77099
T: +1 281 530 5656
F: +1 281 530 5887
www.alsglobal.com

Client: bhate Date: 02/01/24 WO#:

Time Received: 910 Received by: SM BO#:

Matrices: Solid/Sludge (Water) Oil Wipes Hydrocarbon Liquid Other

Kit ID/Cooler ID	Trip Blank ID	Cooler Temp (C) Observed/Corrected	IR #	Temp BLK Present?
Blue	—	1.4 / 1.3	31	Y (N)
		/		Y N
		/		Y N
		/		Y N
		/		Y N

Delivery Method: (FedEx) UPS Greyhound ALS Client Other

Date/Time of Unpacking: 02/01/24 Unpacked by: JC

Shipping container/cooler in good condition?	(Yes)	No	Not Present
Custody seals intact on shipping container/cooler?	(Yes)	No	Not Present
Custody seals intact on sample bottles?	Yes	No	(Not Present)
Chain of Custody present?	(Yes)	No	
Chain of Custody signed when relinquished and received?	(Yes)	No	
Chain of Custody - Sampler's name present?	(Yes)	No	
Chain of Custody agrees with sample labels?	(Yes)	No	
Samples in proper container/bottle?	(Yes)	No	
VOA/TX1005/1006 Solids in hermetically Sealed Vials:	Yes	No	(No VOA/TX1005/1006 Solid
Sample containers intact?	(Yes)	No	
Sufficient sample volume for indicated test?	(Yes)	No	
All samples received within holding time?	(Yes)	No	
Container/Temp Blank temperature in compliance?	(Yes)	No	
Water - VOA vials have zero headspace?	Yes	No	N/A (No VOA submitted)
Non-VOA waters preserved with HCl, H2SO4, HNO3 are pH <2?			Yes No (N/A)
Waters preserved with NaOH/Ascorbic acid are pH>12?	Yes	No	(N/A)
pH adjusted?	Yes*	No	(N/A) *See Preservation Logbook

pH adjusted by: _____ **pH Paper Lot:** _____

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Houston, TX 77099
T: +1 281 530 5656
F: +1 281 530 5887
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SAMPLE ACCEPTANCE POLICY

This policy outlines the criteria samples must meet to be accepted by ALS Environmental – Houston HRMS.

Cooler Custody Seals (desirable, mandatory if specified in SAP):

- ✓ Intact on outside of cooler, signed and dated

Chain-of-Custody (COC) documentation (mandatory):

The following is required on each COC:

- ✓ Sample ID, the location, date and time of collection, collector's name, preservation type, sample type, and any other special remarks concerning the sampleThe COC must be completed in ink.
- ✓ Signature and date of relinquishing party.

In the absence of a COC at sample receipt, the COC will be requested from the client.

Sample Integrity (mandatory):

Samples are inspected upon arrival to ensure that sample integrity was not compromised during transfer to the laboratory.

- ✓ Sample containers must arrive in good condition (not broken or leaking).
- ✓ Samples must be labeled appropriately, including Sample IDs, and requested test using durable labels and indelible ink.
- ✓ The correct type of sample bottle must be used for the method requested.
- ✓ An appropriate sample volume, or weight, must be received.
- ✓ Sample IDs and number of containers must reconcile with the COC.
- ✓ Samples must be received within the method defined holding time.

Temperature Requirement (varies by sample matrix):

- ✓ Aqueous and Non-aqueous samples must be shipped and stored cold, at 0 to 6ºC.
- ✓ Tissue samples must be shipped and stored frozen, at -20 to -10ºC.
- ✓ Air samples are shipped and stored cold, at 0 to 6ºC
- ✓ The sample temperature must be recorded on the COC

All cooler inspections are documented on the Cooler Receipt Form (CRF). A separate CRF is completed for each service request. Any samples not meeting the above criteria are noted on the CRF and the Project Manager notified. The Project Manager must resolve any sample integrity issues with the client prior to proceeding with the analysis. Such resolutions are documented in writing and filed with the project folder. Data associated with samples received outside of this acceptance policy will be qualified on the case narrative of the final report

Preparation Information Benchsheets

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Phone (281)530-5656 Fax (281)530-5887
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Preparation Information Benchsheet

Prep Run#: 433599 **Prep WorkFlow:** GenExt28Day **Status:** Prepped
Team: Semivoa GCMS/JOSEL.JUAREZ **Prep Method:** Method **Prep Date/Time:** 2/6/24 10:00

#	Lab Code	Client ID	B#	Method /Test	pH	Cl	Matrix	Amt. Ext.	Sample Description
1	E2400084-001	PLS-0124	.01	6850/ClO4 DOD			Water	10mL	
2	E2400097-001	HBW7_013024	.01	6850/ClO4 DOD			Wastewater	10mL	
3	E2400097-002	HBW10_013024	.01	6850/ClO4 DOD			Wastewater	10mL	
4	E2400097-003	HBW1_013024	.01	6850/ClO4 DOD			Wastewater	10mL	
5	E2400097-004	HBW1_013024_a	.01	6850/ClO4 DOD			Wastewater	10mL	
6	E2400097-005	GPW1_013024	.01	6850/ClO4 DOD			Wastewater	10mL	
7	E2400097-006	GPW3_013024	.01	6850/ClO4 DOD			Wastewater	10mL	
8	E2400098-001	AAR3361R	.02	6850/ClO4 DOD			Water	10mL	
9	E2400099-001	AAR3367	.01	6850/ClO4 DOD			Ground Water	10mL	
10	E2400099-002	AAR3374	.01	6850/ClO4 DOD			Ground Water	10mL	
11	E2400099-003	AAR3375	.01	6850/ClO4 DOD			Ground Water	10mL	
12	E2400099-004	AAR3382	.01	6850/ClO4 DOD			Ground Water	10mL	
13	E2400099-005	AAR3385	.01	6850/ClO4 DOD			Ground Water	10mL	
14	E2400099-006	AAR9166	.01	6850/ClO4 DOD			Water	10mL	
15	EQ2400070-01	MB		6850/ClO4 DOD			Liquid	10mL	
16	EQ2400070-02	LCS		6850/ClO4 DOD			Liquid	10mL	
17	EQ2400070-03	DLCS		6850/ClO4 DOD			Liquid	10mL	
18	EQ2400070-04	ICS		6850/ClO4 DOD			Liquid	10mL	
19	EQ2400070-05	AAR3361R MS	.02	6850/ClO4 DOD			Liquid	10mL	
20	EQ2400070-06	AAR3361R DMS	.02	6850/ClO4 DOD			Liquid	10mL	

Preparation Materials

6850 Amber Glass screw vial 2mL Screw Top Vial (221894) 6850 0.45um syringe filters 6850 0.45 SYRING FILTER (229979) 6850 Luer-Lok Syringes Luer Lok Syringes (231696)

Preparation Steps

Step: Preparation
Started: 2/6/24 10:00
Finished: 2/6/24 11:30
By: JOSEL.JUAREZ
Comments

Comments: _____

_____

Reviewed By: _____ Date: _____

Preparation Information Benchsheet

Prep Run#: 433599
Team: Semivoa GCMS/JOSEL.JUAREZ

Prep WorkFlow: GenExt28Day
Prep Method: Method

Status: Prepped
Prep Date/Time: 2/6/24 10:00

Chain of Custody

Relinquished By:		Date:		Extracts Examined
Received By:		Date:		Yes No

Analytical Results

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ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client:	Bhate Environmental Associates, Inc.	**Service Request:**	E2400097
Project:	LHAAP/JVPCIBH.0001	**Date Collected:**	1/30/24 0815
Sample Matrix:	Wastewater	**Date Received:**	2/ 1/24
Sample Name:	HBW7_013024	**Units:**	µg/L
Lab Code:	E2400097-001	**Basis:**	NA

Perchlorates in Water, Soils, Solid Wastes Using High Performance LC/Electrospray/Mass Spectrometry

Analytical Method: 6850
Prep Method: Method

Analyte Name	Result	Q	LOQ	LOD	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Analysis Lot	Note
Perchlorate	**0.0772**	J	0.100	0.0500	0.0250	1	2/ 6/24	2/8/24 11:22	433599	831860	

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client:	Bhate Environmental Associates, Inc.	**Service Request:**	E2400097
Project:	LHAAP/JVPCIBH.0001	**Date Collected:**	1/30/24 0830
Sample Matrix:	Wastewater	**Date Received:**	2/ 1/24
Sample Name:	HBW10_013024	**Units:**	µg/L
Lab Code:	E2400097-002	**Basis:**	NA

Perchlorates in Water, Soils, Solid Wastes Using High Performance LC/Electrospray/Mass Spectrometry

Analytical Method: 6850
Prep Method: Method

Analyte Name	Result	Q	LOQ	LOD	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Analysis Lot	Note
Perchlorate	**0.0565**	J	0.100	0.0500	0.0250	1	2/ 6/24	2/8/24 11:27	433599	831860	

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client:	Bhate Environmental Associates, Inc.	**Service Request:**	E2400097
Project:	LHAAP/JVPCIBH.0001	**Date Collected:**	1/30/24 0845
Sample Matrix:	Wastewater	**Date Received:**	2/ 1/24
Sample Name:	HBW1_013024	**Units:**	µg/L
Lab Code:	E2400097-003	**Basis:**	NA

Perchlorates in Water, Soils, Solid Wastes Using High Performance LC/Electrospray/Mass Spectrometry

Analytical Method: 6850
Prep Method: Method

Analyte Name	Result	Q	LOQ	LOD	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Analysis Lot	Note
Perchlorate	**0.0609**	J	0.100	0.0500	0.0250	1	2/ 6/24	2/8/24 11:33	433599	831860	

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client:	Bhate Environmental Associates, Inc.	**Service Request:**	E2400097
Project:	LHAAP/JVPCIBH.0001	**Date Collected:**	1/30/24 0845
Sample Matrix:	Wastewater	**Date Received:**	2/ 1/24
Sample Name:	HBW1_013024_a	**Units:**	µg/L
Lab Code:	E2400097-004	**Basis:**	NA

Perchlorates in Water, Soils, Solid Wastes Using High Performance LC/Electrospray/Mass Spectrometry

Analytical Method: 6850
Prep Method: Method

Analyte Name	Result	Q	LOQ	LOD	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Analysis Lot	Note
Perchlorate	**0.0693**	J	0.100	0.0500	0.0250	1	2/ 6/24	2/8/24 11:49	433599	831860	

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client:	Bhate Environmental Associates, Inc.	**Service Request:**	E2400097
Project:	LHAAP/JVPCIBH.0001	**Date Collected:**	1/30/24 0900
Sample Matrix:	Wastewater	**Date Received:**	2/ 1/24
Sample Name:	GPW1_013024	**Units:**	µg/L
Lab Code:	E2400097-005	**Basis:**	NA

Perchlorates in Water, Soils, Solid Wastes Using High Performance LC/Electrospray/Mass Spectrometry

Analytical Method: 6850
Prep Method: Method

Analyte Name	Result	Q	LOQ	LOD	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Analysis Lot	Note
Perchlorate	**0.0671**	J	0.100	0.0500	0.0250	1	2/ 6/24	2/8/24 11:55	433599	831860	

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client:	Bhate Environmental Associates, Inc.	**Service Request:**	E2400097
Project:	LHAAP/JVPCIBH.0001	**Date Collected:**	1/30/24 0913
Sample Matrix:	Wastewater	**Date Received:**	2/ 1/24
Sample Name:	GPW3_013024	**Units:**	µg/L
Lab Code:	E2400097-006	**Basis:**	NA

Perchlorates in Water, Soils, Solid Wastes Using High Performance LC/Electrospray/Mass Spectrometry

Analytical Method: 6850
Prep Method: Method

Analyte Name	Result	Q	LOQ	LOD	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Analysis Lot	Note
Perchlorate	**0.0490**	J	0.100	0.0500	0.0250	1	2/ 6/24	2/8/24 12:01	433599	831860	

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client:	Bhate Environmental Associates, Inc.	**Service Request:**	E2400097
Project:	LHAAP/JVPCIBH.0001	**Date Collected:**	NA
Sample Matrix:	Wastewater	**Date Received:**	NA
Sample Name:	Method Blank	**Units:**	µg/L
Lab Code:	EQ2400070-01	**Basis:**	NA

Perchlorates in Water, Soils, Solid Wastes Using High Performance LC/Electrospray/Mass Spectrometry

Analytical Method: 6850
Prep Method: Method

Analyte Name	Result	Q	LOQ	LOD	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Analysis Lot	Note
Perchlorate	ND	U	0.100	0.0500	0.0250	1	2/ 6/24	2/8/24 09:56	433599	831860	

Accuracy & Precision

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ALS Group USA, Corp. dba ALS Environmental

QA/QC Report

Client:	Bhate Environmental Associates, Inc.	**Service Request:**	E2400097
Project:	LHAAP/JVPCIBH.0001	**Date Analyzed:**	2/ 8/24
Sample Matrix:	Wastewater		

Lab Control Sample Summary

Perchlorates in Water, Soils, Solid Wastes Using High Performance LC/Electrospray/Mass Spectrometry

Analytical Method:	6850	**Units:**	µg/L
Prep Method:	Method	**Basis:**	NA
		Extraction Lot:	433599

	Lab Control Sample EQ2400070-02			Duplicate Lab Control Sample EQ2400070-03					
Analyte Name	**Result**	**Spike Amount**	**% Rec**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**	**RPD**	**RPD Limit**
Perchlorate	0.0907	0.100	91	0.0846	0.100	85	84 - 119	7	15

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

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Analytical Report

Client:	Bhate Environmental Associates, Inc.	**Service Request:**	E2400097
Project:	LHAAP/JVPCIBH.0001	**Date Collected:**	NA
Sample Matrix:	Wastewater	**Date Received:**	NA
Sample Name:	Lab Control Sample	**Units:**	µg/L
Lab Code:	EQ2400070-02	**Basis:**	NA

Perchlorates in Water, Soils, Solid Wastes Using High Performance LC/Electrospray/Mass Spectrometry

Analytical Method: 6850
Prep Method: Method

Analyte Name	Result	Q	LOQ	LOD	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Analysis Lot	Note
Perchlorate	**0.0907**	J	0.100	0.0500	0.0250	1	2/ 6/24	2/8/24 10:16	433599	831860	

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client:	Bhate Environmental Associates, Inc.	**Service Request:**	E2400097
Project:	LHAAP/JVPCIBH.0001	**Date Collected:**	NA
Sample Matrix:	Wastewater	**Date Received:**	NA
Sample Name:	Duplicate Lab Control Sample	**Units:**	µg/L
Lab Code:	EQ2400070-03	**Basis:**	NA

Perchlorates in Water, Soils, Solid Wastes Using High Performance LC/Electrospray/Mass Spectrometry

Analytical Method: 6850
Prep Method: Method

Analyte Name	Result	Q	LOQ	LOD	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Analysis Lot	Note
Perchlorate	**0.0846**	J	0.100	0.0500	0.0250	1	2/ 6/24	2/8/24 10:50	433599	831860	

April 30, 2024 Service Request No:E2400393

Marcia Olive
Bhate Environmental Associates, Inc.
445 Union Blvd
Suite 129
Lakewood, CO 80228

Laboratory Results for: LHAAP/ Quaterly Surface Water Samples

Dear Marcia,

Enclosed are the results of the sample(s) submitted to our laboratory April 19, 2024
For your reference, these analyses have been assigned our service request number **E2400393.**

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current TNI standards, where applicable, and except as noted in the laboratory case narrative provided. All results are intended to be considered in their entirety and ALS Environmental is not responsible for use of less than the complete final report. Results apply only to the items submitted to the laboratory, as received for analysis. In accordance with the current TNI Standard, a statement on the estimated uncertainty of measurement of any quantitative analysis will be supplied upon request.

Please contact me if you have any questions. My extension is 2190. You may also contact me via email at hussam.kelany@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental



Hussam Kelany
Project Manager

ADDRESS 10450 Stancliff Rd., Suite 210, Houston, TX 77099
PHONE +1 281 530 5656 | FAX +1 281 530 5887
ALS Group USA, Corp.
dba ALS Environmental

Certificate of Analysis

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10450 Stancliff Rd., Suite 210, Houston TX 77099
Phone (281)530-5656 Fax (281)530-5887
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Client:	Bhate Environmental Associates, Inc.	**Service Request No.:**	E2400393
Project:	LHAAP/ Quarterly Surface Water Samples	**Date Received:**	04/19/24
Sample Matrix:	Water		

CASE NARRATIVE

All analyses were performed in adherence to the quality assurance program of ALS Environmental. This report contains analytical results for samples designated for Tier II. When appropriate to the method, method blank results have been reported with each analytical test.

Sample Receipt

Six samples were received for analysis at ALS Environmental in Houston on 04/19/24.

The samples were received in good condition and are consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4°C upon receipt at the laboratory.

Data Validation Notes and Discussion

Precision and Accuracy:

EQ2400193: Laboratory Control Spike/Duplicate Laboratory Control Spike (LCS/DLCS) samples were analyzed and reported in lieu of/addition to a MS/MSD for this extraction batch.

The results of analyses are given in the attached laboratory report. All results are intended to be considered in their entirety, and ALS Environmental (ALS) is not responsible for utilization of less than the complete report.

Use of ALS group USA Corp dba ALS Environmental (ALS)'s Name. Client shall not use ALS's name or trademark in any marketing or reporting materials, press releases or in any other manner ("Materials") whatsoever and shall not attribute to ALS any test result, tolerance or specification derived from ALS's data ("Attribution") without ALS's prior written consent, which may be withheld by ALS for any reason in its sole discretion. To request ALS's consent, Client shall provide copies of the proposed Materials or Attribution and describe in writing Client's proposed use of such Materials or Attribution. If ALS has not provided written approval of the Materials or Attribution within ten (10) days of receipt from Client, Client's request to use ALS's name or trademark in any Materials or Attribution shall be deemed denied. ALS may, in its discretion, reasonably charge Client for its time in reviewing Materials or Attribution requests. Client acknowledges and agrees that the unauthorized use of ALS's name or trademark may cause ALS to incur irreparable harm for which the recovery of money damages will be inadequate. Accordingly, Client acknowledges and agrees that a violation shall justify preliminary injunctive relief. For questions contact the laboratory.

Client: Bhate Environmental Associates, Inc. **Service Request:**E2400393

Project: LHAAP/ Quaterly Surface Water Samples/JVPCIBH.0001

SAMPLE CROSS-REFERENCE

SAMPLE #	CLIENT SAMPLE ID	DATE	TIME
E2400393-001	HBW7_041824	4/18/2024	0740
E2400393-002	HBW10_041824	4/18/2024	0755
E2400393-003	HBW1_041824	4/18/2024	0807
E2400393-004	GPW1_041824	4/18/2024	0823
E2400393-005	GPW1_041824_a	4/18/2024	0823
E2400393-006	GPW3_041824	4/18/2024	0834

Service Request Summary

Folder #: **E2400393**
Client Name: Bhate Environmental Associates, Inc.
Project Name: LHAAP/ Quaterly Surface Water Samples
Project Number: JVPCIBH.0001

Report To: Marcia Olive
Bhate Environmental Associates, Inc.
445 Union Blvd
Lakewood, CO 80228
USA
Phone Number: 303-597-2450
Cell Number:
Fax Number:
E-mail: molive@bhate.com

Project Chemist: Hussam Kelany
Originating Lab: HOUSTON
Logged By: JCORONADO2
Date Received: 04/19/24
Internal Due Date: 5/1/2024
QAP: LAB QAP
Qualifier Set: Lab Standard
Formset: Lab Standard
Merged?: Y
Report to MDL?: Y
P.O. Number:
EDD: BASIC_WQC_CASNo_LOD

6 120 mL-Plastic Bottle Natural WM Unpreserved
Location: EHRMS-WIC 6A
Pressure Gas:

Lab Samp No.	Client Samp No	Matrix	Collected	Semivoa GCMS: ClO4 DOD/6850
E2400393-001	HBW7_041824	Water	04/18/24 0740	**IV**
E2400393-002	HBW10_041824	Water	04/18/24 0755	**IV**
E2400393-003	HBW1_041824	Water	04/18/24 0807	**IV**
E2400393-004	GPW1_041824	Water	04/18/24 0823	**IV**
E2400393-005	GPW1_041824_a	Water	04/18/24 0823	**IV**
E2400393-006	GPW3_041824	Water	04/18/24 0834	**IV**

Service Request Summary

Folder #: **E2400393**
Client Name: Bhate Environmental Associates, Inc.
Project Name: LHAAP/ Quaterly Surface Water Samples
Project Number: JVPCIBH.0001

Report To: Marcia Olive
Bhate Environmental Associates, Inc.
445 Union Blvd
Lakewood, CO 80228
USA
Phone Number: 303-597-2450
Cell Number:
Fax Number:
E-mail: molive@bhate.com

Project Chemist: Hussam Kelany
Originating Lab: HOUSTON
Logged By: JCORONADO2
Date Received: 04/19/24
Internal Due Date: 5/1/2024
QAP: LAB QAP
Qualifier Set: Lab Standard
Formset: Lab Standard
Merged?: Y
Report to MDL?: Y
P.O. Number:
EDD: BASIC_WQC_CASNo_LOD

6 120 mL-Plastic Bottle Natural WM Unpreserved
Location: EHRMS-WIC 6A
Pressure Gas:

Data Qualifiers

Lab Standard

+	Possible Tedlar bag artifact.
A	TIC is a suspected aldol-condensation product
B	Analyte found in the associated method blank as well as in the sample.
BC	Reported results are not blank corrected.
BH	The back section of the tube yielded higher results than the front.
BT	Results indicated possible breakthrough; back section >=10% front section.
C	Result identification confirmed.
D	Compound identified in an analysis at a secondary dilution factor
D	Spike was diluted out
DE	Reported results are corrected for desorption efficiency.
E	Estimated value. Concentration above calibration range
E	The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
F	The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
H	The chromatographic fingerprint of the sample resembles a petroleum product but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
H1	Sample analysis performed past holding time. See case narrative.
H2	Initial analysis within holding time. Reanalysis for the required dilution was past holding time.
H3	Sample was received and analyzed past holding time.
H4	Sample was extracted past required extraction holding time, but analyzed within analysis holding time. See case narrative.
I	(Auto) The reference ion ratio was outside acceptance criteria, which may indicate a potential bias to this result.
I	Internal standard not within the specified limits. See case narrative.
I	The reference ion ratio was outside acceptance criteria, which may indicate a potential bias to this result.
J	Estimated Value. Concentration found below MRL.
K	A deflection in the QC ion may indicate interference with the quantitation of this ion. The concentration of this analyte should be considered as an estimate.
K	Analyte was detected above the method reporting limit prior to normalization.
K	The reference ion ratio was outside acceptance criteria, which may indicate a potential bias to this result.
L	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
L1	Laboratory control sample recovery outside the specified limits; results may be biased high.
L2	Laboratory control sample recovery outside the specified limits; results may be biased low.
L3	Laboratory control sample recovery outside the specified limits.
M	Matrix interference; results may be biased high.
M	The duplicate injection precision not met.

Data Qualifiers

Lab Standard

M1	Matrix interference due to coelution with a non-target compound; results may be biased high.
N	Presumptive evidence of a compound for TICs that have been identified based on a mass spectral library search.
N	The Matrix Spike sample recovery is not within control limits. See case narrative.
O	The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
P	Indicates chlorodiphenyl ether interference present at the retention time of the target compound.
P	Pesticide/Aroclor target analyte > 40% difference for detected concentrations between GC columns
Q	Indicates as estimated value because the P and P + 2 theoretical abundance ratio does not meet method criteria.
R	Duplicate Precision not met.
R1	Duplicate precision not within the specified limits; however, the results are below the MRL and considered estimated.
S	Surrogate recovery not within specified limits.
S	The reported value was determined by the Method of Standard Additions (MSA).
T	Analyte is a tentatively identified compound, result is estimated.
U	Compound was analyzed for, but was not detected (ND).
V1	The continuing calibration verification standard was outside (biased high) the specified limits for this compound.
V2	The continuing calibration verification standard was outside (biased low) the specified limits for this compound.
W	Result quantified, but the corresponding peak was detected outside the generated retention time window.
W	The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
X	See case narrative.
Y	Recovery outside limits
Y	The chromatogram resembles a petroleum product but does not match the calibration standard.
Z	The chromatogram does not resemble a petroleum product.
i	The MRL/MDL has been elevated due to a matrix interference.

ALS Laboratory Group

Acronyms

Cal	Calibration
Conc	CONCentration
Dioxin(s)	Polychlorinated dibenzo-p-dioxin(s)
EDL	Estimated Detection Limit
EMPC	Estimated Maximum Possible Concentration
Flags	Data qualifiers
Furan(s)	Polychlorinated dibenzofuran(s)
g	Grams
ICAL	Initial CALibration
ID	IDentifier
Ions	Masses monitored for the analyte during data acquisition
L	Liter (s)
LCS	Laboratory Control Sample
DLCS	Duplicate Laboratory Control Sample
MB	Method Blank
MCL	Method Calibration Limit
MDL	Method Detection Limit
mL	Milliliters
MS	Matrix Spiked sample
DMS	Duplicate Matrix Spiked sample
NO	Number of peaks meeting all identification criteria
PCDD(s)	Polychlorinated dibenzo-p-dioxin(s)
PCDF(s)	Polychlorinated dibenzofuran(s)
ppb	Parts per billion
ppm	Parts per million
ppq	Parts per quadrillion
ppt	Parts per trillion
QA	Quality Assurance
QC	Quality Control
Ratio	Ratio of areas from monitored ions for an analyte
% Rec.	Percent recovery
RPD	Relative Percent Difference
RRF	Relative Response Factor
RT	Retention Time
SDG	Sample Delivery Group
S/N	Signal-to-noise ratio
TEF	Toxicity Equivalence Factor
TEQ	Toxicity Equivalence Quotient

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ALS Environmental

State Certifications, Accreditations, and Licenses

Agency	Number	Expire Date
Arizona Department of Health Services	AZ0793_2024	5/27/2024
Department of Defense	L24-240	4/30/2026
Department of Defense	L23-358	5/31/2025
Florida Department of Health	E87611-38	6/30/2024
Illinois Environmental Protection Agency	2000322023-11	6/30/2024
Kansas Department of Health and Environment	E-10352 2023-2024	7/31/2024
Louisiana Department of Environmental Quality	03087-2023	6/30/2024
Louisiana Department of Health and Hospitals	LA028-2024	12/31/2024
Maine Department of Health and Human Services	2022017	6/5/2024
Maryland Department of the Environment	343-2023	6/30/2024
Minnesota Department of Health	2645386	12/31/2024
Nevada Division of Environmental Protection	TX026932024-1	7/31/2024
New Hampshire Environmental Laboratory Accreditation Program	209424-A	4/24/2025
New Jersey Department of Environmental Protection	TX008-2024	6/30/2024
Oklahoma Department of Environmental Quality	2023-140	8/31/2024
Oregon Environmental Laboratory Accreditation Program	TX200002-011	5/15/2024
Pennsylvania Department of Environmental Protection	68-03441-017	6/30/2024
Utah Department of Health Environmental Laboratory Certification	TX026932023-14	7/31/2024
Washington Department of Ecology	C819-23	11/14/2024

Chain of Custody

ALS Environmental - Houston Specialties Laboratory
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bhate ENVIRONMENTAL CONSTRUCTION ENERGY

1608 13th Avenue South, Suite 300
Birmingham Alabama 35205
Tel: 205-918-4000
Fax: 205-918-4050

Chain of Custody and Analytical Request

Page: _____ of _____

Project/Phase No: JVPCIBH.0001

COC Number(1): _____

LIMS Number: _____

Facility/Base I.D.: LHAAP / BILL to PCI

Project/Site Name: LHAAP / Quarterly Surface Water Samples

Client Name:

Collected by: Scott Beesinger

Field Sample ID (30 Characters Max)	ERPIMS LOCID (15 Characters Max)	Date Collected (dd-mmm-yyyy)	Time Collected (Military) (hhmm)	Sample Depth (beginning - ending)	SA Code (2)	Sample Number (3)	Sample Matrix (4)	Number of containers	PERCHLORATE										Ambient Blank Lot Control Number	Equipment Blank Lot Control Number	Trip Blank Lot Control Number	Cooler ID
								Sample Analysis Requested (5)											Quality Assurance Samples (6)			
HBW7_041824		18 Apr 2024	07:40	-	N		WS	1	X													
HBW10_041824		18 Apr 2024	07:55	-	N		WS	1	X													
HBW1_041824		18 Apr 2024	08:07	-	N		WS	1	X													
GPW1_041824		18 Apr 2024	08:23		N		WS	1	X													
GPW1_041824_a		18 Apr 2024	08:23		FD		WS	1	X													
GPW3_041824		18 Apr 2024	08:34	-	N		WS	1	X													
				-																		
				-																		
				-																		
				-																		
				-																		

E2400393 5
Bhate Environmental Associates, Inc.
LHAAP/ Quaterly Surface Water Samples

COMMENTS:

Standard TAT

Custody Transfers Prior to Receipt by Laboratory

Relinquished By (Signed)	Date	Time	Received by (signed)	Date	Time
1. Scott Beesinger	4/18/24	1430	1. A.T	4/19/24	9:35
2.			2.		
3.			3.		

Sample Delivery Details / Laboratory Receipt

Delivered Directly to Lab: _____ Shipped No.:

_____ Method of Shipment: _____

_____ Fed Ex _____ Airbill Number:

_____ Analytical Lab: ALS 10450 Stancliff Rd. Suite 210 Houston, TX 77099 (281) 530-5656

ATTN: SONIA WEST Lab Recipient: Delivery Date/Time:

1.) Chain of Custody Number = date collected + custody number (e.g. 09-02-1999-01)

2.) Sample Type (SA) Codes: N = Normal Sample, TB = Trip Blank (-c) Sample, FD = Field Duplicate (-a) Samples, FR = Field Replicate (-b) Samples, EB = Equipment Blank (-d) Samples, MS = Matrix Spike, SD = Matrix Spike Duplicate, AB = Ambient Blank (-e)

3.) Sample Number: Unique sample number collected from a particular location per day. (e.g. Groundwater sample collected from MW-1 on 10/10/99 = 01, if sampled again on 10/10/99 = 02, etc.)

4.) Matrix Codes: GS = Soil Gas, WG = Groundwater, WS = Surface Water, SO = Soil, SE = Sediment, SL = Sludge, SS = Surface Soil Samples, WQ = Aqueous Blank Samples (trip, equipment, ambient, etc), SQ = Soil Blanks

5.) Sample Analysis Requested: Analytical method requested and number of containers provided for each.

E2400393 5

Bhate Environmental Associates, Inc.
LHAAP/ Quaterly Surface Water Samples

10450 Stancliff Road, Suite 210
Houston, TX 77099
T: +1 281 530 5656
F: +1 281 530 5887
www.alsglobal.com

Client: bhate Date: 4-19-24 WO#:

Time Received: 9:35 Received by: AT BO#:

Matrices: Solid/Sludge (Water) Oil Wipes Hydrocarbon Liquid Other

Kit ID/Cooler ID	Trip Blank ID	Cooler Temp (C) Observed/Corrected	IR #	Temp BLK Present?
50600	—	2.7 / 2.8	31	(Y) N
		/		Y N
		/		Y N
		/		Y N
		/		Y N

Delivery Method: (FedEx) UPS Greyhound ALS Client Other

Date/Time of Unpacking: 4-19-24 10:30 Unpacked by: ML

Shipping container/cooler in good condition?	(Yes)	No	Not Present
Custody seals intact on shipping container/cooler?	(Yes)	No	~~Not Present~~ ML
Custody seals intact on sample bottles?	Yes	No	(~~Not Present~~)
Chain of Custody present?	(~~Yes~~)	No	
Chain of Custody signed when relinquished and received?	(~~Yes~~)	No	
Chain of Custody - Sampler's name present?	(Yes)	No	
Chain of Custody agrees with sample labels?	(Yes)	No	
Samples in proper container/bottle?	(Yes)	No	
VOA/TX1005/1006 Solids in hermetically Sealed Vials:	Yes	No	(No VOA/TX1005/1006 Solid)
Sample containers intact?	(Yes)	No	
Sufficient sample volume for indicated test?	(Yes)	No	
All samples received within holding time?	(~~Yes~~)	No	
Container/Temp Blank temperature in compliance?	(Yes)	No	
Water - VOA vials have zero headspace?	Yes	No	N/A (No VOA submitted)
Non-VOA waters preserved with HCl, H2SO4, HNO3 are pH <2?		Yes	No (N/A)
Waters preserved with NaOH/Ascorbic acid are pH>12?	Yes	No	(N/A)
pH adjusted?	Yes*	No	(N/A) *See Preservation Logbook

pH adjusted by: _____ **pH Paper Lot:** _____

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Houston, TX 77099
T: +1 281 530 5656
F: +1 281 530 5887
www.alsglobal.com

SAMPLE ACCEPTANCE POLICY

This policy outlines the criteria samples must meet to be accepted by ALS Environmental – Houston HRMS.

Cooler Custody Seals (desirable, mandatory if specified in SAP):

- ✓ Intact on outside of cooler, signed and dated

Chain-of-Custody (COC) documentation (mandatory):

The following is required on each COC:

- ✓ Sample ID, the location, date and time of collection, collector's name, preservation type, sample type, and any other special remarks concerning the sampleThe COC must be completed in ink.
- ✓ Signature and date of relinquishing party.

In the absence of a COC at sample receipt, the COC will be requested from the client.

Sample Integrity (mandatory):

Samples are inspected upon arrival to ensure that sample integrity was not compromised during transfer to the laboratory.

- ✓ Sample containers must arrive in good condition (not broken or leaking).
- ✓ Samples must be labeled appropriately, including Sample IDs, and requested test using durable labels and indelible ink.
- ✓ The correct type of sample bottle must be used for the method requested.
- ✓ An appropriate sample volume, or weight, must be received.
- ✓ Sample IDs and number of containers must reconcile with the COC.
- ✓ Samples must be received within the method defined holding time.

Temperature Requirement (varies by sample matrix):

- ✓ Aqueous and Non-aqueous samples must be shipped and stored cold, at 0 to 6ºC.
- ✓ Tissue samples must be shipped and stored frozen, at -20 to -10ºC.
- ✓ Air samples are shipped and stored cold, at 0 to 6ºC
- ✓ The sample temperature must be recorded on the COC

All cooler inspections are documented on the Cooler Receipt Form (CRF). A separate CRF is completed for each service request. Any samples not meeting the above criteria are noted on the CRF and the Project Manager notified. The Project Manager must resolve any sample integrity issues with the client prior to proceeding with the analysis. Such resolutions are documented in writing and filed with the project folder. Data associated with samples received outside of this acceptance policy will be qualified on the case narrative of the final report

Preparation Information Benchsheets

ALS Environmental - Houston Specialties Laboratory
10450 Stancliff Rd., Suite 210, Houston TX 77099
Phone (281)530-5656 Fax (281)530-5887
www.alsglobal.com

Preparation Information Benchsheet

Prep Run#: 437269 **Prep WorkFlow:** GenExt28Day **Status:** Prepped
Team: Semivoa GCMS/NVOSS **Prep Method:** Method **Prep Date/Time:** 4/22/24 08:30

#	Lab Code	Client ID	B#	Method /Test	pH	Cl	Matrix	Amt. Ext.	Sample Description
1	E2400392-001	2404160927X PL-6-725	.01	6850/ClO4 DOD			Water	10mL	
2	E2400392-002	2404161418X PL-6-545	.01	6850/ClO4 DOD			Water	10mL	
3	E2400392-003	2404171026C BLM-14-327	.01	6850/ClO4 DOD			Water	10mL	
4	E2400393-001	HBW7_041824	.01	6850/ClO4 DOD			Water	10mL	
5	E2400393-002	HBW10_041824	.01	6850/ClO4 DOD			Water	10mL	
6	E2400393-003	HBW1_041824	.01	6850/ClO4 DOD			Water	10mL	
7	E2400393-004	GPW1_041824	.01	6850/ClO4 DOD			Water	10mL	
8	E2400393-005	GPW1_041824_a	.01	6850/ClO4 DOD			Water	10mL	
9	E2400393-006	GPW3_041824	.01	6850/ClO4 DOD			Water	10mL	
10	EQ2400193-01	MB		6850/ClO4 DOD			Liquid	10mL	
11	EQ2400193-02	LCS		6850/ClO4 DOD			Liquid	10mL	
12	EQ2400193-03	DLCS		6850/ClO4 DOD			Liquid	10mL	
13	EQ2400193-04	ICS		6850/ClO4 DOD			Liquid	10mL	

Spiking Solutions

Name: Perchlorate Intermediate Stock 2 Inventory ID 233555 Logbook Ref: Perchlorate INT. Stock2 Expires On: 08/05/2024

EQ2400193-02 10.00µL EQ2400193-03 10.00µL EQ2400193-04 10.00µL

Name: Perchlorate Internal Standard 1ug/mL Inventory ID 233561 Logbook Ref: Perchlorate Internal Standard Expires On: 08/05/2024

E2400392-001 100.00µL E2400392-002 100.00µL E2400392-003 100.00µL E2400393-001 100.00µL E2400393-002 100.00µL E2400393-003 100.00µL
E2400393-004 100.00µL E2400393-005 100.00µL E2400393-006 100.00µL EQ2400193-01 100.00µL EQ2400193-02 100.00µL EQ2400193-03 100.00µL
EQ2400193-04 100.00µL

Name: Perchlorate Anion Spiking Soln. 25,000 ppm Inventory ID 233595 Logbook Ref: Expires On: 08/04/2024

EQ2400193-04 20.00µL

Preparation Materials

6850 0.45um syringe filters 6850 0.45 SYRING FILTER (229979) 6850 Luer-Lok Syringes Luer Lok Syringes (231696)

Preparation Steps

Step: Preparation
Started: 4/22/24 08:30
Finished: 4/22/24 09:30
By: JOSEL.JUAREZ
Comments

Preparation Information Benchsheet

Prep Run#: 437269
Team: Semivoa GCMS/NVOSS

Prep WorkFlow: GenExt28Day
Prep Method: Method

Status: Prepped
Prep Date/Time: 4/22/24 08:30

Comments: _____

Reviewed By: _____ Date: _____

Chain of Custody

Relinquished By: _____ Date: _____

Received By: _____ Date: _____

Extracts Examined
Yes No

Analytical Results

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ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client:	Bhate Environmental Associates, Inc.	**Service Request:**	E2400393
Project:	LHAAP/ Quaterly Surface Water Samples/JVPCIBH.0001	**Date Collected:**	4/18/24 0740
Sample Matrix:	Water	**Date Received:**	4/19/24
Sample Name:	HBW7_041824	**Units:**	µg/L
Lab Code:	E2400393-001	**Basis:**	NA

Perchlorates in Water, Soils, Solid Wastes Using High Performance LC/Electrospray/Mass Spectrometry

Analytical Method: 6850
Prep Method: Method

Analyte Name	Result	Q	LOQ	LOD	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Analysis Lot	Note
Perchlorate	ND	U	0.100	0.0500	0.0250	1	4/22/24	4/25/24 14:40	437269	839424	

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client:	Bhate Environmental Associates, Inc.	**Service Request:**	E2400393
Project:	LHAAP/ Quaterly Surface Water Samples/JVPCIBH.0001	**Date Collected:**	4/18/24 0755
Sample Matrix:	Water	**Date Received:**	4/19/24
Sample Name:	HBW10_041824	**Units:**	µg/L
Lab Code:	E2400393-002	**Basis:**	NA

Perchlorates in Water, Soils, Solid Wastes Using High Performance LC/Electrospray/Mass Spectrometry

Analytical Method: 6850
Prep Method: Method

Analyte Name	Result	Q	LOQ	LOD	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Analysis Lot	Note
Perchlorate	ND	U	0.100	0.0500	0.0250	1	4/22/24	4/25/24 14:46	437269	839424	

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client:	Bhate Environmental Associates, Inc.	**Service Request:**	E2400393
Project:	LHAAP/ Quaterly Surface Water Samples/JVPCIBH.0001	**Date Collected:**	4/18/24 0807
Sample Matrix:	Water	**Date Received:**	4/19/24
Sample Name:	HBW1_041824	**Units:**	µg/L
Lab Code:	E2400393-003	**Basis:**	NA

Perchlorates in Water, Soils, Solid Wastes Using High Performance LC/Electrospray/Mass Spectrometry

Analytical Method: 6850
Prep Method: Method

Analyte Name	Result	Q	LOQ	LOD	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Analysis Lot	Note
Perchlorate	**0.0368**	J	0.100	0.0500	0.0250	1	4/22/24	4/25/24 14:51	437269	839424	

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client:	Bhate Environmental Associates, Inc.	**Service Request:**	E2400393
Project:	LHAAP/ Quaterly Surface Water Samples/JVPCIBH.0001	**Date Collected:**	4/18/24 0823
Sample Matrix:	Water	**Date Received:**	4/19/24
Sample Name:	GPW1_041824	**Units:**	µg/L
Lab Code:	E2400393-004	**Basis:**	NA

Perchlorates in Water, Soils, Solid Wastes Using High Performance LC/Electrospray/Mass Spectrometry

Analytical Method: 6850
Prep Method: Method

Analyte Name	Result	Q	LOQ	LOD	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Analysis Lot	Note
Perchlorate	**0.0907**	J	0.100	0.0500	0.0250	1	4/22/24	4/25/24 14:57	437269	839424	

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client:	Bhate Environmental Associates, Inc.	**Service Request:**	E2400393
Project:	LHAAP/ Quaterly Surface Water Samples/JVPCIBH.0001	**Date Collected:**	4/18/24 0823
Sample Matrix:	Water	**Date Received:**	4/19/24
Sample Name:	GPW1_041824_a	**Units:**	µg/L
Lab Code:	E2400393-005	**Basis:**	NA

Perchlorates in Water, Soils, Solid Wastes Using High Performance LC/Electrospray/Mass Spectrometry

Analytical Method: 6850
Prep Method: Method

Analyte Name	Result	Q	LOQ	LOD	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Analysis Lot	Note
Perchlorate	**0.0777**	J	0.100	0.0500	0.0250	1	4/22/24	4/25/24 15:04	437269	839424	

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client:	Bhate Environmental Associates, Inc.	**Service Request:**	E2400393
Project:	LHAAP/ Quaterly Surface Water Samples/JVPCIBH.0001	**Date Collected:**	4/18/24 0834
Sample Matrix:	Water	**Date Received:**	4/19/24
Sample Name:	GPW3_041824	**Units:**	µg/L
Lab Code:	E2400393-006	**Basis:**	NA

Perchlorates in Water, Soils, Solid Wastes Using High Performance LC/Electrospray/Mass Spectrometry

Analytical Method: 6850
Prep Method: Method

Analyte Name	Result	Q	LOQ	LOD	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Analysis Lot	Note
Perchlorate	**0.106**		0.100	0.0500	0.0250	1	4/22/24	4/25/24 15:09	437269	839424	

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client:	Bhate Environmental Associates, Inc.	**Service Request:**	E2400393
Project:	LHAAP/ Quaterly Surface Water Samples/JVPCIBH.0001	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Method Blank	**Units:**	µg/L
Lab Code:	EQ2400193-01	**Basis:**	NA

Perchlorates in Water, Soils, Solid Wastes Using High Performance LC/Electrospray/Mass Spectrometry

Analytical Method: 6850
Prep Method: Method

Analyte Name	Result	Q	LOQ	LOD	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Analysis Lot	Note
Perchlorate	ND	U	0.100	0.0500	0.0250	1	4/22/24	4/25/24 12:41	437269	839424	

Accuracy & Precision

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Phone (281)530-5656 Fax (281)530-5887
www.alsglobal.com

ALS Group USA, Corp. dba ALS Environmental

QA/QC Report

Client:	Bhate Environmental Associates, Inc.	**Service Request:**	E2400393
Project:	LHAAP/ Quaterly Surface Water Samples/JVPCIBH.0001	**Date Analyzed:**	4/25/24
Sample Matrix:	Water		

Lab Control Sample Summary

Perchlorates in Water, Soils, Solid Wastes Using High Performance LC/Electrospray/Mass Spectrometry

Analytical Method:	6850	**Units:**	µg/L
Prep Method:	Method	**Basis:**	NA
		Extraction Lot:	437269

	Lab Control Sample EQ2400193-02			Duplicate Lab Control Sample EQ2400193-03					
Analyte Name	**Result**	**Spike Amount**	**% Rec**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**	**RPD**	**RPD Limit**
Perchlorate	0.0938	0.100	94	0.101	0.100	101	84 - 119	7	15

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client:	Bhate Environmental Associates, Inc.	**Service Request:**	E2400393
Project:	LHAAP/ Quaterly Surface Water Samples/JVPCIBH.0001	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Lab Control Sample	**Units:**	µg/L
Lab Code:	EQ2400193-02	**Basis:**	NA

Perchlorates in Water, Soils, Solid Wastes Using High Performance LC/Electrospray/Mass Spectrometry

Analytical Method: 6850
Prep Method: Method

Analyte Name	Result	Q	LOQ	LOD	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Analysis Lot	Note
Perchlorate	**0.0938**	J	0.100	0.0500	0.0250	1	4/22/24	4/25/24 12:46	437269	839424	

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client:	Bhate Environmental Associates, Inc.	**Service Request:**	E2400393
Project:	LHAAP/ Quaterly Surface Water Samples/JVPCIBH.0001	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Duplicate Lab Control Sample	**Units:**	µg/L
Lab Code:	EQ2400193-03	**Basis:**	NA

Perchlorates in Water, Soils, Solid Wastes Using High Performance LC/Electrospray/Mass Spectrometry

Analytical Method: 6850
Prep Method: Method

Analyte Name	Result	Q	LOQ	LOD	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Analysis Lot	Note
Perchlorate	**0.101**		0.100	0.0500	0.0250	1	4/22/24	4/25/24 12:52	437269	839424	

August 01, 2024 Service Request No:E2400830

Marcia Olive
Bhate Environmental Associates, Inc.
445 Union Blvd
Suite 129
Lakewood, CO 80228

Laboratory Results for: LHAAP

Dear Marcia,

Enclosed are the results of the sample(s) submitted to our laboratory July 17, 2024
For your reference, these analyses have been assigned our service request number **E2400830.**

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current TNI standards, where applicable, and except as noted in the laboratory case narrative provided. All results are intended to be considered in their entirety and ALS Environmental is not responsible for use of less than the complete final report. Results apply only to the items submitted to the laboratory, as received for analysis. In accordance with the current TNI Standard, a statement on the estimated uncertainty of measurement of any quantitative analysis will be supplied upon request.

Please contact me if you have any questions. My extension is 2190. You may also contact me via email at hussam.kelany@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

H Kelany

Hussam Kelany
Project Manager

ADDRESS 10450 Stancliff Rd., Suite 210, Houston, TX 77099
PHONE +1 281 530 5656 | FAX +1 281 530 5887
ALS Group USA, Corp.
dba ALS Environmental

Certificate of Analysis

ALS Environmental - Houston Specialties Laboratory
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Phone (281)530-5656 Fax (281)530-5887
www.alsglobal.com

Client:	Bhate Environmental Associates, Inc.	**Service Request No.:**	E2400830
Project:	LHAAP	**Date Received:**	07/17/24
Sample Matrix:	Water		

CASE NARRATIVE

All analyses were performed in adherence to the quality assurance program of ALS Environmental. This report contains analytical results for samples designated for Tier IV. When appropriate to the method, method blank results have been reported with each analytical test.

Sample Receipt

Six samples were received for analysis at ALS Environmental in Houston on 07/17/24.

The samples were received in good condition and are consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4°C upon receipt at the laboratory.

Data Validation Notes and Discussion

Precision and Accuracy:

EQ2400412-01: Laboratory Control Spike/Duplicate Laboratory Control Spike (LCS/DLCS) samples were analyzed and reported addition to a MS/MSD for this extraction batch.

The batch precision (MS/DMS) measurements were determined on an unrelated sample in the extraction batch. The MS/DMS results are not included in this report.

The results of analyses are given in the attached laboratory report. All results are intended to be considered in their entirety, and ALS Environmental (ALS) is not responsible for utilization of less than the complete report.

Use of ALS group USA Corp dba ALS Environmental (ALS)'s Name. Client shall not use ALS's name or trademark in any marketing or reporting materials, press releases or in any other manner ("Materials") whatsoever and shall not attribute to ALS any test result, tolerance or specification derived from ALS's data ("Attribution") without ALS's prior written consent, which may be withheld by ALS for any reason in its sole discretion. To request ALS's consent, Client shall provide copies of the proposed Materials or Attribution and describe in writing Client's proposed use of such Materials or Attribution. If ALS has not provided written approval of the Materials or Attribution within ten (10) days of receipt from Client, Client's request to use ALS's name or trademark in any Materials or Attribution shall be deemed denied. ALS may, in its discretion, reasonably charge Client for its time in reviewing Materials or Attribution requests. Client acknowledges and agrees that the unauthorized use of ALS's name or trademark may cause ALS to incur irreparable harm for which the recovery of money damages will be inadequate. Accordingly, Client acknowledges and agrees that a violation shall justify preliminary injunctive relief. For questions contact the laboratory.

Client: Bhate Environmental Associates, Inc. **Service Request:**E2400830
Project: LHAAP/JVPCIBH.0001

SAMPLE CROSS-REFERENCE

SAMPLE #	CLIENT SAMPLE ID	DATE	TIME
E2400830-001	HBW7_071624	7/16/2024	0800
E2400830-002	HBW10_071624	7/16/2024	0815
E2400830-003	HBW1_071624	7/16/2024	0830
E2400830-004	GPW1_071624	7/16/2024	0845
E2400830-005	GPW3_071624	7/16/2024	0855
E2400830-006	GPW3_071624_a	7/16/2024	0855

Service Request Summary

Folder #: **E2400830**
Client Name: Bhate Environmental Associates, Inc.
Project Name: LHAAP
Project Number: JVPCIBH.0001

Report To: Marcia Olive
Bhate Environmental Associates, Inc.
445 Union Blvd
Lakewood, CO 80228
USA
Phone Number: 303-597-2450
Cell Number:
Fax Number:
E-mail: molive@bhate.com

Project Chemist: Hussam Kelany
Originating Lab: HOUSTON
Logged By: MONICA.SMITH
Date Received: 07/17/24
Internal Due Date: 7/29/2024
QAP: LAB QAP
Qualifier Set: Lab Standard
Formset: Lab Standard
Merged?: Y
Report to MDL?: Y
P.O. Number:
EDD: BASIC_WQC_CASNo_LOD

6 120 mL-Plastic Bottle Natural WM Unpreserved
Location: EHRMS-WIC 2B
Pressure Gas:

Lab Samp No.	Client Samp No	Matrix	Collected	Semivoa GCMS ClO4 DOD/6850
E2400830-001	HBW7_071624	Water	07/16/24 0800	**IV**
E2400830-002	HBW10_071624	Water	07/16/24 0815	**IV**
E2400830-003	HBW1_071624	Water	07/16/24 0830	**IV**
E2400830-004	GPW1_071624	Water	07/16/24 0845	**IV**
E2400830-005	GPW3_071624	Water	07/16/24 0855	**IV**
E2400830-006	GPW3_071624_a	Water	07/16/24 0855	**IV**

Service Request Summary

Folder #: **E2400830**
Client Name: Bhate Environmental Associates, Inc.
Project Name: LHAAP
Project Number: JVPCIBH.0001

Report To: Marcia Olive
Bhate Environmental Associates, Inc.
445 Union Blvd
Lakewood, CO 80228
USA
Phone Number: 303-597-2450
Cell Number:
Fax Number:
E-mail: molive@bhate.com

Project Chemist: Hussam Kelany
Originating Lab: HOUSTON
Logged By: MONICA.SMITH
Date Received: 07/17/24
Internal Due Date: 7/29/2024
QAP: LAB QAP
Qualifier Set: Lab Standard
Formset: Lab Standard
Merged?: Y
Report to MDL?: Y
P.O. Number:
EDD: BASIC_WQC_CASNo_LOD

6 120 mL-Plastic Bottle Natural WM Unpreserved
Location: EHRMS-WIC 2B
Pressure Gas:

Data Qualifiers

Lab Standard

+	Possible Tedlar bag artifact.
A	TIC is a suspected aldol-condensation product
B	Analyte found in the associated method blank as well as in the sample.
BC	Reported results are not blank corrected.
BH	The back section of the tube yielded higher results than the front.
BT	Results indicated possible breakthrough; back section >=10% front section.
C	Result identification confirmed.
D	Compound identified in an analysis at a secondary dilution factor
D	Spike was diluted out
DE	Reported results are corrected for desorption efficiency.
E	Estimated value. Concentration above calibration range
E	The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
F	The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
H	The chromatographic fingerprint of the sample resembles a petroleum product but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
H1	Sample analysis performed past holding time. See case narrative.
H2	Initial analysis within holding time. Reanalysis for the required dilution was past holding time.
H3	Sample was received and analyzed past holding time.
H4	Sample was extracted past required extraction holding time, but analyzed within analysis holding time. See case narrative.
I	(Auto) The reference ion ratio was outside acceptance criteria, which may indicate a potential bias to this result.
I	Internal standard not within the specified limits. See case narrative.
I	The reference ion ratio was outside acceptance criteria, which may indicate a potential bias to this result.
J	Estimated Value. Concentration found below MRL.
K	A deflection in the QC ion may indicate interference with the quantitation of this ion. The concentration of this analyte should be considered as an estimate.
K	Analyte was detected above the method reporting limit prior to normalization.
K	The reference ion ratio was outside acceptance criteria, which may indicate a potential bias to this result.
L	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
L1	Laboratory control sample recovery outside the specified limits; results may be biased high.
L2	Laboratory control sample recovery outside the specified limits; results may be biased low.
L3	Laboratory control sample recovery outside the specified limits.
M	Matrix interference; results may be biased high.
M	The duplicate injection precision not met.

Data Qualifiers

Lab Standard

M1	Matrix interference due to coelution with a non-target compound; results may be biased high.
N	Presumptive evidence of a compound for TICs that have been identified based on a mass spectral library search.
N	The Matrix Spike sample recovery is not within control limits. See case narrative.
O	The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
P	Indicates chlorodiphenyl ether interference present at the retention time of the target compound.
P	Pesticide/Aroclor target analyte > 40% difference for detected concentrations between GC columns
Q	Indicates as estimated value because the P and P + 2 theoretical abundance ratio does not meet method criteria.
R	Duplicate Precision not met.
R1	Duplicate precision not within the specified limits; however, the results are below the MRL and considered estimated.
S	Surrogate recovery not within specified limits.
S	The reported value was determined by the Method of Standard Additions (MSA).
T	Analyte is a tentatively identified compound, result is estimated.
U	Compound was analyzed for, but was not detected (ND).
V1	The continuing calibration verification standard was outside (biased high) the specified limits for this compound.
V2	The continuing calibration verification standard was outside (biased low) the specified limits for this compound.
W	Result quantified, but the corresponding peak was detected outside the generated retention time window.
W	The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
X	See case narrative.
Y	Recovery outside limits
Y	The chromatogram resembles a petroleum product but does not match the calibration standard.
Z	The chromatogram does not resemble a petroleum product.
i	The MRL/MDL has been elevated due to a matrix interference.

ALS Laboratory Group

Acronyms

Cal	Calibration
Conc	CONCentration
Dioxin(s)	Polychlorinated dibenzo-p-dioxin(s)
EDL	Estimated Detection Limit
EMPC	Estimated Maximum Possible Concentration
Flags	Data qualifiers
Furan(s)	Polychlorinated dibenzofuran(s)
g	Grams
ICAL	Initial CALibration
ID	IDentifier
Ions	Masses monitored for the analyte during data acquisition
L	Liter (s)
LCS	Laboratory Control Sample
DLCS	Duplicate Laboratory Control Sample
MB	Method Blank
MCL	Method Calibration Limit
MDL	Method Detection Limit
mL	Milliliters
MS	Matrix Spiked sample
DMS	Duplicate Matrix Spiked sample
NO	Number of peaks meeting all identification criteria
PCDD(s)	Polychlorinated dibenzo-p-dioxin(s)
PCDF(s)	Polychlorinated dibenzofuran(s)
ppb	Parts per billion
ppm	Parts per million
ppq	Parts per quadrillion
ppt	Parts per trillion
QA	Quality Assurance
QC	Quality Control
Ratio	Ratio of areas from monitored ions for an analyte
% Rec.	Percent recovery
RPD	Relative Percent Difference
RRF	Relative Response Factor
RT	Retention Time
SDG	Sample Delivery Group
S/N	Signal-to-noise ratio
TEF	Toxicity Equivalence Factor
TEQ	Toxicity Equivalence Quotient

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State Certifications, Accreditations, and Licenses

Agency	Number	Expire Date
Arkansas Department of Environmental Quality	88-00356	3/28/2025
California State Environmental Laboratory Accreditation Program	2919-2024	4/30/2025
Department of Defense	L24-240	4/30/2026
Hawaii Department of Health	2024	4/30/2025
Louisiana Department of Health and Hospitals	LA028-2024	12/31/2024
Minnesota Department of Health	2645386	12/31/2024
New Hampshire Environmental Laboratory Accreditation Program	209424-A	4/24/2025
Oklahoma Department of Environmental Quality	2023-140	8/31/2024
Oregon Environmental Laboratory Accreditation Program	TX200002-2024	5/15/2025
Tennessee Department of Environment and Conservation	04016-2024	4/30/2025
Texas Commision on Environmental Quality	TX-C24-00130	4/30/2025
Washington Department of Ecology	C819-23	11/14/2024

Chain of Custody

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E2400830

bhate ENVIRONMENTAL CONSTRUCTION ENERGY

Bhate Environmental Associates, Inc.
LHAAP

Page: of

Project/Phase No: JVPCIBH.0001

COC Number(1):

LIMS Number:

1608 13th Avenue South, Suite 300
Birmingham Alabama 35205
Tel: 205-918-4000
Fax: 205-918-4050

Chain of Custody and Analytical Request

Facility/Base I.D.: LHAAP

Project/Site Name: LHAAP / Quarterly Surface Water Samples

Client Name:

Collected by: Scott Beesinger

Field Sample ID (30 Characters Max)	ERPIMS LOCID (15 Characters Max)	Date Collected (dd-mmm-yyyy)	Time Collected (Military) (hhmm)	Sample Depth (beginning - ending)	SA Code (2)	Sample Number (3)	Sample Matrix (4)	Number of containers	PERCHLORATE									Ambient Blank Lot Control Number	Equipment Blank Lot Control Number	Trip Blank Lot Control Number	Cooler ID
								Sample Analysis Requested (5)										Quality Assurance Samples (6)			
HBW7_041824		16 Jul 2024	08:00	-	N		WS	1	X												
HBW10_041824		16 Jul 2024	08:15	-	N		WS	1	X												
HBW1_041824		16 Jul 2024	08:30	-	N		WS	1	X												
GPW1_041824		16 Jul 2024	08:45		N		WS	1	X												
GPW3_041824		16 Jul 2024	08:55		N		WS	1	X												
GPW3_041824_a		16 Jul 2024	08:55	-	FD		WS	1	X												
				-																	
				-																	
				-																	
				-																	
				-																	

all samples should have the date "071624" instead of "041824"

COMMENTS:

Standard TAT

Cooler #9115 Temp 1.2 Bag 34 CF 0.3

Custody Transfers Prior to Receipt by Laboratory

Relinquished By (Signed)	Date	Time	Received by (signed)	Date	Time
1. Scott Beesinger	7/16/24	1330	1.		
2.			2.		
3.			3. SM	07/17/24	0912

Sample Delivery Details / Laboratory Receipt

Delivered Directly to Lab: Shipped No.:

Method of Shipment:

Fed Ex Airbill Number:

Analytical Lab: ALS 10450 Stancliff Rd. Suite 210 Houston, TX 77099 (281) 530-5656

ATTN: SONIA WEST Lab Recipient: Delivery Date/Time:

1.) Chain of Custody Number = date collected + custody number (e.g. 09-02-1999-01)

2.) Sample Type (SA) Codes: N = Normal Sample, TB = Trip Blank (-c) Sample, FD = Field Duplicate (-a) Samples, FR = Field Replicate (-b) Samples, EB = Equipment Blank (-d) Samples, MS = Matrix Spike, SD = Matrix Spike Duplicate, AB = Ambient Blank (-e)

3.) Sample Number: Unique sample number collected from a particular location per day. (e.g. Groundwater sample collected from MW-1 on 10/10/99 = 01, if sampled again on 10/10/99 = 02, etc.)

4.) Matrix Codes: GS = Soil Gas, WG = Groundwater, WS = Surface Water, SO = Soil, SE = Sediment, SL = Sludge, SS = Surface Soil Samples, WQ = Aqueous Blank Samples (trip, equipment, ambient, etc), SQ = Soil Blanks

5.) Sample Analysis Requested: Analytical method requested and number of containers provided for each.

6.) Quality assurance samples are assigned by date (ddmmyy) and the sample number associated with the sample (01, 02, etc) (e.g. Equipment blank collected in association with MW-1 on 10/10/99 will be designated 10109901 in the Equipment Blank Lot Control

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Client: Bhate Date: 7.17.24 WO#:

Time Received: 0925 Received by: SM BO#: 97961/93665

Matrices: Solid/Sludge Water Oil Wipes Hydrocarbon Liquid Other

Kit ID/Cooler ID	Trip Blank ID	Cooler Temp (C) Observed/Corrected	IR #	Temp BLK Present?
49115	–	1.2 / 1.2	34	(Y) N
		/		Y N
		/		Y N
		/		Y N
		/		Y N

Delivery Method: (FedEx) UPS Greyhound ALS Client Other

Date/Time of Unpacking: 7-17-24 Unpacked by: RG

Shipping container/cooler in good condition?	(Yes)	No	Not Present
Custody seals intact on shipping container/cooler?	(Yes)	No	Not Present
Custody seals intact on sample bottles?	Yes	No	(Not Present)
Chain of Custody present?	(Yes)	No	
Chain of Custody signed when relinquished and received?	(Yes)	No	
Chain of Custody - Sampler's name present?	(Yes)	No	
Chain of Custody agrees with sample labels?	(Yes)	No	
Samples in proper container/bottle?	(Yes)	No	
VOA/TX1005/1006 Solids in hermetically Sealed Vials:	Yes	No	(No VOA/TX1005/1006 Solid)
Sample containers intact?	(Yes)	No	
Sufficient sample volume for indicated test?	(Yes)	No	
All samples received within holding time?	(Yes)	No	
Container/Temp Blank temperature in compliance?	(Yes)	No	
Water - VOA vials have zero headspace?	(Yes)	No	N/A No VOA submitted
Non-VOA waters preserved with HCl, H2SO4, HNO3 are pH <2?		(Yes)	No N/A
Waters preserved with NaOH/Ascorbic acid are pH>12?	Yes	No	(N/A)
pH adjusted?	Yes*	(No)	N/A *See Preservation Logbook
pH adjusted by: _____	**pH Paper Lot:** 321500223		

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Login Notes: _____

COC-HBW7_041824, Bottle-HBW7_071624

COC-HBW10_041824, Bottle-HBW10_071624

COC-HBW01_041824, Bottle-HBW01_071624

COC# GPW1_041824, Bottle GPW1_071624

COC GPW3_041824, Bottle-GPW3_071624

COC GPW3_041824a, Bottle GPW3_071624

Client Contacted: _____ Date Contacted: _____

Person Contacted: _____ Contacted By: _____

Regarding: _____

Comments: _____

Corrective Action: _____

Logged by: _____

Labelled by: _____

Scanned by: _____

PM Review: _____

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SAMPLE ACCEPTANCE POLICY

This policy outlines the criteria samples must meet to be accepted by ALS Environmental – Houston HRMS.

Cooler Custody Seals (desirable, mandatory if specified in SAP):

- ✓ Intact on outside of cooler, signed and dated

Chain-of-Custody (COC) documentation (mandatory):

The following is required on each COC:

- ✓ Sample ID, the location, date and time of collection, collector's name, preservation type, sample type, and any other special remarks concerning the sampleThe COC must be completed in ink.
- ✓ Signature and date of relinquishing party.

In the absence of a COC at sample receipt, the COC will be requested from the client.

Sample Integrity (mandatory):

Samples are inspected upon arrival to ensure that sample integrity was not compromised during transfer to the laboratory.

- ✓ Sample containers must arrive in good condition (not broken or leaking).
- ✓ Samples must be labeled appropriately, including Sample IDs, and requested test using durable labels and indelible ink.
- ✓ The correct type of sample bottle must be used for the method requested.
- ✓ An appropriate sample volume, or weight, must be received.
- ✓ Sample IDs and number of containers must reconcile with the COC.
- ✓ Samples must be received within the method defined holding time.

Temperature Requirement (varies by sample matrix):

- ✓ Aqueous and Non-aqueous samples must be shipped and stored cold, at 0 to 6ºC.
- ✓ Tissue samples must be shipped and stored frozen, at -20 to -10ºC.
- ✓ Air samples are shipped and stored cold, at 0 to 6ºC
- ✓ The sample temperature must be recorded on the COC

All cooler inspections are documented on the Cooler Receipt Form (CRF). A separate CRF is completed for each service request. Any samples not meeting the above criteria are noted on the CRF and the Project Manager notified. The Project Manager must resolve any sample integrity issues with the client prior to proceeding with the analysis. Such resolutions are documented in writing and filed with the project folder. Data associated with samples received outside of this acceptance policy will be qualified on the case narrative of the final report

Preparation Information Benchsheets

ALS Environmental - Houston Specialties Laboratory
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Preparation Information Benchsheet

Prep Run#: 442124 **Prep WorkFlow:** GenExt28Day **Status:** Prepped
Team: Semivoa GCMS/JOSEL.JUAREZ **Prep Method:** Method **Prep Date/Time:** 7/25/24 07:57

#	Lab Code	Client ID	B#	Method /Test	pH	Cl	Matrix	Amt. Ext.	Sample Description
1	E2400830-001	HBW7_071624	.01	6850/ClO4 DOD			Water	10mL	
2	E2400830-002	HBW10_071624	.01	6850/ClO4 DOD			Water	10mL	
3	E2400830-003	HBW1_071624	.01	6850/ClO4 DOD			Water	10mL	
4	E2400830-004	GPW1_071624	.01	6850/ClO4 DOD			Water	10mL	
5	E2400830-005	GPW3_071624	.01	6850/ClO4 DOD			Water	10mL	
6	E2400830-006	GPW3_071624_a	.01	6850/ClO4 DOD			Water	10mL	
7	E2400837-001	RM9W-BSWS01-BULKWATER	.01	6850/ClO4 DOD			Water	10mL	
8	E2400837-002	RM9W-BSWS01-BULKWATER-DUP	.01	6850/ClO4 DOD			Water	10mL	
9	E2400843-001	EA-25_0324	.01	6850/ClO4 DOD			Water	10mL	
10	E2400843-002	CTC-48_0324	.01	6850/ClO4 DOD			Water	10mL	
11	E2400843-003	EA-60_0324	.01	6850/ClO4 DOD			Water	10mL	
12	E2400843-004	GUKOMELIK #2	.01	6850/ClO4 DOD			Water	10mL	
13	E2400843-005	CTC-23_0324	.01	6850/ClO4 DOD			Water	10mL	
14	E2400843-006	CTC-29_0324	.01	6850/ClO4 DOD			Water	10mL	
15	E2400843-007	EA-30_0324	.01	6850/ClO4 DOD			Water	10mL	
16	E2400843-008	EA-35_0324	.01	6850/ClO4 DOD			Water	10mL	
17	E2400843-009	CTC-42_0324	.01	6850/ClO4 DOD			Water	10mL	
18	E2400846-001	16-WW55-240718	.01	6850/ClO4 DOD			Ground Water	10mL	
19	E2400846-002	16-WW41-240718	.01	6850/ClO4 DOD			Ground Water	10mL	
20	E2400846-003	16-EW03-240718	.01	6850/ClO4 DOD			Ground Water	10mL	
21	EQ2400412-01	MB		6850/ClO4 DOD			Liquid	10mL	
22	EQ2400412-02	LCS		6850/ClO4 DOD			Liquid	10mL	
23	EQ2400412-03	DLCS		6850/ClO4 DOD			Liquid	10mL	
24	EQ2400412-04	ICS		6850/ClO4 DOD			Liquid	10mL	
25	EQ2400412-05	16-EW03-240718 MS	.01	6850/ClO4 DOD			Liquid	10mL	
26	EQ2400412-06	16-EW03-240718 DMS	.01	6850/ClO4 DOD			Liquid	10mL	

Spiking Solutions

Name: Perchlorate Anion Spiking Soln. 25,000 ppm Inventory ID 233595 Logbook Ref: Expires On: 08/04/2024

EQ2400412-04 20.00µL

Name: Perchlorate Internal Standard 1ug/mL Inventory ID 236095 Logbook Ref: Perchlorate IS cg7/3/24 Expires On: 11/24/2024

E2400830-001 100.00µL E2400830-002 100.00µL E2400830-003 100.00µL E2400830-004 100.00µL E2400830-005 100.00µL E2400830-006 100.00µL

Preparation Information Benchsheet

Prep Run#: 442124 **Prep WorkFlow:** GenExt28Day **Status:** Prepped
Team: Semivoa GCMS/JOSEL.JUAREZ **Prep Method:** Method **Prep Date/Time:** 7/25/24 07:57

E2400837-001	100.00µL	E2400837-002	100.00µL	E2400843-001	100.00µL	E2400843-002	100.00µL	E2400843-003	100.00µL	E2400843-004	100.00µL
E2400843-005	100.00µL	E2400843-006	100.00µL	E2400843-007	100.00µL	E2400843-008	100.00µL	E2400843-009	100.00µL	E2400846-001	100.00µL
E2400846-002	100.00µL	E2400846-003	100.00µL	EQ2400412-01	100.00µL	EQ2400412-02	100.00µL	EQ2400412-03	100.00µL	EQ2400412-04	100.00µL
EQ2400412-05	100.00µL	EQ2400412-06	100.00µL								

Name: Perchlorate Intermediate Stock 3 Inventory ID 236096 Logbook Ref: Perchlorate Inter. Stock 3 cg7 Expires On: 10/25/2024

EQ2400412-02	100.00µL	EQ2400412-03	100.00µL	EQ2400412-04	100.00µL	EQ2400412-05	100.00µL	EQ2400412-06	100.00µL		

Preparation Materials

6850 Luer-Lok Syringes Luer Lok Syringes (235268)

Preparation Steps

Step: Preparation
Started: 7/25/24 07:57
Finished: 7/25/24 09:00
By: JOSEL.JUAREZ
Comments

Comments: _____

Reviewed By: _____ Date: _____

Chain of Custody

Relinquished By: _____ Date: _____ Extracts Examined

Received By: _____ Date: _____ Yes No

Analytical Results

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ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client:	Bhate Environmental Associates, Inc.	**Service Request:**	E2400830
Project:	LHAAP/JVPCIBH.0001	**Date Collected:**	7/16/24 0800
Sample Matrix:	Water	**Date Received:**	7/17/24
Sample Name:	HBW7_071624	**Units:**	µg/L
Lab Code:	E2400830-001	**Basis:**	NA

Perchlorates in Water, Soils, Solid Wastes Using High Performance LC/Electrospray/Mass Spectrometry

Analytical Method: 6850
Prep Method: Method

Analyte Name	Result	Q	LOQ	LOD	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Analysis Lot	Note
Perchlorate	**0.0338**	J	0.100	0.0500	0.0250	1	7/25/24	7/25/24 12:28	442124	848646	

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client:	Bhate Environmental Associates, Inc.	**Service Request:**	E2400830
Project:	LHAAP/JVPCIBH.0001	**Date Collected:**	7/16/24 0815
Sample Matrix:	Water	**Date Received:**	7/17/24
Sample Name:	HBW10_071624	**Units:**	µg/L
Lab Code:	E2400830-002	**Basis:**	NA

Perchlorates in Water, Soils, Solid Wastes Using High Performance LC/Electrospray/Mass Spectrometry

Analytical Method: 6850
Prep Method: Method

Analyte Name	Result	Q	LOQ	LOD	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Analysis Lot	Note
Perchlorate	**0.0306**	J	0.100	0.0500	0.0250	1	7/25/24	7/25/24 12:34	442124	848646	

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client:	Bhate Environmental Associates, Inc.	**Service Request:**	E2400830
Project:	LHAAP/JVPCIBH.0001	**Date Collected:**	7/16/24 0830
Sample Matrix:	Water	**Date Received:**	7/17/24
Sample Name:	HBW1_071624	**Units:**	µg/L
Lab Code:	E2400830-003	**Basis:**	NA

Perchlorates in Water, Soils, Solid Wastes Using High Performance LC/Electrospray/Mass Spectrometry

Analytical Method: 6850
Prep Method: Method

Analyte Name	Result	Q	LOQ	LOD	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Analysis Lot	Note
Perchlorate	**0.0342**	J	0.100	0.0500	0.0250	1	7/25/24	7/25/24 12:39	442124	848646	

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client:	Bhate Environmental Associates, Inc.	**Service Request:**	E2400830
Project:	LHAAP/JVPCIBH.0001	**Date Collected:**	7/16/24 0845
Sample Matrix:	Water	**Date Received:**	7/17/24
Sample Name:	GPW1_071624	**Units:**	µg/L
Lab Code:	E2400830-004	**Basis:**	NA

Perchlorates in Water, Soils, Solid Wastes Using High Performance LC/Electrospray/Mass Spectrometry

Analytical Method: 6850
Prep Method: Method

Analyte Name	Result	Q	LOQ	LOD	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Analysis Lot	Note
Perchlorate	**0.0253**	J	0.100	0.0500	0.0250	1	7/25/24	7/25/24 12:45	442124	848646	

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client:	Bhate Environmental Associates, Inc.	**Service Request:**	E2400830
Project:	LHAAP/JVPCIBH.0001	**Date Collected:**	7/16/24 0855
Sample Matrix:	Water	**Date Received:**	7/17/24
Sample Name:	GPW3_071624	**Units:**	µg/L
Lab Code:	E2400830-005	**Basis:**	NA

Perchlorates in Water, Soils, Solid Wastes Using High Performance LC/Electrospray/Mass Spectrometry

Analytical Method: 6850
Prep Method: Method

Analyte Name	Result	Q	LOQ	LOD	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Analysis Lot	Note
Perchlorate	**0.0419**	J	0.100	0.0500	0.0250	1	7/25/24	7/25/24 12:50	442124	848646	

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client:	Bhate Environmental Associates, Inc.	**Service Request:**	E2400830
Project:	LHAAP/JVPCIBH.0001	**Date Collected:**	7/16/24 0855
Sample Matrix:	Water	**Date Received:**	7/17/24
Sample Name:	GPW3_071624_a	**Units:**	µg/L
Lab Code:	E2400830-006	**Basis:**	NA

Perchlorates in Water, Soils, Solid Wastes Using High Performance LC/Electrospray/Mass Spectrometry

Analytical Method: 6850
Prep Method: Method

Analyte Name	Result	Q	LOQ	LOD	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Analysis Lot	Note
Perchlorate	**0.0259**	J	0.100	0.0500	0.0250	1	7/25/24	7/25/24 12:56	442124	848646	

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client:	Bhate Environmental Associates, Inc.	**Service Request:**	E2400830
Project:	LHAAP/JVPCIBH.0001	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Method Blank	**Units:**	µg/L
Lab Code:	EQ2400412-01	**Basis:**	NA

Perchlorates in Water, Soils, Solid Wastes Using High Performance LC/Electrospray/Mass Spectrometry

Analytical Method: 6850
Prep Method: Method

Analyte Name	Result	Q	LOQ	LOD	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Analysis Lot	Note
Perchlorate	ND	U	0.100	0.0500	0.0250	1	7/25/24	7/25/24 11:11	442124	848646	

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client:	Bhate Environmental Associates, Inc.	**Service Request:**	E2400830
Project:	LHAAP/JVPCIBH.0001	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Lab Control Sample	**Units:**	µg/L
Lab Code:	EQ2400412-02	**Basis:**	NA

Perchlorates in Water, Soils, Solid Wastes Using High Performance LC/Electrospray/Mass Spectrometry

Analytical Method: 6850
Prep Method: Method

Analyte Name	Result	Q	LOQ	LOD	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Analysis Lot	Note
Perchlorate	**0.115**		0.100	0.0500	0.0250	1	7/25/24	7/25/24 11:55	442124	848646	

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client:	Bhate Environmental Associates, Inc.	**Service Request:**	E2400830
Project:	LHAAP/JVPCIBH.0001	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Duplicate Lab Control Sample	**Units:**	µg/L
Lab Code:	EQ2400412-03	**Basis:**	NA

Perchlorates in Water, Soils, Solid Wastes Using High Performance LC/Electrospray/Mass Spectrometry

Analytical Method: 6850
Prep Method: Method

Analyte Name	Result	Q	LOQ	LOD	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Analysis Lot	Note
Perchlorate	**0.117**		0.100	0.0500	0.0250	1	7/25/24	7/25/24 11:22	442124	848646	

Accuracy & Precision

ALS Environmental - Houston Specialties Laboratory
10450 Stancliff Rd., Suite 210, Houston TX 77099
Phone (281)530-5656 Fax (281)530-5887
www.alsglobal.com

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	Bhate Environmental Associates, Inc.	**Service Request:**	E2400830
Project:	LHAAP/JVPCIBH.0001	**Date Analyzed:**	07/25/24
Sample Matrix:	Water	**Date Extracted:**	07/25/24

Duplicate Lab Control Sample Summary
Perchlorates in Water, Soils, Solid Wastes Using High Performance LC/Electrospray/Mass Spectrometry

Analysis Method:	6850	**Units:**	ug/L
Prep Method:	Method	**Basis:**	NA
		Analysis Lot:	848646

	Lab Control Sample EQ2400412-02			Duplicate Lab Control Sample EQ2400412-03					
Analyte Name	**Result**	**Spike Amount**	**% Rec**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**	**RPD**	**RPD Limit**
Perchlorate	0.115	0.100	115	0.117	0.100	117	84-119	2	15

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client:	Bhate Environmental Associates, Inc.	**Service Request:**	E2400830
Project:	LHAAP/JVPCIBH.0001	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Lab Control Sample	**Units:**	µg/L
Lab Code:	EQ2400412-02	**Basis:**	NA

Perchlorates in Water, Soils, Solid Wastes Using High Performance LC/Electrospray/Mass Spectrometry

Analytical Method: 6850
Prep Method: Method

Analyte Name	Result	Q	LOQ	LOD	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Analysis Lot	Note
Perchlorate	**0.115**		0.100	0.0500	0.0250	1	7/25/24	7/25/24 11:55	442124	848646	

ALS Group USA, Corp. dba ALS Environmental

Analytical Report

Client:	Bhate Environmental Associates, Inc.	**Service Request:**	E2400830
Project:	LHAAP/JVPCIBH.0001	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Duplicate Lab Control Sample	**Units:**	µg/L
Lab Code:	EQ2400412-03	**Basis:**	NA

Perchlorates in Water, Soils, Solid Wastes Using High Performance LC/Electrospray/Mass Spectrometry

Analytical Method: 6850
Prep Method: Method

Analyte Name	Result	Q	LOQ	LOD	MDL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Analysis Lot	Note
Perchlorate	**0.117**		0.100	0.0500	0.0250	1	7/25/24	7/25/24 11:22	442124	848646	

SGS

Orlando, FL

12/09/24

The results set forth herein are provided by SGS North America Inc.

e-Hardcopy 2.0
Automated Report



Technical Report for

Bhate Environmental

Longhorn AAP Perchlorates; Karnack TX

JVPCIBH.0001

SGS Job Number: FC20573

Sampling Date: 11/19/24

Report to:

MOLIVE@bhate.com

ATTN: Distribution6

Total number of pages in report: 34

Test results contained within this data package meet the requirements of the National Environmental Laboratory Accreditation Program and/or state specific certification programs as applicable unless noted in the narrative, comments or footnotes.

Norm Farmer
Technical Director

Client Service contact: Jean Dent-Smith 407-425-6700

Certifications: FL(E83510), LA(03051), KS(E-10327), NC(573), NJ(FL002), NY(12022), SC(96038001) DoD ELAP(ANAB L2229), AZ(AZ0806), CA(2937), TX(T104704404), PA(68-03573), VA(460177), AL, AK, AR, CT, IA, KY, MA, MI. MS, ND, NH, NV, OK, OR, IL, UT, VT, WA, WI, WV

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how we can serve you better at:
EHS.US.CustomerCare@sgs.com

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SGS Engage@19:41 09-Dec-2024

Sample Summary

Bhate Environmental

Job No: FC20573

Longhorn AAP Perchlorates; Karnack TX
Project No: JVPCIBH.0001

Sample Number	Collected Date	Time	By	Received	Matrix Code	Type	Client Sample ID
FC20573-1	11/19/24	08:15	SB	11/20/24	AQ	Surface Water	HBW7_111924
FC20573-2	11/19/24	08:29	SB	11/20/24	AQ	Surface Water	HBW10_111924
FC20573-3	11/19/24	08:45	SB	11/20/24	AQ	Surface Water	HBW1_111924
FC20573-4	11/19/24	08:45	SB	11/20/24	AQ	Surface Water	HBW1_111924-A
FC20573-5	11/19/24	09:07	SB	11/20/24	AQ	Surface Water	GPW1_111924
FC20573-6	11/19/24	09:22	SB	11/20/24	AQ	Surface Water	GPW3_111924

SAMPLE DELIVERY GROUP CASE NARRATIVE

Client: Bhate Environmental **Job No:** FC20573

Site: Longhorn AAP Perchlorates; Karnack TX **Report Date:** 12/9/2024 6:43:04 PM

On 11/20/2024, 6 Sample(s), 0 Trip Blank(s), 0 Equip. Blank(s) and 0 Field Blank(s) were received at SGS North America Inc - Orlando. at a maximum corrected temperature of 1.8 C. Samples were intact and chemically preserved, unless noted below. A SGS North America Inc. - Orlando Job Number of FC20573 was assigned to the project.

Laboratory sample ID, client sample ID and dates of sample collection are detailed in the report's Results Summary Section. Specified quality control criteria were achieved for this job except as noted below. For more information, please refer to the analytical results and QC summary pages.

MS Semi-volatiles By Method SW846 6850

Matrix: AQ **Batch ID:** OP6728

Sample(s) FC20570-1MSD, FC20570-1MS were used as the QC samples indicated.

Matrix Spike/Matrix Spike Duplicate Recovery(s) for Perchlorate are outside control limits. Outside control limits due to high level in sample relative to spike amount.

SGS North America Inc. - Orlando certifies that data reported for samples received, listed on the associated custody chain or analytical task order, were produced to specifications meeting the Quality System precision, accuracy and completeness objectives except as noted. Estimated non-standard method measurement uncertainty data is available on request, based on quality control bias and implicit for standard methods. Acceptable uncertainty requires tested parameter quality control data to meet method criteria. SGS North America Inc.- Orlando is not responsible for data quality assumptions if partial reports are used and recommends that this report be used in its entirety.

Narrative prepared by:

_____

Kim Benham, Report Generation (signature on file)

Summary of Hits

Job Number: FC20573
Account: Bhate Environmental
Project: Longhorn AAP Perchlorates; Karnack TX
Collected: 11/19/24

Lab Sample ID / Analyte	Client Sample ID	Result/ Qual	LOQ	LOD	Units	Method
FC20573-1	**HBW7_111924**					
No hits reported in this sample.						
FC20573-2	**HBW10_111924**					
No hits reported in this sample.						
FC20573-3	**HBW1_111924**					
No hits reported in this sample.						
FC20573-4	**HBW1_111924-A**					
No hits reported in this sample.						
FC20573-5	**GPW1_111924**					
No hits reported in this sample.						
FC20573-6	**GPW3_111924**					
Perchlorate		0.095 J	0.20	0.10	ug/l	SW846 6850

Sample Results

Report of Analysis

SGS Engage@19:41 09-Dec-2024

Report of Analysis

Client Sample ID:	HBW7_111924		
Lab Sample ID:	FC20573-1	**Date Sampled:**	11/19/24
Matrix:	AQ - Surface Water	**Date Received:**	11/20/24
Method:	SW846 6850 IN HOUSE	**Percent Solids:**	n/a
Project:	Longhorn AAP Perchlorates; Karnack TX		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	Q116052.D	1	12/05/24 16:34	AL	12/03/24 15:30	OP6728	SQ2406
Run #2							

	Initial Volume	Final Volume
Run #1	10.0 ml	10.0 ml
Run #2		

CAS No.	Compound	Result	LOQ	LOD	DL	Units	Q
14797-73-0	Perchlorate	0.10 U	0.20	0.10	0.050	ug/l	

U = Not detected LOD = Limit of Detection J = Indicates an estimated value
LOQ = Limit of Quantitation DL = Detection Limit B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

SGS Engage@19:41 09-Dec-2024

Report of Analysis

Client Sample ID: HBW10_111924
Lab Sample ID: FC20573-2
Matrix: AQ - Surface Water
Method: SW846 6850 IN HOUSE
Project: Longhorn AAP Perchlorates; Karnack TX

Date Sampled: 11/19/24
Date Received: 11/20/24
Percent Solids: n/a

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	Q116053.D	1	12/05/24 16:41	AL	12/03/24 15:30	OP6728	SQ2406
Run #2							

	Initial Volume	Final Volume
Run #1	10.0 ml	10.0 ml
Run #2		

CAS No.	Compound	Result	LOQ	LOD	DL	Units	Q
14797-73-0	Perchlorate	0.10 U	0.20	0.10	0.050	ug/l	

U = Not detected LOD = Limit of Detection
LOQ = Limit of Quantitation DL = Detection Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

SGS Engage@19:41 09-Dec-2024

Report of Analysis

Client Sample ID: HBW1_111924
Lab Sample ID: FC20573-3
Matrix: AQ - Surface Water
Method: SW846 6850 IN HOUSE
Project: Longhorn AAP Perchlorates; Karnack TX

Date Sampled: 11/19/24
Date Received: 11/20/24
Percent Solids: n/a

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	Q116057.D	1	12/05/24 17:09	AL	12/03/24 15:30	OP6728	SQ2406
Run #2							

	Initial Volume	Final Volume
Run #1	10.0 ml	10.0 ml
Run #2		

CAS No.	Compound	Result	LOQ	LOD	DL	Units	Q
14797-73-0	Perchlorate	0.10 U	0.20	0.10	0.050	ug/l	

U = Not detected LOD = Limit of Detection
LOQ = Limit of Quantitation DL = Detection Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

SGS Engage@19:41 09-Dec-2024

Report of Analysis

Client Sample ID: HBW1_111924-A
Lab Sample ID: FC20573-4
Matrix: AQ - Surface Water
Method: SW846 6850 IN HOUSE
Project: Longhorn AAP Perchlorates; Karnack TX

Date Sampled: 11/19/24
Date Received: 11/20/24
Percent Solids: n/a

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	Q116058.D	1	12/05/24 17:16	AL	12/03/24 15:30	OP6728	SQ2406
Run #2							

	Initial Volume	Final Volume
Run #1	10.0 ml	10.0 ml
Run #2		

CAS No.	Compound	Result	LOQ	LOD	DL	Units	Q
14797-73-0	Perchlorate	0.10 U	0.20	0.10	0.050	ug/l	

U = Not detected LOD = Limit of Detection
LOQ = Limit of Quantitation DL = Detection Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

SGS Engage@19:41 09-Dec-2024

Report of Analysis

Client Sample ID: GPW1_111924
Lab Sample ID: FC20573-5
Matrix: AQ - Surface Water
Method: SW846 6850 IN HOUSE
Project: Longhorn AAP Perchlorates; Karnack TX

Date Sampled: 11/19/24
Date Received: 11/20/24
Percent Solids: n/a

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	Q116059.D	1	12/05/24 17:23	AL	12/03/24 15:30	OP6728	SQ2406
Run #2							

	Initial Volume	Final Volume
Run #1	10.0 ml	10.0 ml
Run #2		

CAS No.	Compound	Result	LOQ	LOD	DL	Units	Q
14797-73-0	Perchlorate	0.10 U	0.20	0.10	0.050	ug/l	

U = Not detected LOD = Limit of Detection
LOQ = Limit of Quantitation DL = Detection Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

SGS Engage@19:41 09-Dec-2024

Report of Analysis

Client Sample ID: GPW3_111924
Lab Sample ID: FC20573-6
Matrix: AQ - Surface Water
Method: SW846 6850 IN HOUSE
Project: Longhorn AAP Perchlorates; Karnack TX

Date Sampled: 11/19/24
Date Received: 11/20/24
Percent Solids: n/a

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	Q116060.D	1	12/05/24 17:30	AL	12/03/24 15:30	OP6728	SQ2406
Run #2							

	Initial Volume	Final Volume
Run #1	10.0 ml	10.0 ml
Run #2		

CAS No.	Compound	Result	LOQ	LOD	DL	Units	Q
14797-73-0	Perchlorate	0.095	0.20	0.10	0.050	ug/l	J

U = Not detected LOD = Limit of Detection
LOQ = Limit of Quantitation DL = Detection Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

5

Misc. Forms

Custody Documents and Other Forms

Includes the following where applicable:

- Chain of Custody
- QC Evaluation: DOD QSM5.x Limits

bhate ENVIRONMENTAL CONSTRUCTION UNLIMITED

1608 13th Avenue South, Suite 300
Birmingham Alabama 35205
Tel: 205-918-4000
Fax: 205-918-4050

Page: ____ of ____

Project/Phase No: JVPCIBH.0001

COC Number(1): ____

LIMS Number: ____

Chain of Custody and Analytical Request

FC20573

Facility/Base I.D.: LHAAP

Project/Site Name: LHAAP / Quarterly Surface Water Samples

Client Name:

Collected by: Scott Beesinger

	Field Sample ID (30 Characters Max)	ERPIMS LOCID (15 Characters Max)	Date Collected (dd-mmm-yyyy)	Time Collected (Military) (hhmm)	Sample Depth (beginning - ending)	SA Code (2)	Sample Number (3)	Sample Matrix (4)	Number of containers	PERCHLORATE										Ambient Blank Lot Control Number	Equipment Blank Lot Control Number	Trip Blank Lot Control Number	Cooler ID
									Sample Analysis Requested (5)											Quality Assurance Samples (6)			
1	HBW7_111924		19 Nov 2024	08:15	-	N		WS	1	X													
2	HBW10_111924		19 Nov 2024	08:29	-	N		WS	1	X													
3	HBW1_111924		19 Nov 2024	08:45	-	N		WS	1	X													
4	HBW1_111924_a		19 Nov 2024	08:45		FD		WS	1	X													
5	GPW1_111924		19 Nov 2024	09:07		N		WS	1	X													
6	GPW3_111924		19 Nov 2024	09:22	-	N		WS	1	X													
					-																		
					-																		
					-																		
					-																		
					-																		

INITIAL ASSESSMENT ____

LABEL VERIFICATION ____

COMMENTS:

Standard TAT 2.0 SP

Custody Transfers Prior to Receipt by Laboratory

	Relinquished By (Signed)	Date	Time	Received by (signed)	Date	Time
1.	Scott Beesinger	11/19/24	1430			
2.					11/20/24	930
3.						

Sample Delivery Details / Laboratory Receipt 2.0 FR

Delivered Directly to Lab: ____ Shipped ____ No.:

Method of Shipment: ____

Fed Ex ____ Airbill Number: ____

Analytical Lab: ALS 4405 Vineland Rd Suite C 15 Orlando, FL 32811 (407) 795-1841

ATTN: Jean Dent-Smith Lab Recipient: Delivery Date/Time:

1.) Chain of Custody Number = date collected + custody number (e.g. 09-02-1999-01)

2.) Sample Type (SA) Codes: N = Normal Sample, TB = Trip Blank (-c) Sample, FD = Field Duplicate (-a) Samples, FR = Field Replicate (-b) Samples, EB = Equipment Blank (-d) Samples, MS = Matrix Spike, SD = Matrix Spike Duplicate, AB = Ambient Blank (-e)

3.) Sample Number: Unique sample number collected from a particular location per day. (e.g. Groundwater sample collected from MW-1 on 10/10/99 = 01, if sampled again on 10/10/99 = 02, etc.)

4.) Matrix Codes: GS = Soil Gas, WG = Groundwater, WS = Surface Water, SO = Soil, SE = Sediment, SL = Sludge, SS = Surface Soil Samples, WQ = Aqueous Blank Samples (trip, equipment, ambient, etc), SQ = Soil Blanks

5.) Sample Analysis Requested: Analytical method requested and number of containers provided for each.

6.) Quality assurance samples are assigned by date (ddmmyy) and the sample number associated with the sample (01, 02, etc) (e.g. Equipment blank collected in association with MW-1 on 10/10/99 will be designated 10109901 in the Equipment Blank Lot Control

SGS - Orlando Sample Receipt Summary

Job Number: fc20573 **Client:** BHATE **Project:** LHAAP

Date / Time Received: 11/20/2024 9:30:00 AM **Delivery Method:** FED EX **Airbill #'s:** 4004 9004 0390

Cooler Temps (Raw Measured) °C: Cooler 1: (2.0);

Cooler Temps (Corrected) °C: Cooler 1: (1.8);

Cooler Information	Y	or	N
1. Custody Seals Present:	☑		☐
2. Custody Seals Intact:	☑		☐
3. Temp criteria achieved:	☑		☐
4. Cooler temp verification:	IR Gun		
5. Cooler media:	Ice (Bag)		

Trip Blank Information	Y	or	N	N/A
1. Trip Blank present / cooler:	☐		☐	☑
2. Trip Blank listed on COC:	☐		☐	☑

	W	or	S	N/A
3. Type of TB Received	☐		☐	☑

Sample Information	Y	or	N	N/A
1. Sample labels present on bottles:	☑		☐	
2. Samples presented properly	☑		☐	
3. Sufficient volume/containers recv'd for analysis	☑		☐	
4. Condition of sample:	Intact			
5. Sample recv'd within HT	☑		☐	
6. Dates/Times/IDs on COC match sample label	☑		☐	
7. VOCs have headspace	☐		☐	☑
8. Bottles received for unspecified tests	☐		☑	
9. Compositing instructions clear	☐		☐	☑
10. Voa Soil Kits/Jars received past 48hrs?	☐		☐	☑
11. % Solids Jar Received?	☐		☐	☑
12. Residual Chlorine Present?	☐		☐	☑

Misc Information

Number of Encores: 25 Gram 5 Gram

Number of Lab Filtered Metals:

Test Strip Lot #s: pH 0-3: 226422 pH 10-12: Other: (Specify) pH 1.0 - 12.0 222221

Residual Chlorine Test Strip Lot #

Comments

Sample Receipt Summary 112723 EK Technician: SHAYLAP Date: 11/20/2024 11:01:34 AM Reviewer: Date:

QC Evaluation: DOD QSM5.x Limits

Job Number: FC20573
Account: Bhate Environmental
Project: Longhorn AAP Perchlorates; Karnack TX
Collected: 11/19/24

QC Sample ID	CAS#	Analyte	Sample Type	Result Type	Result	Units	Limits
OP6728	SW846 6850						
OP6728-BS	14797-73-0	Perchlorate	BSP	REC	100	%	84-119
OP6728-MS*	14797-73-0	Perchlorate	MS	REC	-25000 [a]	%	84-119
OP6728-MSD*	14797-73-0	Perchlorate	MSD	REC	-5000 [a]	%	84-119
OP6728-MSD*	14797-73-0	Perchlorate	MSD	RPD	1	%	15

(a) Outside control limits due to high level in sample relative to spike amount.

* Sample used for QC is not from job FC20573

MS Semi-volatiles

QC Data Summaries

Includes the following where applicable:

- Method Blank Summaries
- Blank Spike Summaries
- Matrix Spike and Duplicate Summaries
- Internal Standard Area Summaries
- Initial and Continuing Calibration Summaries
- Run Sequence Reports

Instrument Blank

Job Number: FC20573
Account: BHATALB Bhate Environmental
Project: Longhorn AAP Perchlorates; Karnack TX

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
SQ2406-IBLK	Q116083.D	1	12/05/24	AL	n/a	n/a	SQ2406

The QC reported here applies to the following samples: **Method:** SW846 6850

FC20573-1, FC20573-2, FC20573-3, FC20573-4, FC20573-5, FC20573-6

CAS No.	Compound	Result	RL	MDL	Units	Q
14797-73-0	Perchlorate	ND	0.20	0.050	ug/l	

Method Blank Summary

Job Number: FC20573
Account: BHATALB Bhate Environmental
Project: Longhorn AAP Perchlorates; Karnack TX

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP6728-MB	Q116045.D	1	12/05/24	AL	12/03/24	OP6728	SQ2406

The QC reported here applies to the following samples: **Method:** SW846 6850

FC20573-1, FC20573-2, FC20573-3, FC20573-4, FC20573-5, FC20573-6

CAS No.	Compound	Result	RL	MDL	Units	Q
14797-73-0	Perchlorate	ND	0.20	0.050	ug/l	

Blank Spike Summary

Job Number: FC20573
Account: BHATALB Bhate Environmental
Project: Longhorn AAP Perchlorates; Karnack TX

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP6728-BS	Q116044.D	1	12/05/24	AL	12/03/24	OP6728	SQ2406

The QC reported here applies to the following samples: **Method:** SW846 6850

FC20573-1, FC20573-2, FC20573-3, FC20573-4, FC20573-5, FC20573-6

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits
14797-73-0	Perchlorate	0.2	0.20	100	80-120

* = Outside of Control Limits.

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: FC20573
Account: BHATALB Bhate Environmental
Project: Longhorn AAP Perchlorates; Karnack TX

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP6728-MS	Q116047.D	100	12/05/24	AL	12/03/24	OP6728	SQ2406
OP6728-MSD	Q116048.D	100	12/05/24	AL	12/03/24	OP6728	SQ2406
FC20570-1	Q116046.D	100	12/05/24	AL	12/03/24	OP6728	SQ2406

The QC reported here applies to the following samples: **Method:** SW846 6850

FC20573-1, FC20573-2, FC20573-3, FC20573-4, FC20573-5, FC20573-6

CAS No.	Compound	FC20570-1 ug/l	Q	Spike ug/l	MS ug/l	MS %	Spike ug/l	MSD ug/l	MSD %	RPD	Limits Rec/RPD
14797-73-0	Perchlorate	4830		0.2	4780	-25000*	0.2	4820	-5000*	[a]1	80-120/15

(a) Outside control limits due to high level in sample relative to spike amount.

