LONGHORN ARMY AMMUNITION PLANT KARNACK, TEXAS

ADMINISTRATIVE RECORD

Volume 6

2019

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Longhorn Army Ammunition Plant

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

VOLUME 6

2019

A. Title: (cont'd) Report – Final Five Year Review Report, Longhorn Army Ammunition Plant, Karnack, Texas
Author(s): Department of the Army
Recipient: Environmental Protection Agency
Date: May 15, 2019
Bate Stamp: 00920848 – 00921368

B. Title: Transmittal Letter – Draft Remedial Action Operation Report, Landfill 12 (LHAAP-12), Longhorn Army Ammunition Plant, Karnack, Texas
Author(s): Department of the Army
Recipient: Environmental Protection Agency
Date: May 16, 2019
Bate Stamp: 00921369 – 00921369

C. Title: Transmittal Letter – Draft Remedial Action Operation Report, Landfill 12 (LHAAP-12), Longhorn Army Ammunition Plant, Karnack, Texas
Author(s): Department of the Army
Recipient: Texas Commission on Environmental Quality
Date: May 16, 2019
Bate Stamp: 00921370 – 00921370

D. Title: Minutes – Final Minutes, Monthly Managers' Meeting (MMM), 25 April 2019, Longhorn Army Ammunition Plant, Karnack, Texas
Author(s): Department of the Army
Recipient: All Parties
Date: May 17, 2019
Bate Stamp: 00921371 – 00921406

E. Title: Transmittal Letter – Draft Remedial Design/Remedial Action Work Plan, LHAAP-03, Former Waste Collection Pad, Building 722-P Paint Shop, Longhorn Army Ammunition Plant, Karnack, Texas
Author(s): Department of the Army
Recipient: Environmental Protection Agency
Date: May 17, 2019
Bate Stamp: 00921407 – 00921407

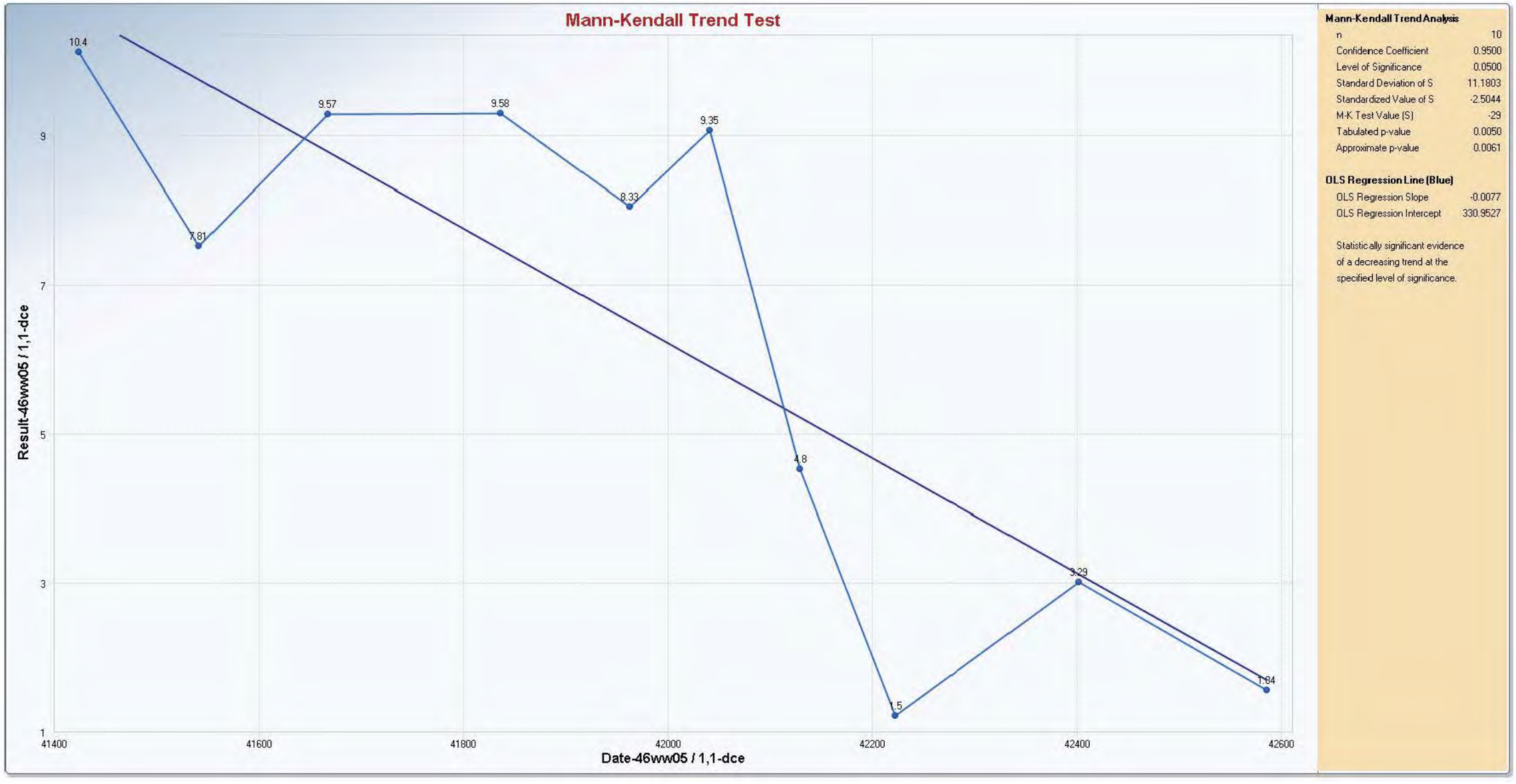
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VOLUME 6 (cont'd)

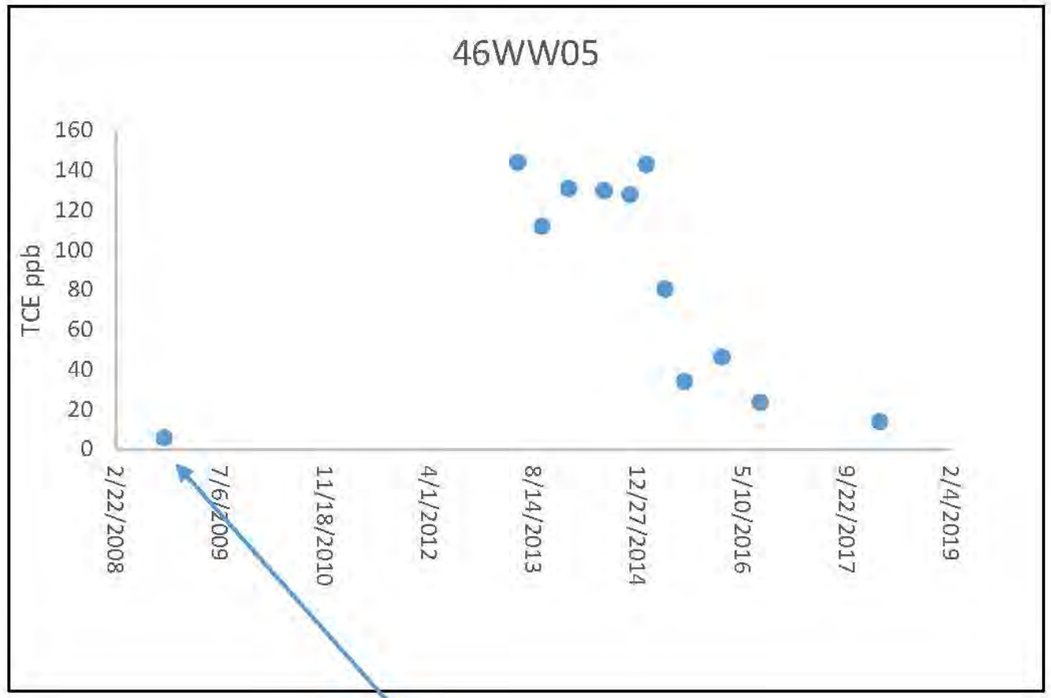
2019

F. Title: Transmittal Letter – Draft Remedial Design/Remedial Action Work Plan, LHAAP-03, Former Waste Collection Pad, Building 722-P Paint Shop, Longhorn Army Ammunition Plant, Karnack, Texas, March 2019
Author(s): Department of the Army
Recipient: Texas Commission on Environmental Quality
Date: May 28, 2019
Bate Stamp: 00921408 – 00921408

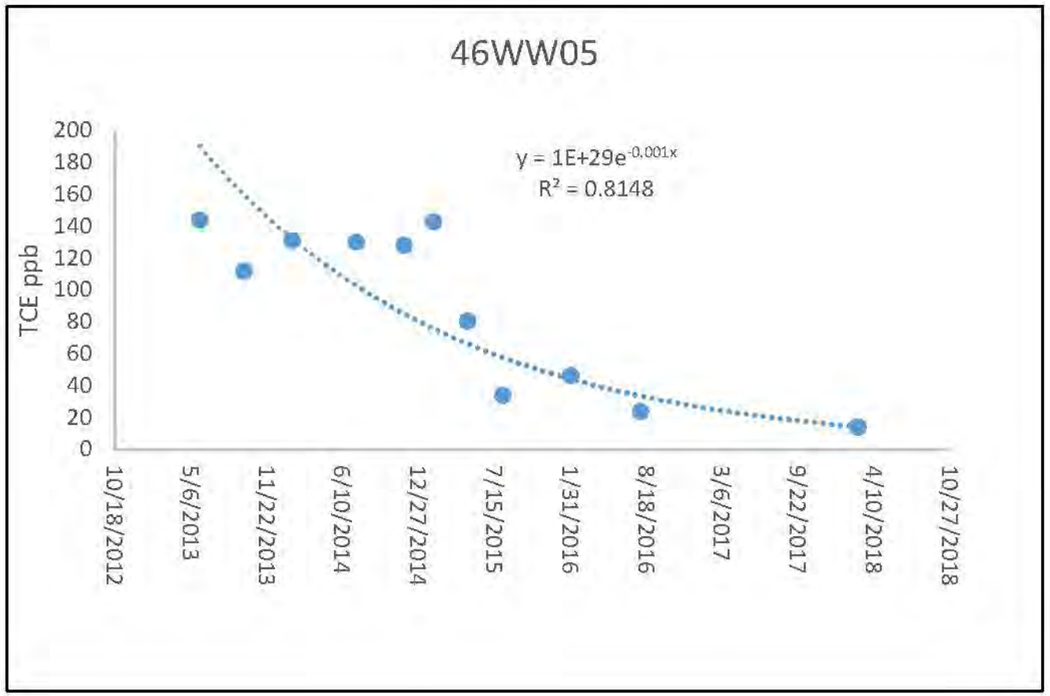
G. Title: Minutes – Final Minutes, Monthly Managers' Meeting (MMM), 16 May 2019 Longhorn Army Ammunition Plant, Karnack, Texas
Author(s): Department of the Army
Recipient: All Parties
Date: May 28, 2019
Bate Stamp: 00921409 – 00921419



Plot 95. LHAAP-46 Mann-Kendall analysis – 1,1-DCE, Intermediate Groundwater Zone monitoring well 46WW05 (AECOM, 2017k).

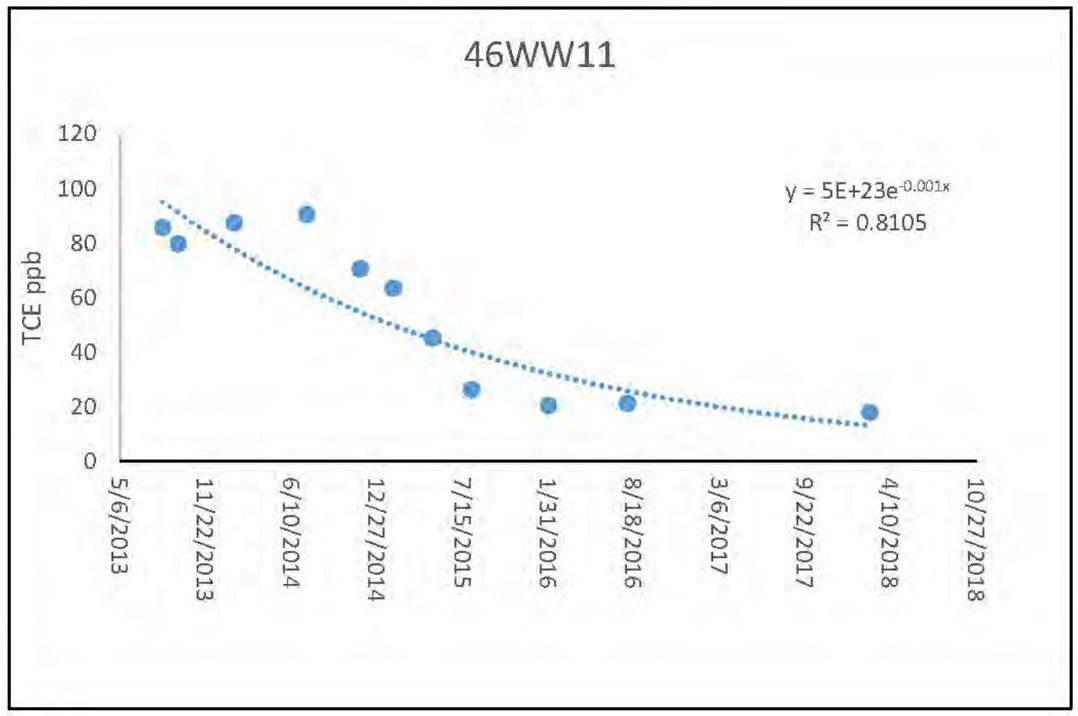


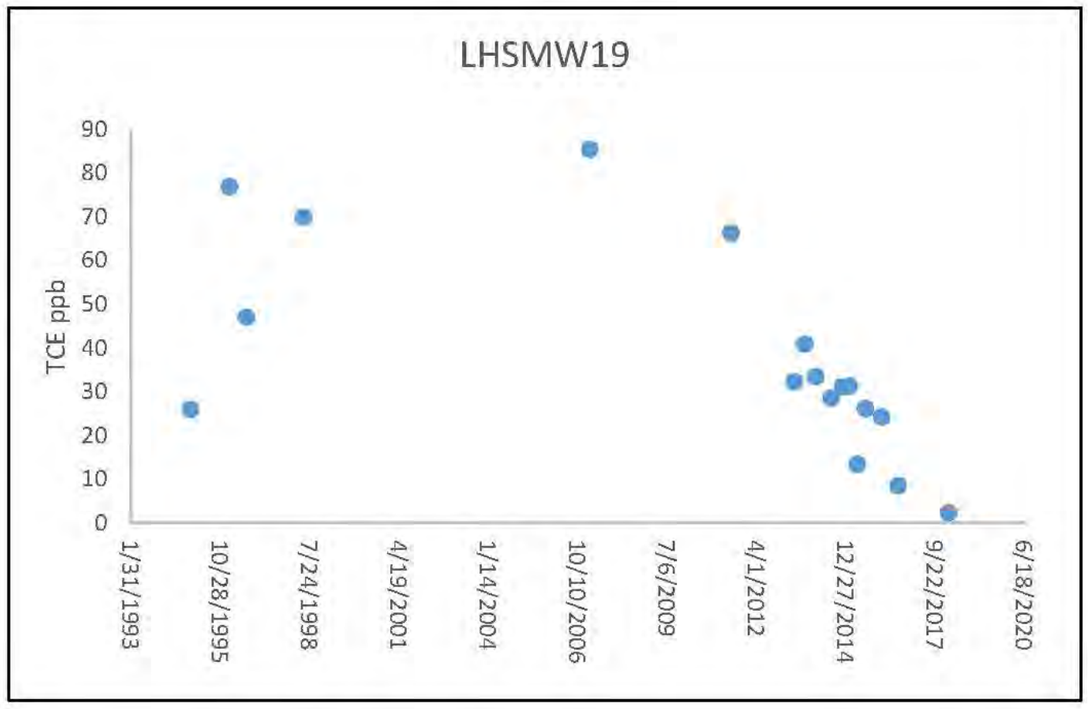
In 2008 TCE Concentration was 5.9 ppb in 2008, this data was not included in Mann-Kendall trend analysis or the estimation of the fist order decay rate



Restoration time for TCE in 46WW05 is estimated at ~ 8 years Using the maximum Concentration reported in July 2014.

Plot 96. LHAAP-46 Fourth Five-Year Review-calculated restoration time – Intermediate Groundwater Zone monitoring well 46WW05 with TCE Declining Trend.





Restoration time for TCE in 46WW11 is estimated at ~ 8 years Using Concentration Measured in 2013.

Plot 97. LHAAP-46 Fourth Five-Year Review-calculated restoration – Shallow Groundwater Zones Monitoring Wells with TCE declining trends.

5.0 LHAAP-50

5.1 MNA Monitoring Network

5.1.1 Spatial and Temporal Variation in Groundwater Flow Directions

In October 2013, August and November 2015 groundwater flow is to the northeast (Plot 98 through Plot 100) discharging into Goose Prairie Creek, however, in May and November 2015 there is an unexplained hydraulic depression near the former storage tank location (Plot 101 through Plot 102).

5.1.2 Spatial and Temporal Variation in COCs

COC plume maps for seven sampling events (October 2013, February 2015, May 2015, August 2015, November 2015, May 2016, and November 2016) are shown in Plot 104 through Plot 111 (perchlorate removal area is in Plot 103). TCE and perchlorate are the most widespread COCs in shallow groundwater. The presence of TCE daughter compounds cis-1,2-DCE and VC indicate that reductive dechlorination is occurring to limited extent in some locations within the Shallow Groundwater Zone plume. In the recent sampling events of 2016 TCE and perchlorate plumes fall within the same general footprint. The areal extent of the COCs plumes in shallow groundwater appears to vary, remaining stable within the historical footprints. The center of the COCs plumes remains aligned along the predominant major direction of groundwater (e.g., along the northeast Plot 98 through Plot 102), along 50WW08, 50WW09, 50WW05, 50WW13, 50WW11, 50WW06, 50WW12. Concentrations of COCs in perimeter wells located hydraulically downgradient (e.g., northeast) of the plumes remained non-detect.

5.1.3 Surface Water Monitoring

Plot 112 depicts the surface water sampling locations prescribed in the Remedial Action Work Plan (AECOM, 2013i). Surface water sampling includes locations:

- GPW-1 – Located adjacent to the percolate contaminated soil excavation area. Designed to monitor for contaminant contributions from soil runoff from the perchlorate-contaminated portion of LHAAP-50, two years following perchlorate contaminated soil excavation, which took place in fall 2013.
- GPW-1A – Located in a ditch at the upgradient end of a culvert in LHAAP-47 to monitor for contaminant contributions in runoff from the perchlorate-contaminated portion of LHAAP-47.
- 50SW06 – Located in Goose Prairie Creek. Designed to monitor for potential discharge point for groundwater to surface water contamination.

Analytical results for the samples collected in 2015 from 50SW06, GPW-1, and GPW-1A were below detection limits for all COCs except for perchlorate in one historical sample (Plot 113). One perchlorate concentration of 38.2 µg/L, which exceeds the perchlorate PCL of 17 µg/L, was reported in the sample from GPW-1A collected on February 17, 2015.

Analytical results for the samples collected in 2016 from GPW-1, and GPW-1A were below MCLs/PCL for all COCs except perchlorate (Plot 114). Perchlorate was detected, but was at concentrations below the PCL of 17 µg/L in the four GPW-1 samples and in the GPW-1A sample. The highest perchlorate concentration was detected in May 2016 at GPW-1 at 6.59

µg/L, which is still below the PCL of 17 µg/L. The 2016 analytical results for the surface water sample, 50SW06, were not present or addressed in the third annual RA(O) report for LHAAP50 (Bhate, 2018c).

5.2 MNA Performance

Temporal trends of COCs and groundwater indicates that, in some locations, COCs increase as groundwater elevations increase and vice versa, while in other locations, COCs increase as groundwater elevations decreases and vice versa. Mann-Kendall trend analyses, correlation of temporal trends of COCs concentrations and groundwater levels (Plot 131 through Plot 140), and estimated TCE restoration time (when Mann-Kendall analyses show decline with 95% confidence, Plot 141 through Plot 143) are summarized in Plot 144 (Bhate, 2018c). Results from the Mann-Kendall analysis performed in the Year 3 RA(O) (Bhate, 2018c) include data through 2016. The comment column in Plot 144 includes visual observations of concentrations trends using the data available through 2017.

Plot 111 depicts the COCs plumes and spatial distribution of the Mann-Kendall results, with comments regarding potential correlations between fluctuation in groundwater elevations and concentrations of COCs and the potential influence of the excavation of perchlorate-impacted surface soil excavation on the apparent trends (Bhate, 2018c). Spatial distribution of the results of trend analyses conducted by the Fourth Five-Year Review are depicted in Figure 29 through Figure 31. Key findings of trend analyses for predominant COCs (Perchlorate and TCE) are summarized below:

- Mann-Kendall trend analysis show only one location, 50WW06 (downgradient/leading edge well), with an increasing trend in the concentration of perchlorate at 95% confidence (Plot 111 and Plot 117). A Mann-Kendall analysis was performed using data collected between 2013 and 2016 (Plot 117), therefore the most recent perchlorate concentration of 950 µg/L reported in November 2017, which is within the range of the low concentrations of the data used in the analysis, was not included in the analysis. Mann-Kendall/Theil-Sen trend analyses conducted by the Fourth Five-Year Review, which utilizes all the data collected to date show increasing trend in perchlorate concentration at 50WW06. Although monitoring reports and Fourth Five-Year Review's trend analyses show an increase in perchlorate concentrations in this well, additional data is required to confirm that the trend in 50WW06 truly reflects an increasing trend because:
    - It is possible that the noted increase is due to a slug that was released during the excavation of impacted soil during the fall of 2013. Between 2013 and 2015, perchlorate concentrations increase with rising groundwater elevations and increasing regional base flow conditions (Figure 4). After 2015, the correlation is indirect (e.g., increases in concentrations when groundwater elevations are low, possibly due to the removal of the source). The switch in perchlorate vs. groundwater elevation patterns at this location cannot be attributed to the change in groundwater flow direction.
    - Concentration of perchlorate reported for the last 2017 monitoring events are within the historical low levels.
- Highest concentrations of perchlorate (as high as 87,800 ppb) occur in 50WW12 (Plot 111 and Plot 125). The Mann-Kendall analyses indicate no trend with stable perchlorate concentrations data. Mann-Kendall/Theil-Sen trend analysis results for perchlorate at

50WW12 conducted by the Fourth Five-Year Review is “Indeterminate” (Figure 31) which means that a trend could not be established.

- The available vertical profile of perchlorate concentrations in groundwater (Plot 145) indicates that the highest concentration is encountered at shallow depth at location 50DPT03 (Plot 145) located near 50WW13 (Plot 111). The Mann-Kendall analysis of perchlorate data from 50WW13 indicates that there is no trend and that perchlorate concentration data is not stable (Plot 126). Mann-Kendall/Theil-Sen trend analysis result for perchlorate at 50WW13 conducted by the Fourth Five-Year Review is “Intermediate” (Figure 35) which mean that a trend could not be established. Visual observation (Plot 137) indicates that concentrations of perchlorate increase with decreasing groundwater elevation and vice versa, and that the concentration at the peak remains stable (~12000 ppb) with time.
- The Mann-Kendall trend, analysis results show that there are two locations with increasing TCE's concentration trends at 95% confidence including 50WW09 (Plot 120) and 50WW12 (Plot 124), located immediately downgradient of the excavated impacted soil. The Fourth Five-Year Review’s trend analysis, which includes all the data collected to date, indicates an increasing TCE’s trend in 50WW12, but indicates that a trend could not be identified for TCE in well 50WW09 (Figure 30). Results from the Fourth Five-Year Review’s trend analysis also indicates an increase in TCE trends in downgradient/leading edge well 50WW06, located adjacent to 50WW12. As discussed below, there is uncertainty whether the trend truly reflects future increases in TCE concentrations at these locations:
    - 50WW09 (Plot 120) located immediately downgradient of the excavated impacted soil – Concentrations of TCE in this well increased between December 2014 and August 2015, decreasing below the MCL thereafter with the most recent result posted in 2017 (not included in the Mann-Kendall analysis) below the MCL (Plot 120, Plot 121, and Plot 134). The increase in TCE concentrations between December 2014 and August 2015 may be attributed to the excavation of soil (Plot 103) which took place in fall 2013. It is common to see increase in concentrations in groundwater after earth disturbance due to temporary increases in mass loading rate of contaminant from recharge of the exposed impacted soil. Vertical profile of TCE in groundwater (Plot 146) show low TCE concentration in the upper portion of the aquifer near this location, indicating that a source of TCE is not suspected near this well. Additional data is required to confirm that the trend in 50WW09 truly reflects an increasing trend generated by the Army, or whether the lower concentration of TCE reported for 2017 is sustained. The Fourth Five-Year Review’s trend analysis indicates insufficient data to establish a TCE trend in this well.
    - 50WW12 (Plot 124) – located immediately downgradient of the excavated impacted soil. The Mann-Kendall and the Fourth Five-Year Review’s trend analyses there is an increasing trend in TCE concentration in this well. TCE concentrations between October 2013 and November 2015 fluctuated between 0.25 and 33.9 µg/L, increasing to 417 µg/L on May 2016, decreasing to 109 µg/L on November 2016, and decreasing to 41 µg/L in November 2017. The Mann-Kendall analysis was performed without the data from 2017. An increasing trend in TCE concentration with statistical significance of 95% was also derived by from the Fourth Five-Year Review’s trend analysis, which included the data collected to

date. Additional monitoring data is required to confirm that the trend in 50WW12 truly reflects an increasing TCE trend.

- The available vertical profile of TCE concentrations in groundwater (Plot 146) indicates that highest concentration (~1% of TCE solubility, which may be indicative of non-aqueous phase liquid is encountered in the shallow aquifer (25 to 30 feet below ground surface) at 50DPT03 (Plot 145) located near 50WW13 (Plot 111). The Mann-Kendall analysis for TCE data at 50WW13 indicates no trend and that TCE concentration data is not stable (Plot 126). The Fourth Five-Year Review's trend analysis confirms that a TCE trend could not be established with the available data. Visual observation (Plot 137) indicates that concentrations of TCE increase with decreasing groundwater elevation and vice versa, and that the concentration at the peak remains stable (~ 6000 to 8000 ppb) with time.
- The Mann-Kendall analysis results indicates declining TCE trends in three wells including: 50WW05 (side-gradient in-plume well), 50WW14 (in-plume well), and 50WW15 (side gradient perimeter well) (Plot 111). The Fourth Five-Year Review trend analysis results confirms the declining trend in TCE concentrations at 50WW05 and 50WW14 (Figure 29), but no analysis was conducted for well 50WW15 since the data did not meet the criteria for analysis. The Fourth Five-Year Review analysis results indicates declining TCE trends in 50WW08 (in –plume well) (Figure 33).

5.2.1 Geochemical Indicators

The most recent data reported in year 3 RA(O) shows that geochemical conditions at the site are not favorable for reductive dechlorination, specifically:

- The ORP measurements at LHAAP-50 during the 3rd year RA-O monitoring period ranged between -8 mV to 265 mV, indicating the presence of anaerobic and aerobic zones across the site. In the May 2016 sampling event, ORP was above 50 mV at all the impacted wells except 50WW05, which had an ORP of 35 mV. In the November 2016 sampling event, ORP was above 50 mV at all the impacted wells except 50WW05 and 50WW14, which had ORP's of 32 and -8 mV respectively. The general condition of the plume is aerobic, and therefore, not conducive to the biodegradation of chlorinated ethenes.
- Sulfate concentrations at the site ranged between 63.1 mg/L and 658 mg/L. Relatively high concentrations of sulfate and corresponding sulfide below laboratory reporting limits indicates that the conditions in the aquifer are generally not conducive for reductive dechlorination.
- Methane measured in select wells was generally found to range from non-detect levels to 17.1 µg/L. These low methane levels indicate that conditions in the aquifer are generally not conducive optimal for reductive dechlorination.
- Ethane and ethene, the two end products of the reductive dechlorination pathways for chlorinated ethanes and ethenes, were below the laboratory reporting limits during the 3rd year RA(O) monitoring period. These results indicate that complete dechlorination within the plume is not taking place.

5.2.2 Time to Restoration

TCE restoration times calculated by for wells 50WW05, 50WW14 and 50WW15, where the Mann-Kendall analysis indicates a significant decreasing trend, are 20, 0.7, and 1.8 years, respectively (Plot 112). Restoration times were calculated using TCE concentration reported in November 2016. Because TCE restoration time of 0.7 year was calculated for 50WW14, TCE concentrations in November 2017 in well 50WW14 was expected to be <= MCL of 5 µg/L. TCE concentration in well 50WW14, decreased from 10.9 in November 2016 to 8.2 µg/L in November 2017.

TCE restoration times of less than 20 years were estimated in locations where the Mann-Kendall analysis shows decline in concentration with 95% confidence (Bhate, 2018c). In these locations, MNA meets the lower range of the ROD's estimated condition of clean up time of 50 years estimated in the ROD. Given that in most locations temporal variation in COCs show no trend (either with stable or not stable data), it is not possible at this time to estimate restoration times from concentrations trends throughout the plume. According to the ROD, due to heterogeneity in the formation, restoration time could be one order of magnitude higher than the 50 years estimate (i.e., 500 years). Therefore, with time it is expected that the source(s) will be depleted through natural attenuation leading to declining trends in COCs throughout the plumes.

5.3 Data Analysis Summary

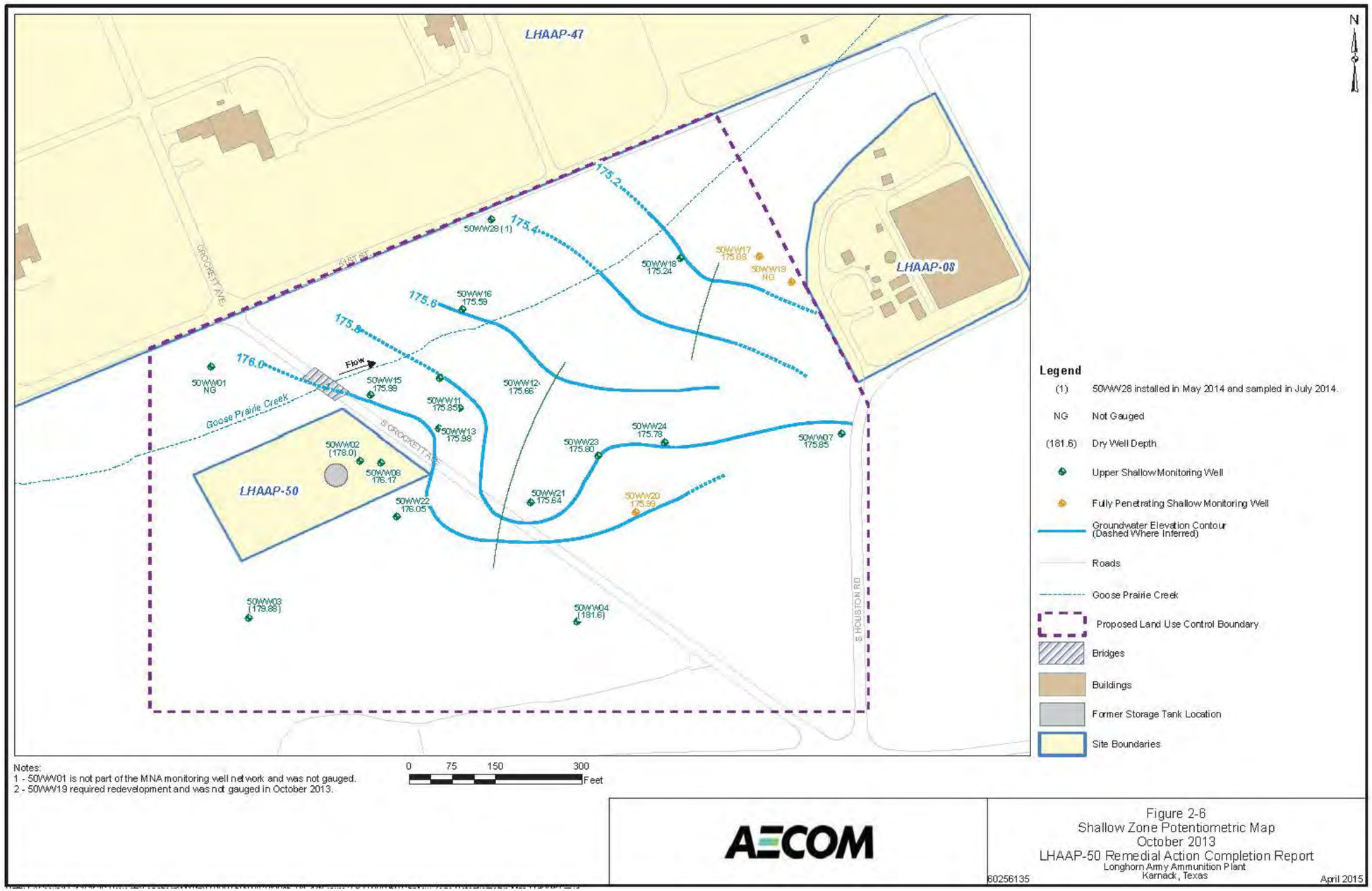
Data analysis indicates that although the footprints of COCs change with time, the areal extent of the footprints remained stable. Concentrations of COCs in perimeter wells located hydraulically downgradient (e.g., northeast) of the plumes remained non-detect. The center of the predominant COCs plumes are oriented along the major groundwater flow direction (e.g., to the northeast). Temporal variation of COCs in wells located within the center of the plume correlates to fluctuation in groundwater elevations. In most wells, peak COC concentrations coincided with low groundwater elevation and vice versa. However, in one location 50WW12, with highest perchlorate concentrations, peaks in concentrations coincided with peaks in groundwater elevation, with peak concentrations of perchlorate increasing with time to a level of 87,800 ppb (Plot 136). Although the Army's and the Fourth Five-Year Review's trend analysis of perchlorate at this location indicate no trend, visual inspection indicates that the peak concentrations of perchlorate increase with time.

Spatial distribution of trend analysis results and plume contours are depicted in Plot 111 (Bhate, 2018c). The Mann-Kendall analysis indicated increase in TCE concentrations at 95% confidence in two wells (50WW09 (Plot 120) and 50WW12 (Plot 124) located immediately downgradient of the excavated impacted soil), and increase in perchlorate at 95% confidence in one downgradient/leading edge well (50WW06, Plot 117) to levels as high as 5240 ppb. The Fourth Five-Year Review's trend analysis, which includes all the data collected to date, indicates insufficient data for TCE trend analysis in well 50WW09, but confirms the increasing trend for TCE noted at 50WW12, and in perchlorate noted at 50WW06. In addition, the 2019 Five-Year Review's trend analysis indicates an increase in TCE trends in 50WW06 located adjacent to 50WW12.

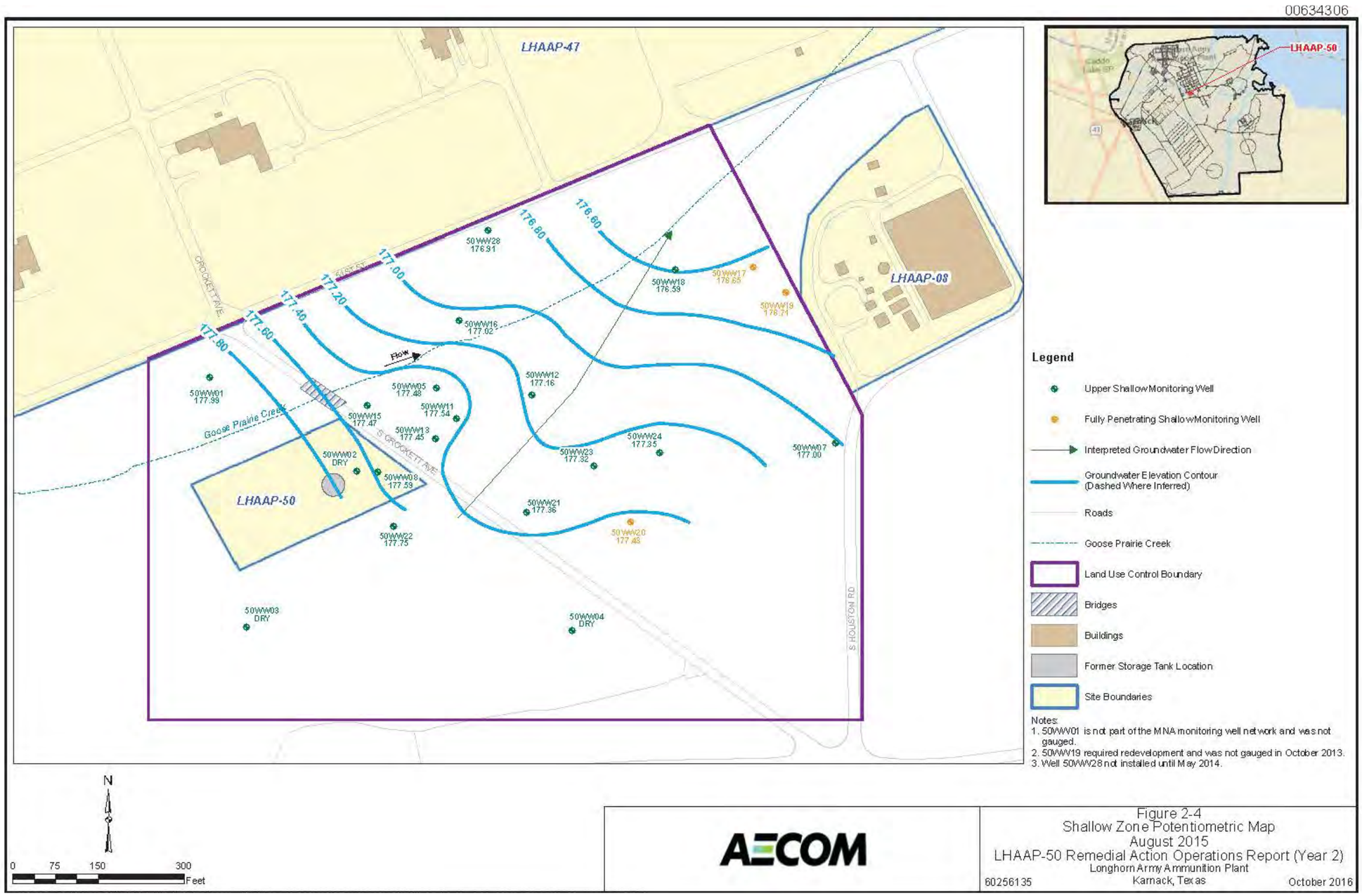
A source of TCE is suspected at 50WW13. This is based on results from vertical profile investigation showing TCE concentrations at 1% solubility (indicative of the presence of residual DNAPL). Highest TCE concentrations (as high as 13,000 ppb) were reported at this well. Limited TCE daughter compounds cis-1,2-DCE and VC indicate that reductive dechlorination is occurring in some locations within the Shallow Groundwater Zone plume, but geochemical conditions are not favorable, and that complete dechlorination within the plume is not taking place. The Army recommended implementing the ROD contingency to enhance MNA by creating conditions that are conducive for reductive dechlorination.

Limited analytical data was available for surface water station, 50SW06, located in Goose Prairie Creek and designed to monitor for potential discharge points for groundwater to surface water contamination (three quarters in 2015). Perchlorate at a maximum level of 1.44 µg/L, lower than the cleanup level of 17 µg/L, is the only COCs detected at this surface water station. In 2016 (three years after the excavation of the perchlorate- impacted soil), perchlorate at a level of 6.59 µg/L, lower than the cleanup level of 17 µg/L, was detected at the surface water station located adjacent to the percolate contaminated soil excavation area.

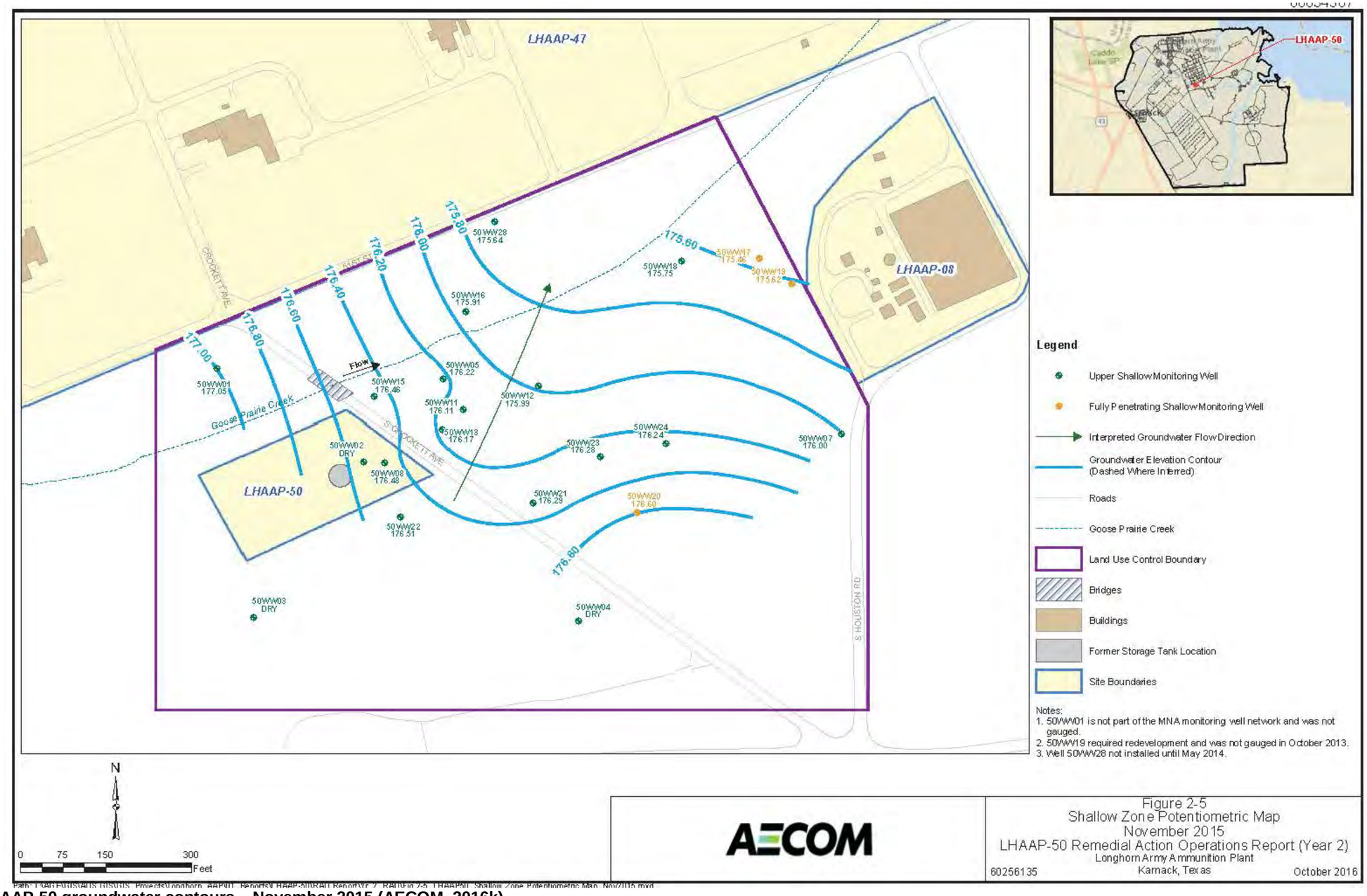
Restoration times of TCE that are < 20 years were estimated in locations where the Mann-Kendall analyses show decline in concentrations with 95% confidence (Bhate, 2018c). In these locations, MNA meets the lower range of the ROD's estimated clean up time of 50 years. Since in most locations temporal variation in COCs show no trend (either with stable or not stable data), it is not possible at this time to estimate restoration times from concentrations trends throughout the plume. According to the ROD, due to heterogeneity in the formation, restoration time could be one order of magnitude higher than the 50 years estimate (i.e., 500 years). Therefore, with time it is expected that the source(s) will be depleted through natural attenuation leading to declining trends in COCs throughout the plumes.



Plot 98. LHAAP-50 groundwater contours – October 2013 (AECOM, 2016f).

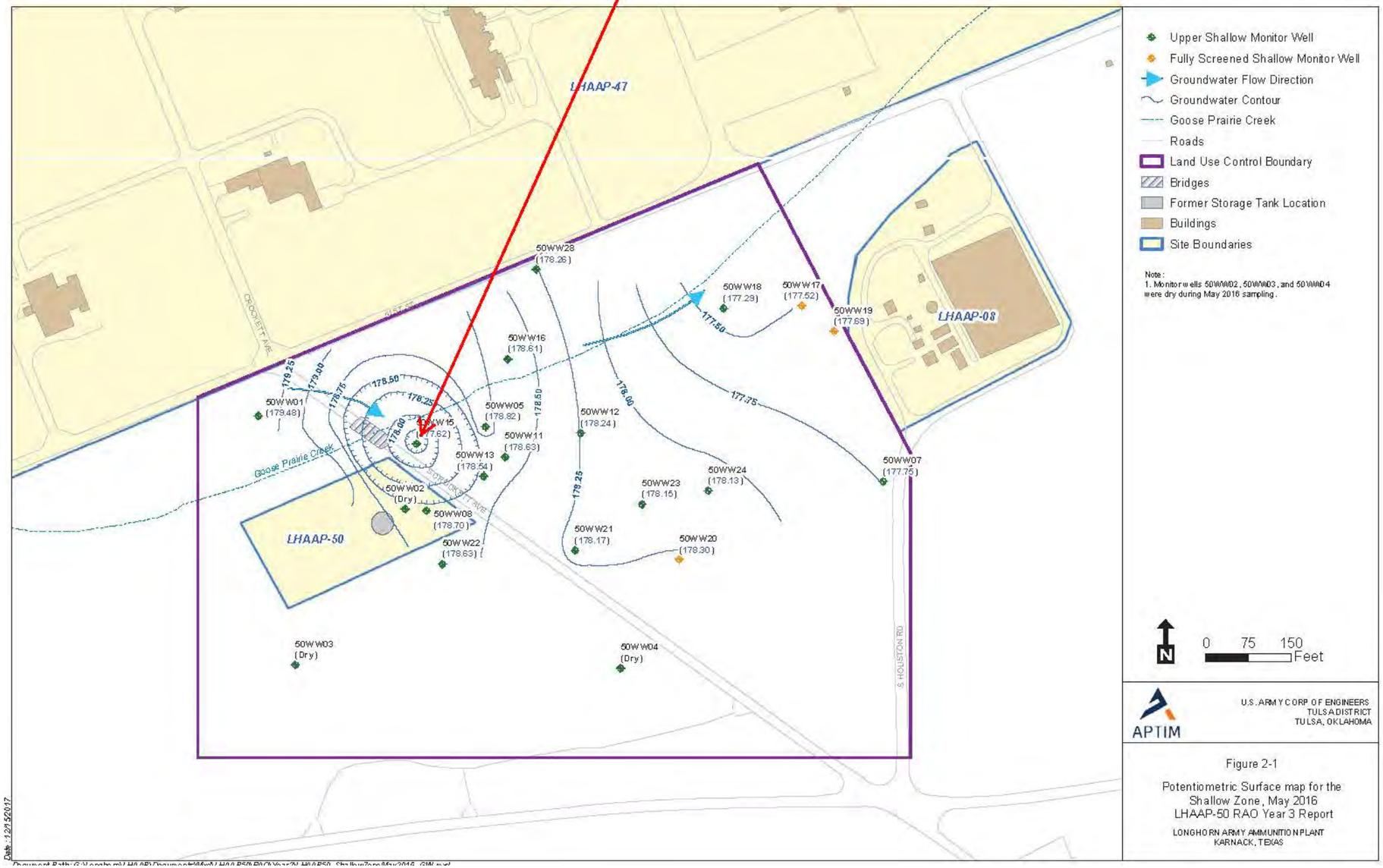


Plot 99. LHAAP-50 groundwater contours – August 2015 (AECOM, 2016k).

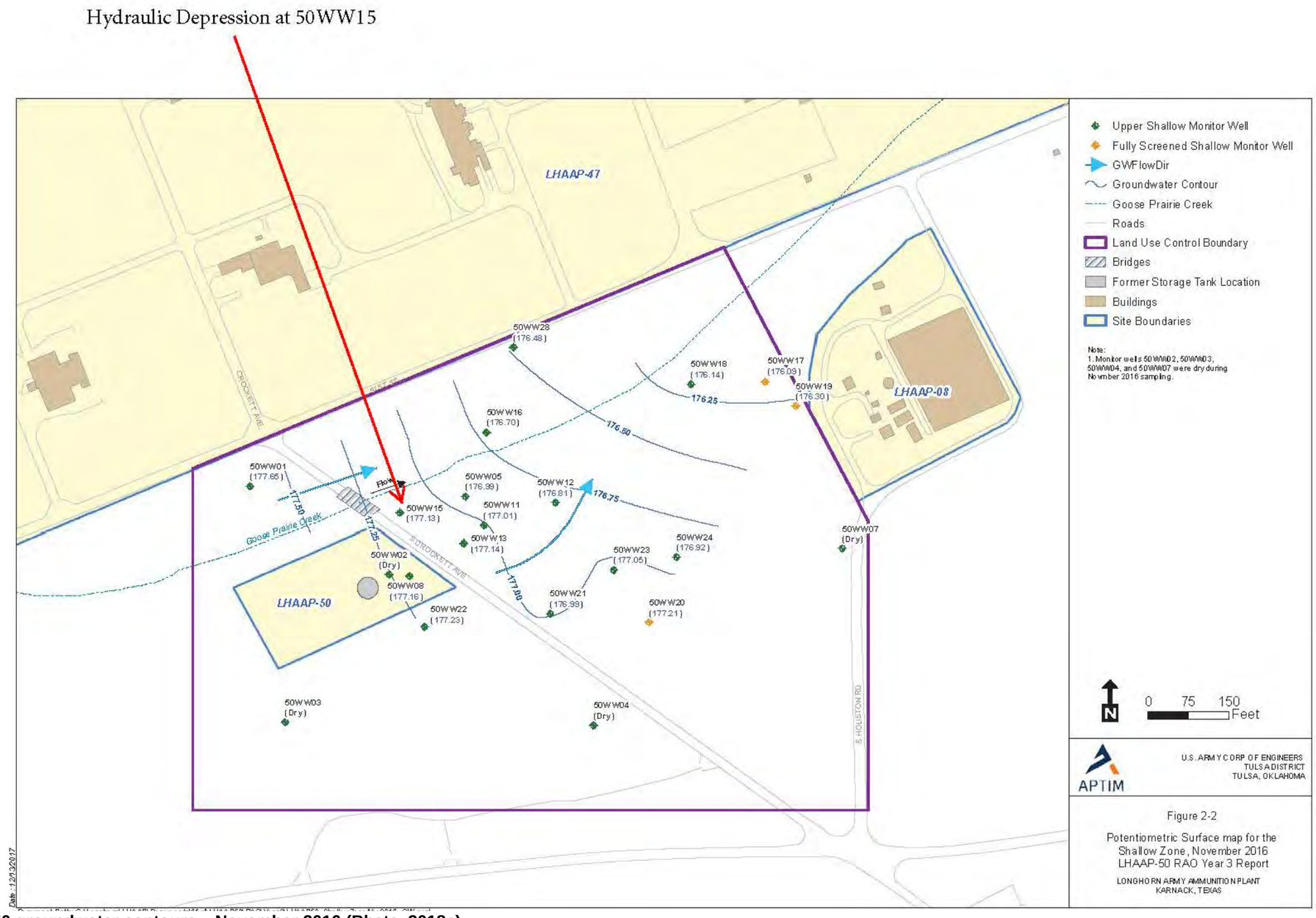


Plot 100. LHAAP-50 groundwater contours – November 2015 (AECOM, 2016k).

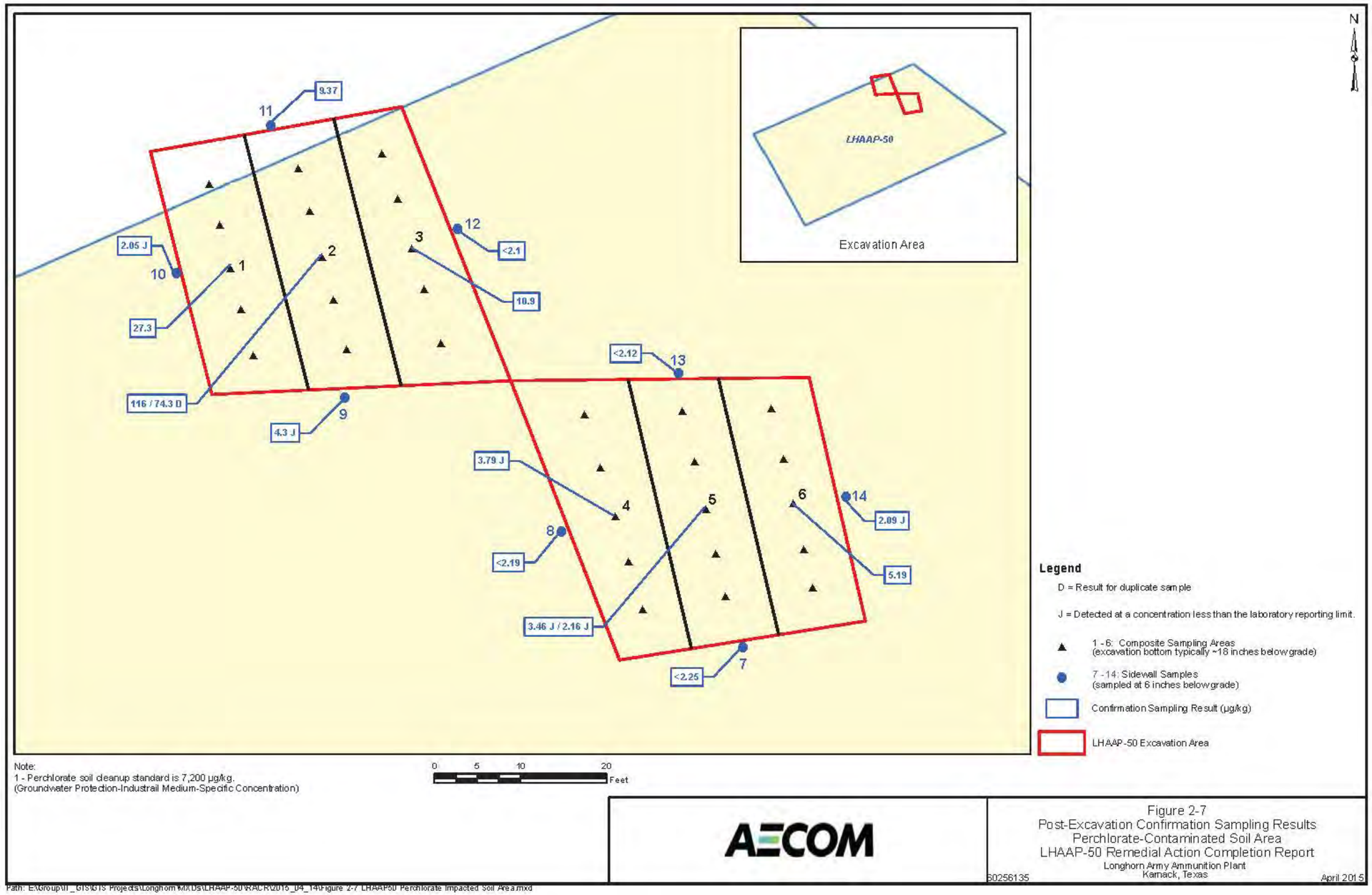
There is no explanation for the hydraulic depression at 50WW15, it is possible that contours between 50WW15 is to the north / north west discharging to Goose Prairie Creek .



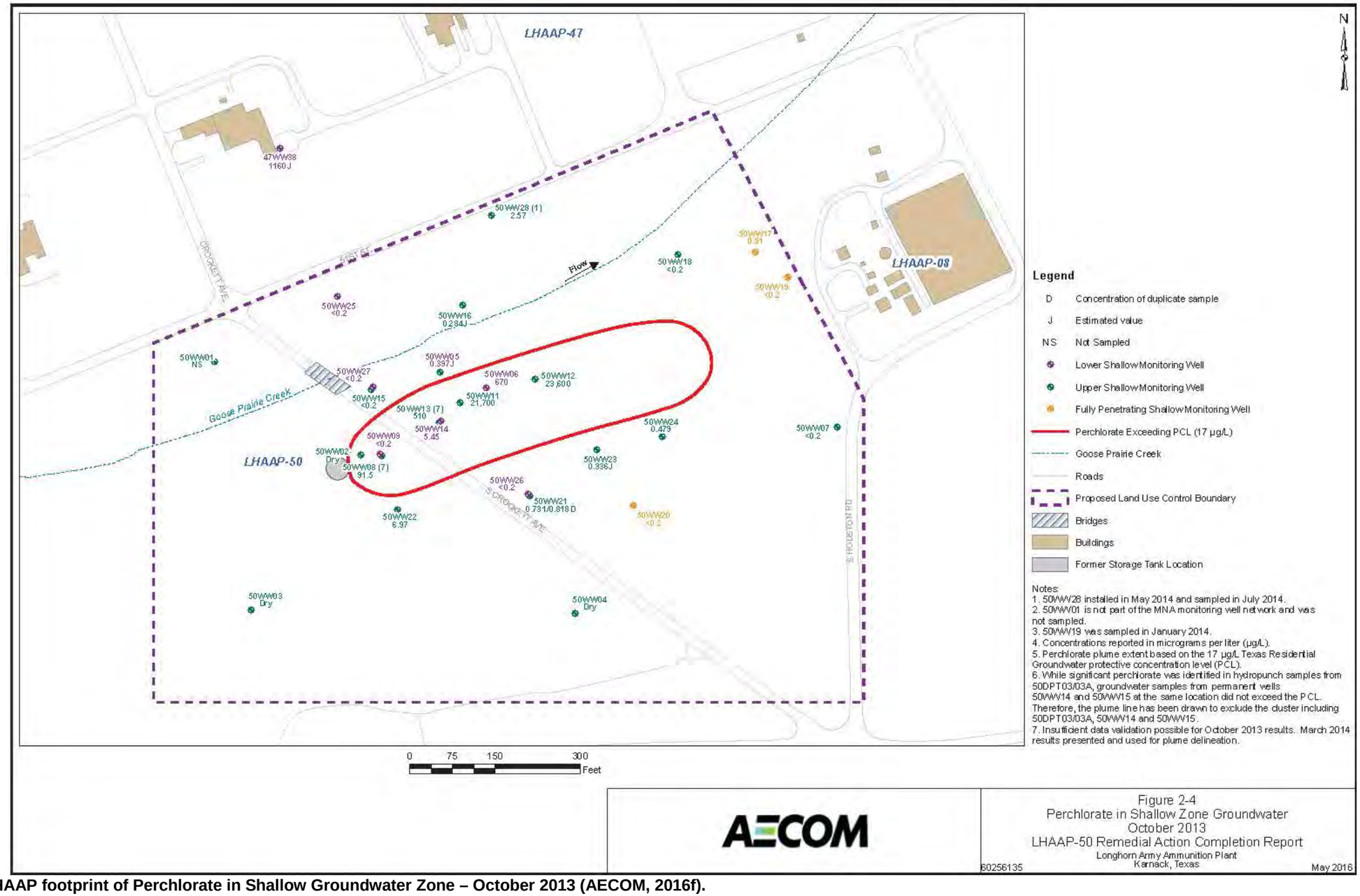
Plot 101. LHAAP-50 groundwater contours – May 2016 (Bhate, 2018c).



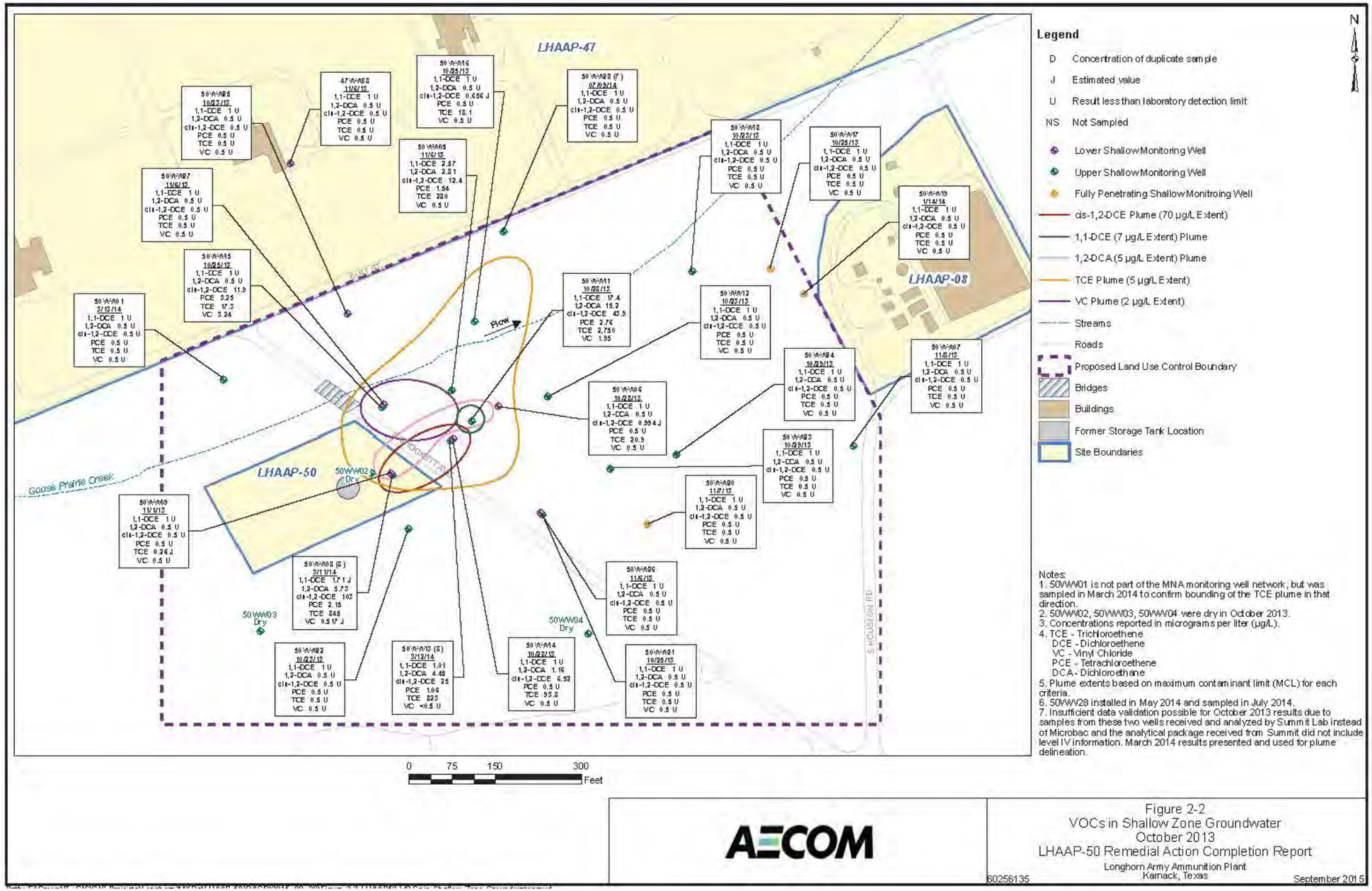
Plot 102. LHAAP-50 groundwater contours – November 2016 (Bhate, 2018c).



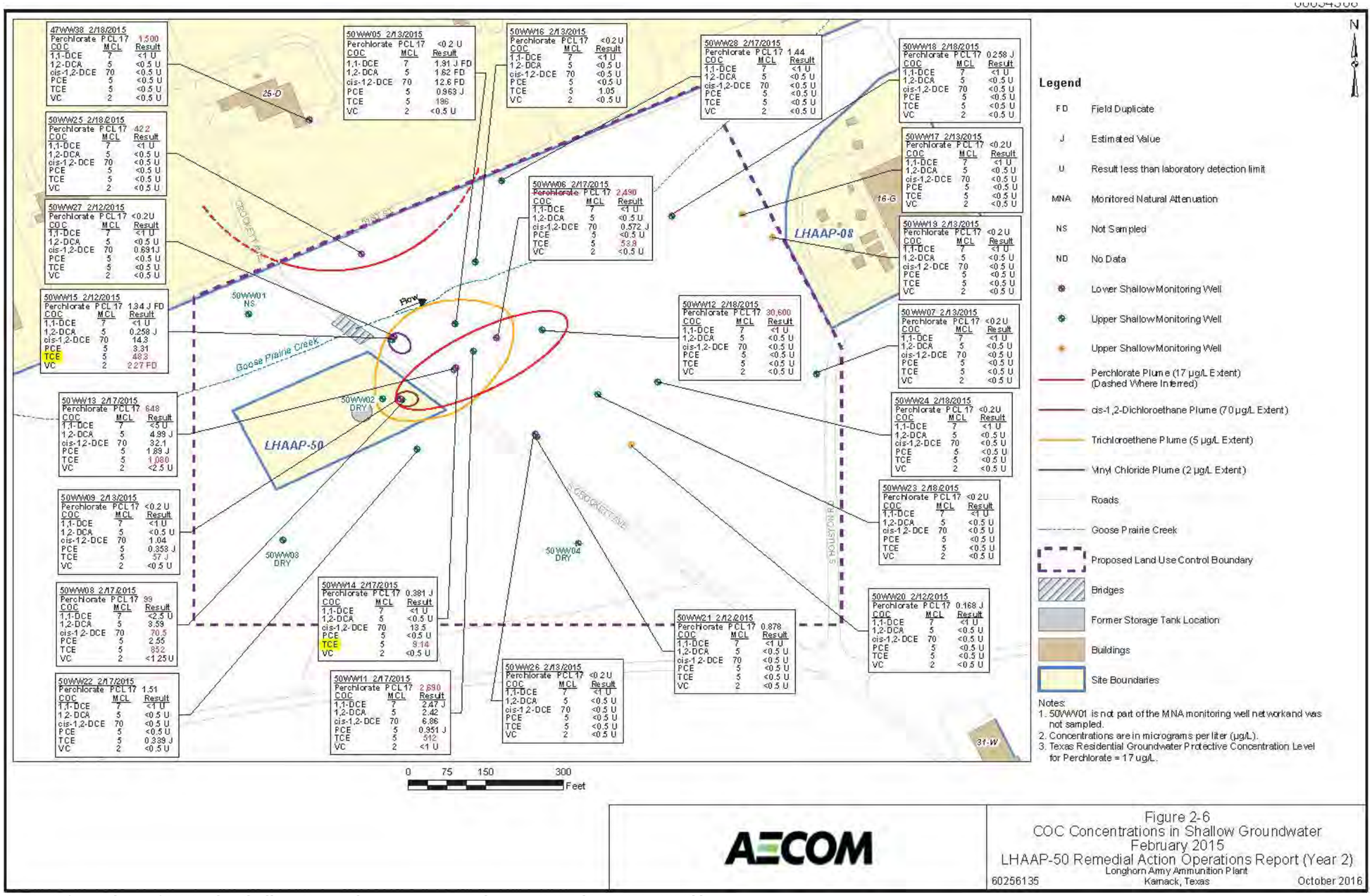
Plot 103. LHAAP-50 areal extent of Perchlorate-impacted soil excavated (AECOM, 2016f).



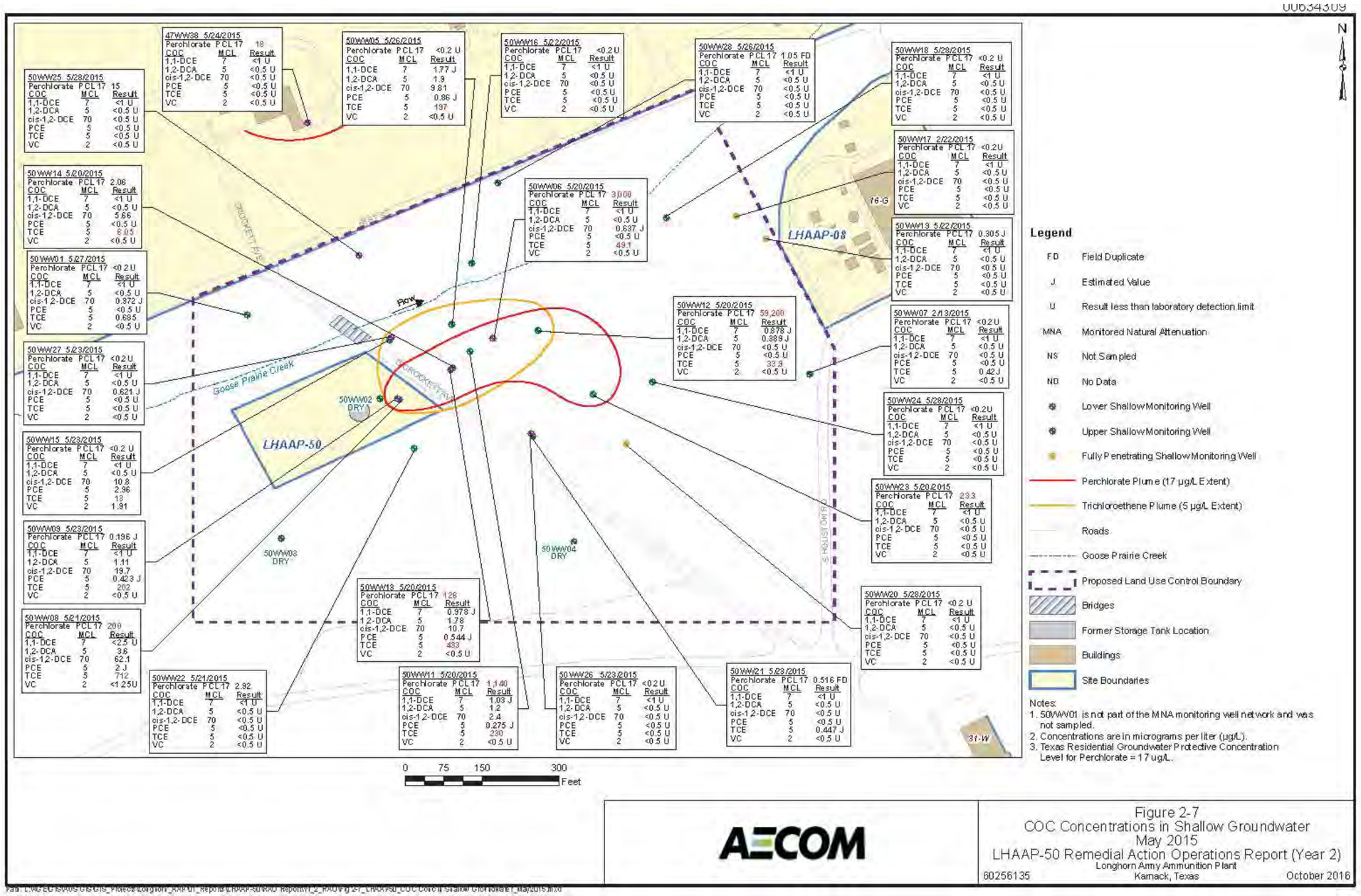
Plot 104. LHAAP footprint of Perchlorate in Shallow Groundwater Zone – October 2013 (AECOM, 2016f).



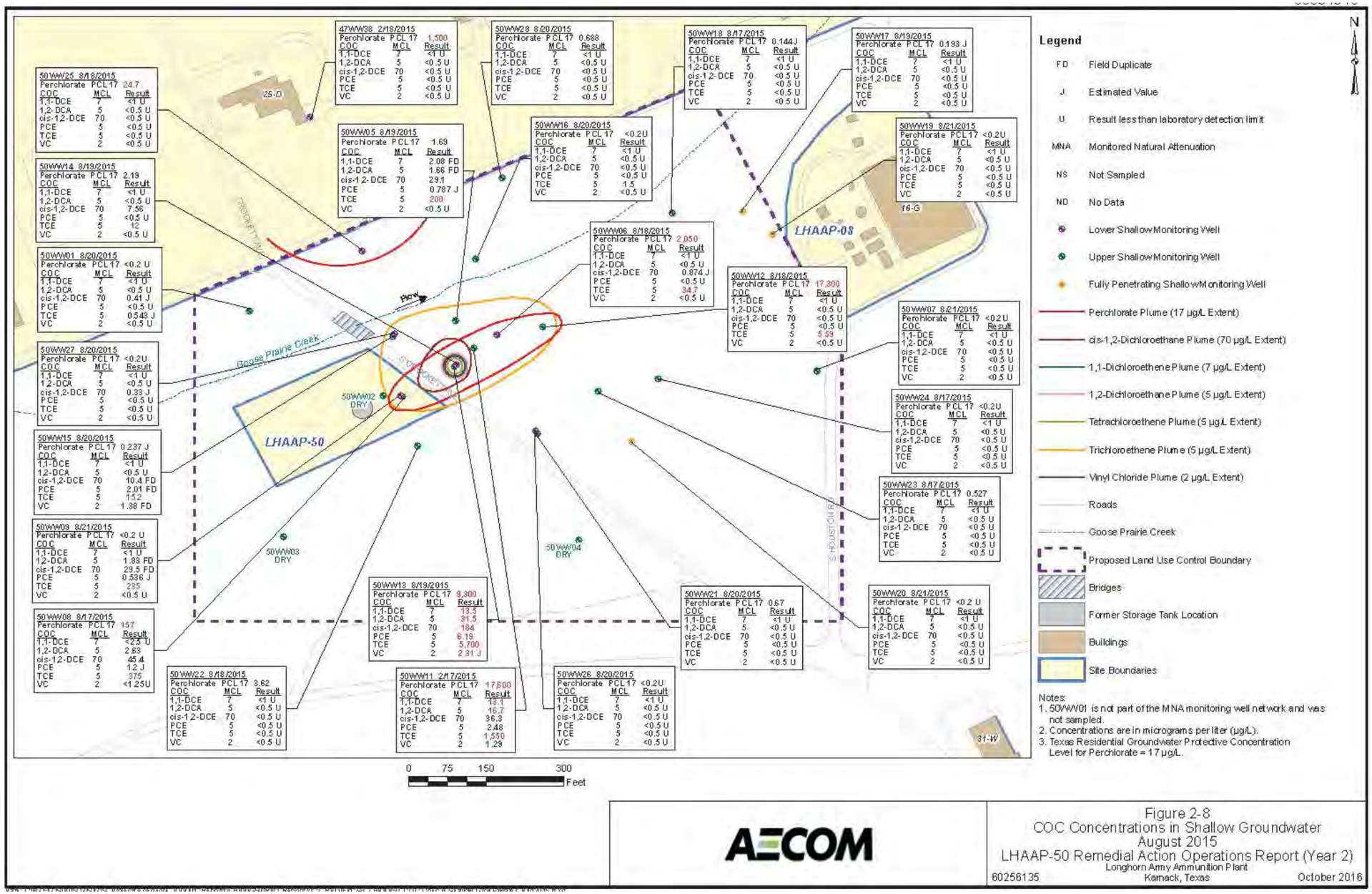
Plot 105. LHAAP-50 VOC footprints in the Shallow Groundwater Zone – October 2013 (AECOM, 2016f).



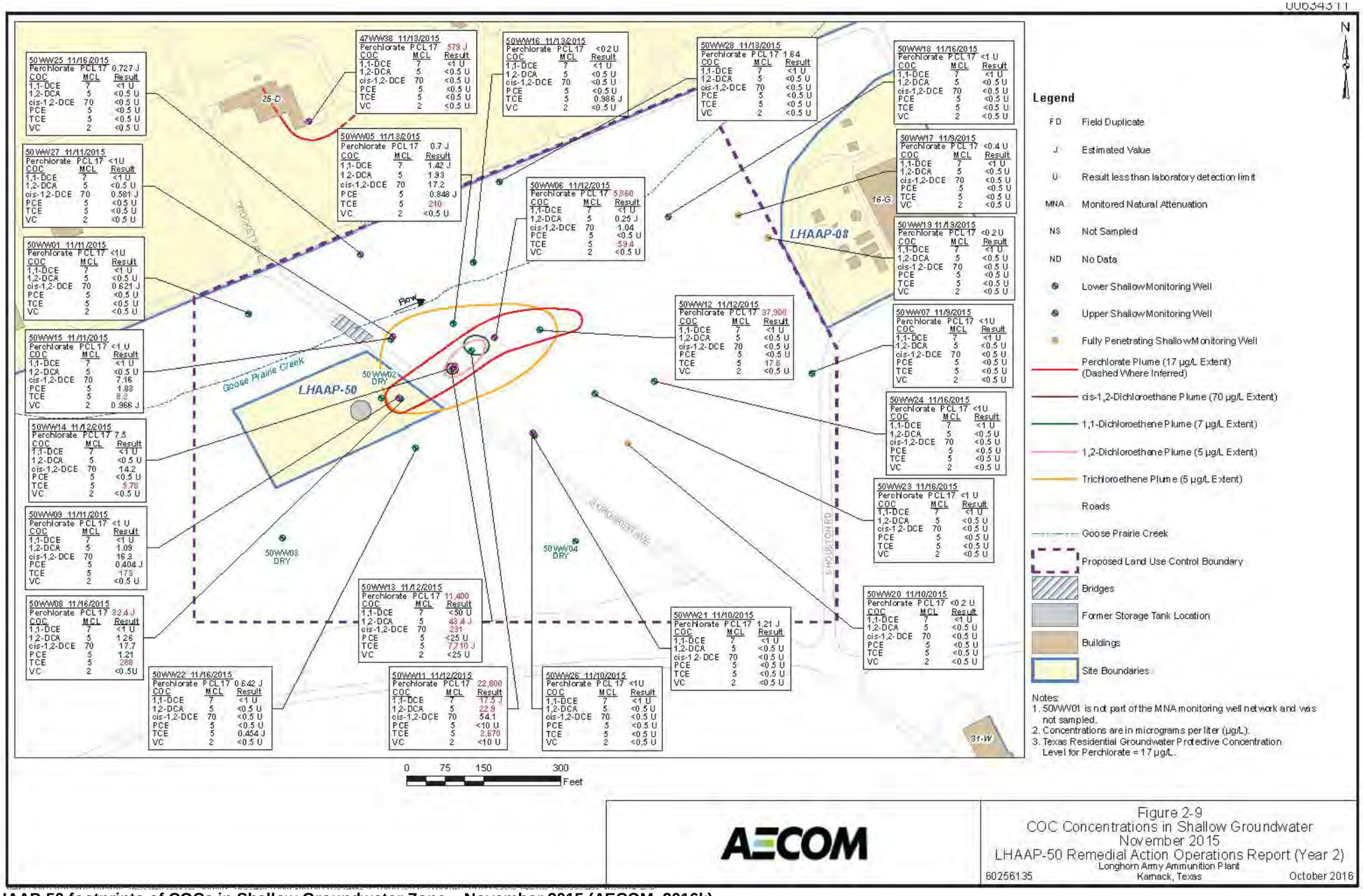
Plot 106. LHAAP-50 footprints of COCs in Shallow Groundwater Zone – February 2015 (AECOM, 2016k).



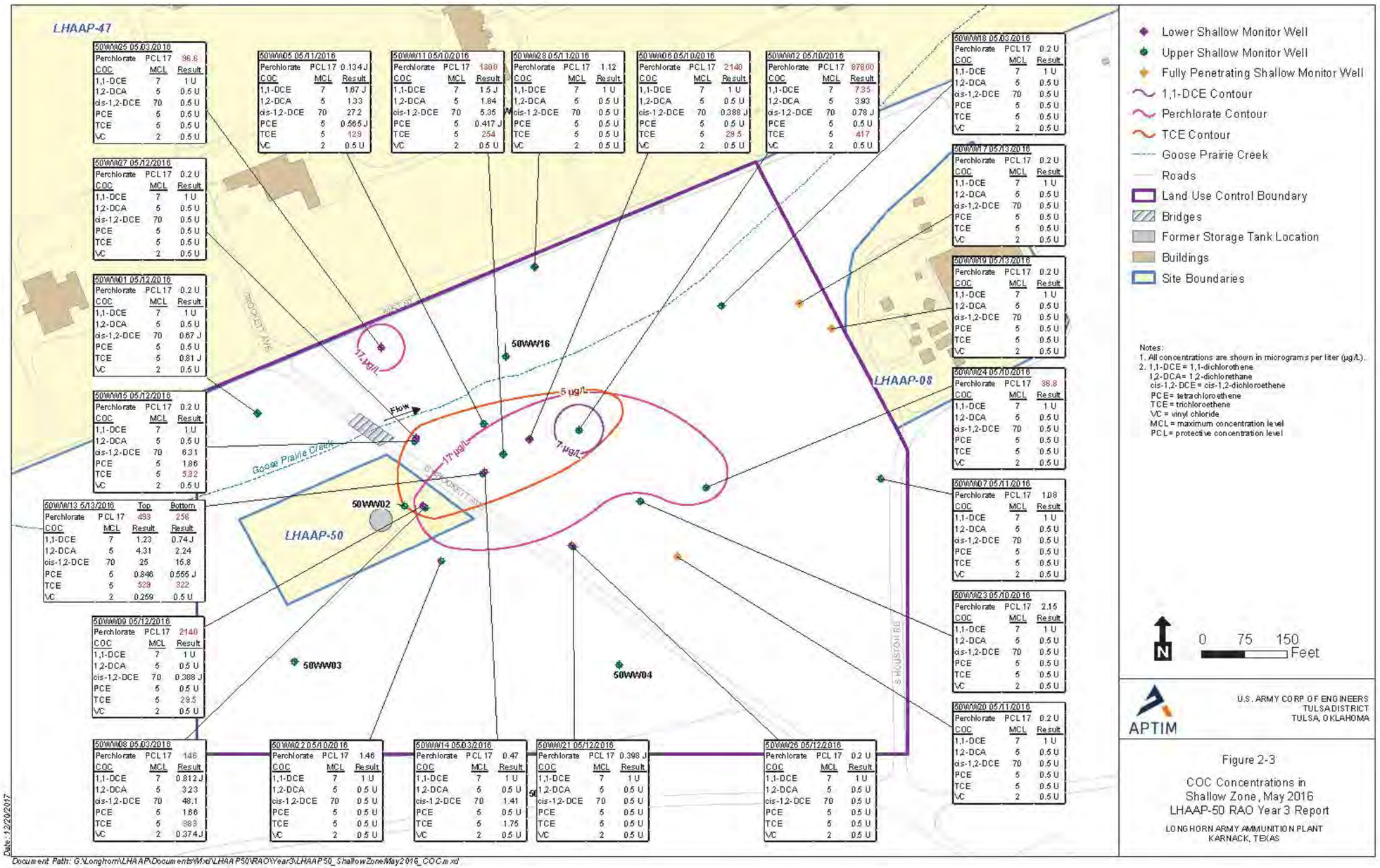
Plot 107. LHAAP-50 footprints of COCs in Shallow Groundwater Zone – May 2015 (AECOM, 2016k).



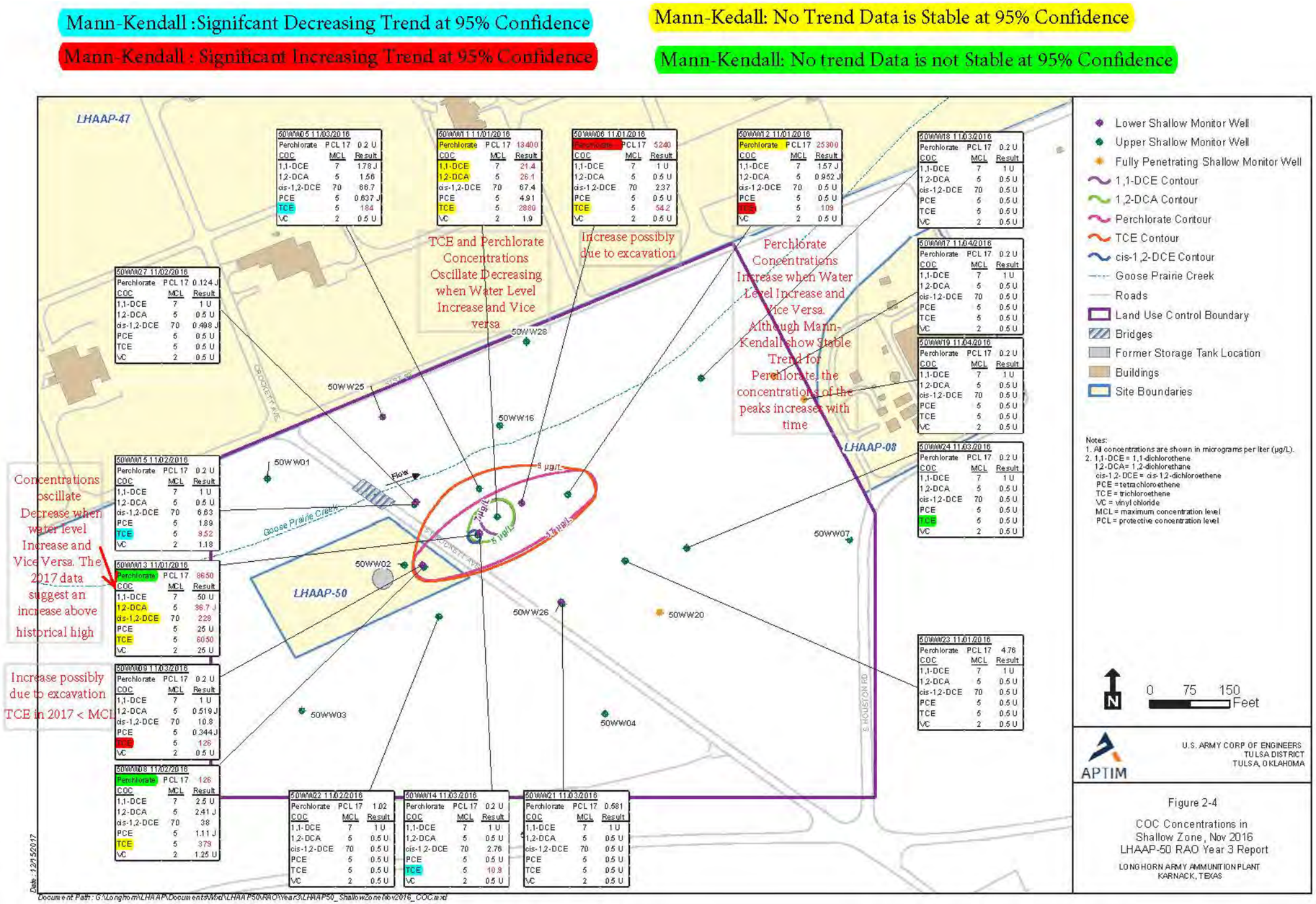
Plot 108. LHAAP-50 footprints of COCs in Shallow Groundwater Zone – August 2015 (AECOM, 2016k).



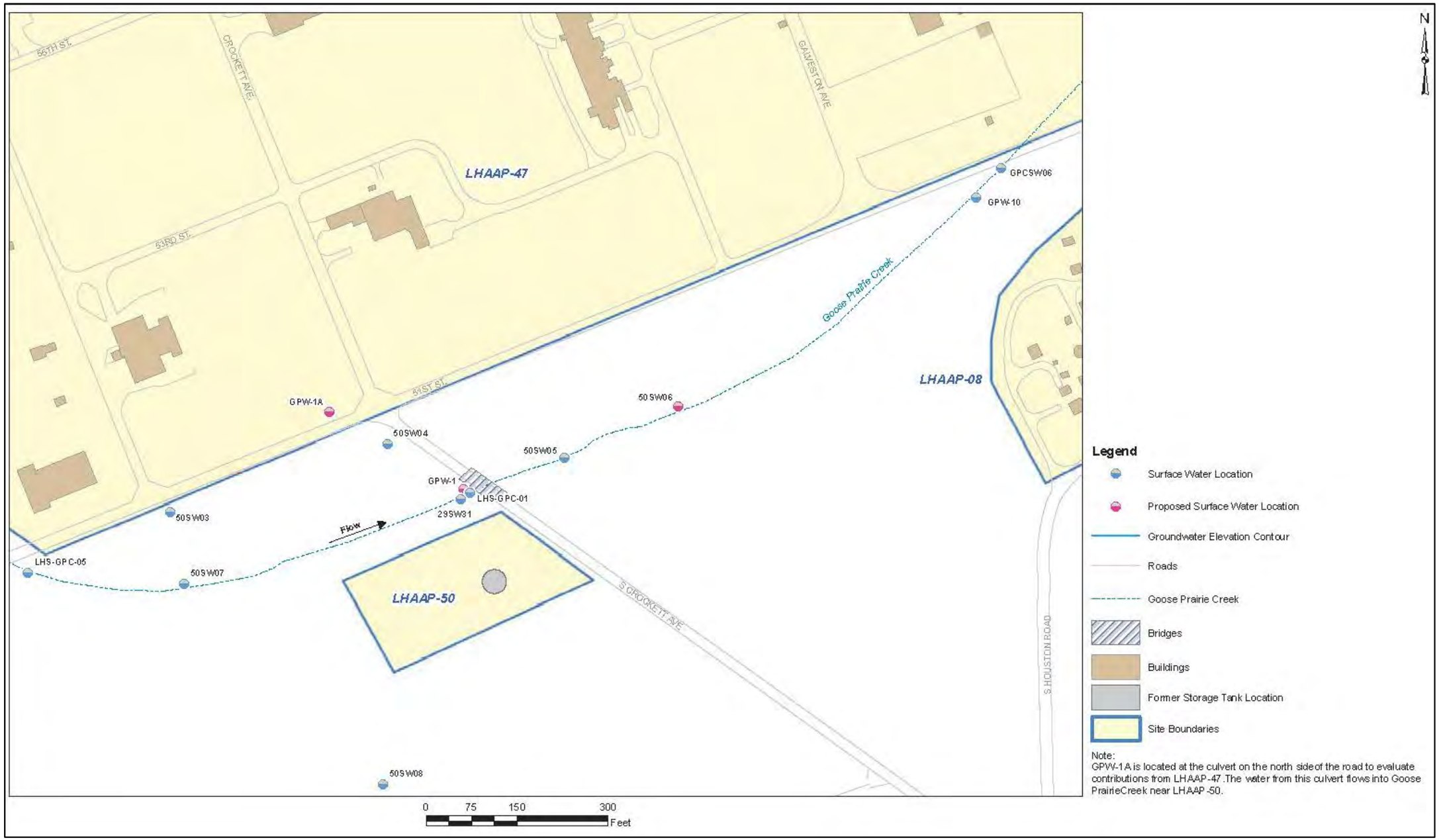
Plot 109. LHAAP-50 footprints of COCs in Shallow Groundwater Zone – November 2015 (AECOM, 2016k).



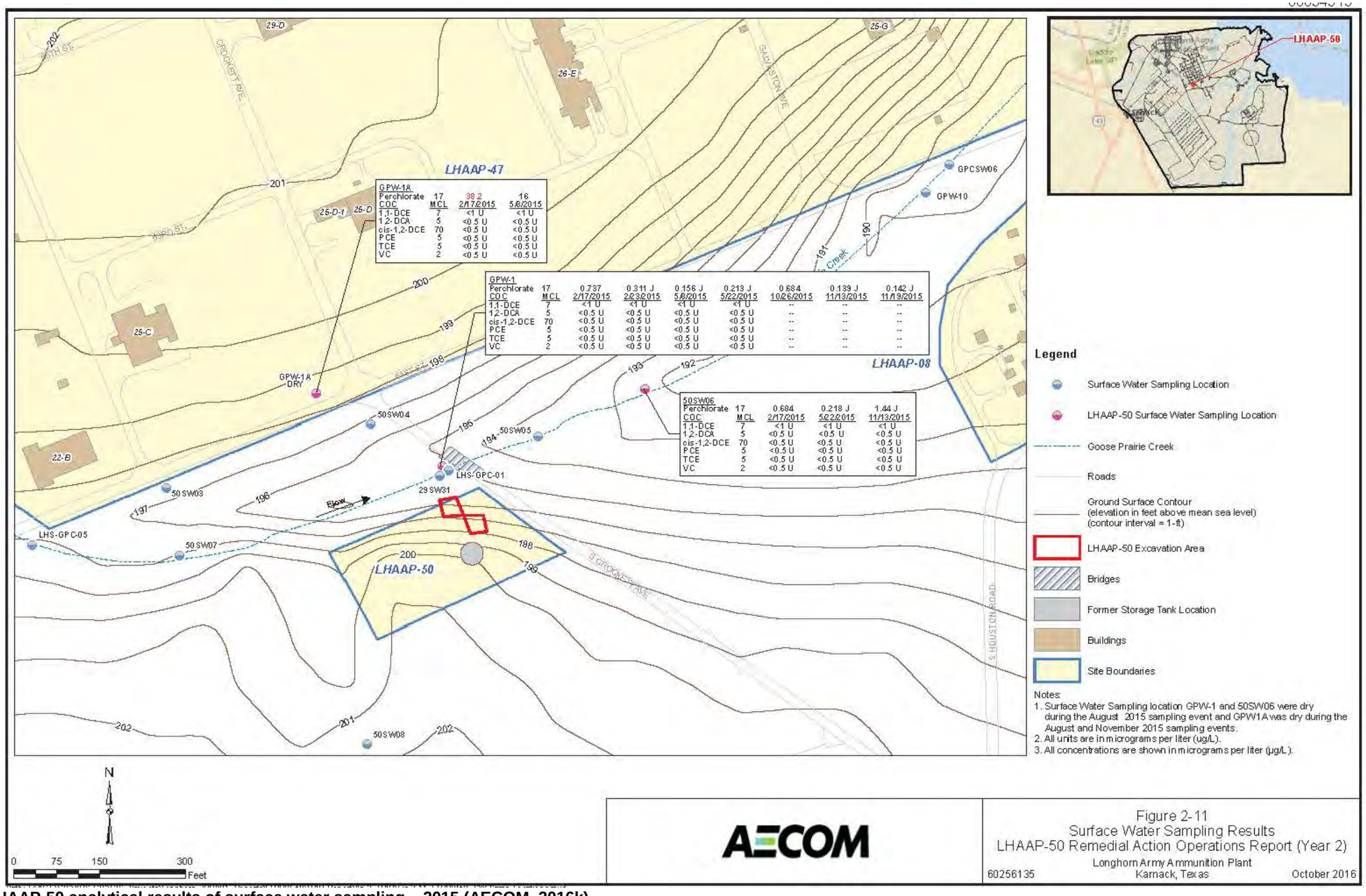
Plot 110. LHAAP-50 footprints of COCs in Shallow Groundwater Zone – May 2016 (Bhate, 2018c).



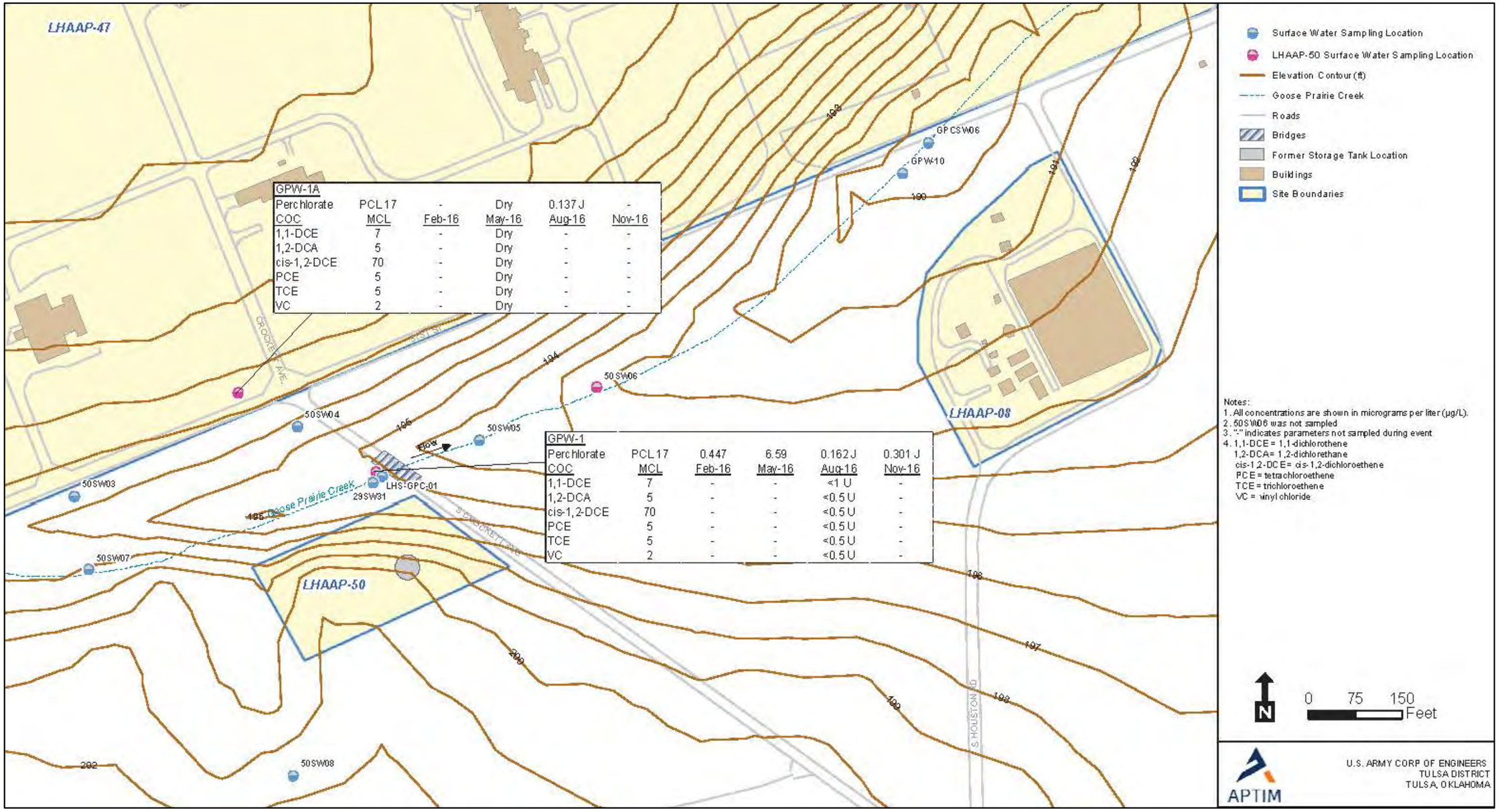
Plot 111. LHAAP-50 footprints of COCs in Shallow Groundwater Zone and spatial distribution of trend analysis – November 2016 (Bhate, 2018c, with 2019 fourth five-year review annotations).



Plot 112. LHAAP-50 surface water sampling locations (AECOM, 2013i).



Plot 113. LHAAP-50 analytical results of surface water sampling – 2015 (AECOM, 2016k).



Plot 114. LHAAP-50 analytical results of surface water sampling – 2016 (Bhate, 2018c).

Mann-Kendall Analysis - 50WW05 Upper Shallow

Well: 50WW05
Chemical: Trichloroethene
MCL: 5 µg/L

Date	Concentration (µg/L)
11/6/2013	280
3/17/2014	304
6/20/2014	270
11/11/2014	329
2/13/2015	193
5/26/2015	197
8/19/2015	200
11/13/2015	210
5/11/2016	129
11/3/2016	184

Date	11/6/2013	3/17/2014	6/20/2014	11/11/2014	2/13/2015	5/26/2015	8/19/2015	11/13/2015	5/11/2016	11/3/2016	Positive	Negative
data	280	304	270	329	193	197	200	210	129	184		
280	0	-76.00	-10.00	49.00	-87.00	-83.00	-80.00	-70.00	-151.00	-96.00	1	9
304		0.00	66.00	125.00	-11.00	-7.00	4.00	6.00	-75.00	-20.00	3	5
270			0.00	59.00	-77.00	-73.00	-70.00	-60.00	-141.00	-88.00	1	6
329				0.00	-136.00	-132.00	-129.00	-119.00	-200.00	-145.00	0	6
193					0.00	4.00	7.00	17.00	-64.00	-9.00	3	2
197						0.00	3.00	13.00	-68.00	-13.00	2	2
200							0.00	10.00	-71.00	-16.00	1	2
210								0.00	-81.00	-26.00	0	2
129									0.00	55.00	1	0
184										0.00	0	0
											12	33

count n	10
Average/mean	219.6
std dev	57.3
Neg - Pos S (S on table)	21
p (crossed n and S)	0.036
α defined significance (95 %)	0.05
Significant trend?	Yes

Date	GW Elevation
11/6/2013	178.15
3/17/2014	177.45
6/20/2014	178.32
11/11/2014	176.68
2/13/2015	177.53
5/26/2015	179.23
8/19/2015	177.48
11/13/2015	176.22
5/11/2016	178.8
11/3/2016	177

Plot 115. LHAAP-50 Mann-Kendall - 50WW05 - TCE (Bhate, 2018c).

Mann-Kendall Analysis - 50WW06 Lower Shallow

50WW06
Chemical: TCE
GWPS: 5 µg/L

Date	Concentration (µg/L)
10/28/2013	20.9
3/11/2014	36.5
6/25/2014	27.4
11/4/2014	36.1
2/17/2015	53.9
5/20/2015	49.1
8/18/2015	34.7
11/12/2015	59.4
5/10/2016	29.5
11/1/2016	54.2

Date	10/28/2013	3/11/2014	6/25/2014	11/4/2014	2/17/2015	5/20/2015	8/18/2015	11/12/2015	5/10/2016	11/1/2016		
data	20.9	36.5	27.4	36.1	53.9	49.1	34.7	59.4	29.5	54.2	Positive	Negative
20.9	0	15.60	6.50	15.20	33.00	28.20	13.80	38.50	8.60	33.30	9	0
36.5		0.00	-9.10	-0.40	17.40	12.60	-1.80	22.90	-7.00	17.70	4	4
27.4			0.00	8.70	26.50	21.70	7.30	32.00	2.10	26.80	7	0
36.1				0.00	17.80	13.00	-1.40	23.30	-6.60	18.10	4	2
53.9					0.00	-4.80	-19.20	5.50	-24.40	0.30	2	3
49.1						0.00	-14.40	10.30	-19.60	5.10	2	2
34.7							0.00	24.70	-5.20	19.50	2	1
59.4								0.00	-29.90	-5.20	0	2
29.5									0.00	24.70	1	0
54.2										0.00	0	0
											31	14

count:n	10
Average/mean	40.2
std dev	13.1
Neg - Pos: s (x on table)	17
p (cross of n and s)	0.078
a: defined significance (95 %)	0.05
Significant trend?	No
coefficient of variaton	0.33
Stable?	Yes

There is not a trend at a 95% confidence, however the concentrations are stable around the mean.

50WW06	30-Aug-04	Trichloroethene	15
50WW06	22-Feb-07	trichloroethene	2
50WW06	22-Feb-07	trichloroethene	Unknown
50WW06	22-Feb-07	trichloroethene	Unknown
50WW06	11-May-05	TRICHLOROETHENE	Unknown
50WW06	11-May-05	TRICHLOROETHENE	Unknown
50WW06	11-May-05	TRICHLOROETHENE	4.7
50WW06	7-Aug-10	TRICHLOROETHENE	3.33
50WW06	7-Aug-10	TRICHLOROETHENE	3.28
50WW06	5/10/2016	Trichloroethene	29.5
50WW06	11/1/2016	Trichloroethene	54.2
50WW06	11/13/2017	Trichloroethene	13

Plot 116. LHAAP-50 Mann-Kendall - 50WW06 - TCE (Bhate, 2018c).

Mann-Kendall Analysis - 50WW06 Lower Shallow

50WW06
Chemical: Perchlorate
PCL: 17 µg/L

Date	Concentration (µg/L)
10/28/2013	670
3/11/2014	2,090
6/25/2014	700
11/4/2014	1,510
2/17/2015	2,490
5/20/2015	3,000
8/18/2015	2,050
11/12/2015	5,860
5/10/2016	2,140
11/1/2016	5,240

count:n	10
Average/mean	2,575
std dev	1,734
Neg - Pos: s (x on table)	27
p (cross of n and s)	0.008
α: defined significance (95 %)	0.05
Significant trend?	Yes

An increasing trend at a 95% confidence is observed and the trend is stable around the mean.

Date	10/28/2013	3/11/2014	6/25/2014	11/4/2014	2/17/2015	5/20/2015	8/18/2015	11/12/2015	5/10/2016	11/1/2016		
data	670	2,090	700	1,510	2,490	3,000	2,050	5,860	2,140	5,240	Positive	Negative
670	0	1,420	30	840	1,820	2,330	1,380	5,190	1,470	4,570	9	0
2,090		0	-1,390	-580	400	910	-40	3,770	50	3,150	5	3
700			0	810	1,790	2,300	1,350	5,160	1,440	4,540	7	0
1,510				0	980	1,490	540	4,350	630	3,730	6	0
2,490					0	510	-440	3,370	-350	2,750	3	2
3,000						0	-950	2,860	-860	2,240	2	2
2,050							0	3,810	90	3,190	3	0
5,860								0	-3,720	-620	0	2
2,140									0	3,100	1	0
5,240										0	0	0
											36	9

Date	GW Elevation
10/28/2013	175.75
3/11/2014	177.3
6/25/2014	177.95
11/4/2014	176.54
2/17/2015	177.35
5/20/2015	178.84
8/18/2015	177.34
11/12/2015	176.09
5/10/2016	178.4
11/1/2016	176.9

Location	Date	Constituent	Result (ug/	Code
50WW06	30-Aug-04	Perchlorate	6.7	
50WW06	22-Feb-07	Perchlorate	4	U
50WW06	11-May-05	PERCHLORATE	Unknown	
50WW06	11-May-05	PERCHLORATE	Unknown	
50WW06	11-May-05	PERCHLORATE	24.8	
50WW06	7-Aug-10	PERCHLORATE	131	
50WW06	7-Aug-10	PERCHLORATE	113	
50WW06	5/10/2016	Perchlorate	2140	
50WW06	11/1/2016	Perchlorate	5240	
50WW06	11/13/2017	Perchlorate	950	

Plot 117. LHAAP-50 Mann-Kendall - 50WW06 - Perchlorate (Bhate, 2018c).

Mann-Kendall Analysis - 50WW08 Upper Shallow

50WW08
Chemical: Trichloroethene
MCL: 5 µg/L

Date	Concentration (µg/L)
10/30/2013	247
3/11/2014	845
6/24/2014	814
11/6/2014	685
2/17/2015	852
5/21/2015	712
8/17/2015	375
5/3/2016	383
11/2/2016	379

Date	10/30/2013	3/11/2014	6/24/2014	11/6/2014	2/17/2015	5/21/2015	8/17/2015	5/3/2016	11/2/2016		
data	247	845	814	685	852	712	375	383	379	Positive	Negative
247	0	598.00	567.00	438.00	605.00	465.00	128.00	136.00	132.00	8	0
845		0.00	-31.00	-160.00	7.00	-133.00	-470.00	-462.00	-466.00	1	6
814			0.00	-129.00	38.00	-102.00	-439.00	-431.00	-435.00	1	5
685				0.00	167.00	27.00	-310.00	-302.00	-306.00	2	3
852					0.00	-140.00	-477.00	-469.00	-473.00	0	4
712						0.00	-337.00	-329.00	-333.00	0	3
375							0.00	8.00	4.00	2	0
383								0.00	-4.00	0	1
379									0.00	0	0
										14	22

count n	9
Average/mean	588.0
std dev	239.5
Neg - Pos: s (x on table)	8
p (cross of n and s)	0.238
α: defined significance (95%)	0.05
Significant trend?	No
coefficient of variation	0.41
Stable?	Yes

There is not a trend at a 95% confidence, however the concentrations are stable around the mean.

Location	Date	Constituent	Result (ug/	Code
50WW08	5/3/2016	Trichloroethene	383	
50WW08	11/2/2016	Trichloroethene	379	
50WW08	11/13/2017	Trichloroethene	180	J
50WW08	11/13/2017	Trichloroethene	240	J

Plot 118. LHAAP-50 Mann-Kendall - 50WW08 - TCE (Bhate, 2018c)

Mann-Kendall Analysis - 50WW08 Upper Shallow

50WW08
Chemical: Perchlorate
PCL: 17 ug/L

Date	Concentration (µg/L)
10/30/2013	6,404
3/11/2014	91.5
6/24/2014	132
11/6/2014	56.3
2/17/2015	99
5/21/2015	200
8/17/2015	157
5/3/2016	146
11/2/2016	126

Date	10/30/2013	3/11/2014	6/24/2014	11/6/2014	2/17/2015	5/21/2015	8/17/2015	5/3/2016	11/2/2016	Positive	Negative
data	6,404	91.5	132	56.3	99	200	157	146	126		
6,404	0	-6312.50	-6272.00	-6347.70	-6305.00	-6204.00	-6247.00	-6258.00	-6278.00	0	8
91.5		0.00	40.50	-35.20	7.50	108.50	65.50	54.50	34.50	6	1
132			0.00	-75.70	-33.00	68.00	25.00	14.00	-6.00	3	3
56.3				0.00	42.70	143.70	100.70	89.70	69.70	5	0
99					0.00	101.00	58.00	47.00	27.00	4	0
200						0.00	-43.00	-54.00	-74.00	0	3
157							0.00	-11.00	-31.00	0	2
146								0.00	-20.00	0	1
126									0.00	0	0
										18	18

count n	9
Average/mean	823.5
std dev	2093.1
Neg - Pos: s (x on table)	0
p (cross of n and s)	0.54
α: defined significance (95%)	0.05
Significant trend?	No
coefficient of variation	2.54
Stable?	No

There is not a trend at a 95% confidence. The concentrations are not stable around the mean.