* = Outside of Control Limits.

Internal Standard Area Summary

Job Number: FC20573
Account: BHATALB Bhate Environmental
Project: Longhorn AAP Perchlorates; Karnack TX

Check Std:	SQ2406-CC2406	**Injection Date:**	12/05/24
Lab File ID:	Q116041.D	**Injection Time:**	15:18
Instrument ID:	GCMSQ	**Method:**	SW846 6850

	IS 1 AREA	RT
Initial Cal [a]	40447	4.23
Check Std [b]	47580	4.24
Upper Limit [c]	60671	6.24
Lower Limit [d]	20224	2.24

Lab Sample ID	IS 1 AREA	RT
OP6728-BS	46852	4.24
OP6728-MB	46951	4.24
FC20570-1	46361	4.23
OP6728-MS	46990	4.23
OP6728-MSD	45857	4.23
ZZZZZZ	42591	4.13
ZZZZZZ	45131	4.13
ZZZZZZ	47091	4.13
FC20573-1	45836	4.19
FC20573-2	46099	4.19

IS 1 = Cl18O4 (ISTD)

(a) Initial Cal is: SQ2406-ICC2406 Q116024.D 12/05/24 13:21. Area is AVERAGE of initial cal points.
(b) Check Std Limit = -50 to + 50% of initial cal area.
(c) Upper Limit = + 50% of initial standard area; Retention time + 2 minutes of check standard.
(d) Lower Limit = -50% of initial standard area; Retention time -2 minutes of check standard.

Internal Standard Area Summary

Job Number: FC20573
Account: BHATALB Bhate Environmental
Project: Longhorn AAP Perchlorates; Karnack TX

Check Std:	SQ2406-CC2406	**Injection Date:**	12/05/24
Lab File ID:	Q116054.D	**Injection Time:**	16:48
Instrument ID:	GCMSQ	**Method:**	SW846 6850

	IS 1 AREA	RT
Initial Cal [a]	40447	4.23
Check Std [b]	50595	4.23
Upper Limit [c]	60671	6.23
Lower Limit [d]	20224	2.23

Lab Sample ID	IS 1 AREA	RT
FC20573-3	45298	4.19
FC20573-4	44623	4.19
FC20573-5	44773	4.19
FC20573-6	44707	4.19
ZZZZZZ	45084	4.06
ZZZZZZ	43145	4.07
ZZZZZZ	51665	4.23
ZZZZZZ	45983	4.11
ZZZZZZ	54008	4.23
ZZZZZZ	55250	4.23

IS 1 = Cl18O4 (ISTD)

(a) Initial Cal is: SQ2406-ICC2406 Q116024.D 12/05/24 13:21. Area is AVERAGE of initial cal points.
(b) Check Std Limit = -50 to + 50% of initial cal area.
(c) Upper Limit = + 50% of initial standard area; Retention time + 2 minutes of check standard.
(d) Lower Limit = -50% of initial standard area; Retention time -2 minutes of check standard.

Initial Calibration Summary

Job Number: FC20573
Account: BHATALB Bhate Environmental
Project: Longhorn AAP Perchlorates; Karnack TX

Sample: SQ2406-ICC2406
Lab FileID: Q116024.D

Initial Calibration Report

Method Path	D:\MassHunter\Methods
Method File	6850_120524_SQ2406.quantmethod.xml
Batch Name	D:\MassHunter\Data\120524_6850_SQ2406\QuantResults\sq2406.batch.bin
Last Calib Update	12/9/2024 9:18:26 AM

Level Name	Calibration Files	Acq. Date-Time	Level Last Update Time
1	D:\MassHunter\Data\120524_6850_SQ2406\Q116021.d	12/5/2024 1:00:40 PM	12/9/2024 9:18:26 AM
2	D:\MassHunter\Data\120524_6850_SQ2406\Q116022.d	12/5/2024 1:07:32 PM	12/9/2024 9:18:26 AM
3	D:\MassHunter\Data\120524_6850_SQ2406\Q116023.d	12/5/2024 1:14:25 PM	12/9/2024 9:18:26 AM
4	D:\MassHunter\Data\120524_6850_SQ2406\Q116024.d	12/5/2024 1:21:17 PM	12/9/2024 9:18:26 AM
5	D:\MassHunter\Data\120524_6850_SQ2406\Q116025.d	12/5/2024 1:28:09 PM	12/9/2024 9:18:26 AM
6	D:\MassHunter\Data\120524_6850_SQ2406\Q116026.d	12/5/2024 1:35:02 PM	12/9/2024 9:18:26 AM
7	D:\MassHunter\Data\120524_6850_SQ2406\Q116027.d	12/5/2024 1:41:54 PM	12/9/2024 9:18:26 AM
8	D:\MassHunter\Data\120524_6850_SQ2406\Q116028.d	12/5/2024 1:48:48 PM	12/9/2024 9:18:26 AM

Compound	Curve Fit	1	2	3	4	5	6	7	8	Avg RF	%RSD
I Cl18O4		---------- ISTD ----------									
T Perchlorate	Quadratic	1.0971	1.0607	1.1243	1.1937	1.1905	1.2240	1.2884	1.3675	1.1933	8.495

(RedFont and #) = Outlier Flag; (I) = Internal Standard; (T) = Target; (S) = Surrogate; (M) = Matrix Spike

Initial Calibration Summary

Job Number: FC20573
Account: BHATALB Bhate Environmental
Project: Longhorn AAP Perchlorates; Karnack TX

Sample: SQ2406-ICC2406
Lab FileID: Q116024.D

Initial Calibration Report

Compounds with Curve fitting not using Avg Response Factor:

Compound	Curve Fit	Curve Fit Formula	Curve Fit R2
T Perchlorate	Quadratic	y = 0.016868 * x ^ 2 + 1.199327 * x	0.999987

(RedFont and #) = Outlier Flag; (I) = Internal Standard; (T) = Target; (S) = Surrogate; (M) = Matrix Spike

Generated at 9:19 AM on 12/9/2024

Initial Calibration Verification

Job Number: FC20573
Account: BHATALB Bhate Environmental
Project: Longhorn AAP Perchlorates; Karnack TX

Sample: SQ2406-ICV2406
Lab FileID: Q116029.D

Continuing Calibration Report

Batch: D:\MassHunter\Data\120524_6850_SQ2406\sq2406.batch.bin

Level ID:Calibration File
1:D:\MassHunter\Data\120524_6850_SQ2406\Q116021.d
2:D:\MassHunter\Data\120524_6850_SQ2406\Q116022.d
3:D:\MassHunter\Data\120524_6850_SQ2406\Q116023.d
4:D:\MassHunter\Data\120524_6850_SQ2406\Q116024.d
5:D:\MassHunter\Data\120524_6850_SQ2406\Q116025.d
6:D:\MassHunter\Data\120524_6850_SQ2406\Q116026.d
7:D:\MassHunter\Data\120524_6850_SQ2406\Q116027.d
8:D:\MassHunter\Data\120524_6850_SQ2406\Q116028.d

Data File: Q116029
Type : QC
Level : 4

Cpnd Name	Exp. Conc	Final Conc	Dev %	Area %
Cl18O4	---	--ISTD--		
Perchlorate	2.000	2.244	12.2	112.2

CC Criteria: +/- 15%

Continuing Calibration Summary

Job Number: FC20573
Account: BHATALB Bhate Environmental
Project: Longhorn AAP Perchlorates; Karnack TX

Sample: SQ2406-CC2406
Lab FileID: Q116041.D

Continuing Calibration Report

Batch: D:\MassHunter\Data\120524_6850_SQ2406\sq2406.batch.bin

Level ID:Calibration File
1:D:\MassHunter\Data\120524_6850_SQ2406\Q116021.d
2:D:\MassHunter\Data\120524_6850_SQ2406\Q116022.d
3:D:\MassHunter\Data\120524_6850_SQ2406\Q116023.d
4:D:\MassHunter\Data\120524_6850_SQ2406\Q116024.d
5:D:\MassHunter\Data\120524_6850_SQ2406\Q116025.d
6:D:\MassHunter\Data\120524_6850_SQ2406\Q116026.d
7:D:\MassHunter\Data\120524_6850_SQ2406\Q116027.d
8:D:\MassHunter\Data\120524_6850_SQ2406\Q116028.d

Data File: Q116041
Type : QC
Level : 4

Cpnd Name	Exp. Conc	Final Conc	Dev %	Area %
Cl18O4	---	--ISTD--		
Perchlorate	2.000	2.080	4.0	104.0

CC Criteria: +/- 15%

Continuing Calibration Summary

Job Number: FC20573
Account: BHATALB Bhate Environmental
Project: Longhorn AAP Perchlorates; Karnack TX

Sample: SQ2406-CC2406
Lab FileID: Q116042.D

Continuing Calibration Report

Batch: D:\MassHunter\Data\120524_6850_SQ2406\sq2406.batch.bin

Level ID:Calibration File
1:D:\MassHunter\Data\120524_6850_SQ2406\Q116021.d
2:D:\MassHunter\Data\120524_6850_SQ2406\Q116022.d
3:D:\MassHunter\Data\120524_6850_SQ2406\Q116023.d
4:D:\MassHunter\Data\120524_6850_SQ2406\Q116024.d
5:D:\MassHunter\Data\120524_6850_SQ2406\Q116025.d
6:D:\MassHunter\Data\120524_6850_SQ2406\Q116026.d
7:D:\MassHunter\Data\120524_6850_SQ2406\Q116027.d
8:D:\MassHunter\Data\120524_6850_SQ2406\Q116028.d

Data File: Q116042
Type : QC
Level : 1

Cpnd Name	Exp. Conc	Final Conc	Dev %	Area %
Cl18O4	---	--ISTD--		
Perchlorate	0.200	0.206	3.2	103.2

CC Criteria: +/- 15%

Continuing Calibration Summary

Job Number: FC20573
Account: BHATALB Bhate Environmental
Project: Longhorn AAP Perchlorates; Karnack TX

Sample: SQ2406-CC2406
Lab FileID: Q116054.D

Continuing Calibration Report

Batch: D:\MassHunter\Data\120524_6850_SQ2406\sq2406.batch.bin

Level ID:Calibration File
1:D:\MassHunter\Data\120524_6850_SQ2406\Q116021.d
2:D:\MassHunter\Data\120524_6850_SQ2406\Q116022.d
3:D:\MassHunter\Data\120524_6850_SQ2406\Q116023.d
4:D:\MassHunter\Data\120524_6850_SQ2406\Q116024.d
5:D:\MassHunter\Data\120524_6850_SQ2406\Q116025.d
6:D:\MassHunter\Data\120524_6850_SQ2406\Q116026.d
7:D:\MassHunter\Data\120524_6850_SQ2406\Q116027.d
8:D:\MassHunter\Data\120524_6850_SQ2406\Q116028.d

Data File: Q116054
Type : QC
Level : 4

Cpnd Name	Exp. Conc	Final Conc	Dev %	Area %
Cl18O4	---	--ISTD--		
Perchlorate	2.000	2.064	3.2	103.2

CC Criteria: +/- 15%

Continuing Calibration Summary

Job Number: FC20573
Account: BHATALB Bhate Environmental
Project: Longhorn AAP Perchlorates; Karnack TX

Sample: SQ2406-CC2406
Lab FileID: Q116055.D

Continuing Calibration Report

Batch: D:\MassHunter\Data\120524_6850_SQ2406\sq2406.batch.bin

Level ID:Calibration File
1:D:\MassHunter\Data\120524_6850_SQ2406\Q116021.d
2:D:\MassHunter\Data\120524_6850_SQ2406\Q116022.d
3:D:\MassHunter\Data\120524_6850_SQ2406\Q116023.d
4:D:\MassHunter\Data\120524_6850_SQ2406\Q116024.d
5:D:\MassHunter\Data\120524_6850_SQ2406\Q116025.d
6:D:\MassHunter\Data\120524_6850_SQ2406\Q116026.d
7:D:\MassHunter\Data\120524_6850_SQ2406\Q116027.d
8:D:\MassHunter\Data\120524_6850_SQ2406\Q116028.d

Data File: Q116055
Type : QC
Level : 1

Cpnd Name	Exp. Conc	Final Conc	Dev %	Area %
Cl18O4	---	--ISTD--		
Perchlorate	0.200	0.191	-4.3	95.7

CC Criteria: +/- 15%

Continuing Calibration Summary

Job Number: FC20573
Account: BHATALB Bhate Environmental
Project: Longhorn AAP Perchlorates; Karnack TX

Sample: SQ2406-CC2406
Lab FileID: Q116067.D

Continuing Calibration Report

Batch: D:\MassHunter\Data\120524_6850_SQ2406\sq2406.batch.bin

Level ID:Calibration File
1:D:\MassHunter\Data\120524_6850_SQ2406\Q116021.d
2:D:\MassHunter\Data\120524_6850_SQ2406\Q116022.d
3:D:\MassHunter\Data\120524_6850_SQ2406\Q116023.d
4:D:\MassHunter\Data\120524_6850_SQ2406\Q116024.d
5:D:\MassHunter\Data\120524_6850_SQ2406\Q116025.d
6:D:\MassHunter\Data\120524_6850_SQ2406\Q116026.d
7:D:\MassHunter\Data\120524_6850_SQ2406\Q116027.d
8:D:\MassHunter\Data\120524_6850_SQ2406\Q116028.d

Data File: Q116067
Type : QC
Level : 4

Cpnd Name	Exp. Conc	Final Conc	Dev %	Area %
Cl18O4	---	--ISTD--		
Perchlorate	2.000	2.029	1.4	101.4

CC Criteria: +/- 15%

Continuing Calibration Summary

Job Number: FC20573
Account: BHATALB Bhate Environmental
Project: Longhorn AAP Perchlorates; Karnack TX

Sample: SQ2406-CC2406
Lab FileID: Q116068.D

Continuing Calibration Report

Batch: D:\MassHunter\Data\120524_6850_SQ2406\sq2406.batch.bin

Level ID:Calibration File
1:D:\MassHunter\Data\120524_6850_SQ2406\Q116021.d
2:D:\MassHunter\Data\120524_6850_SQ2406\Q116022.d
3:D:\MassHunter\Data\120524_6850_SQ2406\Q116023.d
4:D:\MassHunter\Data\120524_6850_SQ2406\Q116024.d
5:D:\MassHunter\Data\120524_6850_SQ2406\Q116025.d
6:D:\MassHunter\Data\120524_6850_SQ2406\Q116026.d
7:D:\MassHunter\Data\120524_6850_SQ2406\Q116027.d
8:D:\MassHunter\Data\120524_6850_SQ2406\Q116028.d

Data File: Q116068
Type : QC
Level : 1

Cpnd Name	Exp. Conc	Final Conc	Dev %	Area %
Cl18O4	---	--ISTD--		
Perchlorate	0.200	0.179	-10.7	89.3

CC Criteria: +/- 15%

Run Sequence Report

Job Number: FC20573
Account: BHATALB Bhate Environmental
Project: Longhorn AAP Perchlorates; Karnack TX

Run ID: SQ2406 **Method:** SW846 6850 **Instrument ID:** GCMSQ

Lab Sample ID	Lab File ID	Date/Time Analyzed	Prep QC Batch	Client Sample ID
SQ2406-IC2406	Q116020.D	12/05/24 12:53	n/a	Mass Calibration Verification
SQ2406-IC2406	Q116021.D	12/05/24 13:00	n/a	Initial cal 0.2
SQ2406-IC2406	Q116022.D	12/05/24 13:07	n/a	Initial cal 0.5
SQ2406-IC2406	Q116023.D	12/05/24 13:14	n/a	Initial cal 1.0
SQ2406-ICC2406	Q116024.D	12/05/24 13:21	n/a	Initial cal 2
SQ2406-IC2406	Q116025.D	12/05/24 13:28	n/a	Initial cal 5
SQ2406-IC2406	Q116026.D	12/05/24 13:35	n/a	Initial cal 10
SQ2406-IC2406	Q116027.D	12/05/24 13:41	n/a	Initial cal 25
SQ2406-IC2406	Q116028.D	12/05/24 13:48	n/a	Initial cal 50
SQ2406-ICV2406	Q116029.D	12/05/24 13:55	n/a	Initial cal verification 2
SQ2406-CC2406	Q116031.D	12/05/24 14:09	n/a	Continuing cal 2
SQ2406-CC2406	Q116032.D	12/05/24 14:16	n/a	Continuing cal 0.2
OP6727-BS	Q116033.D	12/05/24 14:23	OP6727	Blank Spike
OP6727-MB	Q116034.D	12/05/24 14:30	OP6727	Method Blank
FC20413-1	Q116035.D	12/05/24 14:37	OP6727	(used for QC only; not part of job FC20573)
OP6727-MS	Q116036.D	12/05/24 14:43	OP6727	Matrix Spike
OP6727-MSD	Q116037.D	12/05/24 14:50	OP6727	Matrix Spike Duplicate
ZZZZZZ	Q116038.D	12/05/24 14:57	OP6727	(unrelated sample)
ZZZZZZ	Q116039.D	12/05/24 15:04	OP6727	(unrelated sample)
ZZZZZZ	Q116040.D	12/05/24 15:11	OP6727	(unrelated sample)
SQ2406-CC2406	Q116041.D	12/05/24 15:18	n/a	Continuing cal 2
SQ2406-CC2406	Q116042.D	12/05/24 15:25	n/a	Continuing cal 0.2
OP6728-BS	Q116044.D	12/05/24 15:39	OP6728	Blank Spike
OP6728-MB	Q116045.D	12/05/24 15:45	OP6728	Method Blank
FC20570-1	Q116046.D	12/05/24 15:52	OP6728	(used for QC only; not part of job FC20573)
OP6728-MS	Q116047.D	12/05/24 15:59	OP6728	Matrix Spike
OP6728-MSD	Q116048.D	12/05/24 16:06	OP6728	Matrix Spike Duplicate
ZZZZZZ	Q116049.D	12/05/24 16:13	OP6728	(unrelated sample)
ZZZZZZ	Q116050.D	12/05/24 16:20	OP6728	(unrelated sample)
ZZZZZZ	Q116051.D	12/05/24 16:27	OP6728	(unrelated sample)
FC20573-1	Q116052.D	12/05/24 16:34	OP6728	HBW7_111924
FC20573-2	Q116053.D	12/05/24 16:41	OP6728	HBW10_111924
SQ2406-CC2406	Q116054.D	12/05/24 16:48	n/a	Continuing cal 2
SQ2406-CC2406	Q116055.D	12/05/24 16:55	n/a	Continuing cal 0.2
FC20573-3	Q116057.D	12/05/24 17:09	OP6728	HBW1_111924
FC20573-4	Q116058.D	12/05/24 17:16	OP6728	HBW1_111924-A
FC20573-5	Q116059.D	12/05/24 17:23	OP6728	GPW1_111924
FC20573-6	Q116060.D	12/05/24 17:30	OP6728	GPW3_111924
ZZZZZZ	Q116061.D	12/05/24 17:37	OP6728	(unrelated sample)
ZZZZZZ	Q116062.D	12/05/24 17:43	OP6728	(unrelated sample)
ZZZZZZ	Q116063.D	12/05/24 17:50	OP6728	(unrelated sample)
ZZZZZZ	Q116064.D	12/05/24 17:57	OP6728	(unrelated sample)
ZZZZZZ	Q116065.D	12/05/24 18:04	OP6728	(unrelated sample)
ZZZZZZ	Q116066.D	12/05/24 18:11	OP6728	(unrelated sample)
SQ2406-CC2406	Q116067.D	12/05/24 18:18	n/a	Continuing cal 2
SQ2406-CC2406	Q116068.D	12/05/24 18:25	n/a	Continuing cal 0.2

Run Sequence Report

Job Number: FC20573
Account: BHATALB Bhate Environmental
Project: Longhorn AAP Perchlorates; Karnack TX

Run ID: SQ2406	**Method:** SW846 6850	**Instrument ID:** GCMSQ

Lab Sample ID	Lab File ID	Date/Time Analyzed	Prep QC Batch	Client Sample ID
ZZZZZZ	Q116070.D	12/05/24 18:39	OP6728	(unrelated sample)
ZZZZZZ	Q116071.D	12/05/24 18:45	OP6728	(unrelated sample)
ZZZZZZ	Q116072.D	12/05/24 18:52	OP6728	(unrelated sample)
ZZZZZZ	Q116073.D	12/05/24 18:59	OP6728	(unrelated sample)
SQ2406-CC2406	Q116074.D	12/05/24 19:06	n/a	Continuing cal 2
SQ2406-CC2406	Q116075.D	12/05/24 19:13	n/a	Continuing cal 0.2
SQ2406-CC2406	Q116081.D	12/05/24 19:54	n/a	Continuing cal 2
SQ2406-ECC2406	Q116082.D	12/05/24 20:01	n/a	Ending cal 0.2
SQ2406-IBLK	Q116083.D	12/05/24 20:08	n/a	Instrument Blank
SQ2406-IBLK	Q116083.D	12/05/24 20:08	n/a	Instrument Blank

DEPARTMENT OF THE ARMY
US ARMY INSTALLATION MANAGEMENT COMMAND
US ARMY ENVIRONMENTAL COMMAND
2455 REYNOLDS ROAD
JOINT BASE SAN ANTONIO FORT SAM HOUSTON, TX 78234-7588

March 4, 2025

SUBJECT: Final Tenth Annual Remedial Action Operation Report, LHAAP-46 (Plant 2 Area), Longhorn Army Ammunition Plant (LHAAP), Karnack, Texas, March 2025

Mr. Brian Follin
U.S. Environmental Protection Agency
1201 Elm Street, Suite 500
Dallas, TX 75270-2002

Dear Mr. Follin,

An electronic copy of the above referenced document has been added to the project portal's "Documents" folder at the following address for your records: (https://aptimcorp.sharepoint.com/sites/501032/regulators/Shared%20Documents/Forms/AllItems.aspx). An electronic copy of this letter and download instructions for the electronic file have been sent via email. The document includes revisions based upon comments on the Draft Final version received from the Texas Commission on Environmental Quality (TCEQ) on February 4, 2025.

The document was prepared by the PCI-Bhate Joint Venture (PCI-Bhate) team, on behalf of the Army as part of PCI-Bhate's Performance Based Remediation contract for the facility. I ask that Zack Beck, PCI-Bhate's Project Manager, be copied on any communications related to the project.

The point of contact for this action is the undersigned. I may be contacted at (210) 846-8652, or by email at: michael.a.bowlby.civ@army.mil.

Sincerely,

Michael A. Bowlby

Michael Bowlby
Team Lead, EPA Regions 6 and 8
U.S. Army Environmental Command

Electronic copies furnished:
A. Palmie, TCEQ, Austin, TX
J. Reyes, USEPA Region 6, Dallas, TX
E. Duerkop, USFWS, Caddo Lake NWR, TX

C. Montoya, USACE, Tulsa District, OK
A. Williams, USACE, Tulsa District, OK
K. Russell, BRAC, Huntsville, AL
Z. Beck, Bhate, Lakewood, CO
N. Alfino, PCI Environmental, Denver, CO
P. Srivastav, APTIM, Houston, TX

DEPARTMENT OF THE ARMY
US ARMY INSTALLATION MANAGEMENT COMMAND
US ARMY ENVIRONMENTAL COMMAND
2455 REYNOLDS ROAD
JOINT BASE SAN ANTONIO FORT SAM HOUSTON, TX 78234-7588

March 4, 2025

SUBJECT: Final Tenth Annual Remedial Action Operation Report, LHAAP-46 (Plant 2 Area), Longhorn Army Ammunition Plant (LHAAP), Karnack, Texas, March 2025

Ms. April Palmie
Texas Commission on Environmental Quality
Superfund Section, MC-136
12100 Park 35 Circle, Bldg D
Austin, TX 78753

Dear Ms. Palmie,

An electronic copy of the above referenced document has been added to the project portal's "Documents" folder at the following address for your records: (https://aptimcorp.sharepoint.com/sites/501032/regulators/Shared%20Documents/Forms/AllItems.aspx). An electronic copy of this letter and download instructions for the electronic file have been sent via email. The document includes revisions based upon comments on the Draft Final version received from the Texas Commission on Environmental Quality (TCEQ) on February 4, 2025.

The document was prepared by the PCI-Bhate Joint Venture (PCI-Bhate) team, on behalf of the Army as part of PCI-Bhate's Performance Based Remediation contract for the facility. I ask that Zack Beck, PCI-Bhate's Project Manager, be copied on any communications related to the project.

The point of contact for this action is the undersigned. I may be contacted at (210) 846-8652, or by email at: michael.a.bowlby.civ@army.mil.

Sincerely,

Michael A. Bowlby

Michael Bowlby
Team Lead, EPA Regions 6 and 8
U.S. Army Environmental Command

Electronic copies furnished:
B. Follin, USEPA Region 6, Dallas, TX
J. Reyes, USEPA Region 6, Dallas, TX
E. Duerkop, USFWS, Caddo Lake NWR, TX

C. Montoya, USACE, Tulsa District, OK
A. Williams, USACE, Tulsa District, OK
K. Russell, BRAC, Huntsville, AL
Z. Beck, Bhate, Lakewood, CO
N. Alfino, PCI Environmental, Denver, CO
P. Srivastav, APTIM, Houston, TX

Draft 10th Annual Remedial Action Operation Report, LHAAP-46 (Plant 2 Area), Longhorn Army Ammunition Plant (LHAAP), Karnack, Texas, September 2024

Submitted by: U.S. Environmental Protection Agency
Responded by: Aptim Federal Services Inc.
Date Responded: 11/18/24

1. Respondent concurs (C) or does not concur (D)
2. Commenter agrees (A) or does not agree (D) with response.

Number	Section/Page	Paragraph/Line	Comment	C, D	Response	A,D
Reviewer #1:						
1	Fig. 2-1	Explanation and map portions of figure	1) In the explanation, it is unclear why the word "Historical" is included before the text "Groundwater Flow Direction." 2) The potentiometric-surface map contours are highly inferred and should be dashed.	C	It appears the comment should be directed at Figure 2-2. Figure 2-2 has been revised to delete "Historical" from the legend and the contours have been dashed to imply inferred.	
2	Section 2.2.1.1, p. 2-2 to 2-3, figs. 2-3 and 2-4	General comment	The report text does not specify the source(s) of the intermediate zone depths and lithologic information for the various wells, nor does the notes section of figs. 2-3 and 2-4 provide this information.	C	The source of the shallow and intermediate zone depths is identified in the text as boring logs found in the RACR (AECOM 2015a) from the shallow and nearest intermediate zone wells in the 2nd sentence of the 3rd paragraph of Section 2.2.1.1. Note 2 has been added to Figures 2-3 and 2-4 stating "Screen depths and lithology are obtained from well construction forms and boring logs (AECOM 2015a)".	
3	Section 2.2.1.1, p. 2-3	3rd complete paragraph, 1st sentence (begins with "The groundwater elevations…")	It would be beneficial to cite table 2-3 at the end of this sentence.	C	Text has been revised accordingly.	
4	Section 2.2.1.2, p. 2-3 and fig. 2-5	1st paragraph, last sentence	1) This sentence indicates groundwater flow in the intermediate zone is to the north and northwest. However, the potentiometric-surface map in fig.	C	Text has been revised to note groundwater flow to the northeast.	

Number	Section/Page	Paragraph/Line	Comment	C, D	Response	A,D
			2-5 indicates groundwater within the LUC boundary also flows to the northeast in the eastern part of the area. For instance, groundwater that follows a conceptual flowpath that begins approximately midway between wells 46WW02 and LHSMW23R would predominantly flow in a northeastern direction toward well 46WW14. 2) It is recommended to add a flow arrow for this area to depict this potential groundwater flowpath.		Figure 2-5 has been revised to include flow arrow.	
5	Section 3.1.1, p. 3-3, **Well LHSMW21** subsection	1st paragraph	1) This well's trends testing period is markedly different from that of the other wells subjected to trends testing. In particular, it is substantially longer (1996–2024 in LHSMW21 vs 2013–2024 in other wells) and incorporates a 15-year gap (May 1998–September 2013) with no available data. Therefore, it is important to discuss this difference when discussing the trends testing results for this well and comparing them to the trends testing of the other wells. 2) The trends testing period for this well should be specified somewhere in this paragraph (best location may be after "significant increasing trend" in last sentence of paragraph).	C	The longer data period for LHSMW21 came about because the well was not sampled between 2013 and 2019 in favor of attempting to sample LHSMW20. However, the 4th Annual RA-O Report recommended changing the network to remove LHSMW 20 and include LHSMW21 due to persistent dry conditions in LHSMW20. The trend analysis in the first few annual reports after that incorporated the available data prior to 2013 (1996-1998) to provide more data points upon which to base the Mann-Kendall trend analysis. With the 2024 sample data included, there are now eight data points available from 2013 to 2018, and the trend analysis has been revised to remove the 1996-1998 data to make the trend analysis period 2013 to 2024 to match the other wells. The evaluation in Appendix E and Table 3-1 are	

Number	Section/Page	Paragraph/Line	Comment	C, D	Response	A,D
					revised and the text in Section 3.1.1 has been revised to "The Mann-Kendall trend analysis for the 2013 to 2024 evaluation period in LHSMW21 for TCE and cis-1,2-DCE indicates a statistically significant increasing trend with a confidence factors of 98.4 percent and 97.7 percent, respectively, and for VC a statical trend of probably increasing with a confidence factor of 92.9 percent as shown in **Table 3-1** and **Appendix E**." to reflect this change.	
6	Section 3.1.1, p. 3-3, **Well LHSMW21** subsection	2nd paragraph, 3rd sentence	This sentence suggests simultaneous decreases in COC concentrations indicate that biodegradation is not occurring at this time. A more detailed explanation would be helpful here.	C	The text has been revised to the following "However, the concurrent decrease in TCE, cis-1,2-DCE, and VC during the tenth year RA-O period indicates biodegradation may not be occurring at this time (would expect to observe an increase in daughter products) and may instead be the result of localized dilution."	
7	Section 3.1.1, p. 3-3, **Well LHSMW21** subsection	2nd paragraph, 4th sentence	In the context of this sentence, it would be beneficial to add the word "zone" after the word "shallow" at both locations in the sentence.	C	Text has been revised accordingly.	
8	Section 3.1.1, p. 3-3, **Shallow Zone COCs and Distance** subsection	1st paragraph, 2nd sentence,	Because this report is for the year 10 RA-O, it is recommended to revise this sentence to incorporate the 2024 sampling results. In addition, the sentence would benefit from revision to improve clarity and readability. Potential revision: "*TCE concentrations at downgradient well LHSMW19 have varied over time, with concentrations decreasing below the MCL for the first time in February 2018. Subsequently, the concentration then increased to 24 µg/L in February 2023, before decreasing slightly to 18 µg/L in February 2024.*"	C	Text has been revised accordingly.	

Number	Section/Page	Paragraph/Line	Comment	C, D	Response	A,D
9	Section 3.1.1, p. 3-3, **Shallow Zone COCs and Distance** subsection	1st paragraph, 3rd sentence,	It would be beneficial to revise this sentence to incorporate the 2023 sampling results for well 46WW11 and to improve clarity and readability. Potential revision: "*The next well located downgradient from well LHSMW19 is well 46WW11, where TCE concentrations decreased from 90.6 µg/L in July 2014 to 8.5 µg/L in February 2022. The concentration then increased to 22 µg/L in February 2023, before decreasing to 18 µg/L in February 2024.*"	C	Text has been revised accordingly.	
10	Section 3.1.1, p. 3-3, **Shallow Zone COCs and Distance** subsection	1st paragraph, 6th sentence,	This sentence mentions the "historical center of the contaminant plume," yet it does not provide readers with any indication of its location. It would be helpful to should specify where this "historical center" was located.	C	Text has been revised to read "Based on the concentrations of COCs present in well LHSMW21 above MCLs, it appears concentrations were increasing away from the historical center of the contaminant plume near LHSMW19."	
11	Section 3.1.2, p. 3-4, **Well 46WW02** subsection	1st paragraph, last sentence	1) While it is accurate to state that the Mann-Kendall trend test indicated a probable decrease in TCE concentrations over time, it is important to note that concentrations have been increasing since 2020 (15 µg/L in 2020, 25 µg/L in 2021, 29 µg/L in 2022 and 2023, and 35 µg/L in 2024; table 2-6, fig. 3-1d). 2) The trend testing period for this well should be specified in this sentence (best location may be after "over time").	C	Text has been revised to "The Mann-Kendall trend analysis in 46WW02 indicates a probably decreasing trend in TCE concentrations over time (2013-2024) with a confidence factor of 90.7 percent, however concentrations have been increasing since 2020 (15 µg/L in 2020, 25 µg/L in 2021, 29 µg/L in 2022 and 2023, and 35 µg/L in 2024."	
12	Section 3.1.2, p. 3-4 and 3-5, **Well 46WW05** subsection	1st paragraph, last sentence (begins on bottom of p. 3-4 and continues on top of p. 3-5)	1) The trend testing period for this well should be specified in this sentence (best location may be after "over time"). 2) The trends testing results for this well in appendix E indicate the confidence factor was 99.9 percent, not "greater than" 99.9 percent.	C	Text has been revised accordingly.	
13	Section 3.1.2, p. 3-5, **Intermediate Zone COCs and Distance** subsection	1st paragraph, 1st sentence	Because groundwater also flows to the northeast within the LUC boundary (refer to comment #4), this sentence should be revised to specify this is the general direction	C	Text has been revised to "The direction of groundwater flow in the intermediate zone is generally to the north and northwest (**Figure 2-5**)	

Number	Section/Page	Paragraph/Line	Comment	C, D	Response	A,D
			of flow for the part of the site that includes the plumes centered on wells 46WW02 and 46WW05.		where two independent plumes exist centered on 46WW02 and 46WW05. These small plumes are separated by 46WW09 (**Figure 2-7**), where no COCs have been detected. COCs have not been detected in wells 46WW08, 46WW09 or 46WW16, cross/downgradient of wells 46WW02 and 46WW05, respectively. No COCs were observed in shallow/intermediate well 46WW17 during the tenth year RA-O sampling event."	
14	Section 3.1.2, p. 3-5, **Intermediate Zone COCs and Distance** subsection	1st paragraph, 3rd sentence	1) Based on the potentiometric-surface map in fig. 2-5, well 46WW16 appears to be more crossgradient than downgradient from well 46WW05 in February 2024. In fact, the map indicates flow in the vicinity of the plume centered on 46WW05 likely is just to the south/southwest of well 46WW16. 2) The potentiometric-surface map in fig. 2-5 indicates well 46WW08 is also downgradient of the plume centered on 46WW02.	C	See response to Comment 13. Text has been revised to "These small plumes are separated by 46WW09 (**Figure 2-7**), where no COCs have been detected. COCs have not been detected in wells 46WW08, 46WW09 or 46WW16, cross/downgradient of wells 46WW02 and 46WW05, respectively."	
15	Section 3.1.4, p. 3-5	1st paragraph, 2nd sentence	1) This sentence should reference appendix E, table 3-1, and/or section 3.3 because it is referring to the Mann-Kendall trends testing results. 2) The sentence indicates historical COC data for wells 46WW11 and LHSMW19 were evaluated for trends, which implies that more than one COC at each well was tested for trends. However, appendix E and table 3-1 indicate TCE was the only "historical COC" analyzed for trends at these wells.	C	Text has been revised to "Analysis of the historical TCE data (**Section 3.3** and **Appendix E**) indicates…" to address the referenced section and TCE being the only historical COC analyzed.	
16	Section 3.1.4, bottom of p. 3-5 and top of p. 3-6	2nd paragraph, 2nd sentence	Based on the potentiometric-surface map in fig. 2-5, well 46WW08 also can be considered to be located on a flowpath downgradient from the plume centered on 46WW02.	C	Reference to 46WW08 has been incorporated.	

Number	Section/Page	Paragraph/Line	Comment	C, D	Response	A,D
17	Section 3.1.4, p. 3-6	1st paragraph, last sentence,	1) The Mann-Kendall trend test result for TCE in well 46WW02 indicated concentrations were "probably decreasing," not "decreasing" (appendix E; table 3-1). 2) While the Mann-Kendall trend test result for well 46WW02 did indicate TCE concentrations were "probably decreasing," it is important to note that concentrations in this well have been increasing since February 2020 (fig. 3-1d; table 2-6).	E	Please note that the referenced text is discussing TCE concentration decreases in wells surrounding/ downgradient of 46WW02 and 46WW05, not the concentrations in those wells.	
18	Section 3.2, p. 3-6, **Dissolved Oxygen** subsection	1st paragraph, 3rd sentence	Although DO in the 5 impacted wells ranges from 0.46 to 1.42 mg/L, it is worth noting that measurements in 4 of 5 impacted wells were near (slightly above) 0.5 mg/L: 1) Impacted intermediate zone wells—46WW02 (0.46 mg/L) and 46WW05 (0.54 mg/L). 2) Impacted shallow zone wells—LHSMW19 (0.71 mg/L), LHSMW21 (0.53 mg/L).	C	The following text has been incorporated "Although shallow zone wells LHSMW19 (0.71 mg/L) and LHSMW21 (0.53 mg/L) and intermediate zone wells 46WW02 (0.46 mg/L) and 46WW05 (0.54 mg/L) were near 0.5 mg/L, DO levels observed in each of the impacted wells except 46WW02 are not favorable for reductive dechlorination at this time."	
19	Section 3.2, p. 3-6, **Dissolved Oxygen** subsection	1st paragraph, last sentence	The inclusion of the word "low" before "DO levels" seems to be unnecessary.	C	Referenced text has been deleted.	
20	Section 3.2, p. 3-6, **Oxidation-Reduction Potential** subsection	1st paragraph, 2nd sentence	The negative sign is missing before "50" (i.e., "ORP values less than -50 millivolts…").	E	The Remedial Action Work Plan for LHAAP-46 cites the USEPA's 1998 *Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Groundwater* as the basis for interpreting the second line of evidence for MNA. The Preliminary Screening for Anaerobic Biodegradation Processes found on Table 2-3 of that document identifies ORP <50 mV as "Reductive pathway is possible" and <-100 mV as Reductive Pathway likely". The <50	

Number	Section/Page	Paragraph/Line	Comment	C, D	Response	A,D
					mV threshold has been used for evaluation of the second line of evidence in previous RA-O Reports for LHAAP-46 and we believe it is appropriate to continue to do so to be consistent with the RAWP and the past reports. The sentence in question has been revised as follows for consistency with the screening criteria: 'ORP values less than 50 millivolts (mV) indicate that ~~the aquifer is favorable for~~ biological reductive dechlorination of chlorinated ethenes and ethanes is possible."	
21	Section 3.2, p. 3-6, **Oxidation-Reduction Potential** subsection	1st paragraph, 4th sentence	1) The negative sign is missing before "50" (i.e., "… the ORP measurements were above -50 mV…"). 2) The sentence indicates ORP measurements in 4 of 5 impacted wells were greater than -50 mV. This is incorrect—ORP values were -50 mV in all 5 impacted wells (refer to table 2-5).	E	1) See response to Comment #20. 2) The ORP readings for the five impacted wells were all well above 50 mV with the noted range of 77 to 243 mV. Text has been revised to read Revised to "In February 2024, the ORP measurements were above 50 mV at the five ~~impacted~~ wells where TCE exceeded the MCL, suggesting that groundwater conditions are oxidative within most of the plume area."	
22	Section 3.2, p. 3-8, **Ethene and Ethane** subsection	1st paragraph, 2nd sentence	1) The current sentence structure is cumbersome and unclear, and it is advisable to revise it to enhance clarity and readability. 2) The "J" qualifier is missing for the "0.586 ug/L" value.	C	Text has been revised to "During the tenth year RA-O, ethane was detected in four of the monitoring wells with COCs above MCLs. Ethane concentrations ranged from 0.586 J µg/L to 1.9 µg/L."	
23	Section 3.3, p. 3-8	2nd paragraph, 2nd sentence	Sentence is partially incorrect. The Mann-Kendall trend test result for TCE in intermediate zone well 46WW02	C	Text has been revised to "Using Mann-Kendall trend analysis, TCE	

Number	Section/Page	Paragraph/Line	Comment	C, D	Response	A,D
			indicated concentrations were "probably decreasing," not "decreasing" (appendix E; table 3-1).		concentrations showed a significant decrease over time in shallow zone wells 46WW11 and LHSMW19 and probably decreasing to decreasing in intermediate zone wells 46WW02 and 46WW05, respectively (Table 3-1 and Appendix E)."	
24	Section 4.0, p. 4-1	2nd bullet	As noted in an earlier comment, the potentiometric-surface map in fig. 2-5 indicates groundwater within the LUC boundary also flows to the northeast in the eastern part of the area.	C	Text has been revised accordingly.	
25	Section 4.0, p. 4-1	4th bullet	Agree with recommendation to install new well.	C	Noted.	
26	Section 4.0, p. 4-1	6th bullet	1) The Mann-Kendall trend test result for TCE in well 46WW02 indicated concentrations were "probably decreasing," not "decreasing" (appendix E; table 3-1). 2) While the Mann-Kendall trend test result for well 46WW02 did indicate TCE concentrations were "probably decreasing," it is important to note that concentrations in this well have been increasing since February 2020 (fig. 3-1d; table 2-6).	C	Text has been revised to "In the intermediate zone, COC concentrations show a probably decreasing and decreasing trend in wells 46WW02 and 46WW05, respectively. However, TCE concentrations at 46WW02 have been increasing since 2020 (15 µg/L in 2020, 25 µg/L in 2021, 29 µg/L in 2022 and 2023, and 35 µg/L in 2024)."	
27	Section 4.0, p. 4-2	Last paragraph, 2nd sentence	The second sentence must be revised to clarify that the conclusion regarding the decreasing concentrations in four out of five affected wells are based on the results of the Mann-Kendall trends tests, not actual concentrations because concentrations have increased in several of these wells: 1) TCE concentrations in well 46WW02 have been increasing since February 2020 (fig. 3-1d; table 2-6). 2) TCE concentrations in well 46WW05 have been increasing since February 2022 (fig. 3-1d; table 2-6).	C	Text has been revised to "The trend analysis of COC concentrations in wells with sufficient historical data was conducted. In four of the five wells where COCs were observed above the MCL, concentrations are decreasing based on the Mann-Kendall trend evaluation."	

Number	Section/Page	Paragraph/Line	Comment	C, D	Response	A,D
			3) Although there is a statistically significant decrease in TCE concentrations during the period 2013–24, a visual examination of the trends plot for well LHSMW19 suggests a general increase in concentrations beginning February 2018.			
28	Section 4.0, p. 4-2	Last paragraph, 3rd sentence	This sentence probably should be revised in response to the comments made in comment #27.	C	Sentence in question has been revised to clarify that it is referring to COC concentrations in LHSMW21.	

Response to TCEQ Comments on
Draft Tenth Annual Remedial Action Operation Report
LHAAP-46 (Plant 2 Area)

Document Date: 23 September 2024
Comment Date: 29 October 2024

Reviewer: TCEQ
Respondent: Lena Sierocinski – Army

1. Respondent Concurs (C), Does Not Concur (D), Takes Exception (E), or Delete (X)
2. Commenter Agrees (A) with response, or Does Not Agree (D) with response

Comment Number	Section/ Page	Paragraph/ Line	TCEQ Comment	C, D, E, or X	Response	A or D
1	1.0, 1-2		Sentence beginning "**Table 2-4**", revise this sentence for clarity. Suggestion: Also, two cross-sections (**Figures 2-3** and **2-4**) and **Table 2-4** are included to document the relationship between the historically dry shallow zone wells and the nearby intermediate zone wells.	C	Concur. Text has been revised to "Also, two cross-sections (**Figures 2-3** and **2-4**) and **Table 2-4** are included to evaluate the relationship between the historically dry shallow zone wells and the nearby intermediate zone wells."	
2	1.4, 1-5	3rd paragraph, last sentence.	Please revise this sentence for clarity. Suggestion: Wells that were dry during previous years continued to be dry, including 46WW04, 46WW10, and LHSMW17. These wells were last sampled in 2022, when sufficient water was present to collect a sample after being dry for several years.	C	Concur. Text has been revised accordingly.	
3	2.2.1.2, 2-3	2nd paragraph	Has the Army considered P&A of 46WW08 and replacement?	C	P&A and replacement of 46WW08 has not been discussed previously. However, we would welcome further discussion of the topic at the next MMM as a recommendation to be added to the Report.	
4			Please delete the 2nd sentence beginning "At LHSMW21". The information is covered sufficiently in the following sections. If you don't delete, revise this sentence to clean up commas, an incomplete statement about VC, and the conclusion. Noting the conclusion here of "may be occurring" conflicts with the "not occurring at this time" conclusion in 3.1.1, Well LHSMW21 section.	C	Concur. Referenced text has been deleted.	

Comment Number	Section/ Page	Paragraph/ Line	TCEQ Comment	C, D, E, or X	Response	A or D
5	3.1.1, 3-2	1st paragraph	Revise the first sentence. Suggestion: At 46WW17, which is screened across the shallow/intermediate zone, no COCs were observed above their laboratory detection limits.	C	Concur. Text has been revised accordingly.	
6	3.1, 3-6		Dissolved Oxygen, last sentence, remove "low" at the beginning of the sentence. Will read "The DO levels…" after edit.	C	Concur. Text has been revised accordingly.	
7	Table 2-4		Add the dates that go with the measurements in these columns, especially for the data in columns 9-12. It is fine to have this table a snapshot in time; the date of the data just needs to be noted.	C	Concur. Table 2-4 has been revised to include the following note: "The intermediate zone depth to water and intermediate zone groundwater elevations shown are based on readings from the February 2023 sampling event."	
8	Tables 2-5 and 2-6		I appreciate the change back to turquoise highlight for above MCL/PCL. The blue in the last report was difficult to distinguish. On Table 2-6, please make the Location Description row height shorter, comparable to the height of the Sample Date row. It would also help if this row was below the Location Code row, instead of between sample date and results.	C	Concur. Row location has been revised accordingly. Please note that the height of the Location Description row is dictated by the description being forced across only a few cells in a few cases where the data for a given well overlaps the page by only one sample. The table has been reformatted to minimize those instances to allow the row height to be smaller.	
9	Quality Control		Please add a quality control summary report. Following the LHAAP-16 Year 3 report, TCEQ requested the Army include quality control summary reports for all reports that include analytical results. Is it possible to add one to this report?	C	Concur. A quality control summary report has been prepared and incorporated into the Year 10 RAO Report. DQSRs will be prepared and included for forthcoming reports.	
10	Appendix A		Next year, try to print a new copy of the form and remove the word "sample".	C	Concur. Form will be revised accordingly.	
11	Appendix B		Is there an equipment calibration log for this event?	C	A calibration log is available and has been incorporated into Appendix C.	

Final
Tenth Annual Remedial Action Operation Report
LHAAP-46 (Plant 2 Area)
Longhorn Army Ammunition Plant
Karnack, Texas

Contract Number: W912BV23C0007
Task Order: W45XMA31085678

Rev 0
March 2025

Prepared for:

U.S. Army Corps of Engineers, Tulsa District
Contracting Division
2488 East 81st Street
Tulsa, Oklahoma 74137–4290

Prepared by:

PCIbhate

11921 Freedom Drive, Suite 550
Reston, Virginia 20190
251 333 1127

Prepared by:

APTIM

Aptim Federal Services, LLC
10333 Richmond Avenue, Suite 1030
Houston Texas 77042

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Acronyms and Abbreviations

µg/L	micrograms per liter
AECOM	AECOM Technical Services, Inc.
amsl	above mean sea level
bgs	below ground surface
Bhate	Bhate Environmental Associates, Inc.
COC	contaminant of concern
DCE	dichloroethene
DO	dissolved oxygen
EPA	U.S. Environmental Protection Agency
LHAAP	Longhorn Army Ammunition Plant
LUC	land use control
MCL	Maximum Contaminant Level
mg/L	milligram(s) per liter
MNA	monitored natural attenuation
mV	millivolts
No.	Number
ORP	oxidation-reduction potential
PCI	Poarch Creek Indians-Governmental Services
PCI-Bhate JV	Poarch Creek Indians-Governmental Services Bhate Environmental Associates, Inc. Joint Venture
RACR	Remedial Action Completion Report
RA-O	remedial action operation
RD	Remedial Design
Shaw	Shaw Environmental, Inc.
TCE	trichloroethene
TNT	trinitrotoluene
TOC	total organic carbon
U.S.	United States
USACE	U.S. Army Corps of Engineers
VC	vinyl chloride
VOC	volatile organic compound

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1.0 INTRODUCTION

The U.S. Army Corps of Engineers (USACE), Tulsa District, contracted with the Poarch Creek Indians-Governmental Services (PCI) Bhate Environmental Associates, Inc. (Bhate) Joint Venture LLC (PCI-Bhate JV) under Omaha Multiple Environmental Government Acquisition, National Small Business Multiple Award Contract Number (No.) W912BV23C0007, Environmental Remediation Services with Military Munitions Response Program, Task Order No. W45XMA31085678, to conduct environmental restoration at multiple sites at the former Longhorn Army Ammunition Plant (LHAAP). The PCI-Bhate JV Team consists of the PCI-Bhate JV as the prime contractor and Aptim Federal Services, LLC as a subcontractor responsible for remedial activities at several sites, including LHAAP-46.

LHAAP is located in east Texas, in the northeastern corner of Harrison County between State Highway 43 in Karnack, Texas, and the western shore of Caddo Lake, as shown on **Figure 1-1**. The nearest cities are Marshall, Texas, approximately 14 miles to the southwest, and Shreveport, Louisiana, approximately 40 miles to the east. Caddo Lake is a large freshwater lake that bounds LHAAP to the north and east. The eastern fence of the LHAAP installation is 3.5 miles from the Texas-Louisiana state border.

LHAAP was established in December 1941 with the primary mission of manufacturing trinitrotoluene (TNT). Production of TNT began at Plant 1 in October 1942 through 1945, then Plant 1 was placed on standby status until February 1952. In 1952, the facility was reactivated, and production of pyrotechnic ammunition, such as photoflash bombs, simulators, hand signals, and tracers for 40-millimeter ammunition, continued at Plant 2, northeast of Plant 1, through 1956. In December 1954, a third facility, Plant 3, began production of solid-fuel rocket motors for tactical missiles until 1965, when Plant 2 was reactivated. In the years following the Vietnam conflict, LHAAP continued to produce flares and other basic pyrotechnic or illuminating items for the U.S. Department of Defense inventory. From September 1988 to May 1991, LHAAP was also used for the static firing and elimination of Pershing I and II rocket motors. LHAAP-46 is the current designation of the former Plant 2 Area. Construction of facilities for producing JB-2 propellant fuel at Plant 2 began in 1944, but construction was halted in 1945 with the end of World War II. Plant 2 was used to produce pyrotechnic ammunition, such as photoflash bombs, simulators, hand signals, and tracers for 40 mm ammunition from 1952 to 1956. Plant 2 was reactivated to produce pyrotechnic and illuminating devices from 1965 to 1997. LHAAP, including Plant 2, operated until 1997 when it was placed on inactive status and classified by the U.S. Army Armament, Munitions, and Chemical Command as excess property (Shaw Environmental, Inc. [Shaw] 2011).

Remedial action operation (RA-O) activities are required at LHAAP-46 under the Record of Decision issued for the site in September 2010 (USACE 2010). The Remedial Action Completion Report (RACR) (AECOM Technical Services, Inc. [AECOM] 2015a) outlined the implementation of RA-O to address risks associated with contaminated groundwater at the LHAAP-46 site. The RACR was developed using the basis and details of the Remedial Design (RD) (Shaw 2011) and the Remedial Action Work Plan for LHAAP-46 (AECOM 2013).

Groundwater monitoring at LHAAP-46 is ongoing, as described in the RACR. This report represents the tenth year of RA-O implementation and summarizes the results of site inspections and sampling activities. RA-O groundwater sampling performed at LHAAP-46 between May 2013 and February 2024 has determined that eight of the twelve shallow wells have been dry during nearly every sampling event. Due to contractual reasons, sampling was not performed in 2017. Five of the typically dry shallow monitoring wells are located within the historical trichloroethene (TCE) plume area or to the east (downgradient) of the current shallow zone TCE plume areas. The inability to sample these shallow wells in key locations has prevented the full evaluation of the plume extent and the progress of the monitored natural attenuation (MNA) remedy at the site (AECOM 2017). A *Final Technical Memorandum – Remedial Action-Operation Monitoring at LHAAP-46* was submitted in March 2018 (Bhate 2018a), which concluded that the groundwater elevations declining in the area of LHAAP-46 were not likely to be a temporary rain-dependent issue but were part of a long-term trend of declining groundwater elevations. The memorandum recommended that MNA evaluation at LHAAP-46 should proceed without waiting for data from the dry wells, and the Texas Commission on Environmental Quality and U.S. Environmental Protection Agency (EPA) regulators concurred with the recommendation. During discussion of the Eighth Annual RA-O Report (Bhate 2023), the EPA requested additional evaluation of the screened intervals for the dry wells at LHAAP-46 relative to the bottom of the shallow zone/top of the intermediate zone to determine the potential for installation of shallow wells with deeper screened intervals. **Section 2.2.1.1** has been expanded to include a discussion of the dry shallow zone well screened intervals. Also, two cross-sections (**Figures 2-3** and **2-4**) and **Table 2-4** are included to evaluate the relationship between the historically dry shallow zone wells and the nearby intermediate zone wells. The annual RA-O sampling event for Year 10 was conducted in February 2024. An evaluation of the MNA remedy is included in **Section 3.0** of this Tenth Annual RA-O Report.

1.1 Remedial Action Objectives

The remedial action objectives for the LHAAP-46 site are to protect human health and meet applicable or relevant and appropriate requirements. There are no unacceptable ecological risks posed by the LHAAP-46 site (USACE 2010). The remedial action objectives for LHAAP-46, consistent with the reasonably anticipated future use of the site as a national wildlife refuge, are as follows:

- Protection of human health by preventing human exposure to the contaminated groundwater.
- Protection of human health and the environment by preventing contaminated groundwater from migrating into nearby surface water.
- Returning groundwater to its potential beneficial use as a drinking water source, wherever practicable.

1.2 Performance Objectives

The remedy selected for LHAAP-46 is land use controls (LUC) and MNA. The performance objectives at LHAAP-46 consist of two components: physical inspections and groundwater/surface water monitoring.

As a component of the LUC implementation, the civil survey of the LUC boundary was conducted in November 2014 and recorded in the Harrison County Courthouse in December 2014. Physical inspections are conducted annually to confirm compliance with the LUC objectives, which consist of preventing human exposure to groundwater contamination at levels that pose an unacceptable risk to a future maintenance worker and ensuring that there is no withdrawal or use of groundwater from the site for anything other than environmental monitoring and testing until the Maximum Contaminant Levels (MCLs) are attained. Groundwater monitoring of the remedy has been conducted at the site since May 2013, and LHAAP-46 is included in the facility-wide Five-Year Review. Groundwater and surface water monitoring are being conducted with the following performance objectives:

- Detect changes in environmental conditions that may reduce the efficacy of natural attenuation processes.
- Identify potentially toxic and/or mobile transformation products.
- Verify that the plume is not expanding.
- Verify no unacceptable impact to downgradient receptors, such as discharge to surface water.
- Detect new releases of contaminants to the environment that could impact effectiveness of the natural attenuation remedy.
- Verify attainment of the remediation objectives.

LHAAP-46 RA-O monitoring began in 2013. During the first two years, monitoring was performed on a quarterly basis and documented in annual reports (AECOM 2015b, 2016). In accordance with the RD (Shaw 2011), the Year 3 (AECOM 2017), Year 4 (Bhate 2019a), and Year 5 (Bhate 2020) RA-O monitoring events were conducted semiannually; the Year 6 RA-O, Year 7 RA-O, Year 8 RA-O, and Year 9 RA-O monitoring events (Bhate 2021, 2022, and 2023) were conducted on an annual basis; and the Year 10 RA-O monitoring period is the fifth event where the monitoring was conducted annually.

Groundwater monitoring attempted as part of the Year 10 RA-O consisted of groundwater sampling at twelve shallow zone wells, ten intermediate zone wells, one shallow/intermediate zone well, and one deep zone well. Of these twenty-four monitoring wells, nine shallow wells were dry such that no samples were collected for laboratory analysis. This report summarizes the LUC compliance inspection, monitoring well inspection, and results of groundwater and surface water sampling.

1.3 Site Description

Site LHAAP-46 (Plant 2 Area) is located in the north-central portion of LHAAP, in a formerly industrial area where pyrotechnic and illumination devices were produced until 1997 (**Figure 1-2**). LHAAP-46 occupies approximately 190 acres within a triangular area bounded by Avenue P to the southwest, the LHAAP property boundary fence to the north, and site LHAAP-47 to the southeast. The surface features at LHAAP-46 include asphalt-paved roads, parking areas, building foundation remnants, abandoned buildings, wooded areas, and overgrown grasses and other vegetation. The topography is relatively flat,

sloping slightly to the east, with the surface water drainage flowing to the east into tributaries of Goose Prairie Creek, which eventually discharges into Caddo Lake. LHAAP-46 has no known areas of archaeological or historical importance.

1.4 Conceptual Site Model

A detailed Conceptual Site Model for LHAAP-46 was previously developed and is presented in the Record of Decision (USACE 2010). Based on additional data collected as part of the final remedy implementation and presented in the LHAAP-46 Final RACR (AECOM 2015a), the lithologic units at the site have been characterized. Three groundwater zones, identified as the shallow, intermediate, and deep zones, are present beneath LHAAP-46. The top of the shallow groundwater zone is encountered at approximately 10 to 28 feet below ground surface (bgs) and extends to approximately 24 to 40 feet bgs beneath LHAAP-46. The lithology of the shallow zone consists mostly of clay, with relatively thin discontinuous sand layers. Groundwater tends to occur preferentially in the more permeable thin sand layers. The shallow groundwater zone is typically unconfined.

The intermediate groundwater zone is generally sandier than the shallow groundwater zone. A relatively thick sand layer was identified in the intermediate groundwater zone in three of the five monitoring wells installed during remedy implementation, but it was not present in the boreholes for monitoring wells 46WW08 and 46WW16, in the northern part of the site. A clay layer that acts as a leaky aquitard is present between the shallow and intermediate zones throughout most of the site. At 46WW17, the uppermost sandy layers appeared deeper than the other nearby shallow zone wells and there was no obvious aquitard separating the shallow zone from the intermediate zone. The well was installed in the uppermost observed saturated zone at a depth that straddles the depths typically seen for shallow and intermediate zone wells at the site, and the groundwater elevation is consistent with other nearby intermediate zone wells. Well 46WW17 is referred to as a shallow/intermediate zone well due to the position of the well screen and the lack of a confining layer to separate the two zones, and the groundwater elevations are used only in the development of potentiometric surface contours for the intermediate zone.

The groundwater elevation in the shallow groundwater zone is approximately 15 to 20 feet higher than the intermediate groundwater zone, supporting some degree of hydraulic separation between those zones. However, there is a downward vertical gradient and contaminants of concern (COCs) in the shallow groundwater zone that are also present in groundwater in the intermediate zone. Depth to groundwater was observed to range from approximately 19 to 37 feet bgs in the intermediate zone wells. The sand interval representing the intermediate zone is at a depth between 36 and 43 feet bgs.

Only one groundwater monitoring well, 46WW03, is completed in the deep groundwater zone. Based on previous investigations, the deep groundwater zone consists primarily of clay, with occasional fine sand and silt layers. However, a thick, fine-grained sand bed occurs approximately 88 feet bgs and extends to approximately 101.5 feet bgs. The upper surface of the sand is gradational, with an increase in the proportion of sand beginning at about 80 feet bgs.

The basal contact of the deep zone sand unit with the underlying shale and clay units is sharp. Monitoring well 46WW03 is screened in this deep sand bed between 90 and 100 feet bgs. The clayey section above the deep sand layer is interpreted as an aquitard separating the intermediate groundwater zone from the deep groundwater zone. A very hard layer identified at 82 feet bgs may represent the upper boundary of the deep groundwater zone where possible mineralization (cementation) has occurred. Based on the depth to groundwater in well 46WW03, it appears that the water-bearing sand in the deep zone is under confined to semiconfined conditions. Communication between the intermediate groundwater zone and the deep groundwater zone is limited based on the difference in groundwater elevations in collocated wells 46WW02 and 46WW03, which was 3.0 feet or greater during the quarterly Year 2 and semiannual Years 3 and 4 RA-O periods. During the Year 5 semiannual, and Years 6, 7, and 8 annual RA-Os, the difference in elevation was slightly lower, averaging 2.6 feet, with a downward vertical gradient, but still indicating a lack of hydraulic communication between the intermediate and deep zones in this area. Additionally, the groundwater analytical results corroborate the lack of communication between the intermediate and deep zones, as the COCs in the intermediate zone at 46WW02 have not migrated downward in the vicinity of deep well 46WW03.

Groundwater elevations in shallow and intermediate wells at the site have been declining since at least the year 2000, as documented in the *Final Technical Memorandum – Remedial Action-Operation Monitoring at LHAAP-46* (Bhate 2018a). The average decline in wells evaluated in the memorandum has been greater than 10 feet since 2000, and several of the wells at the site have run dry and have remained that way in most cases even after large rainfall events, as documented in previous RA-O reports. The conclusion of the memorandum was that the decline in groundwater elevations was not attributable to changes in rainfall. The groundwater elevations measured in February 2024 were generally consistent with those measured in previous years and most locations had groundwater elevations slightly lower than in 2023. Wells that were dry during previous years continued to be dry, including 46WW04, 46WW10, and LHSMW17. These wells were last sampled in 2022, when sufficient water was present to collect a sample after being dry for several years.

The groundwater COCs in the shallow and intermediate zones at LHAAP-46 are TCE and its daughter products: cis-1,2-dichloroethene (DCE) and vinyl chloride (VC). Human health risks associated with these COCs are the primary driver for remedial action, as the site poses no unacceptable ecological risks (USACE 2010). Previous investigations conducted at the Plant 2 Area between 1991 and 2008 determined the nature and extent of contamination in the soil, groundwater, surface water, and sediments at LHAAP-46. The most likely sources of contamination were spills resulting from a variety of support services that occurred in the area (USACE 2009, 2010). The spills resulted in soil contamination, and the COCs released to the surface soil subsequently migrated through leaching to the groundwater. The previous investigations and the risk assessments concluded that the soil, sediment, and surface water at LHAAP-46 do not pose a risk to the environment or to human health under an industrial exposure scenario for a future maintenance worker (USACE 2010).

The nearest significant surface water body to LHAAP-46 is Goose Prairie Creek, which is located approximately 1,500 feet east of the site (**Figure 1-2**). Minor drainages located north of the site and within the south-central portion of the site feed into Goose Prairie Creek. The potential exposure pathways are groundwater used as drinking water and migration of impacted groundwater into surface water. Groundwater is not used as drinking water at the refuge, and this potential exposure pathway has been eliminated for any hypothetical future receptors because LUCs are in place that prohibit the use of groundwater for any purpose other than for environmental monitoring and testing.

2.0 SITE ACTIVITIES AT LHAAP-46

This chapter describes the results of the tenth annual RA-O activities conducted between December 2023 and August 2024, including the annual LUC compliance inspection, annual groundwater monitoring, and monitoring system repairs and/or maintenance performed at LHAAP-46.

2.1 Annual Land Use Control Compliance Inspection, Well Maintenance, and Repairs

2.1.1 Annual Land Use Control Compliance Inspection

The annual LUC compliance inspection for LHAAP-46 was performed on February 22, 2024, and no LUC violations were identified. The LUC for LHAAP-46 is groundwater restriction. Groundwater use at LHAAP-46 is restricted to environmental monitoring and testing until levels of COCs in groundwater and soil allow unrestricted use and unlimited exposure. The restriction applies to groundwater underlying a 63.772-acre tract defined by the surveyed LUC boundary (AECOM 2015a). The Annual LUC Compliance Certification Documentation Form for the tenth annual RA-O period is included in **Appendix A**.

2.1.2 Well Field Operation and Maintenance

Inspections of the conditions/integrity of monitoring wells were conducted during the February 2024 sampling event, and the information was recorded on the field sampling forms. **Table 2-1** provides a summary of the maintenance activities that were performed at the site during the tenth annual RA-O period. **Appendix B** includes a photographic log, which shows the condition of the wells during this period. During the tenth annual reporting period, no noncompliance issues or concerns were noted during the annual well inspections in February 2024. No damage to well bollards, pads, or protective well casings was observed. Peeling of the paint on the protective casing was observed at LHSMW17, LHSMW19, LHSMW20, LHSMW22, and LHSMW24 and will be addressed during the Year 11 annual RA-O in February 2025. Mowing the area to control brush and weeds was conducted at LHAAP-46 on February 15, 2024.

2.2 Annual Groundwater Monitoring

LHAAP-46 tenth year RA-O monitoring wells are depicted on **Figure 2-1**. During the February 2024 sampling event, nine of the twenty-four wells planned for sampling were dry or had insufficient water for a sample to be collected, as shown in **Table 2-2**. Two wells, LHSMW20 and LHSMW24, which are only used for gauging, were dry and could not be gauged. Before collection of groundwater samples, the wells were gauged using a water level probe, and the depth to water (or bottom of the well) was recorded to the nearest 0.01 foot from the top of casing.

Groundwater samples were collected using the low-flow sampling procedures described in the Installation-Wide Work Plan (Bhate 2018b). The low-flow method is utilized to minimize the turbidity in

the groundwater samples. After water quality parameters stabilized and were within acceptable ranges, samples were collected at the same low flow rate. All groundwater samples were analyzed for volatile organic compounds (VOCs) according to SW-846 Method 8260b. Samples from a subset of wells were also analyzed for MNA parameters, as further discussed in **Section 3.0**. Sample collection field forms are provided in **Appendix C**. Laboratory analytical data packages are provided in **Appendix D**. The MNA parameter list was revised in accordance with the *Final Technical Memorandum – Monitored Natural Attenuation Parameters* (Bhate 2019b) to remove sampling for phosphorus, manganese, total iron, and dissolved iron (laboratory).

2.2.1 Groundwater Elevations and Flow Direction

Synoptic water level measurements were attempted at 26 wells in February 2024. Eleven of the wells were dry and could not be gauged. Groundwater elevations are summarized in **Table 2-3**. In accordance with the recommendations in the Fourth Annual RA-O Report (Bhate 2019a), the off-schedule attempts to gauge and sample wells that were dry during the semiannual sampling events were discontinued. As approved in the Fifth Annual RA-O Report (Bhate 2020), groundwater elevations measurements at 46WW15, LHSMW20, and LHSMW24 were added to the RA-O plan to gather additional information regarding the potentiometric surface and the extent of dry conditions in the shallow aquifer, beginning with the March 2021 event. Wells 46WW15, LHSMW20, and LHSMW24 were dry in February 2024.

2.2.1.1 Shallow Groundwater Zone

During the February 2024 monitoring event, shallow wells 46WW01, 46WW04, 46WW10, 46WW12, 46WW13, 46WW15, alternate well LHSMW18, and LHSMW22 were dry. Wells 46WW11, LHSMW19, and LHSMW21 could be gauged for groundwater in the shallow zone. Well 46WW17 straddles the shallow and intermediate zone depth range such that the groundwater elevation is representative of the intermediate zone. **Figure 2-2** presents the groundwater potentiometric surface for the shallow groundwater zone, as interpreted during the February 2024 monitoring event. Based on the gauging data collected during the February 2024 event, the groundwater flow was generally to the east and southeast.

The groundwater elevations at 46WW11, LHSMW19, and LHSMW21 have been relatively consistent over the years and have generally not changed more than 1 to 2 feet from one event to the next between 2013 and 2024 (**Table 2-3**).

For the 2024 RA-O evaluation, the screened interval depths in the 11 historically dry shallow wells were evaluated to determine where the bottom of these wells are vertically located relative to the top of the intermediate groundwater zone. The evaluation used the boring logs from the shallow wells and the nearest intermediate zone wells found in the RACR (AECOM 2015a). **Table 2-4** presents the results of the evaluation. The screened intervals for the shallow and intermediate zone wells evaluated on **Table 2-4** are shown on cross sections A-A' and B-B' (locations shown on **Figure 2-1**) presented in **Figure 2-3** and **Figure 2-4**, respectively. The intermediate zone monitoring wells that were used to project the top of the intermediate zone for each shallow zone monitoring well are projected onto the cross-section

adjacent to the shallow wells for clarity, but the locations do not necessarily reflect the intermediate zone monitoring well's actual location were it to be placed onto the cross section.

At five of the wells (46WW01, LHSMW17, LHSMW18, LHSMW20, and LHSMW22) shaded in green on **Table 2-4**, the bottom of the shallow well screen was greater than 10 feet above the top of the intermediate groundwater zone at the nearest intermediate zone well. The distance to the nearest intermediate zone well ranged from 23 feet at 46WW01 to 496 feet at LHSMW17, with an average of 259 feet. These locations are generally in the central and southern portion of the site. At two of the shallow well locations (46WW04 and 46WW10 [shaded blue in **Table 2-4**]), the bottom of the well screen was less than 10 feet above the top of the intermediate groundwater zone, with the distance to the nearest intermediate zone well ranging from 22 feet at 46WW04 to 325 feet at 46WW10. Both of those locations are along the western edge of the site. The four remaining wells (46WW12, 46WW13, 46WW15, and LHSMW24) (shaded gray in **Table 2-4**) have bottom of screen elevations that overlapped the top of the intermediate groundwater zone in the nearest intermediate well by 2.61 to 5.19 feet. The distance to the nearest intermediate zone well in those four locations ranged from 136 feet at 46WW15 to 256 feet at LHSMW24. Locations 46WW12, 46WW13, and LHSMW-24 are located to the east of the center of the site, and LHSMW15 is located 1,050 feet west of the site boundary.

The groundwater elevations in the shallow groundwater zone in the eastern and northern portions of the site, where measurable groundwater was present, ranged from 185.22 to 189.07 feet above mean sea level (amsl) at 46WW11 and LHSMW21, respectively (**Table 2-3**). The top of the intermediate zone in the nearest intermediate well for the five wells screened at least 10 feet above the top of the intermediate groundwater zone ranged from 166.37 to 174.16 amsl. This indicates that there may be enough depth below the bottom of the existing screened interval to redrill new wells screened at least five to 10 feet deeper in the shallow groundwater zone. Based on the depth to groundwater in other shallow zone monitoring wells, deeper shallow zone wells could intersect shallow groundwater without intersecting the top of the intermediate groundwater zone in the central and southern portion of the site.

2.2.1.2 Intermediate Groundwater Zone

Water was present in each of the intermediate zone wells gauged during the February 2024 gauging event. The groundwater elevations for the intermediate zone wells have been relatively consistent over the years and have generally not changed more than 1 to 2 feet from one event to the next between 2013 and 2024 (**Table 2-3**). **Figure 2-5** presents the groundwater potentiometric surface for the intermediate zone. The groundwater elevation in 46WW08 was not used in developing the contour maps because the groundwater elevation appears to be anomalously high relative to other intermediate zone wells, as has been observed in previous years. The groundwater elevation in 46WW08 continues to be similar to the shallow zone elevation. It is possible that there is leakage from the shallow zone in this area of the site or that the grout seal is leaking, such that the groundwater elevation at 46WW08 reflects shallow zone conditions. The groundwater flow direction in the intermediate groundwater zone

interpreted from the February 2024 data is generally to the north, northwest, and northeast, consistent with the flow direction presented in previous RA-O reports.

2.2.1.3 Deep Groundwater Zone

Well 46WW03 is the only well screened in the deep groundwater zone. Therefore, a potentiometric surface map for the deep zone was not constructed.

2.2.1.4 Vertical Gradients

For the shallow and intermediate zones, well pair 46WW04/46WW06 has been used in the past to evaluate the vertical gradient; however, shallow well 46WW04 was dry in February 2024 and could not be used. Therefore, the intermediate and deep zones well pair 46WW02/46WW03 has been used to evaluate the vertical gradient.

The intermediate to deep zone evaluation of the vertical gradient was conducted between collocated intermediate and deep zone wells 46WW02 and 46WW03 in February 2024. The groundwater elevations in February 2024 were 172.38 feet amsl in the intermediate well (46WW02) and 168.77 feet amsl in the deep well (46WW03), indicating a difference of 3.61 feet between these two zones with a downward vertical gradient. The head differential between the two zones indicates that there is hydraulic separation between these two units, but the layer between the intermediate and deep zones may be more permeable than the layer between the shallow and intermediate zones based on historical vertical gradients measured between the shallow and intermediate zones.

2.2.2 Groundwater Analytical Results

VOC and MNA analytical results and field measurements for the 2024 annual samples are presented in **Table 2-5**. **Table 2-6** provides historical results for LHAAP-46 COCs. Laboratory reports and the Quality Control Summary Report are provided in **Appendix D**. During the tenth year RA-O monitoring events, TCE was detected at concentrations above the MCL (5 micrograms per liter [µg/L]) in the shallow and intermediate zones at five of the sampled monitoring wells (46WW02, 46WW05, 46WW11, LHSMW19, and LHSMW21). Also, the COC, cis-1,2-DCE, was detected at concentrations above the MCL of 70 µg/L in one well, LHSMW21.

Figure 2-6 depicts the shallow zone COC results for wells sampled during the tenth year RA-O sampling events. TCE was detected above the MCL in all three of the four shallow or shallow/intermediate wells where a sufficient volume of water was present to collect a sample. At 46WW11, the TCE concentration decreased from 22 µg/L in February 2023 to 18 µg/L in February 2024. The TCE concentration at LHSMW19 decreased from 24 µg/L (26 µg/L in the field duplicate sample) in February 2023 to 18 µg/L (19 µg/L in the field duplicate sample) in February 2024. At LHSMW21, the February 2024 TCE concentration of 45 µg/L is a decrease from the recent high concentration of 61 µg/L detected in February 2023. The cis-1,2-DCE concentration at LHSMW21 also decreased from 200 µg/L in 2023 to 170 µg/L in 2024 and VC level decreased to below detection level of 1 µg/L from 8 µg/L in February 2023.

Figure 2-7 depicts the intermediate zone COC data for wells sampled in February 2024. TCE continued to be detected above the MCL in two intermediate wells (46WW02 and 46WW05) in 2024. At 46WW02, the TCE concentration increased from 29 µg/L in February 2023 to 35 µg/L in February 2024. At 46WW05, the TCE concentration increased from 33 µg/L in February 2023 to 57 µg/L in February 2024. No COCs were detected above the laboratory reporting limits in shallow/intermediate well 46WW17.

No COCs were detected above the laboratory reporting limits in the deep zone well 46WW03.

2.3 Surface Water Sampling

Figure 2-1 shows the surface water locations associated with site LHAAP-46. Surface water sample location 46SW10 is located in a tributary of Goose Prairie Creek. The location is downgradient of the intermediate zone groundwater plume but cross gradient from the shallow zone groundwater plume (**Figures 2-6** and **2-7**).

To determine if groundwater can potentially influence surface water, groundwater elevations are compared to the elevation at the bottom of the creek. The elevation of the bottom of the creek at surface water sampling location 46SW10 is 197.27 feet amsl. Well LHSMW21 is the nearest shallow zone well to the surface water sampling location and the groundwater elevation in February 2024 was 189.07 feet amsl, which was below the bottom of the creek. Therefore, groundwater was not discharging to the creek and a surface water sample was not collected.

2.4 Groundwater Monitoring Network

As approved in the Sixth Annual RA-O Report (Bhate 2021), 46WW17 was added to the sampling network beginning with the Year 7 annual sampling in March 2021. No changes to the groundwater monitoring network are planned for Year 11 (**Figure 2-8**). Year 11 RA-O sampling locations are listed in **Table 2-7**.

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3.0 NATURAL ATTENUATION EVALUATION

This section presents the results of the natural attenuation evaluation for LHAAP-46 groundwater COCs as described in the Final RD (Shaw 2011). Samples were collected in February 2024 from 15 of the 24 wells planned for the annual sampling event. Field parameters were recorded during the sampling of each of these wells. In addition, samples from two shallow zone wells and four intermediate zone wells were analyzed for additional parameters used to evaluate MNA. The analytical results are summarized in **Table 2-5**. The three lines of evidence to evaluate MNA are presented in **Sections 3.1** through **3.3**.

3.1 First Line of Evidence: Change in COC Concentrations

Natural attenuation is the combination of multiple mechanisms, including biodegradation, volatilization, dilution, advection, and adsorption that decrease contaminant concentrations. The first line of evidence evaluates the decrease in COC concentrations over time and distance. As with previous RA-O events at LHAAP-46, the inability to sample many of the shallow wells due to dry conditions hinders a full evaluation of MNA at the site. However, evaluation of the groundwater elevation trends indicated that the declining elevations were not related to lack of rainfall. Rebound of the elevations has not occurred despite abundant rainfall for the last several years, including during the winter of 2020/2021. COC concentrations for the tenth year of RA-O sampling events are provided on **Figures 2-6** and **2-7** as well as in **Tables 2-5** and **2-6**.

During the tenth annual RA-O sampling, TCE was detected at concentrations above the MCL of 5 µg/L in three shallow (46WW11, LHSMW19, and LHSMW21) and two intermediate (46WW02 and 46WW05) monitoring wells.

Mann-Kendall analysis for the tenth annual RA-O monitoring period was completed for TCE at wells where the levels were detected above the MCL. The results are presented in **Appendix E** in graphical format, with statistical results presented on the bottom of the page. The GSI Mann-Kendall Tool Kit was used for this analysis. The concentrations of COCs are presented in µg/L. Half the reporting limit was used for nondetect results. For duplicate samples, the primary sample result was used. The level of significance is calculated for each analysis and provided on the trend analysis sheet. A summary table of the Mann-Kendall results is provided in **Table 3-1**. Historical COC results for all wells are presented in **Table 2-6**.

3.1.1 Shallow Zone

In February 2024, three shallow wells had a sufficient amount of water to collect samples. Analytical results from two wells, 46WW11 and LHSMW19, indicated TCE concentrations above the MCL of 5 µg/L and analytical results from the third well, LHSMW21, indicated the presence of TCE and cis-1,2-DCE at concentrations above their respective MCLs.

At 46WW17, which is screened across the shallow/intermediate zone, no COCs were observed above their laboratory detection limits. The lack of shallow zone saturation observed during the drilling of 46WW17 currently delineates the northeastern plume boundary. However, as recommended in the Year 7 and Year 8 RA-O Reports, installation of an additional well in the shallow zone (based on screened elevation) may be advisable in the future to confirm the absence of shallow zone saturation and/or contamination to the northeast of LHSMW21.

Well 46WW11

VOC groundwater results since August 2013 are available for well 46WW11 (**Table 2-6**). TCE concentrations in this well have decreased over time from a high of 90.6 µg/L in July 2014 to a low of 8.5 µg/L in February 2022, then increased to 22 µg/L in February 2023, and then decreased to 18 µg/L in February 2024, remaining above the MCL (**Figure 3-1a**). Since 2018, cis-1,2-DCE and VC have remained below the laboratory reporting limit. The Mann-Kendall trend analysis in 46WW11 continues to indicate a statistically significant decrease in TCE concentrations over time with a confidence factor greater than 99.9 percent (**Table 3-1** and **Appendix E**).

Figure 3-1a shows a graph of TCE concentration and groundwater elevation versus time in 46WW11. The historical decrease in TCE concentrations and the lack of cis-1,2-DCE and VC indicates abiotic processes are likely to be the primary mechanism for the decrease in COCs rather than anaerobic biodegradation of TCE (**Table 2-6**).

Well LHSMW19

VOC groundwater results since December 1994 are available for well LHSMW19 (**Table 2-6**). TCE levels in this well increased from 26 µg/L in December 1994 to a high of 85.5 µg/L in February 2007. Since 2007, TCE levels have decreased to a low of 2.4 µg/L in February 2018 and have since rebounded to 24 µg/L in February 2023, and decreased to 18 µg/L in February 2024, remaining above the MCL (**Figure 3-1b**). The TCE degradation product cis-1,2-DCE has fluctuated over the years at low levels and was not detected in February 2018. The cis-1,2-DCE concentrations have slowly increased in concentration since 2018 with the February 2024 concentration of 12 µg/L still well below the MCL of 70 µg/L. VC has remained below laboratory reporting limits since 1996. Even with the rebound in TCE concentrations since 2018, the Mann-Kendall trend analysis of the analytical data for monitoring well LHSMW19 indicates a statistically significant decrease trend in TCE concentrations over time (2013–2024) with a confidence factor of 99.5 percent (**Table 3-1** and **Appendix E**).

Figure 3-1b includes a graph of TCE concentrations and groundwater elevations over time in LHSMW19. The fluctuating TCE concentrations and the presence of cis-1,2-DCE during the tenth year RA-O period indicate limited biodegradation is occurring. However, other MNA processes, including dilution and dispersion, may be the primary mechanisms for the decrease in TCE.

Well LHSMW21

VOC groundwater results are available for well LHSMW21 since February 1996 (**Table 2-6**). The TCE concentrations in this well have increased over time, from below the detection limit in 1996 to 1998, to below the MCL of 5 µg/L in 2013, to 61 µg/L in February 2023, slightly decreasing to 45 µg/L in February 2024 (**Figure 3-1c**). Since 1996, cis-1,2-DCE has also increased from below the detection limit in 1998 to 200 µg/L in February 2023 and then decreased slightly to 170 µg/L in February 2024. VC has continued to slowly increase recently and was detected at the highest concentration of 8 µg/L in February 2023, and then decreased to below the detection limit in February 2024. The Mann-Kendall trend analysis for the 2013 to 2024 evaluation period in LHSMW21 for TCE and cis-1,2-DCE indicates a statistically significant increasing trend with a confidence factors of 98.4 percent and 97.7 percent, respectively, and for VC a statical trend of probably increasing with a confidence factor of 92.9 percent as shown in **Table 3-1** and **Appendix E**.

Figure 3-1c shows a graph of TCE, cis-1,2-DCE, and VC concentrations along with groundwater elevation versus time at LHSMW21. The presence of daughter products cis-1,2-DCE and VC indicates the biological degradation of TCE has occurred at the site. However, the concurrent decrease in TCE, cis-1,2-DCE, and VC during the tenth year RA-O period indicates biodegradation may not be occurring at this time (would expect to observe an increase in daughter products) and may instead be the result of localized dilution. Monitoring well 46WW17, located to the northeast of LHSMW21, currently bounds the plume in this direction based on the lack of observed shallow zone groundwater saturation and the lack of a confining layer underlying the shallow zone permeable strata. However, it may be advisable to install a well screened only in the shallow permeable strata at a depth comparable to LHSMW21 in the future to confirm the absence of saturation and/or contamination downgradient of LHSMW21.

Other Shallow Zone Wells

Historically, COCs have been below their respective MCLs at the other shallow zone wells, except for 46WW01 and LHSMW18. During the third year RA-O period (2016), groundwater was present at 46WW01 and LHSMW18, and COC concentrations were below their respective MCLs for each of these wells. There has been insufficient water present in 46WW01 or LHSMW18 for sampling since the third year RA-O period.

Shallow Zone COCs and Distance

Based on the direction of groundwater flow, which is generally to the east or east-southeast based on limited potentiometric data in the shallow zone (**Figure 2-2**), monitoring well 46WW10 is considered a background well for the shallow zone, although 46WW10 was dry in February 2024. TCE concentrations at downgradient well LHSMW19 have varied over time, with concentrations decreasing below the MCL for the first time in February 2018. Subsequently, the concentration then increased to 24 µg/L in February 2023, before decreasing slightly to 18 µg/L in February 2024. The next well located downgradient from well LHSMW19 is well 46WW11, where TCE concentrations decreased from 90.6 µg/L in July 2014 to 8.5 µg/L in February 2022. The concentration then increased to 22 µg/L in

February 2023, before decreasing to 18 µg/L in February 2024. Monitoring well LHSMW21, which is cross gradient of these wells, did have sufficient water for sampling. Based on the concentrations of COCs present in well LHSMW21 above MCLs, it appears concentrations were increasing away from the historical center of the contaminant plume near LHSMW19. There may be a northward component to the plume migration that is not visible in the potentiometric surface contours due to the limited groundwater elevation data available. Monitoring well 46WW17 was installed in July 2020 and is located to the east-northeast of LHSMW21. This well is considered a shallow/intermediate well. Concentrations of COCs in 46WW17 are below their detection limits, and the lack of shallow saturation encountered there currently defines the northeastern edge of the shallow plume near LHSMW21.

3.1.2 Intermediate Zone

Groundwater samples were collected from nine wells in the intermediate zone during the tenth year RA-O. TCE was detected above the MCL in two wells, 46WW02 and 46WW05, which are the focus of this section.

Well 46WW02

At 46WW02, COCs have been detected above the MCLs since November 1998 (**Table 2-6**), and TCE was detected above the MCL during the tenth year RA-O monitoring period. **Figure 3-1d** includes a graph of TCE, cis-1,2-DCE, and VC concentrations over time and shows decreasing concentrations of TCE through 2020 prior to increasing to current levels with consistently low concentrations of cis-1,2-DCE and VC. The TCE concentrations in this well decreased from 38.2 µg/L to 15 µg/L between November 2014 and February 2020, before increasing to 29 µg/L in February 2022, remaining stable at 29 µg/L in 2023, and increasing to 35 µg/L in February 2024. The 15 µg/L TCE concentration detected during the sixth year RA-O was the lowest observed to date. During the past several RA-O sampling events, the TCE degradation product cis-1,2-DCE has been present at low levels (below 3 µg/L). In February 2024, VC was not detected. A Mann-Kendall trend analysis was conducted for TCE, the only COC above an MCL. The results are presented in **Appendix E**. The Mann-Kendall trend analysis in 46WW02 indicates a probably decreasing trend in TCE concentrations over time (2013–2024) with a confidence factor of 90.7 percent, however concentrations have been increasing since 2020 (15 µg/L in 2020, 25 µg/L in 2021, 29 µg/L in 2022 and 2023, and 35 µg/L in 2024).

The historical decrease in TCE concentrations and the minimal cis-1,2-DCE and VC concentrations indicate anaerobic biodegradation may have occurred in the past, however currently abiotic processes are likely to be the primary mechanism for the decrease in TCE.

Well 46WW05

VOC groundwater results are available for 46WW05 from October 2008 through the tenth year RA-O monitoring period in 2023 (**Table 2-6**). TCE, cis-1,2-DCE, VC, and 1,1-DCE have historically been detected in 46WW05; however, only TCE has been detected above its MCL since November 2014. The highest level of TCE was 144 µg/L in May 2013, and concentrations decreased to their lowest level at 6.4 µg/L in

August 2018. Concentrations rebounded to 62 µg/L in August 2019 and appear to be fluctuating since, with a detection of 57 µg/L in February 2024. **Figure 3-1e** includes a graph of concentrations of TCE, cis-1,2-DCE, and VC in monitoring well 46WW05 over time and shows an overall decrease in TCE concentrations since February 2016 although concentrations have been increasing since 2022. A Mann-Kendall trend analysis was conducted for TCE, the only COC currently above the MCL. The results are presented in **Table 3-1** and **Appendix E**. The trend analysis for TCE in 46WW05 indicates that there is a statistically significant decreasing trend in TCE concentrations over time (2013–2024) with a 99.9 percent confidence factor.

The general decrease in TCE concentrations over time and the presence of cis-1,2-DCE indicate limited biodegradation is likely occurring. Other MNA processes, including dilution and dispersion, are likely to be the primary mechanisms reducing COC concentrations in the vicinity of well 46WW05.

Other Intermediate Zone Wells

Historically, COCs have been below their respective MCLs at the remaining intermediate zone monitoring wells included in the RA-O monitoring program.

Intermediate Zone COCs and Distance

The direction of groundwater flow in the intermediate zone is generally to the north and northwest (**Figure 2-5**) where two independent plumes exist centered on 46WW02 and 46WW05. These small plumes are separated by 46WW09 (**Figure 2-7**), where no COCs have been detected. COCs have not been detected in wells 46WW08, 46WW09 or 46WW16, cross/downgradient of wells 46WW02 and 46WW05, respectively. No COCs were observed in shallow/intermediate well 46WW17 during the tenth year RA-O sampling event. The data from wells in the intermediate zone indicate that TCE is degrading over distance within the individual plumes.

3.1.3 Deep Zone

No COCs were detected at deep zone monitoring well 46WW03 during the tenth year RA-O sampling events. COCs have not been observed at this well since the well was installed and first sampled in 1998.

3.1.4 Plume Stability

Plume maps completed for the February 2024 sampling event are presented for the shallow zone and the intermediate zone on **Figures 2-6** and **2-7**, respectively. Analysis of the historical TCE data (**Section 3.3** and **Appendix E**) indicates a decreasing trend in shallow zone monitoring wells 46WW11 and LHSMW19. However, the increasing trends for TCE, cis-1,2-DCE, and VC at LHSMW21 indicate that the horizontal extent of the shallow zone plume may be fluctuating or migrating northeastward. COCs are below their detection limits at 46WW17, and the plume is bound in this direction, based on the lack of a separate shallow saturated zone noted during drilling. However, installation of an additional well at a depth comparable to LHSMW21 may be desirable to confirm the absence of shallow groundwater or

contamination downgradient of LHSMW21. Although groundwater elevations could only be measured from three wells during the February 2024 sampling event, shallow groundwater flow appears to generally be toward the east and southeast, which is consistent with the historical easterly groundwater flow direction.

In the intermediate zone, COCs were detected above MCLs in only two wells, 46WW02 and 46WW05. Based on the general direction of intermediate groundwater flow (generally to the north and northwest), the following wells are considered to be along the groundwater flowpath: 46WW02, 46WW08, 46WW09, 46WW05, and 46WW16 (**Figure 2-5**). Contaminated groundwater in the vicinity of wells 46WW02 and 46WW05 occurs in two separate, isolated plumes (**Figure 2-7**); however, no COCs have been detected above MCLs at wells downgradient of these two wells. Therefore, based on the inferred flowpath, COC levels are not increasing with distance from the source area. Concentrations of COCs in wells surrounding the most impacted wells (46WW02 and 46WW05) are decreasing over time, indicating the intermediate zone plume is not migrating.

Due to the potential for expansion of the shallow plume beyond LHSMW21, the intermediate well 46WW14 was added to the monitoring network beginning with the March 2021 annual sampling event. All three COCs were below the laboratory detection limit at 46WW14 during the February 2024 sampling event, indicating that shallow contamination at LHSMW21 has not migrated to the intermediate zone in that area.

3.2 Second Line of Evidence: Geochemical Indicators

To aid in determining if the groundwater is favorable for MNA processes, geochemical indicators are evaluated. During groundwater sampling, field parameters were collected and include dissolved oxygen (DO), oxidation-reduction potential (ORP), pH, conductivity, turbidity, and temperature. Select monitoring wells were sampled for additional MNA parameters, as shown in **Table 2-2**. **Table 2-5** provides the geochemical data used to determine if the site groundwater is favorable for MNA biological degradation processes. The MNA parameters analyzed during the tenth year of RA-O include anions (chloride, nitrate, and sulfate), total organic carbon (TOC), and dissolved gases (ethene, ethane, methane, and carbon dioxide).

Dissolved Oxygen

DO is the most thermodynamically favored electron acceptor used by microbes for biodegradation of organic carbon, whether natural or anthropogenic (EPA 1998). Anaerobic bacteria, which are the primary microbes able to degrade the site COCs, may be inhibited at DO concentrations greater than 0.5 milligram per liter (mg/L). In monitoring wells where COCs are above the MCL, the DO concentrations during the tenth year RA-O ranged from 0.46 to 1.42 mg/L, with an average of 0.73 mg/L. Although shallow zone wells LHSMW19 (0.71 mg/L) and LHSMW21 (0.53 mg/L), and intermediate zone wells 46WW02 (0.46 mg/L) and 46WW05 (0.54 mg/L), were near 0.5 mg/L, the DO levels observed in each of the impacted wells, except 46WW02, are not favorable for reductive dechlorination at this time.

Oxidation-Reduction Potential

The ORP levels indicate the oxidative or reductive potential in the aquifer and aid in determining if conditions are conducive for biodegradation. ORP values less than 50 millivolts (mV) indicate that biological reductive dechlorination of chlorinated ethenes and ethanes is possible. During the tenth year RA-O monitoring, the ORP measurements ranged from 77 to 243 mV, with an average of 146 mV. In February 2024, the ORP measurements were above 50 mV at the five wells where TCE exceeded the MCL, suggesting that groundwater conditions are oxidative within most of the plume area.

Nitrate

After DO has been depleted by microbes in the treatment zone, nitrate may be used as an electron acceptor and is reduced to nitrite. Nitrate levels above 1.0 mg/L may compete with reductive dechlorination (EPA 1998). The nitrate concentrations were all below 1.0 mg/L during the tenth year RA-O. The nitrate levels are not expected to inhibit the anaerobic degradation of site COCs.

Sulfate

After DO, nitrate, and iron have been depleted in the groundwater, sulfate is used as an electron acceptor and is reduced to sulfide. Concentrations of sulfate greater than 20 mg/L may compete with reductive dechlorination of the site COCs. However, in many plumes with high concentrations of sulfate, reductive dechlorination still occurs (EPA 1998). Sulfate was sampled in monitoring wells designated for MNA analysis during the tenth year RA-O and ranged from 238 to 4,340 mg/L in February 2024. The elevated sulfate concentrations observed at the site indicate sulfate may compete as an electron acceptor with site COCs.

Methane

Methanogenesis occurs in highly reducing conditions and generally occurs after oxygen, nitrate, iron, and sulfate have been depleted. Methane levels above 500 µg/L are considered indicative of methanogenic conditions (EPA 1998). Methane concentrations were nearly all less than 25 µg/L (75.5 µg/L was observed in 46WW11) during the tenth year RA-O and suggest that methanogenic conditions are not present in the groundwater.

Total Organic Carbon

Regardless of the electron acceptor being used, organic carbon is a required source of reduced carbon and energy to sustain microbial activity. TOC is utilized as an energy and hydrogen source to support reductive dechlorination of the chlorinated COCs. TOC concentrations greater than 20 mg/L are considered adequate to support microbial activity (EPA 1998). The highest level of TOC observed during the tenth year RA-O sampling event was 8.69 mg/L at 46WW02, indicating that carbon concentrations in the groundwater are not supportive of reductive dechlorination.

pH

The pH of the groundwater can affect the activity of microbial populations. Microbes capable of degrading chlorinated aliphatic hydrocarbons generally prefer pH values from 6 to 8 standard units (EPA 1998). The pH levels in the shallow and intermediate zones ranged from 4.8 to 7.36 standard units, with an average of 6.15 standard units during the tenth year RA-O sampling. The measured pH was below 6.0 standard units in 5 of the 15 readings collected during the tenth year RA-O sampling event and continues to be low (4.8 and 4.87) in the impacted intermediate zone wells, which is likely to be inhibiting the potential for degradation by dechlorinating bacteria.

Ethene and Ethane

Ethane and ethene are two final degradation products of the reductive dechlorination pathways for chlorinated ethanes and ethenes. During the tenth year RA-O, ethane was detected in four of the monitoring wells with COCs above MCLs. Ethane concentrations ranged from 0.586 J µg/L to 1.9 µg/L. Ethene was below the laboratory reporting limit of 0.5 µg/L in each of the primary groundwater samples analyzed. The presence of ethane detected in the four wells may indicate that some reductive dechlorination may be occurring, although ethene was not detected.

Geochemical Indicator MNA Parameter Summary

The qualitative assessment of groundwater geochemical indicators collected during the tenth year RA-O period continues to indicate that current groundwater conditions are not favorable for MNA processes via biological reduction. The presence of the degradation products, cis-1,2-DCE, VC, and ethane suggests that limited but complete biological degradation may be occurring. However, the primary MNA processes responsible for reducing concentrations appear to be abiotic.

3.3 Third Line of Evidence: Predictive Analysis and Microbial Analysis

If the first two lines of evidence for MNA are deemed inadequate or inconclusive and/or the need for a contingency remedy is evaluated, data from field or microcosm studies will be necessary to establish the third line of evidence for MNA. The COC and geochemistry data indicate that abiotic degradation of the site contaminants is the primary mechanism reducing concentrations, and therefore, the microbial analysis is not required. Dechlorinating bacteria such as *Dehalococcoides Mccartyi* and associated functional genes have not been measured at this site and could not be used to assess whether they exist naturally at the site.

Also, predictive analysis using degradation rates can be used as a third line of evidence to estimate the time required to reach the MCL. Using Mann-Kendall trend analysis, TCE concentrations showed a significant decrease over time in shallow zone wells 46WW11 and LHSMW19, and probably decreasing to decreasing in intermediate zone wells 46WW02 and 46WW05, respectively (**Table 3-1** and **Appendix E**). The calculated first order rate constants and the times to achieve the MCL of 5 µg/L are included in **Appendix F**.

At shallow groundwater well 46WW11, the first order rate constant was calculated at 0.0005 day^{-1} and the time to achieve the MCL of 5 µg/L from the February 2024 concentration of 18 µg/L is estimated at 7.0 years. For LHSMW19, the first order rate constant is 0.0002 day^{-1} and the time to achieve the MCL of 5 µg/L from the February 2024 concentration of 18 µg/L is estimated at 17.5 years. At intermediate zone well 46WW05, the first order rate constant is 0.00004 day^{-1} and the time to achieve the MCL of 5 µg/L from the February 2024 concentration of 57 µg/L is estimated at 166.7 years. At intermediate zone well 46WW02, the first order rate constant is 0.00006 day^{-1} and the time to achieve the MCL of 5 µg/L from the February 2024 concentration of 35 µg/L is estimated at 88.9 years.

These predictions assume that the decrease in concentrations will continue at the same rate as calculated from recent data. The predictive analysis estimates that TCE may decrease to below the MCL in areas where decreasing concentrations are observed in 166.7 years at LHAAP-46. The tenth annual RA-O estimate of predictive analysis cleanup time based on the wells with decreasing trends increased from the ninth annual RA-O estimate of 24.1 years due to steady concentrations at 46WW02 that resulted in a decrease in the first order rate constant from 0.0001 to 0.00006. In addition, this analysis only applies to wells with a decreasing trend, and currently there are increasing trends for TCE, cis-1,2-DCE, and VC at LHSMW21, so the time to reach the MCL throughout the site groundwater cannot be determined at this time.

While these calculations provide an estimated time to achieve the MCL at each location with a decreasing trend, given lithologic variability and groundwater elevation fluctuations that may influence COC concentrations, the time necessary to achieve the MCL may vary by an order of magnitude or more. Additionally, the rate of reduction could diminish over time as the residual concentrations decrease, and the time frames to achieve the MCL may be longer than estimated by these calculations.

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4.0 CONCLUSIONS AND RECOMENDATIONS

During the tenth year RA-O monitoring at LHAAP-46, samples were collected from shallow, intermediate, and deep zone wells in February 2024. Samples were analyzed for VOCs and geochemical parameters to evaluate effectiveness of MNA as a site remedy. Reductions in COC concentrations over time and with distance were evaluated. The results of the evaluation and the conclusions are summarized below:

- During the tenth annual reporting period, five wells were observed to have peeling paint (LHSMW17, LHSMW19, LHSMW20, LHSMW22, and LHSMW24). These wells will be repainted during the eleventh annual RA-O activities. No other issues or concerns were noted during the annual well inspections, and no damage to well bollards, pads, or protective well casings was observed.
- Consistent with previous years, groundwater flow direction appears to be to the east and southeast in the shallow zone and generally to the north, northwest, and northeast in the intermediate zone. However, the potentiometric contours are based on relatively few locations and may not accurately depict small differences in the flow directions that exist at the site.
- TCE and cis-1,2-DCE are the only COCs detected in the groundwater at concentrations exceeding the MCLs in 2024.
- In the shallow groundwater zone, wells 46WW11, LHSMW19, LHSMW21, and recent shallow/intermediate monitoring well 46WW17 are the only wells where sufficient water was present to collect samples. The groundwater elevation at 46WW17 indicates that it is likely representative of the intermediate zone. However, the absence of shallow saturation or a confining layer underlying the permeable intervals observed during drilling indicates that saturation and/or contamination may not be present in the shallow zone interval east-northeast of LHSMW21. As recommended in the Year 7 and Year 8 RA-O Reports (Bhate 2022 and Bhate 2023), consideration should be given to confirming this in the future by installing a shallow well near 46WW17 with a screened interval elevation similar to LHSMW21 to determine if saturated conditions and/or contamination are present.
- TCE concentrations in the shallow zone demonstrate a decreasing trend in wells 46WW11 and LHSMW19 based on Mann-Kendall trend analysis. The Mann-Kendall analysis at well LHSMW21 indicates increasing trends for TCE, cis-1,2-DCE, and VC. Future sampling will aid in determining if these trends continue.
- In the intermediate zone, COC concentrations show a probably decreasing and decreasing trend in wells 46WW02 and 46WW05, respectively. However, TCE concentrations at 46WW02 have been increasing since 2020 (15 µg/L in 2020, 25 µg/L in 2021, 29 µg/L in 2022 and 2023, and 35 µg/L in 2024). Groundwater elevations have shown a loose correlation with the COC

concentrations, and dilution is not apparent when groundwater elevations have increased. COCs have not increased with distance from the most impacted wells, 46WW02 and 46WW05, and no new detection of COCs at boundary area wells have been reported, indicating plume migration is not occurring. Due to the presence of COCs detected at shallow well LHSMW21, 46WW14 was added to the annual sampling to assess potential downward migration into the intermediate zone. COCs continued to be below the laboratory detection limit in February 2024 at 46WW14.

- No COCs were detected in the one deep well (46WW03).
- The assessment of geochemical parameters indicates that groundwater conditions are not favorable for biological reductive dechlorination in most areas and that abiotic MNA processes appear to be primarily responsible for declining concentrations.
- The predictive analysis estimates that TCE concentrations may decrease to below the MCL at LHAAP-46 in 116.7 years where COCs are decreasing; however, based on the increasing concentrations at LHSMW21, it is not possible to determine when COCs will reach the MCL in all areas of the site. Also, given lithologic variability at the site, the potential for plume migration, and other factors affecting the concentration trends, the time for all COCs to reach the MCL may vary by an order of magnitude or more.

No compliance issues or concerns were noted during the annual LUC inspection for LHAAP-46 conducted on February 22, 2024. LHSMW23 was replaced by LHSMW23R in August 2019. Monitoring well LHSMW21 was added to the monitoring network in place of LHSMW20 due to the persistent dry conditions at LHSMW20. As COCs were detected in LHSMW21, the installation of the downgradient well 46WW17 was completed in June 2020. Intermediate zone monitoring well 46WW14 was added to assess downward migration near shallow well LHSMW21. Wells 46WW14, LHSMW23R, and 46WW17 will continue to be sampled as part of the tenth annual RA-O sampling.

The trend analysis of COC concentrations in wells with sufficient historical data was conducted. In four of the five wells where COCs were observed above the MCL, concentrations are decreasing based on the Mann-Kendall trend evaluation. At the one monitoring well where COCs have increased recently (LHSMW21), the 2024 TCE concentration (45 µg/L) decreased from the highest concentration that has been detected at that location (61 µg/L). The increasing COC concentrations in LHSMW21 since 2016 suggest that the shallow groundwater plume may be expanding or migrating. MNA with LUCs is still considered an appropriate remedy at this time. The MNA monitoring will continue on an annual basis in the eleventh annual RA-O, in accordance with the RACR (AECOM 2015a). The MNA parameter list is shown in the notes in **Table 2-7**. The wells to be sampled during the eleventh annual RA-O monitoring event are shown in **Table 2-7** and illustrated on **Figure 2-8**. To gather additional information regarding the potentiometric surface and the extent of dry conditions in the shallow aquifer, groundwater elevations will continue to be measured in LHSMW20 and LHSMW24 during each sampling event, as shown in **Table 2-7**.

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Tables

Table 2-1
Well Maintenance Activities Year 10 RA-O

Well ID	Date Inspected	Pads	Bollards	Protective Casings	Locks	Date Mowed	Photos	Comments
46WW01	2/28/2024	Good	Good	Good	In Place		Yes	
46WW02	2/26/2024	Good	Good	Good	In Place		Yes	
46WW03	2/26/2024	Good	Good	Good	In Place		Yes	
46WW04	2/28/2024	Good	Good	Good	In Place		Yes	
46WW05	2/26/2024	Good	Good	Good	In Place		Yes	
46WW06	2/26/2024	Good	Good	Good	In Place		Yes	
46WW07	2/22/2024	Good	Good	Good	In Place		Yes	
46WW08	2/26/2024	Good	Good	Good	In Place		Yes	
46WW09	2/22/2024	Good	Good	Good	In Place		Yes	
46WW10	2/28/2024	Good	Good	Good	In Place		Yes	
46WW11	2/22/2024	Good	Good	Good	In Place		Yes	
46WW12	2/28/2024	Good	Good	Good	In Place		Yes	
46WW13	2/28/2024	Good	Good	Good	In Place		Yes	
46WW14	2/22/2024	Good	Good	Good	In Place		Yes	
46WW15	2/28/2024	Good	Good	Good	In Place		No	
46WW16	2/26/2024	Good	Good	Good	In Place		Yes	
46WW17	2/22/2024	Good	Good	Good	In Place		Yes	
LHSMW17	2/28/2024	Good	Good	Good	In Place		Yes	Paint peeling
LHSMW18	2/28/2024	Good	Good	Good	In Place		Yes	
LHSMW19	2/22/2024	Good	Good	Good	In Place		Yes	Paint peeling
LHSMW20	2/28/2024	Good	Good	Good	In Place		Yes	Paint peeling
LHSMW21	2/22/2024	Good	Good	Good	In Place		Yes	
LHSMW22	2/26/2024	Good	Good	Good	In Place		Yes	Paint peeling
LHSMW23R	2/26/2024	Good	Good	Good	In Place		Yes	
LHSMW24	2/28/2024	Good	Good	Good	In Place		Yes	Paint peeling
LHSMW25	2/22/2024	Good	Good	Good	In Place		Yes	

Notes:

ID - identifier

RA-O - remedial action operation

Table 2-2
Year 10 Annual RA-O Sampling Locations

Well ID	Groundwater Zone	VOC	Field Parameters	MNA	Water Present?
46WW01	Shallow	X	X		No
46WW04	Shallow	X	X		No
46WW10	Shallow	X	X		No
46WW11	Shallow	X	X	X	Yes
46WW12	Shallow	X	X		No
46WW13	Shallow	X	X		No
46WW15	Shallow	X	X		No
46WW17	Shallow/ Intermediate	X	X		Yes
LHSMW17	Shallow	X	X		No
LHSMW18 [a]	Shallow				No
LHSMW19	Shallow	X	X		Yes
LHSMW20	Shallow	Groundwater Elevation Only			No
LHSMW21	Shallow	X	X	X	Yes
LHSMW22	Shallow	X	X		No
LHSMW24	Shallow	Groundwater Elevation Only			No
46WW02	Intermediate	X	X	X	Yes
46WW05	Intermediate	X	X	X	Yes
46WW06	Intermediate	X	X		Yes
46WW07	Intermediate	X	X		Yes
46WW08	Intermediate	X	X		Yes
46WW09	Intermediate	X	X	X	Yes
46WW14	Intermediate	X	X		Yes
46WW16	Intermediate	X	X	X	Yes
LHSMW23R	Intermediate	X	X		Yes
LHSMW25	Intermediate	X	X		Yes
46WW03	Deep	X	X		Yes
46SW10 [b]	Surface Water	X	X		NS

Notes:

Field parameters to be monitored for all wells: pH, temperature, conductivity, turbidity, oxidation-reduction potential (ORP), and dissolved oxygen (DO).

MNA parameters include nitrate, sulfate, chloride, TOC, dissolved iron (field), and dissolved gases (methane, ethane, ethene, and carbon dioxide).

[a] LHSMW18 only sampled if LHSMW17 is dry.

[b] 46SW10 is only sampled if surface water is present and the GW elevation at either LHSMW21 or 46WW16 exceeds 197 feet.

X - well will be analyzed for that parameter

GW - groundwater

ID - identification

MNA - monitored natural attenuation

NS - not sampled due to water level was below the creek bottom

RA-O - remedial action operation

TOC - total organic carbon

VOC - volatile organic compounds

Table 2-3
Groundwater Elevation Data

Well ID	Zone	Sampling Date	Screen Interval (ft BTOC)		Top of Casing Elevation (ft MSL)	Ground Surface Elevation (ft MSL)	Depth to Water (ft BTOC)	Groundwater Elevation (ft MSL)
			Top	Bottom				
46WW01	S	01/16/02	17.07	27.07	212.82	209.75	Dry	Dry
		03/15/02	17.07	27.07	212.82	209.75	Dry	Dry
		02/13/05	17.07	27.07	212.82	209.75	26.00	186.82
		05/15/05	17.07	27.07	212.82	209.75	Dry	Dry
		02/19/07	17.07	27.07	212.82	209.75	22.65	190.16
		03/16/08	17.07	27.07	212.82	209.75	25.45	187.37
		05/15/08	17.07	27.07	212.82	209.75	Dry	Dry
		10/13/08	17.07	27.07	212.82	209.75	Dry	Dry
		05/02/13	17.07	27.07	212.82	209.75	26.00	186.82
		05/28/13	17.07	27.07	212.82	209.75	Dry	Dry
		08/10/13	17.07	27.07	212.82	209.75	Dry	Dry
		09/20/13	17.07	27.07	212.82	209.75	Dry	Dry
		01/25/14	17.07	27.07	212.82	209.75	Dry	Dry
		07/15/14	17.07	27.07	212.82	209.75	Dry	Dry
		11/18/14	17.07	27.07	212.82	209.75	Dry	Dry
		02/03/15	17.07	27.07	212.82	209.75	Dry	Dry
		05/05/15	17.07	27.07	212.82	209.75	Dry	Dry
		08/05/15	17.07	27.07	212.82	209.75	Dry	Dry
		02/01/16	17.07	27.07	212.82	209.75	Dry	Dry
		03/28/16	17.07	27.07	212.82	209.75	24.85	187.97
		08/03/16	17.07	27.07	212.82	209.75	25.45	187.37
		02/20/18	17.07	27.07	212.82	209.75	Dry	Dry
		08/27/18	17.07	27.07	212.82	209.75	Dry	Dry
		02/20/19	17.07	27.07	212.82	209.75	Dry	Dry
		08/12/19	17.07	27.07	212.82	209.75	Dry	Dry
		02/19/20	17.07	27.07	212.82	209.75	Dry	Dry
		03/18/21	17.07	27.07	212.82	209.75	Dry	Dry
		02/14/22	17.07	27.07	212.82	209.75	Dry	Dry
		02/06/23	17.07	27.07	212.82	209.75	Dry	Dry
		2/28/2024	17.07	27.07	212.82	209.75	Dry	Dry
46WW02	I	01/16/02	38.05	48.05	212.21	209.16	37.11	175.10
		05/15/02	38.05	48.05	212.21	209.16	37.30	174.91
		02/13/05	38.05	48.05	212.21	209.16	35.90	176.31
		06/15/05	38.05	48.05	212.21	209.16	37.00	175.21
		02/20/07	38.05	48.05	212.21	209.16	31.49	180.72
		04/07/08	38.05	48.05	212.21	209.16	32.30	179.91
		04/16/08	38.05	48.05	212.21	209.16	37.25	174.96
		05/15/08	38.05	48.05	212.21	209.16	37.03	175.18
		05/02/13	38.05	48.05	212.21	209.16	35.90	176.31
		05/28/13	38.05	48.05	212.21	209.16	35.85	176.36
		08/14/13	38.05	48.05	212.21	209.16	36.15	176.06
		08/17/13	38.05	48.05	212.21	209.16	36.20	176.01
		09/19/13	38.05	48.05	212.21	209.16	36.33	175.88
		01/27/14	38.05	48.05	212.21	209.16	36.52	175.69
		07/15/14	38.05	48.05	212.21	209.16	36.63	175.58
		11/18/14	38.05	48.05	212.21	209.16	37.37	174.84
		02/05/15	38.05	48.05	212.21	209.16	37.30	174.91
		05/06/15	38.05	48.05	212.21	209.16	37.00	175.21
		08/05/15	38.05	48.05	212.21	209.16	37.03	175.18

Table 2-3
Groundwater Elevation Data

Well ID	Zone	Sampling Date	Screen Interval (ft BTOC)		Top of Casing Elevation (ft MSL)	Ground Surface Elevation (ft MSL)	Depth to Water (ft BTOC)	Groundwater Elevation (ft MSL)
			Top	Bottom				
46WW02	I	02/01/16	38.05	48.05	212.21	209.16	37.11	175.10
		08/04/16	38.05	48.05	212.21	209.16	37.25	174.96
		02/20/18	38.05	48.05	212.21	209.16	37.76	174.45
		08/29/18	38.05	48.05	212.21	209.16	38.25	173.96
		02/21/19	38.05	48.05	212.21	209.16	46WW02 contained water and a sample was collected. The sample collection log was misplaced and no water level information is available.	
		08/12/19	38.05	48.05	212.21	209.16	38.23	173.98
		02/13/20	38.05	48.05	212.21	209.16	38.74	173.47
		03/16/21	38.05	48.05	212.21	209.16	38.57	173.64
		02/15/22	38.05	48.05	212.21	209.16	39.10	173.11
		02/06/23	38.05	48.05	212.21	209.16	39.33	172.88
		2/26/2024	38.05	48.05	212.21	209.16	39.83	172.38
46WW03	D	03/16/02	92.67	102.67	212.47	209.80	40.69	171.78
		05/15/02	92.67	102.67	212.47	209.80	40.60	171.87
		06/15/05	92.67	102.67	212.47	209.80	40.32	172.15
		04/16/08	92.67	102.67	212.47	209.80	40.77	171.70
		05/15/08	92.67	102.67	212.47	209.80	40.71	171.76
		05/30/13	92.67	102.67	212.47	209.80	39.81	172.66
		08/17/13	92.67	102.67	212.47	209.80	40.34	172.13
		09/26/13	92.67	102.67	212.47	209.80	46.48	165.99
		01/25/14	92.67	102.67	212.47	209.80	40.61	171.86
		07/17/14	92.67	102.67	212.47	209.80	40.47	172.00
		11/20/14	92.67	102.67	212.47	209.80	41.00	171.47
		02/05/15	92.67	102.67	212.47	209.80	40.60	171.87
		05/06/15	92.67	102.67	212.47	209.80	40.32	172.15
		08/05/15	92.67	102.67	212.47	209.80	40.71	171.76
		02/03/16	92.67	102.67	212.47	209.80	40.69	171.78
		08/04/16	92.67	102.67	212.47	209.80	40.77	171.70
		02/26/18	92.67	102.67	212.47	209.80	41.47	171.00
		08/27/18	92.67	102.67	212.47	209.80	42.05	170.42
		02/20/19	92.67	102.67	212.47	209.80	41.20	171.27
		08/12/19	92.67	102.67	212.47	209.80	41.19	171.28
		02/19/20	92.67	102.67	212.47	209.80	41.75	170.72
		03/18/21	92.67	102.67	212.47	209.80	41.50	170.97
		02/15/22	92.67	102.67	212.47	209.80	41.93	170.54
		02/06/23	92.67	102.67	212.47	209.80	42.78	169.69
		2/26/2024	92.67	102.67	212.47	209.80	43.70	168.77
46WW04	S	02/16/02	16.92	26.92	215.39	212.47	25.67	189.72
		03/15/02	16.92	26.92	215.39	212.47	Dry	Dry
		02/13/05	16.92	26.92	215.39	212.47	24.86	190.53
		05/15/05	16.92	26.92	215.39	212.47	24.48	190.91
		02/19/07	16.92	26.92	215.39	212.47	21.31	194.08
		03/16/08	16.92	26.92	215.39	212.47	25.04	190.35
		04/15/08	16.92	26.92	215.39	212.47	24.13	191.26
		09/13/08	16.92	26.92	215.39	212.47	25.48	189.91
		05/02/13	16.92	26.92	215.39	212.47	24.86	190.53

Table 2-3
Groundwater Elevation Data

Well ID	Zone	Sampling Date	Screen Interval (ft BTOC)		Top of Casing Elevation (ft MSL)	Ground Surface Elevation (ft MSL)	Depth to Water (ft BTOC)	Groundwater Elevation (ft MSL)
			Top	Bottom				
46WW04	S	05/24/13	16.92	26.92	215.39	212.47	24.90	190.49
		08/09/13	16.92	26.92	215.39	212.47	25.48	189.91
		09/20/13	16.92	26.92	215.39	212.47	26.00	189.39
		01/25/14	16.92	26.92	215.39	212.47	25.90	189.49
		07/17/14	16.92	26.92	215.39	212.47	24.68	190.71
		11/19/14	16.92	26.92	215.39	212.47	26.00	189.39
		02/03/15	16.92	26.92	215.39	212.47	Dry	Dry
		05/05/15	16.92	26.92	215.39	212.47	24.48	190.91
		08/04/15	16.92	26.92	215.39	212.47	24.13	191.26
		02/02/16	16.92	26.92	215.39	212.47	25.67	189.72
		08/03/16	16.92	26.92	215.39	212.47	25.04	190.35
		02/22/18	16.92	26.92	215.39	212.47	Dry	Dry
		08/29/18	16.92	26.92	215.39	212.47	Dry	Dry
		02/20/19	16.92	26.92	215.39	212.47	Dry	Dry
		08/13/19	16.92	26.92	215.39	212.47	Dry	Dry
		02/18/20	16.92	26.92	215.39	212.47	Dry	Dry
		03/15/21	16.92	26.92	215.39	212.47	Dry	Dry
		02/13/22	16.92	26.92	215.39	212.47	26.4	188.99
		02/09/23	16.92	26.92	215.39	212.47	Dry	Dry
		2/28/2024	16.92	26.92	215.39	212.47	Dry	Dry
46WW05	I	01/16/02	36.65	46.65	208.24	205.59	38.08	170.16
		05/15/02	36.65	46.65	208.24	205.59	37.45	170.79
		05/15/05	36.65	46.65	208.24	205.59	38.03	170.21
		03/16/08	36.65	46.65	208.24	205.59	38.35	169.89
		06/15/08	36.65	46.65	208.24	205.59	37.05	171.19
		05/30/13	36.65	46.65	208.24	205.59	37.25	170.99
		08/14/13	36.65	46.65	208.24	205.59	37.65	170.59
		08/17/13	36.65	46.65	208.24	205.59	37.73	170.51
		09/24/13	36.65	46.65	208.24	205.59	37.75	170.49
		01/28/14	36.65	46.65	208.24	205.59	38.20	170.04
		07/16/14	36.65	46.65	208.24	205.59	37.83	170.41
		11/19/14	36.65	46.65	208.24	205.59	38.48	169.76
		02/05/15	36.65	46.65	208.24	205.59	37.45	170.79
		05/05/15	36.65	46.65	208.24	205.59	38.03	170.21
		08/06/15	36.65	46.65	208.24	205.59	37.05	171.19
		02/01/16	36.65	46.65	208.24	205.59	38.08	170.16
		08/03/16	36.65	46.65	208.24	205.59	38.35	169.89
		02/26/18	36.65	46.65	208.24	205.59	39.03	169.21
		08/28/18	36.65	46.65	208.24	205.59	39.25	168.99
		02/25/19	36.65	46.65	208.24	205.59	39.14	169.10
		08/13/19	36.65	46.65	208.24	205.59	38.45	169.79
		02/13/20	36.65	46.65	208.24	205.59	39.32	168.92
		03/16/21	36.65	46.65	208.24	205.59	39.00	169.24
		02/15/22	36.65	46.65	208.24	205.59	39.65	168.59
		02/07/23	36.65	46.65	208.24	205.59	40.05	168.19
		2/26/2024	36.65	46.65	208.24	205.59	39.96	168.28
46WW06	I	02/16/02	40.60	50.60	213.84	211.24	39.76	174.08
		06/15/02	40.60	50.60	213.84	211.24	39.93	173.91

Table 2-3
Groundwater Elevation Data

Well ID	Zone	Sampling Date	Screen Interval (ft BTOC)		Top of Casing Elevation (ft MSL)	Ground Surface Elevation (ft MSL)	Depth to Water (ft BTOC)	Groundwater Elevation (ft MSL)
			Top	Bottom				
46WW06	I	01/15/05	40.60	50.60	213.84	211.24	39.91	173.93
		04/15/08	40.60	50.60	213.84	211.24	39.90	173.94
		04/16/08	40.60	50.60	213.84	211.24	40.23	173.61
		05/24/13	40.60	50.60	213.84	211.24	38.98	174.86
		08/16/13	40.60	50.60	213.84	211.24	39.12	174.72
		09/25/13	40.60	50.60	213.84	211.24	39.10	174.74
		01/25/14	40.60	50.60	213.84	211.24	39.28	174.56
		07/17/14	40.60	50.60	213.84	211.24	39.55	174.29
		11/19/14	40.60	50.60	213.84	211.24	39.91	173.93
		02/06/15	40.60	50.60	213.84	211.24	39.93	173.91
		05/01/15	40.60	50.60	213.84	211.24	39.91	173.93
		08/04/15	40.60	50.60	213.84	211.24	39.90	173.94
		02/02/16	40.60	50.60	213.84	211.24	39.76	174.08
		08/04/16	40.60	50.60	213.84	211.24	40.23	173.61
		02/26/18	40.60	50.60	213.84	211.24	39.91	173.93
		08/27/18	40.60	50.60	213.84	211.24	41.10	172.74
		02/20/19	40.60	50.60	213.84	211.24	41.05	172.79
		08/13/19	40.60	50.60	213.84	211.24	39.80	174.04
		02/18/20	40.60	50.60	213.84	211.24	41.77	172.07
		03/15/21	40.60	50.60	213.84	211.24	41.55	172.29
		02/13/22	40.60	50.60	213.84	211.24	42.12	171.72
		02/09/23	40.60	50.60	213.84	211.24	42.30	171.54
		2/26/2024	40.60	50.60	213.84	211.24	43.63	170.21
46WW07	I	02/16/02	41.50	51.00	207.87	205.37	35.70	172.17
		03/15/02	41.50	51.00	207.87	205.37	35.95	171.92
		01/15/05	41.50	51.00	207.87	205.37	35.62	172.25
		02/16/08	41.50	51.00	207.87	205.37	35.96	171.91
		04/15/08	41.50	51.00	207.87	205.37	35.68	172.19
		05/25/13	41.50	51.00	207.87	205.37	35.28	172.59
		08/16/13	41.50	51.00	207.87	205.37	35.60	172.27
		09/19/13	41.50	51.00	207.87	205.37	35.70	172.17
		01/27/14	41.50	51.00	207.87	205.37	36.72	171.15
		07/18/14	41.50	51.00	207.87	205.37	35.47	172.40
		11/19/14	41.50	51.00	207.87	205.37	36.25	171.62
		02/03/15	41.50	51.00	207.87	205.37	35.95	171.92
		05/01/15	41.50	51.00	207.87	205.37	35.62	172.25
		08/04/15	41.50	51.00	207.87	205.37	35.68	172.19
		02/02/16	41.50	51.00	207.87	205.37	35.70	172.17
		08/02/16	41.50	51.00	207.87	205.37	35.96	171.91
		03/23/18	41.50	51.00	207.87	205.37	36.77	171.10
		08/27/18	41.50	51.00	207.87	205.37	31.15	176.72
		02/20/19	41.50	51.00	207.87	205.37	36.51	171.36
		08/12/19	41.50	51.00	207.87	205.37	36.42	171.45
		02/18/20	41.50	51.00	207.87	205.37	36.81	171.06
		03/18/21	41.50	51.00	207.87	205.37	36.68	171.19
		02/11/22	41.50	51.00	207.87	205.37	36.76	171.11
		02/06/23	41.50	51.00	207.87	205.37	37.90	169.97
		2/22/2024	41.50	51.00	207.87	205.37	38.48	169.39

Table 2-3
Groundwater Elevation Data

Well ID	Zone	Sampling Date	Screen Interval (ft BTOC)		Top of Casing Elevation (ft MSL)	Ground Surface Elevation (ft MSL)	Depth to Water (ft BTOC)	Groundwater Elevation (ft MSL)
			Top	Bottom				
46WW08	I	05/25/13	35.72	45.22	211.73	209.51	21.35	190.38
		08/16/13	35.72	45.22	211.73	209.51	21.55	190.18
		09/21/13	35.72	45.22	211.73	209.51	21.75	189.98
		01/28/14	35.72	45.22	211.73	209.51	21.85	189.88
		07/18/14	35.72	45.22	211.73	209.51	21.30	190.43
		11/20/14	35.72	45.22	211.73	209.51	22.06	189.67
		02/03/15	35.72	45.22	211.73	209.51	21.85	189.88
		05/01/15	35.72	45.22	211.73	209.51	20.94	190.79
		08/04/15	35.72	45.22	211.73	209.51	21.02	190.71
		02/03/16	35.72	45.22	211.73	209.51	21.75	189.98
		08/02/16	35.72	45.22	211.73	209.51	21.37	190.36
		02/23/18	35.72	45.22	211.73	209.51	22.43	189.30
		08/27/18	35.72	45.22	211.73	209.51	22.76	188.97
		02/20/19	35.72	45.22	211.73	209.51	22.00	189.73
		08/13/19	35.72	45.22	211.73	209.51	20.59	191.14
		02/18/20	35.72	45.22	211.73	209.51	22.15	189.58
		03/15/21	35.72	45.22	211.73	209.51	21.55	190.18
		02/13/22	35.72	45.22	211.73	209.51	22.56	189.17
		02/09/23	35.72	45.22	211.73	209.51	22.92	188.81
		2/26/2024	35.72	45.22	211.73	209.51	23.15	188.58
46WW09	I	05/30/13	31.48	40.98	210.19	207.71	34.50	175.69
		08/13/13	31.48	40.98	210.19	207.71	36.95	173.24
		08/17/13	31.48	40.98	210.19	207.71	36.03	174.16
		09/24/13	31.48	40.98	210.19	207.71	32.50	177.69
		01/27/14	31.48	40.98	210.19	207.71	33.05	177.14
		07/15/14	31.48	40.98	210.19	207.71	38.18	172.01
		11/19/14	31.48	40.98	210.19	207.71	36.99	173.20
		02/05/15	31.48	40.98	210.19	207.71	35.90	174.29
		05/05/15	31.48	40.98	210.19	207.71	36.55	173.64
		08/06/15	31.48	40.98	210.19	207.71	37.47	172.72
		02/02/16	31.48	40.98	210.19	207.71	37.35	172.84
		08/03/16	31.48	40.98	210.19	207.71	37.83	172.36
		02/22/18	31.48	40.98	210.19	207.71	38.65	171.54
		08/28/18	31.48	40.98	210.19	207.71	38.81	171.38
		02/25/19	31.48	40.98	210.19	207.71	38.81	171.38
		08/12/19	31.48	40.98	210.19	207.71	38.40	171.79
		02/13/20	31.48	40.98	210.19	207.71	38.95	171.24
		03/16/21	31.48	40.98	210.19	207.71	38.60	171.59
		02/15/22	31.48	40.98	210.19	207.71	39.15	171.04
		02/07/23	31.48	40.98	210.19	207.71	39.92	170.27
		2/22/2024	31.48	40.98	210.19	207.71	40.37	169.82
46WW10	S	2/16/2002	14.19	23.69	213.69	211.40	24.08	189.61
		3/15/2002	14.19	23.69	213.69	211.40	23.95	189.74
		5/15/2005	14.19	23.69	213.69	211.40	23.80	189.89
		3/16/2008	14.19	23.69	213.69	211.40	24.17	189.52
		4/15/2008	14.19	23.69	213.69	211.40	23.57	190.12
		9/13/2008	14.19	23.69	213.69	211.40	22.00	191.69
		05/24/13	14.19	23.69	213.69	211.40	23.20	190.49

Table 2-3
Groundwater Elevation Data

Well ID	Zone	Sampling Date	Screen Interval (ft BTOC)		Top of Casing Elevation (ft MSL)	Ground Surface Elevation (ft MSL)	Depth to Water (ft BTOC)	Groundwater Elevation (ft MSL)
			Top	Bottom				
46WW10	S	08/09/13	14.19	23.69	213.69	211.40	22.00	191.69
		09/20/13	14.19	23.69	213.69	211.40	23.42	190.27
		01/25/14	14.19	23.69	213.69	211.40	23.61	190.08
		07/17/14	14.19	23.69	213.69	211.40	23.57	190.12
		11/19/14	14.19	23.69	213.69	211.40	23.83	189.86
		02/03/15	14.19	23.69	213.69	211.40	23.95	189.74
		05/05/15	14.19	23.69	213.69	211.40	23.80	189.89
		08/04/15	14.19	23.69	213.69	211.40	23.57	190.12
		02/02/16	14.19	23.69	213.69	211.40	24.08	189.61
		08/03/16	14.19	23.69	213.69	211.40	24.17	189.52
		02/22/18	14.19	23.69	213.69	211.40	Dry	Dry
		08/29/18	14.19	23.69	213.69	211.40	Dry	Dry
		02/20/19	14.19	23.69	213.69	211.40	Dry	Dry
		08/13/19	14.19	23.69	213.69	211.40	Dry	Dry
		02/18/20	14.19	23.69	213.69	211.40	Dry	Dry
		03/15/21	14.19	23.69	213.69	211.40	Dry	Dry
		02/13/22	14.19	23.69	213.69	211.40	24.55	189.14
		02/09/23	14.19	23.69	213.69	211.40	Dry	Dry
		2/28/2024	14.19	23.69	213.69	211.4	Dry	Dry
46WW11	S	1/16/2002	22.25	32.25	212.22	209.97	25.25	186.97
		4/15/2002	22.25	32.25	212.22	209.97	25.37	186.85
		6/15/2005	22.25	32.25	212.22	209.97	24.48	187.74
		3/16/2008	22.25	32.25	212.22	209.97	25.02	187.20
		5/15/2008	22.25	32.25	212.22	209.97	24.37	187.85
		05/25/13	22.25	32.25	212.22	209.97	Dry	Dry
		08/14/13	22.25	32.25	212.22	209.97	25.63	186.59
		09/19/13	22.25	32.25	212.22	209.97	25.98	186.24
		01/28/14	22.25	32.25	212.22	209.97	25.35	186.87
		07/16/14	22.25	32.25	212.22	209.97	24.76	187.46
		11/18/14	22.25	32.25	212.22	209.97	25.80	186.42
		02/04/15	22.25	32.25	212.22	209.97	25.37	186.85
		05/06/15	22.25	32.25	212.22	209.97	24.48	187.74
		08/05/15	22.25	32.25	212.22	209.97	24.37	187.85
		02/01/16	22.25	32.25	212.22	209.97	25.25	186.97
		08/03/16	22.25	32.25	212.22	209.97	25.02	187.20
		02/20/18	22.25	32.25	212.22	209.97	25.95	186.27
		08/29/18	22.25	32.25	212.22	209.97	27.30	184.92
		02/21/19	22.25	32.25	212.22	209.97	46WW11 contained water and a sample was collected. The sample collection log was misplaced and no water level information is available.	
		08/12/19	22.25	32.25	212.22	209.97	24.62	187.60
		02/13/20	22.25	32.25	212.22	209.97	25.72	186.50
		03/16/21	22.25	32.25	212.22	209.97	25.22	187.00
		02/14/22	22.25	32.25	212.22	209.97	25.60	186.62
		02/09/23	22.25	32.25	212.22	209.97	27.00	185.22
		2/22/2024	22.25	32.25	212.22	209.97	27.00	185.22

Table 2-3
Groundwater Elevation Data

Well ID	Zone	Sampling Date	Screen Interval (ft BTOC)		Top of Casing Elevation (ft MSL)	Ground Surface Elevation (ft MSL)	Depth to Water (ft BTOC)	Groundwater Elevation (ft MSL)
			Top	Bottom				
46WW12	S	1/16/2002	18.97	28.47	209.57	207.10	Dry	Dry
		3/15/2002	18.97	28.47	209.57	207.10	Dry	Dry
		5/15/2005	18.97	28.47	209.57	207.10	Dry	Dry
		4/15/2008	18.97	28.47	209.57	207.10	Dry	Dry
		4/16/2008	18.97	28.47	209.57	207.10	Dry	Dry
		10/13/2008	18.97	28.47	209.57	207.10	Dry	Dry
		05/28/13	18.97	28.47	209.57	207.10	Dry	Dry
		08/10/13	18.97	28.47	209.57	207.10	Dry	Dry
		09/20/13	18.97	28.47	209.57	207.10	Dry	Dry
		01/25/14	18.97	28.47	209.57	207.10	Dry	Dry
		07/15/14	18.97	28.47	209.57	207.10	Dry	Dry
		11/19/14	18.97	28.47	209.57	207.10	Dry	Dry
		02/03/15	18.97	28.47	209.57	207.10	Dry	Dry
		05/05/15	18.97	28.47	209.57	207.10	Dry	Dry
		08/04/15	18.97	28.47	209.57	207.10	Dry	Dry
		02/01/16	18.97	28.47	209.57	207.10	Dry	Dry
		08/04/16	18.97	28.47	209.57	207.10	Dry	Dry
		02/20/18	18.97	28.47	209.57	207.10	Dry	Dry
		08/27/18	18.97	28.47	209.57	207.10	Dry	Dry
		02/20/19	18.97	28.47	209.57	207.10	Dry	Dry
		08/13/19	18.97	28.47	209.57	207.10	Dry	Dry
		02/18/20	18.97	28.47	209.57	207.10	Dry	Dry
		03/15/21	18.97	28.47	209.57	207.10	Dry	Dry
		02/11/22	18.97	28.47	209.57	207.10	Dry	Dry
		02/06/23	18.97	28.47	209.57	207.10	Dry	Dry
		2/28/2024	18.97	28.47	209.57	207.1	Dry	Dry
46WW13	S	1/16/2002	21.42	30.92	208.38	205.96	Dry	Dry
		3/15/2002	21.42	30.92	208.38	205.96	Dry	Dry
		5/15/2005	21.42	30.92	208.38	205.96	Dry	Dry
		4/16/2008	21.42	30.92	208.38	205.96	Dry	Dry
		5/15/2008	21.42	30.92	208.38	205.96	Dry	Dry
		05/28/13	21.42	30.92	208.38	205.96	30.05	178.33
		08/13/13	21.42	30.92	208.38	205.96	30.20	178.18
		09/23/13	21.42	30.92	208.38	205.96	30.35	178.03
		01/27/14	21.42	30.92	208.38	205.96	Dry	Dry
		07/15/14	21.42	30.92	208.38	205.96	Dry	Dry
		11/19/14	21.42	30.92	208.38	205.96	Dry	Dry
		02/03/15	21.42	30.92	208.38	205.96	Dry	Dry
		05/05/15	21.42	30.92	208.38	205.96	Dry	Dry
		08/05/15	21.42	30.92	208.38	205.96	Dry	Dry
		02/01/16	21.42	30.92	208.38	205.96	Dry	Dry
		08/04/16	21.42	30.92	208.38	205.96	Dry	Dry
		02/20/18	21.42	30.92	208.38	205.96	Dry	Dry
		08/27/18	21.42	30.92	208.38	205.96	Dry	Dry
		02/20/19	21.42	30.92	208.38	205.96	Dry	Dry
		08/13/19	21.42	30.92	208.38	205.96	Dry	Dry
		02/18/20	21.42	30.92	208.38	205.96	Dry	Dry
		03/15/21	21.42	30.92	208.38	205.96	Dry	Dry
		02/11/22	21.42	30.92	208.38	205.96	Dry	Dry

Table 2-3
Groundwater Elevation Data

Well ID	Zone	Sampling Date	Screen Interval (ft BTOC)		Top of Casing Elevation (ft MSL)	Ground Surface Elevation (ft MSL)	Depth to Water (ft BTOC)	Groundwater Elevation (ft MSL)
			Top	Bottom				
46WW13	S	02/06/23	21.42	30.92	208.38	205.96	Dry	Dry
		2/28/2024	21.42	30.92	208.38	205.96	Dry	Dry
46WW14	I	03/15/21	44.60	54.10	204.40	201.80	33.15	171.25
		02/11/22	44.60	54.10	204.40	201.80	33.39	171.01
		02/06/23	44.60	54.10	204.40	201.80	34.35	170.05
		2/22/2024	44.60	54.10	204.40	201.8	35.00	169.40
46WW15	S	05/29/13	20.45	29.95	206.96	205.01	Dry	Dry
		08/10/13	20.45	29.95	206.96	205.01	Dry	Dry
		09/24/13	20.45	29.95	206.96	205.01	Dry	Dry
		01/25/14	20.45	29.95	206.96	205.01	Dry	Dry
		07/15/14	20.45	29.95	206.96	205.01	Dry	Dry
		11/19/14	20.45	29.95	206.96	205.01	Dry	Dry
		02/03/15	20.45	29.95	206.96	205.01	Dry	Dry
		05/05/15	20.45	29.95	206.96	205.01	Dry	Dry
		08/04/15	20.45	29.95	206.96	205.01	Dry	Dry
		02/01/16	20.45	29.95	206.96	205.01	Dry	Dry
		08/04/16	20.45	29.95	206.96	205.01	Dry	Dry
		02/20/19	20.45	29.95	206.96	205.01	Dry	Dry
		08/13/19	20.45	29.95	206.96	205.01	Dry	Dry
		02/18/20	20.45	29.95	206.96	205.01	Dry	Dry
		03/15/21	20.45	29.95	206.96	205.01	Dry	Dry
		02/11/22	20.45	29.95	206.96	205.01	Dry	Dry
		02/09/23	20.45	29.95	206.96	205.01	Dry	Dry
		2/28/2024	20.45	29.95	206.96	205.01	Dry	Dry
46WW16	I	4/15/2002	40.66	50.46	208.23	205.57	37.31	170.92
		5/15/2005	40.66	50.46	208.23	205.57	37.31	170.92
		1/14/2007	40.66	50.46	208.23	205.57	37.00	171.23
		6/15/2008	40.66	50.46	208.23	205.57	37.35	170.88
		07/01/14	40.66	50.46	208.23	205.57	37.00	171.23
		07/16/14	40.66	50.46	208.23	205.57	37.15	171.08
		11/18/14	40.66	50.46	208.23	205.57	38.00	170.23
		02/04/15	40.66	50.46	208.23	205.57	37.31	170.92
		05/05/15	40.66	50.46	208.23	205.57	37.31	170.92
		08/06/15	40.66	50.46	208.23	205.57	37.35	170.88
		02/22/18	40.66	50.46	208.23	205.57	38.33	169.9
		08/28/18	40.66	50.46	208.23	205.57	38.62	169.61
		02/21/19	40.66	50.46	208.23	205.57	46WW16 contained water and a sample was collected. The sample collection log was misplaced and no water level information is available.	
		08/13/19	40.66	50.46	208.23	205.57	37.95	170.28
		02/13/20	40.66	50.46	208.23	205.57	38.62	169.61
		03/16/21	40.66	50.46	208.23	205.57	38.15	170.08
		02/14/22	40.66	50.46	208.23	205.57	38.85	169.38
		02/06/23	40.66	50.46	208.23	205.57	39.42	168.81
		2/26/2024	40.66	50.46	208.23	205.57	40.30	167.93

Table 2-3
Groundwater Elevation Data

Well ID	Zone	Sampling Date	Screen Interval (ft BTOC)		Top of Casing Elevation (ft MSL)	Ground Surface Elevation (ft MSL)	Depth to Water (ft BTOC)	Groundwater Elevation (ft MSL)
			Top	Bottom				
46WW17	S/I	07/07/20	27.69	37.69	202.54	199.85	33.95	168.59
		03/15/21	27.69	37.69	202.54	199.85	30.63	171.91
		02/11/22	27.69	37.69	202.54	199.85	31.42	171.12
		02/09/23	27.69	37.69	202.54	199.85	32.45	170.09
		2/22/2024	27.69	37.69	202.54	199.85	32.93	169.61
LHSMW08	I	12/1/1994	25.52	35.52	211.73	209.51	13.52	198.21
		2/1/1996	25.52	35.52	211.73	209.51	15.24	196.49
		12/1/1996	25.52	35.52	211.73	209.51	15.24	196.49
		4/7/2008	25.52	35.52	211.73	209.51	25.78	185.95
		9/13/2008	25.52	35.52	211.73	209.51	32.50	179.23
		05/29/13	25.52	35.52	211.73	209.51	30.48	181.25
		08/09/13	25.52	35.52	211.73	209.51	32.50	179.23
		09/21/13	25.52	35.52	211.73	209.51	31.70	180.03
LHSMW11	S	12/1/1994	17.02	27.02	212.91	209.89	13.54	199.37
		2/1/1996	17.02	27.02	212.91	209.89	15.40	197.51
		12/1/1996	17.02	27.02	212.91	209.89	15.40	197.51
		3/16/2002	17.02	27.02	212.91	209.89	Dry	Dry
		5/16/2008	17.02	27.02	212.91	209.89	26.46	186.45
		10/13/2008	17.02	27.02	212.91	209.89	Dry	Dry
		05/24/13	17.02	27.02	212.91	209.89	Dry	Dry
		08/10/13	17.02	27.02	212.91	209.89	Dry	Dry
		09/20/13	17.02	27.02	212.91	209.89	Dry	Dry
		01/25/14	17.02	27.02	212.91	209.89	Dry	Dry
		02/03/16	17.02	27.02	212.91	209.89	Dry	Dry
		08/05/16	17.02	27.02	212.91	209.89	26.46	186.45
		02/25/19	17.02	27.02	212.91	209.89	Dry	Dry
LHSMW12	S	12/1/1994	6.64	16.64	209.02	205.98	9.66	199.36
		2/1/1996	6.64	16.64	209.02	205.98	10.48	198.54
		12/1/1996	6.64	16.64	209.02	205.98	10.48	198.54
		3/16/2002	6.64	16.64	209.02	205.98	Dry	Dry
		5/16/2008	6.64	16.64	209.02	205.98	Dry	Dry
		10/13/2008	6.64	16.64	209.02	205.98	Dry	Dry
		05/24/13	6.64	16.64	209.02	205.98	Dry	Dry
		08/10/13	6.64	16.64	209.02	205.98	Dry	Dry
		09/20/13	6.64	16.64	209.02	205.98	Dry	Dry
		01/25/14	6.64	16.64	209.02	205.98	Dry	Dry
		02/03/16	6.64	16.64	209.02	205.98	Dry	Dry
		08/05/16	6.64	16.64	209.02	205.98	Dry	Dry
		02/25/19	6.64	16.64	209.02	205.98	Dry	Dry
LHSMW14	S	12/1/1994	10.51	20.51	244.78	241.67	9.80	234.98
		2/1/1996	10.51	20.51	244.78	241.67	9.94	234.84
		12/1/1996	10.51	20.51	244.78	241.67	9.94	234.84
		3/16/2002	10.51	20.51	244.78	241.67	9.55	235.23
		9/13/2008	10.51	20.51	244.78	241.67	14.92	229.86
		05/24/13	10.51	20.51	244.78	241.67	12.81	231.97
		08/09/13	10.51	20.51	244.78	241.67	14.92	229.86
		09/24/13	10.51	20.51	244.78	241.67	15.5	229.28
		02/03/16	10.51	20.51	244.78	241.67	9.55	235.23
		02/25/19	10.51	20.51	244.78	241.67	8.47	236.31

Table 2-3
Groundwater Elevation Data

Well ID	Zone	Sampling Date	Screen Interval (ft BTOC)		Top of Casing Elevation (ft MSL)	Ground Surface Elevation (ft MSL)	Depth to Water (ft BTOC)	Groundwater Elevation (ft MSL)
			Top	Bottom				
LHSMW15	S	12/1/1994	14.57	24.57	226.65	223.68	16.05	210.60
		2/1/1996	14.57	24.57	226.65	223.68	16.60	210.05
		12/1/1996	14.57	24.57	226.65	223.68	16.60	210.05
		3/16/2002	14.57	24.57	226.65	223.68	Dry	Dry
		5/16/2008	14.57	24.57	226.65	223.68	Dry	Dry
		10/13/2008	14.57	24.57	226.65	223.68	Dry	Dry
		05/25/13	14.57	24.57	226.65	223.68	Dry	Dry
		08/10/13	14.57	24.57	226.65	223.68	Dry	Dry
		09/20/13	14.57	24.57	226.65	223.68	Dry	Dry
		01/25/14	14.57	24.57	226.65	223.68	Dry	Dry
		02/03/16	14.57	24.57	226.65	223.68	Dry	Dry
		08/05/16	14.57	24.57	226.65	223.68	Dry	Dry
		02/25/19	14.57	24.57	226.65	223.68	Dry	Dry
LHSMW16	S	12/1/1994	14.49	24.49	232.19	229.30	8.25	223.94
		2/1/1996	14.49	24.49	232.19	229.30	9.96	222.23
		12/1/1996	14.49	24.49	232.19	229.30	9.96	222.23
		3/16/2002	14.49	24.49	232.19	229.30	14.22	217.97
		4/15/2002	14.49	24.49	232.19	229.30	Dry	Dry
		5/15/2005	14.49	24.49	232.19	229.30	Dry	Dry
		5/15/2008	14.49	24.49	232.19	229.30	Dry	Dry
		5/16/2008	14.49	24.49	232.19	229.30	11.25	220.94
		10/13/2008	14.49	24.49	232.19	229.30	18.80	213.39
		05/29/13	14.49	24.49	232.19	229.30	16.70	215.49
		08/10/13	14.49	24.49	232.19	229.30	18.80	213.39
		09/25/13	14.49	24.49	232.19	229.30	20.95	211.24
		01/29/14	14.49	24.49	232.19	229.30	20.54	211.65
		11/19/14	14.49	24.49	232.19	229.30	21.26	210.93
		02/04/15	14.49	24.49	232.19	229.30	NM	NM
		05/05/15	14.49	24.49	232.19	229.30	NM	NM
		08/05/15	14.49	24.49	232.19	229.30	NM	NM
		02/03/16	14.49	24.49	232.19	229.30	14.22	217.97
		08/05/16	14.49	24.49	232.19	229.30	11.25	220.94
		02/22/18	14.49	24.49	232.19	229.30	Dry	Dry
		08/28/18	14.49	24.49	232.19	229.30	Dry	Dry
		02/25/19	14.49	24.49	232.19	229.30	10.32	221.87
LHSMW17	S	12/1/1994	16.68	26.68	214.58	211.50	11.24	203.34
		2/1/1996	16.68	26.68	214.58	211.50	13.15	201.43
		12/1/1996	16.68	26.68	214.58	211.50	13.15	201.43
		2/16/2002	16.68	26.68	214.58	211.50	Dry	Dry
		3/15/2002	16.68	26.68	214.58	211.50	Dry	Dry
		5/15/2005	16.68	26.68	214.58	211.50	Dry	Dry
		3/16/2008	16.68	26.68	214.58	211.50	Dry	Dry
		5/15/2008	16.68	26.68	214.58	211.50	Dry	Dry
		11/18/14	16.68	26.68	214.58	211.50	Dry	Dry
		02/03/15	16.68	26.68	214.58	211.50	Dry	Dry
		05/05/15	16.68	26.68	214.58	211.50	NM	NM
		08/05/15	16.68	26.68	214.58	211.50	Dry	Dry
		02/02/16	16.68	26.68	214.58	211.50	Dry	Dry
		08/03/16	16.68	26.68	214.58	211.50	Dry	Dry

Table 2-3
Groundwater Elevation Data

Well ID	Zone	Sampling Date	Screen Interval (ft BTOC)		Top of Casing Elevation (ft MSL)	Ground Surface Elevation (ft MSL)	Depth to Water (ft BTOC)	Groundwater Elevation (ft MSL)
			Top	Bottom				
LHSMW17	S	02/22/18	16.68	26.68	214.58	211.50	Dry	Dry
		08/29/18	16.68	26.68	214.58	211.50	Dry	Dry
		02/20/19	16.68	26.68	214.58	211.50	Dry	Dry
		08/13/19	16.68	26.68	214.58	211.50	Dry	Dry
		02/18/20	16.68	26.68	214.58	211.50	Dry	Dry
		03/15/21	16.68	26.68	214.58	211.50	Dry	Dry
		02/14/22	16.68	26.68	214.58	211.50	26.65	187.93
		02/09/23	16.68	26.68	214.58	211.50	Dry	Dry
		2/28/2024	16.68	26.68	214.58	211.50	Dry	Dry
LHSMW18	S	12/1/1994	17.47	27.47	215.35	212.38	13.68	201.67
		2/1/1996	17.47	27.47	215.35	212.38	15.07	200.28
		12/1/1996	17.47	27.47	215.35	212.38	15.07	200.28
		2/16/2002	17.47	27.47	215.35	212.38	Dry	Dry
		3/15/2002	17.47	27.47	215.35	212.38	Dry	Dry
		5/15/2005	17.47	27.47	215.35	212.38	Dry	Dry
		2/20/2007	17.47	27.47	215.35	212.38	22.47	192.88
		3/16/2008	17.47	27.47	215.35	212.38	24.66	190.69
		5/15/2008	17.47	27.47	215.35	212.38	Dry	Dry
		10/13/2008	17.47	27.47	215.35	212.38	Dry	Dry
		05/28/13	17.47	27.47	215.35	212.38	25.62	189.73
		08/10/13	17.47	27.47	215.35	212.38	Dry	Dry
		09/20/13	17.47	27.47	215.35	212.38	Dry	Dry
		01/25/14	17.47	27.47	215.35	212.38	Dry	Dry
		07/17/14	17.47	27.47	215.35	212.38	Dry	Dry
		11/20/14	17.47	27.47	215.35	212.38	NM	NM
		02/03/15	17.47	27.47	215.35	212.38	Dry	Dry
		05/05/15	17.47	27.47	215.35	212.38	Dry	Dry
		08/05/15	17.47	27.47	215.35	212.38	Dry	Dry
		02/02/16	17.47	27.47	215.35	212.38	Dry	Dry
		03/28/16	17.47	27.47	215.35	212.38	25.15	190.20
		08/03/16	17.47	27.47	215.35	212.38	24.66	190.69
		02/22/18	17.47	27.47	215.35	212.38	Dry	Dry
		08/29/18	17.47	27.47	215.35	212.38	Dry	Dry
		02/20/19	17.47	27.47	215.35	212.38	Dry	Dry
		08/13/19	17.47	27.47	215.35	212.38	Dry	Dry
		02/18/20	17.47	27.47	215.35	212.38	Dry	Dry
		03/15/21	17.47	27.47	215.35	212.38	Dry	Dry
		02/09/23	17.47	27.47	215.35	212.38	Dry	Dry
		2/28/2024	17.47	27.47	215.35	212.38	Dry	Dry
LHSMW19	S	12/1/1994	19.76	29.76	212.96	209.80	11.15	201.81
		2/1/1996	19.76	29.76	212.96	209.80	12.35	200.61
		12/1/1996	19.76	29.76	212.96	209.80	12.35	200.61
		1/16/2002	19.76	29.76	212.96	209.80	24.91	188.05
		4/15/2002	19.76	29.76	212.96	209.80	24.90	188.06
		6/15/2005	19.76	29.76	212.96	209.80	24.25	188.71
		2/20/2007	19.76	29.76	212.96	209.80	20.90	192.06
		3/16/2008	19.76	29.76	212.96	209.80	24.84	188.12
		5/15/2008	19.76	29.76	212.96	209.80	24.36	188.60

Table 2-3
Groundwater Elevation Data

Well ID	Zone	Sampling Date	Screen Interval (ft BTOC)		Top of Casing Elevation (ft MSL)	Ground Surface Elevation (ft MSL)	Depth to Water (ft BTOC)	Groundwater Elevation (ft MSL)
			Top	Bottom				
LHSMW19	S	05/28/13	19.76	29.76	212.96	209.80	24.50	188.46
		08/13/13	19.76	29.76	212.96	209.80	25.13	187.83
		09/23/13	19.76	29.76	212.96	209.80	26.38	186.58
		01/28/14	19.76	29.76	212.96	209.80	24.90	188.06
		07/16/14	19.76	29.76	212.96	209.80	24.55	188.41
		11/18/14	19.76	29.76	212.96	209.80	25.33	187.63
		02/04/15	19.76	29.76	212.96	209.80	24.90	188.06
		05/06/15	19.76	29.76	212.96	209.80	24.25	188.71
		08/05/15	19.76	29.76	212.96	209.80	24.36	188.60
		02/01/16	19.76	29.76	212.96	209.80	24.91	188.05
		08/03/16	19.76	29.76	212.96	209.80	24.84	188.12
		02/20/18	19.76	29.76	212.96	209.80	25.91	187.05
		08/28/18	19.76	29.76	212.96	209.80	26.61	186.35
		02/20/19	19.76	29.76	212.96	209.80	25.55	187.41
		08/12/19	19.76	29.76	212.96	209.80	24.70	188.26
		02/19/20	19.76	29.76	212.96	209.80	25.35	187.61
		03/18/21	19.76	29.76	212.96	209.80	25.08	187.88
		02/14/22	19.76	29.76	212.96	209.80	25.20	187.76
		02/09/23	19.76	29.76	212.96	209.80	26.10	186.86
		2/22/2024	19.76	29.76	212.96	209.80	26.18	186.78
LHSMW20	S	12/1/1994	15.08	25.08	209.29	206.21	12.60	196.69
		2/1/1996	15.08	25.08	209.29	206.21	12.84	196.45
		12/1/1996	15.08	25.08	209.29	206.21	12.84	196.45
		05/28/13	15.08	25.08	209.29	206.21	24.2	185.09
		08/10/13	15.08	25.08	209.29	206.21	Dry	Dry
		09/20/13	15.08	25.08	209.29	206.21	Dry	Dry
		01/25/14	15.08	25.08	209.29	206.21	Dry	Dry
		07/17/14	15.08	25.08	209.29	206.21	Dry	Dry
		11/20/14	15.08	25.08	209.29	206.21	Dry	Dry
		02/03/15	15.08	25.08	209.29	206.21	Dry	Dry
		05/05/15	15.08	25.08	209.29	206.21	Dry	Dry
		08/04/15	15.08	25.08	209.29	206.21	Dry	Dry
		02/01/16	15.08	25.08	209.29	206.21	Dry	Dry
		08/04/16	15.08	25.08	209.29	206.21	Dry	Dry
		02/20/19	15.08	25.08	209.29	206.21	Dry	Dry
		08/13/19	15.08	25.08	209.29	206.21	Dry	Dry
		03/18/21	15.08	25.08	209.29	206.21	Dry	Dry
		02/11/22	15.08	25.08	209.29	206.21	Dry	Dry
		02/09/23	15.08	25.08	209.29	206.21	Dry	Dry
LHSMW21	S	12/1/1994	19.61	29.61	207.67	204.66	10.92	196.75
		2/1/1996	19.61	29.61	207.67	204.66	11.70	195.97
		12/1/1996	19.61	29.61	207.67	204.66	11.70	195.97
		05/28/13	19.61	29.61	207.67	204.66	19.87	187.80
		08/10/13	19.61	29.61	207.67	204.66	22.40	185.27
		09/25/13	19.61	29.61	207.67	204.66	23.60	184.07
		02/02/16	19.61	29.61	207.67	204.66	22.15	185.52
		08/05/16	19.61	29.61	207.67	204.66	21.12	186.55
		02/25/19	19.61	29.61	207.67	204.66	22.22	185.45
		08/13/19	19.61	29.61	207.67	204.66	20.55	187.12

Table 2-3
Groundwater Elevation Data

Well ID	Zone	Sampling Date	Screen Interval (ft BTOC)		Top of Casing Elevation (ft MSL)	Ground Surface Elevation (ft MSL)	Depth to Water (ft BTOC)	Groundwater Elevation (ft MSL)
			Top	Bottom				
LHSMW21	S	02/13/20	19.61	29.61	207.67	204.66	21.30	186.37
		03/16/21	19.61	29.61	207.67	204.66	18.53	189.14
		02/15/22	19.61	29.61	207.67	204.66	19.60	188.07
		02/06/23	19.61	29.61	207.67	204.66	19.35	188.32
		2/22/2024	19.61	29.61	207.67	204.66	18.60	189.07
LHSMW22	S	12/1/1994	18.69	28.69	209.60	206.41	13.89	195.71
		2/1/1996	18.69	28.69	209.60	206.41	15.08	194.52
		12/1/1996	18.69	28.69	209.60	206.41	15.08	194.52
		1/16/2002	18.69	28.69	209.60	206.41	Dry	Dry
		3/15/2002	18.69	28.69	209.60	206.41	Dry	Dry
		5/15/2005	18.69	28.69	209.60	206.41	Dry	Dry
		2/19/2007	18.69	28.69	209.60	206.41	25.21	184.39
		4/15/2008	18.69	28.69	209.60	206.41	Dry	Dry
		4/16/2008	18.69	28.69	209.60	206.41	Dry	Dry
		10/13/2008	18.69	28.69	209.60	206.41	Dry	Dry
		05/28/13	18.69	28.69	209.60	206.41	Dry	Dry
		08/10/13	18.69	28.69	209.60	206.41	Dry	Dry
		09/20/13	18.69	28.69	209.60	206.41	Dry	Dry
		01/25/14	18.69	28.69	209.60	206.41	Dry	Dry
		07/17/14	18.69	28.69	209.60	206.41	Dry	Dry
		11/20/14	18.69	28.69	209.60	206.41	Dry	Dry
		02/03/15	18.69	28.69	209.60	206.41	Dry	Dry
		05/05/15	18.69	28.69	209.60	206.41	Dry	Dry
		08/04/15	18.69	28.69	209.60	206.41	Dry	Dry
		02/01/16	18.69	28.69	209.60	206.41	Dry	Dry
		08/04/16	18.69	28.69	209.60	206.41	Dry	Dry
		02/20/18	18.69	28.69	209.60	206.41	Dry	Dry
		08/28/18	18.69	28.69	209.60	206.41	Dry	Dry
		02/20/19	18.69	28.69	209.60	206.41	Dry	Dry
		08/13/19	18.69	28.69	209.60	206.41	Dry	Dry
		02/18/20	18.69	28.69	209.60	206.41	Dry	Dry
		03/15/21	18.69	28.69	209.60	206.41	Dry	Dry
		02/11/22	18.69	28.69	209.60	206.41	Dry	Dry
		02/06/23	18.69	28.69	209.60	206.41	Dry	Dry
		2/26/2024	18.69	28.69	209.60	206.41	Dry	Dry
LHSMW23	I	12/1/1994	21.42	41.42	208.82	205.80	15.53	193.29
		2/1/1996	21.42	41.42	208.82	205.80	17.02	191.80
		12/1/1996	21.42	41.42	208.82	205.80	17.02	191.80
		1/16/2002	21.42	41.42	208.82	205.80	Dry	Dry
		3/15/2002	21.42	41.42	208.82	205.80	Dry	Dry
		5/15/2005	21.42	41.42	208.82	205.80	Dry	Dry
		2/19/2007	21.42	41.42	208.82	205.80	26.55	182.27
		04/07/08	21.42	41.42	208.82	205.80	27.64	181.18
		04/15/08	21.42	41.42	208.82	205.80	Dry	Dry
		04/16/08	21.42	41.42	208.82	205.80	Dry	Dry
		10/13/08	21.42	41.42	208.82	205.80	Dry	Dry
		05/25/13	21.42	41.42	208.82	205.80	Dry	Dry
		08/10/13	21.42	41.42	208.82	205.80	Dry	Dry

Table 2-3
Groundwater Elevation Data

Well ID	Zone	Sampling Date	Screen Interval (ft BTOC)		Top of Casing Elevation (ft MSL)	Ground Surface Elevation (ft MSL)	Depth to Water (ft BTOC)	Groundwater Elevation (ft MSL)
			Top	Bottom				
LHSMW23	I	09/20/13	21.42	41.42	208.82	205.80	Dry	Dry
		01/25/14	21.42	41.42	208.82	205.80	Dry	Dry
		07/17/14	21.42	41.42	208.82	205.80	Dry	Dry
		11/20/14	21.42	41.42	208.82	205.80	Dry	Dry
		02/03/15	21.42	41.42	208.82	205.80	Dry	Dry
		05/05/15	21.42	41.42	208.82	205.80	Dry	Dry
		08/04/15	21.42	41.42	208.82	205.80	Dry	Dry
		02/01/16	21.42	41.42	208.82	205.80	Dry	Dry
		03/28/16	21.42	41.42	208.82	205.80	Dry	Dry
		08/04/16	21.42	41.42	208.82	205.80	Dry	Dry
		02/20/18	21.42	41.42	208.82	205.80	Dry	Dry
		08/28/18	21.42	41.42	208.82	205.80	Dry	Dry
		02/20/19	21.42	41.42	208.82	205.80	Dry	Dry
		08/13/19	21.42	41.42	208.82	205.80	Dry	Dry
		09/03/19	23.09	43.09	208.84	205.75	35.80	173.04
		02/19/20	23.09	43.09	208.84	205.75	35.90	172.94
		03/18/21	23.09	43.09	208.84	205.75	35.95	172.89
		02/11/22	23.09	43.09	208.84	205.75	36.13	172.71
		02/09/23	23.09	43.09	208.84	205.75	36.73	172.11
		2/26/2024	23.09	43.09	208.84	205.75	37.05	171.79
LHSMW24	S	12/1/1994	18.96	28.96	203.84	200.52	11.90	191.94
		02/01/96	18.96	28.96	203.84	200.52	13.84	190.00
		12/1/1996	18.96	28.96	203.84	200.52	13.84	190.00
		2/16/2002	18.96	28.96	203.84	200.52	27.88	175.96
		5/16/2008	18.96	28.96	203.84	200.52	Dry	Dry
		10/13/2008	18.96	28.96	203.84	200.52	Dry	Dry
		05/28/13	18.96	28.96	203.84	200.52	Dry	Dry
		08/10/13	18.96	28.96	203.84	200.52	Dry	Dry
		09/20/13	18.96	28.96	203.84	200.52	Dry	Dry
		01/25/14	18.96	28.96	203.84	200.52	Dry	Dry
		07/17/14	18.96	28.96	203.84	200.52	Dry	Dry
		02/02/16	18.96	28.96	203.84	200.52	27.88	175.96
		08/05/16	18.96	28.96	203.84	200.52	Dry	Dry
		02/25/19	18.96	28.96	203.84	200.52	Dry	Dry
		03/18/21	18.96	28.96	203.84	200.52	Dry	Dry
		02/11/22	18.96	28.96	203.84	200.52	Dry	Dry
		02/09/23	18.96	28.96	203.84	200.52	Dry	Dry
		2/9/2023	18.96	28.96	203.84	200.52	Dry	Dry
LHSMW25	I	12/1/1994	22.10	42.10	201.97	199.07	15.75	186.22
		2/1/1996	22.10	42.10	201.97	199.07	17.10	184.87
		12/1/1996	22.10	42.10	201.97	199.07	17.10	184.87
		4/7/2008	22.10	42.10	201.97	199.07	25.50	176.47
		02/22/18	22.10	42.10	201.97	199.07	30.90	171.07
		08/27/18	22.10	42.10	201.97	199.07	31.33	170.64
		02/25/19	22.10	42.10	201.97	199.07	30.93	171.04
		08/12/19	22.10	42.10	201.97	199.07	29.85	172.12
		02/19/20	22.10	42.10	201.97	199.07	31.22	170.75
		03/15/21	22.10	42.10	201.97	199.07	30.82	171.15

Table 2-3
Groundwater Elevation Data

Well ID	Zone	Sampling Date	Screen Interval (ft BTOC)		Top of Casing Elevation (ft MSL)	Ground Surface Elevation (ft MSL)	Depth to Water (ft BTOC)	Groundwater Elevation (ft MSL)
			Top	Bottom				
LHSMW25	I	02/13/22	22.10	42.10	201.97	199.07	31.33	170.64
		02/09/23	22.10	42.10	201.97	199.07	32.00	169.97
		2/22/2024	22.10	42.10	201.97	199.07	32.60	169.37
LHSMW27	S	12/1/1994	10.50	20.50	202.10	199.20	12.19	189.91
		2/1/1996	10.50	20.50	202.10	199.20	14.05	188.05
		12/1/1996	10.50	20.50	202.10	199.20	14.05	188.05
		2/16/2002	10.50	20.50	202.10	199.20	17.82	184.28
		5/16/2008	10.50	20.50	202.10	199.20	Dry	Dry
		10/13/2008	10.50	20.50	202.10	199.20	Dry	Dry
		05/28/13	10.50	20.50	202.10	199.20	Dry	Dry
		08/10/13	10.50	20.50	202.10	199.20	Dry	Dry
		09/20/13	10.50	20.50	202.10	199.20	Dry	Dry
		01/25/14	10.50	20.50	202.10	199.20	Dry	Dry
		07/18/14	10.50	20.50	202.10	199.20	Dry	Dry
		02/02/16	10.50	20.50	202.10	199.20	17.82	184.28
		08/05/16	10.50	20.50	202.10	199.20	Dry	Dry
		02/25/19	10.50	20.50	202.10	199.20	19.17	182.93

Notes:
BTOC - below top of casing
D - Deep
ft - feet
I - Intermediate
ID - identifier
MSL - mean sea level
NM - not measured
S - shallow

Table 2-4

Evaluation of Screened Intervals for Historically Dry Shallow Groundwater Zone Wells

Dry Shallow Zone Well ID	Top of Shallow Zone Screen Elevation (ft MSL)	Bottom of Shallow Zone Well Screen Elevation (ft MSL)	Nearest Int. Zone Well ID	Distance to Nearest Int. Zone Well from Dry Shallow Well (ft)	Top of Int. Zone Well Casing Elevation (ft MSL)	Top of Int. Zone Screen Elevation (ft MSL)	Bottom of Int. Zone Screen Elevation (ft MSL)	Depth to Int. Zone Groundwater (ft BTOC)	Int. Zone Groundwater Elevation (ft MSL)	Ground Surface Elevation (ft MSL)	Approximate Top of Intermediate Zone Based on Boring Log (ft MSL)	Approximate Depth from Bottom of Shallow Zone Screen to Top of Intermediate Zone (ft)
46WW01	195.75	185.75	46WW02	23	212.21	174.16	164.16	39.33	172.88	209.16	169.16	16.59
46WW04	198.47	188.47	46WW06	22	213.84	173.24	163.24	42.3	171.54	211.24	182.74	5.73
46WW10	199.50	190.00	46WW06	325	213.84	173.24	163.24	42.3	171.54	211.24	182.74	7.26
46WW12	190.60	181.10	46WW09	224	210.19	178.71	169.21	39.92	170.27	207.71	183.71	-2.61
46WW13	186.96	177.46	LHSMW23R	170	208.84	185.75	165.75	36.73	172.11	205.75	181.75	-4.29
46WW15	186.51	177.01	LHSMW23R	136	208.84	185.75	165.75	36.73	172.11	205.75	181.75	-4.74
LHSMW17	197.90	187.90	46WW02	496	212.21	174.16	164.16	39.33	172.88	209.16	169.16	18.74
LHSMW18	197.88	187.88	46WW02	306	212.21	174.16	164.16	39.33	172.88	209.16	169.16	18.72
LHSMW20	194.21	184.21	46WW07	155	207.87	166.37	156.87	37.9	169.97	205.37	166.37	17.84
LHSMW22	190.91	180.91	46WW02	317	212.21	174.16	164.16	39.33	172.88	209.16	169.16	11.75
LHSMW24	184.88	174.88	LHSMW25	256	201.97	179.87	159.87	32	169.97	199.07	180.07	-5.19

Notes:

Green shading indicates the bottom of the shallow groundwater zone well is at least ten feet above the top of the intermediate groundwater zone at the nearest intermediate zone well.

Blue shading indicates the bottom of the shallow groundwater zone well is less than ten feet above the top of the intermediate groundwater zone at the nearest intermediate zone well.

Gray shading indicates the bottom of the shallow groundwater zone well overlaps with the top of the intermediate groundwater zone at the nearest intermediate zone well.

The intermediate zone depth to water and intermediate zone groundwater elevations shown are based on readings from the February 2023 sampling event.

ft - feet
ID - identifier
Int. - Intermediate
MSL - mean sea level

Table 2-5
Year 10 Groundwater RA-O Sampling Results – February 2024

	Location Code		46WW02		46WW03		46WW05		46WW06		46WW07		46WW08		46WW09				46WW11	
	Location Description		Site 46 - Central, Within Site Boundary, Intermediate Zone		Site 46 - Central, Within Site Boundary, Deep Zone		Site 46 - North, Within Site Boundary, Intermediate Zone		Site 46 - West, Within Site Boundary, Intermediate Zone		Site 46 - North, Within Site Boundary. Intermediate Zone		Site 46 - NNW, Inside Site Boundary. Intermediate Zone		Site 46 - Central, Within Site Boundary. Intermediate Zone				Site 46 - Central, Within Site Boundary, Shallow Zone	
	Sample ID		46WW02-240226		46WW03-240226		46WW05-240226		46WW06-240226		46WW07-240222		46WW08-240226		46WW09-240222		46WW09-240222-FD		46WW11-240222	
	Sample Date		2/26/2024		2/26/2024		2/26/2024		2/26/2024		2/22/2024		2/26/2024		2/22/2024		2/22/2024		2/22/2024	
	Sample Purpose		REG		REG		REG		REG		REG		REG		REG		FD		REG	
Analyte	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Field Measurements																				
Dissolved oxygen	mg/L	NV	0.46		0.53		0.54		0.26		5.72		0.45		5.48		5.48		1.42	
Ferrous Iron	mg/L	NV	0.67		NM		3.21		NM		NM		NM		1.46		1.46		0.33	
Oxidation Reduction Potential	mV	NV	243		154		206		-13		159		-26		139		139		101	
pH	SU	NV	4.87		7.36		4.8		5.96		6.59		6.09		6.37		6.37		5.18	
Specific conductivity	mS/cm	NV	0.449		0.524		6.09		1.54		0.447		5.33		3.4		3.4		0.691	
Temperature	C	NV	18.01		17.91		22.82		18.68		17.93		20.32		17.72		17.72		18.03	
Turbidity	NTU	NV	2.4		9.2		7.9		161		0.4		24.1		89		89		2.1	
Dissolved Gases (RSK-175)																				
Carbon dioxide	µg/L	NV	100,000	R	NA		210,000		NA		NA		NA		63,000		NA		170,000	
Ethane	µg/L	NV	0.586	J	NA		1.9		NA		NA		NA		< 0.5	U	< 0.5	U	1.81	
Ethylene	µg/L	NV	< 0.5	U	NA		< 0.5	U	NA		NA		NA		< 0.5	UJ	< 0.5	UJ	< 0.5	UJ
Methane	µg/L	NV	1.07		NA		3.04	J	NA		NA		NA		1.27		1.38		75.5	
General Chemistry (SM5310B/SW9056A)																				
Chloride	mg/L	NV	46.7		NA		218		NA		NA		NA		374		389		157	
Nitrate	mg/L	10	0.0508	J	NA		0.177	J	NA		NA		NA		< 0.05	UJ	0.03	J	< 0.05	UJ
Sulfate	mg/L	NV	249		NA		4,340		NA		NA		NA		1,660		1,750		238	
Total organic carbon	mg/L	NV	8.69		NA		7.4		NA		NA		NA		3.19		3.17		1.77	
Volatile Organic Compounds (Method SW8260C)																				
cis-1,2-Dichloroethene	µg/L	70	2.7		< 1	U	1.8		< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U
Trichloroethene	µg/L	5	35		< 1	U	57		< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	18	
Vinyl chloride	µg/L	2	< 0.5	U	< 1	U	< 0.5	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U

Notes:

Blue highlighting indicates concentrations above the MCL.

1 - Samples for nitrate from 2/7/2023 and 2/9/2023 could not be analyzed within the hold time due to an instrument outage. Samples were recollected for nitrate from the affected locations on 2/28/23.

< The analyte was not detected above the concentration shown.

µg/L - micrograms per liter

C - Celsius

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FD - field duplicate

ID - identification

MCL - Maximum Contaminant Level

mg/L - milligrams per liter

mS/cm - milliSiemens per centimeter

mV - millivolts

NA - not analyzed

NM - not measured

NTU - Nephelometric Turbidity Units

NV - no value; MCLs only shown for contaminants of concern

R - Relative percent difference above laboratory control limit

Std. Units - standard pH units

Val Qual - Validation Qualifier

Table 2-5
Year 10 Groundwater RA-O Sampling Results – February 2024

	Location Code		46WW14		46WW16		46WW17		LHSMW19				LHSMW21		LHSMW23R				LHSMW25	
	Location Description		Site 45 - Northeast, Within Site Boundary, Intermediate Zone		Site 46 - North, Within Site Boundary, Intermediate Zone		Site 46 - Northeast, Within Site Boundary, Shallow/Intermediate Zone		Site 46 - Central, Within Site Boundary, Shallow Zone				Site 46 - North, Within Site Boundary, Shallow Zone		Site 46 - South, Within Site Boundary, Intermediate Zone				Site 46 - East, Within Site Boundary, Intermediate Zone	
	Sample ID		46WW14-240222		46WW16-240226		46WW17-240222		LHSMW19-240222		LHSMW19-240222-		LHSMW21-240222		LHSMW23R-240226		LHSMW23R-24026-		LHSMW25-240222	
	Sample Date		2/22/2024		2/26/2024		2/22/2024		2/22/2024		2/22/2024		2/22/2024		2/26/2024		2/26/2024		2/22/2024	
	Sample Purpose		REG		REG		REG		REG		FD		REG		REG		FD		REG	
Analyte	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Field Measurements																				
Dissolved oxygen	mg/L	NV	0.62		0.31		3.56		0.71		0.71		0.53		4.44		4.44		0.39	
Ferrous Iron	mg/L	NV	NM		0.19		NM		NM		NM		1.12		NM		NM		NM	
Oxidation Reduction Potential	mV	NV	-105		-124		117		77		77		103		126		126		8	
pH	SU	NV	6.73		7.17		6.23		6.47		6.47		6.73		5.53		5.53		6.23	
Specific conductivity	mS/cm	NV	0.555		2.5		5.98		2.85		2.85		1.78		4.36		4.36		1.18	
Temperature	C	NV	19		22.65		20.88		18.59		18.59		19.02		22.9		22.9		20.48	
Turbidity	NTU	NV	12.1		67.2		1.4		0		0		57.2		27.2		27.2		2.1	
Dissolved Gases (RSK-175)																				
Carbon dioxide	µg/L	NV	NA		46,000		NA		NA		NA		43,000		NA		NA		NA	
Ethane	µg/L	NV	NA		< 0.5	U	NA		NA		NA		0.878	J	NA		NA		NA	
Ethylene	µg/L	NV	NA		< 0.5	U	NA		NA		NA		< 0.5	UJ	NA		NA		NA	
Methane	µg/L	NV	NA		1.97	J	NA		NA		NA		1.41		NA		NA		NA	
General Chemistry (SM5310B/SW9056A)																				
Chloride	mg/L	NV	NA		269		NA		NA		NA		95.3		NA		NA		NA	
Nitrate	mg/L	10	NA		< 0.1	U	NA		NA		NA		< 0.05	UJ	NA		NA		NA	
Sulfate	mg/L	NV	NA		592		NA		NA		NA		816		NA		NA		NA	
Total organic carbon	mg/L	NV	NA		2.6		NA		NA		NA		1.6		NA		NA		NA	
Volatile Organic Compounds (Method SW8260C)																				
cis-1,2-Dichloroethene	µg/L	70	< 1	U	< 1	U	< 1	U	12		12		170		0.66	J	0.65	J	< 1	U
Trichloroethene	µg/L	5	< 1	U	< 1	U	< 1	U	18		19		45		0.56	J	< 0.5	U	< 1	U
Vinyl chloride	µg/L	2	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 0.5	U	< 0.5	U	< 1	U

Notes:

Blue highlighting indicates concentrations above the MCL.

1 - Samples for nitrate from 2/7/2023 and 2/9/2023 could not be analyzed within the hold time due to an instrument outage. Samples were recollected for nitrate from the affected locations on 2/28/23.

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ID - identification

MCL - Maximum Contaminant Level

mg/L - milligrams per liter

mS/cm - milliSiemens per centimeter

mV - millivolts

NA - not analyzed

NM - not measured

NTU - Nephelometric Turbidity Units

NV - no value; MCLs only shown for contaminants of concern

R - Relative percent difference above laboratory control limit

Std. Units - standard pH units

Val Qual - Validation Qualifier

Table 2-6
Historical COC Concentrations 1998–2024

Location Code			46WW01												46WW02											
Location Description			Site 46 - Central, inside site boundary. Shallow Zone.												Site 46 - Central, inside site boundary. Intermediate Zone.										Site 46 - Central, inside site boundary. Intermediate Zone.	
Sample ID			46WW01-981001		46WW01-981107		46WW01-981107FD		46WW01-FEB2007		46WW01-032916		46WW01-080416		46WW02-981106		46WW02-FEB2007		46WW02-102808		46WW02-052813		46WW02-091913		46WW02-012714	
Sample Date			10/1/1998		11/7/1998		11/7/1998		2/19/2007		3/29/2016		8/4/2016		11/6/1998		2/20/2007		10/28/2008		5/28/2013		9/19/2013		1/27/2014	
Analyte	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
cis-1,2-Dichloroethene	µg/L	70	1.2		< 1	U	< 1	U	< 0.83	U	< 0.5	U	< 0.5	U	1		1.4	J	1.45		1.76		1.91		2.09	
Trichloroethene	µg/L	5	6.6		< 1	U	< 1	U	< 0.63	U	< 0.5	U	< 0.5	U	24		28.9		31.2		30		37.4		35.2	
Vinyl chloride	µg/L	2	< 1	U	< 1	U	< 1	U	< 0.32	U	< 0.5	U	< 0.5	U	< 1	U	< 0.32	U	< 0.25	U	0.495	J	0.465	J	0.556	J

Notes:

Blue Highlighting Indicates concentrations above the MCL/PCL.

Some samples may have been diluted due to the concentration(s) of one or more analytes exceeding the upper limit of the calibration curve.

µg/L - micrograms per liter

COC - contaminant of concern

E - east

FD - field duplicate

H - Result may be biased high. Details are provided in the validation report.

ID - Identifier

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

MCL - Maximum Contaminant Level

N - north

NE - northeast

NNW - north-northwest

SE - southeast

SW - southwest

U - Undetected: The analyte was analyzed for, but not detected.

UJ - Undetected estimated: The analyte was analyzed for but, was not detected. Even though the analyte was not detected, certain discrepancies in meeting analyte specific quality control were not met.

Val Qual - validation qualifier

W - west

Table 2-6
Historical COC Concentrations 1998–2024

Location Code			46WW02																					
Location Description			Site 46 - Central, inside site boundary. Intermediate Zone.																					
Sample ID			46WW02-071514		46WW02-111814		46WW02-020515		46WW02-050615		46WW02-080515		46WW02-020116		46WW02-080416		46WW02-022018		46WW02-180829		46WW02-190221		46WW02-190812		46WW02-200213	
Sample Date			7/15/2014		11/18/2014		2/5/2015		5/6/2015		8/5/2015		2/1/2016		8/4/2016		2/20/2018		8/29/2018		2/21/2019		8/12/2019		2/13/2020	
Analyte	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
cis-1,2-Dichloroethene	µg/L	70	1.72		1.97		2.08		1.44		1.37		1.28		1.31		0.52	J	1.4		1		1.1		1.6	
Trichloroethene	µg/L	5	32.8		38.2		37.6		24		20.3		16.6		20.7		21		24		16		17		15	
Vinyl chloride	µg/L	2	0.493	J	0.501	J	0.432	J	< 0.5	U	< 0.5	U	< 0.5	U	0.259	J	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U

Notes:

Blue Highlighting Indicates concentrations above the MCL/PCL.

Some samples may have been diluted due to the concentration(s) of one or more analytes exceeding the upper limit of the calibration curve.

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W - west

Table 2-6
Historical COC Concentrations 1998–2024

Location Code			46WW02								46WW03													
Location Description			Site 46 - Central, inside site boundary. Intermediate Zone.								Site 46 - Central, inside site boundary. Deep Zone													
Sample ID			46WW02-210316		46WW02-220215		46WW02-230206		46WW02-240226		46WW03-981106		46WW03-053013		46WW03-053013-FD		46WW03-092613		46WW03-012514		46WW03FD-012514		46WW03-071714		46WW03-112014	
Sample Date			3/16/2021		2/15/2022		2/6/2023		2/26/2024		11/6/1998		5/30/2013		5/30/2013		9/26/2013		1/25/2014		1/25/2014		7/17/2014		11/20/2014	
Analyte	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
cis-1,2-Dichloroethene	µg/L	70	1.4		1.2		1.8	J	2.7		< 1	U	< 0.25	U	< 0.25	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Trichloroethene	µg/L	5	25		29		29		35		< 1	U	< 0.25	U	< 0.25	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Vinyl chloride	µg/L	2	< 0.5	U	< 0.5	U	0.43	J	< 0.5	U	< 1	U	< 0.25	U	< 0.25	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U

Notes:

Blue Highlighting Indicates concentrations above the MCL/PCL.

Some samples may have been diluted due to the concentration(s) of one or more analytes exceeding the upper limit of the calibration curve.

µg/L - micrograms per liter

COC - contaminant of concern

E - east

FD - field duplicate

H - Result may be biased high. Details are provided in the validation report.

ID - Identifier

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

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W - west

Table 2-6
Historical COC Concentrations 1998–2024

Location Code			46WW03																					
Location Description			Site 46 - Central, inside site boundary. Deep Zone.																					
Sample ID			46WW03FD-112014		46WW03-020515		46WW03-050615		46WW03-080515		46WW03FD-080515		46WW03-020316		46WW03-080416		46WW03-022618		46WW03-180827		46WW03-190220		46WW03-190812		46WW03-200219	
Sample Date			11/20/2014		2/5/2015		5/6/2015		8/5/2015		8/5/2015		2/3/2016		8/4/2016		2/26/2018		8/27/2018		2/20/2019		8/12/2019		2/19/2020	
Analyte	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
cis-1,2-Dichloroethene	µg/L	70	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Trichloroethene	µg/L	5	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Vinyl chloride	µg/L	2	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U

Notes:

Blue Highlighting Indicates concentrations above the MCL/PCL.

Some samples may have been diluted due to the concentration(s) of one or more analytes exceeding the upper limit of the calibration curve.

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Val Qual - validation qualifier

W - west

Table 2-6
Historical COC Concentrations 1998–2024

Location Code			46WW03												46WW04											
Location Description			Site 46 - Central, inside site boundary. Deep Zone.												Site 46 - West, inside site boundary. Shallow Zone.											
Sample ID			46WW03-200219-FD		46WW03-210318		46WW03-210318-FD		46WW03-220215		46WW03-230206		46WW03-240226		46WW04-981107		46WW04-FEB2007		46WW04F-052413		46WW04-092113		46WW04-012514		46WW04-071814	
Sample Date			2/19/2020		3/18/2021		3/18/2021		2/15/2022		2/6/2023		2/26/2024		11/7/1998		2/19/2007		5/24/2013		9/21/2013		1/25/2014		7/18/2014	
Analyte	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
cis-1,2-Dichloroethene	µg/L	70	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U	< 0.83	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Trichloroethene	µg/L	5	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	0.71	J	< 0.63	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Vinyl chloride	µg/L	2	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U	< 0.32	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U

Notes:

Blue Highlighting Indicates concentrations above the MCL/PCL.

Some samples may have been diluted due to the concentration(s) of one or more analytes exceeding the upper limit of the calibration curve.

µg/L - micrograms per liter

COC - contaminant of concern

E - east

FD - field duplicate

H - Result may be biased high. Details are provided in the validation report.

ID - Identifier

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

MCL - Maximum Contaminant Level

N - north

NE - northeast

NNW - north-northwest

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SW - southwest

U - Undetected: The analyte was analyzed for, but not detected.

UJ - Undetected estimated: The analyte was analyzed for but, was not detected. Even though the analyte was not detected, certain discrepancies in meeting analyte specific quality control were not met.

Val Qual - validation qualifier

W - west

Table 2-6
Historical COC Concentrations 1998–2024

Location Code			46WW04								46WW05												46WW05			
Location Description			Site 46 - West, inside site boundary. Shallow Zone.								Site 46 - N, inside site boundary. Intermediate Zone.															
Sample ID			46WW04-050615		46WW04-080515		46WW04-020316		46WW04-220213		46WW05-100908		46WW05-053013		46WW05-092413		46WW05-012814		46WW05-071614		46WW05-111914		46WW05-020515		46WW05-050515	
Sample Date			5/6/2015		8/5/2015		2/3/2016		2/13/2022		10/9/2008		5/30/2013		9/24/2013		1/28/2014		7/16/2014		11/19/2014		2/5/2015		5/5/2015	
Analyte	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
cis-1,2-Dichloroethene	µg/L	70	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	1.72		10.2		8.12		10.3		9.74		9.55		10.9		7	
Trichloroethene	µg/L	5	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	5.9		144		112		131		130		128		143		80.5	
Vinyl chloride	µg/L	2	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.25	U	2.14		1.79		2.53		2.09		1.59		1.72		0.956	J

Notes:

Blue Highlighting Indicates concentrations above the MCL/PCL.

Some samples may have been diluted due to the concentration(s) of one or more analytes exceeding the upper limit of the calibration curve.

µg/L - micrograms per liter

COC - contaminant of concern

E - east

FD - field duplicate

H - Result may be biased high. Details are provided in the validation report.

ID - Identifier

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

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U - Undetected: The analyte was analyzed for, but not detected.

UJ - Undetected estimated: The analyte was analyzed for but, was not detected. Even though the analyte was not detected, certain discrepancies in meeting analyte specific quality control were not met.

Val Qual - validation qualifier

W - west

Table 2-6
Historical COC Concentrations 1998–2024

Location Code			46WW05																					
Location Description			Site 46 - N, inside site boundary. Intermediate Zone.																					
Sample ID			46WW05-080615		46WW05-020116		46WW05-080316		46WW05-022618		46WW05-022618-FD		46WW05-180828		46WW05-190225		46WW05-190813		46WW05-200213		46WW05-210316		46WW05-220215		46WW05-230207	
Sample Date			8/6/2015		2/1/2016		8/3/2016		2/26/2018		2/26/2018		8/28/2018		2/25/2019		8/13/2019		2/13/2020		3/16/2021		2/15/2022		2/7/2023	
Analyte	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
cis-1,2-Dichloroethene	µg/L	70	3.87		3.12		1.86		< 0.5	U	0.62	J	< 0.5	U	2.2		4.8		1.6		1.6		0.7	J	1.8	
Trichloroethene	µg/L	5	34		46.4		23.6		14		14		6.4		27		62		19		20		18		33	
Vinyl chloride	µg/L	2	0.274	J	0.832	J	0.522	J	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	1.2		0.65	J	< 0.5	U	< 0.5	U	< 1	U

Notes:

Blue Highlighting Indicates concentrations above the MCL/PCL.

Some samples may have been diluted due to the concentration(s) of one or more analytes exceeding the upper limit of the calibration curve.

µg/L - micrograms per liter

COC - contaminant of concern

E - east

FD - field duplicate

H - Result may be biased high. Details are provided in the validation report.

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J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

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Val Qual - validation qualifier

W - west

Table 2-6
Historical COC Concentrations 1998–2024

Location Code			46WW05		46WW06																			
Location Description			Site 46 - N, inside site boundary. Intermediate Zone.		Site 46 - W, inside site boundary. Intermediate Zone.																			
Sample ID			46WW05-240226		46WW06-100908		46WW06-052413		46WW06-092513		46WW06-012514		46WW06-071714		46WW06FD-071714		46WW06-111914		46WW06FD-111914		46WW06-020615		46WW06-050115		46WW06-080415	
Sample Date			2/26/2024		10/9/2008		5/24/2013		9/25/2013		1/25/2014		7/17/2014		7/17/2014		11/19/2014		11/19/2014		2/6/2015		5/1/2015		8/4/2015	
Analyte	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
cis-1,2-Dichloroethene	µg/L	70	1.8		< 0.25	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Trichloroethene	µg/L	5	57		< 0.25	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Vinyl chloride	µg/L	2	< 0.5	U	< 0.25	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U

Notes:

Blue Highlighting Indicates concentrations above the MCL/PCL.

Some samples may have been diluted due to the concentration(s) of one or more analytes exceeding the upper limit of the calibration curve.

µg/L - micrograms per liter

COC - contaminant of concern

E - east

FD - field duplicate

H - Result may be biased high. Details are provided in the validation report.

ID - Identifier

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

MCL - Maximum Contaminant Level

N - north

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U - Undetected: The analyte was analyzed for, but not detected.

UJ - Undetected estimated: The analyte was analyzed for but, was not detected. Even though the analyte was not detected, certain discrepancies in meeting analyte specific quality control were not met.

Val Qual - validation qualifier

W - west

Table 2-6
Historical COC Concentrations 1998–2024

Location Code			46WW06																					
Location Description			Site 46 - W, inside site boundary. Intermediate Zone.																					
Sample ID			46WW06-020216		46WW06-080416		46WW06FD-080416		46WW06-022618		46WW06-180827		46WW06-190220		46WW06-190813		46WW06-200219		46WW06-210315		46WW06-220213		46WW06-230209		46WW06-240226	
Sample Date			2/2/2016		8/4/2016		8/4/2016		2/26/2018		8/27/2018		2/20/2019		8/13/2019		2/19/2020		3/15/2021		2/13/2022		2/9/2023		2/26/2024	
Analyte	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
cis-1,2-Dichloroethene	µg/L	70	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U
Trichloroethene	µg/L	5	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	0.65	J	< 0.5	U	< 0.5	U	< 1	U	< 1	U
Vinyl chloride	µg/L	2	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U

Notes:

Blue Highlighting Indicates concentrations above the MCL/PCL.

Some samples may have been diluted due to the concentration(s) of one or more analytes exceeding the upper limit of the calibration curve.

µg/L - micrograms per liter

COC - contaminant of concern

E - east

FD - field duplicate

H - Result may be biased high. Details are provided in the validation report.

ID - Identifier

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

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Val Qual - validation qualifier

W - west

Table 2-6
Historical COC Concentrations 1998–2024

Location Code			46WW07																					
Location Description			Site 46 - N, inside site boundary. Intermediate Zone.																					
Sample ID			46WW07-052513		46WW07-052513-FD		46WW07-091913		46WW07-012714		46WW07-071814		46WW07FD-071814		46WW07-112014		46WW07-020315		46WW07-050115		46WW07-080415		46WW07-020216		46WW07-080216	
Sample Date			5/25/2013		5/25/2013		9/21/2013		1/27/2014		7/18/2014		7/18/2014		11/20/2014		2/3/2015		5/1/2015		8/4/2015		2/2/2016		8/2/2016	
Analyte	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
cis-1,2-Dichloroethene	µg/L	70	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Trichloroethene	µg/L	5	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Vinyl chloride	µg/L	2	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U

Notes:

Blue Highlighting Indicates concentrations above the MCL/PCL.

Some samples may have been diluted due to the concentration(s) of one or more analytes exceeding the upper limit of the calibration curve.

µg/L - micrograms per liter

COC - contaminant of concern

E - east

FD - field duplicate

H - Result may be biased high. Details are provided in the validation report.

ID - Identifier

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Val Qual - validation qualifier

W - west

Table 2-6
Historical COC Concentrations 1998–2024

Location Code			46WW07																				46WW08	
Location Description			Site 46 - N, inside site boundary. Intermediate Zone.																				Site 46 - NNW, inside site boundary. Intermediate Zone.	
Sample ID			46WW07-022318		46WW07-180827		46WW07-190220		46WW07-190812		46WW07-200218		46WW07-200218-FD		46WW07-210318		46WW07-210318-FD		46WW07-220211		46WW07-230206		46WW07-240222		46WW08-052513	
Sample Date			2/23/2018		8/27/2018		2/20/2019		8/12/2019		2/18/2020		2/18/2020		3/18/2021		3/18/2021		2/11/2022		2/6/2023		2/22/2024		5/25/2013	
Analyte	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
cis-1,2-Dichloroethene	µg/L	70	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 0.5	U
Trichloroethene	µg/L	5	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	1	J	< 0.5	U	< 1	U	< 0.5	U
Vinyl chloride	µg/L	2	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 0.5	U

Notes:

Blue Highlighting Indicates concentrations above the MCL/PCL.

Some samples may have been diluted due to the concentration(s) of one or more analytes exceeding the upper limit of the calibration curve.

µg/L - micrograms per liter

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Val Qual - validation qualifier

W - west

Table 2-6
Historical COC Concentrations 1998–2024

Location Code			46WW08																					
Location Description			Site 46 - NNW, inside site boundary. Intermediate Zone.																					
Sample ID			46WW08-092113		46WW08-092113-FD		46WW08-012814		46WW08FD-012814		46WW08-071814		46WW08-112014		46WW08-020315		46WW08FD-020315		46WW08-050115		46WW08FD-050115		46WW08-080415		46WW08-020316	
Sample Date			9/21/2013		9/21/2013		1/28/2014		1/28/2014		7/18/2014		11/20/2014		2/3/2015		2/3/2015		5/1/2015		5/1/2015		8/4/2015		2/3/2016	
Analyte	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
cis-1,2-Dichloroethene	µg/L	70	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Trichloroethene	µg/L	5	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Vinyl chloride	µg/L	2	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U

Notes:

Blue Highlighting Indicates concentrations above the MCL/PCL.

Some samples may have been diluted due to the concentration(s) of one or more analytes exceeding the upper limit of the calibration curve.

µg/L - micrograms per liter

COC - contaminant of concern

E - east

FD - field duplicate

H - Result may be biased high. Details are provided in the validation report.

ID - Identifier

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

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UJ - Undetected estimated: The analyte was analyzed for but, was not detected. Even though the analyte was not detected, certain discrepancies in meeting analyte specific quality control were not met.

Val Qual - validation qualifier

W - west

Table 2-6
Historical COC Concentrations 1998–2024

Location Code			46WW08																					
Location Description			Site 46 - NNW, inside site boundary. Intermediate Zone.																					
Sample ID			46WW08-080216		46WW08-022318		46WW08-022318-FD		46WW08-180827		46WW08-180827FD		46WW08-190220		46WW08-190813		46WW08-190813-FD		46WW08-200218		46WW08-210315		46WW08-220213		46WW08-230209	
Sample Date			8/2/2016		2/23/2018		2/23/2018		8/27/2018		8/27/2018		2/20/2019		8/13/2019		8/13/2019		2/18/2020		3/15/2021		2/13/2022		2/9/2023	
Analyte	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
cis-1,2-Dichloroethene	µg/L	70	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U
Trichloroethene	µg/L	5	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U
Vinyl chloride	µg/L	2	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U

Notes:

Blue Highlighting Indicates concentrations above the MCL/PCL.

Some samples may have been diluted due to the concentration(s) of one or more analytes exceeding the upper limit of the calibration curve.

µg/L - micrograms per liter

COC - contaminant of concern

E - east

FD - field duplicate

H - Result may be biased high. Details are provided in the validation report.

ID - Identifier

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

MCL - Maximum Contaminant Level

N - north

NE - northeast

NNW - north-northwest

SE - southeast

SW - southwest

U - Undetected: The analyte was analyzed for, but not detected.

UJ - Undetected estimated: The analyte was analyzed for but, was not detected. Even though the analyte was not detected, certain discrepancies in meeting analyte specific quality control were not met.