Date	GW Elevation
10/30/2013	176.17
3/11/2014	177.47
6/24/2014	178.37
11/6/2014	176.7
2/17/2015	177.62
5/21/2015	179.08
8/17/2015	177.59
5/3/2016	178.7
11/2/2016	177.2

Location	Date	Constituent	Result (ug/
50WW08	5/3/2016	Perchlorate	146
50WW08	11/2/2016	Perchlorate	126
50WW08	11/13/2017	Perchlorate	27
50WW08	11/13/2017	Perchlorate	25

Plot 119. LHAAP-50 Mann-Kendall - 50WW08 - Perchlorate (Bhate, 2018c)

Mann-Kendall Analysis - 50WW09 Lower Shallow

50WW09
Chemical: TCE
MCL: 5 µg/L

Date	Concentration (µg/L)
11/1/2013	0.26
3/14/2014	20.2
6/19/2014	36.3
11/12/2014	19.8
2/13/2015	57
5/23/2015	202
8/21/2015	235
11/11/2015	173
5/12/2016	154
11/3/2016	126

Date	11/1/2013	3/14/2014	6/19/2014	11/12/2014	2/13/2015	5/23/2015	8/21/2015	11/11/2015	5/12/2016	11/3/2016	Positive	Negative
data	0.26	20.2	36.3	19.8	57	202	235	173	154	126		
0.26	0	19.94	36.04	19.54	56.74	201.74	234.74	172.74	153.74	125.74	9	0
20.2		0.00	16.10	-0.40	36.80	181.80	214.80	152.80	133.80	105.80	7	1
36.3			0.00	-16.50	20.70	165.70	198.70	136.70	117.70	89.70	6	1
19.8				0.00	37.20	182.20	215.20	153.20	134.20	106.20	6	0
57					0.00	145.00	178.00	116.00	97.00	69.00	5	0
202						0.00	33.00	-29.00	-48.00	-76.00	1	3
235							0.00	-62.00	-81.00	-109.00	0	3
173								0.00	-19.00	-47.00	0	2
154									0.00	-28.00	0	1
126										0.00	0	0
											34	11

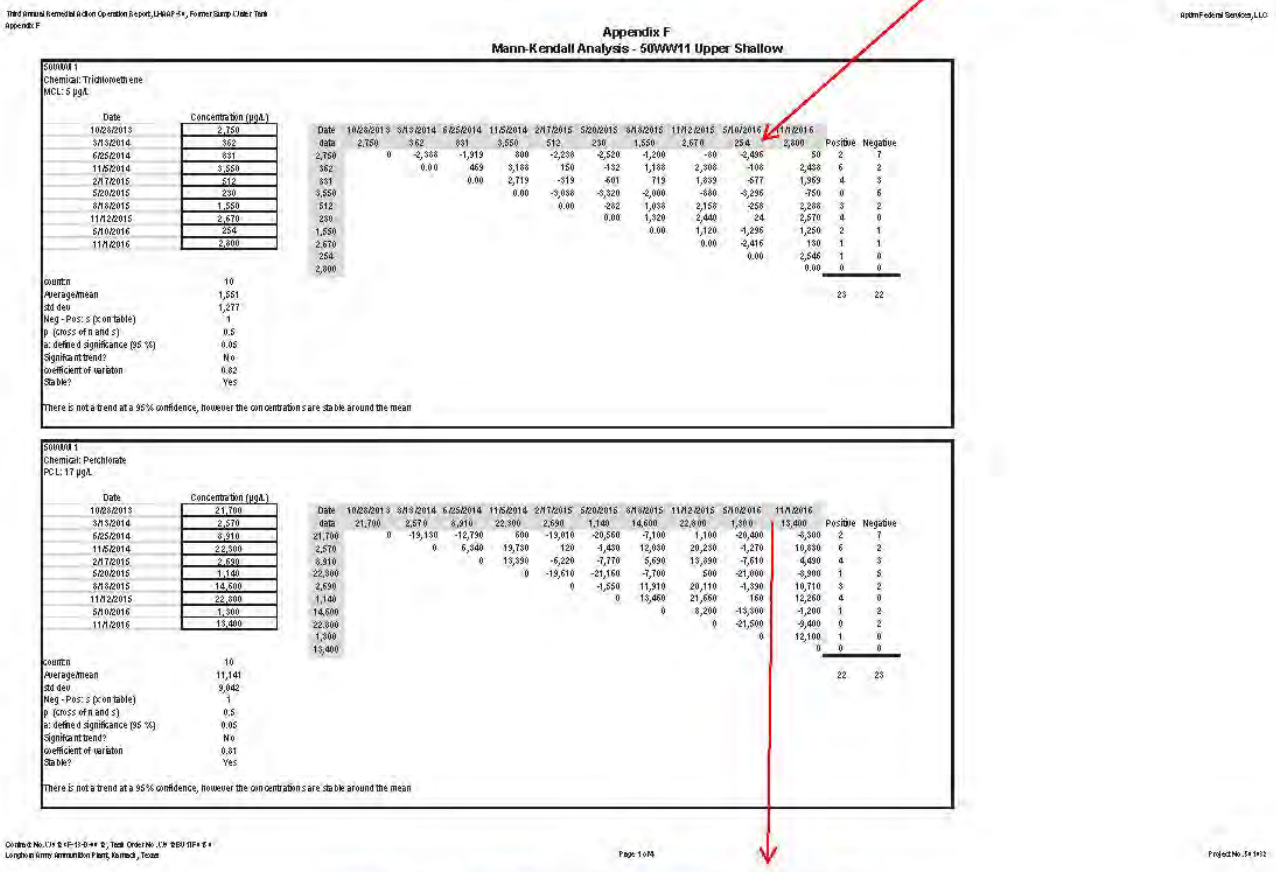
count:n	10.0
Average/mean	102.4
std dev	85.7
Neg - Pos: s (x on table)	23
p (cross of n and s)	0.023
a: defined significance (95%)	0.05
Significant trend?	Yes

Date	GW Elevation
11/1/2013	176.16
3/14/2014	179.38
6/19/2014	178.41
11/12/2014	176.76
2/13/2015	177.66
5/23/2015	179.19
8/21/2015	177.52
11/11/2015	176.45
5/12/2016	178.7
11/3/2016	177.2

Location	Date	Constituent	Result (ug/
50WW09	5/12/2016	Trichloroethene	154
50WW09	11/3/2016	Trichloroethene	126
50WW09	11/10/2017	Trichloroethene	4.9

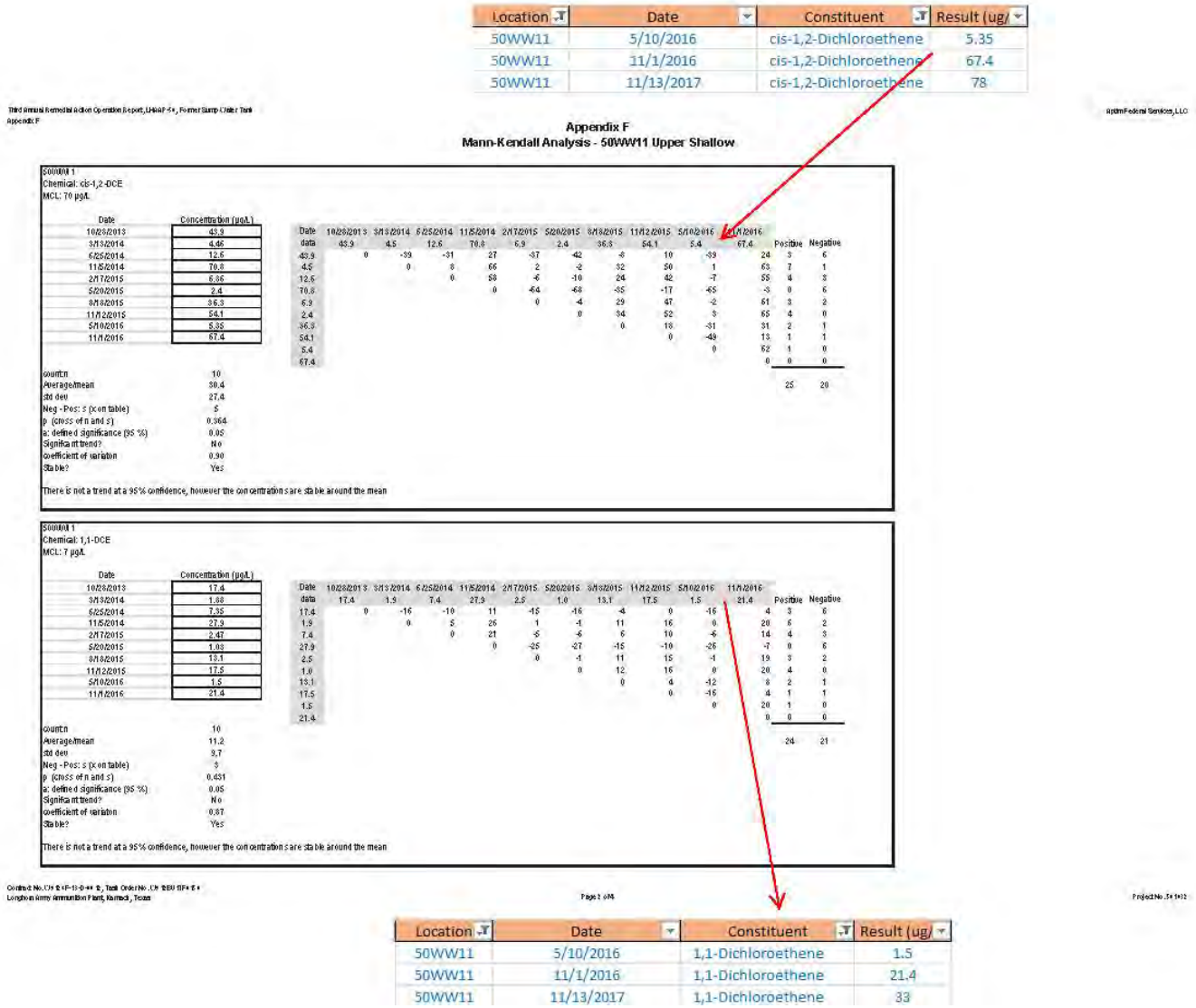
Plot 120. LHAAP-50 Mann-Kendall - 50WW09 - TCE (Bhate, 2018c).

Location	Date	Constituent	Result (ug/
50WW11	5/10/2016	Trichloroethene	254
50WW11	11/1/2016	Trichloroethene	2880
50WW11	11/13/2017	Trichloroethene	4700



50WW11	5/10/2016	Perchlorate	1300
50WW11	11/1/2016	Perchlorate	13400
50WW11	11/13/2017	Perchlorate	20000

Plot 121. LHAAP-50 Mann-Kendall - 50WW11 – TCE & Perchlorate (Bhate, 2018c).



Location	Date	Constituent	Result (ug/
50WW11	5/10/2016	cis-1,2-Dichloroethene	5.35
50WW11	11/1/2016	cis-1,2-Dichloroethene	67.4
50WW11	11/13/2017	cis-1,2-Dichloroethene	78

Appendix F
Mann-Kendall Analysis - 50WW11 Upper Shallow

50WW11
Chemical: cis-1,2-DCE
MCL: 70 µg/L

Date	Concentration (µg/L)
10/28/2013	43.9
3/13/2014	4.46
6/25/2014	12.6
11/5/2014	70.8
2/17/2015	6.86
5/20/2015	2.4
8/18/2015	36.3
11/12/2015	54.1
5/10/2016	5.35
11/1/2016	67.4

count:n	10
Average/mean	30.4
Std dev	27.4
Neg - Pos: s (x on table)	5
p (cross of n and s)	0.364
a: defined significance (95 %)	0.05
Significant trend?	No
Coefficient of variation	0.90
Stable?	Yes

There is not a trend at a 95% confidence, however the concentration s are stable around the mean

50WW11
Chemical: 1,1-DCE
MCL: 7 µg/L

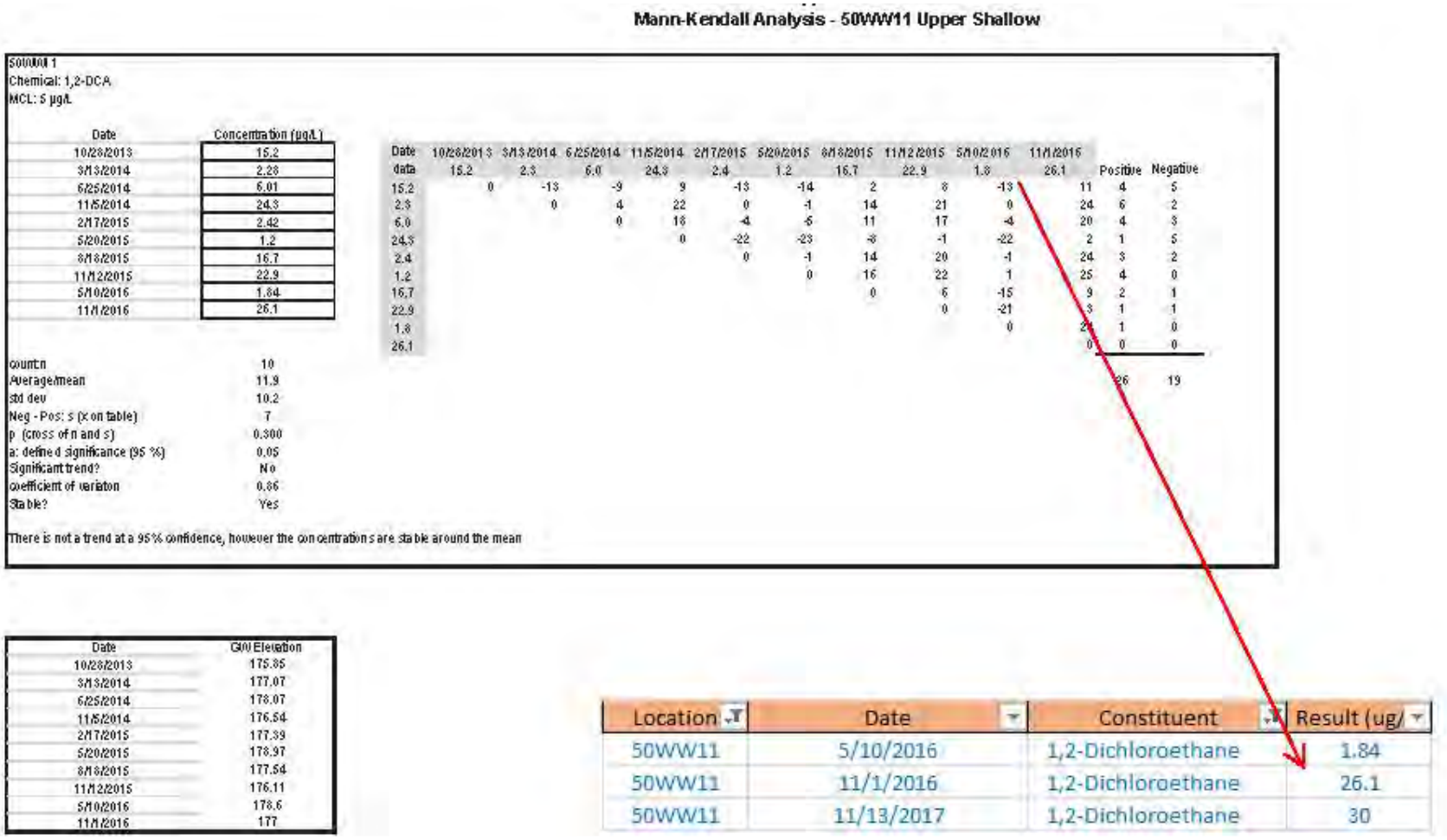
Date	Concentration (µg/L)
10/28/2013	17.4
3/13/2014	1.88
6/25/2014	7.35
11/5/2014	27.9
2/17/2015	2.47
5/20/2015	1.03
8/18/2015	13.1
11/12/2015	17.5
5/10/2016	1.5
11/1/2016	21.4

count:n	10
Average/mean	11.2
Std dev	9.7
Neg - Pos: s (x on table)	9
p (cross of n and s)	0.431
a: defined significance (95 %)	0.05
Significant trend?	No
Coefficient of variation	0.87
Stable?	Yes

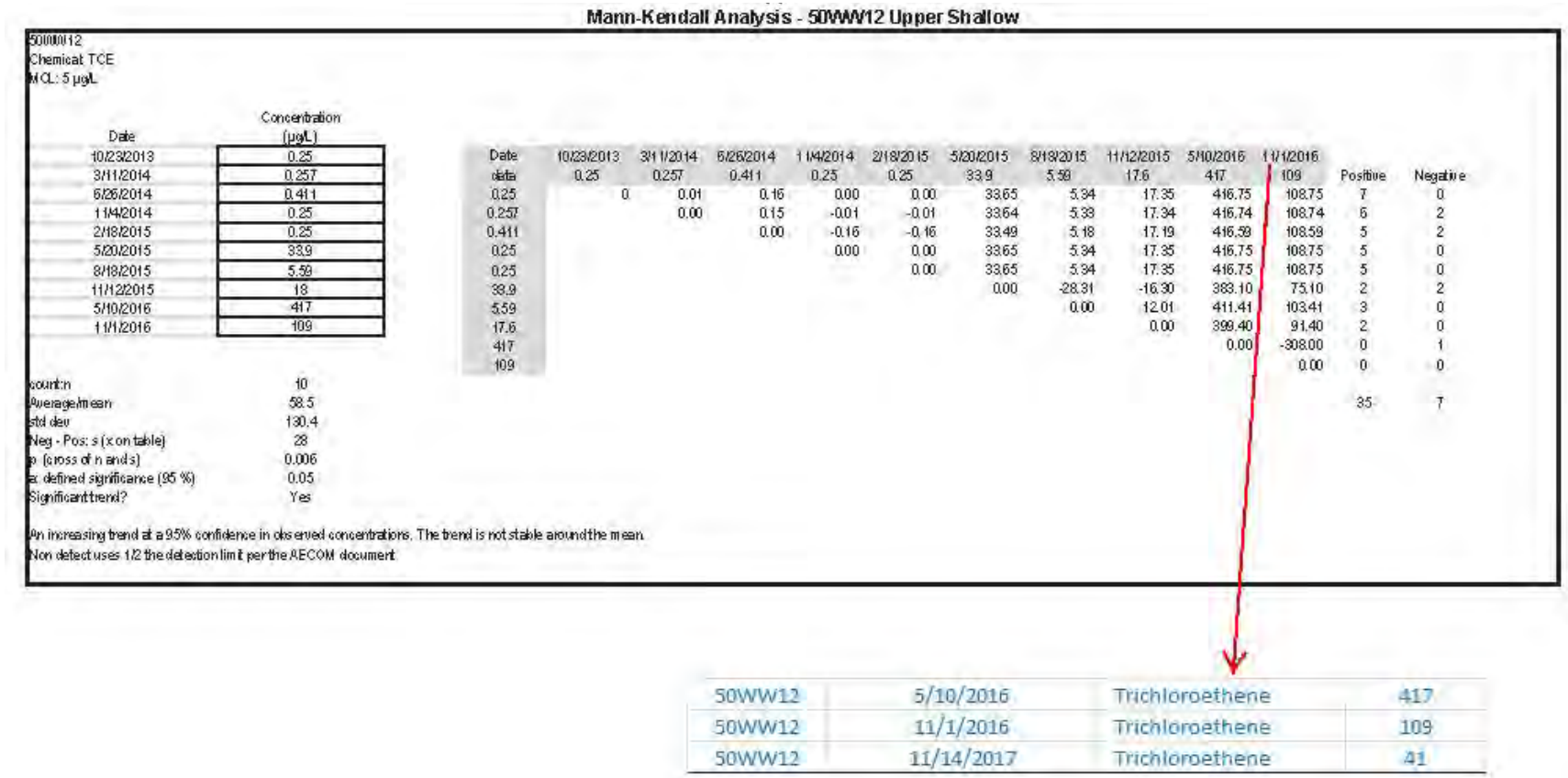
There is not a trend at a 95% confidence, however the concentration s are stable around the mean

Location	Date	Constituent	Result (ug/
50WW11	5/10/2016	1,1-Dichloroethene	1.5
50WW11	11/1/2016	1,1-Dichloroethene	21.4
50WW11	11/13/2017	1,1-Dichloroethene	33

Plot 122. LHAAP-50 Mann-Kendall - 50WW11 – Cis-DCE & 1,1-DCE (Bhate, 2018c).



Plot 123. LHAAP-50 Mann-Kendall - 50WW11 – 1,2-DCA (Bhate, 2018c).



Plot 124. LHAAP-50 Mann-Kendall - 50WW12 – TCE (Bhate, 2018c).

Mann-Kendall Analysis - 50WW12 Upper Shallow

50WW12
Chemical: Perchlorate
PCL: 17 µg/L

Date	Concentration (µg/L)
10/23/2013	23,600
3/11/2014	35,700
6/26/2014	35,500
11/4/2014	14,300
2/18/2015	30,600
5/20/2015	59,200
8/18/2015	17,300
11/12/2015	37,900
5/10/2016	87,800
11/1/2016	25,300

count: n	10
Average/mean	36,720
std dev	21,955
Neg - Pos: s (x on table)	9
p (cross of n and s)	0.242
α: defined significance (95 %)	0.05
Significant trend?	No
coefficient of variation	0.60
Stable?	Yes

There is not a trend at a 95% confidence, however the concentrations are stable around the mean.

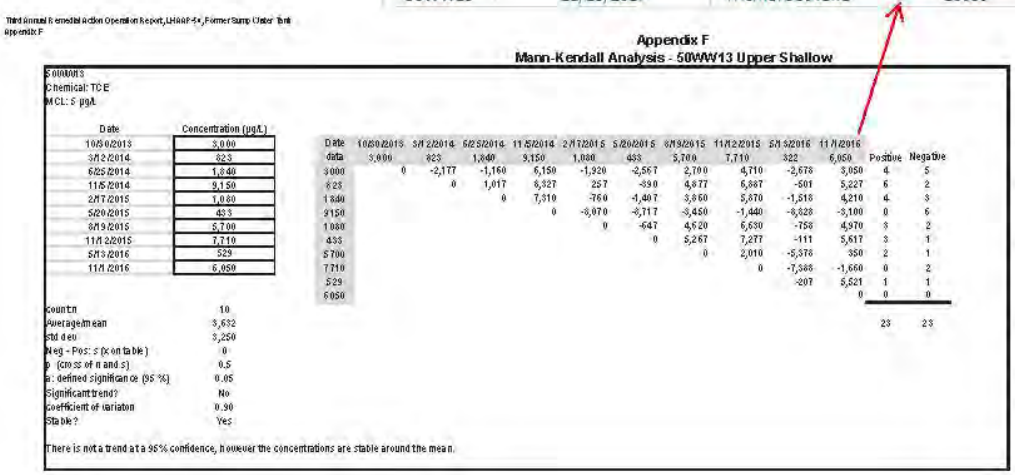
Date	10/23/2013	3/11/2014	6/26/2014	11/4/2014	2/18/2015	5/20/2015	8/18/2015	11/12/2015	5/10/2016	11/1/2016		
date	23,600	35,700	35,500	14,300	30,600	59,200	17,300	37,900	87,800	25,300	Positive	Negative
23,600	0	12,100	11,900	-9,300	7,000	35,600	-6,300	14,300	64,200	1,700	7	2
35,700		0	-200	-21,400	-5,100	23,500	-18,400	2,200	52,100	-10,400	3	5
35,500			0	-21,200	-4,900	23,700	-18,200	2,400	52,300	-10,200	3	4
14,300				0	16,300	44,900	3,000	23,600	73,500	11,000	6	0
30,600					0	28,600	-13,300	7,300	57,200	-5,300	3	2
59,200						0	-41,900	-21,300	28,600	-33,900	1	3
17,300							0	20,600	70,500	8,000	3	0
37,900								0	49,900	-12,600	1	1
87,800									0	-62,500	0	1
25,300										0	0	0
											27	18

Date	GW Elevation
10/23/2013	175.65
3/11/2014	177.06
6/26/2014	177.76
11/4/2014	176.39
2/18/2015	176.98
5/20/2015	178.71
8/18/2015	177.16
11/12/2015	175.99
5/10/2016	178.2
11/1/2016	176.8

50WW12	5/10/2016	Perchlorate	87800
50WW12	11/1/2016	Perchlorate	25300
50WW12	11/14/2017	Perchlorate	21000

Plot 125. LHAAP-50 Mann-Kendall - 50WW12 – Perchlorate (Bhate, 2018c).

50WW13	5/13/2016	Trichloroethene	322
50WW13	5/13/2016	Trichloroethene	529
50WW13	11/1/2016	Trichloroethene	6050
50WW13	11/13/2017	Trichloroethene	13000



Appendix F
Mann-Kendall Analysis - 50WW13 Upper Shallow

50WW13
Chemical: TCE
MCL: 5 µg/L

Date	Concentration (µg/L)
10/30/2013	3,000
3/12/2014	823
6/25/2014	1,840
11/5/2014	9,150
2/17/2015	1,080
5/20/2015	433
8/19/2015	5,700
11/12/2015	7,710
5/13/2016	529
11/1/2016	6,050

Date	10/30/2013	3/12/2014	6/25/2014	11/5/2014	2/17/2015	5/20/2015	8/19/2015	11/12/2015	5/13/2016	11/1/2016	Positive	Negative
data	3,000	823	1,840	9,150	1,080	433	5,700	7,710	322	6,050		
3000		0	-2,177	-1,160	6,150	-1,920	-2,567	2,700	4,710	-2,678	3,050	4	5
823			0	1,017	6,327	257	-390	4,877	6,887	-501	5,227	6	2
1840				0	7,510	-760	-1,407	3,860	5,870	-1,518	4,210	4	3
9150					0	-8,070	-8,717	-5,450	-1,440	-8,028	-5,100	0	6
1080						0	-647	4,620	6,630	-758	4,970	3	2
433							0	5,267	7,277	-111	5,617	3	1
5700								0	2,010	-5,378	350	2	1
7710									0	-7,388	-1,660	0	2
529										-207	5,521	1	1
6050											0	0	0
												23	23

Count n	10
Average/mean	3,632
Std dev	3,250
Neg - Pos: s (from table)	0
p (cross of n and s)	0.5
α: defined significance (95 %)	0.05
Significant trend?	No
Coefficient of variation	0.90
Stable?	Yes

There is not a trend at a 95% confidence, however the concentrations are stable around the mean.

Given the oscilation of TCE concentrations increasing as groundwater increases and vice versa, and given the increase in peak concentration in 2017 to level > 1%solubility, visually temporal changes in TCE indicates an increasing trend. However, the 2017 results posted in the data base is a suspect as TCE and Perchlorate concentrations are identical = 13000 ppb.

50WW13
Chemical: Perchlorate
PCL: 17 µg/L

Date	Concentration (µg/L)
10/30/2013	14.7
3/12/2014	510
6/25/2014	3,110
11/5/2014	11,700
2/17/2015	648
5/20/2015	126
8/19/2015	9,300
11/12/2015	11,400
5/13/2016	493
11/1/2016	8,650

Date	10/30/2013	3/12/2014	6/25/2014	11/5/2014	2/17/2015	5/20/2015	8/19/2015	11/12/2015	5/13/2016	11/1/2016	Positive	Negative
data	15	510	3,110	11,700	648	126	9,300	11,400	493	8,650		
15		0	495	3,095	11,685	633	111	9,285	11,385	478	8,635	9	0
510			0	2,600	11,190	138	-384	8,790	10,890	-17	8,140	6	2
3,110				0	8,590	-2,462	-2,984	6,190	8,290	-2,617	5,540	4	3
11,700					0	-11,052	-11,574	-2,400	-300	-11,207	-3,050	0	6
648						0	-522	8,652	10,752	-155	8,002	3	2
126							0	9,174	11,274	367	8,524	4	0
9,300								0	2,100	-8,807	-650	1	2
11,400									0	-10,907	-2,750	0	2
493										0	8,157	1	0
8,650											0	0	0
												28	17

Count n	10
Average/mean	4,595
Std dev	5,029
Neg - Pos: s (from table)	11
p (cross of n and s)	0.242
α: defined significance (95 %)	0.05
Significant trend?	No
Coefficient of variation	1.09
Stable?	No

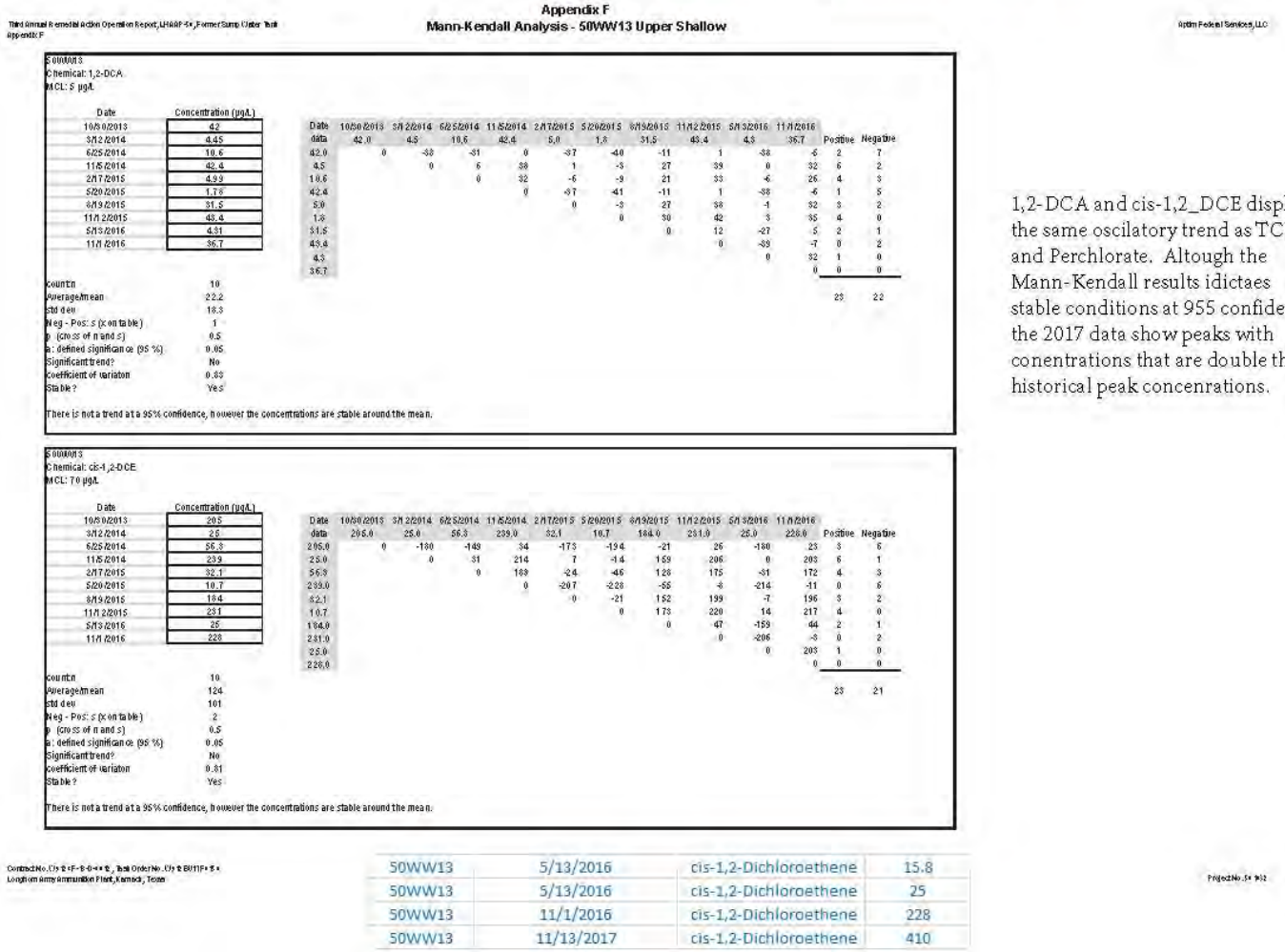
There is not a trend at a 95% confidence. The concentrations are not stable around the mean.

Perchlorate concentrations oscilate with groundwater elevations increasing as water level decrease and vice versa

50WW13	5/13/2016	Perchlorate	256
50WW13	5/13/2016	Perchlorate	493
50WW13	11/1/2016	Perchlorate	8650
50WW13	11/13/2017	Perchlorate	13000

Plot 126. LHAAP-50 Mann-Kendall - 50WW13 – TCE & Perchlorate (Bhate, 2018c).

50WW13	5/13/2016	1,2-Dichloroethane	2.24
50WW13	5/13/2016	1,2-Dichloroethane	4.31
50WW13	11/1/2016	1,2-Dichloroethane	36.7
50WW13	11/13/2017	1,2-Dichloroethane	83



Appendix F
Mann-Kendall Analysis - 50WW13 Upper Shallow

50WW13
Chemical: 1,2-DCA
MCL: 5 µg/L

Date	Concentration (µg/L)
10/30/2013	42
3/12/2014	4.45
6/25/2014	10.6
11/5/2014	42.4
2/17/2015	4.99
5/20/2015	1.78
8/19/2015	31.5
11/12/2015	43.4
5/13/2016	4.31
11/1/2016	36.7

count:n	10
Average/mean	22.2
Std dev	18.3
Neg - Pos: s (x on table)	1
p (cross of n and s)	0.5
a: defined significance (95 %)	0.05
Significant trend?	No
Coefficient of variation	0.83
Stable?	Yes

There is not a trend at a 95% confidence, however the concentrations are stable around the mean.

Date	10/30/2013	3/12/2014	6/25/2014	11/5/2014	2/17/2015	5/20/2015	8/19/2015	11/12/2015	5/13/2016	11/1/2016	Positive	Negative
data	42.0	4.5	10.6	42.4	5.0	1.8	31.5	43.4	4.3	36.7		
42.0	0	-38	-31	0	-37	-40	-11	1	-38	-6	2	7
4.5		0	6	38	1	-3	27	39	0	32	6	2
10.6			0	32	-6	-9	21	33	-6	26	4	3
42.4				0	-37	-41	-11	1	-38	-6	1	5
5.0					0	-3	27	38	-1	32	3	2
1.8						0	30	42	3	35	4	0
31.5							0	12	-27	-5	2	1
43.4								0	-39	-7	0	2
4.3									0	32	1	0
36.7										0	0	0
											23	22

50WW13
Chemical: cis-1,2-DCE
MCL: 70 µg/L

Date	Concentration (µg/L)
10/30/2013	205
3/12/2014	25
6/25/2014	56.3
11/5/2014	239
2/17/2015	32.1
5/20/2015	10.7
8/19/2015	184
11/12/2015	231
5/13/2016	25
11/1/2016	228

count:n	10
Average/mean	124
Std dev	101
Neg - Pos: s (x on table)	2
p (cross of n and s)	0.5
a: defined significance (95 %)	0.05
Significant trend?	No
Coefficient of variation	0.81
Stable?	Yes

There is not a trend at a 95% confidence, however the concentrations are stable around the mean.

Date	10/30/2013	3/12/2014	6/25/2014	11/5/2014	2/17/2015	5/20/2015	8/19/2015	11/12/2015	5/13/2016	11/1/2016	Positive	Negative
data	205.0	25.0	56.3	239.0	32.1	10.7	184.0	231.0	25.0	228.0		
205.0	0	-180	-149	34	-173	-194	-21	26	-180	23	3	6
25.0		0	31	214	7	-14	159	206	0	203	6	1
56.3			0	183	-24	-46	128	175	-31	172	4	3
239.0				0	-207	-228	-55	-8	-214	-11	0	5
32.1					0	-21	152	199	-7	196	3	2
10.7						0	173	220	14	217	4	0
184.0							0	47	-159	44	2	1
231.0								0	-206	-3	0	2
25.0									0	203	1	0
228.0										0	0	0
											23	21

1,2-DCA and cis-1,2_DCE display the same oscilatory trend as TCE and Perchlorate. Altough the Mann-Kendall results idictaes stable conditions at 955 confidence the 2017 data show peaks with conentrations that are double the historical peak concenrations.

50WW13	5/13/2016	cis-1,2-Dichloroethene	15.8
50WW13	5/13/2016	cis-1,2-Dichloroethene	25
50WW13	11/1/2016	cis-1,2-Dichloroethene	228
50WW13	11/13/2017	cis-1,2-Dichloroethene	410

Plot 127. LHAAP-50 Mann-Kendall - 50WW13 – 1,2-DCE & cis-1,2 DCE (Bhate, 2018c).

Mann-Kendall Analysis - 50WW14 Lower Shallow

50WW14
Chemical: TCE
MCL: 5 µg/L

Date	Concentration (µg/L)
10/28/2013	93.8
3/12/2014	37.4
6/25/2014	21.9
11/5/2014	26.7
2/17/2015	9.14
5/20/2015	6.05
8/19/2015	12
11/12/2015	5.78
5/3/2016	1.75
11/12/2016	10.9

count: n	10
Average/mean	22.5
std dev	27.3
Neg - Pos: s (x on table)	31
p (cross of n and s)	0.002
α: defined significance (95 %)	0.05
Significant trend?	Yes

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	11/12/2016	Positive	Negative
data	93.8	37.4	21.9	26.7	9.14	6.05	12	5.78	1.75	10.9		
93.8	0	-56.40	-71.90	-67.10	-84.66	-87.75	-81.80	-88.02	-92.05	-82.90	0	9
37.4		0.00	-15.50	-10.70	-28.26	-31.35	-25.40	-31.62	-35.65	-26.50	0	8
21.9			0.00	4.80	-12.76	-15.85	-9.90	-16.12	-20.15	-11.00	1	6
26.7				0.00	-17.56	-20.65	-14.70	-20.92	-24.95	-15.80	0	6
9.14					0.00	-3.09	2.86	-3.36	-7.39	1.76	2	3
6.05						0.00	5.95	-0.27	-4.30	4.85	2	2
12							0.00	-6.22	-10.25	-1.10	0	3
5.78								0.00	-4.03	5.12	1	1
1.75									0.00	9.15	1	0
10.9										0.00	0	0
											7	38

A decreasing trend at a 95% confidence in observed concentrations, but the trend is not stable around the mean.

Date	GW Elevation
10/28/2013	175.89
3/12/2014	177.04
6/25/2014	177.94
11/5/2014	176.6
2/17/2015	177.34
5/20/2015	178.94
8/19/2015	177.35
11/12/2015	176.09
5/3/2016	178.5
11/12/2016	177

50WW14	5/3/2016	Trichloroethene	1.75
50WW14	11/1/2016	Trichloroethene	10.9
50WW14	11/13/2017	Trichloroethene	8.2

Plot 128. LHAAP-50 Mann-Kendall - 50WW14 – TCE (Bhate, 2018c).

Mann-Kendall Analysis - 50WW15 Upper Shallow

50WW15
Chemical: TCE
MCL: 5 µg/L

Date	Concentration (µg/L)
10/25/2013	17.3
3/17/2014	22.5
6/19/2014	18.9
11/7/2014	35.4
2/12/2015	48.3
5/23/2015	13
8/20/2015	15.2
11/11/2015	8.2
5/12/2016	5.32
11/2/2016	9.52

Date	10/25/2013	3/17/2014	6/19/2014	11/7/2014	2/12/2015	5/23/2015	8/20/2015	11/11/2015	5/12/2016	11/2/2016	Positive	Negative
data	17.3	22.5	18.9	35.4	48.3	13	15.2	8.2	5.32	9.52		
17.3	0	5.20	1.60	18.10	31.00	-4.30	-2.10	-9.10	-11.98	-7.78	4	5
22.5		0.00	-4.60	11.90	24.80	-10.50	-8.30	-15.30	-18.18	-13.58	2	6
18.9			0.00	16.50	29.40	-5.90	-3.70	-10.70	-13.58	-9.38	2	5
35.4				0.00	12.90	-22.40	-20.20	-27.20	-30.08	-25.88	1	5
48.3					0.00	-35.30	-33.10	-40.10	-42.98	-38.78	0	5
13						0.00	2.20	-4.80	-7.68	-3.48	1	3
15.2							0.00	-7.00	-9.88	-5.68	0	3
8.2								0.00	-2.88	1.32	1	1
5.32									0.00	4.20	1	0
9.52										0.00	0	0
											12	33

count n	10
Average/mean	19.5
std dev	13.3
Neg - Pos s (positive)	21
p (circle of n and s)	0.036
α defined significance (95 %)	0.05
Significant trend?	Yes

A decreasing trend at a 95% confidence is observed and the trend is stable around the mean.

Date	GW Elevation
10/25/2013	175.99
3/17/2014	177.47
6/19/2014	178.45
11/7/2014	176.68
2/12/2015	177.56
5/23/2015	179.25
8/20/2015	177.47
11/11/2015	176.46
5/12/2016	177.6
11/2/2016	177.1

Plot 129. LHAAP-50 Mann-Kendall - 50WW15 – TCE (Bhate, 2018c).

Mann-Kendall Analysis - 50WW24 Upper Shallow

50WW24
Chemical: Perchlorate
PQL: 17 ug/L

Date	Concentration (ug/L)
10/29/2013	0.479
3/26/2014	0.1 U
6/26/2014	110
11/4/2014	0.1 U
2/18/2015	0.1 U
5/28/2015	0.1 U
8/17/2015	0.1 U
11/16/2015	0.5 U
5/10/2016	36.8
11/2/2016	0.1

Count n	10
Average/mean	14.8
Std dev	35.4
Neg - Pos = (s on table)	0
p: (cross ref n and s)	0.536
α: defined significance (95 %)	0.05
Significant trend?	No
Coefficient of variation	2.38
Stable?	No

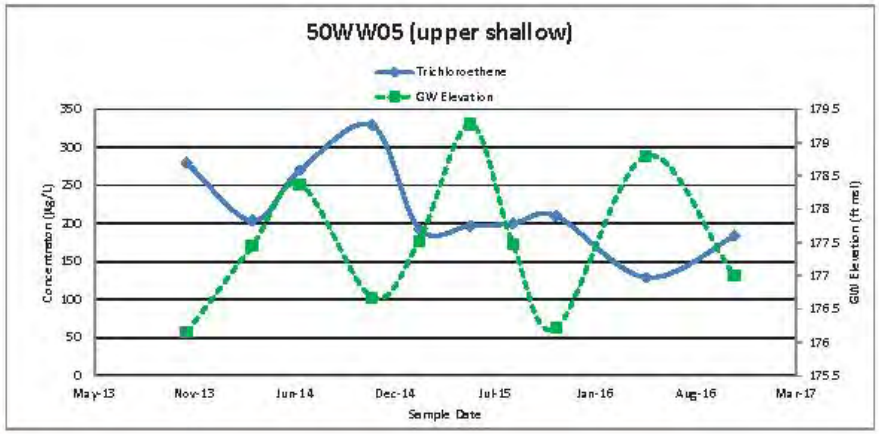
Date	10/29/2013	3/26/2014	6/26/2014	11/4/2014	2/18/2015	5/28/2015	8/17/2015	11/16/2015	5/10/2016	11/2/2016	Positive	Negative
Data	0.479	0.1	110	0.1	0.1	0.1	0.1	0.5	36.8	0.1		
0.479	0	-0.38	109.52	-0.38	-0.38	-0.38	-0.38	0.02	36.32	-0.38	3	6
0.1		0.00	109.90	0.00	0.00	0.00	0.00	0.40	36.70	0.00	3	0
110			0.00	-109.90	-109.90	-109.90	-109.90	-109.50	-73.20	-109.90	0	7
0.1				0.00	0.00	0.00	0.00	0.40	36.70	0.00	2	0
0.1					0.00	0.00	0.00	0.40	36.70	0.00	2	0
0.1						0.00	0.00	0.40	36.70	0.00	2	0
0.1							0.00	0.40	36.70	0.00	2	0
0.5								0.00	36.30	-0.40	1	1
36.8									0.00	-36.70	0	1
0.1										0.00	0	0
											15	15

There is not a trend at a 95% confidence. The concentrations are not stable around the mean.
Non detect uses 1/2 the detection limit per the AECOM document

Date	GW Elevation
10/29/2013	176.78
3/26/2014	176.93
6/26/2014	177.71
11/4/2014	176.42
2/18/2015	177.68
5/28/2015	176.35
8/17/2015	177.35
11/16/2015	176.24
5/10/2016	178.1
11/2/2016	176.9

Plot 130. LHAAP-50 Mann-Kendall - 50WW15 – Perchlorate (Bhate, 2018c).

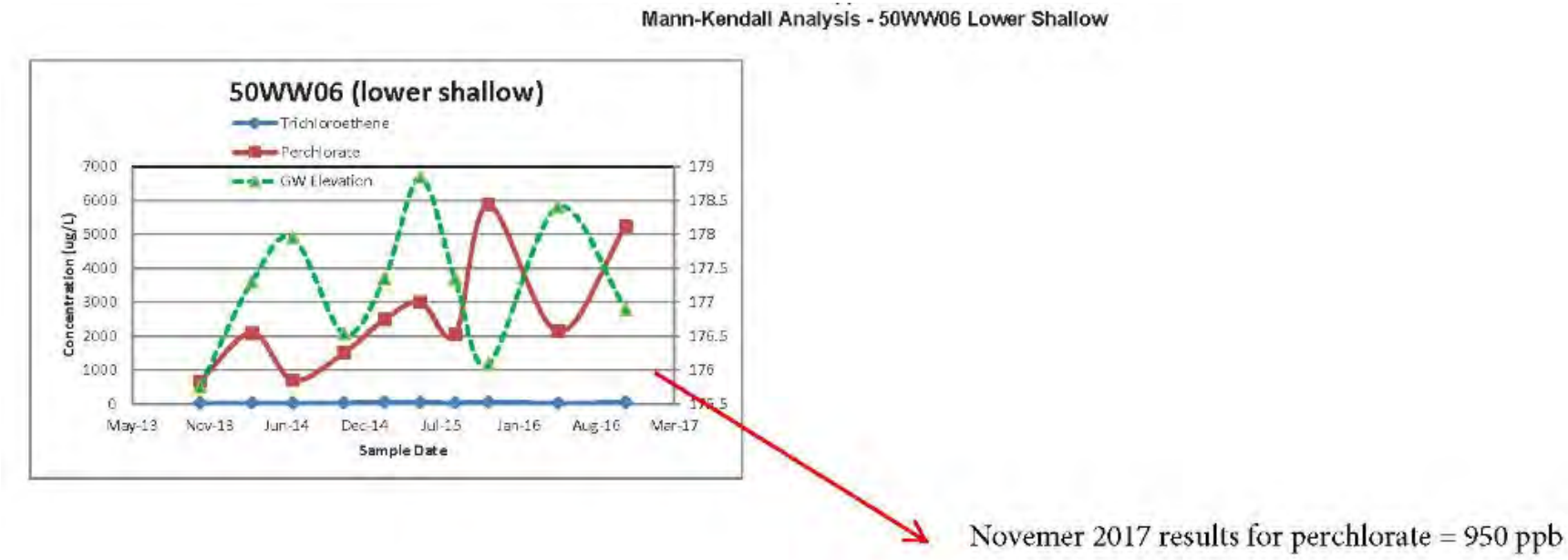
Mann-Kendall Analysis - 50WW05 Upper Shallow



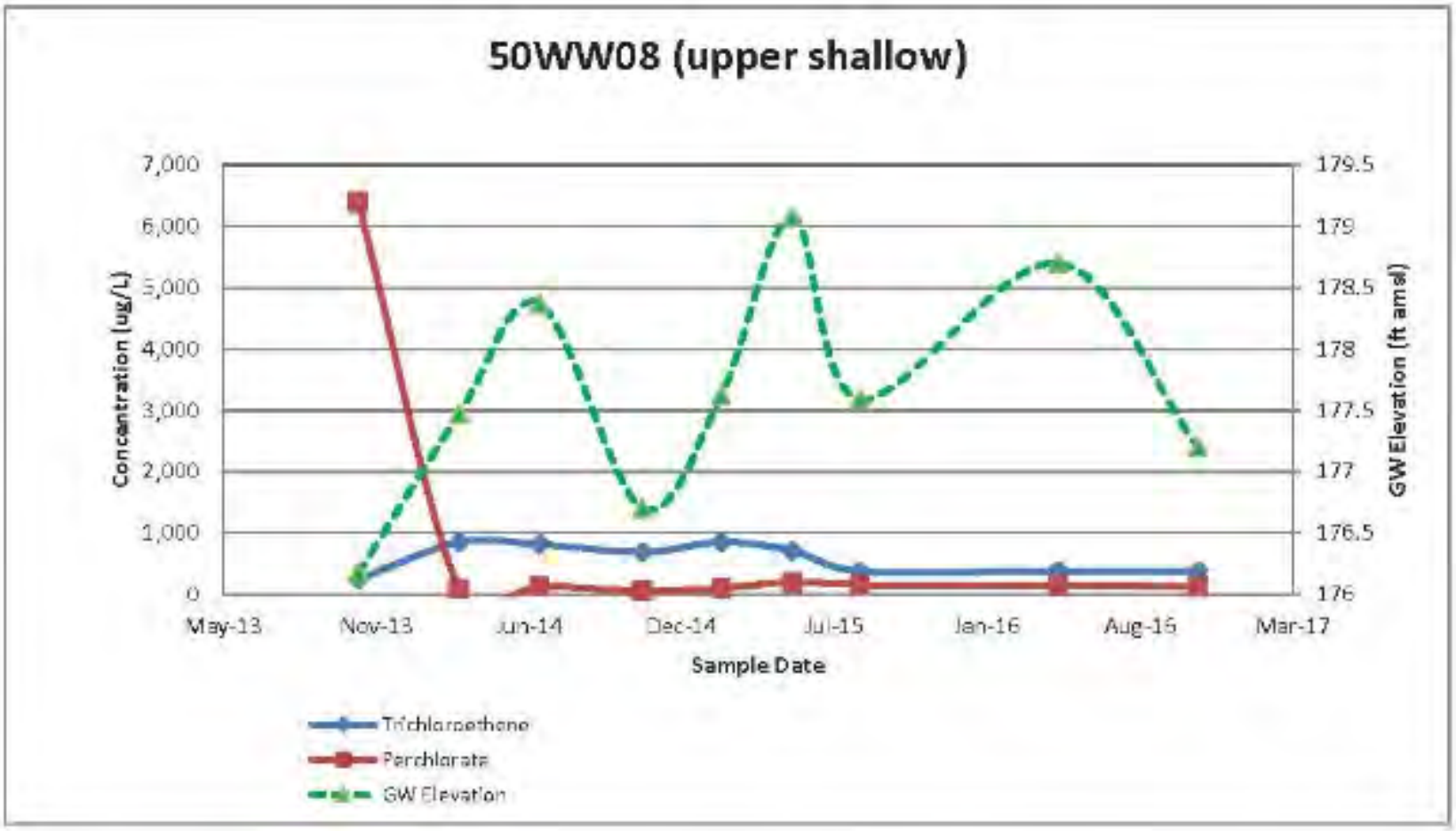
Location	Date	Constituent	Result (ug/	Code
50WW05	23-Feb-07	Perchlorate	27.8	
50WW05	21-Sep-02	Perchlorate	5850	
50WW05	11-May-05	PERCHLORATE	804	R
50WW05	11-May-05	PERCHLORATE	719	
50WW05	4-Apr-09	Perchlorate	0.44	U
50WW05	5-Aug-10	PERCHLORATE	0.189	J
50WW05	5/11/2016	Perchlorate	0.134	J
50WW05	5/11/2016	Perchlorate	0.276	J
50WW05	11/3/2016	Perchlorate	0.2	U
50WW05	11/10/2017	Perchlorate	4	U
50WW05	11/10/2017	Perchlorate	4	U

50WW05	23-Feb-07	trichloroethene	Unknown
50WW05	23-Feb-07	trichloroethene	1460
50WW05	23-Feb-07	trichloroethene	Unknown
50WW05	11-May-05	TRICHLOROETHENE	1920
50WW05	11-May-05	TRICHLOROETHENE	3130
50WW05	4-Apr-09	TRICHLOROETHENE	601
50WW05	5-Aug-10	TRICHLOROETHENE	788
50WW05	5/11/2016	Trichloroethene	129
50WW05	5/11/2016	Trichloroethene	128
50WW05	11/3/2016	Trichloroethene	184
50WW05	11/10/2017	Trichloroethene	180
50WW05	11/10/2017	Trichloroethene	160

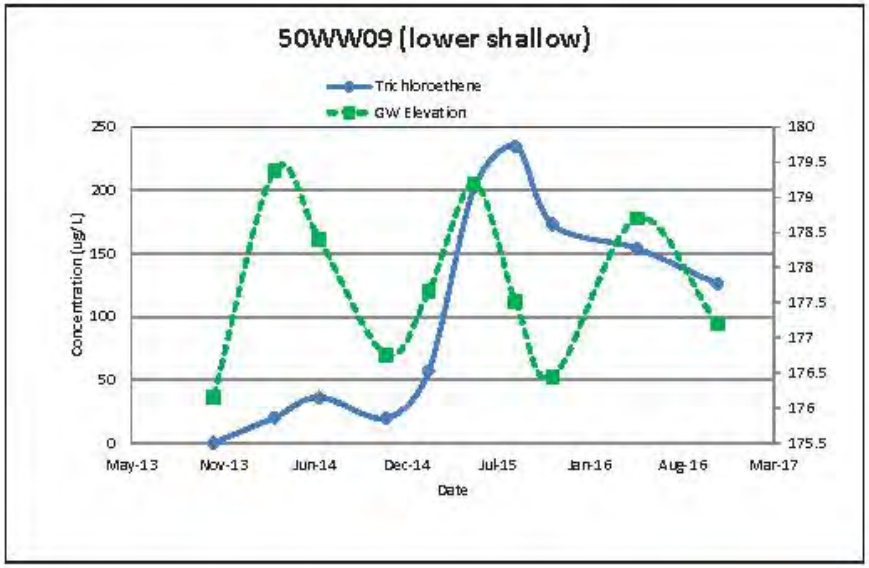
Plot 131. LHAAP-50 trend plot of COCs concentrations & groundwater elevations - 50WW05 – TCE (Bhate, 2018c).



Plot 132. LHAAP-50 trend plot of COCs concentrations & groundwater elevations - 50WW06 – TCE & Perchlorate (Bhate, 2018c).

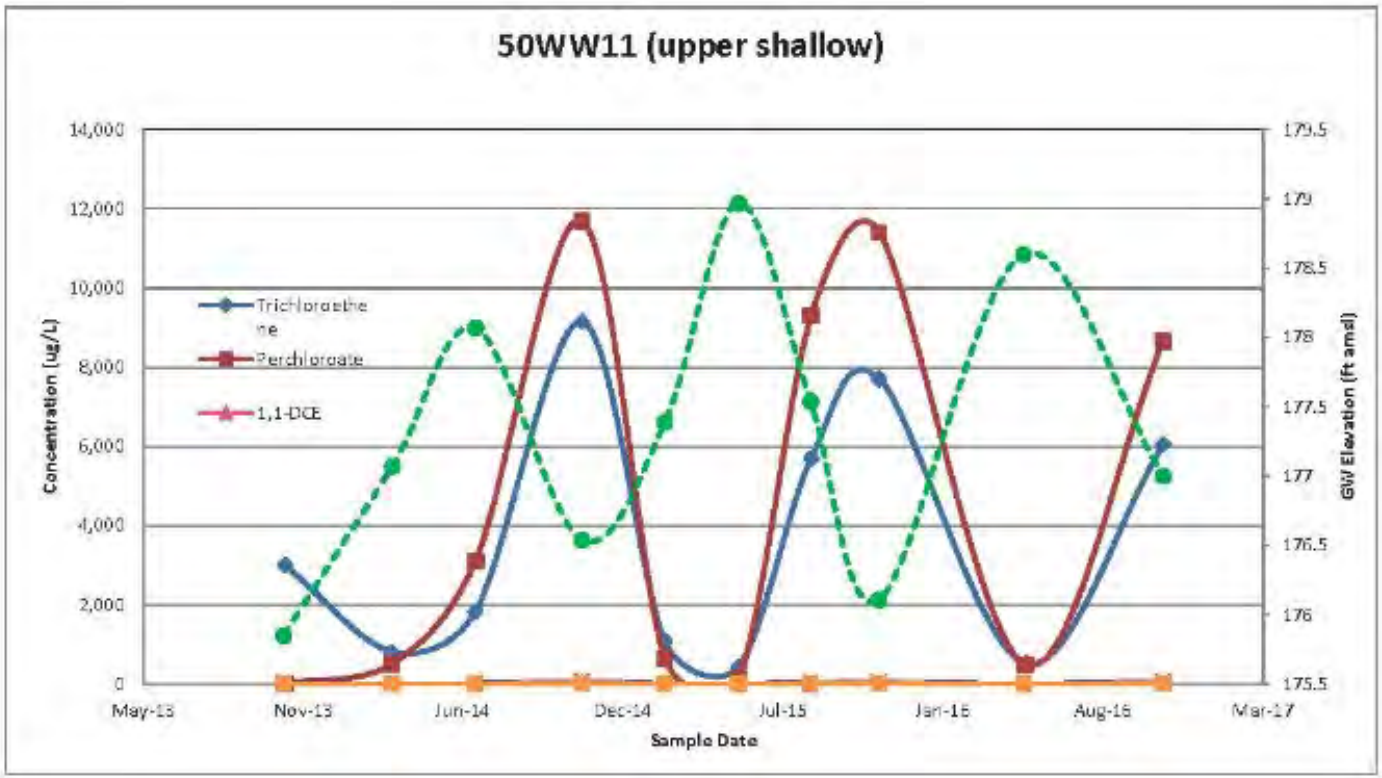


Plot 133. LHAAP-50 trend plot of COCs concentrations & groundwater elevations - 50WW08 – TCE & Perchlorate (Bhate, 2018c).

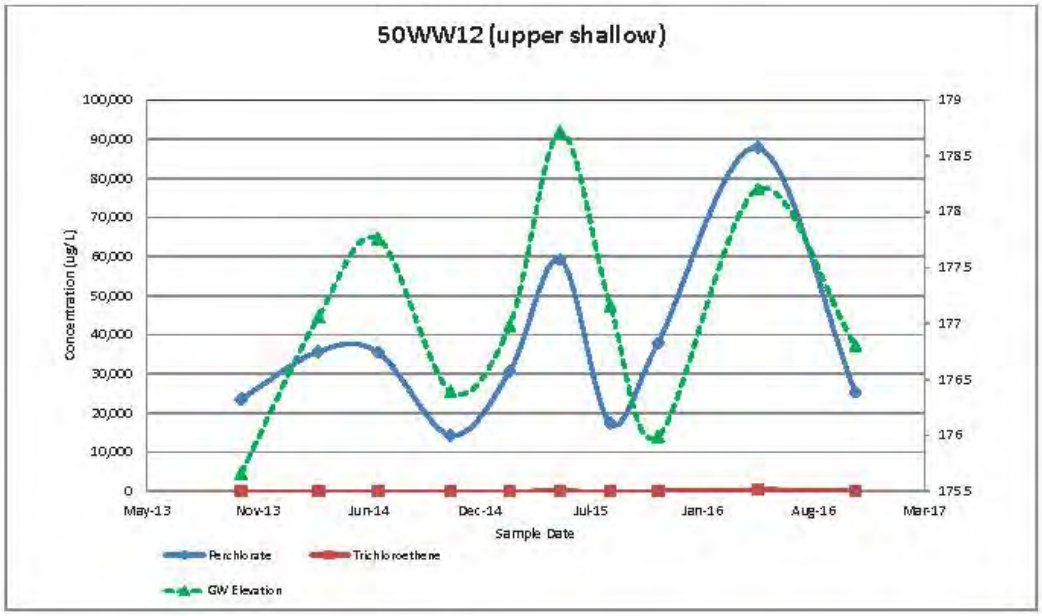


Location	Date	Constituent	Result (ug/
50WW09	5/12/2016	Trichloroethene	154
50WW09	11/3/2016	Trichloroethene	126
50WW09	11/10/2017	Trichloroethene	4.9

Plot 134. LHAAP-50 trend plot of COCs concentrations & groundwater elevations - 50WW09 – TCE (Bhate, 2018c).



Plot 135. LHAAP-50 trend plot of COCs concentrations & groundwater elevations - 50WW11 – TCE, Perchlorate, and 1,1-DCE (Bhate, 2018c).



Although Mann-Kendall indicates that Perchlorate is stable the trend of the peak concentration appears to increase with time.

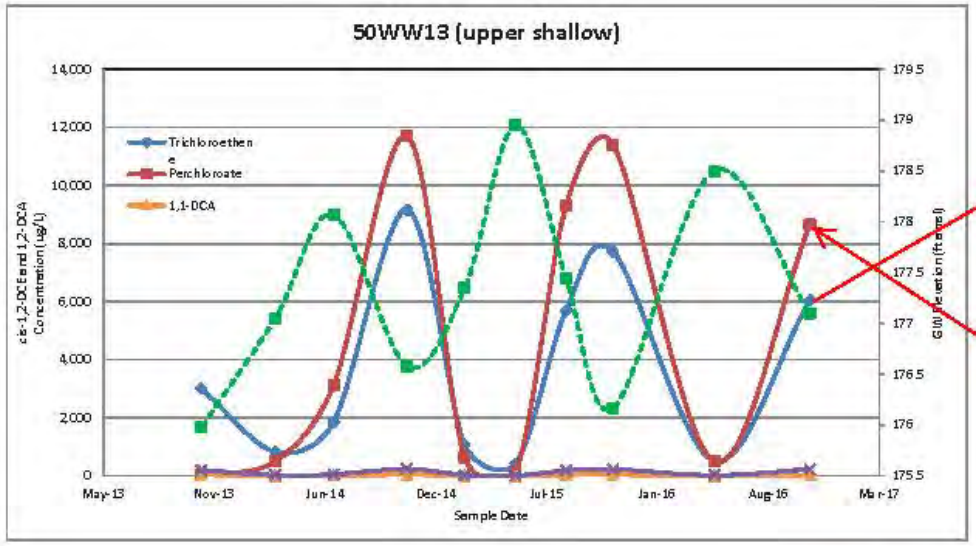
50WW12	5/10/2016	Trichloroethene	417
50WW12	11/1/2016	Trichloroethene	109
50WW12	11/14/2017	Trichloroethene	41

50WW12	5/10/2016	Perchlorate	87800
50WW12	11/1/2016	Perchlorate	25300
50WW12	11/14/2017	Perchlorate	21000

Plot 136. LHAAP-50 trend plot of COCs concentrations & groundwater elevations - 50WW12 – TCE & Perchlorate (Bhate, 2018c).

Date	GW Elevation
10/30/2013	175.98
3/12/2014	177.05
6/25/2014	176.07
11/5/2014	176.58
2/17/2015	177.35
5/20/2015	176.95
8/19/2015	177.45
11/12/2015	176.17
5/13/2016	178.5
11/1/2016	177.1

50WW13	5/13/2016	Trichloroethene	322
50WW13	5/13/2016	Trichloroethene	529
50WW13	11/1/2016	Trichloroethene	6050
50WW13	11/13/2017	Trichloroethene	13000

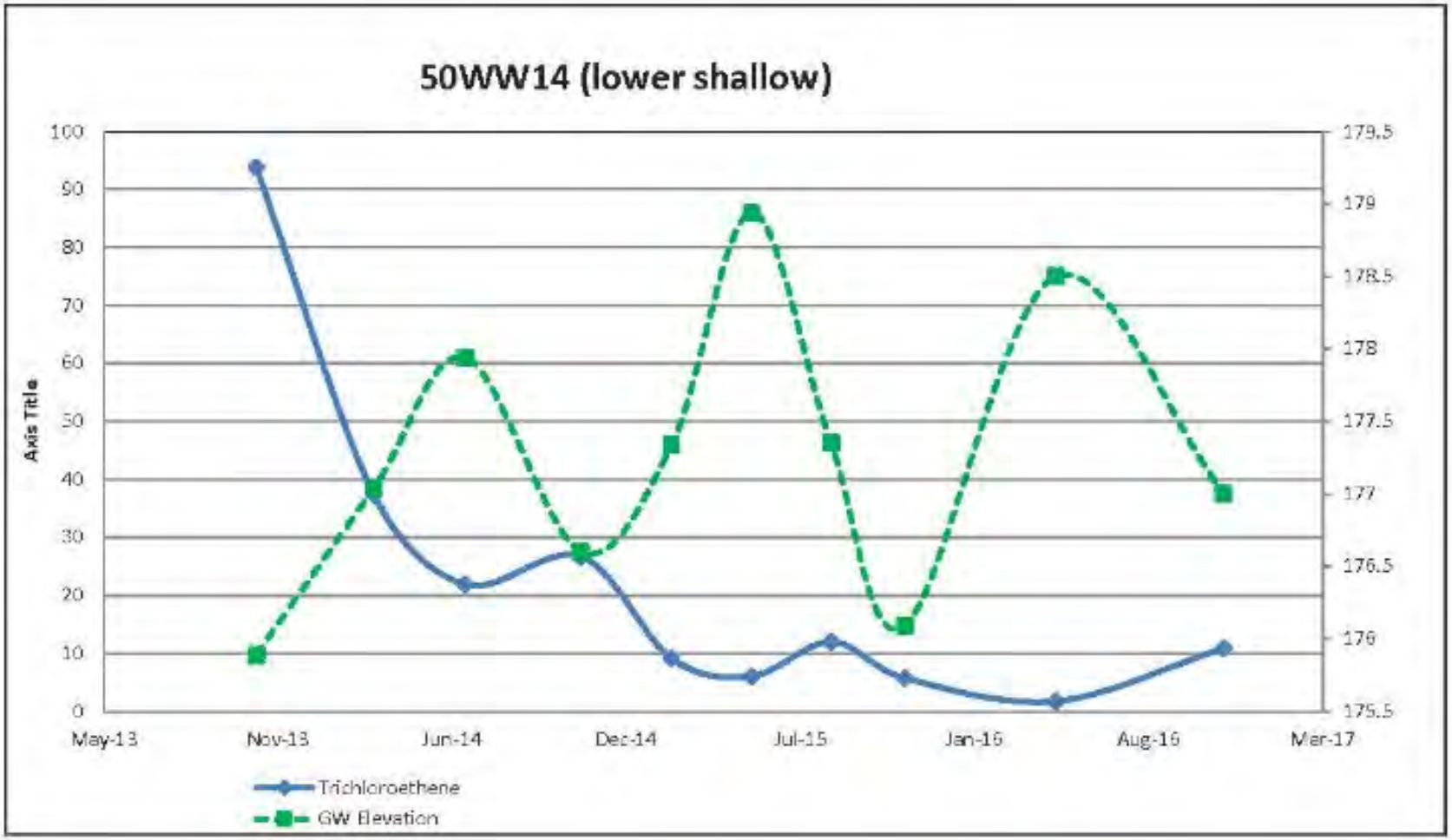


TCE concentration > 1% solubility (of 1000 ppm) which may indicate that DNAPL may be present.

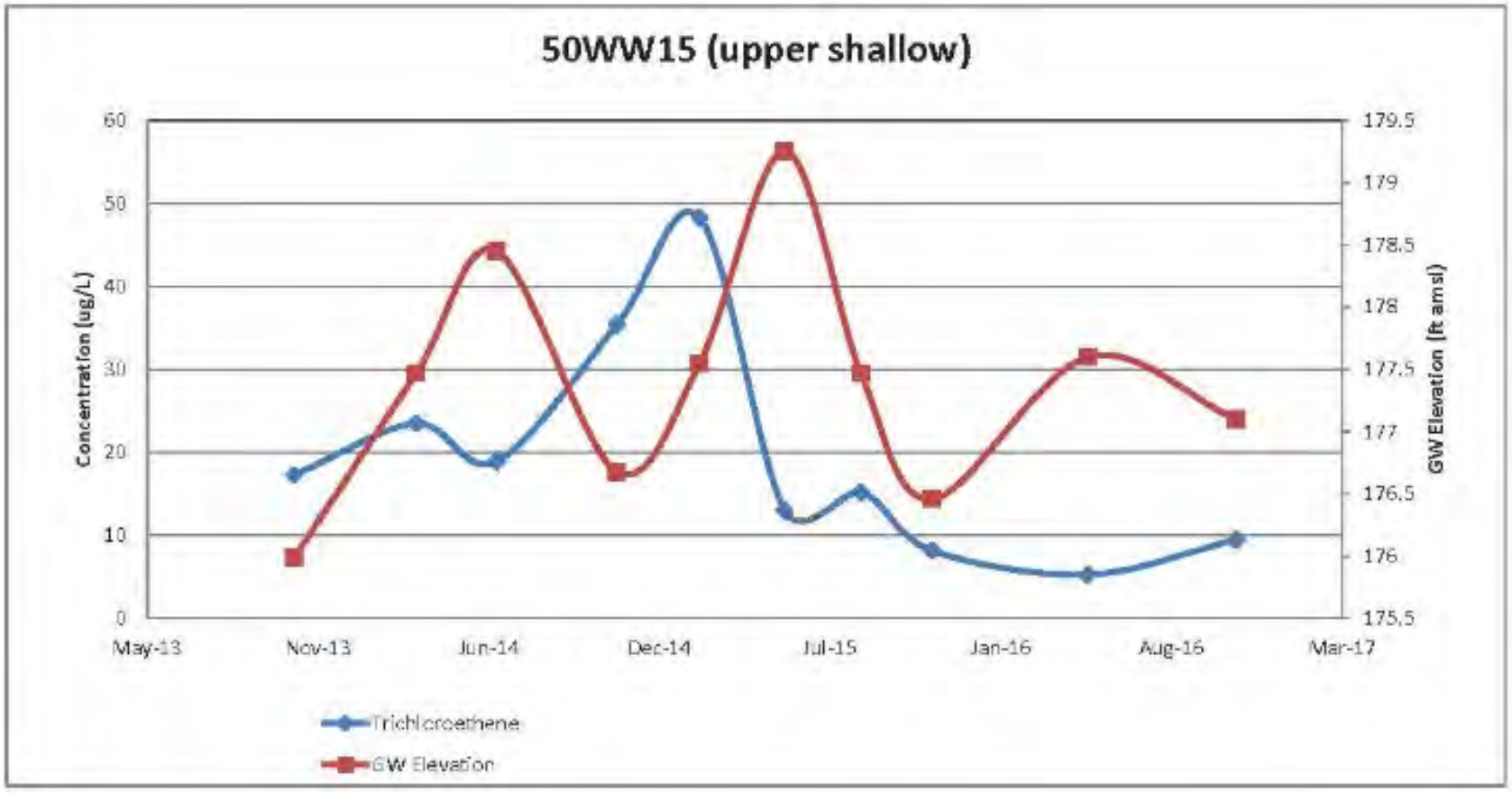
The 2017 results for TCE and Perchlorate obtained from the data are suspect as the concetrations are idential.

50WW13	5/13/2016	Perchlorate	256
50WW13	5/13/2016	Perchlorate	493
50WW13	11/1/2016	Perchlorate	8650
50WW13	11/13/2017	Perchlorate	13000

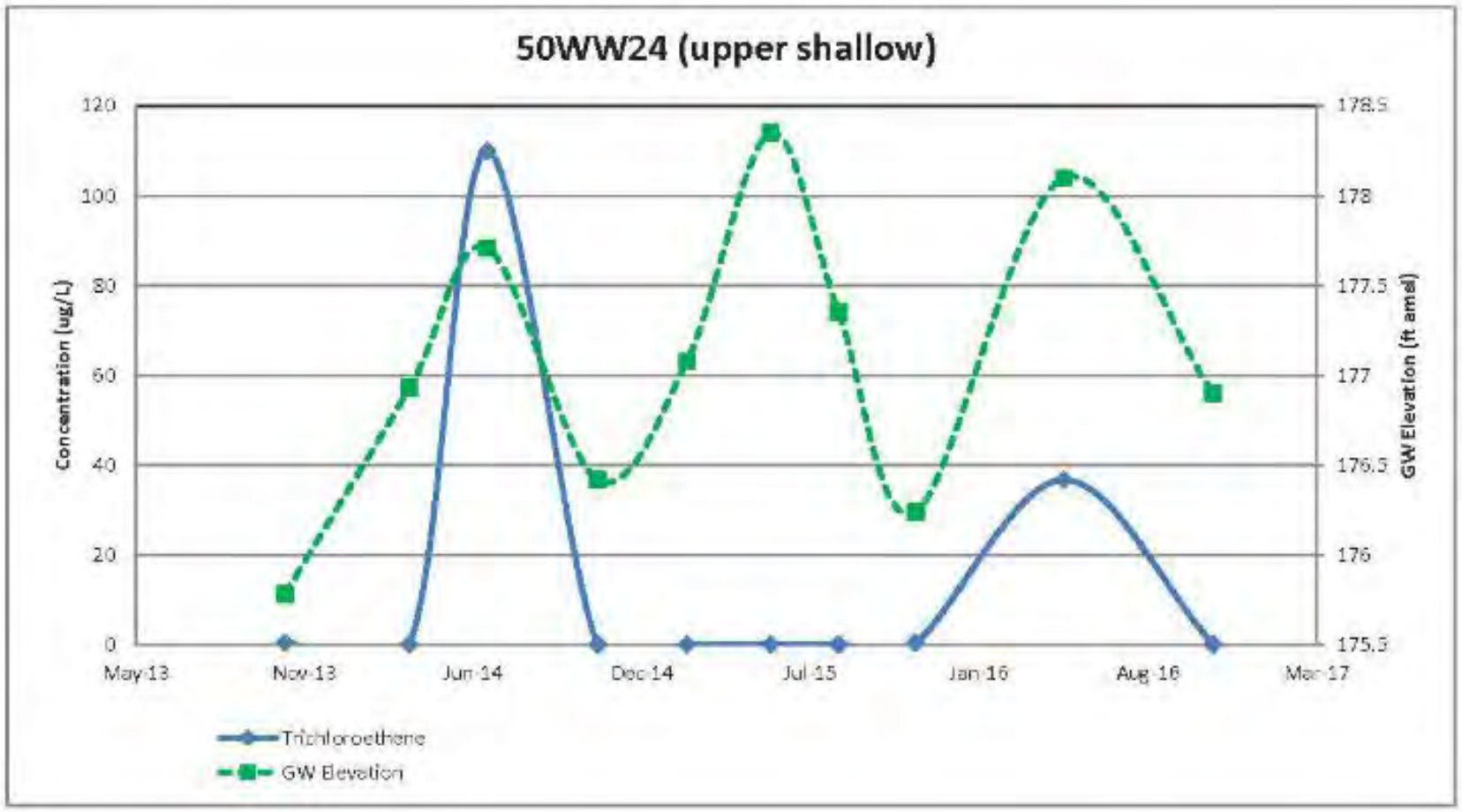
Plot 137. LHAAP-50 trend plot of COCs concentrations & groundwater elevations - 50WW13 – TCE, Perchlorate, and 1,2-DCA (Bhate, 2018c).



Plot 138. LHAAP-50 trend plot of COC concentrations & groundwater elevations - 50WW14 – TCE (Bhate, 2018c).

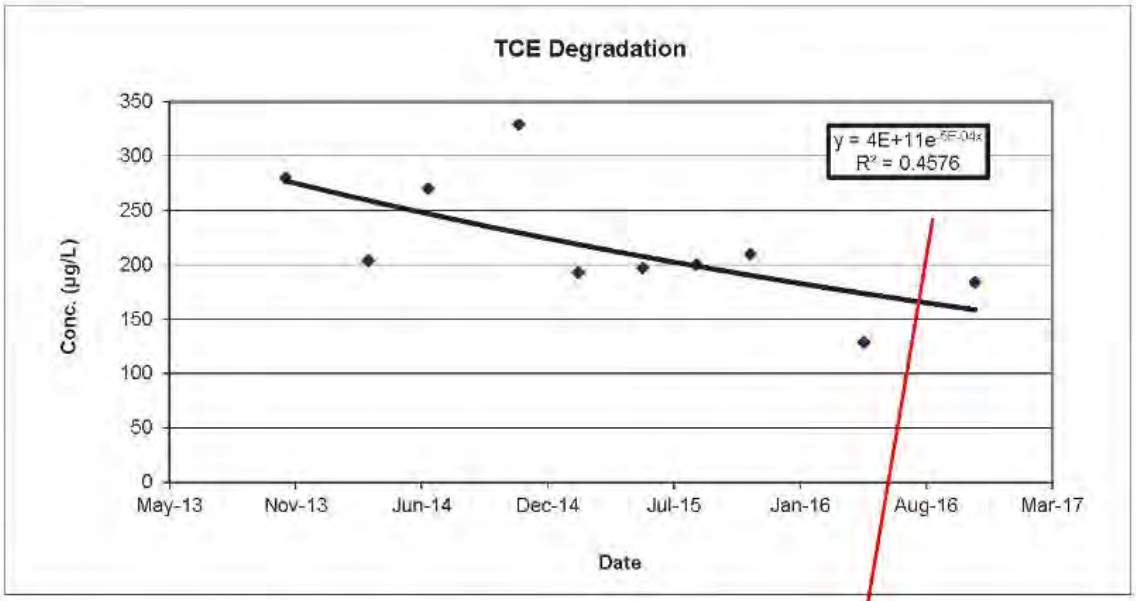


Plot 139. LHAAP-50 trend plot of COC concentrations & groundwater elevations - 50WW15 – TCE (Bhate, 2018c).



Plot 140. LHAAP-50 trend plot of COCs concentrations & groundwater elevations - 50WW24 – TCE (Bhate, 2018c).

Sampling Date	TCE in 50WW05 (µg/L)
11/6/2013	280
3/17/2014	204
6/20/2014	270
11/11/2014	329
2/13/2015	193
5/26/2015	197
8/19/2015	200
11/13/2015	210
5/11/2016	129
11/3/2016	184



Chemical: TCE Well ID	Attenuation Rate Constant (day^{-1})	Attenuation Half-life (days)	Attenuation Half-life (years)	Attenuation Half-life (years)	Current Conc. (µg/L)	Target Concentration for TCE (µg/L)	Estimated Cleanup Time (years)
50WW015	0.00004	0.0146	17328.7	47.5	184	5	247.0

Error in computation of restoration time in Year 3 RA(O).

Notes:

1) 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

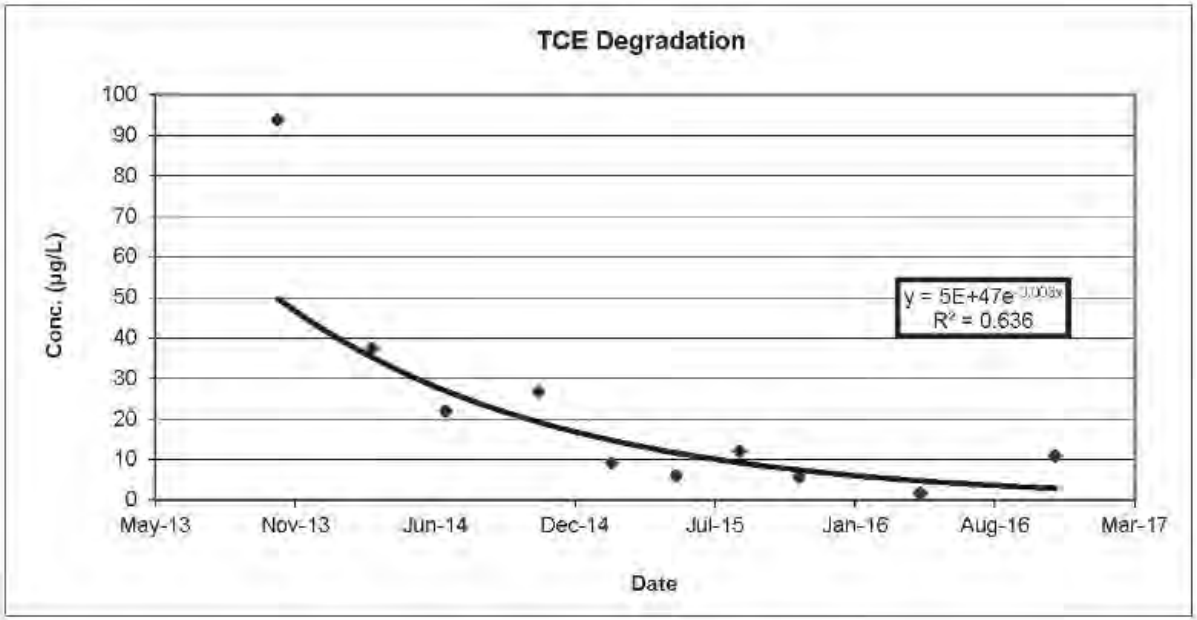
TCE - trichloroethene

Attenuation Rate	**0.0005**	**day-1**
Attenuation half life	**1386.3**	**days**

Estimated Clen up time ~ 20 years

Plot 141. LHAAP-50 restoration time - 50WW005 – TCE (Bhate, 2018c. Corrected by USACE – coefficient used by contractor do not reflect the equation derived).

Sampling Date	TCE in 50WW14 (µg/L)
10/28/2013	93.8
3/12/2014	37.4
6/25/2014	21.9
11/5/2014	26.7
2/17/2015	9.14
5/20/2015	6.05
8/19/2015	12
11/12/2015	5.78
5/3/2016	1.75
11/12/2016	10.9



Chemical: TCE Well ID	Attenuation Rate Constant (day^{-1})	Attenuation Half-life (days)	Attenuation Half-life (years)	Attenuation Half-life (years)	Current Conc. (µg/L)	Target Concentration for TCE (µg/L)	Estimated Cleanup Time (years)
50WW014	0.0030	1.0950	231.0	0.6	10.9	5	0.7

Notes:

1) 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.

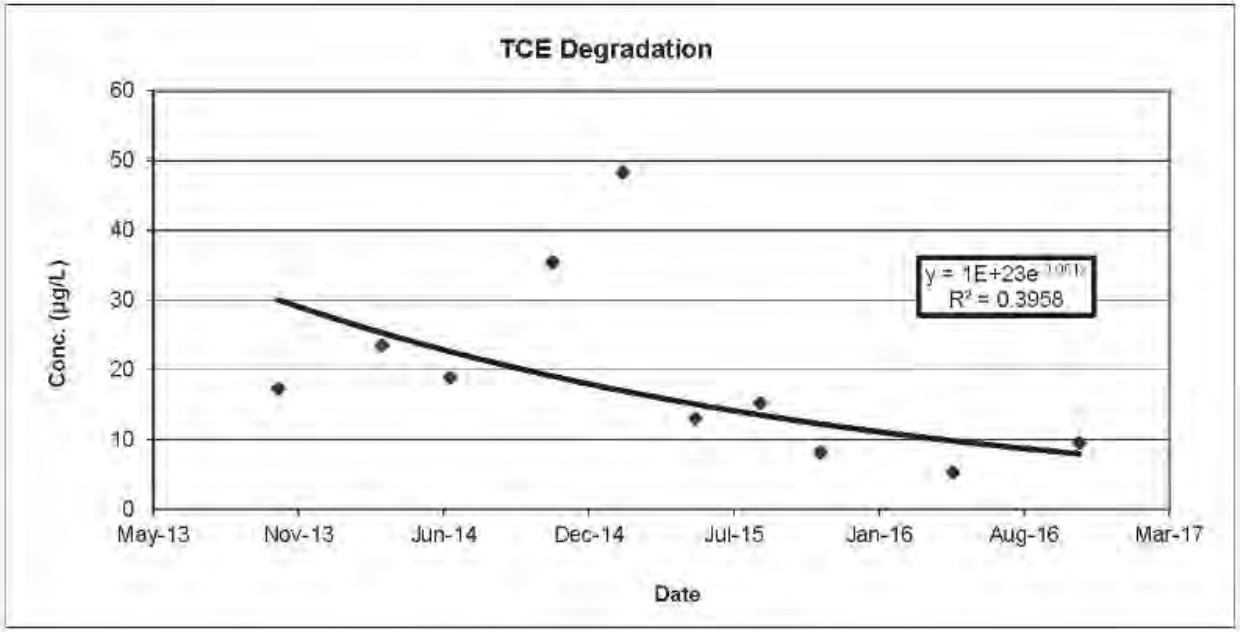
µg/L - micrograms per liter

MCL - maximum contaminant level

TCE - trichloroethene

Plot 142. LHAAP-50 rrestoration time - 50WW014 – TCE (Bhate, 2018c).

Sampling Date	TCE in 50WW15 (µg/L)
10/25/2013	17.3
3/17/2014	23.5
6/19/2014	18.9
11/7/2014	35.4
2/12/2015	48.3
5/23/2015	13
8/20/2015	15.2
11/11/2015	8.2
5/12/2016	5.32
11/2/2016	9.52



Chemical: TCE Well ID	Attenuation Rate Constant (day^{-1})	Attenuation Half-life (days)	Attenuation Half-life (years)	Attenuation Half-life (years)	Current Conc. (µg/L)	Target Concentration for TCE (µg/L)	Estimated Cleanup Time (years)
50WW015	0.0010	0.3650	693.1	1.9	9.52	5	1.8

Notes:

1) 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

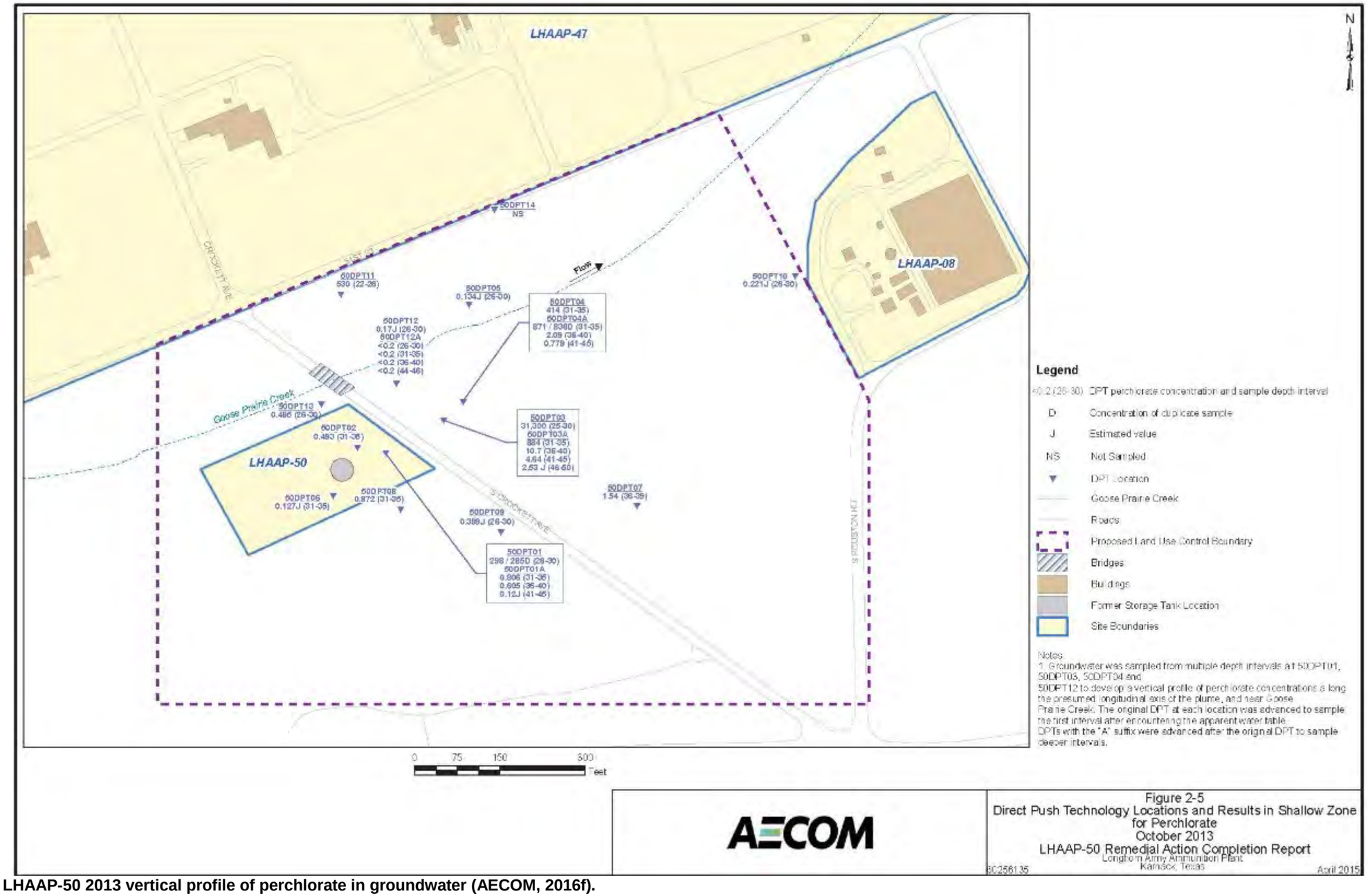
MCL - maximum contaminant level

TCE - trichloroethene

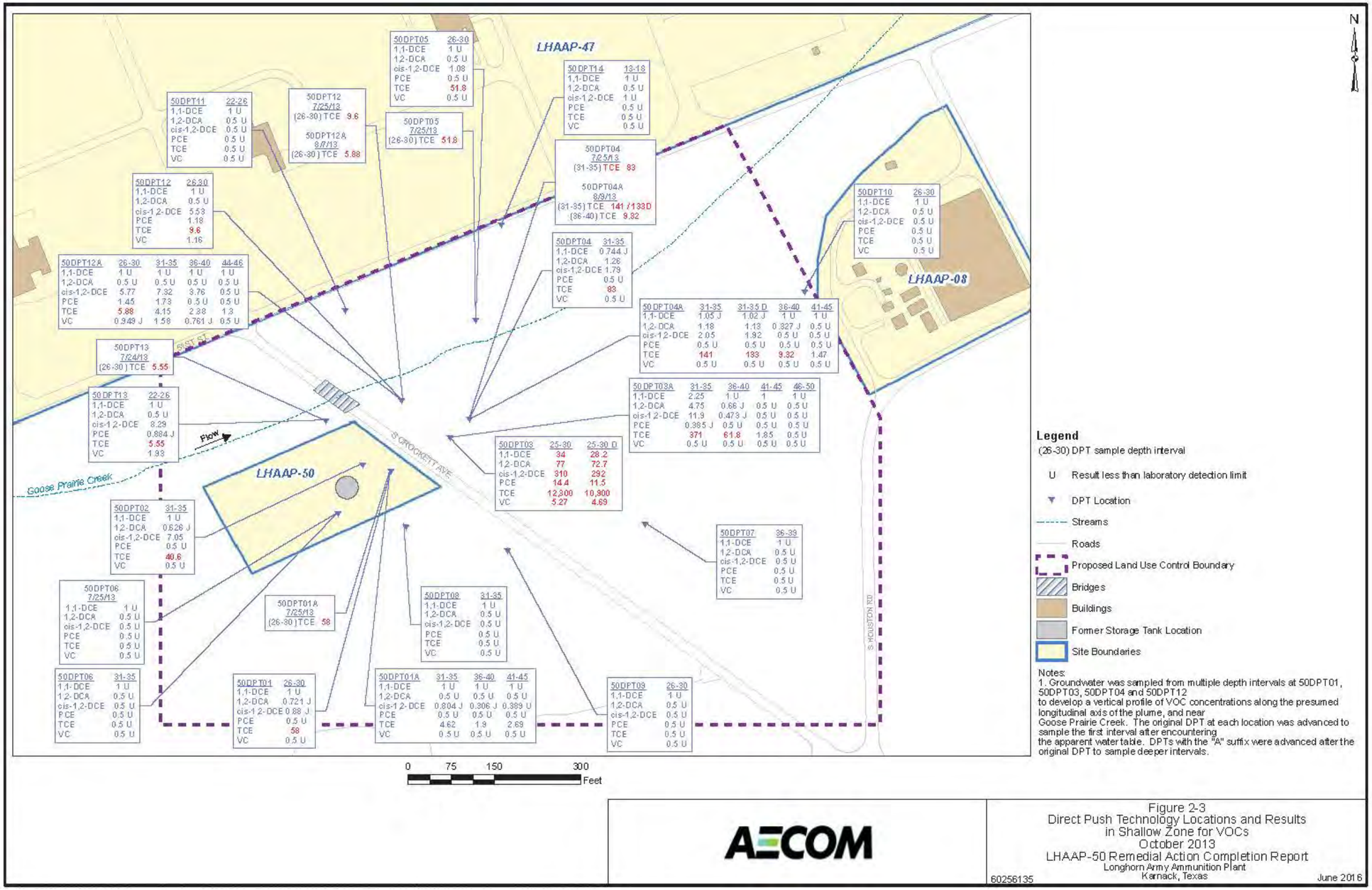
Plot 143. LHAAP-50 restoration time - 50WW015 – TCE (Bhate, 2018c).

Monitoring Well	Perchlorate	TCE	cis-DCE	1,1-DCE	1,2-DCA	Correlation to Groundwater Levels	Comment/Visual Observation	TCE Restoration Time (years) as of Nov 2016
50WW05	-	Significant Decrease	-	-	-			20 Years
50WW06	Significant Increase	No trend Data is Stable	-	-	-	Between November 2013 and July 2015 Perchlorate Concentrations Increased with groundwater level and vice versa, subsequently the trend switch with Perchlorate concentration increasing when water level decrease and vice versa.	The switch in correlation between perchlorate concentrations and groundwater elevations suggests that the excavation of perchlorate-impacted soil are affecting perchlorate concentrations trend with some delay effects.	
50WW08	No trend Data is not Stable	No trend Data is Stable	-	-	-	Trend of perchlorate concentration and groundwater level at 50WW08 is similar to that encountered at 50WW06.	The Mann-Kendall results for perchlorate might be attributed to the excavation of the perchlorate-impacted soil. Recent analytical data of 2017 are lowest concentration encountered to date.	
50WW09	-	Significant Increase	-	-	-		Concentrations of TCE in this well increased only after December 2014, and started decreasing subsequent to August 2015 with the most recent results of 2017 below MCL. The increase in concentration may be associated with the excavation of the soil.	
50WW11	No trend Data is Stable	No trend Data is Stable	No trend Data is Stable	No trend Data is Stable	No trend Data is Stable	TCE and Perchlorate concentrations varies increasing when water levels decreases and vice versa.	Water sample collected using direct push technologies show elevated TCE concentration ~ 1% solubility, and elevated perchlorate in aqueous samples collected at interval of 25 through 30 below surface elevation.	
50WW12	No trend Data is Stable	Significant Increase					Change in perchlorate concentrations mirrors change in groundwater elevation. Mann-Kendall test indicates stable trend, but the peak to peak concentrations increase over time.	
50WW13	No trend Data is not Stable	No trend Data is Stable	No trend Data is Stable		No trend Data is Stable	Trend of perchlorate concentration and groundwater level at 50WW08 is similar to that encountered at 50WW06.	Water sample collected using direct push technologies show elevated TCE concentration ~ 1% solubility, and elevated perchlorate in aqueous samples collected at interval of 25 through 30 below surface elevation.	
50WW14	-	Significant Decrease	-	-	-			0.7
50WW15	-	Significant Decrease	-	-	-			1.8
50WW24	No trend Data is not Stable	-	-	-	-			

Plot 144. LHAAP-50 ssummary of Mann-Kendall Trend Analysis performed by Bhate (Bhate, 2018c), visual & correlation to groundwater elevation and soil excavation.



Plot 145. LHAAP-50 2013 vertical profile of perchlorate in groundwater (AECOM, 2016f).



Plot 146. LHAAP-50 2013 vertical profile of VOC's in groundwater (AECOM, 2016f).

6.0 LHAAP-58

6.1 Site-Wide Monitoring

6.1.1 Groundwater Monitoring

The site contains an eastern and western plume (Plot 147). The Shallow Groundwater Zone flow direction is interpreted to be toward the southeast in the western portion of the site and to the east-southeast in the eastern portion of the site (Plot 148 shows typical contour pattern and some cases where professional judgment is needed after computer generation). The most recent shallow groundwater contours, October 2016 are shown in Plot 148 (Bhate, 2018a). The contours shown were manually revised, honoring the data, to reflect the historical groundwater flow regime and remove the hydraulic depression to the southeast. COCs in the shallow groundwater zones are discussed in section 8.2.

Groundwater contours in the intermediate and deep zones cannot be generated due to insufficient number of wells. COCs concentrations in intermediate (35AWW01 and 35WW05) and deep (35AWW02) monitoring wells were below the laboratory detection limits.

6.1.2 Surface Water Monitoring

Surface water is monitored at 35ASW03, which is in a ditch that runs parallel to 4th Street, on the western boundary of the site, and adjacent to the western groundwater plume (Plot 149). The surveyed bottom of the ditch at the lowest point is 213.58 ft amsl, while the gauged water level in nearest upgradient monitoring well, 35AWW18, in April 2016 was 195.35 ft above msl. Analytical results from 35ASW03 during the 1st, 2nd, and 3rd Year RA(O)s were below MCLs for all COCs that were detected in groundwater at the site. The RA(O) recommended sampling surface water only if the groundwater elevation is at or above the bottom of the ditch.

6.2 Eastern Plume

6.2.1 Spatial and Temporal Variation in COCs

Based on the southeasterly direction of groundwater flow, the following wells are considered to be along the groundwater flow path: 35AWW10, 35AWW08, 03WW01, 35AWW09, and 35AWW21. Analysis of historical COCs plumes spanning from 2003/2008 through October 2016 (Plot 157 through Plot 164) indicates that:

- Concentration of COCs in upgradient well 35AWW10 remains below the MCL throughout the monitoring period.
- Prior to EISB, the center of the PCE and TCE plumes were defined by data from wells 35AWW08 and 03WW01 (historical plume center wells). Subsequent to EISB, the PCE and TCE plume centers are defined by data from wells 35AWW08, LHSMW04, and well 35AWW09.
- Although the maximum concentration of PCE and TCE at the historical location of the center of the plume (35AWW08, 03WW01), where EISB was implemented, decreased over time, the footprint of these plumes, exceeding the MCL, increased overtime, expanding to downgradient wells 35AWW09 and side downgradient well LHSMW04.
- At historical plume center wells 35WW08, PCE (Plot 170) and TCE (Plot 171) decreased from levels > 9000 and > 600 ppb, respectively, in 2008, to levels that that are < 40 and

< 250 ppb in 2016. At historical plume center well 03WW01, PCE (Plot 167) and TCE (Plot 168) decreased from levels > 1000 and > 100 ppb, respectively, in 2008 to non-detect. At downgradient well 35AWW09, PCE (Plot 173) and TCE (Plot 174) increased from levels ~ 20 and ~10 ppb, respectively, in 2013, to levels of ~ 170 and ~ 50 ppb in 2016. At downgradient well LHSMW04, PCE (Plot 185) and TCE (Plot 204) increased from levels ~ 6 and ~5 ppb, respectively, in 2007, to levels of ~ 400 and ~ 100 ppb in 2016.

- Concentration of daughter by-product (cis-DCE and VC) exceeding MCL are encountered in historical plume center wells 35AWW08 (Plot 169) and 03WW01 (Plot 166) located within the EISB area. At 35AWW08 (Plot 169), cis-DCE increased from a level of ~ 10 ppb in 2008 to ~ 60 ppb in 2016, while VC was only detected in 2016 at a levels of ~10 ppb. At 03WW01 (Plot 166), cis-DCE remained < 50 ppb between 2008 and 2015, increasing to ~ 100 ppb in one of the sampling events of 2016, while VC remained ND in all sampling events.
- The extent of the COCs plumes exceeding the MCL are defined with the available network of perimeter wells (Plot 158 through Plot 165), where concentrations remains below the detection limits.

6.2.2 Enhanced In-Situ Bioremediation

Enhanced In-Situ Bioremediation (EISB) was implemented from September 23 to 25, 2013. The remedy comprised of injecting 2,200 gallons of sodium lactate solution (specifically commercially available Willclear Plus containing 30-40% lactates, and 40-45% carboxylates along with other nutrients) via direct push. Approximately 9680 lbs of 60% sodium lactate (880 gallons) solution was used. The solution was injection through 12 injection points at depth interval of approximately 23 to 30 feet bgs, with an injection flow rate of 4 to 6 gpm. Locations of the injection points (58EISB-01, 02, 03, 04, 05, 06, 07, 07a, 08, 09, 10, and 11) along with the VOCs plumes of primary COCs, delineated based on results of samples collected in October 2013, shortly after the injection, are shown in Plot 151 through Plot 155. The analytical results of August 2013 collected prior to EISB are also posted in these plots. Bioaugmentation with KB-1 Plus culture via the direct push points within the target treatment area was performed in November 2013. Bioaugmentation was performed due to low count of DHC and BHB population encountered in October 2013.

Field data, biogeochemical parameters, dechlorinating bacteria pre- and post-EISB are presented in Plot 156. This data together with data collected through October 2016, is analyzed to determine the effectiveness of the EISB and MNA in the eastern plume in achieving the RAO.

6.2.3 Trend Analysis

Plumes and trend plots of COCs, generated by O&M are included in Plot 151 through Plot 155, Plot 157, and Plot 166 through Plot 184 (including Mann-Kendall and Theil-Sen analysis (Bhate, 2018a)).

The Fourth Five-Year Review team conducted trend analyses with the protocol described in section 1.3 of Appendix C (Figure 33, Figure 34, and Figure 35). Comparison of the Army's PCE, TCE, cis-DCE, and VC trend analyses are summarized below (Bhate, 2018a).

Area	Well ID	PCE	TCE	cis-DCE
East Plume	03WW01	Decreasing Trend	Insufficient Evidence for Trend	Increasing Trend
	35AWW08	Decreasing Trend	Insufficient Evidence for Trend (Visually appears Decreasing Trend)	Insufficient Evidence for Trend (Visually appears Increasing Trend)
	35AWW09	Increasing Trend	Increasing Trend	Insufficient Evidence for Trend

The Army performed Mann-Kendall analysis for the data collected from 2008 through the end of the 3rd year RA(O) period (October 2016, Bhate, 2018a) for various COCs encountered at the two plume center's monitoring wells 03WW01, 35AWW08, located within the EISB's area, and for COCs at downgradient well 35AWW09 (located ~ 110 feet downgradient of 35AWW08). The results are presented in Plot 166 through Plot 184.

Results of Fourth Five-Year Review trend that are supportive of the results of the Army's trend analysis include the increasing trends in PCE and TCE concentrations in downgradient well 35WW09, and the decreasing trend in PCE concentrations in plume center wells 35AWW08 and 03WW01 (Figure 33). The Fourth Five-Year Review results of trend analyses show decreasing trends in TCE concentrations in 03WW01 and 35WW08 (Figure 34) and an increasing trend in TCE and PCE concentrations in LHSMW04. The difference between the Fourth Five-Year Review and the Army's results is attributed to the additional recent data (Appendix F) used in the Fourth Five-Year Review's trend analysis. The Fourth Five-Year Review analysis show insufficient data for trend analysis of cis-1,2-DCE since results for this compound did not meet the 2019 criteria required to perform the analysis (e.g. concentrations are < 10xMCL).

The decrease of PCE and TCE concentrations in plume center wells, and the increase in cis-DCE (Plot 166 through Plot 168) provide lines of evidence that the decline in PCE and TCE, at least in part, is due to EISB. All COCs had reduced to non-detected at well 03WW01 by the end of the reporting period (October 2016). VC was also detected in October 2016 at 35AWW08 as well, indicating the degradation of cis-1,2-DCE. Additional monitoring will be required to evaluate whether complete reductive dechlorination will occur.

The increasing trends in concentrations of PCE and TCE in wells 35AWW09 and LHSMW04 (for details see section 8.2.1) located immediately down-gradient/side-gradient of the historical plume's center, is likely due to migration of these COCs from upgradient. The low concentrations of cis-1,2-DCE (Plot 172 and Plot 185) in these wells and the lack of trends suggests that the influence of biodegradation associated with EISB appears to remain within the area targeted for EISB (area of monitoring wells 35AWW08 and 03WW01, see section 8.2.1 for details).

These results indicates that the plume center has shifted from the location of historically plume center wells 03WW01/35AWW08 to historically downgradient wells LHSMW04/35AWW09. COCs concentrations in well 35AWW12 located adjacent to LHSMW04 (Plot 157 through Plot 164) are ND. The screen for well 35AWW12 extends from 22.17 to 36.77 bgs, while the screen interval of LHSMW04 extends from 21.11 to 31.1 bgs. Well construction detail, including ground elevations tied to a recognized vertical datum, screen intervals, and sampling protocol, including depth of sampling needs to be evaluated to ensure that 35AWW12 can be used to delineate the eastern COCs plume along the southeast.

Spatial and temporal analysis of COCs in the eastern plume indicates that while the footprint of COCs increased, the maximum concentrations of the parent compounds PCE and TCE decreased. The available perimeter network of monitoring wells are sufficient to delineate the plumes to MCLs levels, and the enhanced biodegradation associated with EISB remains within the area targeted for EISB.

6.2.4 Geochemical Indicators

Geochemical parameters indicate that reductive dechlorination is taking place within the EISB area (e.g., 03WW01 and 35AWW08) only (see table below). Key findings are:

- Historical plume centered wells, 35AWW08 and 03WW01 (5,500 mg/L) located within the EISB area had the highest alkalinity readings onsite in October 2016, while outside the EISB area, alkalinity levels were generally lower, ranging between 55.4 mg/L and 704 mg/L in October 2016. The higher alkalinity in 03WW01 and 35AWW08 is associated with biodegradation of organic substrate added to the groundwater and generation of carbon dioxide.
- Measurements of DO and ORP within the EISB area were unreliable due to method of sample collection (i.e. use of bailers), while reliable measurements of ORP in the eastern plume in wells located outside the EISB area indicates aerobic conditions (ORP ranging between ~ 300 and 500 mV). Therefore, conditions (oxidation-reduction potential and nutrients) outside the EISB, including the area immediately downgradient of the historical hot spot are, in general are not favorable for anaerobic biodegradation.
- Chloride levels within the eastern plume EISB treatment area in historical plume centered wells 03WW01 and 35AWW08 were 762 and 2,000 mg/L, respectively. Chloride concentrations in downgradient well 35AWW09 and upgradient well 35WW10 were 1,420 mg/L and < 20 mg/L, respectively. These results showing higher chloride concentrations in the EISB area and downgradient of the treatment area, as compared to background levels in upgradient wells provide evidence for biodegradation.
- Methanogenesis occurs in highly reducing conditions. Ethane and ethene are the end-products of reductive dechlorination of chlorinated VOCs and their levels increase if complete reductive dechlorination takes place. Methane levels above 500 µg/L are considered to indicate methanogenic conditions (USEPA, September 1998). Methane concentrations in the historical plume center well 03WW01 increased from 4.35 µg/L in October 2013 to 5,950 µg/L in October 2016, and in historical plume center well 35AWW08 from 5.38 µg/L in October 2013 to 7,350 µg/L in October 2016. These wells are influenced by EISB and the production of methane is a strong indicator of anaerobic conditions. Methane concentrations in the remaining wells were below 250 µg/L, indicating limited anaerobic conditions in the aquifer. Ethene was only detected at one well in October 2016, at 2.64 J µg/L in 35AWW20, indicating that limited reductive dechlorination is occurring in the western plume. Ethane was nondetect in all the samples.

Geochemical Indicator	Trend Indicative of Aerobic Bio \ Reductive Dechlorination	East PlumeSummary of Results	Key Findings
Alkalinity	Increase Compared to Background	Elevated within EISB area (35AWW08 and 03WW01) and low outside.	Indicative of Ongoing Bio within EISB area only.
Chloride	Increase Compared to Background	Elevated in the EISB area and immediately downgradient of area at 35AWW09.	Indicative of Ongoing reductive dechlorination within EISB area and possibly immediately downgradiet of EISB area. Though elevated Chloride downgradient of EISB area may be due to migration.
Dissolved Oxygen	<0.5 mg/L	No data within EISB area. Levels outside EISB ~ 2 mg/L. Measurements of DO below 2 mg/L are often unreliable.	Not supportive of anaerobic degradation outside EISB area.
Oxidation-Reduction Potential	Anaerobic	No data in EISB area but very high 279-499 mV immediately downgradient of EISB (35AWW09).	Not supportive of anaerobic Bio outside EISB area.
Nitrate and Nitrite	Lower comared to Background. Nitrate < 1 mg/L.	ND in all wells.	
Iron	Increase Compared to Background	Elevated within EISB area (35AWW08 and 03WW01) and low outside.	Indicative of anaerobic bio through iron reducing condition within the EISB area only.
Sulfate and Sulfide	Low Concentrations.Decrease relative to background though reductive dechlorination still occurs at elevated sulfate conc.	In EISB area the levels declined from high of ~ 500 to 700 ppm to < 10 mg/L. Immediately downgradient level elevated ~ 1000 ppm.	Indicative of anaerobic bio through sulfate reducing condition within the EISB area only.
Dissolved Gasses	Methane > 500 ppb. Ethane and Ethene - End product of reductive dechlorination.	In EISB area methane levels increased from low < 10 ppb to high ~ 6000 to 7000 ppb. Outside EISB ~ 250 ppb.	Indicative of anaerobic bio through methanogeneis within the EISB area only.
Total Organic Carbon	> 20 ppm	In EISB area levels remain elevated at ~ 300 to 900 ppm. Immediately downgradient of EISB levels < 20 mg/L.	Supportive of Bio within EISB area only.
Phorphorous	Require as nutrient.	Within EISB area levels of phosphrous declined from ~250 to 300 mg/L in October 2013 (after substrate application) to 2 to 6 ppm in 2016. Indicating that it could be deplete and become rate limiting within EISB. ND immediately outside EISB area.	Supportive of Bio within EISB area only. But phosphorus is being depleted and could become rate limiting to bio within EISB area.
Manganese	Increase Compared to Background	Increase in concentrations encountered only within EISB area.	Indicative of anaerobic bio within EISB area only.
Dechlorinating Bacteria	Persence of dechlorinating bacteria, dehalococcoides ethenogenes, dehalobacter, and associated functional genes of bio through reductive dechlorination.	Elevated count of micrbial population within EISB area. Comparing the population counts reported immediately after the ISBN in 2013 through October 2016 indicates rapid proliferation of the microbial population during the 3rd year reporting period.	Idicative of improved conditions for reductive dechlorination.

- Organic carbon is a required source of reduced carbon and energy to sustain microbial activity. TOC is utilized as a carbon and an energy source to support the reductive dechlorination of the chlorinated COCs. TOC concentrations greater than 20 mg/L are considered adequate to support microbial activity (USEPA, 1998). TOC concentrations in historical plume centered wells, 03WW01 and 35AWW08, influenced by injected substrate, exceeded this threshold, with October 2016 concentrations of 292 mg/L and 918 mg/L respectively. These concentrations indicate that sufficient TOC remains in the aquifer to support reductive dechlorination in the eastern plume.
- Dechlorinating bacteria, dehalococcoides ethenogenes, dehalobacter, and associated functional genes were analyzed in groundwater samples from wells historical plume centered wells 03WW01 and 35AWW08, downgradient well 35AWW09, and upgradient well 35AWW10. Generally, the microbial population counts and the functional gene counts were below the laboratory reporting limits in areas not influenced by bioaugmentation (35AWW09 and 35AWW10), indicating a limited natural population of the bacteria and the absence of gene expression necessary for anaerobic biological degradation of the COCs. Within the bioaugmentation area, the microbial population counts were high, indicating the rapid proliferation of the microbial population during the 3rd year reporting period.
- Phosphorus in groundwater is a nutrient available to microbes for their metabolic processes during reductive dechlorination. Phosphorus is generally present at very low concentrations in the aquifer. However, phosphorus was introduced with the injected substrate in the area of historical plume centered wells 03WW01 and 35AWW08. In 03WW01, phosphorous was reported at 243 mg/L in October 2013, but decreased to 2.06 J mg/L in October 2016, indicating consumption of phosphorous by bacteria. Similarly, phosphorous was detected at 361 mg/L in 35AWW08 in October 2013, but decreased to 5.68 mg/L in October 2016. These levels continue to support microbial activities, but could become rate-limiting quickly.

6.3 Western Plume MNA Performance

6.3.1 Spatial and Temporal Variation in COCs

Plumes and trend plots including Mann-Kendall and Theil-Sen analysis of COCs are included in Plot 151 through Plot 155, and Plot 157 through Plot 184 (Bhate, 2018a).

Based on the southeasterly direction of groundwater flow, the following wells are considered to be along the groundwater flow path: 35AWW15, 35AWW20, LHSMW07, and 35AWW19. Analysis of historical COCs plumes spanning from 2003/2008 through October 2016 (Plot 157 through Plot 164) indicates that:

- The COC concentrations in upgradient well 35AWW15 have remained below detection throughout all monitoring periods.
- The footprint of the TCE plume exceeding the MCL increased along the eastern (LHSMW06 (cross gradient perimeter well) with levels < MCL of 5 ppb between 1994 and 2015, subsequently increasing to maximum level of ~9 ppb, slightly above the MCL)/south eastern (35AWW14 (down gradient well), with levels MCL < 7 ppb between 1994 and April 2016, subsequently increasing to maximum level of ~10 ppb slightly above the MCL) perimeter
- The footprint of the 1,1-DCE plume exceeding the MCL increased along the eastern edge (LHSMW06 with levels < MCL of 7 ppb between 1994 and 2015. In 2016, it increased to a maximum level of ~19 ppb)/southeastern (35AWW14 with levels < MCL of 7 ppb between 1994 and April 2016, subsequently increasing to a maximum level of ~10 ppb, slightly above the MCL) perimeter.
- 1,1-DCE slightly exceeds the MCL of 7 ppb along the southern and southeastern perimeter wells (35AWW19 at a maximum level of ~ 17 ppb, 35AWW14 at a maximum level of ~ 10 ppb). Therefore, the lateral extent of the footprint of 1,1-DCE exceeding MCL is no longer defined along the southeastern perimeter.
- TCE exceeds the MCL along the southeastern (35AWW14) perimeter well. Therefore, the lateral extent of the footprint of TCE exceeding MCL is no longer defined along the southeastern perimeter.
- Concentrations of COCs in perimeter wells, 35AWW15, 35AWW16, 35AWW17, and 35AWW18, which are located away from the most impacted wells 35AWW20 and LHSMW07, remained non-detect.

6.3.2 Trend Analysis

Mann-Kendall analyses for the data collected from 2008 through the end of the 3rd year RA(O) period (October 2016) were completed by the Army for various COCs encountered for the plumes center well 35AWW20 (Plot 175 through Plot 178), monitoring well LHSMW07 (Plot 182 through Plot 184) located adjacent to the ditch (along the eastern bank, see Plot 149), and well 35AWW06 (Plot 179 through Plot 181) located west of the ditch (Bhate, 2018a). The results are summarized in the table below:

Area	Well ID	PCE	TCE	cis-DCE	VC	1,1-DCE
West Plume	35AWW20		Insufficient Evidence for Trend	Insufficient Evidence for Trend	Increasing Trend	Insufficient Evidence for Trend
	LHSMW06		Increasing Trend		Increasing Trend	Increasing Trend
	LHSMW07		Increasing Trend		Increasing Trend	Insufficient Evidence for Trend

VC is the only COC in plume center well 35AWW20, with an increasing concentration trend, where concentration increased from ~ 60 ppb to ~ 180 ppb (Plot 178) between 2013 and 2016. Insufficient evidence for trends were determined for 1,1-DCE (Plot 175), cis-1,2 DCE (Plot 176), and TCE (Plot 177).

Mann-Kendall analysis for the well cross gradient from the plume center, LHSMW06, indicates increasing concentration trends for TCE (Plot 180), VC (Plot 200), and 1,1-DCE (Plot 179). TCE concentrations increased from ~ 0.5 to ~ 9 ppb, VC increased from ~ 0.6 to ~ 2.4 ppb, and 1,1-DCE increased from ~ 600 to ~ 1000 ppb between 1994 and 2016.

Mann-Kendall analysis for down gradient well from plume center, LHSMW07, indicates increasing concentration trends for TCE (Plot 183), VC (Plot 184), and insufficient trend for 1,1-DCE (Plot 182). TCE concentrations increased from ~ 20 to ~ 70 ppb, VC increased from ~ 1 to ~ 20 ppb between 1994 and 2016.

The Fourth Five-Year Review team conducted trend analyses with the protocol described in section 1.3 of Appendix C (Figure 33 through Figure 35). Comparison of results of trend analyses for PCE, TCE, cis-DCE, VC, and 1,1-DCE performed by the Army (Bhate, 2018a) and the Fourth Five-Year Review are summarized below.

- Results of the Fourth Five-Year Review (Figure 33 and Figure 35) and the Army's trend analyses for TCE and 1,1-DCE in 35AWW20, are the same indicating that there is insufficient data to support a trend (Note that insufficient evidence for trend designated by O&M, is equivalent to intermediate designation by the Fourth Five-Year Review).
- Concentrations of VC indicate an increasing trend over time at 35AWW20, while the Fourth Five-Year Review analysis shows an intermediate trend (Plot 177 and Figure 33). These results indicate there is no appreciable attenuation occurring near plume center well 35AWW20.
- The Mann-Kendall trend analysis in LHSMW06, a cross gradient well from plume's center, located along the northeast perimeter of the plumes indicates statistically increasing trends in concentrations for TCE; 1,1-DCE; and VC over time. The Mann-Kendall analysis further indicates that while degradation is occurring, with the increase in daughter products, migration of COCs from upgradient sources is likely. The Fourth Five-Year Review did not perform trend analyses for well LHSMW06 since the data did not meet the criteria required to perform the analysis.
- The Mann-Kendall trend analysis in LHSMW07 located downgradient of the plume's center (35AWW20), indicates a statistically significant evidence of an increasing trend in concentrations for TCE, and VC over time, and an insufficient trend for 1,1-DCE. The Fourth Five-Year Review analysis indicates statistically significant evidence of an increasing trend in concentrations of TCE, but shows intermediate results for 1,1-DCE and VC. The increase in TCE concentration in LHSMW07 indicates likely migration of COCs from the upgradient plume's center area of 35AWW20 to the area of LHSMW07.

6.3.3 Geochemical Indicators

Geochemical parameters indicate that limited reductive dechlorination is taking place within the plume's center. However, in general conditions (field redox and nutrient) are not favorable for anaerobic biodegradation (see Table below).

In 2016, alkalinity levels were generally lower outside the footprint of the western plume (55 mg/L at 35AWW20) as compared to in-plume well (704 mg/L 35AWW20). The higher alkalinity in plume center well (35AWW20) is likely associated with biodegradation of organic substrate added to the groundwater and generation of carbon dioxide. Alkalinity levels in plume-centered wells located within the EISB area of the eastern plume are about one order of magnitude larger than in-plume wells located in the western plume.

In 2016, DO levels in plume centered well 35AWW20 were 0.88 mg/L (April 2016) and 1.35 mg/L (October 2016); and in cross gradient well LHSMW07 were 0.47 mg/L (April 2016) and 1.34 mg/L (October 2016). ORP levels of 91 and 113 mV were reported in October 2016 at plume centered well 35AWW20 and cross gradient well LHSMW07, respectively. An ORP level of 130 mV was reported in cross gradient well LHSMW07 in April 2016. These results indicate that conditions within the western plume are generally aerobic and not supportive of anaerobic degradation.

In 2016, chloride levels within in plume centered well 35AWW20 and cross gradient wells LHSMW07 and 35WW10 were 1420, 2380 and 1420 mg/L, respectively. Chloride levels in background upgradient wells was < 20 mg/L. These results showing higher chloride concentrations in the COCs impacted area as compared to background levels in upgradient wells provide evidence for biodegradation.

Methanogenesis occurs in highly reducing conditions. Ethane and ethene are the end products of reductive dechlorination of chlorinated VOCs and their levels increase if complete reductive dechlorination takes place. Methane levels above 500 µg/L are considered to indicate methanogenic conditions (USEPA, September 1998). Methane concentrations in the western plume wells were below 250 µg/L, indicating limited anaerobic conditions in the aquifer. Ethene was only detected at one plume centered well 35 AWW20, in October 2016 at 2.64 J µg/L indicating that limited reductive dechlorination is occurring in the western plume. Ethane was nondetect in all the samples.

Organic carbon is a required source of reduced carbon and energy to sustain microbial activity. TOC is utilized as a carbon and energy source to support the reductive dechlorination of the chlorinated COCs. TOC concentrations greater than 20 mg/L are considered adequate to support microbial activity (USEPA, 1998). TOC in the western plume centered well, 35AWW20, and cross gradient well, LHSMW07, while above the 20 mg/L threshold, was detected at low concentrations of 31.8 mg/L and 41.6 mg/L, respectively. The remaining wells generally had TOC concentrations below 20 mg/L.

Geochemical Indicator	Trend Indicative of Aerobic Bio \ Reductive Dechlorination	West Plume Summary of Results	Key Findings
Alkalinity	Increase Compared to Background	Elevated in 35AWW20 located at the plume's center as compared to backround (as represented by 35AWW10).	Indicative of Ongoing Bio within center of the COCs plume.
Chloride	Increase Compared to Background	Elevated in 35AWW20 located at the plume's center as compared to backround (as represented by 35AWW10).	Indicative of Ongoing Bio within center of the COCs plume.
Dissolved Oxygen	<0.5 mg/L	Level at the plume center and along the western perimeter of the plume were lower in April than October, ranging between 0.47 and 1.35 ppm. Measurements of DO below 2 mg/L are often unreliable.	Not supportive of anaerobic Bio
Oxidation-Reduction Potential	Anaerobic	Level ranging between 67 and 130 MV.	Generally aerobic and not supportive of anaerobic degradation.
Nitrate and Nitrite	Lower comared to Background. Nitrate < 1 mg/L.	ND in all wells.	
Iron	Increase Compared to Background	Low levels in all wells.	Not supportive of anaerobic bio through iron reducing bacteria.
Sulfate and Sulfide	Low Concentrations.Decrease relative to background though reductive dechlorination still occurs at elevated sulfate conc.	Elevated level > 1000 ppm. However, low level of sulfide < 1 ppm with J prefex was encountered in plume center.	Indicative that limited anaerobic sulfate reduction is taking place.
Dissolved Gasses	Methane > 500 ppb. Ethane and Ethene - End product of reductive dechlorination.	Levels < 250 ppm, but low levels of ethene was detected in plume's center.	Idicative of limited reductive dechlorination.
Total Organic Carbon	> 20 ppm	Low levels of ~ 30 to 40 ppm , slightly above the thereshold levels	Suportive of Bio.
Phorphorous	Require as nutrient.	Non detect (<0.2 ppb U)	Insufficient nutrient to support biodegradation.
Manganese	Increase Compared to Background	Within plume center the levels ~ 2 ppm tapering off to ~ 0.1 ppm away from plume center.	Idicative of limited anaerobic bio within the plume's center.
Dechlorinating Bacteria	Persence of dechlorinating bacteria, dehalococcoides ethenogenes, dehalobacter, and associated functional genes of bio through reductive dechlorination.	Not Analyzed (RA(O) years 1, 2 and 3)	

6.3.4 EISB in the Western Plume

According to the installation, EISB, the recommended ROD's contingency remedial action plan for the western plume (Plot 187) was implemented in March and April of 2018. No data was available for analysis for the Fourth Five-Year Review.

6.4 Data Analysis Summary

EISB in the eastern plume appears to be effective only in the area where the amendments were applied, reducing the concentration and hence the mass loading of COCs. However, the footprints of the plumes appeared to increase in size. Although the footprints of the plumes increased in size, concentrations of COCs in downgradient perimeter wells remain non-detect. Restoration time of parent compounds (PCE and TCE) is reduced due to the reduction in concentration and mass of these compounds in the Shallow Groundwater Zone.

MNA in the western COCs plumes does not appear to be an effective remedy, as is evident by the increase in size of the COCs footprints. Several of the downgradient perimeter wells have COCs concentrations greater than MCL. Although the COCs footprint increased in size, the available analytical results from surface water monitoring are below the MCL. A more detailed summary for the conditions encountered at the western plume, and USACE recommendation for enhanced MNA is provided below in Appendix C section 7.8.2.

6.4.1 Eastern Plume

EISB treatment in the eastern plume area appears to be effectively reducing the VOC concentrations within the EISB treatment area. COCs concentrations in historical plume‘s center well 03WW01 reduced by orders of magnitude to non-detect 3 years after implementation of EISB. Although orders of magnitude reduction in PCE was observed in historical plume’s center well 35AWW08, PCE and TCE concentrations at the end of the reporting period (October 2016) remained above the MCL. VC was detected in October 2016 at 35AWW08 as well, indicating limited degradation of cis-1,2-DCE. Additional monitoring will be required to evaluate whether complete reductive dechlorination will occur. For details on spatial and temporal variation of COCs in the eastern plume, see sections 8.2.1 and 8.2.2.

The center of the eastern COCs plumes shifted from 03WW01/35AWW08 to .35AWW09/LHSMW04 (Plot 158 through Plot 165). Although concentrations of PCE and TCE immediately downgradient and cross-gradient of the eastern COCs plumes’ centers have increased in size, the mass loading of COCs from the plume center decreased due to the significant decrease in the maximum concentration of the parent COCs (PCE from level > 1500 µg/L to levels of 400 µg/L). For details on spatial and temporal variation of COCs in the eastern plume, see sections 8.2.1 and 8.2.2.

Geochemical parameters indicate that reductive dechlorination is taking place in the EISB treatment area. Alkalinity, methane and chloride levels are elevated in the EISB area, while ORP levels are depressed. In 2016, microbial counts were high within the EISB area, and TOC remained elevated above the threshold criteria for reductive dechlorination. However, complete reductive dechlorination to the end product is limited. Ethene was detected at low levels in only one plume center well, and ethane was nondetect for all samples. For detailed analysis of geochemical parameters, see Appendix C section 7.2.4.

Although the footprint of the eastern COCs plumes as delineated by the contoured MCLs shifted and appear to increase, the available network of monitoring wells are sufficient to define the extent of the COCs plumes exceeding the MCL. COCs in perimeter wells remain below the detection limits. COCs plumes do not extend to surface water bodies and restoration time of

parent compounds (PCE and TCE) has been reduced due to the reduction in concentration and mass of these compounds.

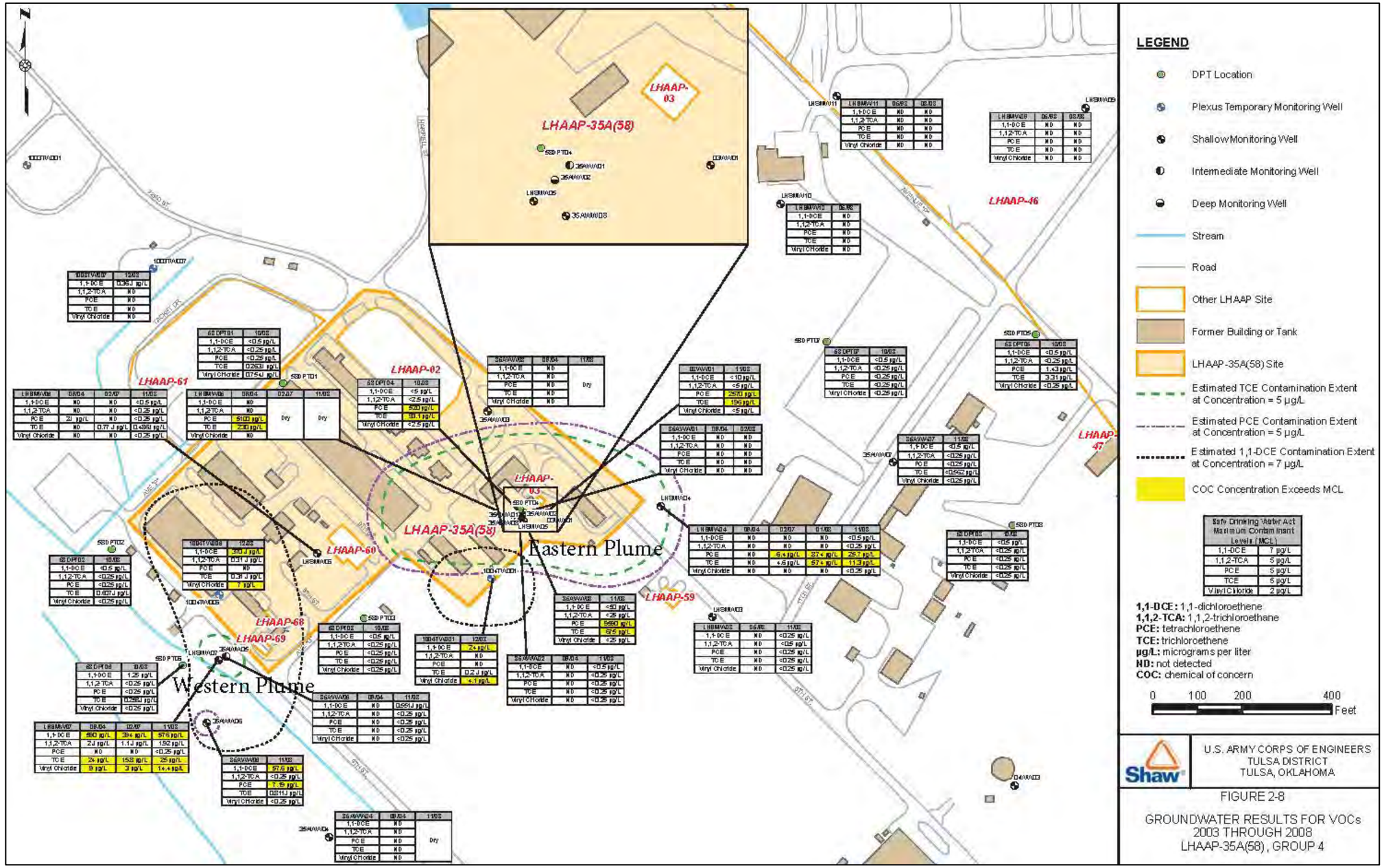
6.4.2 Western Plume

Concentrations of COCs in perimeter wells, 35AWW15, 35AWW16, 35AWW17, and 35AWW18, located away from the most impacted plume center well 35AWW20, and cross gradient well LHSMW07, remained non-detect. However, concentrations of 1,1-DCE in monitoring downgradient perimeter wells 35AWW14 and 35AWW19, increased from below the MCL of 7 ppb in October 2013 to a maximum level of ~ 17 ppb, slightly above the MCL, in October 2016, indicating plume expansion in the downgradient direction. Based on the interpreted southeastern groundwater flow direction, COC levels have generally increased with distance from the plume center. According to the 3rd year monitoring results, the lateral extent of the western plume is no longer defined in the area of downgradient perimeter wells 35AWW14 and 35AWW19.

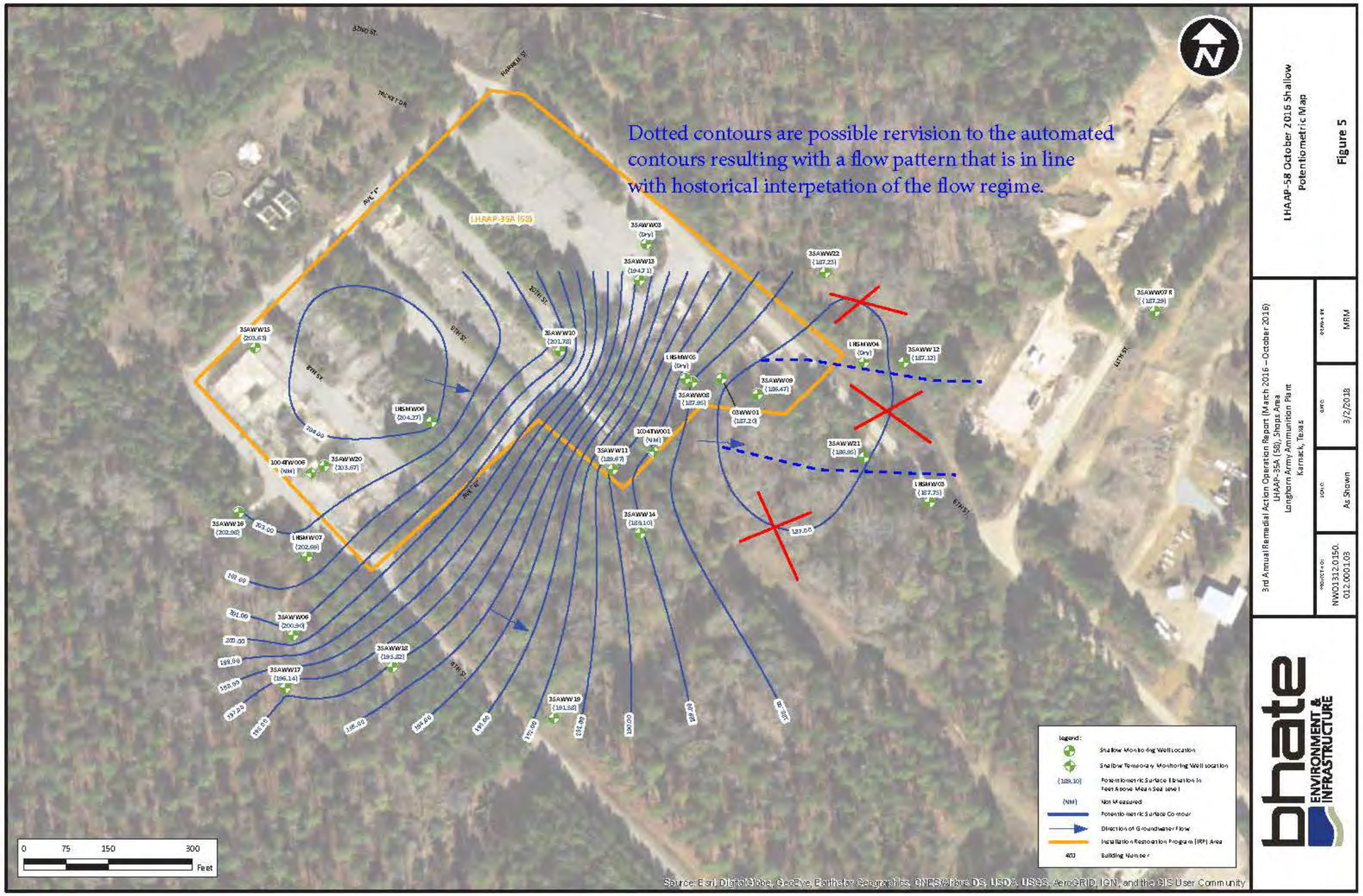
The plume center well (35AWW20) exhibits the highest levels of COCs, which first increased then decreased over the 3-year RA(O) monitoring period, except for VC, which exhibited an overall increasing trend (Plot 175 through Plot 178). The concentrations of COCs in cross gradient well LHSMW07 have increased (Plot 183 and Plot 184). The increase in concentrations of COCs in cross gradient well LHSMW07 indicates likely migration of COCs from the upgradient area of plume center well 35AWW20, to the area of cross gradient well LHSMW07. LHSMW07 is located adjacent to the surface water sampling location 35ASW03, a potential exposure point. Concentrations of COCs in surface water samples were below MCLs. Analytical results from 35ASW03 during the 1st, 2nd, and 3rd Year RA(O)s were below MCLs for all COCs that were detected in groundwater at the site. According to the RA(O) the surveyed bottom of the ditch at the lowest point is 213.58 ft above msl, while the gauged water level in nearest upgradient monitoring well 35AWW18 in April 2016 was 195.35 ft above msl. Therefore, the RA(O) recommended surface water sampling only if the groundwater elevation is at or above the bottom of the ditch.

The qualitative assessment of geochemical indicators and the absence of dechlorinating bacteria in the Shallow Groundwater Zone (outside of EISB zone) at LHAAP-35A (58) indicate aerobic conditions with elevated ORP, relatively low levels of methane, and TOC slightly above the Threshold value of 20 mg/L, adequate to support microbial activities (for details see Appendix C section 7.3.3). Therefore, current naturally occurring geochemical conditions are not optimal for MNA. Although, degradation products (1,1-DCE in 35AWW09; 1,1-DCE, cis-1,2-DCE, and VC in plume center well 35AWW20; and 1,1-DCE and VC in cross gradient well LHSMW07) have been detected in the western plume, conditions that currently exist within the impacted area do not sustain complete reductive dechlorination.

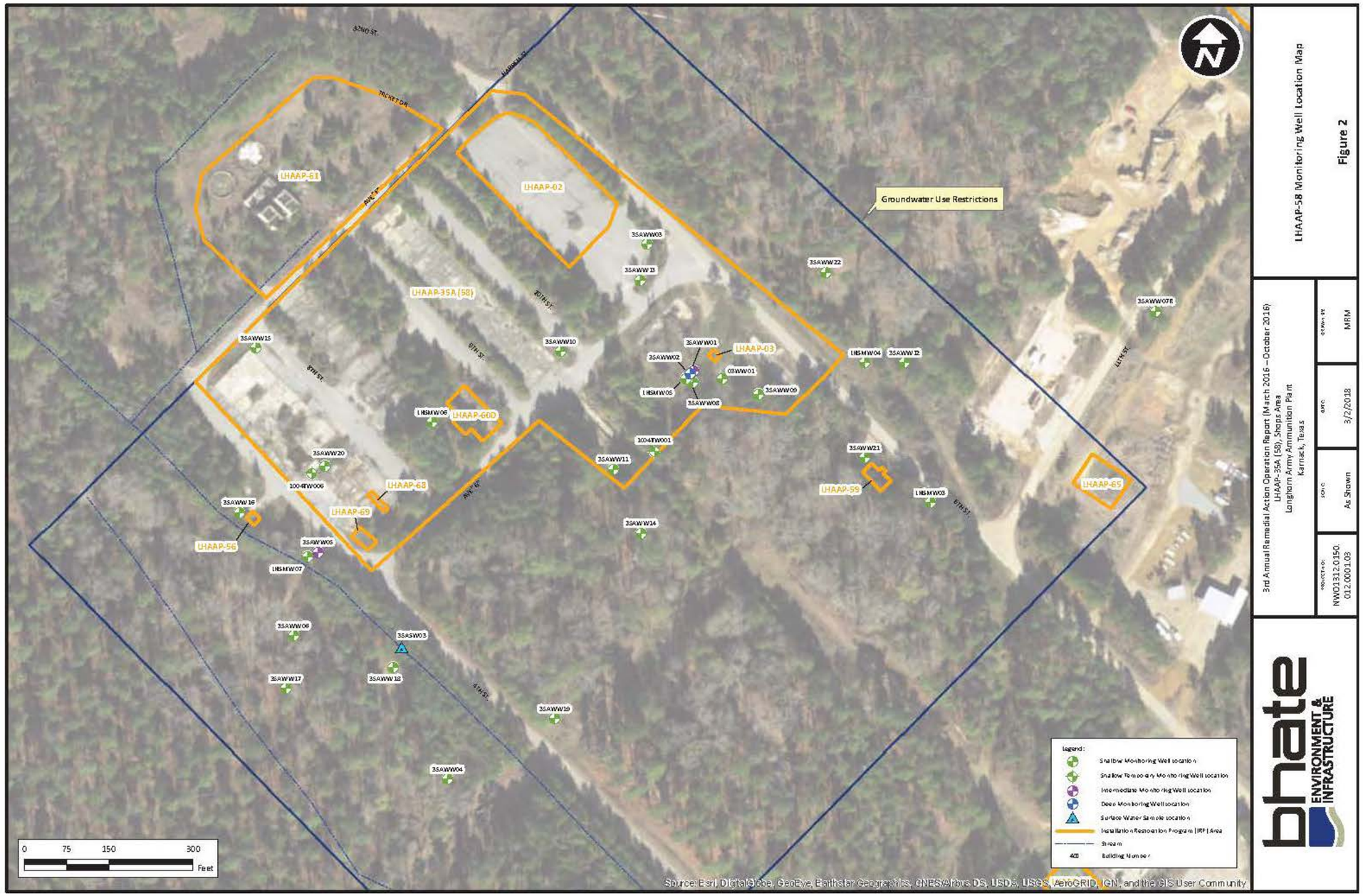
In order to address the noted increases in COCs trends in the western plume the installation indicated that in March and April 2018, they have implemented the ROD's contingency remedial action plan to enhanced MNA.



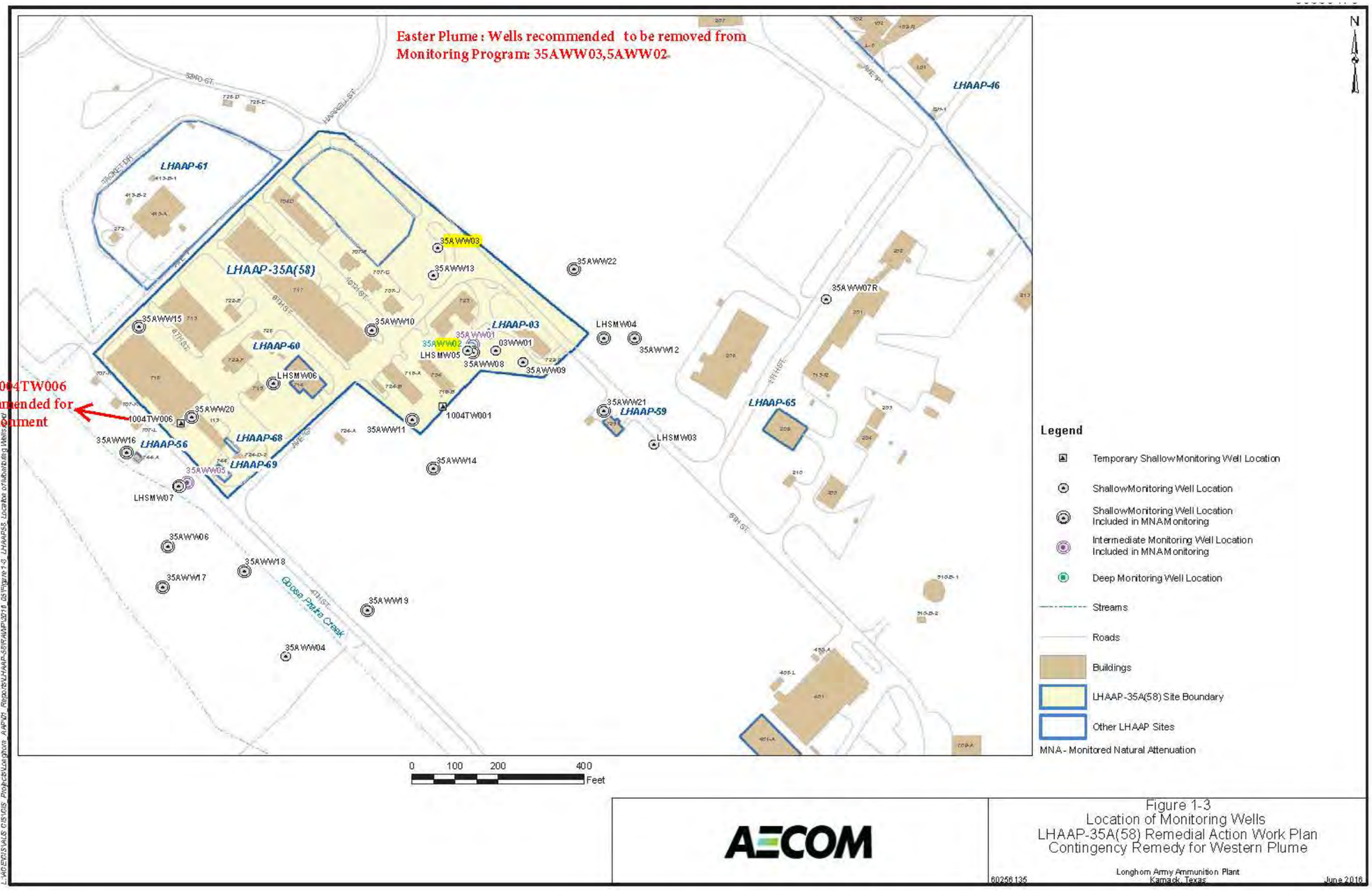
Plot 147. LHAAP-58 Western and Eastern plumes delineated in the ROD (US Army, 2010f).



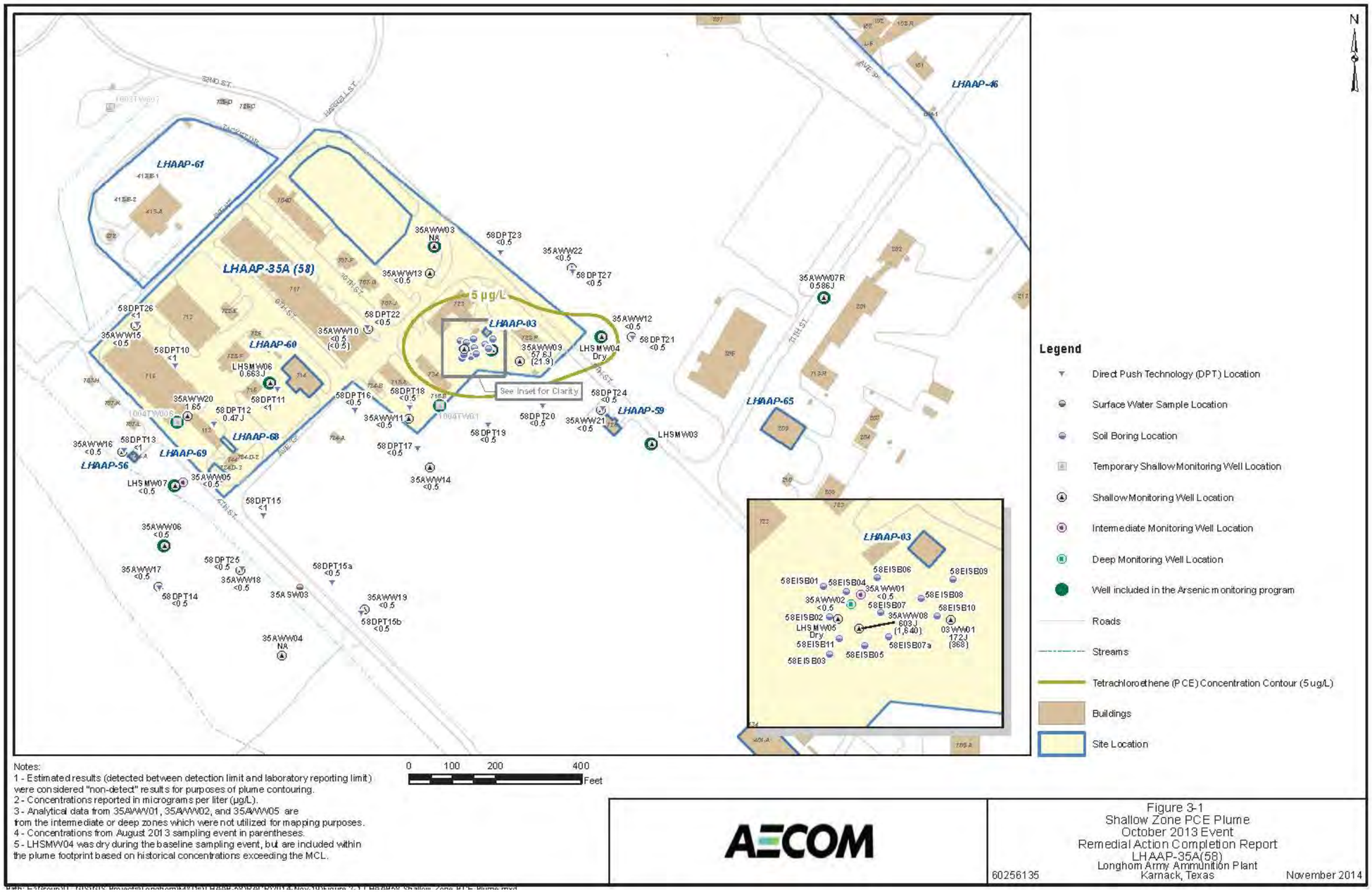
Plot 148. LHAAP-58 groundwater contours – October 2016 (Bhate, 2018a).



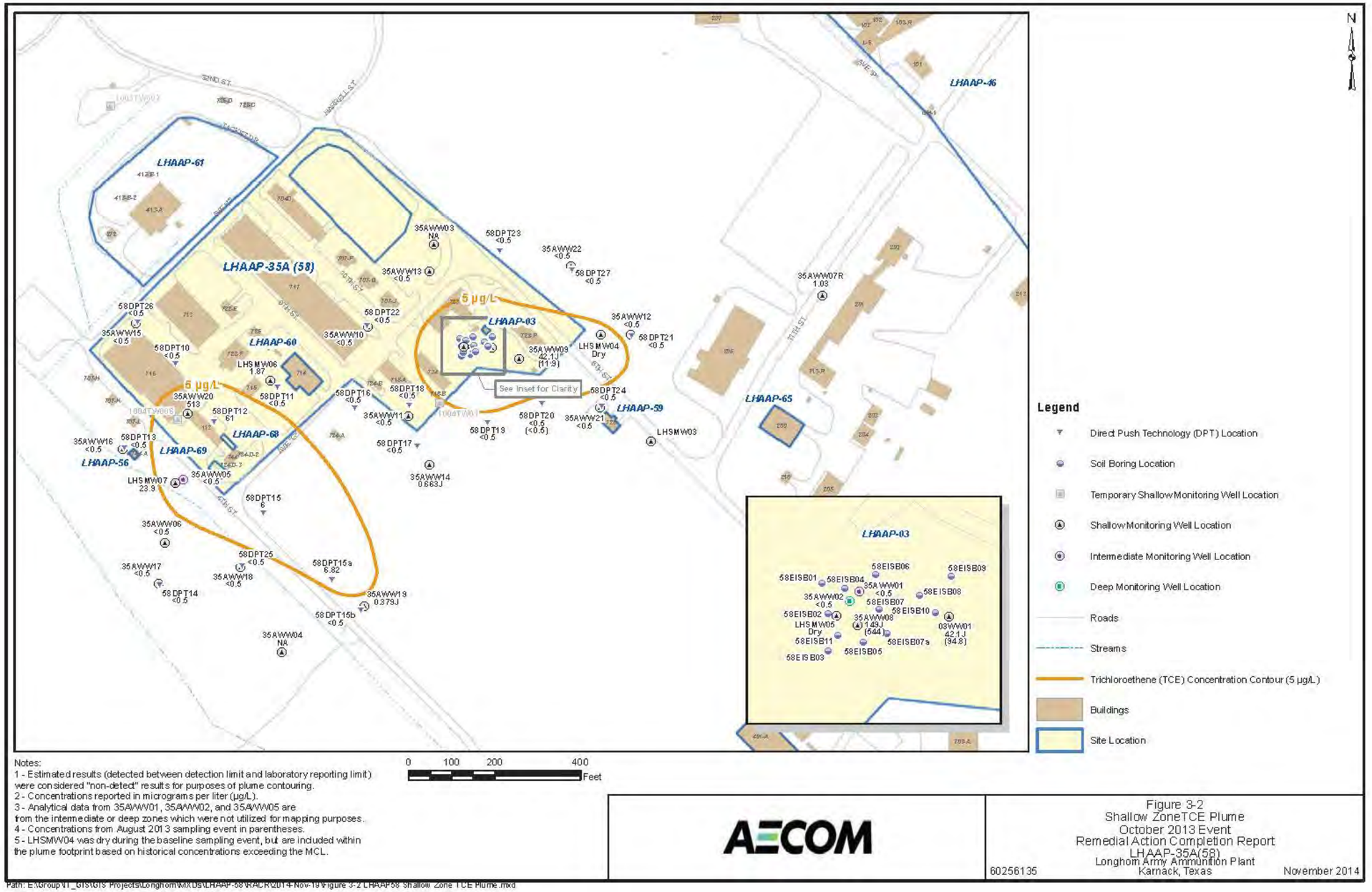
Plot 149. LHAAP-58 ditch and surface water sampling station (Bhate, 2018a).



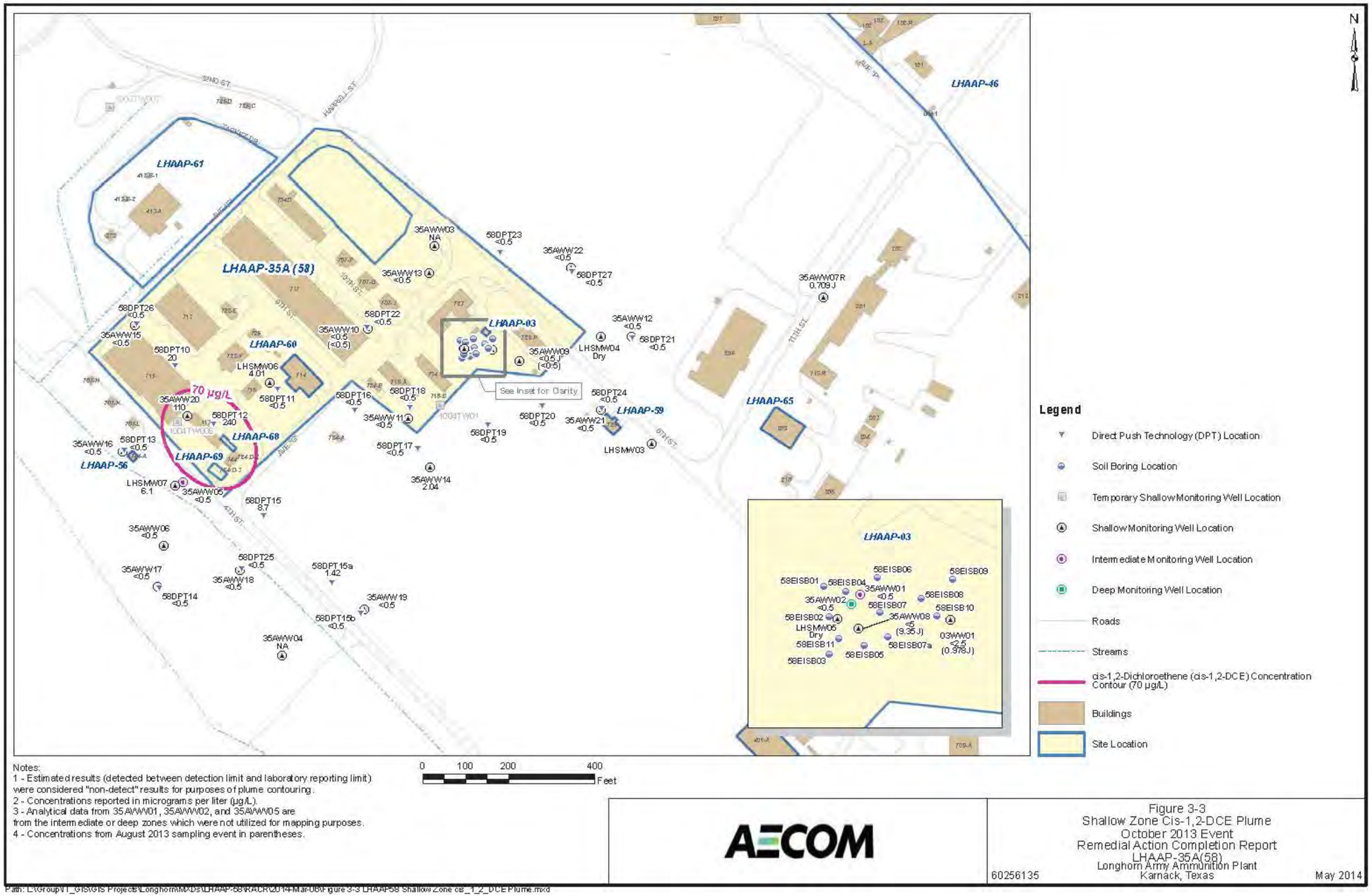
Plot 150. LHAAP-58 monitoring wells and proposed revisions to monitoring (AECOM, 2016l).



Plot 151. LHAAP-58 PCE Footprint – October 2013 (AECOM , 2015f)



Plot 152. LHAAP-58 TCE Footprints – October 2013 (AECOM, 2015f)



Notes:
1 - Estimated results (detected between detection limit and laboratory reporting limit) were considered "non-detect" results for purposes of plume contouring.
2 - Concentrations reported in micrograms per liter (µg/L).
3 - Analytical data from 35AWW01, 35AWW02, and 35AWW05 are from the intermediate or deep zones which were not utilized for mapping purposes.
4 - Concentrations from August 2013 sampling event in parentheses.

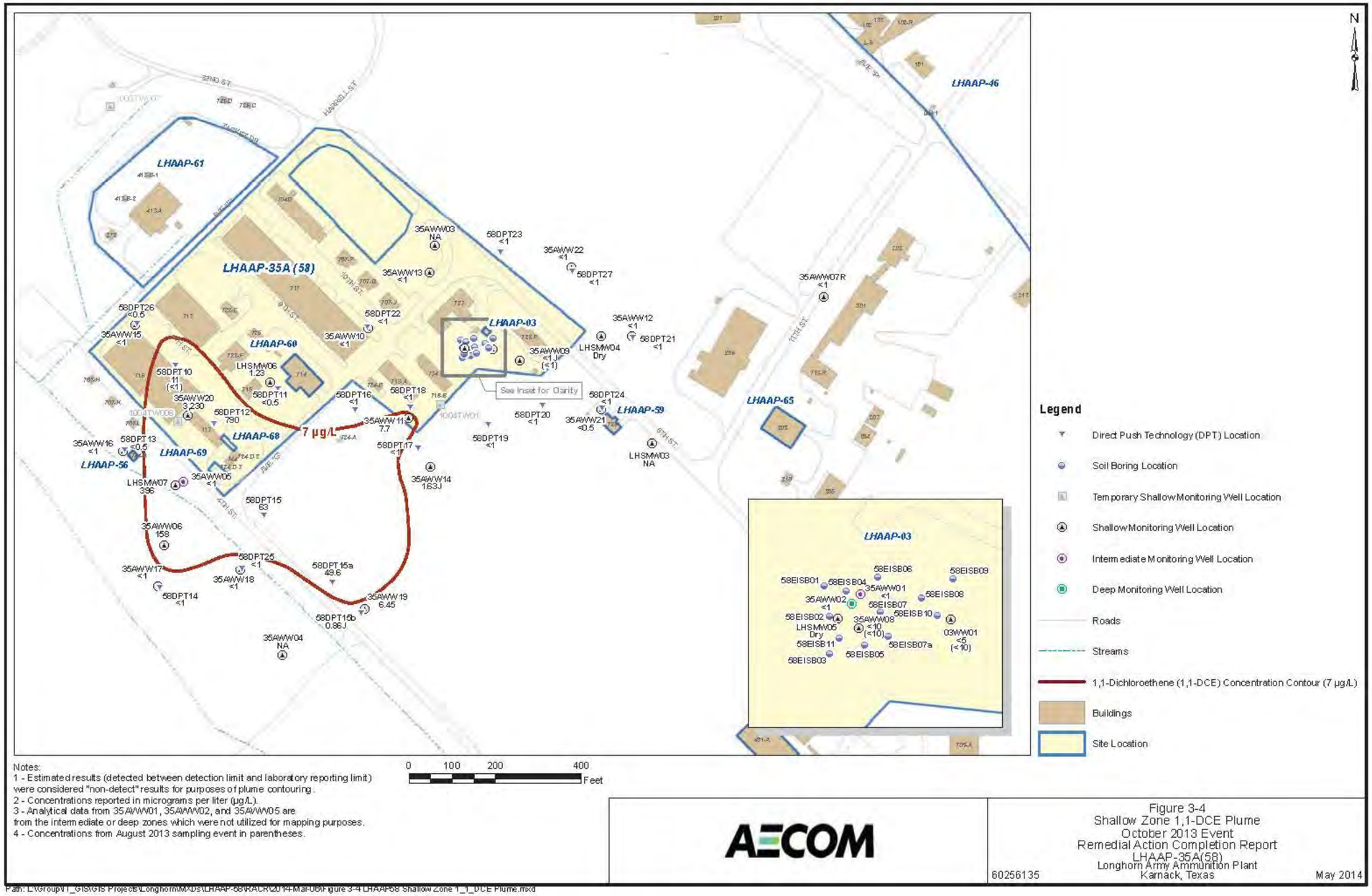
AECOM

Figure 3-3
Shallow Zone Cis-1,2-DCE Plume
October 2013 Event
Remedial Action Completion Report
LHAAP-35A(58)
Longhorn Army Ammunition Plant
Karnack, Texas

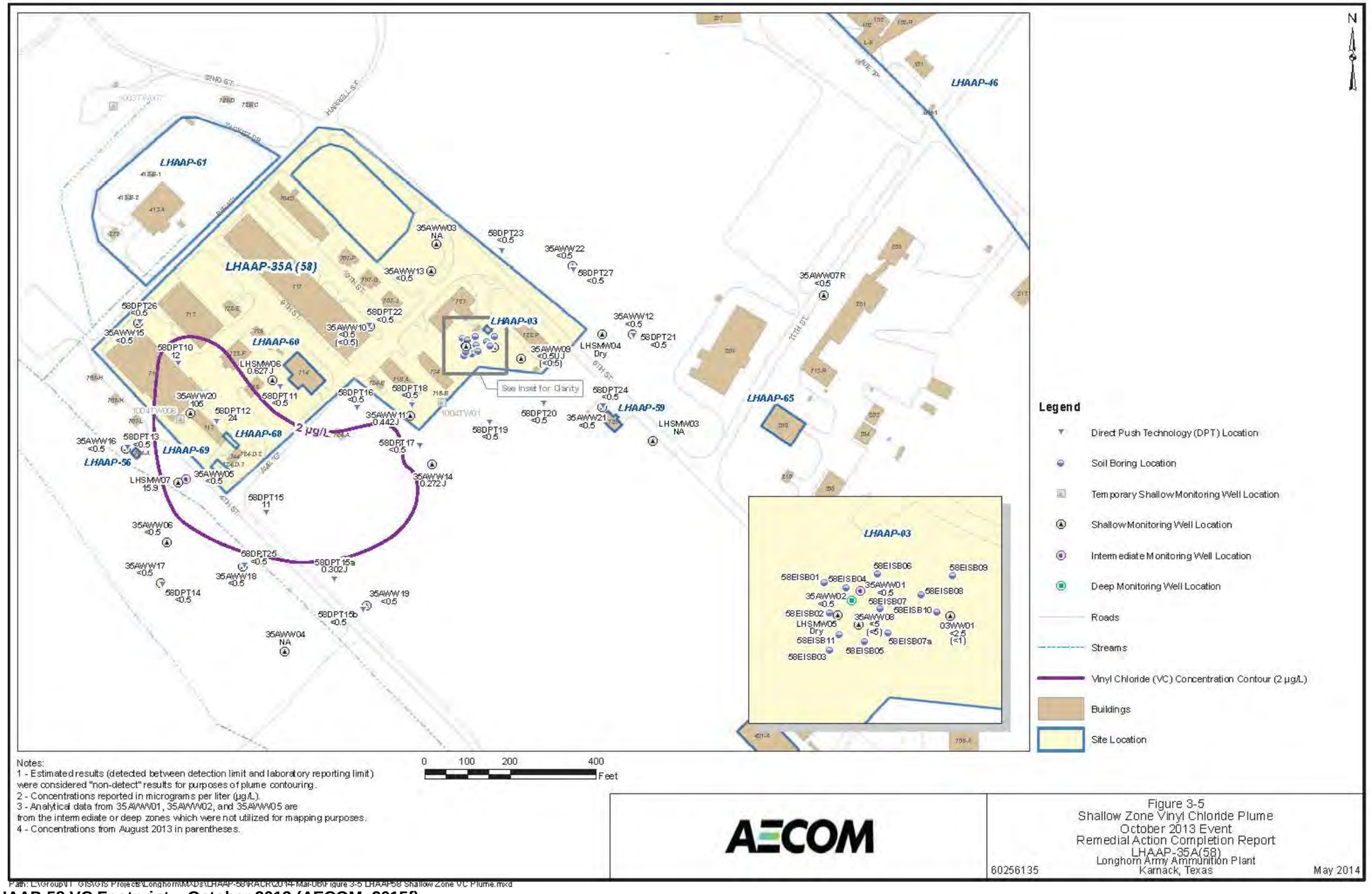
60256135 May 2014

Path: L:\Group\T_GIS\GIS Projects\LonghornMXDs\LHAAP-58\RACR\2014-Mar-06\Figure 3-3 LHAAP-58 Shallow Zone cis_1_2_DCE Plume.mxd

Plot 153. LHAAP-58 cis-1,2 DCE Footprint – October 2013 (AECOM, 2015f)



Plot 154. LHAAP-58 1,1-DCE Footprint – October 2013 (AECOM, 2015f)



Notes:
1 - Estimated results (detected between detection limit and laboratory reporting limit) were considered "non-detect" results for purposes of plume contouring.
2 - Concentrations reported in micrograms per liter (µg/L).
3 - Analytical data from 35AWW01, 35AWW02, and 35AWW05 are from the intermediate or deep zones which were not utilized for mapping purposes.
4 - Concentrations from August 2013 in parentheses.

AECOM

Figure 3-5
Shallow Zone Vinyl Chloride Plume
October 2013 Event
Remedial Action Completion Report
LHAAP-35A(58)
Longhorn Army Ammunition Plant
Karnack, Texas

60256135 May 2014

Path: L:\Group\1 GIS\GIS Projects\LonghornMXDs\LHAAP-58\RACR\2014-Mar-06\Figure 3-5 LHAAP-58 Shallow Zone VC Plume.mxd

Plot 155. LHAAP-58 VC Footprint – October 2013 (AECOM, 2015f)

Table 4-2: LHAAP-35A (58) Field Parameters and Biogeochemical Data - August 2013

Sample ID: / Sample Date:	Units	03WW01-082013 8/20/2013	35AWW08-082013 8/20/2013	35AWW09-082813 8/29/2013	35AWW09F-082813 8/29/2013	35AWW10-082813 8/29/2013	35AWW10F-082813 8/29/2013
Water Quality Parameters							
Temperature	°C	26.19 B	23.44 B	27.7	NA	26.77	NA
pH	pH Units	6.18 B	6.05 B	6.32	NA	6.92	NA
Conductivity	mS/cm	3.64 B	8.23 B	7.2	NA	1.39	NA
Dissolved Oxygen	mg/L	NA B	NA B	1.62	NA	5.69	NA
Turbidity	NTU	33 B	26.9 B	20.8	NA	1.3	NA
Oxidation Reduction Potential	mV	246 B	112 B	106	NA	96	NA
Ferrous Iron, Field	mg/L	0.78 B	0.52 B	NA	NA	NA	NA
Alkalinity (310.2)							
Alkalinity, Total	mg/L	142	174	250	NA	379	NA
Nitrogen (353.2)							
Nitrogen, Nitrate-Nitrite	mg/L	NA	NA	0.201	NA	0.455	NA
Phosphorus (365.4)							
Phosphorus	mg/L	<0.2 U	0.178 J	0.351 J	NA	0.412	NA
Sulfide (376.1)							
Sulfide	mg/L	<1 U	1.2 J	1.75 J	NA	<1 U	NA
Total Organic Carbon (415.1)							
Total Organic Carbon (TOC)	mg/L	10.5	16.5	5.77	NA	3.84	NA
Metals (6010C)							
Iron	mg/L	<0.1 U	4.2	<0.1 U	NA	<0.1 U	NA
Dissolved Metals (6010C)							
Iron	mg/L	<0.1 U	4.75	NA	<0.1 U	NA	<0.1 U
Metals (6020A)							
Manganese	mg/L	0.0589	5.57	0.361	NA	0.0814	NA
Dissolved Metals (6020A)							
Manganese	mg/L	0.0561	5.71	NA	0.341	NA	0.0730
Volatile Fatty Acids (830-MBA)							
Acetic Acid	mg/L	<1 U	<1 U	<1 U	NA	<1 U	NA
Butyric Acid	mg/L	<1 U	<1 U	<1 U	NA	<1 U	NA
Lactic Acid	mg/L	<1 U	<1 U	<1 U	NA	<1 U	NA
Propionic Acid	mg/L	<10 U	<10 U	<10 U	NA	<10 U	NA
Pyruvic Acid	mg/L	<0.1 U	<0.1 U	<0.1 U	NA	<0.1 U	NA

Table 4-2: LHAAP-35A (58) Field Parameters and Biogeochemical Data - August 2013

Sample ID: / Sample Date:	Units	03WW01-082013 8/20/2013	35AWW08-082013 8/20/2013	35AWW09-082813 8/29/2013	35AWW09F-082813 8/29/2013	35AWW10-082813 8/29/2013	35AWW10F-082813 8/29/2013
Anions (9056)							
Chloride	mg/L	892	2510	1970	NA	195	NA
Nitrate	mg/L	<1 U	<4 U	<1 U	NA	<1 U	NA
Nitrite	mg/L	<1 U	<4 U	<1 U	NA	<1 U	NA
Sulfate	mg/L	534	1480	1070	NA	209	NA
Dechlorinating Bacteria							
Dehalococcoides	CEQ/mL	1.2	<0.9	18.4	NA	31.1	NA
tceA Reductase	CEQ/mL	<0.5	<0.9	<0.5	NA	<0.5	NA
BAV1 Vinyl Chloride Reductase	CEQ/mL	<0.5	<0.9	<0.5	NA	<0.5	NA
Vinyl Chloride Reductase	CEQ/mL	<0.5	<0.9	<0.5	NA	0.2 J	NA
Dehalobacter spp.	CEQ/mL	0.4 J	<5.3	0.3 J	NA	1.6 J	NA
Dissolved Gases (RSK-175)							
Carbon Dioxide	ug/L	143000	149000	150000	NA	61000	NA
Ethane	ug/L	<2 U	<2 U	<2 U	NA	<2 U	NA
Ethene	ug/L	<2 U	<2 U	<2 U	NA	<2 U	NA
Methane	ug/L	3.22 J	<2 U	31.5	NA	3.79 J	NA
Ferrous Iron (SM3500FE)							
Ferrous Iron	mg/L	<0.04 U	<0.04 U	<0.04 U	NA	<0.04 U	NA

Table 5-2: LHAAP-35A (58) Monitoring Well Field Parameters and Biogeochemical Data - October 2013

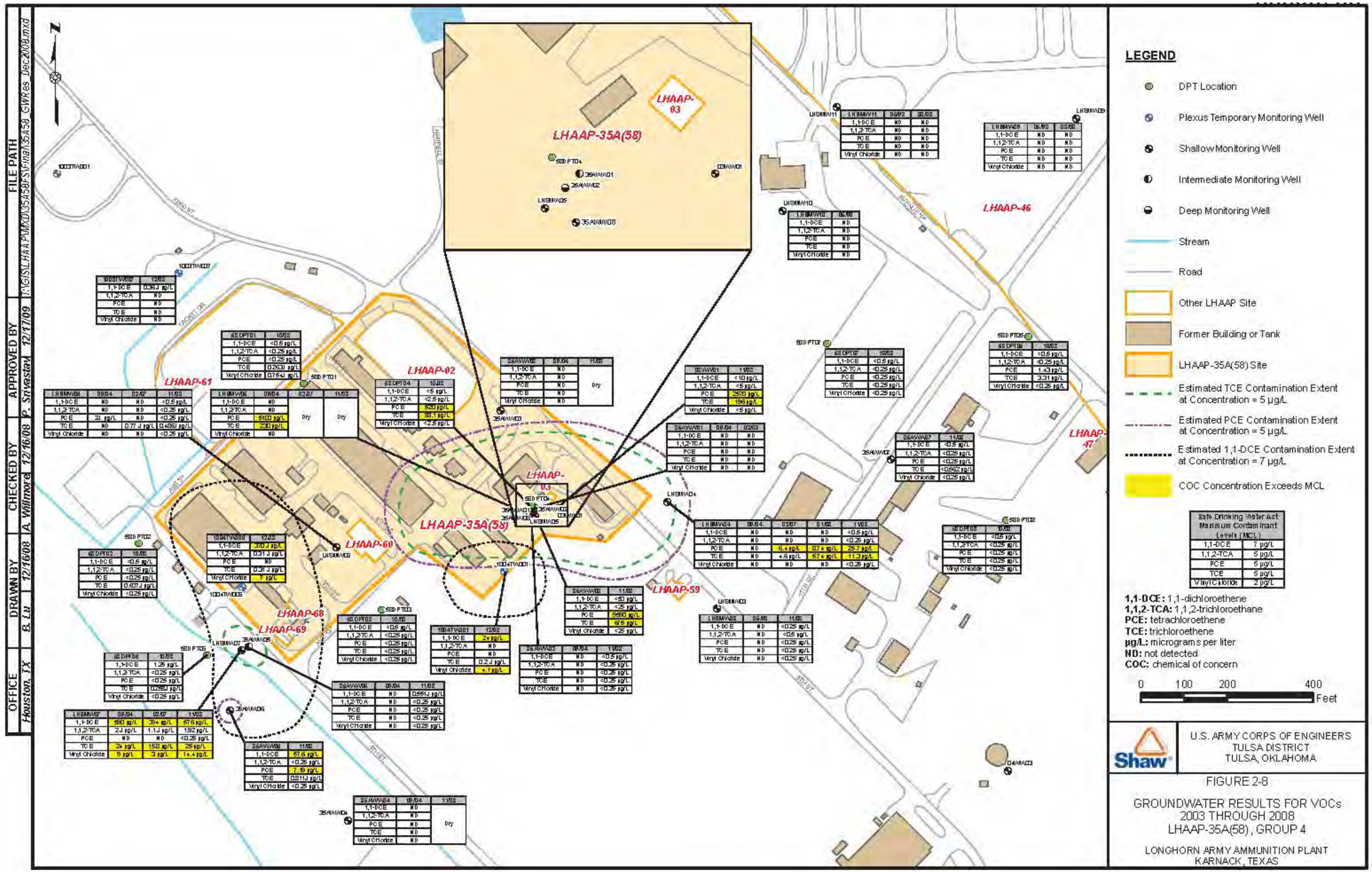
Sample ID: / Sample Date:	Units	03WW01-101013 10/10/2013	03WW01F-101013 10/10/2013	35AWW01-101113 10/11/2013	35AWW02-102213 10/22/2013	35AWW05-101613 10/16/2013	35AWW06-101513 10/15/2013	35AWW06F-101513 10/15/2013	35AWW07R-101613 10/16/2013	35AWW08-101013 10/10/2013	35AWW08F-101013 10/10/2013	35AWW09-101013 10/10/2013	35AWW09F-101013 10/10/2013
Water Quality Parameters													
Temperature	°C	17.4	NA	25.58	22.72	21.05	21.39	NA	20.83	16.82	NA	19.67	NA
pH	pH Units	6.55	NA	7.06	8.12	6.95	6.56	NA	7.54	6.7	NA	5.43	NA
Conductivity	mS/cm	39.2	NA	0.576	0.875	3.05	6.73	NA	0.205	47.7	NA	7.68	NA
Dissolved Oxygen	mg/L	NA B	NA B	0.85	1.3	0.67	1.05	NA	NA B	NA B	NA B	1.53	NA
Turbidity	NTU	10	NA	131	7.3	16.5	0	NA	197	4.1	NA	40.5	NA
Oxidation Reduction Potential	mV	-235	NA	-23	89	-141	96	NA	198	-100	NA	182	NA
Alkalinity (310.2)													
Alkalinity, Total	mg/L	39700	NA	NA	NA	NA	582	NA	NA	35600	NA	235	NA
Nitrogen (353.2)													
Nitrogen, Nitrate-Nitrite	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phosphorus (365.4)													
Phosphorus	mg/L	243	NA	NA	NA	NA	<0.2 U	NA	NA	361	NA	<0.2 U	NA
Sulfide (376.1)													
Sulfide	mg/L	1.58 J	NA	NA	NA	NA	0.82 J	NA	NA	1.89 J	NA	<1 U	NA
Total Organic Carbon (415.1)													
Total Organic Carbon (TOC)	mg/L	69200	NA	NA	NA	NA	6.35	NA	NA	65400	NA	9.83	NA
Metals (6010C)													
Iron	mg/L	36.6	NA	NA	NA	NA	0.159 J	NA	NA	29.7	NA	NA	<0.1 U
Dissolved Metals (6010C)													
Iron	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals (6020A)													
Manganese	mg/L	50.4	NA	NA	NA	NA	0.278	NA	NA	45.8	NA	NA	0.23
Dissolved Metals (6020A)													
Manganese	mg/L	NA	55.2	NA	NA	NA	NA	0.191	NA	NA	40.7	NA	0.234
Volatile Fatty Acids (830-MBA)													
Acetic Acid	mg/L	3486	NA	NA	NA	NA	NA	NA	NA	776	NA	<1 U	NA
Butyric Acid	mg/L	<100 U	NA	NA	NA	NA	NA	NA	NA	<100 U	NA	<1 U	NA
Lactic Acid	mg/L	97100	NA	NA	NA	NA	NA	NA	NA	89700	NA	<1 U	NA
Propionic Acid	mg/L	<1000 U	NA	NA	NA	NA	NA	NA	NA	<1000 U	NA	<10 U	NA
Pyruvic Acid	mg/L	61.5	NA	NA	NA	NA	NA	NA	NA	61.7	NA	<0.1 U	NA
Anions (9056)													
Chloride	mg/L	398	NA	NA	NA	NA	1120	NA	NA	905	NA	1730	NA
Nitrate	mg/L	<20 U	NA	NA	NA	NA	<4 U	NA	NA	12.3 J	NA	<2 U	NA
Nitrite	mg/L	<20 U	NA	NA	NA	NA	<4 U	NA	NA	<20 U	NA	<2 U	NA
Sulfate	mg/L	487	NA	NA	NA	NA	1650	NA	NA	703	NA	1170	NA

Table 5-2: LHAAP-35A (58) Monitoring Well Field Parameters and Biogeochemical Data - October 2013

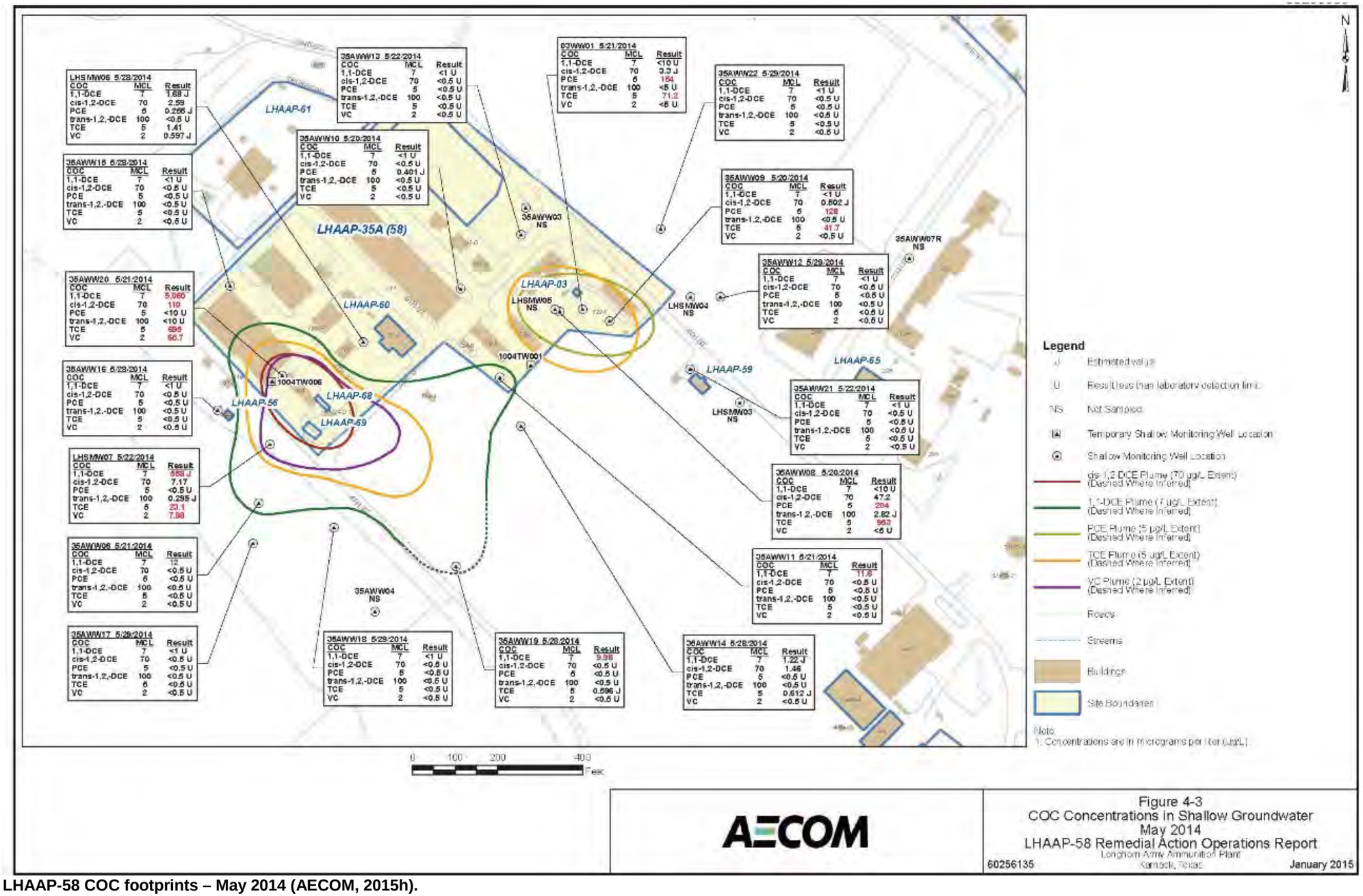
Sample ID: / Sample Date:	Units	03WW01-101013 10/10/2013	03WW01F-101013 10/10/2013	35AWW01-101113 10/11/2013	35AWW02-102213 10/22/2013	35AWW05-101613 10/16/2013	35AWW06-101513 10/15/2013	35AWW06F-101513 10/15/2013	35AWW07R-101613 10/16/2013	35AWW08-101013 10/10/2013	35AWW08F-101013 10/10/2013	35AWW09-101013 10/10/2013	35AWW09F-101013 10/10/2013
Dechlorinating Bacteria													
Dehalococcoides	CEQ/mL	<2.1	NA	NA	NA	NA	NA	NA	NA	3.6	NA	4	NA
tceA Reductase	CEQ/mL	<2.1	NA	NA	NA	NA	NA	NA	NA	2.65	NA	0.3 J	NA
BAV1 Vinyl Chloride Reductase	CEQ/mL	<2.1	NA	NA	NA	NA	NA	NA	NA	<2.2	NA	<0.5	NA
Vinyl Chloride Reductase	CEQ/mL	<2.1	NA	NA	NA	NA	NA	NA	NA	<2.2	NA	<0.5	NA
Dehalobacter spp.	CEQ/mL	15.7 J	NA	NA	NA	NA	NA	NA	NA	1300	NA	<4.7	NA
Dissolved Gases (RSK-175)													
Carbon Dioxide	ug/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethane	ug/L	<2 U	NA	NA	NA	NA	<2 U	NA	NA	<2 U	NA	<2 U	NA
Ethene	ug/L	<2 U	NA	NA	NA	NA	<2 U	NA	NA	<2 U	NA	<2 U	NA
Methane	ug/L	4.35 J	NA	NA	NA	NA	4.01 J	NA	NA	5.38	14.3	14.3	NA
Ferrous Iron (SM3500FE)													
Ferrous Iron	mg/L	95.3 J	NA	NA	NA	NA	<0.04 U	NA	NA	52.4 J	NA	<0.04 U	NA

Note: Samples were not collected for LHAWW08 and LHDMW08 as they were dry.
B - Blank-Corrected Sample

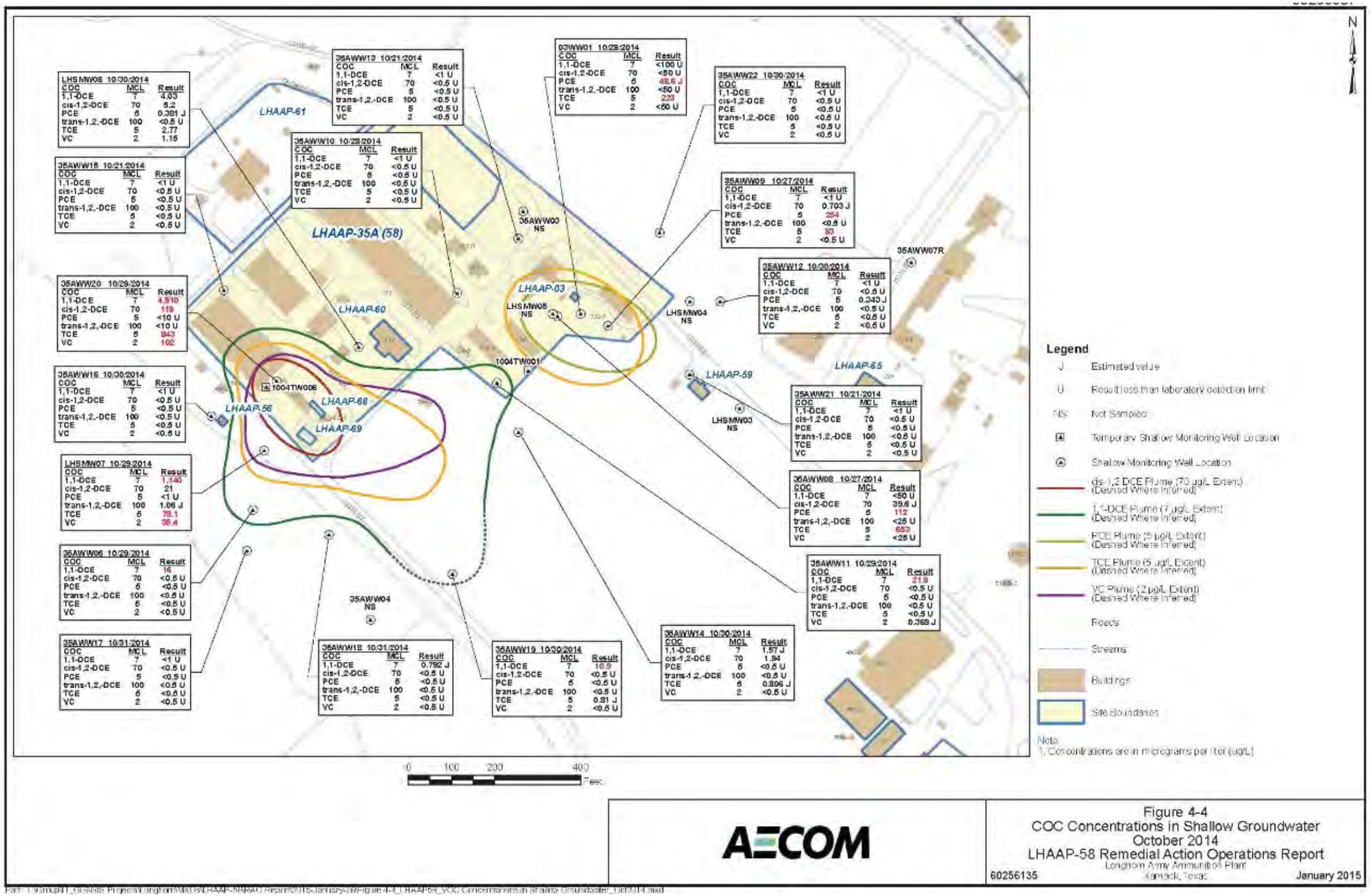
Plot 156. LHAAP-58 field and biogeochemical parameters pre (August 2013) and post (October 2013) EISB in the Eastern Plume (AECOM, 2015f).



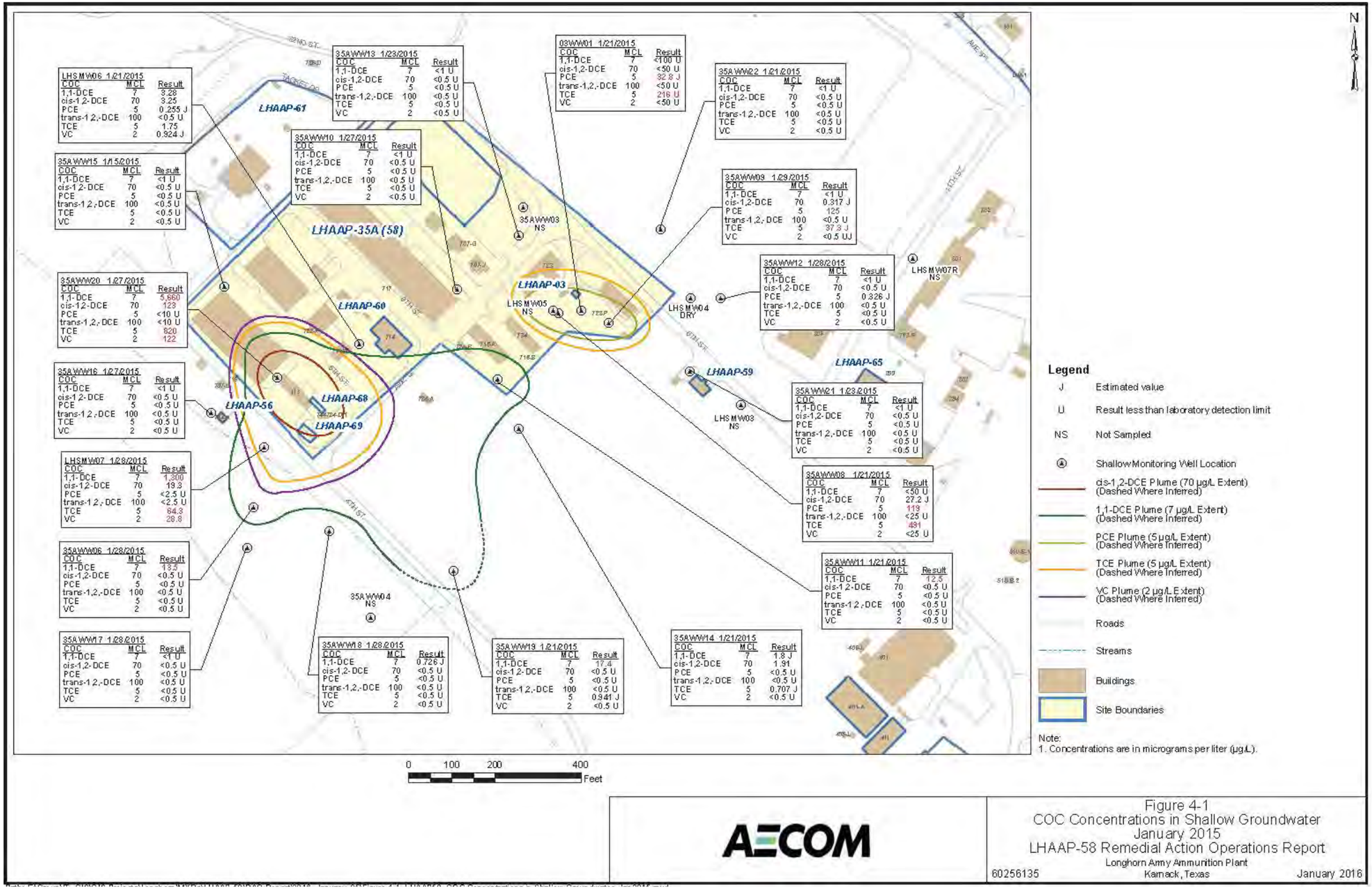
Plot 157. LHAAP-58 COC Footprints - 2003 through 2008 (US Army, 2010f).



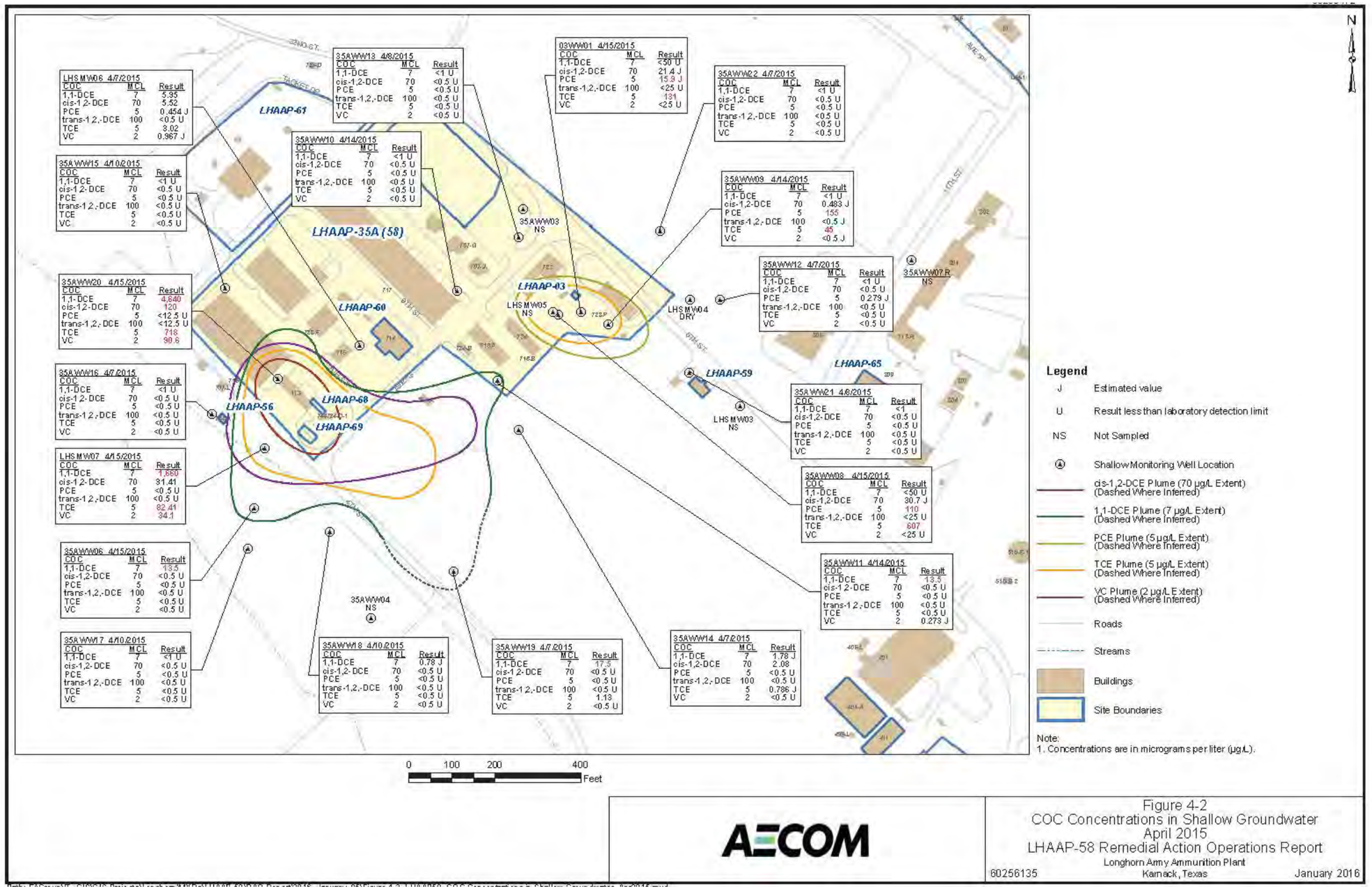
Plot 158. LHAAP-58 COC footprints – May 2014 (AECOM, 2015h).



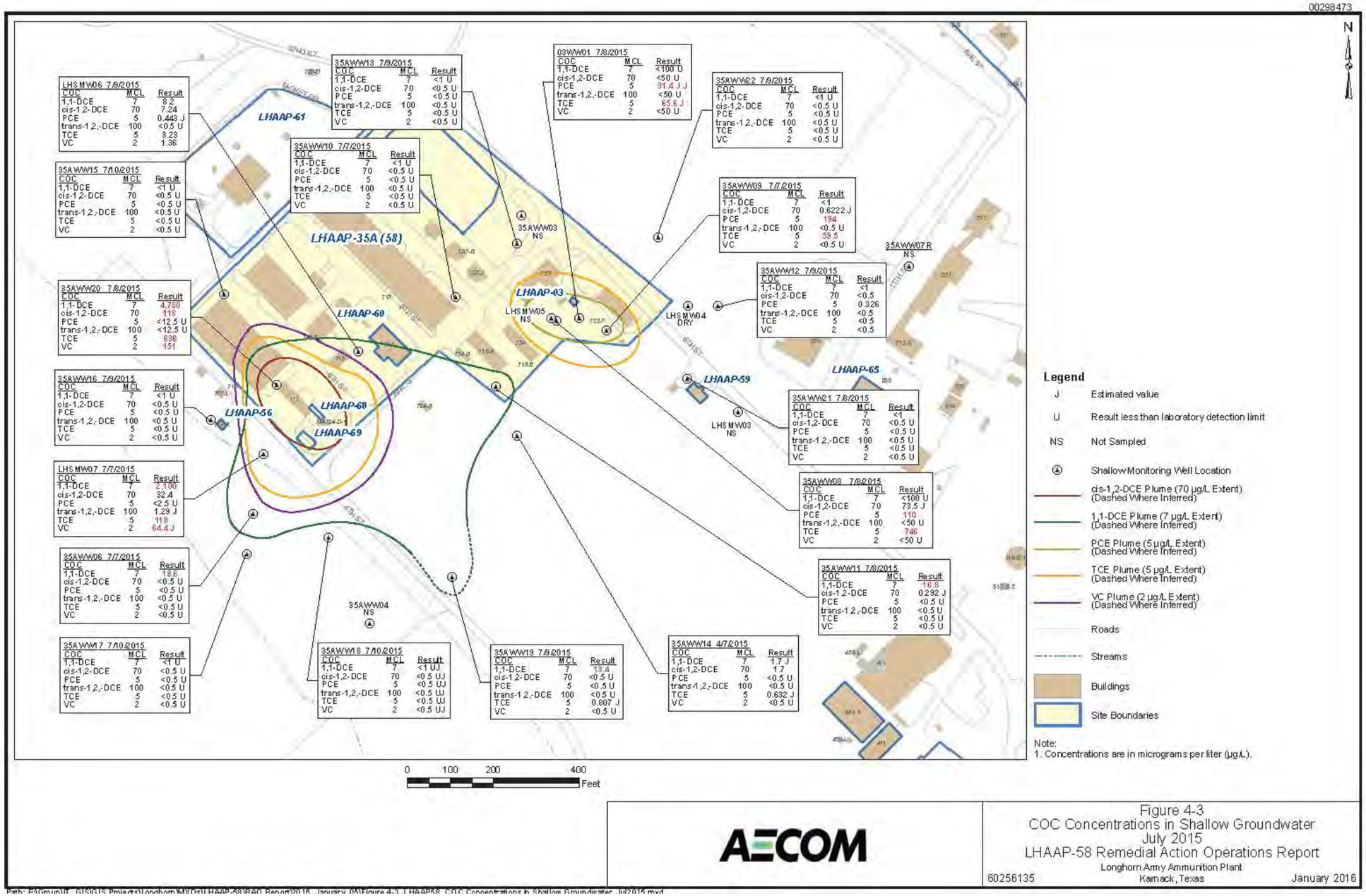
Plot 159. LHAAP-58 COC footprints – May 2014 (AECOM, 2015h).



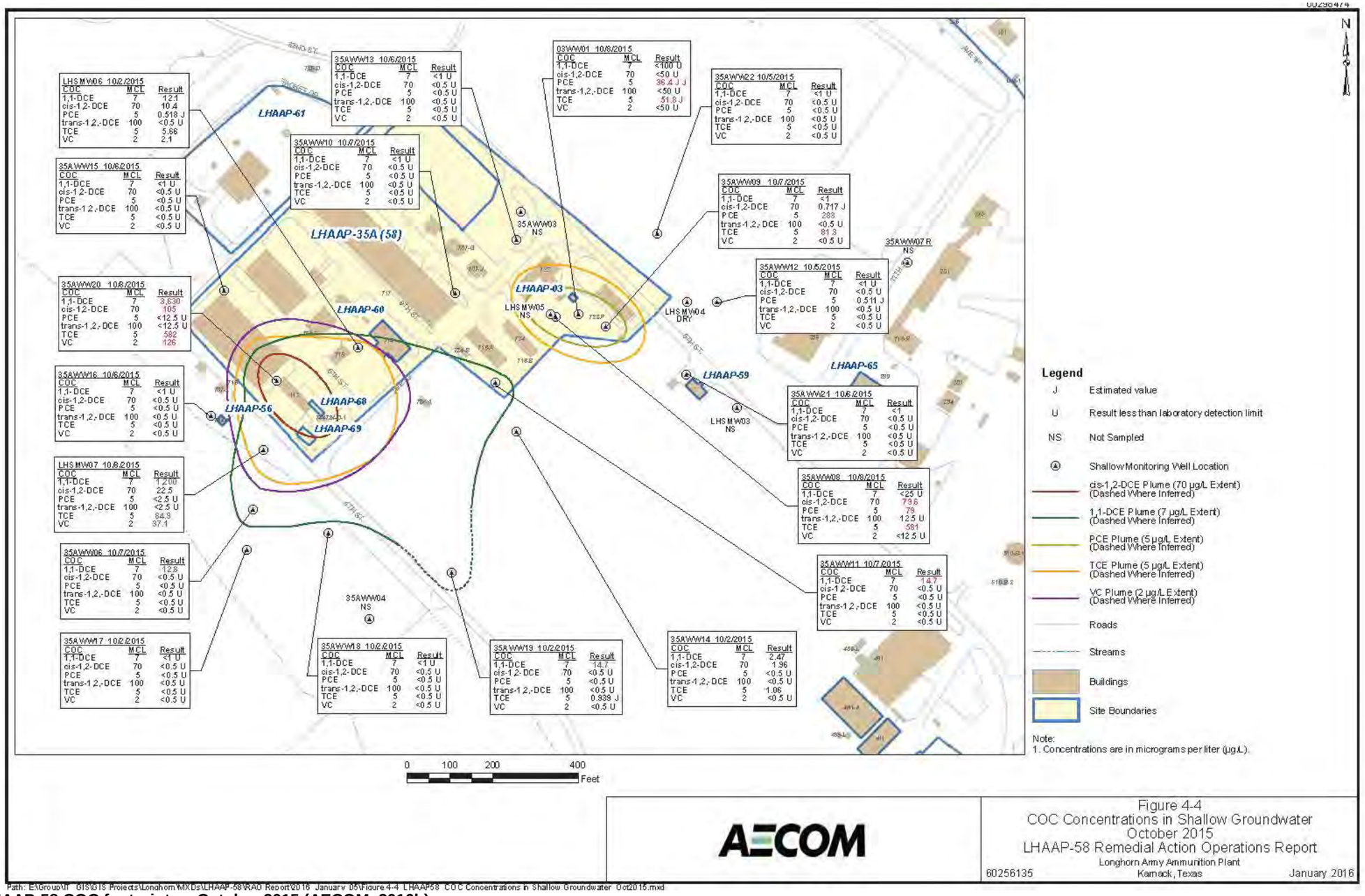
Plot 160. LHAAP-58 COC footprints – January 2015 (AECOM, 2016h).



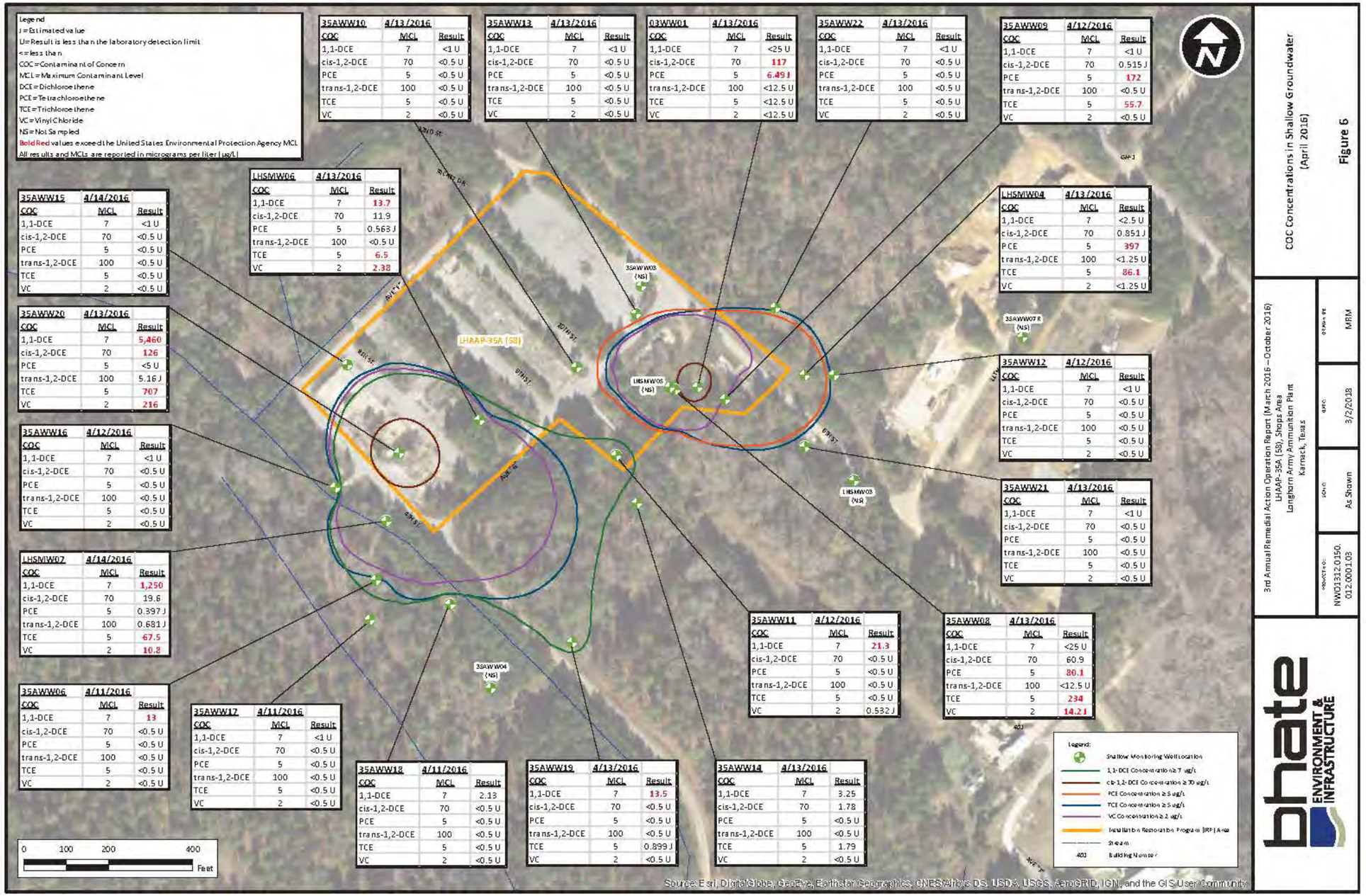
Plot 161. LHAAP-58 COC footprints – April 2015 (AECOM, 2016h).



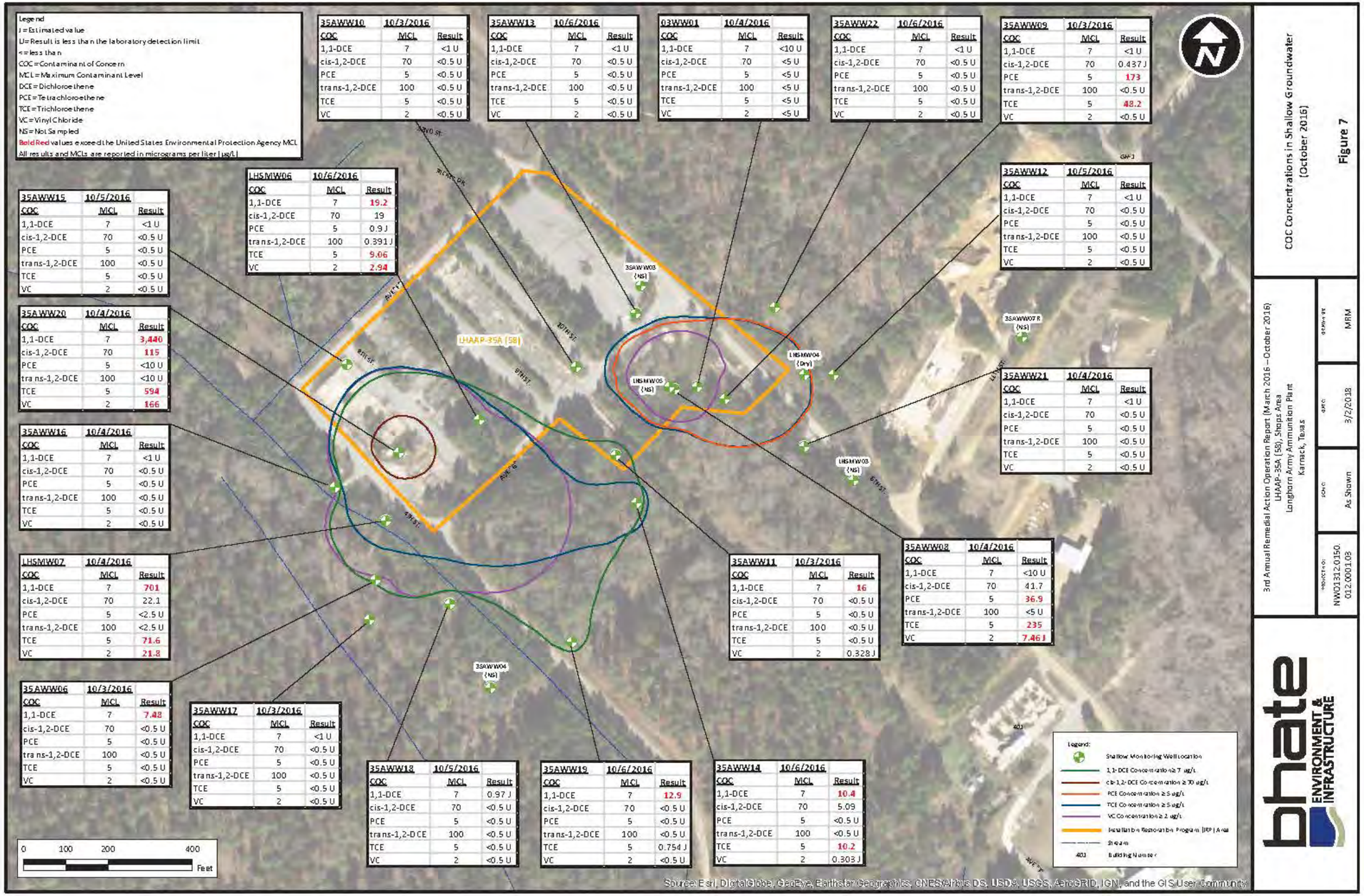
Plot 162. LHAAP-58 COC footprints – July 2015 (AECOM, 2016h)



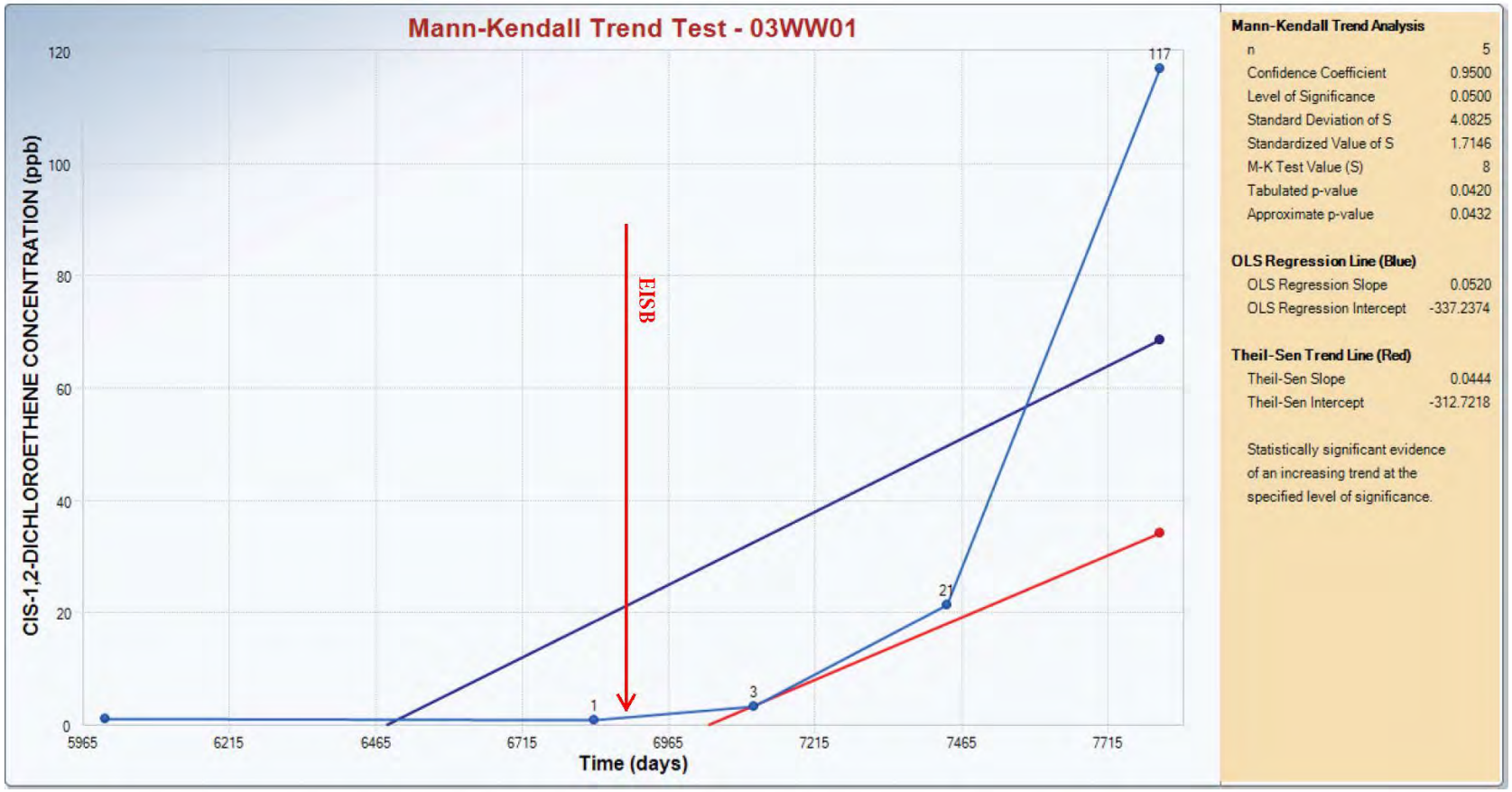
Plot 163. LHAAP-58 COC footprints – October 2015 (AECOM, 2016h)



Plot 164. LHAAP-58 COC footprints – April 2016 (Bhate, 2018a).



Plot 165. LHAAP-58 COC footprints – October 2016 (Bhate, 2018a).

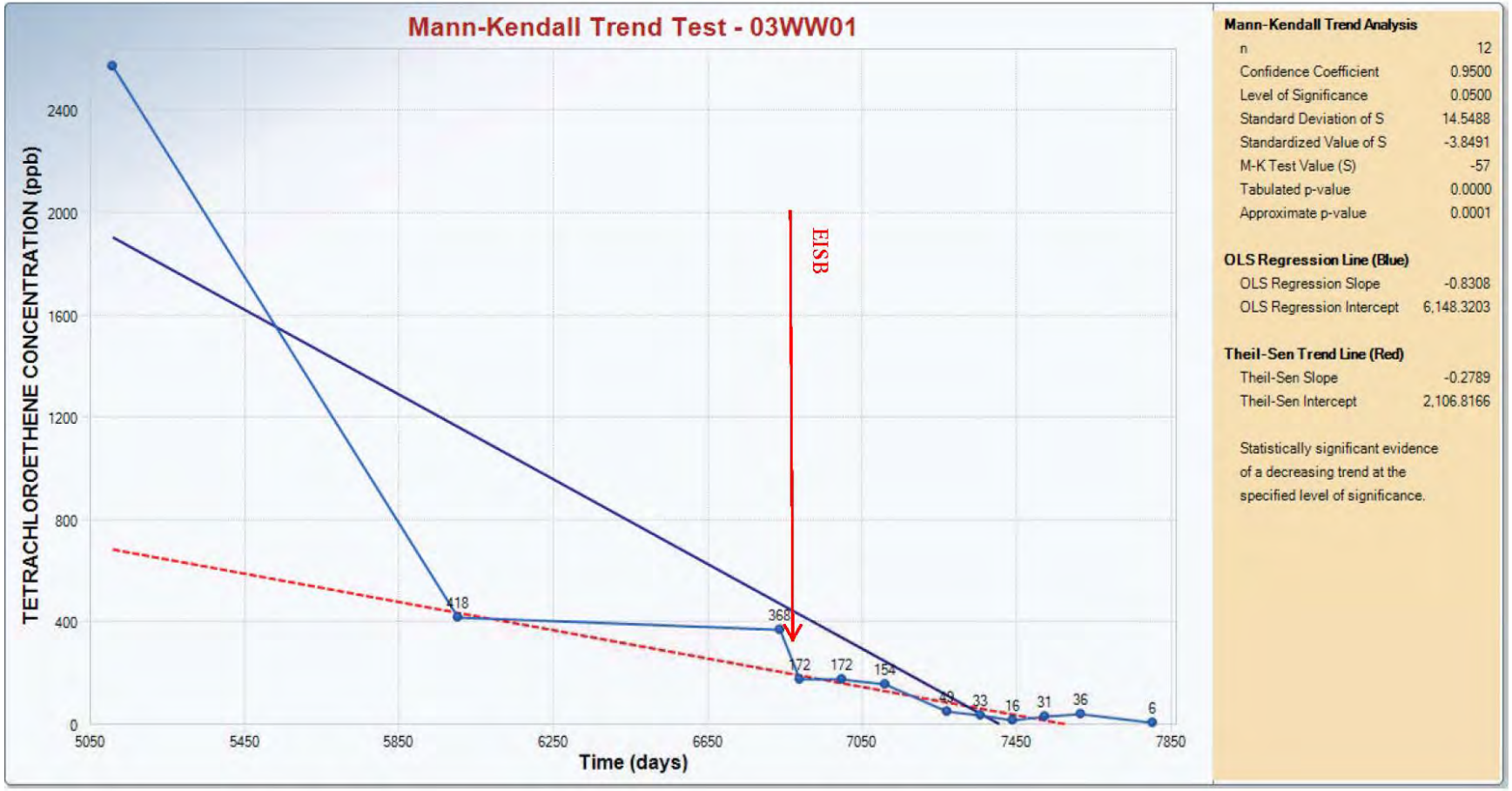


Sample Identification: / Sample Date:	Units	MCL	03WW01-112408 11/24/2008	03WW01-110509 5/9/2011	03WW01-082013 8/20/2013	03WW01-101013 10/10/2013	03WW01-12914 1/29/2014	03WW01-052114 5/21/2014	03WW01-102814 10/28/2014	03WW01-012115 1/21/2015	03WW01-041515 4/15/2015	03WW01-070815 7/8/2015	03WW01-100815 10/8/2015	03WW01-041316 4/13/2016	03WW01-100416 10/4/2016
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
CIS-1,2-DICHLOROETHENE	µg/L	70	<20 U	1.1 J	0.978 J	<2.5 U	<5 U	3.3 J	<50 U	<50 U	21.4 J	<50 U	<50 U	117	<5 U
TETRACHLOROETHENE	µg/L	5	2,570	418	368	172 J	172	154	48.6 J	32.8 J	15.9 J	31.4 J	36.4 J	6.49 J	<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
TRICHLOROETHENE	µg/L	5	196	69.1	94.8	42.1 J	58.4	71.2	223	216	131	65.6 J	51.8 J	<12.5 U	<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

Notes:
Blue Highlighting Indicates Analyte Detected Above MCL

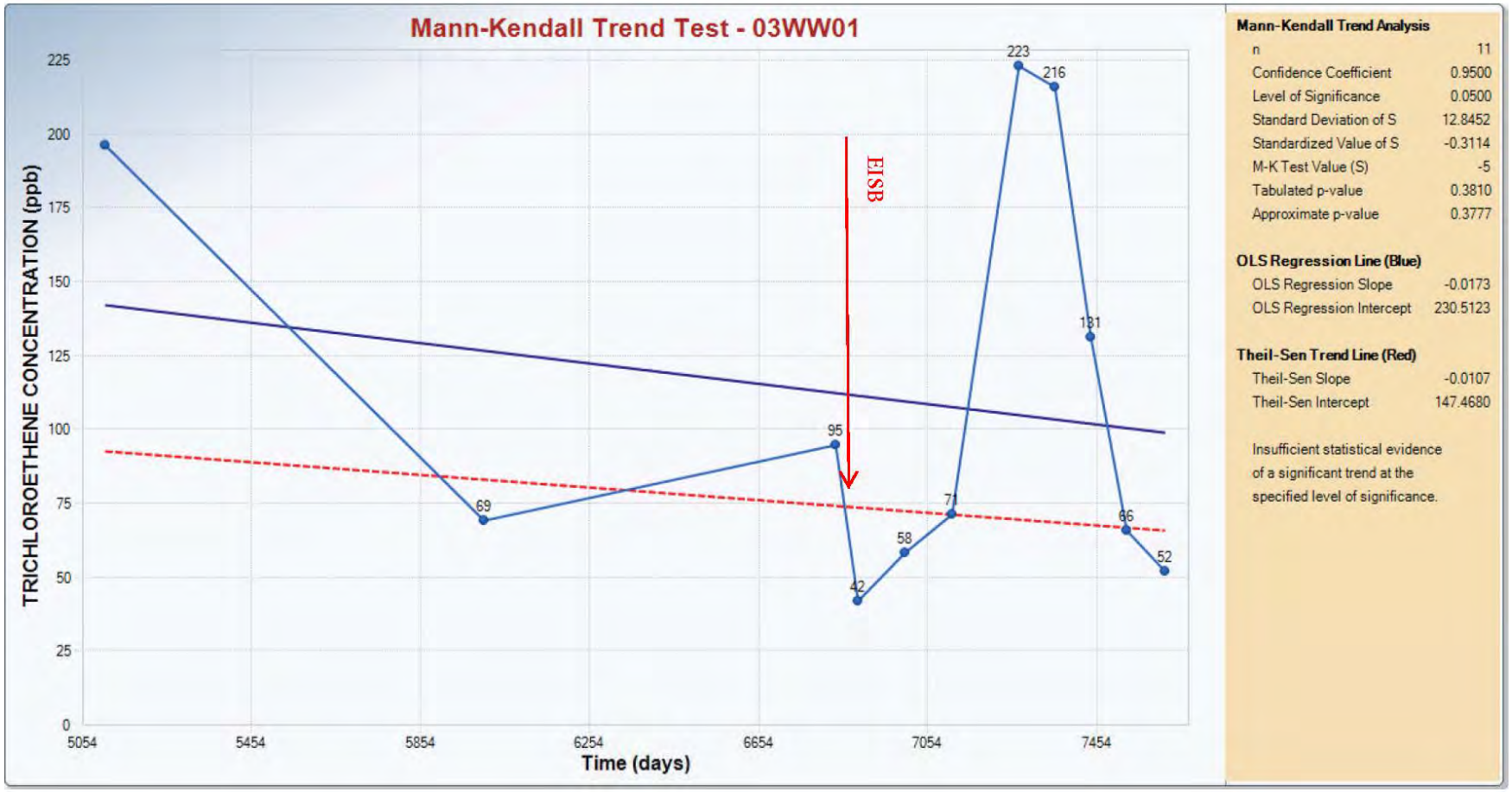
Note ND is not included in the Trend Analysis

Plot 166. LHAAP-58 EISB (September 2013, East Plume) Mann-Kendall Trend – cis-1,2 DCE - 03WW01 (Bhate, 2018a).