Val Qual - validation qualifier

W - west

Table 2-6
Historical COC Concentrations 1998–2024

Location Code			46WW08		46WW09																			
Location Description			Site 46 - NNW, inside site boundary. Intermediate Zone.		Site 46 - Central, within site boundary. Intermediate Zone.																			
Sample ID			46WW08-240226		46WW09-092413		46WW09-012714		46WW09-071514		46WW09-111914		46WW09-020515		46WW09-050515		46WW09-080615		46WW09-020216		46WW09-080316		46WW09-022218		46WW09-180828	
Sample Date			2/26/2024		9/24/2013		1/27/2014		7/15/2014		11/19/2014		2/5/2015		5/5/2015		8/6/2015		2/2/2016		8/3/2016		2/22/2018		8/28/2018	
Analyte	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
cis-1,2-Dichloroethene	µg/L	70	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Trichloroethene	µg/L	5	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Vinyl chloride	µg/L	2	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U

Notes:

Blue Highlighting Indicates concentrations above the MCL/PCL.

Some samples may have been diluted due to the concentration(s) of one or more analytes exceeding the upper limit of the calibration curve.

µg/L - micrograms per liter

COC - contaminant of concern

E - east

FD - field duplicate

H - Result may be biased high. Details are provided in the validation report.

ID - Identifier

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

MCL - Maximum Contaminant Level

N - north

NE - northeast

NNW - north-northwest

SE - southeast

SW - southwest

U - Undetected: The analyte was analyzed for, but not detected.

UJ - Undetected estimated: The analyte was analyzed for but, was not detected. Even though the analyte was not detected, certain discrepancies in meeting analyte specific quality control were not met.

Val Qual - validation qualifier

W - west

Table 2-6
Historical COC Concentrations 1998–2024

Location Code			46WW09																		46WW10			
Location Description			Site 46 - Central, within site boundary. Intermediate Zone.																		Site 46 - West, inside site boundary. Shallow Zone.			
Sample ID			46WW09-190225		46WW09-190225-FD		46WW09-190812		46WW09-200213		46WW09-220215		46WW09-220215-FD		46WW09-230207		46WW09-230207-FD		46WW09-240222		46WW09-240222-FD		46WW10-052513		46WW10-092113	
Sample Date			2/25/2019		2/25/2019		8/12/2019		2/13/2020		2/15/2022		2/15/2022		2/7/2023		2/7/2023		2/22/2024		2/22/2024		5/25/2013		9/21/2013	
Analyte	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
cis-1,2-Dichloroethene	µg/L	70	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U	< 1	U	< 1	U	< 0.5	U	< 0.5	U
Trichloroethene	µg/L	5	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U	< 1	U	< 1	U	< 0.5	U	< 0.5	U
Vinyl chloride	µg/L	2	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U	< 1	U	< 1	U	< 0.5	U	< 0.5	U

Notes:

Blue Highlighting Indicates concentrations above the MCL/PCL.

Some samples may have been diluted due to the concentration(s) of one or more analytes exceeding the upper limit of the calibration curve.

µg/L - micrograms per liter

COC - contaminant of concern

E - east

FD - field duplicate

H - Result may be biased high. Details are provided in the validation report.

ID - Identifier

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

MCL - Maximum Contaminant Level

N - north

NE - northeast

NNW - north-northwest

SE - southeast

SW - southwest

U - Undetected: The analyte was analyzed for, but not detected.

UJ - Undetected estimated: The analyte was analyzed for but, was not detected. Even though the analyte was not detected, certain discrepancies in meeting analyte specific quality control were not met.

Val Qual - validation qualifier

W - west

Table 2-6
Historical COC Concentrations 1998–2024

Location Code			46WW10																		46WW11			
Location Description			Site 46 - West, inside site boundary. Shallow Zone.																		Site 46 - Central, within site boundary. Shallow Zone.			
Sample ID			46WW10-012514		46WW10-071714		46WW10-112014		46WW10-020415		46WW10-050615		46WW10FD-050615		46WW10-080515		46WW10-020316		46WW10-080416		46WW10-220213		46WW11-081413		46WW11-091913	
Sample Date			1/25/2014		7/17/2014		11/20/2014		2/4/2015		5/6/2015		5/6/2015		8/5/2015		2/3/2016		8/4/2016		2/13/2022		8/14/2013		9/19/2013	
Analyte	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
cis-1,2-Dichloroethene	µg/L	70	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	1.56		1.11	
Trichloroethene	µg/L	5	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	85.9		79.8	
Vinyl chloride	µg/L	2	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U

Notes:

Blue Highlighting Indicates concentrations above the MCL/PCL.

Some samples may have been diluted due to the concentration(s) of one or more analytes exceeding the upper limit of the calibration curve.

µg/L - micrograms per liter

COC - contaminant of concern

E - east

FD - field duplicate

H - Result may be biased high. Details are provided in the validation report.

ID - Identifier

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

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N - north

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U - Undetected: The analyte was analyzed for, but not detected.

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Val Qual - validation qualifier

W - west

Table 2-6
Historical COC Concentrations 1998–2024

Location Code			46WW11																					
Location Description			Site 46 - Central, within site boundary. Shallow Zone.																					
Sample ID			46WW11-012814		46WW11-071614		46WW11-111814		46WW11-020415		46WW11-050615		46WW11-080515		46WW11-020116		46WW11-080316		46WW11-022018		46WW11-180829		46WW11-180829FD		46WW11-190221	
Sample Date			1/28/2014		7/16/2014		11/18/2014		2/4/2015		5/6/2015		8/5/2015		2/1/2016		8/3/2016		2/20/2018		8/29/2018		8/29/2018		2/21/2019	
Analyte	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
cis-1,2-Dichloroethene	µg/L	70	2.04		2.12		1.28		1.99		1.4		0.749	J	0.578	J	0.325	J	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Trichloroethene	µg/L	5	87.5		90.6		70.7		63.6		45.3		26.3		20.5		21.2		18		13		12		13	
Vinyl chloride	µg/L	2	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U

Notes:

Blue Highlighting Indicates concentrations above the MCL/PCL.

Some samples may have been diluted due to the concentration(s) of one or more analytes exceeding the upper limit of the calibration curve.

µg/L - micrograms per liter

COC - contaminant of concern

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Val Qual - validation qualifier

W - west

Table 2-6
Historical COC Concentrations 1998–2024

Location Code			46WW11																46WW13				46WW14	
Location Description			Site 46 - Central, within site boundary. Shallow Zone.																Site 46 - SE, within site boundary. Shallow Zone.				Site 46 - NE, within site boundary. Intermediate Zone.	
Sample ID			46WW11-190812		46WW11-190812-FD		46WW11-200213		46WW11-200213-FD		46WW11-210316		46WW11-210316-FD		46WW11-220214		46WW11-230209		46WW11-240222		46WW13-052913		46WW13-092413		46WW14-052913	
Sample Date			8/12/2019		8/12/2019		2/13/2020		2/13/2020		3/16/2021		3/16/2021		2/14/2022		2/9/2023		2/22/2024		5/29/2013		9/24/2013		5/29/2013	
Analyte	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
cis-1,2-Dichloroethene	µg/L	70	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U	37.3		35.5		< 0.25	U
Trichloroethene	µg/L	5	24		24		14		14		19		19		8.5		22		18		107		103		< 0.25	U
Vinyl chloride	µg/L	2	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 1	U	13.1		9.83		< 0.25	U

Notes:

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µg/L - micrograms per liter

COC - contaminant of concern

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W - west

Table 2-6
Historical COC Concentrations 1998–2024

Location Code			46WW14																					
Location Description			Site 46 - NE, within site boundary. Intermediate Zone.																					
Sample ID			46WW14-091913		46WW14-012714		46WW14-071514		46WW14-111914		46WW14-020615		46WW14FD-020615		46WW14-050515		46WW14-020216		46WW14FD-020216		46WW14-080216		46WW14FD-080216		46WW14-210315	
Sample Date			9/19/2013		1/27/2014		7/15/2014		11/19/2014		2/6/2015		2/6/2015		5/5/2015		2/2/2016		2/2/2016		8/2/2016		8/2/2016		3/15/2021	
Analyte	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
cis-1,2-Dichloroethene	µg/L	70	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Trichloroethene	µg/L	5	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Vinyl chloride	µg/L	2	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U

Notes:

Blue Highlighting Indicates concentrations above the MCL/PCL.

Some samples may have been diluted due to the concentration(s) of one or more analytes exceeding the upper limit of the calibration curve.

µg/L - micrograms per liter

COC - contaminant of concern

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FD - field duplicate

H - Result may be biased high. Details are provided in the validation report.

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J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

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Table 2-6
Historical COC Concentrations 1998–2024

Location Code			46WW14						46WW16															
Location Description			Site 46 - NE, within site boundary. Intermediate Zone.						Site 46 - N, within site boundary. Intermediate Zone.															
Sample ID			46WW14-220211		46WW14-230206		46WW14-240222		46WW16-070114		46WW16-071614		46WW16-111814		46WW16-050515		46WW16-080615		46WW16-020116		46WW16-080316		46WW16-022218		46WW16-180828	
Sample Date			2/11/2022		2/6/2023		2/22/2024		7/1/2014		7/16/2014		11/18/2014		5/5/2015		8/6/2015		2/1/2016		8/3/2016		2/22/2018		8/28/2018	
Analyte	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
cis-1,2-Dichloroethene	µg/L	70	< 0.5	U	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Trichloroethene	µg/L	5	< 0.5	U	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Vinyl chloride	µg/L	2	< 0.5	U	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U

Notes:

Blue Highlighting Indicates concentrations above the MCL/PCL.

Some samples may have been diluted due to the concentration(s) of one or more analytes exceeding the upper limit of the calibration curve.

µg/L - micrograms per liter

COC - contaminant of concern

E - east

FD - field duplicate

H - Result may be biased high. Details are provided in the validation report.

ID - Identifier

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Val Qual - validation qualifier

W - west

Table 2-6
Historical COC Concentrations 1998–2024

Location Code			46WW16														46WW17									
Location Description			Site 46 - N, within site boundary. Intermediate Zone.														Site 46 - Northeast, Within Site Boundary, Shallow/Intermediate Zone.									
Sample ID			46WW16-190221		46WW16-190813		46WW16-200213		46WW16-210316		46WW16-220214		46WW16-230206		46WW16-240226		46WW17-200707		46WW17-210315		46WW17-220211		46WW17-220211-FD		46WW17-230209	
Sample Date			2/21/2019		8/13/2019		2/13/2020		3/16/2021		2/14/2022		2/6/2023		2/26/2024		7/7/2020		3/15/2021		2/11/2022		2/11/2022		2/9/2023	
Analyte	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
cis-1,2-Dichloroethene	µg/L	70	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	UJ	< 0.5	U	< 0.5	U	< 1	U	0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U
Trichloroethene	µg/L	5	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U
Vinyl chloride	µg/L	2	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U

Notes:

Blue Highlighting Indicates concentrations above the MCL/PCL.

Some samples may have been diluted due to the concentration(s) of one or more analytes exceeding the upper limit of the calibration curve.

µg/L - micrograms per liter

COC - contaminant of concern

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FD - field duplicate

H - Result may be biased high. Details are provided in the validation report.

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Val Qual - validation qualifier

W - west

Table 2-6
Historical COC Concentrations 1998–2024

Location Code			46WW17		LHSMW08								LHSMW11								LHSMW12				LHSMW14	
Location Description			Site 46 - Northeast, Within Site Boundary, Shallow/Interme		Site 46 - South, outside of site boundary. Intermediate Zone.																				Site 46 - West, outside of site boundary. Shallow Zone.	
Sample ID			46WW17-240222		LHSMW08-960813		LHSMW08-960813FD		LHSMW08-980513		LHSMW08-092113		LHSMW11-960813		LHSMW11-980514		LHSMW11-980514FD		LHSMW11-031508		LHSMW12-960813		LHSMW12-980514		LHSMW14-941129	
Sample Date			2/22/2024		8/13/1996		8/13/1996		5/13/1998		9/21/2013		8/13/1996		5/14/1998		5/14/1998		3/15/2008		8/13/1996		5/14/1998		11/29/1994	
Analyte	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
cis-1,2-Dichloroethene	µg/L	70	< 1	U	< 0.2	U	< 0.2	U	< 1	U	< 0.5	U	< 0.2	U	< 1	U	< 1	U	< 0.25	U	< 0.2	U	< 1	U		
Trichloroethene	µg/L	5	< 1	U	< 0.25	U	< 0.25	U	< 1	U	< 0.5	U	< 0.25	U	< 1	U	< 1	U	< 0.25	U	< 0.25	U	< 1	U	< 5	U
Vinyl chloride	µg/L	2	< 1	U	< 0.24	U	< 0.24	U	< 1	U	< 0.5	U	< 0.24	U	< 1	U	< 1	U	< 0.25	U	< 0.24	U	< 1	U		

Notes:

Blue Highlighting Indicates concentrations above the MCL/PCL.

Some samples may have been diluted due to the concentration(s) of one or more analytes exceeding the upper limit of the calibration curve.

µg/L - micrograms per liter

COC - contaminant of concern

E - east

FD - field duplicate

H - Result may be biased high. Details are provided in the validation report.

ID - Identifier

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

MCL - Maximum Contaminant Level

N - north

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SE - southeast

SW - southwest

U - Undetected: The analyte was analyzed for, but not detected.

UJ - Undetected estimated: The analyte was analyzed for but, was not detected. Even though the analyte was not detected, certain discrepancies in meeting analyte specific quality control were not met.

Val Qual - validation qualifier

W - west

Table 2-6
Historical COC Concentrations 1998–2024

Location Code			LHSMW14										LHSMW15								LHSMW16					
Location Description			Site 46 - West, outside of site boundary. Shallow Zone.		Site 46 - West, outside of site boundary. Shallow Zone.																					
Sample ID			LHSMW14-960206		LHSMW14-960814		LHSMW14-960814FD		LHSMW14-980514		LHSMW14-092413		LHSMW15-960206		LHSMW15-960815		LHSMW15-980514		LHSMW15-102708		LHSMW16-941129		LHSMW16-960206		LHSMW16-960815	
Sample Date			2/6/1996		8/14/1996		8/14/1996		5/14/1998		9/24/2013		2/6/1996		8/15/1996		5/14/1998		10/27/2008		11/29/1994		2/6/1996		8/15/1996	
Analyte	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
cis-1,2-Dichloroethene	µg/L	70	< 1	U	< 0.2	U	< 0.2	U	< 1	U	< 0.5	U	< 1	U	< 0.2	U	< 1	U	< 0.25	U			< 1	U	< 0.2	U
Trichloroethene	µg/L	5	< 1	U	< 0.25	U	< 0.25	U	< 1	U	< 0.5	U	< 1	U	< 0.25	U	< 1	U	< 0.25	U	< 5	U	< 1	U	< 0.25	U
Vinyl chloride	µg/L	2	< 1	U	< 0.24	U	< 0.24	U	< 1	U	< 0.5	U	< 1	U	< 0.24	U	< 1	U	< 0.25	U			< 1	U	< 0.24	U

Notes:

Blue Highlighting Indicates concentrations above the MCL/PCL.

Some samples may have been diluted due to the concentration(s) of one or more analytes exceeding the upper limit of the calibration curve.

µg/L - micrograms per liter

COC - contaminant of concern

E - east

FD - field duplicate

H - Result may be biased high. Details are provided in the validation report.

ID - Identifier

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

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Val Qual - validation qualifier

W - west

Table 2-6
Historical COC Concentrations 1998–2024

Location Code			LHSMW16																LHSMW18					
Location Description			Site 46 - West, outside of site boundary. Shallow Zone.		Site 46 - SW, inside site boundary. Shallow Zone.														Site 46 - Central, inside site boundary. Shallow Zone.					
Sample ID			LHSMW16-980514		LHSMW17-960212		LHSMW17-960815		LHSMW17-980514		LHSMW17-000524		LHSMW17-000524FD		LHSMW17-001002FD		LHSMW17-001003		LHSMW17-220214		LHSMW18-941202		LHSMW18-960212		LHSMW18-960815	
Sample Date			5/14/1998		2/12/1996		8/15/1996		5/14/1998		5/24/2000		5/24/2000		10/2/2000		10/3/2000		2/14/2022		12/2/1994		2/12/1996		8/15/1996	
Analyte	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
cis-1,2-Dichloroethene	µg/L	70	< 1	U	< 1	U	< 0.2	U	< 1	U	< 1	U	100	J	< 1	U	< 1	U	< 0.5	U			4.5		6.1	
Trichloroethene	µg/L	5	< 1	U	< 1	U	< 0.25	U	< 1	U	< 1	U	1		< 1	U	< 1	U	< 0.5	U	14		21		27.5	
Vinyl chloride	µg/L	2	< 1	U	< 1	U	< 0.24	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 0.5	U			< 1	U	0.68	

Notes:

Blue Highlighting Indicates concentrations above the MCL/PCL.

Some samples may have been diluted due to the concentration(s) of one or more analytes exceeding the upper limit of the calibration curve.

µg/L - micrograms per liter

COC - contaminant of concern

E - east

FD - field duplicate

H - Result may be biased high. Details are provided in the validation report.

ID - Identifier

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

MCL - Maximum Contaminant Level

N - north

NE - northeast

NNW - north-northwest

SE - southeast

SW - southwest

U - Undetected: The analyte was analyzed for, but not detected.

UJ - Undetected estimated: The analyte was analyzed for but, was not detected. Even though the analyte was not detected, certain discrepancies in meeting analyte specific quality control were not met.

Val Qual - validation qualifier

W - west

Table 2-6
Historical COC Concentrations 1998–2024

Location Code			LHSMW18						LHSMW19															
Location Description			Site 46 - Central, inside site boundary. Shallow Zone.						Site 46 - Central, within site boundary. Shallow Zone.															
Sample ID			LHSMW18-980514		LHSMW18-FEB2007		LHSMW18-032916		LHSMW19-941202		LHSMW19-960206		LHSMW19-960815		LHSMW19-980515		LHSMW19-FEB2007		LHSMW19-110620		LHSMW19-052813		LHSMW19-092413		LHSMW19-012814	
Sample Date			5/14/1998		2/20/2007		3/29/2016		12/2/1994		2/6/1996		8/15/1996		5/15/1998		2/20/2007		6/20/2011		5/28/2013		9/24/2013		1/28/2014	
Analyte	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
cis-1,2-Dichloroethene	µg/L	70	9.8		1.5	J	1.28				< 3	U	< 0.2	U	< 1	U	< 0.83	U	2.98		1.45		2.44		2.15	
Trichloroethene	µg/L	5	38		4.8		3.35		26		77		47.1		70		85.5		66.4		32.3		40.9		33.5	
Vinyl chloride	µg/L	2	0.71	J	< 0.32	U	< 0.5	U			< 3	U	< 0.24	U	< 1	U	< 0.32	U	< 0.25	U	< 0.25	U	< 0.5	U	< 0.5	U

Notes:

Blue Highlighting Indicates concentrations above the MCL/PCL.

Some samples may have been diluted due to the concentration(s) of one or more analytes exceeding the upper limit of the calibration curve.

µg/L - micrograms per liter

COC - contaminant of concern

E - east

FD - field duplicate

H - Result may be biased high. Details are provided in the validation report.

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J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

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U - Undetected: The analyte was analyzed for, but not detected.

UJ - Undetected estimated: The analyte was analyzed for but, was not detected. Even though the analyte was not detected, certain discrepancies in meeting analyte specific quality control were not met.

Val Qual - validation qualifier

W - west

Table 2-6
Historical COC Concentrations 1998–2024

Location Code			LHSMW19																					
Location Description			Site 46 - Central, within site boundary. Shallow Zone.																					
Sample ID			LHSMW19-071614		LHSMW19-111814		LHSMW19-020415		LHSMW19-050615		LHSMW19-080515		LHSMW19-020116		LHSMW19-080316		LHSMW19-022018		LHSMW19-180828		LHSMW19-190220		LHSMW19-190812		LHSMW19-200219	
Sample Date			7/16/2014		11/18/2014		2/4/2015		5/6/2015		8/5/2015		2/1/2016		8/3/2016		2/20/2018		8/28/2018		2/20/2019		8/12/2019		2/19/2020	
Analyte	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
cis-1,2-Dichloroethene	µg/L	70	1.52		1.59		1.9		0.944	J	2.3		1.92		0.967	J	< 0.5	U	1.7		3.9		4.2		5.6	
Trichloroethene	µg/L	5	28.6		31.2		31.3		13.4		26.2		24.2		8.53		2.4		8.8		16		13		19	
Vinyl chloride	µg/L	2	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U

Notes:

Blue Highlighting Indicates concentrations above the MCL/PCL.

Some samples may have been diluted due to the concentration(s) of one or more analytes exceeding the upper limit of the calibration curve.

µg/L - micrograms per liter

COC - contaminant of concern

E - east

FD - field duplicate

H - Result may be biased high. Details are provided in the validation report.

ID - Identifier

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

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UJ - Undetected estimated: The analyte was analyzed for but, was not detected. Even though the analyte was not detected, certain discrepancies in meeting analyte specific quality control were not met.

Val Qual - validation qualifier

W - west

Table 2-6
Historical COC Concentrations 1998–2024

Location Code			LHSMW19												LHSMW20								LHSMW21			
Location Description			Site 46 - Central, within site boundary. Shallow Zone.												Site 46 - N, inside site boundary. Shallow Zone.								Site 46 - NE, inside site boundary. Shallow Zone.			
Sample ID			LHSMW19-210318		LHSMW19-220214		LHSMW19-230209		LHSMW19-230209-FD		LHSMW19-240222		LHSMW19-240222-FD		LHSMW20-960207		LHSMW20-960815		LHSMW20-980515		LHSMW20-102708		LHSMW21-960207		LHSMW21-960815	
Sample Date			3/18/2021		2/14/2022		2/9/2023		2/9/2023		2/22/2024		2/22/2024		2/7/1996		8/15/1996		5/15/1998		10/27/2008		2/7/1996		8/15/1996	
Analyte	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
cis-1,2-Dichloroethene	µg/L	70	3.9		10		11		11		12		12		< 1	U	< 0.2	U	< 1	U	< 0.25	U	< 1	U	< 0.2	U
Trichloroethene	µg/L	5	13		21		24		26		18		19		< 1	U	< 0.25	U	< 1	U	< 0.25	U	< 1	U	< 0.25	U
Vinyl chloride	µg/L	2	< 0.5	U	< 0.5	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 0.24	U	< 1	U	< 0.25	U	< 1	U	< 0.24	U

Notes:

Blue Highlighting Indicates concentrations above the MCL/PCL.

Some samples may have been diluted due to the concentration(s) of one or more analytes exceeding the upper limit of the calibration curve.

µg/L - micrograms per liter

COC - contaminant of concern

E - east

FD - field duplicate

H - Result may be biased high. Details are provided in the validation report.

ID - Identifier

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

MCL - Maximum Contaminant Level

N - north

NE - northeast

NNW - north-northwest

SE - southeast

SW - southwest

U - Undetected: The analyte was analyzed for, but not detected.

UJ - Undetected estimated: The analyte was analyzed for but, was not detected. Even though the analyte was not detected, certain discrepancies in meeting analyte specific quality control were not met.

Val Qual - validation qualifier

W - west

Table 2-6
Historical COC Concentrations 1998–2024

Location Code			LHSMW21																		LHSMW22					
Location Description			Site 46 - NE, inside site boundary. Shallow Zone.																		Site 46 - Central, inside site boundary. Shallow Zone.					
Sample ID			LHSMW21-980515		LHSMW21-092513		LHSMW21-190225		LHSMW21-190813		LHSMW21-200213		LHSMW21-210316		LHSMW21-220215		LHSMW21-230206		LHSMW21-240222		LHSMW22-960207		LHSMW22-960815		LHSMW22-980515	
Sample Date			5/15/1998		9/25/2013		2/25/2019		8/13/2019		2/13/2020		3/10/2021 & 4/29/2021		2/15/2022		2/6/2023		2/22/2024		2/7/1996		8/15/1996		5/15/1998	
Analyte	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
cis-1,2-Dichloroethene	µg/L	70	< 1	U	30.6		100		170		170		130		180		200		170		< 1	U	0.54		1.1	
Trichloroethene	µg/L	5	< 1	U	1.64		20		41		36		33		49	J	61		45		1		1.7		3.1	
Vinyl chloride	µg/L	2	< 1	U	1.44		< 0.5	U	0.97	J	2.4		3.7		4.9	J	8		< 1	U	< 1	U	< 0.24	U	< 1	U

Notes:

Blue Highlighting Indicates concentrations above the MCL/PCL.

Some samples may have been diluted due to the concentration(s) of one or more analytes exceeding the upper limit of the calibration curve.

µg/L - micrograms per liter

COC - contaminant of concern

E - east

FD - field duplicate

H - Result may be biased high. Details are provided in the validation report.

ID - Identifier

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

MCL - Maximum Contaminant Level

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U - Undetected: The analyte was analyzed for, but not detected.

UJ - Undetected estimated: The analyte was analyzed for but, was not detected. Even though the analyte was not detected, certain discrepancies in meeting analyte specific quality control were not met.

Val Qual - validation qualifier

W - west

Table 2-6
Historical COC Concentrations 1998–2024

Location Code			LHSMW22		LHSMW23																			
Location Description			Site 46 - Central, inside site boundary. Shallow Zone.		Site 46 - SE, inside site boundary. Intermediate Zone.																			
Sample ID			LHSMW22-FEB2007		LHSMW23-941204		LHSMW23-941204FD		LHSMW23-960206		LHSMW23-960815		LHSMW23-980515		LHSMW23-FEB2007		LHSMW23-102808		LHSMW23R-190903		LHSMW23R-200219		LHSMW25-210315		LHSMW23R-220211	
Sample Date			2/19/2007		12/4/1994		12/4/1994		2/6/1996		8/15/1996		5/15/1998		2/19/2007		10/28/2008		9/3/2019		2/19/20		3/15/2021		2/11/2022	
Analyte	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
cis-1,2-Dichloroethene	µg/L	70	< 0.83	U					< 1	U	< 0.2	U	< 1	U	< 0.83	U	0.614	J	0.5	U	0.71	J	< 0.5	U	0.8	J
Trichloroethene	µg/L	5	< 0.63	U	< 5	U	< 5	U	< 1	U	< 0.25	U	1.3		1.4	J	2.51		0.5	U	0.65	J	< 0.5	U	0.65	J
Vinyl chloride	µg/L	2	< 0.32	U					< 1	U	< 0.24	U	< 1	U	< 0.32	U	0.412	J,H	0.5	U	< 0.5	U	< 0.5	U	< 0.5	U

Notes:

Blue Highlighting Indicates concentrations above the MCL/PCL.

Some samples may have been diluted due to the concentration(s) of one or more analytes exceeding the upper limit of the calibration curve.

µg/L - micrograms per liter

COC - contaminant of concern

E - east

FD - field duplicate

H - Result may be biased high. Details are provided in the validation report.

ID - Identifier

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

MCL - Maximum Contaminant Level

N - north

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U - Undetected: The analyte was analyzed for, but not detected.

UJ - Undetected estimated: The analyte was analyzed for but, was not detected. Even though the analyte was not detected, certain discrepancies in meeting analyte specific quality control were not met.

Val Qual - validation qualifier

W - west

Table 2-6
Historical COC Concentrations 1998–2024

Location Code			LHSMW23R								LHSMW24								LHSMW25							
Location Description			Site 46 - South, Within Site Boundary, Intermediate Zone								Site 46 - E, outside of site boundary. Shallow Zone.								Site 46 - E, within site boundary. Intermediate zone.							
Sample ID			LHSMW23R-230209		LHSMW23R-230209-FD		LHSMW23R-240226		LHSMW23R-24026-FD		LHSMW24-941204		LHSMW24-960207		LHSMW24-960820		LHSMW24-980515		LHSMW25-941204		LHSMW25-960207		LHSMW25-960820		LHSMW25-980515	
Sample Date			2/9/2023		2/9/2023		2/26/2024		2/26/2024		12/4/1994		2/7/1996		8/20/1996		5/15/1998		12/4/1994		2/7/1996		8/20/1996		5/15/1998	
Analyte	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
cis-1,2-Dichloroethene	µg/L	70	0.77	J	0.86	J	0.66	J	0.65	J			< 1	U	< 0.2	U	< 1	U			< 1	U	< 0.2	U	< 1	U
Trichloroethene	µg/L	5	0.76	J	0.78	J	0.56	J	< 0.5	U	< 5	U	< 1	U	< 0.25	U	< 1	U	< 5	U	< 1	U	< 0.25	U	< 1	U
Vinyl chloride	µg/L	2	< 1	U	< 1	U	< 0.5	U	< 0.5	U			< 1	U	< 0.24	U	< 1	U			< 1	U	< 0.24	U	< 1	U

Notes:

Blue Highlighting Indicates concentrations above the MCL/PCL.

Some samples may have been diluted due to the concentration(s) of one or more analytes exceeding the upper limit of the calibration curve.

µg/L - micrograms per liter

COC - contaminant of concern

E - east

FD - field duplicate

H - Result may be biased high. Details are provided in the validation report.

ID - Identifier

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

MCL - Maximum Contaminant Level

N - north

NE - northeast

NNW - north-northwest

SE - southeast

SW - southwest

U - Undetected: The analyte was analyzed for, but not detected.

UJ - Undetected estimated: The analyte was analyzed for but, was not detected. Even though the analyte was not detected, certain discrepancies in meeting analyte specific quality control were not met.

Val Qual - validation qualifier

W - west

Table 2-6
Historical COC Concentrations 1998–2024

Location Code			LHSMW25																					
Location Description			Site 46 - E, within site boundary. Intermediate zone.																					
Sample ID			LHSMW25-102808		LHSMW25-102808-QA		LHSMW25-052513		LHSMW25-092513		LHSMW25-092513-FD		LHSMW25-012514		LHSMW25-071814		LHSMW25-112014		LHSMW25-020615		LHSMW25-050115		LHSMW25-080415		LHSMW25FD-080415	
Sample Date			10/28/2008		10/28/2008		5/25/2013		9/25/2013		9/25/2013		1/25/2014		7/18/2014		11/20/2014		2/6/2015		5/1/2015		8/4/2015		8/4/2015	
Analyte	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
cis-1,2-Dichloroethene	µg/L	70	< 0.25	U	< 0.25	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Trichloroethene	µg/L	5	< 0.25	U	< 0.25	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Vinyl chloride	µg/L	2	< 0.25	UJ,H	< 0.25	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U

Notes:

Blue Highlighting Indicates concentrations above the MCL/PCL.

Some samples may have been diluted due to the concentration(s) of one or more analytes exceeding the upper limit of the calibration curve.

µg/L - micrograms per liter

COC - contaminant of concern

E - east

FD - field duplicate

H - Result may be biased high. Details are provided in the validation report.

ID - Identifier

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

MCL - Maximum Contaminant Level

N - north

NE - northeast

NNW - north-northwest

SE - southeast

SW - southwest

U - Undetected: The analyte was analyzed for, but not detected.

UJ - Undetected estimated: The analyte was analyzed for but, was not detected. Even though the analyte was not detected, certain discrepancies in meeting analyte specific quality control were not met.

Val Qual - validation qualifier

W - west

Table 2-6
Historical COC Concentrations 1998–2024

Location Code			LHSMW25																					
Location Description			Site 46 - E, within site boundary. Intermediate zone.																					
Sample ID			LHSMW25-020216		LHSMW25FD-020216		LHSMW25-080416		LHSMW25-022218		LHSMW25-180827		LHSMW25-190225		LHSMW25-190812		LHSMW25-200219		LHSMW25-210315		LHSMW25-220213		LHSMW25-230209		LHSMW25-240222	
Sample Date			2/2/2016		2/2/2016		8/4/2016		2/22/2018		8/27/2018		2/25/2019		8/12/2019		2/19/2020		3/15/2021		2/13/2022		2/9/2023		2/22/2024	
Analyte	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
cis-1,2-Dichloroethene	µg/L	70	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	UJ	< 1	U	< 1	U
Trichloroethene	µg/L	5	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	UJ	< 1	U	< 1	U
Vinyl chloride	µg/L	2	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	UJ	< 1	U	< 1	U

Notes:

Blue Highlighting Indicates concentrations above the MCL/PCL.

Some samples may have been diluted due to the concentration(s) of one or more analytes exceeding the upper limit of the calibration curve.

µg/L - micrograms per liter

COC - contaminant of concern

E - east

FD - field duplicate

H - Result may be biased high. Details are provided in the validation report.

ID - Identifier

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

MCL - Maximum Contaminant Level

N - north

NE - northeast

NNW - north-northwest

SE - southeast

SW - southwest

U - Undetected: The analyte was analyzed for, but not detected.

UJ - Undetected estimated: The analyte was analyzed for but, was not detected. Even though the analyte was not detected, certain discrepancies in meeting analyte specific quality control were not met.

Val Qual - validation qualifier

W - west

P

Table 2-6
Historical COC Concentrations 1998–2024

Location Code			LHSMW27					
Location Description			Site 46 - SE, outside of site boundary. Shallow Zone.					
Sample ID			LHSMW27-960208		LHSMW27-960820		LHSMW27-980515	
Sample Date			2/8/1996		8/20/1996		5/15/1998	
Analyte	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual
cis-1,2-Dichloroethene	µg/L	70	< 1	U	< 0.2	U	< 1	U
Trichloroethene	µg/L	5	< 1	U	< 0.25	U	< 1	U
Vinyl chloride	µg/L	2	< 1	U	< 0.24	U	< 1	U

Notes:

Blue Highlighting Indicates concentrations above the MCL/PCL.

Some samples may have been diluted due to the concentration(s) of one or more analytes exceeding the upper limit of the calibration curve.

µg/L - micrograms per liter

COC - contaminant of concern

E - east

FD - field duplicate

H - Result may be biased high. Details are provided in the validation report.

ID - Identifier

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

MCL - Maximum Contaminant Level

N - north

NE - northeast

NNW - north-northwest

SE - southeast

SW - southwest

U - Undetected: The analyte was analyzed for, but not detected.

UJ - Undetected estimated: The analyte was analyzed for but, was not detected. Even though the analyte was not detected, certain discrepancies in meeting analyte specific quality control were not met.

Val Qual - validation qualifier

W - west

Table 2-7
Year 11 Annual RA-O Sampling Locations

Well ID	Groundwater Zone	Groundwater Elevations	VOC	Field Parameters	MNA
46WW01	Shallow	X	X	X	
46WW04	Shallow	X	X	X	
46WW10	Shallow	X	X	X	
46WW11	Shallow	X	X	X	X
46WW12	Shallow	X	X	X	
46WW13	Shallow	X	X	X	
46WW15	Shallow	X	X	X	
LHSMW17	Shallow	X	X	X	
LHSMW18 [a]	Shallow	X	X	X	
LHSMW19	Shallow	X	X	X	
LHSMW20	Shallow	X			
LHSMW21	Shallow	X	X	X	X
LHSMW22	Shallow	X	X	X	
LHSMW24	Shallow	X			
46WW17	Shallow/Intermediate	X	X	X	
46WW02	Intermediate	X	X	X	X
46WW05	Intermediate	X	X	X	X
46WW06	Intermediate	X	X	X	
46WW07	Intermediate	X	X	X	
46WW08	Intermediate	X	X	X	
46WW09	Intermediate	X	X	X	X
46WW14	Intermediate	X	X	X	
46WW16	Intermediate	X	X	X	X
LHSMW23R	Intermediate	X	X	X	
LHSMW25	Intermediate	X	X	X	
46WW03	Deep	X	X	X	
46SW10 [b]	Surface Water		X	X	

Notes:

Field parameters to be monitored for all wells: pH, temperature, conductivity, turbidity, oxidation-reduction potential (ORP), and dissolved oxygen (DO).

MNA parameters include nitrate, sulfate, chloride, TOC, dissolved iron (field), and dissolved gases (methane, ethane, ethene, carbon dioxide).

[a] LHSMW18 only sampled if LHSMW17 is dry.

[b] 46SW10 is only sampled if surface water is present and the groundwater elevation at either LHSMW21 or 46WW16 exceeds 197 feet.

X Well will be analyzed for that parameter.

ID - identifier

MNA - monitored natural attenuation

RA-O - remedial action operation

TOC - total organic carbon

VOC - volatile organic compound

Table 3-1
Mann-Kendall Trend Summary

Monitoring Well	Groundwater Zone	Statistical TCE Trend	Statistical cis-1,2-DCE Trend	Statistical VC Trend	Confidence Factor
46WW11	Shallow	Decreasing	NA	NA	> 99.9%
LHSMW19	Shallow	Decreasing	NA	NA	99.5%
LHSMW21	Shallow	Increasing	Increasing	Probably Increasing	98.4%, 97.7%, 92.9%
46WW02	Intermediate	Decreasing	NA	NA	90.7%
46WW05	Intermediate	Decreasing	NA	NA	99.9%

Notes:

> greater than

DCE - dichloroethene

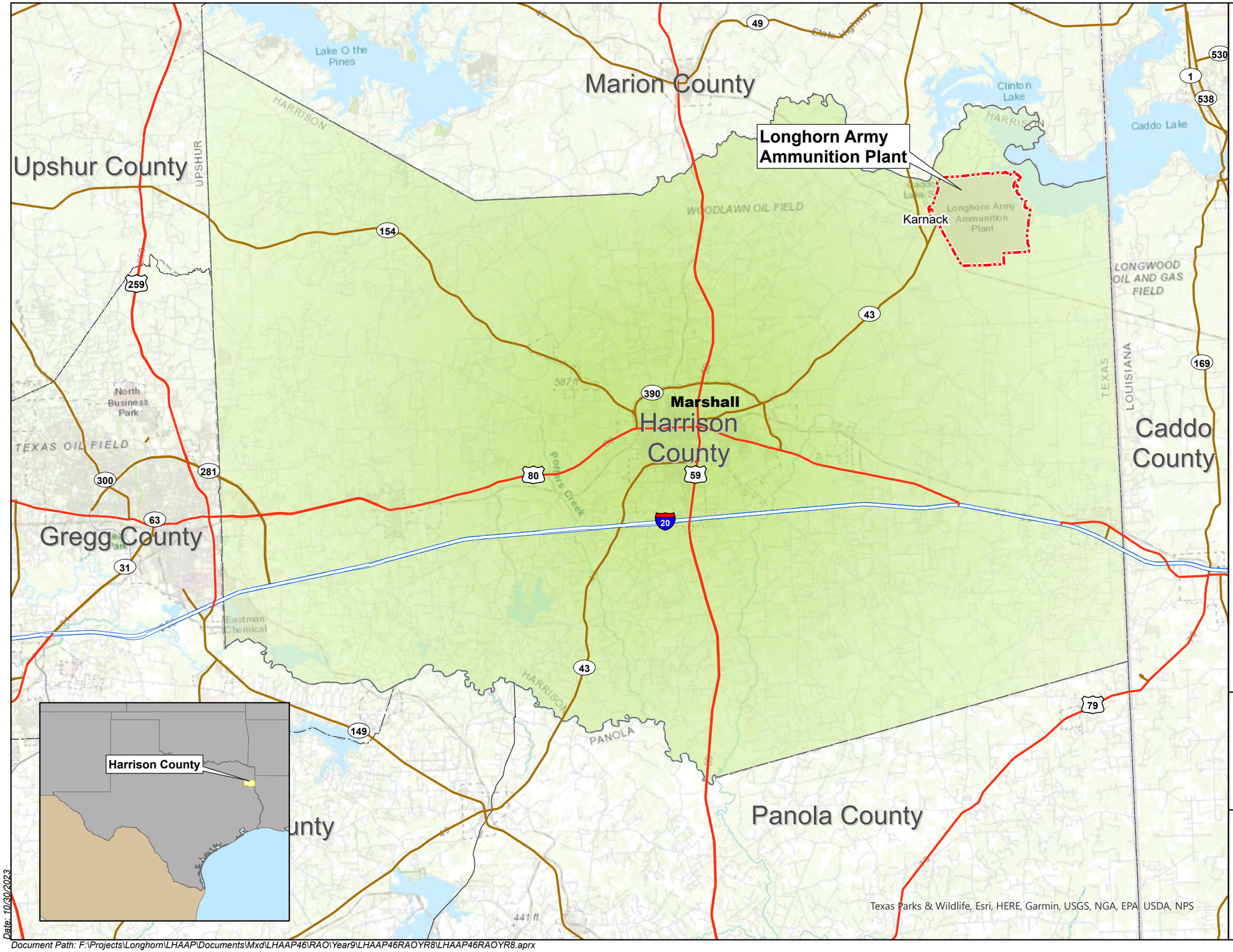
MCL - Maximum Contaminant Level

NA - Not applicable; Trend not calculated because chemical was not detected above the MCL.

TCE - trichloroethene

VC - vinyl chloride

Figures



Note:
1. RA-O = Remedial Action Operations
2. LHAAP = Longhorn Army Ammunition Plant

N

0 2 4 Miles

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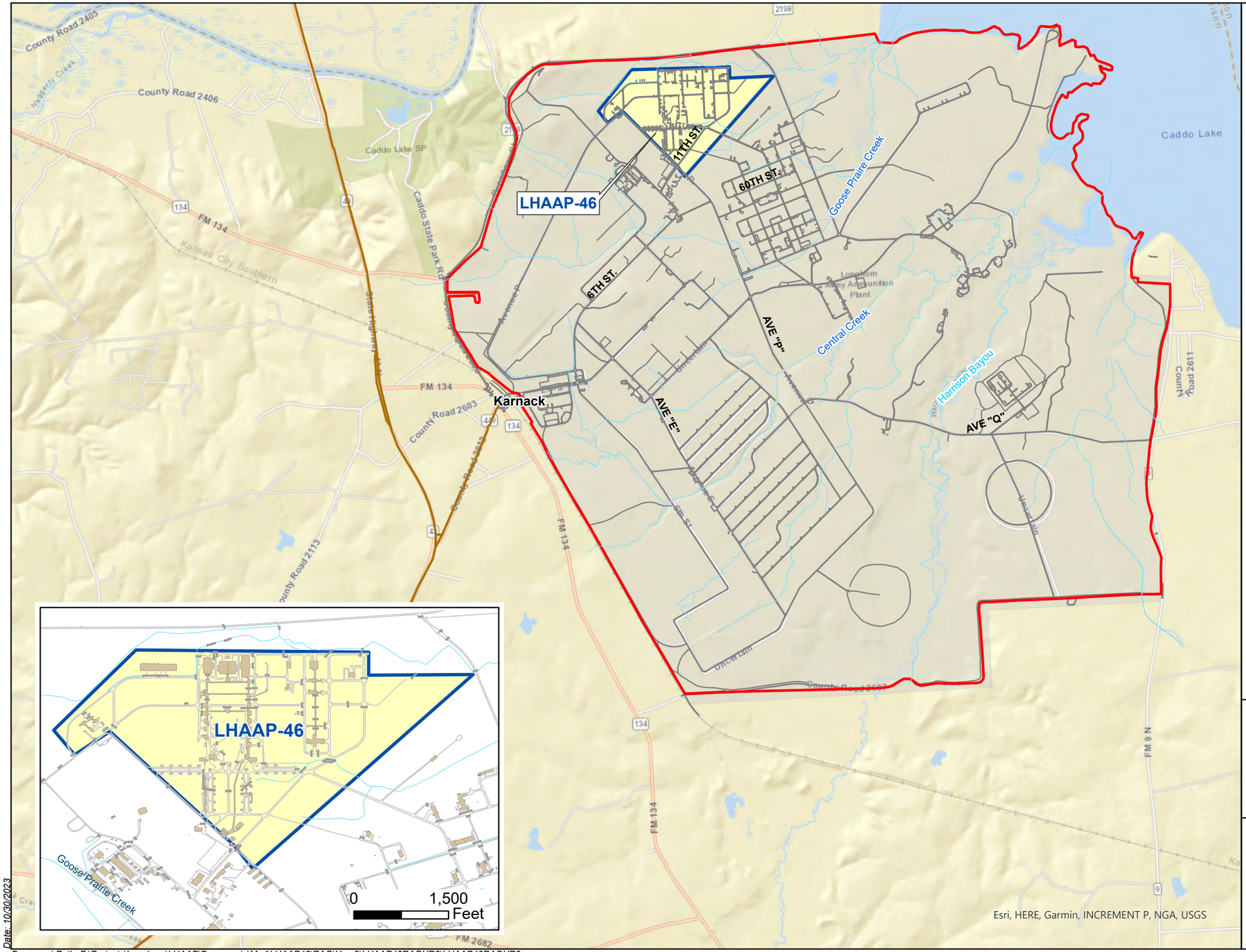
Figure 1-1

LHAAP Location Map
Tenth Annual RA-O Report
LHAAP-46

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Date: 10/30/2023

Document Path: F:\Projects\Longhorn\LHAAP\Documents\Mxd\LHAAP46\RAO\Year9\LHAAP46RAOYR8\LHAAP46RAOYR8.aprx



Stream
Road
LHAAP Boundary
LHAAP-46 Site Boundary

Note:
1. RA-O = Remedial Action Operations
2. LHAAP = Longhorn Army Ammunition Plant

N

0 1,500 3,000
Feet

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TULSA, OKLAHOMA

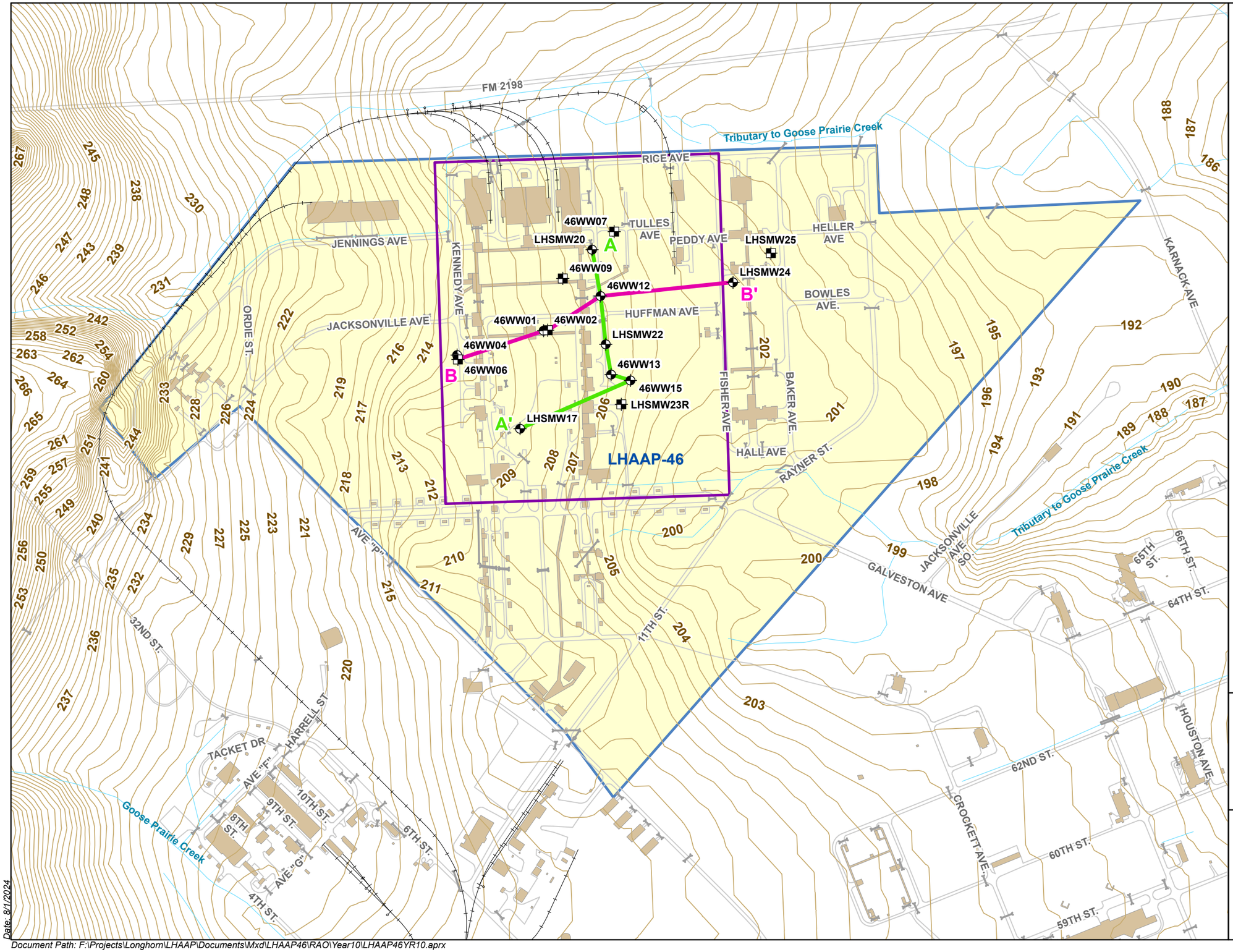
PCIbhate APTIM

Figure 1-2

LHAAP Site Vicinity Map
Tenth Annual RA-O Report
LHAAP-46
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Date: 10/30/2023

Document Path: F:\Projects\Longhorn\LHAAP\Documents\Mxd\LHAAP46\RAO\Year9\LHAAP46RAOYR8\LHAAP46RAOYR8.aprx



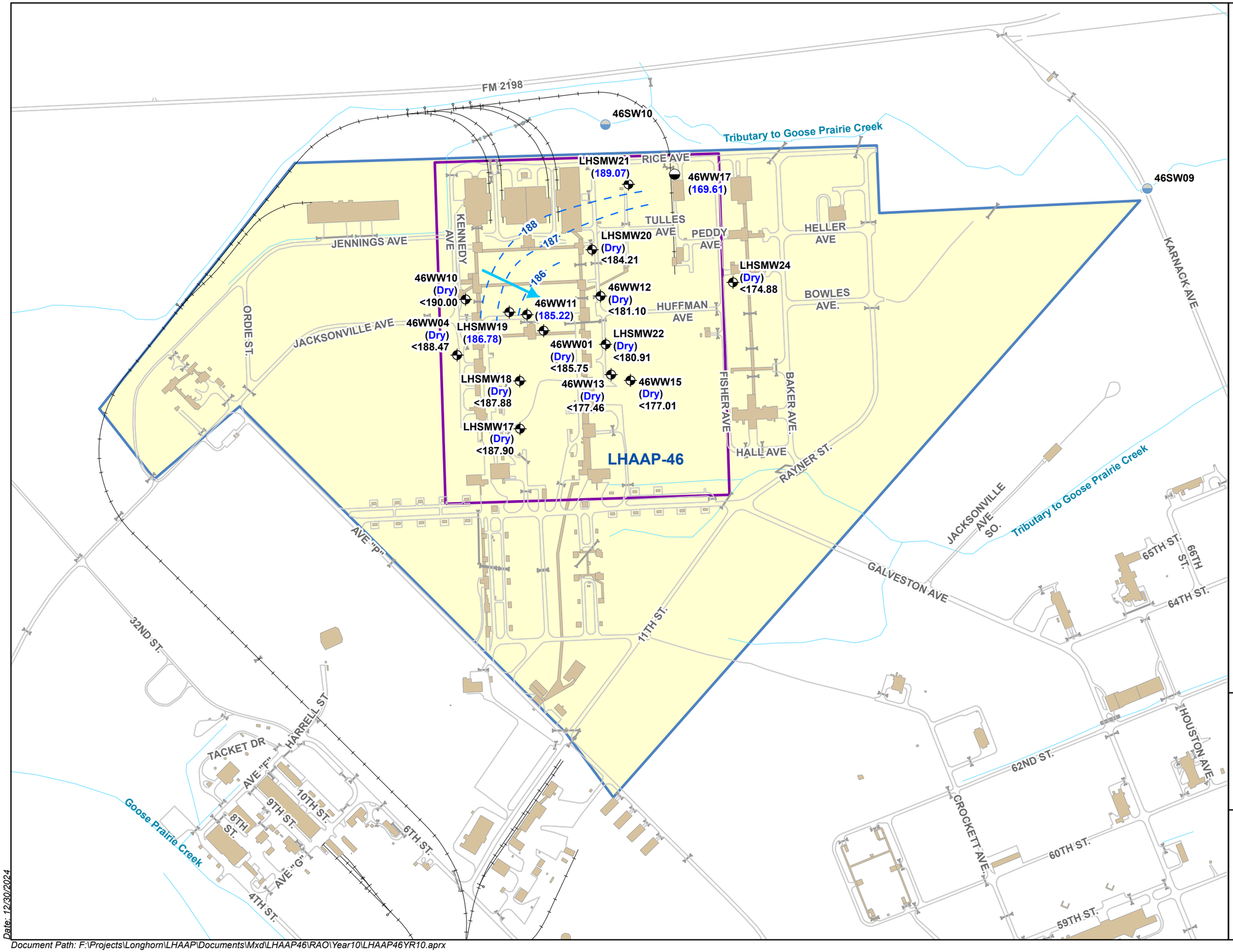
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Figure 2-1
Groundwater Monitoring Wells and
Surface Water Locations
Tenth Annual RA-O Report
LHAAP-46
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Date: 8/1/2024

Document Path: F:\Projects\Longhorn\LHAAP\Documents\Mxd\LHAAP46\RAO\Year10\LHAAP46YR10.aprx



- Shallow Monitoring Well
- Shallow/Intermediate Monitoring Well
- Surface Water Sample Location
- Former Railroad Location
- Groundwater Flow Direction
- Groundwater Contour (in feet above msl) (*Dashed where inferred*)
- Culvert
- Surveyed Land Use Control Boundary
- Stream
- Roads
- Former Buildings
- LHAAP-46 Site Boundary

186.27 Groundwater Elevation (feet msl)

Notes:
1. RA-O = Remedial Action Operations
2. LHAAP = Longhorn Army Ammunition Plant
3. msl = Mean Sea Level
4. Monitoring well 46WW17 is a shallow/intermediate well installed in an area with no apparent confining layer between the shallow and intermediate zones. The groundwater elevation shown was not used to develop the shallow zone potentiometric contours.
5. Wells that were dry have their bottom of screen elevation shown.
6. NM = not measured. LHSMW18 was not sampled because LHSMW17 contained enough water to collect a sample.

N

0 250 500 Feet

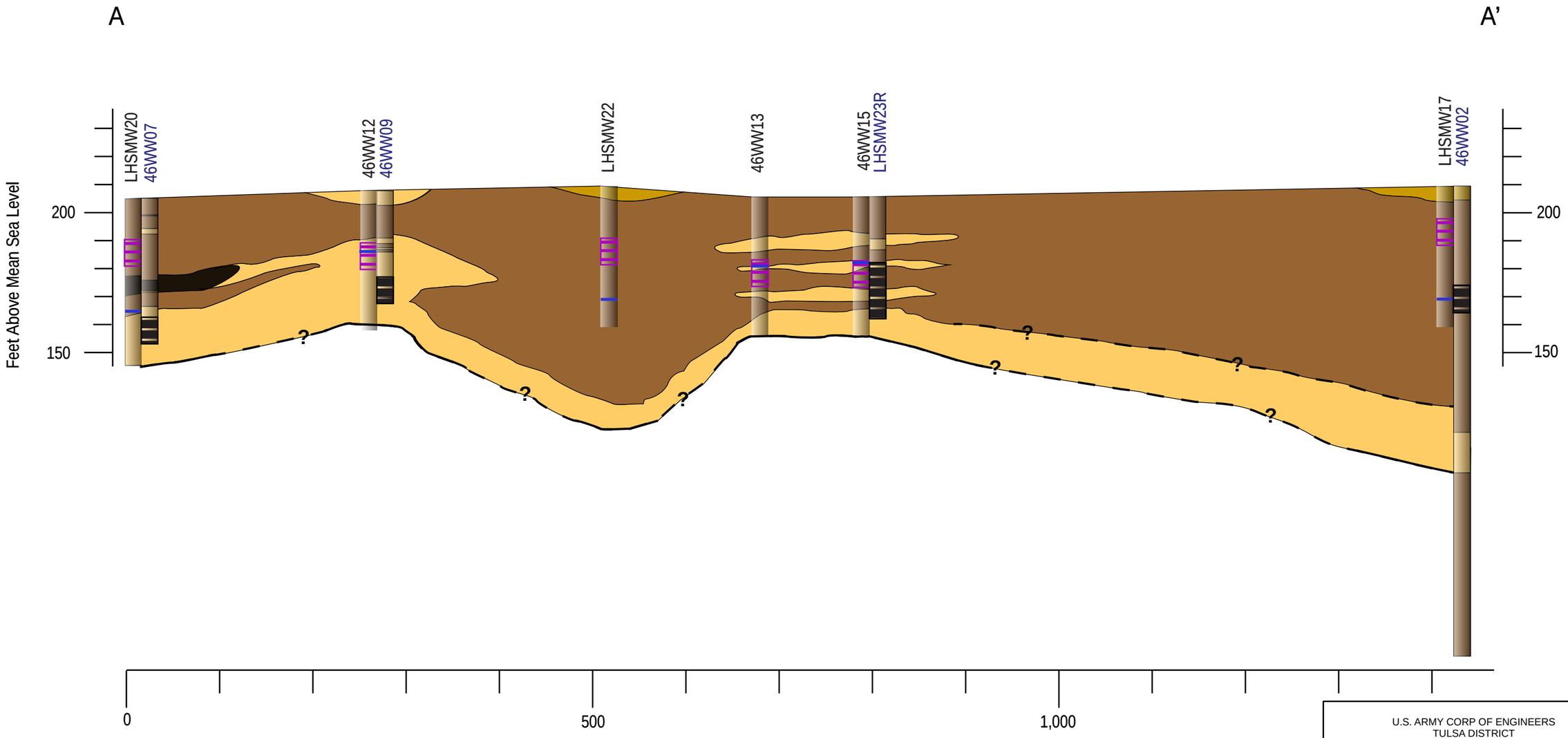
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Figure 2-2
Shallow Zone Potentiometric Map – February 2024
Tenth Annual RA-O Report
LHAAP-46
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Date: 12/30/2024

Document Path: F:\Projects\Longhorn\LHAAP\Documents\Mxd\LHAAP46\RAO\Year10\LHAAP46YR10.aprx



Top of Intermediate Zone
46WW07 Shallow Monitoring Well
46WW07 Intermediate Monitoring Well
Monitoring Well Construction
Shallow Screen
Intermediate Screen

Clay
Sand
Lignite
Silt

Notes:

1. The intermediate zone monitoring wells are projected onto the cross section adjacent to shallow zone monitoring wells where the intermediate lithology was used to identify the likely top of the intermediate zone. The actual distance of the intermediate zone monitoring wells from the shallow zone monitoring wells shown on the cross section can be found on Table 2-4.
2. Screen depths and lithology are obtained from well construction forms and boring logs (RACR, 2015).
3. Lithologies from the borings logs were simplified into clay, sand, lignite, or silt based on the primary content of the layer to reduce clutter and make it easier to depict the lithology.

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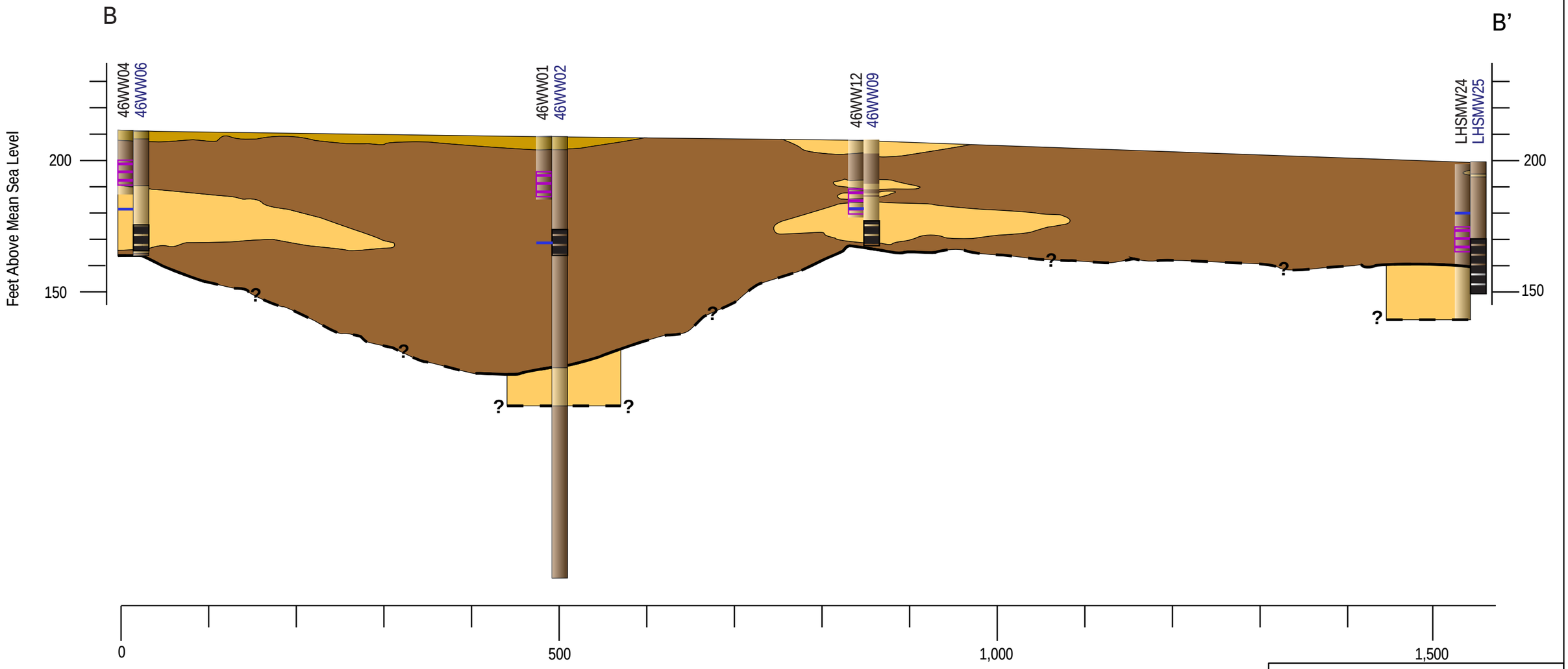
Figure 2-3

Cross Section A-A'
Tenth Annual RA-O Report
LHAAP-46

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Date: 8/1/2024

Document Path: F:\Projects\Longhorn\LHAAP\Documents\Mxd\LHAAP46\RAO\Year9\LHAAP46RAOYR8\LHAAP46RAOYR9.aprx



Notes:

1. The intermediate zone monitoring wells are projected onto the cross section adjacent to shallow zone monitoring wells where the intermediate lithology was used to identify the likely top of the intermediate zone. The actual distance of the intermediate zone monitoring wells from the shallow zone monitoring wells shown on the cross section can be found on Table 2-4.
2. Screen depths and lithology are obtained from well construction forms and boring logs (RACR, 2015).
3. Lithologies from the borings logs were simplified into clay, sand, lignite, or silt based on the primary content of the layer to reduce clutter and make it easier to depict the lithology.

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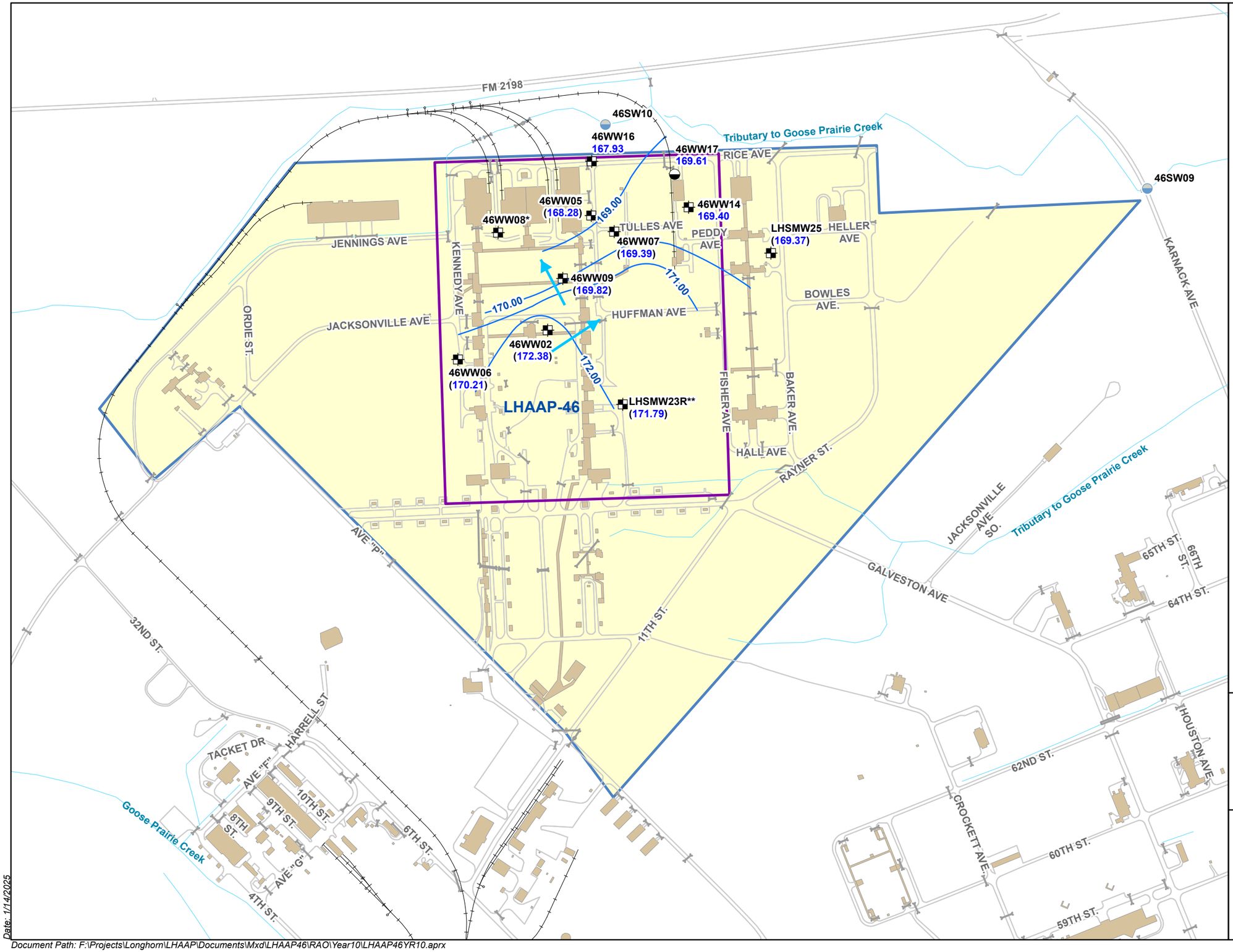
Figure 2-4

Cross Section B-B'
Tenth Annual RA-O Report
LHAAP-46

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Date: 8/1/2024

Document Path: F:\Projects\Longhorn\LHAAP\Documents\Mxd\LHAAP46\RAO\Year9\LHAAP46RAOYR8\LHAAP46RAOYR9.aprx



- Shallow/Intermediate Monitoring Well
- Intermediate Monitoring Well
- Surface Water Sample Location
- Former Railroad Location
- Groundwater Flow Direction
- Groundwater Contour (in feet above msl)
- Culvert
- Surveyed Land Use Control Boundary
- Stream
- Roads
- Former Buildings
- LHAAP-46 Site Boundary

186.27 Groundwater Elevation (feet msl)

Notes:
1. RA-O = Remedial Action Operations
2. LHAAP = Longhorn Army Ammunition Plant
3. msl = Mean Sea Level
4.* = The groundwater elevation in 46WW08 continues to be similar to the shallow zone elevations, despite the well being screened in the intermediate zone. It is possible that there is leakage from the shallow zone to the intermediate zone in this area of the site such that the well reflects shallow zone conditions. Water level elevation from this well was not used for constructing intermediate zone contours.
5.** = LHSMW23R was installed in August 2019 to replace LHSMW23.
6. Monitoring well 46WW17 is a shallow/intermediate well installed in an area with no apparent confining layer between the shallow and intermediate zones. The groundwater elevation shown was not used to develop the intermediate zone potentiometric contours.

N

0 250 500 Feet

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Figure 2-5
Intermediate Zone Potentiometric Map – February 2024
Tenth Annual RA-O Report
LHAAP-46
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Date: 1/14/2025

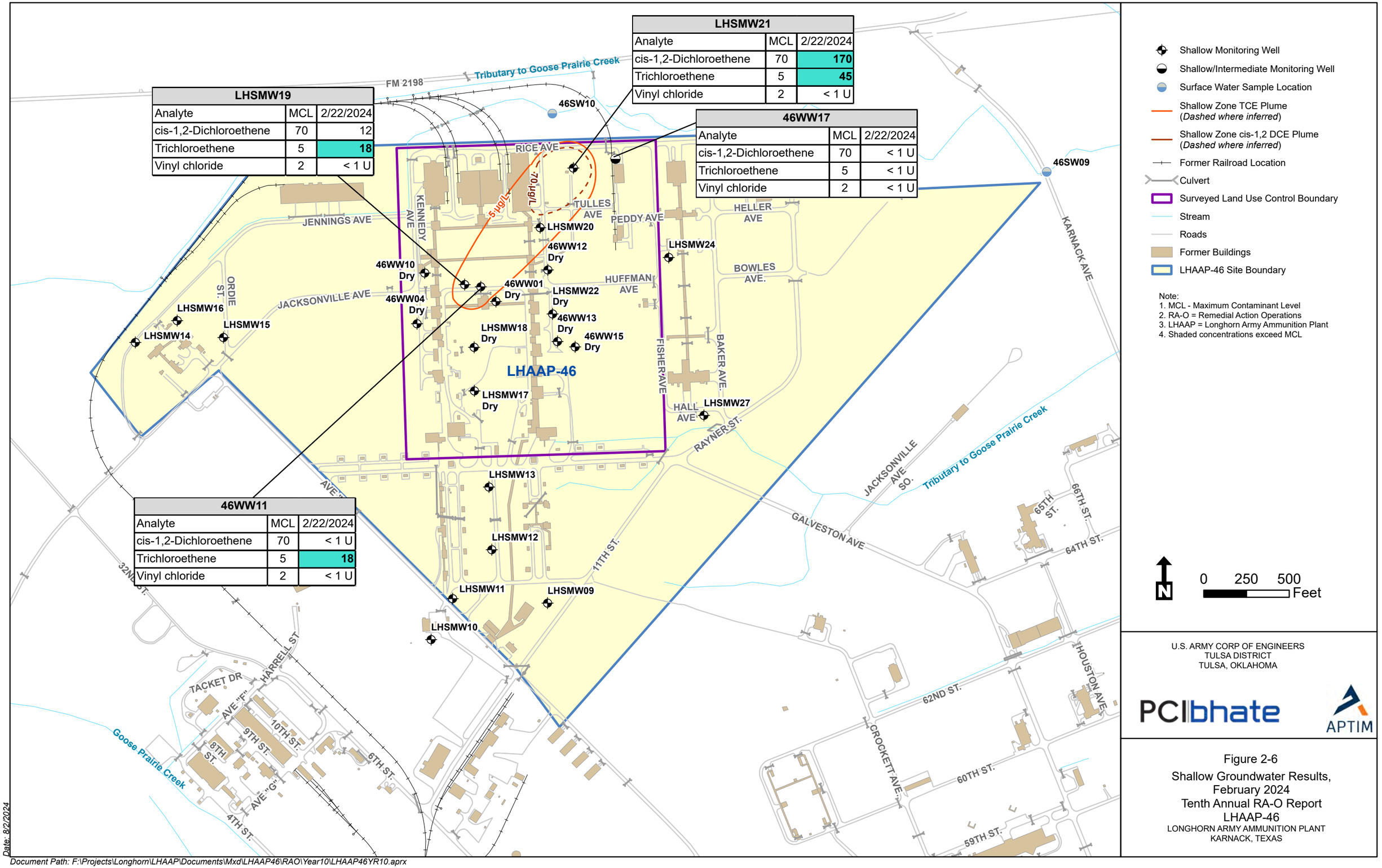
Document Path: F:\Projects\Longhorn\LHAAP\Documents\Mxd\LHAAP46\RAO\Year10\LHAAP46YR10.aprx

LHSMW19		
Analyte	MCL	2/22/2024
cis-1,2-Dichloroethene	70	12
Trichloroethene	5	**18**
Vinyl chloride	2	< 1 U

LHSMW21		
Analyte	MCL	2/22/2024
cis-1,2-Dichloroethene	70	**170**
Trichloroethene	5	**45**
Vinyl chloride	2	< 1 U

46WW17		
Analyte	MCL	2/22/2024
cis-1,2-Dichloroethene	70	< 1 U
Trichloroethene	5	< 1 U
Vinyl chloride	2	< 1 U

46WW11		
Analyte	MCL	2/22/2024
cis-1,2-Dichloroethene	70	< 1 U
Trichloroethene	5	**18**
Vinyl chloride	2	< 1 U



- Shallow Monitoring Well
- Shallow/Intermediate Monitoring Well
- Surface Water Sample Location
- Shallow Zone TCE Plume (*Dashed where inferred*)
- Shallow Zone cis-1,2 DCE Plume (*Dashed where inferred*)
- Former Railroad Location
- Culvert
- Surveyed Land Use Control Boundary
- Stream
- Roads
- Former Buildings
- LHAAP-46 Site Boundary

Note:
1. MCL - Maximum Contaminant Level
2. RA-O = Remedial Action Operations
3. LHAAP = Longhorn Army Ammunition Plant
4. Shaded concentrations exceed MCL

N

0 250 500 Feet

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Figure 2-6
Shallow Groundwater Results,
February 2024
Tenth Annual RA-O Report
LHAAP-46
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Date: 8/2/2024

Document Path: F:\Projects\Longhorn\LHAAP\Documents\Mxd\LHAAP46\RAO\Year10\LHAAP46YR10.aprx

46WW05		
Analyte	MCL	2/26/2024
cis-1,2-Dichloroethene	70	1.8
Trichloroethene	5	**57**
Vinyl chloride	2	< 0.5 U

46WW16		
Analyte	MCL	2/26/2024
cis-1,2-Dichloroethene	70	< 1 U
Trichloroethene	5	< 1 U
Vinyl chloride	2	< 1 U

46WW17		
Analyte	MCL	2/22/2024
cis-1,2-Dichloroethene	70	< 1 U
Trichloroethene	5	< 1 U
Vinyl chloride	2	< 1 U

46WW08		
Analyte	MCL	2/26/2024
cis-1,2-Dichloroethene	70	< 1 U
Trichloroethene	5	< 1 U
Vinyl chloride	2	< 1 U

46WW14		
Analyte	MCL	2/22/2024
cis-1,2-Dichloroethene	70	< 1 U
Trichloroethene	5	< 1 U
Vinyl chloride	2	< 1 U

LHSMW25		
Analyte	MCL	2/22/2024
cis-1,2-Dichloroethene	70	< 1 U
Trichloroethene	5	< 1 U
Vinyl chloride	2	< 1 U

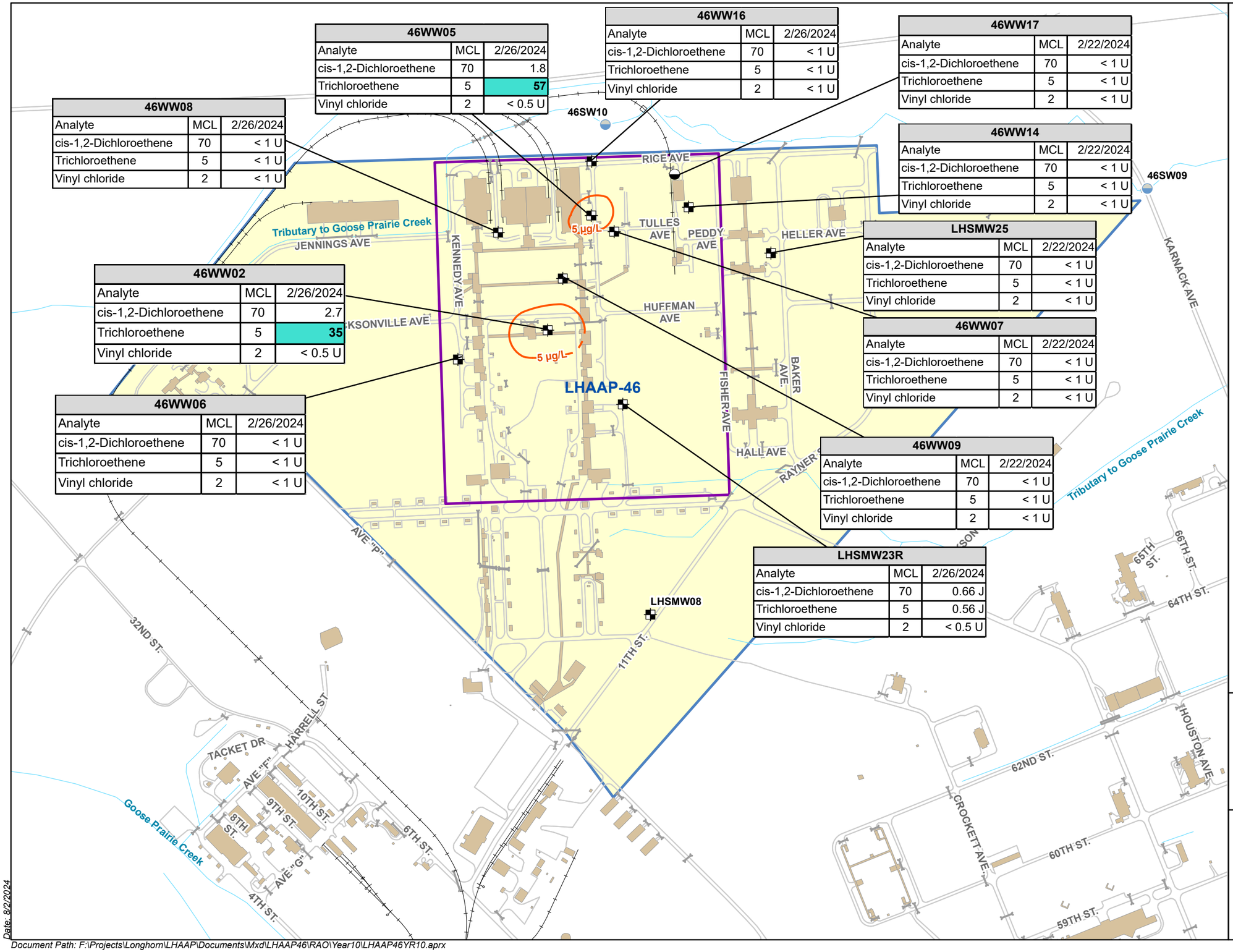
46WW02		
Analyte	MCL	2/26/2024
cis-1,2-Dichloroethene	70	2.7
Trichloroethene	5	**35**
Vinyl chloride	2	< 0.5 U

46WW07		
Analyte	MCL	2/22/2024
cis-1,2-Dichloroethene	70	< 1 U
Trichloroethene	5	< 1 U
Vinyl chloride	2	< 1 U

46WW06		
Analyte	MCL	2/26/2024
cis-1,2-Dichloroethene	70	< 1 U
Trichloroethene	5	< 1 U
Vinyl chloride	2	< 1 U

46WW09		
Analyte	MCL	2/22/2024
cis-1,2-Dichloroethene	70	< 1 U
Trichloroethene	5	< 1 U
Vinyl chloride	2	< 1 U

LHSMW23R		
Analyte	MCL	2/26/2024
cis-1,2-Dichloroethene	70	0.66 J
Trichloroethene	5	0.56 J
Vinyl chloride	2	< 0.5 U



Note:
1. MCL - Maximum Contaminant Level
2. RA-O = Remedial Action Operations
3. LHAAP = Longhorn Army Ammunition Plant
4. Shaded concentrations exceed MCL

N

0 250 500 Feet

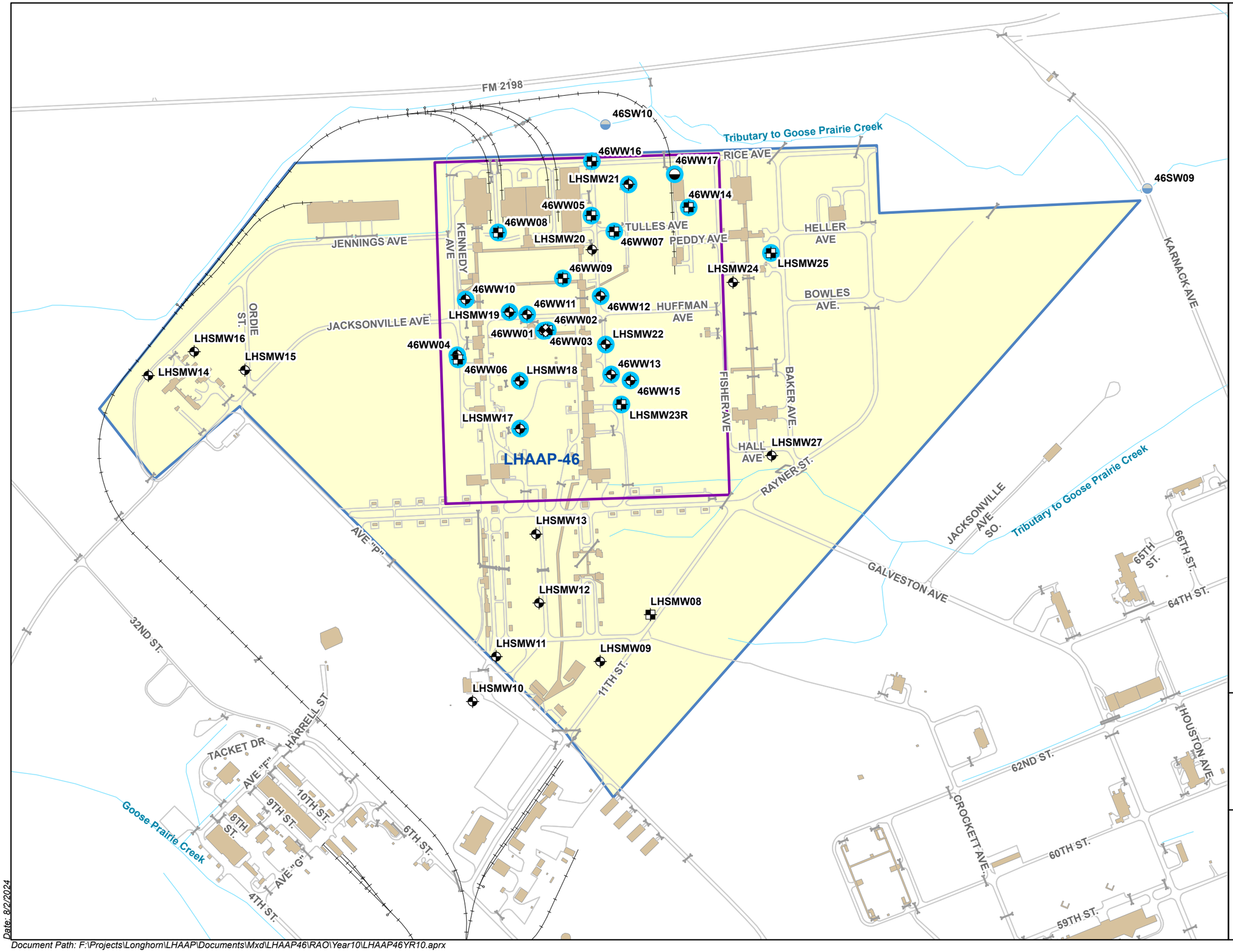
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Figure 2-7
Intermediate Groundwater Results,
February 2024
Tenth Annual RA-O Report
LHAAP-46
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Date: 8/2/2024

Document Path: F:\Projects\Longhorn\LHAAP\Documents\Mxd\LHAAP46\RAO\Year10\LHAAP46YR10.aprx



- Shallow Monitoring Well
- Shallow/Intermediate Monitoring Well
- Intermediate Monitoring Well
- Deep Monitoring Well
- RA-O Monitoring Well
- Surface Water Sample Location
- Former Railroad Location
- Culvert
- Surveyed Land Use Control Boundary
- Stream
- Roads
- Former Buildings
- LHAAP-46 Site Boundary

Note:
1. RA-O = Remedial Action Operations
2. LHAAP = Longhorn Army Ammunition Plant

N

0 250 500 Feet

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Figure 2-8

Year 11 Annual RA-O Monitoring Locations
Tenth Annual RA-O Report
LHAAP-46
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Date: 8/2/2024

Document Path: F:\Projects\Longhorn\LHAAP\Documents\Mxd\LHAAP46\RAO\Year10\LHAAP46YR10.aprx

Figure 3-1a
Shallow Monitoring Well 46WW11

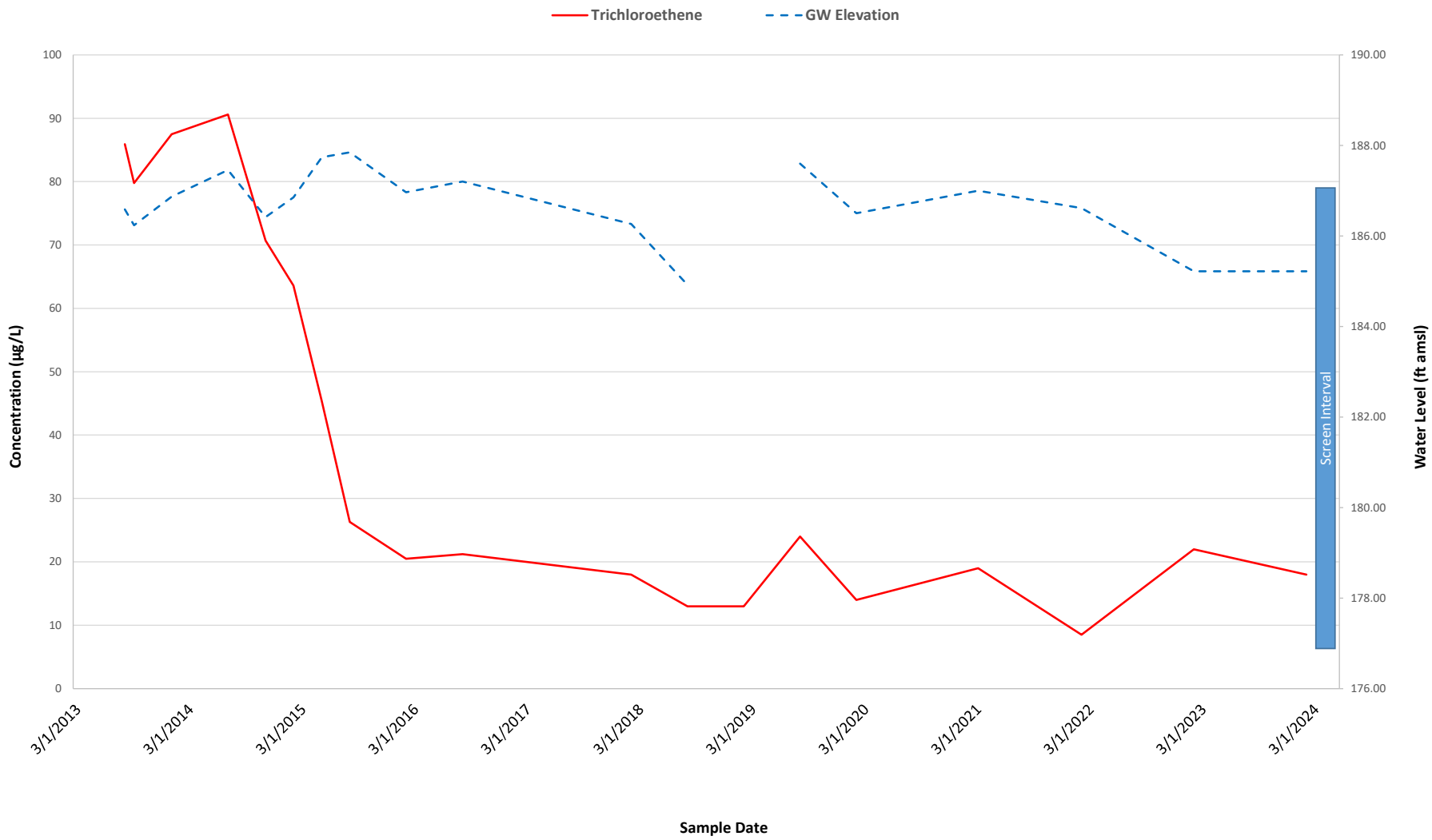


Figure 3-1b
Shallow Monitoring Well LHSMW19

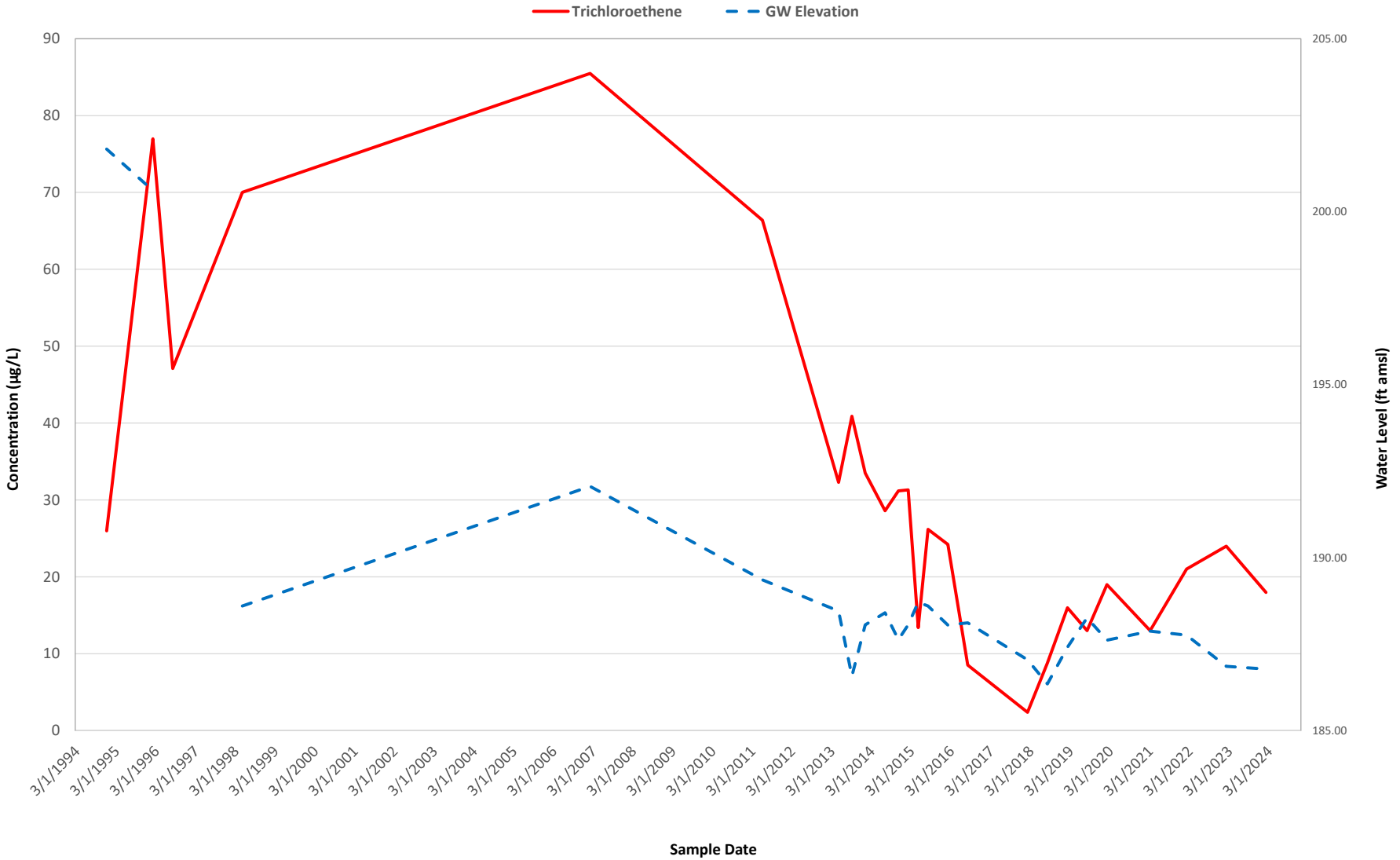


Figure 3-1c
Shallow Monitoring Well LHSMW21

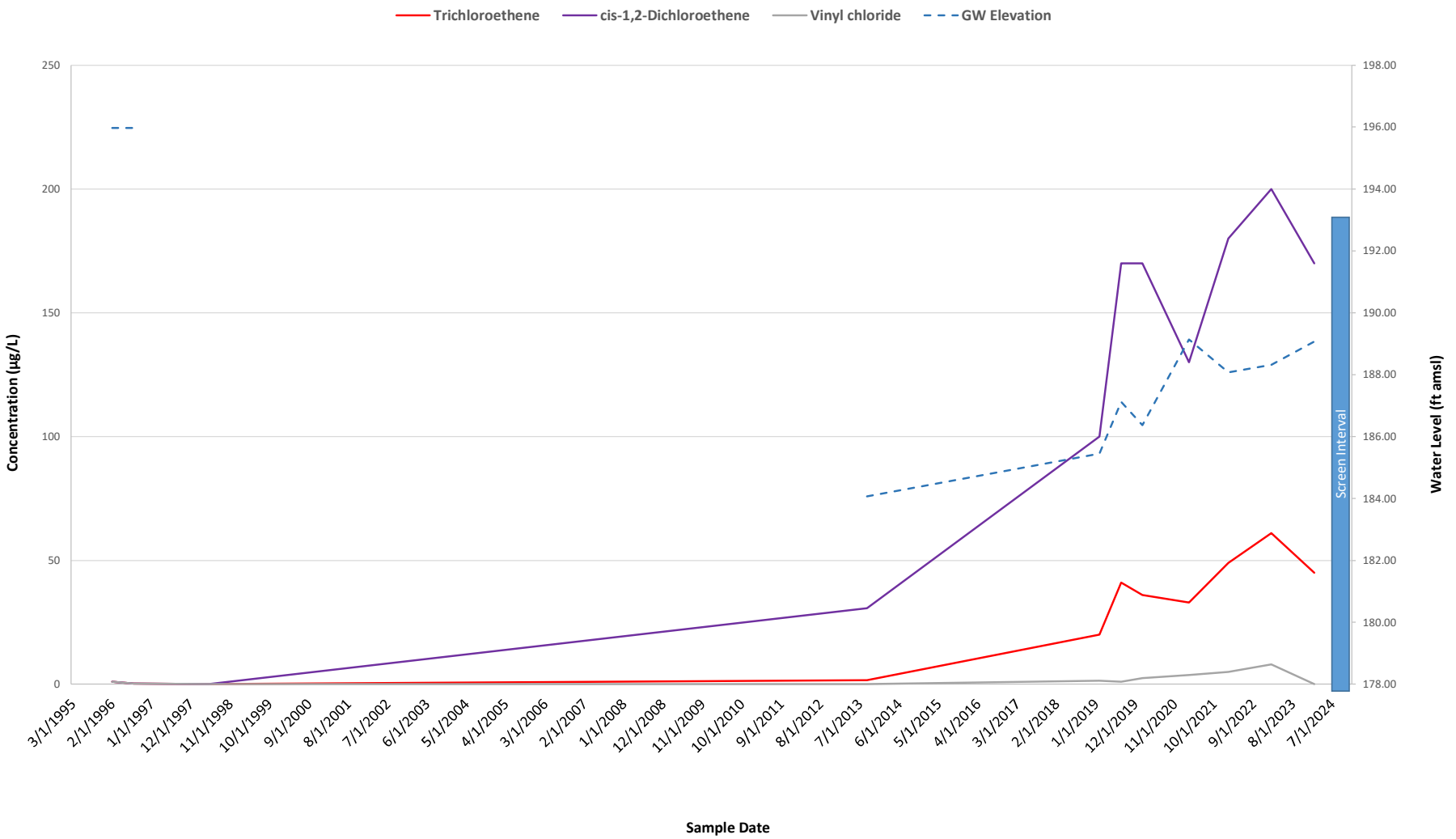


Figure 3-1d
Intermediate Monitoring Well 46WW02

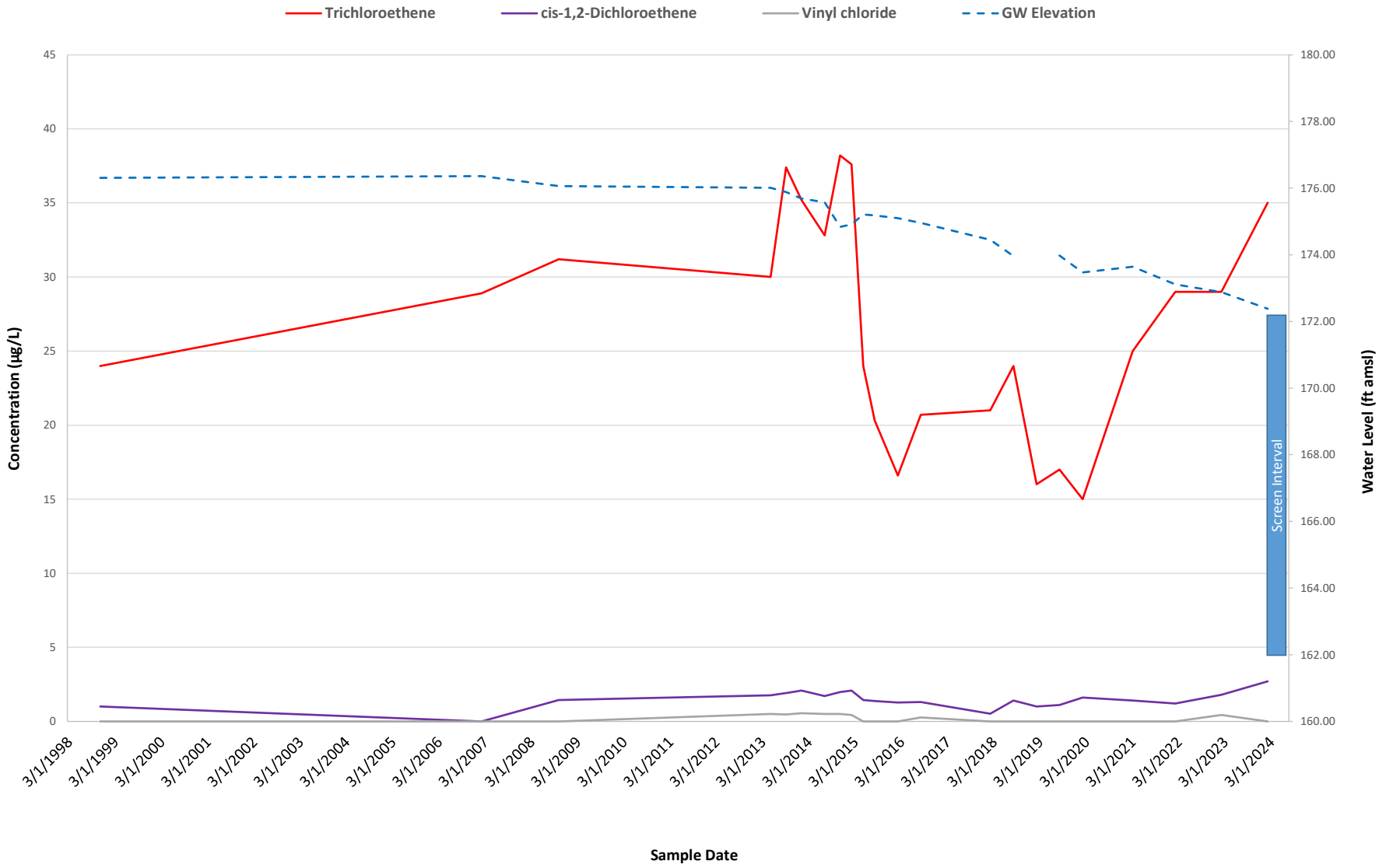
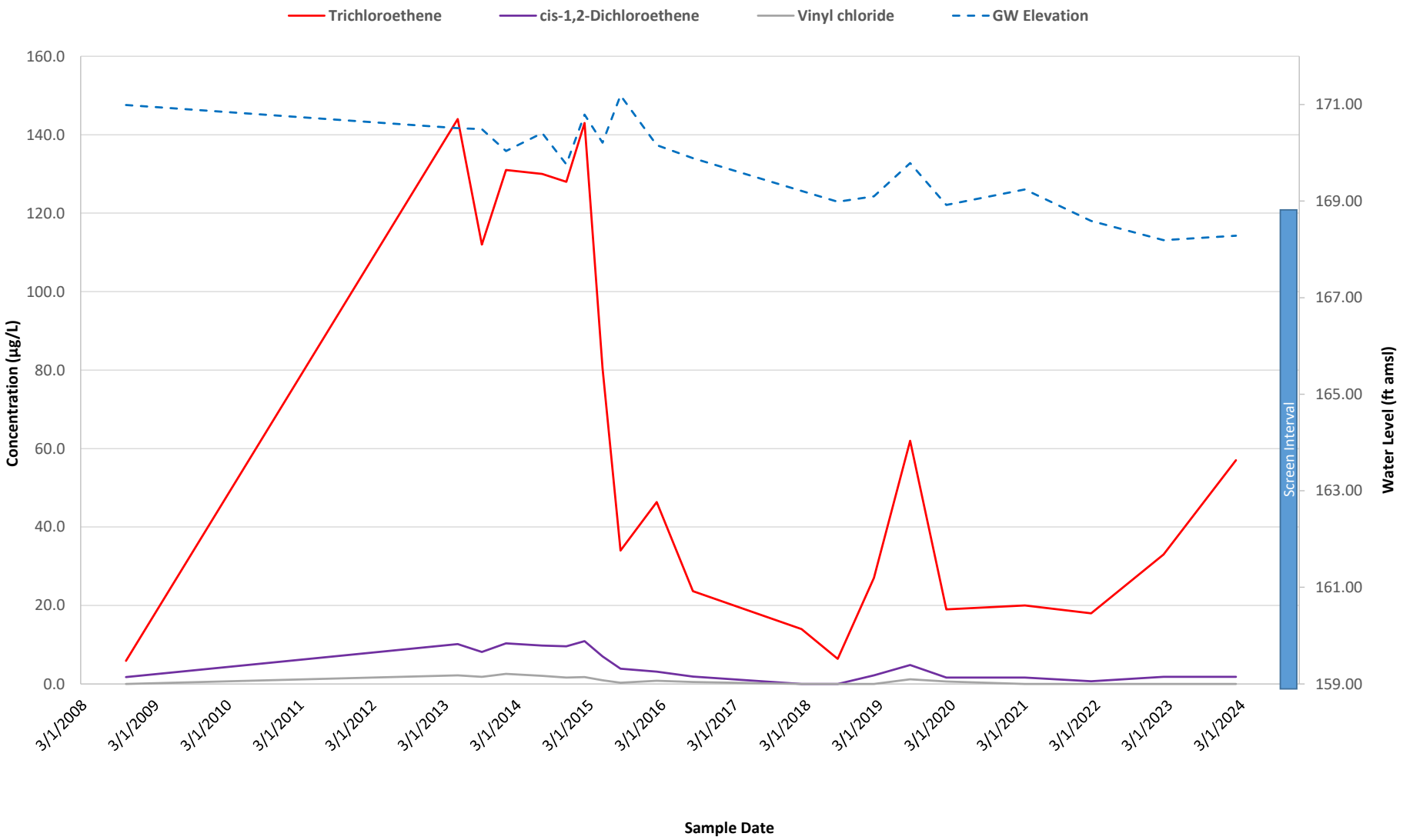


Figure 3-1e
Intermediate Monitoring Well 46WW05



Appendix A

Annual Land Use Control Compliance Certification Documentation

Sample Annual Land Use Control Compliance Certification Documentation

In accordance with the Remedial Design for LHAAP-46 dated September 30, 2011, a certification of site was conducted by Aptim [indicate transferee] on 2/22/24.