Sample Identification: / Sample Date:	Units	MCL	03WW01-112408 11/24/2008	03WW01-110509 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
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
CIS-1,2-DICHLOROETHENE	µg/L	70	<20 U	1.1 J	0.978 J	<2.5 U	<5 U	3.3 J	<50 U	<50 U	21.4 J	<50 U	<50 U	117	<5 U
TETRACHLOROETHENE	µg/L	5	2,570	418	368	172 J	172	154	48.6 J	32.8 J	15.9 J	31.4 J	36.4 J	6.49 J	<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
TRICHLOROETHENE	µg/L	5	196	69.1	94.8	42.1 J	58.4	71.2	223	216	131	65.6 J	51.8 J	<12.5 U	<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

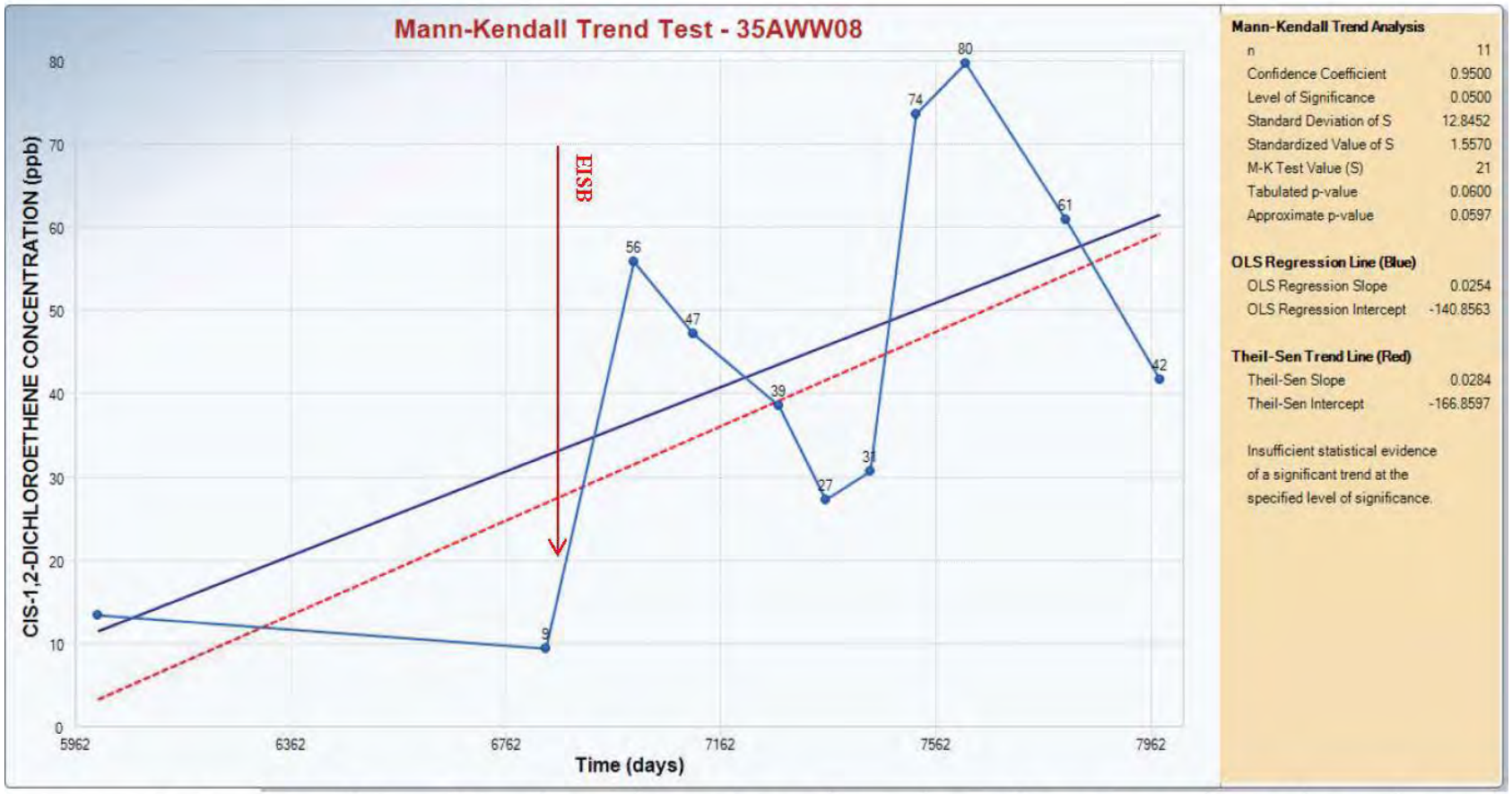
Plot 167. LHAAP-58 EISB (September 2013, East Plume) Mann-Kendall Trend – PCE - 03WW01 (Bhate, 2018a)



Sample Identification: / Sample Date:	Units	MCL	03WW01-112408 11/24/2008	03WW01-110509 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
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
CIS-1,2-DICHLOROETHENE	µg/L	70	<20 U	1.1 J	0.978 J	<2.5 U	<5 U	3.3 J	<50 U	<50 U	21.4 J	<50 U	<50 U	117	<5 U
TETRACHLOROETHENE	µg/L	5	2,570	418	368	172 J	172	154	48.6 J	32.8 J	15.9 J	31.4 J	36.4 J	6.49 J	<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
TRICHLOROETHENE	µg/L	5	196	69.1	94.8	42.1 J	58.4	71.2	223	216	131	65.6 J	51.8 J	<12.5 U	<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
Notes:															

Note ND not included in Analysis

Plot 168. LHAAP-58 EISB (September 2013, East Plume) Mann-Kendall Trend – TCE - 03WW01 (Bhate, 2018a)



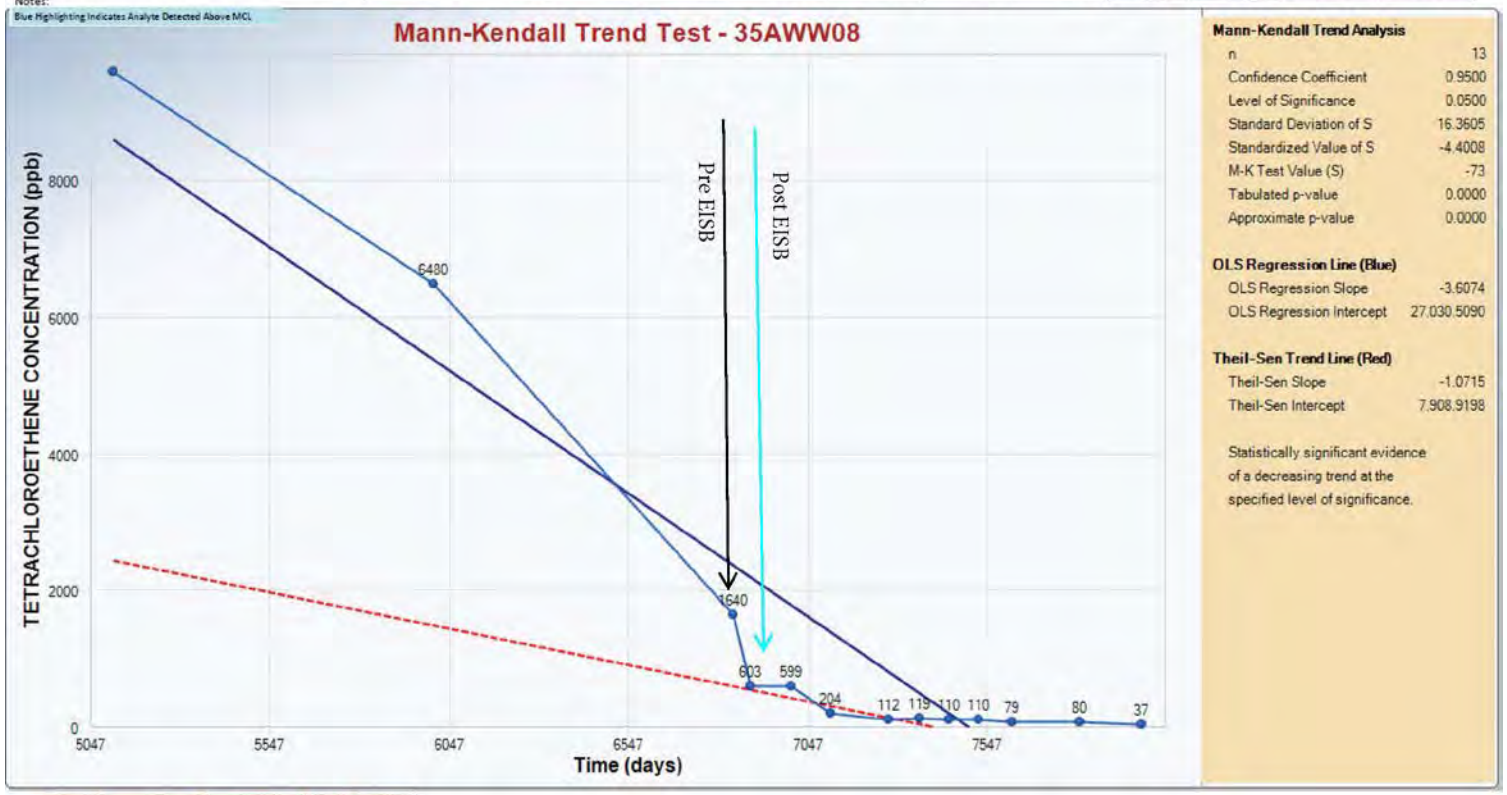
Sample Identification: / Sample Date:	Units	MCL	35AWW08-112408 11/24/2008	35AWW08-110509 5/9/2011	35AWW08-082013 8/20/2013	35AWW08-101013 10/10/2013	35AWW08-012914 1/29/2014	35AWW08-052014 5/20/2014	35AWW08-102714 10/27/2014	35AWW08-012115 1/21/2015	35AWW08-041515 4/15/2015	35AWW08-070815 7/8/2015	35AWW08-100815 10/8/2015	35AWW08-041316 4/13/2016	35AWW08-100416 10/4/2016
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	<25 U	<25 U	<10 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	79.6	60.9	41.7
TETRACHLOROETHENE	µg/L	5	9,590	6,480	1,640	603 J	599	204	112	119	110	110	79	80.1	36.9
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	<12.5 U	<12.5 U	<5 U
TRICHLOROETHENE	µg/L	5	675	1,150	544	149 J	895	953	653	491	607	746	581	234	235
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	<12.5 U	14.2 J	7.46 J

Notes:
Blue Highlighting Indicates Analyte Detected Above MCL

Plot 169. LHAAP-58 EISB (September 2013, East Plume) Mann-Kendall Trend – cis-1,2 DCE – 35AWW08, excluding ND results (Bhate, 2018a)

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	35AWW08-100815 10/8/2015	35AWW08-041316 4/13/2016	35AWW08-100416 10/4/2016
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	<25 U	<25 U	<10 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	79.6	60.9	41.7
TETRACHLOROETHENE	µg/L	5	9,590	6,480	1,640	603 J	599	204	112	119	110	110	79	80.1	36.9
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	<12.5 U	<12.5 U	<5 U
TRICHLOROETHENE	µg/L	5	675	1,150	544	149 J	895	953	653	491	607	746	581	234	235
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	<12.5 U	14.2 J	7.46 J

Notes:
Blue Highlighting Indicates Analyte Detected Above MCL



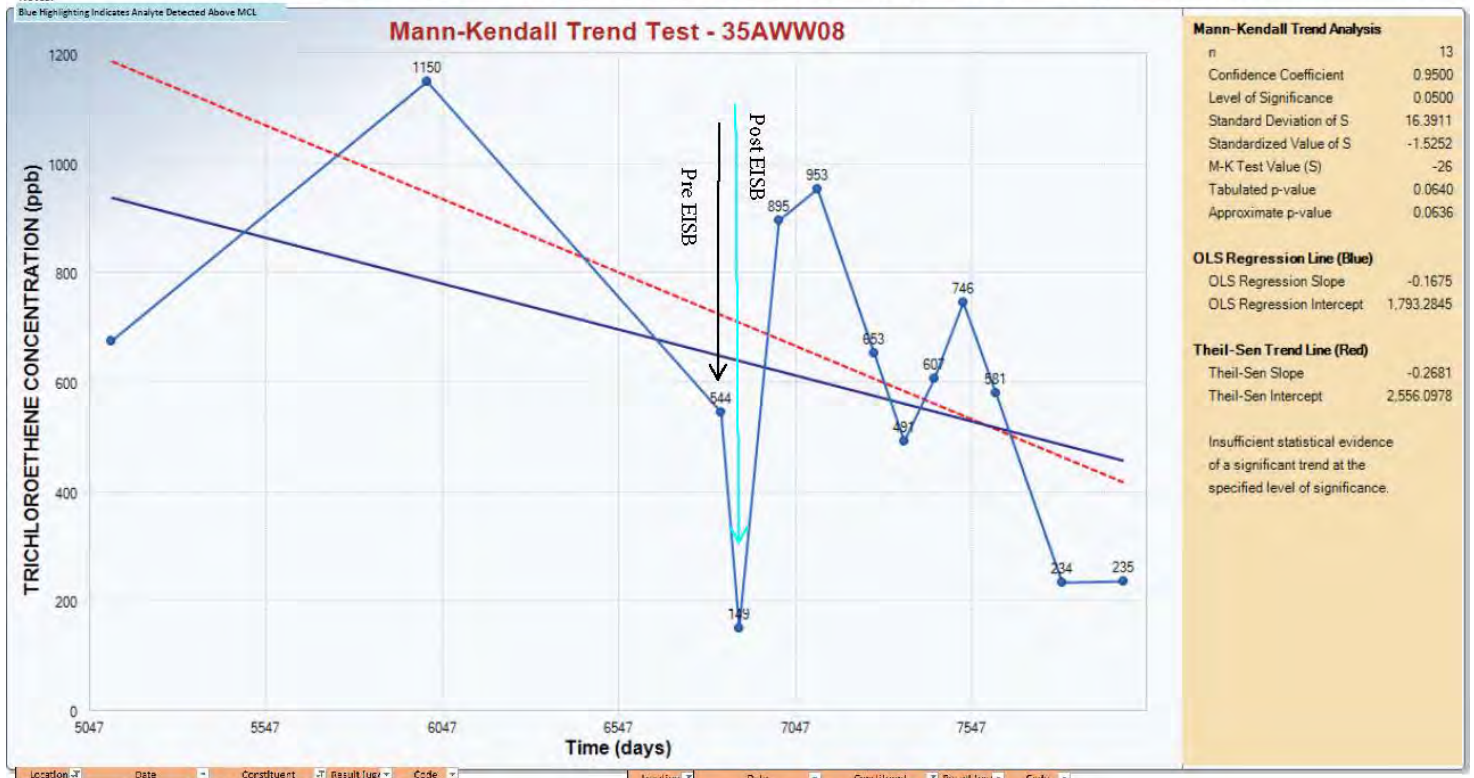
Location	Date	Constituent	Result (ug/	Code
35AWW08	24-Nov-08	TETRACHLOROETHENE	9590	
35AWW08	9-May-11	Tetrachloroethene	6480	
35AWW08	9-May-11	Tetrachloroethene	6240	R
35AWW08	8/20/2013	Tetrachloroethene	1840	
35AWW08	10/10/2013	Tetrachloroethene	603	J
35AWW08	1/29/2014	Tetrachloroethene	599	
35AWW08	5/20/2014	Tetrachloroethene	204	H1
35AWW08	10/27/2014	Tetrachloroethene	112	
35AWW08	4/13/2016	Tetrachloroethene	80.1	
35AWW08	10/4/2016	Tetrachloroethene	36.9	
35AWW08	11/15/2017 07:40:00 AM	Tetrachloroethene	12	

September 2013 EISB

Plot 170. LHAAP-58 Mann-Kendall Trend – PCE – 35AWW08 (Bhate, 2018a)

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	35AWW08-100815 10/8/2015	35AWW08-041316 4/13/2016	35AWW08-100416 10/4/2016
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	<25 U	<25 U	<10 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	79.6	60.9	41.7
TETRACHLOROETHENE	µg/L	5	9,590	6,480	1,640	603 J	599	204	112	119	110	110	79	80.1	36.9
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	<12.5 U	<12.5 U	<5 U
TRICHLOROETHENE	µg/L	5	675	1,150	544	149 J	895	953	653	491	607	746	581	234	235
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	<12.5 U	14.2 J	7.46 J

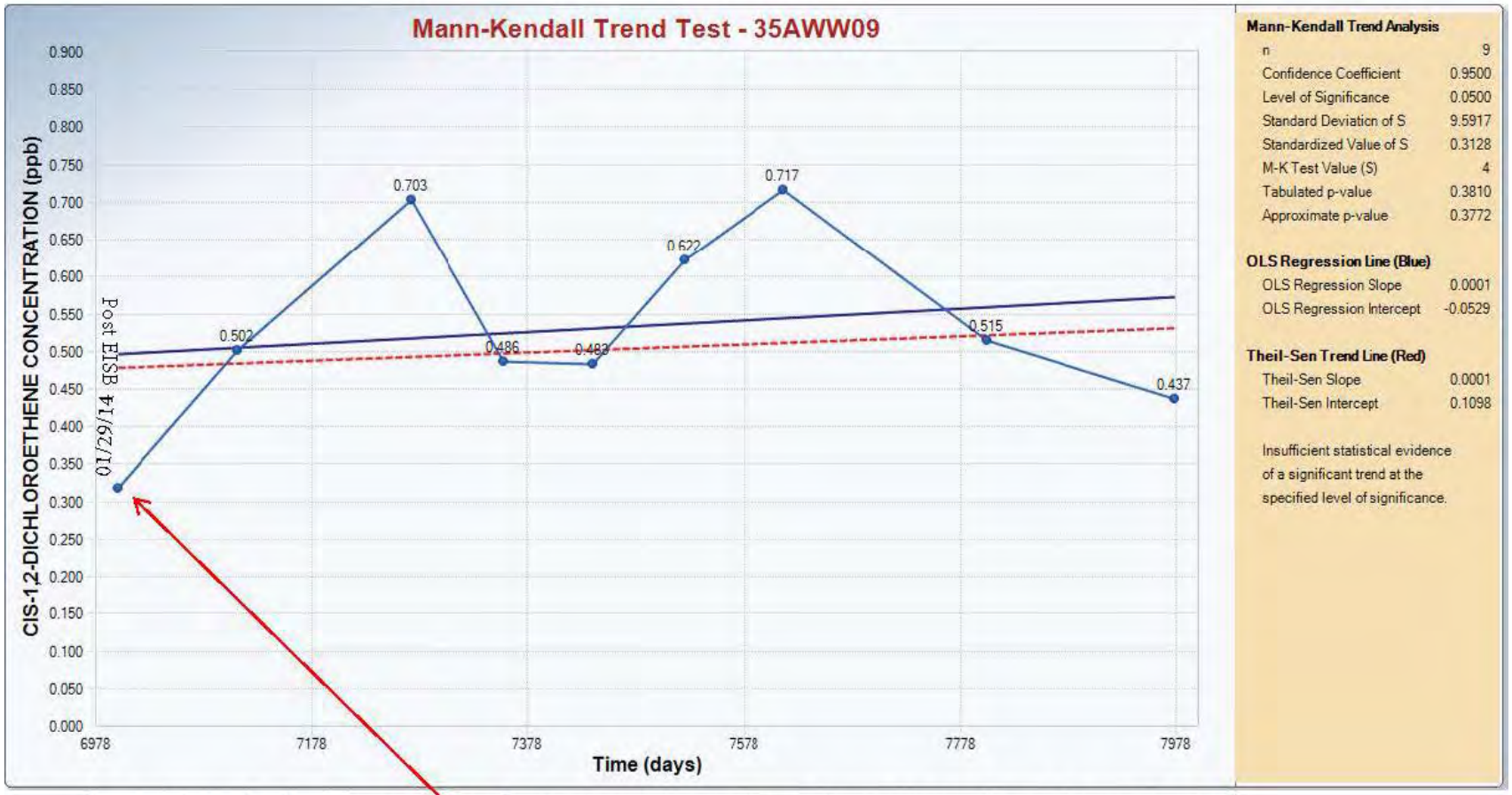
Notes:
Blue Highlighting Indicates Analyte Detected Above MCL



Location	Date	Constituent	Result [ug/	Code
35AWW08	24-Nov-08	CIS-1,2-DICHLOROETHEN	25	U
35AWW08	9-May-11	cis-1,2-Dichloroethene	13.4	J
35AWW08	9-May-11	cis-1,2-Dichloroethene	25	R
35AWW08	8/20/2013	cis-1,2-Dichloroethene	9.35	J
35AWW08	10/10/2013	cis-1,2-Dichloroethene	5	U
35AWW08	1/29/2014	cis-1,2-Dichloroethene	55.9	
35AWW08	5/20/2014	cis-1,2-Dichloroethene	47.2	
35AWW08	10/27/2014	cis-1,2-Dichloroethene	38.6	J
35AWW08	4/13/2016	cis-1,2-Dichloroethene	60.9	
35AWW08	10/4/2016	cis-1,2-Dichloroethene	41.7	
35AWW08	11/25/2017 07:40:00 AM	cis-1,2-Dichloroethene	38	

Location	Date	Constituent	Result [ug/	Code
35AWW08	24-Nov-08	VINYL CHLORIDE	25	U
35AWW08	9-May-11	Vinyl chloride	25	R
35AWW08	9-May-11	Vinyl chloride	6.25	U
35AWW08	8/20/2013	Vinyl chloride	5	U
35AWW08	10/10/2013	Vinyl chloride	5	U
35AWW08	1/29/2014	Vinyl chloride	5	U
35AWW08	5/20/2014	Vinyl chloride	5	U
35AWW08	10/27/2014	Vinyl chloride	25	U
35AWW08	4/13/2016	Vinyl chloride	14.2	J
35AWW08	10/4/2016	Vinyl chloride	7.46	J
35AWW08	11/25/2017 07:40:00 AM	Vinyl chloride	< 20	

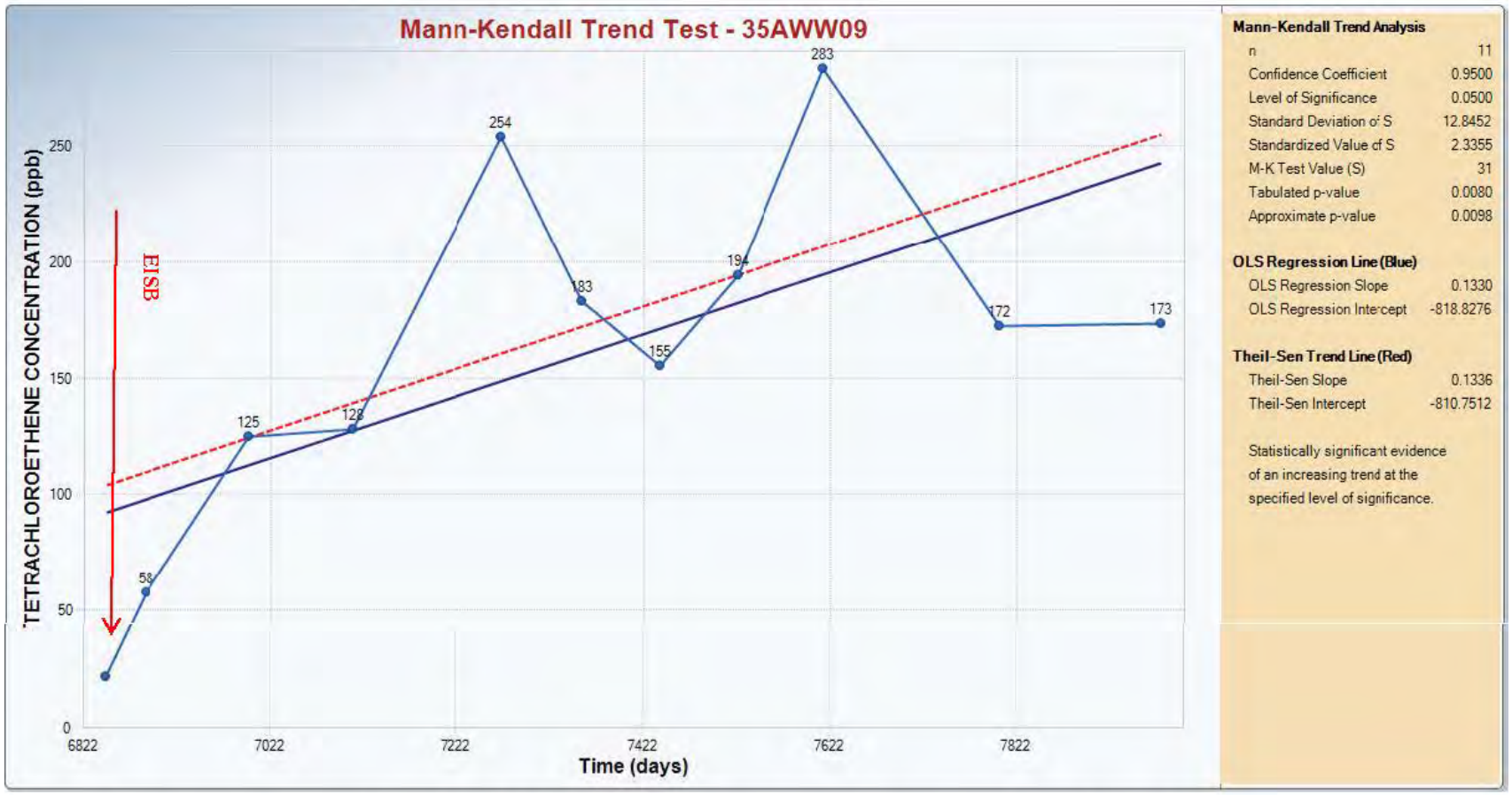
Plot 171. LHAAP-58 Mann-Kendall Trend – TCE – 35AWW08 (Bhate, 2018a)



Sample Identification: / Sample Date:	Units	MCL	35AWW09-082913 8/29/2013	35AWW09-101313 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
1,1-DICHLOROETHENE	µg/L	7	<1 U	<1 UJ	<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 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
TETRACHLOROETHENE	µg/L	5	21.9	57.6 J	125	128	254	183	155	194	283	172	173
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
TRICHLOROETHENE	µg/L	5	11.9	8.97 J	37.3	41.7	93	64.3	45	59.5	81.3	55.7	48.2
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

Notes:
Blue Highlighting Indicates Analyte Detected Above MCL

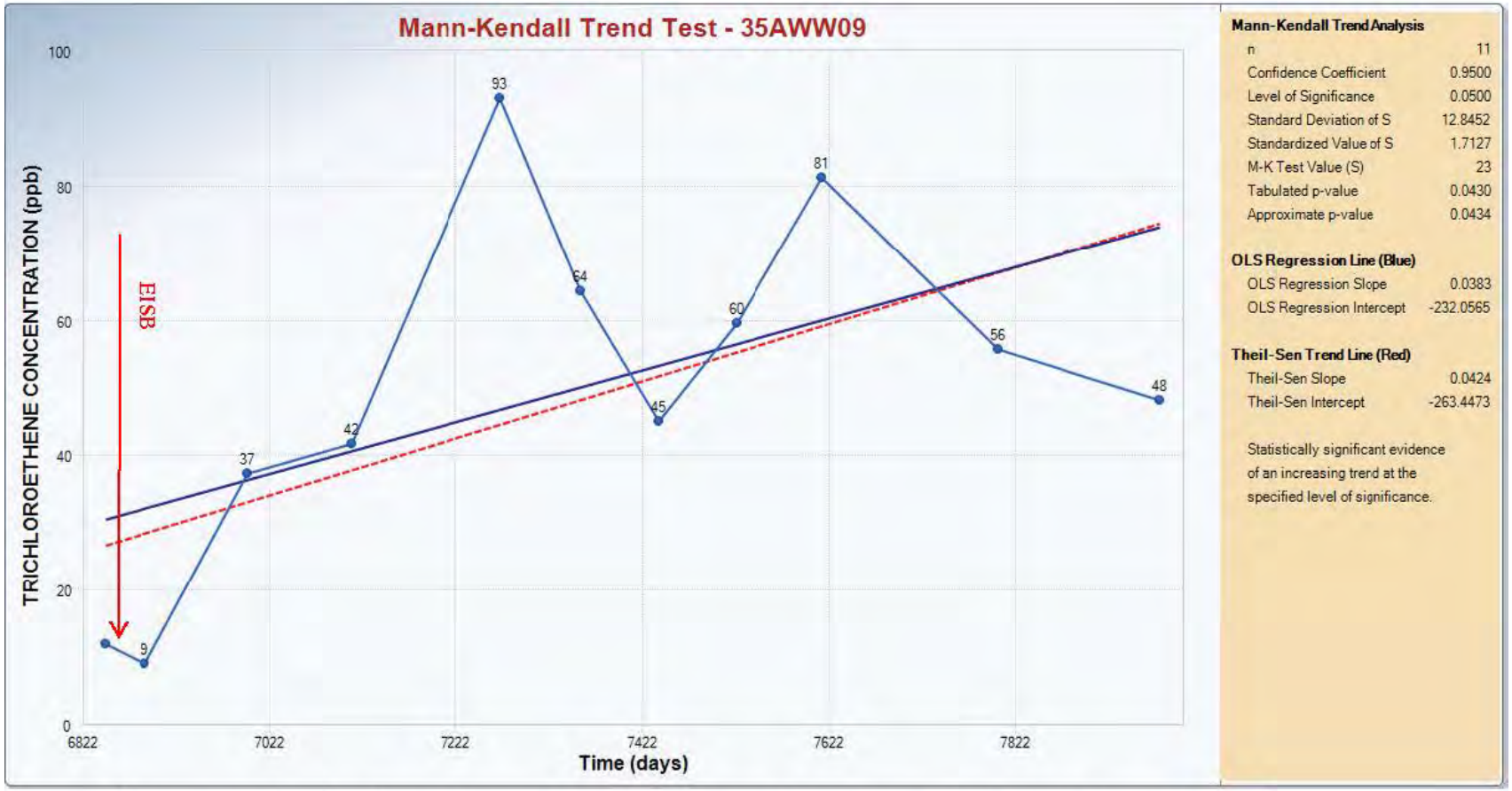
Plot 172. LHAAP-58 Mann-Kendall Trend – cis-1,2 DCE – 35AWW09 (Bhate, 2018a)



Sample Identification: / Sample Date:	Units	MCL	35AWW09-082913 8/29/2013	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
1,1-DICHLOROETHENE	µg/L	7	<1 U	<1 UJ	<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 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
TETRACHLOROETHENE	µg/L	5	21.9	57.6 J	125	128	254	183	155	194	283	172	173
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
TRICHLOROETHENE	µg/L	5	11.9	8.97 J	37.3	41.7	93	64.3	45	59.5	81.3	55.7	48.2
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

Notes:

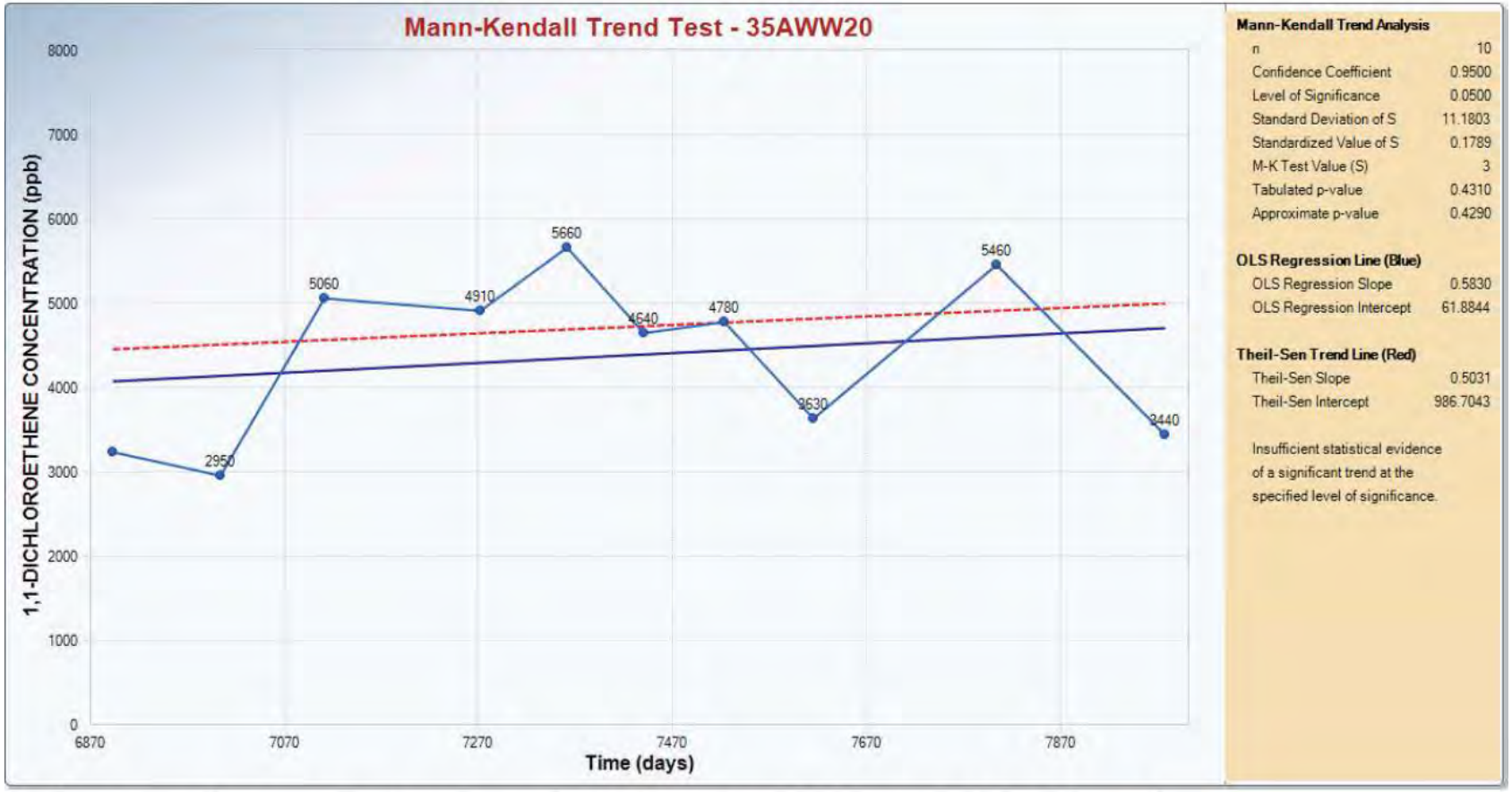
Plot 173. LHAAP-58 Mann-Kendall Trend – PCE – 35AWW09 (Bhate, 2018a)



Sample Identification: / Sample Date:	Units	MCL	35AWW09-082913 8/29/2013	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
1,1-DICHLOROETHENE	µg/L	7	<1 U	<1 UJ	<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 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
TETRACHLOROETHENE	µg/L	5	21.9	57.6 J	125	128	254	183	155	194	283	172	173
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
TRICHLOROETHENE	µg/L	5	11.9	8.97 J	37.3	41.7	93	64.3	45	59.5	81.3	55.7	48.2
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

Notes:

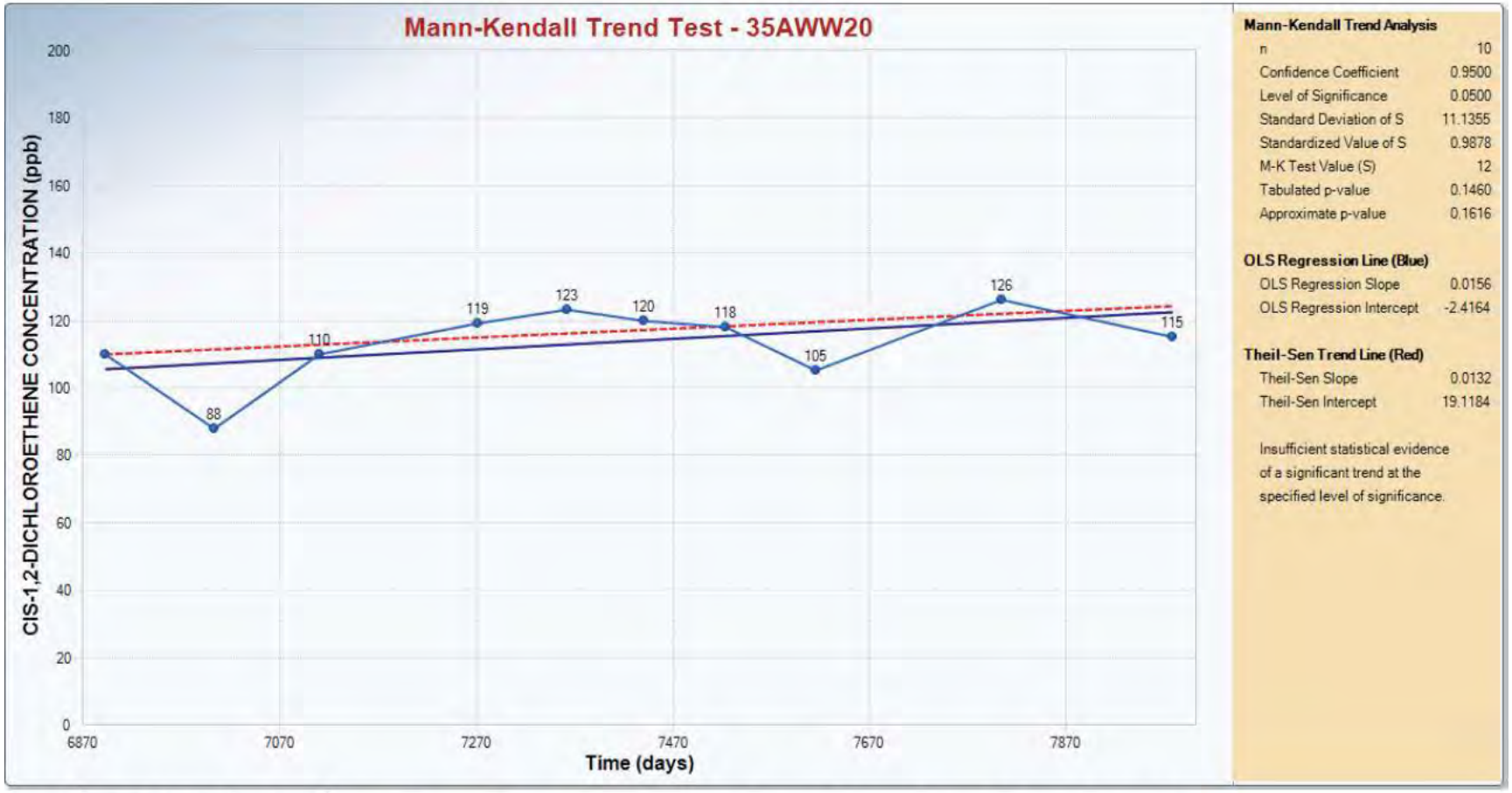
Plot 174. LHAAP-58 Mann-Kendall Trend – TCE – 35AWW09 (Bhate, 2018a)



Sample Identification: / Sample Date:	Units	MCL	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	35AWW20-100815 10/8/2015	35AWW20-041316 4/13/2016	35AWW20-100416 10/4/2016
1,1-DICHLOROETHENE	µg/L	7	3,230	2,950	5,060	4,910	5,660	4,640	4,780	3,630	5,460	3,440
CIS-1,2-DICHLOROETHENE	µg/L	70	110	87.7	110	119	123	120	118	105	126	115
TETRACHLOROETHENE	µg/L	5	1.65	1.53	<10 U	<10 U	<10 U	<12.5 U	<12.5 U	<12.5 U	<12.5 U	<10 U
TRANS-1,2-DICHLOROETHENE	µg/L	100	3.77	3.52	<10 U	<10 U	<10 U	<12.5 U	<12.5 U	<12.5 U	5.16 J	<10 U
TRICHLOROETHENE	µg/L	5	513	479	695	843	820	718	636	582	707	594
VINYL CHLORIDE	µg/L	2	105	62.4	65.7	102	122	90.6	151	126	216	166

Notes:
Blue Highlighting Indicates Analyte Detected Above MCL

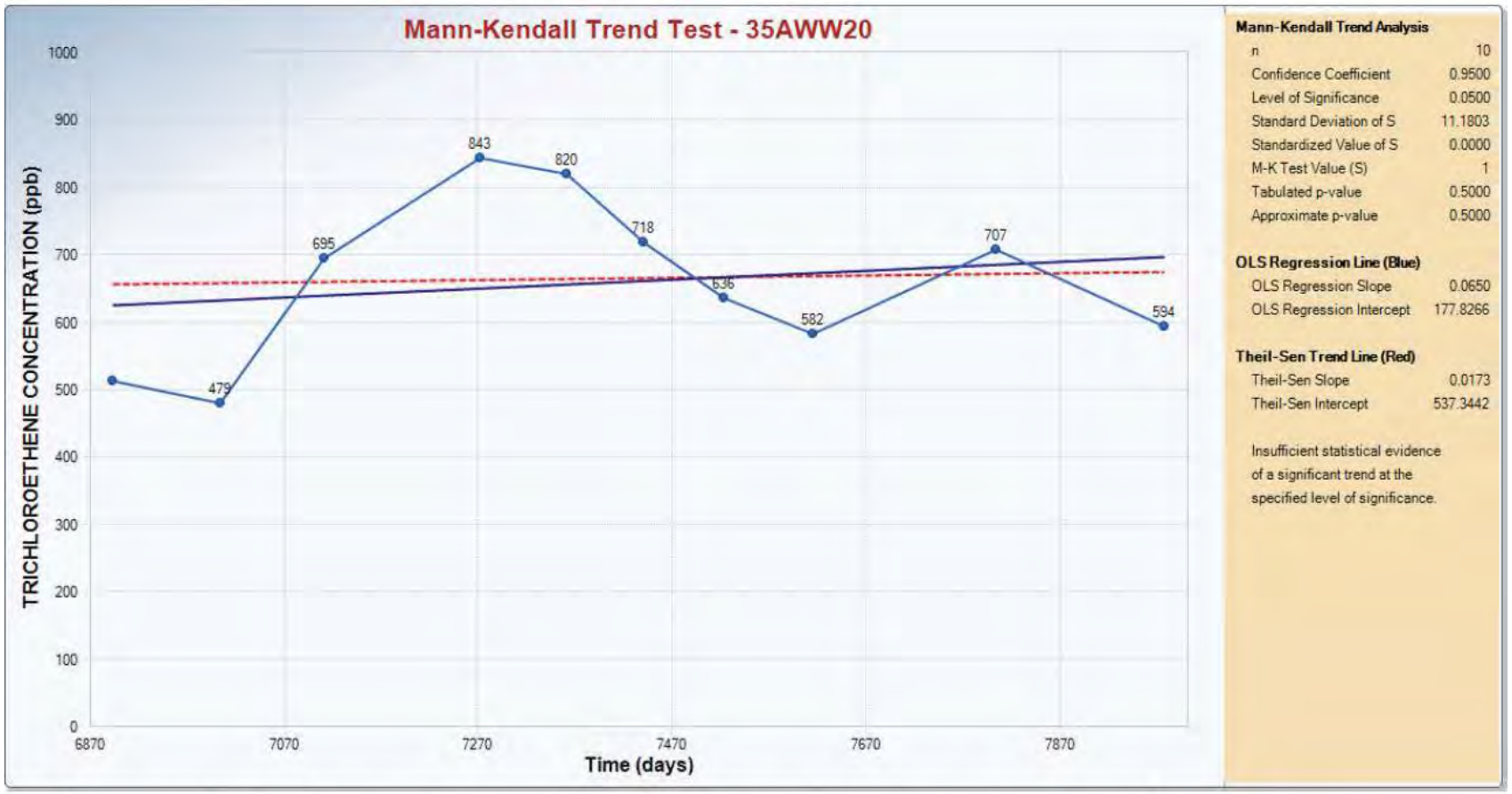
Plot 175. LHAAP-58 Mann-Kendall Trend – 1,1-DCE – 35AWW20 (Bhate, 2018a)



Sample Identification: / Sample Date:	Units	MCL	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	35AWW20-100815 10/8/2015	35AWW20-041316 4/13/2016	35AWW20-100416 10/4/2016
1,1-DICHLOROETHENE	µg/L	7	3,230	2,950	5,060	4,910	5,660	4,640	4,780	3,630	5,460	3,440
CIS-1,2-DICHLOROETHENE	µg/L	70	110	87.7	110	119	123	120	118	105	126	115
TETRACHLOROETHENE	µg/L	5	1.65	1.53	<10 U	<10 U	<10 U	<12.5 U	<12.5 U	<12.5 U	<12.5 U	<10 U
TRANS-1,2-DICHLOROETHENE	µg/L	100	3.77	3.52	<10 U	<10 U	<10 U	<12.5 U	<12.5 U	<12.5 U	5.16 J	<10 U
TRICHLOROETHENE	µg/L	5	513	479	695	843	820	718	636	582	707	594
VINYL CHLORIDE	µg/L	2	105	62.4	65.7	102	122	90.6	151	126	216	166

Notes:
Blue Highlighting Indicates Analyte Detected Above MCL

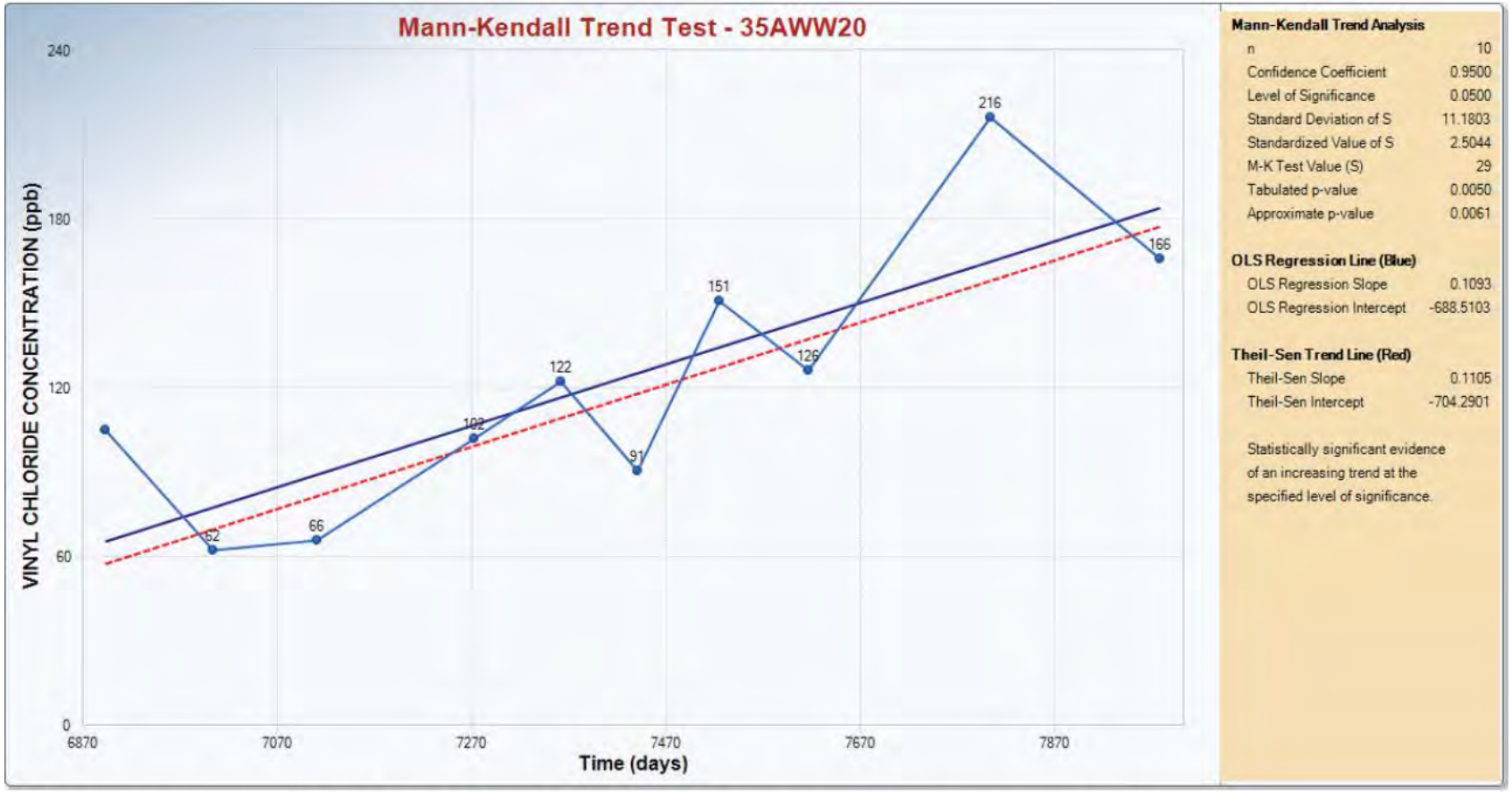
Plot 176. LHAAP-58 Mann-Kendall Trend – cis-1,2 DCE – 35AWW20 (Bhate, 2018a)



Sample Identification: / Sample Date:	Units	MCL	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	35AWW20-100815 10/8/2015	35AWW20-041316 4/13/2016	35AWW20-100416 10/4/2016
1,1-DICHLOROETHENE	µg/L	7	3,230	2,950	5,060	4,910	5,660	4,640	4,780	3,630	5,460	3,440
CIS-1,2-DICHLOROETHENE	µg/L	70	110	87.7	110	119	123	120	118	105	126	115
TETRACHLOROETHENE	µg/L	5	1.65	1.53	<10 U	<10 U	<10 U	<12.5 U	<12.5 U	<12.5 U	<12.5 U	<10 U
TRANS-1,2-DICHLOROETHENE	µg/L	100	3.77	3.52	<10 U	<10 U	<10 U	<12.5 U	<12.5 U	<12.5 U	5.16 J	<10 U
TRICHLOROETHENE	µg/L	5	513	479	695	843	820	718	636	582	707	594
VINYL CHLORIDE	µg/L	2	105	62.4	65.7	102	122	90.6	151	126	216	166

Notes:
Blue Highlighting Indicates Analyte Detected Above MCL

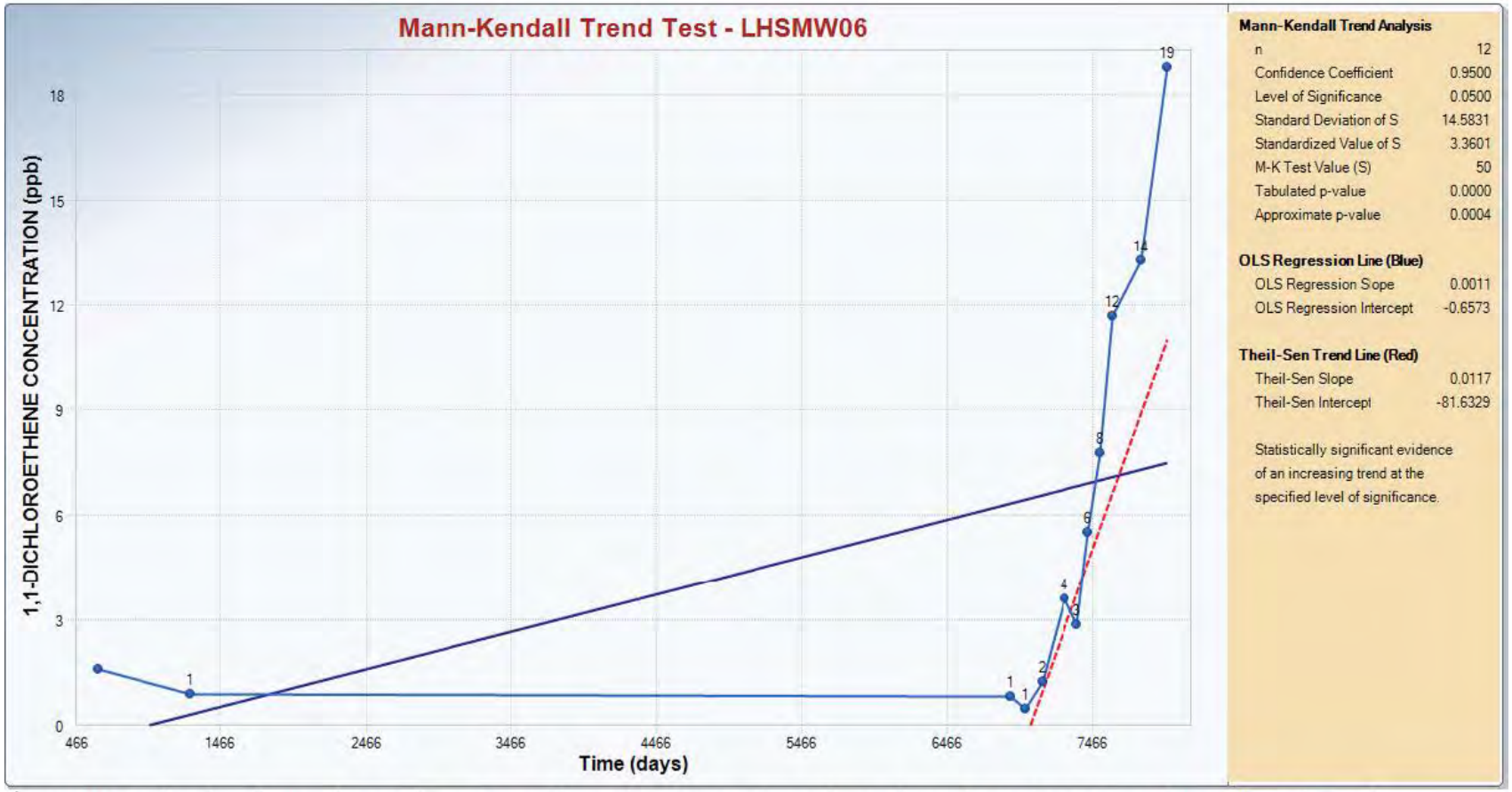
Plot 177. LHAAP-58 Mann-Kendall Trend – TCE – 35AWW20 (Bhate, 2018a)



Sample Identification: / Sample Date:	Units	MCL	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	35AWW20-100815 10/8/2015	35AWW20-041316 4/13/2016	35AWW20-100416 10/4/2016
1,1-DICHLOROETHENE	µg/L	7	3,230	2,950	5,060	4,910	5,660	4,640	4,780	3,630	5,460	3,440
CIS-1,2-DICHLOROETHENE	µg/L	70	110	87.7	110	119	123	120	118	105	126	115
TETRACHLOROETHENE	µg/L	5	1.65	1.53	<10 U	<10 U	<10 U	<12.5 U	<12.5 U	<12.5 U	<12.5 U	<10 U
TRANS-1,2-DICHLOROETHENE	µg/L	100	3.77	3.52	<10 U	<10 U	<10 U	<12.5 U	<12.5 U	<12.5 U	5.16 J	<10 U
TRICHLOROETHENE	µg/L	5	513	479	695	843	820	718	636	582	707	594
VINYL CHLORIDE	µg/L	2	105	62.4	65.7	102	122	90.6	151	126	216	166

Notes:
Blue Highlighting Indicates Analyte Detected Above MCL

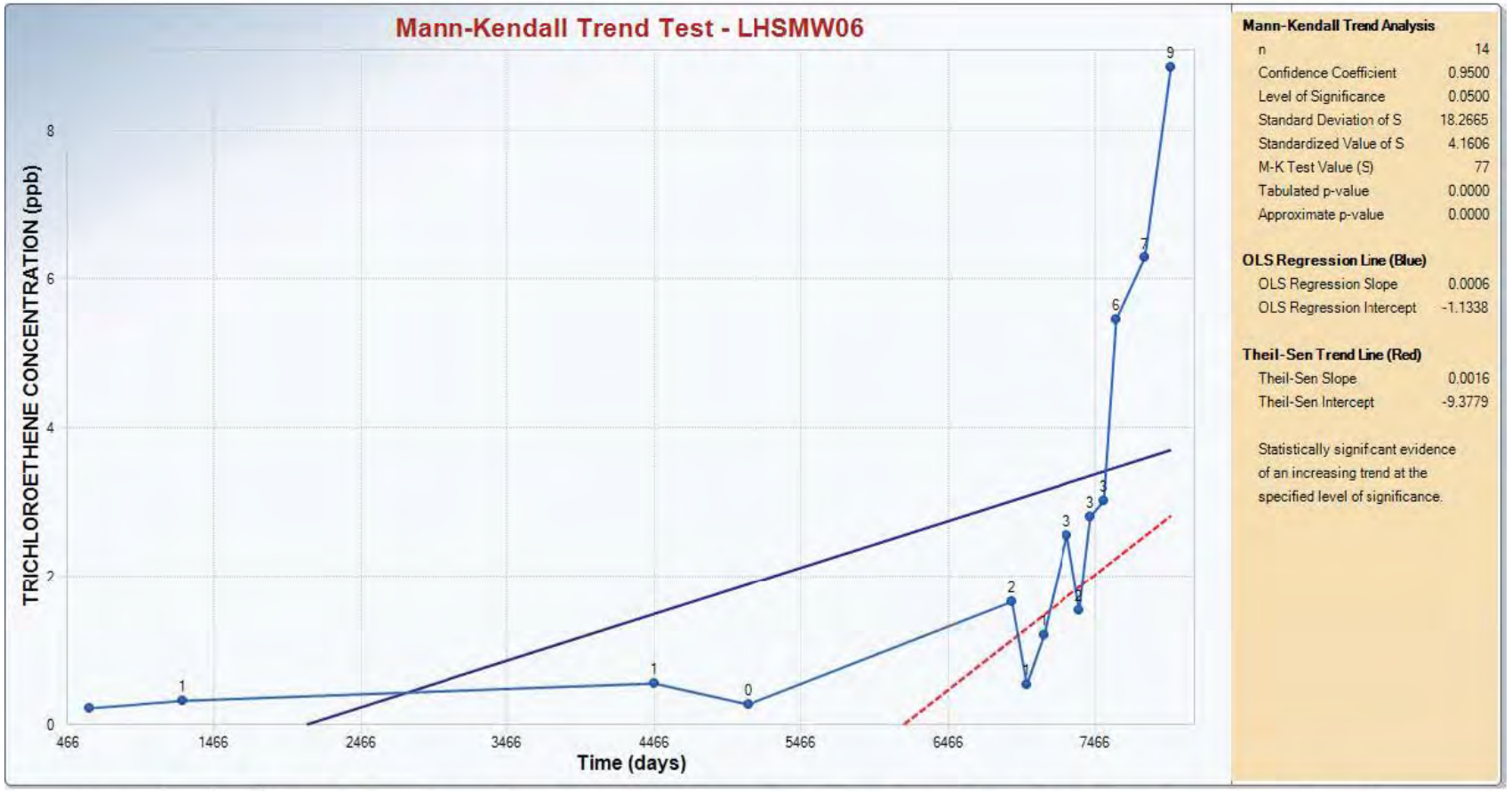
Plot 178. LHAAP-58 Mann-Kendall Trend – VC – 35AWW20 (Bhate, 2018a)



Sample Identification: / Sample Date:	Units	MCL	LHSMW06-941201 12/1/1994	LHSMW06-960813 8/13/1996	LHSMW06-980513 5/13/1998	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	LHSMW06-100616 10/6/2016
1,1-DICHLOROETHENE	µg/L	7	<5 U	2	1.3	<5 U	<2 U	<1 U	1.23 J	0.884 J	1.68 J	4.08	3.28	5.95	8.2	12.1	13.7	19.2
CIS-1,2-DICHLOROETHENE	µg/L	70	NA	0.98	1.4	<5 U	5.1	2.26	4.01	1.85	2.59	5.2	3.25	5.52	7.24	10.4	11.9	19
TETRACHLOROETHENE	µg/L	5	<5 U	0.27	0.69	2 J	<2 U	<1 U	0.863 J	<0.5 U	0.255 J	0.585 J	0.255 J	0.454 J	0.443 J	0.518 J	0.563 J	0.9 J
TRANS-1,2-DICHLOROETHENE	µg/L	100	NA	<0.29 U	<1 U	<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	0.391 J
TRICHLOROETHENE	µg/L	5	<5 U	0.43	0.55	<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	8.06
VINYL CHLORIDE	µg/L	2	NA	0.62	<1 U	<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	2.4	2.94

Notes:

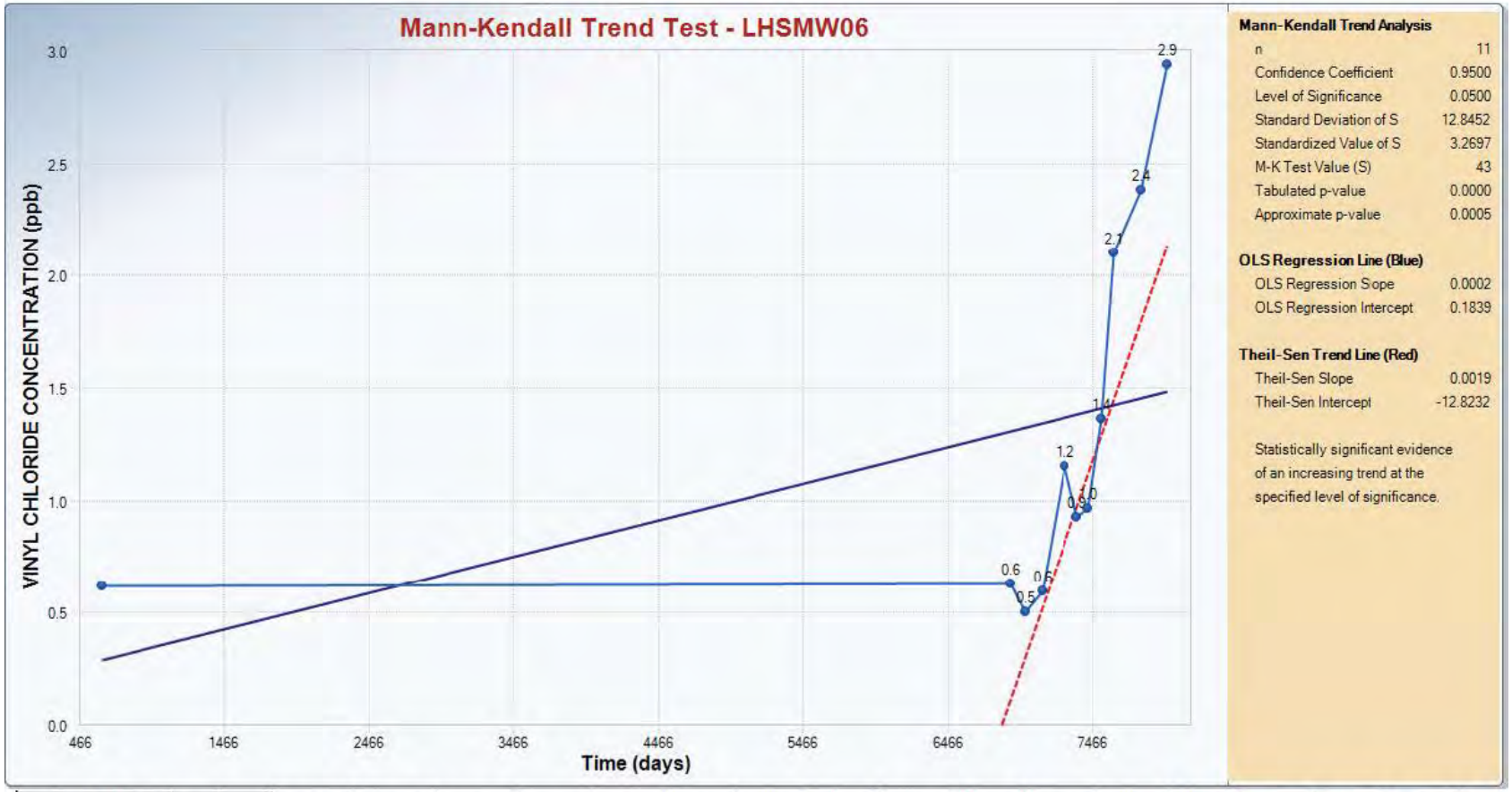
Plot 179. LHAAP-58 Mann-Kendall Trend – 1,1-DCE – LHSMW06 (Bhate, 2018a)



Sample Identification: / Sample Date:	Units	MCL	LHSMW06-941201 12/1/1994	LHSMW06-960813 8/13/1996	LHSMW06-980513 5/13/1998	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	LHSMW06-070815 7/9/2015	LHSMW06-100215 10/2/2015	LHSMW06-041316 4/13/2016	LHSMW06-100616 10/6/2016
1,1-DICHLOROETHENE	µg/L	7	<5 U	2	1.3	<5 U	<2 U	<1 U	1.25 J	0.884 J	1.68 J	4.03	3.28	5.95	8.2	12.1	15.7	19.2
CIS-1,2-DICHLOROETHENE	µg/L	70	NA	0.98	1.4	<5 U	5.1	2.26	4.01	1.85	2.59	5.2	3.25	5.52	7.24	10.4	11.9	19
TETRACHLOROETHENE	µg/L	5	<5 U	0.27	0.69	2 J	<2 U	<1 U	0.665 J	<0.5 U	0.255 J	0.581 J	0.255 J	0.454 J	0.443 J	0.518 J	0.563 J	0.9 J
TRANS-1,2-DICHLOROETHENE	µg/L	100	NA	<0.29 U	<1 U	<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	0.391 J
TRICHLOROETHENE	µg/L	5	<5 U	0.43	0.53	<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	9.06
VINYL CHLORIDE	µg/L	2	NA	0.62	<1 U	<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	2.4	2.94

Notes:
Blue Highlighting Indicates Analyte Detected Above MCL

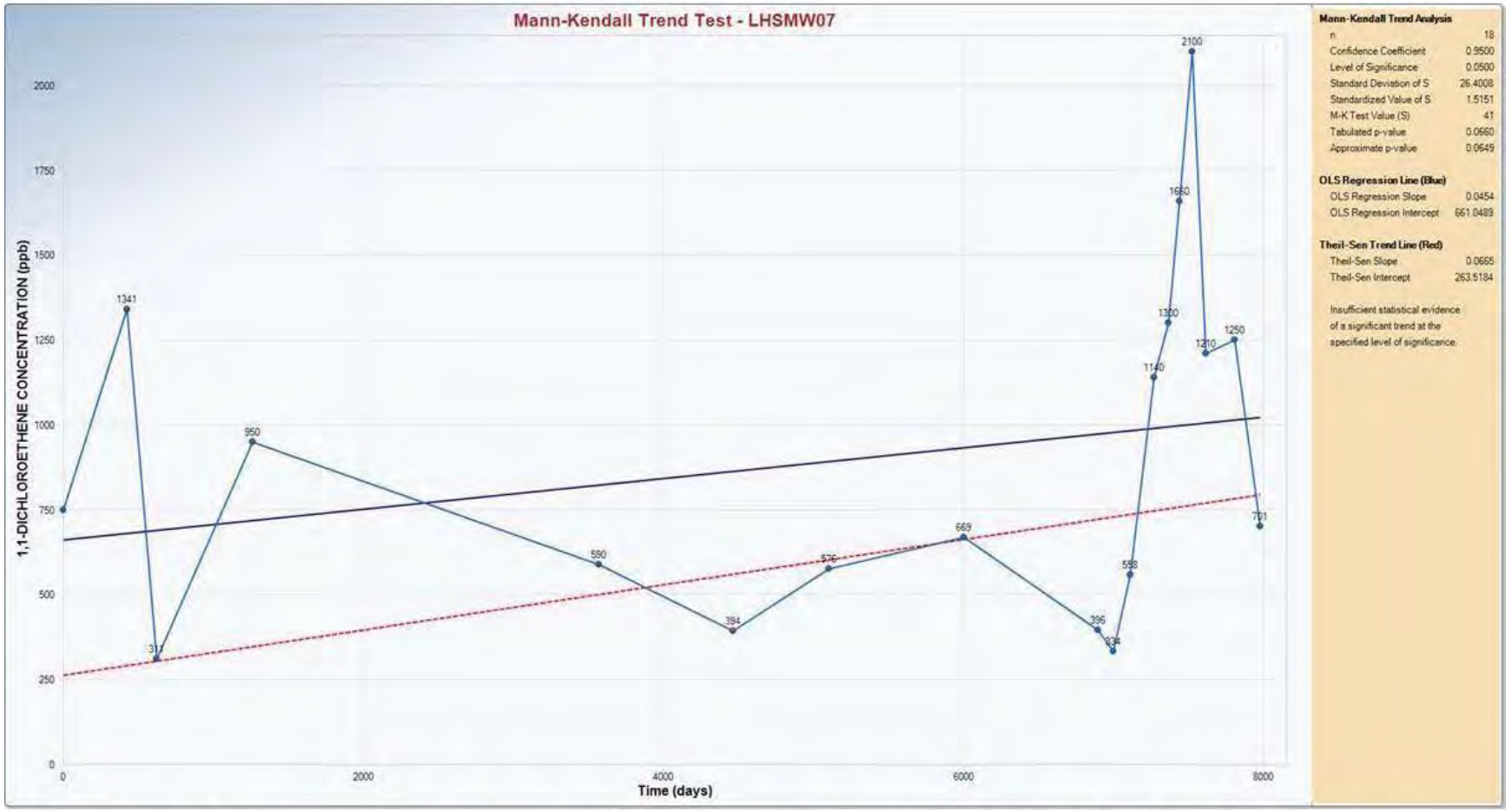
Plot 180. LHAAP-58 Mann-Kendall Trend – TCE – LHSMW06 (Bhate, 2018a)



Sample Identification: / Sample Date:	Units	MCL	LHSMW06-941201 12/1/1994	LHSMW06-960813 8/13/1996	LHSMW06-980513 5/13/1998	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	LHSMW06-100616 10/6/2016
1,1-DICHLOROETHENE	µg/L	7	<5 U	2	1.3	<5 U	<2 U	<1 U	1.25 J	0.884 J	1.68 J	4.03	3.28	5.95	8.2	12.1	13.7	19.2
CIS-1,2-DICHLOROETHENE	µg/L	70	NA	0.98	1.4	<5 U	5.1	2.26	4.01	1.35	2.59	5.2	3.25	5.52	7.24	10.4	11.9	19
TETRACHLOROETHENE	µg/L	5	<5 U	0.27	0.69	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	0.9 J
TRANS-1,2-DICHLOROETHENE	µg/L	100	NA	<0.29 U	<1 U	<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	0.391 J
TRICHLOROETHENE	µg/L	5	<5 U	0.43	0.53	<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	9.06
VINYL CHLORIDE	µg/L	2	NA	0.62	<1 U	<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	2.4	2.94

Notes:
Blue Highlighting Indicates Analyte Detected Above MCL

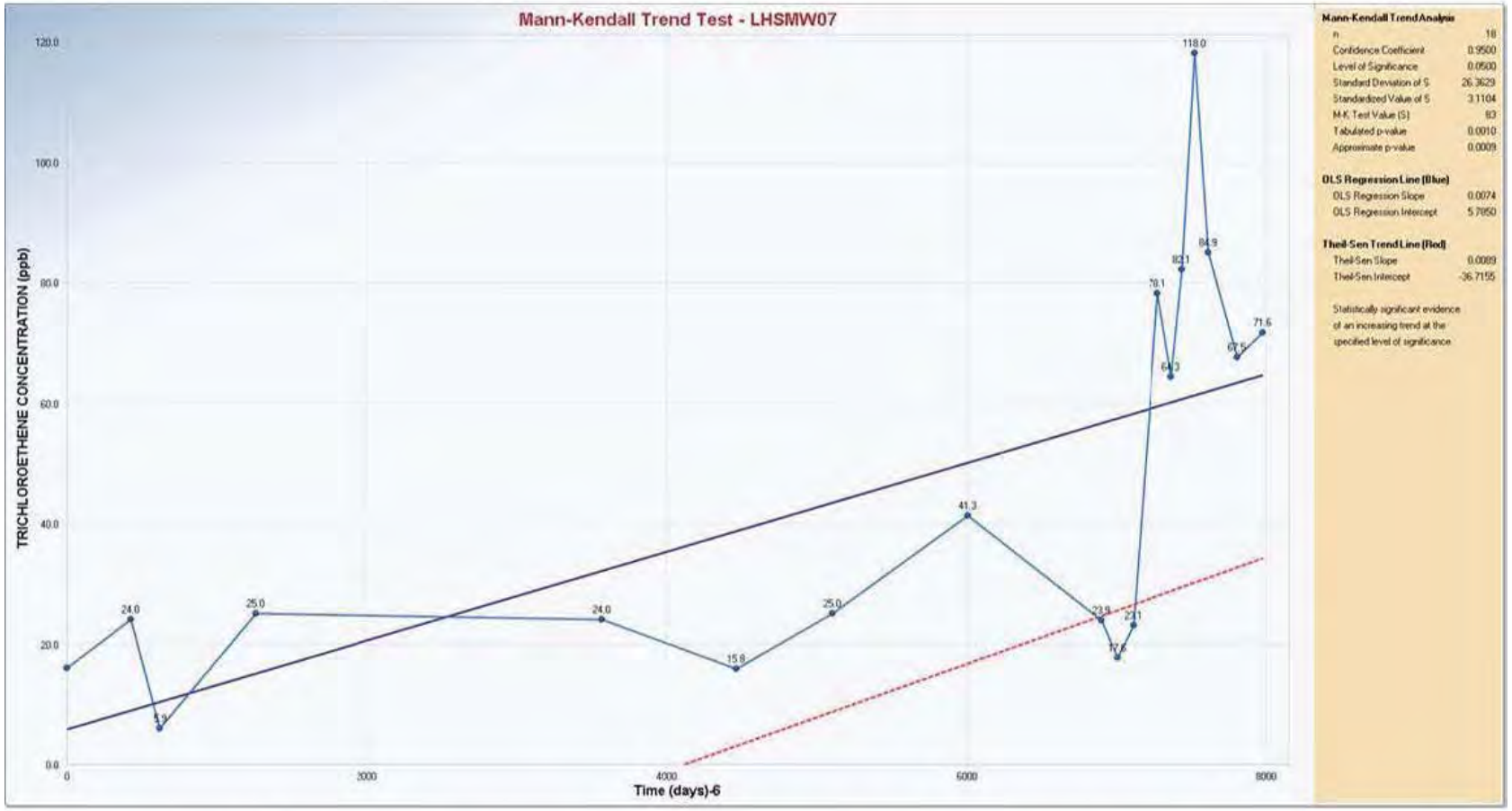
Plot 181. LHAAP-58 Mann-Kendall Trend – VC – LHSMW06 (Bhate, 2018a)



Sample Identification: / Sample Date:	Units	MCL	LHSMW07-941201 12/1/1994	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	LHSMW07-070715 7/7/2015	LHSMW07-100815 10/8/2015	LHSMW07-041416 4/14/2016	LHSMW07-100416 10/4/2016
1,1-DICHLOROETHENE	µg/L	7	750	680	1,341	311	950	590 J	394	576	669	396	334	556 J	1,140	1,300	1,660	2,100	1,210	1,250	701
CIS-1,2-DICHLOROETHENE	µg/L	70	NA	NA	NA	2.5	11	6	3.6	7.96	10.1	6.1	4.66	7.17	21	19.3	31.4	32.4	22.5	19.6	22.1
TETRACHLOROETHENE	µg/L	5	<5 U	<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	<2.5 U	<2.5 U	0.397 J	<2.5 U
TRANS-1,2-DICHLOROETHENE	µg/L	100	NA	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	1.29 J	<2.5 U	0.681 J	<2.5 U
TRICHLOROETHENE	µg/L	5	16	19	24	5.9	25	24	15.8	25	41.3	23.9	17.6	29.1	78.1	64.3	82.1	118	84.9	67.5	71.8
VINYL CHLORIDE	µg/L	2	NA	NA	10	1.1	7.2	8	3	14.4	9.47	14.9	9.43	7.98	35.4	28.8	34.1	69.4 J	37.1	10.8	21.8

Notes:

Plot 182. LHAAP-58 Mann-Kendall Trend – 1,1- DCE – LHSMW07 (Bhate, 2018a).



Sample Identification: / Sample Date:	Units	MCL	LHSMW07-941201 12/1/1994	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-FB62007 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	LHSMW07-070715 7/7/2015	LHSMW07-100815 10/8/2015	LHSMW07-041416 4/14/2016	LHSMW07-100416 10/4/2016
1,1-DICHLOROETHENE	ug/L	7	750	680	1,341	311	950	590 J	394	576	669	396	334	558 J	1,140	1,300	1,660	2,100	1,210	1,250	701
CIS-1,2-DICHLOROETHENE	ug/L	70	NA	NA	NA	2.5	11	6	3.6	7.96	10.1	6.3	4.66	7.17	21	19.3	31.4	32.4	22.5	19.6	22.1
TETRACHLOROETHENE	ug/L	5	<5 U	<5 U	7	2.7	<1 U	<5 U	<2 U	<1 U	0.259 J	<0.5 U	<1 U	<0.5 U	<1 U	<2.5 U	<5 U	<2.5 U	<2.5 U	0.397 J	<2.5 U
TRANS-1,2-DICHLOROETHENE	ug/L	100	NA	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	1.29 J	<2.5 U	0.681 J	<2.5 U
TRICHLOROETHENE	ug/L	5	16	19	24	5.9	25	24	15.8	25	41.3	23.9	17.6	78.1	64.9	82.1	118	84.9	67.5	71.6	
VINYL CHLORIDE	ug/L	2	NA	NA	10	1.1	7.2	9	3	14.4	9.47	15.9	5.43	7.98	35.4	28.8	94.1	69.4 J	37.1	10.8	21.8

Notes:

Plot 183. LHAAP-58 Mann-Kendall Trend – TCE – LHSMW07 (Bhate, 2018a).



Sample Identification: / Sample Date:	Units	MCL	LHSMW07-941201 12/1/1994	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	LHSMW07-070715 7/7/2015	LHSMW07-100815 10/8/2015	LHSMW07-041416 4/14/2016	LHSMW07-100416 10/4/2016
1,1-DICHLOROETHENE	µg/L	7	750	660	1,341	311	950	590 J	394	576	669	396	354	558 J	1,140	1,300	1,660	2,100	1,210	1,250	701
CIS-1,2-DICHLOROETHENE	µg/L	70	NA	NA	NA	2.5	11	6	3.6	7.96	10.1	6.1	4.66	7.17	21	19.3	81.4	82.4	22.5	19.6	22.1
TETRACHLOROETHENE	µg/L	5	<5 U	<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	<2.5 U	<2.5 U	0.397 J	<2.5 U
TRANS-1,2-DICHLOROETHENE	µg/L	100	NA	NA	NA	<0.29 U	0.79	<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	1.29 J	<2.5 U	0.681 J	<2.5 U
TRICHLOROETHENE	µg/L	5	15	19	24	5.9	25	24	15.8	25	41.8	29.9	17.6	33.1	76.1	64.3	82.1	116	84.9	67.5	71.6
VINYL CHLORIDE	µg/L	2	NA	NA	10	1.1	7.2	9	5	14.4	9.47	15.9	5.43	7.98	35.4	28.8	34.1	68.4 J	87.1	10.8	21.8

Notes:

Plot 184. LHAAP-58 Mann-Kendall Trend – VC – LHSMW07 (Bhate, 2018a).

Location	Date	Constituent	Result (ug/L)	Code
LHSMW04	20-Feb-07	Tetrachloroethene	6.4	
LHSMW04	12-Aug-96	Tetrachloroethene	0.25	U
LHSMW04	9-Sep-04	Tetrachloroethene	5	U
LHSMW04	13-May-98	Tetrachloroethene	1	U
LHSMW04	1-Dec-94	Tetrachloroethene	5	U
LHSMW04	30-Jan-08	TETRACHLOROETHENE	8.74	
LHSMW04	25-Nov-08	TETRACHLOROETHENE	25.7	
LHSMW04	3/29/2016	Tetrachloroethene	419	
LHSMW04	4/13/2016	Tetrachloroethene	397	

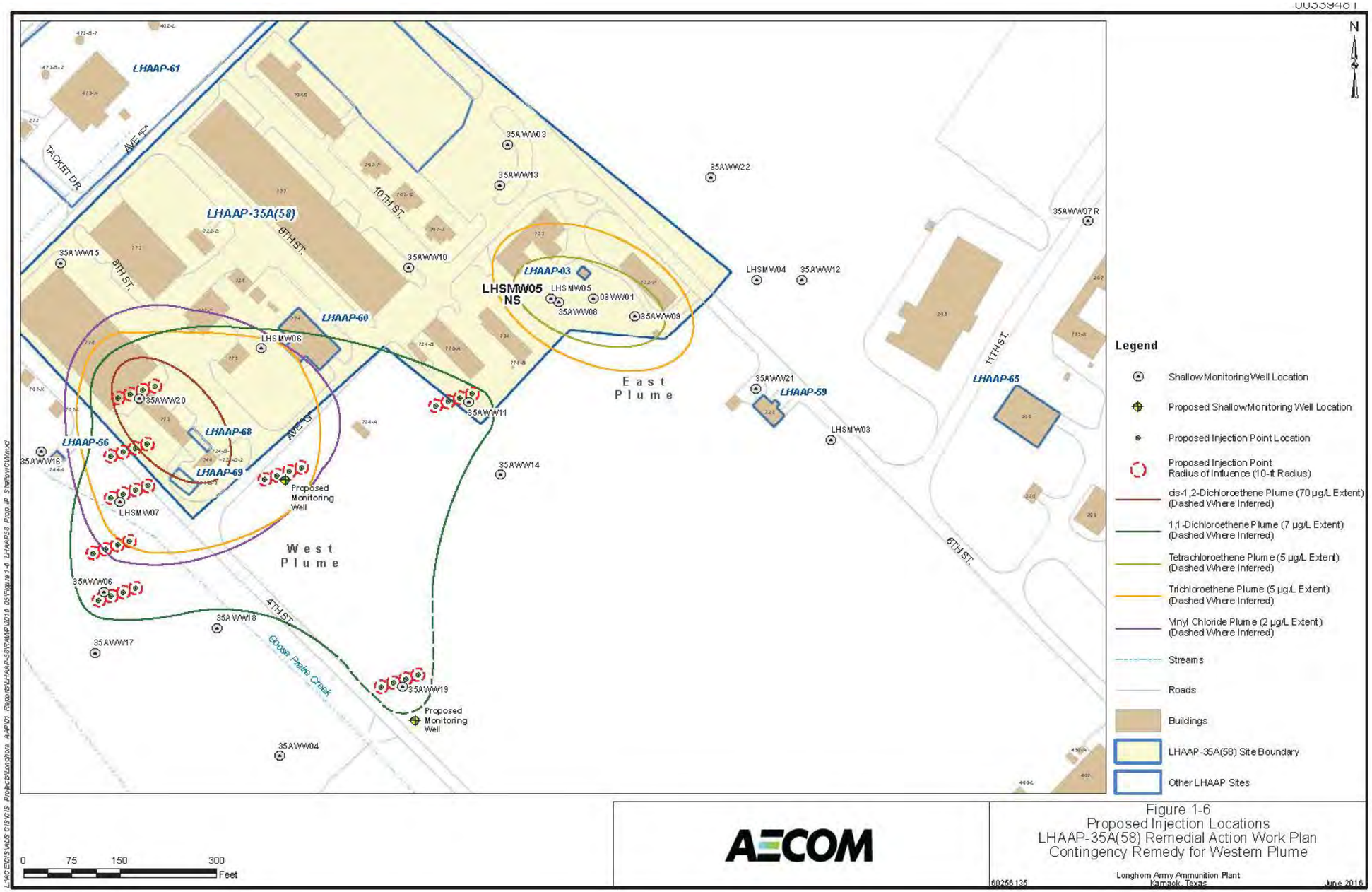
Location	Date	Constituent	Result (ug/L)	Code
LHSMW04	20-Feb-07	Trichloroethene	4.6	
LHSMW04	12-Aug-96	Trichloroethene	0.25	U
LHSMW04	9-Sep-04	Trichloroethene	5	U
LHSMW04	13-May-98	Trichloroethene	1	U
LHSMW04	1-Dec-94	Trichloroethene	5	U
LHSMW04	30-Jan-08	TRICHLOROETHENE	5.74	
LHSMW04	25-Nov-08	TRICHLOROETHENE	11.3	
LHSMW04	3/29/2016	Trichloroethene	106	
LHSMW04	4/13/2016	Trichloroethene	86.1	

Location	Date	Constituent	Result (ug/L)	Code
LHSMW04	20-Feb-07	cis-1,2-Dichloroethene	0.83	U
LHSMW04	12-Aug-96	cis-1,2-Dichloroethene	0.2	U
LHSMW04	9-Sep-04	cis-1,2-Dichloroethene	5	U
LHSMW04	13-May-98	cis-1,2-Dichloroethene	1	U
LHSMW04	30-Jan-08	CIS-1,2-DICHLOROETHENE	1	U
LHSMW04	25-Nov-08	CIS-1,2-DICHLOROETHENE	0.292	J
LHSMW04	3/29/2016	cis-1,2-Dichloroethene	0.666	J
LHSMW04	4/13/2016	cis-1,2-Dichloroethene	0.851	J

Plot 185. LHAAP-58 PCE, TCE and cis-1,2-DCE Concentrations - 2007 through 2016 (Access Data Base Provided to USACE).

Location	Date	Constituent	Result (ug/L)	Code
LHSMW04	20-Feb-07	Vinyl chloride	0.32	U
LHSMW04	12-Aug-96	Vinyl chloride	0.24	U
LHSMW04	9-Sep-04	Vinyl chloride	5	U
LHSMW04	13-May-98	Vinyl chloride	1	U
LHSMW04	30-Jan-08	VINYL CHLORIDE	1	U
LHSMW04	25-Nov-08	VINYL CHLORIDE	0.25	U
LHSMW04	3/29/2016	Vinyl chloride	0.5	U
LHSMW04	4/13/2016	Vinyl chloride	1.25	U

Plot 186. LHAAP-58 VC Concentrations - 2007 through 2016 (Access Data Base Provided to USACE).



Plot 187**. LHAAP-58 EISB for Western Plume Proposed in Revised Remedial Action Work Plan (AECOM, 2016g).**

7.0 LHAAP-67

7.1 Monitoring Network

7.1.1 Groundwater

Based on groundwater level data collected in 2014/2015 and presented in the 3rd and 2nd year RA(O), the dominant Shallow Groundwater Zone direction of flow appears to be to the north/northwest (Plot 188 through Plot 193). The groundwater flow direction is based on contouring groundwater elevation data collected from up to 17 monitoring wells. The 1st year RA(O) (Plot 194 through Plot 197), revealed that the dominant Shallow Groundwater Zone direction of flow appeared to be to the north/northeast. The flow began to shift direction by May 2014 towards the north/northwest and continued to show a north/northwesterly flow direction for the entire second and third year RA(O) reporting periods. According to the 2nd and 3rd years RA(O) reports, the apparent change of the Shallow Groundwater Zone direction of flow may be due to the increase in precipitation the area received during the monitoring period of 2014/2016, and particularly in 2015 (e.g., Plot 23, prolonged period of high precipitation).

7.1.2 Surface Water

Semi-annual sampling of surface water from one location in Central Creek was planned (AECOM, 2017g-i). The Central Creek surface water sampling location was dry during the baseline groundwater monitoring event and no surface water sample was collected. Multiple new Shallow Groundwater Zone monitoring wells show that Central Creek is upgradient from LHAAP-67. The VOC plume is now delineated within the LUC boundary; therefore, concurrence was obtained not to sample surface water from Central Creek (AECOM, 2017g-i).

7.2 MNA Performance

7.2.1 Spatial and Temporal Variation in COCs

Groundwater contamination has been identified in only the Shallow Groundwater Zone at LHAAP-67. COC plume maps for eleven sampling events (June 2013, May 2013, September 2013, January 2014, May 2014, December 2014, December 2014, February 2015, May 2015, November 2015, and May 2016) are shown in Plot 198 through Plot 208.

1,1-DCE, and 1,2-DCA are the most widespread COCs in shallow groundwater. 1,1-DCE and 1,2-DCA are likely abiotic degradation byproducts of 1,1,1-TCA and 1,1,2-TCA, respectively (Plot 209). 1,1,1-TCA has only been detected in 1998 at concentrations of 560,100 and 1800 µg/L in monitoring wells 67WW01 (plume center well), 67WW02 (downgradient well), and 67WW03 (cross gradient well), respectively. Abiotic transformation of 1,1,1-TCA to 1,1-DCE in groundwater can be relatively fast, with half-life in groundwater that could take place in less than 3 years (Vogel and McCarty, 1987). 1,1,2-TCA has also been reported in 1998 in wells 67WW01, 67WW02, and 67WW03 at concentrations of 33, 6.4, and 24 µg/L respectively. 1,1,2-TCA has been detected in 67WW01 at a concentration below the MCL. 1,1,2-TCA has been detected in 67WW08 (plume center well) and 67WW13 (plume center well) in all sampling events at levels ranging between 2.76 to 7.74 µg/L, and 1.99 to 7.66, respectively (e.g., at times slightly above the MCL of 5 µg/L). At the newly installed well 67WW15 (plume center well, Plot 208), 1,1,2-TCA was detected in 2016 at levels of 25.7 µg/L. In 2016, the footprint of 1,1,2-TCA

exceeding the MCL was delineated based on exceedance encountered at plume center wells 67WW13 and 67WW15 (Plot 208).

VC is encountered consistently within the center of the widespread COC plumes. According to the literature, 1,1-DCE can biotransform to VC through reductive dehalogenation (Vogel and McCarty, 1987). The presence of VC indicates that reductive dechlorination is occurring to a limited extent in some locations within the Shallow Groundwater Zone plume.

The footprints of the most widespread COCs (1,1-DCE and 1,2-DCA) appear to be redistributed in response to shifts in groundwater flow direction, remaining stable. The following bullets summarize the footprints' distribution and behavior:

- Monitoring wells 67WW04, 67WW09A, and 67WW10 located south, southeast and southwest, of the COCs footprints are considered upgradient background monitoring wells. COCs were nondetect in these wells in all sampling events (Plot 198 through Plot 208).
    - Plume center shallow monitoring wells include 67WW01, 67WW08, 67WW09, 67WW11, 67WW13, and 67WW15.
        - Peak 1,1-DCE concentrations of ~ 2500 µg/L were encountered in 67WW08 and 67WW15 (Plot 210). 1,1-DCE concentrations in well 67WW08 fluctuate, likely due to a shift in the flow regime. In the most recent sampling event of November 2017, 1,1-DCE concentrations at 67WW08 dropped to a historical low value of 340 µg/L. Limited data is available for the recently installed well 67WW15. Concentration at 67WW15 dropped from ~ 2500 µg/L in 2016 to 340 µg/L in 2017. Historically, elevated concentrations of 1,1-DCE, at the peak, ranging between ~700 and ~800 µg/L, were encountered at 67WW01 and 67WW13. Concentrations in these two wells fluctuates and in the most recent sampling event of November 2017, concentrations were within the historical low range, specifically, 250 and 340 µg/L for wells 67WW01 and 67WW13, respectively. Concentrations of 1,1-DCE in wells 67WW09 and 67WW11 located along the southern boundary of the plumes has been dropping continuously and in 2017 were below detection limits.
        - Historically, highest concentrations of 1,2-DCA were encountered at 67WW08 ranging from ~ 56 µg/L to 101 µg/L between 2013 and 2016, and dropping to 13 µg/L in November 2017. Concentrations in 67WW15 were similar, dropping from 86.5 µg/L in 2016 to 27 µg/L in 2017. Concentrations of 1,2-DCA in 67WW13 ranged between ~13 and ~43 µg/L. 1,2-DCA concentrations in wells 67WW09 and 67WW11 located along the southern boundary of the plume were nondetect.
- Cross-gradient perimeter monitoring wells include 67WW07 and 67WW14. Concentrations of COCs in 67WW07, located along the eastern boundary of the plumes, were below the MCL in all sampling events. Concentration of 1,1-DCE in 67WW14, located along the western perimeter of the plume, exceeded the MCL of 7 µg/L in two out of eleven sampling events. 1,1-DCE concentration in 67WW14 in the most recent sampling event of 2017 was below the MCL.
- Hydraulically downgradient shallow monitoring wells include 67WW12, 67WW02 and 67WW05. Concentrations of COCs in 67WW12, located along the northeast perimeter of the plumes, and in 67WW05, located along the northwest perimeter of the plumes, were non-detect in all sampling events. 1,1-DCE concentrations in 67WW02, located

along the north perimeters of the plume, were detected above MCL in two out of the fifteen sampling events. In most sampling events including the most recent sampling of 2017, 1,1-DCE concentrations in well 67WW02 were below detection limits. The exceedance of 1,1-DCE in this downgradient perimeter well is attributed to plume redistribution due to a prolonged period of high recharge and shift in groundwater flow direction.

The footprints of VC is limited to the center of the plume to wells 67WW01 and 67WW13, though at times the footprint also includes well 67WW08 (located within the center of the plume) due to high reporting limits that are higher than the MCL.

7.2.2 Trend Analysis

The Army conducted Mann-Kendall analysis for COCs data collected from 2013 through 2016 (AECOM, 2017i). Spatial distribution of the trend plots overlaying the May 2016 COCs contours, and the Fourth Five-Year Review's comments regarding the trend plots performed by O&M are included in Plot 208. Results of O&M's Mann Kendall analysis and posting of the historical data through 2017 are presented in Plot 211 through Plot 228. Results from the Fourth Five-Year Review trend analysis are shown in Figure 37 through Figure 39. Summary of the Mann-Kendall trends, the Fourth Five-Year Review trend analysis, and visual observations regarding the trends as they relate to meteorological conditions and the groundwater flow regime are summarized in the table below.

Mann-Kendall analysis performed on data collected between 2013 and 2016 indicates increasing trends in COCs in two wells including plume center 67WW01 and 67WW13 (AECOM, 2017i). The Fourth Five-Year Review trend analysis, which includes all the data collected to date indicates increasing trends in COCs in well 67WW01 (Figure 38). However, as indicates in the summary table above, the Fourth Five-Year Review trend analysis results for 67WW13 is different from the Army's results, likely due to the recent data included in the Fourth Five-Year Review analysis. Based on visual observations, which factored in the meteorological conditions and the change in groundwater flow regime it is possible that the increase in concentrations noted in the trend analysis is due to redistribution of the COCs plumes and/or a slug moving through, specifically:

- The increase in trends of 1,1-DCE and 1,2-DCA at the plume's center (67WW01 (Plot 211 and Plot 212 and Figure 38) may be attributed to plume redistribution resulting from the shift in groundwater flow direction, and/or due to a slug resulting from the extended high precipitation recorded between 2014 and 2016 (in particular the extended period of precipitation noted in 2015, Plot 23). The most recent concentrations for these COCs reported in November 2017 show a significant drop with 1,1-DCE concentration at a historical low value.
- The increase in trend of 1,2-DCA in plume center well 67WW13 (Plot 227) noted by the Army, which utilized the data collected through 2016, is different from the Fourth Five-Year Review trend analysis results, which utilize the data collected to date. The Fourth Five-Year Review analysis indicates that a concentration trend cannot be established for 1,2-DCA in 67WW13. Visual observation that takes into consideration meteorological data and the shift in the groundwater flow regime suggests that the temporary increase in 1,2DCA may be attributed to plume redistribution, and/or the slug moving through. Review of the data indicates that concentrations of 1,2-DCA fluctuated with the lowest

concentration of ~ 13 µg/L reported in May 2014, when the shift in the groundwater flow regime from north/northeast to north/northwest was reported, and the highest concentrations of ~ 42 µg/L reported in 2015, the year with the highest precipitation. Concentrations of 1,2-DCA in 2016 and 2017 have been dropping.

	Summary of Results of Trend Analyses Performed by O&M and the 2019 FYR*			Comment / Visual Observation
Monitoring Well	1,1-DCE	1,2-DCA	TCE	
67WW01	O&M : Significant Increase	O&M : Significant Increase	O&M: No Significant Trend	The two independent trend analyses performed by O&M and the 2019 FYR indicates increase in 1,1-DCE and 1,2-DCA concentrations with statistical significance of 95%. However, the increase in 1,1-DCE concentrations between December 2014 to May 2016 dropped in 2017 to a value that is within the historical low range. It appears that the high 1,1-DCE concentrations may be correlated to high recharge in 2014 and 2015 and may be attributed to a slug moving through and/or plumes redistribution. Similarly 1,2-DCA concentrations increased between 2014 and March 2016 decreasing thereafter.
	2019 FYR : Significant Increase	2019 FYR : Significant Increase	2019 FYR: Insufficient Data	
67WW02	O&M : No Significant Trend	O&M : No Significant Trend	O&M : No Significant Trend	The detection of 1,1-DCE at levels up to ~ 68 ppb (between 2014 and 2016) may be attributed to redistribution of the plume due to change in the flow regime from NE to NW. In 2017 1,1-DCE was not detected in this well.
	2019 FYR : Insufficient Data	2019 FYR : Insufficient Data	2019 FYR : Insufficient Data	
67WW08	O&M : No Significant Trend	O&M : No Significant Trend	O&M : No Significant Trend	In 2017 concentrations of 1,1-DCE and 1,2-DCA dropped to historical low.
	2019 FYR : Intermediate	2019 FYR : Intermediate	2019 FYR : Insufficient Data	
67WW09	O&M: Significant Decrease	O&M: Significant Decrease	O&M : No Significant Trend	
	2019 FYR : Insufficient Data	2019 FYR : Insufficient Data	2019 FYR : Insufficient Data	
67WW11	O&M: Significant Decrease	O&M: Significant Decrease	O&M: No Significant Trend	
	2019 FYR : Insufficient Data	2019 FYR : Insufficient Data	2019 FYR : Insufficient Data	
67WW13	O&M : No Significant Trend	O&M : Significant Increase	O&M: No Significant Trend	
	2019 FYR : Intermediate	2019 FYR : Insufficient Data	2019 FYR : Insufficient Data	

*O&M' s Trend utilized data collected between Spring (May) 2013 through Spring (May) 2015. The trend analysis's protocol employed by the 2019 FYR is described in Section 1.3 of Appendix C.

The Mann-Kendall analysis identified statistically evidence of decreasing trends in COCs concentrations for plume center wells 67WW09 and 67WW11. Because the concentrations of COCs in these wells were below 10XMCL, the data did not meet the criteria for performing trend analysis by the Fourth Five-Year Review (see section 1.3 of Appendix C). Results of the Army's trend analysis for 67WW09 and 67WW11 are summarized below:

- Plume center monitoring well 67WW09 – 1,1-DCE and 1,2-DCA. The decreasing trends in 1,1-DCE and 1,2-DCA may be the result of natural attenuation (e.g., dilution from clean upgradient groundwater). Results from the 2017 sampling event confirms that decrease of one, 1-DCE in 67WW09 to nondetect levels is maintained (Plot 220). Concentration of one, 2-DCA in 67WW09 has been nondetect (Plot 221) since July 2014 and remained non-detect through 2017. Monitoring well 67WW09A was installed south-southeast of monitoring well 67WW09 to bound the plume to the south and in the upgradient direction. VOC results in monitoring well 67WW09A have remained below the MCLs.
- Plume center monitoring well 67WW11 – 1,1-DCE and 1,2-DCA. Similar to the decreasing trends observed for these constituents in monitoring well 67WW09, the decreasing trends observed in monitoring well 67WW11 may be the result of natural attenuation (e.g., dilution from clean upgradient groundwater observed in 67WW09A). Results from the 2017 sampling event confirm that the decrease of 1,1-DCE continues to take place. The most recent sampling event of November 2016 shows that for the first time, concentration of 1,1-DCE in 67WW11 dropped below the MCL (Plot 223). In 2017, the concentration of 1,2-DCA was below the reporting limit of 1 µg/L, confirming that concentration of 1,2-DCA is maintained below the MCL.

Spatial and temporal trends of COCs indicate that the footprints of these COCs redistributed with change in groundwater flow direction, overall remaining stable. Although cross-gradient COC concentrations in perimeter well 67WW14, and the northern downgradient perimeter well 67WW02 (e.g., Plot 208), exceeded the MCL in the 2017 sampling event, perimeter well concentrations were below the MCL. Information from USGS indicates that for an extended period prior to November 2017 both the surface water discharge and stage elevations were relatively low, indicating a prolonged period of low recharge (Figure 4). Precipitation data recorded at a nearby meteorological station indicates that precipitation in October and November 2017 was well below the average precipitation for these months (NOAA, 2018).

MNA is expected to achieve restoration time of 17 to 66 years for TCE, 20 to 34 years for 1,1-DCE, and 21 to 43 years for 1,2-DCA (US Army, 2010d). Considering the lithologic variability, particularly the lateral and vertical change from sand to clay, the time to MCL may range to an order of magnitude greater. The effectiveness of the MNA remedy in meeting these restoration times is summarized below:

- Between 2013 and 2017, TCE was below the MCL in all wells except plume center well 67WW15. In the newly installed well 67WW15, TCE concentrations were 6.89 µg/L and ND in 2016 and 2017, respectively.
- There is insufficient information to estimate restoration time for 1,1-DCE and 1,2-DCA throughout the plume. Restoration time for 1,1-DCE in plume center well 67WW11 where Mann-Kendall show a decreasing trend, was calculated by at 3.4 years (Plot 229) (AECOM, 2017i). The 2017 analytical data shows that 1,1-DCE is below the MCL in this location.

According to the Army, there is no groundwater contamination in the Intermediate Groundwater Zone groundwater (AECOM, 2016i). Although there is likely interconnectivity between the Shallow and Intermediate Groundwater Zones due to the laterally and vertically discontinuous nature of channel sands, flow is predominantly horizontal in these units (USACE 2010). Analytical results from sampling of an intermediate well, 67WW16I, were ND for all COCs (Plot 208).

7.2.3 Geochemical Indicators

The qualitative assessment of geochemical indicators during the three year RA(O) period in the Shallow Groundwater Zone at LHAAP-67 indicates current geochemical conditions are not optimal for MNA. DO concentrations ranging between 0 and 2 mg/L were recorded in plume center wells. Low DO levels (< 0.5 mg/L) recorded at times in plume-centered wells 67WW08 and 67WW13, are beneficial for reductive dechlorination. ORP in plume center wells shift from negative and low positive values (< 50 mV) to values greater than 100 mV, possibly due to the shift in groundwater flow directions. The shift from anaerobic to aerobic redox conditions are not favorable for reductive dechlorination. TOC concentrations ranging between 22.1 and 93 mg/L were recorded in plume center wells. These values are greater than the threshold value of 20 mg/L considered adequate to support reductive dechlorination of COCs and may indicate that conditions could favor natural attenuation. The presence of dissolved iron in plume center well 67WW08 (<1 mg/L) also provides evidence that limited reducing anaerobic conditions are present. Degradation by-products including 1,2-DCA and 1,1- DCE have been detected in the plume monitoring wells. Adequate conditions within the impacted area currently do not exist to sustain complete reductive dechlorination.

7.3 Data Analysis Summary

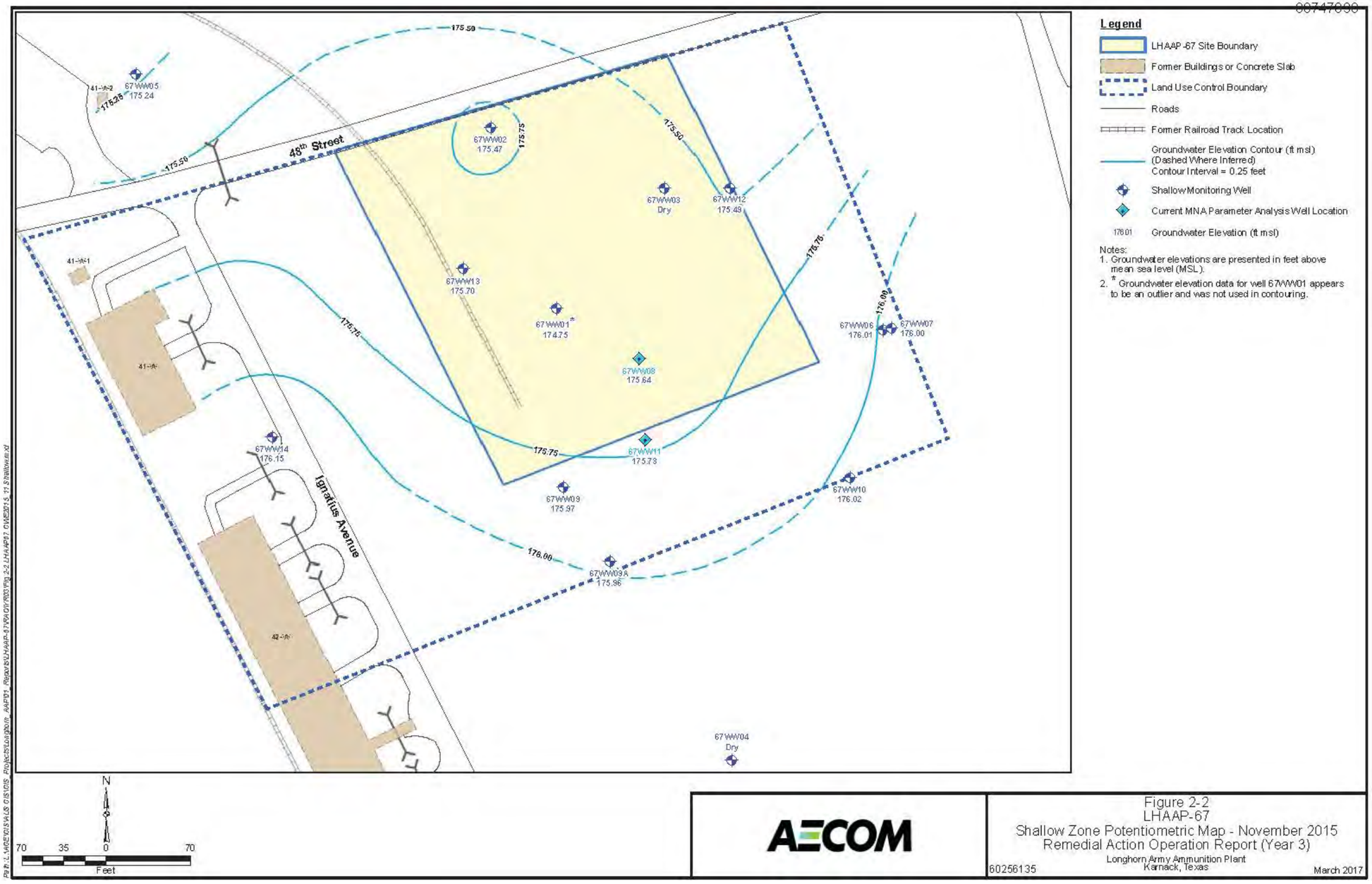
There are two primary widespread COCs in LHAAP67: 1,1-DCE and 1,2-DCA, and to a lesser extent VC. 1,1-DCE is suspected to be an abiotic degradation byproduct of 1,1,1-TCA, which has been detected in groundwater in 1998. 1,1,1-TCA is no longer being detected in groundwater possibly due to the fast degradation rate through hydrolysis to 1,1-DCE. The small footprint of VC encountered within the COCs plume center is possibly due to reductive dechlorination of 1,1-DCE. 1,2-DCA is suspected to be an abiotic degradation by-product of 1,1,2-DCA. Low levels of 1,1,2-DCA are still being detected in groundwater.

The footprints of the primary widespread COCs appear to redistribute with the shift in groundwater flow directions from the north/northeast to the north/northwest. Although the footprints of the 1,1-DCE and 1,2-DCA redistribute, they appear to remain stable within its historical footprint. COCs are non-detect in upgradient perimeter wells located along the southern perimeter of the plumes, and in cross-gradient/downgradient perimeter wells located to the east/northeast and northwest. However, 1,1-DCE and 1,2-DCA above their respective MCL were encountered in a cross gradient perimeter well, located along the western perimeter of the plume, and in a downgradient perimeter well, located north of the plume. This occurred subsequent to a prolonged high recharge period or return to non-drought conditions (Figure 4), and a shift in the groundwater flow direction from northeast to northwest. In the most recent sampling events of November 2017, COCs were below their respective MCL in all perimeter wells.

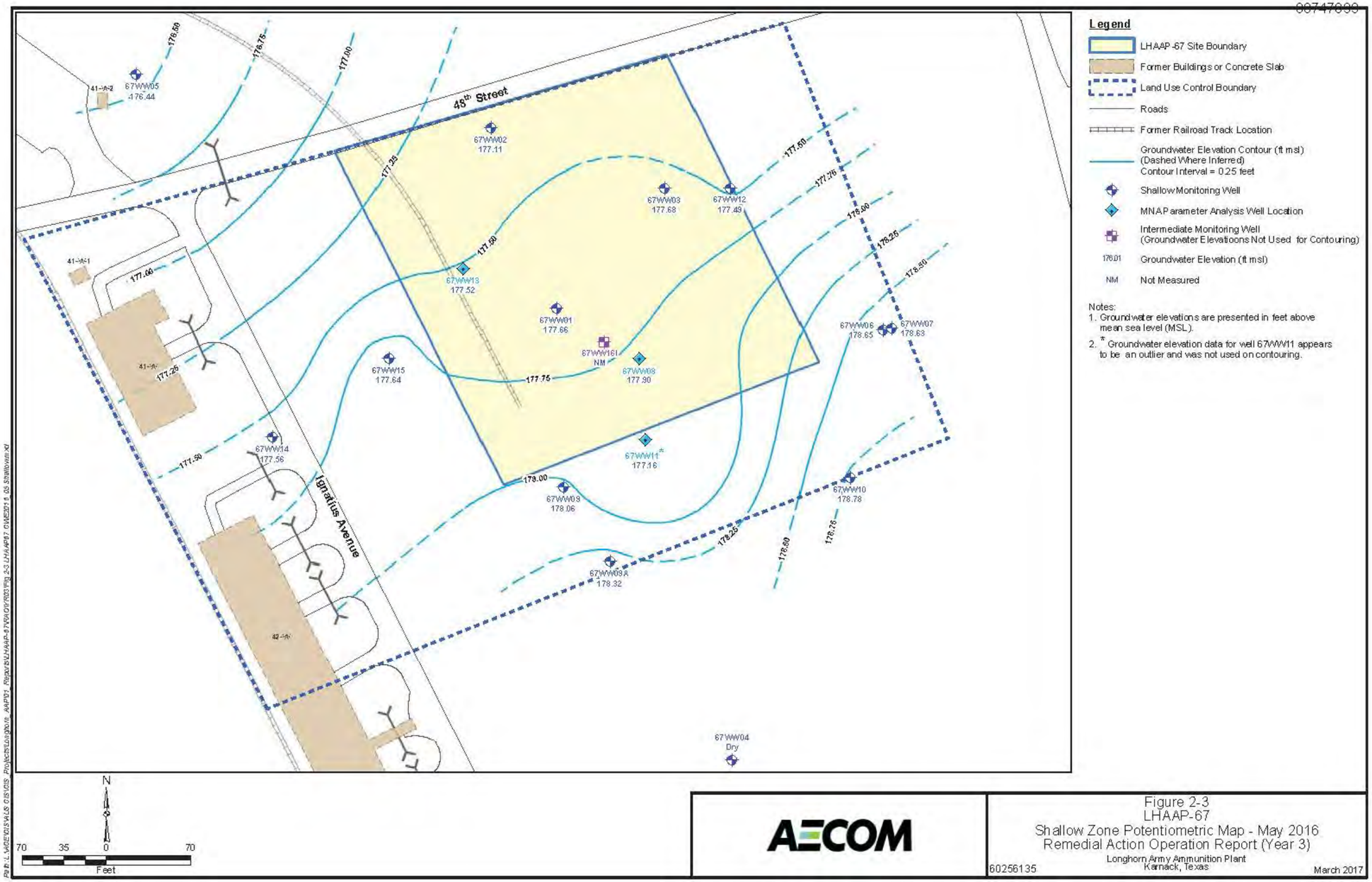
The Mann-Kendall analysis conducted with data collected through 2016 indicated increasing trends in 1,1-DCE and/or 1,2-DCA in two plume center wells (Plot 208). The Fourth Five-Year Review trend analysis confirms the increasing trends of COCs in one of these wells. However, correlation of the trend patterns with the shift in the groundwater flow regime, and meteorological conditions indicates that increasing COC concentrations appear to be temporary and may be attributed to prolonged periods of high recharge. The drop in concentrations of COCs encountered in 2017 are attributed to prolonged period of low recharge.

The qualitative assessment of geochemical indicators during the three year RA(O) period in the Shallow Groundwater Zone at LHAAP-67 indicates current geochemical conditions are not optimal for MNA. .Redox condition shifts from aerobic to anaerobic, presence of dissolved iron, and TOC at concentrations above the threshold value considered adequate to support reductive dechlorination may indicate that, at times, conditions could favor natural attenuation. Degradation by-products including 1,2-DCA and 1,1- DCE have been detected in the plume monitoring wells, adequate conditions within the impacted area currently do not exist to sustain complete reductive dechlorination (for detailed see section 9.2.3).

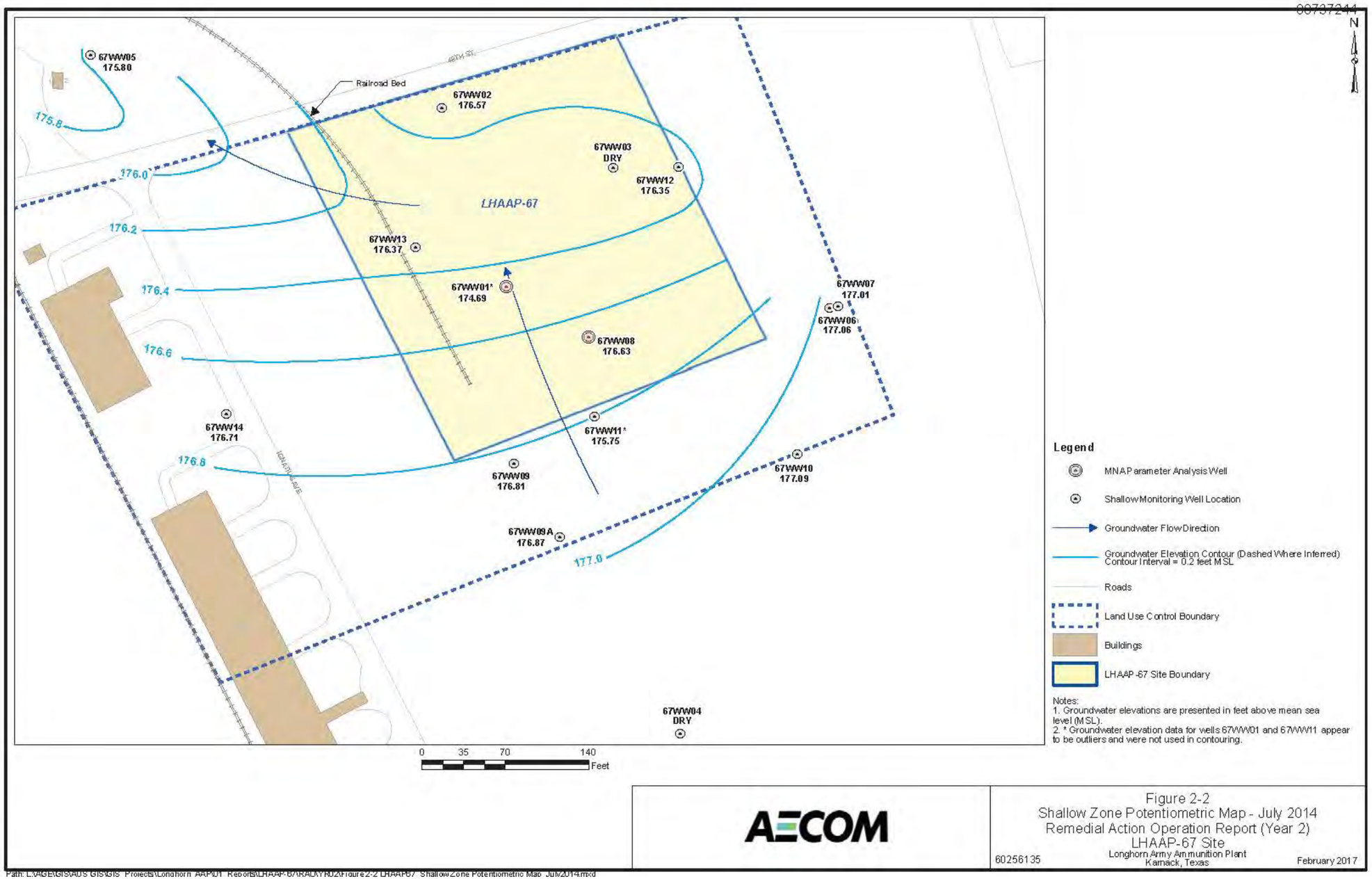
Multiple groundwater contours generated using gauging that includes new Shallow Groundwater Zone monitoring wells show that Central Creek (Figure 3) is upgradient from LHAAP-67. The VOC plume is now delineated within the LUC boundary. Therefore, concurrence was obtained not to sample surface water from Central Creek.



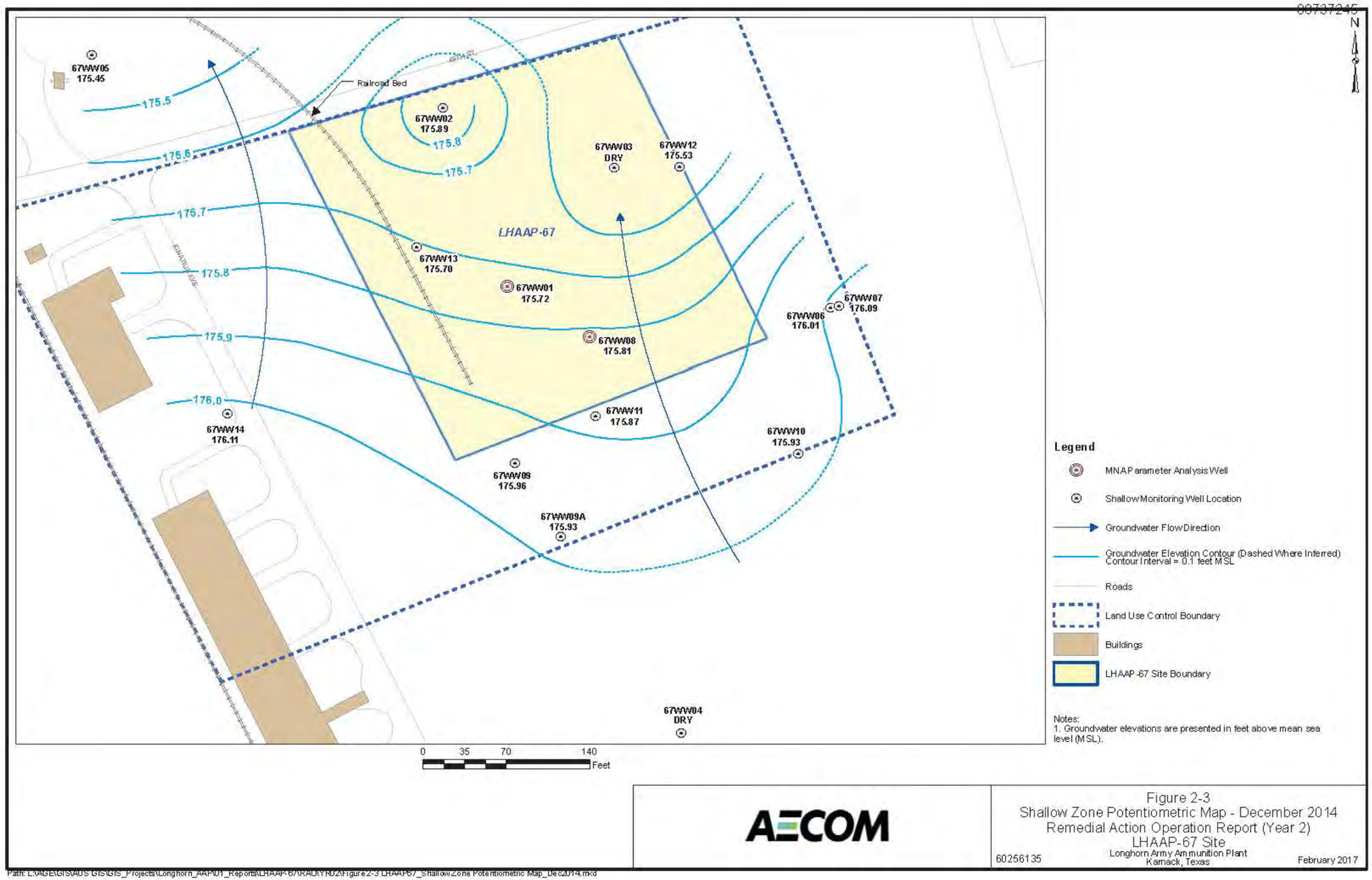
Plot 188. LHAAP-67 ggroundwater contours – November 2015 (AECOM, 2017i).



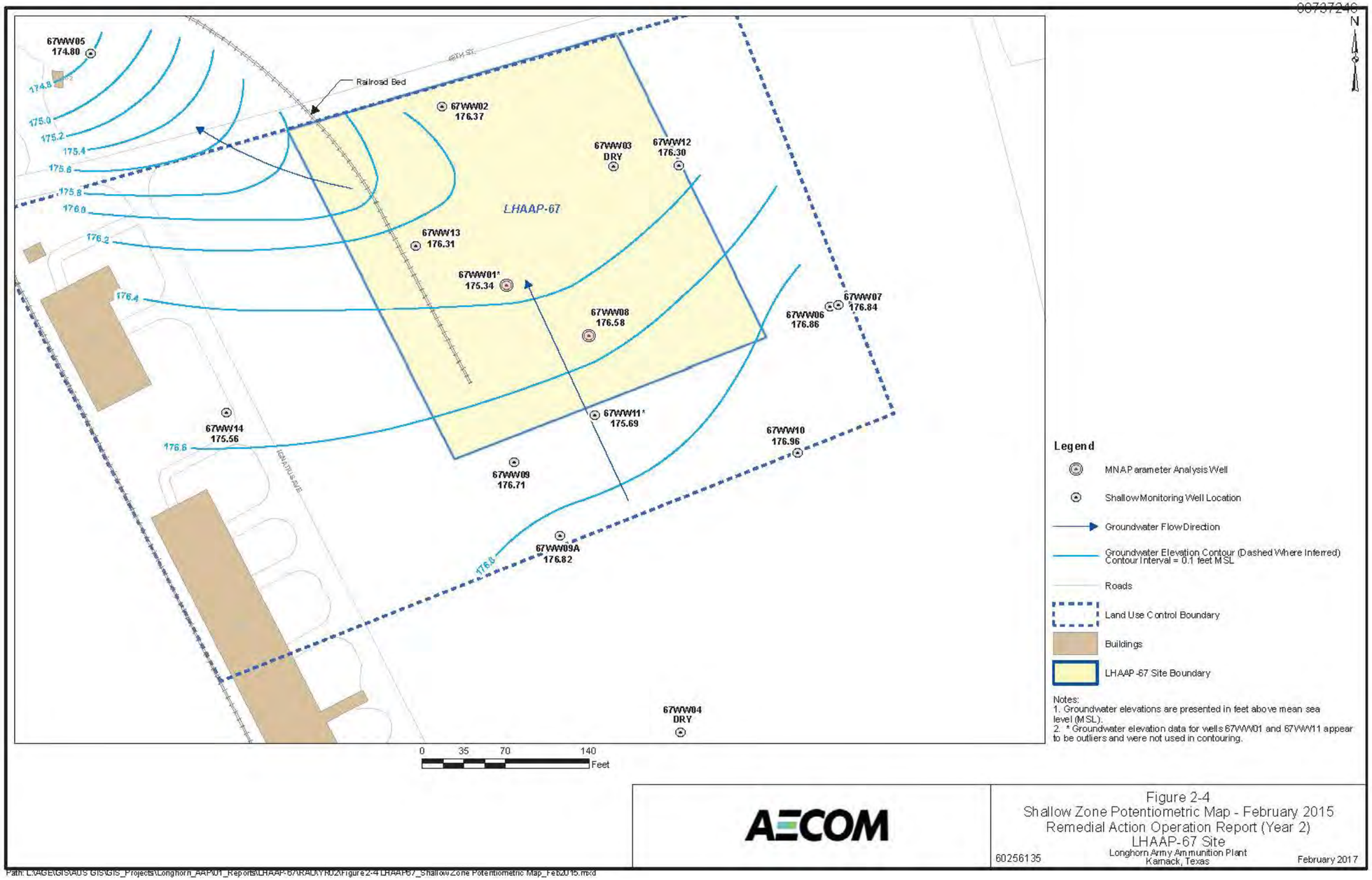
Plot 189. LHAAP-67 ggroundwater contours – May 2016 (AECOM, 2017i).



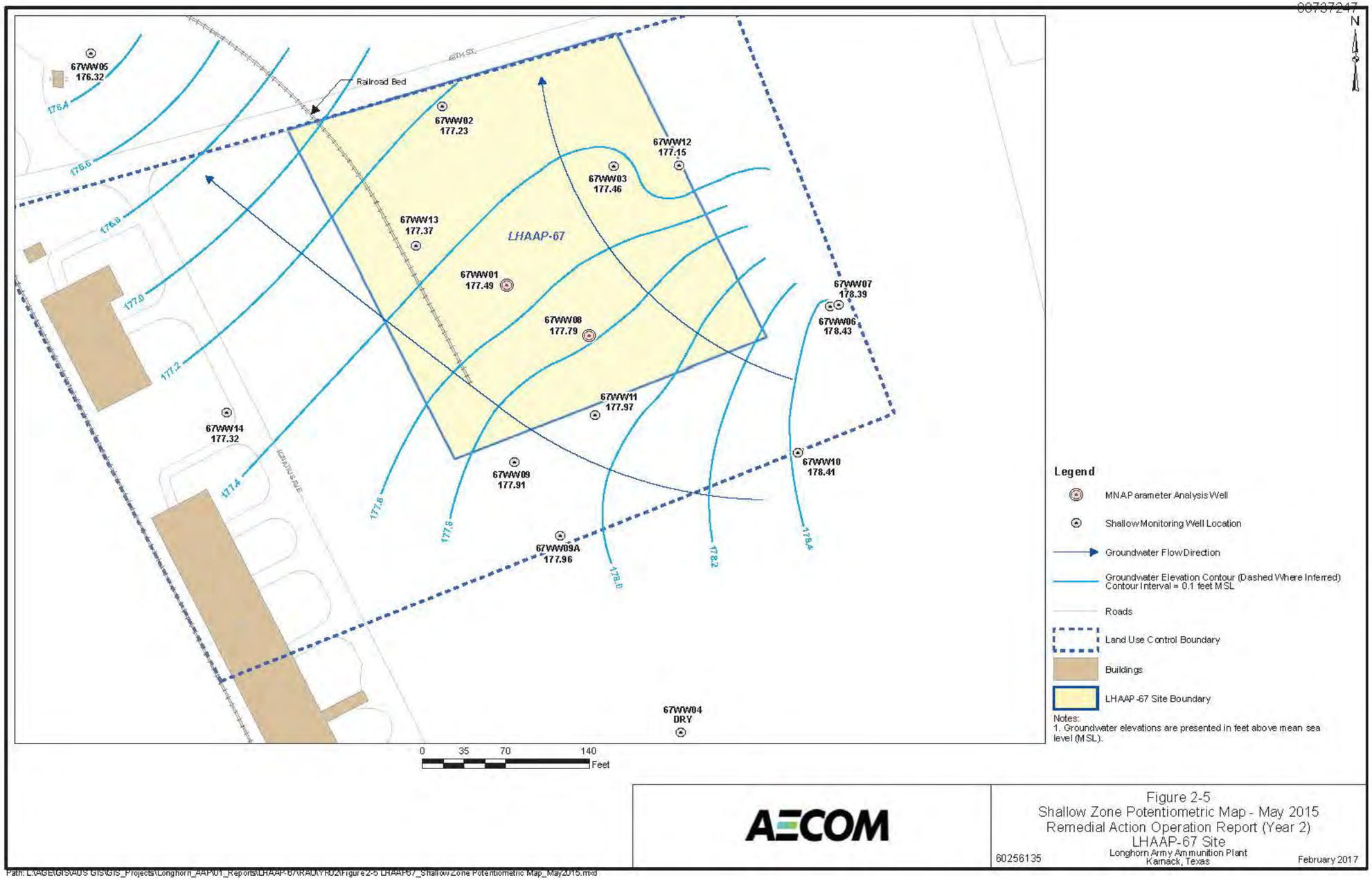
Plot 190. LHAAP-67 ggroundwater contours – July 2014 (AECOM, 2017h).



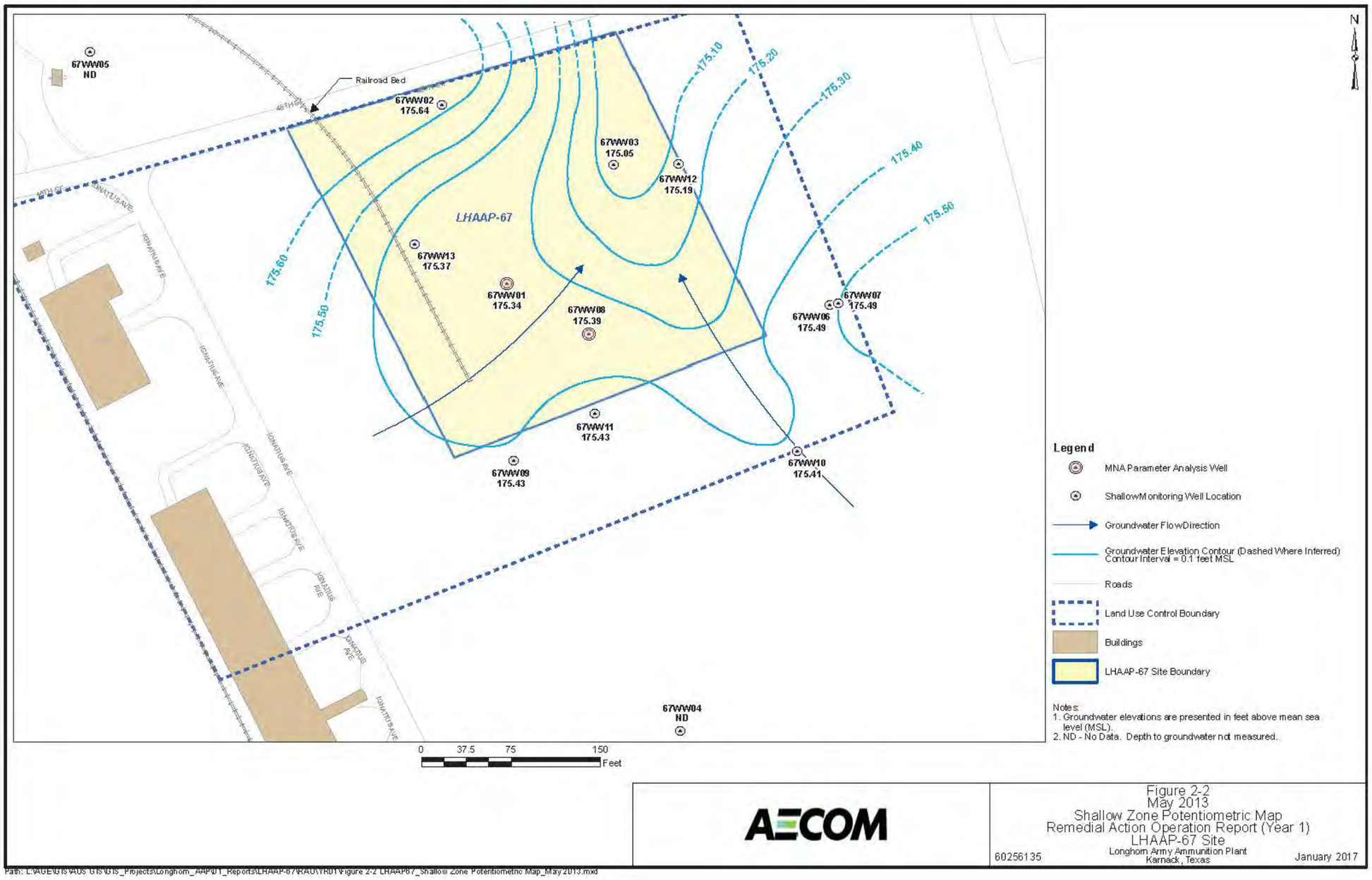
Plot 191. LHAAP-67 ggroundwater contours – December 2014 (AECOM, 2017h).



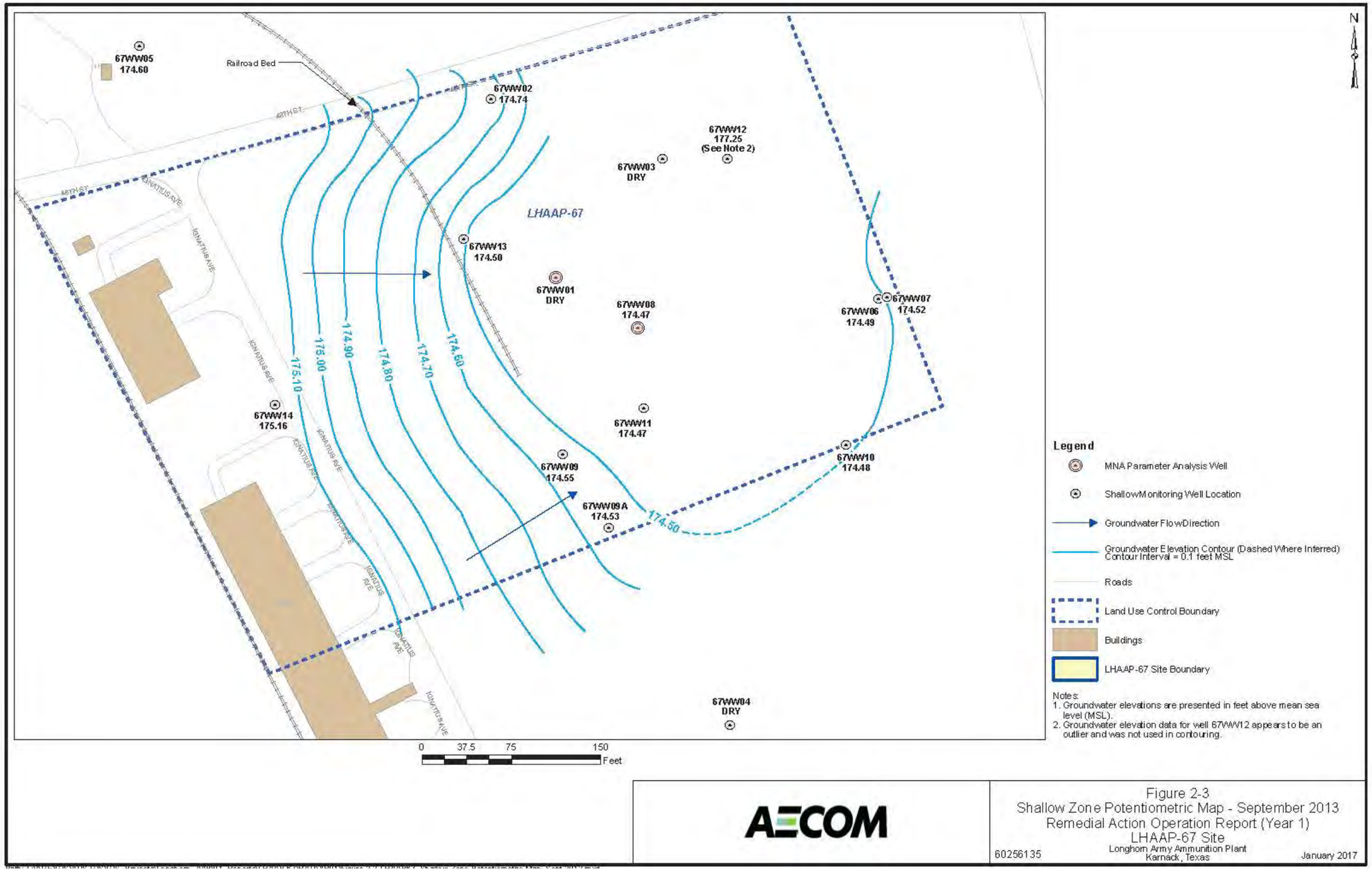
Plot 192. LHAAP-67 ggroundwater contours – February 2015 (AECOM, 2017h).



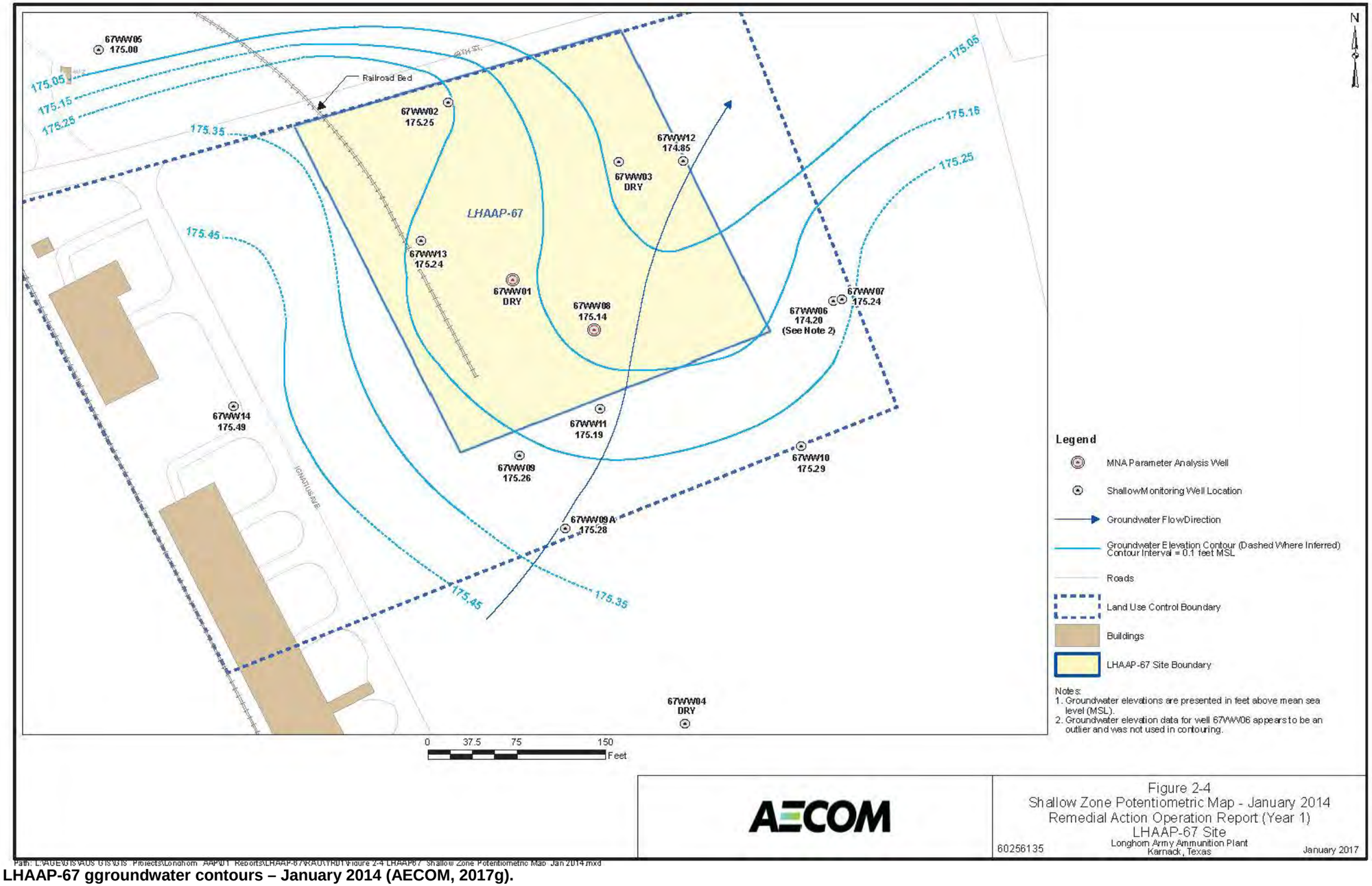
Plot 193. LHAAP-67 ggroundwater contours – May 2015 (AECOM, 2017h).



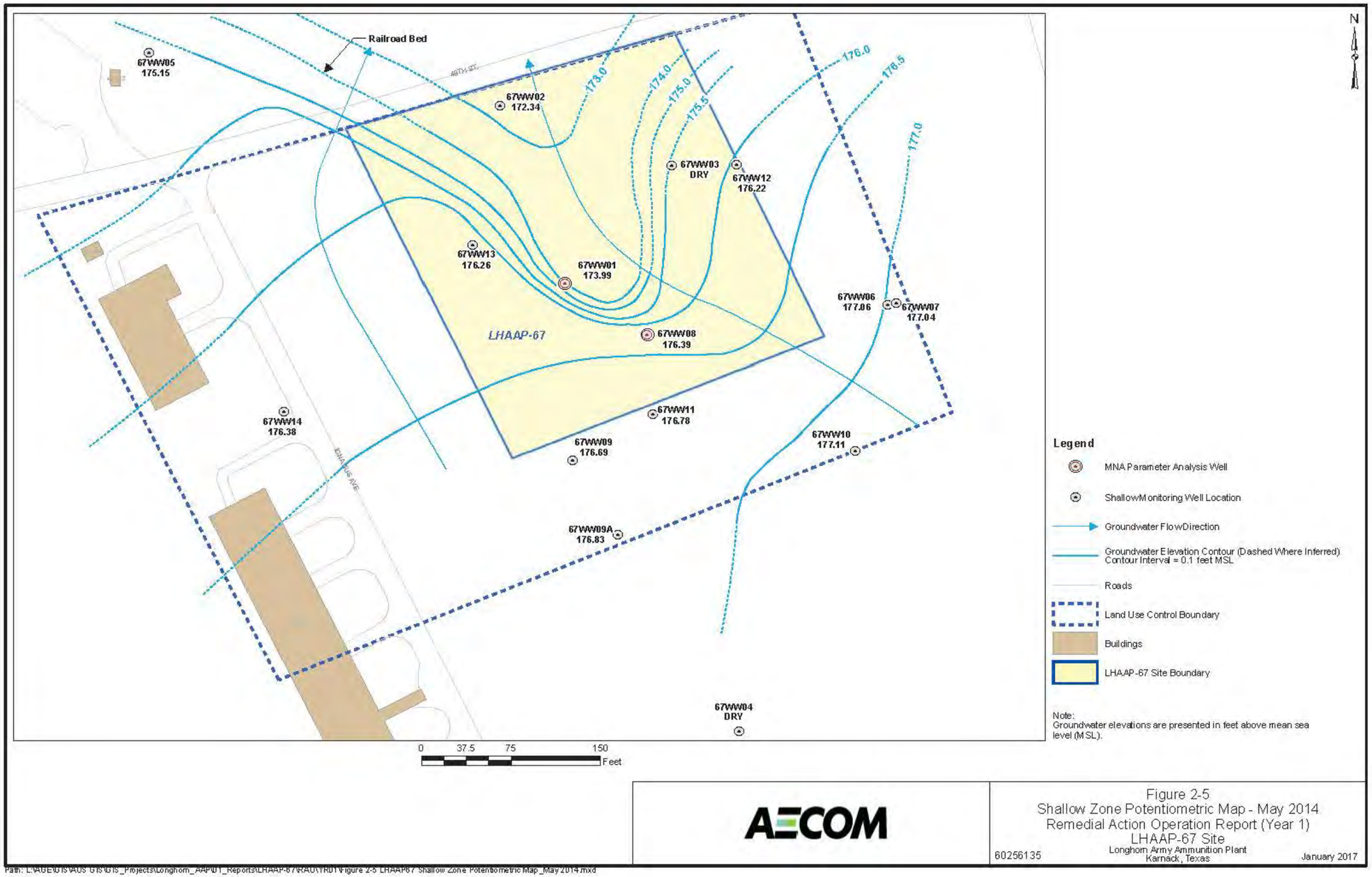
Plot 194. LHAAP-67 ggroundwater contours – May 2013 (AECOM, 2017g).



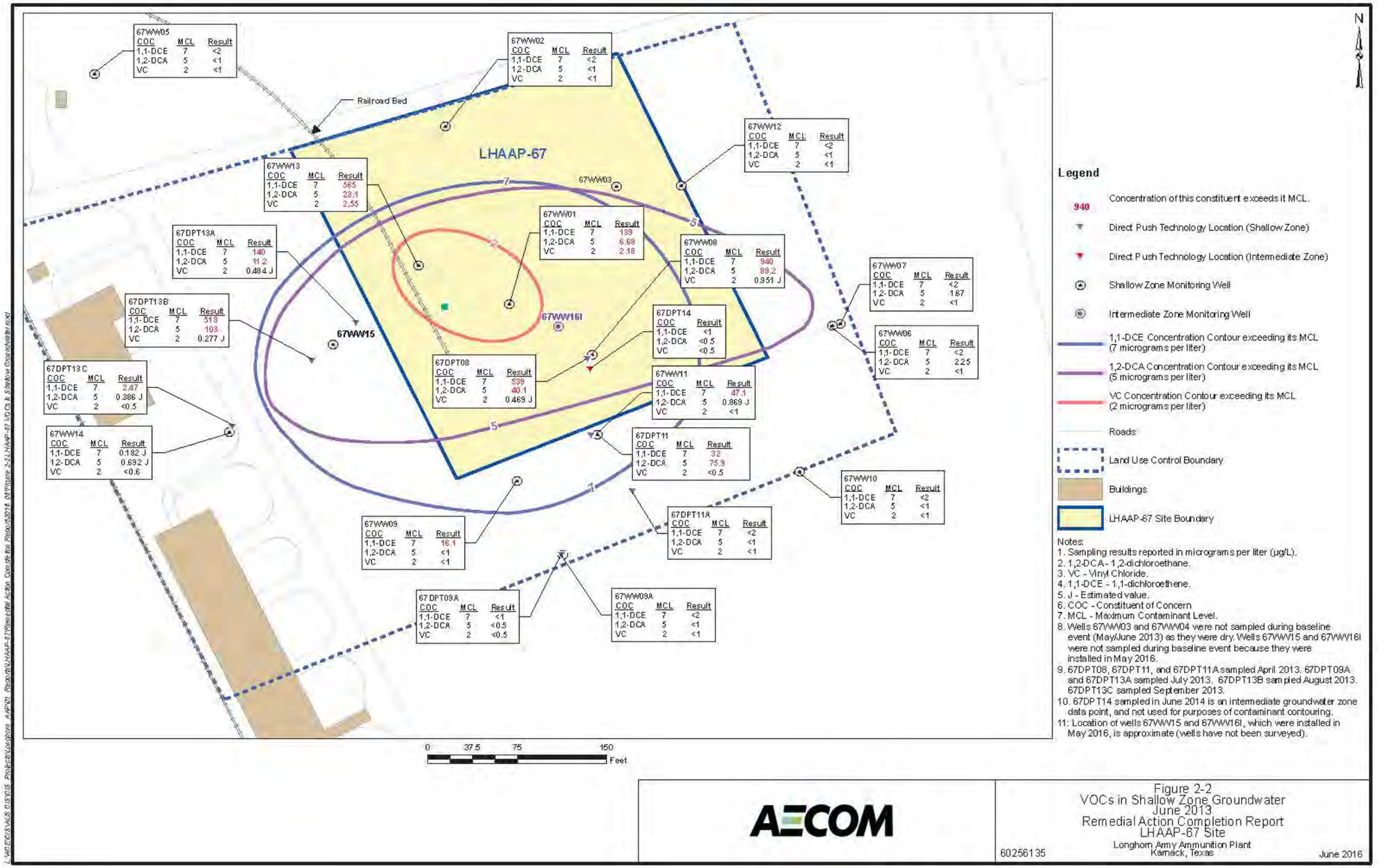
Plot 195. LHAAP-67 ggroundwater contours – September 2013 (AECOM, 2017g).



Plot 196. LHAAP-67 ggroundwater contours – January 2014 (AECOM, 2017g).



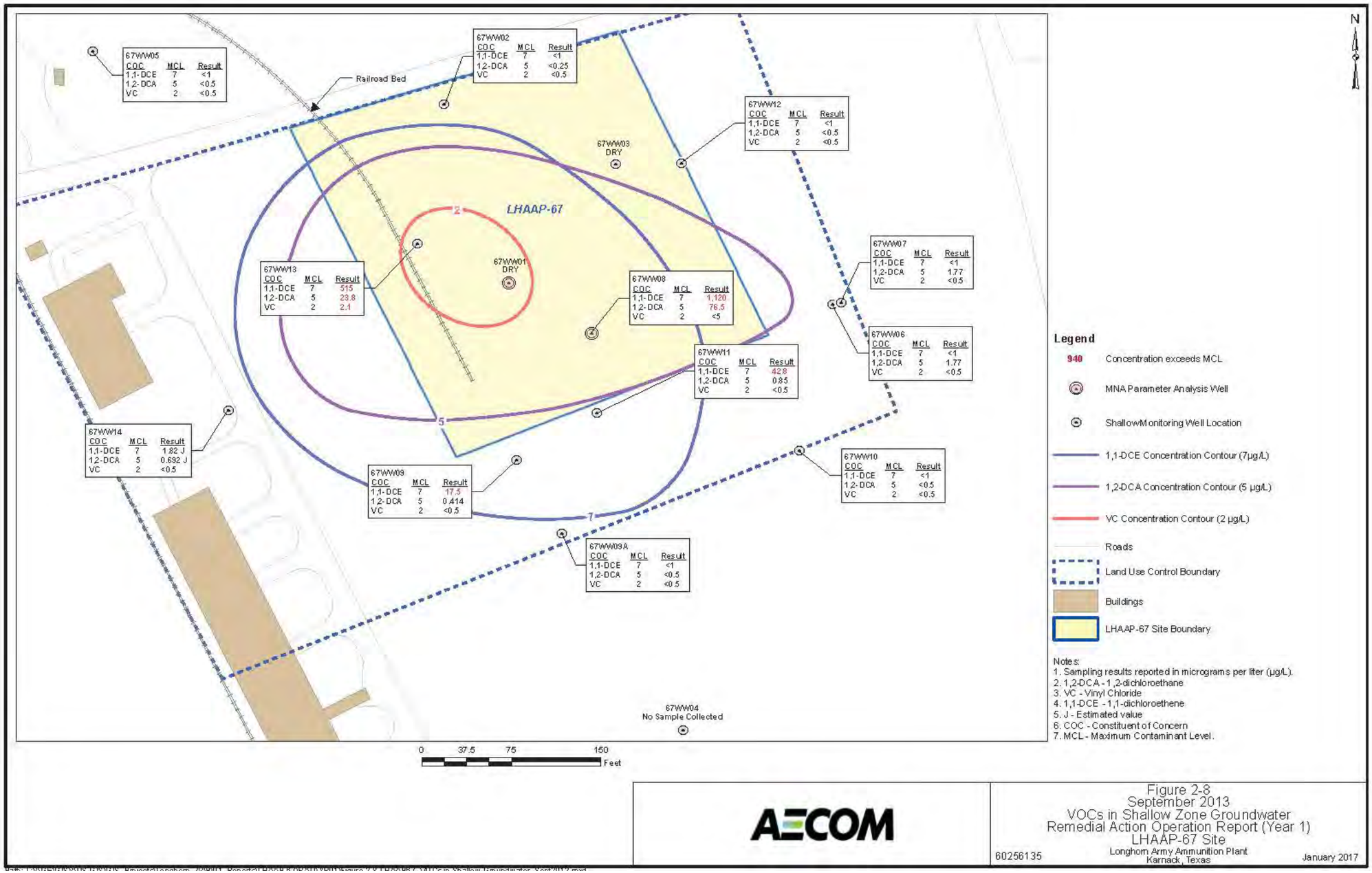
Plot 197. LHAAP-67 ggroundwater contours – May 2014 (AECOM, 2017g).



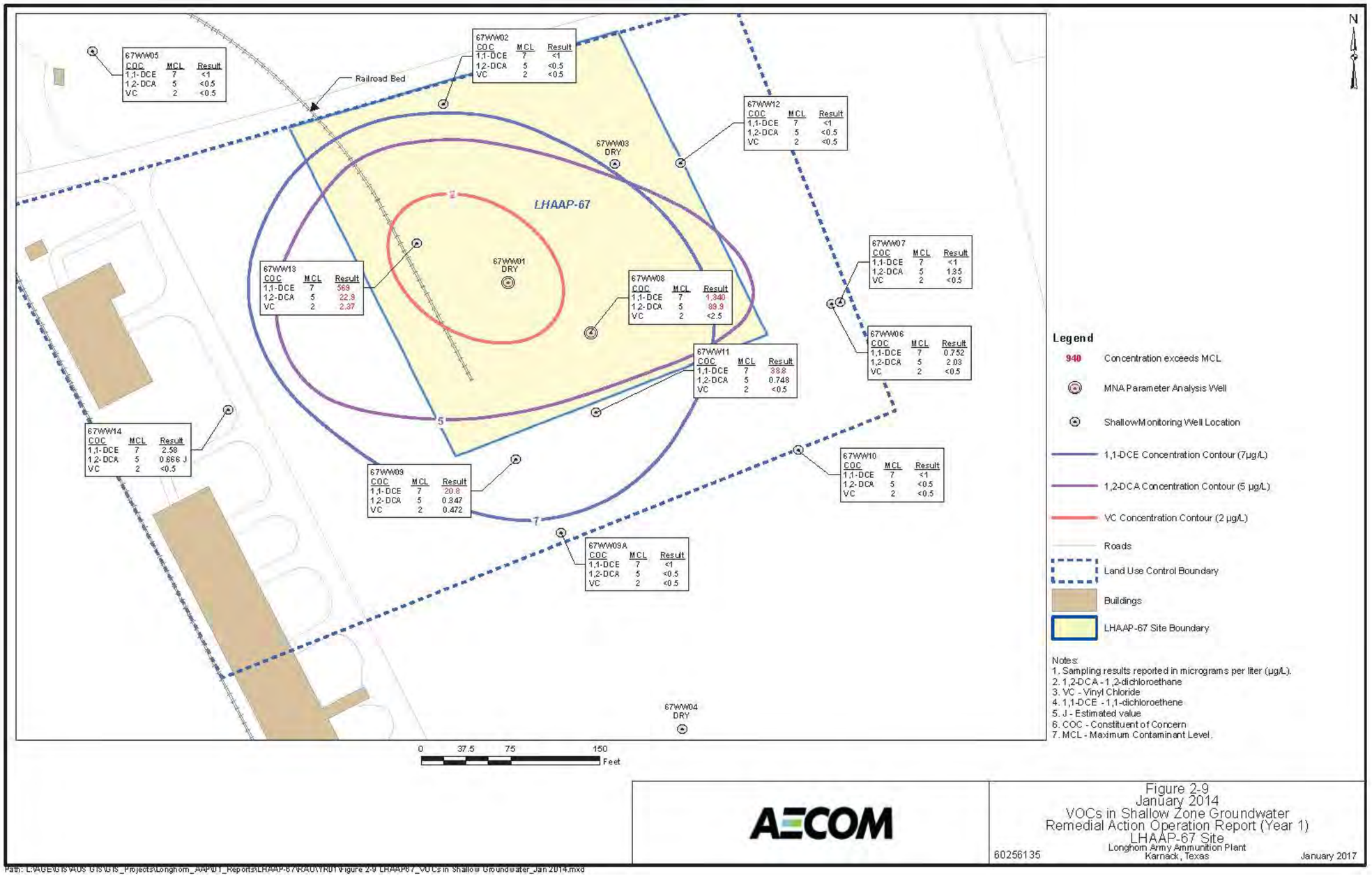
Plot 198. LHAAP-67 COC footprints - June 2013 (AECOM, 2016i).



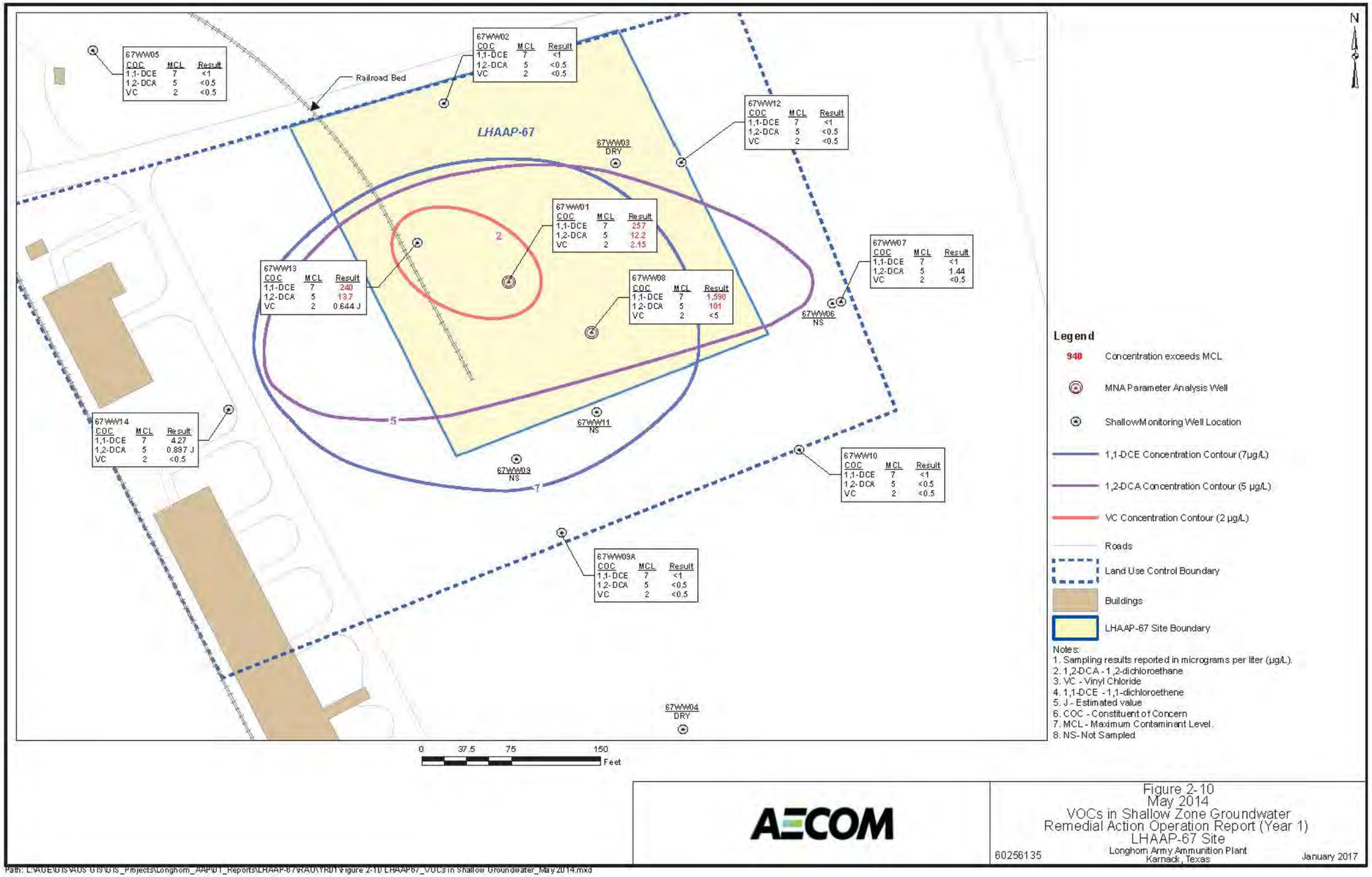
Plot 199. LHAAP-67 COC footprints - May 2013 (AECOM, 2017g).



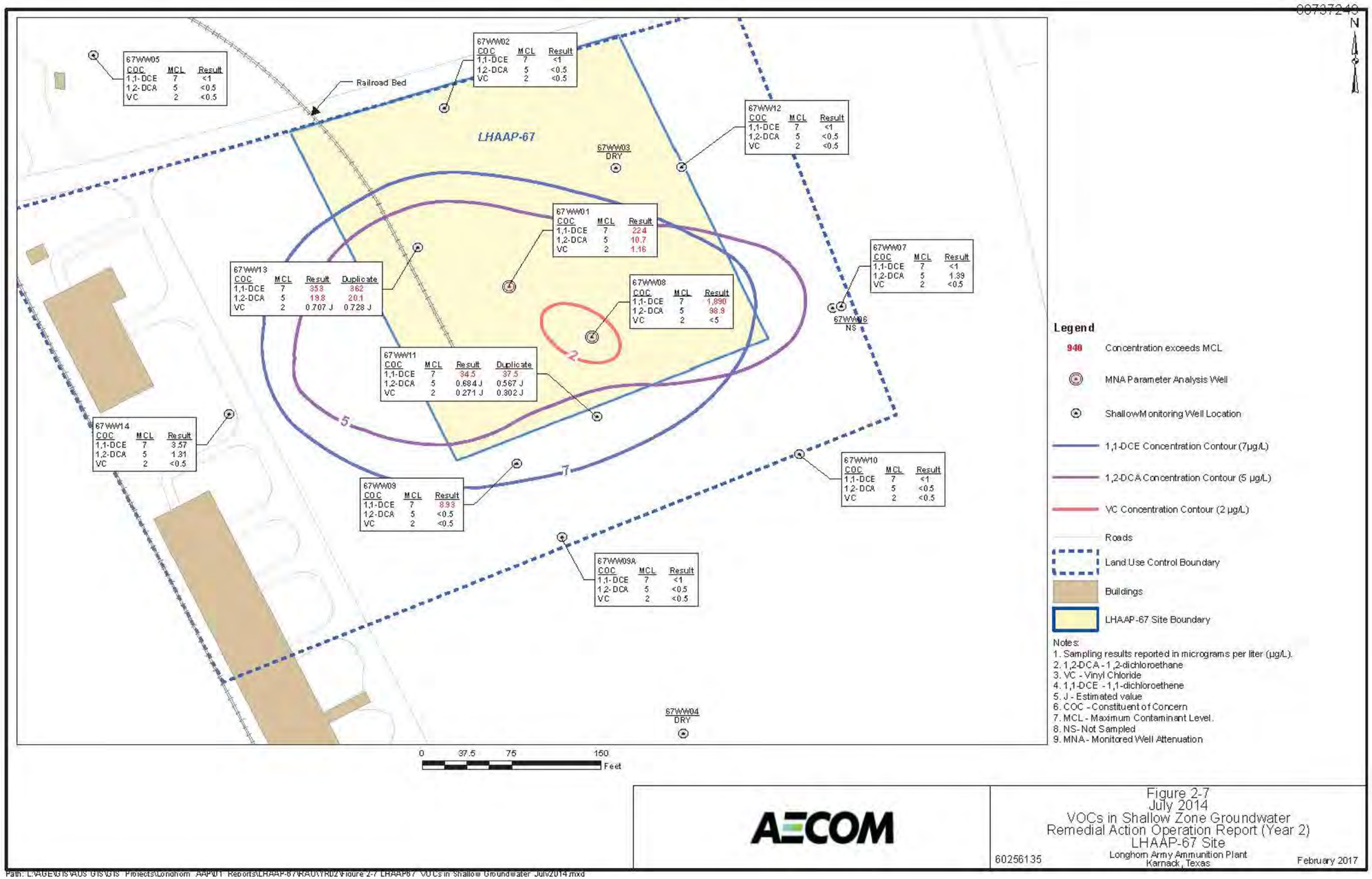
Plot 200. LHAAP-67 COC footprints – September 2013 (AECOM, 2017g).



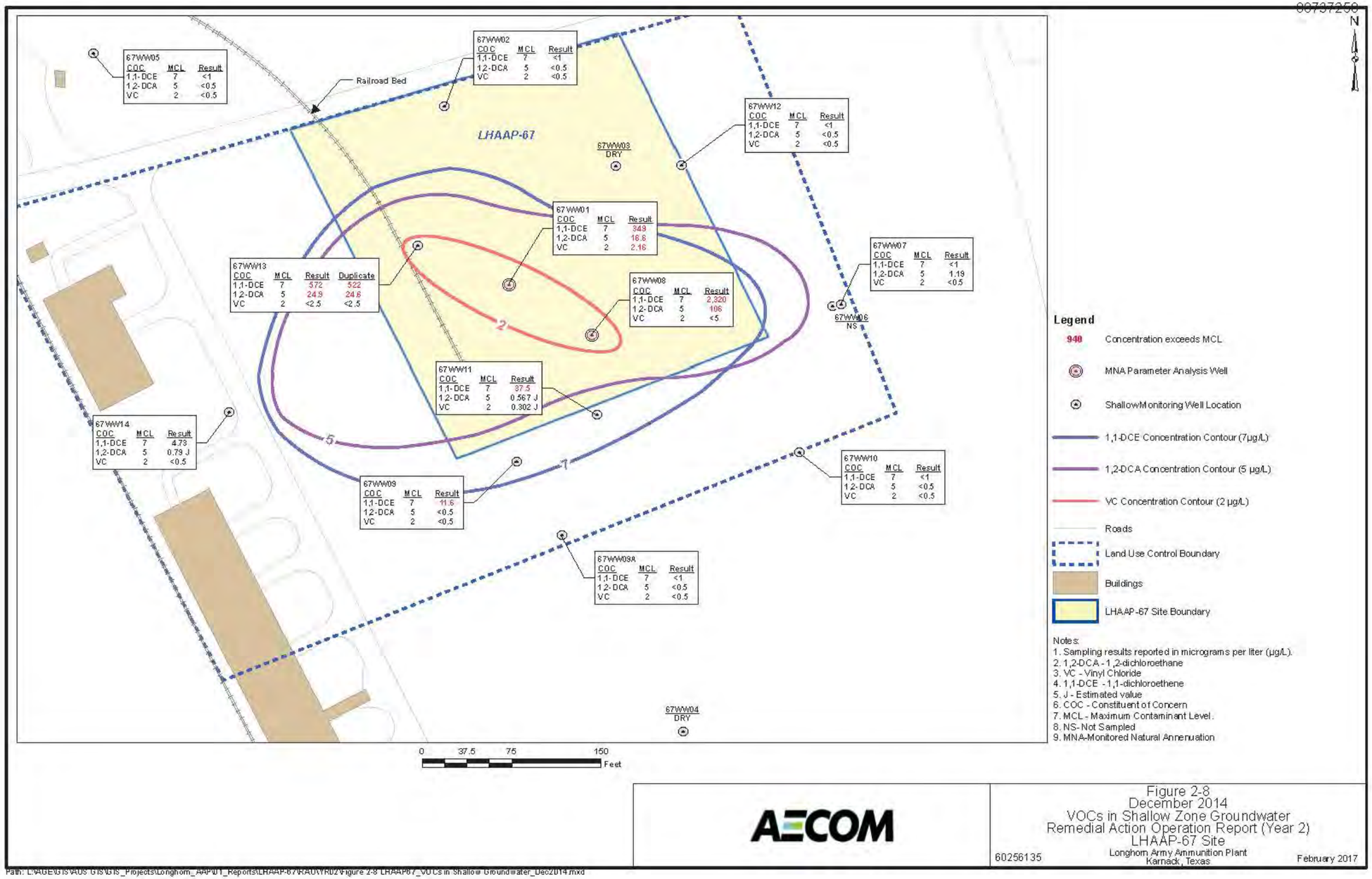
Plot 201. LHAAP-67 COC footprints - January 2014 (AECOM, 2017g).



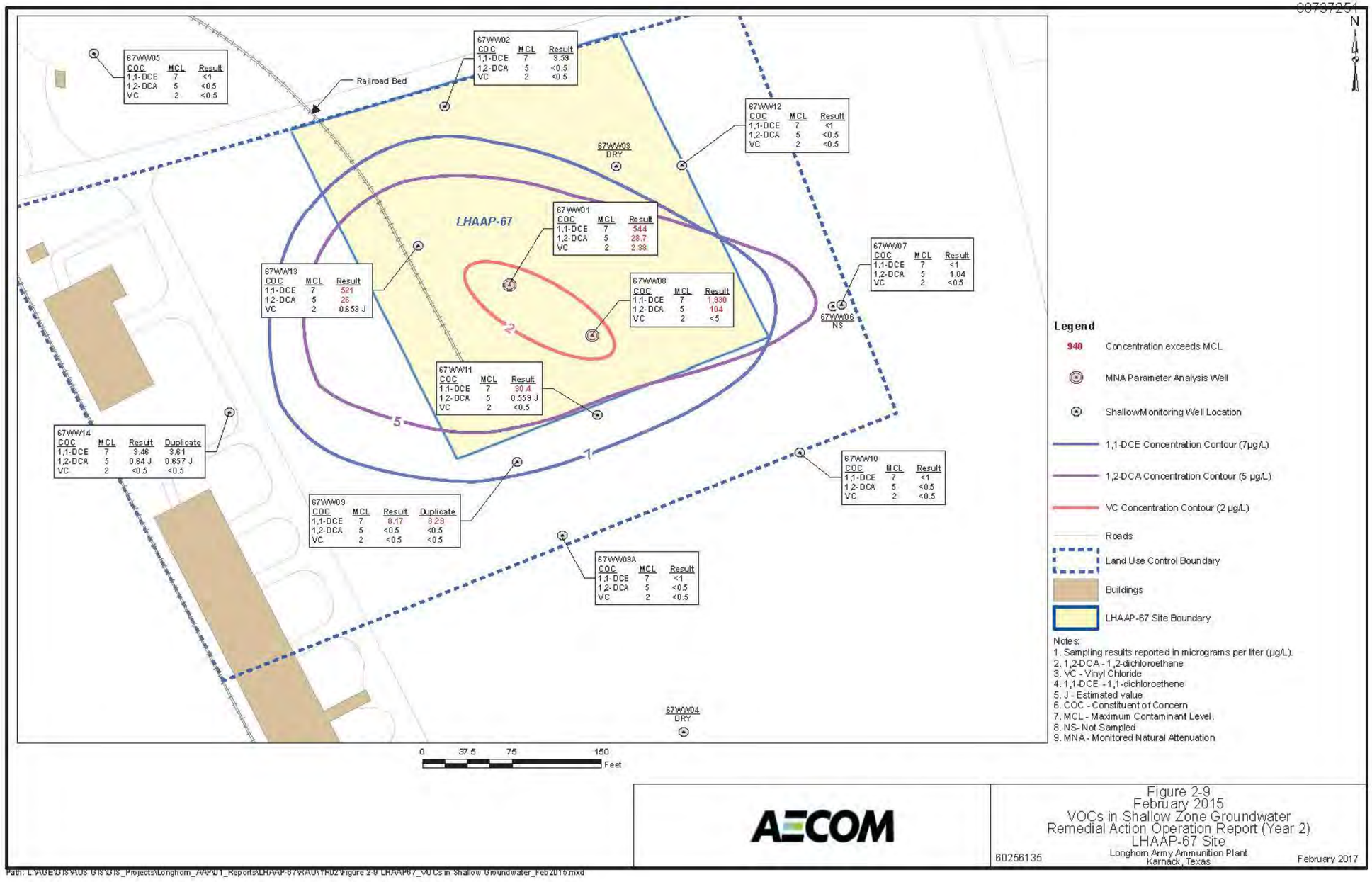
Plot 202. LHAAP-67 COC footprints - May 2014 (AECOM, 2017g).



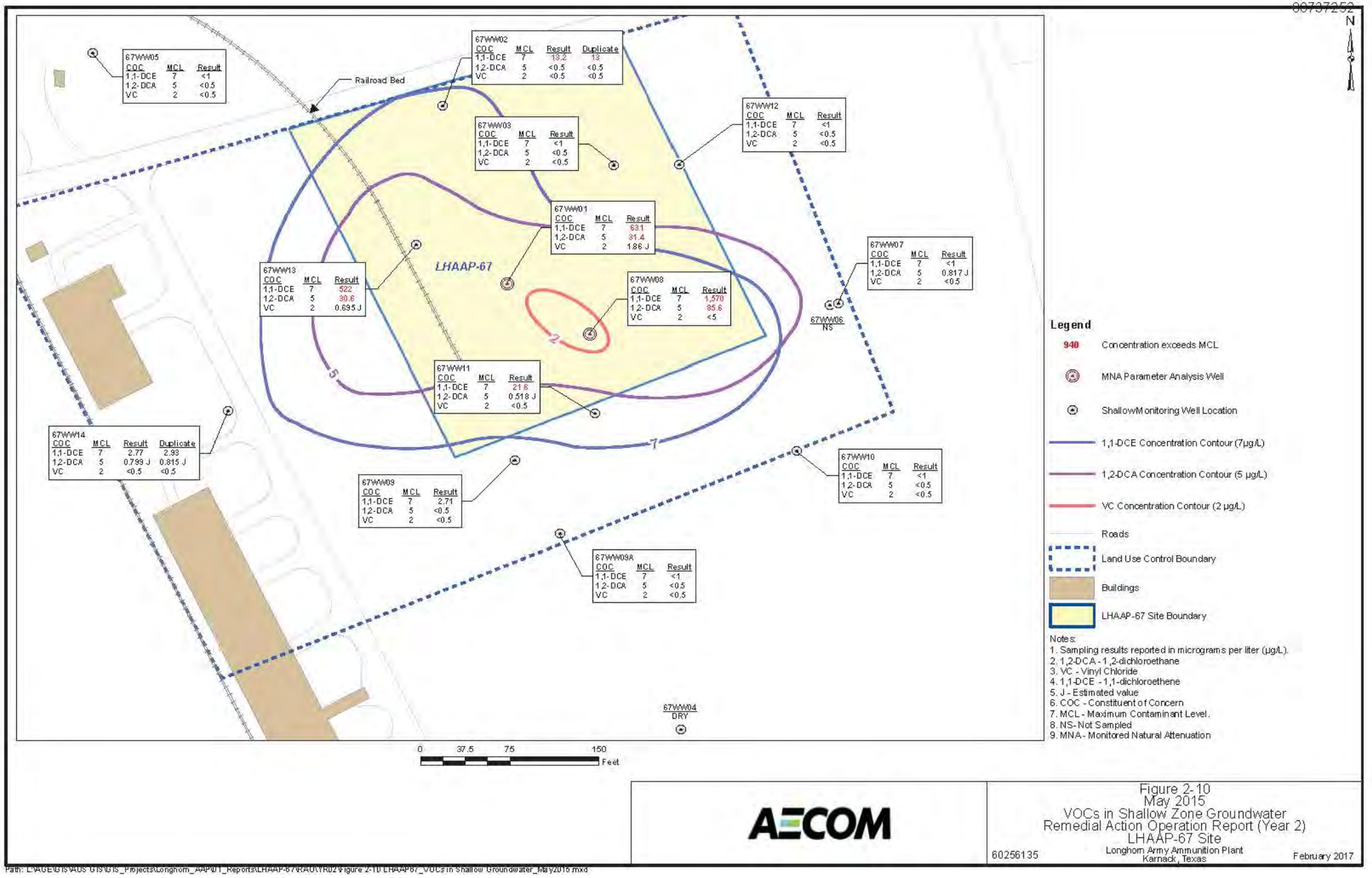
Plot 203. LHAAP-67 COC footprints - July 2014 (AECOM, 2017h).



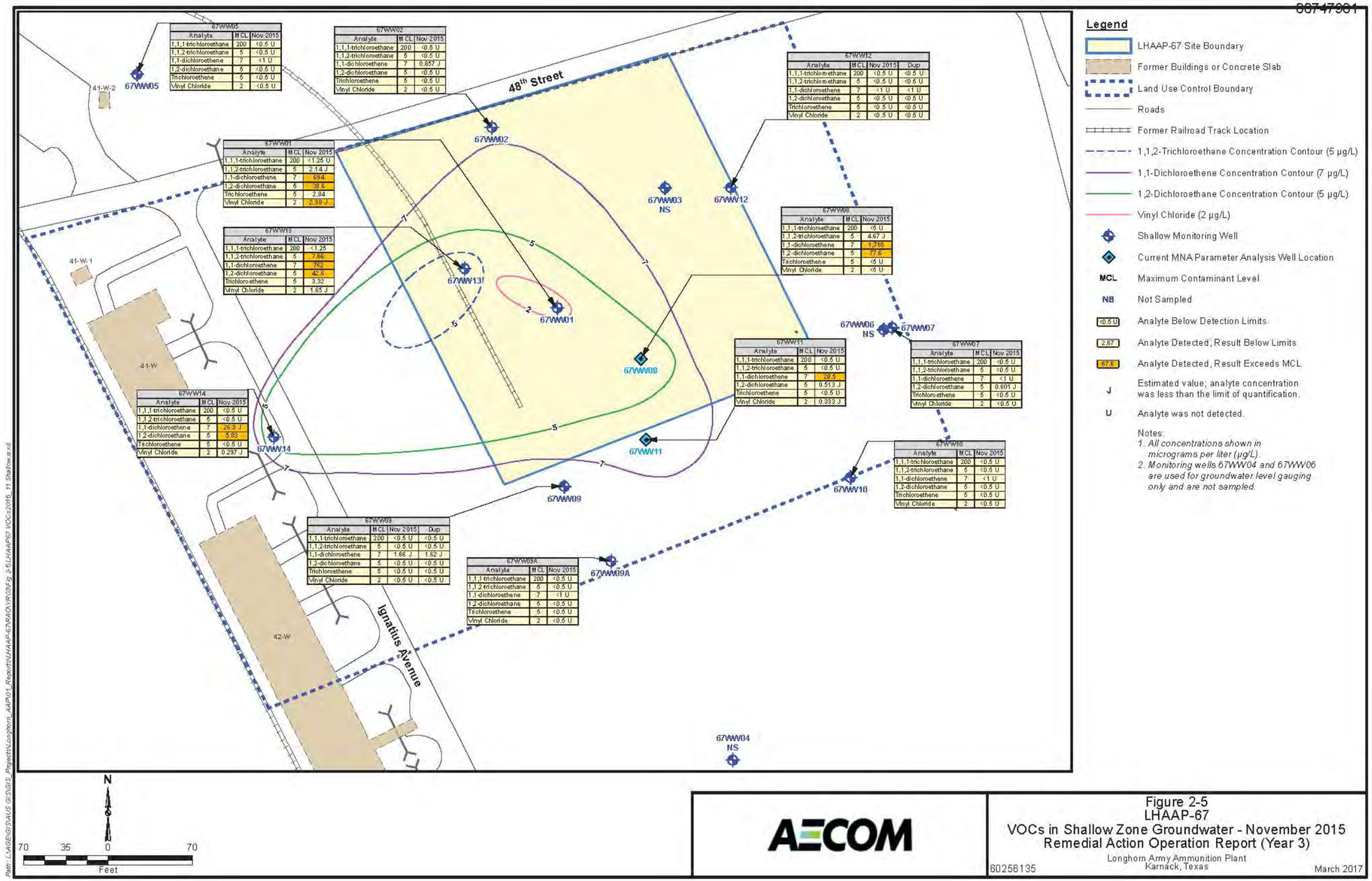
Plot 204. LHAAP-67 COC footprints - December 2014 (AECOM, 2017h)



Plot 205. LHAAP-67 COC footprints - February 2015 (AECOM, 2017h)



Plot 206. LHAAP-67 COC footprints - May 2015 (AECOM, 2017h).

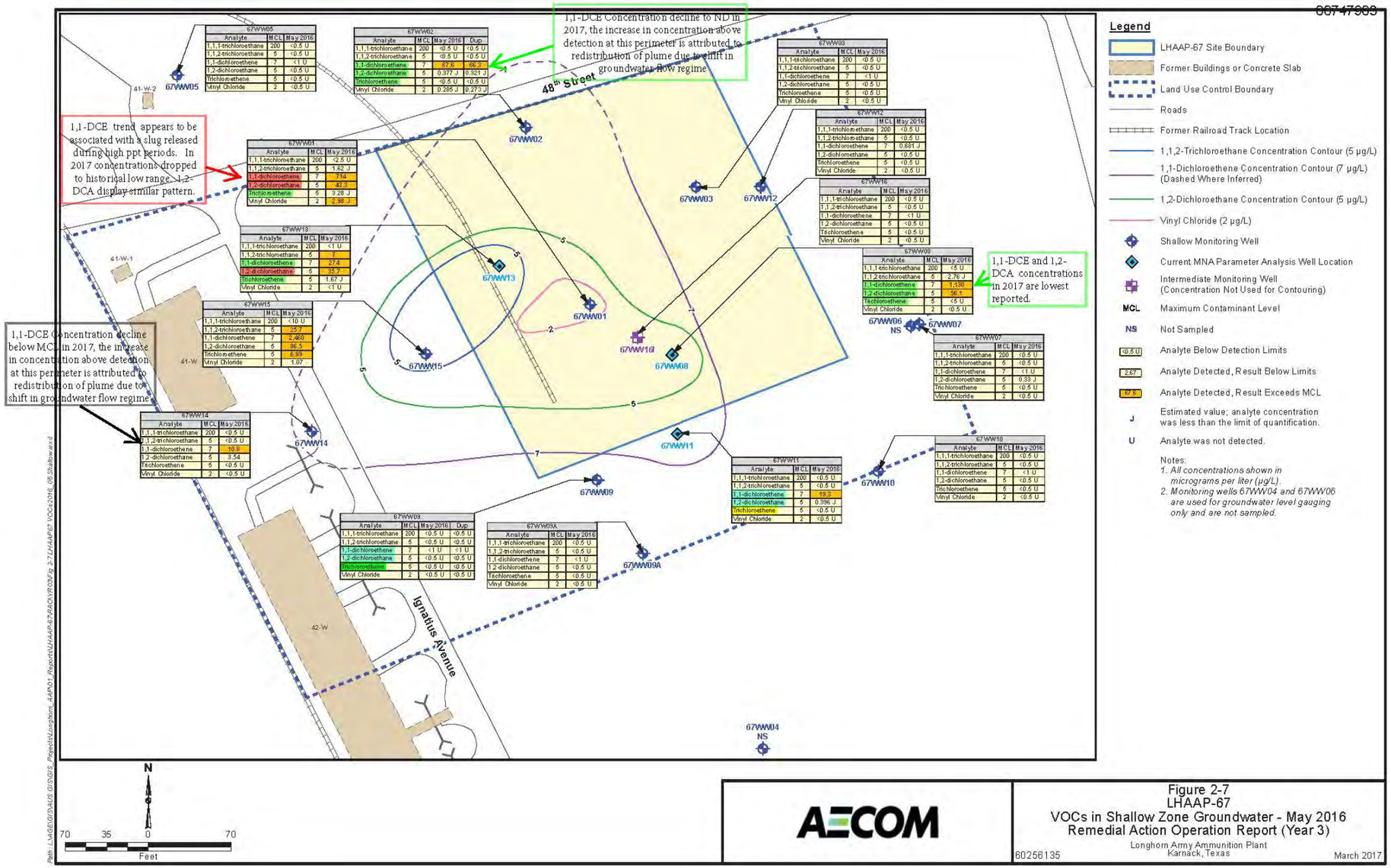


Plot 207. LHAAP-67 COC footprints - November 2015 (AECOM, 2017i).

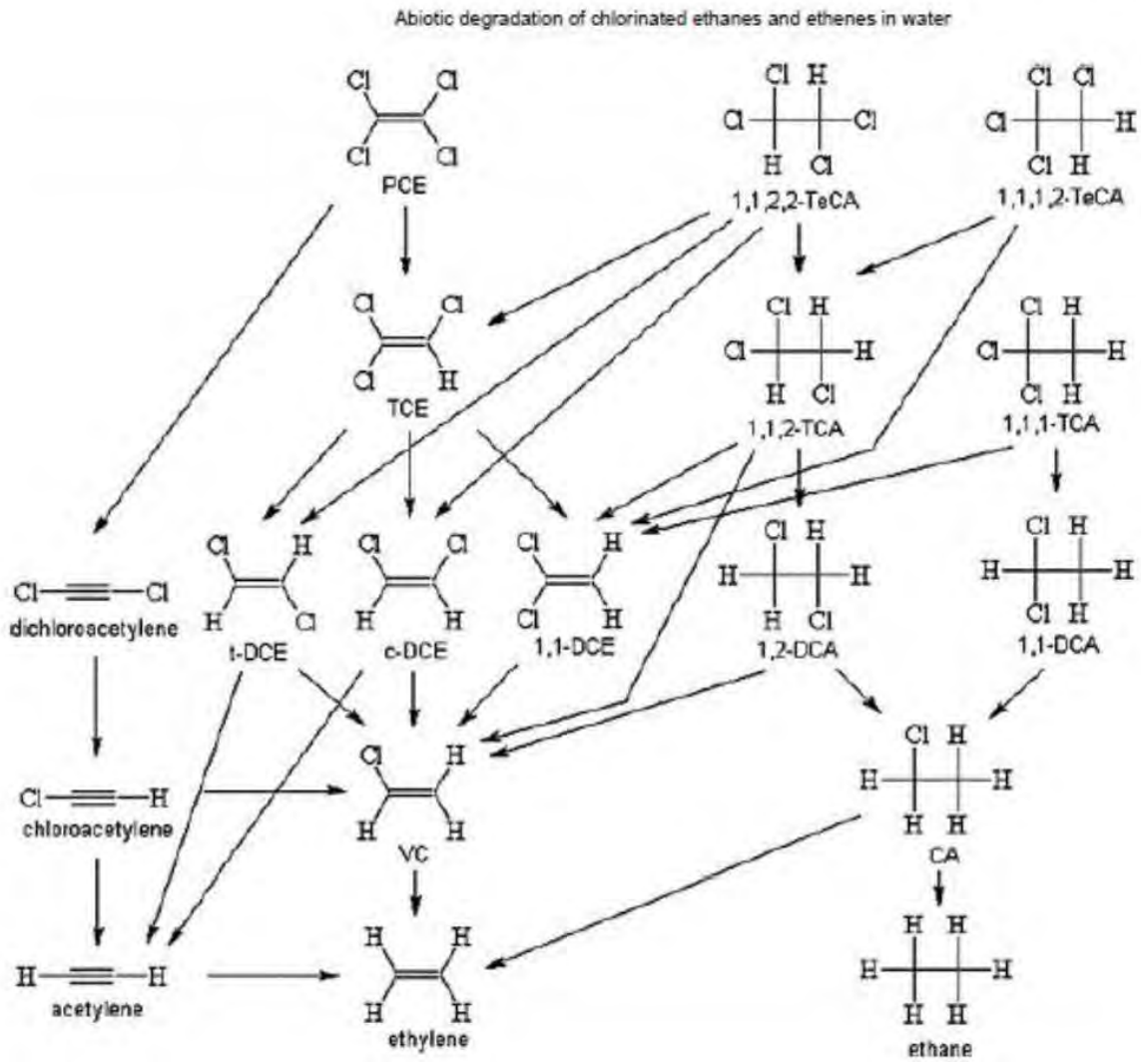
Mann-Kendall :Signifcant Decreasing Trend at 95% Confidence

Mann-Kedall: No Significant Trend

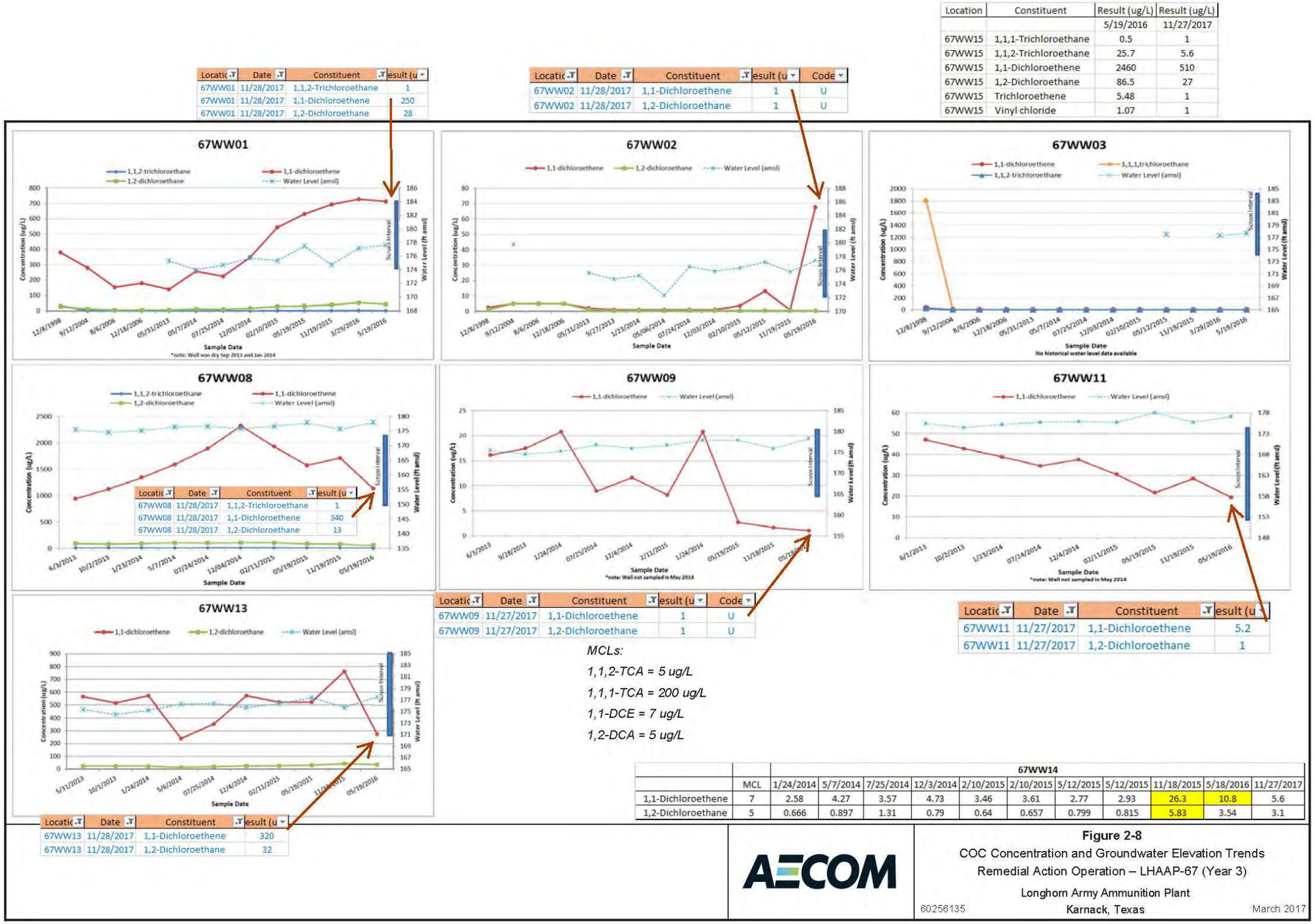
Mann-Kendall : Significant Increasing Trend at 95% Confidence



Plot 208. LHAAP-67 COC footprints - May 2016 (AECOM, 2017i).



Plot 209 Abiotic Degradation of Chlorinated Ethanes and Ethenes (Tobiszewski and Namiesnik, July 2012)



Location	Date	Constituent	Result (u
67WW01	11/28/2017	1,1,2-Trichloroethane	1
67WW01	11/28/2017	1,1-Dichloroethene	250
67WW01	11/28/2017	1,2-Dichloroethane	28

Location	Date	Constituent	Result (u	Code
67WW02	11/28/2017	1,1-Dichloroethene	1	U
67WW02	11/28/2017	1,2-Dichloroethane	1	U

Location	Constituent	Result (ug/L)	Result (ug/L)
		5/19/2016	11/27/2017
67WW15	1,1,1-Trichloroethane	0.5	1
67WW15	1,1,2-Trichloroethane	25.7	5.6
67WW15	1,1-Dichloroethene	2460	510
67WW15	1,2-Dichloroethane	86.5	27
67WW15	Trichloroethene	5.48	1
67WW15	Vinyl chloride	1.07	1

Location	Date	Constituent	Result (u
67WW08	11/28/2017	1,1,2-Trichloroethane	1
67WW08	11/28/2017	1,1-Dichloroethene	340
67WW08	11/28/2017	1,2-Dichloroethane	13

Location	Date	Constituent	Result (u	Code
67WW09	11/27/2017	1,1-Dichloroethene	1	U
67WW09	11/27/2017	1,2-Dichloroethane	1	U

Location	Date	Constituent	Result (u
67WW11	11/27/2017	1,1-Dichloroethene	5.2
67WW11	11/27/2017	1,2-Dichloroethane	1

Location	Date	Constituent	Result (u
67WW13	11/28/2017	1,1-Dichloroethene	320
67WW13	11/28/2017	1,2-Dichloroethane	32

MCLs:

1,1,2-TCA = 5 ug/L

1,1,1-TCA = 200 ug/L

1,1-DCE = 7 ug/L

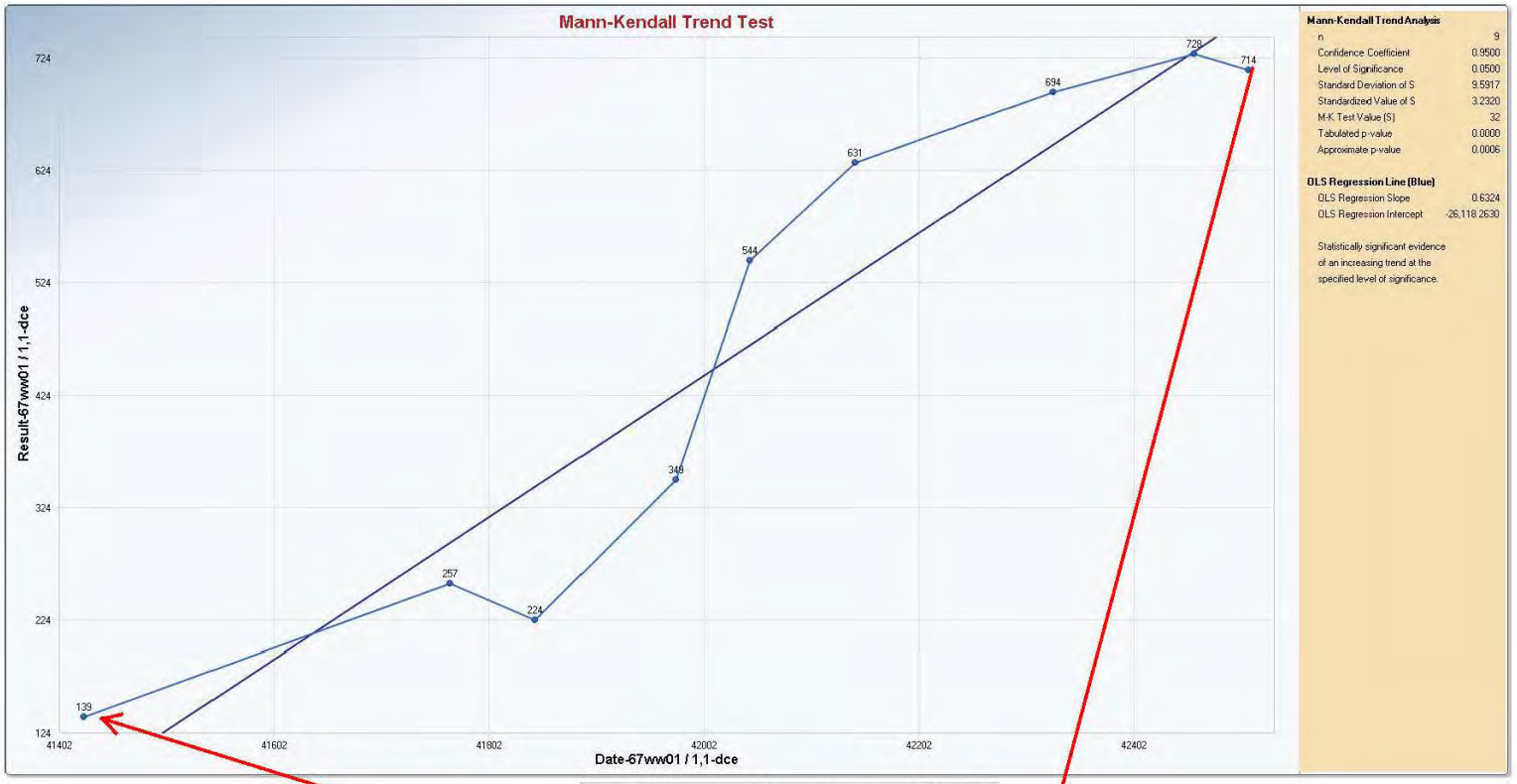
1,2-DCA = 5 ug/L

		67WW14										
	MCL	1/24/2014	5/7/2014	7/25/2014	12/3/2014	2/10/2015	2/10/2015	5/12/2015	5/12/2015	11/18/2015	5/18/2016	11/27/2017
1,1-Dichloroethene	7	2.58	4.27	3.57	4.73	3.46	3.61	2.77	2.93	26.3	10.8	5.6
1,2-Dichloroethane	5	0.666	0.897	1.31	0.79	0.64	0.657	0.799	0.815	5.83	3.54	3.1

AECOM

Figure 2-8
COC Concentration and Groundwater Elevation Trends
Remedial Action Operation – LHAAP-67 (Year 3)
Longhorn Army Ammunition Plant
60256135 Karnack, Texas March 2017

Plot 210. LHAAP-67 COC trends (AECOM, 2017i. Edited to include posting of 2017 data & Data from 67WW14 and 67WW15)



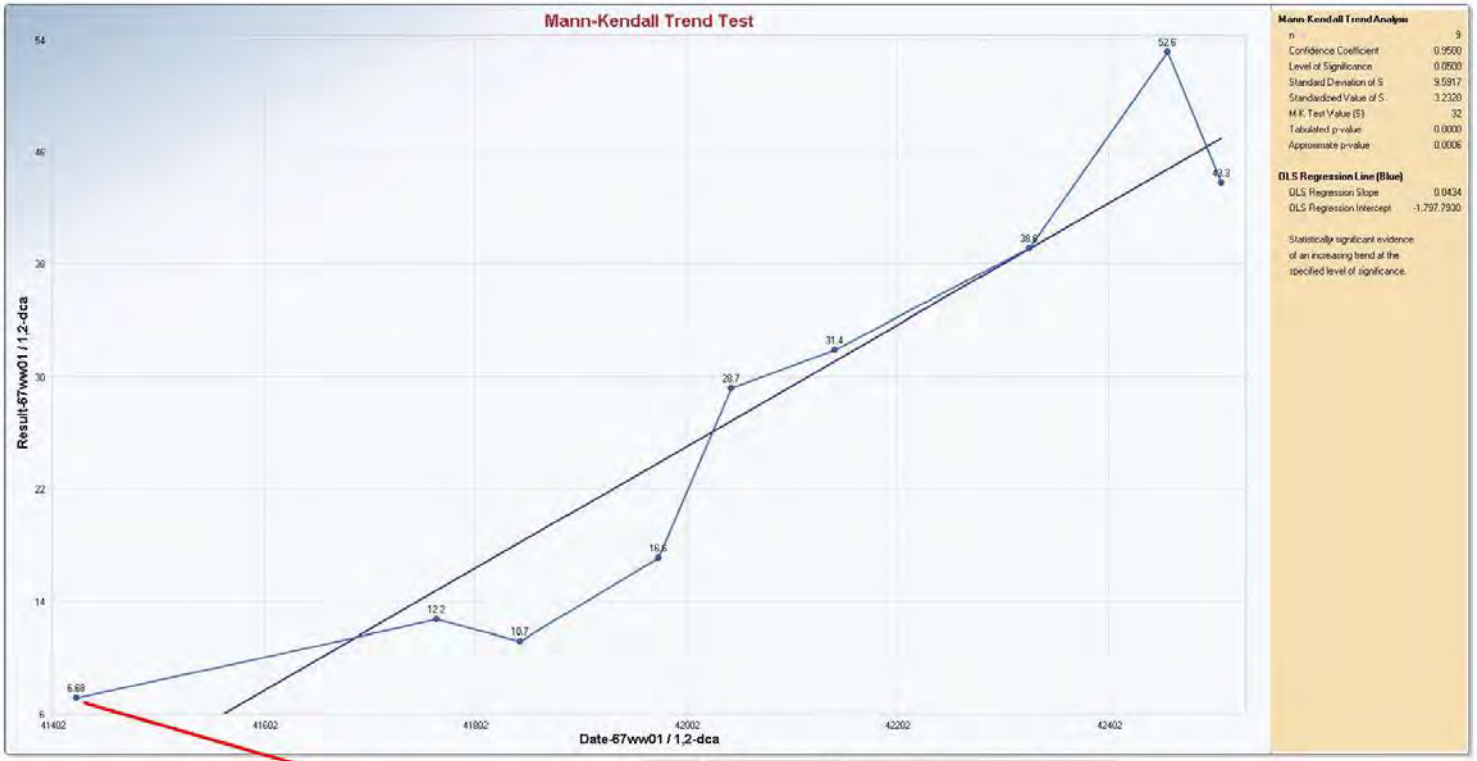
Locatio	Date	Constituent	Result
67WW01	12/8/1998	1,1-Dichloroethene	250
67WW01	9/12/2004	1,1-Dichloroethene	280
67WW01	8/6/2006	1,1-DICHLOROETHENE	153
67WW01	12/18/2006	1,1-DICHLOROETHENE	179
67WW01	5/31/2013	1,1-Dichloroethene	139
67WW01	5/7/2014	1,1-Dichloroethene	257
67WW01	7/25/2014	1,1-Dichloroethene	224
67WW01	12/3/2014	1,1-Dichloroethene	349
67WW01	2/10/2015	1,1-Dichloroethene	544
67WW01	5/19/2015	1,1-Dichloroethene	631
67WW01	11/19/2015	1,1-Dichloroethene	694
67WW01	3/29/2016	1,1-Dichloroethene	728
67WW01	5/19/2016	1,1-Dichloroethene	714
67WW01	11/28/2017	1,1-Dichloroethene	250

LHAAP-67 RA(O) Year 3

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In 2017 1,1-DCE delined to historical low range

Plot 211. LHAAP-67 1,1-DCE Data 2013 through 2016 – 67WW01, edited by Fourth Five-Year Review (AECOM, 2017i, data in table through November 2017).



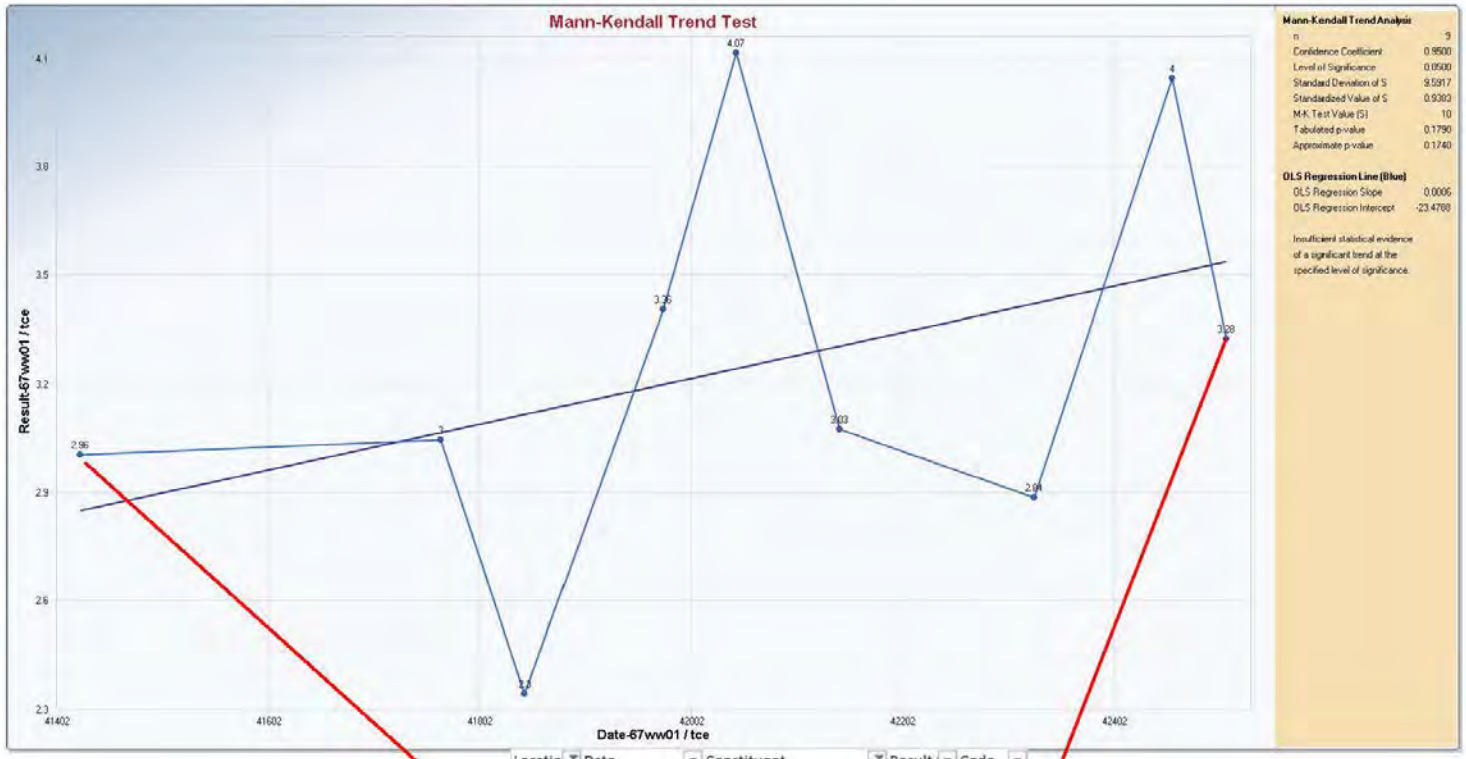
Locatio	Date	Constituent	Result
67WW01	12/8/1998	1,2-Dichloroethane	23
67WW01	9/12/2004	1,2-Dichloroethane	13
67WW01	12/18/2006	1,2-DICHLOROETHANE	6.37
67WW01	5/31/2013	1,2-Dichloroethane	6.68
67WW01	5/7/2014	1,2-Dichloroethane	12.2
67WW01	7/25/2014	1,2-Dichloroethane	10.7
67WW01	12/3/2014	1,2-Dichloroethane	16.6
67WW01	2/10/2015	1,2-Dichloroethane	28.7
67WW01	5/19/2015	1,2-Dichloroethane	31.4
67WW01	11/19/2015	1,2-Dichloroethane	38.6
67WW01	3/29/2016	1,2-Dichloroethane	52.6
67WW01	5/19/2016	1,2-Dichloroethane	43.3
67WW01	11/28/2017	1,2-Dichloroethane	28

LHAAP-67 RA(O) Year 3

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1,2-DCA has similar trend to 1,1-DCE

Plot 212. LHAAP-67 1,2-DCA Data 2013 through 2016 – 67WW01 edited by Fourth Five-Year Review (AECOM, 2017i, data in table through November 2017).

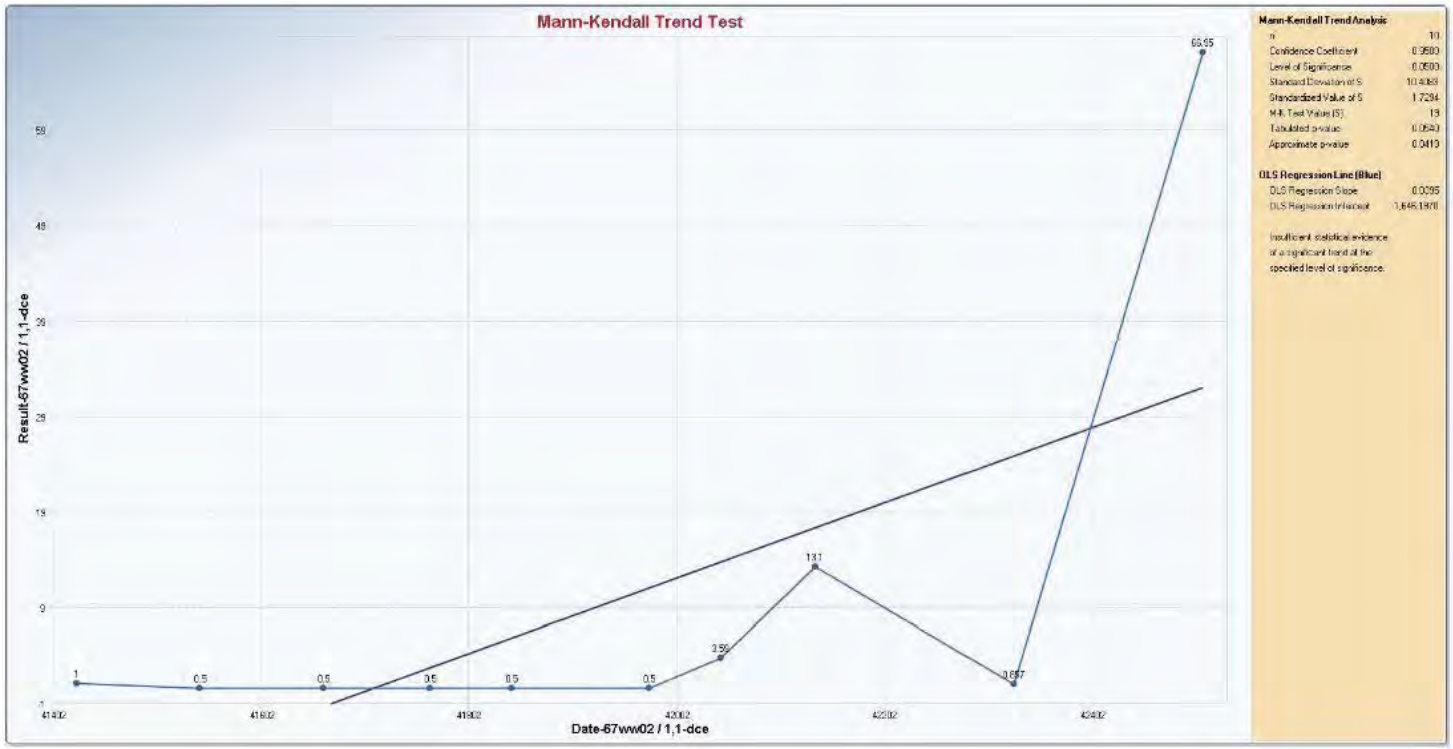


Locatio	Date	Constituent	Result	Code
67WW01	12/8/1998	Trichloroethene	10	U
67WW01	9/12/2004	Trichloroethene	6	
67WW01	12/18/2006	TRICHLOROETHENE	5.99	
67WW01	5/31/2013	Trichloroethene	2.96	
67WW01	5/7/2014	Trichloroethene	3	
67WW01	7/25/2014	Trichloroethene	2.3	
67WW01	12/3/2014	Trichloroethene	3.36	
67WW01	2/10/2015	TRICHLOROETHENE	4.07	
67WW01	5/19/2015	TRICHLOROETHENE	3.03	
67WW01	11/19/2015	TRICHLOROETHENE	2.84	
67WW01	3/29/2016	Trichloroethene	4	
67WW01	5/19/2016	Trichloroethene	3.28	J
67WW01	11/28/2017	Trichloroethene	2.1	

LHAAP-67 RA(O) Year 3

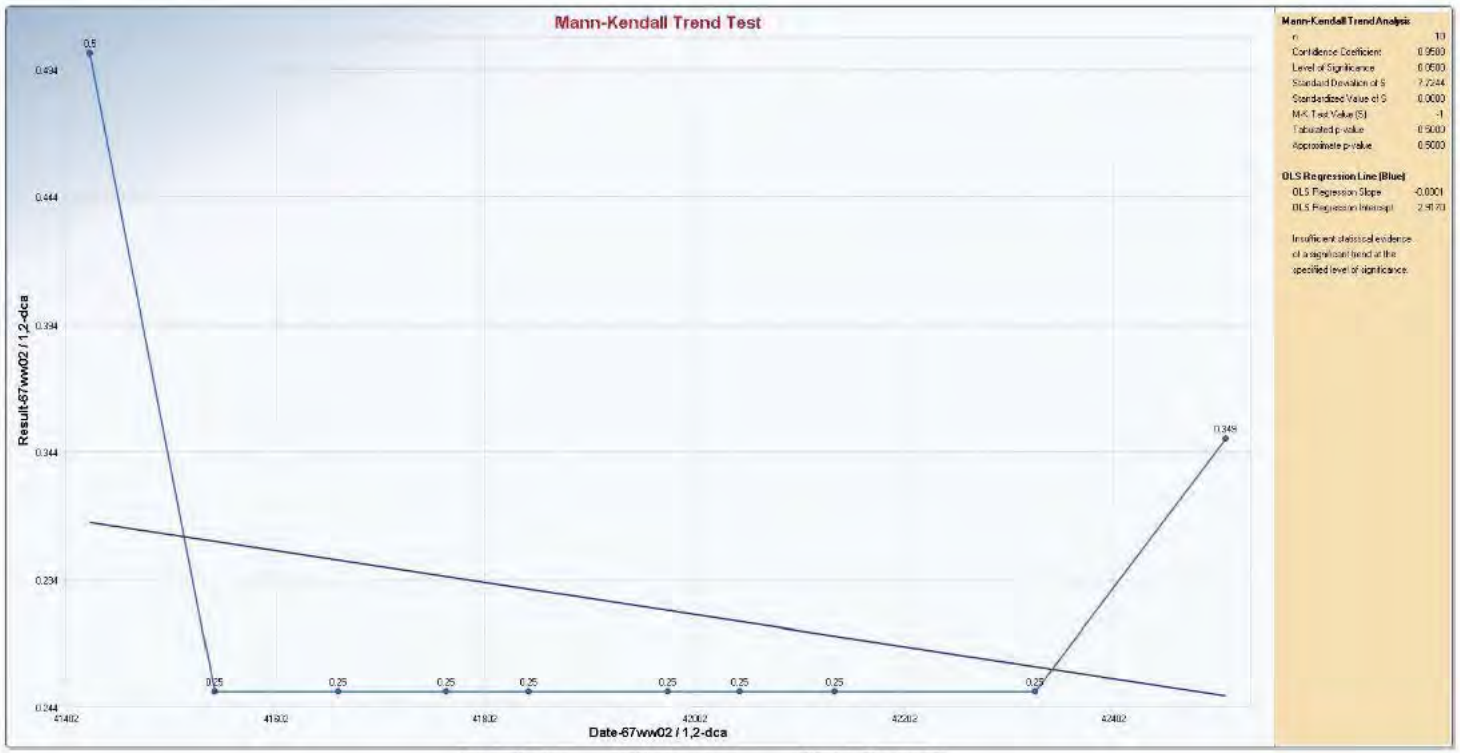
Page 4 of 19

Plot 213. LHAAP-67 TCE Data 2013 through 2016 – 67WW01 edited by Fourth Five-Year Review (AECOM, 2017i, data in table through November 2017).



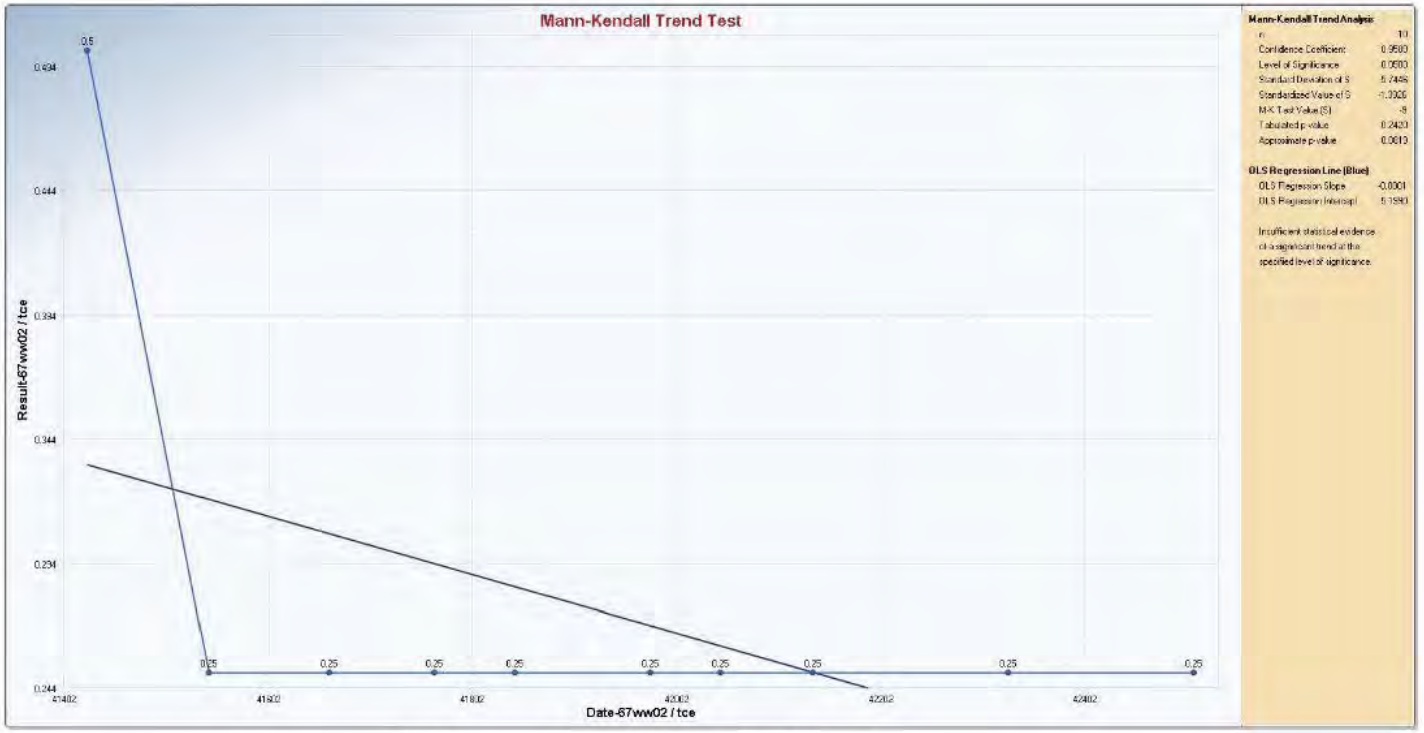
Locatio	Date	Constituent	Result	Code
67WW02	12/8/1998	1,1-Dichloroethene	2.4	
67WW02	9/12/2004	1,1-Dichloroethene	5	U
67WW02	8/6/2006	1,1-DICHLOROETHENE	5	U
67WW02	12/18/2006	1,1-DICHLOROETHENE	5	U
67WW02	5/31/2013	1,1-Dichloroethene	0.5	U
67WW02	9/27/2013	1,1-DICHLOROETHENE	1	U
67WW02	1/23/2014	1,1-Dichloroethene	1	U
67WW02	5/6/2014	1,1-Dichloroethene	1	U
67WW02	7/24/2014	1,1-Dichloroethene	1	U
67WW02	12/3/2014	1,1-Dichloroethene	1	U
67WW02	2/10/2015	1,1-Dichloroethene	3.59	
67WW02	5/12/2015	1,1-Dichloroethene	13.2	
67WW02	11/19/2015	1,1-Dichloroethene	0.857	J
67WW02	5/19/2016	1,1-Dichloroethene	67.6	
67WW02	11/28/2017	1,1-Dichloroethene	1	U

Plot 214. LHAAP-67 1,1-DCE Data 2013 through 2016 – 67WW02 (AECOM, 2017i, data in table through November 2017).



Locatio	Date	Constituent	Result	Code
67WW02	12/8/1998	1,2-Dichloroethane	1	U
67WW02	9/12/2004	1,2-Dichloroethane	5	U
67WW02	8/6/2006	1,2-DICHLOROETHANE	5	U
67WW02	12/18/2006	1,2-DICHLOROETHANE	5	U
67WW02	5/31/2013	1,2-Dichloroethane	0.25	U
67WW02	9/27/2013	1,2-DICHLOROETHANE	0.5	U
67WW02	1/23/2014	1,2-Dichloroethane	0.5	U
67WW02	5/6/2014	1,2-Dichloroethane	0.5	U
67WW02	7/24/2014	1,2-Dichloroethane	0.5	U
67WW02	12/3/2014	1,2-Dichloroethane	0.5	U
67WW02	2/10/2015	1,2-Dichloroethane	0.5	U
67WW02	5/12/2015	1,2-Dichloroethane	0.5	U
67WW02	11/19/2015	1,2-Dichloroethane	0.5	U
67WW02	5/19/2016	1,2-Dichloroethane	0.377	J
67WW02	11/28/2017	1,2-Dichloroethane	1	U

Plot 215. LHAAP-67 1,2-DCA Data 2013 through 2016 – 67WW02 (AECOM, 2017i, data in table through November 2017).

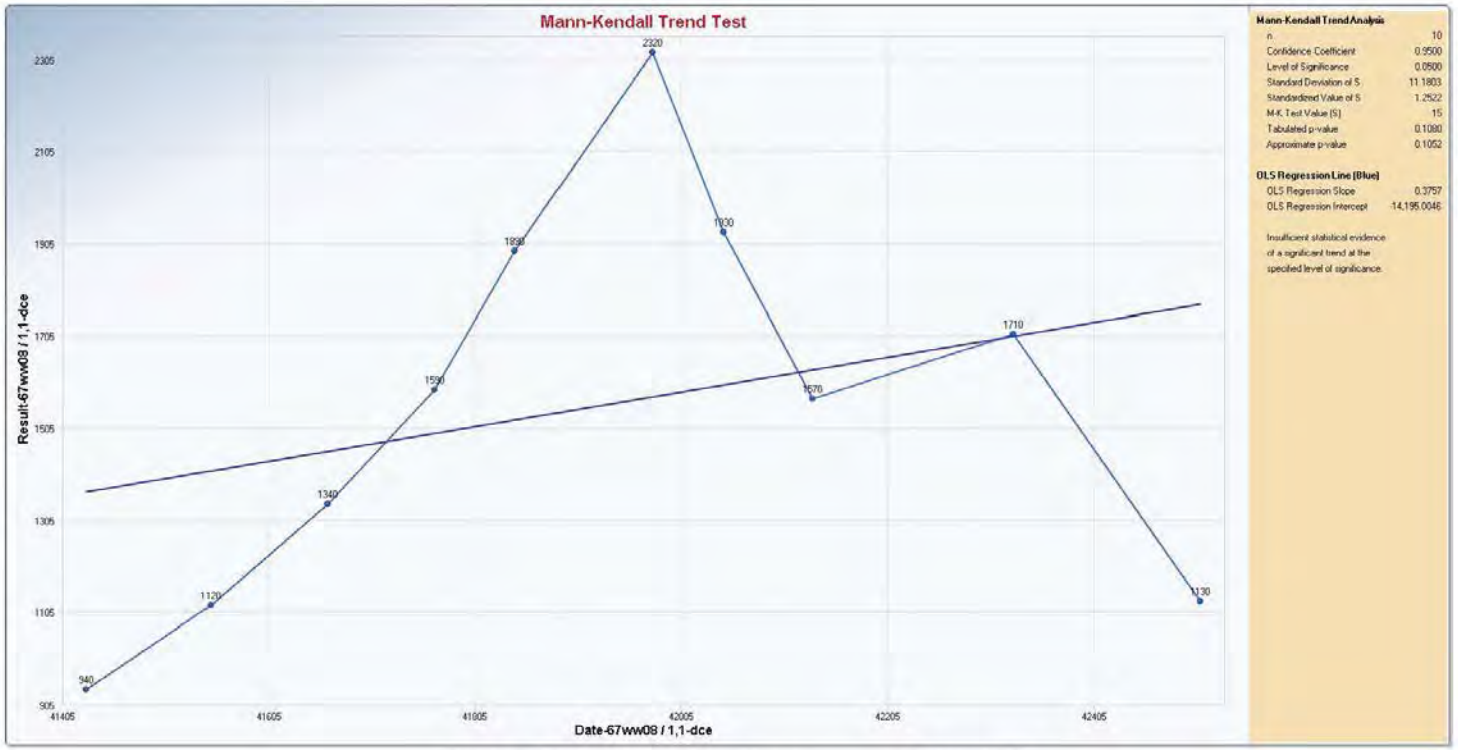


Locatio	Date	Constituent	Result	Code
67WW02	12/8/1998	Trichloroethene	1	U
67WW02	9/12/2004	Trichloroethene	5	U
67WW02	8/6/2006	TRICHLOROETHENE	5	U
67WW02	12/18/2006	TRICHLOROETHENE	5	U
67WW02	5/31/2013	Trichloroethene	0.25	U
67WW02	9/27/2013	Trichloroethene	0.5	U
67WW02	1/23/2014	Trichloroethene	0.5	U
67WW02	5/6/2014	Trichloroethene	0.5	U
67WW02	7/24/2014	Trichloroethene	0.5	U
67WW02	12/3/2014	Trichloroethene	0.5	U
67WW02	2/10/2015	TRICHLOROETHENE	0.5	U
67WW02	5/12/2015	TRICHLOROETHENE	0.5	U
67WW02	11/19/2015	TRICHLOROETHENE	0.5	U
67WW02	5/19/2016	Trichloroethene	0.5	U
67WW02	11/28/2017	Trichloroethene	1	U

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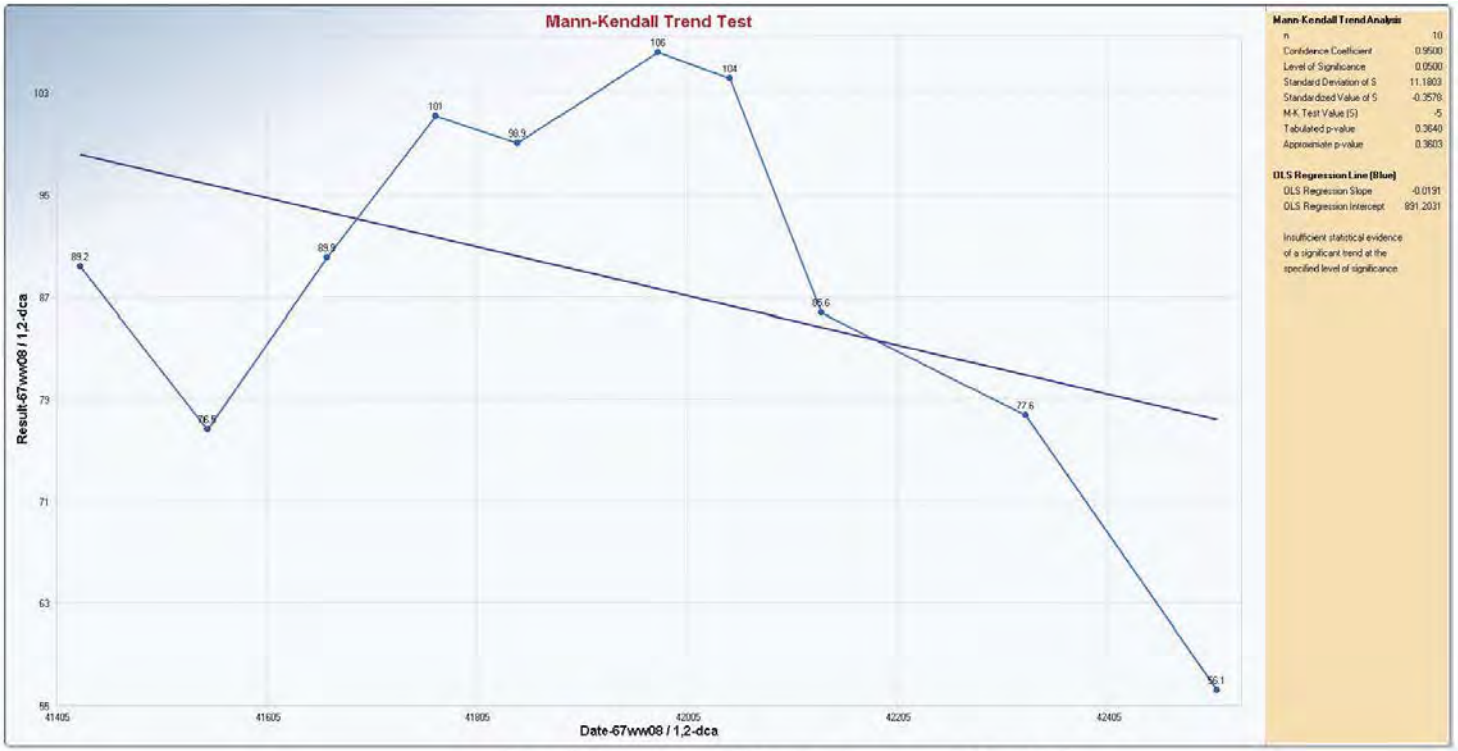
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Plot 216. LHAAP-67 TCE Data 2013 through 2016 – 67WW02 (AECOM, 2017i, data in table through November 2017).



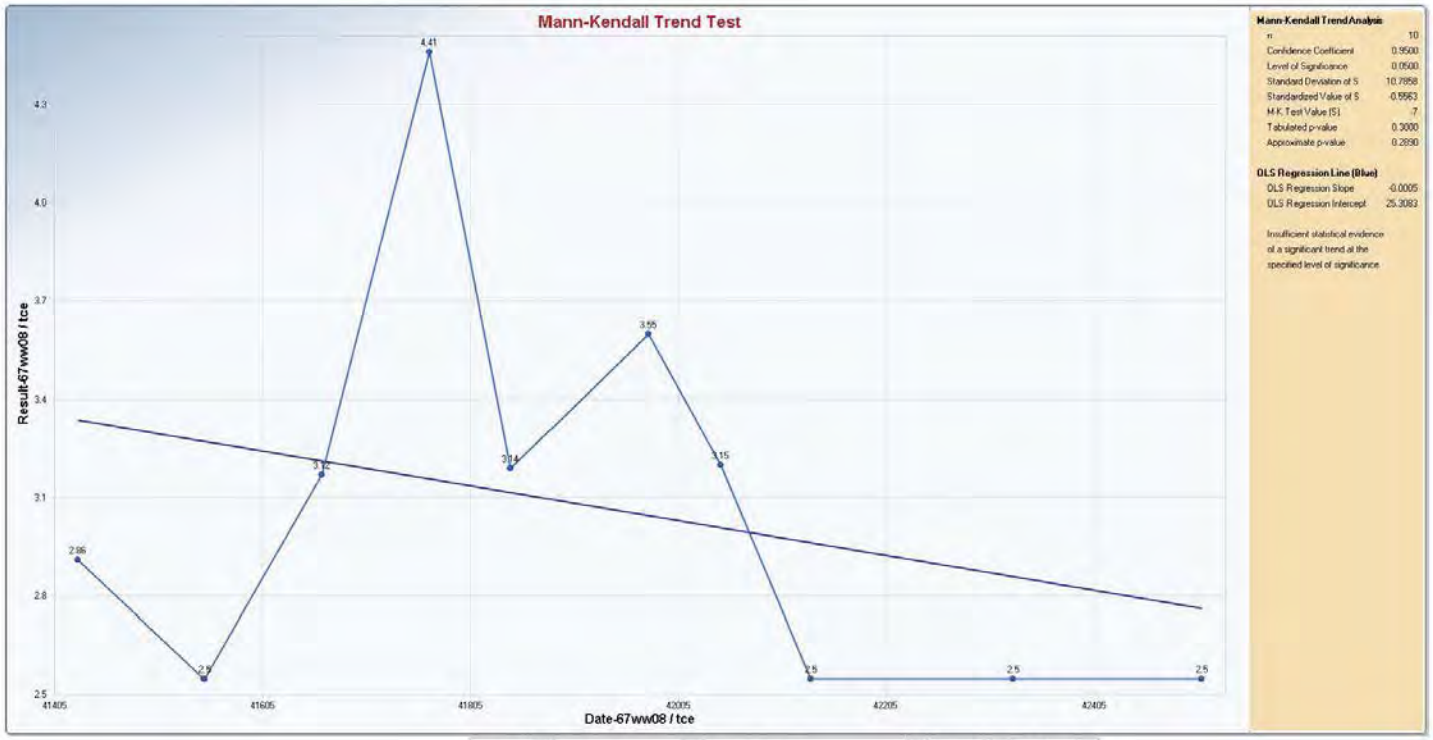
Locatio	Date	Constituent	Result (
67WW08	6/3/2013	1,1-Dichloroethene	1390
67WW08	10/2/2013	1,1-DICHLOROETHENE	1120
67WW08	1/23/2014	1,1-Dichloroethene	1340
67WW08	5/7/2014	1,1-Dichloroethene	1590
67WW08	7/24/2014	1,1-Dichloroethene	1890
67WW08	12/4/2014	1,1-Dichloroethene	2320
67WW08	2/11/2015	1,1-Dichloroethene	1930
67WW08	5/19/2015	1,1-Dichloroethene	1570
67WW08	11/19/2015	1,1-Dichloroethene	1710
67WW08	5/19/2016	1,1-Dichloroethene	1130
67WW08	11/28/2017	1,1-Dichloroethene	340

Plot 217. LHAAP-67 1,1-DCE Data 2013 through 2016 – 67WW08 (AECOM, 2017i, data in table through November 2017).



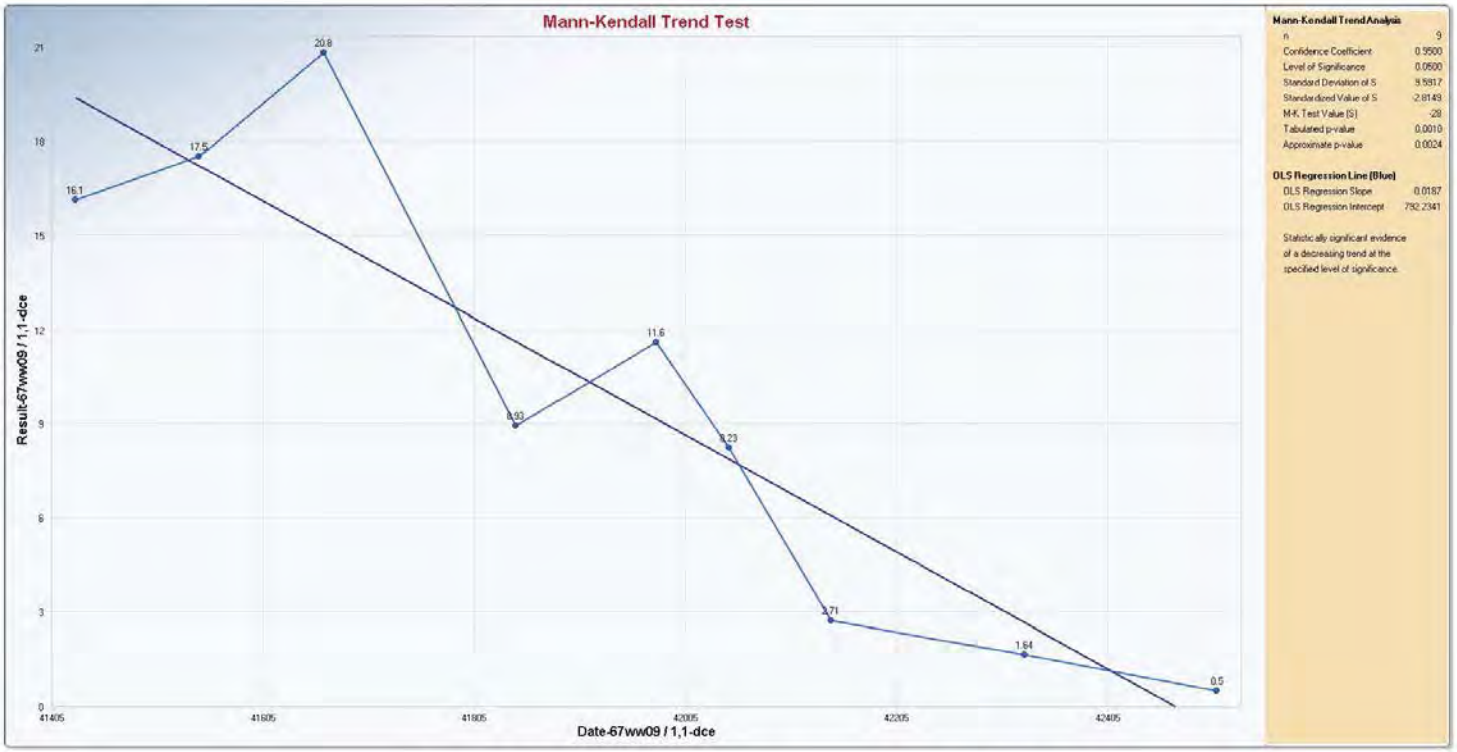
Locatio	Date	Constituent	Result (
67WW08	6/3/2013	1,2-Dichloroethane	89.2
67WW08	10/2/2013	1,2-DICHLOROETHANE	76.5
67WW08	1/23/2014	1,2-Dichloroethane	89.9
67WW08	5/7/2014	1,2-Dichloroethane	101
67WW08	7/24/2014	1,2-Dichloroethane	98.9
67WW08	12/4/2014	1,2-Dichloroethane	106
67WW08	2/11/2015	1,2-Dichloroethane	104
67WW08	5/19/2015	1,2-Dichloroethane	85.6
67WW08	11/19/2015	1,2-Dichloroethane	77.6
67WW08	5/19/2016	1,2-Dichloroethane	56.1
67WW08	11/28/2017	1,2-Dichloroethane	13

Plot 218. LHAAP-67 1,2-DCA Data 2013 through 2016 – 67WW08 (AECOM, 2017i, data in table through November 2017).