A summary of land use control mechanisms is as follows:

Groundwater restriction – restriction of the use of groundwater to environmental monitoring and testing until cleanup levels are met [Indicate whether groundwater restrictions are still required at LHAAP-46]

A summary of compliance with land use and restriction covenants is as follows:

No use of groundwater, installation of new groundwater wells, or tampering with existing wells at LHAAP-46.

I, the undersigned, do document that the certification was performed as indicated above, and that the above information is true and correct to the best of my knowledge, information, and belief.

Date: FEBRUARY 22, 2024

Name/Title: Scott Beesinger/Senior Environmental Tech

Signature: Scott Beesinger

Annual compliance certification forms shall be completed no later than March 1 of each year for the previous calendar year.

Appendix B

Photographic Log and Well Inspection Forms

PHOTO LOG

Photo No.	Date	Task and Description
1	3-25-2024	Monitoring Well 46WW01
2	2-28-2024	Monitoring Well 46WW02
3	3-25-2024	Monitoring Well 46WW03
4	2-28-2024	Monitoring Well 46WW04
5	3-25-2024	Monitoring Well 46WW05
6	2-28-2024	Monitoring Well 46WW06
7	2-28-2024	Monitoring Well 46WW07
8	2-28-2024	Monitoring Well 46WW08
9	2-28-2024	Monitoring Well 46WW09
10	2-28-2024	Monitoring Well 46WW10
11	2-28-2024	Monitoring Well 46WW11
12	2-28-2024	Monitoring Well 46WW12
13	2-28-2024	Monitoring Well 46WW13
14	2-28-2024	Monitoring Well 46WW14
15	3-25-2024	Monitoring Well 46WW15
16	2-28-2024	Monitoring Well 46WW16
17	2-28-2024	Monitoring Well 46WW17
18	3-25-2024	Monitoring Well LHSMW17
19	2-28-2024	Monitoring Well LHSMW18
20	2-28-2024	Monitoring Well LHSMW19
21	3-25-2024	Monitoring Well LHSMW20
22	3-25-2024	Monitoring Well LHSMW21
23	3-25-2024	Monitoring Well LHSMW22
24	2-28-2024	Monitoring Well LHSMW23R
25	2-28-2024	Monitoring Well LHSMW24
26	2-28-2024	Monitoring Well LHSMW25



PHOTO 1: Monitoring Well 46WW01
DATE: March 25, 2024



PHOTO 2: Monitoring Well 46WW02
DATE: February 28, 2024



PHOTO 3: Monitoring Well 46WW03
DATE: March 25, 2024



PHOTO 4: Monitoring Well 46WW04
DATE: February 28, 2024



PHOTO 5: Monitoring Well 46WW05
DATE: March 25, 2024



PHOTO 6: Monitoring Well 46WW06
DATE: February 28, 2024



PHOTO 7: Monitoring Well 46WW07
DATE: February 28, 2024



PHOTO 8: Monitoring Well 46WW08
DATE: February 28, 2024



PHOTO 9: Monitoring Well 46WW09
DATE: February 28, 2024



PHOTO 10: Monitoring Well 46WW10
DATE: February 28, 2024



PHOTO 11: Monitoring Well 46WW11
DATE: February 28, 2024



PHOTO 12: Monitoring Well 46WW12
DATE: February 28, 2024



PHOTO 13: Monitoring Well 46WW13
DATE: February 28, 2024



PHOTO 14: Monitoring Well 46WW14
DATE: February 28, 2024



PHOTO 15: Monitoring Well 46WW15
DATE: March 25, 2024



PHOTO 16: Monitoring Well 46WW16
DATE: February 28, 2024



PHOTO 17: Monitoring Well 46WW17
DATE: February 28, 2024



PHOTO 18: Monitoring Well LHSMW17
DATE: March 25, 2024



PHOTO 19: Monitoring Well LHSMW18
DATE: February 28, 2024



PHOTO 20: Monitoring Well LHSMW19
DATE: February 28, 2024



PHOTO 21: Monitoring Well LHSMW20
DATE: March 25, 2024



PHOTO 22: Monitoring Well LHSMW21
DATE: March 25, 2024



PHOTO 23: Monitoring Well LHSMW22
DATE: March 25, 2024



PHOTO 24: Monitoring Well LHSMW23R
DATE: February 28, 2024



PHOTO 25: Monitoring Well LHSMW24
DATE: February 28, 2024



PHOTO 26: Monitoring Well LHSMW25
DATE: February 28, 2024

01289782

WELL INSPECTION FORM

Job Name: LHAAP
Job No.: 501032
Client: ARMY
Site Name: 46

Well ID: 46WW01
Inspection Date: 2/28/24
Well Completion Depth/ Measured Depth: 26.93
Inspector: Scott Baessinger

☒ ABOVE GROUND
Well Accessible? ☒ Yes ☐ No
Protective casing? ☒ Yes ☐ No
Material: METAL
Condition: ☒ Good ☐ Broken ☐ Cracked ☐ Need Paint
Lid Condition: ☒ Good ☐ Broken ☒ Cracked
Hinge Condition: ☒ Good ☐ Less than 50% rusted ☐ More than 50% rusted

☐ FLUSH MOUNTED NA
Well cover present? ☐ Yes ☐ No
Condition: ☐ Good ☐ Broken ☐ Cracked
Condition of Sump: ☐ Clean ☐ Dry ☐ Standing Water

CONCRETE PAD:
Sloped away from casing? ☒ Yes ☐ No
Pad Area Cleared of Vegetation? ☒ Yes ☐ No
Check any of the following features that apply:
☐ Many Cracks ☐ Gap Around Casing ☐ Few Cracks ☐ Ponded Water ☐ No Pad Present

WELL CONDITION:
Inner Diameter (inches): 4"
Condition: ☒ Good ☐ Broken ☐ Cracked ☐ Other (describe)
Cap present? ☒ Yes ☐ No
Well lock present? ☒ Yes ☐ No
Lock functioning properly? ☒ Yes ☐ No
Are bollards present and stable? ☒ Yes ☐ No
Well ID visible? ☒ Yes ☐ No

WELL INTEGRITY:
Bailer present? ☐ Yes ☒ No
Visual obstruction? ☐ Yes ☒ No
Is well open to completed depth? (complete when gauging) ☒ Yes ☐ No
Is silt present in well? (complete when gauging) ☒ Yes ☐ No
Is silt greater than 10% of well screen length? (complete when gauging) ☐ Yes ☒ No

COMMENTS:

01289783

WELL INSPECTION FORM

Job Name: LHAAP
Job No.: 501032
Client: Army
Site Name: 46

Well ID: 46WW02
Inspection Date: 2/26/24
Well Completion Depth/ Measured Depth: 47.63
Inspector: Scott Beasinger

☒ ABOVE GROUND

Well Accessible? ☒ Yes ☐ No
Protective casing? ☒ Yes ☐ No
Material: METAL
Condition: ☒ Good ☐ Broken ☐ Cracked ☐ Need Paint
Lid Condition: ☒ Good ☐ Broken ☒ Cracked
Hinge Condition: ☒ Good ☐ Less than 50% rusted ☐ More than 50% rusted

☐ FLUSH MOUNTED

Well cover present? NA ☐ Yes ☐ No
Condition: ☐ Good ☐ Broken ☐ Cracked
Condition of Sump: ☐ Clean ☐ Dry ☐ Standing Water

CONCRETE PAD:

Sloped away from casing? ☒ Yes ☐ No
Pad Area Cleared of Vegetation? ☒ Yes ☐ No
Check any of the following features that apply:
☐ Many Cracks ☐ Gap Around Casing ☐ Few Cracks ☐ Ponded Water ☐ No Pad Present

WELL CONDITION:

Inner Diameter (inches): 4"
Condition: ☒ Good ☐ Broken ☐ Cracked ☐ Other (describe)
Cap present? ☒ Yes ☐ No
Well lock present? ☒ Yes ☐ No
Lock functioning properly? ☒ Yes ☐ No
Are bollards present and stable? ☒ Yes ☐ No
Well ID visible? ☒ Yes ☐ No

WELL INTEGRITY:

Bailer present? ☐ Yes ☒ No
Visual obstruction? ☐ Yes ☒ No
Is well open to completed depth? (complete when gauging) ☒ Yes ☐ No
Is silt present in well? (complete when gauging) ☒ Yes ☐ No
Is silt greater than 10% of well screen length? (complete when gauging) ☐ Yes ☒ No

COMMENTS:

01289784

WELL INSPECTION FORM

Job Name: LHAAP
Job No.: 501032
Client: Army
Site Name: 46
Well ID: 46WW03
Inspection Date: 2/26/24
Well Completion Depth/ Measured Depth: 103.46
Inspector: Scott Beesinger

☒ ABOVE GROUND

Well Accessible? ☒ Yes ☐ No
Protective casing? ☒ Yes ☐ No
Material: METAL
Condition: ☒ Good ☐ Broken ☐ Cracked ☐ Need Paint
Lid Condition: ☒ Good ☐ Broken ☒ Cracked
Hinge Condition: ☒ Good ☐ Less than 50% rusted ☐ More than 50% rusted

☐ FLUSH MOUNTED

Well cover present? NA ☐ Yes ☐ No
Condition: ☐ Good ☐ Broken ☐ Cracked
Condition of Sump: ☐ Clean ☐ Dry ☐ Standing Water

CONCRETE PAD:

Sloped away from casing? ☒ Yes ☐ No
Pad Area Cleared of Vegetation? ☒ Yes ☐ No
Check any of the following features that apply:
☐ Many Cracks ☐ Gap Around Casing ☐ Few Cracks ☐ Ponded Water ☐ No Pad Present

WELL CONDITION:

Inner Diameter (inches): 4"
Condition: ☒ Good ☐ Broken ☐ Cracked ☐ Other (describe)
Cap present? ☒ Yes ☐ No
Well lock present? ☒ Yes ☐ No
Lock functioning properly? ☒ Yes ☐ No
Are bollards present and stable? ☒ Yes ☐ No
Well ID visible? ☒ Yes ☐ No

WELL INTEGRITY:

Bailer present? ☐ Yes ☒ No
Visual obstruction? ☐ Yes ☒ No
Is well open to completed depth? (complete when gauging) ☒ Yes ☐ No
Is silt present in well? (complete when gauging) ☒ Yes ☐ No
Is silt greater than 10% of well screen length? (complete when gauging) ☐ Yes ☒ No

COMMENTS:

01289785

WELL INSPECTION FORM

Job Name: LHAAP
Job No.: 501032
Client: ★ Army
Site Name: 46

Well ID: 46MW04
Inspection Date: 2/28/24
Well Completion Depth/ Measured Depth: 26.92
Inspector: Scott Baggenbar

ABOVE GROUND
Well Accessible? ☒ Yes ☐ No
Protective casing? ☒ Yes ☐ No
Material: METAL
Condition: ☒ Good ☐ Broken ☐ Cracked ☐ Need Paint
Lid Condition: ☒ Good ☐ Broken ☐ Cracked
Hinge Condition: ☒ Good ☐ Less than 50% rusted ☐ More than 50% rusted

☐ FLUSH MOUNTED
Well cover present? NA ☐ Yes ☐ No
Condition: ☐ Good ☐ Broken ☐ Cracked
Condition of Sump: ☐ Clean ☐ Dry ☐ Standing Water

CONCRETE PAD:
Sloped away from casing? ☒ Yes ☐ No
Pad Area Cleared of Vegetation? ☒ Yes ☐ No
Check any of the following features that apply:
☐ Many Cracks ☐ Gap Around Casing ☐ Few Cracks ☐ Ponded Water ☐ No Pad Present

WELL CONDITION:
Inner Diameter (inches): 4"
Condition: ☒ Good ☐ Broken ☐ Cracked ☐ Other (describe)
Cap present? ☒ Yes ☐ No
Well lock present? ☒ Yes ☐ No
Lock functioning properly? ☒ Yes ☐ No
Are bollards present and stable? ☒ Yes ☐ No
Well ID visible? ☒ Yes ☐ No

WELL INTEGRITY:
Bailer present? ☐ Yes ☒ No
Visual obstruction? ☐ Yes ☒ No
Is well open to completed depth? (complete when gauging) ☒ Yes ☐ No
Is silt present in well? (complete when gauging) ☒ Yes ☐ No
Is silt greater than 10% of well screen length? (complete when gauging) ☐ Yes ☒ No

COMMENTS:

01289786

WELL INSPECTION FORM

Job Name: LHAAP
Job No.: 501022
Client: Army
Site Name: 46
Well ID: 46MW05
Inspection Date: 2/26/24
Well Completion Depth/ Measured Depth: 46.47
Inspector: Scott Bassinger

ABOVE GROUND

Well Accessible? ☒ Yes ☐ No
Protective casing? ☒ Yes ☐ No
Material: METAL
Condition: ☒ Good ☐ Broken ☐ Cracked ☐ Need Paint
Lid Condition: ☒ Good ☐ Broken ☐ Cracked
Hinge Condition: ☒ Good ☐ Less than 50% rusted ☐ More than 50% rusted

☐ FLUSH MOUNTED

Well cover present? NA ☐ Yes ☐ No
Condition: ☐ Good ☐ Broken ☐ Cracked
Condition of Sump: ☐ Clean ☐ Dry ☐ Standing Water

CONCRETE PAD:

Sloped away from casing? ☒ Yes ☐ No
Pad Area Cleared of Vegetation? ☒ Yes ☐ No
Check any of the following features that apply:
☐ Many Cracks ☐ Gap Around Casing ☐ Few Cracks ☐ Ponded Water ☐ No Pad Present

WELL CONDITION:

Inner Diameter (inches): 4"
Condition: ☒ Good ☐ Broken ☐ Cracked ☐ Other (describe)
Cap present? ☒ Yes ☐ No
Well lock present? ☒ Yes ☐ No
Lock functioning properly? ☒ Yes ☐ No
Are bollards present and stable? ☒ Yes ☐ No
Well ID visible? ☒ Yes ☐ No

WELL INTEGRITY:

Bailer present? ☐ Yes ☒ No
Visual obstruction? ☐ Yes ☒ No
Is well open to completed depth? (complete when gauging) ☒ Yes ☐ No
Is silt present in well? (complete when gauging) ☒ Yes ☐ No
Is silt greater than 10% of well screen length? (complete when gauging) ☐ Yes ☒ No

COMMENTS:

01289787

WELL INSPECTION FORM

Job Name: CHAAP
Job No.: 501032
Client: ARMY
Site Name: 46
Well ID: 46WW06
Inspection Date: 2/26/24
Well Completion Depth/ Measured Depth: 52.70
Inspector: Scott Bressinger

☐ ABOVE GROUND
Well Accessible? ☐ Yes ☐ No
Protective casing? ☐ Yes ☐ No
Material
Condition: ☐ Good ☐ Broken ☐ Cracked ☐ Need Paint
Lid Condition: ☐ Good ☐ Broken ☒ Cracked
Hinge Condition: ☐ Good ☐ Less than 50% rusted ☐ More than 50% rusted

☐ FLUSH MOUNTED
Well cover present? ☐ Yes ☐ No
Condition: ☐ Good ☐ Broken ☐ Cracked
Condition of Sump: ☐ Clean ☐ Dry ☐ Standing Water

CONCRETE PAD:
Sloped away from casing? ☐ Yes ☐ No
Pad Area Cleared of Vegetation? ☐ Yes ☐ No
Check any of the following features that apply:
☐ Many Cracks ☐ Gap Around Casing ☐ Few Cracks ☐ Ponded Water ☐ No Pad Present

WELL CONDITION:
Inner Diameter (inches)
Condition: ☐ Good ☐ Broken ☐ Cracked ☐ Other (describe)
Cap present? ☐ Yes ☐ No
Well lock present? ☐ Yes ☐ No
Lock functioning properly? ☐ Yes ☐ No
Are bollards present and stable? ☐ Yes ☐ No
Well ID visible? ☐ Yes ☐ No

WELL INTEGRITY:
Bailer present? ☐ Yes ☐ No
Visual obstruction? ☐ Yes ☐ No
Is well open to completed depth? (complete when gauging) ☐ Yes ☐ No
Is silt present in well? (complete when gauging) ☐ Yes ☐ No
Is silt greater than 10% of well screen length? (complete when gauging) ☐ Yes ☐ No

COMMENTS:

01289788

WELL INSPECTION FORM

Job Name: LHAAP
Job No.: 501032
Client: Army
Site Name: 46

Well ID: 46WW07
Inspection Date: 2/22/24
Well Completion Depth/ Measured Depth: 51.67
Inspector: Scott Bassinger

☒ ABOVE GROUND

Well Accessible? ☒ Yes ☐ No
Protective casing? ☒ Yes ☐ No
Material: METAL
Condition: ☒ Good ☐ Broken ☐ Cracked ☐ Need Paint
Lid Condition: ☒ Good ☐ Broken ☒ Cracked
Hinge Condition: ☒ Good ☐ Less than 50% rusted ☐ More than 50% rusted

☐ FLUSH MOUNTED

Well cover present? NA ☐ Yes ☐ No
Condition: ☐ Good ☐ Broken ☐ Cracked
Condition of Sump: ☐ Clean ☐ Dry ☐ Standing Water

CONCRETE PAD:

Sloped away from casing? ☒ Yes ☐ No
Pad Area Cleared of Vegetation? ☒ Yes ☐ No
Check any of the following features that apply:
☐ Many Cracks ☐ Gap Around Casing ☐ Few Cracks ☐ Ponded Water ☐ No Pad Present

WELL CONDITION:

Inner Diameter (inches) 4"
Condition: ☒ Good ☐ Broken ☐ Cracked ☐ Other (describe)
Cap present? ☒ Yes ☐ No
Well lock present? ☒ Yes ☐ No
Lock functioning properly? ☒ Yes ☐ No
Are bollards present and stable? ☒ Yes ☐ No
Well ID visible? ☒ Yes ☐ No

WELL INTEGRITY:

Bailer present? ☐ Yes ☒ No
Visual obstruction? ☐ Yes ☒ No
Is well open to completed depth? (complete when gauging) ☒ Yes ☐ No
Is silt present in well? (complete when gauging) ☒ Yes ☐ No
Is silt greater than 10% of well screen length? (complete when gauging) ☐ Yes ☒ No

COMMENTS:

01289789

WELL INSPECTION FORM

Job Name: LHAAP
Job No.: 501032
Client: Army
Site Name: 46
Well ID: 46WW08
Inspection Date: 2/26/24
Well Completion Depth/ Measured Depth: 45.31
Inspector: Scott Beesinger

☒ ABOVE GROUND
Well Accessible? ☒ Yes ☐ No
Protective casing? ☒ Yes ☐ No
Material: METAL
Condition: ☒ Good ☐ Broken ☐ Cracked ☐ Need Paint
Lid Condition: ☒ Good ☐ Broken ☐ Cracked
Hinge Condition: ☒ Good ☐ Less than 50% rusted ☐ More than 50% rusted

☐ FLUSH MOUNTED
Well cover present? NA ☐ Yes ☐ No
Condition: ☐ Good ☐ Broken ☐ Cracked
Condition of Sump: ☐ Clean ☐ Dry ☐ Standing Water

CONCRETE PAD:
Sloped away from casing? ☒ Yes ☐ No
Pad Area Cleared of Vegetation? ☒ Yes ☐ No
Check any of the following features that apply:
☐ Many Cracks ☐ Gap Around Casing ☐ Few Cracks ☐ Ponded Water ☐ No Pad Present

WELL CONDITION:
Inner Diameter (inches) 4"
Condition: ☒ Good ☐ Broken ☐ Cracked ☐ Other (describe)
Cap present? ☒ Yes ☐ No
Well lock present? ☒ Yes ☐ No
Lock functioning properly? ☒ Yes ☐ No
Are bollards present and stable? ☒ Yes ☐ No
Well ID visible? ☒ Yes ☐ No

WELL INTEGRITY:
Bailer present? ☐ Yes ☒ No
Visual obstruction? ☐ Yes ☒ No
Is well open to completed depth? (complete when gauging) ☒ Yes ☐ No
Is silt present in well? (complete when gauging) ☒ Yes ☐ No
Is silt greater than 10% of well screen length? (complete when gauging) ☐ Yes ☒ No

COMMENTS:

01289790

WELL INSPECTION FORM

Job Name: LHAAP
Job No.: 50132
Client: ARMY
Site Name: 46
Well ID: 46WW09
Inspection Date: 2/22/24
Well Completion Depth/ Measured Depth: 42.25
Inspector: Scott Baesinger

☒ ABOVE GROUND

Well Accessible? ☒ Yes ☐ No
Protective casing? ☒ Yes ☐ No
Material: METAL
Condition: ☒ Good ☐ Broken ☐ Cracked ☐ Need Paint
Lid Condition: ☒ Good ☐ Broken ☐ Cracked
Hinge Condition: ☒ Good ☐ Less than 50% rusted ☐ More than 50% rusted

☐ FLUSH MOUNTED

Well cover present? NA ☐ Yes ☐ No
Condition: ☐ Good ☐ Broken ☐ Cracked
Condition of Sump: ☐ Clean ☐ Dry ☐ Standing Water

CONCRETE PAD:

Sloped away from casing? ☒ Yes ☐ No
Pad Area Cleared of Vegetation? ☒ Yes ☐ No
Check any of the following features that apply:
☐ Many Cracks ☐ Gap Around Casing ☐ Few Cracks ☐ Ponded Water ☐ No Pad Present

WELL CONDITION:

Inner Diameter (inches): 4"
Condition: ☒ Good ☐ Broken ☐ Cracked ☐ Other (describe)
Cap present? ☒ Yes ☐ No
Well lock present? ☒ Yes ☐ No
Lock functioning properly? ☒ Yes ☐ No
Are bollards present and stable? ☒ Yes ☐ No
Well ID visible? ☒ Yes ☐ No

WELL INTEGRITY:

Bailer present? ☐ Yes ☒ No
Visual obstruction? ☐ Yes ☒ No
Is well open to completed depth? (complete when gauging) ☒ Yes ☐ No
Is silt present in well? (complete when gauging) ☒ Yes ☐ No
Is silt greater than 10% of well screen length? (complete when gauging) ☐ Yes ☒ No

COMMENTS:

01289791

WELL INSPECTION FORM

Job Name: LHAAP
Job No.: 501032
Client: Army
Site Name: 46
Well ID: 46WW10
Inspection Date: 2/28/24
Well Completion Depth/ Measured Depth: 25.33
Inspector: Scott Baesinger

ABOVE GROUND
Well Accessible? ☒ Yes ☐ No
Protective casing? ☒ Yes ☐ No
Material: METAL
Condition: ☒ Good ☐ Broken ☐ Cracked ☐ Need Paint
Lid Condition: ☒ Good ☐ Broken ☒ Cracked
Hinge Condition: ☒ Good ☐ Less than 50% rusted ☐ More than 50% rusted

☐ FLUSH MOUNTED
Well cover present? NA ☐ Yes ☐ No
Condition: ☐ Good ☐ Broken ☐ Cracked
Condition of Sump: ☐ Clean ☐ Dry ☐ Standing Water

CONCRETE PAD:
Sloped away from casing? ☒ Yes ☐ No
Pad Area Cleared of Vegetation? ☒ Yes ☐ No
Check any of the following features that apply:
☐ Many Cracks ☐ Gap Around Casing ☐ Few Cracks ☐ Ponded Water ☐ No Pad Present

WELL CONDITION:
Inner Diameter (inches) 4"
Condition: ☒ Good ☐ Broken ☐ Cracked ☐ Other (describe)
Cap present? ☒ Yes ☐ No
Well lock present? ☒ Yes ☐ No
Lock functioning properly? ☒ Yes ☐ No
Are bollards present and stable? ☒ Yes ☐ No
Well ID visible? ☒ Yes ☐ No

WELL INTEGRITY:
Bailer present? ☐ Yes ☒ No
Visual obstruction? ☐ Yes ☒ No
Is well open to completed depth? (complete when gauging) ☒ Yes ☐ No
Is silt present in well? (complete when gauging) ☐ Yes ☒ No
Is silt greater than 10% of well screen length? (complete when gauging) ☐ Yes ☒ No

COMMENTS:

01289792

WELL INSPECTION FORM

Job Name: LHAAP
Job No.: 501032
Client: Army
Site Name: 46
Well ID: 46WW11
Inspection Date: 2/22/24
Well Completion Depth/ Measured Depth: 32.90
Inspector: Scott Beesinger

☒ ABOVE GROUND

Well Accessible? ☒ Yes ☐ No
Protective casing? ☒ Yes ☐ No
Material: METAL
Condition: ☒ Good ☐ Broken ☐ Cracked ☐ Need Paint
Lid Condition: ☒ Good ☐ Broken ☐ Cracked
Hinge Condition: ☒ Good ☐ Less than 50% rusted ☐ More than 50% rusted

☐ FLUSH MOUNTED

Well cover present? NA ☐ Yes ☐ No
Condition: ☐ Good ☐ Broken ☐ Cracked
Condition of Sump: ☐ Clean ☐ Dry ☐ Standing Water

CONCRETE PAD:

Sloped away from casing? ☒ Yes ☐ No
Pad Area Cleared of Vegetation? ☒ Yes ☐ No
Check any of the following features that apply:
☐ Many Cracks ☐ Gap Around Casing ☐ Few Cracks ☐ Ponded Water ☐ No Pad Present

WELL CONDITION:

Inner Diameter (inches) 2"
Condition: ☒ Good ☐ Broken ☐ Cracked ☐ Other (describe)
Cap present? ☒ Yes ☐ No
Well lock present? ☒ Yes ☐ No
Lock functioning properly? ☒ Yes ☐ No
Are bollards present and stable? ☒ Yes ☐ No
Well ID visible? ☒ Yes ☐ No

WELL INTEGRITY:

Bailer present? ☐ Yes ☒ No
Visual obstruction? ☐ Yes ☒ No
Is well open to completed depth? (complete when gauging) ☒ Yes ☐ No
Is silt present in well? (complete when gauging) ☐ Yes ☒ No
Is silt greater than 10% of well screen length? (complete when gauging) ☐ Yes ☒ No

COMMENTS:

01289793

WELL INSPECTION FORM

Job Name: LHAAP
Job No.: 501032
Client: Army
Site Name: 46

Well ID: 46WW12
Inspection Date: 2/28/24
Well Completion Depth/ Measured Depth: 29.43
Inspector: Scott Beesinger

☒ ABOVE GROUND

Well Accessible? ☒ Yes ☐ No
Protective casing? ☒ Yes ☐ No
Material: metal
Condition: ☒ Good ☐ Broken ☐ Cracked ☐ Need Paint
Lid Condition: ☒ Good ☐ Broken ☒ Cracked
Hinge Condition: ☒ Good ☐ Less than 50% rusted ☐ More than 50% rusted

☐ FLUSH MOUNTED

Well cover present? NA ☐ Yes ☐ No
Condition: ☐ Good ☐ Broken ☐ Cracked
Condition of Sump: ☐ Clean ☐ Dry ☐ Standing Water

CONCRETE PAD:

Sloped away from casing? ☒ Yes ☐ No
Pad Area Cleared of Vegetation? ☒ Yes ☐ No
Check any of the following features that apply:
☐ Many Cracks ☐ Gap Around Casing ☐ Few Cracks ☐ Ponded Water ☐ No Pad Present

WELL CONDITION:

Inner Diameter (inches): 4"
Condition: ☒ Good ☐ Broken ☐ Cracked ☐ Other (describe)
Cap present? ☒ Yes ☐ No
Well lock present? ☒ Yes ☐ No
Lock functioning properly? ☒ Yes ☐ No
Are bollards present and stable? ☒ Yes ☐ No
Well ID visible? ☒ Yes ☐ No

WELL INTEGRITY:

Bailer present? ☐ Yes ☒ No
Visual obstruction? ☐ Yes ☒ No
Is well open to completed depth? (complete when gauging) ☒ Yes ☐ No
Is silt present in well? (complete when gauging) ☐ Yes ☒ No
Is silt greater than 10% of well screen length? (complete when gauging) ☐ Yes ☒ No

COMMENTS:

01289794

WELL INSPECTION FORM

Job Name: LHAAP
Job No.: 501032
Client: ARMY
Site Name: 46

Well ID: 46WW13
Inspection Date: 2/28/24
Well Completion Depth/ Measured Depth: 31.61
Inspector: Scott Beesinger

☒ ABOVE GROUND

Well Accessible? ☒ Yes ☐ No
Protective casing? ☒ Yes ☐ No
Material: METAL
Condition: ☒ Good ☐ Broken ☐ Cracked ☐ Need Paint
Lid Condition: ☒ Good ☐ Broken ☐ Cracked
Hinge Condition: ☒ Good ☐ Less than 50% rusted ☐ More than 50% rusted

☐ FLUSH MOUNTED

Well cover present? NA ☐ Yes ☐ No
Condition: ☐ Good ☐ Broken ☐ Cracked
Condition of Sump: ☐ Clean ☐ Dry ☐ Standing Water

CONCRETE PAD:

Sloped away from casing? ☒ Yes ☐ No
Pad Area Cleared of Vegetation? ☒ Yes ☐ No
Check any of the following features that apply:
☐ Many Cracks ☐ Gap Around Casing ☐ Few Cracks ☐ Ponded Water ☐ No Pad Present

WELL CONDITION:

Inner Diameter (inches): 4"
Condition: ☒ Good ☐ Broken ☐ Cracked ☐ Other (describe)
Cap present? ☒ Yes ☐ No
Well lock present? ☒ Yes ☐ No
Lock functioning properly? ☒ Yes ☐ No
Are bollards present and stable? ☒ Yes ☐ No
Well ID visible? ☒ Yes ☐ No

WELL INTEGRITY:

Bailer present? ☐ Yes ☒ No
Visual obstruction? ☐ Yes ☒ No
Is well open to completed depth? (complete when gauging) ☒ Yes ☐ No
Is silt present in well? (complete when gauging) ☒ Yes ☐ No
Is silt greater than 10% of well screen length? (complete when gauging) ☐ Yes ☒ No

COMMENTS:

01289795

WELL INSPECTION FORM

Job Name: LHAAP
Job No.: 501032
Client: Army
Site Name: 46
Well ID: 46WW14
Inspection Date: 2/22/24
Well Completion Depth/ Measured Depth: 54.53
Inspector: Scott Bassinger

ABOVE GROUND
Well Accessible? ☒ Yes ☐ No
Protective casing? ☒ Yes ☐ No
Material: METAL
Condition: ☒ Good ☐ Broken ☐ Cracked ☐ Need Paint
Lid Condition: ☒ Good ☐ Broken ☐ Cracked
Hinge Condition: ☒ Good ☐ Less than 50% rusted ☐ More than 50% rusted

FLUSH MOUNTED
Well cover present? NA ☐ Yes ☐ No
Condition: ☐ Good ☐ Broken ☐ Cracked
Condition of Sump: ☐ Clean ☐ Dry ☐ Standing Water

CONCRETE PAD:
Sloped away from casing? ☒ Yes ☐ No
Pad Area Cleared of Vegetation? ☒ Yes ☐ No
Check any of the following features that apply:
☐ Many Cracks ☐ Gap Around Casing ☐ Few Cracks ☐ Ponded Water ☐ No Pad Present

WELL CONDITION:
Inner Diameter (inches): 4"
Condition: ☒ Good ☐ Broken ☐ Cracked ☐ Other (describe)
Cap present? ☒ Yes ☐ No
Well lock present? ☒ Yes ☐ No
Lock functioning properly? ☒ Yes ☐ No
Are bollards present and stable? ☒ Yes ☐ No
Well ID visible? ☒ Yes ☐ No

WELL INTEGRITY:
Bailer present? ☐ Yes ☒ No
Visual obstruction? ☐ Yes ☒ No
Is well open to completed depth? (complete when gauging) ☒ Yes ☐ No
Is silt present in well? (complete when gauging) ☒ Yes ☐ No
Is silt greater than 10% of well screen length? (complete when gauging) ☐ Yes ☒ No

COMMENTS:

01289796

WELL INSPECTION FORM

Job Name: LHAAP
Job No.: 501032
Client: Army
Site Name: 46

Well ID: 46WW15
Inspection Date: 2/28/24
Well Completion Depth/ Measured Depth: 30.19
Inspector: Scott Baggenger

☒ ABOVE GROUND
Well Accessible? ☒ Yes ☐ No
Protective casing? ☒ Yes ☐ No
Material: METAL
Condition: ☒ Good ☐ Broken ☐ Cracked ☐ Need Paint
Lid Condition: ☒ Good ☐ Broken ☐ Cracked
Hinge Condition: ☒ Good ☐ Less than 50% rusted ☐ More than 50% rusted

☐ FLUSH MOUNTED
Well cover present? NA ☐ Yes ☐ No
Condition: ☐ Good ☐ Broken ☐ Cracked
Condition of Sump: ☐ Clean ☐ Dry ☐ Standing Water

CONCRETE PAD:
Sloped away from casing? ☒ Yes ☐ No
Pad Area Cleared of Vegetation? ☒ Yes ☐ No
Check any of the following features that apply:
☐ Many Cracks ☐ Gap Around Casing ☐ Few Cracks ☐ Ponded Water ☐ No Pad Present

WELL CONDITION:
Inner Diameter (inches) 4"
Condition: ☒ Good ☐ Broken ☐ Cracked ☐ Other (describe)
Cap present? ☒ Yes ☐ No
Well lock present? ☒ Yes ☐ No
Lock functioning properly? ☒ Yes ☐ No
Are bollards present and stable? ☒ Yes ☐ No
Well ID visible? ☒ Yes ☐ No

WELL INTEGRITY:
Bailer present? ☐ Yes ☒ No
Visual obstruction? ☐ Yes ☒ No
Is well open to completed depth? (complete when gauging) ☒ Yes ☐ No
Is silt present in well? (complete when gauging) ☒ Yes ☐ No
Is silt greater than 10% of well screen length? (complete when gauging) ☐ Yes ☒ No

COMMENTS:

01289797

WELL INSPECTION FORM

Job Name: LHAAP
Job No.: 501032
Client: Army
Site Name: 46
Well ID: 46MW16
Inspection Date: 2/26/24
Well Completion Depth/ Measured Depth: 51.49
Inspector: Scott Baggingar

ABOVE GROUND
Well Accessible? ☒ Yes ☐ No
Protective casing? ☒ Yes ☐ No
Material: METAL
Condition: ☒ Good ☐ Broken ☐ Cracked ☐ Need Paint
Lid Condition: ☒ Good ☐ Broken ☐ Cracked
Hinge Condition: ☒ Good ☐ Less than 50% rusted ☐ More than 50% rusted

FLUSH MOUNTED
Well cover present? NA ☐ Yes ☐ No
Condition: ☐ Good ☐ Broken ☐ Cracked
Condition of Sump: ☐ Clean ☐ Dry ☐ Standing Water

CONCRETE PAD:
Sloped away from casing? ☒ Yes ☐ No
Pad Area Cleared of Vegetation? ☒ Yes ☐ No
Check any of the following features that apply:
☐ Many Cracks ☐ Gap Around Casing ☐ Few Cracks ☐ Ponded Water ☐ No Pad Present

WELL CONDITION:
Inner Diameter (inches) 4"
Condition: ☒ Good ☐ Broken ☐ Cracked ☐ Other (describe)
Cap present? ☒ Yes ☐ No
Well lock present? ☒ Yes ☐ No
Lock functioning properly? ☒ Yes ☐ No
Are bollards present and stable? ☒ Yes ☐ No
Well ID visible? ☒ Yes ☐ No

WELL INTEGRITY:
Bailer present? ☐ Yes ☒ No
Visual obstruction? ☐ Yes ☒ No
Is well open to completed depth? (complete when gauging) ☒ Yes ☐ No
Is silt present in well? (complete when gauging) ☒ Yes ☐ No
Is silt greater than 10% of well screen length? (complete when gauging) ☐ Yes ☒ No

COMMENTS:

01289798

WELL INSPECTION FORM

Job Name: LHAAP
Job No.: 501032
Client: Army
Site Name: 46
Well ID: 46MW17
Inspection Date: 2/22/24
Well Completion Depth/ Measured Depth: 36.54
Inspector: Scott Bassinger

☒ ABOVE GROUND

Well Accessible? ☒ Yes ☐ No
Protective casing? ☒ Yes ☐ No
Material: METAL
Condition: ☒ Good ☐ Broken ☐ Cracked ☐ Need Paint
Lid Condition: ☒ Good ☐ Broken ☐ Cracked
Hinge Condition: ☒ Good ☐ Less than 50% rusted ☐ More than 50% rusted

☐ FLUSH MOUNTED

Well cover present? NA ☐ Yes ☐ No
Condition: ☐ Good ☐ Broken ☐ Cracked
Condition of Sump: ☐ Clean ☐ Dry ☐ Standing Water

CONCRETE PAD:

Sloped away from casing? ☒ Yes ☐ No
Pad Area Cleared of Vegetation? ☒ Yes ☐ No
Check any of the following features that apply:
☐ Many Cracks ☐ Gap Around Casing ☐ Few Cracks ☐ Ponded Water ☐ No Pad Present

WELL CONDITION:

Inner Diameter (inches): 4"
Condition: ☒ Good ☐ Broken ☐ Cracked ☐ Other (describe)
Cap present? ☒ Yes ☐ No
Well lock present? ☒ Yes ☐ No
Lock functioning properly? ☒ Yes ☐ No
Are bollards present and stable? ☒ Yes ☐ No
Well ID visible? ☒ Yes ☐ No

WELL INTEGRITY:

Bailer present? ☐ Yes ☒ No
Visual obstruction? ☐ Yes ☒ No
Is well open to completed depth? (complete when gauging) ☒ Yes ☐ No
Is silt present in well? (complete when gauging) ☒ Yes ☐ No
Is silt greater than 10% of well screen length? (complete when gauging) ☐ Yes ☒ No

COMMENTS:

01289799

WELL INSPECTION FORM

Job Name: LHAAP
Job No.: 501032
Client: ARMY
Site Name: 46

Well ID: LHSmw17
Inspection Date: 2/28/24
Well Completion Depth/ Measured Depth: 27.00
Inspector: Scott Baesinger

ABOVE GROUND
Well Accessible? ☒ Yes ☐ No
Protective casing? ☒ Yes ☐ No
Material: METAL
Condition: ☒ Good ☐ Broken ☐ Cracked ☐ Need Paint
Lid Condition: ☒ Good ☐ Broken ☐ Cracked
Hinge Condition: ☒ Good ☐ Less than 50% rusted ☐ More than 50% rusted

FLUSH MOUNTED
Well cover present? NA ☐ Yes ☐ No
Condition: ☐ Good ☐ Broken ☐ Cracked
Condition of Sump: ☐ Clean ☐ Dry ☐ Standing Water

CONCRETE PAD:
Sloped away from casing? ☒ Yes ☐ No
Pad Area Cleared of Vegetation? ☒ Yes ☐ No
Check any of the following features that apply:
☐ Many Cracks ☐ Gap Around Casing ☐ Few Cracks ☐ Ponded Water ☐ No Pad Present

WELL CONDITION:
Inner Diameter (inches): 4"
Condition: ☒ Good ☐ Broken ☐ Cracked ☐ Other (describe)
Cap present? ☒ Yes ☐ No
Well lock present? ☒ Yes ☐ No
Lock functioning properly? ☒ Yes ☐ No
Are bollards present and stable? ☒ Yes ☐ No
Well ID visible? ☒ Yes ☐ No

WELL INTEGRITY:
Bailer present? ☐ Yes ☒ No
Visual obstruction? ☐ Yes ☒ No
Is well open to completed depth? (complete when gauging) ☒ Yes ☐ No
Is silt present in well? (complete when gauging) ☒ Yes ☐ No
Is silt greater than 10% of well screen length? (complete when gauging) ☐ Yes ☒ No

COMMENTS:

01289800

WELL INSPECTION FORM

Job Name: LHAAP
Job No.: 501032
Client: Army
Site Name: 46
Well ID: LHSMW18
Inspection Date: 2/28/24
Well Completion Depth/ Measured Depth: 27.88
Inspector: Scott Beegle/Bar

☑ ABOVE GROUND
Well Accessible? ☑ Yes ☐ No
Protective casing? ☑ Yes ☐ No
Material: METAL
Condition: ☑ Good ☐ Broken ☐ Cracked ☐ Need Paint
Lid Condition: ☑ Good ☐ Broken ☐ Cracked
Hinge Condition: ☑ Good ☐ Less than 50% rusted ☐ More than 50% rusted

☐ FLUSH MOUNTED
Well cover present? NA ☐ Yes ☐ No
Condition: ☐ Good ☐ Broken ☐ Cracked
Condition of Sump: ☐ Clean ☐ Dry ☐ Standing Water

CONCRETE PAD:
Sloped away from casing? ☑ Yes ☐ No
Pad Area Cleared of Vegetation? ☑ Yes ☐ No
Check any of the following features that apply:
☐ Many Cracks ☐ Gap Around Casing ☐ Few Cracks ☐ Ponded Water ☐ No Pad Present

WELL CONDITION:
Inner Diameter (inches) 4"
Condition: ☑ Good ☐ Broken ☐ Cracked ☐ Other (describe)
Cap present? ☑ Yes ☐ No
Well lock present? ☑ Yes ☐ No
Lock functioning properly? ☑ Yes ☐ No
Are bollards present and stable? ☑ Yes ☐ No
Well ID visible? ☑ Yes ☐ No

WELL INTEGRITY:
Bailer present? ☐ Yes ☑ No
Visual obstruction? ☐ Yes ☑ No
Is well open to completed depth? (complete when gauging) ☑ Yes ☐ No
Is silt present in well? (complete when gauging) ☑ Yes ☐ No
Is silt greater than 10% of well screen length? (complete when gauging) ☐ Yes ☑ No

COMMENTS:

01289801

WELL INSPECTION FORM

Job Name: LHAAP
Job No.: 501032
Client: ARMY
Site Name: 46
Well ID: LHSMW19
Inspection Date: 2/22/24
Well Completion Depth/ Measured Depth: 30.00
Inspector: Scott Baesinger

ABOVE GROUND
Well Accessible? ☒ Yes ☐ No
Protective casing? ☒ Yes ☐ No
Material: METAL
Condition: ☒ Good ☐ Broken ☐ Cracked ☐ Need Paint
Lid Condition: ☒ Good ☐ Broken ☐ Cracked
Hinge Condition: ☒ Good ☐ Less than 50% rusted ☐ More than 50% rusted

FLUSH MOUNTED
Well cover present? NA ☐ Yes ☐ No
Condition: ☐ Good ☐ Broken ☐ Cracked
Condition of Sump: ☐ Clean ☐ Dry ☐ Standing Water

CONCRETE PAD:
Sloped away from casing? ☒ Yes ☐ No
Pad Area Cleared of Vegetation? ☒ Yes ☐ No
Check any of the following features that apply:
☐ Many Cracks ☐ Gap Around Casing ☐ Few Cracks ☐ Ponded Water ☐ No Pad Present

WELL CONDITION:
Inner Diameter (inches) 4"
Condition: ☒ Good ☐ Broken ☐ Cracked ☐ Other (describe)
Cap present? ☒ Yes ☐ No
Well lock present? ☒ Yes ☐ No
Lock functioning properly? ☒ Yes ☐ No
Are bollards present and stable? ☒ Yes ☐ No
Well ID visible? ☒ Yes ☐ No

WELL INTEGRITY:
Bailer present? ☐ Yes ☒ No
Visual obstruction? ☐ Yes ☒ No
Is well open to completed depth? (complete when gauging) ☒ Yes ☐ No
Is silt present in well? (complete when gauging) ☐ Yes ☒ No
Is silt greater than 10% of well screen length? (complete when gauging) ☐ Yes ☒ No

COMMENTS:

01289802

WELL INSPECTION FORM

Job Name: LHAAP
Job No.: 501032
Client: Army
Site Name: 46
Well ID: LHSMW20
Inspection Date: 2/28/24
Well Completion Depth/ Measured Depth: 25.02
Inspector: Scott Baesinger

☒ ABOVE GROUND

Well Accessible? ☒ Yes ☐ No
Protective casing? ☒ Yes ☐ No
Material: METAL
Condition: ☐ Good ☐ Broken ☐ Cracked ☒ Need Paint
Lid Condition: ☒ Good ☐ Broken ☒ Cracked
Hinge Condition: ☒ Good ☐ Less than 50% rusted ☐ More than 50% rusted

☐ FLUSH MOUNTED

Well cover present? NA ☐ Yes ☐ No
Condition: ☐ Good ☐ Broken ☐ Cracked
Condition of Sump: ☐ Clean ☐ Dry ☐ Standing Water

CONCRETE PAD:

Sloped away from casing? ☒ Yes ☐ No
Pad Area Cleared of Vegetation? ☒ Yes ☐ No
Check any of the following features that apply:
☐ Many Cracks ☐ Gap Around Casing ☐ Few Cracks ☐ Ponded Water ☐ No Pad Present

WELL CONDITION:

Inner Diameter (inches): 4"
Condition: ☒ Good ☐ Broken ☐ Cracked ☐ Other (describe)
Cap present? ☒ Yes ☐ No
Well lock present? ☒ Yes ☐ No
Lock functioning properly? ☒ Yes ☐ No
Are bollards present and stable? ☒ Yes ☐ No
Well ID visible? ☒ Yes ☐ No

WELL INTEGRITY:

Bailer present? ☐ Yes ☒ No
Visual obstruction? ☐ Yes ☒ No
Is well open to completed depth? (complete when gauging) ☒ Yes ☐ No
Is silt present in well? (complete when gauging) ☒ Yes ☐ No
Is silt greater than 10% of well screen length? (complete when gauging) ☐ Yes ☒ No

COMMENTS:

01289803

WELL INSPECTION FORM

Job Name: LHAAP
Job No.: 501032
Client: ARMY
Site Name: 46

Well ID: LHSMW21
Inspection Date: 2/22/24
Well Completion Depth/ Measured Depth: 29.72
Inspector: Scott Baessinger

☒ ABOVE GROUND

Well Accessible? ☒ Yes ☐ No
Protective casing? ☒ Yes ☐ No
Material: METAL
Condition: ☒ Good ☐ Broken ☐ Cracked ☐ Need Paint
Lid Condition: ☒ Good ☐ Broken ☐ Cracked
Hinge Condition: ☒ Good ☐ Less than 50% rusted ☐ More than 50% rusted

☐ FLUSH MOUNTED

Well cover present? NA ☐ Yes ☐ No
Condition: ☐ Good ☐ Broken ☐ Cracked
Condition of Sump: ☐ Clean ☐ Dry ☐ Standing Water

CONCRETE PAD:

Sloped away from casing? ☒ Yes ☐ No
Pad Area Cleared of Vegetation? ☒ Yes ☐ No
Check any of the following features that apply:
☐ Many Cracks ☐ Gap Around Casing ☐ Few Cracks ☐ Ponded Water ☐ No Pad Present

WELL CONDITION:

Inner Diameter (inches): 4"
Condition: ☒ Good ☐ Broken ☐ Cracked ☐ Other (describe)
Cap present? ☒ Yes ☐ No
Well lock present? ☒ Yes ☐ No
Lock functioning properly? ☒ Yes ☐ No
Are bollards present and stable? ☒ Yes ☐ No
Well ID visible? ☒ Yes ☐ No

WELL INTEGRITY:

Bailer present? ☐ Yes ☒ No
Visual obstruction? ☐ Yes ☒ No
Is well open to completed depth? (complete when gauging) ☒ Yes ☐ No
Is silt present in well? (complete when gauging) ☒ Yes ☐ No
Is silt greater than 10% of well screen length? (complete when gauging) ☐ Yes ☒ No

COMMENTS:

01289804

WELL INSPECTION FORM

Job Name: LHAAP
Job No.: 501032
Client: Army
Site Name: 46
Well ID: LHSmw22
Inspection Date: 2/26/24
Well Completion Depth/ Measured Depth: 22.80
Inspector: Scott Bassinger

☒ ABOVE GROUND

Well Accessible? ☒ Yes ☐ No
Protective casing? ☒ Yes ☐ No
Material: METAL
Condition: ☒ Good ☐ Broken ☐ Cracked ☐ Need Paint
Lid Condition: ☒ Good ☐ Broken ☐ Cracked
Hinge Condition: ☒ Good ☐ Less than 50% rusted ☐ More than 50% rusted

☐ FLUSH MOUNTED

Well cover present? NA ☐ Yes ☐ No
Condition: ☐ Good ☐ Broken ☐ Cracked
Condition of Sump: ☐ Clean ☐ Dry ☐ Standing Water

CONCRETE PAD:

Sloped away from casing? ☒ Yes ☐ No
Pad Area Cleared of Vegetation? ☒ Yes ☐ No
Check any of the following features that apply:
☐ Many Cracks ☐ Gap Around Casing ☐ Few Cracks ☐ Ponded Water ☐ No Pad Present

WELL CONDITION:

Inner Diameter (inches): 4"
Condition: ☒ Good ☐ Broken ☐ Cracked ☐ Other (describe)
Cap present? ☒ Yes ☐ No
Well lock present? ☒ Yes ☐ No
Lock functioning properly? ☒ Yes ☐ No
Are bollards present and stable? ☒ Yes ☐ No
Well ID visible? ☒ Yes ☐ No

WELL INTEGRITY:

Bailer present? ☐ Yes ☒ No
Visual obstruction? ☐ Yes ☒ No
Is well open to completed depth? (complete when gauging) ☒ Yes ☐ No
Is silt present in well? (complete when gauging) ☒ Yes ☐ No
Is silt greater than 10% of well screen length? (complete when gauging) ☐ Yes ☒ No

COMMENTS:

01289805

WELL INSPECTION FORM

Job Name: LHAAP
Job No.: 501032
Client: Army
Site Name: 46

Well ID: LHSmw23R
Inspection Date: 2/26/24
Well Completion Depth/ Measured Depth: 43.20
Inspector: Scott Bassinger

☒ ABOVE GROUND

Well Accessible? ☒ Yes ☐ No
Protective casing? ☒ Yes ☐ No
Material: METAL
Condition: ☒ Good ☐ Broken ☐ Cracked ☐ Need Paint
Lid Condition: ☒ Good ☐ Broken ☐ Cracked
Hinge Condition: ☒ Good ☐ Less than 50% rusted ☐ More than 50% rusted

☐ FLUSH MOUNTED

Well cover present? NA ☐ Yes ☐ No
Condition: ☐ Good ☐ Broken ☐ Cracked
Condition of Sump: ☐ Clean ☐ Dry ☐ Standing Water

CONCRETE PAD:

Sloped away from casing? ☒ Yes ☐ No
Pad Area Cleared of Vegetation? ☒ Yes ☐ No
Check any of the following features that apply:
☐ Many Cracks ☐ Gap Around Casing ☐ Few Cracks ☐ Ponded Water ☐ No Pad Present

WELL CONDITION:

Inner Diameter (inches): 4"
Condition: ☒ Good ☐ Broken ☐ Cracked ☐ Other (describe)
Cap present? ☒ Yes ☐ No
Well lock present? ☒ Yes ☐ No
Lock functioning properly? ☒ Yes ☐ No
Are bollards present and stable? ☒ Yes ☐ No
Well ID visible? ☒ Yes ☐ No

WELL INTEGRITY:

Bailer present? ☐ Yes ☒ No
Visual obstruction? ☐ Yes ☒ No
Is well open to completed depth? (complete when gauging) ☒ Yes ☐ No
Is silt present in well? (complete when gauging) ☒ Yes ☐ No
Is silt greater than 10% of well screen length? (complete when gauging) ☐ Yes ☒ No

COMMENTS:

01289806

WELL INSPECTION FORM

Job Name: LHAAP
Job No.: 501032
Client: Army
Site Name: 46
Well ID: LHSmw24
Inspection Date: 2/28/24
Well Completion Depth/ Measured Depth: 28.71
Inspector: Scott Baggingbar

☒ ABOVE GROUND

Well Accessible? ☒ Yes ☐ No
Protective casing? ☒ Yes ☐ No
Material: METAL
Condition: ☒ Good ☐ Broken ☐ Cracked ☒ Need Paint
Lid Condition: ☒ Good ☐ Broken ☐ Cracked
Hinge Condition: ☒ Good ☐ Less than 50% rusted ☐ More than 50% rusted

☐ FLUSH MOUNTED

Well cover present? NA ☐ Yes ☐ No
Condition: ☐ Good ☐ Broken ☐ Cracked
Condition of Sump: ☐ Clean ☐ Dry ☐ Standing Water

CONCRETE PAD:

Sloped away from casing? ☒ Yes ☐ No
Pad Area Cleared of Vegetation? ☒ Yes ☐ No
Check any of the following features that apply:
☐ Many Cracks ☐ Gap Around Casing ☐ Few Cracks ☐ Ponded Water ☐ No Pad Present

WELL CONDITION:

Inner Diameter (inches): 4"
Condition: ☒ Good ☐ Broken ☐ Cracked ☐ Other (describe)
Cap present? ☒ Yes ☐ No
Well lock present? ☒ Yes ☐ No
Lock functioning properly? ☒ Yes ☐ No
Are bollards present and stable? ☒ Yes ☐ No
Well ID visible? ☒ Yes ☐ No

WELL INTEGRITY:

Bailer present? ☐ Yes ☒ No
Visual obstruction? ☐ Yes ☒ No
Is well open to completed depth? (complete when gauging) ☒ Yes ☐ No
Is silt present in well? (complete when gauging) ☒ Yes ☐ No
Is silt greater than 10% of well screen length? (complete when gauging) ☐ Yes ☒ No

COMMENTS:

01289807

WELL INSPECTION FORM

Job Name: LHAAP
Job No.: 501032
Client: ARMY
Site Name: 46
Well ID: LHSMW25
Inspection Date: 2/22/24
Well Completion Depth/ Measured Depth: 42.60
Inspector: Scott Buesing Geer

☒ ABOVE GROUND
Well Accessible? ☒ Yes ☐ No
Protective casing? ☒ Yes ☐ No
Material: METAL
Condition: ☒ Good ☐ Broken ☐ Cracked ☐ Need Paint
Lid Condition: ☒ Good ☐ Broken ☐ Cracked
Hinge Condition: ☒ Good ☐ Less than 50% rusted ☐ More than 50% rusted

☐ FLUSH MOUNTED
Well cover present? NA ☐ Yes ☐ No
Condition: ☐ Good ☐ Broken ☐ Cracked
Condition of Sump: ☐ Clean ☐ Dry ☐ Standing Water

CONCRETE PAD:
Sloped away from casing? ☒ Yes ☐ No
Pad Area Cleared of Vegetation? ☒ Yes ☐ No
Check any of the following features that apply:
☐ Many Cracks ☐ Gap Around Casing ☐ Few Cracks ☐ Ponded Water ☐ No Pad Present

WELL CONDITION:
Inner Diameter (inches) 4"
Condition: ☒ Good ☐ Broken ☐ Cracked ☐ Other (describe)
Cap present? ☒ Yes ☐ No
Well lock present? ☒ Yes ☐ No
Lock functioning properly? ☒ Yes ☐ No
Are bollards present and stable? ☒ Yes ☐ No
Well ID visible? ☒ Yes ☐ No

WELL INTEGRITY:
Bailer present? ☐ Yes ☒ No
Visual obstruction? ☐ Yes ☒ No
Is well open to completed depth? (complete when gauging) ☒ Yes ☐ No
Is silt present in well? (complete when gauging) ☒ Yes ☐ No
Is silt greater than 10% of well screen length? (complete when gauging) ☐ Yes ☒ No

COMMENTS:

Appendix C

Equipment Calibration and Sample Collection Logs

01289809

EQUIPMENT CALIBRATION DAILY LOG

Date: 2/22/24
Project Number: 501032
Project Name: LHAAP-46
Recorded By: Scott Bassinger

PID

Model:
Equipment ID #: Bulb: 10.6 ev

	Parameter	Standard	Exp. Date	Lot #	Morning Calibration	Evening Check	Additional Calib. Check (if necessary)
Ambient Air Calibration	Vapor conc. (ppm)	0.0 (ambient air)	NA	NA	Time: Initials: Value:	Time: Initials: Value:	Time: Initials: Value:
Second Point Calibration	Vapor conc. (ppm)	(isobutylene)			Value:	Value:	Value:

COMB. GAS/O2 METER

Model:
Equipment ID #:

	Parameter	Standard	Exp. Date	Lot #	Morning Calibration	Evening Check	Additional Calib. Check (if necessary)
First Point Calibration	O2 (%)				Time: Initials: Value:	Time: Initials: Value:	Time: Initials: Value:
	% LEL Pentane				Value:	Value:	Value:

WATER QUALITY METER

Model: U-52 HORIBA
Equipment ID #:

	Parameter	Standard	Exp. Date	Lot #	Morning Calibration Check	Evening Check (one point only)	Additional Calib. Check (if necessary)
First Point Calibration (Auto)	pH	4.00	5/24	3GE381	Time: 0600 Initials: SB Value: 4.00	Time: Initials: Value:	Time: Initials: Value:
	Conductivity (mS/cm)	4.49			Value: 4.40	Value:	Value:
	Turbidity (NTU)	0			Value: 0.0	Value:	Value:
	DO (mg/L)	8.3-8.1 (ambient air)	NA	NA	Value: 8.96	Value:	Value:
Second Point Calibration	pH	6.86			Value:	Value:	Value:
	Conductivity (mS/cm)	58.7			Value:	Value:	Value:
	Turbidity (NTU)	100			Value:	Value:	Value:
Third Point Calibration	pH	9.18			Value:	Value:	Value:
	Conductivity (mS/cm)	58.7			Value:	Value:	Value:
	Turbidity (NTU)	100			Value:	Value:	Value:

Additional Remarks:

01289810

EQUIPMENT CALIBRATION DAILY LOG

Date: 2/26/24
Project Number: 501032
Project Name: LHAAP-46
Recorded By: Scott Beasinger

PID

Model:
Equipment ID #: Bulb: 10.5 ev

	Parameter	Standard	Exp. Date	Lot #	Morning Calibration	Evening Check	Additional Calib. Check (if necessary)
Field Portable Calibration	Vapor conc. (ppm)	0.0 (ambient air)	NA	NA	Time: Initials: Value:	Time: Initials: Value:	Time: Initials: Value:
Second Point Calibration	Vapor conc. (ppm)	(isobutylene)			Value:	Value:	Value:

COMB. GAS/O2 METER

Model:
Equipment ID #:

	Parameter	Standard	Exp. Date	Lot #	Morning Calibration	Evening Check	Additional Calib. Check (if necessary)
Field Portal (Calibration)	O2 (%)				Time: Initials: Value:	Time: Initials: Value:	Time: Initials: Value:
	% LEL Pentane				Value:	Value:	Value:

WATER QUALITY METER

Model: U-52 Horiba
Equipment ID #:

	Parameter	Standard	Exp. Date	Lot #	Morning Calibration Check	Evening Check (one point only)	Additional Calib. Check (if necessary)
Field Portal Calibration (Packet)	pH	4.00	5/24	364381	Time: 0630 Initials: SB Value: 4.00	Time: Initials: Value:	Time: Initials: Value:
	Conductivity (mS/cm)	4.49			Value: 4.49	Value:	Value:
	Turbidity (NTU)	0			Value: 0.0	Value:	Value:
	DO (mg/L)	8.3-8.1 (ambient air)	NA	NA	Value: 8.97		
Second Point Calibration	pH	6.86			Value:	Value:	Value:
	Conductivity (mS/cm)	83.7			Value:	Value:	Value:
	Turbidity (NTU)	100			Value:	Value:	Value:
Field Blank Calibration	pH	6.86			Value:	Value:	Value:
	Conductivity (mS/cm)	83.7			Value:	Value:	Value:
	Turbidity (NTU)	100					

EQUIPMENT CALIBRATION DAILY LOG

Date: 3/28/24
Project Number: 501032
Project Name: LHAAP-46
Recorded By: Scott Baesingar

PID

Model:
Equipment ID #:
Bulb: 10.6 ev

Parameter	Standard	Exp. Date	Lot #	Morning Calibration	Evening Check	Additional Calib. Check (if necessary)
First Point Calibration	Vapor conc. (ppm)	0.0 (ambient air)	NA	NA	Time:	Time:	Time:
					Initials:	Initials:	Initials:
					Value:	Value:	Value:
Second Point Calibration	Vapor conc. (ppm)	(isobutylene)			Value:	Value:	Value:

COMB. GAS/O2 METER

Model:
Equipment ID #:

Parameter	Standard	Exp. Date	Lot #	Morning Calibration	Evening Check	Additional Calib. Check (if necessary)
First Point Calibration				Time:	Time:	Time:
				Initials:	Initials:	Initials:
	O2 (%)			Value:	Value:	Value:
	%LEL Pentane			Value:	Value:	Value:

WATER QUALITY METER

Model: YSI Horiba
Equipment ID #:

Parameter	Standard	Exp. Date	Lot #	Morning Calibration Check	Evening Check (one-point only)	Additional Calib. Check (if necessary)
				Time: 0650	Time:	Time:
				Initials: SB	Initials:	Initials:
First Point Calibration (Buffer)	pH	4.00	5/24	364381	Value: 4.00	Value:	Value:
	Conductivity (mS/cm)	4.49			Value: 4.49	Value:	Value:
	Turbidity (NTU)	0			Value: 8.0	Value:	Value:
	DO (mg/L)	6.9-8.1 (ambient air)	NA	NA	Value: 8.96		
Second Point Calibration	pH	6.86			Value:	Value:	Value:
	Conductivity (mS/cm)	83.7			Value:	Value:	Value:
	Turbidity (NTU)	100			Value:	Value:	Value:
Third Point Calibration	pH	9.18			Value:	Value:	Value:
	Conductivity (mS/cm)	82.7			Value:	Value:	Value:
	Turbidity (NTU)	100			Value:	Value:	Value:

APTIM

Sample Collection Log

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **46SW10**

Sampler(s): Scott Beasinger

FIELD CONDITIONS Cloudy / cool

SAMPLING INFORMATION

Sample No: 46SW10-240228 **DATE/TIME:** 2/28/24 0813 **Pump Inlet Depth:** NA

Sampling Method: GRAB **Sample Purpose: REG** **Sample Matrix: SW**

Appearance of Sample	Assoc. QC Samples	Decontamination Procedures

Chain of Custody	COC Notes	Lab	Analyses	Container	Preserv
		ALSHT	VOCs in Water by 8260C	3 x 40 mL Glass	HCL<pH2

Logged by: _____ Date: _____

QC'd by: _____ Date: _____

NO SAMPLE REQUIRED

APTIM

Sample Collection Log

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **46WW01**

Sampler(s): Scott Bassinger

FIELD CONDITIONS Cloudy / Cool

SAMPLING INFORMATION

Sample No: 46WW01-240228 **DATE/TIME:** 2/28/24 0709 **Pump Inlet Depth:** 22.07

Sampling Method: LF **Sample Purpose:** REG **Sample Matrix:** GW

Appearance of Sample	Assoc. QC Samples	Decontamination Procedures

Chain of Custody	COC Notes	Lab	Analyses	Container	Preserv
		ALSHT	VOCs in Water by 8260C	3 x 40 mL Glass	HCL<pH2

WELL AND PURGING INFORMATION

Measuring Point : Top of Casing

Purging Method/Equipment: Low flow/Bladder Pump

Casing ID (in.): 4

Purge Start Date/Time: 2/28/24 NA

Depth to Water - Initial (DTWi) (ft) Dry

Purge End Date/Time: 2/28/24 NA

Depth to Well Bottom (ft) 26.93

Discharge Tube Length: NA PID Reading: NA

Screen Interval (ft): 17.07 - 27.07

Discharge Tube Diameter: 1/4" Immiscible Layer: Y / (N)

Approximate depth of pump inlet*(ft): 22.07

Pump Start Time: NA

Ferrous Iron (Required Y or (N) _____ mg/L

2ND DTW - Dry

APTIM

Sample Collection Log

Location ID: 46WW01					Sample No: 46WW01-240228					
Date of Reading	**Time of Reading**	**Purge Rate**	**Total Purge**	**DTW**	**Cond.**	**Temp.**	**pH**	**Turbidity**	**ORP**	**DO**
		(ml/min)	**(L)**	**(ft)**	**(mS/cm)**	**(°C)**		**(NTU)**	**(mV)**	**(mg/L)**
	Purge Stabilization Criteria	-	-	Drawdown limit 0.3 ft	±10%		±0.1 units	No criteria		± 10% or 0.2 mg/L
			Dry		Well					

Logged by: _____ Date: _____

QC'd by: _____ Date: _____

APTIM

Sample Collection Log

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **46WW02**

Sampler(s): Scott Bassinger

FIELD CONDITIONS

Cloudy

SAMPLING INFORMATION

Sample No: 46WW02-240226 **DATE/TIME:** 2/26/24 0736 **Pump Inlet Depth:** 43.05

Sampling Method: LF **Sample Purpose:** REG **Sample Matrix:** GW

Appearance of Sample	Assoc. QC Samples	Decontamination Procedures

Chain of Custody	COC Notes	Lab	Analyses	Container	Preserv
		ALSHT	Anions (chloride/nitrate/sulfate) in Water by SW9056	1 x 125 mL HPDE	Cool 4C
		ALSHT	Carbon Dioxide in Water by RSK175	3 x 40 mL Glass	Cool 4C
		ALSHT	Dissolved Gases in Water by RSK175	3 x 40 mL Glass	HCL<pH2
		ALSHT	TOC in Water by SM5310B	2 x 40 mL Amber	H2SO4
		ALSHT	VOCs in Water by 8260C	3 x 40 mL Glass	HCL<pH2

WELL AND PURGING INFORMATION

Measuring Point : Top of Casing

Purging Method/Equipment: Low flow/Bladder Pump

Casing ID (in.): 4

Purge Start Date/Time: 2/26/24 0745

Depth to Water - Initial (DTWi) (ft) 39.83

Purge End Date/Time: 2/26/24 0815

Depth to Well Bottom (ft) ~~48~~ 47.63

Discharge Tube Length: NA

PID Reading: NA

Screen Interval (ft): 38.05 - 48.05

Discharge Tube Diameter: 1/4"

Immiscible Layer: Y / (N)

Approximate depth of pump inlet*(ft): ~~48~~ 43.05

Pump Start Time: 0745

Ferrous Iron (Required) (Y) or N) 0.67 mg/L

2ND DTW - 39.83

APTIM

Sample Collection Log

Location ID: 46WW02		Sample No: 46WW02-2402 26								
Date of Reading	Time of Reading	Purge Rate	Total Purge	DTW	Cond.	Temp.	pH	Turbidity	ORP	DO
		(ml/min)	(L)	(ft)	(mS/cm)	(°C)		(NTU)	(mV)	(mg/L)
	Purge Stabilization Criteria	-	-	Drawdown limit 0.3 ft	±10%		±0.1 units	No criteria		± 10% or 0.2 mg/L
2/26/24	0750	100	.5	39.90	0.451	17.48	6.49	5.7	160	0.88
	0755	100	1.0	39.96	0.447	17.69	5.01	5.0	215	0.60
	0800	100	1.5	40.00	0.448	17.88	4.89	3.9	240	0.49
	0805	100	2.0	40.02	0.448	17.93	4.88	3.4	241	0.48
	0810	100	2.5	40.04	0.449	17.97	4.87	2.8	242	0.47
↓	0815	100	3.0	40.06	0.449	18.01	4.87	2.4	243	0.46

Logged by: _____ Date: _____

QC'd by: _____ Date: _____

APTIM

Sample Collection Log

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **46WW02**

Sampler(s): Scott Beesinger

FIELD CONDITIONS Cloudy

SAMPLING INFORMATION

Sample No: 46WW02-240226-MS **DATE/TIME:** 2/26/24 0736 **Pump Inlet Depth:** 43.05

Sampling Method: LF **Sample Purpose:** MS **Sample Matrix:** GW

Appearance of Sample	Assoc. QC Samples	Decontamination Procedures

Chain of Custody	COC Notes	Lab	Analyses	Container	Preserv
		ALSHT	Anions (chloride/nitrate/sulfate) in Water by SW9056	1 x 125 mL HPDE	Cool 4C
		ALSHT	Carbon Dioxide in Water by RSK175	3 x 40 mL Glass	Cool 4C
		ALSHT	Dissolved Gases in Water by RSK175	3 x 40 mL Glass	HCL<pH2
		ALSHT	TOC in Water by SM5310B	2 x 40 mL Amber	H2SO4
		ALSHT	VOCs in Water by 8260C	3 x 40 mL Glass	HCL<pH2

WELL AND PURGING INFORMATION

Measuring Point : Top of Casing

Purging Method/Equipment: Low flow/Bladder Pump

Casing ID (in.): 4

Purge Start Date/Time: 2/26/24 0745

Depth to Water - Initial (DTWi) (ft) 39.83

Purge End Date/Time: 2/26/24 0815

Depth to Well Bottom (ft) ~~48~~ 47.63

Discharge Tube Length: NA PID Reading: NA

Screen Interval (ft): 38.05 - 48.05

Discharge Tube Diameter: 1/4" Immiscible Layer: Y / (N)

Approximate depth of pump inlet*(ft): ~~48~~ 43.05

Pump Start Time: 0745

Ferrous Iron (Required (Y) or N) 0.67 mg/L

2ND DTW - 39.83

APTIM

Sample Collection Log

Location ID: 46WW02				Sample No: 46WW02-240226-MS						
Date of Reading	Time of Reading	Purge Rate	Total Purge	DTW	Cond.	Temp.	pH	Turbidity	ORP	DO
		(ml/min)	(L)	(ft)	(mS/cm)	(°C)		(NTU)	(mV)	(mg/L)
	Purge Stabilization Criteria	-	-	Drawdown limit 0.3 ft	±10%		±0.1 units	No criteria		± 10% or 0.2 mg/L
2/26/24	0750	100	.5	39.90	0.451	17.48	6.49	5.7	160	0.88
	0755	100	1.0	39.96	0.447	17.69	5.01	5.0	215	0.60
	0800	100	1.5	40.00	0.448	17.88	4.89	3.9	240	0.49
	0805	100	2.0	40.02	0.448	17.93	4.87	3.4	241	0.48
	0810	100	2.5	40.04	0.449	17.97	4.86	2.8	242	0.47
↓	0815	100	3.0	40.06	0.449	18.01	4.86	2.4	243	0.46

Logged by: _____ Date: _____

QC'd by: _____ Date: _____

APTIM

Sample Collection Log

Project Name: **Longhorn AAP**

Location ID: **46WW02**

Project No: **501032**

Sampler(s): Scott Beesinger

FIELD CONDITIONS Cloudy

SAMPLING INFORMATION

Sample No: 46WW02-2402 26-MSD **DATE/TIME:** 2/26/24 0736 **Pump Inlet Depth:** 43.05

Sampling Method: LF **Sample Purpose:** MSD **Sample Matrix:** GW

Appearance of Sample	Assoc. QC Samples	Decontamination Procedures

Chain of Custody	COC Notes	Lab	Analyses	Container	Preserv
		ALSHT	Anions (chloride/nitrate/sulfate) in Water by SW9056	1 x 125 mL HPDE	Cool 4C
		ALSHT	Carbon Dioxide in Water by RSK175	3 x 40 mL Glass	Cool 4C
		ALSHT	Dissolved Gases in Water by RSK175	3 x 40 mL Glass	HCL<pH2
		ALSHT	TOC in Water by SM5310B	2 x 40 mL Amber	H2SO4
		ALSHT	VOCs in Water by 8260C	3 x 40 mL Glass	HCL<pH2

WELL AND PURGING INFORMATION

Measuring Point : Top of Casing

Purging Method/Equipment: Low flow/Bladder Pump

Casing ID (in.): 4

Purge Start Date/Time: 2/26/24 0745

Depth to Water - Initial (DTWi) (ft) 39.83

Purge End Date/Time: 2/26/24 0815

Depth to Well Bottom (ft) ~~45~~ 47.63

Discharge Tube Length: NA PID Reading: NA

Screen Interval (ft): 38.05 - 48.05

Discharge Tube Diameter: 1/4" Immiscible Layer: Y / (N)

Approximate depth of pump inlet*(ft): ~~40~~ 43.05

Pump Start Time: 0745

Ferrous Iron (Required (Y) or N) 0.67 mg/L

2ND DTW - 39.83

APTIM

Sample Collection Log

Location ID: 46WW02 **Sample No: 46WW02-240226-MSD**

Date of Reading	Time of Reading	Purge Rate	Total Purge	DTW	Cond.	Temp.	pH	Turbidity	ORP	DO
		(ml/min)	(L)	(ft)	(mS/cm)	(°C)		(NTU)	(mV)	(mg/L)
	Purge Stabilization Criteria	-	-	Drawdown limit 0.3 ft	±10%		±0.1 units	No criteria		± 10% or 0.2 mg/L
2/26/24	0750	100	.5	39.90	0.451	17.48	6.49	5.7	160	0.88
	0755	100	1.0	39.96	0.447	17.69	5.01	5.0	215	0.60
	0800	100	1.5	40.00	0.448	17.88	4.89	3.9	240	0.49
	0805	100	2.0	40.02	0.448	17.93	4.88	3.4	241	0.48
	0810	100	2.5	40.04	0.449	17.97	4.87	2.8	242	0.47
↓	0815	100	3.0	40.06	0.449	18.01	4.87	2.4	243	0.46

Logged by: _____ Date: _____

QC'd by: _____ Date: _____

Sample Collection Log

APTIM

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **46WW03**

Sampler(s): Scott Beesinger

FIELD CONDITIONS Cloudy

SAMPLING INFORMATION

Sample No: 46WW03-240226 **DATE/TIME:** 2/26/24 0646 **Pump Inlet Depth:** 97.67

Sampling Method: LF **Sample Purpose:** REG **Sample Matrix:** GW

Appearance of Sample	Assoc. QC Samples	Decontamination Procedures

Chain of Custody	COC Notes	Lab	Analyses	Container	Preserv
		ALSHT	VOCs in Water by 8260C	3 x 40 mL Glass	HCL<pH2

WELL AND PURGING INFORMATION

Measuring Point : Top of Casing

Casing ID (in.): 4

Depth to Water - Initial (DTWi) (ft) 43.70

Depth to Well Bottom (ft) 103.46

Screen Interval (ft): 92.67 - 102.67

Approximate depth of pump inlet*(ft): 97.67

Ferrous Iron (Required Y or N) _____ mg/L

Purging Method/Equipment: Low flow/Bladder Pump

Purge Start Date/Time: 2/26/24 0700

Purge End Date/Time: 2/26/24 0730

Discharge Tube Length: NA PID Reading: NA

Discharge Tube Diameter: 1/4" Immiscible Layer: Y / N

Pump Start Time: 0700

2ND DTW - 43.70

APTIM

Sample Collection Log

Location ID: 46WW03 **Sample No: 46WW03-240226**

Date of Reading	Time of Reading	Purge Rate	Total Purge	DTW	Cond.	Temp.	pH	Turbidity	ORP	DO
		(ml/min)	(L)	(ft)	(mS/cm)	(°C)		(NTU)	(mV)	(mg/L)
	Purge Stabilization Criteria	-	-	Drawdown limit 0.3 ft	±10%		±0.1 units	No criteria		± 10% or 0.2 mg/L
2/26/24	0705	100	.5	43.76	0.526	19.4	7.21	13.2	154	0.89
	0710	100	1.0	43.80	0.529	18.21	7.23	10.8	174	0.67
	0715	100	1.5	43.83	0.525	18.07	7.32	9.9	159	0.55
	0720	100	2.0	43.82	0.524	18.01	7.34	9.7	157	0.54
	0725	100	2.5	43.84	0.524	17.96	7.35	9.4	156	0.53
↓	0730	100	3.0	43.85	0.524	17.91	7.36	9.2	154	0.53

Logged by: _____ Date: _____

QC'd by: _____ Date: _____

APTIM

Sample Collection Log

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **46WW04**

Sampler(s): Scott Beesinger

FIELD CONDITIONS Cloudy / cool

SAMPLING INFORMATION

Sample No: 46WW04-2402 28 **DATE/TIME:** 2/28/24 0731 **Pump Inlet Depth:** 21.92

Sampling Method: LF **Sample Purpose:** REG **Sample Matrix:** GW

Appearance of Sample | **Assoc. QC Samples** | **Decontamination Procedures**

Chain of Custody	COC Notes	Lab	Analyses	Container	Preserv
		ALSHT	VOCs in Water by 8260C	3 x 40 mL Glass	HCL<pH2

WELL AND PURGING INFORMATION

Measuring Point : Top of Casing

Purging Method/Equipment: Low flow/Bladder Pump

Casing ID (in.): 4

Purge Start Date/Time: 2/28/24 NA

Depth to Water - Initial (DTWi) (ft) Dry

Purge End Date/Time: 2/28/24 NA

Depth to Well Bottom (ft) 24 26.92

Discharge Tube Length: NA PID Reading: NA

Screen Interval (ft): 16.92 - 26.92

Discharge Tube Diameter: 1/4" Immiscible Layer: Y (N)

Approximate depth of pump inlet*(ft): ~~19~~ 21.92

Pump Start Time: NA

Ferrous Iron (Required Y or N) _____ mg/L

2ND DTW- Dry

APTIM

Sample Collection Log

Location ID: 46WW04				Sample No: 46WW04-2402 ZB						
Date of Reading	Time of Reading	Purge Rate	Total Purge	DTW	Cond.	Temp.	pH	Turbidity	ORP	DO
		(ml/min)	(L)	(ft)	(mS/cm)	(°C)		(NTU)	(mV)	(mg/L)
	Purge Stabilization Criteria	-	-	Drawdown limit 0.3 ft	±10%		±0.1 units	No criteria		± 10% or 0.2 mg/L
		Dry Well								

Logged by: _____ Date: _____

QC'd by: _____ Date: _____

APTIM

Sample Collection Log

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **46WW05**

Sampler(s): Scott Baggenstoss

FIELD CONDITIONS CLEAR / SUNNY

SAMPLING INFORMATION

Sample No: 46WW05-2402 26 **DATE/TIME:** 2/26/24 1043 **Pump Inlet Depth:** 41.65

Sampling Method: LF **Sample Purpose:** REG **Sample Matrix:** GW

Appearance of Sample	Assoc. QC Samples	Decontamination Procedures

Chain of Custody	COC Notes	Lab	Analyses	Container	Preserv
		ALSHT	Anions (chloride/nitrate/sulfate) in Water by SW9056	1 x 125 mL HPDE	Cool 4C
		ALSHT	Carbon Dioxide in Water by RSK175	3 x 40 mL Glass	Cool 4C
		ALSHT	Dissolved Gases in Water by RSK175	3 x 40 mL Glass	HCL<pH2
		ALSHT	TOC in Water by SM5310B	2 x 40 mL Amber	H2SO4
		ALSHT	VOCs in Water by 8260C	3 x 40 mL Glass	HCL<pH2

WELL AND PURGING INFORMATION

Measuring Point : Top of Casing

Purging Method/Equipment: Low flow / BLADDER Pump

Casing ID (in.): 4

Depth to Water - Initial (DTWi) (ft) ~~39.96~~ 39.96

Purge Start Date/Time: 2/26/24 1050

Depth to Well Bottom (ft) ~~46.28~~ 46.47

Purge End Date/Time: 2/26/24 1120

Discharge Tube Length: NA

PID Reading: NA

Screen Interval (ft): 36.65 - 46.65

Discharge Tube Diameter: 1/4"

Immiscible Layer: Y / (N)

Approximate depth of pump inlet*(ft): ~~39~~ 41.65

Pump Start Time: 1050

Ferrous Iron (Required (Y) or N) 3.21 mg/L

2nd DTW - ~~39.96~~ 39.96

APTIM

Sample Collection Log

Location ID: 46WW05				Sample No: 46WW05-2402_26						
Date of Reading	Time of Reading	Purge Rate	Total Purge	DTW	Cond.	Temp.	pH	Turbidity	ORP	DO
		(ml/min)	(L)	(ft)	(mS/cm)	(°C)		(NTU)	(mV)	(mg/L)
	Purge Stabilization Criteria	-	-	Drawdown limit 0.3 ft	±10%		±0.1 units	No criteria		± 10% or 0.2 mg/L
2/26/24	1055	100	.5	40.03	5.79	23.81	6.15	12.1	83	0.95
	1100	100	1.0	40.09	5.95	23.00	5.21	10.7	170	0.70
	1105	100	1.5	40.12	6.07	22.95	4.85	9.5	201	0.57
	1110	100	2.0	40.15	6.08	22.90	4.83	8.8	203	0.56
	1115	100	2.5	40.18	6.09	22.86	4.81	8.3	205	0.55
↓	1120	100	3.0	40.20	6.09	22.82	4.80	7.9	206	0.54

Logged by: _____ Date: _____

QC'd by: _____ Date: _____

APTIM

Sample Collection Log

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **46WW06**

Sampler(s): Scott Beesinger

FIELD CONDITIONS Clear/Sunny

SAMPLING INFORMATION

Sample No: 46WW06-240226 **DATE/TIME:** 2/26/24 0835 **Pump Inlet Depth:** 45.60

Sampling Method: LF **Sample Purpose:** REG **Sample Matrix:** GW

Appearance of Sample	Assoc. QC Samples	Decontamination Procedures

Chain of Custody	COC Notes	Lab	Analyses	Container	Preserv
		ALSHT	VOCs in Water by 8260C	3 x 40 mL Glass	HCL<pH2

WELL AND PURGING INFORMATION

Measuring Point : Top of Casing

Casing ID (in.): 4

Depth to Water - Initial (DTWi) (ft) 43.63

Depth to Well Bottom (ft) ~~58.70~~

Screen Interval (ft): 40.60-50.60

Approximate depth of pump inlet*(ft): ~~45.60~~

Ferrous Iron (Required Y or (N) _____ mg/L

Purging Method/Equipment: Low flow/Bladder Pump

Purge Start Date/Time: 2/26/24 0845

Purge End Date/Time: 2/26/24 0915

Discharge Tube Length: NA PID Reading: NA

Discharge Tube Diameter: 1/4" Immiscible Layer: Y /(N)

Pump Start Time: 0845

2ND DTW- 43.63

APTIM

Sample Collection Log

Location ID: 46WW06				Sample No: 46WW06-240226						
Date of Reading	Time of Reading	Purge Rate	Total Purge	DTW	Cond.	Temp.	pH	Turbidity	ORP	DO
		(ml/min)	(L)	(ft)	(mS/cm)	(°C)		(NTU)	(mV)	(mg/L)
	Purge Stabilization Criteria	-	-	Drawdown limit 0.3 ft	±10%		±0.1 units	No criteria		± 10% or 0.2 mg/L
2/26/24	0850	100	.5	43.70	1.38	18.21	5.85	188	39	0.73
	0855	100	1.0	43.76	1.42	18.33	5.97	167	-2	0.39
	0900	100	1.5	43.80	1.51	18.51	5.97	163	-12	0.28
	0905	100	2.0	43.82	1.52	18.56	5.96	162	-12	0.27
	0910	100	2.5	43.84	1.53	18.62	5.96	161	-13	0.27
	0915	100	3.0	43.85	1.54	18.68	5.96	161	-13	0.26

Logged by: _____ Date: _____

QC'd by: _____ Date: _____

APTIM

Sample Collection Log

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **46WW07**

Sampler(s): Scott Beesinger

FIELD CONDITIONS Cloudy

SAMPLING INFORMATION

Sample No: 46WW07-240222 **DATE/TIME:** 2/22/24 0838 **Pump Inlet Depth:** 46.25

Sampling Method: LF **Sample Purpose:** REG **Sample Matrix:** GW

Appearance of Sample	Assoc. QC Samples	Decontamination Procedures

Chain of Custody	COC Notes	Lab	Analyses	Container	Preserv
		ALSHT	VOCs in Water by 8260C	3 x 40 mL Glass	HCL<pH2

WELL AND PURGING INFORMATION

Measuring Point : Top of Casing

Purging Method/Equipment: Low flow/Bladder Pump

Casing ID (in.): 4

Purge Start Date/Time: 2/22/24 0845

Depth to Water - Initial (DTWi) (ft) 38.48

Purge End Date/Time: 2/22/24 0915

Depth to Well Bottom (ft) ~~49~~ 51.67

Discharge Tube Length: NA PID Reading: NA

Screen Interval (ft): 41.50 - 51.00

Discharge Tube Diameter: 1/4" Immiscible Layer: Y /(N)

Approximate depth of pump inlet*(ft): ~~43.75~~ 46.25

Pump Start Time: 0845

Ferrous Iron (Required Y or (N)) _____ mg/L

2ND DTW- 38.48

APTIM

Sample Collection Log

Location ID: 46WW07				Sample No: 46WW07-240222						
Date of Reading	**Time of Reading**	**Purge Rate**	**Total Purge**	**DTW**	**Cond.**	**Temp.**	**pH**	**Turbidity**	**ORP**	**DO**
		(ml/min)	**(L)**	**(ft)**	**(mS/cm)**	**(°C)**		**(NTU)**	**(mV)**	**(mg/L)**
	Purge Stabilization Criteria	-	-	Drawdown limit 0.3 ft	±10%		±0.1 units	No criteria		± 10% or 0.2 mg/L
2/22/24	0850	100	.5	38.56	0.604	17.53	7.02	6.9	131	6.07
	0855	100	1.0	38.62	0.512	17.57	6.85	3.8	144	5.85
	0900	100	1.5	38.66	0.448	17.81	6.64	2.1	157	5.77
	0905	100	2.0	38.68	0.447	17.86	6.62	1.4	158	5.75
	0910	100	2.5	38.70	0.447	17.90	6.60	0.8	158	5.73
↓	0915	100	3.0	38.72	0.447	17.93	6.59	0.4	159	5.72

Logged by: _____ Date: _____

QC'd by: _____ Date: _____

APTIM

Sample Collection Log

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **46WW08**

Sampler(s): Scott Baessinger

FIELD CONDITIONS CLEAR/SUNNY

SAMPLING INFORMATION

Sample No: 46WW08-240226 **DATE/TIME:** 2/26/24 0921 **Pump Inlet Depth:** 40.47

Sampling Method: LF **Sample Purpose:** REG **Sample Matrix:** GW

Appearance of Sample	Assoc. QC Samples	Decontamination Procedures

Chain of Custody	COC Notes	Lab	Analyses	Container	Preserv
		ALSHT	VOCs in Water by 8260C	3 x 40 mL Glass	HCL<pH2

WELL AND PURGING INFORMATION

Measuring Point : Top of Casing

Purging Method/Equipment: Low flow/Bladder Pump

Casing ID (in.): 4

Purge Start Date/Time: 2/26/24 0925

Depth to Water - Initial (DTWi) (ft) 23.15

Purge End Date/Time: 2/26/24 0955

Depth to Well Bottom (ft) ~~43.5~~ 45.31

Discharge Tube Length: NA

PID Reading: NA

Screen Interval (ft): 35.72 - 45.22

Discharge Tube Diameter: 1/4"

Immiscible Layer: Y (N)

Approximate depth of pump inlet*(ft): ~~39.5~~ 40.47

Pump Start Time: 0925

Ferrous Iron (Required Y or (N)) _____ mg/L

2ND DTW - 23.15

APTIM

Sample Collection Log

Location ID: 46WW08		Sample No: 46WW08-2402 26								
Date of Reading	Time of Reading	Purge Rate	Total Purge	DTW	Cond.	Temp.	pH	Turbidity	ORP	DO
		(ml/min)	(L)	(ft)	(mS/cm)	(°C)		(NTU)	(mV)	(mg/L)
	Purge Stabilization Criteria	-	-	Drawdown limit 0.3 ft	±10%		±0.1 units	No criteria		± 10% or 0.2 mg/L
2/26/24	0930	100	.5	23.22	3.52	19.34	6.59	36.5	-18	0.91
	0935	100	1.0	23.28	5.00	19.88	6.27	29.9	-21	0.62
	0940	100	1.5	23.32	5.30	20.18	6.13	25.8	-25	0.48
	0945	100	2.0	23.35	5.31	20.24	6.11	25.3	-25	0.47
	0950	100	2.5	23.37	5.32	20.28	6.10	24.6	-26	0.46
	0955	100	3.0	23.39	5.33	20.32	6.09	24.1	-26	0.45

Logged by: _____ Date: _____

QC'd by: _____ Date: _____

APTIM

Sample Collection Log

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **46WW09**

Sampler(s): Scott Beesing 42

FIELD CONDITIONS

Cloudy

SAMPLING INFORMATION

Sample No: 46WW09-240222 **DATE/TIME:** 2/22/24 0748 **Pump Inlet Depth:** ~~40.25~~ 40.75

Sampling Method: LF **Sample Purpose:** REG **Sample Matrix:** GW

Appearance of Sample | **Assoc. QC Samples** | **Decontamination Procedures**

Chain of Custody	COC Notes	Lab	Analyses	Container	Preserv
		ALSHT	Anions (chloride/nitrate/sulfate) in Water by SW9056	1 x 125 mL HPDE	Cool 4C
		ALSHT	Carbon Dioxide in Water by RSK175	3 x 40 mL Glass	Cool 4C
		ALSHT	Dissolved Gases in Water by RSK175	3 x 40 mL Glass	HCL<pH2
		ALSHT	TOC in Water by SM5310B	2 x 40 mL Amber	H2SO4
		ALSHT	VOCs in Water by 8260C	3 x 40 mL Glass	HCL<pH2

WELL AND PURGING INFORMATION

Measuring Point : Top of Casing

Casing ID (in.): 4

Depth to Water - Initial (DTWi) (ft) 40.37

Depth to Well Bottom (ft) ~~39~~ 42.25

Screen Interval (ft): 31.48 - 40.48

Approximate depth of pump inlet*(ft): ~~39.25~~ ~~40.25~~ 40.75

Ferrous Iron (Required Y or N) 1.46 mg/L

Purging Method/Equipment: Low flow/Bladder Pump

Purge Start Date/Time: 2/22/24 0755

Purge End Date/Time: 2/22/24 0825

Discharge Tube Length: NA PID Reading: NA

Discharge Tube Diameter: 1/4" Immiscible Layer: Y / N

Pump Start Time: 0755

2nd DTW - 40.37

APTIM

Sample Collection Log

Location ID: 46WW09		Sample No: 46WW09-240222								
Date of Reading	Time of Reading	Purge Rate	Total Purge	DTW	Cond.	Temp.	pH	Turbidity	ORP	DO
		(ml/min)	(L)	(ft)	(mS/cm)	(°C)		(NTU)	(mV)	(mg/L)
	Purge Stabilization Criteria	-	-	Drawdown limit 0.3 ft	±10%		±0.1 units	No criteria		± 10% or 0.2 mg/L
2/22/24	0800	100	.5	40.45	3.30	17.42	6.07	109	102	5.72
	0805	100	1.0	40.51	3.28	17.50	6.27	99.7	112	5.59
	0810	100	1.5	40.55	3.38	17.60	6.35	90.7	135	5.53
	0815	100	2.0	40.58	3.39	17.64	6.36	90.4	137	5.51
	0820	100	2.5	40.61	3.40	17.68	6.37	89.5	138	5.49
	0825	100	3.0	40.64	3.40	17.72	6.37	89.0	139	5.48

Logged by: _____ Date: _____

QC'd by: _____ Date: _____

APTIM

Sample Collection Log

Project Name: **Longhorn AAP**

Location ID: **46WW09**

Project No: **501032**

Sampler(s): Scott Bassinger

FIELD CONDITIONS

Cloudy

SAMPLING INFORMATION

Sample No: 46WW09-240222-FD **DATE/TIME:** 2/22/24 0748 **Pump Inlet Depth:** 40.75

Sampling Method: LF **Sample Purpose:** FD **Sample Matrix:** GW

Appearance of Sample | **Assoc. QC Samples** | **Decontamination Procedures**

Chain of Custody	COC Notes	Lab	Analyses	Container	Preserv
		ALSHT	Anions (chloride/nitrate/sulfate) in Water by SW9056	1 x 125 mL HPDE	Cool 4C
		ALSHT	Carbon Dioxide in Water by RSK175	3 x 40 mL Glass	Cool 4C
		ALSHT	Dissolved Gases in Water by RSK175	3 x 40 mL Glass	HCL<pH2
		ALSHT	TOC in Water by SM5310B	2 x 40 mL Amber	H2SO4
		ALSHT	VOCs in Water by 8260C	3 x 40 mL Glass	HCL<pH2

WELL AND PURGING INFORMATION

Measuring Point : Top of Casing

Purging Method/Equipment: Low flow/Bladder Pump

Casing ID (in.): 4

Purge Start Date/Time: 2/22/24 0755

Depth to Water - Initial (DTWi) (ft) 40.37

Purge End Date/Time: 2/22/24 0825

Depth to Well Bottom (ft) 42.25

Discharge Tube Length: NA

PID Reading: NA

Screen Interval (ft): 31.48 - 40.98

Discharge Tube Diameter: 1/4"

Immiscible Layer: Y / (N)

Approximate depth of pump inlet*(ft): ~~39.75~~ 40.75

Pump Start Time: 0755

Ferrous Iron (Required (Y) or N) 1.46 mg/L

2ND DTW - 40.37

APTIM

Sample Collection Log

Location ID: 46WW09		Sample No: 46WW09-2402~~22~~-FD								
Date of Reading	**Time of Reading**	**Purge Rate**	**Total Purge**	**DTW**	**Cond.**	**Temp.**	**pH**	**Turbidity**	**ORP**	**DO**
		(ml/min)	**(L)**	**(ft)**	**(mS/cm)**	**(°C)**		**(NTU)**	**(mV)**	**(mg/L)**
	Purge Stabilization Criteria	-	-	Drawdown limit 0.3 ft	±10%		±0.1 units	No criteria		± 10% or 0.2 mg/L
2/22/24	0800	100	.5	40.45	3.30	17.42	6.07	109	102	5.72
	0805	100	1.0	40.51	3.28	17.50	6.27	99.7	112	5.54
	0810	100	1.5	40.55	3.38	17.60	6.35	90.7	135	5.53
	0815	100	2.0	40.58	3.39	17.64	6.36	90.4	137	5.51
	0820	100	2.5	40.61	3.40	17.68	6.37	89.5	138	5.49
↓	0825	100	3.0	40.64	3.40	17.72	6.37	89.0	139	5.48

Logged by: _____ Date: _____

QC'd by: _____ Date: _____

APTIM

Sample Collection Log

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **46WW10**

Sampler(s): Scott Beesinger

FIELD CONDITIONS

Cloudy / cool

SAMPLING INFORMATION

Sample No: 46WW10-2402 28 **DATE/TIME:** 2/28/24 0736 **Pump Inlet Depth:** 18.94

Sampling Method: LF **Sample Purpose:** REG **Sample Matrix:** GW

Appearance of Sample	Assoc. QC Samples	Decontamination Procedures

Chain of Custody	COC Notes	Lab	Analyses	Container	Preserv
		ALSHT	VOCs in Water by 8260C	3 x 40 mL Glass	HCL<pH2

WELL AND PURGING INFORMATION

Measuring Point : Top of Casing

Casing ID (in.): 4

Depth to Water - Initial (DTWi) (ft) DRY

Depth to Well Bottom (ft) ~~24.00~~ 25.33

Screen Interval (ft): 14.19 - 23.69

Approximate depth of pump inlet*(ft): ~~16.00~~ 18.94

Ferrous Iron (Required Y or (N) _____ mg/L

Purging Method/Equipment: Low Flow/Bladder Pump

Purge Start Date/Time: 2/28/24 NA

Purge End Date/Time: 2/28/24 NA

Discharge Tube Length: NA PID Reading: NA

Discharge Tube Diameter: 1/4" Immiscible Layer: Y / (N)

Pump Start Time: NA

2ND DTW - DRY

APTIM

Sample Collection Log

Location ID: 46WW10				Sample No: 46WW10-240228						
Date of Reading	**Time of Reading**	**Purge Rate**	**Total Purge**	**DTW**	**Cond.**	**Temp.**	**pH**	**Turbidity**	**ORP**	**DO**
		(ml/min)	**(L)**	**(ft)**	**(mS/cm)**	**(°C)**		**(NTU)**	**(mV)**	**(mg/L)**
	Purge Stabilization Criteria	-	-	Drawdown limit 0.3 ft	±10%		±0.1 units	No criteria		± 10% or 0.2 mg/L
			Dry Well							

Logged by: _____ Date: _____

QC'd by: _____ Date: _____

APTIM

Sample Collection Log

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **46WW11**

Sampler(s): Scott Beesinger

FIELD CONDITIONS Cloudy

SAMPLING INFORMATION

Sample No: 46WW11-240222 **DATE/TIME:** 2/22/24 0706 **Pump Inlet Depth:** 27.75

Sampling Method: LF **Sample Purpose:** REG **Sample Matrix:** GW

Appearance of Sample | **Assoc. QC Samples** | **Decontamination Procedures**

Chain of Custody	COC Notes	Lab	Analyses	Container	Preserv
		ALSHT	Anions (chloride/nitrate/sulfate) in Water by SW9056	1 x 125 mL HPDE	Cool 4C
		ALSHT	Carbon Dioxide in Water by RSK175	3 x 40 mL Glass	Cool 4C
		ALSHT	Dissolved Gases in Water by RSK175	3 x 40 mL Glass	HCL<pH2
		ALSHT	TOC in Water by SM5310B	2 x 40 mL Amber	H2SO4
		ALSHT	VOCs in Water by 8260C	3 x 40 mL Glass	HCL<pH2

WELL AND PURGING INFORMATION

Measuring Point : Top of Casing

Purging Method/Equipment: Low Flow/Bladder Pump

Casing ID (in.): 2

Purge Start Date/Time: 2/22/24 0710

Depth to Water - Initial (DTWi) (ft) 27.00

Purge End Date/Time: 2/22/24 0740

Depth to Well Bottom (ft) ~~32~~ 32.40

Discharge Tube Length: NA PID Reading: NA

Screen Interval (ft): 22.25-32.25

Discharge Tube Diameter: 1/4" Immiscible Layer: Y (N)

Approximate depth of pump inlet*(ft): ~~25~~ ~~27.75~~ 27.75 Pump Start Time: 0710

Ferrous Iron (Required (Y) or N) 0.33 mg/L

2ND DTW - 27.00

APTIM

Sample Collection Log

Location ID: 46WW11										Sample No: 46WW11-240222
Date of Reading	**Time of Reading**	**Purge Rate**	**Total Purge**	**DTW**	**Cond.**	**Temp.**	**pH**	**Turbidity**	**ORP**	**DO**
		(ml/min)	**(L)**	**(ft)**	**(mS/cm)**	**(°C)**		**(NTU)**	**(mV)**	**(mg/L)**
	Purge Stabilization Criteria	-	-	Drawdown limit 0.3 ft	±10%		±0.1 units	No criteria		± 10% or 0.2 mg/L
2/22/24	0715	100	.5	27.07	1.05	18.28	6.87	5.8	~~45~~	1.83
	0720	100	1.0	27.15	0.739	18.12	5.62	~~3~~.9	~~8~~0	1.60
	0725	100	1.5	27.20	0.692	18.10	5.20	3.4	97	1.48
	0730	100	2.0	27.23	0.692	18.07	5.19	3.0	98	1.46
	0735	100	2.5	27.26	0.691	18.05	5.19	2.6	99	1.44
↓	0740	100	3.0	27.29	0.691	18.03	5.18	2.1	101	1.42

Logged by: _____ Date: _____

QC'd by: _____ Date: _____

APTIM

Sample Collection Log

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **46WW12**

Sampler(s): Scott Beesinger

FIELD CONDITIONS Cloudy/cool

SAMPLING INFORMATION

Sample No: 46WW12-240228 **DATE/TIME:** 2/28/24 0745 **Pump Inlet Depth:** 23.75

Sampling Method: LF **Sample Purpose:** REG **Sample Matrix:** GW

Appearance of Sample	Assoc. QC Samples	Decontamination Procedures

Chain of Custody	COC Notes	Lab	Analyses	Container	Preserv
		ALSHT	VOCs in Water by 8260C	3 x 40 mL Glass	HCL<pH2

WELL AND PURGING INFORMATION

Measuring Point : Top of Casing

Casing ID (in.): 4

Depth to Water - Initial (DTWi) (ft) DRY

Depth to Well Bottom (ft) ~~28.00~~ 29.43

Screen Interval (ft): 18.97-28.47

Approximate depth of pump inlet*(ft): ~~24.25~~ 23.75

Ferrous Iron (Required Y or N) _____ mg/L

Purging Method/Equipment: Low flow/Bladder Pump

Purge Start Date/Time: 2/28/24 NA

Purge End Date/Time: 2/28/24 NA

Discharge Tube Length: NA PID Reading: NA

Discharge Tube Diameter: 1/4" Immiscible Layer: Y / N

Pump Start Time: NA

2ND DTW- DRY

APTIM

Sample Collection Log

Location ID: 46WW12				Sample No: 46WW12-240228						
Date of Reading	**Time of Reading**	**Purge Rate**	**Total Purge**	**DTW**	**Cond.**	**Temp.**	**pH**	**Turbidity**	**ORP**	**DO**
		(ml/min)	**(L)**	**(ft)**	**(mS/cm)**	**(°C)**		**(NTU)**	**(mV)**	**(mg/L)**
	Purge Stabilization Criteria	-	-	Drawdown limit 0.3 ft	±10%		±0.1 units	No criteria		± 10% or 0.2 mg/L
			DRY		WELL					

Logged by: _____ Date: _____

QC'd by: _____ Date: _____

APTIM

Sample Collection Log

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **46WW13**

Sampler(s): Scott Baggenbar

FIELD CONDITIONS Cloudy / Cool

SAMPLING INFORMATION

Sample No: 46WW13-240228 **DATE/TIME:** 2/28/24 0750 **Pump Inlet Depth:** 26.17

Sampling Method: LF **Sample Purpose:** REG **Sample Matrix:** GW

Appearance of Sample	Assoc. QC Samples	Decontamination Procedures

Chain of Custody	COC Notes	Lab	Analyses	Container	Preserv
		ALSHT	VOCs in Water by 8260C	3 x 40 mL Glass	HCL<pH2

WELL AND PURGING INFORMATION

Measuring Point : Top of Casing

Purging Method/Equipment: Low flow/Bladder Pump

Casing ID (in.): 4

Purge Start Date/Time: 2/28/24 NA

Depth to Water - Initial (DTWi) (ft) Dry

Purge End Date/Time: 2/28/24 NA

Depth to Well Bottom (ft) ~~29~~ 31.61

Discharge Tube Length: NA PID Reading: NA

Screen Interval (ft): 21.42-30.92

Discharge Tube Diameter: 1/4" Immiscible Layer: Y / (N)

Approximate depth of pump inlet*(ft): ~~28.75~~ 26.17

Pump Start Time: NA

Ferrous Iron (Required Y or (N)) _____ mg/L

2ND DTW- Dry

APTIM

Sample Collection Log

Location ID: 46WW13				Sample No: 46WW13-2402 28						
Date of Reading	**Time of Reading**	**Purge Rate**	**Total Purge**	**DTW**	**Cond.**	**Temp.**	**pH**	**Turbidity**	**ORP**	**DO**
		(ml/min)	**(L)**	**(ft)**	**(mS/cm)**	**(°C)**		**(NTU)**	**(mV)**	**(mg/L)**
	Purge Stabilization Criteria	-	-	Drawdown limit 0.3 ft	±10%		±0.1 units	No criteria		± 10% or 0.2 mg/L
			DRY		WELL					

Logged by: _____ Date: _____

QC'd by: _____ Date: _____

APTIM

Sample Collection Log

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **46WW13**

Sampler(s): Scott Beesinger

FIELD CONDITIONS Cloudy / cool

SAMPLING INFORMATION

Sample No: 46WW13-240228-MS **DATE/TIME:** 2/28/24 0750 **Pump Inlet Depth:** 26.17

Sampling Method: LF **Sample Purpose:** MS **Sample Matrix:** GW

Appearance of Sample	Assoc. QC Samples	Decontamination Procedures

Chain of Custody	COC Notes	Lab	Analyses	Container	Preserv
		ALSHT	VOCs in Water by 8260C	3 x 40 mL Glass	HCL<pH2

WELL AND PURGING INFORMATION

Measuring Point : Top of Casing

Casing ID (in.): 4

Depth to Water - Initial (DTWi) (ft) Dry

Depth to Well Bottom (ft) 31.61

Screen Interval (ft): 21.42 - 30.92

Approximate depth of pump inlet*(ft): ~~23.75~~ 26.17

Ferrous Iron (Required Y or (N) _____ mg/L

Purging Method/Equipment: Low flow/Bladder Pump

Purge Start Date/Time: 2/28/24 NA

Purge End Date/Time: 2/28/24 NA

Discharge Tube Length: NA PID Reading: NA

Discharge Tube Diameter: 1/4" Immiscible Layer: Y / (N)

Pump Start Time: NA

2ND DTW - Dry

APTIM

Sample Collection Log

Location ID: 46WW13				Sample No: 46WW13-240228-MS						
Date of Reading	**Time of Reading**	**Purge Rate**	**Total Purge**	**DTW**	**Cond.**	**Temp.**	**pH**	**Turbidity**	**ORP**	**DO**
		(ml/min)	**(L)**	**(ft)**	**(mS/cm)**	**(°C)**		**(NTU)**	**(mV)**	**(mg/L)**
	Purge Stabilization Criteria	-	-	Drawdown limit 0.3 ft	±10%		±0.1 units	No criteria		± 10% or 0.2 mg/L
		Dry			Well					

Logged by: _____ Date: _____

QC'd by: _____ Date: _____

APTIM

Sample Collection Log

Project Name: **Longhorn AAP**

Location ID: **46WW13**

Project No: **501032**

Sampler(s): Scott Beesinger

FIELD CONDITIONS Cloudy/Cool

SAMPLING INFORMATION

Sample No: 46WW13-240228-MSD **DATE/TIME:** 2/28/24 0750 **Pump Inlet Depth:** 26.17

Sampling Method: LF **Sample Purpose:** MSD **Sample Matrix:** GW

Appearance of Sample	Assoc. QC Samples	Decontamination Procedures

Chain of Custody	COC Notes	Lab	Analyses	Container	Preserv
		ALSHT	VOCs in Water by 8260C	3 x 40 mL Glass	HCL<pH2

WELL AND PURGING INFORMATION

Measuring Point : Top of Casing

Purging Method/Equipment: Low flow/Bladder Pump

Casing ID (in.): 4

Purge Start Date/Time: 2/28/24 NA

Depth to Water - Initial (DTWi) (ft) Dry

Purge End Date/Time: 2/28/24 NA

Depth to Well Bottom (ft) ~~30~~ 31.61

Discharge Tube Length: NA PID Reading: NA

Screen Interval (ft): 21.42 - 30.92

Discharge Tube Diameter: 1/4" Immiscible Layer: Y / (N)

Approximate depth of pump inlet*(ft): ~~23.75~~ 26.17

Pump Start Time: NA

Ferrous Iron (Required Y or (N) _____ mg/L

END DTW- Dry

APTIM

Sample Collection Log

Location ID: 46WW13				Sample No: 46WW13-240228-MSD						
Date of Reading	Time of Reading	Purge Rate	Total Purge	DTW	Cond.	Temp.	pH	Turbidity	ORP	DO
		(ml/min)	(L)	(ft)	(mS/cm)	(°C)		(NTU)	(mV)	(mg/L)
	Purge Stabilization Criteria	-	-	Drawdown limit 0.3 ft	±10%		±0.1 units	No criteria		± 10% or 0.2 mg/L
		Dry Well								

Logged by: _____ Date: _____

QC'd by: _____ Date: _____

APTIM

Sample Collection Log

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **46WW14**

Sampler(s): Scott Baginski

FIELD CONDITIONS Cloudy

SAMPLING INFORMATION

Sample No: 46WW14-240222 **DATE/TIME:** 2/22/24 1004 **Pump Inlet Depth:** 49.35

Sampling Method: LF **Sample Purpose:** REG **Sample Matrix:** GW

Appearance of Sample	Assoc. QC Samples	Decontamination Procedures

Chain of Custody	COC Notes	Lab	Analyses	Container	Preserv
		ALSHT	VOCs in Water by 8260C	3 x 40 mL Glass	HCL<pH2

WELL AND PURGING INFORMATION

Measuring Point : Top of Casing

Purging Method/Equipment: Low flow/Bladder Pump

Casing ID (in.): 4

Purge Start Date/Time: 2/22/24 1010

Depth to Water - Initial (DTWi) (ft) 35.00

Purge End Date/Time: 2/22/24 1040

Depth to Well Bottom (ft) 54.53

Discharge Tube Length: NA

PID Reading: NA

Screen Interval (ft): 44.60-54.10

Discharge Tube Diameter: 1/4"

Immiscible Layer: Y / (N)

Approximate depth of pump inlet*(ft): 49.35

Pump Start Time: 1010

Ferrous Iron (Required Y or (N) _____ mg/L

2ND DTW - 35.00

APTIM

Sample Collection Log

Location ID: 46WW14 **Sample No: 46WW14-2402_22**

Date of Reading	Time of Reading	Purge Rate	Total Purge	DTW	Cond.	Temp.	pH	Turbidity	ORP	DO
		(ml/min)	(L)	(ft)	(mS/cm)	(°C)		(NTU)	(mV)	(mg/L)
	Purge Stabilization Criteria	-	-	Drawdown limit 0.3 ft	±10%		±0.1 units	No criteria		± 10% or 0.2 mg/L
2/22/24	1015	100	.5	54.60	0.558	19.30	7.22	16.7	-70	1.02
	1020	100	1.0	54.65	0.556	19.08	6.93	14.5	-100	0.77
	1025	100	1.5	54.68	0.556	19.06	6.77	13.7	-103	0.65
	1030	100	2.0	54.70	0.555	19.04	6.75	13.3	-104	0.64
	1035	100	2.5	54.72	0.555	19.02	6.74	12.6	-104	0.63
↓	1040	100	3.0	54.73	0.555	19.00	6.73	12.1	-105	0.62

Logged by: _____ Date: _____

QC'd by: _____ Date: _____

APTIM

Sample Collection Log

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **46WW15**

Sampler(s): Scott Beesinger

FIELD CONDITIONS Cloudy / cool

SAMPLING INFORMATION

Sample No: 46WW15-2402 28 **DATE/TIME:** 2/28/24 0756 **Pump Inlet Depth:** 25.20

Sampling Method: LF **Sample Purpose:** REG **Sample Matrix:** GW

Appearance of Sample	Assoc. QC Samples	Decontamination Procedures

Chain of Custody	COC Notes	Lab	Analyses	Container	Preserv
		ALSHT	VOCs in Water by 8260C	3 x 40 mL Glass	HCL<pH2

WELL AND PURGING INFORMATION

Measuring Point : Top of Casing

Casing ID (in.): 4

Depth to Water - Initial (DTWi) (ft) DRY

Depth to Well Bottom (ft) ~~29.95~~ 30.19

Screen Interval (ft): 20.45 - 29.95

Approximate depth of pump inlet*(ft): ~~29.95~~ 25.20

Ferrous Iron (Required Y or (N) _____ mg/L

Purging Method/Equipment: Low Flow / Bladder Pump

Purge Start Date/Time: 2/28/24 NA

Purge End Date/Time: 2/28/24 NA

Discharge Tube Length: NA PID Reading: NA

Discharge Tube Diameter: 1/4" Immiscible Layer: Y / (N)

Pump Start Time: NA

2ND DTW - DRY

APTIM

Sample Collection Log

Location ID: 46WW15				Sample No: 46WW15-2402 RE						
Date of Reading	**Time of Reading**	**Purge Rate**	**Total Purge**	**DTW**	**Cond.**	**Temp.**	**pH**	**Turbidity**	**ORP**	**DO**
		(ml/min)	**(L)**	**(ft)**	**(mS/cm)**	**(°C)**		**(NTU)**	**(mV)**	**(mg/L)**
	Purge Stabilization Criteria	-	-	Drawdown limit 0.3 ft	±10%		±0.1 units	No criteria		± 10% or 0.2 mg/L
		Dry		Well						

Logged by: _____ Date: _____

QC'd by: _____ Date: _____

Sample Collection Log

APTIM

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **46WW16**

Sampler(s): Scott Beesinger

FIELD CONDITIONS Clear/ Sunny

SAMPLING INFORMATION

Sample No: 46WW16-240226 **DATE/TIME:** 2/26/24 1001 **Pump Inlet Depth:** 45.56

Sampling Method: LF **Sample Purpose:** REG **Sample Matrix:** GW

Appearance of Sample	Assoc. QC Samples	Decontamination Procedures

Chain of Custody	COC Notes	Lab	Analyses	Container	Preserv
		ALSHT	Anions (chloride/nitrate/sulfate) in Water by SW9056	1 x 125 mL HPDE	Cool 4C
		ALSHT	Carbon Dioxide in Water by RSK175	3 x 40 mL Glass	Cool 4C
		ALSHT	Dissolved Gases in Water by RSK175	3 x 40 mL Glass	HCL<pH2
		ALSHT	TOC in Water by SM5310B	2 x 40 mL Amber	H2SO4
		ALSHT	VOCs in Water by 8260C	3 x 40 mL Glass	HCL<pH2

WELL AND PURGING INFORMATION

Measuring Point : Top of Casing

Purging Method/Equipment: Low flow/Bladder Pump

Casing ID (in.): 4

Purge Start Date/Time: 2/26/24 1005

Depth to Water - Initial (DTWi) (ft) 40.30

Purge End Date/Time: 2/26/24 1035

Depth to Well Bottom (ft) ~~50~~ 51.49

Discharge Tube Length: NA PID Reading: NA

Screen Interval (ft): 40.66 - 50.46

Discharge Tube Diameter: 1/4" Immiscible Layer: Y (N)

Approximate depth of pump inlet*(ft): ~~45~~ 45.56

Pump Start Time: 1005

Ferrous Iron (Required (Y) or N) 0.19 mg/L

2ND DTW- 40.30

APTIM

Sample Collection Log

Location ID: 46WW16		Sample No: 46WW16-240226								
Date of Reading	Time of Reading	Purge Rate	Total Purge	DTW	Cond.	Temp.	pH	Turbidity	ORP	DO
		(ml/min)	(L)	(ft)	(mS/cm)	(°C)		(NTU)	(mV)	(mg/L)
	Purge Stabilization Criteria	-	-	Drawdown limit 0.3 ft	±10%		±0.1 units	No criteria		± 10% or 0.2 mg/L
2/26/24	1010	100	.5	40.37	2.58	23.11	8.34	80.1	-114	0.83
	1015	100	1.0	40.42	2.51	22.37	7.95	75.9	-111	0.49
	1020	100	1.5	40.45	2.51	22.51	7.22	69.2	-122	0.33
	1025	100	2.0	40.47	2.50	22.55	7.20	68.5	-123	0.32
	1030	100	2.5	40.49	2.50	22.60	7.18	67.7	-123	0.31
↓	1035	100	3.0	40.50	2.50	22.65	7.17	67.2	-124	0.31

Logged by: _____ Date: _____

QC'd by: _____ Date: _____

APTIM

Sample Collection Log

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **46WW17**

Sampler(s): Scott Beesinger

FIELD CONDITIONS Sunny

SAMPLING INFORMATION

Sample No: 46WW17-240222 **DATE/TIME:** 2/22/24 1046 **Pump Inlet Depth:** 33.75

Sampling Method: LF **Sample Purpose:** REG **Sample Matrix:** GW

Appearance of Sample	Assoc. QC Samples	Decontamination Procedures

Chain of Custody	COC Notes	Lab	Analyses	Container	Preserv
		ALSHT	VOCs in Water by 8260C	3 x 40 mL Glass	HCL<pH2

WELL AND PURGING INFORMATION

Measuring Point : Top of Casing

Purging Method/Equipment: Low flow/Bladder Pump

Casing ID (in.): 4

Purge Start Date/Time: 2/22/24 1055

Depth to Water - Initial (DTWi) (ft) 32.93

Purge End Date/Time: 2/22/24 1125

Depth to Well Bottom (ft) ~~35~~ 36.54

Discharge Tube Length: NA PID Reading: NA

Screen Interval (ft): 27.69-37.69

Discharge Tube Diameter: 1/4" Immiscible Layer: Y (N)

Approximate depth of pump inlet*(ft): ~~30~~ 33.75

Pump Start Time: 1055

Ferrous Iron (Required Y or (N) _____ mg/L

2ND DTW- 32.93

APTIM

Sample Collection Log

Location ID: 46WW17				Sample No: 46WW17-240222						
Date of Reading	Time of Reading	Purge Rate	Total Purge	DTW	Cond.	Temp.	pH	Turbidity	ORP	DO
		(ml/min)	(L)	(ft)	(mS/cm)	(°C)		(NTU)	(mV)	(mg/L)
	Purge Stabilization Criteria	-	-	Drawdown limit 0.3 ft	±10%		±0.1 units	No criteria		± 10% or 0.2 mg/L
2/22/24	1100	100	.5	33.00	5.71	20.39	7.29	6.6	63	4.05
	1105	100	1.0	33.06	5.90	20.50	6.45	2.2	97	3.77
	1110	100	1.5	33.10	5.96	20.71	6.25	2.0	114	3.62
	1115	100	2.0	33.13	5.97	20.76	6.24	1.8	115	3.60
	1120	100	2.5	33.16	5.97	20.83	6.23	1.6	116	3.58
↓	1125	100	3.0	33.19	5.98	20.88	6.23	1.4	117	3.56

Logged by: _____ Date: _____

QC'd by: _____ Date: _____

APTIM

Sample Collection Log

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **LHSMW17**

Sampler(s): Scott Baggenstoss

FIELD CONDITIONS Cloudy / cool

SAMPLING INFORMATION

Sample No: LHSMW17-240228 **DATE/TIME:** 2/28/24 0717 **Pump Inlet Depth:** 21.68

Sampling Method: LF **Sample Purpose:** REG **Sample Matrix:** GW

Appearance of Sample	Assoc. QC Samples	Decontamination Procedures

Chain of Custody	COC Notes	Lab	Analyses	Container	Preserv
		ALSHT	VOCs in Water by 8260C	3 x 40 mL Glass	HCL<pH2

WELL AND PURGING INFORMATION

Measuring Point : Top of Casing

Casing ID (in.): 4

Depth to Water - Initial (DTWi) (ft) DRY

Depth to Well Bottom (ft) ~~27~~ 27.00

Screen Interval (ft): 16.68 - 26.68

Approximate depth of pump inlet*(ft): ~~16.68~~ 21.68

Ferrous Iron (Required Y or (N)) _____ mg/L

Purging Method/Equipment: Low flow/Bladder Pump

Purge Start Date/Time: 2/28/24 NA

Purge End Date/Time: 2/28/24 NA

Discharge Tube Length: NA PID Reading: NA

Discharge Tube Diameter: 1/4" Immiscible Layer: Y / (N)

Pump Start Time: NA

2ND DTW= DRY

APTIM

Sample Collection Log

Location ID: LHSMW17				Sample No: LHSMW17-2402 28						
Date of Reading	Time of Reading	Purge Rate	Total Purge	DTW	Cond.	Temp.	pH	Turbidity	ORP	DO
		(ml/min)	(L)	(ft)	(mS/cm)	(°C)		(NTU)	(mV)	(mg/L)
	Purge Stabilization Criteria	-	-	Drawdown limit 0.3 ft	±10%		±0.1 units	No criteria		± 10% or 0.2 mg/L
			Dry Well							

Logged by: _____ Date: _____

QC'd by: _____ Date: _____

APTIM

Sample Collection Log

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **LHSMW18**

Sampler(s): Scott Beggs/Nbar

FIELD CONDITIONS Cloudy/cool

SAMPLING INFORMATION

Sample No: LHSMW18-240228 **DATE/TIME:** 2/28/24 0722 **Pump Inlet Depth:** 22.47

Sampling Method: LF **Sample Purpose:** REG **Sample Matrix:** GW

Appearance of Sample	Assoc. QC Samples	Decontamination Procedures

Chain of Custody	COC Notes	Lab	Analyses	Container	Preserv
		ALSHT	VOCs in Water by 8260C	3 x 40 mL Glass	HCL<pH2

WELL AND PURGING INFORMATION

Measuring Point : Top of Casing

Casing ID (in.): 4

Depth to Water - Initial (DTWi) (ft) DRY

Depth to Well Bottom (ft) ~~27~~ 27.88

Screen Interval (ft): 17.47 - 27.47

Approximate depth of pump inlet*(ft): ~~19.5~~ 22.47

Ferrous Iron (Required Y or (N)) _____ mg/L

Purging Method/Equipment: Low flow/Bladder Pump

Purge Start Date/Time: 2/28/24 NA

Purge End Date/Time: 2/28/24 NA

Discharge Tube Length: NA PID Reading: NA

Discharge Tube Diameter: 1/4" Immiscible Layer: Y (N)

Pump Start Time: NA

2ND DTW- DRY

APTIM

Sample Collection Log

Location ID: LHSMW18		Sample No: LHSMW18-2402 24								
Date of Reading	**Time of Reading**	**Purge Rate**	**Total Purge**	**DTW**	**Cond.**	**Temp.**	**pH**	**Turbidity**	**ORP**	**DO**
		(ml/min)	**(L)**	**(ft)**	**(mS/cm)**	**(°C)**		**(NTU)**	**(mV)**	**(mg/L)**
	Purge Stabilization Criteria	-	-	Drawdown limit 0.3 ft	±10%		±0.1 units	No criteria		± 10% or 0.2 mg/L
		DRY		WELL						

Logged by: _____ Date: _____

QC'd by: _____ Date: _____

APTIM

Sample Collection Log

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **LHSMW19**

Sampler(s): Scott Beesinger

FIELD CONDITIONS Cloudy

SAMPLING INFORMATION

Sample No: LHSMW19-240222 **DATE/TIME:** 2/22/24 0618 **Pump Inlet Depth:** ~~27.76~~ 27.00

Sampling Method: LF **Sample Purpose:** REG **Sample Matrix:** GW

Appearance of Sample	Assoc. QC Samples	Decontamination Procedures

Chain of Custody	COC Notes	Lab	Analyses	Container	Preserv
		ALSHT	VOCs in Water by 8260C	3 x 40 mL Glass	HCL<pH2

WELL AND PURGING INFORMATION

Measuring Point : Top of Casing

Purging Method/Equipment: Low flow/Bladder Pump

Casing ID (in.): 4

Purge Start Date/Time: 2/22/24 0630

Depth to Water - Initial (DTWi) (ft) 26.18

Purge End Date/Time: 2/22/24 0700

Depth to Well Bottom (ft) ~~29~~ 30.00

Discharge Tube Length: NA PID Reading: NA

Screen Interval (ft): 19.76 - 29.76

Discharge Tube Diameter: 1/4" Immiscible Layer: Y / (N)

Approximate depth of pump inlet*(ft): ~~25.76~~ ~~29.76~~ 27.00 Pump Start Time: 0630

Ferrous Iron (Required Y or (N) _____ mg/L

2ND DTW- 26.18

APTIM

Sample Collection Log

Location ID: LHSMW19		Sample No: LHSMW19-2402~~22~~								
Date of Reading	**Time of Reading**	**Purge Rate**	**Total Purge**	**DTW**	**Cond.**	**Temp.**	**pH**	**Turbidity**	**ORP**	**DO**
		(ml/min)	**(L)**	**(ft)**	**(mS/cm)**	**(°C)**		**(NTU)**	**(mV)**	**(mg/L)**
	Purge Stabilization Criteria	-	-	Drawdown limit 0.3 ft	±10%		±0.1 units	No criteria		± 10% or 0.2 mg/L
2/22/24	0635	1.80	.5	26.25	3.00	18.77	6.06	5.1	204	1.09
	0640	100	1.0	26.31	2.92	18.69	6.41	2.0	100	0.88
	0645	100	1.5	26.35	2.87	18.66	6.46	0.9	80	0.75
	0650	100	2.0	26.38	2.86	18.64	6.46	0.4	79	0.73
	0655	100	2.5	26.41	2.85	18.61	6.47	0.0	78	0.72
↓	0700	100	3.0	26.44	2.85	18.59	6.47	0.0	77	0.71

Logged by: _____ Date: _____

QC'd by: _____ Date: _____

APTIM

Sample Collection Log

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **LHSMW19**

Sampler(s): Scott Beesinger

FIELD CONDITIONS Cloudy

SAMPLING INFORMATION

Sample No: LHSMW19-240222-FD **DATE/TIME:** 2/22/24 0618 **Pump Inlet Depth:** 24.76

Sampling Method: LF **Sample Purpose:** FD **Sample Matrix:** GW

Appearance of Sample	Assoc. QC Samples	Decontamination Procedures

Chain of Custody	COC Notes	Lab	Analyses	Container	Preserv
		ALSHT	VOCs in Water by 8260C	3 x 40 mL Glass	HCL<pH2

WELL AND PURGING INFORMATION

Measuring Point : Top of Casing

Purging Method/Equipment: Low flow/Bladder Pump

Casing ID (in.): 4

Purge Start Date/Time: 2/22/24 0630

Depth to Water - Initial (DTWi) (ft) 26.18

Purge End Date/Time: 2/22/24 0700

Depth to Well Bottom (ft) ~~30~~ 30.00

Discharge Tube Length: NA PID Reading: NA

Screen Interval (ft): 19.76 - 29.76

Discharge Tube Diameter: 1/4" Immiscible Layer: Y / (N)

Approximate depth of pump inlet*(ft): ~~25~~ 24.76

Pump Start Time: 0630

Ferrous Iron (Required Y or (N)) _____ mg/L

2ND DTW - 26.18

APTIM

Sample Collection Log

Location ID: LHSMW19		Sample No: LHSMW19-240222-FD								
Date of Reading	**Time of Reading**	**Purge Rate**	**Total Purge**	**DTW**	**Cond.**	**Temp.**	**pH**	**Turbidity**	**ORP**	**DO**
		(ml/min)	**(L)**	**(ft)**	**(mS/cm)**	**(°C)**		**(NTU)**	**(mV)**	**(mg/L)**
	Purge Stabilization Criteria	-	-	Drawdown limit 0.3 ft	±10%		±0.1 units	No criteria		± 10% or 0.2 mg/L
2/22/24	0635	100	.5	26.25	3.00	18.77	6.06	5.1	204	1.09
	0640	100	1.0	26.31	2.92	18.69	6.41	2.0	100	0.88
	0645	100	1.5	26.35	2.87	18.66	6.46	0.9	80	0.75
	0650	100	2.0	26.38	2.86	18.64	6.46	0.4	79	0.73
	0655	100	2.5	26.41	2.85	18.61	6.47	0.0	78	0.72
	0700	100	3.0	26.44	2.85	18.59	6.47	0.0	77	0.71

Logged by: _____ Date: _____

QC'd by: _____ Date: _____

APTIM

Sample Collection Log

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **LHSMW21**

Sampler(s): Scott Baesinger

FIELD CONDITIONS Cloudy

SAMPLING INFORMATION

Sample No: LHSMW21-240222 **DATE/TIME:** 2/22/24 0921 **Pump Inlet Depth:** 24.61

Sampling Method: LF **Sample Purpose:** REG **Sample Matrix:** GW

Appearance of Sample | **Assoc. QC Samples** | **Decontamination Procedures**

Chain of Custody	COC Notes	Lab	Analyses	Container	Preserv
		ALSHT	Anions (chloride/nitrate/sulfate) in Water by SW9056	1 x 125 mL HPDE	Cool 4C
		ALSHT	Carbon Dioxide in Water by RSK175	3 x 40 mL Glass	Cool 4C
		ALSHT	Dissolved Gases in Water by RSK175	3 x 40 mL Glass	HCL<pH2
		ALSHT	TOC in Water by SM5310B	2 x 40 mL Amber	H2SO4
		ALSHT	VOCs in Water by 8260C	3 x 40 mL Glass	HCL<pH2

WELL AND PURGING INFORMATION

Measuring Point : Top of Casing

Casing ID (in.): 4

Depth to Water - Initial (DTWi) (ft) 18.60

Depth to Well Bottom (ft) 29.72

Screen Interval (ft): 19.61 - 29.61

Approximate depth of pump inlet*(ft): 24.61

Ferrous Iron (Required Y or N) 1.12 mg/L

Purging Method/Equipment: Low flow/Bladder Pump

Purge Start Date/Time: 2/22/24 0925

Purge End Date/Time: 2/22/24 0955

Discharge Tube Length: NA PID Reading: NA

Discharge Tube Diameter: 1/4" Immiscible Layer: Y / N

Pump Start Time: 0925

2ND DTW - 18.60

APTIM

Sample Collection Log

Location ID: LHSMW21				Sample No: LHSMW21-240222						
Date of Reading	**Time of Reading**	**Purge Rate**	**Total Purge**	**DTW**	**Cond.**	**Temp.**	**pH**	**Turbidity**	**ORP**	**DO**
		(ml/min)	**(L)**	**(ft)**	**(mS/cm)**	**(°C)**		**(NTU)**	**(mV)**	**(mg/L)**
	Purge Stabilization Criteria	-	-	Drawdown limit 0.3 ft	±10%		±0.1 units	No criteria		± 10% or 0.2 mg/L
2/22/24	0930	100	.5	18.67	1.71	18.25	6.57	70.5	185	0.90
	0935	100	1.0	18.74	1.74	18.50	6.69	64.3	126	0.71
	0940	100	1.5	18.78	1.77	18.89	6.71	59.1	106	0.55
	0945	100	2.0	18.81	1.77	18.93	6.72	58.5	105	0.55
	0950	100	2.5	18.83	1.78	18.98	6.73	57.8	104	0.54
↓	0955	100	3.0	18.85	1.78	19.02	6.73	57.2	103	0.53

Logged by: _____ Date: _____

QC'd by: _____ Date: _____

APTIM

Sample Collection Log

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **LHSMW22**

Sampler(s): Scott Baggindine

FIELD CONDITIONS Clear/ Sunny

SAMPLING INFORMATION

Sample No: LHSMW22-2402 26 **DATE/TIME:** 2/26/24 1218 **Pump Inlet Depth:** 23.69

Sampling Method: LF **Sample Purpose:** REG **Sample Matrix:** GW

Appearance of Sample	Assoc. QC Samples	Decontamination Procedures

Chain of Custody	COC Notes	Lab	Analyses	Container	Preserv
		ALSHT	VOCs in Water by 8260C	3 x 40 mL Glass	HCL<pH2

WELL AND PURGING INFORMATION

Measuring Point : Top of Casing

Purging Method/Equipment: Low Flow/Bladder Pump

Casing ID (in.): 4

Purge Start Date/Time: NA

Depth to Water - Initial (DTWi) (ft) DRY

Purge End Date/Time: NA

Depth to Well Bottom (ft) ~~28~~ 22.80

Discharge Tube Length: NA PID Reading: NA

Screen Interval (ft): 18.69-28.69

Discharge Tube Diameter: NA Immiscible Layer: Y / (N)

Approximate depth of pump inlet*(ft): ~~25.5~~ 23.69

Pump Start Time: NA

Ferrous Iron (Required Y or (N) _____ mg/L

2ND DTW DRY

APTIM

Sample Collection Log

Location ID: LHSMW22				Sample No: LHSMW22-2402 Zb						
Date of Reading	**Time of Reading**	**Purge Rate**	**Total Purge**	**DTW**	**Cond.**	**Temp.**	**pH**	**Turbidity**	**ORP**	**DO**
		(ml/min)	**(L)**	**(ft)**	**(mS/cm)**	**(°C)**		**(NTU)**	**(mV)**	**(mg/L)**
	Purge Stabilization Criteria	-	-	Drawdown limit 0.3 ft	±10%		±0.1 units	No criteria		± 10% or 0.2 mg/L
			DRY WELL							

Logged by: _____ Date: _____

QC'd by: _____ Date: _____

APTIM

Sample Collection Log

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **LHSMW23R**

Sampler(s): Scott Beesinger

FIELD CONDITIONS CLEAR/SUNNY

SAMPLING INFORMATION

Sample No: LHSMW23R-2402 ~~26~~ **DATE/TIME:** 2/26/24 1134 **Pump Inlet Depth:** 37.75

Sampling Method: LF **Sample Purpose:** REG **Sample Matrix:** GW

Appearance of Sample	Assoc. QC Samples	Decontamination Procedures

Chain of Custody	COC Notes	Lab	Analyses	Container	Preserv
		ALSHT	VOCs in Water by 8260C	3 x 40 mL Glass	HCL<pH2

WELL AND PURGING INFORMATION

Measuring Point : Top of Casing

Purging Method/Equipment: Low flow/Bladder Pump

Casing ID (in.):

Purge Start Date/Time: 2/26/24 1140

Depth to Water - Initial (DTWi) (ft) 43.20

Purge End Date/Time: 2/26/24 1210

Depth to Well Bottom (ft) ~~40~~ 37.05

Discharge Tube Length: NA

PID Reading: NA

Screen Interval (ft): 23.09 - 43.09

Discharge Tube Diameter: 1/4"

Immiscible Layer: Y / ~~N~~

Approximate depth of pump inlet*(ft): ~~30~~ 37.75

Pump Start Time: 1140

Ferrous Iron (Required Y or ~~N~~) _____ mg/L

2ND DTW - 37.05

APTIM

Sample Collection Log

Location ID: LHSMW23R		Sample No: LHSMW23R-2402 26								
Date of Reading	**Time of Reading**	**Purge Rate**	**Total Purge**	**DTW**	**Cond.**	**Temp.**	**pH**	**Turbidity**	**ORP**	**DO**
		(ml/min)	**(L)**	**(ft)**	**(mS/cm)**	**(°C)**		**(NTU)**	**(mV)**	**(mg/L)**
	Purge Stabilization Criteria	-	-	Drawdown limit 0.3 ft	±10%		±0.1 units	No criteria		± 10% or 0.2 mg/L
2/26/24	1145	100	.5	37.13	4.41	24.08	5.76	37.8	142	4.87
	1150	100	1.0	37.19	4.40	23.41	5.70	32.9	120	4.57
	1155	100	1.5	37.23	4.38	23.12	5.56	28.7	124	4.48
	1200	100	2.0	37.25	4.37	23.04	5.55	28.3	125	4.46
	1205	100	2.5	37.27	4.36	22.96	5.54	27.6	126	4.45
↓	1210	100	3.0	37.29	4.36	22.90	5.53	27.2	126	4.44

Logged by: _____ Date: _____

QC'd by: _____ Date: _____

APTIM

Sample Collection Log

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **LHSMW23R**

Sampler(s): Scott Beesinger

FIELD CONDITIONS Clear/Sunny

SAMPLING INFORMATION

Sample No: LHSMW23R-240226-FD **DATE/TIME:** 2/26/24 1134 **Pump Inlet Depth:** 37.75

Sampling Method: LF **Sample Purpose:** FD **Sample Matrix:** GW

Appearance of Sample	Assoc. QC Samples	Decontamination Procedures

Chain of Custody	COC Notes	Lab	Analyses	Container	Preserv
		ALSHT	VOCs in Water by 8260C	3 x 40 mL Glass	HCL<pH2

WELL AND PURGING INFORMATION

Measuring Point : Top of Casing

Purging Method/Equipment: Low flow/Bladder Pump

Casing ID (in.):

Purge Start Date/Time: 2/26/24 1140

Depth to Water - Initial (DTWi) (ft) 43.20

Purge End Date/Time: 2/26/24 1210

Depth to Well Bottom (ft) ~~40~~ 37.05

Discharge Tube Length: NA PID Reading: NA

Screen Interval (ft): 23.09 - 43.09

Discharge Tube Diameter: 1/4" Immiscible Layer: Y / (N)

Approximate depth of pump inlet*(ft): ~~39~~ 37.75

Pump Start Time: 1140

Ferrous Iron (Required Y or (N) _____ mg/L

2ND DTW - 37.05

APTIM

Sample Collection Log

Location ID: LHSMW23R		Sample No: LHSMW23R-240226-FD								
Date of Reading	**Time of Reading**	**Purge Rate**	**Total Purge**	**DTW**	**Cond.**	**Temp.**	**pH**	**Turbidity**	**ORP**	**DO**
		(ml/min)	**(L)**	**(ft)**	**(mS/cm)**	**(°C)**		**(NTU)**	**(mV)**	**(mg/L)**
	Purge Stabilization Criteria	-	-	Drawdown limit 0.3 ft	±10%		±0.1 units	No criteria		± 10% or 0.2 mg/L
2/26/24	1145	100	.5	37.13	4.41	24.08	5.76	37.8	142	4.87
	1150	100	1.0	37.19	4.40	23.41	5.70	32.9	120	4.57
	1155	100	1.5	37.23	4.38	23.12	5.56	28.7	124	4.48
	1200	100	2.0	37.25	4.37	23.04	5.55	28.3	125	4.46
	1205	100	2.5	37.27	4.36	22.96	5.54	27.6	126	4.45
↓	1210	100	3.0	37.29	4.36	22.90	5.53	27.2	126	4.44

Logged by: _____ Date: _____

QC'd by: _____ Date: _____

APTIM

Sample Collection Log

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **LHSMW25**

Sampler(s): Scott Beesinger

FIELD CONDITIONS

Sunny

SAMPLING INFORMATION

Sample No: LHSMW25-240222 **DATE/TIME:** 2/22/24 1131 **Pump Inlet Depth:** ~~38.60~~ ~~38.50~~ 33.50

Sampling Method: LF **Sample Purpose:** REG **Sample Matrix:** GW

Appearance of Sample	Assoc. QC Samples	Decontamination Procedures

Chain of Custody	COC Notes	Lab	Analyses	Container	Preserv
		ALSHT	VOCs in Water by 8260C	3 x 40 mL Glass	HCL<pH2

WELL AND PURGING INFORMATION

Measuring Point : Top of Casing

Purging Method/Equipment: Low Flow/Bladder Pump

Casing ID (in.): 4

Purge Start Date/Time: 2/22/24 1135

Depth to Water - Initial (DTWi) (ft) 32.60

Purge End Date/Time: 2/22/24 1205

Depth to Well Bottom (ft) ~~39.6~~ 42.60

Discharge Tube Length: NA PID Reading: NA

Screen Interval (ft): 22.10 - 42.10

Discharge Tube Diameter: 1/4" Immiscible Layer: Y (N)

Approximate depth of pump inlet*(ft): ~~29.2~~ ~~38.10~~ 33.50 Pump Start Time: 1135

Ferrous Iron (Required Y or (N) _____ mg/L

2ND DTW - 32.60

APTIM

Sample Collection Log

Location ID: LHSMW25		Sample No: LHSMW25-240222								
Date of Reading	**Time of Reading**	**Purge Rate**	**Total Purge**	**DTW**	**Cond.**	**Temp.**	**pH**	**Turbidity**	**ORP**	**DO**
		(ml/min)	**(L)**	**(ft)**	**(mS/cm)**	**(°C)**		**(NTU)**	**(mV)**	**(mg/L)**
	Purge Stabilization Criteria	-	-	Drawdown limit 0.3 ft	±10%		±0.1 units	No criteria		± 10% or 0.2 mg/L
2/22/24	1140	100	.5	32.67	1.35	21.58	6.69	7.5	389	0.88
	1145	100	1.0	32.74	1.22	20.61	6.35	3.3	12	0.52
	1150	100	1.5	32.79	1.19	20.57	6.25	3.0	9	0.41
	1155	100	2.0	32.82	1.18	20.54	6.24	2.7	8	0.40
	1200	100	2.5	32.85	1.18	20.51	6.23	2.5	8	0.39
↓	1205	100	3.0	32.87	1.18	20.48	6.23	2.1	8	0.39

Logged by: _____ Date: _____

QC'd by: _____ Date: _____

Appendix D

Laboratory Analytical Data Packages and Quality Control Summary Report

APPENDIX D
QUALITY CONTROL SUMMARY REPORT

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1 INTRODUCTION

APTIM reviewed 2 data packages from ALS Environmental, Houston, Texas. Groundwater samples were collected February 2024 for site LHAPP-46 at Longhorn Army Ammunition Plant (LHAAP), Karnack, Texas. Data were reviewed for conformance to the requirements of the following guidance documents: *U.S. Department of Defense (DoD) Quality Systems Manual for Environmental Laboratories, U.S. Department of Defense (DoD) Data validation Guidelines Modules 1,2,4 and 5,* and the *Final Basewide Uniform Federal Policy* [UFP] – *Quality Assurance Project Plan* [QAPP] *Longhorn Army Ammunition Plant* which is in Appendix C of the *Final Installation-Wide Work Plan for Longhorn Army Ammunition Plant Karnack, Texas* (Bhate, May 2018).

1.1 Intended Use of Data

The objective of the groundwater sampling is to confirm compliance with the Remedial Action-Operations (RA-O) and the LHAAP-46 sampling is part of the annual RA-O.

Analyses performed include:

- SM5310B – Total Organic Carbon
- SW8260C- Volatiles
- SW9056A –Nitrate (N), Sulfate (SO_4), and Chloride (Cl)
- RSK-175- Dissolved Gases-Methane, Ethane, Ethene and Carbon Dioxide

Table 1 lists the sample identification numbers (IDs) and their associated laboratory package.

Table 2 lists qualified results with the qualification flag and reason code.

The following narrative is a brief synopsis of data that required qualification due to quality control discrepancies.

1.2 Preservation and Holding Times

Sample identification data were evaluated for agreement with the chain-of-custody (COC). All samples were received in appropriate containers, within the proper temperature range, in good condition, and within the required hold time. With the following exception:

- HS24021475- Nitrate restuls for samples 46WW09-240222, 46WW11-240222, and LHSMW21-240222 were analyzed outside holding time. Nitrate results for samples 46WW09-240222, 46WW11-240222, and LHSMW21-240222 were qualified estimated "UJ".

1.3 Calibrations

All analytes reported must be present in the initial and continuing calibration. The calibrations must meet the acceptance criteria specified in Worksheet 24 (Analytical Instrument Calibration) of the QAPP. All results reported must be within the calibration range. Samples were diluted, if necessary, to bring analyte responses within the calibration range.

1.3.1 Initial Calibration

The initial calibrations must meet the following criteria otherwise the compound is qualified J or UJ: The initial calibration (ICAL)criteria are 20 percent difference (%D) for VOCs and 15% for dissolved gases. The following samples were outside calibration limits:

- HS24021475-The ICAL in samples 46WW09-240222, 46WW11-240222, and LHSMW21-240222 for ethene. Ethene results were qualified estimated "UJ".

- HS24021563-The ICAL in samples 46WW05-240226 and 46WW16-240226 for methane. Methane results were qualified estimated "J".

1.3.2 Continuing Calibration Verifications

The In calibrations must meet the following criteria otherwise the compound is qualified J or UJ: The continuing calibration verification (CCV) criteria are 20 %D for VOCs and 50% for closing CCVs. Dissolved gases 15 %.

The following samples were outside calibration limits:

- HS24021563-The ICAL in samples 46WW05-240226 and 46WW16-240226 for methane. Methane results were qualified estimated "J".

1.4 Blanks

If the analyte result for an associated sample was less than 5X (10X for common laboratory contaminants) the analyte concentration in the blank, that result was qualified "UB" and considered an artifact of blank contamination. Where the sample result for the affected analyte was non-detect or greater than 5X the amount in the blank, no qualifier was applied.

1.5 Surrogates

Surrogates were evaluated using limits defined by each method in the project-specific QAPP Worksheet 28.

No surrogate recoveries were outside control limits.

1.6 Laboratory Control Sample/Laboratory Control Sample Duplicate

Laboratory Control Sample/ Laboratory Control Sample Duplicate (LCS)/(LCSD) recoveries were evaluated using limits defined in the project-specific QAPP Worksheet 15.

No LCS/LCSD recoveries were outside control limits.

1.7 Matrix Spike/Matrix Spike Duplicate Sample

Matrix Spike/Matrix Spike Duplicate (MS)/(MSD) recoveries were evaluated using limits defined in Worksheet 15 of the project-specific QAPP. When sample results were greater than 4x the spike amount, control limits were not applicable and require no qualification. Furthermore, if an MS/MSD analyses was performed on a batched (unrelated) sample no qualification was made to the sample data. Otherwise, only the sample used for spiking requires qualification.

1.7.1 Dissolved Gases – RSK-175

- HS24021563-46WW02-240226 reported MS/MSD %Rs for carbon dioxide were below recovery limits. Carbon dioxide result was qualified rejected "R".

1.8 Internal Standards

If the %R for an internal standard in a sample is not within the limit, the associated sample is qualified for those analytes associated with the internal standard(s) outside of the limit.

Internal standards were within acceptance criteria for the associated compounds.

1.9 Precision

Precision is the measure of variability of individual sample measurements. Evaluation of laboratory and/or field duplicates for precision was done using the relative percent difference (RPD). The RPD is defined as the difference between two duplicate samples divided by the mean and expressed as a percent. Field duplicate RPD limits were set at <30% for groundwater.

Field duplicate RPD limits were within acceptance criteria.

2 DATA USABILITY SUMMARY

The data are usable for the intended purposes of the project (Table 3). The data quality objectives have been met for the project.

Table 1: Field Sample Identification and Laboratory Packages February 2024						
Client Sample ID	**Lab Package**	**Purp**	**RSK-175**	**SM5310B**	**SW8260C**	**SW9056A**
46WW02-240226	HS24021563	REG	X	X	X	X
46WW03-240226	HS24021563	REG			X	
46WW05-240226	HS24021563	REG	X	X	X	X
46WW06-240226	HS24021563	REG			X	
46WW07-240222	HS24021475	REG			X	
46WW08-240226	HS24021563	REG			X	
46WW09-240222	HS24021475	REG	X	X	X	X
46WW11-240222	HS24021475	REG	X	X	X	X
46WW14-240222	HS24021475	REG			X	
46WW16-240226	HS24021563	REG	X	X	X	X
46WW17-240222	HS24021475	REG			X	
LHSMW19-240222	HS24021475	REG			X	
LHSMW21-240222	HS24021475	REG	X	X	X	X
LHSMW23R-240226	HS24021563	REG			X	
LHSMW25-240222	HS24021475	REG			X	
46WW09-240222-FD	HS24021475	FD	X	X	X	X
LHSMW19-240222-FD	HS24021475	FD			X	

GW-Groundwater
ID- Identification
SM- Standard Method
SW-846- Test Methods for Evaluating Solid Waste, Physical/Chemical Methods.
E-U.S. Environmental Protection Agency Method
HS- Houston

Table 2: Qualified Analytical Data February 2024

Client Sample ID	Laboratory Package	Analyte Name	Units	Result	VQ	Validation Reason Codes*			
46WW02-240226	HS24021563	Carbon dioxide	ug/L	100000	R	08A			
46WW02-240226	HS24021563	Ethane	mg/L	0.000586	J	15			
46WW02-240226	HS24021563	Nitrate	mg/L	0.0508	J	15			
46WW05-240226	HS24021563	Methane	mg/L	0.00304	J	04B	05B	15	
46WW05-240226	HS24021563	Nitrate	mg/L	0.177	J	15			
46WW09-240222	HS24021475	Ethylene	mg/L	0.000500	UJ	04B			
46WW09-240222	HS24021475	Nitrate	mg/L	0.0500	UJ	02B			
46WW11-240222	HS24021475	Ethylene	mg/L	0.000500	UJ	04B			
46WW11-240222	HS24021475	Nitrate	mg/L	0.0500	UJ	02B			
46WW16-240226	HS24021563	Methane	mg/L	0.00197	J	04B	05B		
LHSMW21-240222	HS24021475	Ethylene	mg/L	0.000500	UJ	04B			
LHSMW21-240222	HS24021475	Nitrate	mg/L	0.0500	UJ	02B			
LHSMW23R-240226	HS24021563	cis-1,2-Dichloroethene	ug/L	0.66	J	15			
LHSMW23R-240226	HS24021563	Trichloroethene	ug/L	0.56	J	15			

*- See attached Validation Reason Code Definitions

Table 3: Completeness by Method February 2024

Method	No. of Rejected Results	% Completeness
SW8260C	0	100
SW9056A	0	100
SW5310B	0	100
RSK-175	1	>99
SW-846 - Test Methods for Evaluating Solid Waste, Physical/Chemical Methods		

Summary of Data Validation Reason Code

Reason Code	Description
01	Sample received outside of 0 to 6 degrees Celsius
01A	Improper sample preservation
02	Holding time exceeded
02A	Extraction time exceeded
02B	Analysis time exceeded
03	Instrument performance - outside criteria
03A	Bromofluorobenzene (BFB)
03B	Decafluorotriphenylphosphine (DFTPP)
03C	Dichlorodiphenyltrichloroethane (DDT) and/or Endrin % breakdown exceeds criteria
03D	Retention time windows
03E	Resolution
04	Initial calibration results outside specified criteria
04A	Compound mean Relative Response Factor (RRF) Quality Control (QC)criteria not met
04B	Individual % RSD criteria not met
04C	Correlation coefficient <0.995
05	Continuing calibration results outside specified criteria
05A	Compound mean RRF QC criteria not met
05B	Compound % Difference (D) QC criteria not met
06	Result qualified as a result of the 5x/10x blank correction
06A	Method or preparation blank
06B	Initial Calibration Blank (ICB) or Continuing Calibration Blank (CCB)
06C	Equipment Rinsate (ER)
06D	Trip Blank (TB)
06E	Field Blank (FB)
07	Surrogate recoveries outside control limits
07A	Sample
07B	Associated method blank or Laboratory Control Sample (LCS)
08	Matrix Spike (MS)/Matrix Spike Duplicate (MSD)/Duplicate results outside criteria
08A	MS and/or MSD recovery not within control limits (accuracy)
08B	% Relative Percent Difference (RPD) outside acceptance criteria (precision)
08C	% Relative Standard Difference (RSD) outside acceptance criteria (precision)

Summary of Data Validation Reason Code

Reason Code	Description
09	Post digestion spike outside criteria Graphite Furnace Atomic Absorption (GFAA)
10	Internal standards outside specified control limits
10A	Recovery
10B	Retention Time
11	Laboratory control sample recoveries outside specified control limits
11A	Recovery
11B	% RPD (if run in duplicate)
12	Interference check standard
13	Serial dilution
14	Tentatively identified compounds
15	Quantitation
16	Multiple results available; alternate analysis preferred
17	Field duplicate RPD criteria is exceeded
18	Percent difference between original and second column exceeds QC criteria
19	Professional judgement was used to qualify the data
20	Pesticide clean-up checks
21	Target compound identification
22	Radiological calibration
23	Radiological quantitation
24	Reported result and/or lab qualifier revised to reflect validation findings

%D denotes percent difference.
%RSD denotes percent relative standard deviation.
< denotes less than.
°C denotes degrees Celsius.
LCS denotes laboratory control sample. MS denotes matrix spike.
MSD denotes matrix spike duplicate. QC denotes quality control.
RPD denotes percent relative percent difference. RRF denotes relative response factor.

10450 Stancliff Rd. Suite 210
Houston, TX 77099
T: +1 281 530 5656
F: +1 281 530 5887

April 02, 2024

Marcia Olive
Bhate Environmental Associates, Inc.
445 Union Blvd Ste 129
Lakewood, CO 80228

Work Order: **HS24021475**

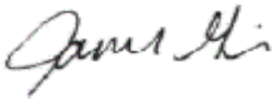
Laboratory Results for: **LHAAP / Site 46**

Dear Marcia Olive,

ALS Environmental received 11 sample(s) on Feb 23, 2024 for the analysis presented in the following report.

This is a REVISED REPORT. Please see the Case Narrative for discussion concerning this revision.

Regards,



Generated By: JUMOKE.LAWAL
James Guin

ALS Houston, US Date: 02-Apr-24

Client: Bhate Environmental Associates, Inc.
Project: LHAAP / Site 46
Work Order: HS24021475

SAMPLE SUMMARY

Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS24021475-01	LHSMW19-240222	Groundwater		22-Feb-2024 07:00	23-Feb-2024 09:00	☐
HS24021475-02	LHSMW19-240222-FD	Groundwater		22-Feb-2024 07:00	23-Feb-2024 09:00	☐
HS24021475-03	46WW11-240222	Groundwater		22-Feb-2024 07:40	23-Feb-2024 09:00	☐
HS24021475-04	46WW09-240222	Groundwater		22-Feb-2024 08:25	23-Feb-2024 09:00	☐
HS24021475-05	46WW09-240222-FD	Groundwater		22-Feb-2024 08:25	23-Feb-2024 09:00	☐
HS24021475-06	46WW07-240222	Groundwater		22-Feb-2024 09:15	23-Feb-2024 09:00	☐
HS24021475-07	LHSMW21-240222	Groundwater		22-Feb-2024 09:55	23-Feb-2024 09:00	☐
HS24021475-08	46WW14-240222	Groundwater		22-Feb-2024 10:40	23-Feb-2024 09:00	☐
HS24021475-09	46WW17-240222	Groundwater		22-Feb-2024 11:25	23-Feb-2024 09:00	☐
HS24021475-10	LHSMW25-240222	Groundwater		22-Feb-2024 12:05	23-Feb-2024 09:00	☐
HS24021475-11	Trip Blank-240222	Water	CG-120823-347	22-Feb-2024 00:00	23-Feb-2024 09:00	☐

Revision:2

ALS Houston, US Date: 02-Apr-24

Client: Bhate Environmental Associates, Inc. **CASE NARRATIVE**
Project: LHAAP / Site 46
Work Order: HS24021475

Work Order Comments

• This report was revised 04/02/24 to update the subcontract Eurofins report to correct a sample ID.

Work Order Comments

• Final report revised to change select list

• The analysis for Carbon Dioxide was subcontracted to Eurofins Lab in Lancaster, PA. Final report attached.

GC Semivolatiles by Method RSK-175

Batch ID: R459722

• The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

GCMS Volatiles by Method SW8260

Batch ID: R460210

Sample ID: VLCSW-240229

• Insufficient sample received to perform MS/MSD. An LCS/LCSD was performed as batch quality control.

WetChemistry by Method SM5310B

Batch ID: R460492,R460881

• The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

WetChemistry by Method SW9056

Batch ID: R459765

Sample ID: 46WW09-240222 (HS24021475-04)

• Sample was analyzed outside of the holding time due to laboratory error. Sample results should be considered estimated.

Sample ID: 46WW09-240222-FD (HS24021475-05)

• Sample was analyzed outside of the holding time due to laboratory error. Sample results should be considered estimated.

Sample ID: 46WW11-240222 (HS24021475-03)

• Sample was analyzed outside of the holding time due to laboratory error. Sample results should be considered estimated.

Sample ID: LHSMW21-240222 (HS24021475-07)

• Sample was analyzed outside of the holding time due to laboratory error. Sample results should be considered estimated.

ALS Houston, US Date: 02-Apr-24

Client: Bhate Environmental Associates, Inc.
Project: LHAAP / Site 46
Sample ID: LHSMW19-240222
Collection Date: 22-Feb-2024 07:00

ANALYTICAL REPORT
WorkOrder:HS24021475
Lab ID:HS24021475-01
Matrix:Groundwater

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C	**Method:SW8260**							Analyst: FT
cis-1,2-Dichloroethene	**12**		**0.20**	**0.50**	**1.0**	**ug/L**	1	01-Mar-2024 02:00
Trichloroethene	**18**		**0.20**	**0.50**	**1.0**	**ug/L**	1	01-Mar-2024 02:00
Vinyl chloride	0.50	U	0.20	0.50	1.0	ug/L	1	01-Mar-2024 02:00
Surr: 1,2-Dichloroethane-d4	*82.6*			**0**	*81-118*	*%REC*	*1*	*01-Mar-2024 02:00*
Surr: 4-Bromofluorobenzene	*90.9*			**0**	*85-114*	*%REC*	*1*	*01-Mar-2024 02:00*
Surr: Dibromofluoromethane	*84.0*			**0**	*80-119*	*%REC*	*1*	*01-Mar-2024 02:00*
Surr: Toluene-d8	*90.1*			**0**	*89-112*	*%REC*	*1*	*01-Mar-2024 02:00*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

Revision: 2

ALS Houston, US Date: 02-Apr-24

Client: Bhate Environmental Associates, Inc.
Project: LHAAP / Site 46
Sample ID: LHSMW19-240222-FD
Collection Date: 22-Feb-2024 07:00

ANALYTICAL REPORT
WorkOrder:HS24021475
Lab ID:HS24021475-02
Matrix:Groundwater

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C	**Method:SW8260**							Analyst: FT
cis-1,2-Dichloroethene	**12**		**0.20**	**0.50**	**1.0**	**ug/L**	1	01-Mar-2024 02:22
Trichloroethene	**19**		**0.20**	**0.50**	**1.0**	**ug/L**	1	01-Mar-2024 02:22
Vinyl chloride	0.50	U	0.20	0.50	1.0	ug/L	1	01-Mar-2024 02:22
Surr: 1,2-Dichloroethane-d4	*83.9*		**0**	*81-118*		*%REC*	*1*	*01-Mar-2024 02:22*
Surr: 4-Bromofluorobenzene	*92.8*		**0**	*85-114*		*%REC*	*1*	*01-Mar-2024 02:22*
Surr: Dibromofluoromethane	*87.3*		**0**	*80-119*		*%REC*	*1*	*01-Mar-2024 02:22*
Surr: Toluene-d8	*89.4*		**0**	*89-112*		*%REC*	*1*	*01-Mar-2024 02:22*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

Revision: 2

ALS Houston, US Date: 02-Apr-24

Client: Bhate Environmental Associates, Inc.
Project: LHAAP / Site 46
Sample ID: 46WW11-240222
Collection Date: 22-Feb-2024 07:40

ANALYTICAL REPORT
WorkOrder:HS24021475
Lab ID:HS24021475-03
Matrix:Groundwater

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C		**Method:SW8260**						Analyst: FT
cis-1,2-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	01-Mar-2024 02:44
Trichloroethene	**18**		**0.20**	**0.50**	**1.0**	**ug/L**	1	01-Mar-2024 02:44
Vinyl chloride	0.50	U	0.20	0.50	1.0	ug/L	1	01-Mar-2024 02:44
Surr: 1,2-Dichloroethane-d4	*82.5*			**0**	*81-118*	*%REC*	*1*	*01-Mar-2024 02:44*
Surr: 4-Bromofluorobenzene	*88.8*			**0**	*85-114*	*%REC*	*1*	*01-Mar-2024 02:44*
Surr: Dibromofluoromethane	*84.4*			**0**	*80-119*	*%REC*	*1*	*01-Mar-2024 02:44*
Surr: Toluene-d8	*89.1*			**0**	*89-112*	*%REC*	*1*	*01-Mar-2024 02:44*
DISSOLVED GASES BY RSK-175		**Method:RSK-175**						Analyst: E.H.
Ethane	**0.00181**		**0.000144**	**0.000500**	**0.00100**	**mg/L**	1	26-Feb-2024 09:01
Ethene	0.000500	U	0.000234	0.000500	0.00100	mg/L	1	26-Feb-2024 09:01
Methane	**0.0755**		**0.000535**	**0.00250**	**0.00250**	**mg/L**	5	26-Feb-2024 09:45
TOTAL ORGANIC CARBON - SM5310B-2011		**Method:SM5310B**						Analyst: MZD
Organic Carbon, Total	**1.77**		**0.500**	**1.00**	**1.00**	**mg/L**	1	05-Mar-2024 02:20
ANIONS BY SW9056A		**Method:SW9056**						Analyst: TH
Chloride	**157**		**2.00**	**1.00**	**5.00**	**mg/L**	10	24-Feb-2024 16:35
Nitrogen, Nitrate (As N)	0.100	HU	0.0300	0.100	0.100	mg/L	1	24-Feb-2024 16:29
Sulfate	**238**		**2.00**	**2.50**	**5.00**	**mg/L**	10	24-Feb-2024 16:35
SUBCONTRACT ANALYSIS - RSK		**Method:NA**						Analyst: SUB
Subcontract Analysis	See Attached		0	0		NA	1	05-Mar-2024 08:52

Note: See Qualifiers Page for a list of qualifiers and their explanation.

Revision: 2

ALS Houston, US Date: 02-Apr-24

Client: Bhate Environmental Associates, Inc.
Project: LHAAP / Site 46
Sample ID: 46WW09-240222
Collection Date: 22-Feb-2024 08:25

ANALYTICAL REPORT
WorkOrder:HS24021475
Lab ID:HS24021475-04
Matrix:Groundwater

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C		**Method:SW8260**						Analyst: FT
cis-1,2-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	01-Mar-2024 03:07
Trichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	01-Mar-2024 03:07
Vinyl chloride	0.50	U	0.20	0.50	1.0	ug/L	1	01-Mar-2024 03:07
Surr: 1,2-Dichloroethane-d4	*81.3*			**0**	*81-118*	*%REC*	*1*	*01-Mar-2024 03:07*
Surr: 4-Bromofluorobenzene	*90.3*			**0**	*85-114*	*%REC*	*1*	*01-Mar-2024 03:07*
Surr: Dibromofluoromethane	*84.5*			**0**	*80-119*	*%REC*	*1*	*01-Mar-2024 03:07*
Surr: Toluene-d8	*89.3*			**0**	*89-112*	*%REC*	*1*	*01-Mar-2024 03:07*
DISSOLVED GASES BY RSK-175		**Method:RSK-175**						Analyst: E.H.
Ethane	0.000500	U	0.000144	0.000500	0.00100	mg/L	1	26-Feb-2024 09:11
Ethene	0.000500	U	0.000234	0.000500	0.00100	mg/L	1	26-Feb-2024 09:11
Methane	**0.00127**		**0.000107**	**0.000500**	**0.000500**	**mg/L**	1	26-Feb-2024 09:11
TOTAL ORGANIC CARBON - SM5310B-2011		**Method:SM5310B**						Analyst: MZD
Organic Carbon, Total	**3.19**		**0.500**	**1.00**	**1.00**	**mg/L**	1	08-Mar-2024 12:25
ANIONS BY SW9056A		**Method:SW9056**						Analyst: TH
Chloride	**374**		**4.00**	**5.00**	**10.0**	**mg/L**	20	24-Feb-2024 16:47
Nitrogen, Nitrate (As N)	0.100	HU	0.0300	0.100	0.100	mg/L	1	24-Feb-2024 16:41
Sulfate	**1,660**		**4.00**	**5.00**	**10.0**	**mg/L**	20	24-Feb-2024 16:47
SUBCONTRACT ANALYSIS - RSK		**Method:NA**						Analyst: SUB
Subcontract Analysis	See Attached		0	0		NA	1	05-Mar-2024 08:52

Note: See Qualifiers Page for a list of qualifiers and their explanation.

Revision: 2

ALS Houston, US Date: 02-Apr-24

Client: Bhate Environmental Associates, Inc.
Project: LHAAP / Site 46
Sample ID: 46WW09-240222-FD
Collection Date: 22-Feb-2024 08:25

ANALYTICAL REPORT
WorkOrder:HS24021475
Lab ID:HS24021475-05
Matrix:Groundwater

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C		**Method:SW8260**						Analyst: FT
cis-1,2-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	01-Mar-2024 03:29
Trichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	01-Mar-2024 03:29
Vinyl chloride	0.50	U	0.20	0.50	1.0	ug/L	1	01-Mar-2024 03:29
Surr: 1,2-Dichloroethane-d4	*81.7*			**0**	*81-118*	*%REC*	*1*	*01-Mar-2024 03:29*
Surr: 4-Bromofluorobenzene	*89.5*			**0**	*85-114*	*%REC*	*1*	*01-Mar-2024 03:29*
Surr: Dibromofluoromethane	*82.8*			**0**	*80-119*	*%REC*	*1*	*01-Mar-2024 03:29*
Surr: Toluene-d8	*90.0*			**0**	*89-112*	*%REC*	*1*	*01-Mar-2024 03:29*
DISSOLVED GASES BY RSK-175		**Method:RSK-175**						Analyst: E.H.
Ethane	0.000500	U	0.000144	0.000500	0.00100	mg/L	1	26-Feb-2024 09:21
Ethene	0.000500	U	0.000234	0.000500	0.00100	mg/L	1	26-Feb-2024 09:21
Methane	**0.00138**		**0.000107**	**0.000500**	**0.000500**	**mg/L**	1	26-Feb-2024 09:21
TOTAL ORGANIC CARBON - SM5310B-2011		**Method:SM5310B**						Analyst: MZD
Organic Carbon, Total	**3.17**		**0.500**	**1.00**	**1.00**	**mg/L**	1	08-Mar-2024 13:10
ANIONS BY SW9056A		**Method:SW9056**						Analyst: TH
Chloride	**389**		**4.00**	**2.00**	**10.0**	**mg/L**	20	24-Feb-2024 17:10
Nitrogen, Nitrate (As N)	**0.0300**	JH	**0.0300**	**0.100**	**0.100**	**mg/L**	1	24-Feb-2024 17:04
Sulfate	**1,750**		**4.00**	**2.00**	**10.0**	**mg/L**	20	24-Feb-2024 17:10
SUBCONTRACT ANALYSIS - RSK		**Method:NA**						Analyst: SUB
Subcontract Analysis	See Attached		0	0		NA	1	05-Mar-2024 08:52

Note: See Qualifiers Page for a list of qualifiers and their explanation.

Revision: 2

ALS Houston, US Date: 02-Apr-24

Client: Bhate Environmental Associates, Inc.
Project: LHAAP / Site 46
Sample ID: 46WW07-240222
Collection Date: 22-Feb-2024 09:15

ANALYTICAL REPORT
WorkOrder:HS24021475
Lab ID:HS24021475-06
Matrix:Groundwater

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C	**Method:SW8260**							Analyst: FT
cis-1,2-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	01-Mar-2024 03:51
Trichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	01-Mar-2024 03:51
Vinyl chloride	0.50	U	0.20	0.50	1.0	ug/L	1	01-Mar-2024 03:51
Surr: 1,2-Dichloroethane-d4	*81.6*			**0**	*81-118*	*%REC*	*1*	*01-Mar-2024 03:51*
Surr: 4-Bromofluorobenzene	*91.6*			**0**	*85-114*	*%REC*	*1*	*01-Mar-2024 03:51*
Surr: Dibromofluoromethane	*83.3*			**0**	*80-119*	*%REC*	*1*	*01-Mar-2024 03:51*
Surr: Toluene-d8	*89.5*			**0**	*89-112*	*%REC*	*1*	*01-Mar-2024 03:51*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

Revision: 2

ALS Houston, US Date: 02-Apr-24

Client: Bhate Environmental Associates, Inc.
Project: LHAAP / Site 46
Sample ID: LHSMW21-240222
Collection Date: 22-Feb-2024 09:55

ANALYTICAL REPORT
WorkOrder:HS24021475
Lab ID:HS24021475-07
Matrix:Groundwater

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C		**Method:SW8260**						Analyst: FT
cis-1,2-Dichloroethene	**170**		**0.20**	**0.50**	**1.0**	**ug/L**	1	01-Mar-2024 04:14
Trichloroethene	**45**		**0.20**	**0.50**	**1.0**	**ug/L**	1	01-Mar-2024 04:14
Vinyl chloride	0.50	U	0.20	0.50	1.0	ug/L	1	01-Mar-2024 04:14
Surr: 1,2-Dichloroethane-d4	*81.7*			**0**	*81-118*	*%REC*	*1*	*01-Mar-2024 04:14*
Surr: 4-Bromofluorobenzene	*89.0*			**0**	*85-114*	*%REC*	*1*	*01-Mar-2024 04:14*
Surr: Dibromofluoromethane	*83.1*			**0**	*80-119*	*%REC*	*1*	*01-Mar-2024 04:14*
Surr: Toluene-d8	*89.9*			**0**	*89-112*	*%REC*	*1*	*01-Mar-2024 04:14*
DISSOLVED GASES BY RSK-175		**Method:RSK-175**						Analyst: E.H.
Ethane	**0.000878**	J	**0.000144**	**0.000500**	**0.00100**	**mg/L**	1	26-Feb-2024 09:36
Ethene	0.000500	U	0.000234	0.000500	0.00100	mg/L	1	26-Feb-2024 09:36
Methane	**0.00141**		**0.000107**	**0.000500**	**0.000500**	**mg/L**	1	26-Feb-2024 09:36
TOTAL ORGANIC CARBON - SM5310B-2011		**Method:SM5310B**						Analyst: MZD
Organic Carbon, Total	**1.60**		**0.500**	**1.00**	**1.00**	**mg/L**	1	08-Mar-2024 13:25
ANIONS BY SW9056A		**Method:SW9056**						Analyst: TH
Chloride	**95.3**		**0.200**	**0.250**	**0.500**	**mg/L**	1	24-Feb-2024 17:16
Nitrogen, Nitrate (As N)	0.100	HU	0.0300	0.100	0.100	mg/L	1	24-Feb-2024 17:16
Sulfate	**816**		**4.00**	**5.00**	**10.0**	**mg/L**	20	24-Feb-2024 17:22
SUBCONTRACT ANALYSIS - RSK		**Method:NA**						Analyst: SUB
Subcontract Analysis	See Attached		0	0		NA	1	05-Mar-2024 08:52

Note: See Qualifiers Page for a list of qualifiers and their explanation.

Revision: 2

ALS Houston, US Date: 02-Apr-24

Client: Bhate Environmental Associates, Inc.
Project: LHAAP / Site 46
Sample ID: 46WW14-240222
Collection Date: 22-Feb-2024 10:40

ANALYTICAL REPORT
WorkOrder:HS24021475
Lab ID:HS24021475-08
Matrix:Groundwater

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C	**Method:SW8260**							Analyst: FT
cis-1,2-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	01-Mar-2024 04:36
Trichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	01-Mar-2024 04:36
Vinyl chloride	0.50	U	0.20	0.50	1.0	ug/L	1	01-Mar-2024 04:36
Surr: 1,2-Dichloroethane-d4	*81.9*			**0**	*81-118*	*%REC*	*1*	*01-Mar-2024 04:36*
Surr: 4-Bromofluorobenzene	*90.6*			**0**	*85-114*	*%REC*	*1*	*01-Mar-2024 04:36*
Surr: Dibromofluoromethane	*83.8*			**0**	*80-119*	*%REC*	*1*	*01-Mar-2024 04:36*
Surr: Toluene-d8	*89.4*			**0**	*89-112*	*%REC*	*1*	*01-Mar-2024 04:36*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

Revision: 2

ALS Houston, US Date: 02-Apr-24

Client: Bhate Environmental Associates, Inc.
Project: LHAAP / Site 46
Sample ID: 46WW17-240222
Collection Date: 22-Feb-2024 11:25

ANALYTICAL REPORT
WorkOrder:HS24021475
Lab ID:HS24021475-09
Matrix:Groundwater

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C	**Method:SW8260**							Analyst: FT
cis-1,2-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	01-Mar-2024 04:58
Trichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	01-Mar-2024 04:58
Vinyl chloride	0.50	U	0.20	0.50	1.0	ug/L	1	01-Mar-2024 04:58
Surr: 1,2-Dichloroethane-d4	*81.8*			**0**	*81-118*	*%REC*	*1*	*01-Mar-2024 04:58*
Surr: 4-Bromofluorobenzene	*90.2*			**0**	*85-114*	*%REC*	*1*	*01-Mar-2024 04:58*
Surr: Dibromofluoromethane	*82.6*			**0**	*80-119*	*%REC*	*1*	*01-Mar-2024 04:58*
Surr: Toluene-d8	*89.2*			**0**	*89-112*	*%REC*	*1*	*01-Mar-2024 04:58*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

Revision: 2

ALS Houston, US Date: 02-Apr-24

Client: Bhate Environmental Associates, Inc.
Project: LHAAP / Site 46
Sample ID: LHSMW25-240222
Collection Date: 22-Feb-2024 12:05

ANALYTICAL REPORT
WorkOrder:HS24021475
Lab ID:HS24021475-10
Matrix:Groundwater

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C	**Method:SW8260**							Analyst: FT
cis-1,2-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	01-Mar-2024 05:20
Trichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	01-Mar-2024 05:20
Vinyl chloride	0.50	U	0.20	0.50	1.0	ug/L	1	01-Mar-2024 05:20
Surr: 1,2-Dichloroethane-d4	*82.7*			**0**	*81-118*	*%REC*	*1*	*01-Mar-2024 05:20*
Surr: 4-Bromofluorobenzene	*89.7*			**0**	*85-114*	*%REC*	*1*	*01-Mar-2024 05:20*
Surr: Dibromofluoromethane	*83.5*			**0**	*80-119*	*%REC*	*1*	*01-Mar-2024 05:20*
Surr: Toluene-d8	*89.0*			**0**	*89-112*	*%REC*	*1*	*01-Mar-2024 05:20*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

Revision: 2

ALS Houston, US Date: 02-Apr-24

Client: Bhate Environmental Associates, Inc.
Project: LHAAP / Site 46
Sample ID: Trip Blank-240222
Collection Date: 22-Feb-2024 00:00

ANALYTICAL REPORT
WorkOrder:HS24021475
Lab ID:HS24021475-11
Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C	**Method:SW8260**							Analyst: FT
cis-1,2-Dichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	01-Mar-2024 01:38
Trichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	01-Mar-2024 01:38
Vinyl chloride	0.50	U	0.20	0.50	1.0	ug/L	1	01-Mar-2024 01:38
Surr: 1,2-Dichloroethane-d4	*81.0*			**0**	*81-118*	*%REC*	*1*	*01-Mar-2024 01:38*
Surr: 4-Bromofluorobenzene	*89.7*			**0**	*85-114*	*%REC*	*1*	*01-Mar-2024 01:38*
Surr: Dibromofluoromethane	*84.0*			**0**	*80-119*	*%REC*	*1*	*01-Mar-2024 01:38*
Surr: Toluene-d8	*89.2*			**0**	*89-112*	*%REC*	*1*	*01-Mar-2024 01:38*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

Revision: 2

ALS Houston, US Date: 02-Apr-24

Client: Bhate Environmental Associates, Inc.
Project: LHAAP / Site 46
WorkOrder: HS24021475

DATES REPORT

Sample ID	Client Samp ID	Collection Date	Leachate Date	Prep Date	Analysis Date	DF
Batch ID: R459722 (0)	**Test Name :** DISSOLVED GASES BY RSK-175				**Matrix:** Groundwater	
HS24021475-03	46WW11-240222	22 Feb 2024 07:40			26 Feb 2024 09:45	5
HS24021475-03	46WW11-240222	22 Feb 2024 07:40			26 Feb 2024 09:01	1
HS24021475-04	46WW09-240222	22 Feb 2024 08:25			26 Feb 2024 09:11	1
HS24021475-05	46WW09-240222-FD	22 Feb 2024 08:25			26 Feb 2024 09:21	1
HS24021475-07	LHSMW21-240222	22 Feb 2024 09:55			26 Feb 2024 09:36	1
Batch ID: R459765 (0)	**Test Name :** ANIONS BY SW9056A				**Matrix:** Groundwater	
HS24021475-03	46WW11-240222	22 Feb 2024 07:40			24 Feb 2024 16:35	10
HS24021475-03	46WW11-240222	22 Feb 2024 07:40			24 Feb 2024 16:29	1
HS24021475-04	46WW09-240222	22 Feb 2024 08:25			24 Feb 2024 16:47	20
HS24021475-04	46WW09-240222	22 Feb 2024 08:25			24 Feb 2024 16:41	1
HS24021475-05	46WW09-240222-FD	22 Feb 2024 08:25			24 Feb 2024 17:10	20
HS24021475-05	46WW09-240222-FD	22 Feb 2024 08:25			24 Feb 2024 17:04	1
HS24021475-07	LHSMW21-240222	22 Feb 2024 09:55			24 Feb 2024 17:22	20
HS24021475-07	LHSMW21-240222	22 Feb 2024 09:55			24 Feb 2024 17:16	1
Batch ID: R460210 (0)	**Test Name :** VOLATILES ORGANICS BY METHOD 8260C				**Matrix:** Water	
HS24021475-11	Trip Blank-240222	22 Feb 2024 00:00			01 Mar 2024 01:38	1
Batch ID: R460210 (0)	**Test Name :** VOLATILES ORGANICS BY METHOD 8260C				**Matrix:** Groundwater	
HS24021475-01	LHSMW19-240222	22 Feb 2024 07:00			01 Mar 2024 02:00	1
HS24021475-02	LHSMW19-240222-FD	22 Feb 2024 07:00			01 Mar 2024 02:22	1
HS24021475-03	46WW11-240222	22 Feb 2024 07:40			01 Mar 2024 02:44	1
HS24021475-04	46WW09-240222	22 Feb 2024 08:25			01 Mar 2024 03:07	1
HS24021475-05	46WW09-240222-FD	22 Feb 2024 08:25			01 Mar 2024 03:29	1
HS24021475-06	46WW07-240222	22 Feb 2024 09:15			01 Mar 2024 03:51	1
HS24021475-07	LHSMW21-240222	22 Feb 2024 09:55			01 Mar 2024 04:14	1
HS24021475-08	46WW14-240222	22 Feb 2024 10:40			01 Mar 2024 04:36	1
HS24021475-09	46WW17-240222	22 Feb 2024 11:25			01 Mar 2024 04:58	1
HS24021475-10	LHSMW25-240222	22 Feb 2024 12:05			01 Mar 2024 05:20	1
Batch ID: R460455 (0)	**Test Name :** SUBCONTRACT ANALYSIS - RSK				**Matrix:** Groundwater	
HS24021475-03	46WW11-240222	22 Feb 2024 07:40			05 Mar 2024 08:52	1
HS24021475-04	46WW09-240222	22 Feb 2024 08:25			05 Mar 2024 08:52	1
HS24021475-05	46WW09-240222-FD	22 Feb 2024 08:25			05 Mar 2024 08:52	1
HS24021475-07	LHSMW21-240222	22 Feb 2024 09:55			05 Mar 2024 08:52	1
Batch ID: R460492 (0)	**Test Name :** TOTAL ORGANIC CARBON - SM5310B-2011				**Matrix:** Groundwater	
HS24021475-03	46WW11-240222	22 Feb 2024 07:40			05 Mar 2024 02:20	1

Revision: 2

ALS Houston, US Date: 02-Apr-24

Client: Bhate Environmental Associates, Inc.
Project: LHAAP / Site 46
WorkOrder: HS24021475

DATES REPORT

Sample ID	Client Samp ID	Collection Date	Leachate Date	Prep Date	Analysis Date	DF
Batch ID: R460881 (0)	**Test Name :** TOTAL ORGANIC CARBON - SM5310B-2011				**Matrix:** Groundwater	
HS24021475-04	46WW09-240222	22 Feb 2024 08:25			08 Mar 2024 12:25	1
HS24021475-05	46WW09-240222-FD	22 Feb 2024 08:25			08 Mar 2024 13:10	1
HS24021475-07	LHSMW21-240222	22 Feb 2024 09:55			08 Mar 2024 13:25	1

Revision: 2

ALS Houston, US Date: 02-Apr-24

Client: Bhate Environmental Associates, Inc.
Project: LHAAP / Site 46
WorkOrder: HS24021475

QC BATCH REPORT

Batch ID: R459722 (0) **Instrument: FID-4** **Method: DISSOLVED GASES BY RSK-175**

MBLK Sample ID: **MBLK-240223** Units: **mg/L** Analysis Date: **23-Feb-2024 09:03**
Client ID: Run ID: **FID-4_459722** SeqNo: **7850600** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Ethane	0.000500	0.00100								U
Ethene	0.000500	0.00100								U
Methane	0.000500	0.000500								U

LCS Sample ID: **LCS-240223** Units: **mg/L** Analysis Date: **23-Feb-2024 09:54**
Client ID: Run ID: **FID-4_459722** SeqNo: **7850601** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Ethane	0.0213	0.00100	0.01804	0	118	75 - 125				
Ethene	0.0180	0.00100	0.0168	0	107	75 - 125				
Methane	0.00854	0.000500	0.009647	0	88.6	75 - 125				

LCSD Sample ID: **LCSD-240223** Units: **mg/L** Analysis Date: **23-Feb-2024 10:02**
Client ID: Run ID: **FID-4_459722** SeqNo: **7850602** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Ethane	0.0210	0.00100	0.01804	0	117	75 - 125	0.02126	1.1	30	
Ethene	0.0187	0.00100	0.0168	0	111	75 - 125	0.01795	4.01	30	
Methane	0.00847	0.000500	0.009647	0	87.8	75 - 125	0.008543	0.88	30	

The following samples were analyzed in this batch: HS24021475-03 HS24021475-04 HS24021475-05 HS24021475-07

Revision: 2

ALS Houston, US Date: 02-Apr-24

Client: Bhate Environmental Associates, Inc.
Project: LHAAP / Site 46
WorkOrder: HS24021475

QC BATCH REPORT

Batch ID: R460210 (0) **Instrument: VOA9** **Method: VOLATILES ORGANICS BY METHOD 8260C**

MBLK Sample ID: **VBLKW-240229** Units: **ug/L** Analysis Date: **29-Feb-2024 23:46**
Client ID: Run ID: **VOA9_460210** SeqNo: **7862695** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
cis-1,2-Dichloroethene	0.50	1.0								U
Trichloroethene	0.50	1.0								U
Vinyl chloride	0.50	1.0								U
Surr: 1,2-Dichloroethane-d4	*40.58*	*35*	*50*	*0*	*81.2*	*81 - 118*				
Surr: 4-Bromofluorobenzene	*44.89*	*35*	*50*	*0*	*89.8*	*85 - 114*				
Surr: Dibromofluoromethane	*42.01*	*35*	*50*	*0*	*84.0*	*80 - 119*				
Surr: Toluene-d8	*44.72*	*35*	*50*	*0*	*89.4*	*89 - 112*				

LCS Sample ID: **VLCSW-240229** Units: **ug/L** Analysis Date: **29-Feb-2024 22:40**
Client ID: Run ID: **VOA9_460210** SeqNo: **7862693** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
cis-1,2-Dichloroethene	20.52	1.0	20	0	103	78 - 123				
Trichloroethene	19.82	1.0	20	0	99.1	79 - 123				
Vinyl chloride	22.34	1.0	20	0	112	58 - 137				
Surr: 1,2-Dichloroethane-d4	*49.09*	*35*	*50*	*0*	*98.2*	*81 - 118*				
Surr: 4-Bromofluorobenzene	*50.74*	*35*	*50*	*0*	*101*	*85 - 114*				
Surr: Dibromofluoromethane	*51.96*	*35*	*50*	*0*	*104*	*80 - 119*				
Surr: Toluene-d8	*48.28*	*35*	*50*	*0*	*96.6*	*89 - 112*				

LCSD Sample ID: **VLCSDW-240229** Units: **ug/L** Analysis Date: **29-Feb-2024 23:02**
Client ID: Run ID: **VOA9_460210** SeqNo: **7862694** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
cis-1,2-Dichloroethene	20.24	1.0	20	0	101	78 - 123	20.52	1.37	20	
Trichloroethene	20.61	1.0	20	0	103	79 - 123	19.82	3.91	20	
Vinyl chloride	20.79	1.0	20	0	104	58 - 137	22.34	7.17	20	
Surr: 1,2-Dichloroethane-d4	*49.41*	*35*	*50*	*0*	*98.8*	*81 - 118*	*49.09*	*0.655*	*20*	
Surr: 4-Bromofluorobenzene	*50.59*	*35*	*50*	*0*	*101*	*85 - 114*	*50.74*	*0.295*	*20*	
Surr: Dibromofluoromethane	*50.51*	*35*	*50*	*0*	*101*	*80 - 119*	*51.96*	*2.83*	*20*	
Surr: Toluene-d8	*49.74*	*35*	*50*	*0*	*99.5*	*89 - 112*	*48.28*	*2.99*	*20*	

The following samples were analyzed in this batch:

HS24021475-01	HS24021475-02	HS24021475-03	HS24021475-04
HS24021475-05	HS24021475-06	HS24021475-07	HS24021475-08
HS24021475-09	HS24021475-10	HS24021475-11	

Revision: 2

ALS Houston, US Date: 02-Apr-24

Client: Bhate Environmental Associates, Inc.
Project: LHAAP / Site 46
WorkOrder: HS24021475

QC BATCH REPORT

Batch ID: R459765 (0) **Instrument: ICS-Integrion** **Method: ANIONS BY SW9056A**

MBLK Sample ID: **MBLK** Units: **mg/L** Analysis Date: **24-Feb-2024 17:57**
Client ID: Run ID: **ICS-Integrion_459765** SeqNo: **7851658** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	0.100	0.500								U
Nitrogen, Nitrate (As N)	0.100	0.100								U
Sulfate	0.100	0.500								U

LCS Sample ID: **LCS** Units: **mg/L** Analysis Date: **24-Feb-2024 18:03**
Client ID: Run ID: **ICS-Integrion_459765** SeqNo: **7851659** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	19.71	0.500	20	0	98.6	80 - 120				
Nitrogen, Nitrate (As N)	3.929	0.100	4	0	98.2	80 - 120				
Sulfate	20.9	0.500	20	0	105	80 - 120				

MS Sample ID: **HS24021089-06MS** Units: **mg/L** Analysis Date: **24-Feb-2024 19:32**
Client ID: Run ID: **ICS-Integrion_459765** SeqNo: **7851671** PrepDate: DF: **250**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	11040	125	2500	8667	94.7	80 - 120				
Nitrogen, Nitrate (As N)	477.5	25.0	500	6.225	94.2	80 - 120				
Sulfate	5436	125	2500	2989	97.9	80 - 120				

MSD Sample ID: **HS24021089-06MSD** Units: **mg/L** Analysis Date: **24-Feb-2024 19:38**
Client ID: Run ID: **ICS-Integrion_459765** SeqNo: **7851672** PrepDate: DF: **250**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	11000	125	2500	8667	93.5	80 - 120	11040	0.288	20	
Nitrogen, Nitrate (As N)	474.8	25.0	500	6.225	93.7	80 - 120	477.5	0.551	20	
Sulfate	5444	125	2500	2989	98.2	80 - 120	5436	0.156	20	

The following samples were analyzed in this batch: HS24021475-03 HS24021475-04 HS24021475-05 HS24021475-07

Revision: 2

ALS Houston, US Date: 02-Apr-24

Client: Bhate Environmental Associates, Inc.
Project: LHAAP / Site 46
WorkOrder: HS24021475

QC BATCH REPORT

Batch ID: R460492 (0) **Instrument: TOC_05** **Method: TOTAL ORGANIC CARBON - SM5310B-2011**

MBLK Sample ID: **MBLK-03042024** Units: **mg/L** Analysis Date: **04-Mar-2024 22:46**
Client ID: Run ID: **TOC_05_460492** SeqNo: **7868781** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Organic Carbon, Total	1.00	1.00								U

LCS Sample ID: **LCS-03042024** Units: **mg/L** Analysis Date: **04-Mar-2024 23:01**
Client ID: Run ID: **TOC_05_460492** SeqNo: **7868782** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Organic Carbon, Total	9.71	1.00	10	0	97.1	85 - 115				

LCSD Sample ID: **LCSD-03042024** Units: **mg/L** Analysis Date: **04-Mar-2024 23:16**
Client ID: Run ID: **TOC_05_460492** SeqNo: **7868783** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Organic Carbon, Total	9.326	1.00	10	0	93.3	85 - 115	9.71	4.03	20	

MS Sample ID: **HS24021629-06MS** Units: **mg/L** Analysis Date: **05-Mar-2024 00:53**
Client ID: Run ID: **TOC_05_460492** SeqNo: **7868790** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Organic Carbon, Total	10.25	1.00	10	0.494	97.6	80 - 120				

The following samples were analyzed in this batch: HS24021475-03

Revision: 2

ALS Houston, US Date: 02-Apr-24

Client: Bhate Environmental Associates, Inc.
Project: LHAAP / Site 46
WorkOrder: HS24021475

QC BATCH REPORT

Batch ID: R460881 (0) **Instrument: TOC_05** **Method: TOTAL ORGANIC CARBON - SM5310B-2011**

MBLK Sample ID: **MBLK-03082024** Units: **mg/L** Analysis Date: **08-Mar-2024 10:29**
Client ID: Run ID: **TOC_05_460881** SeqNo: **7876885** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Organic Carbon, Total	1.00	1.00								U

LCS Sample ID: **LCS-03082024** Units: **mg/L** Analysis Date: **08-Mar-2024 10:44**
Client ID: Run ID: **TOC_05_460881** SeqNo: **7876886** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Organic Carbon, Total	10.42	1.00	10	0	104	85 - 115				

LCSD Sample ID: **LCSD-03082024** Units: **mg/L** Analysis Date: **08-Mar-2024 10:59**
Client ID: Run ID: **TOC_05_460881** SeqNo: **7876887** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Organic Carbon, Total	10.55	1.00	10	0	106	85 - 115	10.42	1.24	20	

MS Sample ID: **HS24021657-01MS** Units: **mg/L** Analysis Date: **08-Mar-2024 11:41**
Client ID: Run ID: **TOC_05_460881** SeqNo: **7876890** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Organic Carbon, Total	10.95	1.00	10	0.9007	100	80 - 120				

The following samples were analyzed in this batch: HS24021475-04 HS24021475-05 HS24021475-07

Revision: 2

ALS Houston, US Date: 02-Apr-24

Client: Bhate Environmental Associates, Inc.
Project: LHAAP / Site 46
WorkOrder: **HS24021475**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte detected below quantitation limit
M	Manually integrated, see raw data for justification
n	Not offered for accreditation
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL/SDL

Acronym	Description
DCS	Detectability Check Study
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
MBLK	Method Blank
MDL	Method Detection Limit
MQL	Method Quantitation Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PDS	Post Digestion Spike
PQL	Practical Quantitaion Limit
SD	Serial Dilution
SDL	Sample Detection Limit
TRRP	Texas Risk Reduction Program

Unit Reported	Description
mg/L	Milligrams per Liter

CERTIFICATIONS,ACCREDITATIONS & LICENSES

Agency	Number	Expire Date
California	2919; 2024	30-Apr-2024
Florida	E87611-38	30-Jun-2024
Illinois	2000322023-11	30-Jun-2024
Kansas	E-10352 2023-2024	31-Jul-2024
Louisiana	03087 2023-2024	30-Jun-2024
Maryland	343; 2023-2024	30-Jun-2024
North Carolina	624 - 2024	31-Dec-2024
North Dakota	R-193 2023-2024	30-Apr-2024
Oklahoma	2023-140	31-Aug-2024
Texas	T104704231-23-32	30-Apr-2024
Utah	TX026932023-14	31-Jul-2024

ALS Houston, US Date: 02-Apr-24

Sample Receipt Checklist

Work Order ID: HS24021475 **Date/Time Received:** **23-Feb-2024 09:00**

Client Name: Bhate Environmental **Received by:** **Si Ma**

Completed By: */S/ Paresh M. Giga* (eSignature) 24-Feb-2024 13:12 (Date/Time) **Reviewed by:** */S/ luis.aguilar* (eSignature) 26-Feb-2024 13:32 (Date/Time)

Matrices: **GW/Water** Carrier name: **FedEx Priority Overnight**

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
VOA/TX1005/TX1006 Solids in hermetically sealed vials?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	1 Page(s)
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	COC IDs:none
Samplers name present on COC?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐	

Temperature(s)/Thermometer(s):	2.5C/2.4C U/C	IR31
Cooler(s)/Kit(s):	51680	
Date/Time sample(s) sent to storage:	2/24/24 13:25	

Water - VOA vials have zero headspace?	Yes ☑	No ☐	No VOA vials submitted ☐
Water - pH acceptable upon receipt?	Yes ☐	No ☐	N/A ☑
pH adjusted?	Yes ☐	No ☐	N/A ☑
pH adjusted by:			

Login Notes: Login Comments: NO3 missed by Login.
Samples taken to analyst 2/24/24 @ 12:15 per JG.