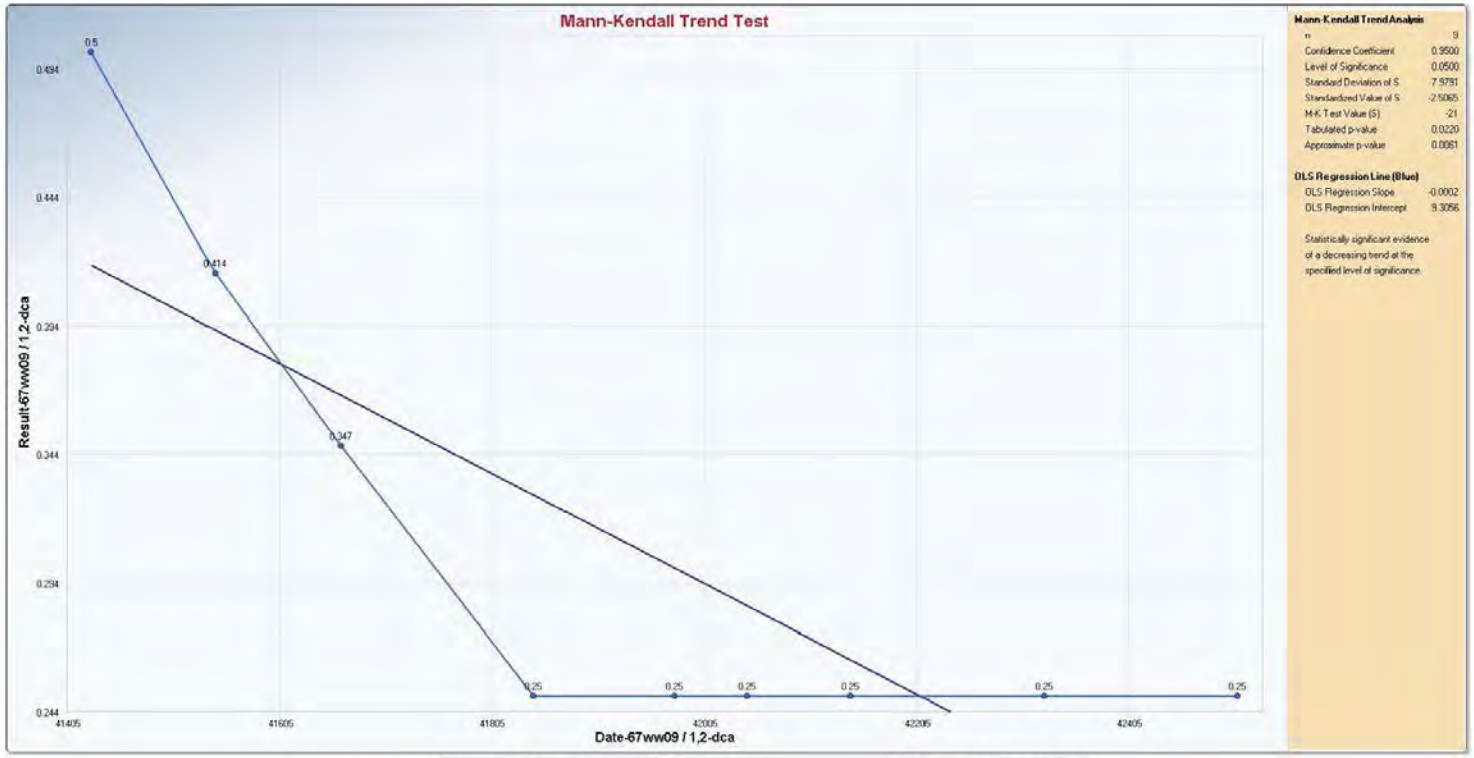
Locatio	Date	Constituent	Result	Code
67WW08	6/3/2013	Trichloroethene	2.86	
67WW08	10/2/2013	Trichloroethene	5	U
67WW08	1/23/2014	Trichloroethene	3.12	J
67WW08	5/7/2014	Trichloroethene	4.41	J
67WW08	7/24/2014	Trichloroethene	3.14	J
67WW08	12/4/2014	Trichloroethene	3.55	J
67WW08	2/11/2015	TRICHLOROETHENE	3.15	J
67WW08	5/19/2015	TRICHLOROETHENE	5	U
67WW08	11/19/2015	TRICHLOROETHENE	5	U
67WW08	5/19/2016	Trichloroethene	5	U
67WW08	11/28/2017	Trichloroethene	1	U

Plot 219. LHAAP-67 TCE Data 2013 through 2016 – 67WW08 (AECOM, 2017i, data in table through November 2017).



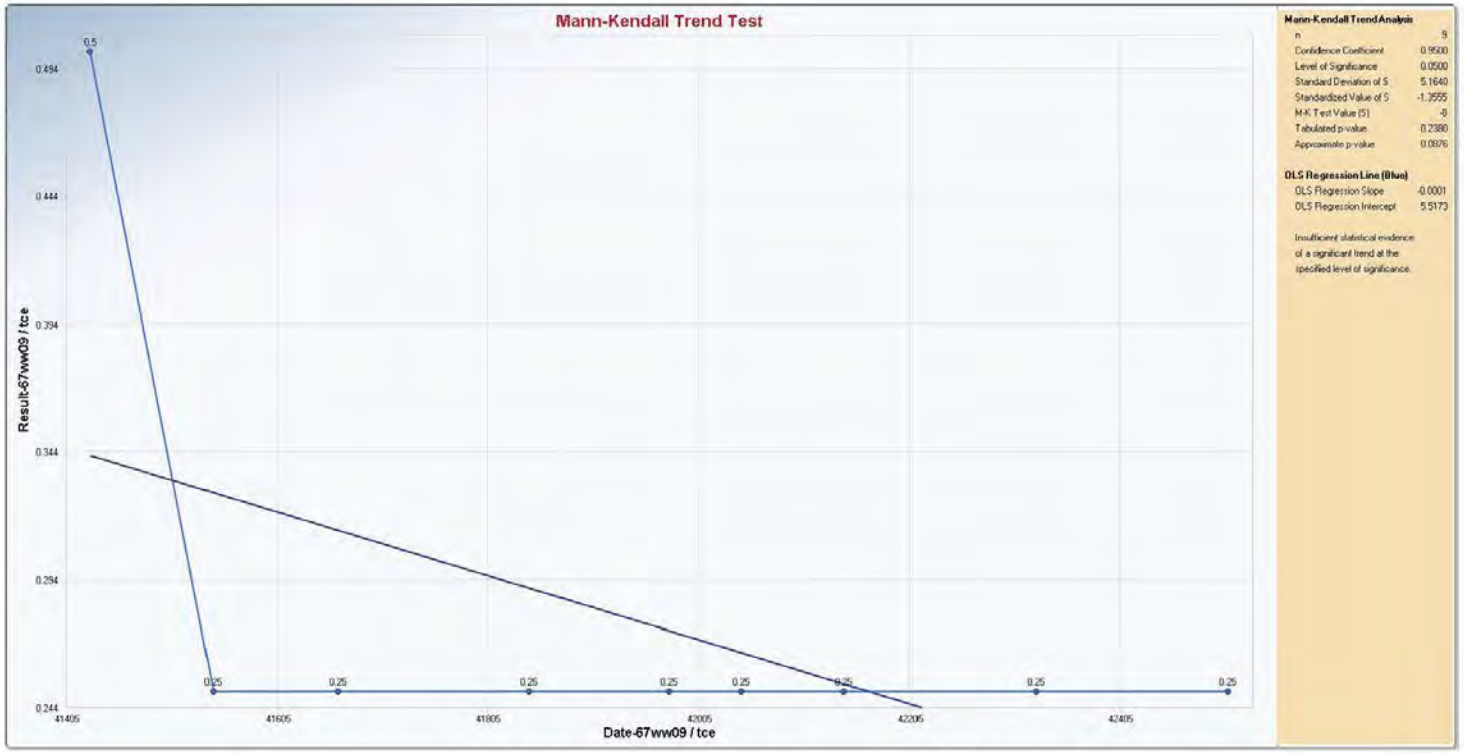
Locatio	Date	Constituent	Result	Code
67WW09	6/1/2013	1,1-Dichloroethene	0.5	U
67WW09	6/3/2013	1,1-Dichloroethene	16.1	
67WW09	9/28/2013	1,1-DICHLOROETHENE	17.5	
67WW09	1/24/2014	1,1-Dichloroethene	20.8	
67WW09	7/25/2014	1,1-Dichloroethene	8.93	
67WW09	12/4/2014	1,1-Dichloroethene	11.6	
67WW09	2/11/2015	1,1-Dichloroethene	8.17	
67WW09	5/19/2015	1,1-Dichloroethene	2.71	
67WW09	11/18/2015	1,1-Dichloroethene	1.66	J
67WW09	5/18/2016	1,1-Dichloroethene	1	U
67WW09	11/27/2017	1,1-Dichloroethene	1	U

Plot 220. LHAAP-67 1,1-DCE Data 2013 through 2016 – 67WW09 (AECOM, 2017i, data in table through November 2017).



Locatio	Date	Constituent	Result	Code
67WW09	6/1/2013	1,2-Dichloroethane	0.25	U
67WW09	6/3/2013	1,2-Dichloroethane	0.25	U
67WW09	9/28/2013	1,2-DICHLOROETHANE	0.414	J
67WW09	1/24/2014	1,2-Dichloroethane	0.347	J
67WW09	7/25/2014	1,2-Dichloroethane	0.5	U
67WW09	12/4/2014	1,2-Dichloroethane	0.5	U
67WW09	2/11/2015	1,2-Dichloroethane	0.5	U
67WW09	5/19/2015	1,2-Dichloroethane	0.5	U
67WW09	11/18/2015	1,2-Dichloroethane	0.5	U
67WW09	5/18/2016	1,2-Dichloroethane	0.5	U
67WW09	11/27/2017	1,2-Dichloroethane	1	U

Plot 221. LHAAP-67 1,2-DCA Data 2013 through 2016 – 67WW09 (AECOM, 2017i, data in table through November 2017).

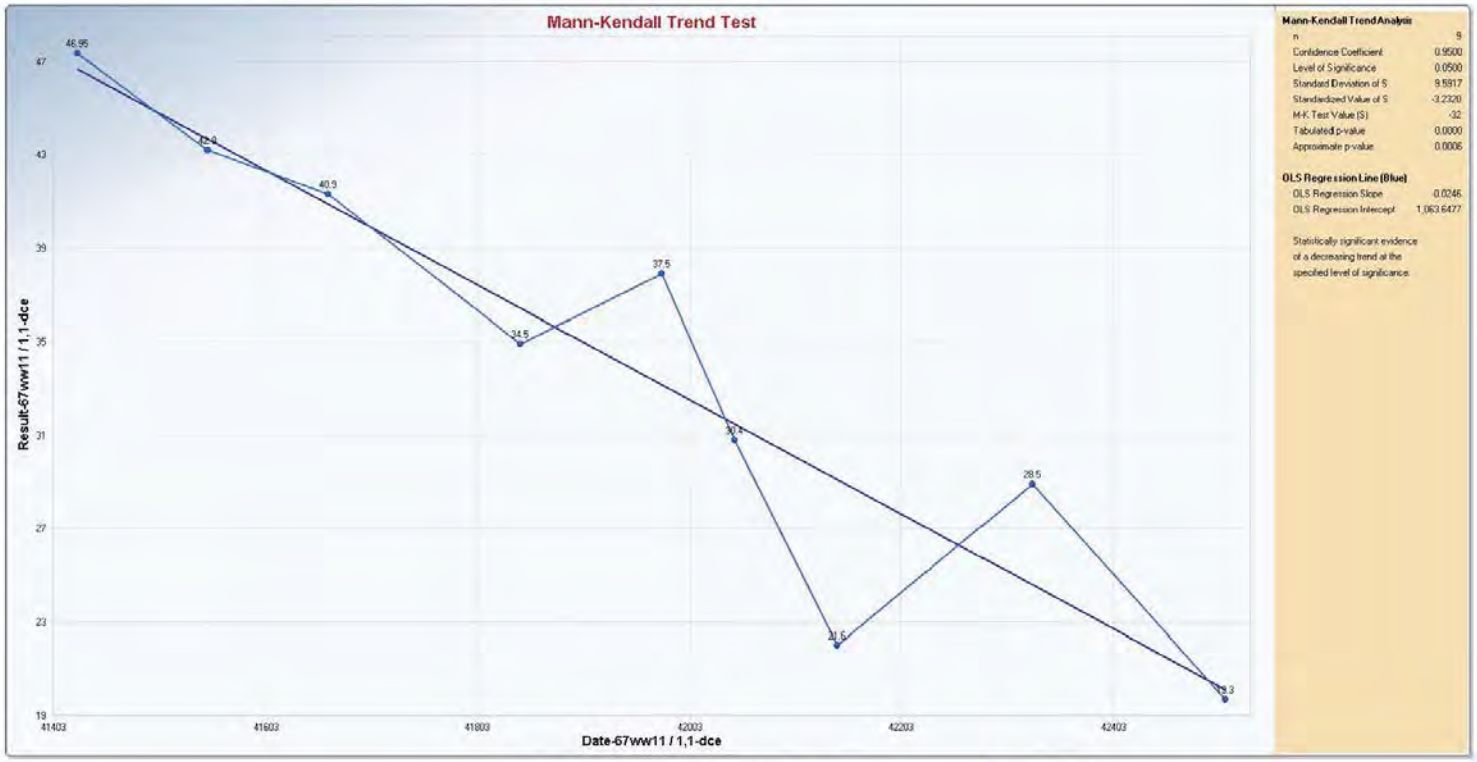


Locatio	Date	Constituent	Result	Code
67WW09	6/1/2013	Trichloroethene	0.25	U
67WW09	6/3/2013	Trichloroethene	0.25	U
67WW09	9/28/2013	Trichloroethene	0.5	U
67WW09	1/24/2014	Trichloroethene	0.5	U
67WW09	7/25/2014	Trichloroethene	0.5	U
67WW09	12/4/2014	Trichloroethene	0.5	U
67WW09	2/11/2015	TRICHLOROETHENE	0.5	U
67WW09	5/19/2015	TRICHLOROETHENE	0.5	U
67WW09	11/18/2015	TRICHLOROETHENE	0.5	U
67WW09	5/18/2016	Trichloroethene	0.5	U
67WW09	11/27/2017	Trichloroethene	1	U

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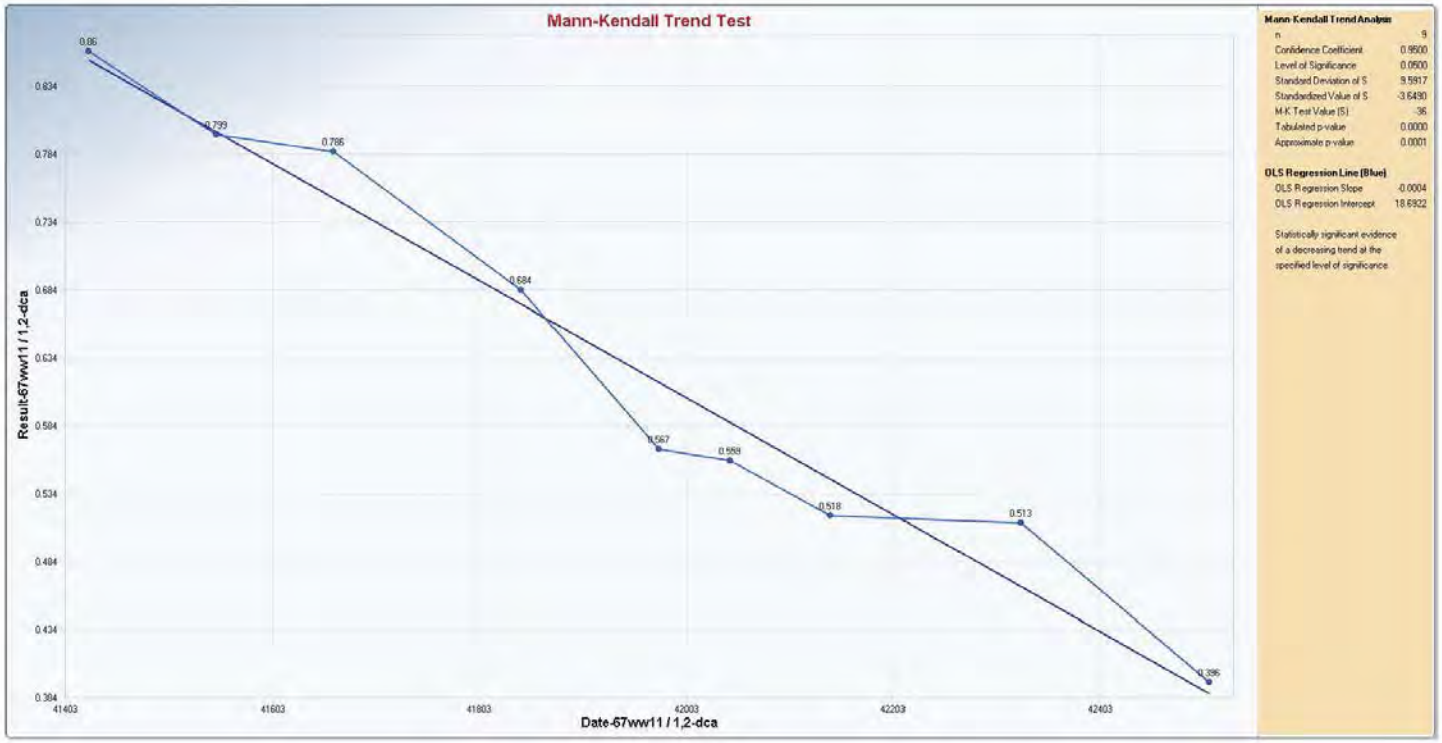
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Plot 222. LHAAP-67 TCE Data 2013 through 2016 – 67WW09 (AECOM, 2017i, data in table through November 2017).



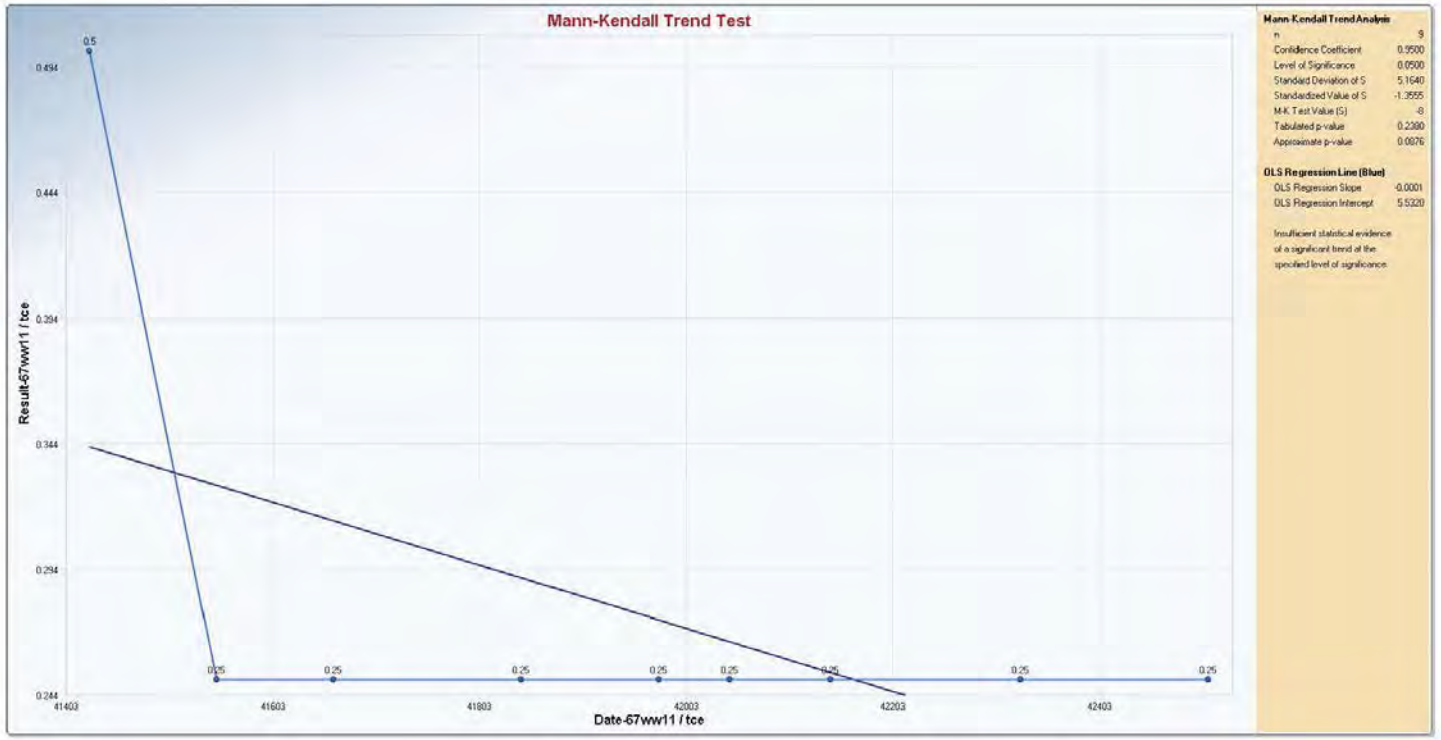
Locatio	Date	Constituent	Result
67WW11	6/1/2013	1,1-Dichloroethene	47.1
67WW11	10/2/2013	1,1-DICHLOROETHENE	42.8
67WW11	1/23/2014	1,1-Dichloroethene	38.8
67WW11	7/24/2014	1,1-Dichloroethene	34.5
67WW11	12/4/2014	1,1-Dichloroethene	37.5
67WW11	2/11/2015	1,1-Dichloroethene	30.4
67WW11	5/19/2015	1,1-Dichloroethene	21.6
67WW11	11/19/2015	1,1-Dichloroethene	28.5
67WW11	5/19/2016	1,1-Dichloroethene	19.3
67WW11	11/27/2017	1,1-Dichloroethene	5.2

Plot 223. LHAAP-67 1,1-DCE Data 2013 through 2016 – 67WW11 (AECOM, 2017i, data in table through November 2017).



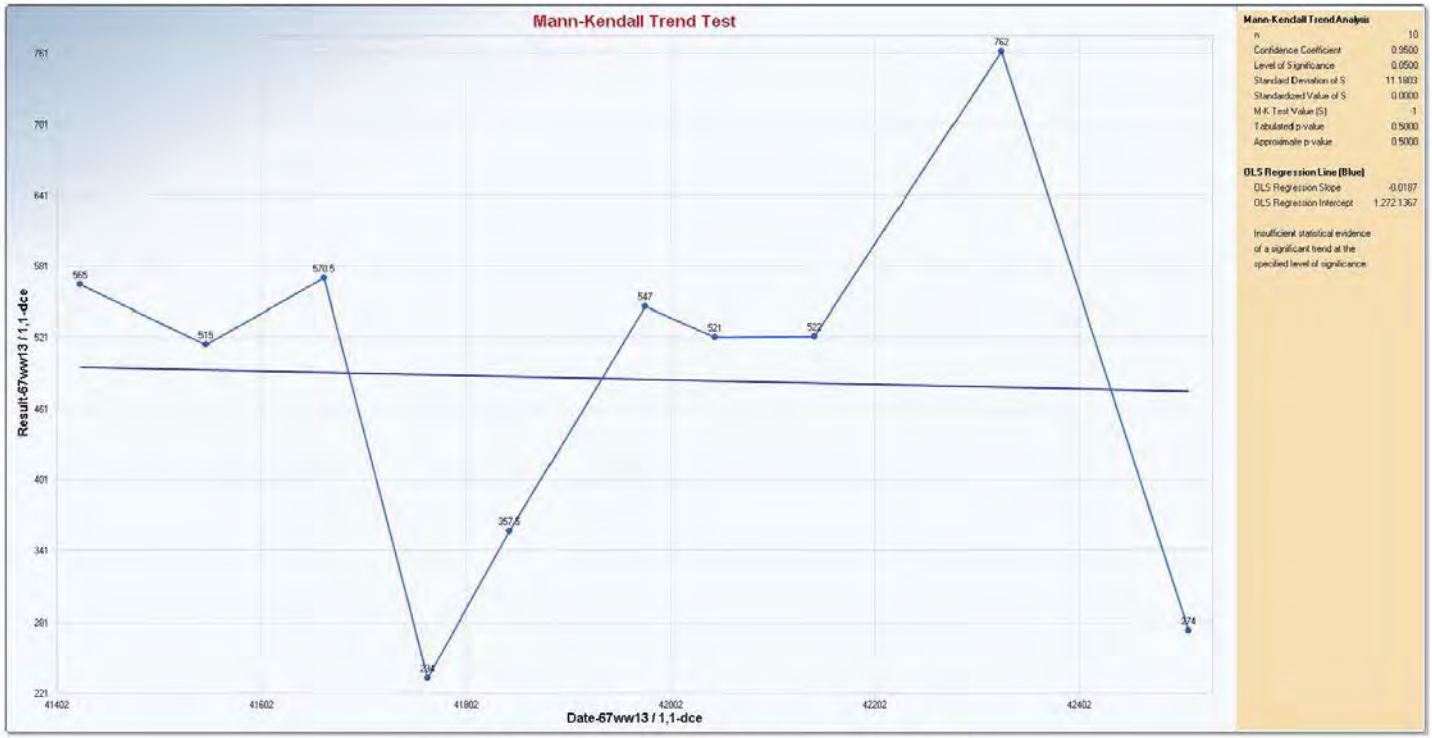
Locatio	Date	Constituent	Result	Code
67WW11	6/1/2013	1,2-Dichloroethane	0.869	J
67WW11	10/2/2013	1,2-DICHLOROETHANE	0.799	J
67WW11	1/23/2014	1,2-Dichloroethane	0.748	J
67WW11	7/24/2014	1,2-Dichloroethane	0.684	J
67WW11	12/4/2014	1,2-Dichloroethane	0.567	J
67WW11	2/11/2015	1,2-Dichloroethane	0.559	J
67WW11	5/19/2015	1,2-Dichloroethane	0.518	J
67WW11	11/19/2015	1,2-Dichloroethane	0.513	J
67WW11	5/19/2016	1,2-Dichloroethane	0.396	J
67WW11	11/27/2017	1,2-Dichloroethane	1	U

Plot 224. LHAAP-67 1,2-DCA Data 2013 through 2016 – 67WW11 (AECOM, 2017i, data in table through November 2017).



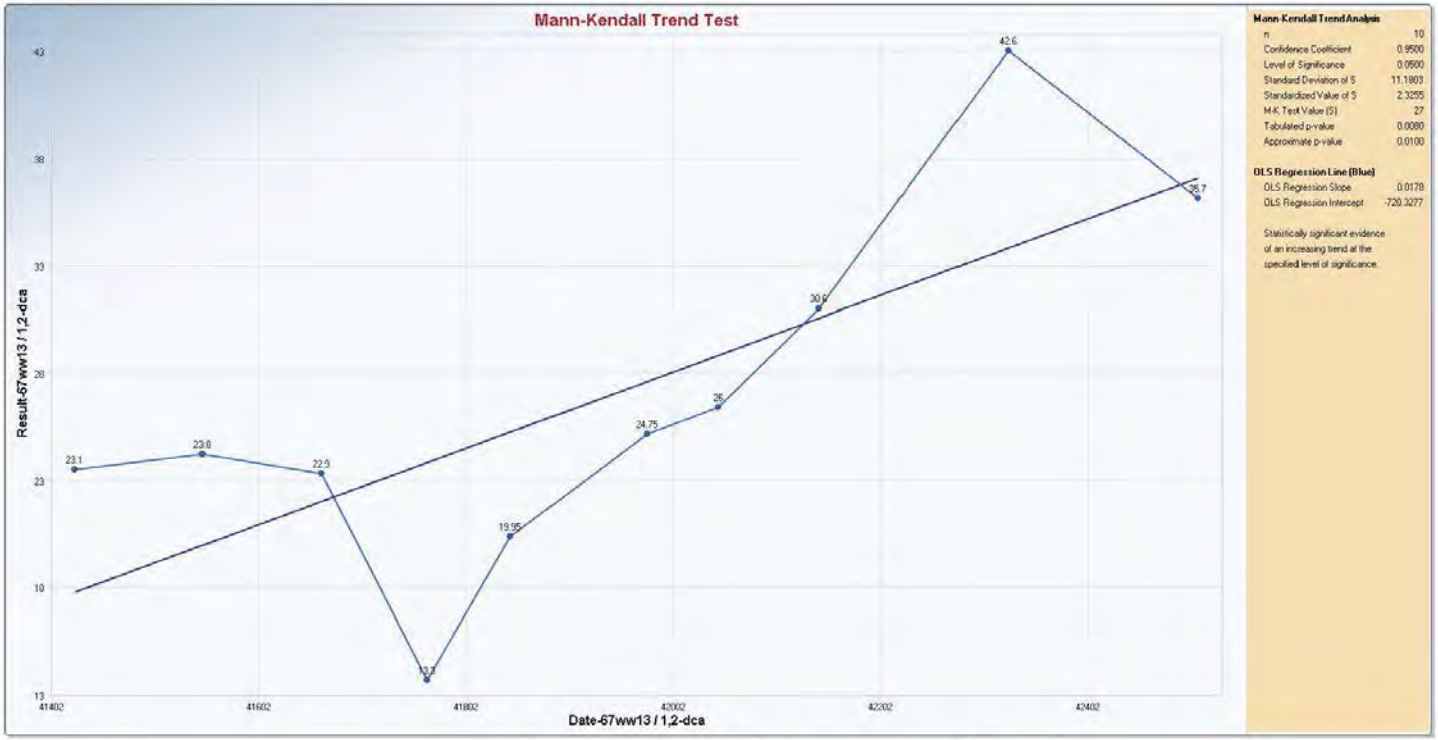
Locatio	Date	Constituent	Result (	Code
67WW11	6/1/2013	Trichloroethene	0.25	U
67WW11	10/2/2013	Trichloroethene	0.5	U
67WW11	1/23/2014	Trichloroethene	0.5	U
67WW11	7/24/2014	Trichloroethene	0.5	U
67WW11	12/4/2014	Trichloroethene	0.5	U
67WW11	2/11/2015	TRICHLOROETHENE	0.5	U
67WW11	5/19/2015	TRICHLOROETHENE	0.5	U
67WW11	11/19/2015	TRICHLOROETHENE	0.5	U
67WW11	5/19/2016	Trichloroethene	0.5	U
67WW11	11/27/2017	Trichloroethene	1	U

Plot 225. LHAAP-67 TCE Data 2013 through 2016 – 67WW11 (AECOM, 2017i, data in table through November 2017).



Locatio	Date	Constituent	Result
67WW13	5/31/2013	1,1-Dichloroethene	498
67WW13	10/1/2013	1,1-DICHLOROETHENE	515
67WW13	1/24/2014	1,1-Dichloroethene	572
67WW13	5/6/2014	1,1-Dichloroethene	240
67WW13	7/25/2014	1,1-Dichloroethene	353
67WW13	12/4/2014	1,1-Dichloroethene	572
67WW13	2/11/2015	1,1-Dichloroethene	521
67WW13	5/19/2015	1,1-Dichloroethene	522
67WW13	11/18/2015	1,1-Dichloroethene	762
67WW13	5/19/2016	1,1-Dichloroethene	274
67WW13	11/28/2017	1,1-Dichloroethene	320

Plot 226. LHAAP-67 1,1-DCE Data 2013 through 2016 – 67WW13 (AECOM, 2017i, data in table through November 2017).

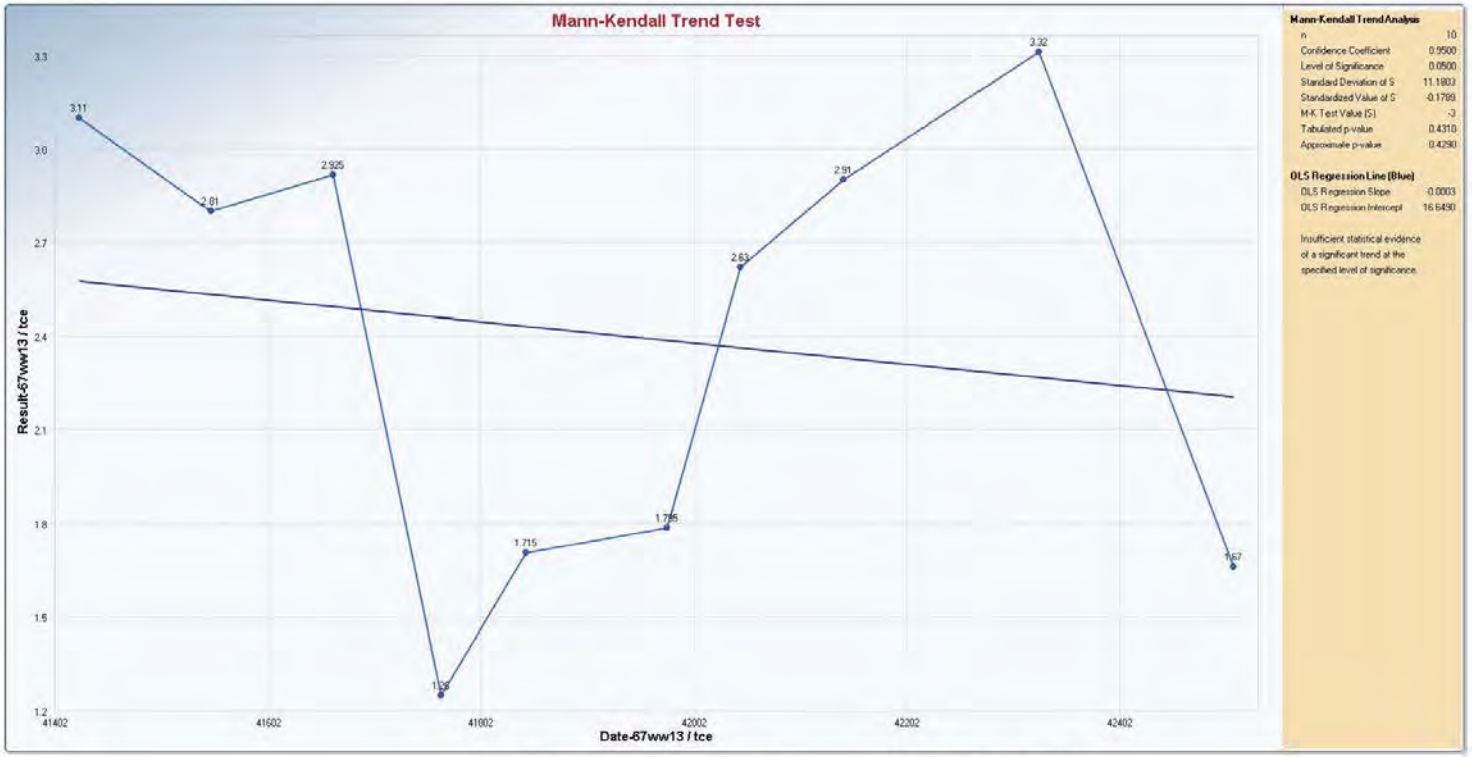


Locatio	Date	Constituent	Result
67WW13	5/31/2013	1,2-Dichloroethane	19.9
67WW13	10/1/2013	1,2-DICHLOROETHANE	23.8
67WW13	1/24/2014	1,2-Dichloroethane	22.9
67WW13	5/6/2014	1,2-Dichloroethane	13.7
67WW13	7/25/2014	1,2-Dichloroethane	19.8
67WW13	12/4/2014	1,2-Dichloroethane	24.9
67WW13	2/11/2015	1,2-Dichloroethane	26
67WW13	5/19/2015	1,2-Dichloroethane	30.6
67WW13	11/18/2015	1,2-Dichloroethane	42.6
67WW13	5/19/2016	1,2-Dichloroethane	35.7
67WW13	11/28/2017	1,2-Dichloroethane	32

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Plot 227. LHAAP-67 1,2-DCA Data 2013 through 2016 – 67WW13 (AECOM, 2017i, data in table through November 2017).



Locatio	Date	Constituent	Result	Code
67WW13	5/31/2013	Trichloroethene	3.11	
67WW13	10/1/2013	Trichloroethene	2.81	
67WW13	1/24/2014	Trichloroethene	2.86	
67WW13	5/6/2014	Trichloroethene	1.25	J
67WW13	7/25/2014	Trichloroethene	1.72	
67WW13	12/4/2014	Trichloroethene	1.65	J
67WW13	2/11/2015	TRICHLOROETHENE	2.63	
67WW13	5/19/2015	TRICHLOROETHENE	2.91	
67WW13	11/18/2015	TRICHLOROETHENE	3.32	
67WW13	5/19/2016	Trichloroethene	1.67	J
67WW13	11/28/2017	Trichloroethene	1	U

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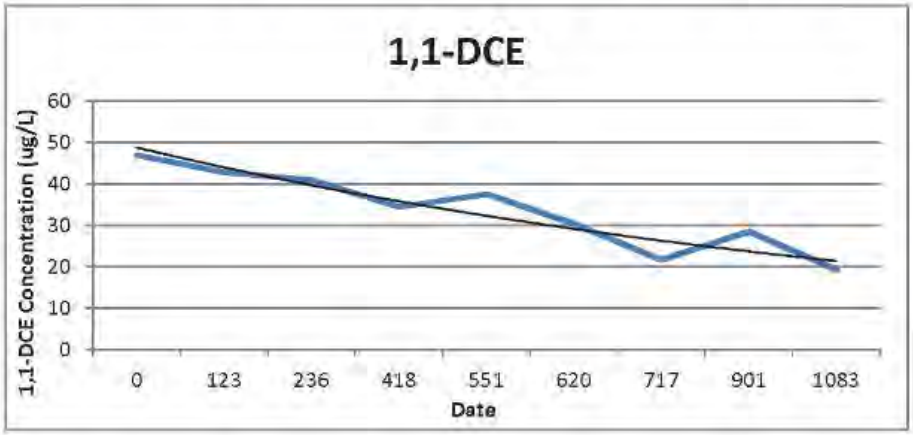
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Plot 228. LHAAP-67 TCE Data 2013 through 2016 – 67WW13 (AECOM, 2017i, data in table through November 2017).

Appendix F: First Order Rate Calculations

1,1-DCE at 67WW11

Date	Jun-13	Oct-13	Jan-14	Jul-14	Dec-14	Feb-15	May-15	Nov-15	May-16
Time	0	123	236	418	551	620	717	901	1083
1,1-DCE	46.95	42.8	40.9	34.5	37.5	30.4	21.6	28.5	19.3



1,1-DCE MCL 7 ug/L

Ln(C/C0) = -Kt
C = concentration at any time
C0 = initial concentration at time zero
t = time in days
K = first order rate constant in 1/day
t1/2 = half life of compound

C =	19.3 mg/L	
C0 =	46.95 mg/L	
t=	1083 days	
K =	0.000821 d^{-1}	0.2996 $year^{-1}$
t1/2 =	844 days	2.31 years

Extrapolating to C =	7 ug/L	
t =	1236 days	time to achieve MCL
	3.4 years	

Note:
1). 1,1-DCE concentrations used for June 2013 and January 2014 are based on an average concentration of the normal sample and its duplicate collected at 67WW11.

Plot 229. LHAAP-67 Rate calculation for 1,1-DCE in 67WW11 (AECOM, 2017i).

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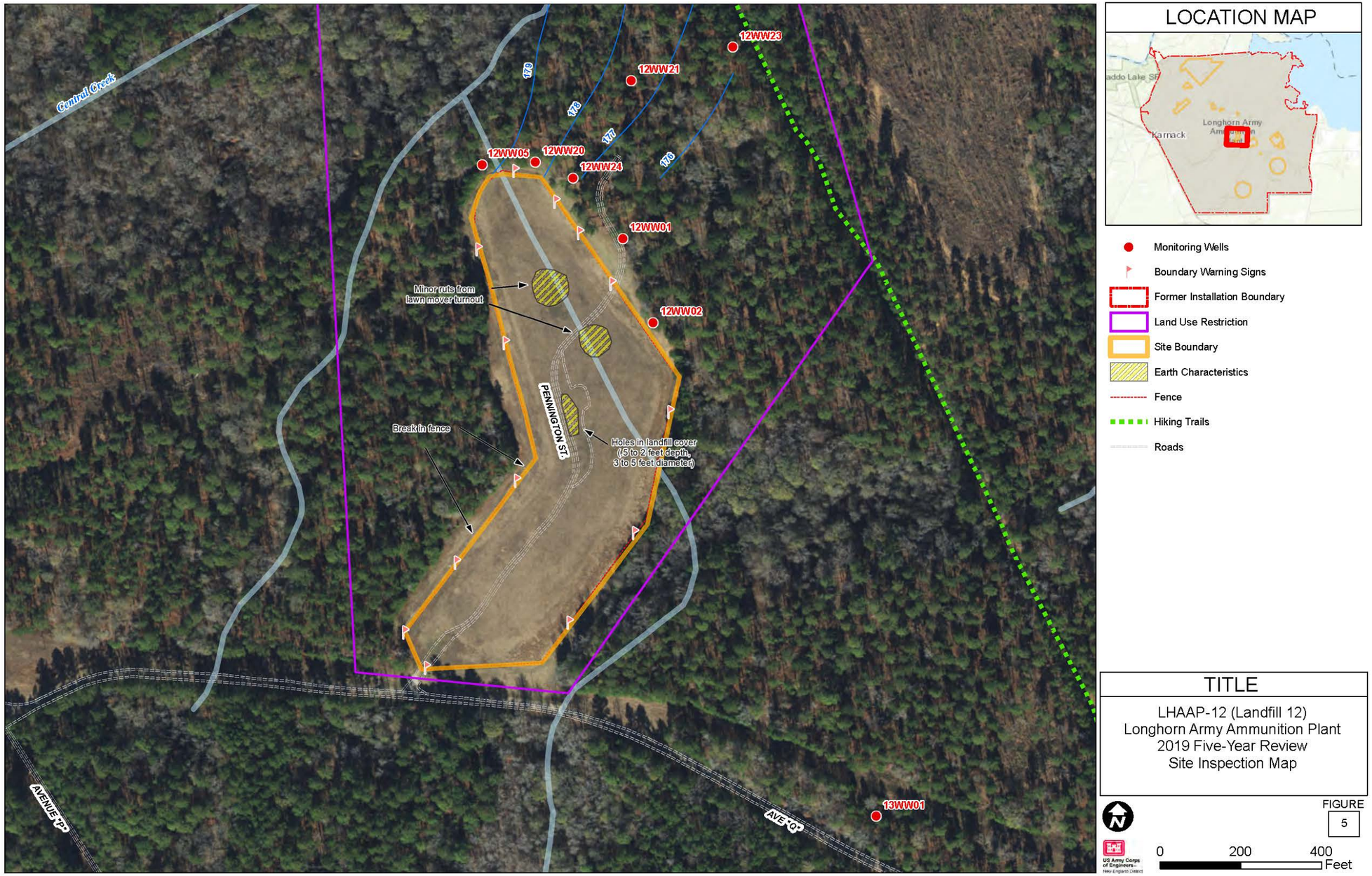
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Site visit map showing inspection findings, site and land use control boundaries, and drainage (LHAAP, 2018a, TNRIS, 2015, USGS, 2011, Landmark Consultants, 2006).

LHAAP-12

Site Inspection Form

I. SITE INFORMATION	
Site Name: Longhorn Army Ammunition Plant	**Date of inspection:** 21 May 2018
Location and Region: Karnack, TX, Region 6	**EPA ID:** TX6213820529
Agency, office, or company leading the five-year review: USACE New England District	**Weather/temperature:** 84°F, winds 0 mph

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 (below) ■ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** __Aaron Williams_____ __Environmental Engineer__ _22-23 May 2018_
   Name Title Date
   Interviewed ■ at site □ at office □ by phone Phone no. (918) 669-4915
   Problems, suggestions; □ Report attached _____
   _.

2. **O&M Staff** Scott Beesinger __Supervisor_ _23 May 2018_____
   Name Title Date
   Interviewed □ at site □ at office □ by phone Phone no. _(903) 930-6193_
   Problems, suggestions; □ Report attached _____
   _.

Inspection Team:	
Drew Clemens, PG	Dr. Lily Sehayek
Chris Kilbridge, PG	

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency USEPA Region 6

Contact Richard Mayer, Senior Project Engineer, 22-23 May, 2018, 214-665-7442

Problems; suggestions; ■ Report attached (Appendix E, Interviews)

Agency Texas Commission on Environmental Quality, (512) 239-1000

Contact: April Palmie, Project Manager, 22-23 May, 2018, 512-239-4152

Problems; suggestions; ■ Report attached (Appendix E, Interviews)

Agency US Fish and Wildlife Service, Caddo Lake Wildlife Refuge

Contact Paul Bruckwicki, Manager, 22-23 May 2018, (903) 679-9144

Problems; suggestions; ■ Report attached (Appendix E, Interviews)

Agency _____

Contact _____ _____ _____ _____
Name Title Date Phone no.

Problems; suggestions; □ Report attached

---

4. **Other interviews** (optional) □ Report attached.

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 plan/emergency response plan	□ Readily available	□ Up to date	■ N/A
	Draft Final Site Safety and Health Plan (Bhate, 2018)			
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
	Water level data collection is not part of routine monitoring. Positional data and well construction information not in a centrally located repository (master file).			
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 $75,000 (LHAAP-12 only) □ Breakdown attached (below)

From	1 Oct 12	To	30 Sep 13	$1,603,762	■ Breakdown below
	Date		Date	Total cost	
From	1 Oct 13	To	30 Sep 14	$1,096,225	■ Breakdown below
	Date		Date	Total cost	
From	1 Oct 14	To	30 Sep 15	$1,144,870	■ Breakdown below
	Date		Date	Total cost	
From	1 Oct 15	To	30 Sep 16	$1,014,574	■ Breakdown below
	Date		Date	Total cost	
From	1 Oct 16	To	30 Sep 17	$559,404	■ Breakdown below
	Date		Date	Total cost	

3. **Unanticipated or Unusually High O&M Costs During Review Period**

None recorded for LHAAP-12

LHAAP 12, 16, and 18/24 operations, maintenance, and monitoring costs by fiscal year.

Fiscal Year	O&M Approximate Actual Cost ($)	LTM Approximate Actual Cost ($)	Approximate Total ($)	Notes
FY13 Actuals	1,421,646.70	182,115.29	1,603,761.99	Upgrades and repairs to the aging GWTP
FY14 Actuals	585,824.68	510,400.52	1,096,225.20	
FY15 Actuals	638,063.55	506,805.99	1,144,869.54	
FY16 Actuals	638,063.55	376,509.95	1,014,573.50	
FY17 Actuals	429,108.05	130,296.03	559,404.08	

V. ACCESS AND INSTITUTIONAL CONTROLS □ **Applicable** □ **N/A**

A. Fencing

1. **Fencing damaged** ■ Location shown on site map □ Gates secured □ N/A

Gate was locked, but not secured to the hinges, allowing for easy unauthorized access. Perimeter fence was down in two locations due to downed trees, creating ~40 ft and ~20 ft breaks, respectively. Damage was reported to USFWS and trees removed.

B. Other Access Restrictions

1. **Signs and other security measures** ■ Location shown on site map □ N/A

Warning signs are posted at ~100 ft intervals on the western and northern parts of the perimeter fence and at the gate. Signs posted at reduced frequency on the eastern side and southern side,

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): Drive by, site walks
Frequency Weekly to monthly
Responsible party/agency US Army

Contact	Name	Title	Date
	Aaron Williams	Environmental Engineer	22-23 May

Reporting is up-to-date □ Yes ■ No
Reports are verified by the lead agency ■ Yes □ No

Specific requirements in deed or decision documents have been met
Violations have been reported
Other problems or suggestions: □ Report attached

USACE noted that while they do not always receive timely reports, for the issues is addressed by the contractor when it is reported.

2. **Adequacy** ■ ICs are adequate □ ICs are inadequate □ N/A

Remarks_____

D. General

1. **Vandalism/trespassing** □ Location shown on site map ■ No vandalism evident

Remarks_____

2. **Land use changes on site** □ N/A

No changes in onsite land use.

3. **Land use changes off site** □ N/A

No changes at the abutting sites or abutting land.

VI. GENERAL SITE CONDITIONS

A. Roads ■ Applicable □ N/A

1. **Roads damaged** ■ Location shown on site map ■ Roads adequate □ N/A

B. Other Site Conditions

Remarks _.

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_____

Lawn mower turnouts left ruts, sometimes 2-in deep, but n are not causing local erosion.

4.	**Holes** ■ Location shown on site map □ Holes not evident Areal extent See map Depth 0.5-2 ft deep Holes are 3-5 ft in diameter.	
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** Type_____ □ No obstructions □ Location shown on site map 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 XX square feet Type XX

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

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

Water level data collection is not part of routine monitoring. Positional data and well construction information not in a centrally located repository (master file).

2. Monitoring data suggests:
□ Groundwater plume is effectively contained □ Contaminant concentrations are declining

Cannot assess contaminant migration status due to incomplete chemistry and water level database submitted before Site Inspection.

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

Monitor well protective casings and ballards are in good condition, but well 12WW-22 could not be located because it was under water. Well 12WW21 and 12WW23 were not found due to overgrown vegetation and lack of time to check alternative access to these wells.

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 Interim Remedy's goal was to mitigate potential risks posed by buried source material at the sites by reducing further migration of contaminants into the ground water and possibly into surface water bodies. The landfill cap is well maintained, eliminating direct exposure to contaminants, and precipitation influence on contaminant migration.

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. The landfill cover is in very good condition, and shows no indication deterioration or features suggesting future integrity compromise. The holes in the landfill cover do not contain material suggesting the cover is compromised. Downed trees were removed, but the two holes ~40 and ~20 ft wide in the perimeter security fence remain open allowing potential trespassers or wayward hikers access to the site. The gate is not secured when locked. The eastern perimeter fence road needs mowing and weeds knocked down near the fence to make warning signs visible, and reduce fence repair costs. If well 12WW-22 is indeed under water, the well served no monitoring benefit and must be properly abandoned to stop groundwater-surface water cross connection. If the well is needed for continued monitoring, install the well at an alternate site that meets chemisty and hydraulic monitoring needs, and survey with at least two existing wells to verity positional data repeatability.
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. Due to site costs being included with LHAAP-16 and LHAAP-18/24, there is no financial indicator of the remedy not being protective.
D.	**Opportunities for Optimization**
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. Address 12WW-22 through abandonment +/- replacement.

Site Inspection Photographs



Photo 1. Warning sign by gate looking north from Avenue P.



Photo 2. Break in western perimeter fence, about 40 ft long.



Photo 3. Break in western perimeter fence (red line), about 20 ft long.



Photo 4. Mowed region outside of western perimeter fence looking North.



Photo 5. Partially obscured warning sign on eastern perimeter fence.

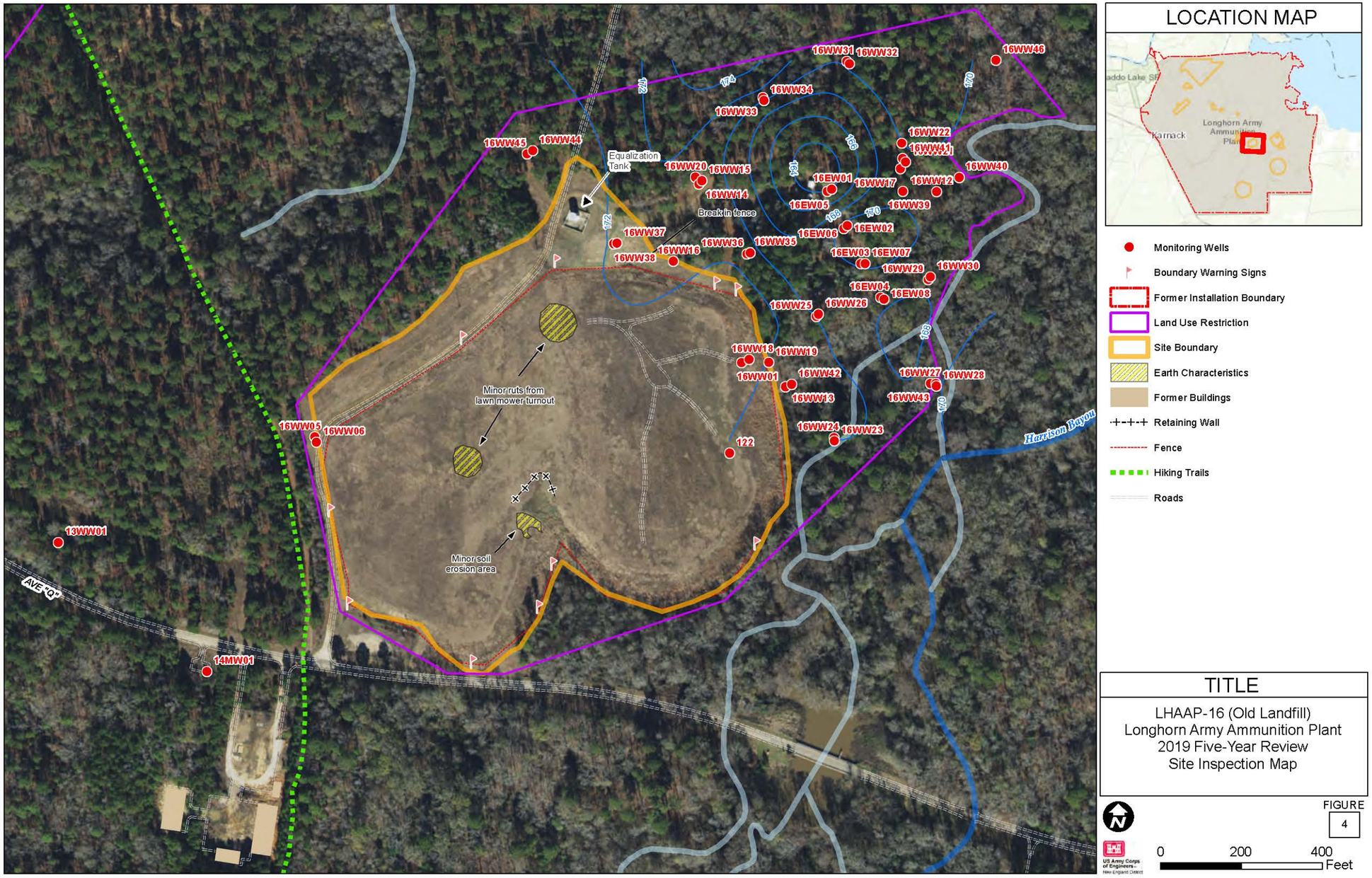


Photo 6. One of the larger holes in the landfill cap (clipboard is 10 by 12 inches.



Photo 7. Panorama looking north from the landfill cap center. Note warning sign right side, center of photograph.

LHAAP-16 Old Landfill



Site Inspection map showing land use control boundary, inspection results, drainage features, and groundwater contours from unspecified date (LHAAP, 2018a, Shaw, 2016, TNRIS, 2015, USGS, 2011).

LHAAP-16

Site Inspection Form

I. SITE INFORMATION	
Site Name: Longhorn Army Ammunition Plant	**Date of inspection:** 22-23 May 2018
Location and Region: Karnack, TX, Region 6	**EPA ID:** TX6213820529
Agency, office, or company leading the five-year review: USACE New England District	**Weather/temperature:** 85°F, winds <5 mph

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 (below) ■ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** __Aaron Williams_____ __Environmental Engineer__ _22-23 May 2018_
   Name Title Date
   Interviewed ■ at site □ at office □ by phone Phone no. (918) 669-4915
   Problems, suggestions; □ Report attached _____
   _.

2. **O&M Staff** Scott Beesinger __Supervisor_ _23 May 2018_____
   Name Title Date
   Interviewed □ at site □ at office □ by phone Phone no. _(903) 930-6193_
   Problems, suggestions; □ Report attached _____
   _.

Inspection Team:	
Drew Clemens, PG	Dr. Lily Sehayek
Chris Kilbridge, PG	

3.	**Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply. Agency USEPA Region 6 Contact Richard Mayer, Senior Project Engineer, 22-23 May, 2018, 214-665-7442 Problems; suggestions; ■ Report attached (Appendix E, Interviews) Agency Texas Commission on Environmental Quality, (512) 239-1000 Contact: April Palmie, Project Manager, 22-23 May, 2018, 512-239-4152 Problems; suggestions; ■ Report attached (Appendix E, Interviews) Agency US Fish and Wildlife Service, Caddo Lake Wildlife Refuge Contact Paul Bruckwicki, Manager, 22-23 May 2018, (903) 679-9144 Problems; suggestions; ■ Report attached (Appendix E, Interviews)
4.	**Other interviews** (optional) □ Report attached.

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 plan/emergency response plan	□ Readily available	□ Up to date	■ N/A
	Draft Final Site Safety and Health Plan (Bhate, 2018)			
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
	Water level data collection is not part of routine monitoring, and none was available after 2007. Positional data and well construction information not in a centrally located repository (master file).			
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 $317,548 (Interim ROD was $75,000)
■ Breakdown (From 2016 ROD Cap Maintenance=$34,327, Bio Barrier=$92,492, Performance Monitoring=$190,729)

From	1 Oct 12	To	30 Sep 13	$1,603,762	■ Breakdown below
	Date		Date	Total cost	
From	1 Oct 13	To	30 Sep 14	$1,096,225	■ Breakdown below
	Date		Date	Total cost	
From	1 Oct 14	To	30 Sep 15	$1,144,870	■ Breakdown below
	Date		Date	Total cost	
From	1 Oct 15	To	30 Sep 16	$1,014,574	■ Breakdown below
	Date		Date	Total cost	
From	1 Oct 16	To	30 Sep 17	$559,404	■ Breakdown below
	Date		Date	Total cost	

3. **Unanticipated or Unusually High O&M Costs During Review Period**

FY2013 upgrades and repairs to the aging GWTP, additional monitor wells sampled during FY15 and FY16

LHAAP 12, 16, and 18/24 operations, maintenance, and monitoring costs by fiscal year.

Fiscal Year	O&M Approximate Actual Cost ($)	LTM Approximate Actual Cost ($)	Approximate Total ($)	Notes
FY13 Actuals	1,421,646.70	182,115.29	1,603,761.99	Upgrades and repairs to the aging GWTP
FY14 Actuals	585,824.68	510,400.52	1,096,225.20	
FY15 Actuals	638,063.55	506,805.99	1,144,869.54	
FY16 Actuals	638,063.55	376,509.95	1,014,573.50	Final ROD Signed
FY17 Actuals	429,108.05	130,296.03	559,404.08	

V. ACCESS AND INSTITUTIONAL CONTROLS ■ Applicable □ N/A

A. Fencing

1. **Fencing damaged** ■ Location shown on site map ■ Gates secured □ N/A

Hole in fence on northnortheast side of perimeter fence, about 30-ft wide. Vegetation obscures fence on western side, covering warning signs and weakening fence for future fence damage.

B. Other Access Restrictions

1. **Signs and other security measures** ■ Location shown on site map □ N/A

Signs posted at 100 to 400 ft intervals on the perimeter fence,

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): Drive by, site walks, sampling
Frequency Weekly to monthly
Responsible party/agency US Army

Contact	Aaron Williams	Environmental Engineer	22-23 May
	Name	Title	Date

Reporting is up-to-date ■ Yes □ No
Reports are verified by the lead agency ■ Yes □ No

Specific requirements in deed or decision documents have been met ■ Yes □ No
Violations have been reported □ Yes ■ No
Other problems or suggestions: □ Report attached

Remarks_____

2. **Adequacy** ■ ICs are adequate □ ICs are inadequate □ N/A

Remarks_____

D. General

1. **Vandalism/trespassing** □ Location shown on site map ■ No vandalism evident

Remarks_____

2. **Land use changes on site** □ N/A

None.

3. **Land use changes off site** □ N/A

Trail Bird Path established west of the site.

VI. GENERAL SITE CONDITIONS

A. Roads ■ Applicable □ N/A

1. **Roads damaged** ■ Location shown on site map ■ Roads adequate □ N/A

B. Other Site Conditions

Remarks_____

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 750-1,000 ft^2___ Depth <1 ft

Extent consists of soil washed down from landfill cap slope, across a retaining wall made of bagged concrete or Sakcrete <6 ft high, and deposited into a wet area. USFWS representative indicated the Army built this field expedient retaining wall to stop erosion due to seepage.

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 <750 ft^2 □ 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_____ See Section 3 Soil Erosion.
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** Type_____ □ No obstructions
□ Location shown on site map 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_____

See Section A Number 3.

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 XX square feet Type XX

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

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

Extraction wells use hammerhead pneumatic pumps that need repeated maintenance due to iron precipitation. These pumps are difficult and expensive to maintain. Total flow from these wells is low ~ 3 gpm. Well redevelopment were not performed on these wells.

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
□ Good condition ■ Needs Maintenance

It is not known how much iron and manganese buildup has reduced pipe flow efficiency and pipe inner diameter.

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_____

See Site Inspection form for LHAAP-18/24.

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

Monitor wells are not yet regularly sampled as part of the finalized ROD due to lack of access for installing a well next to the Ramsar wetlands. A potentially orphan monitor well with a rusted protective casing located near the 16WW14/15/20 cluster.

A hydraulic monitoring program does not exist governing data collection and application, preventing repeatable measurements and limiting assessment of hydraulic control and capture zone effeciency

D. Monitoring Data

3. Monitoring Data
□ Is routinely submitted on time □ Is of acceptable quality

No contract requirement to collect water level data. Contractor is collecting water levels on own initiative, but the data is not kept in a master file or is not readily available for use. Water level data submitted before the Site Inspection did not extend past 2007.

4. 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 1995 Interim Remedy's goal was to mitigate potential risks posed by buried source material at the sites by reducing further migration of contaminants into the ground water and possibly into surface water bodies. The 2016 Final Remedy protects human health and the environment by preventing human exposure to the landfill waste and contaminated groundwater, and preventing groundwater contaminated with chemicals of concern (COCs) from migrating into nearby surface water (Harrison Bayou).

Due to the lack of a standardized hydraulic monitoring program to include Harrison Bayou and no data collection since the final ROD was signed, the effectiveness of hydraulic control at this site cannot be assessed. It is further limited by lack of documented justification for past Harrison Bayou sampling points to assess groundwater concentrations entering surface water and the head differential between the two medias.

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.

The landfill cap provides current and long-term protectiveness for human health risk, preventing exposure to contaminated soil. No holes or slope stability indicators suggesting poor cap integrity. The perimeter 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. A

	potentially orphan monitor well with a rusted protective casing located near the 16WW14/15/20 cluster. Performance-based extraction well redevelopment does not appear to be occurring, leading to increased pump maintenance and replacement. Poor extraction well yield increases the risk of contaminated groundwater entering Harrison Bayou under drought recovery or high gradient conditions. It is not known how much water line condition is limiting well field yield. Assess GWTP water lines for iron and manganese buildup creating line loss and flow restrictions using a camera. Assess remedial options based on results.
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. The final ROD shows increased costs to be associated with the remedy, but site-specific costs are not tracked for LHAAP-12, 16, and 18/24.
D.	**Opportunities for Optimization**
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. Use a borehole camera to assess type and degree of clogging (e.g., iron and manganese precipitation), and design a performance-based extraction well rehabilitation program potentially using methods such as dual swab, ultrasonic and/or CO2. :Plot trends of chemical concentrations as trend graphs of COCs overlaid on a site plan. Plot current interpretation of plume(s) and head changes in plan view and on stratigraphic cross sections through Harrison Bayou to confirm extent and migration of plume and hydraulic conditions are as expected. Opportunities for optimization in monitoring tasks may exist in the form of improved compilation of monitoring data (ie: plant and monitoring well network) to track performance of the final remedy and potentially identify trends that may aid in design of the final remedy.

Site Inspection Photographs



Photo 8. Site access gate from Avenue Q.



Photo 9. Looking east across the southern part of the cap showing a typical warning sign. Vegetation partially obscuring the fence is thicker along the southern and eastern portions of the perimeter fence.



Photo 10. Minor ruts from lawn mower turn out.



Photo 11. Tree down across fence near 16WW16.



Photo 12. Overgrown portion of eastern perimeter fence, completely blocking warning signs.



Photo 13. Partially buried Sakcrete retaining wall (red line is marks exposed top) and most area near fence corner. Straw is used to reduce soil erosion and promote grass growth.



Photo 14. Retaining wall concrete blocks formed by Sakcrete bags. Straw spread to reduce runoff and encourage grass growth.



Photo 15. Monitor well protective casing in poor (lower left) and good condition (16WW14/15/20 cluster, middle center).



Photo 16. Equalization tank and secondary containment structure at site's northern end.



Photo 17. Holding Tank, pump house, and power pole North of the Site Boundary.



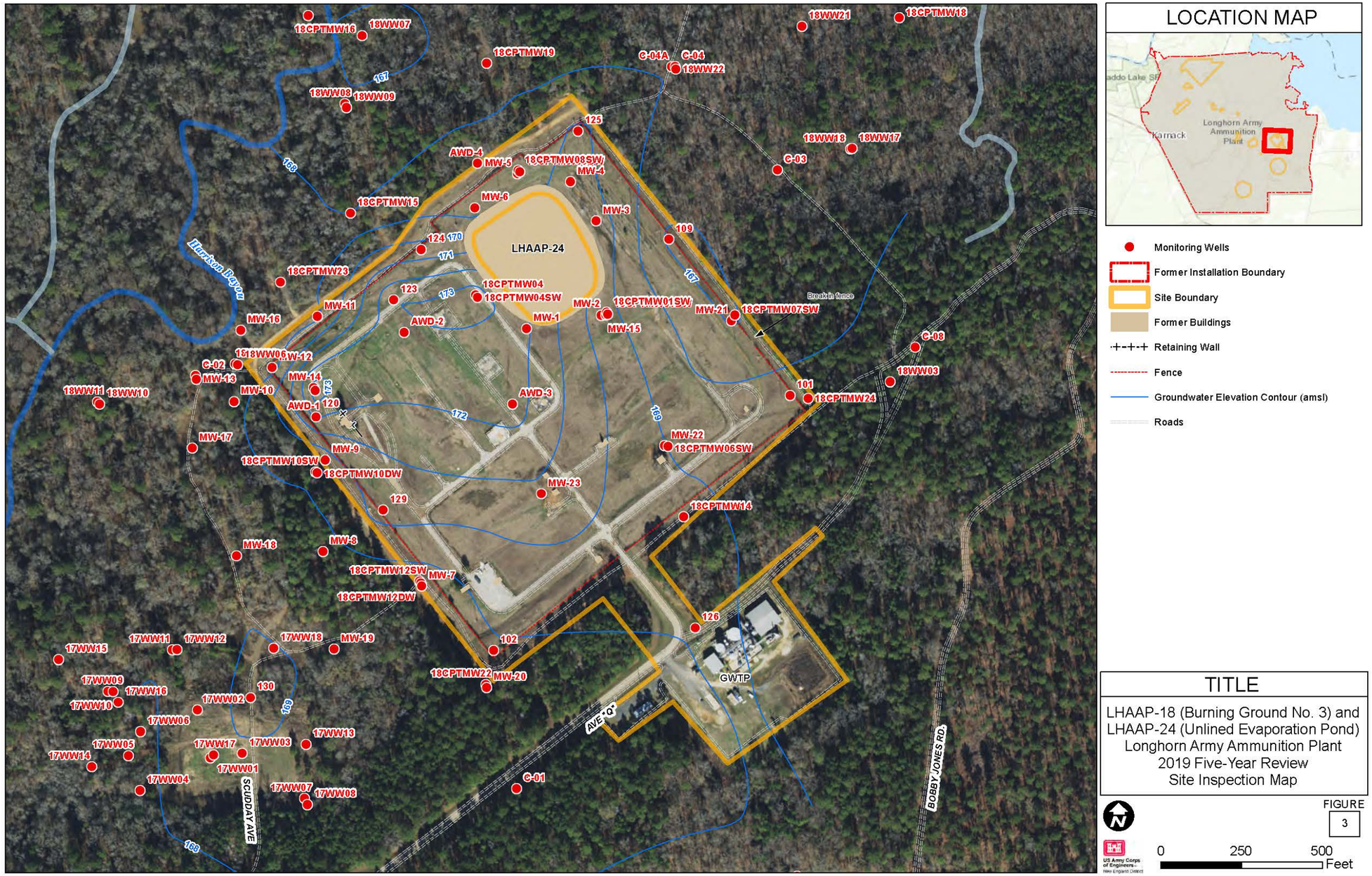
Photo 18. View Looking South East at Vaults of Vertical Extraction Wells 16EW02 and 16EW06.



Photo 19. Looking north-northeast across the landfill cap.

LHAAP-18 and 24 Burning Ground No. 3 and Unlined Evaporation Pond

LHAAP-18/24



Site Inspection map with observations (signs, breaks in the fence), nearby Harrison Bayou and its tributaries, and groundwater contours (LHAAP, 2018a, TNRIS, 2015, USGS, 2011).

Site Inspection Form

I. SITE INFORMATION	
Site Name: Longhorn Army Ammunition Plant	**Date of inspection:** 22-23 May 2018
Location and Region: Karnack, TX, Region 6	**EPA ID:** TX6213820529
Agency, office, or company leading the five-year review: USACE New England District	**Weather/temperature:** 82°F, winds <5 mph

Remedy Includes: (Check all that apply)

- ■ Landfill cover/containment
- ■ Access controls
- ■ Institutional controls
- ■ Groundwater pump and treatment
- □ Surface water collection and treatment
- ■ Other Hydraulic Control
- □ Monitored natural attenuation
- □ Groundwater containment
- □ Vertical barrier walls

Attachments: ■ Inspection team roster attached (below) ■ Site map attached

USACE Inspection Team:	
Drew Clemens, PG	Dr. Lily Sehayek
Chris Kilbridge, PG	

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** Aaron Williams (Name) Environmental Engineer (Title) 22-23 May 2018 (Date)
   Interviewed ■ at site □ at office □ by phone Phone no. (918) 669-4915
   Problems, suggestions; □ Report attached _____

Mr. Williams indicated that in his opinion 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. He observed that the groundwater treatment system is old (> 20 years) and that resources would be better invested toward implementing the final remedy than performing substantial upgrades to the existing treatment system.

2. **O&M Staff** Scott Beesinger Supervisor 23 May 2018
Name Title Date
Interviewed ■ at site □ at office □ by phone Phone no. (903) 930-6193
Problems, suggestions; □ Report attached _____

Mr. Beesinger indicated there were no violations for effluent discharge. He indicated that the fluidized bed reactor (FBR) had breakthrough of carbon and biomass. The site supervisor tried to address this issue by installing filters before the ion exchange vessel. Initially the operator tried installing a 10-micron filter prior to the ion exchange, however, the filter clogged in one day; subsequently they tried a 100 micron filter that clogged in four days. The subcontractor trouble-shoot the FBR issue and found that the lateral nozzles are clogged (though the inductor function properly). The plan is to replace the lateral and nozzle. The site supervisor indicated that the current process flow diagram does not depict the ion exchange vessel and needs to be revised to include the ion exchange between the discharge pumps and the flow meter. He indicated that they would use ion exchange to remove perchlorate while the FBR is bypassed and taken off-line for repair. He indicated that there were issues with the submersible pumps in some of the ICTs due to iron precipitation, especially at ITC No. 13A, 13B, and 13C; pumps in these locations had to be removed every 3-4 months to be cleaned. Submersible pumps had to be replaced typically after the third cleaning. He indicated that there was no knowledge of the condition of the media in the trench outside the ICT lateral pipe to determine if iron fouling of the trench itself was occurring in this part of the ICT, which could be reducing the efficiency of hydraulic control of interim remedy.

He noted that the vertical extraction wells at Site 16 had similar iron precipitation clogging of the pumps, which are hammerhead pneumatic pumps that are more difficult and expensive to maintain. He indicate that he is not performing any well redevelopment of the extraction wells at Site 16.

Mr. Beesinger indicated that the current leak from the acid tank (Site Inspection Photo 7) occurs at the same location as the spill of the hydrochloric acid reported in December 2016. The spill of December 2016 is attributed to failure at the flange bolts at the acid tank. In 2016, the pump operated automatically and the spilled acid was returned into the influent, which adversely impacted the treatment system. As preventative measure with the current PLC the pump will cease when acid is spilled.

Mr. Bessinger indicated that the flow from the ICT are controlled by controlling the water elevations in the ICT to minimize the number of times the pumps starts and stops. In the summer time, the level is held low at approximately 40 feet below ground elevation and in the winter the level is held high at approximately 22 feet below ground elevations.

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency USEPA Region 6
Contact Richard Mayer, Senior Project Engineer, 22-23 May, 2018, 214-665-7442
Problems; suggestions; ■ Report attached (Appendix E, Interviews)

Mr. Mayer indicated that in his opinion 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. He observed that the groundwater treatment system is old (> 20 years) and that resources would be better invested toward implementing the final remedy than performing substantial upgrades to the existing treatment system.

Agency Texas Commission on Environmental Quality, (512) 239-1000
Contact: April Palmie, Project Manager, 22-23 May, 2018, 512-239-4152
Problems; suggestions; ■ Report attached (Appendix E, Interviews)

Ms Palmie indicated that in her opinion 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. She noted that in the past there were frequent problems with pump repairs and other equipment issues that were not maintained in a timely manner, but since AECOM and the current contractor have been operating the system, maintenance has been more responsive. She observed that the groundwater treatment system is old (> 20 years) and that resources would be better invested toward implementing the final remedy than performing substantial upgrades to the existing treatment system.

Agency US Fish and Wildlife Service, Caddo Lake Wildlife Refuge
Contact Paul Bruckwicki, Manager, 22-23 May 2018, (903) 679-9144
Problems; suggestions; ■ Report attached (Appendix E, Interviews)

Mr. Bruckwicki noted that he was supportive of the remedial activities being performed on the site, but that he wished progress could be made more quickly toward selection and implementation of the final remedy.

Agency US Army
Contact Rose Zeiler, Installation Manager, 22-23 May 2018, 479-635-0110
Problems; suggestions; ■ Report attached (Appendix E, Interviews)

Ms. Zeiler indicated that in her opinion 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. She observed that the groundwater treatment system is old (> 20 years) and that resources would be better invested toward implementing the final remedy than performing substantial upgrades to the existing treatment system. For example, Ms. Zeiler noted that there were significant operations issues that prevent the fluidized bed reactor (FBR) from operating as designed to remove perchlorate. Other system failures have let to prolonged shutdown of the system. Ms. Zeiler noted that the best path forward was selection of the final remedy.

4. **Other interviews** (optional) □ Report attached.

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
	The Site Inspection team did not have enough time to review the O&M Manual, the As-Built Drawings, and their status.			
2.	**Site-Specific Health and Safety Plan**	■ Readily available	■ Up to date	□ N/A
	□ Contingency plan/emergency response plan	□ Readily available	□ Up to date	□ N/A
	The Site Inspection team did not have enough time to review the Contingency Plan and its status.			
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 Substantive requirements for monitoring and discharge are documented in the 2017 Final Revised Sampling and Analysis Plan.			
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
	Water level data collection is not part of routine monitoring, and none was available after 2007. Positional data and well construction information not in a centrally located repository (master file). Chemistry database was incomplete.			
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 $450,000 ■ Breakdown attached (below)
[LHAAP 18/24 System annual O&M=$400,000; Residual material treatment and offsite disposal=$50,000)

From	1 Oct 12 (Date)	To	30 Sep 13 (Date)	$1,603,762 (Total cost)	■ Breakdown below
From	1 Oct 13 (Date)	To	30 Sep 14 (Date)	$1,096,225 (Total cost)	■ Breakdown below
From	1 Oct 14 (Date)	To	30 Sep 15 (Date)	$1,144,870 (Total cost)	■ Breakdown below
From	1 Oct 15 (Date)	To	30 Sep 16 (Date)	$1,014,574 (Total cost)	■ Breakdown below
From	1 Oct 16 (Date)	To	30 Sep 17 (Date)	$559,404 (Total cost)	■ Breakdown below

3. **Unanticipated or Unusually High O&M Costs During Review Period**

FY2013 upgrades and repairs to the aging GWTP, additional monitor wells sampled during FY15 and FY16

LHAAP 12, 16, and 18/24 operations, maintenance, and monitoring costs by fiscal year.

Fiscal Year	O&M Approximate Actual Cost ($)	LTM Approximate Actual Cost ($)	Approximate Total ($)	Notes
FY13 Actuals	1,421,646.70	182,115.29	1,603,761.99	Upgrades and repairs to the aging GWTP
FY14 Actuals	585,824.68	510,400.52	1,096,225.20	
FY15 Actuals	638,063.55	506,805.99	1,144,869.54	
FY16 Actuals	638,063.55	376,509.95	1,014,573.50	
FY17 Actuals	429,108.05	130,296.03	559,404.08	

V. ACCESS AND INSTITUTIONAL CONTROLS □ **Applicable** □ **N/A**

A. Fencing

1. **Fencing damaged** ■ Location shown on site map ■ Gates secured □ N/A
Hole in fence near northeast corner, about 15-ft wide. Site gate is open, but side security (pedestrian, vehicle) is controlled by keypad system southwest of the site.

B. Other Access Restrictions

1. **Signs and other security measures** ■ Location shown on site map □ N/A
Signs posted at 1 to 2 per perimeter fence side, but those on the NW and NE sections are partially to completely overgrown by vines,

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): Drive by, sampling, maintenance, site walks

Frequency Weekly to monthly

Responsible party/agency US Army

Contact	Name	Title	Date
	Aaron Williams	Environmental Engineer	22-23 May

Reporting is up-to-date □ Yes ■ No
Reports are verified by the lead agency ■ Yes □ No

Specific requirements in deed or decision documents have been met
Violations have been reported
Other problems or suggestions: □ Report attached

2. **Adequacy** ■ ICs are adequate □ ICs are inadequate □ N/A
Remarks _.

D. General

1. **Vandalism/trespassing** □ Location shown on site map ■ No vandalism evident
Remarks_____
_____

2. **Land use changes on site** □ N/A
Remarks: None.

3. **Land use changes off site** □ N/A
Remarks: No changes at the abutting sites or land.

VI. GENERAL SITE CONDITIONS

A. Roads ■ Applicable □ N/A

1. **Roads damaged** ■ Location shown on site map ■ Roads adequate □ N/A

B. Other Site Conditions

Remarks _.

VII. LANDFILL COVERS ■ Applicable □ N/A

A. Landfill Surface

1. **Settlement** (Low spots) □ Location shown on site map ■ Settlement not evident
Areal extent_____ Depth_____

Grass was too tall to observe presence or absence.

2. **Cracks** □ Location shown on site map ■ Cracking not evident
Lengths_____ Widths_____ Depths_____

Grass was too tall to observe presence or absence.

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 See map Depth _.

Grass was too tall to observe presence or absence.

5. **Vegetative Cover** ■ Grass ■ Cover properly established □ No signs of stress
□ Trees/Shrubs (indicate size and locations on a diagram)

No large bushes or trees are present in the UEP cover. Grass is 1.5+ feet tall, and scattered bushes are present.

6.	**Alternative Cover (armored rock, concrete, etc.)** ■ N/A Remarks_____	
7.	**Bulges** □ Location shown on site map ■ Bulges not evident Areal extent_____ Height_____ Grass was too tall to observe presence or absence.	
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_____ None were evident at LHAAP-18. Grass was too tall at LHAAP-24 to assess.	
9.	**Slope Instability** □ Slides □ Location shown on site map ■ No evidence of slope instability Areal extent_____ Grass was too tall to observe presence or absence	
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** Type_____ □ No obstructions
□ Location shown on site map 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 XX square feet Type XX

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

1. **Settlement** □ Location shown on site map ■ Settlement not evident
Areal extent_____ Depth_____

Settlement monitoring is not conducted

2. **Performance Monitoring** Type of monitoring_____
□ Performance not monitored
Frequency_____ □ Evidence of breaching
Head differential_____

Water level data collection is not part of routine monitoring, and none was available after 2007. Positional data and well construction information not in a centrally located repository (master file).

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

See Section-2.

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
□ Good condition ■ Needs Maintenance

See Section-2.

It is not known how much iron and manganese buildup has reduced pipe flow efficiency and pipe inner diameter.

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

GWTP excess effluent is stored in the offsite INF Pond, and discharged into Harrison Bayou when flowing. Water is retained during summer months when the bayou does not flow, and used to be sprinkled on the UEP when the pond is full but this practice was discontinued according to the site manager. Birds and otters have been observed in the INF Pond. The pond was not inspected in this review due to lack of time.

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
□ Good condition □ Needs Maintenance

Not inspected due to lack of time.

3. **Spare Parts and Equipment**
□ Readily available □ Good condition □ Requires upgrade □ Needs to be provided

Not inspected due to lack of time.

C. Treatment System ■ Applicable □ N/A

1. **Treatment Train** (Check components that apply)
■ Metals removal □ Oil/water separation □ Bioremediation
■ Air stripping □ Carbon adsorbers
■ Filters: Sand
■ Additive (e.g., chelation agent, flocculent)_____
■ Others GAC, FBR, Ion Exchange
□ 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

5. Monitoring Data
■ Is routinely submitted on time □ Is of acceptable quality

Water level data is not available electronically after 2007. System monitoring data scope is not broad enough to support maintenance and system performance assessment needs.

6. Monitoring data suggests:
□ Groundwater plume is effectively contained □ Contaminant concentrations are declining

Hydraulic control has been achieved.

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 interim remedy's intent was to achieve hydraulic control of groundwater entering Harrison Bayou. In the opinion of the individuals interviewed, the interim remedial action is satisfactory for hydraulic control to prevent migration of the contamination in the shallow aquifer. The monitoring data is interpreted to indicate there is no migration of COCs from the shallow aquifer to the nearest receiving surface water body (Harrison Bayou).

Due to the lack of readily usable data (water level, well construction, positional), assessing the effectiveness of hydraulic control at this site is problematic. It is further limited by lack of documented justification for past Harrison Bayou sampling points to assess groundwater concentrations entering surface water and the head differential between the two medias.

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.

A fallen tree as taken down about 15 ft of fence, and vines obscure warning signs on two perimeter fence sides.

ICT yields appear to be dropping, and iron precipitate routinely damage pumps, reducing system uptime and mass removal. Laterals and filter pack have not been redeveloped since installation.

It is not known how much water line condition is limiting well field yield.

In the opinion of the individuals interviewed, the implementation of the interim remedial action is protective in the short-term by preventing migration of contaminants in the shallow aquifer to the nearest surface water body (Harrison Bayou), when the system is functioning. It was noted by the interviewees that the protectiveness of the interim remedy depends on the responsiveness by the O&M contractor in maintaining the system if there are equipment malfunctions that disrupt the system. It was noted that the current groundwater treatment system is old (> 20 years) and was maintenance intensive, but that investment in substantial plant upgrades was not believed to be a good use of resources. The interviewees appeared to be in consensus that the best path forward was to maintain the existing equipment and complete the submission of the proposed final remedy and to select and implement the final remedy.

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.

It is not clear if the GWTP will again experience significant repair periods and downtime as in FY 2013. Issues to date and system age suggest major repairs will be an ongoing issue as long as the current system is used.

The interviewees noted that there have been a high frequency of unscheduled repairs, such as breakthrough of carbon media and biomass from the fluidized bed reactor (FBR); corrosion of fittings that released acid from the pH control tank; frequent need to clean submersible pumps at the ICTs and redevelop the vertical extraction pipes at site 18/24 due to iron precipitation fouling; etc. Also, the system is old and has had a high frequency of electrical component failures. Typically, these equipment failures are fixed prior to the interim remedy shutdown period resulting in a compromise of protectiveness.

Potential compromise of the system unrelated to equipment O&M was noted to exist in the form of the constraints on discharge of treated effluent to the Harrison Bayou. If the stream flow in the Harrison Bayou is too low, the treated effluent must be discharged to the INF (holding) pond for temporary holding and later discharge to the Harrison Bayou when flows in this stream are sufficiently high to provide adequate dilution. During prolonged dry periods, storage in the INF pond could reach capacity and impair protectiveness of the interim remedy if the plant treatment flow rate has to be reduced to reduce the flow diverted to the INF pond.

Reports do not contain updated depictions of COC plumes on selected existing stratigraphic cross-sections to better understand extent of plumes and head changes in the vertical to ensure that the short-term effectiveness of preventing plume migration into the Wilcox Formation or into Harrison Bayou, is being achieved.

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

The interviews were in consensus that the best opportunity for optimization operation of the interim remedy was to complete submission of the proposed final remedy, and for the regulating agencies to approve selection of the final remedy so that it can be implemented.

The Site Inspection Team concludes:

Use a camera to investigate ICT lateral screens. Assess type and degree of clogging, and design a performance-based rehabilitation program potentially using methods such as dual swab, ultrasonic and/or CO2.

Assess GWTP raw water lines for iron and manganese buildup creating line loss and flow restrictions using a camera. Assess remedial options based on results.

Plot trends of chemical concentrations as trend graphs of COCs overlaid on a site plan. Plot current interpretation of plume(s) and head changes in plan view and on stratigraphic cross sections through Harrison Bayou to confirm extent and migration of plume and hydraulic conditions are as expected.

Develop system performance-based monitoring criteria for the well fields and the GWTP, and include the collection, storing, application, and reporting of the monitoring criteria in the next contract or its modification.

Opportunities for optimization in monitoring tasks may exist in the form of improved compilation of monitoring data (i.e.: plant and monitoring well network) to track performance of the interim remedy and potentially identify trends that may aid in design of the final remedy.

Site Inspection Photographs



Photo 20. Key pad-activated vehicle and pedestrian security gate with warning signs looking SW.



Photo 21. Backwards-facing warning sign on SW perimeter fence (facing into LHAAP-18).



Photo 22. Fence brake about 15 ft wide, looking NE toward exterior access road.



Photo 23. Overgrown portion of NE perimeter fence (red dashed line), potentially covering warning signs. Vegetation increases fence degradation.



Photo 24. View from the perimeter road looking northwest across the former burning ground (LHAAP-18). Fence is in good condition, but warning sign hanger needs repair.



Photo 25. Looking west across the former burning ground (LHAAP-18). Grass is 1-3 ft tall, and occasional bushes are up to 4 ft tall.



Photo 26. Typical ICT Header on northeastern side.



Photo 27. Groundwater treatment plant main building and tanks looking east.



Photo 28. Leaking acid tank at the GWTP.



Photo 29. GWTP Fluid Bed Reactor.



Photo 30. GWTP Sand Filter.



Photo 31. GWTP Air Stripper.



Photo 32. Looking west across the former burning ground (LHAAP-18). Grass is 1-3 ft tall, and occasional bushes are up to 4 ft tall.



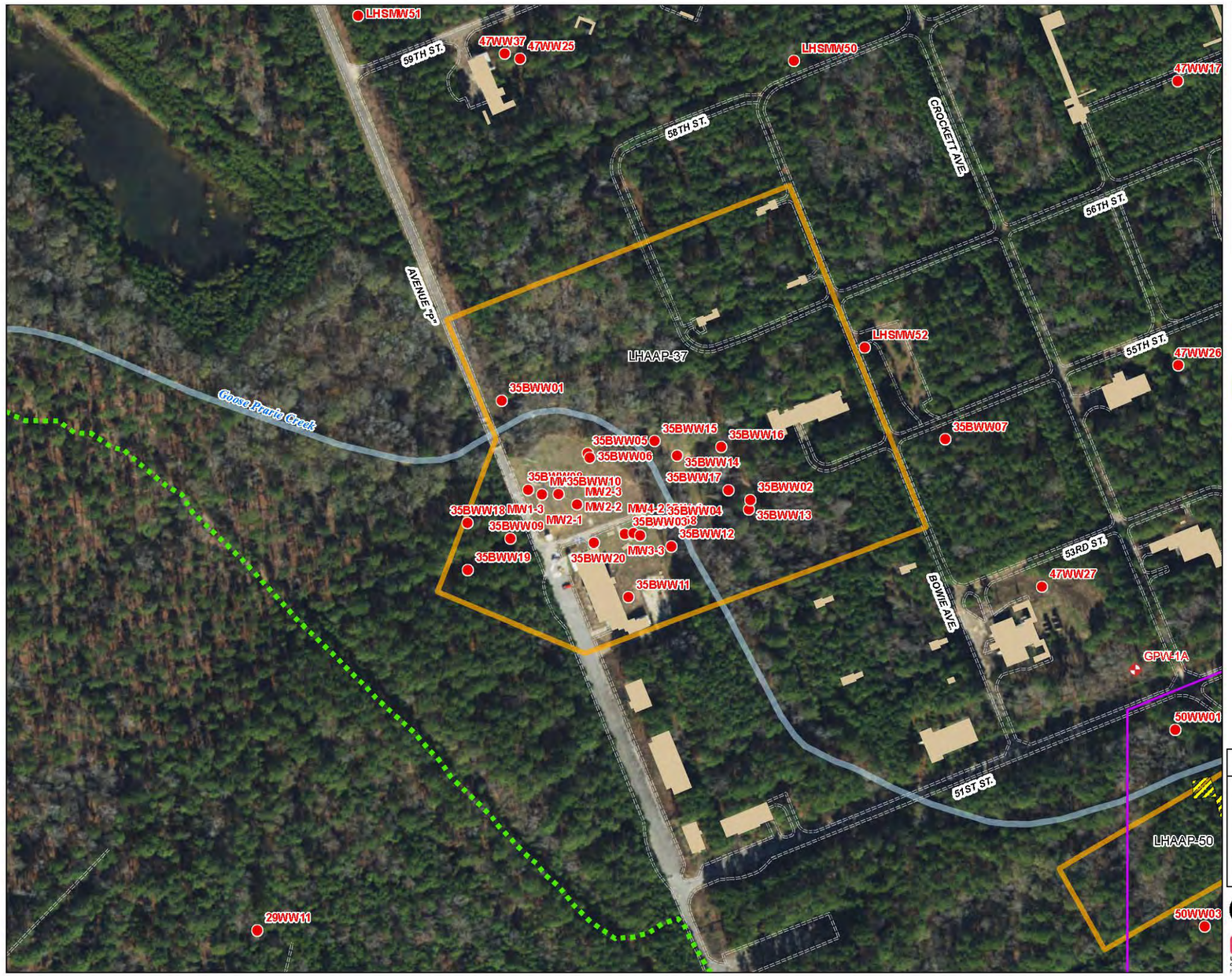
Photo 33. Looking north across former burning ground (LHAAP-18) toward the former unlined evaporation pond (LHAAP-24).



Photo 34. Looking southwest across the former unlined evaporation pond (LHAAP-24) toward the former burning ground (LHAAP-18). Grass is 1-3 ft tall, and occasional bushes are up to 4 ft tall.

LHAAP-35B (37) Chemical Laboratory

LHAAP-35B (37)





- Monitoring Wells
- Surface Water Sampling Well
- Former Installation Boundary
- Land Use Restriction
- Site Boundary
- Former Buildings
- Hiking Trails
- Roads

TITLE

LHAAP-35B (37) (Chemical Laboratory)
Longhorn Army Ammunition Plant
2019 Five-Year Review
Site Inspection Map

FIGURE 9

US Army Corps of Engineers – New England District

0 200 400 Feet

Site inspection map showing site/land use control boundary, features, and nearby hiking trail (LHAAP, 2018a, TNRIS, 2015, Landmark Consultants, 2015a, USGS, 2011).

LHAAP-35B (37)

Site Inspection Form

I. SITE INFORMATION	
Site Name: Longhorn Army Ammunition Plant	**Date of inspection:** 23 May 2018
Location and Region: Karnack, TX, Region 6	**EPA ID:** TX6213820529
Agency, office, or company leading the five-year review: USACE New England District	**Weather/temperature:** Sunny, 78°F, winds <5 mph

Remedy Includes: (Check all that apply)

- □ Landfill cover/containment
- □ Access controls
- ■ Institutional controls
- □ Groundwater pump and treatment
- □ Surface water collection and treatment
- ■ Other Five-Year Review Site Inspection.
- ■ Monitored natural attenuation
- □ Groundwater containment
- □ Vertical barrier walls

Attachments: ■ Inspection team roster attached (below) ■ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** Aaron Williams (Name) Environmental Engineer (Title) 23 May 2018 (Date)
   Interviewed ■ at site □ at office □ by phone Phone no. (918) 669-4915
   Problems, suggestions; □ Report attached _____

2. **O&M Staff** Scott Beesinger (Name) Supervisor (Title) 23 May 2018 (Date)
   Interviewed □ at site □ at office □ by phone Phone no. (903) 930-6193
   Problems, suggestions; □ Report attached _____

Inspection Team:	
Drew Clemens, PG	Dr. Lily Sehayek
Chris Kilbridge, PG	

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency USEPA Region 6

Contact Richard Mayer, Senior Project Engineer, 22-23 May, 2018, 214-665-7442

Problems; suggestions; ■ Report attached (Appendix E, Interviews)

Agency Texas Commission on Environmental Quality

Contact: April Palmie, Project Manager, 22-23 May, 2018, (512) 239-4152

Problems; suggestions; ■ Report attached (Appendix E, Interviews)

Agency US Fish and Wildlife Service, Caddo Lake Wildlife Refuge

Contact Paul Bruckwicki, Manager, 22-23 May 2018, (903) 679-9144

Problems; suggestions; ■ Report attached (Appendix E, Interviews)

Agency _____

Contact _____ _____ _____ _____
Name Title Date Phone no.

Problems; suggestions; □ Report attached

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4. **Other interviews** (optional) □ Report attached.

LHAAP-35B (37)

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 plan/emergency response plan	□ Readily available	□ Up to date	■ N/A
	Draft Final Site Safety and Health Plan (Bhate, 2018)			
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 $13,104 per year for 30 years □ Breakdown attached (below)

From	1 Oct 12	To	30 Sep 13	$0	□ Breakdown below
	Date		Date	Total cost	
From	1 Oct 13	To	30 Sep 14	$0	□ Breakdown below
	Date		Date	Total cost	
From	1 Oct 14	To	30 Sep 15	$0	□ Breakdown below
	Date		Date	Total cost	
From	1 Oct 15	To	30 Sep 16	$0	□ Breakdown below
	Date		Date	Total cost	
From	1 Oct 16	To	30 Sep 17	$0	□ Breakdown below
	Date		Date	Total cost	

3. **Unanticipated or Unusually High O&M Costs During Review Period**

Remarks_____

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): Drive by, site walks, sampling
Frequency Weekly to monthly
Responsible party/agency US Army

Contact	Aaron Williams	Environmental Engineer	23 May
	Name	Title	Date

Reporting is up-to-date ■ Yes □ No
Reports are verified by the lead agency ■ Yes □ No

Specific requirements in deed or decision documents have been met ■ Yes □ No
Violations have been reported □ Yes ■ No
Other problems or suggestions: □ Report attached

Remarks_____

2. **Adequacy** ■ ICs are adequate □ ICs are inadequate □ N/A

Remarks_____

D. General

1. **Vandalism/trespassing** □ Location shown on site map ■ No vandalism evident

Remarks_____

2. **Land use changes on site** □ N/A

None.

3. **Land use changes off site** □ N/A

None.

VI. GENERAL SITE CONDITIONS			
A. Roads	■ Applicable	□ N/A	
1. **Roads damaged**	■ Location shown on site map	■ Roads adequate	□ N/A
B. Other Site Conditions			
Remarks_____			

VII. LANDFILL COVERS □ Applicable ■ N/A		
A. Landfill Surface		
1. **Settlement** (Low spots) Areal extent_____	□ Location shown on site map Depth_____	□ Settlement not evident
Remarks_____		
2. **Cracks** Lengths_____ Widths_____	□ Location shown on site map Depths_____	□ Cracking not evident
Remarks_____		
3. **Erosion** Areal extent_____	□ Location shown on site map Depth_____	□ Erosion not evident
Remarks_____		
4. **Holes** Areal extent _____	□ Location shown on site map Depth ___.	□ Holes not evident
Remarks_____		
5. **Vegetative Cover** □ Trees/Shrubs (indicate size and locations on a diagram)	□ Grass	□ Cover properly established □ No signs of stress
Remarks_____		
6. **Alternative Cover (armored rock, concrete, etc.)**		□ N/A
Remarks_____		
7. **Bulges** Areal extent_____	□ Location shown on site map Height_____	□ Bulges not evident
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** Type_____ □ No obstructions
□ Location shown on site map 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 XX square feet Type XX	
	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
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

7. Monitoring Data
   - ■ Is routinely submitted on time ■ Is of acceptable quality

8. 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.).

Groundwater Land Use Restriction prevents use of groundwater exceeding levels for other than environmental monitoring and testing until the COCs have met cleanup levels. An MNA program begun in 2018 assesses cleanup progress in groundwater and surface water at quarterly sampling intervals. Beginning in 2020, bio-plug performance objectives will be re-evaluated, and the sampling program reduced to semi-annual until the 2024 five-year review, where monitoring effectiveness and needs will be reassessed.

The groundwater land use restriction has been successfully implemented, for no water or rig supply wells have been drilled within the LUC boundary.

The criteria for selecting Goose Prairie Creek surface water sample points is not known (hydrology survey, field water quality reconnaissance, etc.), It is not known where and under what conditions (high, low, or base flow) groundwater discharge to surface water. No hydrogeologic cross-sections with chemistry overlays have been prepared showing the link, or lack thereof, between shallow groundwater and surface water.

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.

The O&M phase of the remedy began in May 2018, so it is too early in the program to assess groundwater and surface water monitoring adequacy.

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.

MNA remedy sampling began May 2018, so not enough chemistry and water level data has been collected to establish trends, and identify potential remedy problems.

D.	Opportunities for Optimization
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. Determine gaining and losing sections of the stream near the site and under what conditions they occur (high flow, low flow base flow, storm). Identify and survey surface water sampling points that address ecological and human health monitoring requirements.

Site Inspection Photographs



Photo 35. LHAAP-35B (37) looking southeast from Goose Prairie Creek Bridge along Avenue Q toward the site.



Photo 36. LHAAP-35B (37) former facility walls looking southeast.



Photo 37. LHAAP-35B (37) former access road and foundations looking northwest.



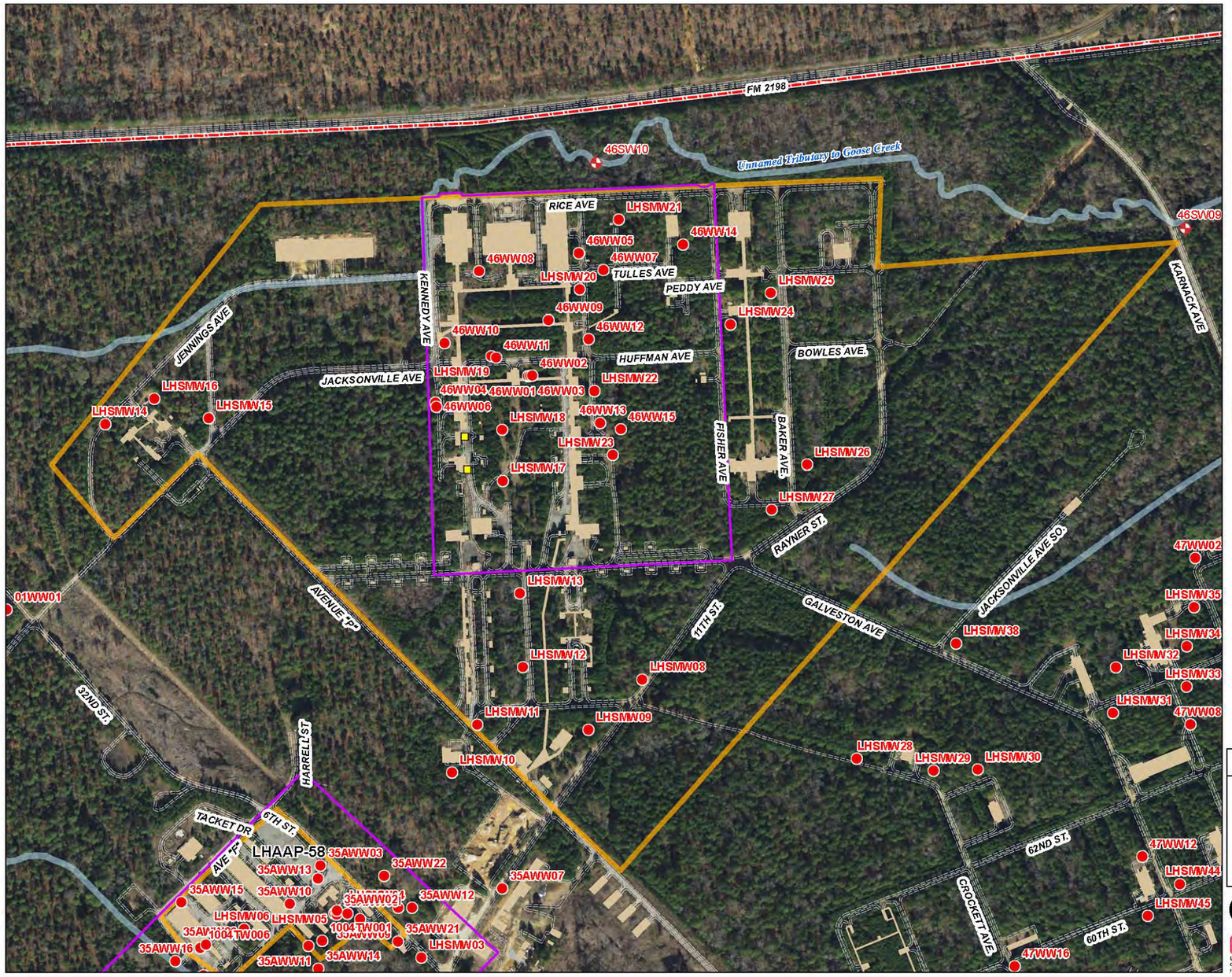
Photo 38. LHAAP-35B (37) former access road and foundations.



Photo 39. LHAAP-35B (37), Avenue Q Bridge across Goose Prairie Creek looking upstream (left panel) and downstream (right panel).

LHAAP-46 Plant 2 Area

LHAAP-46





Monitoring Wells
Surface Water Sampling Well
Non Fuel UST Fill Pipe
Former Installation Boundary
Land Use Restriction
Site Boundary
Former Buildings
Roads

TITLE

LHAAP-46 (Plant 2 Area)
Longhorn Army Ammunition Plant
2019 Five-Year Review
Site Inspection Map

FIGURE 12

0 450 900 Feet

Site inspection map showing features, drainage, LUC boundary, and potential UST fill pipe locations (LHAAP, 2018a, TNRIS, 2015, Landmark Consultants, 2014a, USGS, 2011).

LHAAP-46

Site Inspection Form

I. SITE INFORMATION	
Site Name: Longhorn Army Ammunition Plant	**Date of inspection:** 23 May 2018
Location and Region: Karnack, TX, Region 6	**EPA ID:** TX6213820529
Agency, office, or company leading the five-year review: USACE New England District	**Weather/temperature:** Partly cloudy, 85°F, winds <5 mph

Remedy Includes: (Check all that apply)

- □ Landfill cover/containment
- □ Access controls
- ■ Institutional controls
- □ Groundwater pump and treatment
- □ Surface water collection and treatment
- ■ Other Five-Year Review Site Inspection.
- ■ Monitored natural attenuation
- □ Groundwater containment
- □ Vertical barrier walls

Attachments: ■ Inspection team roster attached (below) ■ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** Aaron Williams (Name) Environmental Engineer (Title) _____ (Date)
   Interviewed □ at site □ at office □ by phone Phone no. (918) 669-4915
   Problems, suggestions; □ Report attached _____

2. **O&M Staff** Scott Beesinger (Name) Supervisor (Title) _____ (Date)
   Interviewed □ at site □ at office □ by phone Phone no. (903) 930-6193
   Problems, suggestions; □ Report attached _____

Inspection Team:

Drew Clemens, PG	Dr. Lily Sehayek
Chris Kilbridge, PG	

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

   Agency US Fish and Wildlife Service, Caddo Lake Wildlife Refuge

   Contact Paul Bruckwicki, Manager, 22-23 May 2018, (903) 679-9144

   Problems; suggestions; ■ Report attached (Appendix E, Interviews)

4. **Other interviews** (optional) □ Report attached.

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 plan/emergency response plan	□ Readily available	□ Up to date	■ N/A
	Draft Final Site Safety and Health Plan (Bhate, 2018)			
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 $55,883 ■ Breakdown attached ($55,883 for MNA in 2010, $31,000 – 63,000 for monitoring)

From	1 Oct 12	To	30 Sep 13	$0	□ Breakdown below
	Date		Date	Total cost	
From	1 Oct 13	To	30 Sep 14	$19,545.59	□ Breakdown below
	Date		Date	Total cost	
From	1 Oct 14	To	30 Sep 15	$19,545.59	□ Breakdown below
	Date		Date	Total cost	
From	1 Oct 15	To	30 Sep 16	$19,545.59	□ Breakdown below
	Date		Date	Total cost	
From	1 Oct 16	To	30 Sep 17	$39,091.19	□ Breakdown below
	Date		Date	Total cost	

3. **Unanticipated or Unusually High O&M Costs During Review Period**

Remarks_____

LHAAP-46 operations, maintenance, and monitoring costs by fiscal year.

Fiscal Year	O&M Approximate Actual Cost ($)	LTM Approximate Actual Cost ($)	Approximate Total ($)	Notes
FY13 Actuals	0	0	0	
FY14 Actuals	0	19,545.59	19,545.59	
FY15 Actuals	0	19,545.59	19,545.59	
FY16 Actuals	0	19,545.59	19,545.59	
FY17 Actuals	0	39,091.19	39,091.19	

LHAAP-46

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): Drive by, site walks, sampling
Frequency Weekly to monthly
Responsible party/agency US Army

Contact	Name	Title	Date
	Aaron Williams	Environmental Engineer	22-23 May

Reporting is up-to-date ■ Yes □ No
Reports are verified by the lead agency ■ Yes □ No

Specific requirements in deed or decision documents have been met ■ Yes □ No
Violations have been reported □ Yes ■ No
Other problems or suggestions: □ Report attached

Remarks_____

2. **Adequacy** ■ ICs are adequate □ ICs are inadequate □ N/A

Remarks_____

D. General

1. **Vandalism/trespassing** □ Location shown on site map ■ No vandalism evident

Remarks_____

2. **Land use changes on site** □ N/A

None.

3.	**Land use changes off site** □ N/A None.
	VI. GENERAL SITE CONDITIONS
A. Roads	■ Applicable □ N/A
1.	**Roads damaged** ■ Location shown on site map ■ Roads adequate □ N/A
B. Other Site Conditions	
	Remarks_____
	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** Areal extent_____ Height_____ Remarks_____	□ Location shown on site map □ Bulges not evident
8.	**Wet Areas/Water Damage** □ Wet areas □ Ponding □ Seeps □ Soft subgrade Remarks_____	□ Wet areas/water damage not evident □ Location shown on site map Areal extent_____ □ Location shown on site map Areal extent_____ □ Location shown on site map Areal extent_____ □ Location shown on site map Areal extent_____
9.	**Slope Instability** Areal extent_____ Remarks_____	□ Slides □ Location shown on site map □ No evidence of slope instability
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** Remarks_____	□ Location shown on site map □ N/A or okay
2.	**Bench Breached** Remarks_____	□ Location shown on site map □ N/A or okay
3.	**Bench Overtopped** Remarks_____	□ Location shown on site map □ N/A or okay
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** Areal extent_____ Depth_____ Remarks_____	□ Location shown on site map □ No evidence of settlement

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** Type_____ □ No obstructions
□ Location shown on site map 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 XX square feet Type XX

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

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

9. Monitoring Data
□ Is routinely submitted on time □ Is of acceptable quality

Database file is missing sampling dates and parameters shown in the RAO reports.

10. 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 final selected remedy for LHAAP-46 protects human health and the environment by preventing human exposure to trichloroethene (TCE)-contaminated groundwater through land use controls and five-year review Site Inspections, and preventing TCE-contaminated groundwater from migrating into nearby surface water by MNA. Two to three five-year review cycles are needed to assess if an MNA remedy is effective and functioning as designed. Discrepancies between the chemistry database and reported data sets are an additional limiting factor.

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.

Monitor wells, well pads, and access roads are in good condition. Maintained wells near Jennings Avenue are not being in the GIS well inventory.

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.

Land use continues to be non-residential, and is included as part of the Caddo Lake National Wildlife Refuge. No signs of vandalism or dumping, and no water supply wells constructed on or near the site.

The CVOC source area is not known. Two potential UST fill pipes are in the western load line area, but their purpose is unknown and have not been investigated. Early problem identification is limited by too few sampling rounds, and the discrepancies between the chemistry database vs. RAO report data sets.

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

The current data set cost about $6,000,000 ($10/parameter), is incomplete, contains errors, and cannot be used to effectively monitor remedy progress. Employ a web-accessible environmental data management system, and use it as the master source for all monitoring and reporting, internal or external. Errors, report preparation time and costs would be reduced.

Site Inspection Photographs



Photo 40. Western load line looking northeast.



Photo 41. Looking north from 11th Street/Avenue P intersection.



Photo 42. Looking west on Bowles Avenue from Rayner Street.



Photo 43. Looking southwest down the former load line from Kennedy Avenue/Rice Avenue intersection.



Photo 44. Looking northeast across former vehicle weigh/inspection station on 32nd Street (note ponded rain water).



Photo 45. Looking east from Avenue P/32nd Street Intersection.



Photo 46. Looking west down former access road from 11th Street.



Photo 47. Looking east down former access road from 32nd Street.

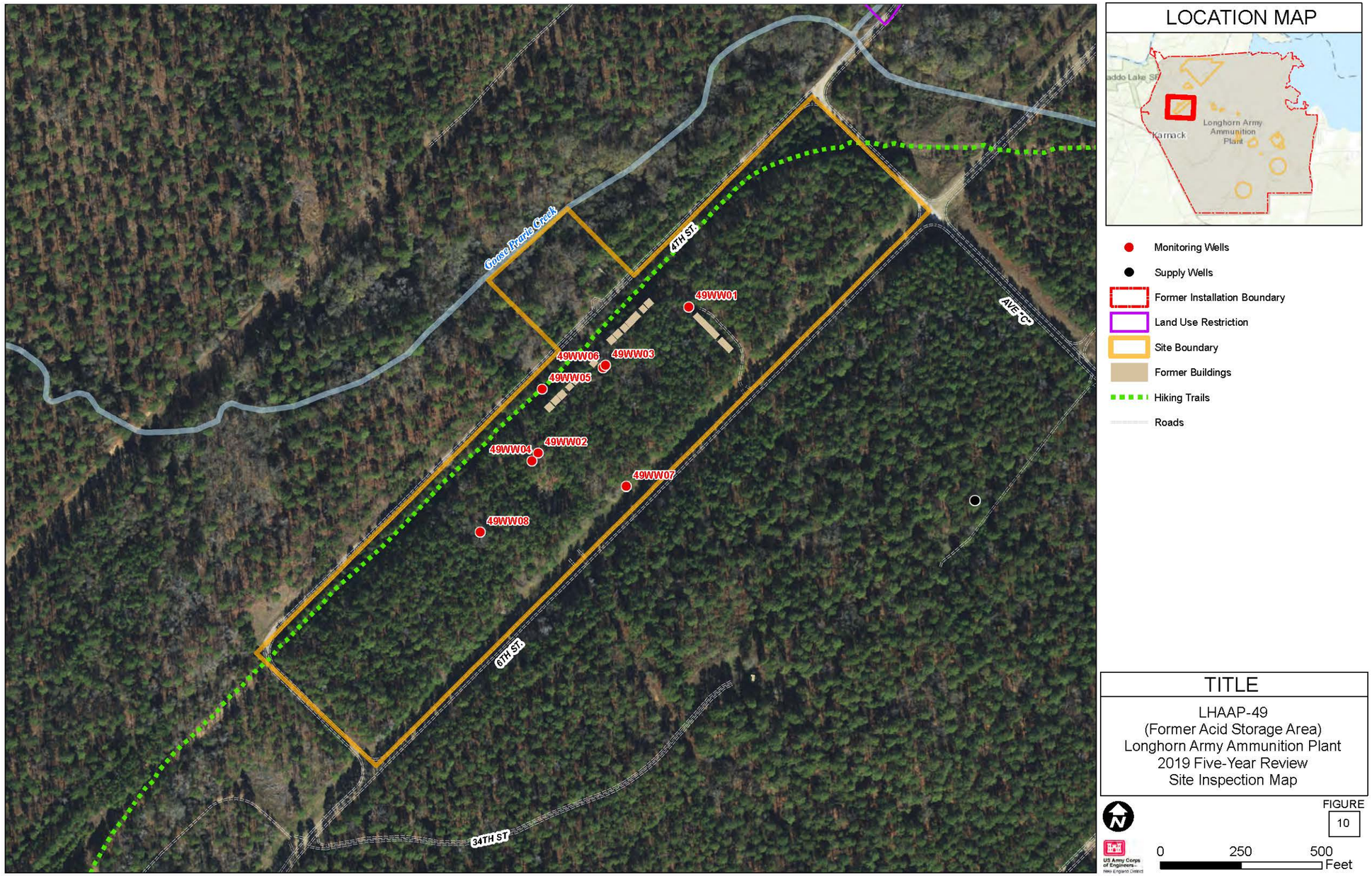


Photo 48. Fill cap for potential UST, middle of western load line.