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

Corrective Action:

bhate

Page: _____ of _____

Project/Phase

No: JVPCIBH.0001

1608 13th Avenue South, Suite 300
Birmingham Alabama 35205

COC Number(1):

Chain of Custody and Analytical Request

LIMS Number: _____

Facility/Base I.D.: LHAAP / BILL to PCI

Project/Site Name: LHAAP / Site 46

Client Name:

Collected by: Scott Beesinger

Field Sample ID (30 Characters Max)	Date Collected (dd-mmm-yyyy)	Time Collected (Military) (hhmm)	Sample Depth (beginning - ending)	SA Code (2)	Sample Number (3)	Sample Matrix (4)	Number of containers	VOC	Dissolved Gases	TOC	Carbon Dioxide	Anions			Ambient Blank Lot Control Number	Equipment Blank Lot Control Number	Trip Blank Lot Control Number	Cooler ID
LHSmw19-240222	22 FEB 2024	0700	-	N		WG	3	X										
LHSmw19-240222-FD	22 FEB 2024	0700	-	FB		WG	3	X										
46wwl1-240222	22 FEB 2024	0740	-	N		WG	12	X	X	X	X	X						
46wwc9-240222	22 FEB 2024	0825		N		WG	12	X	X	X	X	X						
46wwc9-240222-FD	22 FEB 2024	0825		FD		WG	12	X	X	X	X	X						
46wwc7-240222	22 FEB 2024	0915	-	N		WG	3	X										
LHSmw21-240222	22 FEB 2024	0955	-	N		WG	12	X	X	X	X	X						
46wwl4-240222	22 FEB 2024	1040	-	N		WG	3	X										
46wwl7-240222	22 FEB 2024	1125	-	N		WG	3	X										
LHSmw25-240222	22 FEB 2024	1205	-	N		WG	3	X										
TRIP BLANK-240222	22 FEB 2024		-	TB		W	2	X										

Sample Analysis Requested (5) | Quality Assurance Samples (6)

HS24021475

Bhate Environmental Associates, Inc.
LHAAP / Site 46

COMMENTS: STANDARD TAT Coolant Stuck Temp 1.5 Bottles Filled

Custody Transfers Prior to Receipt by Laboratory

Relinquished By (Signed)	Date	Time	Received by (signed)	Date	Time
1. Scott Beesinger	2/22/24	1330	1.		
2.			2.		
3.			3. SM	2/23/24	0910

Sample Delivery Details / Laboratory Receipt

Delivered Directly to Lab: _____ Shipped _____ No.:

Method of Shipment: _____

_____ Fed _____ Ex _____ Airbill Number:

Analytical Lab: ALS 10450 Stanciff, Rd. Suite 210 Houston, TX 77099 (281) 530-5656

ATTN: Dane Wacasey Lab Recipient: Delivery Date/Time:

1.) Chain of Custody Number = date collected + custody number (e.g. 09-02-1999-01)

2.) Sample Type (SA) Codes: N = Normal Sample, TB = Trip Blank (-c) Sample, FD = Field Duplicate (-a) Samples, FR = Field Replicate (-b) Samples, EB = Equipment Blank (-d) Samples, MS = Matrix Spike, SD = Matrix Spike Duplicate, AB = Ambient Blank (-e)

3.) Sample Number: Unique sample number collected from a particular location per day. (e.g. Groundwater sample collected from MW-1 on 10/10/99 = 01, if sampled again on 10/10/99 = 02, etc.)

4.) Matrix Codes: GS = Soil Gas, WG = Groundwater, WS = Surface Water, SO = Soil, SE = Sediment, SL = Sludge, SS = Surface Soil Samples, WQ = Aqueous Blank Samples (trip, equipment, ambient, etc), SQ = Soil Blanks

5.) Sample Analysis Requested: Analytical method requested and number of containers provided for each.

6.) Quality assurance samples are assigned by date (ddmmyy) and the sample number associated with the sample (01, 02, etc) (e.g. Equipment blank collected in association with MW-1 on 10/10/99 will be designated 10109901 in the Equipment Blank Lot Control

ALS
10450 Stancliff Rd., Suite 210
Houston, Texas 77099
Tel. +1 281 530 5656
Fax. +1 281 530 5887

51680

CUSTODY SEAL

Date: 2/23/24 Time: 1330
Name: Scott Beesinger
Company: Apex

Seal Broken By: BM
Date: 02/23/24

51680

FEB 2 3 2024

Must Deliver Next Business Day
Time and Tempature Sensitive!

51680

ORIGIN ID:SGRA (903) 930-6193
ATT: SCOTT BEESINGER
APTIM ENVIRONMENTAL & INFRAST. INC
1203-B EAST GRAND AVE PMB202

MARSHALL, TX 75670
UNITED STATES US

SHIP DATE: 05FEB24
ACTWGT: 1.00 LB MAN
CAD: 0221247/CAFE3755
DIMS: 26x14x14 IN

TO **SAMPLE RECEIVING**
ALS GROUP USA,CORP
10450 STANCLIFF ROAD
SUITE 210
HOUSTON TX 77099
(281) 530-5656
REF: LHAAP-46-B098721-JG

RMA:

FedEx Express

FedEx.
TRK# 0221 6862 6801 8430

FRI - 23 FEB AA
PRIORITY OVERNIGHT

AB SGRA

77099
TX-US
IAH

4210674 22Feb2024 CCGA 5610G/1948/C098

eurofins | Environment Testing

ANALYTICAL REPORT

PREPARED FOR

Attn: James Guin
ALS Group USA, Corp
10450 Stancliff Rd.
Suite 210
Houston, Texas 77099

Generated 4/2/2024 11:02:09 AM Revision 1

JOB DESCRIPTION

HS24021475

JOB NUMBER

410-161910-1

Eurofins Lancaster Laboratories Environment Testing, LLC
2425 New Holland Pike
Lancaster PA 17601

See page two for job notes and contact information.

my EOL

Eurofins Lancaster Laboratories Environment Testing, LLC

Job Notes

This report may not be reproduced except in full, and with written approval from the laboratory. The results relate only to the samples tested. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

Analytical test results meet all requirements of the associated regulatory program (i.e., NELAC (TNI), DoD, and ISO 17025) unless otherwise noted under the individual analysis.

Authorization



Generated
4/2/2024 11:02:09 AM
Revision 1

Authorized for release by
Dana Kauffman, Project Manager
Dana.Kauffman@et.eurofinsus.com
(717)556-7219

Eurofins Lancaster Laboratories Environment Testing, LLC

Compliance Statement

Analytical test results meet all requirements of the associated regulatory program (e.g., NELAC (TNI), DoD, and ISO 17025) unless otherwise noted under the individual analysis. Data qualifiers are applied to note exceptions. Noncompliant quality control (QC) is further explained in narrative comments.
· QC results that exceed the upper limits and are associated with non-detect samples are qualified but further narration is not required since the bias is high and does not change a non-detect result. Further narration is also not required with QC blank detection when the associated sample concentration is non-detect or more than ten times the level in the blank.
· Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD is performed, unless otherwise specified in the method.
· Surrogate and/or isotope dilution analyte recoveries (if applicable) which are outside of the QC window are confirmed unless attributed to a dilution or otherwise noted in the narrative.
Regulated compliance samples (e.g. SDWA, NPDES) must comply with the associated agency requirements/permits.

Measurement uncertainty values, as applicable, are available upon request.

Test results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff. Times are local to the area of activity. Parameters listed in the 40 CFR Part 136 Table II as "analyze immediately" and tested in the laboratory are not performed within 15 minutes of collection.

This report shall not be reproduced except in full, without the written approval of the laboratory.

WARRANTY AND LIMITS OF LIABILITY - In accepting analytical work, we warrant the accuracy of test results for the sample as submitted. The foregoing express warranty is exclusive and is given in lieu of all other warranties, expressed or implied, except as otherwise agreed. We disclaim any other warranties, expressed or implied, including a warranty of fitness for particular purpose and warranty of merchantability. In no event shall Eurofins Lancaster Laboratories Environmental, LLC be liable for indirect, special, consequential, or incidental damages including, but not limited to, damages for loss of profit or goodwill regardless of (A) the negligence (either sole or concurrent) of Eurofins Lancaster Laboratories Environmental and (B) whether Eurofins Lancaster Laboratories Environmental has been informed of the possibility of such damages. We accept no legal responsibility for the purposes for which the client uses the test results. Except as otherwise agreed, no purchase order or other order for work shall be accepted by Eurofins Lancaster Laboratories Environmental which includes any conditions that vary from the Standard Terms and Conditions, and Eurofins Lancaster Laboratories Environmental hereby objects to any conflicting terms contained in any acceptance or order submitted by client.



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Definitions/Glossary

Client: ALS Group USA, Corp
Project/Site: HS24021475

Job ID: 410-161910-1

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Case Narrative

Client: ALS Group USA, Corp
Project: HS24021475

Job ID: 410-161910-1

Job ID: 410-161910-1 — Eurofins Lancaster Laboratories Environment

Job Narrative
410-161910-1

REVISION

The report being provided is a revision of the original report sent on 3/5/2024. The report (revision 1) is being revised due to Update the Job Description and sample ID on 161910-4.

Analytical test results meet all requirements of the associated regulatory program listed on the Accreditation/Certification Summary Page unless otherwise noted under the individual analysis. Data qualifiers are applied to indicate exceptions. Noncompliant quality control (QC) is further explained in narrative comments.

- Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD may be performed, unless otherwise specified in the method.
- Surrogate and/or isotope dilution analyte recoveries (if applicable) which are outside of the QC window are confirmed unless attributed to a dilution or otherwise noted in the narrative.

Regulated compliance samples (e.g. SDWA, NPDES) must comply with the associated agency requirements/permits.

Receipt
The samples were received on 2/27/2024 9:55 AM. Unless otherwise noted below, the samples arrived in good condition, and, where required, properly preserved and on ice. The temperature of the cooler at receipt time was 3.0°C.

GC VOA
No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

Detection Summary

Client: ALS Group USA, Corp
Project/Site: HS24021475

Job ID: 410-161910-1

Client Sample ID: HS24021475-03 46WW11-240222 — Lab Sample ID: 410-161910-1

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	Dil Fac	D	Method	Prep Type
Carbon dioxide	170000		12000		5600	ug/L	1		RSK-175	Total/NA

Client Sample ID: HS24021475-04 46WW09-240222 — Lab Sample ID: 410-161910-2

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	Dil Fac	D	Method	Prep Type
Carbon dioxide	63000		12000		5600	ug/L	1		RSK-175	Total/NA

Client Sample ID: HS24021475-05 46WW09-240222FD — Lab Sample ID: 410-161910-3

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	Dil Fac	D	Method	Prep Type
Carbon dioxide	71000		12000		5600	ug/L	1		RSK-175	Total/NA

Client Sample ID: HS24021475-07 LHSMW21-240222 — Lab Sample ID: 410-161910-4

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	Dil Fac	D	Method	Prep Type
Carbon dioxide	43000		12000		5600	ug/L	1		RSK-175	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample Results

Client: ALS Group USA, Corp
Project/Site: HS24021475

Job ID: 410-161910-1

Client Sample ID: HS24021475-03 46WW11-240222
Lab Sample ID: 410-161910-1
Date Collected: 02/22/24 07:40
Matrix: Water
Date Received: 02/27/24 09:55

Method: RSK-175 - Dissolved Gases (GC)

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Carbon dioxide	170000		12000		5600	ug/L		03/04/24 11:11	1

Client Sample ID: HS24021475-04 46WW09-240222
Lab Sample ID: 410-161910-2
Date Collected: 02/22/24 08:25
Matrix: Water
Date Received: 02/27/24 09:55

Method: RSK-175 - Dissolved Gases (GC)

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Carbon dioxide	63000		12000		5600	ug/L		03/04/24 11:18	1

Client Sample ID: HS24021475-05 46WW09-240222FD
Lab Sample ID: 410-161910-3
Date Collected: 02/22/24 08:25
Matrix: Water
Date Received: 02/27/24 09:55

Method: RSK-175 - Dissolved Gases (GC)

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Carbon dioxide	71000		12000		5600	ug/L		03/04/24 11:27	1

Client Sample ID: HS24021475-07 LHSMW21-240222
Lab Sample ID: 410-161910-4
Date Collected: 02/22/24 09:55
Matrix: Water
Date Received: 02/27/24 09:55

Method: RSK-175 - Dissolved Gases (GC)

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Carbon dioxide	43000		12000		5600	ug/L		03/04/24 11:34	1

QC Sample Results

Client: ALS Group USA, Corp
Project/Site: HS24021475

Job ID: 410-161910-1

Method: RSK-175 - Dissolved Gases (GC)

Lab Sample ID: MB 410-479323/1-A
Matrix: Water
Analysis Batch: 479281

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 479323

Analyte	MB Result	MB Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Carbon dioxide	<5600		12000		5600	ug/L		03/04/24 10:41	1

Lab Sample ID: LCS 410-479323/2-A
Matrix: Water
Analysis Batch: 479281

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 479323

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits		
Carbon dioxide			35800	36400		ug/L		102	80 - 122		

QC Association Summary

Client: ALS Group USA, Corp
Project/Site: HS24021475

Job ID: 410-161910-1

GC VOA

Analysis Batch: 479281

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
410-161910-1	HS24021475-03 46WW11-240222	Total/NA	Water	RSK-175	479323
410-161910-2	HS24021475-04 46WW09-240222	Total/NA	Water	RSK-175	479323
410-161910-3	HS24021475-05 46WW09-240222FD	Total/NA	Water	RSK-175	479323
410-161910-4	HS24021475-07 LHSMW21-240222	Total/NA	Water	RSK-175	479323
MB 410-479323/1-A	Method Blank	Total/NA	Water	RSK-175	479323
LCS 410-479323/2-A	Lab Control Sample	Total/NA	Water	RSK-175	479323

Prep Batch: 479323

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
410-161910-1	HS24021475-03 46WW11-240222	Total/NA	Water	RSK-175	
410-161910-2	HS24021475-04 46WW09-240222	Total/NA	Water	RSK-175	
410-161910-3	HS24021475-05 46WW09-240222FD	Total/NA	Water	RSK-175	
410-161910-4	HS24021475-07 LHSMW21-240222	Total/NA	Water	RSK-175	
MB 410-479323/1-A	Method Blank	Total/NA	Water	RSK-175	
LCS 410-479323/2-A	Lab Control Sample	Total/NA	Water	RSK-175	

Lab Chronicle

Client: ALS Group USA, Corp
Project/Site: HS24021475

Job ID: 410-161910-1

Client Sample ID: HS24021475-03 46WW11-240222
Lab Sample ID: 410-161910-1
Date Collected: 02/22/24 07:40
Matrix: Water
Date Received: 02/27/24 09:55

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	RSK-175			479323	HQR6	ELLE	03/04/24 10:36
Total/NA	Analysis	RSK-175		1	479281	LXF2	ELLE	03/04/24 11:11

Client Sample ID: HS24021475-04 46WW09-240222
Lab Sample ID: 410-161910-2
Date Collected: 02/22/24 08:25
Matrix: Water
Date Received: 02/27/24 09:55

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	RSK-175			479323	HQR6	ELLE	03/04/24 10:36
Total/NA	Analysis	RSK-175		1	479281	LXF2	ELLE	03/04/24 11:18

Client Sample ID: HS24021475-05 46WW09-240222FD
Lab Sample ID: 410-161910-3
Date Collected: 02/22/24 08:25
Matrix: Water
Date Received: 02/27/24 09:55

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	RSK-175			479323	HQR6	ELLE	03/04/24 10:36
Total/NA	Analysis	RSK-175		1	479281	LXF2	ELLE	03/04/24 11:27

Client Sample ID: HS24021475-07 LHSMW21-240222
Lab Sample ID: 410-161910-4
Date Collected: 02/22/24 09:55
Matrix: Water
Date Received: 02/27/24 09:55

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	RSK-175			479323	HQR6	ELLE	03/04/24 10:36
Total/NA	Analysis	RSK-175		1	479281	LXF2	ELLE	03/04/24 11:34

Laboratory References:

ELLE = Eurofins Lancaster Laboratories Environment Testing, LLC, 2425 New Holland Pike, Lancaster, PA 17601, TEL (717)656-2300

Accreditation/Certification Summary

Client: ALS Group USA, Corp
Project/Site: HS24021475

Job ID: 410-161910-1

Laboratory: Eurofins Lancaster Laboratories Environment Testing, LLC

Unless otherwise noted, all analytes for this laboratory were covered under each accreditation/certification below.

Authority	Program	Identification Number	Expiration Date
Louisiana (All)	NELAP	02055	06-30-24

The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.

Analysis Method	Prep Method	Matrix	Analyte
RSK-175	RSK-175	Water	Carbon dioxide

Texas	NELAP	T104704194-23-46	08-31-24

Method Summary

Client: ALS Group USA, Corp
Project/Site: HS24021475

Job ID: 410-161910-1

Method	Method Description	Protocol	Laboratory
RSK-175	Dissolved Gases (GC)	RSK	ELLE
RSK-175	Dissolved Gases Prep	RSK	ELLE

Protocol References:

RSK = Sample Prep And Calculations For Dissolved Gas Analysis In Water Samples Using A GC Headspace Equilibration Technique, RSKSOP-175, Rev. 0, 8/11/94, USEPA Research Lab

Laboratory References:

ELLE = Eurofins Lancaster Laboratories Environment Testing, LLC, 2425 New Holland Pike, Lancaster, PA 17601, TEL (717)656-2300

Sample Summary

Client: ALS Group USA, Corp
Project/Site: HS24021475

Job ID: 410-161910-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
410-161910-1	HS24021475-03 46WW11-240222	Water	02/22/24 07:40	02/27/24 09:55
410-161910-2	HS24021475-04 46WW09-240222	Water	02/22/24 08:25	02/27/24 09:55
410-161910-3	HS24021475-05 46WW09-240222FD	Water	02/22/24 08:25	02/27/24 09:55
410-161910-4	HS24021475-07 LHSMW21-240222	Water	02/22/24 09:55	02/27/24 09:55

410-161910 Chain of Custody

10450 Stancliff Rd, Ste 210
Houston, TX 77099
T: +1 281 530 5656
F: +1 281 530 5887
www.alsglobal.com

Subcontract Chain of Custody

SAMPLING STATE: **Colorado** **COC ID:** **24856**

SUBCONTRACT TO:

Eurofins Lancaster Laboratories Envt Testing
2425 New Holland Pike
Lancaster, PA 17601 **Phone:** +1 717 656 2300

CUSTOMER INFORMATION:

Company:	ALS Houston
Contact:	James Guin
Address:	10450 Stancliff Rd, Ste 210
Phone:	+1 281 530 5656
Email:	James.Guin@alsglobal.com
Alternate Contact:	Jumoke M. Lawal
Email:	jumoke.lawal@alsglobal.com

INVOICE INFORMATION:

Company:	ALS Houston
Contact:	Accounts Payable
Address:	10450 Stancliff Rd, Ste 210
Phone:	+1 281 530 5656
Reference:	HS24021475
TSR:	Sonia West

	LAB SAMPLE ID	CLIENT SAMPLE ID	MATRIX	COLLECT DATE
	ANALYSIS REQUESTED			DUE DATE
1.	**HS24021475-03**	**46WW11-240222**	**Groundwater**	**22 Feb 2024 07:40**
	RSK-CO2; DoD Level II & IV, Equ_APTIM_GISKey			08 Mar 2024
2.	**HS24021475-04**	**46WW09-240222**	**Groundwater**	**22 Feb 2024 08:25**
	RSK-CO2; DoD Level II & IV, Equ_APTIM_GISKey			08 Mar 2024
3.	**HS24021475-05**	**46WW09-240222-FD**	**Groundwater**	**22 Feb 2024 08:25**
	RSK-CO2; DoD Level II & IV, Equ_APTIM_GISKey			08 Mar 2024
4.	**HS24021475-07**	**LHSMW21-240222**	**Groundwater**	**22 Feb 2024 09:55**
	RSK-CO2; DoD Level II & IV, Equ_APTIM_GISKey			08 Mar 2024

Comments: Please analyze for the analysis listed above.
Send report to the emails shown above.

QC Level: DOD IV (DoD Data Package)

Relinquished By: _____ Date/Time: 02/26/24 18:00

Received By: _____ Date/Time: 2/27/24 0955

Cooler ID(s): _____ Temperature(s): _____

R: 3.4
C: 3.0

HMB

Login Sample Receipt Checklist

Client: ALS Group USA, Corp

Job Number: 410-161910-1

Login Number: 161910
List Number: 1
Creator: Arroyo, Haley

List Source: Eurofins Lancaster Laboratories Environment Testing, LLC

Question	Answer	Comment
The cooler's custody seal is intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature acceptable,where thermal pres is required(</=6C, not frozen).	True	
Cooler Temperature is recorded.	True	
WV:Container Temp acceptable,where thermal pres is required (</=6C, not frozen).	N/A	
WV: Container Temperature is recorded.	N/A	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
There are no discrepancies between the containers received and the COC.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
There is sufficient vol. for all requested analyses.	True	
Is the Field Sampler's name present on COC?	False	Received project as a subcontract.
Sample custody seals are intact.	N/A	
VOA sample vials do not have headspace >6mm in diameter (none, if from WV)?	True	

10450 Stancliff Rd. Suite 210
Houston, TX 77099
T: +1 281 530 5656
F: +1 281 530 5887

March 13, 2024

Marcia Olive
Bhate Environmental Associates, Inc.
445 Union Blvd Ste 129
Lakewood, CO 80228

Work Order: **HS24021563**

Laboratory Results for: **LHAAP / Site 46**

Dear Marcia Olive,

ALS Environmental received 9 sample(s) on Feb 27, 2024 for the analysis presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested. Results are expressed as "as received" unless otherwise noted.

QC sample results for this data met EPA or laboratory specifications except as noted in the Case Narrative or as noted with qualifiers in the QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained by ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

If you have any questions regarding this report, please feel free to call me.

Sincerely,

Generated By: JUMOKE.LAWAL
James Guin

ALS Houston, US Date: 13-Mar-24

Client: Bhate Environmental Associates, Inc.
Project: LHAAP / Site 46
Work Order: HS24021563

SAMPLE SUMMARY

Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS24021563-01	46WW03-240226	Groundwater		26-Feb-2024 07:30	27-Feb-2024 09:10	☐
HS24021563-02	46WW02-240226	Groundwater		26-Feb-2024 08:15	27-Feb-2024 09:10	☐
HS24021563-03	46WW06-240226	Groundwater		26-Feb-2024 09:15	27-Feb-2024 09:10	☐
HS24021563-04	46WW08-240226	Groundwater		26-Feb-2024 09:55	27-Feb-2024 09:10	☐
HS24021563-05	46WW16-240226	Groundwater		26-Feb-2024 10:35	27-Feb-2024 09:10	☐
HS24021563-06	46WW05-240226	Groundwater		26-Feb-2024 11:20	27-Feb-2024 09:10	☐
HS24021563-07	LHSMW23R-240226	Groundwater		26-Feb-2024 12:10	27-Feb-2024 09:10	☐
HS24021563-08	LHSMW23R-24026-FD	Groundwater		26-Feb-2024 12:10	27-Feb-2024 09:10	☐
HS24021563-09	Trip Blank-240226	Groundwater	CG-120823-348	26-Feb-2024 00:00	27-Feb-2024 09:10	☐

ALS Houston, US Date: 13-Mar-24

Client: Bhate Environmental Associates, Inc. **CASE NARRATIVE**
Project: LHAAP / Site 46
Work Order: HS24021563

Work Order Comments

- The analysis for Carbon Dioxide was subcontracted to Eurofins Environmental Testing America l in Lancaster, PA . Final report attached

GC Semivolatiles by Method RSK-175

Batch ID: R460200

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

GCMS Volatiles by Method SW8260

Batch ID: R460168

Sample ID: 46WW02-240226 (HS24021563-02)

- Surrogate failed outside control limits high. There are no hits associated with this surrogate.

Sample ID: 46WW02-240226 (HS24021563-02MS)

- Ms/MSD/Surrogates failed due to matrix interference.

Sample ID: 46WW02-240226 (HS24021563-02MSD)

- The RPD between the MS and MSD was outside of the control limit.

Sample ID: VSTD050

- Acetone failed outside control limits high. Associated samples are ND.

Batch ID: R460210

Sample ID: VLCSW-240229

- Insufficient sample received to perform MS/MSD. An LCS/LCSD was performed as batch quality control.

Batch ID: R460228

Sample ID: HS24021593-04MS

- MS and MSD are for an unrelated sample

WetChemistry by Method SM5310B

Batch ID: R460955

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

ALS Houston, US Date: 13-Mar-24

Client: Bhate Environmental Associates, Inc.
Project: LHAAP / Site 46
Work Order: HS24021563

CASE NARRATIVE

WetChemistry by Method SW9056

Batch ID: R459965

Sample ID: 46WW02-240226 (HS24021563-02MS)

- The MS and/or MSD recovery was outside of the control limits; however, the result in the parent sample is greater than 4x the spike amount. (Sulfate)

Sample ID: 46WW05-240226 (HS24021563-06)

- The reporting limit is elevated due to dilution for high concentrations of non-target analytes. (Nitrogen, Nitrate (As N))

Sample ID: HS24021593-04MSD

- MS and MSD are for an unrelated sample (Sulfate)

ALS Houston, US Date: 13-Mar-24

Client: Bhate Environmental Associates, Inc.
Project: LHAAP / Site 46
Sample ID: 46WW03-240226
Collection Date: 26-Feb-2024 07:30

ANALYTICAL REPORT
WorkOrder:HS24021563
Lab ID:HS24021563-01
Matrix:Groundwater

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C	**Method:SW8260**							Analyst: FT
cis-1,2-Dichloroethene	1.0	U	0.20	1.0	1.0	ug/L	1	01-Mar-2024 05:43
Trichloroethene	1.0	U	0.20	1.0	1.0	ug/L	1	01-Mar-2024 05:43
Vinyl chloride	1.0	U	0.20	1.0	1.0	ug/L	1	01-Mar-2024 05:43
Surr: 1,2-Dichloroethane-d4	*83.3*			**0**	*81-118*	*%REC*	*1*	*01-Mar-2024 05:43*
Surr: 4-Bromofluorobenzene	*88.4*			**0**	*85-114*	*%REC*	*1*	*01-Mar-2024 05:43*
Surr: Dibromofluoromethane	*85.2*			**0**	*80-119*	*%REC*	*1*	*01-Mar-2024 05:43*
Surr: Toluene-d8	*89.2*			**0**	*89-112*	*%REC*	*1*	*01-Mar-2024 05:43*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Houston, US Date: 13-Mar-24

Client: Bhate Environmental Associates, Inc.
Project: LHAAP / Site 46
Sample ID: 46WW02-240226
Collection Date: 26-Feb-2024 08:15

ANALYTICAL REPORT
WorkOrder:HS24021563
Lab ID:HS24021563-02
Matrix:Groundwater

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C		**Method:SW8260**						Analyst: TS
cis-1,2-Dichloroethene	**2.7**		**0.20**	**0.50**	**1.0**	**ug/L**	1	29-Feb-2024 11:46
Trichloroethene	**35**		**0.20**	**0.50**	**1.0**	**ug/L**	1	29-Feb-2024 11:46
Vinyl chloride	0.50	U	0.20	0.50	1.0	ug/L	1	29-Feb-2024 11:46
Surr: 1,2-Dichloroethane-d4	*110*			**0**	*81-118*	*%REC*	*1*	*29-Feb-2024 11:46*
Surr: 4-Bromofluorobenzene	*103*			**0**	*85-114*	*%REC*	*1*	*29-Feb-2024 11:46*
Surr: Dibromofluoromethane	*111*			**0**	*80-119*	*%REC*	*1*	*29-Feb-2024 11:46*
Surr: Toluene-d8	*114*	*S*		**0**	*89-112*	*%REC*	*1*	*29-Feb-2024 11:46*
DISSOLVED GASES BY RSK-175		**Method:RSK-175**						Analyst: E.H.
Ethane	**0.000586**	J	**0.000144**	**0.000500**	**0.00100**	**mg/L**	1	04-Mar-2024 08:38
Ethene	0.000500	U	0.000234	0.000500	0.00100	mg/L	1	04-Mar-2024 08:38
Methane	**0.00107**		**0.000107**	**0.000500**	**0.000500**	**mg/L**	1	04-Mar-2024 08:38
TOTAL ORGANIC CARBON - SM5310B-2011		**Method:SM5310B**						Analyst: JAC
Organic Carbon, Total	**8.69**		**0.500**	**1.00**	**1.00**	**mg/L**	1	10-Mar-2024 15:13
ANIONS BY SW9056A		**Method:SW9056**						Analyst: TH
Chloride	**46.7**		**0.200**	**0.250**	**0.500**	**mg/L**	1	27-Feb-2024 14:21
Nitrogen, Nitrate (As N)	**0.0508**	J	**0.0300**	**0.100**	**0.100**	**mg/L**	1	27-Feb-2024 14:21
Sulfate	**249**		**1.00**	**1.25**	**2.50**	**mg/L**	5	27-Feb-2024 15:03
SUBCONTRACT ANALYSIS - RSK		**Method:NA**						Analyst: SUB
Subcontract Analysis	See Attached		0	0		NA	1	08-Mar-2024 15:46

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Houston, US Date: 13-Mar-24

Client: Bhate Environmental Associates, Inc.
Project: LHAAP / Site 46
Sample ID: 46WW06-240226
Collection Date: 26-Feb-2024 09:15

ANALYTICAL REPORT
WorkOrder:HS24021563
Lab ID:HS24021563-03
Matrix:Groundwater

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C	**Method:SW8260**							Analyst: FT
cis-1,2-Dichloroethene	1.0	U	0.20	1.0	1.0	ug/L	1	01-Mar-2024 06:05
Trichloroethene	1.0	U	0.20	1.0	1.0	ug/L	1	01-Mar-2024 06:05
Vinyl chloride	1.0	U	0.20	1.0	1.0	ug/L	1	01-Mar-2024 06:05
Surr: 1,2-Dichloroethane-d4	*81.8*			**0**	*81-118*	*%REC*	*1*	*01-Mar-2024 06:05*
Surr: 4-Bromofluorobenzene	*88.5*			**0**	*85-114*	*%REC*	*1*	*01-Mar-2024 06:05*
Surr: Dibromofluoromethane	*82.8*			**0**	*80-119*	*%REC*	*1*	*01-Mar-2024 06:05*
Surr: Toluene-d8	*89.3*			**0**	*89-112*	*%REC*	*1*	*01-Mar-2024 06:05*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Houston, US Date: 13-Mar-24

Client: Bhate Environmental Associates, Inc.
Project: LHAAP / Site 46
Sample ID: 46WW08-240226
Collection Date: 26-Feb-2024 09:55

ANALYTICAL REPORT
WorkOrder:HS24021563
Lab ID:HS24021563-04
Matrix:Groundwater

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C	**Method:SW8260**							Analyst: FT
cis-1,2-Dichloroethene	1.0	U	0.20	1.0	1.0	ug/L	1	01-Mar-2024 06:27
Trichloroethene	1.0	U	0.20	1.0	1.0	ug/L	1	01-Mar-2024 06:27
Vinyl chloride	1.0	U	0.20	1.0	1.0	ug/L	1	01-Mar-2024 06:27
Surr: 1,2-Dichloroethane-d4	*81.1*			**0**	*81-118*	*%REC*	*1*	*01-Mar-2024 06:27*
Surr: 4-Bromofluorobenzene	*89.7*			**0**	*85-114*	*%REC*	*1*	*01-Mar-2024 06:27*
Surr: Dibromofluoromethane	*82.7*			**0**	*80-119*	*%REC*	*1*	*01-Mar-2024 06:27*
Surr: Toluene-d8	*89.3*			**0**	*89-112*	*%REC*	*1*	*01-Mar-2024 06:27*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Houston, US Date: 13-Mar-24

Client: Bhate Environmental Associates, Inc.
Project: LHAAP / Site 46
Sample ID: 46WW16-240226
Collection Date: 26-Feb-2024 10:35

ANALYTICAL REPORT
WorkOrder:HS24021563
Lab ID:HS24021563-05
Matrix:Groundwater

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C		**Method:SW8260**						Analyst: FT
cis-1,2-Dichloroethene	1.0	U	0.20	1.0	1.0	ug/L	1	01-Mar-2024 06:49
Trichloroethene	1.0	U	0.20	1.0	1.0	ug/L	1	01-Mar-2024 06:49
Vinyl chloride	1.0	U	0.20	1.0	1.0	ug/L	1	01-Mar-2024 06:49
Surr: 1,2-Dichloroethane-d4	*82.1*			**0**	*81-118*	*%REC*	*1*	*01-Mar-2024 06:49*
Surr: 4-Bromofluorobenzene	*91.1*			**0**	*85-114*	*%REC*	*1*	*01-Mar-2024 06:49*
Surr: Dibromofluoromethane	*83.8*			**0**	*80-119*	*%REC*	*1*	*01-Mar-2024 06:49*
Surr: Toluene-d8	*90.5*			**0**	*89-112*	*%REC*	*1*	*01-Mar-2024 06:49*
DISSOLVED GASES BY RSK-175		**Method:RSK-175**						Analyst: E.H.
Ethane	0.000500	U	0.000144	0.000500	0.00100	mg/L	1	28-Feb-2024 10:05
Ethene	0.000500	U	0.000234	0.000500	0.00100	mg/L	1	28-Feb-2024 10:05
Methane	**0.00197**		**0.000107**	**0.000500**	**0.000500**	**mg/L**	1	28-Feb-2024 10:05
TOTAL ORGANIC CARBON - SM5310B-2011		**Method:SM5310B**						Analyst: JAC
Organic Carbon, Total	**2.60**		**0.500**	**1.00**	**1.00**	**mg/L**	1	10-Mar-2024 16:00
ANIONS BY SW9056A		**Method:SW9056**						Analyst: TH
Chloride	**269**		**2.00**	**2.50**	**5.00**	**mg/L**	10	27-Feb-2024 14:45
Nitrogen, Nitrate (As N)	0.100	U	0.0300	0.100	0.100	mg/L	1	27-Feb-2024 14:39
Sulfate	**592**		**2.00**	**2.50**	**5.00**	**mg/L**	10	27-Feb-2024 14:45
SUBCONTRACT ANALYSIS - RSK		**Method:NA**						Analyst: SUB
Subcontract Analysis	See Attached		0	0		NA	1	08-Mar-2024 15:46

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Houston, US Date: 13-Mar-24

Client: Bhate Environmental Associates, Inc.
Project: LHAAP / Site 46
Sample ID: 46WW05-240226
Collection Date: 26-Feb-2024 11:20

ANALYTICAL REPORT
WorkOrder:HS24021563
Lab ID:HS24021563-06
Matrix:Groundwater

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C		**Method:SW8260**						Analyst: TS
cis-1,2-Dichloroethene	**1.8**		**0.20**	**0.50**	**1.0**	**ug/L**	1	29-Feb-2024 19:28
Trichloroethene	**57**		**0.20**	**0.50**	**1.0**	**ug/L**	1	29-Feb-2024 19:28
Vinyl chloride	0.50	U	0.20	0.50	1.0	ug/L	1	29-Feb-2024 19:28
Surr: 1,2-Dichloroethane-d4	*99.5*			**0**	*81-118*	*%REC*	*1*	*29-Feb-2024 19:28*
Surr: 4-Bromofluorobenzene	*103*			**0**	*85-114*	*%REC*	*1*	*29-Feb-2024 19:28*
Surr: Dibromofluoromethane	*110*			**0**	*80-119*	*%REC*	*1*	*29-Feb-2024 19:28*
Surr: Toluene-d8	*108*			**0**	*89-112*	*%REC*	*1*	*29-Feb-2024 19:28*
DISSOLVED GASES BY RSK-175		**Method:RSK-175**						Analyst: E.H.
Ethane	**0.00190**		**0.000144**	**0.000500**	**0.00100**	**mg/L**	1	28-Feb-2024 10:16
Ethene	0.000500	U	0.000234	0.000500	0.00100	mg/L	1	28-Feb-2024 10:16
Methane	**0.00304**		**0.000107**	**0.000500**	**0.000500**	**mg/L**	1	28-Feb-2024 10:16
TOTAL ORGANIC CARBON - SM5310B-2011		**Method:SM5310B**						Analyst: JAC
Organic Carbon, Total	**7.40**		**0.500**	**1.00**	**1.00**	**mg/L**	1	10-Mar-2024 16:15
ANIONS BY SW9056A		**Method:SW9056**						Analyst: TH
Chloride	**218**		**1.00**	**1.25**	**2.50**	**mg/L**	5	27-Feb-2024 14:51
Nitrogen, Nitrate (As N)	**0.177**	J	**0.150**	**0.500**	**0.500**	**mg/L**	5	27-Feb-2024 14:51
Sulfate	**4,340**		**20.0**	**25.0**	**50.0**	**mg/L**	100	27-Feb-2024 14:57
SUBCONTRACT ANALYSIS - RSK		**Method:NA**						Analyst: SUB
Subcontract Analysis	See Attached		0	0		NA	1	08-Mar-2024 15:46

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Houston, US Date: 13-Mar-24

Client: Bhate Environmental Associates, Inc.
Project: LHAAP / Site 46
Sample ID: LHSMW23R-240226
Collection Date: 26-Feb-2024 12:10

ANALYTICAL REPORT
WorkOrder:HS24021563
Lab ID:HS24021563-07
Matrix:Groundwater

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C	**Method:SW8260**							Analyst: TS
cis-1,2-Dichloroethene	**0.66**	J	**0.20**	**0.50**	**1.0**	**ug/L**	1	29-Feb-2024 22:58
Trichloroethene	**0.56**	J	**0.20**	**0.50**	**1.0**	**ug/L**	1	29-Feb-2024 22:58
Vinyl chloride	0.50	U	0.20	0.50	1.0	ug/L	1	29-Feb-2024 22:58
Surr: 1,2-Dichloroethane-d4	*99.2*			**0**	*81-118*	*%REC*	*1*	*29-Feb-2024 22:58*
Surr: 4-Bromofluorobenzene	*99.5*			**0**	*85-114*	*%REC*	*1*	*29-Feb-2024 22:58*
Surr: Dibromofluoromethane	*112*			**0**	*80-119*	*%REC*	*1*	*29-Feb-2024 22:58*
Surr: Toluene-d8	*109*			**0**	*89-112*	*%REC*	*1*	*29-Feb-2024 22:58*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Houston, US Date: 13-Mar-24

Client: Bhate Environmental Associates, Inc.
Project: LHAAP / Site 46
Sample ID: LHSMW23R-24026-FD
Collection Date: 26-Feb-2024 12:10

ANALYTICAL REPORT
WorkOrder:HS24021563
Lab ID:HS24021563-08
Matrix:Groundwater

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C	**Method:SW8260**							Analyst: TS
cis-1,2-Dichloroethene	**0.65**	J	**0.20**	**0.50**	**1.0**	**ug/L**	1	29-Feb-2024 23:19
Trichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	29-Feb-2024 23:19
Vinyl chloride	0.50	U	0.20	0.50	1.0	ug/L	1	29-Feb-2024 23:19
Surr: 1,2-Dichloroethane-d4	*98.1*			**0**	*81-118*	*%REC*	*1*	*29-Feb-2024 23:19*
Surr: 4-Bromofluorobenzene	*101*			**0**	*85-114*	*%REC*	*1*	*29-Feb-2024 23:19*
Surr: Dibromofluoromethane	*111*			**0**	*80-119*	*%REC*	*1*	*29-Feb-2024 23:19*
Surr: Toluene-d8	*106*			**0**	*89-112*	*%REC*	*1*	*29-Feb-2024 23:19*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Houston, US Date: 13-Mar-24

Client: Bhate Environmental Associates, Inc.
Project: LHAAP / Site 46
Sample ID: Trip Blank-240226
Collection Date: 26-Feb-2024 00:00

ANALYTICAL REPORT
WorkOrder:HS24021563
Lab ID:HS24021563-09
Matrix:Groundwater

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C	**Method:SW8260**							Analyst: FT
cis-1,2-Dichloroethene	1.0	U	0.20	1.0	1.0	ug/L	1	01-Mar-2024 00:31
Trichloroethene	1.0	U	0.20	1.0	1.0	ug/L	1	01-Mar-2024 00:31
Vinyl chloride	1.0	U	0.20	1.0	1.0	ug/L	1	01-Mar-2024 00:31
Surr: 1,2-Dichloroethane-d4	*81.6*			**0**	*81-118*	*%REC*	*1*	*01-Mar-2024 00:31*
Surr: 4-Bromofluorobenzene	*88.9*			**0**	*85-114*	*%REC*	*1*	*01-Mar-2024 00:31*
Surr: Dibromofluoromethane	*83.4*			**0**	*80-119*	*%REC*	*1*	*01-Mar-2024 00:31*
Surr: Toluene-d8	*89.3*			**0**	*89-112*	*%REC*	*1*	*01-Mar-2024 00:31*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Houston, US Date: 13-Mar-24

Client: Bhate Environmental Associates, Inc.
Project: LHAAP / Site 46
WorkOrder: HS24021563

DATES REPORT

Sample ID	Client Samp ID	Collection Date	Leachate Date	Prep Date	Analysis Date	DF
Batch ID: R459965 (0)	**Test Name :** ANIONS BY SW9056A				**Matrix:** Groundwater	
HS24021563-02	46WW02-240226	26 Feb 2024 08:15			27 Feb 2024 15:03	5
HS24021563-02	46WW02-240226	26 Feb 2024 08:15			27 Feb 2024 14:21	1
HS24021563-05	46WW16-240226	26 Feb 2024 10:35			27 Feb 2024 14:45	10
HS24021563-05	46WW16-240226	26 Feb 2024 10:35			27 Feb 2024 14:39	1
HS24021563-06	46WW05-240226	26 Feb 2024 11:20			27 Feb 2024 14:57	100
HS24021563-06	46WW05-240226	26 Feb 2024 11:20			27 Feb 2024 14:51	5
Batch ID: R460168 (0)	**Test Name :** VOLATILES ORGANICS BY METHOD 8260C				**Matrix:** Groundwater	
HS24021563-02	46WW02-240226	26 Feb 2024 08:15			29 Feb 2024 11:46	1
HS24021563-06	46WW05-240226	26 Feb 2024 11:20			29 Feb 2024 19:28	1
Batch ID: R460200 (0)	**Test Name :** DISSOLVED GASES BY RSK-175				**Matrix:** Groundwater	
HS24021563-02	46WW02-240226	26 Feb 2024 08:15			04 Mar 2024 08:38	1
HS24021563-05	46WW16-240226	26 Feb 2024 10:35			28 Feb 2024 10:05	1
HS24021563-06	46WW05-240226	26 Feb 2024 11:20			28 Feb 2024 10:16	1
Batch ID: R460210 (0)	**Test Name :** VOLATILES ORGANICS BY METHOD 8260C				**Matrix:** Groundwater	
HS24021563-01	46WW03-240226	26 Feb 2024 07:30			01 Mar 2024 05:43	1
HS24021563-03	46WW06-240226	26 Feb 2024 09:15			01 Mar 2024 06:05	1
HS24021563-04	46WW08-240226	26 Feb 2024 09:55			01 Mar 2024 06:27	1
HS24021563-05	46WW16-240226	26 Feb 2024 10:35			01 Mar 2024 06:49	1
HS24021563-09	Trip Blank-240226	26 Feb 2024 00:00			01 Mar 2024 00:31	1
Batch ID: R460228 (0)	**Test Name :** VOLATILES ORGANICS BY METHOD 8260C				**Matrix:** Groundwater	
HS24021563-07	LHSMW23R-240226	26 Feb 2024 12:10			29 Feb 2024 22:58	1
HS24021563-08	LHSMW23R-24026-FD	26 Feb 2024 12:10			29 Feb 2024 23:19	1
Batch ID: R460876 (0)	**Test Name :** SUBCONTRACT ANALYSIS - RSK				**Matrix:** Groundwater	
HS24021563-02	46WW02-240226	26 Feb 2024 08:15			08 Mar 2024 15:46	1
HS24021563-05	46WW16-240226	26 Feb 2024 10:35			08 Mar 2024 15:46	1
HS24021563-06	46WW05-240226	26 Feb 2024 11:20			08 Mar 2024 15:46	1
Batch ID: R460955 (0)	**Test Name :** TOTAL ORGANIC CARBON - SM5310B-2011				**Matrix:** Groundwater	
HS24021563-02	46WW02-240226	26 Feb 2024 08:15			10 Mar 2024 15:13	1
HS24021563-05	46WW16-240226	26 Feb 2024 10:35			10 Mar 2024 16:00	1
HS24021563-06	46WW05-240226	26 Feb 2024 11:20			10 Mar 2024 16:15	1

ALS Houston, US Date: 13-Mar-24

Client: Bhate Environmental Associates, Inc.
Project: LHAAP / Site 46
WorkOrder: HS24021563

QC BATCH REPORT

Batch ID: R460200 (0) **Instrument: FID-4** **Method: DISSOLVED GASES BY RSK-175**

MBLK Sample ID: **MBLK-240228** Units: **mg/L** Analysis Date: **28-Feb-2024 08:31**
Client ID: Run ID: **FID-4_460200** SeqNo: **7862483** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Ethane	0.000500	0.00100								U
Ethene	0.000500	0.00100								U
Methane	0.000500	0.000500								U

LCS Sample ID: **LCS-240228** Units: **mg/L** Analysis Date: **28-Feb-2024 08:44**
Client ID: Run ID: **FID-4_460200** SeqNo: **7862484** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Ethane	0.0192	0.00100	0.01804	0	106	75 - 125				
Ethene	0.0156	0.00100	0.0168	0	93.2	75 - 125				
Methane	0.00846	0.000500	0.009647	0	87.7	75 - 125				

LCSD Sample ID: **LCSD-240228** Units: **mg/L** Analysis Date: **28-Feb-2024 13:43**
Client ID: Run ID: **FID-4_460200** SeqNo: **7862505** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Ethane	0.0177	0.00100	0.01804	0	97.9	75 - 125	0.01920	8.34	30	
Ethene	0.0148	0.00100	0.0168	0	87.9	75 - 125	0.01565	5.8	30	
Methane	0.00776	0.000500	0.009647	0	80.4	75 - 125	0.008460	8.64	30	

MS Sample ID: **HS24021563-02MS** Units: **mg/L** Analysis Date: **04-Mar-2024 08:57**
Client ID: **46WW02-240226** Run ID: **FID-4_460200** SeqNo: **7865791** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Ethane	0.0150	0.00100	0.01804	0.0005857	79.9	75 - 125				
Ethene	0.0134	0.00100	0.0168	0	79.5	75 - 125				
Methane	0.00868	0.000500	0.009647	0.001069	78.9	75 - 125				

ALS Houston, US Date: 13-Mar-24

Client: Bhate Environmental Associates, Inc.
Project: LHAAP / Site 46
WorkOrder: HS24021563

QC BATCH REPORT

Batch ID: R460200 (0) **Instrument:** FID-4 **Method:** DISSOLVED GASES BY RSK-175

MSD Sample ID: **HS24021563-02MSD** Units: **mg/L** Analysis Date: **04-Mar-2024 09:08**
Client ID: **46WW02-240226** Run ID: **FID-4_460200** SeqNo: **7865792** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Ethane	0.0153	0.00100	0.01804	0.0005857	81.8	75 - 125	0.01500	2.27	30	
Ethene	0.0140	0.00100	0.0168	0	83.6	75 - 125	0.01336	4.98	30	
Methane	0.00865	0.000500	0.009647	0.001069	78.6	75 - 125	0.008683	0.359	30	

The following samples were analyzed in this batch: HS24021563-02 HS24021563-05 HS24021563-06

ALS Houston, US Date: 13-Mar-24

Client: Bhate Environmental Associates, Inc.
Project: LHAAP / Site 46
WorkOrder: HS24021563

QC BATCH REPORT

Batch ID: R460168 (0) **Instrument: VOA10** **Method: VOLATILES ORGANICS BY METHOD 8260C**

MBLK Sample ID: **VBLKW-240229** Units: **ug/L** Analysis Date: **29-Feb-2024 11:18**
Client ID: Run ID: **VOA10_460168** SeqNo: **7861506** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
cis-1,2-Dichloroethene	0.50	1.0								U
Trichloroethene	0.50	1.0								U
Vinyl chloride	0.50	1.0								U
Surr: 1,2-Dichloroethane-d4	*56*	*35*	*50*	*0*	*112*	*81 - 118*				
Surr: 4-Bromofluorobenzene	*52.05*	*35*	*50*	*0*	*104*	*85 - 114*				
Surr: Dibromofluoromethane	*57.26*	*35*	*50*	*0*	*115*	*80 - 119*				
Surr: Toluene-d8	*55.83*	*35*	*50*	*0*	*112*	*89 - 112*				

LCS Sample ID: **VLCSW-240229** Units: **ug/L** Analysis Date: **29-Feb-2024 10:36**
Client ID: Run ID: **VOA10_460168** SeqNo: **7861505** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
cis-1,2-Dichloroethene	22.13	1.0	20	0	111	78 - 123				
Trichloroethene	21.35	1.0	20	0	107	79 - 123				
Vinyl chloride	21.43	1.0	20	0	107	58 - 137				
Surr: 1,2-Dichloroethane-d4	*57.43*	*35*	*50*	*0*	*115*	*81 - 118*				
Surr: 4-Bromofluorobenzene	*53.14*	*35*	*50*	*0*	*106*	*85 - 114*				
Surr: Dibromofluoromethane	*59.28*	*35*	*50*	*0*	*119*	*80 - 119*				
Surr: Toluene-d8	*53.61*	*35*	*50*	*0*	*107*	*89 - 112*				

MS Sample ID: **HS24021563-02MS** Units: **ug/L** Analysis Date: **29-Feb-2024 12:28**
Client ID: **46WW02-240226** Run ID: **VOA10_460168** SeqNo: **7861508** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
cis-1,2-Dichloroethene	20.26	1.0	20	2.665	88.0	78 - 123				
Trichloroethene	52.08	1.0	20	34.57	87.6	79 - 123				
Vinyl chloride	18.91	1.0	20	0	94.6	58 - 137				
Surr: 1,2-Dichloroethane-d4	*59.82*	*35*	*50*	*0*	*120*	*81 - 118*				S
Surr: 4-Bromofluorobenzene	*51.67*	*35*	*50*	*0*	*103*	*85 - 114*				
Surr: Dibromofluoromethane	*60.52*	*35*	*50*	*0*	*121*	*80 - 119*				S
Surr: Toluene-d8	*55.55*	*35*	*50*	*0*	*111*	*89 - 112*				

ALS Houston, US Date: 13-Mar-24

Client: Bhate Environmental Associates, Inc.
Project: LHAAP / Site 46
WorkOrder: HS24021563

QC BATCH REPORT

Batch ID: R460168 (0) **Instrument:** VOA10 **Method:** VOLATILES ORGANICS BY METHOD 8260C

MSD Sample ID: **HS24021563-02MSD** Units: **ug/L** Analysis Date: **29-Feb-2024 12:49**
Client ID: **46WW02-240226** Run ID: **VOA10_460168** SeqNo: **7861509** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
cis-1,2-Dichloroethene	24.67	1.0	20	2.665	110	78 - 123	20.26	19.6	20	
Trichloroethene	55.59	1.0	20	34.57	105	79 - 123	52.08	6.52	20	
Vinyl chloride	23.85	1.0	20	0	119	58 - 137	18.91	23.1	20	R
Surr: 1,2-Dichloroethane-d4	*52.17*	*35*	*50*	*0*	*104*	*81 - 118*	*59.82*	*13.7*	*20*	
Surr: 4-Bromofluorobenzene	*51.17*	*35*	*50*	*0*	*102*	*85 - 114*	*51.67*	*0.98*	*20*	
Surr: Dibromofluoromethane	*55.95*	*35*	*50*	*0*	*112*	*80 - 119*	*60.52*	*7.84*	*20*	
Surr: Toluene-d8	*54.06*	*35*	*50*	*0*	*108*	*89 - 112*	*55.55*	*2.72*	*20*	

The following samples were analyzed in this batch: HS24021563-02 HS24021563-06

ALS Houston, US Date: 13-Mar-24

Client: Bhate Environmental Associates, Inc.
Project: LHAAP / Site 46
WorkOrder: HS24021563

QC BATCH REPORT

Batch ID: R460210 (0) **Instrument: VOA9** **Method: VOLATILES ORGANICS BY METHOD 8260C**

MBLK Sample ID: **VBLKW-240229** Units: **ug/L** Analysis Date: **29-Feb-2024 23:46**
Client ID: Run ID: **VOA9_460210** SeqNo: **7862695** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
cis-1,2-Dichloroethene	1.0	1.0								U
Trichloroethene	1.0	1.0								U
Vinyl chloride	1.0	1.0								U
Surr: 1,2-Dichloroethane-d4	*40.58*	*35*	*50*	*0*	*81.2*	*81 - 118*				
Surr: 4-Bromofluorobenzene	*44.89*	*35*	*50*	*0*	*89.8*	*85 - 114*				
Surr: Dibromofluoromethane	*42.01*	*35*	*50*	*0*	*84.0*	*80 - 119*				
Surr: Toluene-d8	*44.72*	*35*	*50*	*0*	*89.4*	*89 - 112*				

LCS Sample ID: **VLCSW-240229** Units: **ug/L** Analysis Date: **29-Feb-2024 22:40**
Client ID: Run ID: **VOA9_460210** SeqNo: **7862693** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
cis-1,2-Dichloroethene	20.52	1.0	20	0	103	78 - 123				
Trichloroethene	19.82	1.0	20	0	99.1	79 - 123				
Vinyl chloride	22.34	1.0	20	0	112	58 - 137				
Surr: 1,2-Dichloroethane-d4	*49.09*	*35*	*50*	*0*	*98.2*	*81 - 118*				
Surr: 4-Bromofluorobenzene	*50.74*	*35*	*50*	*0*	*101*	*85 - 114*				
Surr: Dibromofluoromethane	*51.96*	*35*	*50*	*0*	*104*	*80 - 119*				
Surr: Toluene-d8	*48.28*	*35*	*50*	*0*	*96.6*	*89 - 112*				

LCSD Sample ID: **VLCSDW-240229** Units: **ug/L** Analysis Date: **29-Feb-2024 23:02**
Client ID: Run ID: **VOA9_460210** SeqNo: **7862694** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
cis-1,2-Dichloroethene	20.24	1.0	20	0	101	78 - 123	20.52	1.37	20	
Trichloroethene	20.61	1.0	20	0	103	79 - 123	19.82	3.91	20	
Vinyl chloride	20.79	1.0	20	0	104	58 - 137	22.34	7.17	20	
Surr: 1,2-Dichloroethane-d4	*49.41*	*35*	*50*	*0*	*98.8*	*81 - 118*	*49.09*	*0.655*	*20*	
Surr: 4-Bromofluorobenzene	*50.59*	*35*	*50*	*0*	*101*	*85 - 114*	*50.74*	*0.295*	*20*	
Surr: Dibromofluoromethane	*50.51*	*35*	*50*	*0*	*101*	*80 - 119*	*51.96*	*2.83*	*20*	
Surr: Toluene-d8	*49.74*	*35*	*50*	*0*	*99.5*	*89 - 112*	*48.28*	*2.99*	*20*	

The following samples were analyzed in this batch: HS24021563-01 HS24021563-03 HS24021563-04 HS24021563-05 HS24021563-09

ALS Houston, US Date: 13-Mar-24

Client: Bhate Environmental Associates, Inc.
Project: LHAAP / Site 46
WorkOrder: HS24021563

QC BATCH REPORT

Batch ID: R460228 (0) **Instrument: VOA10** **Method: VOLATILES ORGANICS BY METHOD 8260C**

MBLK Sample ID: **VBLKW-240229** Units: **ug/L** Analysis Date: **29-Feb-2024 22:37**
Client ID: Run ID: **VOA10_460228** SeqNo: **7863014** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
cis-1,2-Dichloroethene	0.50	1.0								U
Trichloroethene	0.50	1.0								U
Vinyl chloride	0.50	1.0								U
Surr: 1,2-Dichloroethane-d4	*49.35*	*35*	*50*	*0*	*98.7*	*81 - 118*				
Surr: 4-Bromofluorobenzene	*51.36*	*35*	*50*	*0*	*103*	*85 - 114*				
Surr: Dibromofluoromethane	*53.29*	*35*	*50*	*0*	*107*	*80 - 119*				
Surr: Toluene-d8	*53.82*	*35*	*50*	*0*	*108*	*89 - 112*				

LCS Sample ID: **VLCSW-240229** Units: **ug/L** Analysis Date: **29-Feb-2024 21:34**
Client ID: Run ID: **VOA10_460228** SeqNo: **7863013** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
cis-1,2-Dichloroethene	19.46	1.0	20	0	97.3	78 - 123				
Trichloroethene	21.12	1.0	20	0	106	79 - 123				
Vinyl chloride	17.31	1.0	20	0	86.5	58 - 137				
Surr: 1,2-Dichloroethane-d4	*48.6*	*35*	*50*	*0*	*97.2*	*81 - 118*				
Surr: 4-Bromofluorobenzene	*51.86*	*35*	*50*	*0*	*104*	*85 - 114*				
Surr: Dibromofluoromethane	*55.3*	*35*	*50*	*0*	*111*	*80 - 119*				
Surr: Toluene-d8	*53.01*	*35*	*50*	*0*	*106*	*89 - 112*				

MS Sample ID: **HS24021593-04MS** Units: **ug/L** Analysis Date: **01-Mar-2024 00:01**
Client ID: Run ID: **VOA10_460228** SeqNo: **7862991** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
cis-1,2-Dichloroethene	71.55	1.0	20	56.28	76.4	78 - 123				S
Trichloroethene	25.56	1.0	20	2.403	116	79 - 123				
Vinyl chloride	20.38	1.0	20	1.85	92.7	58 - 137				
Surr: 1,2-Dichloroethane-d4	*47.92*	*35*	*50*	*0*	*95.8*	*81 - 118*				
Surr: 4-Bromofluorobenzene	*50.75*	*35*	*50*	*0*	*102*	*85 - 114*				
Surr: Dibromofluoromethane	*49.85*	*35*	*50*	*0*	*99.7*	*80 - 119*				
Surr: Toluene-d8	*54.75*	*35*	*50*	*0*	*110*	*89 - 112*				

ALS Houston, US Date: 13-Mar-24

Client: Bhate Environmental Associates, Inc.
Project: LHAAP / Site 46
WorkOrder: HS24021563

QC BATCH REPORT

Batch ID: R460228 (0) **Instrument: VOA10** **Method: VOLATILES ORGANICS BY METHOD 8260C**

MSD Sample ID: **HS24021593-04MSD** Units: **ug/L** Analysis Date: **01-Mar-2024 00:22**
Client ID: Run ID: **VOA10_460228** SeqNo: **7862992** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
cis-1,2-Dichloroethene	69.88	1.0	20	56.28	68.0	78 - 123	71.55	2.37	20	S
Trichloroethene	23.88	1.0	20	2.403	107	79 - 123	25.56	6.82	20	
Vinyl chloride	19.14	1.0	20	1.85	86.4	58 - 137	20.38	6.31	20	
Surr: 1,2-Dichloroethane-d4	*48.2*	*35*	*50*	*0*	*96.4*	*81 - 118*	*47.92*	*0.585*	*20*	
Surr: 4-Bromofluorobenzene	*50.58*	*35*	*50*	*0*	*101*	*85 - 114*	*50.75*	*0.35*	*20*	
Surr: Dibromofluoromethane	*51.16*	*35*	*50*	*0*	*102*	*80 - 119*	*49.85*	*2.6*	*20*	
Surr: Toluene-d8	*54.39*	*35*	*50*	*0*	*109*	*89 - 112*	*54.75*	*0.662*	*20*	

The following samples were analyzed in this batch: HS24021563-07 HS24021563-08

ALS Houston, US Date: 13-Mar-24

Client: Bhate Environmental Associates, Inc.
Project: LHAAP / Site 46
WorkOrder: HS24021563

QC BATCH REPORT

Batch ID: R459965 (0) **Instrument: ICS-Integrion** **Method: ANIONS BY SW9056A**

MBLK Sample ID: **MBLK** Units: **mg/L** Analysis Date: **27-Feb-2024 14:09**
Client ID: Run ID: **ICS-Integrion_459965** SeqNo: **7856831** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	0.250	0.500								U
Nitrogen, Nitrate (As N)	0.100	0.100								U
Nitrogen, Nitrite (As N)	0.100	0.100								U
Sulfate	0.250	0.500								U

LCS Sample ID: **LCS** Units: **mg/L** Analysis Date: **27-Feb-2024 14:15**
Client ID: Run ID: **ICS-Integrion_459965** SeqNo: **7856832** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	19.63	0.500	20	0	98.2	80 - 120				
Nitrogen, Nitrate (As N)	3.871	0.100	4	0	96.8	80 - 120				
Nitrogen, Nitrite (As N)	3.906	0.100	4	0	97.6	80 - 120				
Sulfate	20.41	0.500	20	0	102	80 - 120				

MS Sample ID: **HS24021593-04MS** Units: **mg/L** Analysis Date: **27-Feb-2024 20:34**
Client ID: Run ID: **ICS-Integrion_459965** SeqNo: **7856880** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	21.43	0.500	10	11.57	98.6	80 - 120				
Nitrogen, Nitrate (As N)	1.869	0.100	2	0.0175	92.6	80 - 120				
Nitrogen, Nitrite (As N)	1.862	0.100	2	0.1308	86.6	80 - 120				
Sulfate	46.58	0.500	10	38.87	77.0	80 - 120				S

MS Sample ID: **HS24021563-02MS** Units: **mg/L** Analysis Date: **27-Feb-2024 14:27**
Client ID: **46WW02-240226** Run ID: **ICS-Integrion_459965** SeqNo: **7856834** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	55.86	0.500	10	46.72	91.4	80 - 120				O
Nitrogen, Nitrate (As N)	1.935	0.100	2	0.0508	94.2	80 - 120				
Nitrogen, Nitrite (As N)	1.768	0.100	2	0.0043	88.2	80 - 120				
Sulfate	229.7	0.500	10	231.5	-18.7	80 - 120				SEO

ALS Houston, US Date: 13-Mar-24

Client: Bhate Environmental Associates, Inc.
Project: LHAAP / Site 46
WorkOrder: HS24021563

QC BATCH REPORT

Batch ID: R459965 (0) **Instrument: ICS-Integrion** **Method: ANIONS BY SW9056A**

MSD Sample ID: **HS24021593-04MSD** Units: **mg/L** Analysis Date: **27-Feb-2024 20:40**
Client ID: Run ID: **ICS-Integrion_459965** SeqNo: **7856881** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	21.41	0.500	10	11.57	98.4	80 - 120	21.43	0.0654	20	
Nitrogen, Nitrate (As N)	1.866	0.100	2	0.0175	92.4	80 - 120	1.869	0.177	20	
Nitrogen, Nitrite (As N)	1.86	0.100	2	0.1308	86.4	80 - 120	1.862	0.145	20	
Sulfate	46.66	0.500	10	38.87	77.9	80 - 120	46.58	0.184	20	S

MSD Sample ID: **HS24021563-02MSD** Units: **mg/L** Analysis Date: **27-Feb-2024 14:33**
Client ID: **46WW02-240226** Run ID: **ICS-Integrion_459965** SeqNo: **7856835** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	55.73	0.500	10	46.72	90.1	80 - 120	55.86	0.237	20	O
Nitrogen, Nitrate (As N)	1.928	0.100	2	0.0508	93.9	80 - 120	1.935	0.342	20	
Nitrogen, Nitrite (As N)	1.762	0.100	2	0.0043	87.9	80 - 120	1.768	0.34	20	
Sulfate	229.2	0.500	10	231.5	-23.5	80 - 120	229.7	0.21	20	SEO

The following samples were analyzed in this batch: HS24021563-02 HS24021563-05 HS24021563-06

ALS Houston, US Date: 13-Mar-24

Client: Bhate Environmental Associates, Inc.
Project: LHAAP / Site 46
WorkOrder: HS24021563

QC BATCH REPORT

Batch ID: R460955 (0) **Instrument:** TOC_05 **Method:** TOTAL ORGANIC CARBON - SM5310B-2011

MBLK Sample ID: **MBLK-03092024** Units: **mg/L** Analysis Date: **10-Mar-2024 11:24**
Client ID: Run ID: **TOC_05_460955** SeqNo: **7879346** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Organic Carbon, Total	1.00	1.00								U

LCS Sample ID: **LCS-03092024** Units: **mg/L** Analysis Date: **10-Mar-2024 11:39**
Client ID: Run ID: **TOC_05_460955** SeqNo: **7879347** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Organic Carbon, Total	10.51	1.00	10	0	105	85 - 115				

LCSD Sample ID: **LCSD-03092024** Units: **mg/L** Analysis Date: **10-Mar-2024 12:13**
Client ID: Run ID: **TOC_05_460955** SeqNo: **7879348** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Organic Carbon, Total	10.43	1.00	10	0	104	85 - 115	10.51	0.764	20	

MS Sample ID: **HS24021563-02MS** Units: **mg/L** Analysis Date: **10-Mar-2024 15:29**
Client ID: **46WW02-240226** Run ID: **TOC_05_460955** SeqNo: **7879359** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Organic Carbon, Total	17.29	1.00	10	8.694	86.0	80 - 120				

MSD Sample ID: **HS24021563-02MSD** Units: **mg/L** Analysis Date: **10-Mar-2024 15:46**
Client ID: **46WW02-240226** Run ID: **TOC_05_460955** SeqNo: **7879360** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Organic Carbon, Total	17.1	1.00	10	8.694	84.1	80 - 120	17.29	1.1	20	

The following samples were analyzed in this batch: HS24021563-02 HS24021563-05 HS24021563-06

ALS Houston, US Date: 13-Mar-24

Client: Bhate Environmental Associates, Inc.
Project: LHAAP / Site 46
WorkOrder: **HS24021563**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte detected below quantitation limit
M	Manually integrated, see raw data for justification
n	Not offered for accreditation
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL/SDL

Acronym	Description
DCS	Detectability Check Study
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
MBLK	Method Blank
MDL	Method Detection Limit
MQL	Method Quantitation Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PDS	Post Digestion Spike
PQL	Practical Quantitaion Limit
SD	Serial Dilution
SDL	Sample Detection Limit
TRRP	Texas Risk Reduction Program

Unit Reported	Description
mg/L	Milligrams per Liter

CERTIFICATIONS,ACCREDITATIONS & LICENSES

Agency	Number	Expire Date
Arkansas	88-00356	27-Mar-2024
California	2919; 2024	30-Apr-2024
Dept of Defense	L22-90-R2	31-Mar-2024
Florida	E87611-38	30-Jun-2024
Illinois	2000322023-11	30-Jun-2024
Kansas	E-10352 2023-2024	31-Jul-2024
Louisiana	03087 2023-2024	30-Jun-2024
Maryland	343; 2023-2024	30-Jun-2024
North Carolina	624 - 2024	31-Dec-2024
North Dakota	R-193 2023-2024	30-Apr-2024
Oklahoma	2023-140	31-Aug-2024
Texas	T104704231-23-32	30-Apr-2024
Utah	TX026932023-14	31-Jul-2024

ALS Houston, US Date: 13-Mar-24

Sample Receipt Checklist

Work Order ID: HS24021563 **Date/Time Received:** **27-Feb-2024 09:10**

Client Name: Bhate Environmental **Received by:** **Si Ma**

Completed By: */S/ Paresh M. Giga* (eSignature) 27-Feb-2024 10:58 (Date/Time) **Reviewed by:** */S/ luis.aguilar* (eSignature) 27-Feb-2024 14:55 (Date/Time)

Matrices: **GW/Water** Carrier name: **FedEx Priority Overnight**

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
VOA/TX1005/TX1006 Solids in hermetically sealed vials?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	1 Page(s)
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	COC IDs:none
Samplers name present on COC?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐	

Temperature(s)/Thermometer(s):	2.5C/2.4C U/C	IR31
Cooler(s)/Kit(s):	50398	
Date/Time sample(s) sent to storage:	2/27/24 11:25	

Water - VOA vials have zero headspace?	Yes ☑	No ☐	No VOA vials submitted ☐
Water - pH acceptable upon receipt?	Yes ☐	No ☐	N/A ☑
pH adjusted?	Yes ☐	No ☐	N/A ☑
pH adjusted by:			

Login Notes:

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

Corrective Action:

bhate

Page: _____ of

Project/Phase

No: JVPCIBH.0001

1608 13th Avenue South, Suite 300
Birmingham Alabama 35205

COC Number(1):

Chain of Custody and Analytical Request

LIMS Number:

Facility/Base I.D.: LHAAP / BILL to PCI

Project/Site Name: LHAAP / Site 46

Client Name:

Collected by: Scott Beesinger

Sample Analysis Requested (5) | Quality Assurance Samples (6)

Field Sample ID (30 Characters Max)	Date Collected (dd-mmm-yyyy)	Time Collected (Military) (hhmm)	Sample Depth (beginning - ending)	SA Code (2)	Sample Number (3)	Sample Matrix (4)	Number of containers	VOC	Dissolved Gases	TOC	Carbon Dioxide	Anions	Ambient Blank Lot Control Number	Equipment Blank Lot Control Number	Trip Blank Lot Control Number	Cooler ID
46wwc3-240226	26 FEB 2024	0730	-	N		wb	3	X								
46wwc2-240226	26 FEB 2024	0815	-	N		wb	12	X	X	X	X	X				
46wwc2-240226-MS	26 FEB 2024	0815	-	MS		wb	12	X	X	X	X	X				
46wwc2-240226-MSD	26 FEB 2024	0815		SD		wb	12	X	X	X	X	X				
46wwc6-240226	26 FEB 2024	0915		N		wb	3									
46wwc8-240226	26 FEB 2024	0955	-	N		wb	3									
46wwc6-240226	26 FEB 2024	1035	-	N		wb	12	X	X	X	X	X				
46wwc5-240226	26 FEB 2024	1120	-	N		wb	12	X	X	X	X	X				
LHSmw23R-240226	26 FEB 2024	1210	-	N		wb	3	X								
LHSmw23R-240226-FD	26 FEB 2024	1210	-	FD		wb	3	X								
Trip Blank-240226	26 FEB 2024		-	TB		w	2	X								

HS24021563
Bhate Environmental Associates, Inc.
LHAAP / Site 46

COMMENTS: STANDARD TAT Cooler# 503978 Temp 3.5 SPM3 LVF-01

Custody Transfers Prior to Receipt by Laboratory

Relinquished by (Signed)	Date	Time	Received by (signed)	Date	Time
1. Scott Beesinger	2/26/24	1430	1.		
2.			2.		
3.			3.	02/27/24	0900

Sample Delivery Details / Laboratory Receipt

Delivered Directly to Lab: _____ Shipped _____ No.:

_____ Method of Shipment: _____

_____ Fed Ex _____ Airbill Number:

_____ Analytical Lab: ALS 10450 Stanciff Rd. Suite 210 Houston, TX 77099 (281) 530-5656

ATTN: Dane Wagasey Lab Recipient: Delivery Date/Time:

1.) Chain of Custody Number = date collected + custody number (e.g. 09-02-1999-01)

2.) Sample Type (SA) Codes: N = Normal Sample, TB = Trip Blank (-c) Sample, FD = Field Duplicate (-a) Samples, FR = Field Replicate (-b) Samples, EB = Equipment Blank (-d) Samples, MS = Matrix Spike, SD = Matrix Spike Duplicate, AB = Ambient Blank (-e)

3.) Sample Number: Unique sample number collected from a particular location per day. (e.g. Groundwater sample collected from MW-1 on 10/10/99 = 01, if sampled again on 10/10/99 = 02, etc.)

4.) Matrix Codes: GS = Soil Gas, WG = Groundwater, WS = Surface Water, SO = Soil, SE = Sediment, SL = Sludge, SS = Surface Soil Samples, WQ = Aqueous Blank Samples (trip, equipment, ambient, etc), SQ = Soil Blanks

5.) Sample Analysis Requested: Analytical method requested and number of containers provided for each.

6.) Quality assurance samples are assigned by date (ddmmyy) and the sample number associated with the sample (01, 02, etc) (e.g. Equipment blank collected in association with MW-1 on 10/10/99 will be designated 10109901 in the Equipment Blank Lot Control

ALS
10450 Stancliff Rd., Suite 210
Houston, Texas 77099
Tel. +1 281 530 5656
Fax. +1 281 530 5887

50398

CUSTODY SEAL

Date: 2/26/24 Time: 1 PM
Name: Scott Beesinger
Company: BHATE

Seal Broken By:
Date: 02/27/24

50398 FEB 27 2024

Must Deliver Next Business Day
Time and Tempature Sensitive!

50398

ORIGIN ID:SGRA (903) 930-6193
ATT: SCOTT BEESINGER
APTIM ENVIRONMENTAL & INFRAST. INC
1203-B EAST GRAND AVE PHB202

MARSHALL, TX 75670
UNITED STATES US

SHIP DATE: 05FEB24
ACTWGT: 1.00 LB MAN
CAD: 0221247/CAFE3755
DIMS: 26x14x14 IN

TO SAMPLE RECEIVING
ALS GROUP USA,CORP
10450 STANCLIFF ROAD
SUITE 210
HOUSTON TX 77099
(281) 530-5656
REF: LHAAP-46-BO98721-JG

RMA:

FedEx Express

FedEx
TRK# 0221 6862 6801 8440

TUE - 27 FEB AA
PRIORITY OVERNIGHT

AB SGRA

77099
TX-US
IAH

4238674 26Feb2024 0GGA 58166/9948/C0B9

eurofins | Environment Testing

ANALYTICAL REPORT

PREPARED FOR

Attn: James Guin
ALS Group USA, Corp
10450 Stancliff Rd.
Suite 210
Houston, Texas 77099

Generated 3/8/2024 5:04:42 PM

JOB DESCRIPTION

HS24021563

JOB NUMBER

410-162062-1

Eurofins Lancaster Laboratories Environment Testing, LLC
2425 New Holland Pike
Lancaster PA 17601

See page two for job notes and contact information.

my EOL

Eurofins Lancaster Laboratories Environment Testing, LLC

Job Notes

This report may not be reproduced except in full, and with written approval from the laboratory. The results relate only to the samples tested. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

Analytical test results meet all requirements of the associated regulatory program (i.e., NELAC (TNI), DoD, and ISO 17025) unless otherwise noted under the individual analysis.

Authorization



Generated
3/8/2024 5:04:42 PM

Authorized for release by
Kelly Bauer, Project Manager
Kelly.Bauer@et.eurofinsus.com
(717)556-7262

Eurofins Lancaster Laboratories Environment Testing, LLC

Compliance Statement

Analytical test results meet all requirements of the associated regulatory program (e.g., NELAC (TNI), DoD, and ISO 17025) unless otherwise noted under the individual analysis. Data qualifiers are applied to note exceptions. Noncompliant quality control (QC) is further explained in narrative comments.
· QC results that exceed the upper limits and are associated with non-detect samples are qualified but further narration is not required since the bias is high and does not change a non-detect result. Further narration is also not required with QC blank detection when the associated sample concentration is non-detect or more than ten times the level in the blank.
· Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD is performed, unless otherwise specified in the method.
· Surrogate and/or isotope dilution analyte recoveries (if applicable) which are outside of the QC window are confirmed unless attributed to a dilution or otherwise noted in the narrative.
Regulated compliance samples (e.g. SDWA, NPDES) must comply with the associated agency requirements/permits.

Measurement uncertainty values, as applicable, are available upon request.

Test results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff. Times are local to the area of activity. Parameters listed in the 40 CFR Part 136 Table II as "analyze immediately" and tested in the laboratory are not performed within 15 minutes of collection.

This report shall not be reproduced except in full, without the written approval of the laboratory.

WARRANTY AND LIMITS OF LIABILITY - In accepting analytical work, we warrant the accuracy of test results for the sample as submitted. The foregoing express warranty is exclusive and is given in lieu of all other warranties, expressed or implied, except as otherwise agreed. We disclaim any other warranties, expressed or implied, including a warranty of fitness for particular purpose and warranty of merchantability. In no event shall Eurofins Lancaster Laboratories Environmental, LLC be liable for indirect, special, consequential, or incidental damages including, but not limited to, damages for loss of profit or goodwill regardless of (A) the negligence (either sole or concurrent) of Eurofins Lancaster Laboratories Environmental and (B) whether Eurofins Lancaster Laboratories Environmental has been informed of the possibility of such damages. We accept no legal responsibility for the purposes for which the client uses the test results. Except as otherwise agreed, no purchase order or other order for work shall be accepted by Eurofins Lancaster Laboratories Environmental which includes any conditions that vary from the Standard Terms and Conditions, and Eurofins Lancaster Laboratories Environmental hereby objects to any conflicting terms contained in any acceptance or order submitted by client.



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Definitions/Glossary

Client: ALS Group USA, Corp
Project/Site: HS24021563

Job ID: 410-162062-1

Qualifiers

GC VOA

Qualifier	Qualifier Description
cn	Refer to Case Narrative for further detail
F1	MS and/or MSD recovery exceeds control limits.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Case Narrative

Client: ALS Group USA, Corp
Project: HS24021563

Job ID: 410-162062-1

Job ID: 410-162062-1 — Eurofins Lancaster Laboratories Environment

Job Narrative
410-162062-1

Analytical test results meet all requirements of the associated regulatory program listed on the Accreditation/Certification Summary Page unless otherwise noted under the individual analysis. Data qualifiers are applied to indicate exceptions. Noncompliant quality control (QC) is further explained in narrative comments.

- Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD may be performed, unless otherwise specified in the method.
- Surrogate and/or isotope dilution analyte recoveries (if applicable) which are outside of the QC window are confirmed unless attributed to a dilution or otherwise noted in the narrative.

Regulated compliance samples (e.g. SDWA, NPDES) must comply with the associated agency requirements/permits.

Receipt
The samples were received on 2/28/2024 9:40 AM. Unless otherwise noted below, the samples arrived in good condition, and, where required, properly preserved and on ice. The temperature of the cooler at receipt time was 4.4°C.

GC VOA
Method RSK_175_CO2_D5: The matrix spike / matrix spike duplicate (MS/MSD) recoveries were outside control limits for one or more analytes. See QC Sample Results for detail. Sample matrix interference and/or non-homogeneity are suspected because the associated laboratory control sample (LCS) recovery is within acceptance limits. Samples were reanalyzed and recoveries were outside control limits for one or more analytes. HS24021563-02 46WW02-240226 (410-162062-1)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

Detection Summary

Client: ALS Group USA, Corp
Project/Site: HS24021563

Job ID: 410-162062-1

Client Sample ID: HS24021563-02 46WW02-240226 — Lab Sample ID: 410-162062-1

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	Dil Fac	D	Method	Prep Type
Carbon dioxide	100000	F1 cn	12000		5600	ug/L	1		RSK-175	Total/NA

Client Sample ID: HS24021563-05 46WW16-240226 — Lab Sample ID: 410-162062-2

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	Dil Fac	D	Method	Prep Type
Carbon dioxide	46000		12000		5600	ug/L	1		RSK-175	Total/NA

Client Sample ID: HS24021563-06 46WW05-240226 — Lab Sample ID: 410-162062-3

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	Dil Fac	D	Method	Prep Type
Carbon dioxide	210000		12000		5600	ug/L	1		RSK-175	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample Results

Client: ALS Group USA, Corp
Project/Site: HS24021563

Job ID: 410-162062-1

Client Sample ID: HS24021563-02 46WW02-240226

Lab Sample ID: 410-162062-1
Date Collected: 02/26/24 08:15
Matrix: Water
Date Received: 02/28/24 09:40

Method: RSK-175 - Dissolved Gases (GC)

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Carbon dioxide	100000	F1 cn	12000		5600	ug/L		03/04/24 11:49	1

Client Sample ID: HS24021563-05 46WW16-240226

Lab Sample ID: 410-162062-2
Date Collected: 02/26/24 10:35
Matrix: Water
Date Received: 02/28/24 09:40

Method: RSK-175 - Dissolved Gases (GC)

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Carbon dioxide	46000		12000		5600	ug/L		03/04/24 12:40	1

Client Sample ID: HS24021563-06 46WW05-240226

Lab Sample ID: 410-162062-3
Date Collected: 02/26/24 11:20
Matrix: Water
Date Received: 02/28/24 09:40

Method: RSK-175 - Dissolved Gases (GC)

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Carbon dioxide	210000		12000		5600	ug/L		03/04/24 12:47	1

QC Sample Results

Client: ALS Group USA, Corp
Project/Site: HS24021563

Job ID: 410-162062-1

Method: RSK-175 - Dissolved Gases (GC)

Lab Sample ID: MB 410-479323/1-A
Matrix: Water
Analysis Batch: 479281

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 479323

Analyte	MB Result	MB Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Carbon dioxide	<5600		12000		5600	ug/L		03/04/24 10:41	1

Lab Sample ID: LCS 410-479323/2-A
Matrix: Water
Analysis Batch: 479281

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 479323

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits		
Carbon dioxide			35800	36400		ug/L		102	80 - 122		

Lab Sample ID: 410-162062-1 MS
Matrix: Water
Analysis Batch: 479281

Client Sample ID: HS24021563-02 46WW02-240226
Prep Type: Total/NA
Prep Batch: 479323

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits		
Carbon dioxide	100000	F1 cn	35800	96200	F1	ug/L		-12	80 - 122		

Lab Sample ID: 410-162062-1 MSD
Matrix: Water
Analysis Batch: 479281

Client Sample ID: HS24021563-02 46WW02-240226
Prep Type: Total/NA
Prep Batch: 479323

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Carbon dioxide	100000	F1 cn	35800	94200	F1	ug/L		-18	80 - 122	2	20

QC Association Summary

Client: ALS Group USA, Corp
Project/Site: HS24021563

Job ID: 410-162062-1

GC VOA

Analysis Batch: 479281

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
410-162062-1	HS24021563-02 46WW02-240226	Total/NA	Water	RSK-175	479323
410-162062-2	HS24021563-05 46WW16-240226	Total/NA	Water	RSK-175	479323
410-162062-3	HS24021563-06 46WW05-240226	Total/NA	Water	RSK-175	479323
MB 410-479323/1-A	Method Blank	Total/NA	Water	RSK-175	479323
LCS 410-479323/2-A	Lab Control Sample	Total/NA	Water	RSK-175	479323
410-162062-1 MS	HS24021563-02 46WW02-240226	Total/NA	Water	RSK-175	479323
410-162062-1 MSD	HS24021563-02 46WW02-240226	Total/NA	Water	RSK-175	479323

Prep Batch: 479323

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
410-162062-1	HS24021563-02 46WW02-240226	Total/NA	Water	RSK-175	
410-162062-2	HS24021563-05 46WW16-240226	Total/NA	Water	RSK-175	
410-162062-3	HS24021563-06 46WW05-240226	Total/NA	Water	RSK-175	
MB 410-479323/1-A	Method Blank	Total/NA	Water	RSK-175	
LCS 410-479323/2-A	Lab Control Sample	Total/NA	Water	RSK-175	
410-162062-1 MS	HS24021563-02 46WW02-240226	Total/NA	Water	RSK-175	
410-162062-1 MSD	HS24021563-02 46WW02-240226	Total/NA	Water	RSK-175	

Lab Chronicle

Client: ALS Group USA, Corp
Job ID: 410-162062-1
Project/Site: HS24021563

Client Sample ID: HS24021563-02 46WW02-240226
Lab Sample ID: 410-162062-1
Date Collected: 02/26/24 08:15
Matrix: Water
Date Received: 02/28/24 09:40

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	RSK-175			479323	HQR6	ELLE	03/04/24 10:36
Total/NA	Analysis	RSK-175		1	479281	LXF2	ELLE	03/04/24 11:49

Client Sample ID: HS24021563-05 46WW16-240226
Lab Sample ID: 410-162062-2
Date Collected: 02/26/24 10:35
Matrix: Water
Date Received: 02/28/24 09:40

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	RSK-175			479323	HQR6	ELLE	03/04/24 10:36
Total/NA	Analysis	RSK-175		1	479281	LXF2	ELLE	03/04/24 12:40

Client Sample ID: HS24021563-06 46WW05-240226
Lab Sample ID: 410-162062-3
Date Collected: 02/26/24 11:20
Matrix: Water
Date Received: 02/28/24 09:40

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	RSK-175			479323	HQR6	ELLE	03/04/24 10:36
Total/NA	Analysis	RSK-175		1	479281	LXF2	ELLE	03/04/24 12:47

Laboratory References:

ELLE = Eurofins Lancaster Laboratories Environment Testing, LLC, 2425 New Holland Pike, Lancaster, PA 17601, TEL (717)656-2300

Accreditation/Certification Summary

Client: ALS Group USA, Corp
Project/Site: HS24021563

Job ID: 410-162062-1

Laboratory: Eurofins Lancaster Laboratories Environment Testing, LLC

Unless otherwise noted, all analytes for this laboratory were covered under each accreditation/certification below.

Authority	Program	Identification Number	Expiration Date
Louisiana (All)	NELAP	02055	06-30-24

The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.

Analysis Method	Prep Method	Matrix	Analyte
RSK-175	RSK-175	Water	Carbon dioxide

Texas	NELAP	T104704194-23-46	08-31-24

Method Summary

Client: ALS Group USA, Corp
Project/Site: HS24021563

Job ID: 410-162062-1

Method	Method Description	Protocol	Laboratory
RSK-175	Dissolved Gases (GC)	RSK	ELLE
RSK-175	Dissolved Gases Prep	RSK	ELLE

Protocol References:

RSK = Sample Prep And Calculations For Dissolved Gas Analysis In Water Samples Using A GC Headspace Equilibration Technique, RSKSOP-175, Rev. 0, 8/11/94, USEPA Research Lab

Laboratory References:

ELLE = Eurofins Lancaster Laboratories Environment Testing, LLC, 2425 New Holland Pike, Lancaster, PA 17601, TEL (717)656-2300

Sample Summary

Client: ALS Group USA, Corp
Project/Site: HS24021563

Job ID: 410-162062-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
410-162062-1	HS24021563-02 46WW02-240226	Water	02/26/24 08:15	02/28/24 09:40
410-162062-2	HS24021563-05 46WW16-240226	Water	02/26/24 10:35	02/28/24 09:40
410-162062-3	HS24021563-06 46WW05-240226	Water	02/26/24 11:20	02/28/24 09:40

410-162062 Chain of Custody

10450 Stancliff Rd, Ste 210
Houston, TX 77099
T: +1 281 530 5656
F: +1 281 530 5887
www.alsglobal.com

Subcontract Chain of Custody

SAMPLING STATE: **Colorado** **COC ID:** **24877**

SUBCONTRACT TO:

Eurofins Lancaster Laboratories Envt Testing
2425 New Holland Pike
Lancaster, PA 17601 **Phone:** +1 717 656 2300

CUSTOMER INFORMATION:

Company:	ALS Houston
Contact:	James Guin
Address:	10450 Stancliff Rd, Ste 210
Phone:	+1 281 530 5656
Email:	James.Guin@alsglobal.com
Alternate Contact:	Jumoke M. Lawal
Email:	jumoke.lawal@alsglobal.com

INVOICE INFORMATION:

Company:	ALS Houston
Contact:	Accounts Payable
Address:	10450 Stancliff Rd, Ste 210
Phone:	+1 281 530 5656
Reference:	HS24021563
TSR:	Sonia West

	LAB SAMPLE ID	CLIENT SAMPLE ID	MATRIX	COLLECT DATE
	ANALYSIS REQUESTED			DUE DATE
1.	**HS24021563-02**	**46WW02-240226**	**Groundwater**	**26 Feb 2024 08:15**
	RSK-CO2; DoD Level II & IV, Equ_APTIM_GISKey			12 Mar 2024
2.	**HS24021563-05**	**46WW16-240226**	**Groundwater**	**26 Feb 2024 10:35**
	RSK-CO2; DoD Level II & IV, Equ_APTIM_GISKey			12 Mar 2024
3.	**HS24021563-06**	**46WW05-240226**	**Groundwater**	**26 Feb 2024 11:20**
	RSK-CO2; DoD Level II & IV, Equ_APTIM_GISKey			12 Mar 2024

Comments: Please analyze for the analysis listed above.
Send report to the emails shown above.
Hs24021563-02 = ms/msd

QC Level: DOD IV (DoD Data Package)

Relinquished By: _____ Date/Time: FEB 27 2024 1200

Received By: _____ Date/Time: 2/28/24 09:40

Cooler ID(s): _____ Temperature(s): _____

R: 4.5
C: 4.4

Login Sample Receipt Checklist

Client: ALS Group USA, Corp

Job Number: 410-162062-1

Login Number: 162062
List Number: 1
Creator: Arroyo, Haley

List Source: Eurofins Lancaster Laboratories Environment Testing, LLC

Question	Answer	Comment
The cooler's custody seal is intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature acceptable,where thermal pres is required(</=6C, not frozen).	True	
Cooler Temperature is recorded.	True	
WV:Container Temp acceptable,where thermal pres is required (</=6C, not frozen).	N/A	
WV: Container Temperature is recorded.	N/A	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
There are no discrepancies between the containers received and the COC.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
There is sufficient vol. for all requested analyses.	True	
Is the Field Sampler's name present on COC?	False	Received project as a subcontract.
Sample custody seals are intact.	N/A	
VOA sample vials do not have headspace >6mm in diameter (none, if from WV)?	N/A	

Appendix E

Mann-Kendall Trend Analysis

46WW02 Mann-Kendall Trend Analysis

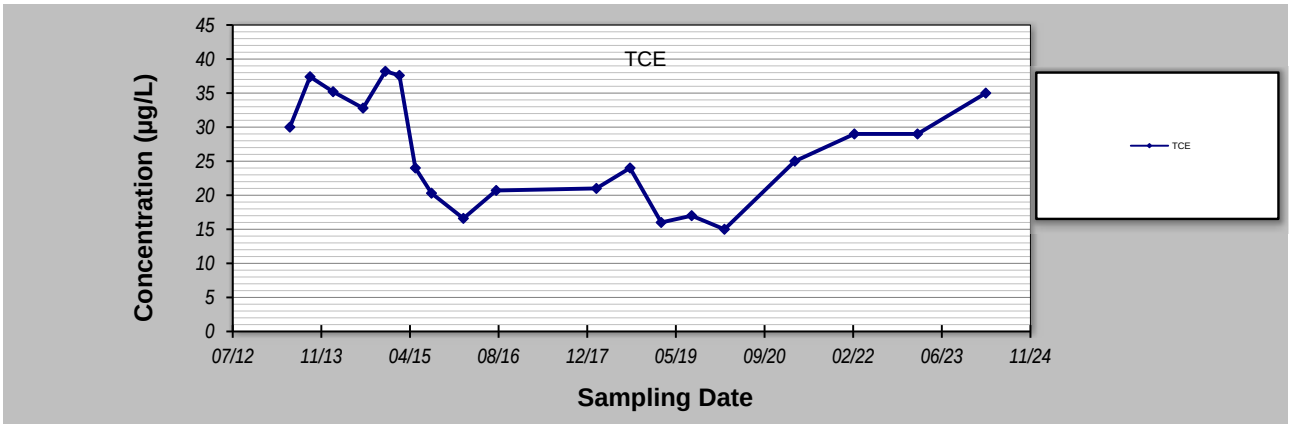
GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date: 1-May-24
Facility Name: LHAAP-46
Conducted By: Chris Long

Job ID: 502072
Constituent: TCE
Concentration Units: µg/L

Sampling Point ID: TCE

Sampling Event	Sampling Date	TCE CONCENTRATION (µg/L)
1	5/28/2013	30
2	9/19/2013	37.4
3	1/27/2014	35.2
4	7/15/2014	32.8
5	11/18/2014	38.2
6	2/5/2015	37.6
7	5/6/2015	24
8	8/5/2015	20.3
9	2/1/2016	16.6
10	8/4/2016	20.7
11	2/20/2018	21
12	8/29/2018	24
13	2/21/2019	16
14	8/12/2019	17
15	2/13/2020	15
16	3/16/2021	25
17	2/15/2022	29
18	2/6/2023	29
19	2/26/2024	35
20		
Coefficient of Variation:		0.30
Mann-Kendall Statistic (S):		-39
Confidence Factor:		90.7%
Concentration Trend:		Prob. Decreasing



Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water* , 41(3):355-367, 2003.

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46WW05 Mann-Kendall Trend Analysis

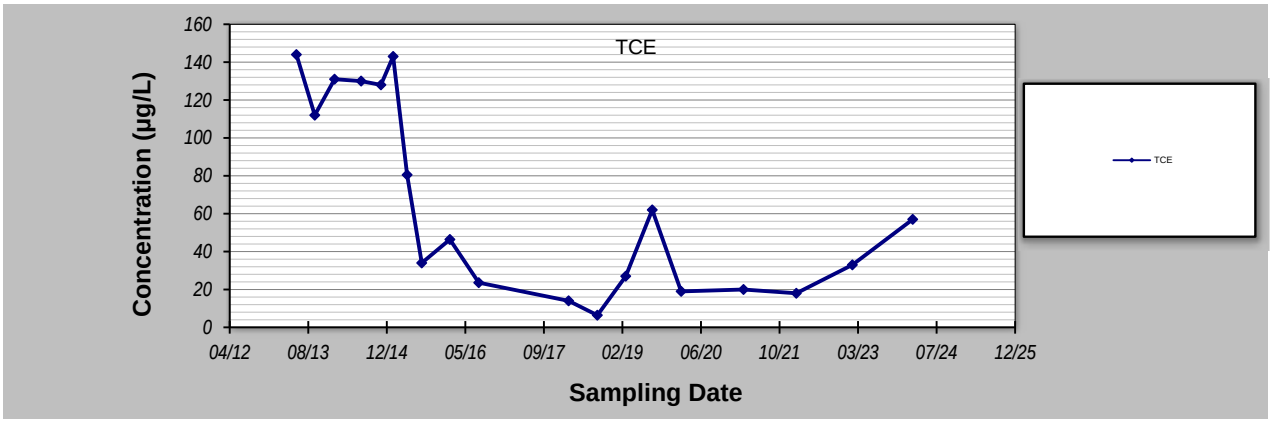
GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date: 1-May-24
Facility Name: LHAAP-46
Conducted By: Chris Long

Job ID: 502072
Constituent: TCE
Concentration Units: µg/L

Sampling Point ID: TCE

Sampling Event	Sampling Date	TCE CONCENTRATION (µg/L)
1	5/30/2013	144
2	9/24/2013	112
3	1/28/2014	131
4	7/16/2014	130
5	11/19/2014	128
6	2/5/2015	143
7	5/5/2015	80.5
8	8/6/2015	34
9	2/1/2016	46.4
10	8/3/2016	23.6
11	2/26/2018	14
12	8/28/2018	6.4
13	2/25/2019	27
14	8/13/2019	62
15	2/13/2020	19
16	3/16/2021	20
17	2/15/2022	18
18	2/7/2023	33
19	2/26/2024	57
20		
Coefficient of Variation:		0.78
Mann-Kendall Statistic (S):		-89
Confidence Factor:		99.9%
Concentration Trend:		Decreasing



Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water* , 41(3):355-367, 2003.

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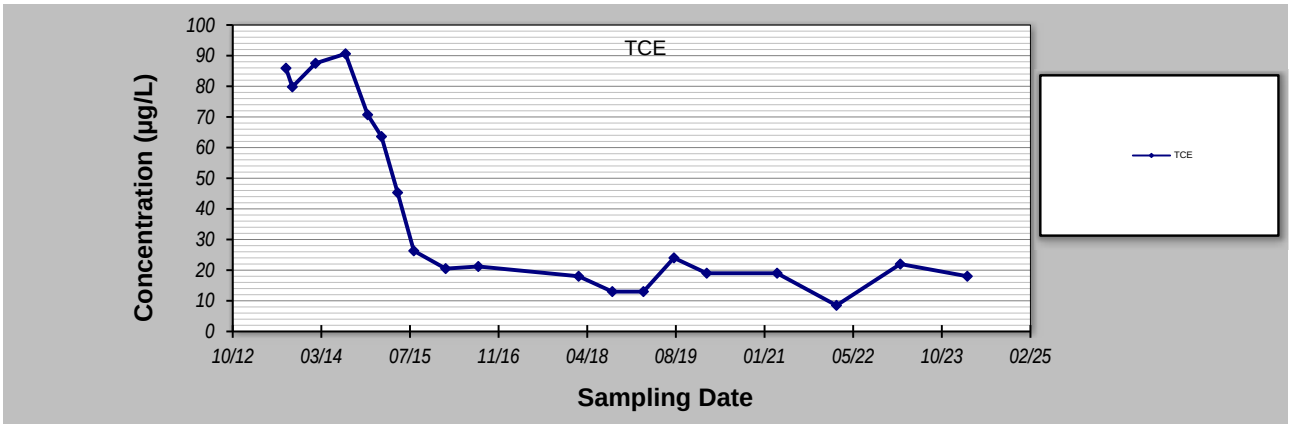
46WW11 Mann-Kendall Trend Analysis

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	1-May-24	Job ID:	502072
Facility Name:	LHAAP-46	Constituent:	TCE
Conducted By:	Chris Long	Concentration Units:	µg/L

Sampling Point ID:	TCE

Sampling Event	Sampling Date	TCE CONCENTRATION (µg/L)
1	8/14/2013	85.9
2	9/19/2013	79.8
3	1/28/2014	87.5
4	7/16/2014	90.6
5	11/18/2014	70.7
6	2/4/2015	63.6
7	5/6/2015	45.3
8	8/5/2015	26.3
9	2/1/2016	20.5
10	8/3/2016	21.2
11	2/20/2018	18
12	8/29/2018	13
13	2/21/2019	13
14	8/12/2019	24
15	2/13/2020	19
16	3/16/2021	19
17	2/14/2022	8.5
18	2/9/2023	22
19	2/22/2024	18
20		
Coefficient of Variation:		0.76
Mann-Kendall Statistic (S):		-112
Confidence Factor:		>99.9%
Concentration Trend:		Decreasing



Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water* , 41(3):355-367, 2003.