Photo 49. Fill cap for potential UST, middle of western load line.

LHAAP-49 Former Acid Storage Area



Site inspection map showing current conditions and nearby features (LHAAP, 2018a, TNRIS, 2015, Landmark Consultants, 2011a, USGS, 2011).

LHAAP-49

Site Inspection Form

I. SITE INFORMATION	
Site Name: Longhorn Army Ammunition Plant	**Date of inspection:** 23 May 2018, 1245
Location and Region: Karnack, TX, Region 6	**EPA ID:** TX6213820529
Agency, office, or company leading the five-year review: USACE New England District	**Weather/temperature:** 83°F, winds <5 mph

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 (below) ■ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** __Aaron Williams_____ __Environmental Engineer__ _____
   Name Title Date
   Interviewed ■ at site □ at office □ by phone Phone no. (918) 669-4915
   Problems, suggestions; □ Report attached _____

   _.

2. **O&M Staff** Scott Beesinger Supervisor 23 May 2018
   Name Title Date
   Interviewed □ at site □ at office □ by phone Phone no. (903) 930-6193
   Problems, suggestions; □ Report attached _____

   _.

Inspection Team:	
Drew Clemens, PG	Dr. Lily Sehayek
Chris Kilbridge, PG	

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency US Fish and Wildlife Service, Caddo Lake Wildlife Refuge

Contact Paul Bruckwicki, Manager, 22-23 May 2018, (903) 679-9144

Problems; suggestions; ■ Report attached (Appendix E, Interviews)

Agency _____

Contact _____ _____ _____ _____
Name Title Date Phone no.

Problems; suggestions; □ Report attached

---

4. **Other interviews** (optional) □ Report attached.

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 plan/emergency response plan □ Readily available □ Up to date ■ N/A

Draft Final Site Safety and Health Plan (Bhate, 2018)

3. **O&M and OSHA Training Records** □ Readily available □ Up to date ■ N/A

No OM&M at this site.

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 $0 □ Breakdown attached (below)

From	1 Oct 12	To	30 Sep 13	$0	□ Breakdown below
	Date		Date	Total cost	
From	1 Oct 13	To	30 Sep 14	$0	□ Breakdown below
	Date		Date	Total cost	
From	1 Oct 14	To	30 Sep 15	$0	□ Breakdown below
	Date		Date	Total cost	
From	1 Oct 15	To	30 Sep 16	$0	□ Breakdown below
	Date		Date	Total cost	
From	1 Oct 16	To	30 Sep 17	$0	□ Breakdown below
	Date		Date	Total cost	

3. **Unanticipated or Unusually High O&M Costs During Review Period**

Remarks_____

LHAAP-49

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

Visitor center sign posted at site entrance.

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): Drive by, site walks

Frequency Daily to Weekly

Responsible party/agency US Army

Contact	Name	Title	Date
	Aaron Williams	Environmental Engineer	22-23 May

Reporting is up-to-date	■ Yes	□ No
Reports are verified by the lead agency	■ Yes	□ No

Specific requirements in deed or decision documents have been met	□ Yes	□ No	■ Not Applicable
Violations have been reported	□ Yes	□ No	■ Not Applicable

Other problems or suggestions: □ Report attached

USFWS manages the site as part of the refuge.

2. **Adequacy** ■ ICs are adequate □ ICs are inadequate □ N/A

Remarks_____

D. General

1. **Vandalism/trespassing** □ Location shown on site map ■ No vandalism evident

Remarks_____

2. **Land use changes on site** □ N/A

None.

3.	**Land use changes off site** □ N/A None.

VI. GENERAL SITE CONDITIONS			
A. Roads	■ Applicable	□ N/A	
1.	**Roads damaged**	■ Location shown on site map	■ Roads adequate □ N/A
B. Other Site Conditions			
	No construction, vandalism, artifact hunting debris, or damage from hiker overuse found.		

VII. LANDFILL COVERS □ Applicable ■ N/A		
A. Landfill Surface		
1.	**Settlement** (Low spots) Areal extent_____	□ Location shown on site map □ Settlement not evident Depth_____
	Remarks_____	
2.	**Cracks** Lengths_____ Widths_____	□ Location shown on site map □ Cracking not evident Depths_____
	Remarks_____	
3.	**Erosion** Areal extent_____	□ Location shown on site map □ Erosion not evident Depth_____
	Remarks_____	
4.	**Holes** Areal extent _____	□ Location shown on site map □ Holes not evident 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** Areal extent_____ Height_____ Remarks_____	□ Location shown on site map □ Bulges not evident
8.	**Wet Areas/Water Damage** □ Wet areas □ Ponding □ Seeps □ Soft subgrade Remarks_____	□ Wet areas/water damage not evident □ Location shown on site map Areal extent_____ □ Location shown on site map Areal extent_____ □ Location shown on site map Areal extent_____ □ Location shown on site map Areal extent_____
9.	**Slope Instability** Areal extent_____ Remarks_____	□ Slides □ Location shown on site map □ No evidence of slope instability
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** Remarks_____	□ Location shown on site map □ N/A or okay
2.	**Bench Breached** Remarks_____	□ Location shown on site map □ N/A or okay
3.	**Bench Overtopped** Remarks_____	□ Location shown on site map □ N/A or okay
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** Areal extent_____ Depth_____ Remarks_____	□ Location shown on site map □ No evidence of settlement

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** Type_____ □ No obstructions
□ Location shown on site map 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 XX square feet Type XX	
	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
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

11. Monitoring Data
    - □ Is routinely submitted on time □ Is of acceptable quality

12. 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 is classified as No Further Action, so it has no RAOs or remedy beyond the 5-year review site inspection. No change in land use occurred since the January 2012 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.

No OM&M at this site. Monitor wells are present, but are no longer used to monitor the site's groundwater.

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.

Not Applicable.

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

Not Applicable.

Site Inspection Photographs-23 May 2018



Photo 50. Auto Route Tour stop at LHAAP-49.



Photo 51. Former building now used to house bats. Note lack of graffiti.



Photo 52. Former acid unloading infrastructure. Note lack of graffiti.



Photo 53. Offsite land use looking west from the 6th Street Auto Route stop.



Photo 54. Looking west from road intersection from 6th Street.



Photo 55. Looking north-northwest from 4th Street road intersection.



Photo 56. Looking southeast across the middle of the site from 4th Street.



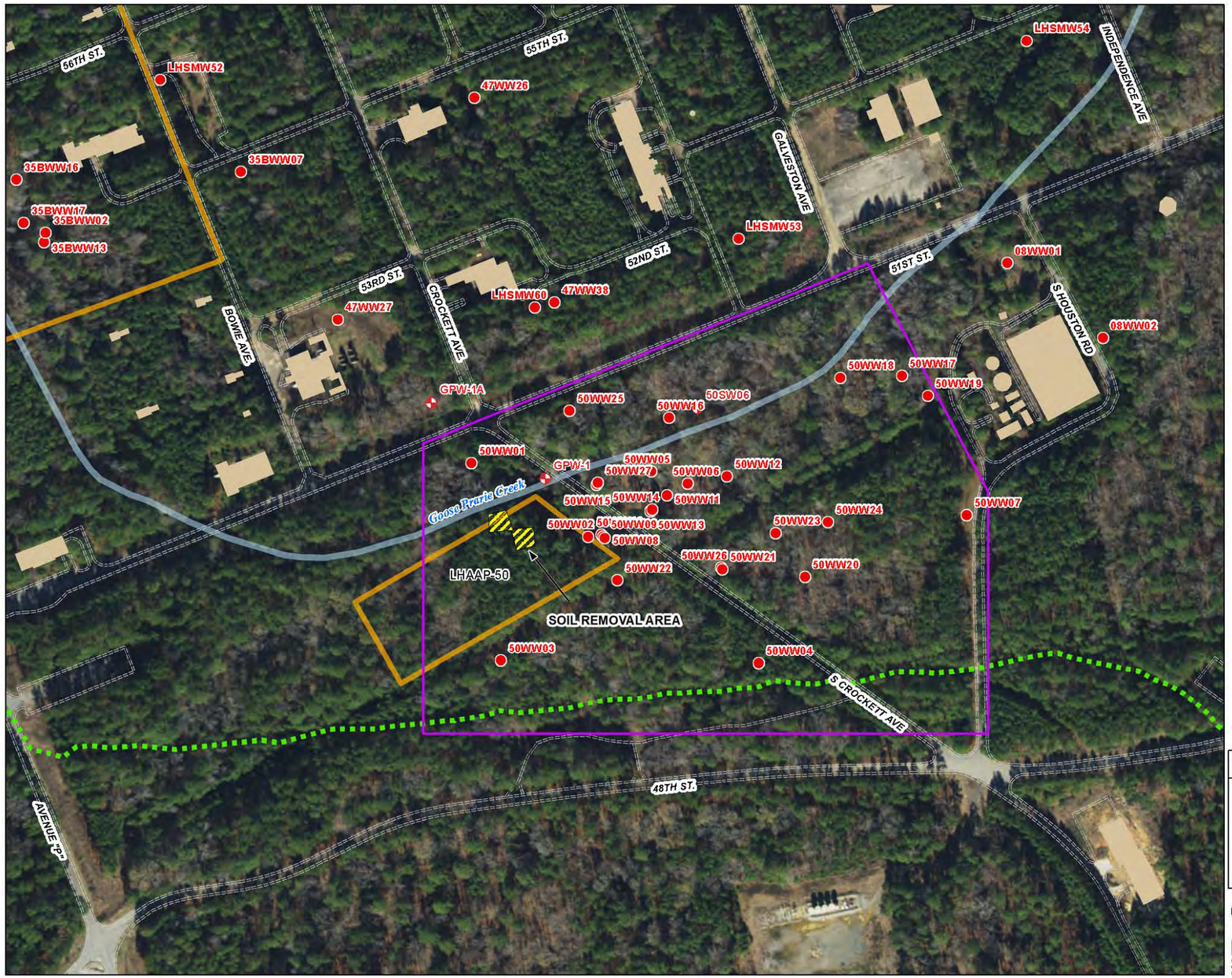
Photo 57. Looking southeast across the southern end of the site from 4th Street.

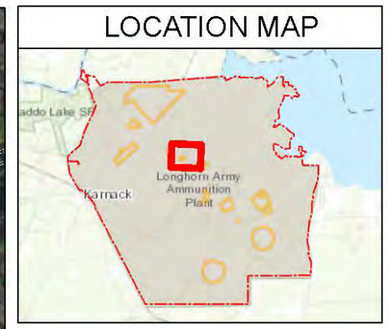


Photo 58. Looking north-northeast across the across the site from 6th Street.

LHAAP-50 Former Sump Water Tank

LHAAP-50





- Monitoring Wells
- Surface Water Sampling Well
- Former Installation Boundary
- Land Use Restriction
- Site Boundary
- Former Buildings
- Hiking Trails
- Roads

TITLE

LHAAP-50
(Former Sump Water Tank)
Longhorn Army Ammunition Plant
2019 Five-Year Review
Site Inspection Map

FIGURE 8

US Army Corps of Engineers – New England District

0 200 400 Feet

Site inspection map showing LUC boundary, soil removal area, media sampling locations, and nearby hiking trail (LHAAP, 2018a, TNRIS, 2015, Landmark Consultants, 2015b, USGS, 2011).

LHAAP-50

Site Inspection Form

I. SITE INFORMATION	
Site Name: Longhorn Army Ammunition Plant	**Date of inspection:** 23 May 2018
Location and Region: Karnack, TX, Region 6	**EPA ID:** TX6213820529
Agency, office, or company leading the five-year review: USACE New England District	**Weather/temperature:** Sunny, 78°F, winds <5 mph

Remedy Includes: (Check all that apply)

- □ Landfill cover/containment
- □ Access controls
- ■ Institutional controls
- □ Groundwater pump and treatment
- □ Surface water collection and treatment
- ■ Other Five-Year Review Site Inspection.
- ■ Monitored natural attenuation
- □ Groundwater containment
- □ Vertical barrier walls

Attachments: ■ Inspection team roster attached (below) ■ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** Aaron Williams (Name) Environmental Engineer (Title) 23 May 2018 (Date)
   Interviewed ■ at site □ at office □ by phone Phone no. (918) 669-4915
   Problems, suggestions; □ Report attached _____

2. **O&M Staff** Scott Beesinger (Name) Supervisor (Title) 23 May 2018 (Date)
   Interviewed □ at site □ at office □ by phone Phone no. (903) 930-6193
   Problems, suggestions; □ Report attached _____

Inspection Team:	
Drew Clemens, PG	Dr. Lily Sehayek
Chris Kilbridge, PG	

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency USEPA Region 6

Contact Richard Mayer, Senior Project Engineer, 22-23 May, 2018, 214-665-7442

Problems; suggestions; ■ Report attached (Appendix E, Interviews)

Agency Texas Commission on Environmental Quality

Contact: April Palmie, Project Manager, 22-23 May, 2018, (512) 239-4152

Problems; suggestions; ■ Report attached (Appendix E, Interviews)

Agency US Fish and Wildlife Service, Caddo Lake Wildlife Refuge

Contact Paul Bruckwicki, Manager, 22-23 May 2018, (903) 679-9144

Problems; suggestions; ■ Report attached (Appendix E, Interviews)

Agency _____

Contact _____ _____ _____ _____
Name Title Date Phone no.

Problems; suggestions; □ Report attached

---

4. **Other interviews** (optional) □ Report attached.

LHAAP-50

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 plan/emergency response plan	□ Readily available	□ Up to date	■ N/A
	Draft Final Site Safety and Health Plan (Bhate, 2018)			
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 $15,302 per year for 30 years (LTM) □ Breakdown attached (below)

From	1 Oct 12 (Date)	To	30 Sep 13 (Date)	$24,463 (Total cost)	□ Breakdown below
From	1 Oct 13 (Date)	To	30 Sep 14 (Date)	$24,463 (Total cost)	□ Breakdown below
From	1 Oct 14 (Date)	To	30 Sep 15 (Date)	$24,463 (Total cost)	□ Breakdown below
From	1 Oct 15 (Date)	To	30 Sep 16 (Date)	$24,463 (Total cost)	□ Breakdown below
From	1 Oct 16 (Date)	To	30 Sep 17 (Date)	$48,927 (Total cost)	□ Breakdown below

3. **Unanticipated or Unusually High O&M Costs During Review Period**

Remarks_____

LHAAP-50 operations, maintenance, and monitoring costs for 2013-2017.

Calendar Year	O&M Approximate Actual Costs	LTM Approximate Actual Costs	Total	Notes
2013	-	-	-	
2014	-	24,463	24,463	
2015	-	24,463	24,463	
2016	-	24,463	24,463	
2017	-	48,927	48,927	

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): Drive by, site walks, sampling
Frequency Weekly to monthly
Responsible party/agency US Army

Contact	Aaron Williams	Environmental Engineer	23 May
	Name	Title	Date

Reporting is up-to-date ■ Yes □ No
Reports are verified by the lead agency ■ Yes □ No

Specific requirements in deed or decision documents have been met ■ Yes □ No
Violations have been reported □ Yes ■ No
Other problems or suggestions: □ Report attached

Remarks_____

2. **Adequacy** ■ ICs are adequate □ ICs are inadequate □ N/A

Remarks_____

D. General

1. **Vandalism/trespassing** □ Location shown on site map ■ No vandalism evident

Remarks_____

2. **Land use changes on site** □ N/A

None.

3.	**Land use changes off site** □ N/A None.

VI. GENERAL SITE CONDITIONS			
A. Roads ■ Applicable □ N/A			
1.	**Roads damaged**	■ Location shown on site map	■ Roads adequate □ N/A
B. Other Site Conditions			
	Remarks_____		
VII. LANDFILL COVERS □ Applicable ■ N/A			
A. Landfill Surface			
1.	**Settlement** (Low spots) Areal extent_____	□ Location shown on site map Depth_____	□ Settlement not evident
	Remarks_____		
2.	**Cracks** Lengths_____ Widths_____	□ Location shown on site map Depths_____	□ Cracking not evident
	Remarks_____		
3.	**Erosion** Areal extent_____	□ Location shown on site map Depth_____	□ Erosion not evident
	Remarks_____		
4.	**Holes** Areal extent _____	□ Location shown on site map Depth ___.	□ Holes not evident
	Remarks_____		
5.	**Vegetative Cover** □ Grass □ Trees/Shrubs (indicate size and locations on a diagram)	□ Cover properly established	□ No signs of stress
	Remarks_____		
6.	**Alternative Cover (armored rock, concrete, etc.)**		□ N/A
	Remarks_____		

7.	**Bulges** Areal extent_____ Height_____ Remarks_____	□ Location shown on site map □ Bulges not evident
8.	**Wet Areas/Water Damage** □ Wet areas □ Ponding □ Seeps □ Soft subgrade Remarks_____	□ Wet areas/water damage not evident □ Location shown on site map Areal extent_____ □ Location shown on site map Areal extent_____ □ Location shown on site map Areal extent_____ □ Location shown on site map Areal extent_____
9.	**Slope Instability** Areal extent_____ Remarks_____	□ Slides □ Location shown on site map □ No evidence of slope instability
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** Remarks_____	□ Location shown on site map □ N/A or okay
2.	**Bench Breached** Remarks_____	□ Location shown on site map □ N/A or okay
3.	**Bench Overtopped** Remarks_____	□ Location shown on site map □ N/A or okay
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** Areal extent_____ Depth_____ Remarks_____	□ Location shown on site map □ No evidence of settlement

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** Type_____ □ No obstructions
□ Location shown on site map 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 XX square feet Type XX	
	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
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

13. Monitoring Data
■ Is routinely submitted on time ■ Is of acceptable quality

14. 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.).

Groundwater Land Use Restriction prevents use of groundwater exceeding levels for other than environmental monitoring and testing until the COCs have met cleanup levels. Excavation and off-site disposal of perchlorate-contaminated soil was done in 2013. An MNA program begun in 2018 assesses cleanup progress in groundwater and surface water at quarterly sampling intervals.

The groundwater land use restriction has been successfully implemented, for no water or rig supply wells have been drilled within the LUC boundary.

The criteria for selecting Goose Prairie Creek surface water sample points is not known (hydrology survey, field water quality reconnaissance, etc.), It is not known where and under what conditions (high, low, or base flow) groundwater discharge to surface water. No hydrogeologic cross-sections with chemistry overlays have been prepared showing the link, or lack thereof, between shallow groundwater and surface water.

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.

The O&M phase of the remedy began in May 2014, so it is too early in the program to assess groundwater and surface water monitoring adequacy.

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.

MNA remedy sampling began in 2014, so not enough chemistry and water level data has been collected to establish trends, and identify potential remedy problems.

D.	Opportunities for Optimization
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. Determine gaining and losing sections of the stream near the site and under what conditions they occur (high flow, low flow base flow, storm). Identify and survey surface water sampling points that address ecological and human health monitoring requirements.

Site Inspection Photographs



Photo 59. LHAAP-50 soil removal area looking southwest.



Photo 60. LHAAP-50 looking west from South Crockett Avenue.



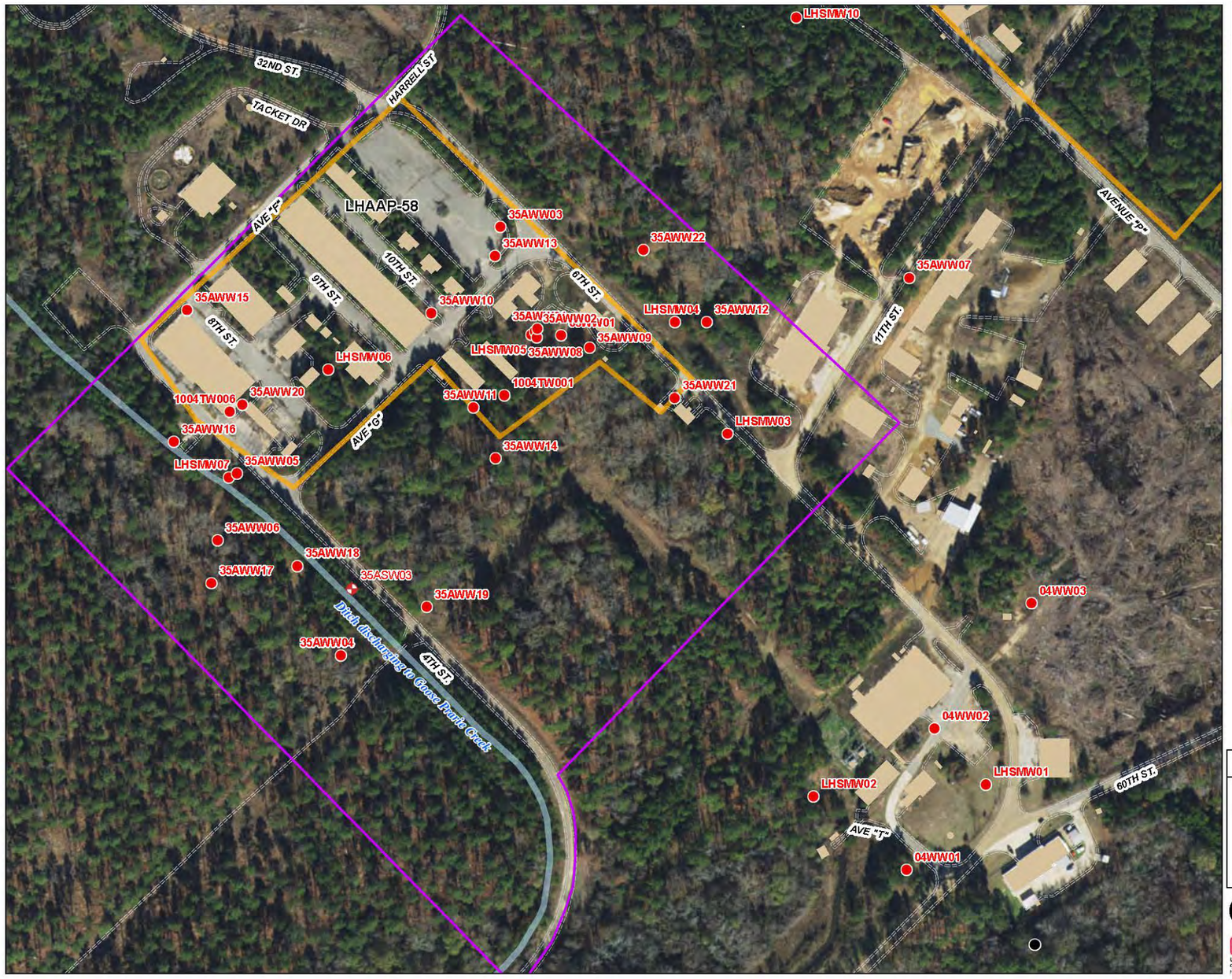
Photo 61. LHAAP-50 looking west.



Photo 62. LHAAP-50 looking east from the soil removal area.

LHAAP-35A (58) Shops Area

LHAAP-35A (58)





- Monitoring Wells
- Surface Water Sampling Well
- Supply Wells
- Former Installation Boundary
- Land Use Restriction
- Site Boundary
- Former Buildings
- Roads

TITLE

LHAAP-35A(58) (Shops Area)
Longhorn Army Ammunition Plant
2019 Five-Year Review
Site Inspection Map

FIGURE 11

US Army Corps of Engineers – New England District

0 200 400 Feet

Site inspection map showing LUC boundary, soil removal area, media sampling locations, and nearby hiking trail (LHAAP, 2018a, TNRIS, 2015, Landmark Consultants, 2015c, USGS, 2011).

LHAAP-35A (58)

Site Inspection Form

I. SITE INFORMATION	
Site Name: Longhorn Army Ammunition Plant	**Date of inspection:** 23 May 2018
Location and Region: Karnack, TX, Region 6	**EPA ID:** TX6213820529
Agency, office, or company leading the five-year review: USACE New England District	**Weather/temperature:** Sunny, 78°F, winds <5 mph

Remedy Includes: (Check all that apply)

- □ Landfill cover/containment
- □ Access controls
- ■ Institutional controls
- □ Groundwater pump and treatment
- □ Surface water collection and treatment
- ■ Other Five-Year Review Site Inspection.
- ■ Monitored natural attenuation
- □ Groundwater containment
- □ Vertical barrier walls

Attachments: ■ Inspection team roster attached (below) ■ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** Aaron Williams (Name) Environmental Engineer (Title) 23 May 2018 (Date)
   Interviewed ■ at site □ at office □ by phone Phone no. (918) 669-4915
   Problems, suggestions; □ Report attached _____
   .

2. **O&M Staff** Scott Beesinger (Name) Supervisor (Title) 23 May 2018 (Date)
   Interviewed □ at site □ at office □ by phone Phone no. (903) 930-6193
   Problems, suggestions; □ Report attached _____
   .

Inspection Team:	
Drew Clemens, PG	Dr. Lily Sehayek
Chris Kilbridge, PG	

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency USEPA Region 6

Contact Richard Mayer, Senior Project Engineer, 22-23 May, 2018, 214-665-7442

Problems; suggestions; ■ Report attached (Appendix E, Interviews)

Agency Texas Commission on Environmental Quality

Contact: April Palmie, Project Manager, 22-23 May, 2018, (512) 239-4152

Problems; suggestions; ■ Report attached (Appendix E, Interviews)

Agency US Fish and Wildlife Service, Caddo Lake Wildlife Refuge

Contact Paul Bruckwicki, Manager, 22-23 May 2018, (903) 679-9144

Problems; suggestions; ■ Report attached (Appendix E, Interviews)

Agency _____

Contact _____ _____ _____ _____
Name Title Date Phone no.

Problems; suggestions; □ Report attached

---

4. **Other interviews** (optional) □ Report attached.

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 plan/emergency response plan	□ Readily available	□ Up to date	■ N/A
	Draft Final Site Safety and Health Plan (Bhate, 2018)			
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 $15,302 per year for 30 years (LTM) □ Breakdown attached (below)

From	1 Oct 12	To	30 Sep 13	$13,033	□ Breakdown below
	Date		Date	Total cost	
From	1 Oct 13	To	30 Sep 14	$13,033	□ Breakdown below
	Date		Date	Total cost	
From	1 Oct 14	To	30 Sep 15	$13,033	□ Breakdown below
	Date		Date	Total cost	
From	1 Oct 15	To	30 Sep 16	$13,033	□ Breakdown below
	Date		Date	Total cost	
From	1 Oct 16	To	30 Sep 17	$26,066	□ Breakdown below
	Date		Date	Total cost	

3. **Unanticipated or Unusually High O&M Costs During Review Period**

Remarks_____

LHAAP-35A (58) operations, maintenance, and monitoring costs for 2013-2017.

Calendar Year	O&M Approximate Actual Costs	LTM Approximate Actual Costs	Total	Notes
2013	-	-	-	
2014	-	13,033	13,033	
2015	-	13,033	13,033	
2016	-	13,033	13,033	
2017	-	26,066	26,066	

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): Drive by, site walks, sampling
Frequency Weekly to monthly
Responsible party/agency US Army

Contact	Aaron Williams	Environmental Engineer	23 May
	Name	Title	Date

Reporting is up-to-date ■ Yes □ No
Reports are verified by the lead agency ■ Yes □ No

Specific requirements in deed or decision documents have been met ■ Yes □ No
Violations have been reported □ Yes ■ No
Other problems or suggestions: □ Report attached

Remarks_____

2. **Adequacy** ■ ICs are adequate □ ICs are inadequate □ N/A

Remarks_____

D. General

1. **Vandalism/trespassing** □ Location shown on site map ■ No vandalism evident

Remarks_____

2. **Land use changes on site** □ N/A

None.

3.	**Land use changes off site** □ N/A None.

VI. GENERAL SITE CONDITIONS			
A. Roads	■ Applicable	□ N/A	
1.	**Roads damaged**	■ Location shown on site map	■ Roads adequate □ N/A
B. Other Site Conditions			
	Remarks_____		

VII. LANDFILL COVERS □ Applicable ■ N/A		
A. Landfill Surface		
1.	**Settlement** (Low spots) Areal extent_____	□ Location shown on site map □ Settlement not evident Depth_____
	Remarks_____	
2.	**Cracks** Lengths_____ Widths_____	□ Location shown on site map □ Cracking not evident Depths_____
	Remarks_____	
3.	**Erosion** Areal extent_____	□ Location shown on site map □ Erosion not evident Depth_____
	Remarks_____	
4.	**Holes** Areal extent _____	□ Location shown on site map □ Holes not evident 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** Type_____ □ No obstructions
□ Location shown on site map 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 XX square feet Type XX	
	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
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

15. Monitoring Data
■ Is routinely submitted on time ■ Is of acceptable quality

16. 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.).

Groundwater Land Use Restriction prevents use of groundwater exceeding levels for other than environmental monitoring and testing until the COCs have met cleanup levels. EISB was implemented in the eastern plume area only, as the COC levels in this area represented highest concentrations in the shallow groundwater zone at the site and warranted active treatment MNA. An MNA program begun in 2014 assesses cleanup progress in groundwater7 and surface water at quarterly sampling intervals.

The groundwater land use restriction has been successfully implemented, for no water or rig supply wells have been drilled within the LUC boundary.

The criteria for selecting surface water sample points in the ditch discharging into Goose Prairie Creek is not known (hydrology survey, field water quality reconnaissance, etc.), It is not known where and under what conditions (high, low, or base flow) groundwater discharge to surface water. No hydrogeologic cross-sections with chemistry overlays have been prepared showing the link, or lack thereof, between shallow groundwater and surface water.

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.

The O&M phase of the remedy began in May 2014, so it is too early in the program to assess groundwater and surface water monitoring adequacy.

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.

MNA remedy sampling began in 2014, so not enough chemistry and water level data has been collected to establish trends, and identify potential remedy problems.

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

Determine gaining and losing sections of the stream near the site and under what conditions they occur (high flow, low flow base flow, storm). Identify and survey surface water sampling points that address ecological and human health monitoring requirements.



Photo 63. LHAAP-35A (58) looking west offsite from Avenue F.



Photo 64. LHAAP-35A (58) looking southeast across the site from Avenue F.



Photo 65. LHAAP-35A (58) looking northeast across the site from Avenue G.



Photo 66. LHAAP-35A (58) looking northwest across the site from Avenue G.



Photo 67. LHAAP-35A (58) looking northwest along 8th Street from Avenue G.



Photo 68. LHAAP-35A (58) Looking southeast from Avenue G.



Photo 69. LHAAP-35A (58) from 6th Street looking northeast.



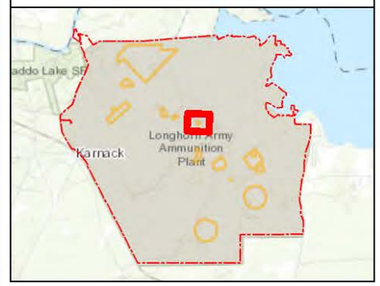
Photo 70. LHAAP-35A (58) looking southeast down 6th Street.

LHAAP-67 Aboveground Storage Tank Farm

LHAAP-67



LOCATION MAP



- Monitoring Wells
- Former Installation Boundary
- Site Boundary
- Former Buildings
- Hiking Trails
- Roads

TITLE

LHAAP-67
(Aboveground Storage Tank Farm)
Longhorn Army Ammunition Plant
2019 Five-Year Review
Site Inspection Map

FIGURE 7

US Army Corps of Engineers – New England District

0 150 300 Feet

Site inspection map showing nearby hiking trail and Central Creek wetland (LHAAP, 2018a, TNRIS, 2015, Landmark Consultants, 2015a, USGS, 2011).

LHAAP-67

Site Inspection Form

I. SITE INFORMATION	
Site Name: Longhorn Army Ammunition Plant	**Date of inspection:** 23 May 2018
Location and Region: Karnack, TX, Region 6	**EPA ID:** TX6213820529
Agency, office, or company leading the five-year review: USACE New England District	**Weather/temperature:** XX°F, winds <5 mph

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 (below) ■ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** __Aaron Williams_____ __Environmental Engineer__ _22-23 May 2018_
   Name Title Date
   Interviewed ■ at site □ at office □ by phone Phone no. (918) 669-4915
   Problems, suggestions; □ Report attached _____
   _.

2. **O&M Staff** Scott Beesinger __Supervisor_ _23 May 2018_____
   Name Title Date
   Interviewed □ at site □ at office □ by phone Phone no. _(903) 930-6193_
   Problems, suggestions; □ Report attached _____
   _.

Inspection Team:	
Drew Clemens, PG	Dr. Lily Sehayek
Chris Kilbridge, PG	

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency USEPA Region 6

Contact Richard Mayer, Senior Project Engineer, 22-23 May, 2018, 214-665-7442

Problems; suggestions; ■ Report attached (Appendix E, Interviews)

Agency Texas Commission on Environmental Quality, (512) 239-1000

Contact: April Palmie, Project Manager, 22-23 May, 2018, 512-239-4152

Problems; suggestions; ■ Report attached (Appendix E, Interviews)

Agency US Fish and Wildlife Service, Caddo Lake Wildlife Refuge

Contact Paul Bruckwicki, Manager, 22-23 May 2018, (903) 679-9144

Problems; suggestions; ■ Report attached (Appendix E, Interviews)

Agency _____

Contact _____ _____ _____ _____
Name Title Date Phone no.

Problems; suggestions; □ Report attached

---

4. **Other interviews** (optional) □ Report attached.

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 plan/emergency response plan	□ Readily available	□ Up to date	■ N/A
	Draft Final Site Safety and Health Plan (Bhate, 2018)			
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 $20,233/year for monitoring □ Breakdown attached (below)

From	1 Oct 12	To	30 Sep 13	-	■ Breakdown below
	Date		Date	Total cost	
From	1 Oct 13	To	30 Sep 14	$21,305	■ Breakdown below
	Date		Date	Total cost	
From	1 Oct 14	To	30 Sep 15	$21,305	■ Breakdown below
	Date		Date	Total cost	
From	1 Oct 15	To	30 Sep 16	$21,305	■ Breakdown below
	Date		Date	Total cost	
From	1 Oct 16	To	30 Sep 17	$42,609	■ Breakdown below
	Date		Date	Total cost	

3. **Unanticipated or Unusually High O&M Costs During Review Period**

Remarks_____

LHAAP-67 operations, maintenance, and monitoring costs by fiscal year.

Fiscal Year	O&M Approximate Actual Cost ($)	LTM Approximate Actual Cost ($)	Approximate Total ($)	Notes
FY13 Actuals	-	-	-	Remedy not implemented
FY14 Actuals	-	$21,305	$21,305	
FY15 Actuals	-	$21,305	$21,305	
FY16 Actuals	-	$21,305	$21,305	
FY17 Actuals	-	$42,609	$42,609	Increased costs due to sampling new wells drilled in FY 2016

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): Drive by, site walks, sampling
Frequency Weekly to monthly
Responsible party/agency US Army

Contact	Aaron Williams	Environmental Engineer	22-23 May
	Name	Title	Date

Reporting is up-to-date ■ Yes □ No
Reports are verified by the lead agency ■ Yes □ No

Specific requirements in deed or decision documents have been met ■ Yes □ No
Violations have been reported □ Yes ■ No
Other problems or suggestions: □ Report attached

Remarks_____

2. **Adequacy** ■ ICs are adequate □ ICs are inadequate □ N/A

Remarks_____

D. General

1. **Vandalism/trespassing** □ Location shown on site map ■ No vandalism evident

Remarks_____

2. **Land use changes on site** □ N/A

None.

3.	**Land use changes off site**	□ N/A
	None.	

VI. GENERAL SITE CONDITIONS				
A. Roads	■ Applicable	□ N/A		
1.	**Roads damaged**	■ Location shown on site map	■ Roads adequate	□ N/A
B. Other Site Conditions				
	Remarks_____			
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** Areal extent_____ Height_____ Remarks_____	□ Location shown on site map □ Bulges not evident
8.	**Wet Areas/Water Damage** □ Wet areas □ Ponding □ Seeps □ Soft subgrade Remarks_____	□ Wet areas/water damage not evident □ Location shown on site map Areal extent_____ □ Location shown on site map Areal extent_____ □ Location shown on site map Areal extent_____ □ Location shown on site map Areal extent_____
9.	**Slope Instability** Areal extent_____ Remarks_____	□ Slides □ Location shown on site map □ No evidence of slope instability
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** Remarks_____	□ Location shown on site map □ N/A or okay
2.	**Bench Breached** Remarks_____	□ Location shown on site map □ N/A or okay
3.	**Bench Overtopped** Remarks_____	□ Location shown on site map □ N/A or okay
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** Areal extent_____ Depth_____ Remarks_____	□ Location shown on site map □ No evidence of settlement



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** Type_____ □ No obstructions
□ Location shown on site map 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 XX square feet Type XX	
	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
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

17. Monitoring Data
    - □ Is routinely submitted on time □ Is of acceptable quality

18. 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.).

Groundwater Land Use Restriction prevents use of groundwater exceeding levels for other than environmental monitoring and testing until the COCs have met cleanup levels. An MNA program begun in 2014 assesses cleanup progress in groundwater and surface water at quarterly sampling intervals. Beginning in 2020, MNA performance objectives will be re-evaluated, and the sampling program reduced to semi-annual until the 2024 five-year review, where monitoring effectiveness and needs will be reassessed.

The criteria for selecting Central Creek surface water sample points is not known (hydrology survey, field water quality reconnaissance, etc.), It is not known where and under what conditions (high, low, or base flow) groundwater discharge to surface water. No hydrogeologic cross-sections with chemistry overlays have been prepared showing the link, or lack thereof, between shallow groundwater and surface water.

The groundwater land use restriction has been successfully implemented, for no water or rig supply wells have been drilled within the LUC boundary.

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.

The O&M phase of the remedy began in 2014, so it is too early in the program to assess groundwater and surface water monitoring adequacy.

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.

MNA remedy sampling began May 2018, so not enough chemistry and water level data has been collected to establish trends, and identify potential remedy problems.

D.	Opportunities for Optimization
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. Determine gaining and losing sections of the stream near the site and under what conditions they occur (high flow, low flow base flow, storm). Identify and survey surface water sampling points that address ecological and human health monitoring requirements.

Site Inspection Photographs



Photo 71. LHAAP-67 looking northwest toward 48 Street parking area.



Photo 72. LHAAP-67 looking southeast down slope toward Central Creek.

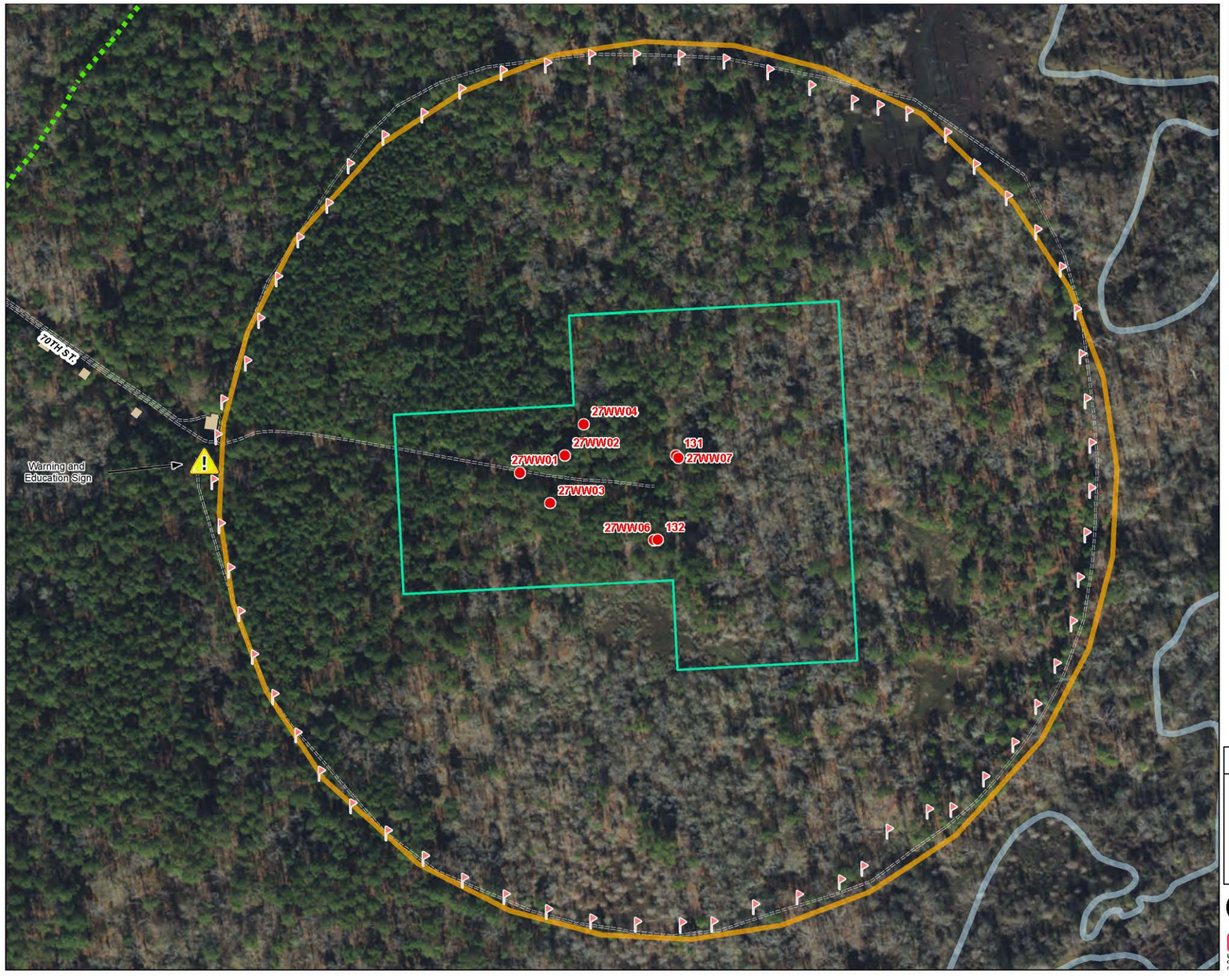


Photo 73. LHAAP-67 looking west (controlled burn charring on tree trunks).



Photo 74. LHAAP-67 looking east (controlled burn charring on tree trunks).

LHAAP-001-R-01 South Test Area/Bomb Test Area



LOCATION MAP



- Monitoring Wells
- Boundary Warning Signs
- Former Installation Boundary
- Site Boundary
- Open Burning/Open Detonation
- Former Buildings
- Hiking Trails
- Roads

TITLE

LHAAP-001-R-01
Longhorn Army Ammunition Plant
2019 Five-Year Review
Site Inspection Map

FIGURE 1

US Army Corps of Engineers – New England District

0 200 400 Feet

Site visit map showing former OBOD area, institutional controls, and nearby Harrison Bayou (meandering channel east of the site) (LHAAP, 2018a, TNRIS, 2015, USGS, 2011, EODT, 2009).

LHAAP-001-R-01

Site Inspection Form

I. SITE INFORMATION	
Site Name: Longhorn Army Ammunition Plant	**Date of inspection:** 22-23 May 2018
Location and Region: Karnack, TX, Region 6	**EPA ID:** TX6213820529
Agency, office, or company leading the five-year review: USACE New England District	**Weather/temperature:** 83-87°F, winds <5 mph

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: Five-Year Review Site Inspection, Limited Groundwater Sampling (perchlorate).

Attachments: ■ Inspection team roster attached (below) ■ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** Aaron Williams (Name) Environmental Engineer (Title) 22-23 May 2018 (Date)
   Interviewed ■ at site □ at office □ by phone Phone no. (918) 669-4915
   Problems, suggestions; □ Report attached _____

2. **O&M Staff** Scott Beesinger (Name) Supervisor (Title) 22 May 2018 (Date)
   Interviewed □ at site □ at office □ by phone Phone no. (903) 930-6193
   Problems, suggestions; □ Report attached _____
   Not interviewed for this site.

Inspection Team:	
Drew Clemens, PG	Dr. Lily Sehayek
Chris Kilbridge, PG	

3.	**Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply. Agency USEPA Region 6 Contact Richard Mayer, Senior Project Engineer, 22-23 May, 2018, 214-665-7442 Problems; suggestions; ■ Report attached (Appendix E, Interviews) Agency Texas Commission on Environmental Quality, (512) 239-1000 Contact: April Palmie, Project Manager, 22-23 May, 2018, 512-239-4152 Problems; suggestions; ■ Report attached (Appendix E, Interviews) Agency US Fish and Wildlife Service, Caddo Lake Wildlife Refuge Contact Paul Bruckwicki, Manager, 22-23 May 2018, (903) 679-9144 Problems; suggestions; ■ Report attached (Appendix E, Interviews)
4.	**Other interviews** (optional) □ Report attached.

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
	O&M Plan and As-Builts are in Final Site Specific Final Report for the MEC Removal Action At The Former Longhorn Army Ammunition Plant LHAAP-001-R (Site 27) AND LHAAP-003-R (Site 54) Karnack, Texas (EODT, 2009).			
2.	**Site-Specific Health and Safety Plan**	■ Readily available	■ Up to date	□ N/A
	□ Contingency plan/emergency response plan	□ Readily available	□ Up to date	■ N/A
	Draft Final Site Safety and Health Plan (Bhate, 2018)			
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 $3,557 □ Breakdown attached (below)

From	1 Oct 12	To	30 Sep 13	$568	■ Breakdown below
	Date		Date	Total cost	
From	1 Oct 13	To	30 Sep 14	$568	■ Breakdown below
	Date		Date	Total cost	
From	1 Oct 14	To	30 Sep 15	$568	■ Breakdown below
	Date		Date	Total cost	
From	1 Oct 15	To	30 Sep 16	$568	■ Breakdown below
	Date		Date	Total cost	
From	1 Oct 16	To	30 Sep 17	$568	■ Breakdown below
	Date		Date	Total cost	

3. **Unanticipated or Unusually High O&M Costs During Review Period**

Remarks_____

Breakdown of LHAAP-001-R-01 operations and maintenance costs by fiscal year.

Fiscal Year	O&M Approximate Actual Cost ($)	LTM Approximate Actual Cost ($)	Approximate Total ($)	Notes
FY13 Actuals	$568.31	$0	$568.31	
FY14 Actuals	$568.31	$0	$568.31	
FY15 Actuals	$568.31	$0	$568.31	
FY16 Actuals	$568.31	$0	$568.31	
FY17 Actuals	$568.31	$0	$568.31	

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

No missing or damaged signs.

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): Drive by, site walks, sampling
Frequency Weekly to monthly
Responsible party/agency US Army

Contact	Name	Title	Date
	Aaron Williams	Environmental Engineer	22-23 May

Reporting is up-to-date ■ Yes □ No
Reports are verified by the lead agency ■ Yes □ No

Specific requirements in deed or decision documents have been met ■ Yes □ No
Violations have been reported □ Yes ■ No
Other problems or suggestions: □ Report attached

Remarks_____

2. **Adequacy** ■ ICs are adequate □ ICs are inadequate □ N/A

Remarks_____

D. General

1. **Vandalism/trespassing** □ Location shown on site map ■ No vandalism evident

Remarks_____

2. **Land use changes on site** □ N/A

None.

3.	**Land use changes off site** □ N/A None.

VI. GENERAL SITE CONDITIONS			
A. Roads	■ Applicable	□ N/A	
1.	**Roads damaged**	■ Location shown on site map	■ Roads adequate □ N/A
B. Other Site Conditions			
	No erosion or evidence of digging.		

VII. LANDFILL COVERS □ Applicable ■ N/A		
A. Landfill Surface		
1.	**Settlement** (Low spots) Areal extent_____	□ Location shown on site map □ Settlement not evident Depth_____
	Remarks_____	
2.	**Cracks** Lengths_____ Widths_____	□ Location shown on site map □ Cracking not evident Depths_____
	Remarks_____	
3.	**Erosion** Areal extent_____	□ Location shown on site map □ Erosion not evident Depth_____
	Remarks_____	
4.	**Holes** Areal extent _____	□ Location shown on site map □ Holes not evident 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** Areal extent_____	□ Location shown on site map Height_____	□ Bulges not evident
	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** Areal extent_____	□ Location shown on site map Depth_____	□ No evidence of settlement
	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** Type_____ □ No obstructions
□ Location shown on site map 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 XX square feet Type XX	
	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
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

19. Monitoring Data

□ Is routinely submitted on time □ Is of acceptable quality

2018 sampling data will not be ready in time for this five-year review.

20. Monitoring data suggests:

□ Groundwater plume is effectively contained □ Contaminant concentrations are declining

Remarks_____

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.

The groundwater monitoring part of the remedy is to collect three round of data to show perchlorate levels remain below Texas Risk Reduction Program Tier 1 Groundwater Residential Protective Concentration Level of 17 micrograms per liter for perchlorate. This is the state remedial standard utilized in the absence of a federal drinking water standard.

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 selected remedy for addressing the low MEC risk and site contaminants while meeting the RAOs is a combination of land use controls and limited perchlorate groundwater monitoring. No indications that Land Use Controls are not being followed. The 2018 sampling data will not be ready in time for this five-year review.

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.

Site warning signs and their posts show no signs of damage or deterioration, and their perimeter frequency is sufficient.

XI. OVERALL OBSERVATIONS	
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. No indicators that the remedy is not functioning as designed.
D.	**Opportunities for Optimization**
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. .

Site Inspection Photographs



Photo 75. Warning sign at 70th Street entrance to the site.



Photo 76. Example of UXO warning sign on the site perimeter road.



Photo 77. Northwest portion of the site's perimeter road.



Photo 78. View looking west toward the primary MEC removal area.



Photo 79. Looking west from site center.



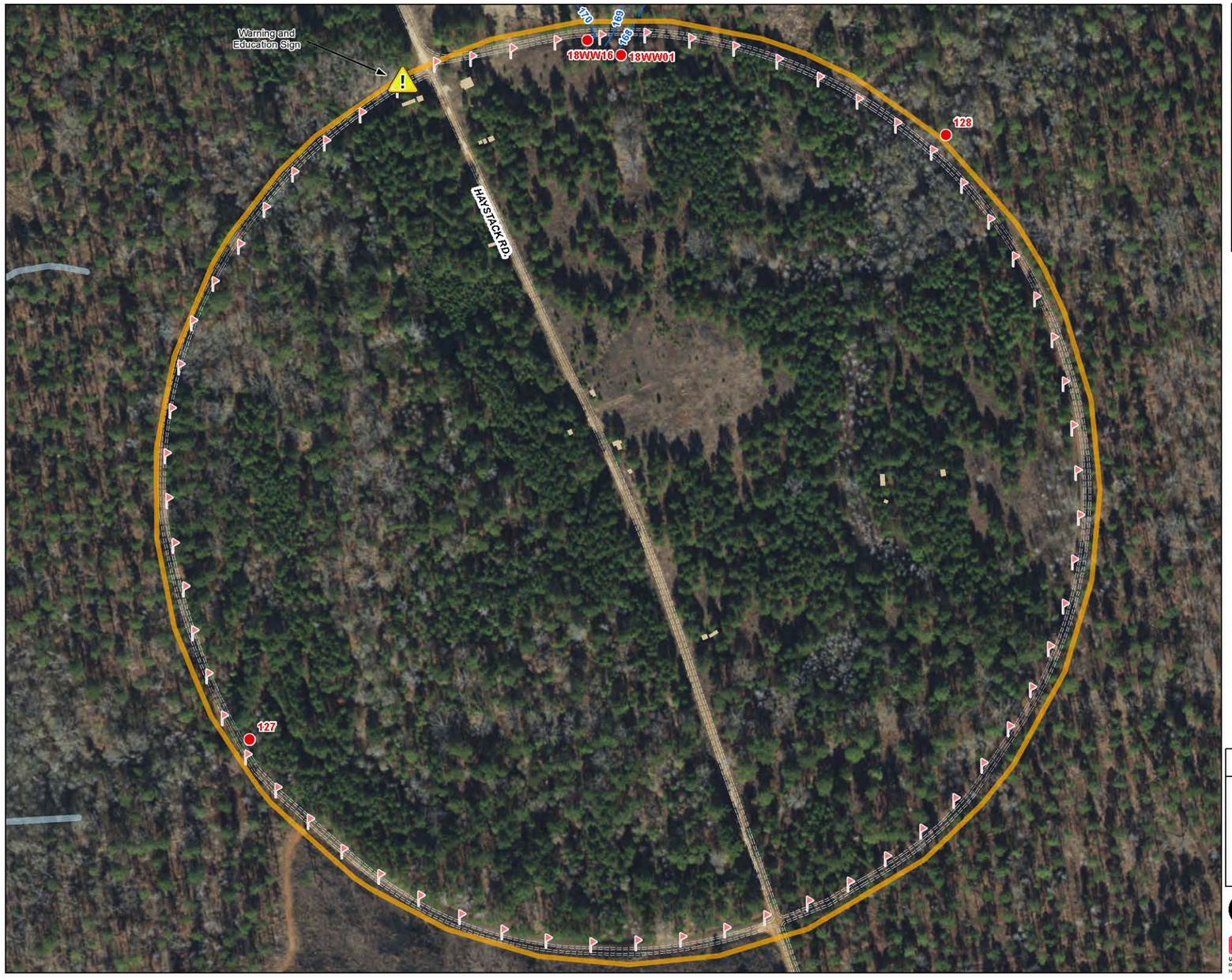
Photo 80. Monitor well 27WW07 / 131.



Photo 81. Monitor well 27WW01.

LHAAP-003-R-01 Ground Signal Test Area

LHAAP-003-R-01



LOCATION MAP



Monitoring Wells
Boundary Warning Signs
Former Installation Boundary
Site Boundary
Former Buildings
Groundwater Elevation Contour (amsl)
Roads

TITLE

LHAAP-003-R-01
(Ground Signal Test Area)
Longhorn Army Ammunition Plant
2019 Five-Year Review
Site Inspection Map

FIGURE 2

US Army Corps of Engineers – New England District

0 200 400 Feet

Site inspection map showing institutional controls. Harrison Bayou channels are to the west (LHAAP, 2018a, TNRIS, 2015, USGS, 2011, EODT, 2009).

LHAAP-003-R-01

Site Inspection Form

I. SITE INFORMATION	
Site Name: Longhorn Army Ammunition Plant	**Date of inspection:** 22-23 May 2018
Location and Region: Karnack, TX, Region 6	**EPA ID:** TX6213820529
Agency, office, or company leading the five-year review: USACE New England District	**Weather/temperature:** Sunny to cloudy, 84°F, winds <5 mph

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: Five-Year Review Site Inspection, Limited Groundwater Sampling (perchlorate).

Attachments: ■ Inspection team roster attached (below) ■ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** Aaron Williams (Name) Environmental Engineer (Title) 22-23 May 2018 (Date)
   Interviewed ■ at site □ at office □ by phone Phone no. (918) 669-4915
   Problems, suggestions; □ Report attached _____

2. **O&M Staff** Scott Beesinger (Name) Supervisor (Title) 22 May 2018 (Date)
   Interviewed □ at site □ at office □ by phone Phone no. (903) 930-6193
   Problems, suggestions; □ Report attached _____

   Not interviewed for this site.

Inspection Team:	
Drew Clemens, PG	Dr. Lily Sehayek
Chris Kilbridge, PG	

3.	**Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply. Agency USEPA Region 6 Contact Richard Mayer, Senior Project Engineer, 22-23 May, 2018, 214-665-7442 Problems; suggestions; ■ Report attached (Appendix E, Interviews) Agency Texas Commission on Environmental Quality, (512) 239-1000 Contact: April Palmie, Project Manager, 22-23 May, 2018, 512-239-4152 Problems; suggestions; ■ Report attached (Appendix E, Interviews) Agency US Fish and Wildlife Service, Caddo Lake Wildlife Refuge Contact Paul Bruckwicki, Manager, 22-23 May 2018, (903) 679-9144 Problems; suggestions; ■ Report attached (Appendix E, Interviews)
4.	**Other interviews** (optional) □ Report attached.

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
	O&M Plan and As-Builts are in Final Site Specific Final Report for the MEC Removal Action At The Former Longhorn Army Ammunition Plant LHAAP-001-R (Site 27) AND LHAAP-003-R (Site 54) Karnack, Texas (EODT, 2009).			
2.	**Site-Specific Health and Safety Plan**	■ Readily available	■ Up to date	□ N/A
	□ Contingency plan/emergency response plan	□ Readily available	□ Up to date	■ N/A
	Draft Final Site Safety and Health Plan (Bhate, 2018)			
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 $2,600 (O&M + monitoring) □ Breakdown attached

From	1 Oct 12	To	30 Sep 13	$568	■ Breakdown below
	Date		Date	Total cost	
From	1 Oct 13	To	30 Sep 14	$568	■ Breakdown below
	Date		Date	Total cost	
From	1 Oct 14	To	30 Sep 15	$568	■ Breakdown below
	Date		Date	Total cost	
From	1 Oct 15	To	30 Sep 16	$11,572	■ Breakdown below
	Date		Date	Total cost	
From	1 Oct 16	To	30 Sep 17	$568	■ Breakdown below
	Date		Date	Total cost	

3. **Unanticipated or Unusually High O&M Costs During Review Period**

Two wells redeveloped, and three wells sampled September 2017.

LHAAP-003-R-01 operations, maintenance, and monitoring costs by fiscal year.

Fiscal Year	O&M Approximate Actual Cost ($)	LTM Approximate Actual Cost ($)	Approximate Total ($)	Notes
FY13 Actuals	$568.31	$0	$568.31	
FY14 Actuals	$568.31	$0	$568.31	
FY15 Actuals	$568.31	$0	$568.31	
FY16 Actuals	$568.31	$11,004	$11,572.31	ROD Signed Aug 2016, wells sampled Sep 2017
FY17 Actuals	$568.31	$0	$568.31	

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): Drive by, site walks, sampling
Frequency Weekly to monthly
Responsible party/agency US Army

Contact	Aaron Williams	Environmental Engineer	22-23 May
	Name	Title	Date

Reporting is up-to-date ■ Yes □ No
Reports are verified by the lead agency ■ Yes □ No

Specific requirements in deed or decision documents have been met ■ Yes □ No
Violations have been reported □ Yes ■ No
Other problems or suggestions: □ Report attached

Remarks_____

2. **Adequacy** ■ ICs are adequate □ ICs are inadequate □ N/A

Remarks_____

D. General

1. **Vandalism/trespassing** □ Location shown on site map ■ No vandalism evident

Remarks_____

2. **Land use changes on site** □ N/A

None.

3.	**Land use changes off site** □ N/A None.
	VI. GENERAL SITE CONDITIONS
A. Roads	■ Applicable □ N/A
1.	**Roads damaged** ■ Location shown on site map ■ Roads adequate □ N/A
B. Other Site Conditions	
	Remarks_____
	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** Areal extent_____	□ Location shown on site map Height_____	□ Bulges not evident
	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** Areal extent_____	□ Location shown on site map Depth_____	□ No evidence of settlement
	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** Type_____ □ No obstructions
□ Location shown on site map 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 XX square feet Type XX

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

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

21. Monitoring Data
□ Is routinely submitted on time □ Is of acceptable quality

One round of data was collected during low groundwater conditions and submitted as a letter report includes Prime Contractor QC report.

22. Monitoring data suggests:
□ Groundwater plume is effectively contained □ Contaminant concentrations are declining

Monitor wells 18WW16, MW127, and MW128 were not sufficiently developed to collect representative aquifer samples, and that sampling was potentially done under low contaminant concentration conditions. Well redevelopment's performance specification was a minimum number of well volumes removed using a bailer, the least efficient well redevelopment method. It is not known how much bottom sediment was present or removed, how much filter pack or formation water was removed, or changes to the well's hydraulic performance, Unless the residual contaminant mass is saturated regardless of high or low groundwater elevations, the perchlorate flux entering the groundwater system is biased low.

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.

The groundwater monitoring part of the remedy is to collect one round of data to show perchlorate levels remain below Texas Risk Reduction Program Tier 1 Groundwater Residential Protective Concentration Level of 17 micrograms per liter for perchlorate. This is the state remedial standard utilized in the absence of a federal drinking water standard.

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 selected remedy for addressing the low MEC risk and site contaminants while meeting the RAOs is a combination of land use controls and limited perchlorate groundwater monitoring. No indications that Land Use Controls are not being followed.
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. Site warning signs and their posts show no signs of damage or deterioration, and their perimeter frequency is sufficient.
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. Inadequate well redevelopment and sampling during low groundwater elevation conditions may have produced samples not representative of the aquifer. Sample results may be biased low or be false negatives.
D.	**Opportunities for Optimization**
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. .

Site Inspection Photographs



Photo 82. UXO warning sign at the northern Haystack Road site entrance, (closest to Q Avenue) and a National Wildlife Refuge hunting zone sign.



Photo 83. No digging warning sign near 18WW01.



Photo 84. Looking northeast across the site near the site's center.



Photo 85. View looking northeast away from the site showing current land use.



Photo 86. View southeast into the site showing typical site conditions.



Photo 87. Remaining test infrastructure, showing no graffiti or vandalism.



Photo 88. Monitor well 18WW16.

LHAAP-004-R-01 Former Pistol Range

LHAAP-004-R-01



LOCATION MAP



- Monitoring Wells
- Former Installation Boundary
- Site Boundary
- Groundwater Elevation Contour (amsl)
- Roads

TITLE

LHAAP-004-R-01
(Former Pistol Range)
Longhorn Army Ammunition Plant
2019 Five-Year Review
Site Inspection Map

FIGURE 6

US Army Corps of Engineers – New England District

0 150 300 Feet

Site inspection map showing topography and nearby Harrison Bayou (LHAAP, 2018a, TNRIS, 2015, Landmark Consultants, 2011b, USGS, 2011).

LHAAP-004-R-01

Site Inspection Form

I. SITE INFORMATION	
Site Name: Longhorn Army Ammunition Plant	**Date of inspection:** 22 May 2018
Location and Region: Karnack, TX, Region 6	**EPA ID:** TX6213820529
Agency, office, or company leading the five-year review: USACE New England District	**Weather/temperature:** 86°F, winds <5 mph

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 (below) ■ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** __Aaron Williams_____ __Environmental Engineer__ _22-23 May 2018_
   Name Title Date
   Interviewed ■ at site □ at office □ by phone Phone no. (918) 669-4915
   Problems, suggestions; □ Report attached _____
   _.

2. **O&M Staff** Scott Beesinger __Supervisor_ _23 May 2018_____
   Name Title Date
   Interviewed □ at site □ at office □ by phone Phone no. _(903) 930-6193_
   Problems, suggestions; □ Report attached _____
   _.

Inspection Team:	
Drew Clemens, PG	Dr. Lily Sehayek
Chris Kilbridge, PG	

3.	**Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply. Agency USEPA Region 6 Contact Richard Mayer, Senior Project Engineer, 22-23 May, 2018, 214-665-7442 Problems; suggestions; ■ Report attached (Appendix E, Interviews) Agency Texas Commission on Environmental Quality, (512) 239-1000 Contact: April Palmie, Project Manager, 22-23 May, 2018, 512-239-4152 Problems; suggestions; ■ Report attached (Appendix E, Interviews) Agency US Fish and Wildlife Service, Caddo Lake Wildlife Refuge Contact Paul Bruckwicki, Manager, 22-23 May 2018, (903) 679-9144 Problems; suggestions; ■ Report attached (Appendix E, Interviews)
4.	**Other interviews** (optional) □ Report attached.

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 plan/emergency response plan	□ Readily available	□ Up to date	■ N/A
	Draft Final Site Safety and Health Plan (Bhate, 2018)			
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 $98,000 □ Breakdown attached (below)

From	1 Oct 12	To	30 Sep 13	$0	□ Breakdown below
	Date		Date	Total cost	
From	1 Oct 13	To	30 Sep 14	$0	□ Breakdown below
	Date		Date	Total cost	
From	1 Oct 14	To	30 Sep 15	$0	□ Breakdown below
	Date		Date	Total cost	
From	1 Oct 15	To	30 Sep 16	$0	□ Breakdown below
	Date		Date	Total cost	
From	1 Oct 16	To	30 Sep 17	$0	□ Breakdown below
	Date		Date	Total cost	

3. **Unanticipated or Unusually High O&M Costs During Review Period**

Remarks_____

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): Drive by, site walks, sampling
Frequency Weekly to monthly
Responsible party/agency US Army

Contact	Aaron Williams	Environmental Engineer	22-23 May
	Name	Title	Date

Reporting is up-to-date ■ Yes □ No
Reports are verified by the lead agency ■ Yes □ No

Specific requirements in deed or decision documents have been met ■ Yes □ No
Violations have been reported □ Yes ■ No
Other problems or suggestions: □ Report attached

Remarks_____

2. **Adequacy** ■ ICs are adequate □ ICs are inadequate □ N/A

Remarks_____

D. General

1. **Vandalism/trespassing** □ Location shown on site map ■ No vandalism evident

Remarks_____

2. **Land use changes on site** □ N/A

None.

3. **Land use changes off site** □ N/A

None.

VI. GENERAL SITE CONDITIONS

A. Roads ■ Applicable □ N/A

1. **Roads damaged** ■ Location shown on site map ■ Roads adequate □ N/A

B. Other Site Conditions

Remarks_____

VII. LANDFILL COVERS □ Applicable ■ N/A	
A. Landfill Surface	
1. **Settlement** (Low spots) Areal extent_____	□ Location shown on site map □ Settlement not evident Depth_____ Remarks_____
2. **Cracks** Lengths_____ Widths_____ Depths_____	□ Location shown on site map □ Cracking not evident Remarks_____
3. **Erosion** Areal extent_____	□ Location shown on site map □ Erosion not evident Depth_____ Remarks_____
4. **Holes** Areal extent _____	□ Location shown on site map □ Holes not evident Depth ___. Remarks_____
5. **Vegetative Cover** □ Trees/Shrubs (indicate size and locations on a diagram)	□ Grass □ Cover properly established □ No signs of stress Remarks_____
6. **Alternative Cover (armored rock, concrete, etc.)**	□ N/A Remarks_____
7. **Bulges** Areal extent_____	□ Location shown on site map □ Bulges not evident 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** Type_____ □ No obstructions
□ Location shown on site map 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 XX square feet Type XX

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

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

23. Monitoring Data
□ Is routinely submitted on time □ Is of acceptable quality

24. 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. No small arms ammunition was observed. Tire ruts in Robett Avenue were too shallow to allow human contact with residual soil contamination.
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. No O&M activities occur at this site. Monitor well PRWW01 could not be found, and may have been abandoned.
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. No O&M costs for this site.
D.	**Opportunities for Optimization**
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. None for this site.

Site Inspection Photographs



Photo 89. Looking south into the former Pistol Range.



Photo 90. Looking east toward the former target berm and soil remediation area. Monitor Well PRWW01 should be in the left center part of the photograph was not found.



Photo 91. Looking west from within the soil remediation area.



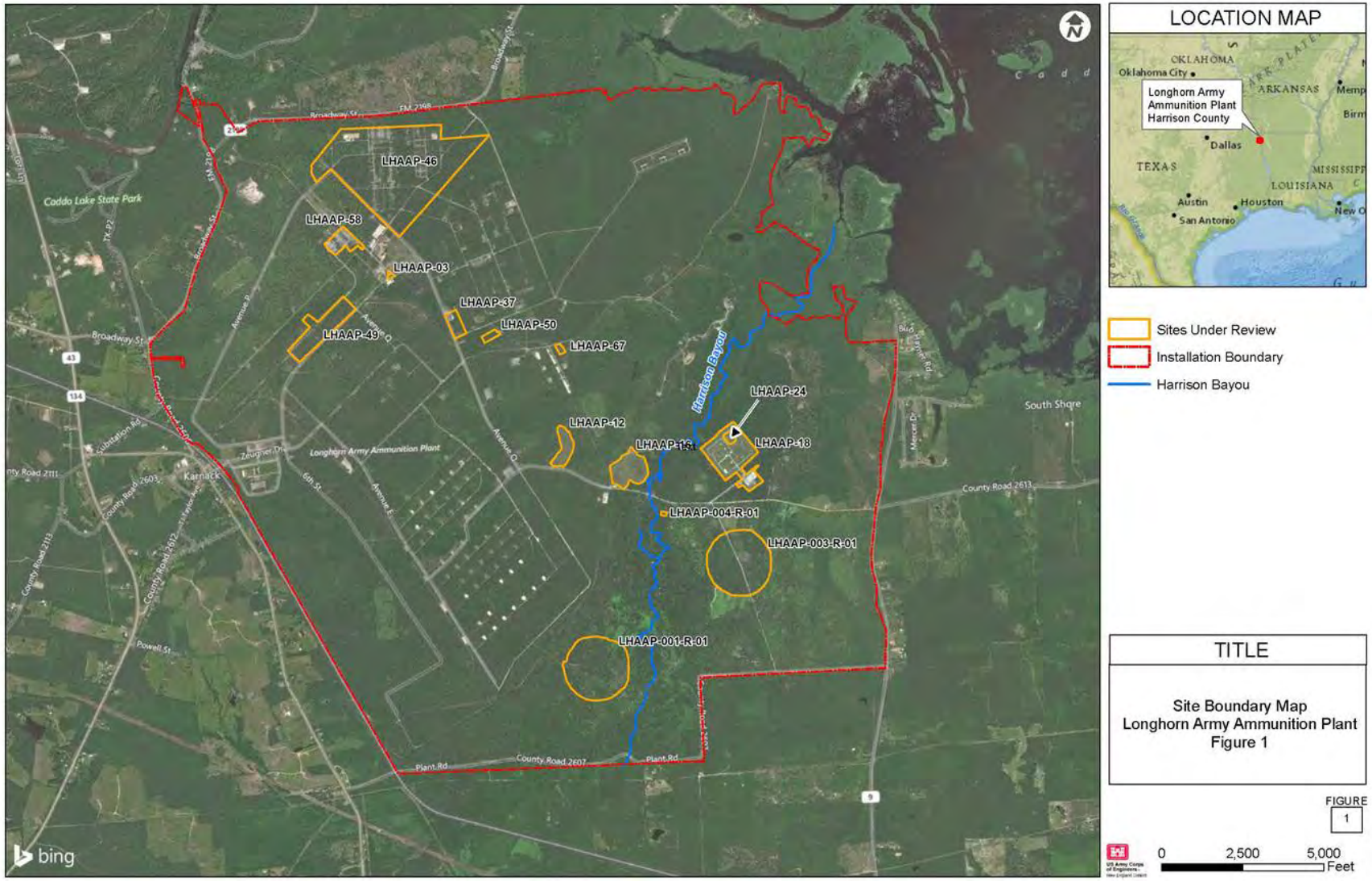
Photo 92. Looking north along Robett Avenue toward the Avenue Q entrance.

APPENDIX E - FIVE-YEAR REVIEW INTERVIEWS

INTERVIEW DOCUMENTATION FORM

The following is a list of individual interviewed for the Fourth Five-Year Review. See the attached contact record(s) for a detailed summary of the interviews and map of the sites evaluated in this review period (HAAP- 12, LHAAP- 16, LHAAP - 18/24, LHAAP-37, LHAAP-46, LHAAP- 49, LHAAP-50, LHAAP-58, LHAAP-67, LHAAP-001-R-01, LHAAP-003-R-01, and LHAAP- 004-R-01).

Name	Title/Position	Organization	Date
Rich Mayer	Senior Project Engineer	USEPA Region 6	21 June 2018
April Palmie	Project Manager	Texas Commission on Environmental Quality	23 May 2018
Paul Bruckwicki	Caddo Lake Wildlife Refuge Manager	US Fish and Wildlife Service	22 May 2018
Rose Zeiler	Site Manager	US Army	25 June 2018
Aaron Williams	USACE Site Manager/ Environmental Engineer	USACE Tulsa District	21 June 2018
Paul Fortune	Co-Chair	LHAAP RAB	29 June 2018



Location map used with all interview forms (in person and email).

INTERVIEW RECORD

Site Name: Longhorn Army Ammunition Plant	**EPA ID No.:** TX6213820529
Subject: Five-Year review for: LHAAP-12 (Landfill 12) LHAAP-16 (Old Landfill) LHAAP-18/24 (Burning Ground No. 3 and Unlined Evaporation Pond) LHAAP-35B(37) (Chemical Laboratory) LHAAP-46 (Plant 2 Area) LHAAP- 49 (Former Acid Storage Area)	LHAAP-50 (Former Sump Water Tank) LHAAP-35A(58) (Shops Area) LHAAP-67 (Aboveground Storage Tank Farm) LHAAP-001-R-01 (South Test Area/Bomb Test Area) LHAAP-003-R-01 (Ground Signal Test Area) LHAAP-004-R-01 (Former Pistol Range)
Time: _____	**Date:** **21** June 2018
Type: □ Telephone □ Visit ■ Other-Email **Location of Visit:** Office	□ Incoming ■ Outgoing

Contact Made By:

Name: Drew Clemens, PG	**Title:** Lead Author	**Organization:** USACE North Atlantic Division

Individual Contacted:

Name: Mr. Rich Mayer, P.G.	**Title:** Sr. Project Engineer	**Organization:** USEPA

Telephone No: 214-665-7442 **Fax No: N/A** **E-Mail Address:** mayer.richard@epa.gov	**Street Address:** **6PD-F** **USEPA Region 6** **1445 Ross Avenue, Suite 1200** **Dallas, Texas 75202**

Summary Of Conversation

Q1: What is your overall impression of the Army's LHAAP restoration program and at the sites evaluated by the Fourth Five-Year Review (see above and attached)?
A1: The program has greatly improved over the past 6 years due to more competent contractors and better oversight by the Army. The groundwater plumes are better delineated than in the past years. For example, one of the RODs (Site 67) had only one groundwater well for plume delineation. This has been corrected. Also, the surface water sampling procedures have been improved (call me for more details). Another improvement has been the stoppage of treated groundwater being sprinkled onto the surface of Site 18/24. USEPA did not like that action AND COMMENTED SEVERAL TIMES ON STOPPING THIS.

Q2: Are you aware of any environmental issues the Five-Year Review should focus on?
A2: There is a potential policy issue pertaining to new a new contaminant found on sites with existing RODs. Existing RODs before the 2011 dispute has industrial drinking water levels for contaminants without a MCL. Pre-dispute ROD Sites 35A(58) and Site 12 have found 1,4-dioxane as a new contaminant. The Army has initially indicated that since 1,4-dioxane has no MCL they will require an industrial drinking water standard instead of a residential one. Currently unsure how USEPA will handle these sites in the Five-Year Review.

INTERVIEW RECORD

Site Name: Longhorn Army Ammunition Plant	**EPA ID No.:** TX6213820529

Q3: 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.
A3: Yes. Site visits to observe field sampling and some lead sampling by USEPA. Oversight responsibilities as the lead oversight agency.

Q4: 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.
A4: No.

Q5: What effects have site operations had on the surrounding community?
A5: None other than economically helping local business with monies spent (from the Army, USEPA, State and the Army's contractors) while conducting the investigations and remediation.

Q6: Is the remedy(s) functioning as expected?
A6: One of the MNA remedies was not working as additional in situ remedies have been conducted at Site 35A (58). The groundwater treatment plant continues to have problems treating perchlorate and has had several excursions. The system is old and for many years the plant was not kept up or maintained as needed. The Army contractors were lax with the upkeep of the plant (probably they did not want to spend the money!). The FBR unit is currently being updated.

Q7: Is the Town or RAB actively involved in the site, and are there any community concerns regarding the site or its operation and administration?
A7: The RAB is involved, have not seen in town officials from Karnack or Marshall at the RAB meetings over the past several years. I don't believe there are any significant concerns regarding the site or the operation of the groundwater treatment plant from the RAB members.

Q8: Have there been any changes in the use of the former installation and surrounding area during the last 5 years, or are changes planned?
A8: No or nothing significant.

Q9: Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details.
A9: I am not aware of any, but the US Fish and Wildlife Service would be more aware of trespassing or vandalism. There was a release of chlorine from some old cylinders used at the fire station well in August of 2014. It was reported by the U.S Fish and Wildlife personnel. Apparently, the cylinders were left by one of the Army contractors and were forgotten.

Q10: Do you have any comments, suggestions, or recommendations regarding the project, site management, or operations?
A10: None other than the comments made for the previous questions.

INTERVIEW RECORD

Site Name: Longhorn Army Ammunition Plant	**EPA ID No.:** TX6213820529
Subject: Five-Year review for: LHAAP-12 (Landfill 12) LHAAP-16 (Old Landfill) LHAAP-18/24 (Burning Ground No. 3 and Unlined Evaporation Pond) LHAAP-35B (37) (Chemical Laboratory) LHAAP-46 (Plant 2 Area) LHAAP- 49 (Former Acid Storage Area)	LHAAP-50 (Former Sump Water Tank) LHAAP-35A (58) (Shops Area) LHAAP-67 (Aboveground Storage Tank Farm) LHAAP-001-R-01 (South Test Area/Bomb Test Area) LHAAP-003-R-01 (Ground Signal Test Area) LHAAP-004-R-01 (Former Pistol Range)
Time: 1001	**Date:** 23 May 2018
Type: □ Telephone ■ Visit □ Other **Location of Visit:** LHAAP-50 (Former Sump Water Tank)	■ Incoming □ Outgoing

Contact Made By:

Name: Drew Clemens, PG	**Title:** Lead Author	**Organization:** USACE

Individual Contacted:

Name: April Palmie	**Title:** Project Manager	**Organization:** Texas Commission on Environmental Quality
Telephone No: (512) 239-4152 **Fax No: N/A** **E-Mail Address:** april.palmie@tceq.texas.gov		**Street Address:** P.O. Box 13087, MC-136 **City, State, Zip:** Austin, TX 78711-3087

Summary Of Conversation

Q1: What is your overall impression of the Army's LHAAP restoration program and at the sites evaluated by the Fourth Five-Year Review (see above and attached)?
A1: The Army hired a good contractor.

Q2: Are you aware of any environmental issues the Five-Year Review should focus on?
A2: No. O&M are pretty well monitored. O&M success is a function of a good contract (Performance Work Statement) and performance measurement parameters.

Q3: 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.
A3: Yes-site visits and quarterly meetings. From the state regulatory perspective, site work is progressing.

Q4: 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.
A4: No.

Q5: What effects have site operations had on the surrounding community?
A5: Positive. As sites achieve remedy in place and is transferred to the USFWS, surface water rights

INTERVIEW RECORD

Site Name: Longhorn Army Ammunition Plant	**EPA ID No.:** TX6213820529

are also transferred.

Q6: Is the remedy(s) functioning as expected?
A6: Remedies are functioning as designed and implementing contingencies, like at LHAAP-35A (58) (Shops Area).

Q7: Is the Town or RAB actively involved in the site, and are there any community concerns regarding the site or its operation and administration?
A7: The RAB is actively involved. The Army and its contractor conduct an effective outreach program. Community concerns arise when Caddo Lake issues become mixed with former LHAAP issues.

Q8: Have there been any changes in the use of the former installation and surrounding area during the last 5 years, or are changes planned?
A8: Just property transfers to USFWS, such as LHAAP-12 (Landfill 12).

Q9: Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details.
A9: Not aware of any issues.

Q10: Do you have any comments, suggestions, or recommendations regarding the project, site management, or operations?
A10: No.

INTERVIEW RECORD

Site Name: Longhorn Army Ammunition Plant	**EPA ID No.:** TX6213820529

Subject: Five-Year review for:

LHAAP-12 (Landfill 12)
LHAAP-16 (Old Landfill)
LHAAP-18/24 (Burning Ground No. 3 and Unlined Evaporation Pond)
LHAAP-35B(37) (Chemical Laboratory)
LHAAP-46 (Plant 2 Area)
LHAAP- 49 (Former Acid Storage Area)
LHAAP-50 (Former Sump Water Tank)
LHAAP-35A(58) (Shops Area)
LHAAP-67 (Aboveground Storage Tank Farm)
LHAAP-001-R-01 (South Test Area/Bomb Test Area)
LHAAP-003-R-01 (Ground Signal Test Area)
LHAAP-004-R-01 (Former Pistol Range)

Time: _____	**Date:** 25 June 2018
Type: □ Telephone □ Visit ■ Other-Email **Location of Visit:** Office	□ Incoming ■ Outgoing

Contact Made By:

Name: Drew Clemens, PG	**Title:** Lead Author	**Organization:** USACE North Atlantic Division

Individual Contacted:

Name: Ms. Rose Zeiler	**Title:** Site Manager	**Organization:** US Army

Telephone No: 479-635-0110 **Fax No:** **E-Mail Address:** rose.m.zeiler.civ@mail.mil	**Street Address:** Site Manager's Office Longhorn Army Ammunition Plant PO Box 220 727 South Brooklyn Road Ratcliff, AR 72951

Summary Of Conversation

Q1: What is your overall impression of the Army's LHAAP restoration program and at the sites evaluated by the Fourth Five-Year Review (see above and attached)?
A1: The restoration program is effective, protective of human health and the environment and functioning well. The remedies at LHAAP-16 and -18/24 are interim with no final remedies in place. The landfill caps at LHAAP-12 and -16 are maintained throughout the year and are in good condition. The site inspection revealed some minor routine maintenance issues, such as the need for chemical treatment of pine seedlings, filling in of small depressions and burrows, minor erosion and sign maintenance. MNA remedies are in place at LHAAP-12, -37, -46, -50, -58 and -67. The LUCs are in place and monitored with no problems observed or reported. The well systems are clear of vegetation and in good condition. No MNA issues have been identified for these sites, except Site 50, for which a contingency remedy is planned because of plume migration and Site 58 for which a contingency remedy for the western plume was recently implemented. The MMRP sites, 001-R and 003-R, are well maintained, all MEC warning signs are in place and are visible from one sign to the next. Perimeter roads are clear. The GWTP – the interim remedy for Site 18/24 – is meeting its objective, which is protection of surface water through plume containment.

Q2: Are you aware of any environmental issues the Five-Year Review should focus on?
A2: Except for persistent operational issues associated with the FBR at LHAAP-18/24, which will be addressed with a final ROD, no environmental issues are evident.

INTERVIEW RECORD

Site Name: Longhorn Army Ammunition Plant	**EPA ID No.:** TX6213820529

Q3: 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.
A3: The site is visited a minimum of four times yearly. Site inspections of operating remedies take place during those visits. Teleconferences take place weekly among the Army team and the contractors and monthly among the Managers' group, which includes the regulators. Other contact takes place during the week in the form of emails and telephone calls. The team coordinates frequently and is well informed. The discussions focus on schedule, field activities, resolution of comments and development of restoration plans.

Q4: 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.
A4: Two shutdowns of the GWTP that raised concern. Both stemmed from problems with the FBR. The first related to a higher concentration acetic acid feed that resulted from a drum shipped to the plant that was mislabeled, and the second was an acid release (into a containment system) that made its way into the treatment system through the sump system. Both issues were resolved without compromising surface water. These sorts of problems will be mitigated with implementation of a final remedy for Site 18/24. The draft proposed plan for a final Site 18/24 remedy is scheduled for 2018.

Q5: What effects have site operations had on the surrounding community?
A5: Environmental impacts on groundwater are well contained within the former installation and there were no surface water exceedances of screening criteria during the review period.

Q6: Is the remedy(s) functioning as expected?
A6: Remedies are functioning as expected with two exceptions, both for MNA sites. A contingent remedy of in situ bioremediation was implemented in the western plume of Site 58 due to plume migration and a contingent remedy of in situ bioremediation at Site 50 is planned. In both cases, no exposure to human health has occurred – the pathways remain incomplete – and there have been no surface water impacts, so the remedies remain effective.

Q7: Is the Town or RAB actively involved in the site, and are there any community concerns regarding the site or its operation and administration?
A7: The RAB is actively involved, meeting quarterly. Although participation by the larger community is limited, the RAB members are engaged and actively communicate with Army.

8: Have there been any changes in the use of the former installation and surrounding area during the last 5 years, or are changes planned?
A8: There have been no changes in the use of the installation or surrounding area – it is still a natural wildlife refuge. Additional acreage was transferred from Army to USFWS for incorporation into the refuge system during the review period and transfers will continue in the future.

Q9: Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details.
A9: No.

Q10: Do you have any comments, suggestions, or recommendations regarding the project, site management, or operations?
A10: No.

INTERVIEW RECORD

Site Name: Longhorn Army Ammunition Plant	**EPA ID No.:** TX6213820529

Subject: Five-Year review for:

LHAAP-12 (Landfill 12)
LHAAP-16 (Old Landfill)
LHAAP-18/24 (Burning Ground No. 3 and Unlined Evaporation Pond)
LHAAP-35B(37) (Chemical Laboratory)
LHAAP-46 (Plant 2 Area)
LHAAP- 49 (Former Acid Storage Area)
LHAAP-50 (Former Sump Water Tank)
LHAAP-35A(58) (Shops Area)
LHAAP-67 (Aboveground Storage Tank Farm)
LHAAP-001-R-01 (South Test Area/Bomb Test Area)
LHAAP-003-R-01 (Ground Signal Test Area)
LHAAP-004-R-01 (Former Pistol Range)

Time: _____	**Date:** 20 June 2018
Type: □ Telephone □ Visit ■ Other-Email **Location of Visit:** Office	□ Incoming ■ Outgoing

Contact Made By:

Name: Drew Clemens, PG	**Title:** Lead Author	**Organization:** USACE North Atlantic Division

Individual Contacted:

Name: Aaron Williams	**Title:** USACE Site Manager/ Environmental Engineer	**Organization:** USACE Tulsa District
Telephone No: (918) 669-4915 **Fax No:** **E-Mail Address:** Aaron.K.Williams@usace.army.mil		**Street Address:** 2488 E 81st St Tulsa, OK 74137

Summary Of Conversation

Q1: What is your overall impression of the Army's LHAAP restoration program and at the sites evaluated by the Fourth Five-Year Review (see above and attached)?
A1: .The remedies are effectively meeting objectives. For those sites where the effectiveness of the remedies has been in question, such as for LHAAP-58 and LHAAP-50, the Army has recommended the implementation of the contingency remedies to enhance MNA.

Q2: Are you aware of any environmental issues the Five-Year Review should focus on?
A2: . No

Q3: 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.
A3: Communicate with the Army's contractor weekly to discuss status of sites and visit LHAAP at least quarterly with the regulators to discuss the program and visit sites. Review RAO Reports to ensure remedies remain protective and proper maintenance conducted.

Q4: 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.
A4: The fluidized bed reactor at the GWTP has not been performing as designed. USACE engineer conducted site visit and evaluated O&M activities with what is prescribed in the O&M plan for the FBR. No significant change to O&M was identified at that time, only identification of need to provide better documentation of O&M activities.

INTERVIEW RECORD

Site Name: Longhorn Army Ammunition Plant	**EPA ID No.:** TX6213820529

Q5: What effects have site operations had on the surrounding community?
A5: None.

Q6: Is the remedy(s) functioning as expected?
A6: Yes, with the exception of LHAAP-50 and LHAAP-58 which are implementing contingency remedies to enhance MNA.

Q7: Is the Town or RAB actively involved in the site, and are there any community concerns regarding the site or its operation and administration?
A7: The community is actively involved and aware of site operations, with a RAB in place, which meets quarterly. No known concerns regarding the sites or operation and administration.

Q8: Have there been any changes in the use of the former installation and surrounding area during the last 5 years, or are changes planned?
A8: No.

Q9: Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details.
A9: Yes, it has been several years ago but there was a report of equipment stolen from one of the sites. The perpetrator was caught attempting to sell the equipment to a metals recycler.

Q10: Do you have any comments, suggestions, or recommendations regarding the project, site management, or operations?
A10: No.

Construction Considerations

a. What is the current status of construction (e.g., budget and schedule) at the sites under review?
Construction of the LHAAP-58 contingency remedy was completed and construction of the LHAAP-50 contingency remedy is in the early planning phase. Construction of the final remedy for LHAAP-16 has been delayed to later this summer as the site is currently too wet for installation of some of the wells.

b. Have any problems been encountered which required, or will require, changes to this remedial design for the sites under review?
No.

c. Have any problems or difficulties been encountered which have impacted construction progress or implementability at any of the sites under review? Yes, the LHAAP-16 final remedy construction is delayed to later this summer as the site is currently too wet for installation of some of the wells.

d. Do you have any comments, suggestions, or recommendations regarding the project (e.g., project design construction documents, constructability, contingency plans, current as-builts, system O&M manual(s), management, regulatory agencies, etc., for the sites under review)?
The current contractor is preparing to conduct maintenance/replacement of equipment inside the fluidized bed reactor, which is expected to return the system to designed performance. This more intensive maintenance and required frequency needs to be captured in the O&M manual.

INTERVIEW RECORD

Site Name: Longhorn Army Ammunition Plant	**EPA ID No.:** TX6213820529

Performance, Operation and Maintenance Problems

a. Are the remedies functioning as expected at the sites under review? Yes/No. How well are the remedies performing?
Yes, with the exception of LHAAP-50 and LHAAP-58 which are implementing contingency remedies to enhance MNA.

b. Is there a continuous on-site O&M presence? If so, please describe staff and activities.
Yes, the Army's contractor is at the GWTP several days each week conducting regular inspections and maintenance on wells, landfill caps, and groundwater collection and treatment systems that support the remedies.

c. Have there been any significant changes in the O&M requirements, maintenance schedules, or sampling routines in the last five-years for the sites under review? If so, do they affect the protectiveness or effectiveness of the remedy at any of the evaluated sites? Please describe changes and impacts. Due to the age of the GWTP, the O&M requirement has become more robust and is changing to capture the less frequent intensive O&M required to keep the system performing as designed.

d. Have there been any unexpected O&M difficulties or costs at the sites in the last five-years for the sites under review? Due to the age of the GWTP, the GWTP has had several O&M difficulties over the last five-years

e. Have there been opportunities to optimize O&M during the last five-years at the sites under review, including GWTP system monitoring? Please describe changes and resultant or desired cost savings or improved efficiency, or items that should be done in the future. Yes, the current contractor is in the process of performing a more intensive maintenance of the FBR, which is expected to result in improved efficiency in perchlorate treatment.

f. What are the major repair, replacement, or failure-to-upgrade items that could cause system downtime exceeding 5 days per year over the next 10 years? Please describe. The major repair/replacement for the FBR is expected to cause the system to be down for ~5 days. The GWTP operator can best answer which parts/equipment are not commercially available.

INTERVIEW RECORD

Site Name: Longhorn Army Ammunition Plant	**EPA ID No.:** TX6213820529

Subject: Five-Year review for:

LHAAP-12 (Landfill 12)
LHAAP-16 (Old Landfill)
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LHAAP-35B(37) (Chemical Laboratory)
LHAAP-46 (Plant 2 Area)
LHAAP- 49 (Former Acid Storage Area)
LHAAP-50 (Former Sump Water Tank)
LHAAP-35A(58) (Shops Area)
LHAAP-67 (Aboveground Storage Tank Farm)
LHAAP-001-R-01 (South Test Area/Bomb Test Area)
LHAAP-003-R-01 (Ground Signal Test Area)
LHAAP-004-R-01 (Former Pistol Range)

Time: 0915	**Date:** 22 May 2018
Type: □ Telephone □ Visit ■ Other **Location of Visit:** Caddo Lake National Wildlife Refuge	■ Incoming □ Outgoing

Contact Made By:

Name: Drew Clemens, PG	**Title:** Lead Author	**Organization:** USACE

Individual Contacted:

Name: Mr. Paul Bruckwicki	**Title:** Refuge Manager	**Organization:** US Fish & Wildlife Service
Telephone No: (903) 679-9144 **Fax No:** N/A **E-Mail Address:** **Paul_bruckwicki@fws.gov**		**Street Address:** Caddo Lake National Wildlife Refuge 15600 Hwy 134 **City, State, Zip:** Karnack, TX 75661

Summary Of Conversation

Q1: What is your overall impression of the Army's LHAAP restoration program and at the sites evaluated by the Fourth Five-Year Review (see above and attached)?
A1: Adequate.

Q2: Are you aware of any environmental issues the Five-Year Review should focus on?
A2: No.

Q3: 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.
A3: Site walk at Landfill 12 (LHAAP-12 (Landfill 12)). The site was transferred from the Army to the Refuge the week of 14 May 2018. Two downed trees need removing.

Q4: 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.
A4: Army contractor wanted to bulldoze a drill rig access road across Harrison Bayou at LHAAP-16, but was not allowed to do so for the Bayou is part of a Wetlands of International Importance (Ramsar Site, bottomland hardwood).

Q5: What effects have site operations had on the surrounding community?

INTERVIEW RECORD

Site Name: Longhorn Army Ammunition Plant	**EPA ID No.:** TX6213820529

A5: Community members are happy cleanup activities are progressing, but do not like the time needed to accomplish the work.

Q6: Is the remedy(s) functioning as expected?
A6: The remedies are functioning, but operating properly and successfully (OPS) has yet to be determined. After 2002, USFWS is able to accept land from the Army when a remedy is in place instead of OPS.

Q7: Is the Town or RAB actively involved in the site, and are there any community concerns regarding the site or its operation and administration?
A7: The RAB is fairly active. A tour was conducted in April 2018.

Q8: Have there been any changes in the use of the former installation and surrounding area during the last 5 years, or are changes planned?
A8: No changes in current or future land use within the former LHAAP boundary. USFWS is acquiring abutting properties as they become available.

Q9: Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details.
A9: No.

Q10: Do you have any comments, suggestions, or recommendations regarding the project, site management, or operations?
A10: None, all is going good.

Q11: Are there any site-specific unique species or offsite receptors?
A11: No unique, site-specific species within the refuge. The only Caddo Lake surface water intakes are at the downstream end in Louisiana.

INTERVIEW RECORD

Site Name: Longhorn Army Ammunition Plant (LHAAP)	**EPA ID No.:** TX6213820529

Subject: Five-Year review for:

LHAAP-12 (Landfill 12)
LHAAP-16 (Old Landfill)
LHAAP-18/24 (Burning Ground No. 3 and Unlined Evaporation Pond)
LHAAP-35B(37) (Chemical Laboratory)
LHAAP-46 (Plant 2 Area)
LHAAP- 49 (Former Acid Storage Area)
LHAAP-50 (Former Sump Water Tank)
LHAAP-35A(58) (Shops Area)
LHAAP-67 (Aboveground Storage Tank Farm)
LHAAP-001-R-01 (South Test Area/Bomb Test Area)
LHAAP-003-R-01 (Ground Signal Test Area)
LHAAP-004-R-01 (Former Pistol Range)

Time: _____	**Date:** ____ June 2018
Type: □ Telephone □ Visit ■ Other **Location of Visit:** Office	□ Incoming ■ Outgoing

Contact Made By:

Name: Drew Clemens, PG	**Title:** Lead Author	**Organization:** US Army Corps of Engineers, North Atlantic Division

Individual Contacted:

Name: Mr. Paul Fortune	**Title:** Co-Chair	**Organization:** RAB
Telephone No: **Fax No: N/A** **E-Mail Address:**	**Street Address:** **City, State, Zip:**	

Summary Of Conversation

Q1: Are any of the above environmental sites new to you?
A1: no

Q2: What is your overall impression of the Army's LHAAP restoration program?
A2: .pretty good overall , questionable in some areas

Q3: Are you aware of any environmental issues the Five-Year Review should focus on?
A3: .yes

Q4: Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted for the public regarding the site? If so, what is your overall impression?
A4: yes The Army has done a good job reporting to the public

Q5: Are you aware of any complaints, violations, or other incidents related to the site? If so, were you satisfied with the results?
A5 no:

Q6: What effects have site operations had on the surrounding community?
A6: Very little

INTERVIEW RECORD

Site Name: Longhorn Army Ammunition Plant (LHAAP)	**EPA ID No.:** TX6213820529

Q7: To your knowledge, is the remedy(s) functioning as expected?
A7: .It's questionable in my opinion about the remedies in place for sites 12,16, and 18/24

Q8: Is the Town or RAB actively involved in the site, and are there any community concerns regarding the site or its operation and administration?
A8: .There has always been a community concern about the contaminated ground water entering Caddo Lake.

Q9: Have there been any changes in the use of the former installation and surrounding area during the last 5 years, or are changes planned?
A9: .not to my knowledge

Q10: Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details.
A10: no

Q11: Do you have any comments, suggestions, or recommendations regarding the project, site management, or :
A11. Has the Army turned over the mineral rights to the USFWS? If not why not? It seems the environmental contractors should be given more than five-year terms if the Army and the public is happy with them.

CENAE-EDG 30 October, 2018

MEMORANDUM FOR RECORD

SUBJECT: Request for Texas Clean-up Goal Related information, Texas Commission on Environmental Quality, April Palmie on 9 August 2018

1. Background. The cleanup goals related to Texas guidance and regulations for the Longhorn Army Ammunition Plant Five Year Review were not clear. Our lead author Drew Clemens provided information on who to contact in Texas:

April Palmie
Superfund Section/Remediation Division
Texas Commission on Environmental Quality
Phone: (512) 239-4152
Email: April.Palmie@tceq.texas.gov

2. Ms. Palmie provided the link for the updated Texas Risk Reduction Rule Guidance: https://www.tceq.texas.gov/remediation/rrr.html

3. Ms. Palmie further noted:
The look-up tables are under Cleanup standards - MSC and Risk-based screening tables. The tables were last updated March 31, 2006 because later sites mostly moved over to Texas Risk Reduction Program (TRRP). The info from page 65 of the LHAAP-35A(58) ROD does match the RRR look-up table (10 and 41 milligrams). Not a typo.

4. Point of contact is the undersigned, and can be reached by phone (978-318-8042) or email (Cynthia.A.Auld@usace.army.mil).