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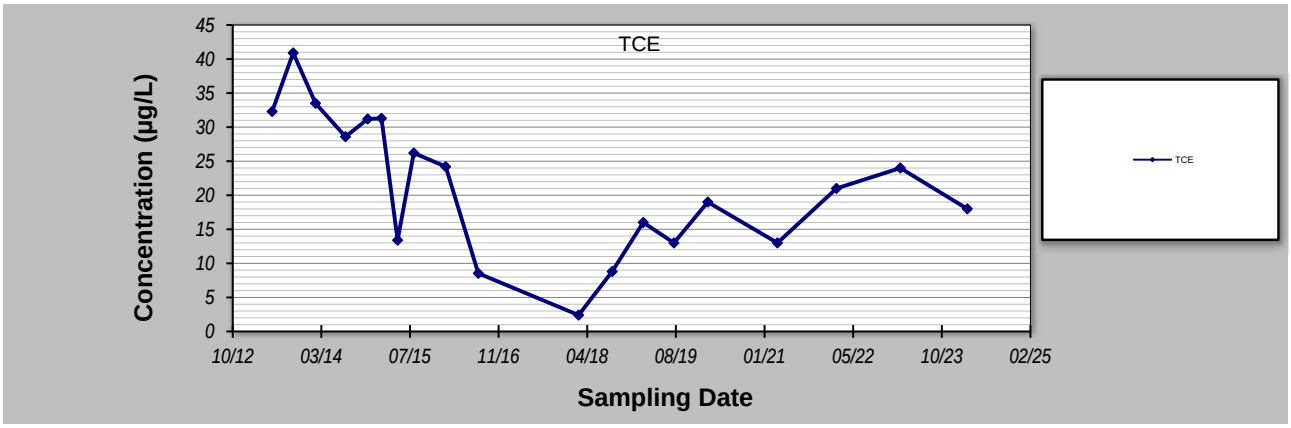
LHSMW19 Mann-Kendall Trend Analysis

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	1-May-24	Job ID:	502072
Facility Name:	LHAAP-46	Constituent:	TCE
Conducted By:	Chris Long	Concentration Units:	µg/L

Sampling Point ID:	TCE

Sampling Event	Sampling Date	TCE CONCENTRATION (µg/L)
1	5/28/2013	32.3
2	9/24/2013	40.9
3	1/28/2014	33.5
4	7/16/2014	28.6
5	11/18/2014	31.2
6	2/4/2015	31.3
7	5/6/2015	13.4
8	8/5/2015	26.2
9	2/1/2016	24.2
10	8/3/2016	8.53
11	2/20/2018	2.4
12	8/28/2018	8.8
13	2/20/2019	16
14	8/12/2019	13
15	2/19/2020	19
16	3/18/2021	13
17	2/14/2022	21
18	2/9/2023	24
19	2/22/2024	18
20		
Coefficient of Variation:		0.48
Mann-Kendall Statistic (S):		-72
Confidence Factor:		99.5%
Concentration Trend:		Decreasing



Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water* , 41(3):355-367, 2003.

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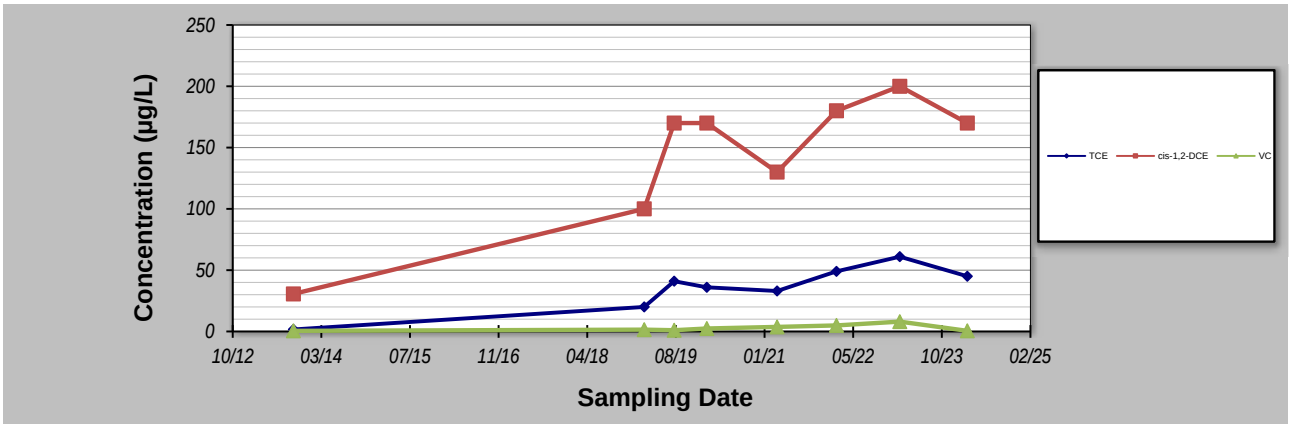
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LHSMW21 Mann-Kendall Trend Analysis

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	1-May-24	Job ID:	502072
Facility Name:	LHAAP-46	Constituent:	TCE, cis-1,2-DCE, and VC
Conducted By:	Chris Long	Concentration Units:	µg/L

Sampling Point ID:	TCE	cis-1,2-DCE	VC				
Sampling Event	Sampling Date	TCE, CIS-1,2-DCE, AND VC CONCENTRATION (µg/L)						
1	9/25/2013	1.64	30.6	0.5				
2	2/25/2019	20	100	1.44				
3	8/13/2019	41	170	0.97				
4	2/13/2020	36	170	2.4				
5	3/16/2021	33	130	3.7				
6	2/14/2022	49	180	4.9				
7	2/6/2023	61	200	8				
8	2/22/2024	45	170	0.5				
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		0.51	0.38	0.94				
Mann-Kendall Statistic (S):		18	17	13				
Confidence Factor:		98.4%	97.7%	92.9%				
Concentration Trend:		Increasing	Increasing	Prob. Increasing				



Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water* , 41(3):355-367, 2003.

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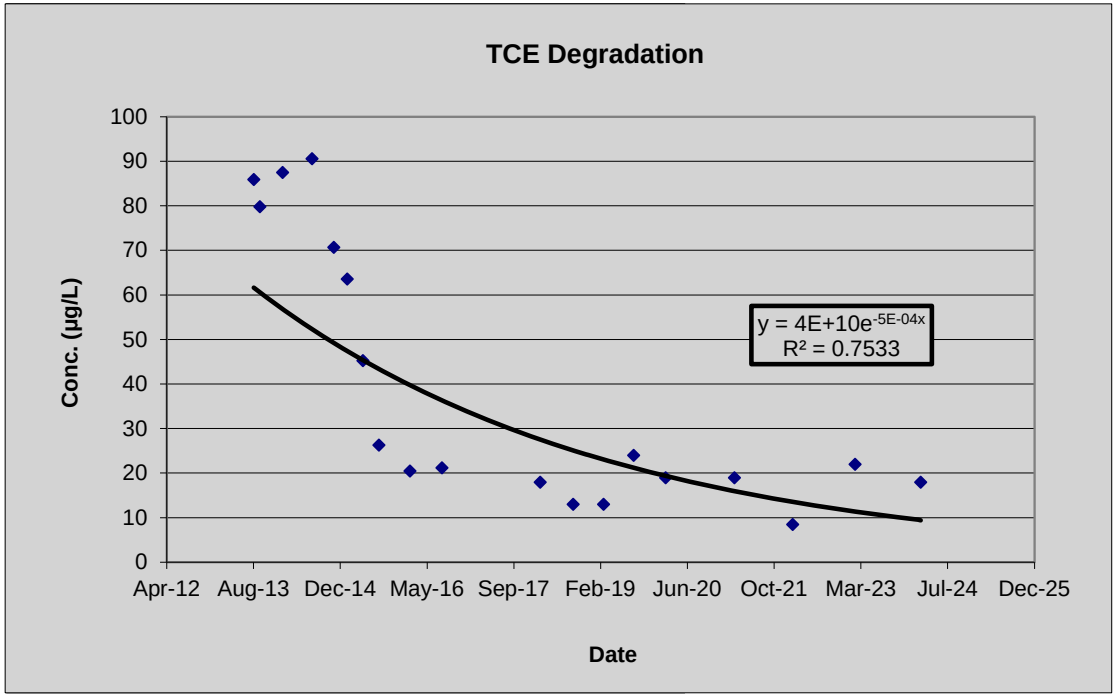
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Appendix F

Predictive Modeling

Figure F-1
Time-Dependent Attenuation Rate Constant and Estimated Cleanup Time
46WW11

Date	TCE (µg/L)
8/14/2013	85.9
9/19/2013	79.8
1/28/2014	87.5
7/16/2014	90.6
11/18/2014	70.7
2/4/2015	63.6
5/6/2015	45.3
8/5/2015	26.3
2/1/2016	20.5
8/3/2016	21.2
2/20/2018	18
8/29/2018	13
2/21/2019	13
8/12/2019	24
2/13/2020	19
3/16/2021	19
2/14/2022	8.5
2/9/2023	22
2/22/2024	18

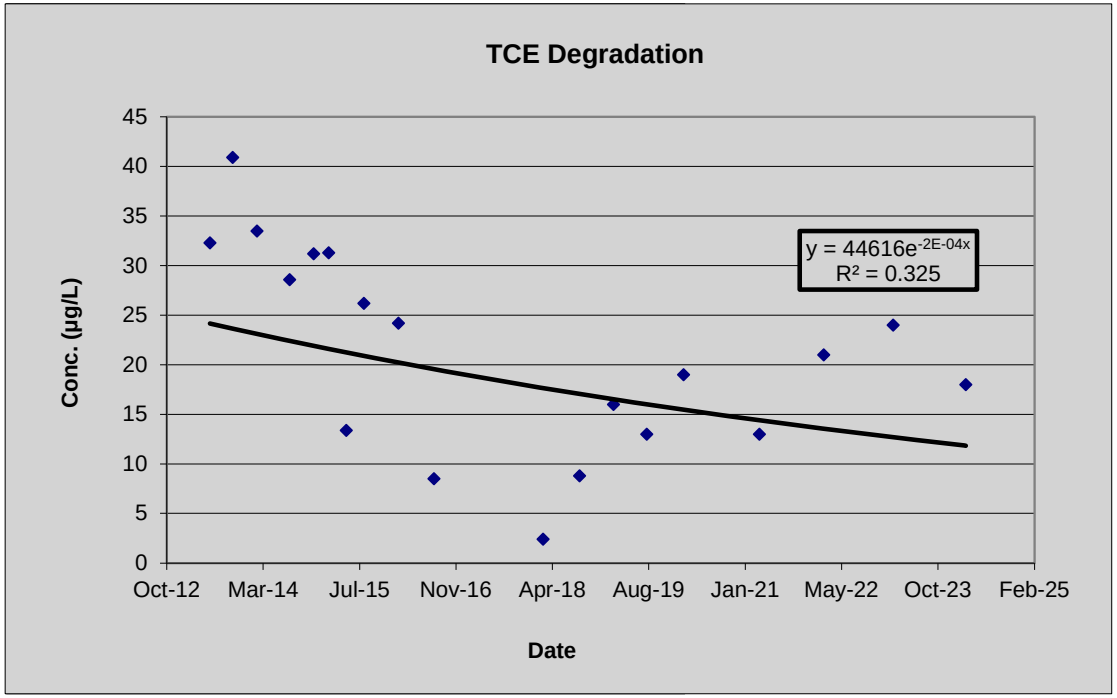


Chemical: TCE Well ID	Attenuation Rate Constant (day^{-1})	Attenuation Half-life (days)	Attenuation Half-life (years)	Current Conc. (µg/L)	Target Concentration for TCE (µg/L)	Estimated Cleanup Time (years)
46WW11	0.0005	1386.3	3.8	18	5	7.0

Notes:
The estimated cleanup time was calculated as the time it would take the most recent detected TCE concentration to reach the MCL using the site-specific attenuation rate, and assuming first order degradation kinetics.
µg/L - micrograms per liter
MCL - maximum contaminant level
TCE - trichloroethene

Figure F-2
Time-Dependent Attenuation Rate Constant and Estimated Cleanup Time
LHSMW19

Date	TCE (µg/L)
5/28/2013	32.3
9/24/2013	40.9
1/28/2014	33.5
7/16/2014	28.6
11/18/2014	31.2
2/4/2015	31.3
5/6/2015	13.4
8/5/2015	26.2
2/1/2016	24.2
8/3/2016	8.53
2/20/2018	2.4
8/28/2018	8.8
2/20/2019	16
8/12/2019	13
2/19/2020	19
3/18/2021	13
2/14/2022	21
2/9/2023	24
2/22/2024	18



Chemical: TCE Well ID	Attenuation Rate Constant (day^{-1})	Attenuation Half-life (days)	Attenuation Half-life (years)	Current Conc. (µg/L)	Target Concentration for TCE (µg/L)	Estimated Cleanup Time (years)
LHSMW19	0.0002	3465.7	9.5	18	5	17.5

Notes:
The estimated cleanup time was calculated as the time it would take the most recent detected TCE concentration to reach the MCL using the site-specific attenuation rate, and assuming first order degradation kinetics.

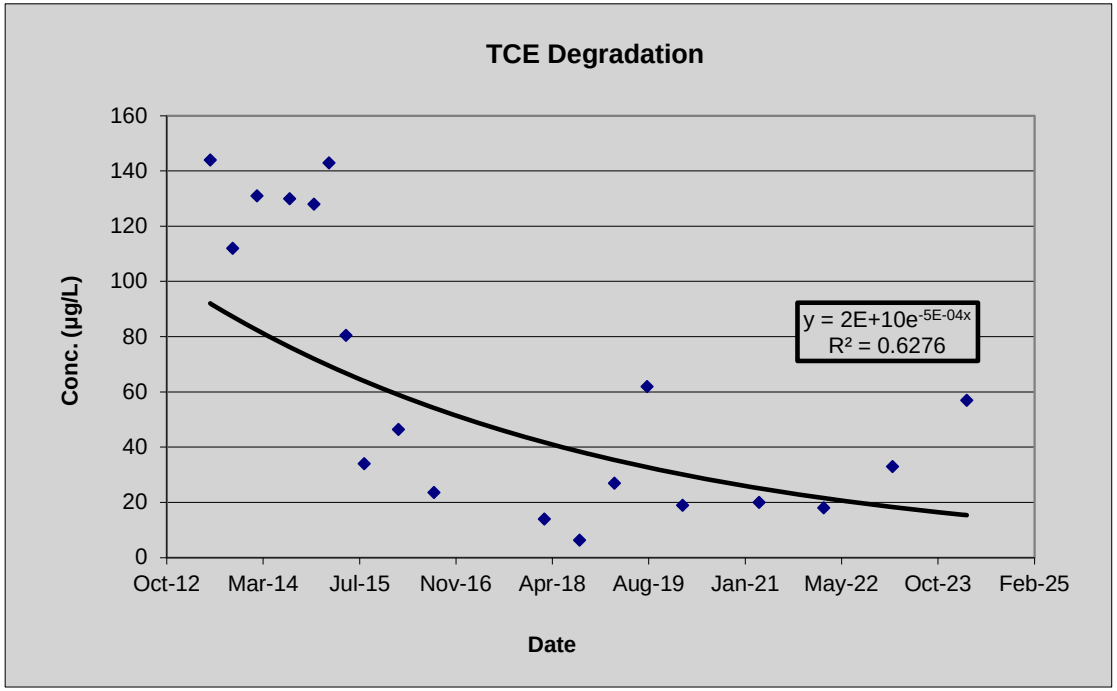
µg/L - micrograms per liter

MCL - maximum contaminant level

TCE - trichloroethene

Figure F-3
Time-Dependent Attenuation Rate Constant and Estimated Cleanup Time
46WW05

Date	TCE (µg/L)
5/30/2013	144
9/24/2013	112
1/28/2014	131
7/16/2014	130
11/19/2014	128
2/5/2015	143
5/5/2015	80.5
8/6/2015	34
2/1/2016	46.4
8/3/2016	23.6
2/26/2018	14
8/28/2018	6.4
2/25/2019	27
8/13/2019	62
2/13/2020	19
3/16/2021	20
2/15/2022	18
2/7/2023	33
2/26/2024	57



Chemical: TCE Well ID	Attenuation Rate Constant (day^{-1})	Attenuation Half-life (days)	Attenuation Half-life (years)	Current Conc. (µg/L)	Target Concentration for TCE (µg/L)	Estimated Cleanup Time (years)
46WW05	0.00004	17328.7	47.5	57	5	166.7

Notes:
The estimated cleanup time was calculated as the time it would take the most recent detected TCE concentration to reach the MCL using the site-specific attenuation rate, and assuming first order degradation kinetics.

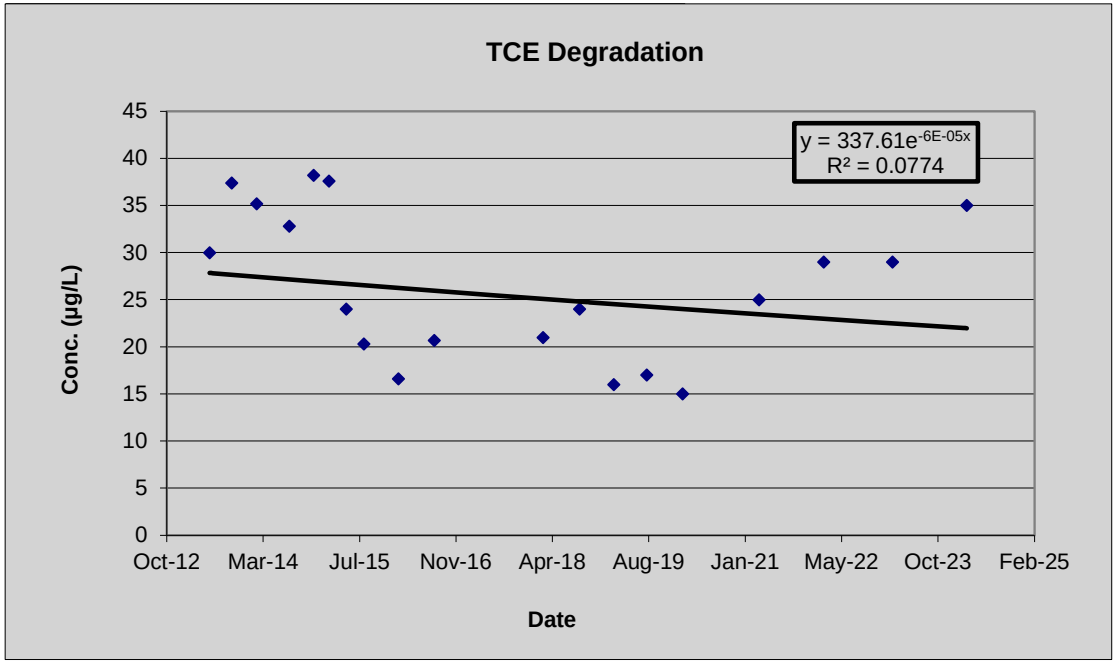
µg/L - micrograms per liter

MCL - maximum contaminant level

TCE - trichloroethene

Figure F-4
Time-Dependent Attenuation Rate Constant and Estimated Cleanup Time
46WW02

Date	TCE (µg/L)
5/28/2013	30
9/19/2013	37.4
1/27/2014	35.2
7/15/2014	32.8
11/18/2014	38.2
2/5/2015	37.6
5/6/2015	24
8/5/2015	20.3
2/1/2016	16.6
8/4/2016	20.7
2/20/2018	21
8/29/2018	24
2/21/2019	16
8/12/2019	17
2/13/2020	15
3/16/2021	25
2/15/2022	29
2/6/2023	29
2/26/2024	35



Chemical: TCE Well ID	Attenuation Rate Constant (day^{-1})	Attenuation Half-life (days)	Attenuation Half-life (years)	Current Conc. (µg/L)	Target Concentration for TCE (µg/L)	Estimated Cleanup Time (years)
46WW02	0.00006	11552.5	31.7	35	5	88.9

Notes:
The estimated cleanup time was calculated as the time it would take the most recent detected TCE concentration to reach the MCL using the site-specific attenuation rate, and assuming first order degradation kinetics.
µg/L - micrograms per liter
MCL - maximum contaminant level
TCE - trichloroethene

HS24021563 LHAAP Site 46 Cover Page

ALS WO# HS24021563

ALS Environmental
ALS Group USA, Corp
10450 Stancliff Road, Suite 210
Houston, TX 77099
T : +1 281 530 5656
F : +1 281 530 5887
www.alsglobal.com

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- Raw Data FID_4_460200 240304

HS24021563 Wetchem 9056_W
- Sequence Overview
- 020424 ICAL
- STD1
- STD2
- STD3
- STD4

10450 Stancliff Rd. Suite 210
Houston, TX 77099
T: +1 281 530 5656
F: +1 281 530 5887
alsglobal.com

WorkOrder: HS24021563

LHAAP / Site 46

Bhate Environmental Associates, Inc.

Marcia Olive
445 Union Blvd Ste 129
Lakewood CO 80228

21-Mar-2024

HS24021563 LHAAP Site 46 Final

ALS WO# HS24021563

10450 Stancliff Rd. Suite 210
Houston, TX 77099
T: +1 281 530 5656
F: +1 281 530 5887

March 13, 2024

Marcia Olive
Bhate Environmental Associates, Inc.
445 Union Blvd Ste 129
Lakewood, CO 80228

Work Order: **HS24021563**

Laboratory Results for: **LHAAP / Site 46**

Dear Marcia Olive,

ALS Environmental received 9 sample(s) on Feb 27, 2024 for the analysis presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested. Results are expressed as "as received" unless otherwise noted.

QC sample results for this data met EPA or laboratory specifications except as noted in the Case Narrative or as noted with qualifiers in the QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained by ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

If you have any questions regarding this report, please feel free to call me.

Sincerely,

Generated By: JUMOKE.LAWAL
James Guin

ALS Houston, US Date: 13-Mar-24

Client: Bhate Environmental Associates, Inc.
Project: LHAAP / Site 46
Work Order: HS24021563

SAMPLE SUMMARY

Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS24021563-01	46WW03-240226	Groundwater		26-Feb-2024 07:30	27-Feb-2024 09:10	☐
HS24021563-02	46WW02-240226	Groundwater		26-Feb-2024 08:15	27-Feb-2024 09:10	☐
HS24021563-03	46WW06-240226	Groundwater		26-Feb-2024 09:15	27-Feb-2024 09:10	☐
HS24021563-04	46WW08-240226	Groundwater		26-Feb-2024 09:55	27-Feb-2024 09:10	☐
HS24021563-05	46WW16-240226	Groundwater		26-Feb-2024 10:35	27-Feb-2024 09:10	☐
HS24021563-06	46WW05-240226	Groundwater		26-Feb-2024 11:20	27-Feb-2024 09:10	☐
HS24021563-07	LHSMW23R-240226	Groundwater		26-Feb-2024 12:10	27-Feb-2024 09:10	☐
HS24021563-08	LHSMW23R-24026-FD	Groundwater		26-Feb-2024 12:10	27-Feb-2024 09:10	☐
HS24021563-09	Trip Blank-240226	Groundwater	CG-120823-348	26-Feb-2024 00:00	27-Feb-2024 09:10	☐

ALS Houston, US Date: 13-Mar-24

Client: Bhate Environmental Associates, Inc. **CASE NARRATIVE**
Project: LHAAP / Site 46
Work Order: HS24021563

Work Order Comments

- The analysis for Carbon Dioxide was subcontracted to Eurofins Environmental Testing America l in Lancaster, PA . Final report attached

GC Semivolatiles by Method RSK-175

Batch ID: R460200

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

GCMS Volatiles by Method SW8260

Batch ID: R460168

Sample ID: 46WW02-240226 (HS24021563-02)

- Surrogate failed outside control limits high. There are no hits associated with this surrogate.

Sample ID: 46WW02-240226 (HS24021563-02MS)

- Ms/MSD/Surrogates failed due to matrix interference.

Sample ID: 46WW02-240226 (HS24021563-02MSD)

- The RPD between the MS and MSD was outside of the control limit.

Sample ID: VSTD050

- Acetone failed outside control limits high. Associated samples are ND.

Batch ID: R460210

Sample ID: VLCSW-240229

- Insufficient sample received to perform MS/MSD. An LCS/LCSD was performed as batch quality control.

Batch ID: R460228

Sample ID: HS24021593-04MS

- MS and MSD are for an unrelated sample

WetChemistry by Method SM5310B

Batch ID: R460955

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

ALS Houston, US Date: 13-Mar-24

Client: Bhate Environmental Associates, Inc.
Project: LHAAP / Site 46
Work Order: HS24021563

CASE NARRATIVE

WetChemistry by Method SW9056

Batch ID: R459965

Sample ID: 46WW02-240226 (HS24021563-02MS)

- The MS and/or MSD recovery was outside of the control limits; however, the result in the parent sample is greater than 4x the spike amount. (Sulfate)

Sample ID: 46WW05-240226 (HS24021563-06)

- The reporting limit is elevated due to dilution for high concentrations of non-target analytes. (Nitrogen, Nitrate (As N))

Sample ID: HS24021593-04MSD

- MS and MSD are for an unrelated sample (Sulfate)

ALS Houston, US Date: 13-Mar-24

Client: Bhate Environmental Associates, Inc.
Project: LHAAP / Site 46
Sample ID: 46WW03-240226
Collection Date: 26-Feb-2024 07:30

ANALYTICAL REPORT
WorkOrder:HS24021563
Lab ID:HS24021563-01
Matrix:Groundwater

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C	**Method:SW8260**							Analyst: FT
cis-1,2-Dichloroethene	1.0	U	0.20	1.0	1.0	ug/L	1	01-Mar-2024 05:43
Trichloroethene	1.0	U	0.20	1.0	1.0	ug/L	1	01-Mar-2024 05:43
Vinyl chloride	1.0	U	0.20	1.0	1.0	ug/L	1	01-Mar-2024 05:43
Surr: 1,2-Dichloroethane-d4	*83.3*			**0**	*81-118*	*%REC*	*1*	*01-Mar-2024 05:43*
Surr: 4-Bromofluorobenzene	*88.4*			**0**	*85-114*	*%REC*	*1*	*01-Mar-2024 05:43*
Surr: Dibromofluoromethane	*85.2*			**0**	*80-119*	*%REC*	*1*	*01-Mar-2024 05:43*
Surr: Toluene-d8	*89.2*			**0**	*89-112*	*%REC*	*1*	*01-Mar-2024 05:43*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Houston, US Date: 13-Mar-24

Client: Bhate Environmental Associates, Inc.
Project: LHAAP / Site 46
Sample ID: 46WW02-240226
Collection Date: 26-Feb-2024 08:15

ANALYTICAL REPORT
WorkOrder:HS24021563
Lab ID:HS24021563-02
Matrix:Groundwater

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C		**Method:SW8260**						Analyst: TS
cis-1,2-Dichloroethene	**2.7**		**0.20**	**0.50**	**1.0**	**ug/L**	1	29-Feb-2024 11:46
Trichloroethene	**35**		**0.20**	**0.50**	**1.0**	**ug/L**	1	29-Feb-2024 11:46
Vinyl chloride	0.50	U	0.20	0.50	1.0	ug/L	1	29-Feb-2024 11:46
Surr: 1,2-Dichloroethane-d4	*110*			**0**	*81-118*	*%REC*	*1*	*29-Feb-2024 11:46*
Surr: 4-Bromofluorobenzene	*103*			**0**	*85-114*	*%REC*	*1*	*29-Feb-2024 11:46*
Surr: Dibromofluoromethane	*111*			**0**	*80-119*	*%REC*	*1*	*29-Feb-2024 11:46*
Surr: Toluene-d8	*114*	*S*		**0**	*89-112*	*%REC*	*1*	*29-Feb-2024 11:46*
DISSOLVED GASES BY RSK-175		**Method:RSK-175**						Analyst: E.H.
Ethane	**0.000586**	J	**0.000144**	**0.000500**	**0.00100**	**mg/L**	1	04-Mar-2024 08:38
Ethene	0.000500	U	0.000234	0.000500	0.00100	mg/L	1	04-Mar-2024 08:38
Methane	**0.00107**		**0.000107**	**0.000500**	**0.000500**	**mg/L**	1	04-Mar-2024 08:38
TOTAL ORGANIC CARBON - SM5310B-2011		**Method:SM5310B**						Analyst: JAC
Organic Carbon, Total	**8.69**		**0.500**	**1.00**	**1.00**	**mg/L**	1	10-Mar-2024 15:13
ANIONS BY SW9056A		**Method:SW9056**						Analyst: TH
Chloride	**46.7**		**0.200**	**0.250**	**0.500**	**mg/L**	1	27-Feb-2024 14:21
Nitrogen, Nitrate (As N)	**0.0508**	J	**0.0300**	**0.100**	**0.100**	**mg/L**	1	27-Feb-2024 14:21
Sulfate	**249**		**1.00**	**1.25**	**2.50**	**mg/L**	5	27-Feb-2024 15:03
SUBCONTRACT ANALYSIS - RSK		**Method:NA**						Analyst: SUB
Subcontract Analysis	See Attached		0	0		NA	1	08-Mar-2024 15:46

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Houston, US Date: 13-Mar-24

Client: Bhate Environmental Associates, Inc.
Project: LHAAP / Site 46
Sample ID: 46WW06-240226
Collection Date: 26-Feb-2024 09:15

ANALYTICAL REPORT
WorkOrder:HS24021563
Lab ID:HS24021563-03
Matrix:Groundwater

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C	**Method:SW8260**							Analyst: FT
cis-1,2-Dichloroethene	1.0	U	0.20	1.0	1.0	ug/L	1	01-Mar-2024 06:05
Trichloroethene	1.0	U	0.20	1.0	1.0	ug/L	1	01-Mar-2024 06:05
Vinyl chloride	1.0	U	0.20	1.0	1.0	ug/L	1	01-Mar-2024 06:05
Surr: 1,2-Dichloroethane-d4	*81.8*			**0**	*81-118*	*%REC*	*1*	*01-Mar-2024 06:05*
Surr: 4-Bromofluorobenzene	*88.5*			**0**	*85-114*	*%REC*	*1*	*01-Mar-2024 06:05*
Surr: Dibromofluoromethane	*82.8*			**0**	*80-119*	*%REC*	*1*	*01-Mar-2024 06:05*
Surr: Toluene-d8	*89.3*			**0**	*89-112*	*%REC*	*1*	*01-Mar-2024 06:05*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Houston, US Date: 13-Mar-24

Client: Bhate Environmental Associates, Inc.
Project: LHAAP / Site 46
Sample ID: 46WW08-240226
Collection Date: 26-Feb-2024 09:55

ANALYTICAL REPORT
WorkOrder:HS24021563
Lab ID:HS24021563-04
Matrix:Groundwater

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C	**Method:SW8260**							Analyst: FT
cis-1,2-Dichloroethene	1.0	U	0.20	1.0	1.0	ug/L	1	01-Mar-2024 06:27
Trichloroethene	1.0	U	0.20	1.0	1.0	ug/L	1	01-Mar-2024 06:27
Vinyl chloride	1.0	U	0.20	1.0	1.0	ug/L	1	01-Mar-2024 06:27
Surr: 1,2-Dichloroethane-d4	*81.1*			**0**	*81-118*	*%REC*	*1*	*01-Mar-2024 06:27*
Surr: 4-Bromofluorobenzene	*89.7*			**0**	*85-114*	*%REC*	*1*	*01-Mar-2024 06:27*
Surr: Dibromofluoromethane	*82.7*			**0**	*80-119*	*%REC*	*1*	*01-Mar-2024 06:27*
Surr: Toluene-d8	*89.3*			**0**	*89-112*	*%REC*	*1*	*01-Mar-2024 06:27*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Houston, US Date: 13-Mar-24

Client: Bhate Environmental Associates, Inc.
Project: LHAAP / Site 46
Sample ID: 46WW16-240226
Collection Date: 26-Feb-2024 10:35

ANALYTICAL REPORT
WorkOrder:HS24021563
Lab ID:HS24021563-05
Matrix:Groundwater

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C		**Method:SW8260**						Analyst: FT
cis-1,2-Dichloroethene	1.0	U	0.20	1.0	1.0	ug/L	1	01-Mar-2024 06:49
Trichloroethene	1.0	U	0.20	1.0	1.0	ug/L	1	01-Mar-2024 06:49
Vinyl chloride	1.0	U	0.20	1.0	1.0	ug/L	1	01-Mar-2024 06:49
Surr: 1,2-Dichloroethane-d4	*82.1*			**0**	*81-118*	*%REC*	*1*	*01-Mar-2024 06:49*
Surr: 4-Bromofluorobenzene	*91.1*			**0**	*85-114*	*%REC*	*1*	*01-Mar-2024 06:49*
Surr: Dibromofluoromethane	*83.8*			**0**	*80-119*	*%REC*	*1*	*01-Mar-2024 06:49*
Surr: Toluene-d8	*90.5*			**0**	*89-112*	*%REC*	*1*	*01-Mar-2024 06:49*
DISSOLVED GASES BY RSK-175		**Method:RSK-175**						Analyst: E.H.
Ethane	0.000500	U	0.000144	0.000500	0.00100	mg/L	1	28-Feb-2024 10:05
Ethene	0.000500	U	0.000234	0.000500	0.00100	mg/L	1	28-Feb-2024 10:05
Methane	**0.00197**		**0.000107**	**0.000500**	**0.000500**	**mg/L**	1	28-Feb-2024 10:05
TOTAL ORGANIC CARBON - SM5310B-2011		**Method:SM5310B**						Analyst: JAC
Organic Carbon, Total	**2.60**		**0.500**	**1.00**	**1.00**	**mg/L**	1	10-Mar-2024 16:00
ANIONS BY SW9056A		**Method:SW9056**						Analyst: TH
Chloride	**269**		**2.00**	**2.50**	**5.00**	**mg/L**	10	27-Feb-2024 14:45
Nitrogen, Nitrate (As N)	0.100	U	0.0300	0.100	0.100	mg/L	1	27-Feb-2024 14:39
Sulfate	**592**		**2.00**	**2.50**	**5.00**	**mg/L**	10	27-Feb-2024 14:45
SUBCONTRACT ANALYSIS - RSK		**Method:NA**						Analyst: SUB
Subcontract Analysis	See Attached		0	0		NA	1	08-Mar-2024 15:46

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Houston, US Date: 13-Mar-24

Client: Bhate Environmental Associates, Inc.
Project: LHAAP / Site 46
Sample ID: 46WW05-240226
Collection Date: 26-Feb-2024 11:20

ANALYTICAL REPORT
WorkOrder:HS24021563
Lab ID:HS24021563-06
Matrix:Groundwater

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C		**Method:SW8260**						Analyst: TS
cis-1,2-Dichloroethene	**1.8**		**0.20**	**0.50**	**1.0**	**ug/L**	1	29-Feb-2024 19:28
Trichloroethene	**57**		**0.20**	**0.50**	**1.0**	**ug/L**	1	29-Feb-2024 19:28
Vinyl chloride	0.50	U	0.20	0.50	1.0	ug/L	1	29-Feb-2024 19:28
Surr: 1,2-Dichloroethane-d4	*99.5*			**0**	*81-118*	*%REC*	*1*	*29-Feb-2024 19:28*
Surr: 4-Bromofluorobenzene	*103*			**0**	*85-114*	*%REC*	*1*	*29-Feb-2024 19:28*
Surr: Dibromofluoromethane	*110*			**0**	*80-119*	*%REC*	*1*	*29-Feb-2024 19:28*
Surr: Toluene-d8	*108*			**0**	*89-112*	*%REC*	*1*	*29-Feb-2024 19:28*
DISSOLVED GASES BY RSK-175		**Method:RSK-175**						Analyst: E.H.
Ethane	**0.00190**		**0.000144**	**0.000500**	**0.00100**	**mg/L**	1	28-Feb-2024 10:16
Ethene	0.000500	U	0.000234	0.000500	0.00100	mg/L	1	28-Feb-2024 10:16
Methane	**0.00304**		**0.000107**	**0.000500**	**0.000500**	**mg/L**	1	28-Feb-2024 10:16
TOTAL ORGANIC CARBON - SM5310B-2011		**Method:SM5310B**						Analyst: JAC
Organic Carbon, Total	**7.40**		**0.500**	**1.00**	**1.00**	**mg/L**	1	10-Mar-2024 16:15
ANIONS BY SW9056A		**Method:SW9056**						Analyst: TH
Chloride	**218**		**1.00**	**1.25**	**2.50**	**mg/L**	5	27-Feb-2024 14:51
Nitrogen, Nitrate (As N)	**0.177**	J	**0.150**	**0.500**	**0.500**	**mg/L**	5	27-Feb-2024 14:51
Sulfate	**4,340**		**20.0**	**25.0**	**50.0**	**mg/L**	100	27-Feb-2024 14:57
SUBCONTRACT ANALYSIS - RSK		**Method:NA**						Analyst: SUB
Subcontract Analysis	See Attached		0	0		NA	1	08-Mar-2024 15:46

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Houston, US Date: 13-Mar-24

Client: Bhate Environmental Associates, Inc.
Project: LHAAP / Site 46
Sample ID: LHSMW23R-240226
Collection Date: 26-Feb-2024 12:10

ANALYTICAL REPORT
WorkOrder:HS24021563
Lab ID:HS24021563-07
Matrix:Groundwater

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C	**Method:SW8260**							Analyst: TS
cis-1,2-Dichloroethene	**0.66**	J	**0.20**	**0.50**	**1.0**	**ug/L**	1	29-Feb-2024 22:58
Trichloroethene	**0.56**	J	**0.20**	**0.50**	**1.0**	**ug/L**	1	29-Feb-2024 22:58
Vinyl chloride	0.50	U	0.20	0.50	1.0	ug/L	1	29-Feb-2024 22:58
Surr: 1,2-Dichloroethane-d4	*99.2*			**0**	*81-118*	*%REC*	*1*	*29-Feb-2024 22:58*
Surr: 4-Bromofluorobenzene	*99.5*			**0**	*85-114*	*%REC*	*1*	*29-Feb-2024 22:58*
Surr: Dibromofluoromethane	*112*			**0**	*80-119*	*%REC*	*1*	*29-Feb-2024 22:58*
Surr: Toluene-d8	*109*			**0**	*89-112*	*%REC*	*1*	*29-Feb-2024 22:58*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Houston, US Date: 13-Mar-24

Client: Bhate Environmental Associates, Inc.
Project: LHAAP / Site 46
Sample ID: LHSMW23R-24026-FD
Collection Date: 26-Feb-2024 12:10

ANALYTICAL REPORT
WorkOrder:HS24021563
Lab ID:HS24021563-08
Matrix:Groundwater

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C	**Method:SW8260**							Analyst: TS
cis-1,2-Dichloroethene	**0.65**	J	**0.20**	**0.50**	**1.0**	**ug/L**	1	29-Feb-2024 23:19
Trichloroethene	0.50	U	0.20	0.50	1.0	ug/L	1	29-Feb-2024 23:19
Vinyl chloride	0.50	U	0.20	0.50	1.0	ug/L	1	29-Feb-2024 23:19
Surr: 1,2-Dichloroethane-d4	*98.1*			**0**	*81-118*	*%REC*	*1*	*29-Feb-2024 23:19*
Surr: 4-Bromofluorobenzene	*101*			**0**	*85-114*	*%REC*	*1*	*29-Feb-2024 23:19*
Surr: Dibromofluoromethane	*111*			**0**	*80-119*	*%REC*	*1*	*29-Feb-2024 23:19*
Surr: Toluene-d8	*106*			**0**	*89-112*	*%REC*	*1*	*29-Feb-2024 23:19*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Houston, US Date: 13-Mar-24

Client: Bhate Environmental Associates, Inc.
Project: LHAAP / Site 46
Sample ID: Trip Blank-240226
Collection Date: 26-Feb-2024 00:00

ANALYTICAL REPORT
WorkOrder:HS24021563
Lab ID:HS24021563-09
Matrix:Groundwater

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
VOLATILES ORGANICS BY METHOD 8260C	**Method:SW8260**							Analyst: FT
cis-1,2-Dichloroethene	1.0	U	0.20	1.0	1.0	ug/L	1	01-Mar-2024 00:31
Trichloroethene	1.0	U	0.20	1.0	1.0	ug/L	1	01-Mar-2024 00:31
Vinyl chloride	1.0	U	0.20	1.0	1.0	ug/L	1	01-Mar-2024 00:31
Surr: 1,2-Dichloroethane-d4	*81.6*			**0**	*81-118*	*%REC*	*1*	*01-Mar-2024 00:31*
Surr: 4-Bromofluorobenzene	*88.9*			**0**	*85-114*	*%REC*	*1*	*01-Mar-2024 00:31*
Surr: Dibromofluoromethane	*83.4*			**0**	*80-119*	*%REC*	*1*	*01-Mar-2024 00:31*
Surr: Toluene-d8	*89.3*			**0**	*89-112*	*%REC*	*1*	*01-Mar-2024 00:31*

Note: See Qualifiers Page for a list of qualifiers and their explanation.

ALS Houston, US Date: 13-Mar-24

Client: Bhate Environmental Associates, Inc.
Project: LHAAP / Site 46
WorkOrder: HS24021563

DATES REPORT

Sample ID	Client Samp ID	Collection Date	Leachate Date	Prep Date	Analysis Date	DF
Batch ID: R459965 (0)	**Test Name :** ANIONS BY SW9056A				**Matrix:** Groundwater	
HS24021563-02	46WW02-240226	26 Feb 2024 08:15			27 Feb 2024 15:03	5
HS24021563-02	46WW02-240226	26 Feb 2024 08:15			27 Feb 2024 14:21	1
HS24021563-05	46WW16-240226	26 Feb 2024 10:35			27 Feb 2024 14:45	10
HS24021563-05	46WW16-240226	26 Feb 2024 10:35			27 Feb 2024 14:39	1
HS24021563-06	46WW05-240226	26 Feb 2024 11:20			27 Feb 2024 14:57	100
HS24021563-06	46WW05-240226	26 Feb 2024 11:20			27 Feb 2024 14:51	5
Batch ID: R460168 (0)	**Test Name :** VOLATILES ORGANICS BY METHOD 8260C				**Matrix:** Groundwater	
HS24021563-02	46WW02-240226	26 Feb 2024 08:15			29 Feb 2024 11:46	1
HS24021563-06	46WW05-240226	26 Feb 2024 11:20			29 Feb 2024 19:28	1
Batch ID: R460200 (0)	**Test Name :** DISSOLVED GASES BY RSK-175				**Matrix:** Groundwater	
HS24021563-02	46WW02-240226	26 Feb 2024 08:15			04 Mar 2024 08:38	1
HS24021563-05	46WW16-240226	26 Feb 2024 10:35			28 Feb 2024 10:05	1
HS24021563-06	46WW05-240226	26 Feb 2024 11:20			28 Feb 2024 10:16	1
Batch ID: R460210 (0)	**Test Name :** VOLATILES ORGANICS BY METHOD 8260C				**Matrix:** Groundwater	
HS24021563-01	46WW03-240226	26 Feb 2024 07:30			01 Mar 2024 05:43	1
HS24021563-03	46WW06-240226	26 Feb 2024 09:15			01 Mar 2024 06:05	1
HS24021563-04	46WW08-240226	26 Feb 2024 09:55			01 Mar 2024 06:27	1
HS24021563-05	46WW16-240226	26 Feb 2024 10:35			01 Mar 2024 06:49	1
HS24021563-09	Trip Blank-240226	26 Feb 2024 00:00			01 Mar 2024 00:31	1
Batch ID: R460228 (0)	**Test Name :** VOLATILES ORGANICS BY METHOD 8260C				**Matrix:** Groundwater	
HS24021563-07	LHSMW23R-240226	26 Feb 2024 12:10			29 Feb 2024 22:58	1
HS24021563-08	LHSMW23R-24026-FD	26 Feb 2024 12:10			29 Feb 2024 23:19	1
Batch ID: R460876 (0)	**Test Name :** SUBCONTRACT ANALYSIS - RSK				**Matrix:** Groundwater	
HS24021563-02	46WW02-240226	26 Feb 2024 08:15			08 Mar 2024 15:46	1
HS24021563-05	46WW16-240226	26 Feb 2024 10:35			08 Mar 2024 15:46	1
HS24021563-06	46WW05-240226	26 Feb 2024 11:20			08 Mar 2024 15:46	1
Batch ID: R460955 (0)	**Test Name :** TOTAL ORGANIC CARBON - SM5310B-2011				**Matrix:** Groundwater	
HS24021563-02	46WW02-240226	26 Feb 2024 08:15			10 Mar 2024 15:13	1
HS24021563-05	46WW16-240226	26 Feb 2024 10:35			10 Mar 2024 16:00	1
HS24021563-06	46WW05-240226	26 Feb 2024 11:20			10 Mar 2024 16:15	1

ALS Houston, US Date: 13-Mar-24

Client: Bhate Environmental Associates, Inc.
Project: LHAAP / Site 46
WorkOrder: HS24021563

QC BATCH REPORT

Batch ID: R460200 (0) **Instrument:** FID-4 **Method:** DISSOLVED GASES BY RSK-175

MBLK Sample ID: **MBLK-240228** Units: **mg/L** Analysis Date: **28-Feb-2024 08:31**
Client ID: Run ID: **FID-4_460200** SeqNo: **7862483** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Ethane	0.000500	0.00100								U
Ethene	0.000500	0.00100								U
Methane	0.000500	0.000500								U

LCS Sample ID: **LCS-240228** Units: **mg/L** Analysis Date: **28-Feb-2024 08:44**
Client ID: Run ID: **FID-4_460200** SeqNo: **7862484** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Ethane	0.0192	0.00100	0.01804	0	106	75 - 125				
Ethene	0.0156	0.00100	0.0168	0	93.2	75 - 125				
Methane	0.00846	0.000500	0.009647	0	87.7	75 - 125				

LCSD Sample ID: **LCSD-240228** Units: **mg/L** Analysis Date: **28-Feb-2024 13:43**
Client ID: Run ID: **FID-4_460200** SeqNo: **7862505** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Ethane	0.0177	0.00100	0.01804	0	97.9	75 - 125	0.01920	8.34	30	
Ethene	0.0148	0.00100	0.0168	0	87.9	75 - 125	0.01565	5.8	30	
Methane	0.00776	0.000500	0.009647	0	80.4	75 - 125	0.008460	8.64	30	

MS Sample ID: **HS24021563-02MS** Units: **mg/L** Analysis Date: **04-Mar-2024 08:57**
Client ID: **46WW02-240226** Run ID: **FID-4_460200** SeqNo: **7865791** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Ethane	0.0150	0.00100	0.01804	0.0005857	79.9	75 - 125				
Ethene	0.0134	0.00100	0.0168	0	79.5	75 - 125				
Methane	0.00868	0.000500	0.009647	0.001069	78.9	75 - 125				

ALS Houston, US Date: 13-Mar-24

Client: Bhate Environmental Associates, Inc.
Project: LHAAP / Site 46
WorkOrder: HS24021563

QC BATCH REPORT

Batch ID: R460200 (0) **Instrument:** FID-4 **Method:** DISSOLVED GASES BY RSK-175

MSD Sample ID: **HS24021563-02MSD** Units: **mg/L** Analysis Date: **04-Mar-2024 09:08**
Client ID: **46WW02-240226** Run ID: **FID-4_460200** SeqNo: **7865792** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Ethane	0.0153	0.00100	0.01804	0.0005857	81.8	75 - 125	0.01500	2.27	30	
Ethene	0.0140	0.00100	0.0168	0	83.6	75 - 125	0.01336	4.98	30	
Methane	0.00865	0.000500	0.009647	0.001069	78.6	75 - 125	0.008683	0.359	30	

The following samples were analyzed in this batch: HS24021563-02 HS24021563-05 HS24021563-06

ALS Houston, US Date: 13-Mar-24

Client: Bhate Environmental Associates, Inc.
Project: LHAAP / Site 46
WorkOrder: HS24021563

QC BATCH REPORT

Batch ID: R460168 (0) **Instrument:** VOA10 **Method:** VOLATILES ORGANICS BY METHOD 8260C

MBLK Sample ID: **VBLKW-240229** Units: **ug/L** Analysis Date: **29-Feb-2024 11:18**
Client ID: Run ID: **VOA10_460168** SeqNo: **7861506** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
cis-1,2-Dichloroethene	0.50	1.0								U
Trichloroethene	0.50	1.0								U
Vinyl chloride	0.50	1.0								U
Surr: 1,2-Dichloroethane-d4	*56*	*35*	*50*	*0*	*112*	*81 - 118*				
Surr: 4-Bromofluorobenzene	*52.05*	*35*	*50*	*0*	*104*	*85 - 114*				
Surr: Dibromofluoromethane	*57.26*	*35*	*50*	*0*	*115*	*80 - 119*				
Surr: Toluene-d8	*55.83*	*35*	*50*	*0*	*112*	*89 - 112*				

LCS Sample ID: **VLCSW-240229** Units: **ug/L** Analysis Date: **29-Feb-2024 10:36**
Client ID: Run ID: **VOA10_460168** SeqNo: **7861505** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
cis-1,2-Dichloroethene	22.13	1.0	20	0	111	78 - 123				
Trichloroethene	21.35	1.0	20	0	107	79 - 123				
Vinyl chloride	21.43	1.0	20	0	107	58 - 137				
Surr: 1,2-Dichloroethane-d4	*57.43*	*35*	*50*	*0*	*115*	*81 - 118*				
Surr: 4-Bromofluorobenzene	*53.14*	*35*	*50*	*0*	*106*	*85 - 114*				
Surr: Dibromofluoromethane	*59.28*	*35*	*50*	*0*	*119*	*80 - 119*				
Surr: Toluene-d8	*53.61*	*35*	*50*	*0*	*107*	*89 - 112*				

MS Sample ID: **HS24021563-02MS** Units: **ug/L** Analysis Date: **29-Feb-2024 12:28**
Client ID: **46WW02-240226** Run ID: **VOA10_460168** SeqNo: **7861508** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
cis-1,2-Dichloroethene	20.26	1.0	20	2.665	88.0	78 - 123				
Trichloroethene	52.08	1.0	20	34.57	87.6	79 - 123				
Vinyl chloride	18.91	1.0	20	0	94.6	58 - 137				
Surr: 1,2-Dichloroethane-d4	*59.82*	*35*	*50*	*0*	*120*	*81 - 118*				S
Surr: 4-Bromofluorobenzene	*51.67*	*35*	*50*	*0*	*103*	*85 - 114*				
Surr: Dibromofluoromethane	*60.52*	*35*	*50*	*0*	*121*	*80 - 119*				S
Surr: Toluene-d8	*55.55*	*35*	*50*	*0*	*111*	*89 - 112*				

ALS Houston, US Date: 13-Mar-24

Client: Bhate Environmental Associates, Inc.
Project: LHAAP / Site 46
WorkOrder: HS24021563

QC BATCH REPORT

Batch ID: R460168 (0) **Instrument:** VOA10 **Method:** VOLATILES ORGANICS BY METHOD 8260C

MSD Sample ID: **HS24021563-02MSD** Units: **ug/L** Analysis Date: **29-Feb-2024 12:49**
Client ID: **46WW02-240226** Run ID: **VOA10_460168** SeqNo: **7861509** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	RPD %RPD	RPD Limit	Qual
cis-1,2-Dichloroethene	24.67	1.0	20	2.665	110	78 - 123	20.26	19.6	20	
Trichloroethene	55.59	1.0	20	34.57	105	79 - 123	52.08	6.52	20	
Vinyl chloride	23.85	1.0	20	0	119	58 - 137	18.91	23.1	20	R
Surr: 1,2-Dichloroethane-d4	*52.17*	*35*	*50*	*0*	*104*	*81 - 118*	*59.82*	*13.7*	*20*	
Surr: 4-Bromofluorobenzene	*51.17*	*35*	*50*	*0*	*102*	*85 - 114*	*51.67*	*0.98*	*20*	
Surr: Dibromofluoromethane	*55.95*	*35*	*50*	*0*	*112*	*80 - 119*	*60.52*	*7.84*	*20*	
Surr: Toluene-d8	*54.06*	*35*	*50*	*0*	*108*	*89 - 112*	*55.55*	*2.72*	*20*	

The following samples were analyzed in this batch: HS24021563-02 HS24021563-06

ALS Houston, US Date: 13-Mar-24

Client: Bhate Environmental Associates, Inc.
Project: LHAAP / Site 46
WorkOrder: HS24021563

QC BATCH REPORT

Batch ID: R460210 (0) **Instrument:** VOA9 **Method:** VOLATILES ORGANICS BY METHOD 8260C

MBLK Sample ID: **VBLKW-240229** Units: **ug/L** Analysis Date: **29-Feb-2024 23:46**
Client ID: Run ID: **VOA9_460210** SeqNo: **7862695** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
cis-1,2-Dichloroethene	1.0	1.0								U
Trichloroethene	1.0	1.0								U
Vinyl chloride	1.0	1.0								U
Surr: 1,2-Dichloroethane-d4	*40.58*	*35*	*50*	*0*	*81.2*	*81 - 118*				
Surr: 4-Bromofluorobenzene	*44.89*	*35*	*50*	*0*	*89.8*	*85 - 114*				
Surr: Dibromofluoromethane	*42.01*	*35*	*50*	*0*	*84.0*	*80 - 119*				
Surr: Toluene-d8	*44.72*	*35*	*50*	*0*	*89.4*	*89 - 112*				

LCS Sample ID: **VLCSW-240229** Units: **ug/L** Analysis Date: **29-Feb-2024 22:40**
Client ID: Run ID: **VOA9_460210** SeqNo: **7862693** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
cis-1,2-Dichloroethene	20.52	1.0	20	0	103	78 - 123				
Trichloroethene	19.82	1.0	20	0	99.1	79 - 123				
Vinyl chloride	22.34	1.0	20	0	112	58 - 137				
Surr: 1,2-Dichloroethane-d4	*49.09*	*35*	*50*	*0*	*98.2*	*81 - 118*				
Surr: 4-Bromofluorobenzene	*50.74*	*35*	*50*	*0*	*101*	*85 - 114*				
Surr: Dibromofluoromethane	*51.96*	*35*	*50*	*0*	*104*	*80 - 119*				
Surr: Toluene-d8	*48.28*	*35*	*50*	*0*	*96.6*	*89 - 112*				

LCSD Sample ID: **VLCSDW-240229** Units: **ug/L** Analysis Date: **29-Feb-2024 23:02**
Client ID: Run ID: **VOA9_460210** SeqNo: **7862694** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
cis-1,2-Dichloroethene	20.24	1.0	20	0	101	78 - 123	20.52	1.37	20	
Trichloroethene	20.61	1.0	20	0	103	79 - 123	19.82	3.91	20	
Vinyl chloride	20.79	1.0	20	0	104	58 - 137	22.34	7.17	20	
Surr: 1,2-Dichloroethane-d4	*49.41*	*35*	*50*	*0*	*98.8*	*81 - 118*	*49.09*	*0.655*	*20*	
Surr: 4-Bromofluorobenzene	*50.59*	*35*	*50*	*0*	*101*	*85 - 114*	*50.74*	*0.295*	*20*	
Surr: Dibromofluoromethane	*50.51*	*35*	*50*	*0*	*101*	*80 - 119*	*51.96*	*2.83*	*20*	
Surr: Toluene-d8	*49.74*	*35*	*50*	*0*	*99.5*	*89 - 112*	*48.28*	*2.99*	*20*	

The following samples were analyzed in this batch: HS24021563-01 HS24021563-03 HS24021563-04 HS24021563-05 HS24021563-09

ALS Houston, US Date: 13-Mar-24

Client: Bhate Environmental Associates, Inc.
Project: LHAAP / Site 46
WorkOrder: HS24021563

QC BATCH REPORT

Batch ID: R460228 (0) **Instrument:** VOA10 **Method:** VOLATILES ORGANICS BY METHOD 8260C

MBLK Sample ID: **VBLKW-240229** Units: **ug/L** Analysis Date: **29-Feb-2024 22:37**
Client ID: Run ID: **VOA10_460228** SeqNo: **7863014** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
cis-1,2-Dichloroethene	0.50	1.0								U
Trichloroethene	0.50	1.0								U
Vinyl chloride	0.50	1.0								U
Surr: 1,2-Dichloroethane-d4	*49.35*	*35*	*50*	*0*	*98.7*	*81 - 118*				
Surr: 4-Bromofluorobenzene	*51.36*	*35*	*50*	*0*	*103*	*85 - 114*				
Surr: Dibromofluoromethane	*53.29*	*35*	*50*	*0*	*107*	*80 - 119*				
Surr: Toluene-d8	*53.82*	*35*	*50*	*0*	*108*	*89 - 112*				

LCS Sample ID: **VLCSW-240229** Units: **ug/L** Analysis Date: **29-Feb-2024 21:34**
Client ID: Run ID: **VOA10_460228** SeqNo: **7863013** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
cis-1,2-Dichloroethene	19.46	1.0	20	0	97.3	78 - 123				
Trichloroethene	21.12	1.0	20	0	106	79 - 123				
Vinyl chloride	17.31	1.0	20	0	86.5	58 - 137				
Surr: 1,2-Dichloroethane-d4	*48.6*	*35*	*50*	*0*	*97.2*	*81 - 118*				
Surr: 4-Bromofluorobenzene	*51.86*	*35*	*50*	*0*	*104*	*85 - 114*				
Surr: Dibromofluoromethane	*55.3*	*35*	*50*	*0*	*111*	*80 - 119*				
Surr: Toluene-d8	*53.01*	*35*	*50*	*0*	*106*	*89 - 112*				

MS Sample ID: **HS24021593-04MS** Units: **ug/L** Analysis Date: **01-Mar-2024 00:01**
Client ID: Run ID: **VOA10_460228** SeqNo: **7862991** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
cis-1,2-Dichloroethene	71.55	1.0	20	56.28	76.4	78 - 123				S
Trichloroethene	25.56	1.0	20	2.403	116	79 - 123				
Vinyl chloride	20.38	1.0	20	1.85	92.7	58 - 137				
Surr: 1,2-Dichloroethane-d4	*47.92*	*35*	*50*	*0*	*95.8*	*81 - 118*				
Surr: 4-Bromofluorobenzene	*50.75*	*35*	*50*	*0*	*102*	*85 - 114*				
Surr: Dibromofluoromethane	*49.85*	*35*	*50*	*0*	*99.7*	*80 - 119*				
Surr: Toluene-d8	*54.75*	*35*	*50*	*0*	*110*	*89 - 112*				

ALS Houston, US Date: 13-Mar-24

Client: Bhate Environmental Associates, Inc.
Project: LHAAP / Site 46
WorkOrder: HS24021563

QC BATCH REPORT

Batch ID: R460228 (0) **Instrument:** VOA10 **Method:** VOLATILES ORGANICS BY METHOD 8260C

MSD Sample ID: **HS24021593-04MSD** Units: **ug/L** Analysis Date: **01-Mar-2024 00:22**
Client ID: Run ID: **VOA10_460228** SeqNo: **7862992** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
cis-1,2-Dichloroethene	69.88	1.0	20	56.28	68.0	78 - 123	71.55	2.37	20	S
Trichloroethene	23.88	1.0	20	2.403	107	79 - 123	25.56	6.82	20	
Vinyl chloride	19.14	1.0	20	1.85	86.4	58 - 137	20.38	6.31	20	
Surr: 1,2-Dichloroethane-d4	*48.2*	*35*	*50*	*0*	*96.4*	*81 - 118*	*47.92*	*0.585*	*20*	
Surr: 4-Bromofluorobenzene	*50.58*	*35*	*50*	*0*	*101*	*85 - 114*	*50.75*	*0.35*	*20*	
Surr: Dibromofluoromethane	*51.16*	*35*	*50*	*0*	*102*	*80 - 119*	*49.85*	*2.6*	*20*	
Surr: Toluene-d8	*54.39*	*35*	*50*	*0*	*109*	*89 - 112*	*54.75*	*0.662*	*20*	

The following samples were analyzed in this batch: HS24021563-07 HS24021563-08

ALS Houston, US Date: 13-Mar-24

Client: Bhate Environmental Associates, Inc.
Project: LHAAP / Site 46
WorkOrder: HS24021563

QC BATCH REPORT

Batch ID: R459965 (0) **Instrument: ICS-Integrion** **Method: ANIONS BY SW9056A**

MBLK Sample ID: **MBLK** Units: **mg/L** Analysis Date: **27-Feb-2024 14:09**
Client ID: Run ID: **ICS-Integrion_459965** SeqNo: **7856831** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	0.250	0.500								U
Nitrogen, Nitrate (As N)	0.100	0.100								U
Nitrogen, Nitrite (As N)	0.100	0.100								U
Sulfate	0.250	0.500								U

LCS Sample ID: **LCS** Units: **mg/L** Analysis Date: **27-Feb-2024 14:15**
Client ID: Run ID: **ICS-Integrion_459965** SeqNo: **7856832** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	19.63	0.500	20	0	98.2	80 - 120				
Nitrogen, Nitrate (As N)	3.871	0.100	4	0	96.8	80 - 120				
Nitrogen, Nitrite (As N)	3.906	0.100	4	0	97.6	80 - 120				
Sulfate	20.41	0.500	20	0	102	80 - 120				

MS Sample ID: **HS24021593-04MS** Units: **mg/L** Analysis Date: **27-Feb-2024 20:34**
Client ID: Run ID: **ICS-Integrion_459965** SeqNo: **7856880** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	21.43	0.500	10	11.57	98.6	80 - 120				
Nitrogen, Nitrate (As N)	1.869	0.100	2	0.0175	92.6	80 - 120				
Nitrogen, Nitrite (As N)	1.862	0.100	2	0.1308	86.6	80 - 120				
Sulfate	46.58	0.500	10	38.87	77.0	80 - 120				S

MS Sample ID: **HS24021563-02MS** Units: **mg/L** Analysis Date: **27-Feb-2024 14:27**
Client ID: **46WW02-240226** Run ID: **ICS-Integrion_459965** SeqNo: **7856834** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	55.86	0.500	10	46.72	91.4	80 - 120				O
Nitrogen, Nitrate (As N)	1.935	0.100	2	0.0508	94.2	80 - 120				
Nitrogen, Nitrite (As N)	1.768	0.100	2	0.0043	88.2	80 - 120				
Sulfate	229.7	0.500	10	231.5	-18.7	80 - 120				SEO

ALS Houston, US Date: 13-Mar-24

Client: Bhate Environmental Associates, Inc.
Project: LHAAP / Site 46
WorkOrder: HS24021563

QC BATCH REPORT

Batch ID: R459965 (0) **Instrument:** ICS-Integrion **Method:** ANIONS BY SW9056A

MSD Sample ID: **HS24021593-04MSD** Units: **mg/L** Analysis Date: **27-Feb-2024 20:40**
Client ID: Run ID: **ICS-Integrion_459965** SeqNo: **7856881** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	21.41	0.500	10	11.57	98.4	80 - 120	21.43	0.0654	20	
Nitrogen, Nitrate (As N)	1.866	0.100	2	0.0175	92.4	80 - 120	1.869	0.177	20	
Nitrogen, Nitrite (As N)	1.86	0.100	2	0.1308	86.4	80 - 120	1.862	0.145	20	
Sulfate	46.66	0.500	10	38.87	77.9	80 - 120	46.58	0.184	20	S

MSD Sample ID: **HS24021563-02MSD** Units: **mg/L** Analysis Date: **27-Feb-2024 14:33**
Client ID: **46WW02-240226** Run ID: **ICS-Integrion_459965** SeqNo: **7856835** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	55.73	0.500	10	46.72	90.1	80 - 120	55.86	0.237	20	O
Nitrogen, Nitrate (As N)	1.928	0.100	2	0.0508	93.9	80 - 120	1.935	0.342	20	
Nitrogen, Nitrite (As N)	1.762	0.100	2	0.0043	87.9	80 - 120	1.768	0.34	20	
Sulfate	229.2	0.500	10	231.5	-23.5	80 - 120	229.7	0.21	20	SEO

The following samples were analyzed in this batch: HS24021563-02 HS24021563-05 HS24021563-06

ALS Houston, US Date: 13-Mar-24

Client: Bhate Environmental Associates, Inc.
Project: LHAAP / Site 46
WorkOrder: HS24021563

QC BATCH REPORT

Batch ID: R460955 (0) **Instrument:** TOC_05 **Method:** TOTAL ORGANIC CARBON - SM5310B-2011

MBLK Sample ID: **MBLK-03092024** Units: **mg/L** Analysis Date: **10-Mar-2024 11:24**
Client ID: Run ID: **TOC_05_460955** SeqNo: **7879346** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Organic Carbon, Total	1.00	1.00								U

LCS Sample ID: **LCS-03092024** Units: **mg/L** Analysis Date: **10-Mar-2024 11:39**
Client ID: Run ID: **TOC_05_460955** SeqNo: **7879347** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Organic Carbon, Total	10.51	1.00	10	0	105	85 - 115				

LCSD Sample ID: **LCSD-03092024** Units: **mg/L** Analysis Date: **10-Mar-2024 12:13**
Client ID: Run ID: **TOC_05_460955** SeqNo: **7879348** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Organic Carbon, Total	10.43	1.00	10	0	104	85 - 115	10.51	0.764	20	

MS Sample ID: **HS24021563-02MS** Units: **mg/L** Analysis Date: **10-Mar-2024 15:29**
Client ID: **46WW02-240226** Run ID: **TOC_05_460955** SeqNo: **7879359** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Organic Carbon, Total	17.29	1.00	10	8.694	86.0	80 - 120				

MSD Sample ID: **HS24021563-02MSD** Units: **mg/L** Analysis Date: **10-Mar-2024 15:46**
Client ID: **46WW02-240226** Run ID: **TOC_05_460955** SeqNo: **7879360** PrepDate: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Organic Carbon, Total	17.1	1.00	10	8.694	84.1	80 - 120	17.29	1.1	20	

The following samples were analyzed in this batch: HS24021563-02 HS24021563-05 HS24021563-06

ALS Houston, US Date: 13-Mar-24

Client: Bhate Environmental Associates, Inc.
Project: LHAAP / Site 46
WorkOrder: **HS24021563**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte detected below quantitation limit
M	Manually integrated, see raw data for justification
n	Not offered for accreditation
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL/SDL

Acronym	Description
DCS	Detectability Check Study
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
MBLK	Method Blank
MDL	Method Detection Limit
MQL	Method Quantitation Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PDS	Post Digestion Spike
PQL	Practical Quantitaion Limit
SD	Serial Dilution
SDL	Sample Detection Limit
TRRP	Texas Risk Reduction Program

Unit Reported	Description
mg/L	Milligrams per Liter

CERTIFICATIONS,ACCREDITATIONS & LICENSES

Agency	Number	Expire Date
Arkansas	88-00356	27-Mar-2024
California	2919; 2024	30-Apr-2024
Dept of Defense	L22-90-R2	31-Mar-2024
Florida	E87611-38	30-Jun-2024
Illinois	2000322023-11	30-Jun-2024
Kansas	E-10352 2023-2024	31-Jul-2024
Louisiana	03087 2023-2024	30-Jun-2024
Maryland	343; 2023-2024	30-Jun-2024
North Carolina	624 - 2024	31-Dec-2024
North Dakota	R-193 2023-2024	30-Apr-2024
Oklahoma	2023-140	31-Aug-2024
Texas	T104704231-23-32	30-Apr-2024
Utah	TX026932023-14	31-Jul-2024

ALS Houston, US Date: 13-Mar-24

Sample Receipt Checklist

Work Order ID: HS24021563 **Date/Time Received:** 27-Feb-2024 09:10

Client Name: Bhate Environmental **Received by:** Si Ma

Completed By:	/S/ Paresh M. Giga	27-Feb-2024 10:58	**Reviewed by:**	/S/ luis.aguilar	27-Feb-2024 14:55
	eSignature	Date/Time		eSignature	Date/Time

Matrices: **GW/Water** Carrier name: **FedEx Priority Overnight**

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
VOA/TX1005/TX1006 Solids in hermetically sealed vials?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	1 Page(s)
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	COC IDs:none
Samplers name present on COC?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐	

Temperature(s)/Thermometer(s):	2.5C/2.4C U/C	IR31
Cooler(s)/Kit(s):	50398	
Date/Time sample(s) sent to storage:	2/27/24 11:25	

Water - VOA vials have zero headspace?	Yes ☑	No ☐	No VOA vials submitted ☐
Water - pH acceptable upon receipt?	Yes ☐	No ☐	N/A ☑
pH adjusted?	Yes ☐	No ☐	N/A ☑
pH adjusted by:			

Login Notes:

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

Corrective Action:

bhate

Page: ____ of ____

Project/Phase

No: JVPCIBH.0001

COC Number(1):

LIMS Number:

1608 13th Avenue South, Suite 300
Birmingham Alabama 35205

Chain of Custody and Analytical Request

Facility/Base I.D.: LHAAP / BILL to PCI

Project/Site Name: LHAAP / Site 46

Client Name:

Collected by: Scott Beesinger

Sample Analysis Requested (5) | Quality Assurance Samples (6)

Field Sample ID (30 Characters Max)	Date Collected (dd-mmm-yyyy)	Time Collected (Military) (hhmm)	Sample Depth (beginning - ending)	SA Code (2)	Sample Number (3)	Sample Matrix (4)	Number of containers	VOC	Dissolved Gases	TOC	Carbon Dioxide	Anions	Ambient Blank Lot Control Number	Equipment Blank Lot Control Number	Trip Blank Lot Control Number	Cooler ID
46WW03-240226	26 FEB 2024	0730	-	N		WG	3	X								
46WW02-240226	26 FEB 2024	0815	-	N		WG	12	X	X	X	X	X				
46WW02-240226-MS	26 FEB 2024	0815	-	MS		WG	12	X	X	X	X	X				
46WW02-240226-MSD	26 FEB 2024	0815	-	SD		WG	12	X	X	X	X	X				
46WW06-240226	26 FEB 2024	0915		N		WG	3									
46WW08-240226	26 FEB 2024	0955	-	N		WG	3									
46WW16-240226	26 FEB 2024	1035	-	N		WG	12	X	X	X	X	X				
46WW05-240226	26 FEB 2024	1120	-	N		WG	12	X	X	X	X	X				
LHSMW23R-240226	26 FEB 2024	1210	-	N		WG	3	X								
LHSMW23R-240226-FD	26 FEB 2024	1210	-	FD		WG	3	X								
TRIP BLANK-240226	26 FEB 2024		-	TB		W	2	X								

HS24021563

Bhate Environmental Associates, Inc.

LHAAP / Site 46

COMMENTS: STANDARD TAT

Cooler # 503018 Temp 3.5 Seal # CUF-01

Custody Transfers Prior to Receipt by Laboratory

Relinquished By (Signed)	Date	Time	Received by (signed)	Date	Time
1. Scott Beesinger	2/26/24	1430	1. [signature]		
2.			2.		
3.			3.	02/27/24	0010

Sample Delivery Details / Laboratory Receipt

Delivered Directly to Lab: ____ Shipped ____ No.:

Method of Shipment: ____

Fed Ex ____ Airbill Number:

Analytical Lab: ALS 10450 Stanciff Rd. Suite 210 Houston, TX 77099 (281) 530-5656

ATTN: Dane Wagasey Lab Recipient: Delivery Date/Time:

1.) Chain of Custody Number = date collected + custody number (e.g. 09-02-1999-01)

2.) Sample Type (SA) Codes: N = Normal Sample, TB = Trip Blank (-c) Sample, FD = Field Duplicate (-a) Samples, FR = Field Replicate (-b) Samples, EB = Equipment Blank (-d) Samples, MS = Matrix Spike, SD = Matrix Spike Duplicate, AB = Ambient Blank (-e)

3.) Sample Number: Unique sample number collected from a particular location per day. (e.g. Groundwater sample collected from MW-1 on 10/10/99 = 01, if sampled again on 10/10/99 = 02, etc.)

4.) Matrix Codes: GS = Soil Gas, WG = Groundwater, WS = Surface Water, SO = Soil, SE = Sediment, SL = Sludge, SS = Surface Soil Samples, WQ = Aqueous Blank Samples (trip, equipment, ambient, etc), SQ = Soil Blanks

5.) Sample Analysis Requested: Analytical method requested and number of containers provided for each.

6.) Quality assurance samples are assigned by date (ddmmyy) and the sample number associated with the sample (01, 02, etc) (e.g. Equipment blank collected in association with MW-1 on 10/10/99 will be designated 10109901 in the Equipment Blank Lot Control

ALS
10450 Stancliff Rd., Suite 210
Houston, Texas 77099
Tel. +1 281 530 5656
Fax. +1 281 530 5887

50398

CUSTODY SEAL

Date: 2/26/24 Time: 1 PM
Name: Scott Beesinger
Company: BHATE

Seal Broken By: BMY
Date: 02/27/24

50398 FEB 2 7 2024

Must Deliver Next Business Day
Time and Tempature Sensitive!

50398

ORIGIN ID:SGRA (903) 930-6183
ATT: SCOTT BEESINGER
APTIM ENVIRONMENTAL & INFRAST. INC
1203-B EAST GRAND AVE PH8202

MARSHALL, TX 75670
UNITED STATES US

SHIP DATE: 05FEB24
ACTWGT: 1.00 LB MAN
CAD: 0221247/CAFE3705
DIMS: 26x14x14 IN

TO **SAMPLE RECEIVING**
ALS GROUP USA,CORP
10450 STANCLIFF ROAD
SUITE 210
HOUSTON TX 77099
(281) 530-5656
REF: LHAAP-46-B098721-JG

RMA:

FedEx Express

FedEx
TRK# 0221 6862 6801 8440

TUE - 27 FEB AA
PRIORITY OVERNIGHT

AB SGRA

77099
TX-US
IAH

4230674 26Feb2024 0600A 5815G5/194A/E0BB

eurofins | Environment Testing

ANALYTICAL REPORT

PREPARED FOR

Attn: James Guin
ALS Group USA, Corp
10450 Stancliff Rd.
Suite 210
Houston, Texas 77099

Generated 3/8/2024 5:04:42 PM

JOB DESCRIPTION

HS24021563

JOB NUMBER

410-162062-1

Eurofins Lancaster Laboratories Environment Testing, LLC
2425 New Holland Pike
Lancaster PA 17601

See page two for job notes and contact information.

my EOL

Eurofins Lancaster Laboratories Environment Testing, LLC

Job Notes

This report may not be reproduced except in full, and with written approval from the laboratory. The results relate only to the samples tested. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

Analytical test results meet all requirements of the associated regulatory program (i.e., NELAC (TNI), DoD, and ISO 17025) unless otherwise noted under the individual analysis.

Authorization



Generated
3/8/2024 5:04:42 PM

Authorized for release by
Kelly Bauer, Project Manager
Kelly.Bauer@et.eurofinsus.com
(717)556-7262

Eurofins Lancaster Laboratories Environment Testing, LLC

Compliance Statement

Analytical test results meet all requirements of the associated regulatory program (e.g., NELAC (TNI), DoD, and ISO 17025) unless otherwise noted under the individual analysis. Data qualifiers are applied to note exceptions. Noncompliant quality control (QC) is further explained in narrative comments.
· QC results that exceed the upper limits and are associated with non-detect samples are qualified but further narration is not required since the bias is high and does not change a non-detect result. Further narration is also not required with QC blank detection when the associated sample concentration is non-detect or more than ten times the level in the blank.
· Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD is performed, unless otherwise specified in the method.
· Surrogate and/or isotope dilution analyte recoveries (if applicable) which are outside of the QC window are confirmed unless attributed to a dilution or otherwise noted in the narrative.
Regulated compliance samples (e.g. SDWA, NPDES) must comply with the associated agency requirements/permits.

Measurement uncertainty values, as applicable, are available upon request.

Test results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff. Times are local to the area of activity. Parameters listed in the 40 CFR Part 136 Table II as "analyze immediately" and tested in the laboratory are not performed within 15 minutes of collection.

This report shall not be reproduced except in full, without the written approval of the laboratory.

WARRANTY AND LIMITS OF LIABILITY - In accepting analytical work, we warrant the accuracy of test results for the sample as submitted. The foregoing express warranty is exclusive and is given in lieu of all other warranties, expressed or implied, except as otherwise agreed. We disclaim any other warranties, expressed or implied, including a warranty of fitness for particular purpose and warranty of merchantability. In no event shall Eurofins Lancaster Laboratories Environmental, LLC be liable for indirect, special, consequential, or incidental damages including, but not limited to, damages for loss of profit or goodwill regardless of (A) the negligence (either sole or concurrent) of Eurofins Lancaster Laboratories Environmental and (B) whether Eurofins Lancaster Laboratories Environmental has been informed of the possibility of such damages. We accept no legal responsibility for the purposes for which the client uses the test results. Except as otherwise agreed, no purchase order or other order for work shall be accepted by Eurofins Lancaster Laboratories Environmental which includes any conditions that vary from the Standard Terms and Conditions, and Eurofins Lancaster Laboratories Environmental hereby objects to any conflicting terms contained in any acceptance or order submitted by client.



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Definitions/Glossary

Client: ALS Group USA, Corp
Project/Site: HS24021563

Job ID: 410-162062-1

Qualifiers

GC VOA

Qualifier	Qualifier Description
cn	Refer to Case Narrative for further detail
F1	MS and/or MSD recovery exceeds control limits.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Case Narrative

Client: ALS Group USA, Corp
Project: HS24021563

Job ID: 410-162062-1

Job ID: 410-162062-1 — Eurofins Lancaster Laboratories Environment

Job Narrative
410-162062-1

Analytical test results meet all requirements of the associated regulatory program listed on the Accreditation/Certification Summary Page unless otherwise noted under the individual analysis. Data qualifiers are applied to indicate exceptions. Noncompliant quality control (QC) is further explained in narrative comments.

- Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD may be performed, unless otherwise specified in the method.
- Surrogate and/or isotope dilution analyte recoveries (if applicable) which are outside of the QC window are confirmed unless attributed to a dilution or otherwise noted in the narrative.

Regulated compliance samples (e.g. SDWA, NPDES) must comply with the associated agency requirements/permits.

Receipt
The samples were received on 2/28/2024 9:40 AM. Unless otherwise noted below, the samples arrived in good condition, and, where required, properly preserved and on ice. The temperature of the cooler at receipt time was 4.4°C.

GC VOA
Method RSK_175_CO2_D5: The matrix spike / matrix spike duplicate (MS/MSD) recoveries were outside control limits for one or more analytes. See QC Sample Results for detail. Sample matrix interference and/or non-homogeneity are suspected because the associated laboratory control sample (LCS) recovery is within acceptance limits. Samples were reanalyzed and recoveries were outside control limits for one or more analytes. HS24021563-02 46WW02-240226 (410-162062-1)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

Detection Summary

Client: ALS Group USA, Corp
Project/Site: HS24021563

Job ID: 410-162062-1

Client Sample ID: HS24021563-02 46WW02-240226 — Lab Sample ID: 410-162062-1

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	Dil Fac	D	Method	Prep Type
Carbon dioxide	100000	F1 cn	12000		5600	ug/L	1		RSK-175	Total/NA

Client Sample ID: HS24021563-05 46WW16-240226 — Lab Sample ID: 410-162062-2

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	Dil Fac	D	Method	Prep Type
Carbon dioxide	46000		12000		5600	ug/L	1		RSK-175	Total/NA

Client Sample ID: HS24021563-06 46WW05-240226 — Lab Sample ID: 410-162062-3

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	Dil Fac	D	Method	Prep Type
Carbon dioxide	210000		12000		5600	ug/L	1		RSK-175	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample Results

Client: ALS Group USA, Corp
Project/Site: HS24021563

Job ID: 410-162062-1

Client Sample ID: HS24021563-02 46WW02-240226

Lab Sample ID: 410-162062-1
Date Collected: 02/26/24 08:15
Matrix: Water
Date Received: 02/28/24 09:40

Method: RSK-175 - Dissolved Gases (GC)

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Carbon dioxide	100000	F1 cn	12000		5600	ug/L		03/04/24 11:49	1

Client Sample ID: HS24021563-05 46WW16-240226

Lab Sample ID: 410-162062-2
Date Collected: 02/26/24 10:35
Matrix: Water
Date Received: 02/28/24 09:40

Method: RSK-175 - Dissolved Gases (GC)

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Carbon dioxide	46000		12000		5600	ug/L		03/04/24 12:40	1

Client Sample ID: HS24021563-06 46WW05-240226

Lab Sample ID: 410-162062-3
Date Collected: 02/26/24 11:20
Matrix: Water
Date Received: 02/28/24 09:40

Method: RSK-175 - Dissolved Gases (GC)

Analyte	Result	Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Carbon dioxide	210000		12000		5600	ug/L		03/04/24 12:47	1

QC Sample Results

Client: ALS Group USA, Corp
Project/Site: HS24021563

Job ID: 410-162062-1

Method: RSK-175 - Dissolved Gases (GC)

Lab Sample ID: MB 410-479323/1-A
Matrix: Water
Analysis Batch: 479281

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 479323

Analyte	MB Result	MB Qualifier	LOQ	LOD	DL	Unit	D	Analyzed	Dil Fac
Carbon dioxide	<5600		12000		5600	ug/L		03/04/24 10:41	1

Lab Sample ID: LCS 410-479323/2-A
Matrix: Water
Analysis Batch: 479281

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 479323

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits		
Carbon dioxide			35800	36400		ug/L		102	80 - 122		

Lab Sample ID: 410-162062-1 MS
Matrix: Water
Analysis Batch: 479281

Client Sample ID: HS24021563-02 46WW02-240226
Prep Type: Total/NA
Prep Batch: 479323

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits		
Carbon dioxide	100000	F1 cn	35800	96200	F1	ug/L		-12	80 - 122		

Lab Sample ID: 410-162062-1 MSD
Matrix: Water
Analysis Batch: 479281

Client Sample ID: HS24021563-02 46WW02-240226
Prep Type: Total/NA
Prep Batch: 479323

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Carbon dioxide	100000	F1 cn	35800	94200	F1	ug/L		-18	80 - 122	2	20

QC Association Summary

Client: ALS Group USA, Corp
Project/Site: HS24021563

Job ID: 410-162062-1

GC VOA

Analysis Batch: 479281

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
410-162062-1	HS24021563-02 46WW02-240226	Total/NA	Water	RSK-175	479323
410-162062-2	HS24021563-05 46WW16-240226	Total/NA	Water	RSK-175	479323
410-162062-3	HS24021563-06 46WW05-240226	Total/NA	Water	RSK-175	479323
MB 410-479323/1-A	Method Blank	Total/NA	Water	RSK-175	479323
LCS 410-479323/2-A	Lab Control Sample	Total/NA	Water	RSK-175	479323
410-162062-1 MS	HS24021563-02 46WW02-240226	Total/NA	Water	RSK-175	479323
410-162062-1 MSD	HS24021563-02 46WW02-240226	Total/NA	Water	RSK-175	479323

Prep Batch: 479323

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
410-162062-1	HS24021563-02 46WW02-240226	Total/NA	Water	RSK-175	
410-162062-2	HS24021563-05 46WW16-240226	Total/NA	Water	RSK-175	
410-162062-3	HS24021563-06 46WW05-240226	Total/NA	Water	RSK-175	
MB 410-479323/1-A	Method Blank	Total/NA	Water	RSK-175	
LCS 410-479323/2-A	Lab Control Sample	Total/NA	Water	RSK-175	
410-162062-1 MS	HS24021563-02 46WW02-240226	Total/NA	Water	RSK-175	
410-162062-1 MSD	HS24021563-02 46WW02-240226	Total/NA	Water	RSK-175	

Lab Chronicle

Client: ALS Group USA, Corp
Project/Site: HS24021563

Job ID: 410-162062-1

Client Sample ID: HS24021563-02 46WW02-240226
Lab Sample ID: 410-162062-1
Date Collected: 02/26/24 08:15
Matrix: Water
Date Received: 02/28/24 09:40

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	RSK-175			479323	HQR6	ELLE	03/04/24 10:36
Total/NA	Analysis	RSK-175		1	479281	LXF2	ELLE	03/04/24 11:49

Client Sample ID: HS24021563-05 46WW16-240226
Lab Sample ID: 410-162062-2
Date Collected: 02/26/24 10:35
Matrix: Water
Date Received: 02/28/24 09:40

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	RSK-175			479323	HQR6	ELLE	03/04/24 10:36
Total/NA	Analysis	RSK-175		1	479281	LXF2	ELLE	03/04/24 12:40

Client Sample ID: HS24021563-06 46WW05-240226
Lab Sample ID: 410-162062-3
Date Collected: 02/26/24 11:20
Matrix: Water
Date Received: 02/28/24 09:40

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	RSK-175			479323	HQR6	ELLE	03/04/24 10:36
Total/NA	Analysis	RSK-175		1	479281	LXF2	ELLE	03/04/24 12:47

Laboratory References:

ELLE = Eurofins Lancaster Laboratories Environment Testing, LLC, 2425 New Holland Pike, Lancaster, PA 17601, TEL (717)656-2300

Accreditation/Certification Summary

Client: ALS Group USA, Corp
Project/Site: HS24021563

Job ID: 410-162062-1

Laboratory: Eurofins Lancaster Laboratories Environment Testing, LLC

Unless otherwise noted, all analytes for this laboratory were covered under each accreditation/certification below.

Authority	Program	Identification Number	Expiration Date
Louisiana (All)	NELAP	02055	06-30-24

The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.

Analysis Method	Prep Method	Matrix	Analyte
RSK-175	RSK-175	Water	Carbon dioxide

Texas	NELAP	T104704194-23-46	08-31-24

Method Summary

Client: ALS Group USA, Corp
Project/Site: HS24021563

Job ID: 410-162062-1

Method	Method Description	Protocol	Laboratory
RSK-175	Dissolved Gases (GC)	RSK	ELLE
RSK-175	Dissolved Gases Prep	RSK	ELLE

Protocol References:

RSK = Sample Prep And Calculations For Dissolved Gas Analysis In Water Samples Using A GC Headspace Equilibration Technique, RSKSOP-175, Rev. 0, 8/11/94, USEPA Research Lab

Laboratory References:

ELLE = Eurofins Lancaster Laboratories Environment Testing, LLC, 2425 New Holland Pike, Lancaster, PA 17601, TEL (717)656-2300

Sample Summary

Client: ALS Group USA, Corp
Project/Site: HS24021563

Job ID: 410-162062-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
410-162062-1	HS24021563-02 46WW02-240226	Water	02/26/24 08:15	02/28/24 09:40
410-162062-2	HS24021563-05 46WW16-240226	Water	02/26/24 10:35	02/28/24 09:40
410-162062-3	HS24021563-06 46WW05-240226	Water	02/26/24 11:20	02/28/24 09:40

410-162062 Chain of Custody

10450 Stancliff Rd, Ste 210
Houston, TX 77099
T: +1 281 530 5656
F: +1 281 530 5887
www.alsglobal.com

Subcontract Chain of Custody

SAMPLING STATE: **Colorado** **COC ID:** **24877**

SUBCONTRACT TO:

Eurofins Lancaster Laboratories Envt Testing
2425 New Holland Pike
Lancaster, PA 17601 **Phone:** +1 717 656 2300

CUSTOMER INFORMATION:

Company:	ALS Houston
Contact:	James Guin
Address:	10450 Stancliff Rd, Ste 210
Phone:	+1 281 530 5656
Email:	James.Guin@alsglobal.com
Alternate Contact:	Jumoke M. Lawal
Email:	jumoke.lawal@alsglobal.com

INVOICE INFORMATION:

Company:	ALS Houston
Contact:	Accounts Payable
Address:	10450 Stancliff Rd, Ste 210
Phone:	+1 281 530 5656
Reference:	HS24021563
TSR:	Sonia West

	LAB SAMPLE ID	CLIENT SAMPLE ID	MATRIX	COLLECT DATE
	ANALYSIS REQUESTED			DUE DATE
1.	**HS24021563-02**	**46WW02-240226**	**Groundwater**	**26 Feb 2024 08:15**
	RSK-CO2; DoD Level II & IV, Equ_APTIM_GISKey			12 Mar 2024
2.	**HS24021563-05**	**46WW16-240226**	**Groundwater**	**26 Feb 2024 10:35**
	RSK-CO2; DoD Level II & IV, Equ_APTIM_GISKey			12 Mar 2024
3.	**HS24021563-06**	**46WW05-240226**	**Groundwater**	**26 Feb 2024 11:20**
	RSK-CO2; DoD Level II & IV, Equ_APTIM_GISKey			12 Mar 2024

Comments: Please analyze for the analysis listed above.
Send report to the emails shown above.
Hs24021563-02 = ms/msd

QC Level: DOD IV (DoD Data Package)

Relinquished By: _____ Date/Time: FEB 27 2024 1200

Received By: _____ Date/Time: 2/28/24 09:40

Cooler ID(s): _____ Temperature(s): _____

E: 4.5
C: 4.4

Login Sample Receipt Checklist

Client: ALS Group USA, Corp

Job Number: 410-162062-1

Login Number: 162062
List Number: 1
Creator: Arroyo, Haley

List Source: Eurofins Lancaster Laboratories Environment Testing, LLC

Question	Answer	Comment
The cooler's custody seal is intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature acceptable,where thermal pres is required(</=6C, not frozen).	True	
Cooler Temperature is recorded.	True	
WV:Container Temp acceptable,where thermal pres is required (</=6C, not frozen).	N/A	
WV: Container Temperature is recorded.	N/A	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
There are no discrepancies between the containers received and the COC.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
There is sufficient vol. for all requested analyses.	True	
Is the Field Sampler's name present on COC?	False	Received project as a subcontract.
Sample custody seals are intact.	N/A	
VOA sample vials do not have headspace >6mm in diameter (none, if from WV)?	N/A	

HS24021563-MSVOA-SW8260

ALS WO# HS24021563

right solutions.
right partner.

Form 1

Organic Analysis Data Sheet

Volatiles by EPA Volatiles Organics by Method 8260C

Workorder

HS24021563

Client

Bhate Environmental Associates, Inc.

Project

LHAAP / Site 46

03/21/2024

ALS Environmental–Houston Laboratory
10450 Stancliff Road, Suite 210, Houston, TX 77099
Phone (281) 530-5656 Fax (281) 530-5887
www.alsglobal.com

Form 1 - Organic Analysis Data Sheet

Client	Bhate Environmental Associates, Inc.	Workorder	
Project	LHAAP / Site 46	**HS24021563**	

Volatiles by EPA Volatiles Organics by Method 8260C

46WW03-240226	Collected	Received	Matrix	Basis
HS24021563-01	02/26/24 07:30	02/27/24 09:10	Groundwater	Wet

Analyte	Units	Result	Q	DL	LOD	LOQ	DF	Analysis Date	Run ID	DataFile
cis-1,2-Dichloroethene	ug/L	1.0	U	0.20	1.0	1.0	1	03/01/24 05:43	VOA9_460210	V022922.D
Trichloroethene	ug/L	1.0	U	0.20	1.0	1.0	1	03/01/24 05:43	VOA9_460210	V022922.D
Vinyl chloride	ug/L	1.0	U	0.20	1.0	1.0	1	03/01/24 05:43	VOA9_460210	V022922.D

Form 1 - Organic Analysis Data Sheet

Client	Bhate Environmental Associates, Inc.	Workorder	
Project	LHAAP / Site 46	**HS24021563**	

Volatiles by EPA Volatiles Organics by Method 8260C

46WW02-240226	Collected	Received	Matrix	Basis
HS24021563-02	02/26/24 08:15	02/27/24 09:10	Groundwater	Wet

Analyte	Units	Result	Q	DL	LOD	LOQ	DF	Analysis Date	Run ID	DataFile
cis-1,2-Dichloroethene	ug/L	2.7		0.20	1.0	1.0	1	02/29/24 11:46	VOA10_460168	F022907.D
Trichloroethene	ug/L	35		0.20	1.0	1.0	1	02/29/24 11:46	VOA10_460168	F022907.D
Vinyl chloride	ug/L	1.0	U	0.20	1.0	1.0	1	02/29/24 11:46	VOA10_460168	F022907.D

Form 1 - Organic Analysis Data Sheet

Client	Bhate Environmental Associates, Inc.	Workorder	
Project	LHAAP / Site 46	**HS24021563**	

Volatiles by EPA Volatiles Organics by Method 8260C

46WW06-240226	Collected	Received	Matrix	Basis
HS24021563-03	02/26/24 09:15	02/27/24 09:10	Groundwater	Wet

Analyte	Units	Result	Q	DL	LOD	LOQ	DF	Analysis Date	Run ID	DataFile
cis-1,2-Dichloroethene	ug/L	1.0	U	0.20	1.0	1.0	1	03/01/24 06:05	VOA9_460210	V022923.D
Trichloroethene	ug/L	1.0	U	0.20	1.0	1.0	1	03/01/24 06:05	VOA9_460210	V022923.D
Vinyl chloride	ug/L	1.0	U	0.20	1.0	1.0	1	03/01/24 06:05	VOA9_460210	V022923.D

Form 1 - Organic Analysis Data Sheet

Client	Bhate Environmental Associates, Inc.	Workorder	
Project	LHAAP / Site 46	**HS24021563**	

Volatiles by EPA Volatiles Organics by Method 8260C

46WW08-240226	Collected	Received	Matrix	Basis
HS24021563-04	02/26/24 09:55	02/27/24 09:10	Groundwater	Wet

Analyte	Units	Result	Q	DL	LOD	LOQ	DF	Analysis Date	Run ID	DataFile
cis-1,2-Dichloroethene	ug/L	1.0	U	0.20	1.0	1.0	1	03/01/24 06:27	VOA9_460210	V022924.D
Trichloroethene	ug/L	1.0	U	0.20	1.0	1.0	1	03/01/24 06:27	VOA9_460210	V022924.D
Vinyl chloride	ug/L	1.0	U	0.20	1.0	1.0	1	03/01/24 06:27	VOA9_460210	V022924.D

Form 1 - Organic Analysis Data Sheet

Client	Bhate Environmental Associates, Inc.	Workorder	
Project	LHAAP / Site 46	**HS24021563**	

Volatiles by EPA Volatiles Organics by Method 8260C

46WW16-240226	Collected	Received	Matrix	Basis
HS24021563-05	02/26/24 10:35	02/27/24 09:10	Groundwater	Wet

Analyte	Units	Result	Q	DL	LOD	LOQ	DF	Analysis Date	Run ID	DataFile
cis-1,2-Dichloroethene	ug/L	1.0	U	0.20	1.0	1.0	1	03/01/24 06:49	VOA9_460210	V022925.D
Trichloroethene	ug/L	1.0	U	0.20	1.0	1.0	1	03/01/24 06:49	VOA9_460210	V022925.D
Vinyl chloride	ug/L	1.0	U	0.20	1.0	1.0	1	03/01/24 06:49	VOA9_460210	V022925.D

Form 1 - Organic Analysis Data Sheet

Client	Bhate Environmental Associates, Inc.	Workorder	
Project	LHAAP / Site 46	**HS24021563**	

Volatiles by EPA Volatiles Organics by Method 8260C

46WW05-240226	Collected	Received	Matrix	Basis
HS24021563-06	02/26/24 11:20	02/27/24 09:10	Groundwater	Wet

Analyte	Units	Result	Q	DL	LOD	LOQ	DF	Analysis Date	Run ID	DataFile
cis-1,2-Dichloroethene	ug/L	1.8		0.20	1.0	1.0	1	02/29/24 19:28	VOA10_460168	F022929.D
Trichloroethene	ug/L	57		0.20	1.0	1.0	1	02/29/24 19:28	VOA10_460168	F022929.D
Vinyl chloride	ug/L	1.0	U	0.20	1.0	1.0	1	02/29/24 19:28	VOA10_460168	F022929.D

Form 1 - Organic Analysis Data Sheet

Client	Bhate Environmental Associates, Inc.	Workorder	
Project	LHAAP / Site 46	**HS24021563**	

Volatiles by EPA Volatiles Organics by Method 8260C

LHSMW23R-240226	Collected	Received	Matrix	Basis
HS24021563-07	02/26/24 12:10	02/27/24 09:10	Groundwater	Wet

Analyte	Units	Result	Q	DL	LOD	LOQ	DF	Analysis Date	Run ID	DataFile
cis-1,2-Dichloroethene	ug/L	0.66	J	0.20	1.0	1.0	1	02/29/24 22:58	VOA10_460228	G022907.D
Trichloroethene	ug/L	0.56	J	0.20	1.0	1.0	1	02/29/24 22:58	VOA10_460228	G022907.D
Vinyl chloride	ug/L	1.0	U	0.20	1.0	1.0	1	02/29/24 22:58	VOA10_460228	G022907.D

Form 1 - Organic Analysis Data Sheet

Client	Bhate Environmental Associates, Inc.	Workorder	
Project	LHAAP / Site 46	HS24021563	

Volatiles by EPA Volatiles Organics by Method 8260C

LHSMW23R-24026-FD

	Collected	Received	Matrix	Basis
HS24021563-08	02/26/24 12:10	02/27/24 09:10	Groundwater	Wet

Analyte	Units	Result	Q	DL	LOD	LOQ	DF	Analysis Date	Run ID	DataFile
cis-1,2-Dichloroethene	ug/L	0.65	J	0.20	1.0	1.0	1	02/29/24 23:19	VOA10_460228	G022908.D
Trichloroethene	ug/L	1.0	U	0.20	1.0	1.0	1	02/29/24 23:19	VOA10_460228	G022908.D
Vinyl chloride	ug/L	1.0	U	0.20	1.0	1.0	1	02/29/24 23:19	VOA10_460228	G022908.D