CYNTHIA AULD
Human Health Risk Assessor
Geo-Environmental Branch

CF:
Project File

APPENDIX F – SUMMARY CHEMISTRY STATISTICS

Summary of COC Concentrations for LHAAP Wells and Miscellaneous Sampling Locations

Area	Location	Constituent	Count	Earliest	Latest	Avg (µg/L)	Min (µg/L)	Code	Max (µg/L)	Code
ALL	EW-1	1,1,1-Trichloroethane	18	4/1/1994	2/24/2016	711.43	1	U	2500	U
ALL	EW-1	1,1,2-Trichloroethane	16	4/1/1994	2/24/2016	769.49	3		2500	U
ALL	EW-1	1,1-Dichloroethene	18	4/1/1994	2/24/2016	2020.56	3		9120	J
ALL	EW-1	1,2-Dichloroethane	18	4/1/1994	2/24/2016	680.19	1	U	2500	U
ALL	EW-1	1,4-Dioxane	1	1/20/2016	1/20/2016	5.83	5.83	J	5.83	J
ALL	EW-1	Carbon tetrachloride	19	4/1/1994	2/24/2016	669.34	0.66	J	2500	U
ALL	EW-1	Chloroform	19	4/1/1994	2/24/2016	382.13	3		1250	U
ALL	EW-1	cis-1,2-Dichloroethene	15	1/26/1999	2/24/2016	28814.67	3390	D	52300	
ALL	EW-1	magnesium, total	4	4/1/1994	2/24/2016	28350.00	6600		50200	
ALL	EW-1	manganese, total	5	4/1/1994	2/24/2016	1785.60	358		2990	
ALL	EW-1	Methylene chloride	31	4/1/1994	2/24/2016	1319419.90	14600		5497500	
ALL	EW-1	nickel, total	7	4/1/1994	2/24/2016	47.91	30		79.6	
ALL	EW-1	Perchlorate	15	7/24/2008	2/24/2016	13294.00	1760		39800	
ALL	EW-1	Tetrachloroethene	19	4/1/1994	2/24/2016	930.58	3		2500	U
ALL	EW-1	thallium, total	6	4/1/1994	2/24/2016	1.74	0.108	J	4	
ALL	EW-1	Trichloroethene	31	4/1/1994	2/24/2016	80581.19	5467		198800	
ALL	EW-1	Vinyl chloride	18	4/1/1994	2/24/2016	838.67	3		2500	U
ALL	HBW-1	Perchlorate	16	12/14/2011	8/31/2017	0.24	0.1	U	1	U
ALL	HBW-10	Perchlorate	16	12/14/2011	8/31/2017	0.24	0.1	U	1	U
ALL	HBW-7	Perchlorate	17	12/14/2011	8/31/2017	0.24	0.1	U	1	U
AREA 18/24	AWD-1	1,1,1-Trichloroethane	25	4/1/1994	6/26/2017	97.52	0.5		448	J
AREA 18/24	AWD-1	1,1,2-Trichloroethane	23	4/1/1994	6/26/2017	87.13	0.5		1000	U
AREA 18/24	AWD-1	1,1-Dichloroethene	30	4/1/1994	6/26/2017	2385.34	1		62400	
AREA 18/24	AWD-1	1,2-Dichloroethane	30	4/1/1994	6/26/2017	106.00	1	U	792	
AREA 18/24	AWD-1	1,4-Dioxane	2	10/28/2015	6/7/2016	20.17	7.14	J	33.2	J
AREA 18/24	AWD-1	Carbon tetrachloride	29	4/1/1994	6/26/2017	31.24	1	U	250	U
AREA 18/24	AWD-1	Chloroform	28	4/1/1994	6/26/2017	34.35	0.5		250	U
AREA 18/24	AWD-1	Chromium, Total	2	9/13/2011	3/12/2012	32.60	26.3		38.9	
AREA 18/24	AWD-1	cis-1,2-Dichloroethene	20	12/1/1996	6/26/2017	28458.00	5		92800	
AREA 18/24	AWD-1	magnesium, total	8	4/1/1994	12/4/2015	5519.38	5		7500	
AREA 18/24	AWD-1	manganese, total	14	4/1/1994	6/26/2017	554.43	5		1480	
AREA 18/24	AWD-1	Methylene chloride	30	4/1/1994	6/26/2017	4889.04	0.25		54650	
AREA 18/24	AWD-1	nickel, total	29	4/1/1994	6/26/2017	69.36	5		280	
AREA 18/24	AWD-1	Perchlorate	21	10/1/2000	6/26/2017	1287.47	0.1	U	9580	
AREA 18/24	AWD-1	Tetrachloroethene	24	4/1/1994	6/26/2017	49.32	0.5		250	U
AREA 18/24	AWD-1	thallium, total	11	4/1/1994	6/26/2017	2.02	0.155	J	5	
AREA 18/24	AWD-1	Trichloroethene	30	4/1/1994	6/26/2017	43956.00	2210		87600	
AREA 18/24	AWD-1	Vinyl chloride	30	4/1/1994	6/26/2017	1030.17	1		6950	
AREA 18/24	AWD-2	1,1,1-Trichloroethane	22	4/1/1994	6/11/2015	11.99	0.25	U	200	U
AREA 18/24	AWD-2	1,1,2-Trichloroethane	20	4/1/1994	6/11/2015	13.16	0.25	U	200	U
AREA 18/24	AWD-2	1,1-Dichloroethene	27	4/1/1994	6/11/2015	11.53	0.5	U	200	U
AREA 18/24	AWD-2	1,2-Dichloroethane	27	4/1/1994	6/11/2015	665.19	0.5	U	1390	
AREA 18/24	AWD-2	1,4-Dioxane	3	5/1/2013	11/2/2015	1.22	0.587	J	2.07	J
AREA 18/24	AWD-2	CARBON TETRACHLORIDE	27	4/1/1994	6/11/2015	10.86	0.25	U	200	U
AREA 18/24	AWD-2	CHLOROFORM	26	4/1/1994	6/11/2015	16.68	0.25	U	200	U
AREA 18/24	AWD-2	CIS-1,2-DICHLOROETHENE	17	12/1/1996	6/11/2015	38.30	1	U	223	
AREA 18/24	AWD-2	magnesium, total	7	4/1/1994	6/11/2015	20915.00	5		56000	
AREA 18/24	AWD-2	manganese, total	10	4/1/1994	6/11/2015	129.43	5		380	
AREA 18/24	AWD-2	METHYLENE CHLORIDE	27	4/1/1994	6/11/2015	8356.05	0.25	U	130000	
AREA 18/24	AWD-2	nickel, total	24	4/1/1994	6/11/2015	113.94	5		340	
AREA 18/24	AWD-2	Perchlorate	16	10/1/2000	6/11/2015	133.02	1		1220	
AREA 18/24	AWD-2	TETRACHLOROETHENE	22	4/1/1994	6/11/2015	11.99	0.25	U	200	U
AREA 18/24	AWD-2	thallium, total	9	4/1/1994	6/11/2015	2.30	0.126	J	5	
AREA 18/24	AWD-2	TRICHLOROETHENE	27	4/1/1994	6/11/2015	12616.48	8		39800	
AREA 18/24	AWD-2	VINYL CHLORIDE	27	4/1/1994	6/11/2015	18.42	0.25	U	200	U
AREA 18/24	AWD-3	1,1,1-Trichloroethane	28	4/1/1994	6/15/2017	22.36	0.5		500	U
AREA 18/24	AWD-3	1,1,2-Trichloroethane	26	4/1/1994	6/15/2017	4.50	0.5		50	U
AREA 18/24	AWD-3	1,1-Dichloroethene	33	4/1/1994	6/15/2017	24.82	1	U	500	U
AREA 18/24	AWD-3	1,2-Dichloroethane	33	4/1/1994	6/15/2017	8.92	0.5	U	109	
AREA 18/24	AWD-3	1,4-Dioxane	1	10/29/2015	10/29/2015	1.19	1.19	J	1.19	J
AREA 18/24	AWD-3	Carbon tetrachloride	33	4/1/1994	6/15/2017	64.30	5		500	U
AREA 18/24	AWD-3	Chloroform	32	4/1/1994	6/15/2017	19.80	0.5		500	U
AREA 18/24	AWD-3	Chromium, Total	2	9/13/2011	3/12/2012	134.90	90.8		179	
AREA 18/24	AWD-3	cis-1,2-Dichloroethene	23	12/1/1996	6/15/2017	14.04	1	U	170	
AREA 18/24	AWD-3	magnesium, total	10	4/1/1994	12/28/2016	3020.10	5		22900	
AREA 18/24	AWD-3	manganese, total	16	4/1/1994	6/15/2017	159.89	3.88	J	1890	
AREA 18/24	AWD-3	Methylene chloride	33	4/1/1994	6/15/2017	129.76	0.25		2400	
AREA 18/24	AWD-3	nickel, total	31	4/1/1994	6/15/2017	449.86	2.5		2400	
AREA 18/24	AWD-3	Perchlorate	22	10/1/2000	6/15/2017	2849.85	3.88		19200	
AREA 18/24	AWD-3	Tetrachloroethene	28	4/1/1994	6/15/2017	22.90	0.5		500	U
AREA 18/24	AWD-3	thallium, total	13	4/1/1994	6/15/2017	1.82	0.2	U	7	
AREA 18/24	AWD-3	Trichloroethene	33	4/1/1994	6/15/2017	1432.36	122		25000	U
AREA 18/24	AWD-3	Vinyl chloride	33	4/1/1994	6/15/2017	20.13	0.5		500	U
AREA 18/24	AWD-4	1,1,1-Trichloroethane	25	4/1/1994	6/14/2017	2.64	0.5		5	
AREA 18/24	AWD-4	1,1,2-Trichloroethane	23	4/1/1994	6/14/2017	2.43	0.5		5	
AREA 18/24	AWD-4	1,1-Dichloroethene	30	4/1/1994	6/14/2017	4.91	0.593	J	55	
AREA 18/24	AWD-4	1,2-Dichloroethane	30	4/1/1994	6/14/2017	3.05	0.5	U	5	
AREA 18/24	AWD-4	1,4-Dioxane	2	11/3/2015	6/7/2016	1.00	1	U	1	U
AREA 18/24	AWD-4	Carbon tetrachloride	30	4/1/1994	6/14/2017	3.18	0.5	U	5	
AREA 18/24	AWD-4	Chloroform	29	4/1/1994	6/14/2017	3.03	0.25	U	5	
AREA 18/24	AWD-4	cis-1,2-Dichloroethene	20	12/1/1996	6/14/2017	5.72	0.338	J	15	
AREA 18/24	AWD-4	magnesium, total	11	4/1/1994	12/13/2016	11681.36	5		22700	
AREA 18/24	AWD-4	manganese, total	15	4/1/1994	6/14/2017	323.97	5		1230	
AREA 18/24	AWD-4	Methylene chloride	30	4/1/1994	6/14/2017	5.23	0.25		58	
AREA 18/24	AWD-4	nickel, total	30	4/1/1994	6/14/2017	1059.42	0.5		4300	
AREA 18/24	AWD-4	Perchlorate	21	10/1/2000	6/14/2017	8643.48	247		45400	D
AREA 18/24	AWD-4	Tetrachloroethene	25	4/1/1994	6/14/2017	2.62	0.257	J	5	

Summary of COC Concentrations for LHAAP Wells and Miscellaneous Sampling Locations

Area	Location	Constituent	Count	Earliest	Latest	Avg (µg/L)	Min (µg/L)	Code	Max (µg/L)	Code
AREA 18/24	AWD-4	thallium, total	14	4/1/1994	6/14/2017	1.68	0.129	J	5	
AREA 18/24	AWD-4	Trichloroethene	30	4/1/1994	6/14/2017	20.85	0.5		100	
AREA 18/24	AWD-4	Vinyl chloride	30	4/1/1994	6/14/2017	4.00	0.5		10	
AREA 18/24	ACILITY WATER NORT	Carbon tetrachloride	1	3/22/2013	3/22/2013	0.50	0.5	U	0.5	U
AREA 18/24	ACILITY WATER NORT	Chloroform	1	3/22/2013	3/22/2013	0.25	0.25	U	0.25	U
AREA 18/24	ACILITY WATER NORT	cis-1,2-Dichloroethene	1	3/22/2013	3/22/2013	0.50	0.5	U	0.5	U
AREA 18/24	ACILITY WATER NORT	Methylene chloride	1	3/22/2013	3/22/2013	0.50	0.5	U	0.5	U
AREA 18/24	ACILITY WATER NORT	Perchlorate	1	3/22/2013	3/22/2013	0.20	0.2	U	0.2	U
AREA 18/24	ACILITY WATER NORT	Tetrachloroethene	1	3/22/2013	3/22/2013	0.50	0.5	U	0.5	U
AREA 18/24	ACILITY WATER NORT	Trichloroethene	1	3/22/2013	3/22/2013	0.50	0.5	U	0.5	U
AREA 18/24	ACILITY WATER NORT	Vinyl chloride	1	3/22/2013	3/22/2013	0.50	0.5	U	0.5	U
AREA 18/24	ICT-11	1,1,1-Trichloroethane	25	6/1/2001	2/24/2016	14.44	1		100	
AREA 18/24	ICT-11	1,1,2-Trichloroethane	25	6/1/2001	2/24/2016	14.44	1		100	
AREA 18/24	ICT-11	1,1-Dichloroethene	25	6/1/2001	2/24/2016	28.04	1		177	J
AREA 18/24	ICT-11	1,2-Dichloroethane	25	6/1/2001	2/24/2016	18.92	1		100	
AREA 18/24	ICT-11	1,4-DIOXANE	1	10/28/2015	10/28/2015	2.63	2.63	J	2.63	J
AREA 18/24	ICT-11	Carbon tetrachloride	25	6/1/2001	2/24/2016	14.44	1		100	
AREA 18/24	ICT-11	Chloroform	25	6/1/2001	2/24/2016	16.89	0.625	U	100	
AREA 18/24	ICT-11	cis-1,2-Dichloroethene	17	10/1/2003	2/24/2016	817.55	1		4320	
AREA 18/24	ICT-11	magnesium, total	2	2/26/2014	2/24/2016	35950.00	21500		50400	
AREA 18/24	ICT-11	manganese, total	3	2/12/2013	2/24/2016	237.33	112		364	
AREA 18/24	ICT-11	Methylene chloride	25	6/1/2001	2/24/2016	248.97	1.25	U	2860	
AREA 18/24	ICT-11	nickel, total	3	2/12/2013	2/24/2016	10.01	7.98	J	13.7	
AREA 18/24	ICT-11	Perchlorate	28	6/21/2000	2/24/2016	27545.21	296		85000	
AREA 18/24	ICT-11	Tetrachloroethene	25	6/1/2001	2/24/2016	14.49	1		100	
AREA 18/24	ICT-11	thallium, total	3	2/12/2013	2/24/2016	0.17	0.128	J	0.2	U
AREA 18/24	ICT-11	Trichloroethene	25	6/1/2001	2/24/2016	5668.04	541		32900	
AREA 18/24	ICT-11	Vinyl chloride	24	6/1/2001	2/24/2016	51.59	1		365	
AREA 18/24	ICT-12A	1,1,1-Trichloroethane	13	6/1/2001	2/24/2016	10.88	0.5		50	
AREA 18/24	ICT-12A	1,1,2-Trichloroethane	13	6/1/2001	2/24/2016	10.88	0.5		50	
AREA 18/24	ICT-12A	1,1-Dichloroethene	13	6/1/2001	2/24/2016	11.38	0.809	J	50	
AREA 18/24	ICT-12A	1,2-Dichloroethane	13	6/1/2001	2/24/2016	17.38	1		70	
AREA 18/24	ICT-12A	1,4-Dioxane	1	1/20/2016	1/20/2016	1.57	1.57	J	1.57	J
AREA 18/24	ICT-12A	Carbon tetrachloride	13	6/1/2001	2/24/2016	11.21	0.454	J	50	
AREA 18/24	ICT-12A	Chloroform	13	6/1/2001	2/24/2016	11.58	1		50	
AREA 18/24	ICT-12A	cis-1,2-Dichloroethene	6	10/1/2003	2/24/2016	5.94	1		11.7	
AREA 18/24	ICT-12A	magnesium, total	2	3/3/2015	2/24/2016	6745.00	5810		7680	
AREA 18/24	ICT-12A	manganese, total	3	2/12/2013	2/24/2016	219.00	161		275	
AREA 18/24	ICT-12A	Methylene chloride	13	6/1/2001	2/24/2016	72.97	0.5	U	650	
AREA 18/24	ICT-12A	nickel, total	3	2/12/2013	2/24/2016	69.40	12.1		139	
AREA 18/24	ICT-12A	Perchlorate	16	6/21/2000	2/24/2016	10997.81	165		38000	
AREA 18/24	ICT-12A	Tetrachloroethene	13	6/1/2001	2/24/2016	10.88	0.5	U	50	
AREA 18/24	ICT-12A	thallium, total	3	2/12/2013	2/24/2016	0.19	0.166	J	0.2	U
AREA 18/24	ICT-12A	Trichloroethene	13	6/1/2001	2/24/2016	2297.85	375		4600	
AREA 18/24	ICT-12A	Vinyl chloride	13	6/1/2001	2/24/2016	20.34	0.783	J	100	
AREA 18/24	ICT-12B	1,1,1-Trichloroethane	26	6/1/2001	2/24/2016	29.75	1		200	
AREA 18/24	ICT-12B	1,1,2-Trichloroethane	26	6/1/2001	2/24/2016	29.75	1		200	
AREA 18/24	ICT-12B	1,1-Dichloroethene	26	6/1/2001	2/24/2016	47.33	1		200	
AREA 18/24	ICT-12B	1,2-Dichloroethane	26	6/1/2001	2/24/2016	78.99	5		200	
AREA 18/24	ICT-12B	1,4-Dioxane	1	1/20/2016	1/20/2016	4.91	4.91	J	4.91	J
AREA 18/24	ICT-12B	Carbon tetrachloride	26	6/1/2001	2/24/2016	52.21	1		200	
AREA 18/24	ICT-12B	Chloroform	26	6/1/2001	2/24/2016	50.79	1		200	
AREA 18/24	ICT-12B	cis-1,2-Dichloroethene	18	10/1/2003	2/24/2016	81.89	1		485	
AREA 18/24	ICT-12B	magnesium, total	3	2/26/2014	2/24/2016	16400.00	11600		22400	
AREA 18/24	ICT-12B	manganese, total	4	2/12/2013	2/24/2016	94.90	46.3		210	
AREA 18/24	ICT-12B	Methylene chloride	26	6/1/2001	2/24/2016	248.64	5		5390	
AREA 18/24	ICT-12B	nickel, total	4	2/12/2013	2/24/2016	6.16	2.98	J	8.32	
AREA 18/24	ICT-12B	Perchlorate	29	6/21/2000	2/24/2016	128901.03	8430		379000	
AREA 18/24	ICT-12B	Tetrachloroethene	26	6/1/2001	2/24/2016	29.77	1		200	
AREA 18/24	ICT-12B	thallium, total	4	2/12/2013	2/24/2016	0.17	0.11	J	0.2	U
AREA 18/24	ICT-12B	Trichloroethene	26	6/1/2001	2/24/2016	10398.85	5550		20700	
AREA 18/24	ICT-12B	Vinyl chloride	26	6/1/2001	2/24/2016	54.55	1		500	
AREA 18/24	ICT-12C	1,1,1-Trichloroethane	26	6/1/2001	2/24/2016	21.29	1		100	
AREA 18/24	ICT-12C	1,1,2-Trichloroethane	26	6/1/2001	2/24/2016	21.29	1		100	
AREA 18/24	ICT-12C	1,1-Dichloroethene	26	6/1/2001	2/24/2016	33.50	1		100	
AREA 18/24	ICT-12C	1,2-Dichloroethane	25	6/1/2001	2/24/2016	93.34	1		226	
AREA 18/24	ICT-12C	1,4-Dioxane	1	1/20/2016	1/20/2016	1.15	1.15	J	1.15	J
AREA 18/24	ICT-12C	Carbon tetrachloride	26	6/1/2001	2/24/2016	21.30	1		100	
AREA 18/24	ICT-12C	Chloroform	26	6/1/2001	2/24/2016	18.09	1		100	
AREA 18/24	ICT-12C	cis-1,2-Dichloroethene	18	10/1/2003	2/24/2016	171.06	1		449	
AREA 18/24	ICT-12C	magnesium, total	3	2/26/2014	2/24/2016	7263.33	6360		8960	
AREA 18/24	ICT-12C	manganese, total	4	2/12/2013	2/24/2016	48.40	16.5		86.6	
AREA 18/24	ICT-12C	Methylene chloride	26	6/1/2001	2/24/2016	149.76	5		2990	
AREA 18/24	ICT-12C	nickel, total	4	2/12/2013	2/24/2016	25.30	15.1		48.5	
AREA 18/24	ICT-12C	Perchlorate	29	6/21/2000	2/24/2016	27731.38	1000		58800	
AREA 18/24	ICT-12C	Tetrachloroethene	26	6/1/2001	2/24/2016	21.29	1		100	
AREA 18/24	ICT-12C	thallium, total	4	2/12/2013	2/24/2016	0.19	0.162	J	0.201	J
AREA 18/24	ICT-12C	Trichloroethene	25	6/1/2001	2/24/2016	6838.40	1700		14200	
AREA 18/24	ICT-12C	Vinyl chloride	25	6/1/2001	2/24/2016	31.00	1		200	
AREA 18/24	ICT-12D	1,1,1-Trichloroethane	25	6/1/2001	2/24/2016	217.57	1		2000	
AREA 18/24	ICT-12D	1,1,2-Trichloroethane	25	6/1/2001	2/24/2016	218.11	1		2000	
AREA 18/24	ICT-12D	1,1-Dichloroethene	25	6/1/2001	2/24/2016	309.37	1		2000	
AREA 18/24	ICT-12D	1,2-Dichloroethane	25	6/1/2001	2/24/2016	309.06	5		2000	
AREA 18/24	ICT-12D	1,4-Dioxane	1	1/20/2016	1/20/2016	7.50	7.5	J	7.5	J
AREA 18/24	ICT-12D	Carbon tetrachloride	25	6/1/2001	2/24/2016	220.14	1		2000	
AREA 18/24	ICT-12D	Chloroform	25	6/1/2001	2/24/2016	208.26	1		2000	
AREA 18/24	ICT-12D	cis-1,2-Dichloroethene	17	10/1/2003	2/24/2016	12151.53	1		34800	

Summary of COC Concentrations for LHAAP Wells and Miscellaneous Sampling Locations

Area	Location	Constituent	Count	Earliest	Latest	Avg (µg/L)	Min (µg/L)	Code	Max (µg/L)	Code
AREA 18/24	ICT-12D	magnesium, total	2	3/3/2015	2/24/2016	16450.00	14100		18800	
AREA 18/24	ICT-12D	manganese, total	3	2/12/2013	2/24/2016	885.00	600		1270	
AREA 18/24	ICT-12D	Methylene chloride	25	6/1/2001	2/24/2016	111079.36	112		370000	
AREA 18/24	ICT-12D	nickel, total	3	2/12/2013	2/24/2016	39.60	12.7		82.4	
AREA 18/24	ICT-12D	Perchlorate	28	6/21/2000	2/24/2016	78914.64	2000		269000	
AREA 18/24	ICT-12D	Tetrachloroethene	25	6/1/2001	2/24/2016	219.45	1		2000	
AREA 18/24	ICT-12D	thallium, total	3	2/12/2013	2/24/2016	0.18	0.165	J	0.2	U
AREA 18/24	ICT-12D	Trichloroethene	25	6/1/2001	2/24/2016	65100.00	19200		109000	
AREA 18/24	ICT-12D	Vinyl chloride	23	6/1/2001	2/24/2016	1410.65	5		7530	
AREA 18/24	ICT-12E	1,1,1-Trichloroethane	26	6/1/2001	2/24/2016	389.99	1		5000	
AREA 18/24	ICT-12E	1,1,2-Trichloroethane	26	6/1/2001	2/24/2016	390.65	1		5000	
AREA 18/24	ICT-12E	1,1-Dichloroethene	26	6/1/2001	2/24/2016	878.85	5		5000	
AREA 18/24	ICT-12E	1,2-Dichloroethane	26	6/1/2001	2/24/2016	431.55	5		5000	
AREA 18/24	ICT-12E	1,4-Dioxane	1	10/28/2015	10/28/2015	372.00	372	J	372	J
AREA 18/24	ICT-12E	Carbon tetrachloride	26	6/1/2001	2/24/2016	388.99	0.25	U	5000	
AREA 18/24	ICT-12E	Chloroform	26	6/1/2001	2/24/2016	316.89	1		5000	
AREA 18/24	ICT-12E	cis-1,2-Dichloroethene	18	10/1/2003	2/24/2016	9478.83	1		14700	
AREA 18/24	ICT-12E	magnesium, total	3	2/26/2014	2/24/2016	23833.33	16500		28800	
AREA 18/24	ICT-12E	manganese, total	4	2/12/2013	2/24/2016	1410.00	990		2070	
AREA 18/24	ICT-12E	Methylene chloride	26	6/1/2001	2/24/2016	219230.88	123		840000	
AREA 18/24	ICT-12E	nickel, total	4	2/12/2013	2/24/2016	29.15	24		38.8	
AREA 18/24	ICT-12E	Perchlorate	29	6/21/2000	2/24/2016	71385.86	4820		250000	
AREA 18/24	ICT-12E	Tetrachloroethene	26	6/1/2001	2/24/2016	390.45	1		5000	
AREA 18/24	ICT-12E	thallium, total	4	2/12/2013	2/24/2016	0.15	0.101	J	0.2	U
AREA 18/24	ICT-12E	Trichloroethene	26	6/1/2001	2/24/2016	78157.69	16700		137000	
AREA 18/24	ICT-12E	Vinyl chloride	26	6/1/2001	2/24/2016	1217.65	5		10000	
AREA 18/24	ICT-13A	1,1,1-Trichloroethane	17	6/1/2001	2/24/2016	16.38	0.5	U	100	
AREA 18/24	ICT-13A	1,1,2-Trichloroethane	17	6/1/2001	2/24/2016	16.40	0.5	U	100	
AREA 18/24	ICT-13A	1,1-Dichloroethene	17	6/1/2001	2/24/2016	70.58	2.31	J	212	
AREA 18/24	ICT-13A	1,2-Dichloroethane	17	6/1/2001	2/24/2016	101.76	5		237	
AREA 18/24	ICT-13A	1,4-Dioxane	1	10/28/2015	10/28/2015	145.00	145	J	145	J
AREA 18/24	ICT-13A	Carbon tetrachloride	17	6/1/2001	2/24/2016	16.38	0.5	U	100	
AREA 18/24	ICT-13A	Chloroform	17	6/1/2001	2/24/2016	15.96	0.313	U	100	
AREA 18/24	ICT-13A	cis-1,2-Dichloroethene	9	10/1/2003	2/24/2016	830.80	1		4120	
AREA 18/24	ICT-13A	magnesium, total	3	2/26/2014	2/24/2016	24400.00	22600		27900	
AREA 18/24	ICT-13A	manganese, total	4	2/12/2013	2/24/2016	691.50	447		935	
AREA 18/24	ICT-13A	Methylene chloride	17	6/1/2001	2/24/2016	724.94	1.23	J	3350	
AREA 18/24	ICT-13A	nickel, total	4	2/12/2013	2/24/2016	39.20	30.4		53	
AREA 18/24	ICT-13A	Perchlorate	20	6/21/2000	2/24/2016	26551.55	4		60700	
AREA 18/24	ICT-13A	Tetrachloroethene	17	6/1/2001	2/24/2016	16.79	1		100	
AREA 18/24	ICT-13A	thallium, total	4	2/12/2013	2/24/2016	0.18	0.127	J	0.2	U
AREA 18/24	ICT-13A	Trichloroethene	17	6/1/2001	2/24/2016	17918.82	399		44000	
AREA 18/24	ICT-13A	Vinyl chloride	17	6/1/2001	2/24/2016	48.79	0.556	J	250	
AREA 18/24	ICT-13B	1,1,1-Trichloroethane	19	6/1/2001	2/24/2016	14.71	1		100	
AREA 18/24	ICT-13B	1,1,2-Trichloroethane	19	6/1/2001	2/24/2016	14.77	1		100	
AREA 18/24	ICT-13B	1,1-Dichloroethene	19	6/1/2001	2/24/2016	37.73	1		179	
AREA 18/24	ICT-13B	1,2-Dichloroethane	19	6/1/2001	2/24/2016	92.91	5		219	
AREA 18/24	ICT-13B	1,4-Dioxane	1	10/28/2015	10/28/2015	10.30	10.3	J	10.3	J
AREA 18/24	ICT-13B	Carbon tetrachloride	19	6/1/2001	2/24/2016	14.71	1		100	
AREA 18/24	ICT-13B	Chloroform	19	6/1/2001	2/24/2016	14.38	0.625	U	100	
AREA 18/24	ICT-13B	cis-1,2-Dichloroethene	11	10/1/2003	2/24/2016	351.11	1		1740	
AREA 18/24	ICT-13B	magnesium, total	3	2/26/2014	2/24/2016	35733.33	24100		44800	
AREA 18/24	ICT-13B	manganese, total	4	2/12/2013	2/24/2016	1303.00	982	J	1720	
AREA 18/24	ICT-13B	Methylene chloride	19	6/1/2001	2/24/2016	301.40	0.658	J	2910	
AREA 18/24	ICT-13B	nickel, total	4	2/12/2013	2/24/2016	38.45	21.5		49.5	
AREA 18/24	ICT-13B	Perchlorate	22	6/21/2000	2/24/2016	4796.77	62		45000	
AREA 18/24	ICT-13B	Tetrachloroethene	19	6/1/2001	2/24/2016	16.37	1		100	
AREA 18/24	ICT-13B	thallium, total	4	2/12/2013	2/24/2016	0.16	0.133	J	0.2	U
AREA 18/24	ICT-13B	Trichloroethene	19	6/1/2001	2/24/2016	4814.32	529		18800	
AREA 18/24	ICT-13B	Vinyl chloride	19	6/1/2001	2/24/2016	65.67	1		250	
AREA 18/24	ICT-13C	1,1,1-Trichloroethane	16	6/1/2001	2/24/2016	16.20	0.25	U	200	
AREA 18/24	ICT-13C	1,1,2-Trichloroethane	16	6/1/2001	2/24/2016	16.20	0.25	U	200	
AREA 18/24	ICT-13C	1,1-Dichloroethene	16	6/1/2001	2/24/2016	22.94	1		200	
AREA 18/24	ICT-13C	1,2-Dichloroethane	16	6/1/2001	2/24/2016	38.13	1		200	
AREA 18/24	ICT-13C	1,4-Dioxane	1	1/20/2016	1/20/2016	1.00	1	U	1	U
AREA 18/24	ICT-13C	Carbon tetrachloride	16	6/1/2001	2/24/2016	16.20	0.25	U	200	
AREA 18/24	ICT-13C	Chloroform	16	6/1/2001	2/24/2016	16.25	0.193	J	200	
AREA 18/24	ICT-13C	cis-1,2-Dichloroethene	9	10/1/2003	2/24/2016	297.14	1		1380	
AREA 18/24	ICT-13C	magnesium, total	2	3/3/2015	2/24/2016	15150.00	14500		15800	
AREA 18/24	ICT-13C	manganese, total	3	2/12/2013	2/24/2016	971.67	706	J	1500	
AREA 18/24	ICT-13C	Methylene chloride	16	6/1/2001	2/24/2016	115.78	0.5	U	708	
AREA 18/24	ICT-13C	nickel, total	3	2/12/2013	2/24/2016	123.27	18.7		327	
AREA 18/24	ICT-13C	Perchlorate	19	6/21/2000	2/24/2016	3847.82	1.7		27000	
AREA 18/24	ICT-13C	Tetrachloroethene	16	6/1/2001	2/24/2016	16.71	0.5	U	200	
AREA 18/24	ICT-13C	thallium, total	3	2/12/2013	2/24/2016	0.15	0.124	J	0.2	U
AREA 18/24	ICT-13C	Trichloroethene	16	6/1/2001	2/24/2016	3517.56	161		12800	
AREA 18/24	ICT-13C	Vinyl chloride	16	6/1/2001	2/24/2016	50.93	1		500	
AREA 18/24	ICT-13D	1,1,1-Trichloroethane	18	6/1/2001	2/24/2016	2.72	0.25	U	5	
AREA 18/24	ICT-13D	1,1,2-Trichloroethane	18	6/1/2001	2/24/2016	2.72	0.25	U	5	
AREA 18/24	ICT-13D	1,1-Dichloroethene	18	6/1/2001	2/24/2016	2.91	0.5	U	5	
AREA 18/24	ICT-13D	1,2-Dichloroethane	18	6/1/2001	2/24/2016	2.74	0.25	U	5	
AREA 18/24	ICT-13D	1,4-Dioxane	1	1/20/2016	1/20/2016	1.00	1	U	1	U
AREA 18/24	ICT-13D	Carbon tetrachloride	18	6/1/2001	2/24/2016	2.72	0.25	U	5	
AREA 18/24	ICT-13D	Chloroform	18	6/1/2001	2/24/2016	2.64	0.125	U	5	
AREA 18/24	ICT-13D	cis-1,2-Dichloroethene	10	10/1/2003	2/24/2016	2.69	0.288	J	7.02	
AREA 18/24	ICT-13D	magnesium, total	3	2/26/2014	2/24/2016	18883.33	2380		47300	
AREA 18/24	ICT-13D	manganese, total	4	2/12/2013	2/24/2016	547.78	51.1		1110	

Summary of COC Concentrations for LHAAP Wells and Miscellaneous Sampling Locations

Area	Location	Constituent	Count	Earliest	Latest	Avg (µg/L)	Min (µg/L)	Code	Max (µg/L)	Code
AREA 18/24	ICT-13D	Methylene chloride	18	6/1/2001	2/24/2016	3.29	0.25	U	10.5	
AREA 18/24	ICT-13D	nickel, total	4	2/12/2013	2/24/2016	93.10	43		151	
AREA 18/24	ICT-13D	Perchlorate	21	6/21/2000	2/24/2016	100.30	0.3	U	1170	
AREA 18/24	ICT-13D	Tetrachloroethene	18	6/1/2001	2/24/2016	2.77	0.25	U	5	
AREA 18/24	ICT-13D	thallium, total	4	2/12/2013	2/24/2016	0.17	0.122	J	0.2	U
AREA 18/24	ICT-13D	Trichloroethene	18	6/1/2001	2/24/2016	17.44	1		168	
AREA 18/24	ICT-13D	Vinyl chloride	18	6/1/2001	2/24/2016	3.64	0.42	J	10	
AREA 18/24	ICT-13E	1,1,1-Trichloroethane	16	6/1/2001	2/24/2016	2.73	0.25	U	5	
AREA 18/24	ICT-13E	1,1,2-Trichloroethane	16	6/1/2001	2/24/2016	2.73	0.25	U	5	
AREA 18/24	ICT-13E	1,1-Dichloroethene	16	6/1/2001	2/24/2016	2.91	0.5	U	5	
AREA 18/24	ICT-13E	1,2-Dichloroethane	16	6/1/2001	2/24/2016	2.73	0.25	U	5	
AREA 18/24	ICT-13E	1,4-Dioxane	1	1/20/2016	1/20/2016	1.00	1	U	1	U
AREA 18/24	ICT-13E	Carbon tetrachloride	16	6/1/2001	2/24/2016	2.73	0.25	U	5	
AREA 18/24	ICT-13E	Chloroform	16	6/1/2001	2/24/2016	2.65	0.125	U	5	
AREA 18/24	ICT-13E	cis-1,2-Dichloroethene	9	10/1/2003	2/24/2016	2.42	0.39	J	5.28	
AREA 18/24	ICT-13E	magnesium, total	3	2/26/2014	2/24/2016	2386.67	1290		4060	
AREA 18/24	ICT-13E	manganese, total	4	2/12/2013	2/24/2016	26.85	13.5		49.2	
AREA 18/24	ICT-13E	Methylene chloride	16	6/1/2001	2/24/2016	2.94	0.25	U	9.95	
AREA 18/24	ICT-13E	nickel, total	4	2/12/2013	2/24/2016	15.55	10.5		22	
AREA 18/24	ICT-13E	Perchlorate	19	6/21/2000	2/24/2016	961.74	4		4500	
AREA 18/24	ICT-13E	Tetrachloroethene	16	6/1/2001	2/24/2016	2.73	0.25	U	5	
AREA 18/24	ICT-13E	thallium, total	4	2/12/2013	2/24/2016	0.23	0.172	J	0.335	J
AREA 18/24	ICT-13E	Trichloroethene	16	6/1/2001	2/24/2016	4.38	1		8.9	
AREA 18/24	ICT-13E	Vinyl chloride	16	6/1/2001	2/24/2016	2.91	0.25	U	10	
AREA 18/24	ICT-13F	1,1,1-Trichloroethane	25	6/1/2001	2/24/2016	2.02	0.25	U	5	
AREA 18/24	ICT-13F	1,1,2-Trichloroethane	25	6/1/2001	2/24/2016	2.02	0.25	U	5	
AREA 18/24	ICT-13F	1,1-Dichloroethene	25	6/1/2001	2/24/2016	2.20	0.5	U	5	
AREA 18/24	ICT-13F	1,2-Dichloroethane	25	6/1/2001	2/24/2016	2.02	0.25	U	5	
AREA 18/24	ICT-13F	1,4-Dioxane	1	1/20/2016	1/20/2016	1.00	1	U	1	U
AREA 18/24	ICT-13F	Carbon tetrachloride	25	6/1/2001	2/24/2016	2.02	0.25	U	5	
AREA 18/24	ICT-13F	Chloroform	25	6/1/2001	2/24/2016	1.93	0.125	U	5	
AREA 18/24	ICT-13F	cis-1,2-Dichloroethene	17	10/1/2003	2/24/2016	0.90	0.25	U	5	
AREA 18/24	ICT-13F	magnesium, total	3	2/26/2014	2/24/2016	907.00	517	J	1680	
AREA 18/24	ICT-13F	manganese, total	4	2/12/2013	2/24/2016	29.95	15.6		58.5	
AREA 18/24	ICT-13F	Methylene chloride	25	6/1/2001	2/24/2016	2.25	0.25	U	8.37	
AREA 18/24	ICT-13F	nickel, total	4	2/12/2013	2/24/2016	10.43	6.68	J	14.1	
AREA 18/24	ICT-13F	Perchlorate	29	6/21/2000	2/24/2016	3.50	0.11	U	20	
AREA 18/24	ICT-13F	Tetrachloroethene	25	6/1/2001	2/24/2016	2.02	0.25	U	5	
AREA 18/24	ICT-13F	thallium, total	4	2/12/2013	2/24/2016	0.18	0.128	J	0.2	U
AREA 18/24	ICT-13F	Trichloroethene	25	6/1/2001	2/24/2016	2.27	0.25	U	5.51	
AREA 18/24	ICT-13F	Vinyl chloride	25	6/1/2001	2/24/2016	2.42	0.25	U	10	
AREA 18/24	ICT-14A	1,1,1-Trichloroethane	24	6/1/2001	2/24/2016	8.04	0.25	U	100	
AREA 18/24	ICT-14A	1,1,2-Trichloroethane	24	6/1/2001	2/24/2016	8.04	0.25	U	100	
AREA 18/24	ICT-14A	1,1-Dichloroethene	24	6/1/2001	2/24/2016	9.00	0.5	U	100	
AREA 18/24	ICT-14A	1,2-Dichloroethane	24	6/1/2001	2/24/2016	8.09	0.25	U	100	
AREA 18/24	ICT-14A	1,4-Dioxane	1	1/20/2016	1/20/2016	1.00	1	U	1	U
AREA 18/24	ICT-14A	Carbon tetrachloride	24	6/1/2001	2/24/2016	8.03	0.25	U	100	
AREA 18/24	ICT-14A	Chloroform	24	6/1/2001	2/24/2016	8.14	0.129	J	100	
AREA 18/24	ICT-14A	cis-1,2-Dichloroethene	17	10/1/2003	2/24/2016	44.32	1		580	
AREA 18/24	ICT-14A	magnesium, total	2	3/3/2015	2/24/2016	4405.00	4300		4510	
AREA 18/24	ICT-14A	manganese, total	3	2/12/2013	2/24/2016	70.13	38.6		95.5	
AREA 18/24	ICT-14A	Methylene chloride	24	6/1/2001	2/24/2016	20.33	0.25	U	190	
AREA 18/24	ICT-14A	nickel, total	3	2/12/2013	2/24/2016	12.08	8.03		15.3	
AREA 18/24	ICT-14A	Perchlorate	27	6/21/2000	2/24/2016	19154.41	348		192000	
AREA 18/24	ICT-14A	Tetrachloroethene	24	6/1/2001	2/24/2016	8.07	0.25	U	100	
AREA 18/24	ICT-14A	thallium, total	3	2/12/2013	2/24/2016	0.20	0.177	J	0.218	J
AREA 18/24	ICT-14A	Trichloroethene	24	6/1/2001	2/24/2016	94.45	5		659	
AREA 18/24	ICT-14A	Vinyl chloride	21	6/1/2001	2/24/2016	19.77	0.834	J	200	
AREA 18/24	ICT-14B	1,1,1-Trichloroethane	26	6/1/2001	2/24/2016	2.01	0.25	U	5	
AREA 18/24	ICT-14B	1,1,2-Trichloroethane	26	6/1/2001	2/24/2016	2.01	0.25	U	5	
AREA 18/24	ICT-14B	1,1-Dichloroethene	26	6/1/2001	2/24/2016	3.76	1		12.4	
AREA 18/24	ICT-14B	1,2-Dichloroethane	26	6/1/2001	2/24/2016	2.01	0.25	U	5	
AREA 18/24	ICT-14B	1,4-Dioxane	1	12/17/2015	12/17/2015	2.30	2.3		2.3	
AREA 18/24	ICT-14B	Carbon tetrachloride	26	6/1/2001	2/24/2016	2.01	0.25	U	5	
AREA 18/24	ICT-14B	Chloroform	25	6/1/2001	2/24/2016	2.29	0.433	J	5	
AREA 18/24	ICT-14B	cis-1,2-Dichloroethene	18	10/1/2003	2/24/2016	29.67	1		191	
AREA 18/24	ICT-14B	magnesium, total	3	2/26/2014	2/24/2016	8283.33	6140		9830	
AREA 18/24	ICT-14B	manganese, total	4	2/12/2013	2/24/2016	313.50	198	J	531	
AREA 18/24	ICT-14B	Methylene chloride	26	6/1/2001	2/24/2016	2.06	0.25	U	5.06	
AREA 18/24	ICT-14B	nickel, total	4	2/12/2013	2/24/2016	18.45	13.5		21.4	
AREA 18/24	ICT-14B	Perchlorate	29	6/21/2000	2/24/2016	24198.62	4430		44700	
AREA 18/24	ICT-14B	Tetrachloroethene	26	6/1/2001	2/24/2016	2.06	0.365	J	5	
AREA 18/24	ICT-14B	thallium, total	4	2/12/2013	2/24/2016	0.19	0.172	J	0.2	U
AREA 18/24	ICT-14B	Trichloroethene	26	6/1/2001	2/24/2016	185.85	82.1		688	
AREA 18/24	ICT-14B	Vinyl chloride	26	6/1/2001	2/24/2016	9.18	1		20	
AREA 18/24	ICT-14C	1,1,1-Trichloroethane	25	6/1/2001	2/24/2016	17.04	1		50	
AREA 18/24	ICT-14C	1,1,2-Trichloroethane	25	6/1/2001	2/24/2016	17.04	1		50	
AREA 18/24	ICT-14C	1,1-Dichloroethene	24	6/1/2001	2/24/2016	77.71	1		222	
AREA 18/24	ICT-14C	1,2-Dichloroethane	25	6/1/2001	2/24/2016	16.54	1		50	
AREA 18/24	ICT-14C	1,4-Dioxane	1	12/17/2015	12/17/2015	5.31	5.31	J	5.31	J
AREA 18/24	ICT-14C	Carbon tetrachloride	25	6/1/2001	2/24/2016	17.04	1		50	
AREA 18/24	ICT-14C	Chloroform	23	6/1/2001	2/24/2016	23.54	1		54.5	
AREA 18/24	ICT-14C	cis-1,2-Dichloroethene	17	10/1/2003	2/24/2016	2770.71	1		9880	
AREA 18/24	ICT-14C	magnesium, total	3	2/26/2014	2/24/2016	63066.67	46600		89800	
AREA 18/24	ICT-14C	manganese, total	4	2/12/2013	2/24/2016	1260.00	661		2610	
AREA 18/24	ICT-14C	Methylene chloride	24	6/1/2001	2/24/2016	1567.03	2		17800	
AREA 18/24	ICT-14C	nickel, total	4	2/12/2013	2/24/2016	22.03	9.7		35.7	

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Area	Location	Constituent	Count	Earliest	Latest	Avg (µg/L)	Min (µg/L)	Code	Max (µg/L)	Code
AREA 18/24	ICT-14C	Perchlorate	28	6/21/2000	2/24/2016	41144.64	9850		89900	
AREA 18/24	ICT-14C	Tetrachloroethene	24	6/1/2001	2/24/2016	18.63	1		52.4	J
AREA 18/24	ICT-14C	thallium, total	4	2/12/2013	2/24/2016	0.15	0.101	J	0.2	U
AREA 18/24	ICT-14C	Trichloroethene	25	6/1/2001	2/24/2016	7753.60	1390		16100	
AREA 18/24	ICT-14C	Vinyl chloride	24	6/1/2001	2/24/2016	107.43	1		648	
AREA 18/24	ICT-14D	1,1,1-Trichloroethane	25	6/1/2001	2/24/2016	39.58	0.889	J	200	
AREA 18/24	ICT-14D	1,1,2-Trichloroethane	25	6/1/2001	2/24/2016	40.32	1		200	
AREA 18/24	ICT-14D	1,1-Dichloroethene	25	6/1/2001	2/24/2016	107.56	0.5	U	319	
AREA 18/24	ICT-14D	1,2-Dichloroethane	25	6/1/2001	2/24/2016	47.61	1		200	
AREA 18/24	ICT-14D	1,4-Dioxane	1	12/17/2015	12/17/2015	6.54	6.54		6.54	
AREA 18/24	ICT-14D	Carbon tetrachloride	25	6/1/2001	2/24/2016	39.55	0.25	U	200	
AREA 18/24	ICT-14D	Chloroform	24	6/1/2001	2/24/2016	42.47	1		200	
AREA 18/24	ICT-14D	cis-1,2-Dichloroethene	17	10/1/2003	2/24/2016	4480.94	1		18400	
AREA 18/24	ICT-14D	magnesium, total	3	2/26/2014	2/24/2016	88366.67	72800		118000	
AREA 18/24	ICT-14D	manganese, total	4	2/12/2013	2/24/2016	1722.50	1570		1970	
AREA 18/24	ICT-14D	Methylene chloride	25	6/1/2001	2/24/2016	11642.35	2		52800	
AREA 18/24	ICT-14D	nickel, total	4	2/12/2013	2/24/2016	31.58	15.9		60.3	
AREA 18/24	ICT-14D	Perchlorate	28	6/21/2000	2/24/2016	13607.63	1.1	U	49800	
AREA 18/24	ICT-14D	Tetrachloroethene	25	6/1/2001	2/24/2016	40.86	1		200	
AREA 18/24	ICT-14D	thallium, total	4	2/12/2013	2/24/2016	0.20	0.2	U	0.2	U
AREA 18/24	ICT-14D	Trichloroethene	25	6/1/2001	2/24/2016	13773.60	1460		26500	
AREA 18/24	ICT-14D	Vinyl chloride	23	6/1/2001	2/24/2016	579.27	5		9600	
AREA 18/24	ICT-14E	1,1,1-Trichloroethane	15	6/1/2001	2/24/2016	32.18	0.5	U	200	
AREA 18/24	ICT-14E	1,1,2-Trichloroethane	15	6/1/2001	2/24/2016	34.30	1		200	
AREA 18/24	ICT-14E	1,1-Dichloroethene	15	6/1/2001	2/24/2016	35.59	1		200	
AREA 18/24	ICT-14E	1,2-Dichloroethane	15	6/1/2001	2/24/2016	57.98	1.07		215	
AREA 18/24	ICT-14E	1,4-Dioxane	1	1/20/2016	1/20/2016	1.04	1.04	J	1.04	J
AREA 18/24	ICT-14E	Carbon tetrachloride	15	6/1/2001	2/24/2016	32.18	0.5	U	200	
AREA 18/24	ICT-14E	Chloroform	15	6/1/2001	2/24/2016	32.94	1		200	
AREA 18/24	ICT-14E	cis-1,2-Dichloroethene	8	10/1/2003	2/24/2016	66.08	1		200	
AREA 18/24	ICT-14E	magnesium, total	1	2/24/2016	2/24/2016	85300.00	85300		85300	
AREA 18/24	ICT-14E	manganese, total	2	2/12/2013	2/24/2016	1370.00	1270	J	1470	
AREA 18/24	ICT-14E	Methylene chloride	15	6/1/2001	2/24/2016	263.75	0.5	U	1900	
AREA 18/24	ICT-14E	nickel, total	2	2/12/2013	2/24/2016	32.20	30.6		33.8	
AREA 18/24	ICT-14E	Perchlorate	18	6/21/2000	2/24/2016	32279.44	6230		79100	
AREA 18/24	ICT-14E	Tetrachloroethene	15	6/1/2001	2/24/2016	32.18	0.494	J	200	
AREA 18/24	ICT-14E	thallium, total	2	2/12/2013	2/24/2016	0.20	0.2	U	0.2	U
AREA 18/24	ICT-14E	Trichloroethene	15	6/1/2001	2/24/2016	13176.00	2510		22300	
AREA 18/24	ICT-14E	Vinyl chloride	15	6/1/2001	2/24/2016	124.94	1		500	
AREA 18/24	ICT-2	1,1,1-Trichloroethane	16	6/1/2001	2/24/2016	5.91	0.25	U	50	
AREA 18/24	ICT-2	1,1,2-Trichloroethane	16	6/1/2001	2/24/2016	5.91	0.25	U	50	
AREA 18/24	ICT-2	1,1-Dichloroethene	16	6/1/2001	2/24/2016	10.66	0.5	U	50	
AREA 18/24	ICT-2	1,2-Dichloroethane	19	6/19/1994	2/24/2016	76.79	0.483	J	182	
AREA 18/24	ICT-2	1,4-Dioxane	1	1/20/2016	1/20/2016	8.65	8.65		8.65	
AREA 18/24	ICT-2	Carbon tetrachloride	16	6/1/2001	2/24/2016	5.91	0.25	U	50	
AREA 18/24	ICT-2	Chloroform	19	6/19/1994	2/24/2016	7.03	0.125	U	50	
AREA 18/24	ICT-2	cis-1,2-Dichloroethene	8	10/1/2003	2/24/2016	47.81	0.623	J	312	
AREA 18/24	ICT-2	magnesium, total	3	2/26/2014	2/24/2016	40966.67	36200		45800	
AREA 18/24	ICT-2	manganese, total	4	2/12/2013	2/24/2016	392.75	313		531	
AREA 18/24	ICT-2	Methylene chloride	19	6/19/1994	2/24/2016	604.72	0.25	U	11162	
AREA 18/24	ICT-2	nickel, total	7	6/19/1994	2/24/2016	34.27	7.2	J	65	
AREA 18/24	ICT-2	Perchlorate	19	6/21/2000	2/24/2016	7668.90	29.6		17200	
AREA 18/24	ICT-2	Tetrachloroethene	16	6/1/2001	2/24/2016	6.14	0.25	U	50	
AREA 18/24	ICT-2	thallium, total	4	2/12/2013	2/24/2016	0.18	0.104	J	0.2	U
AREA 18/24	ICT-2	Trichloroethene	19	6/19/1994	2/24/2016	2031.66	14		9900	
AREA 18/24	ICT-2	Vinyl chloride	16	6/1/2001	2/24/2016	28.66	0.498	J	123	
AREA 18/24	ICT-4	1,1,1-Trichloroethane	22	6/1/2001	2/24/2016	29.80	1		500	
AREA 18/24	ICT-4	1,1,2-Trichloroethane	22	6/1/2001	2/24/2016	29.80	1		500	
AREA 18/24	ICT-4	1,1-Dichloroethene	22	6/1/2001	2/24/2016	36.83	1		500	
AREA 18/24	ICT-4	1,2-Dichloroethane	22	6/1/2001	2/24/2016	288.42	5		576	
AREA 18/24	ICT-4	1,4-Dioxane	1	1/20/2016	1/20/2016	8.58	8.58		8.58	
AREA 18/24	ICT-4	Carbon tetrachloride	22	6/1/2001	2/24/2016	45.63	5		500	
AREA 18/24	ICT-4	Chloroform	21	6/1/2001	2/24/2016	43.93	1		500	
AREA 18/24	ICT-4	cis-1,2-Dichloroethene	14	10/1/2003	2/24/2016	237.82	1		626	
AREA 18/24	ICT-4	magnesium, total	3	2/26/2014	2/24/2016	45633.33	41800		49500	
AREA 18/24	ICT-4	manganese, total	4	2/12/2013	2/24/2016	808.25	296		1130	
AREA 18/24	ICT-4	Methylene chloride	22	6/1/2001	2/24/2016	218.67	6.25	U	743	
AREA 18/24	ICT-4	nickel, total	4	2/12/2013	2/24/2016	31.63	17.2		44.3	
AREA 18/24	ICT-4	Perchlorate	25	6/21/2000	2/24/2016	106858.00	7300		286000	
AREA 18/24	ICT-4	Tetrachloroethene	22	6/1/2001	2/24/2016	31.18	1		500	
AREA 18/24	ICT-4	thallium, total	4	2/12/2013	2/24/2016	0.18	0.102	J	0.2	U
AREA 18/24	ICT-4	Trichloroethene	22	6/1/2001	2/24/2016	12088.64	3500		23700	
AREA 18/24	ICT-4	Vinyl chloride	22	6/1/2001	2/24/2016	54.01	1		1000	
AREA 18/24	ICT-7	1,1,1-Trichloroethane	26	6/1/2001	2/24/2016	1.96	0.25	U	5	
AREA 18/24	ICT-7	1,1,2-Trichloroethane	26	6/1/2001	2/24/2016	1.96	0.25	U	5	
AREA 18/24	ICT-7	1,1-Dichloroethene	26	6/1/2001	2/24/2016	2.15	0.5	U	5	
AREA 18/24	ICT-7	1,2-Dichloroethane	26	6/1/2001	2/24/2016	1.96	0.25	U	5	
AREA 18/24	ICT-7	1,4-Dioxane	1	1/20/2016	1/20/2016	1.00	1	U	1	U
AREA 18/24	ICT-7	Carbon tetrachloride	26	6/1/2001	2/24/2016	1.96	0.25	U	5	
AREA 18/24	ICT-7	Chloroform	26	6/1/2001	2/24/2016	1.87	0.125	U	5	
AREA 18/24	ICT-7	cis-1,2-Dichloroethene	18	10/1/2003	2/24/2016	0.67	0.25	U	5	
AREA 18/24	ICT-7	magnesium, total	3	2/26/2014	2/24/2016	3133.33	2100		4580	
AREA 18/24	ICT-7	manganese, total	4	2/12/2013	2/24/2016	111.43	53.1		232	
AREA 18/24	ICT-7	Methylene chloride	26	6/1/2001	2/24/2016	1.89	0.25	U	5	
AREA 18/24	ICT-7	nickel, total	4	2/12/2013	2/24/2016	12.28	10.1		15.1	
AREA 18/24	ICT-7	Perchlorate	29	6/21/2000	2/24/2016	556.20	4		9150	
AREA 18/24	ICT-7	Tetrachloroethene	26	6/1/2001	2/24/2016	1.96	0.25	U	5	

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Area	Location	Constituent	Count	Earliest	Latest	Avg (µg/L)	Min (µg/L)	Code	Max (µg/L)	Code
AREA 18/24	ICT-7	thallium, total	4	2/12/2013	2/24/2016	0.24	0.2	U	0.358	J
AREA 18/24	ICT-7	Trichloroethene	26	6/1/2001	2/24/2016	3.40	0.25	U	37	
AREA 18/24	ICT-7	Vinyl chloride	25	6/1/2001	2/24/2016	2.38	0.25	U	10	
AREA 18/24	ICT-8	1,1,1-Trichloroethane	26	6/1/2001	2/24/2016	737.45	1		10000	
AREA 18/24	ICT-8	1,1,2-Trichloroethane	26	6/1/2001	2/24/2016	691.41	1		10000	
AREA 18/24	ICT-8	1,1-Dichloroethene	26	6/1/2001	2/24/2016	1236.31	5		10000	
AREA 18/24	ICT-8	1,2-Dichloroethane	26	6/1/2001	2/24/2016	696.12	1		10000	
AREA 18/24	ICT-8	Carbon tetrachloride	26	6/1/2001	2/24/2016	688.48	1		10000	
AREA 18/24	ICT-8	Chloroform	26	6/1/2001	2/24/2016	586.38	1		10000	
AREA 18/24	ICT-8	cis-1,2-Dichloroethene	18	10/1/2003	2/24/2016	8204.50	1		38200	
AREA 18/24	ICT-8	magnesium, total	3	2/26/2014	2/24/2016	31633.33	24800		42700	
AREA 18/24	ICT-8	manganese, total	4	2/12/2013	2/24/2016	702.50	616		903	
AREA 18/24	ICT-8	Methylene chloride	26	6/1/2001	2/24/2016	576542.31	39900		2610000	
AREA 18/24	ICT-8	nickel, total	4	2/12/2013	2/24/2016	14.15	10.8		15.8	
AREA 18/24	ICT-8	Perchlorate	29	6/21/2000	2/24/2016	8304.48	180		33600	
AREA 18/24	ICT-8	Tetrachloroethene	26	6/1/2001	2/24/2016	842.12	1		10000	
AREA 18/24	ICT-8	thallium, total	4	2/12/2013	2/24/2016	0.17	0.125	J	0.2	U
AREA 18/24	ICT-8	Trichloroethene	25	6/1/2001	2/24/2016	50751.20	6420		163000	
AREA 18/24	ICT-8	Vinyl chloride	26	6/1/2001	2/24/2016	1091.61	1		20000	
AREA 18/24	PRODUCTION2	1,1,1-Trichloroethane	1	8/23/2014	8/23/2014	0.50	0.5	U	0.5	U
AREA 18/24	PRODUCTION2	1,1,2-Trichloroethane	1	8/23/2014	8/23/2014	0.50	0.5	U	0.5	U
AREA 18/24	PRODUCTION2	1,1-Dichloroethene	1	8/23/2014	8/23/2014	1.00	1	U	1	U
AREA 18/24	PRODUCTION2	1,2-Dichloroethane	1	8/23/2014	8/23/2014	0.50	0.5	U	0.5	U
AREA 18/24	PRODUCTION2	Carbon tetrachloride	1	8/23/2014	8/23/2014	0.50	0.5	U	0.5	U
AREA 18/24	PRODUCTION2	Chloroform	1	8/23/2014	8/23/2014	0.25	0.25	U	0.25	U
AREA 18/24	PRODUCTION2	cis-1,2-Dichloroethene	1	8/23/2014	8/23/2014	0.50	0.5	U	0.5	U
AREA 18/24	PRODUCTION2	Methylene chloride	1	8/23/2014	8/23/2014	0.50	0.5	U	0.5	U
AREA 18/24	PRODUCTION2	Perchlorate	1	8/23/2014	8/23/2014	5.98	5.98		5.98	
AREA 18/24	PRODUCTION2	Tetrachloroethene	1	8/23/2014	8/23/2014	0.50	0.5	U	0.5	U
AREA 18/24	PRODUCTION2	Trichloroethene	1	8/23/2014	8/23/2014	0.50	0.5	U	0.5	U
AREA 18/24	PRODUCTION2	Vinyl chloride	1	8/23/2014	8/23/2014	0.50	0.5	U	0.5	U
AREA 58	35ASW03	1,1,1-Trichloroethane	6	10/17/2013	4/13/2016	0.50	0.5	U	0.5	U
AREA 58	35ASW03	1,1,2-Trichloroethane	6	10/17/2013	4/13/2016	0.50	0.5	U	0.5	U
AREA 58	35ASW03	1,1-Dichloroethene	6	10/17/2013	4/13/2016	1.00	1	U	1	U
AREA 58	35ASW03	1,2-Dichloroethane	6	10/17/2013	4/13/2016	0.50	0.5	U	0.5	U
AREA 58	35ASW03	Carbon tetrachloride	6	10/17/2013	4/13/2016	0.50	0.5	U	0.5	U
AREA 58	35ASW03	Chloroform	6	10/17/2013	4/13/2016	0.25	0.25	U	0.25	U
AREA 58	35ASW03	cis-1,2-Dichloroethene	6	10/17/2013	4/13/2016	0.50	0.5	U	0.5	U
AREA 58	35ASW03	Methylene chloride	6	10/17/2013	4/13/2016	0.50	0.5	U	0.5	U
AREA 58	35ASW03	Tetrachloroethene	6	10/17/2013	4/13/2016	0.50	0.5	U	0.5	U
AREA 58	35ASW03	Trichloroethene	6	10/17/2013	4/13/2016	0.46	0.259	J	0.5	U
AREA 58	35ASW03	Vinyl chloride	6	10/17/2013	4/13/2016	0.50	0.5	U	0.5	U
GWTP	GWTPFLOOR	1,1,1-Trichloroethane	1	11/4/2015	11/4/2015	0.50	0.5	U	0.5	U
GWTP	GWTPFLOOR	1,1,2-Trichloroethane	1	11/4/2015	11/4/2015	0.50	0.5	U	0.5	U
GWTP	GWTPFLOOR	1,1-Dichloroethene	1	11/4/2015	11/4/2015	1.00	1	U	1	U
GWTP	GWTPFLOOR	1,2-Dichloroethane	1	11/4/2015	11/4/2015	0.50	0.5	U	0.5	U
GWTP	GWTPFLOOR	Perchlorate	1	11/4/2015	11/4/2015	260.00	260		260	
GWTP	SP103-7	Perchlorate	90	1/15/2003	4/27/2016	15399.46	1.5		26800	
GWTP	SP140-7	1,1,1-TRICHLOROETHANE	159	6/13/2000	9/27/2017	20.28	0.25	U	250	U
GWTP	SP140-7	1,1,2-TRICHLOROETHANE	158	6/13/2000	9/27/2017	19.78	0.25	U	250	U
GWTP	SP140-7	1,1-DICHLOROETHENE	159	6/13/2000	9/27/2017	84.56	0.5	U	380	
GWTP	SP140-7	1,2-DICHLOROETHANE	159	6/13/2000	9/27/2017	56.65	0.25	U	540	
GWTP	SP140-7	1,4-DIOXANE	3	3/29/2017	9/27/2017	19.37	17.7	J	22.5	J
GWTP	SP140-7	CARBON TETRACHLORIDE	159	6/13/2000	9/27/2017	20.07	0.25	U	250	U
GWTP	SP140-7	CHLOROFORM	159	6/13/2000	9/27/2017	22.26	0.125	U	250	U
GWTP	SP140-7	Chromium, Total	5	11/8/2010	11/7/2011	8.51	3.22	J	13.7	
GWTP	SP140-7	cis-1,2-Dichloroethene	115	6/13/2000	12/5/2016	2788.55	1		6950	
GWTP	SP140-7	manganese, total	22	2/1/2005	9/27/2017	1087.70	40.4		3140	
GWTP	SP140-7	METHYLENE CHLORIDE	159	6/13/2000	9/27/2017	19614.37	0.25	U	300000	
GWTP	SP140-7	nickel, total	46	6/13/2000	9/27/2017	68.90	2.94	J	790	
GWTP	SP140-7	PERCHLORATE	131	11/15/2000	9/28/2017	17497.00	0.1	U	76200	
GWTP	SP140-7	TETRACHLOROETHENE	158	6/13/2000	9/27/2017	33.93	0.25	U	250	U
GWTP	SP140-7	thallium, total	9	12/13/2012	9/27/2017	0.19	0.141	J	0.2	U
GWTP	SP140-7	TRICHLOROETHENE	158	6/13/2000	9/27/2017	9857.26	1	U	30500	
GWTP	SP140-7	VINYL CHLORIDE	159	6/13/2000	9/27/2017	54.64	0.988	J	250	U
GWTP	SP650-6	1,1,1-TRICHLOROETHANE	473	3/14/2001	9/28/2017	0.81	0.25	U	12.5	U
GWTP	SP650-6	1,1,2-TRICHLOROETHANE	473	3/14/2001	9/28/2017	0.80	0.25	U	12.5	U
GWTP	SP650-6	1,1-DICHLOROETHENE	474	3/14/2001	9/28/2017	1.19	0.5	U	66.1	
GWTP	SP650-6	1,2-DICHLOROETHANE	474	3/14/2001	9/28/2017	0.94	0.25	U	15.2	J
GWTP	SP650-6	1,4-DIOXANE	72	8/25/2014	9/28/2017	17.05	2.64	J	39.1	
GWTP	SP650-6	CARBON TETRACHLORIDE	473	3/14/2001	9/28/2017	0.81	0.25	U	12.5	U
GWTP	SP650-6	CHLOROFORM	474	3/14/2001	9/28/2017	0.69	0.125	U	9.96	J
GWTP	SP650-6	Chromium, Total	9	5/10/2010	5/21/2012	5.16	2.5	U	12.4	
GWTP	SP650-6	cis-1,2-Dichloroethene	228	9/18/2007	8/9/2017	14.62	0.25	U	1130	
GWTP	SP650-6	magnesium, total	12	10/24/2001	8/25/2014	33917.50	8510		85000	
GWTP	SP650-6	manganese, total	91	10/24/2001	9/27/2017	118.46	3.47		887	
GWTP	SP650-6	METHYLENE CHLORIDE	471	3/14/2001	9/28/2017	38.02	0.25	U	17200	
GWTP	SP650-6	nickel, total	105	5/15/2001	9/27/2017	296.88	1.11	J	10000	
GWTP	SP650-6	PERCHLORATE	1513	3/14/2001	9/28/2017	138.11	0.0088	U	19200	
GWTP	SP650-6	TETRACHLOROETHENE	474	3/14/2001	9/28/2017	0.86	0.206		32.3	J
GWTP	SP650-6	thallium, total	61	12/6/2010	9/27/2017	0.21	0.1	J	1.04	
GWTP	SP650-6	TRICHLOROETHENE	472	3/14/2001	9/28/2017	13.48	0.25	U	5300	
GWTP	SP650-6	VINYL CHLORIDE	473	3/14/2001	9/28/2017	2.05	0.25	U	26.3	
LHAAP 1824	109	1,1,1-Trichloroethane	31	4/1/1994	12/14/2017	3.26	0.5		10	U
LHAAP 1824	109	1,1,2-Trichloroethane	29	4/1/1994	12/14/2017	3.14	0.296	J	10	U
LHAAP 1824	109	1,1-Dichloroethene	36	4/1/1994	12/14/2017	9.67	1	U	117	
LHAAP 1824	109	1,2-Dichloroethane	37	9/24/1988	12/14/2017	3.58	0.5	U	10	U

Summary of COC Concentrations for LHAAP Wells and Miscellaneous Sampling Locations

Area	Location	Constituent	Count	Earliest	Latest	Avg (µg/L)	Min (µg/L)	Code	Max (µg/L)	Code
LHAAP 1824	109	1,4-Dioxane	2	11/4/2015	6/22/2016	1.13	1	U	1.25	U
LHAAP 1824	109	Carbon tetrachloride	36	4/1/1994	12/14/2017	3.63	0.5	U	10	U
LHAAP 1824	109	Chloroform	36	11/19/1982	12/14/2017	3.75	0.5		10	U
LHAAP 1824	109	Chromium, Total	2	9/21/2011	3/12/2012	2.50	2.5	U	2.5	U
LHAAP 1824	109	cis-1,2-Dichloroethene	26	12/1/1996	12/14/2017	155.34	5		660	
LHAAP 1824	109	magnesium, total	10	4/1/1994	6/9/2017	22826.20	5		82000	
LHAAP 1824	109	manganese, total	16	11/19/1982	6/9/2017	103.88	3.96	J	510	
LHAAP 1824	109	Methylene chloride	48	7/1/1984	12/14/2017	245.17	0.25		11000	
LHAAP 1824	109	nickel, total	32	11/19/1982	6/9/2017	15.86	0.5		70	
LHAAP 1824	109	Perchlorate	24	10/1/2000	6/9/2017	35306.88	265		89600	
LHAAP 1824	109	strontium, total	1	11/19/1982	11/19/1982	80.00	80		80	
LHAAP 1824	109	Tetrachloroethene	32	9/24/1988	12/14/2017	3.36	0.5		10	U
LHAAP 1824	109	thallium, total	13	11/19/1982	6/9/2017	5.63	0.112	J	50	
LHAAP 1824	109	Trichloroethene	49	11/19/1982	12/14/2017	459.76	1		1500	
LHAAP 1824	109	Vinyl chloride	36	4/1/1994	12/14/2017	5.63	0.5		22	
LHAAP 1824	120	1,1,1-Trichloroethane	28	4/1/1994	12/14/2017	65.54	0.25	U	1000	U
LHAAP 1824	120	1,1,2-Trichloroethane	26	4/1/1994	12/14/2017	73.60	1		1000	U
LHAAP 1824	120	1,1-Dichloroethene	33	4/1/1994	12/14/2017	186.61	1		1000	U
LHAAP 1824	120	1,2-Dichloroethane	34	9/23/1988	12/14/2017	462.36	1		13000	
LHAAP 1824	120	1,4-DIOXANE	2	11/2/2015	6/16/2016	211.50	203		220	
LHAAP 1824	120	Carbon tetrachloride	33	4/1/1994	12/14/2017	55.78	0.25	U	1000	U
LHAAP 1824	120	Chloroform	33	11/20/1982	12/14/2017	119.03	0.5		1200	U
LHAAP 1824	120	cis-1,2-Dichloroethene	23	12/1/1996	12/14/2017	1411.96	5		3900	
LHAAP 1824	120	magnesium, total	4	4/1/1994	5/1/2002	28526.25	5		44100	
LHAAP 1824	120	manganese, total	7	11/20/1982	5/1/2002	710.57	5		1600	
LHAAP 1824	120	Methylene chloride	45	7/1/1984	12/14/2017	148639.78	50	U	820000	
LHAAP 1824	120	nickel, total	22	11/20/1982	5/23/2006	55.59	5		100	
LHAAP 1824	120	PERCHLORATE	21	10/1/2000	6/9/2017	117047.62	24100	J	252000	
LHAAP 1824	120	strontium, total	1	11/20/1982	11/20/1982	412.00	412		412	
LHAAP 1824	120	Tetrachloroethene	29	9/23/1988	12/14/2017	512.24	0.5		13000	
LHAAP 1824	120	thallium, total	6	11/20/1982	1/22/1999	11.67	2	U	50	
LHAAP 1824	120	Trichloroethene	46	11/20/1982	12/14/2017	31817.46	1		195000	
LHAAP 1824	120	Vinyl chloride	33	4/1/1994	12/14/2017	107.60	1		1000	U
LHAAP 1824	123	1,1,1-Trichloroethane	20	4/1/1994	12/14/2017	2.06	0.25	U	5	
LHAAP 1824	123	1,1,2-Trichloroethane	18	4/1/1994	12/14/2017	1.74	0.25	U	5	
LHAAP 1824	123	1,1-Dichloroethene	25	4/1/1994	12/14/2017	2.82	0.5	U	5	
LHAAP 1824	123	1,2-Dichloroethane	26	9/22/1988	12/14/2017	2.99	0.25	U	6.1	
LHAAP 1824	123	1,4-Dioxane	2	11/4/2015	6/16/2016	0.81	0.587	J	1.04	U
LHAAP 1824	123	Carbon tetrachloride	25	4/1/1994	12/14/2017	2.83	0.25	U	5	
LHAAP 1824	123	Chloroform	24	4/1/1994	12/14/2017	2.62	0.125	U	5	
LHAAP 1824	123	cis-1,2-Dichloroethene	18	12/1/1996	12/14/2017	3.73	0.25	U	14.4	
LHAAP 1824	123	magnesium, total	8	4/1/1994	6/9/2017	8188.13	5		13100	
LHAAP 1824	123	manganese, total	12	11/17/1982	6/9/2017	28.95	2.09	J	130	
LHAAP 1824	123	Methylene chloride	35	7/1/1984	12/14/2017	120.57	0.25		4000	
LHAAP 1824	123	nickel, total	22	11/17/1982	6/9/2017	36.17	0.5		400	
LHAAP 1824	123	Perchlorate	13	10/1/2000	6/9/2017	2788.41	2.31		34600	
LHAAP 1824	123	strontium, total	1	11/17/1982	11/17/1982	72.00	72		72	
LHAAP 1824	123	Tetrachloroethene	21	9/22/1988	12/14/2017	2.20	0.25	U	5	
LHAAP 1824	123	thallium, total	11	11/17/1982	6/9/2017	6.55	0.2	U	50	
LHAAP 1824	123	Trichloroethene	35	7/1/1984	12/14/2017	11.93	0.25	U	100	
LHAAP 1824	123	Vinyl chloride	25	4/1/1994	12/14/2017	2.65	0.25	U	5	
LHAAP 1824	126	1,1,1-Trichloroethane	29	4/1/1994	12/5/2017	2.20	0.25	U	5	
LHAAP 1824	126	1,1,2-Trichloroethane	28	4/1/1994	12/5/2017	2.10	0.25	U	5	
LHAAP 1824	126	1,1-Dichloroethene	34	4/1/1994	12/5/2017	2.78	0.5	U	5	
LHAAP 1824	126	1,2-Dichloroethane	34	4/1/1994	12/5/2017	5.71	0.25	U	110	
LHAAP 1824	126	1,4-Dioxane	2	11/4/2015	6/14/2016	1.04	1	U	1.08	U
LHAAP 1824	126	Carbon tetrachloride	34	4/1/1994	12/5/2017	2.74	0.25	U	5	
LHAAP 1824	126	Chloroform	34	11/20/1982	12/5/2017	2.52	0.125	U	5	
LHAAP 1824	126	Chromium, Total	3	3/24/2011	3/7/2012	4.11	2.5	U	7.34	J
LHAAP 1824	126	cis-1,2-Dichloroethene	25	12/1/1996	12/5/2017	2.33	0.25	U	5	
LHAAP 1824	126	magnesium, total	12	4/1/1994	12/5/2017	175275.42	5		244000	
LHAAP 1824	126	manganese, total	19	11/20/1982	12/5/2017	492.06	5		1340	
LHAAP 1824	126	Methylene chloride	39	7/1/1984	12/5/2017	152.28	0.25		5800	
LHAAP 1824	126	nickel, total	34	11/20/1982	12/5/2017	29.21	0.5		135	
LHAAP 1824	126	Perchlorate	26	5/24/2000	12/5/2017	2.34	0.1	U	7.84	
LHAAP 1824	126	strontium, total	1	11/20/1982	11/20/1982	7760.00	7760		7760	
LHAAP 1824	126	Tetrachloroethene	29	4/1/1994	12/5/2017	2.20	0.25	U	5	
LHAAP 1824	126	thallium, total	15	11/20/1982	12/5/2017	9.27	0.2	U	120	
LHAAP 1824	126	Trichloroethene	39	11/20/1982	12/5/2017	138.46	0.25	U	5300	
LHAAP 1824	126	Vinyl chloride	34	4/1/1994	12/5/2017	2.90	0.25	U	10	
LHAAP 1824	18CPTMW01SW	1,1,1-Trichloroethane	12	5/16/2013	12/20/2017	12.67	0.5	U	50	U
LHAAP 1824	18CPTMW01SW	1,1,2-Trichloroethane	12	5/16/2013	12/20/2017	12.67	0.5	U	50	U
LHAAP 1824	18CPTMW01SW	1,1-Dichloroethene	12	5/16/2013	12/20/2017	25.73	1	U	100	U
LHAAP 1824	18CPTMW01SW	1,2-Dichloroethane	12	5/16/2013	12/20/2017	12.67	0.5	U	50	U
LHAAP 1824	18CPTMW01SW	1,4-Dioxane	3	8/27/2014	6/24/2016	1.02	1	U	1.06	U
LHAAP 1824	18CPTMW01SW	Carbon tetrachloride	12	5/16/2013	12/20/2017	12.67	0.5	U	50	U
LHAAP 1824	18CPTMW01SW	Chloroform	12	5/16/2013	12/20/2017	6.65	0.44	J	25	U
LHAAP 1824	18CPTMW01SW	cis-1,2-Dichloroethene	12	5/16/2013	12/20/2017	15.21	2.75		50	U
LHAAP 1824	18CPTMW01SW	magnesium, total	11	5/16/2013	12/20/2017	18658.18	4040		21500	
LHAAP 1824	18CPTMW01SW	manganese, total	11	5/16/2013	12/20/2017	562.65	73.2		639	
LHAAP 1824	18CPTMW01SW	Methylene chloride	12	5/16/2013	12/20/2017	8751.58	746		32400	
LHAAP 1824	18CPTMW01SW	nickel, total	12	5/16/2013	12/20/2017	4.10	2.25		7.32	J
LHAAP 1824	18CPTMW01SW	Perchlorate	12	5/16/2013	12/20/2017	22.58	0.2	U	158	
LHAAP 1824	18CPTMW01SW	Tetrachloroethene	12	5/16/2013	12/20/2017	12.65	0.279	J	50	U
LHAAP 1824	18CPTMW01SW	thallium, total	12	5/16/2013	12/20/2017	0.33	0.104	J	2	U
LHAAP 1824	18CPTMW01SW	Trichloroethene	12	5/16/2013	12/20/2017	379.56	34.8		1210	
LHAAP 1824	18CPTMW01SW	Vinyl chloride	12	5/16/2013	12/20/2017	12.67	0.5	U	50	U

Summary of COC Concentrations for LHAAP Wells and Miscellaneous Sampling Locations

Area	Location	Constituent	Count	Earliest	Latest	Avg (µg/L)	Min (µg/L)	Code	Max (µg/L)	Code
LHAAP 1824	18CPTMW03SW	1,1,1-Trichloroethane	5	12/19/2014	12/15/2017	1.15	0.5	U	2.5	U
LHAAP 1824	18CPTMW03SW	1,1,2-Trichloroethane	5	12/19/2014	12/15/2017	1.15	0.5	U	2.5	U
LHAAP 1824	18CPTMW03SW	1,1-Dichloroethene	5	12/19/2014	12/15/2017	2.10	1	U	5	U
LHAAP 1824	18CPTMW03SW	1,2-Dichloroethane	5	12/19/2014	12/15/2017	30.02	4.5		79.1	
LHAAP 1824	18CPTMW03SW	1,4-Dioxane	2	10/28/2015	6/8/2016	2.48	1.15	J	3.8	
LHAAP 1824	18CPTMW03SW	Carbon tetrachloride	5	12/19/2014	12/15/2017	1.15	0.5	U	2.5	U
LHAAP 1824	18CPTMW03SW	Chloroform	5	12/19/2014	12/15/2017	0.80	0.25	U	1.89	J
LHAAP 1824	18CPTMW03SW	cis-1,2-Dichloroethene	5	12/19/2014	12/15/2017	48.96	7.2		134	
LHAAP 1824	18CPTMW03SW	magnesium, total	4	12/19/2014	12/15/2017	2742.50	500	U	4540	
LHAAP 1824	18CPTMW03SW	manganese, total	4	12/19/2014	12/15/2017	46.10	6.4		82.2	
LHAAP 1824	18CPTMW03SW	Methylene chloride	5	12/19/2014	12/15/2017	15.45	0.806	J	59	
LHAAP 1824	18CPTMW03SW	nickel, total	4	12/19/2014	12/15/2017	8.96	7.16	J	11.9	
LHAAP 1824	18CPTMW03SW	Perchlorate	4	12/19/2014	6/19/2017	1968.50	154		5880	
LHAAP 1824	18CPTMW03SW	Tetrachloroethene	5	12/19/2014	12/15/2017	1.15	0.5	U	2.5	U
LHAAP 1824	18CPTMW03SW	thallium, total	4	12/19/2014	12/15/2017	0.65	0.2	U	2	U
LHAAP 1824	18CPTMW03SW	Trichloroethene	5	12/19/2014	12/15/2017	366.54	43		1010	
LHAAP 1824	18CPTMW03SW	Vinyl chloride	5	12/19/2014	12/15/2017	1.38	0.792	J	2.74	J
LHAAP 1824	18CPTMW04	1,1,1-Trichloroethane	10	5/17/2013	12/20/2017	1.90	0.5	U	5	U
LHAAP 1824	18CPTMW04	1,1,2-Trichloroethane	10	5/17/2013	12/20/2017	1.90	0.5	U	5	U
LHAAP 1824	18CPTMW04	1,1-Dichloroethene	10	5/17/2013	12/20/2017	5.22	1.81	J	10	U
LHAAP 1824	18CPTMW04	1,2-Dichloroethane	10	5/17/2013	12/20/2017	2.80	0.379	J	8.1	J
LHAAP 1824	18CPTMW04	1,4-Dioxane	3	8/25/2014	6/14/2016	6.83	1.67	J	12.6	
LHAAP 1824	18CPTMW04	Carbon tetrachloride	10	5/17/2013	12/20/2017	1.90	0.5	U	5	U
LHAAP 1824	18CPTMW04	Chloroform	10	5/17/2013	12/20/2017	1.91	0.25	U	4.31	J
LHAAP 1824	18CPTMW04	cis-1,2-Dichloroethene	10	5/17/2013	12/20/2017	59.70	38.7		76.9	
LHAAP 1824	18CPTMW04	magnesium, total	4	5/17/2013	6/15/2017	28070.00	3880		37000	
LHAAP 1824	18CPTMW04	manganese, total	4	5/17/2013	6/15/2017	140.98	17.9		204	
LHAAP 1824	18CPTMW04	Methylene chloride	10	5/17/2013	12/20/2017	2.38	0.5	U	5	U
LHAAP 1824	18CPTMW04	nickel, total	4	5/17/2013	6/15/2017	4.36	4	U	4.79	J
LHAAP 1824	18CPTMW04	Perchlorate	10	5/17/2013	12/20/2017	522.95	0.364	J	1360	
LHAAP 1824	18CPTMW04	Tetrachloroethene	10	5/17/2013	12/20/2017	2.06	0.494	J	5	U
LHAAP 1824	18CPTMW04	thallium, total	4	5/17/2013	6/15/2017	0.20	0.2	U	0.2	U
LHAAP 1824	18CPTMW04	Trichloroethene	10	5/17/2013	12/20/2017	997.56	86.6		2310	
LHAAP 1824	18CPTMW04	Vinyl chloride	10	5/17/2013	12/20/2017	3.34	0.617	J	5.56	
LHAAP 1824	18CPTMW04SW	1,1,1-Trichloroethane	11	5/16/2013	12/20/2017	0.55	0.5	U	1	U
LHAAP 1824	18CPTMW04SW	1,1,2-Trichloroethane	11	5/16/2013	12/20/2017	0.55	0.5	U	1	U
LHAAP 1824	18CPTMW04SW	1,1-Dichloroethene	11	5/16/2013	12/20/2017	1.00	1	U	1	U
LHAAP 1824	18CPTMW04SW	1,2-Dichloroethane	11	5/16/2013	12/20/2017	0.55	0.5	U	1	U
LHAAP 1824	18CPTMW04SW	1,4-Dioxane	2	8/25/2014	6/14/2016	1.04	1	U	1.08	U
LHAAP 1824	18CPTMW04SW	Carbon tetrachloride	11	5/16/2013	12/20/2017	0.55	0.5	U	1	U
LHAAP 1824	18CPTMW04SW	Chloroform	11	5/16/2013	12/20/2017	0.32	0.25	U	1	U
LHAAP 1824	18CPTMW04SW	cis-1,2-Dichloroethene	11	5/16/2013	12/20/2017	0.55	0.5	U	1	U
LHAAP 1824	18CPTMW04SW	magnesium, total	10	5/16/2013	12/20/2017	16320.00	12500		19100	
LHAAP 1824	18CPTMW04SW	manganese, total	10	5/16/2013	12/20/2017	483.78	71.8		1010	
LHAAP 1824	18CPTMW04SW	Methylene chloride	11	5/16/2013	12/20/2017	1.03	0.261	J	4.73	
LHAAP 1824	18CPTMW04SW	nickel, total	10	5/16/2013	12/20/2017	5.84	2.06	J	12.4	
LHAAP 1824	18CPTMW04SW	Perchlorate	11	5/16/2013	12/20/2017	10.24	0.186	J	81.8	D
LHAAP 1824	18CPTMW04SW	Tetrachloroethene	11	5/16/2013	12/20/2017	0.55	0.5	U	1	U
LHAAP 1824	18CPTMW04SW	thallium, total	10	5/16/2013	12/20/2017	0.36	0.101	J	2	U
LHAAP 1824	18CPTMW04SW	Trichloroethene	11	5/16/2013	12/20/2017	0.58	0.5	U	1	U
LHAAP 1824	18CPTMW04SW	Vinyl chloride	11	5/16/2013	12/20/2017	0.55	0.5	U	1	U
LHAAP 1824	18CPTMW06	1,1,1-Trichloroethane	11	5/17/2013	12/18/2017	0.55	0.5	U	1	U
LHAAP 1824	18CPTMW06	1,1,2-Trichloroethane	11	5/17/2013	12/18/2017	0.55	0.5	U	1	U
LHAAP 1824	18CPTMW06	1,1-Dichloroethene	11	5/17/2013	12/18/2017	1.00	1	U	1	U
LHAAP 1824	18CPTMW06	1,2-Dichloroethane	11	5/17/2013	12/18/2017	0.55	0.5	U	1	U
LHAAP 1824	18CPTMW06	1,4-Dioxane	3	8/26/2014	6/8/2016	1.02	1	U	1.05	U
LHAAP 1824	18CPTMW06	Carbon tetrachloride	11	5/17/2013	12/18/2017	0.55	0.5	U	1	U
LHAAP 1824	18CPTMW06	Chloroform	11	5/17/2013	12/18/2017	0.32	0.25	U	1	U
LHAAP 1824	18CPTMW06	cis-1,2-Dichloroethene	11	5/17/2013	12/18/2017	2.23	0.5	U	9.21	
LHAAP 1824	18CPTMW06	magnesium, total	5	5/17/2013	6/12/2017	4510.00	500	U	8640	
LHAAP 1824	18CPTMW06	manganese, total	5	5/17/2013	6/12/2017	80.67	2.43	J	175	
LHAAP 1824	18CPTMW06	Methylene chloride	11	5/17/2013	12/18/2017	91.17	2	U	597	
LHAAP 1824	18CPTMW06	nickel, total	5	5/17/2013	6/12/2017	3.28	2.01	J	4	U
LHAAP 1824	18CPTMW06	Perchlorate	11	5/17/2013	12/18/2017	5.24	0.818		30.3	
LHAAP 1824	18CPTMW06	Tetrachloroethene	11	5/17/2013	12/18/2017	0.55	0.5	U	1	U
LHAAP 1824	18CPTMW06	thallium, total	5	5/17/2013	6/12/2017	0.20	0.2	U	0.2	U
LHAAP 1824	18CPTMW06	Trichloroethene	11	5/17/2013	12/18/2017	8.52	1.02		30.9	
LHAAP 1824	18CPTMW06	Vinyl chloride	11	5/17/2013	12/18/2017	0.55	0.5	U	1	U
LHAAP 1824	18CPTMW07	1,1,1-Trichloroethane	10	5/14/2013	12/6/2017	0.55	0.5	U	1	U
LHAAP 1824	18CPTMW07	1,1,2-Trichloroethane	10	5/14/2013	12/6/2017	0.55	0.5	U	1	U
LHAAP 1824	18CPTMW07	1,1-Dichloroethene	10	5/14/2013	12/6/2017	1.00	1	U	1	U
LHAAP 1824	18CPTMW07	1,2-Dichloroethane	10	5/14/2013	12/6/2017	0.55	0.5	U	1	U
LHAAP 1824	18CPTMW07	1,4-Dioxane	2	10/31/2015	6/22/2016	0.81	0.618	J	1	U
LHAAP 1824	18CPTMW07	Carbon tetrachloride	10	5/14/2013	12/6/2017	0.55	0.5	U	1	U
LHAAP 1824	18CPTMW07	Chloroform	10	5/14/2013	12/6/2017	0.33	0.25	U	1	U
LHAAP 1824	18CPTMW07	cis-1,2-Dichloroethene	10	5/14/2013	12/6/2017	0.53	0.341	J	1	U
LHAAP 1824	18CPTMW07	magnesium, total	3	5/14/2013	6/3/2014	7533.33	1720		18500	
LHAAP 1824	18CPTMW07	manganese, total	4	5/14/2013	6/26/2017	336.48	40.9		634	
LHAAP 1824	18CPTMW07	Methylene chloride	10	5/14/2013	12/6/2017	0.64	0.375	J	2	U
LHAAP 1824	18CPTMW07	nickel, total	4	5/14/2013	6/26/2017	5.03	3.04	J	9.07	
LHAAP 1824	18CPTMW07	Perchlorate	10	5/14/2013	12/6/2017	6.48	0.2	U	39.6	J
LHAAP 1824	18CPTMW07	Tetrachloroethene	10	5/14/2013	12/6/2017	0.55	0.5	U	1	U
LHAAP 1824	18CPTMW07	thallium, total	4	5/14/2013	6/26/2017	0.20	0.2	U	0.2	U
LHAAP 1824	18CPTMW07	Trichloroethene	10	5/14/2013	12/6/2017	0.95	0.34	J	2.29	
LHAAP 1824	18CPTMW07	Vinyl chloride	10	5/14/2013	12/6/2017	0.55	0.5	U	1	U
LHAAP 1824	18CPTMW08DW	1,1,1-Trichloroethane	5	5/17/2013	12/21/2017	0.60	0.5	U	1	U
LHAAP 1824	18CPTMW08DW	1,1,2-Trichloroethane	5	5/17/2013	12/21/2017	0.60	0.5	U	1	U

Summary of COC Concentrations for LHAAP Wells and Miscellaneous Sampling Locations

Area	Location	Constituent	Count	Earliest	Latest	Avg (µg/L)	Min (µg/L)	Code	Max (µg/L)	Code
LHAAP 1824	18CPTMW08DW	1,1-Dichloroethene	5	5/17/2013	12/21/2017	1.00	1	U	1	U
LHAAP 1824	18CPTMW08DW	1,2-Dichloroethane	5	5/17/2013	12/21/2017	0.60	0.5	U	1	U
LHAAP 1824	18CPTMW08DW	1,4-Dioxane	1	6/8/2016	6/8/2016	1.00	1	U	1	U
LHAAP 1824	18CPTMW08DW	Carbon tetrachloride	5	5/17/2013	12/21/2017	0.60	0.5	U	1	U
LHAAP 1824	18CPTMW08DW	Chloroform	5	5/17/2013	12/21/2017	0.40	0.25	U	1	U
LHAAP 1824	18CPTMW08DW	cis-1,2-Dichloroethene	5	5/17/2013	12/21/2017	3.36	0.318	J	15	
LHAAP 1824	18CPTMW08DW	magnesium, total	3	5/17/2013	6/14/2017	4263.33	3370		5430	
LHAAP 1824	18CPTMW08DW	manganese, total	3	5/17/2013	6/14/2017	39.83	25.6		54.5	
LHAAP 1824	18CPTMW08DW	Methylene chloride	5	5/17/2013	12/21/2017	0.96	0.402	J	2	U
LHAAP 1824	18CPTMW08DW	nickel, total	3	5/17/2013	6/14/2017	4.00	4	U	4	U
LHAAP 1824	18CPTMW08DW	Perchlorate	10	5/17/2013	12/21/2017	224.01	0.468		672	
LHAAP 1824	18CPTMW08DW	Tetrachloroethene	5	5/17/2013	12/21/2017	0.60	0.5	U	1	U
LHAAP 1824	18CPTMW08DW	thallium, total	3	5/17/2013	6/14/2017	0.20	0.2	U	0.2	U
LHAAP 1824	18CPTMW08DW	Trichloroethene	5	5/17/2013	12/21/2017	12.10	0.271	J	58	
LHAAP 1824	18CPTMW08DW	Vinyl chloride	5	5/17/2013	12/21/2017	1.98	0.5	U	7.9	
LHAAP 1824	18CPTMW08SW	1,1,1-Trichloroethane	9	6/4/2013	6/14/2017	0.50	0.5	U	0.5	U
LHAAP 1824	18CPTMW08SW	1,1,2-Trichloroethane	9	6/4/2013	6/14/2017	0.50	0.5	U	0.5	U
LHAAP 1824	18CPTMW08SW	1,1-Dichloroethene	9	6/4/2013	6/14/2017	1.17	0.86	J	1.73	J
LHAAP 1824	18CPTMW08SW	1,2-Dichloroethane	9	6/4/2013	6/14/2017	0.50	0.5	U	0.5	U
LHAAP 1824	18CPTMW08SW	1,4-Dioxane	1	6/8/2016	6/8/2016	1.39	1.39	J	1.39	J
LHAAP 1824	18CPTMW08SW	Carbon tetrachloride	9	6/4/2013	6/14/2017	0.50	0.5	U	0.5	U
LHAAP 1824	18CPTMW08SW	Chloroform	9	6/4/2013	6/14/2017	0.63	0.435	J	0.918	J
LHAAP 1824	18CPTMW08SW	cis-1,2-Dichloroethene	9	6/4/2013	6/14/2017	18.57	14.2		23.2	
LHAAP 1824	18CPTMW08SW	magnesium, total	4	6/4/2013	6/14/2017	29900.00	23600		34200	
LHAAP 1824	18CPTMW08SW	manganese, total	4	6/4/2013	6/14/2017	804.75	502		978	
LHAAP 1824	18CPTMW08SW	Methylene chloride	9	6/4/2013	6/14/2017	0.79	0.262	J	3.37	
LHAAP 1824	18CPTMW08SW	nickel, total	4	6/4/2013	6/14/2017	13.85	9.7		16.5	
LHAAP 1824	18CPTMW08SW	Perchlorate	10	6/4/2013	12/21/2017	41430.00	31000		58000	
LHAAP 1824	18CPTMW08SW	Tetrachloroethene	9	6/4/2013	6/14/2017	0.33	0.29	J	0.5	U
LHAAP 1824	18CPTMW08SW	thallium, total	4	6/4/2013	6/14/2017	0.20	0.2	U	0.2	U
LHAAP 1824	18CPTMW08SW	Trichloroethene	9	6/4/2013	6/14/2017	80.36	58.3		109	
LHAAP 1824	18CPTMW08SW	Vinyl chloride	9	6/4/2013	6/14/2017	12.07	5.37		20.9	
LHAAP 1824	18CPTMW10DW	1,1,1-Trichloroethane	5	5/17/2013	12/12/2017	0.60	0.5	U	1	U
LHAAP 1824	18CPTMW10DW	1,1,2-Trichloroethane	5	5/17/2013	12/12/2017	0.60	0.5	U	1	U
LHAAP 1824	18CPTMW10DW	1,1-Dichloroethene	5	5/17/2013	12/12/2017	1.00	1	U	1	U
LHAAP 1824	18CPTMW10DW	1,2-Dichloroethane	5	5/17/2013	12/12/2017	0.60	0.5	U	1	U
LHAAP 1824	18CPTMW10DW	1,4-Dioxane	1	8/21/2014	8/21/2014	1.09	1.09	U	1.09	U
LHAAP 1824	18CPTMW10DW	Carbon tetrachloride	5	5/17/2013	12/12/2017	0.60	0.5	U	1	U
LHAAP 1824	18CPTMW10DW	Chloroform	5	5/17/2013	12/12/2017	0.40	0.25	U	1	U
LHAAP 1824	18CPTMW10DW	cis-1,2-Dichloroethene	5	5/17/2013	12/12/2017	0.62	0.378	J	1	U
LHAAP 1824	18CPTMW10DW	magnesium, total	4	5/17/2013	12/12/2017	9792.50	3370		12500	
LHAAP 1824	18CPTMW10DW	manganese, total	4	5/17/2013	12/12/2017	328.29	5.17		479	
LHAAP 1824	18CPTMW10DW	Methylene chloride	5	5/17/2013	12/12/2017	0.80	0.5	U	2	U
LHAAP 1824	18CPTMW10DW	nickel, total	3	5/17/2013	8/21/2014	4.28	4	U	4.73	J
LHAAP 1824	18CPTMW10DW	Perchlorate	5	5/17/2013	12/12/2017	3.27	0.2	U	12	
LHAAP 1824	18CPTMW10DW	Tetrachloroethene	5	5/17/2013	12/12/2017	0.60	0.5	U	1	U
LHAAP 1824	18CPTMW10DW	thallium, total	4	5/17/2013	12/12/2017	0.65	0.2	U	2	U
LHAAP 1824	18CPTMW10DW	Trichloroethene	5	5/17/2013	12/12/2017	4.59	2.1		7.56	
LHAAP 1824	18CPTMW10DW	Vinyl chloride	5	5/17/2013	12/12/2017	0.60	0.5	U	1	U
LHAAP 1824	18CPTMW10SW	1,1,1-Trichloroethane	11	6/4/2013	12/12/2017	0.55	0.5	U	1	U
LHAAP 1824	18CPTMW10SW	1,1,2-Trichloroethane	11	6/4/2013	12/12/2017	0.55	0.5	U	1	U
LHAAP 1824	18CPTMW10SW	1,1-Dichloroethene	11	6/4/2013	12/12/2017	1.00	1	U	1	U
LHAAP 1824	18CPTMW10SW	1,2-Dichloroethane	11	6/4/2013	12/12/2017	0.55	0.5	U	1	U
LHAAP 1824	18CPTMW10SW	1,4-Dioxane	3	8/20/2014	6/22/2016	1.05	1	U	1.11	J
LHAAP 1824	18CPTMW10SW	Carbon tetrachloride	11	6/4/2013	12/12/2017	0.55	0.5	U	1	U
LHAAP 1824	18CPTMW10SW	Chloroform	11	6/4/2013	12/12/2017	0.32	0.25	U	1	U
LHAAP 1824	18CPTMW10SW	cis-1,2-Dichloroethene	11	6/4/2013	12/12/2017	0.55	0.5	U	1	U
LHAAP 1824	18CPTMW10SW	magnesium, total	5	6/4/2013	6/23/2017	21180.00	19900		22100	
LHAAP 1824	18CPTMW10SW	manganese, total	5	6/4/2013	6/23/2017	919.00	773		980	
LHAAP 1824	18CPTMW10SW	Methylene chloride	11	6/4/2013	12/12/2017	0.64	0.5	U	2	U
LHAAP 1824	18CPTMW10SW	nickel, total	5	6/4/2013	6/23/2017	7.98	6.89	J	10.6	
LHAAP 1824	18CPTMW10SW	Perchlorate	11	6/4/2013	12/12/2017	4.16	0.152	J	24.4	
LHAAP 1824	18CPTMW10SW	Tetrachloroethene	11	6/4/2013	12/12/2017	0.55	0.5	U	1	U
LHAAP 1824	18CPTMW10SW	thallium, total	5	6/4/2013	6/23/2017	0.20	0.2	U	0.2	U
LHAAP 1824	18CPTMW10SW	Trichloroethene	11	6/4/2013	12/12/2017	4.25	0.5	U	23.9	
LHAAP 1824	18CPTMW10SW	Vinyl chloride	11	6/4/2013	12/12/2017	0.55	0.5	U	1	U
LHAAP 1824	18CPTMW12DW	1,1,1-Trichloroethane	4	6/4/2013	12/12/2017	0.63	0.5	U	1	U
LHAAP 1824	18CPTMW12DW	1,1,2-Trichloroethane	4	6/4/2013	12/12/2017	0.63	0.5	U	1	U
LHAAP 1824	18CPTMW12DW	1,1-Dichloroethene	4	6/4/2013	12/12/2017	1.00	1	U	1	U
LHAAP 1824	18CPTMW12DW	1,2-Dichloroethane	4	6/4/2013	12/12/2017	0.63	0.5	U	1	U
LHAAP 1824	18CPTMW12DW	1,4-Dioxane	2	8/22/2014	6/24/2016	1.01	1	U	1.02	U
LHAAP 1824	18CPTMW12DW	Carbon tetrachloride	4	6/4/2013	12/12/2017	0.63	0.5	U	1	U
LHAAP 1824	18CPTMW12DW	Chloroform	4	6/4/2013	12/12/2017	0.44	0.25	U	1	U
LHAAP 1824	18CPTMW12DW	cis-1,2-Dichloroethene	4	6/4/2013	12/12/2017	0.63	0.5	U	1	U
LHAAP 1824	18CPTMW12DW	magnesium, total	4	6/4/2013	12/12/2017	8255.00	3740		10200	
LHAAP 1824	18CPTMW12DW	manganese, total	4	6/4/2013	12/12/2017	173.43	49.7		220	
LHAAP 1824	18CPTMW12DW	Methylene chloride	4	6/4/2013	12/12/2017	0.88	0.5	U	2	U
LHAAP 1824	18CPTMW12DW	nickel, total	3	6/4/2013	8/22/2014	3.23	2.7	J	4	U
LHAAP 1824	18CPTMW12DW	Perchlorate	4	6/4/2013	12/12/2017	0.53	0.283	J	1	U
LHAAP 1824	18CPTMW12DW	Tetrachloroethene	4	6/4/2013	12/12/2017	0.63	0.5	U	1	U
LHAAP 1824	18CPTMW12DW	thallium, total	4	6/4/2013	12/12/2017	0.65	0.2	U	2	U
LHAAP 1824	18CPTMW12DW	Trichloroethene	4	6/4/2013	12/12/2017	0.84	0.257	J	1.62	
LHAAP 1824	18CPTMW12DW	Vinyl chloride	4	6/4/2013	12/12/2017	0.63	0.5	U	1	U
LHAAP 1824	18CPTMW12SW	1,1,1-Trichloroethane	10	6/4/2013	12/12/2017	0.55	0.5	U	1	U
LHAAP 1824	18CPTMW12SW	1,1,2-Trichloroethane	10	6/4/2013	12/12/2017	0.55	0.5	U	1	U
LHAAP 1824	18CPTMW12SW	1,1-Dichloroethene	10	6/4/2013	12/12/2017	1.00	1	U	1	U
LHAAP 1824	18CPTMW12SW	1,2-Dichloroethane	10	6/4/2013	12/12/2017	0.55	0.5	U	1	U

Summary of COC Concentrations for LHAAP Wells and Miscellaneous Sampling Locations

Area	Location	Constituent	Count	Earliest	Latest	Avg (µg/L)	Min (µg/L)	Code	Max (µg/L)	Code
LHAAP 1824	18CPTMW12SW	1,4-Dioxane	3	8/22/2014	6/24/2016	1.03	1	U	1.09	U
LHAAP 1824	18CPTMW12SW	Carbon tetrachloride	10	6/4/2013	12/12/2017	0.55	0.5	U	1	U
LHAAP 1824	18CPTMW12SW	Chloroform	10	6/4/2013	12/12/2017	0.33	0.25	U	1	U
LHAAP 1824	18CPTMW12SW	cis-1,2-Dichloroethene	10	6/4/2013	12/12/2017	0.57	0.379	J	1	U
LHAAP 1824	18CPTMW12SW	magnesium, total	7	6/4/2013	12/12/2017	31785.71	26700		36600	
LHAAP 1824	18CPTMW12SW	manganese, total	8	6/4/2013	12/12/2017	1125.63	570		1520	
LHAAP 1824	18CPTMW12SW	Methylene chloride	10	6/4/2013	12/12/2017	0.63	0.319	J	2	U
LHAAP 1824	18CPTMW12SW	nickel, total	8	6/4/2013	12/12/2017	7.73	2.47	J	11.1	
LHAAP 1824	18CPTMW12SW	Perchlorate	8	6/4/2013	12/12/2017	4.71	0.2	U	30.9	D
LHAAP 1824	18CPTMW12SW	Tetrachloroethene	10	6/4/2013	12/12/2017	0.55	0.5	U	1	U
LHAAP 1824	18CPTMW12SW	thallium, total	8	6/4/2013	12/12/2017	0.65	0.101	J	2.1	
LHAAP 1824	18CPTMW12SW	Trichloroethene	10	6/4/2013	12/12/2017	1.78	1	U	4.31	
LHAAP 1824	18CPTMW12SW	Vinyl chloride	10	6/4/2013	12/12/2017	0.55	0.5	U	1	U
LHAAP 1824	18CPTMW14	1,1,1-Trichloroethane	9	5/13/2013	12/7/2017	0.81	0.5	U	1.25	U
LHAAP 1824	18CPTMW14	1,1,2-Trichloroethane	9	5/13/2013	12/7/2017	0.81	0.5	U	1.25	U
LHAAP 1824	18CPTMW14	1,1-Dichloroethene	9	5/13/2013	12/7/2017	1.49	0.895	J	2.5	U
LHAAP 1824	18CPTMW14	1,2-Dichloroethane	9	5/13/2013	12/7/2017	2.15	1.31		2.95	
LHAAP 1824	18CPTMW14	1,4-Dioxane	2	11/3/2015	6/13/2016	1.00	1	U	1	U
LHAAP 1824	18CPTMW14	Carbon tetrachloride	9	5/13/2013	12/7/2017	0.81	0.5	U	1.25	U
LHAAP 1824	18CPTMW14	Chloroform	9	5/13/2013	12/7/2017	5.09	2.2		6.44	
LHAAP 1824	18CPTMW14	cis-1,2-Dichloroethene	9	5/13/2013	12/7/2017	58.04	0.5	U	205	
LHAAP 1824	18CPTMW14	magnesium, total	8	5/13/2013	12/7/2017	79675.00	12500		195000	
LHAAP 1824	18CPTMW14	manganese, total	8	5/13/2013	12/7/2017	170.67	6.44		571	
LHAAP 1824	18CPTMW14	Methylene chloride	9	5/13/2013	12/7/2017	0.85	0.448	J	2	U
LHAAP 1824	18CPTMW14	nickel, total	8	5/13/2013	12/7/2017	13.02	1.9		35.2	
LHAAP 1824	18CPTMW14	Perchlorate	9	5/13/2013	12/7/2017	835.03	14.5		2700	
LHAAP 1824	18CPTMW14	Tetrachloroethene	9	5/13/2013	12/7/2017	0.78	0.422	J	1.11	J
LHAAP 1824	18CPTMW14	thallium, total	8	5/13/2013	12/7/2017	0.53	0.2	U	2	U
LHAAP 1824	18CPTMW14	Trichloroethene	9	5/13/2013	12/7/2017	410.11	212		600	
LHAAP 1824	18CPTMW14	Vinyl chloride	9	5/13/2013	12/7/2017	0.81	0.5	U	1.25	U
LHAAP 1824	18CPTMW15	1,1,1-Trichloroethane	10	5/14/2013	12/6/2017	0.55	0.5	U	1	U
LHAAP 1824	18CPTMW15	1,1,2-Trichloroethane	10	5/14/2013	12/6/2017	0.62	0.5	U	1.22	
LHAAP 1824	18CPTMW15	1,1-Dichloroethene	10	5/14/2013	12/6/2017	1.85	1	U	9.52	
LHAAP 1824	18CPTMW15	1,2-Dichloroethane	10	5/14/2013	12/6/2017	28.30	0.5	U	278	
LHAAP 1824	18CPTMW15	1,4-Dioxane	2	10/27/2015	6/7/2016	1.00	1	U	1	U
LHAAP 1824	18CPTMW15	Carbon tetrachloride	10	5/14/2013	12/6/2017	0.55	0.5	U	1	U
LHAAP 1824	18CPTMW15	Chloroform	10	5/14/2013	12/6/2017	0.77	0.25	U	4.65	
LHAAP 1824	18CPTMW15	cis-1,2-Dichloroethene	10	5/14/2013	12/6/2017	23.83	0.43	J	232	
LHAAP 1824	18CPTMW15	magnesium, total	4	5/14/2013	6/20/2017	36775.00	25000		47100	
LHAAP 1824	18CPTMW15	manganese, total	4	5/14/2013	6/20/2017	997.75	833		1260	
LHAAP 1824	18CPTMW15	Methylene chloride	10	5/14/2013	12/6/2017	0.65	0.476	J	2	U
LHAAP 1824	18CPTMW15	nickel, total	4	5/14/2013	6/20/2017	88.80	54.2		136	
LHAAP 1824	18CPTMW15	Perchlorate	10	5/14/2013	12/6/2017	569.52	1.9		2060	
LHAAP 1824	18CPTMW15	Tetrachloroethene	10	5/14/2013	12/6/2017	0.62	0.5	U	1.24	
LHAAP 1824	18CPTMW15	thallium, total	4	5/14/2013	6/20/2017	0.20	0.2	U	0.2	U
LHAAP 1824	18CPTMW15	Trichloroethene	10	5/14/2013	12/6/2017	419.82	0.96		4170	
LHAAP 1824	18CPTMW15	Vinyl chloride	10	5/14/2013	12/6/2017	0.67	0.319	J	1.49	
LHAAP 1824	18CPTMW16	1,1,1-Trichloroethane	3	6/4/2013	6/21/2017	0.50	0.5	U	0.5	U
LHAAP 1824	18CPTMW16	1,1,2-Trichloroethane	3	6/4/2013	6/21/2017	0.50	0.5	U	0.5	U
LHAAP 1824	18CPTMW16	1,1-Dichloroethene	3	6/4/2013	6/21/2017	1.00	1	U	1	U
LHAAP 1824	18CPTMW16	1,2-Dichloroethane	3	6/4/2013	6/21/2017	0.50	0.5	U	0.5	U
LHAAP 1824	18CPTMW16	1,4-Dioxane	2	11/2/2015	6/21/2016	1.00	1	U	1	U
LHAAP 1824	18CPTMW16	Carbon tetrachloride	3	6/4/2013	6/21/2017	0.50	0.5	U	0.5	U
LHAAP 1824	18CPTMW16	Chloroform	3	6/4/2013	6/21/2017	0.25	0.25	U	0.25	U
LHAAP 1824	18CPTMW16	cis-1,2-Dichloroethene	3	6/4/2013	6/21/2017	0.50	0.5	U	0.5	U
LHAAP 1824	18CPTMW16	magnesium, total	2	6/4/2013	12/18/2013	6865.00	5870		7860	
LHAAP 1824	18CPTMW16	manganese, total	3	6/4/2013	6/21/2017	280.67	216		338	
LHAAP 1824	18CPTMW16	Methylene chloride	3	6/4/2013	6/21/2017	0.50	0.5	U	0.5	U
LHAAP 1824	18CPTMW16	nickel, total	3	6/4/2013	6/21/2017	3.35	2.05	J	4	U
LHAAP 1824	18CPTMW16	Perchlorate	10	6/4/2013	12/18/2017	0.88	0.107	J	6.23	
LHAAP 1824	18CPTMW16	Tetrachloroethene	3	6/4/2013	6/21/2017	0.50	0.5	U	0.5	U
LHAAP 1824	18CPTMW16	thallium, total	3	6/4/2013	6/21/2017	0.14	0.104	J	0.2	U
LHAAP 1824	18CPTMW16	Trichloroethene	3	6/4/2013	6/21/2017	0.50	0.5	U	0.5	U
LHAAP 1824	18CPTMW16	Vinyl chloride	3	6/4/2013	6/21/2017	0.50	0.5	U	0.5	U
LHAAP 1824	18CPTMW18	1,1,1-Trichloroethane	9	5/15/2013	12/5/2017	0.56	0.5	U	1	U
LHAAP 1824	18CPTMW18	1,1,2-Trichloroethane	9	5/15/2013	12/5/2017	0.56	0.5	U	1	U
LHAAP 1824	18CPTMW18	1,1-Dichloroethene	9	5/15/2013	12/5/2017	1.00	1	U	1	U
LHAAP 1824	18CPTMW18	1,2-Dichloroethane	9	5/15/2013	12/5/2017	0.56	0.5	U	1	U
LHAAP 1824	18CPTMW18	1,4-Dioxane	2	10/29/2015	6/21/2016	1.00	1	U	1	U
LHAAP 1824	18CPTMW18	Carbon tetrachloride	9	5/15/2013	12/5/2017	0.56	0.5	U	1	U
LHAAP 1824	18CPTMW18	Chloroform	9	5/15/2013	12/5/2017	0.33	0.25	U	1	U
LHAAP 1824	18CPTMW18	cis-1,2-Dichloroethene	9	5/15/2013	12/5/2017	0.56	0.5	U	1	U
LHAAP 1824	18CPTMW18	magnesium, total	7	5/15/2013	12/5/2017	236857.14	189000		280000	
LHAAP 1824	18CPTMW18	manganese, total	8	5/15/2013	12/5/2017	2616.25	1930		3370	
LHAAP 1824	18CPTMW18	Methylene chloride	9	5/15/2013	12/5/2017	0.67	0.5	U	2	U
LHAAP 1824	18CPTMW18	nickel, total	8	5/15/2013	12/5/2017	22.59	13.8		27	
LHAAP 1824	18CPTMW18	Perchlorate	9	5/15/2013	12/5/2017	0.68	0.2	U	2	U
LHAAP 1824	18CPTMW18	Tetrachloroethene	9	5/15/2013	12/5/2017	0.56	0.5	U	1	U
LHAAP 1824	18CPTMW18	thallium, total	8	5/15/2013	12/5/2017	0.48	0.103	J	2	U
LHAAP 1824	18CPTMW18	Trichloroethene	9	5/15/2013	12/5/2017	0.56	0.5	U	1	U
LHAAP 1824	18CPTMW18	Vinyl chloride	9	5/15/2013	12/5/2017	0.56	0.5	U	1	U
LHAAP 1824	18CPTMW19	1,1,1-Trichloroethane	10	5/13/2013	12/6/2017	0.55	0.5	U	1	U
LHAAP 1824	18CPTMW19	1,1,2-Trichloroethane	10	5/13/2013	12/6/2017	0.55	0.5	U	1	U
LHAAP 1824	18CPTMW19	1,1-Dichloroethene	10	5/13/2013	12/6/2017	1.00	1	U	1	U
LHAAP 1824	18CPTMW19	1,2-Dichloroethane	10	5/13/2013	12/6/2017	0.55	0.5	U	1	U
LHAAP 1824	18CPTMW19	1,4-Dioxane	2	10/31/2015	6/15/2016	1.00	1	U	1	U
LHAAP 1824	18CPTMW19	Carbon tetrachloride	10	5/13/2013	12/6/2017	0.55	0.5	U	1	U

Summary of COC Concentrations for LHAAP Wells and Miscellaneous Sampling Locations

Area	Location	Constituent	Count	Earliest	Latest	Avg (µg/L)	Min (µg/L)	Code	Max (µg/L)	Code
LHAAP 1824	18CPTMW19	Chloroform	10	5/13/2013	12/6/2017	0.33	0.25	U	1	U
LHAAP 1824	18CPTMW19	cis-1,2-Dichloroethene	10	5/13/2013	12/6/2017	0.55	0.5	U	1	U
LHAAP 1824	18CPTMW19	magnesium, total	3	5/13/2013	6/13/2014	1366.67	1020		1550	
LHAAP 1824	18CPTMW19	manganese, total	4	5/13/2013	6/14/2017	39.90	22.4		81.9	
LHAAP 1824	18CPTMW19	Methylene chloride	10	5/13/2013	12/6/2017	0.65	0.5	U	2	U
LHAAP 1824	18CPTMW19	nickel, total	4	5/13/2013	6/14/2017	3.66	2.82	J	4.27	J
LHAAP 1824	18CPTMW19	Perchlorate	10	5/13/2013	12/6/2017	11.99	3.67		35	
LHAAP 1824	18CPTMW19	Tetrachloroethene	10	5/13/2013	12/6/2017	0.55	0.5	U	1	U
LHAAP 1824	18CPTMW19	thallium, total	4	5/13/2013	6/14/2017	0.20	0.2	U	0.2	U
LHAAP 1824	18CPTMW19	Trichloroethene	10	5/13/2013	12/6/2017	0.55	0.5	U	1	U
LHAAP 1824	18CPTMW19	Vinyl chloride	10	5/13/2013	12/6/2017	0.55	0.5	U	1	U
LHAAP 1824	18CPTMW22R	1,1,1-Trichloroethane	2	6/9/2016	12/14/2017	0.75	0.5	U	1	U
LHAAP 1824	18CPTMW22R	1,1,2-Trichloroethane	2	6/9/2016	12/14/2017	0.75	0.5	U	1	U
LHAAP 1824	18CPTMW22R	1,1-Dichloroethene	2	6/9/2016	12/14/2017	1.00	1	U	1	U
LHAAP 1824	18CPTMW22R	1,2-Dichloroethane	2	6/9/2016	12/14/2017	0.75	0.5	U	1	U
LHAAP 1824	18CPTMW22R	1,4-Dioxane	1	6/9/2016	6/9/2016	1.00	1	U	1	U
LHAAP 1824	18CPTMW22R	Carbon tetrachloride	2	6/9/2016	12/14/2017	0.75	0.5	U	1	U
LHAAP 1824	18CPTMW22R	Chloroform	2	6/9/2016	12/14/2017	0.63	0.25	U	1	U
LHAAP 1824	18CPTMW22R	cis-1,2-Dichloroethene	2	6/9/2016	12/14/2017	0.75	0.5	U	1	U
LHAAP 1824	18CPTMW22R	magnesium, total	1	12/14/2017	12/14/2017	1800.00	1800		1800	
LHAAP 1824	18CPTMW22R	manganese, total	1	12/14/2017	12/14/2017	77.10	77.1		77.1	
LHAAP 1824	18CPTMW22R	Methylene chloride	2	6/9/2016	12/14/2017	1.25	0.5	U	2	U
LHAAP 1824	18CPTMW22R	nickel, total	1	12/14/2017	12/14/2017	5.18	5.18		5.18	
LHAAP 1824	18CPTMW22R	Perchlorate	1	6/9/2016	6/9/2016	0.92	0.917		0.917	
LHAAP 1824	18CPTMW22R	Tetrachloroethene	2	6/9/2016	12/14/2017	0.75	0.5	U	1	U
LHAAP 1824	18CPTMW22R	thallium, total	1	12/14/2017	12/14/2017	2.00	2	U	2	U
LHAAP 1824	18CPTMW22R	Trichloroethene	2	6/9/2016	12/14/2017	0.75	0.5	U	1	U
LHAAP 1824	18CPTMW22R	Vinyl chloride	2	6/9/2016	12/14/2017	0.75	0.5	U	1	U
LHAAP 1824	18CPTMW22SW	1,1,1-Trichloroethane	5	12/17/2014	12/14/2017	0.60	0.5	U	1	U
LHAAP 1824	18CPTMW22SW	1,1,2-Trichloroethane	5	12/17/2014	12/14/2017	0.60	0.5	U	1	U
LHAAP 1824	18CPTMW22SW	1,1-Dichloroethene	5	12/17/2014	12/14/2017	1.00	1	U	1	U
LHAAP 1824	18CPTMW22SW	1,2-Dichloroethane	5	12/17/2014	12/14/2017	0.60	0.5	U	1	U
LHAAP 1824	18CPTMW22SW	1,4-DIOXANE	2	11/4/2015	6/9/2016	0.77	0.543	J	1	U
LHAAP 1824	18CPTMW22SW	Carbon tetrachloride	5	12/17/2014	12/14/2017	0.60	0.5	U	1	U
LHAAP 1824	18CPTMW22SW	Chloroform	5	12/17/2014	12/14/2017	0.40	0.25	U	1	U
LHAAP 1824	18CPTMW22SW	cis-1,2-Dichloroethene	5	12/17/2014	12/14/2017	0.60	0.5	U	1	U
LHAAP 1824	18CPTMW22SW	magnesium, total	4	12/17/2014	12/14/2017	3402.50	500	U	5620	
LHAAP 1824	18CPTMW22SW	manganese, total	4	12/17/2014	12/14/2017	18.63	1.2	J	33.3	
LHAAP 1824	18CPTMW22SW	Methylene chloride	5	12/17/2014	12/14/2017	1.54	0.276	J	3.79	
LHAAP 1824	18CPTMW22SW	nickel, total	3	12/17/2014	6/15/2017	7.68	3.03	J	12.3	
LHAAP 1824	18CPTMW22SW	Perchlorate	4	12/17/2014	6/15/2017	11460.00	7940	D	17300	
LHAAP 1824	18CPTMW22SW	Tetrachloroethene	5	12/17/2014	12/14/2017	0.60	0.5	U	1	U
LHAAP 1824	18CPTMW22SW	thallium, total	4	12/17/2014	12/14/2017	0.65	0.2	U	2	U
LHAAP 1824	18CPTMW22SW	Trichloroethene	5	12/17/2014	12/14/2017	0.78	0.343	J	1.55	
LHAAP 1824	18CPTMW22SW	Vinyl chloride	5	12/17/2014	12/14/2017	0.60	0.5	U	1	U
LHAAP 1824	18CPTMW23	1,1,1-Trichloroethane	11	5/13/2013	12/7/2017	3.68	0.5	U	12.5	U
LHAAP 1824	18CPTMW23	1,1,2-Trichloroethane	11	5/13/2013	12/7/2017	3.81	0.5	U	12.5	U
LHAAP 1824	18CPTMW23	1,1-Dichloroethene	11	5/13/2013	12/7/2017	10.49	1	U	25	U
LHAAP 1824	18CPTMW23	1,2-Dichloroethane	11	5/13/2013	12/7/2017	193.93	0.5	U	350	
LHAAP 1824	18CPTMW23	1,4-Dioxane	3	8/20/2014	6/15/2016	14.21	7.62	J	20.2	
LHAAP 1824	18CPTMW23	Carbon tetrachloride	11	5/13/2013	12/7/2017	3.68	0.5	U	12.5	U
LHAAP 1824	18CPTMW23	Chloroform	11	5/13/2013	12/7/2017	3.95	0.25	U	7.36	
LHAAP 1824	18CPTMW23	cis-1,2-Dichloroethene	11	5/13/2013	12/7/2017	176.02	0.567	J	262	
LHAAP 1824	18CPTMW23	magnesium, total	4	5/13/2013	8/20/2014	11110.00	7240		14700	
LHAAP 1824	18CPTMW23	manganese, total	5	5/13/2013	6/13/2017	528.20	389		781	
LHAAP 1824	18CPTMW23	Methylene chloride	11	5/13/2013	12/7/2017	3.73	0.256	J	12.5	U
LHAAP 1824	18CPTMW23	nickel, total	5	5/13/2013	6/13/2017	26.38	14.7		30.8	
LHAAP 1824	18CPTMW23	Perchlorate	11	5/13/2013	12/7/2017	3573.06	0.908		11000	
LHAAP 1824	18CPTMW23	Tetrachloroethene	11	5/13/2013	12/7/2017	3.81	0.5	U	12.5	U
LHAAP 1824	18CPTMW23	thallium, total	5	5/13/2013	6/13/2017	0.20	0.2	U	0.2	U
LHAAP 1824	18CPTMW23	Trichloroethene	11	5/13/2013	12/7/2017	3258.71	2.81		5670	
LHAAP 1824	18CPTMW23	Vinyl chloride	11	5/13/2013	12/7/2017	5.02	0.5	U	12.5	U
LHAAP 1824	18CPTMW24	1,1,1-Trichloroethane	9	5/14/2013	12/7/2017	0.56	0.5	U	1	U
LHAAP 1824	18CPTMW24	1,1,2-Trichloroethane	9	5/14/2013	12/7/2017	0.56	0.5	U	1	U
LHAAP 1824	18CPTMW24	1,1-Dichloroethene	9	5/14/2013	12/7/2017	1.00	1	U	1	U
LHAAP 1824	18CPTMW24	1,2-Dichloroethane	9	5/14/2013	12/7/2017	0.56	0.5	U	1	U
LHAAP 1824	18CPTMW24	1,4-Dioxane	2	11/3/2015	6/13/2016	1.00	1	U	1	U
LHAAP 1824	18CPTMW24	Carbon tetrachloride	9	5/14/2013	12/7/2017	0.56	0.5	U	1	U
LHAAP 1824	18CPTMW24	Chloroform	9	5/14/2013	12/7/2017	0.30	0.133	J	1	U
LHAAP 1824	18CPTMW24	cis-1,2-Dichloroethene	9	5/14/2013	12/7/2017	15.69	0.485	J	30	
LHAAP 1824	18CPTMW24	magnesium, total	8	5/14/2013	12/7/2017	244625.00	212000		282000	
LHAAP 1824	18CPTMW24	manganese, total	8	5/14/2013	12/7/2017	525.63	332		701	
LHAAP 1824	18CPTMW24	Methylene chloride	9	5/14/2013	12/7/2017	0.67	0.5	U	2	U
LHAAP 1824	18CPTMW24	nickel, total	8	5/14/2013	12/7/2017	18.34	5.62		29.7	
LHAAP 1824	18CPTMW24	Perchlorate	9	5/14/2013	12/7/2017	158.36	43.7		710	
LHAAP 1824	18CPTMW24	Tetrachloroethene	9	5/14/2013	12/7/2017	0.56	0.5	U	1	U
LHAAP 1824	18CPTMW24	thallium, total	8	5/14/2013	12/7/2017	0.53	0.2	U	2	U
LHAAP 1824	18CPTMW24	Trichloroethene	9	5/14/2013	12/7/2017	23.96	3.3		81.7	
LHAAP 1824	18CPTMW24	Vinyl chloride	9	5/14/2013	12/7/2017	0.56	0.5	U	1	U
LHAAP 1824	18WCPTMW19	1,1,1-Trichloroethane	1	12/6/2017	12/6/2017	1.00	1	U	1	U
LHAAP 1824	18WCPTMW19	1,1,2-Trichloroethane	1	12/6/2017	12/6/2017	1.00	1	U	1	U
LHAAP 1824	18WCPTMW19	1,1-Dichloroethene	1	12/6/2017	12/6/2017	1.00	1	U	1	U
LHAAP 1824	18WCPTMW19	1,2-Dichloroethane	1	12/6/2017	12/6/2017	1.00	1	U	1	U
LHAAP 1824	18WCPTMW19	Carbon tetrachloride	1	12/6/2017	12/6/2017	1.00	1	U	1	U
LHAAP 1824	18WCPTMW19	Chloroform	1	12/6/2017	12/6/2017	1.00	1	U	1	U
LHAAP 1824	18WCPTMW19	cis-1,2-Dichloroethene	1	12/6/2017	12/6/2017	1.00	1	U	1	U
LHAAP 1824	18WCPTMW19	Methylene chloride	1	12/6/2017	12/6/2017	2.00	2	U	2	U

Summary of COC Concentrations for LHAAP Wells and Miscellaneous Sampling Locations

Area	Location	Constituent	Count	Earliest	Latest	Avg (µg/L)	Min (µg/L)	Code	Max (µg/L)	Code
LHAAP 1824	18WCPTMW19	Tetrachloroethene	1	12/6/2017	12/6/2017	1.00	1	U	1	U
LHAAP 1824	18WCPTMW19	Trichloroethene	1	12/6/2017	12/6/2017	1.00	1	U	1	U
LHAAP 1824	18WCPTMW19	Vinyl chloride	1	12/6/2017	12/6/2017	1.00	1	U	1	U
LHAAP 1824	18WW02	1,1,1-Trichloroethane	8	6/4/1995	12/8/2017	1.13	0.5	U	5	U
LHAAP 1824	18WW02	1,1,2-Trichloroethane	8	6/4/1995	12/8/2017	1.13	0.5	U	5	U
LHAAP 1824	18WW02	1,1-Dichloroethene	8	6/4/1995	12/8/2017	1.50	1	U	5	U
LHAAP 1824	18WW02	1,2-Dichloroethane	8	6/4/1995	12/8/2017	1.13	0.5	U	5	U
LHAAP 1824	18WW02	1,4-Dioxane	2	12/15/2015	6/22/2016	0.79	0.575	J	1	U
LHAAP 1824	18WW02	Carbon tetrachloride	8	6/4/1995	12/8/2017	1.13	0.5	U	5	U
LHAAP 1824	18WW02	Chloroform	8	6/4/1995	12/8/2017	0.94	0.25	U	5	U
LHAAP 1824	18WW02	cis-1,2-Dichloroethene	7	9/28/2012	12/8/2017	0.57	0.5	U	1	U
LHAAP 1824	18WW02	magnesium, total	5	12/17/2014	12/8/2017	1120.00	500	U	1390	
LHAAP 1824	18WW02	manganese, total	7	9/28/2012	12/8/2017	59.09	14		94.2	
LHAAP 1824	18WW02	Methylene chloride	8	6/4/1995	12/8/2017	1.88	0.5	U	10	U
LHAAP 1824	18WW02	nickel, total	8	6/4/1995	12/8/2017	8.97	1.8		40	U
LHAAP 1824	18WW02	Perchlorate	7	9/28/2012	12/8/2017	0.36	0.2	U	1	U
LHAAP 1824	18WW02	Tetrachloroethene	8	6/4/1995	12/8/2017	1.13	0.5	U	5	U
LHAAP 1824	18WW02	thallium, total	8	6/4/1995	12/8/2017	625.43	0.181	J	5000	U
LHAAP 1824	18WW02	Trichloroethene	8	6/4/1995	12/8/2017	1.15	0.5	U	5	U
LHAAP 1824	18WW02	Vinyl chloride	8	6/4/1995	12/8/2017	1.75	0.5	U	10	U
LHAAP 1824	18WW06	1,1,1-Trichloroethane	12	6/2/1995	12/8/2017	0.96	0.5	U	5	U
LHAAP 1824	18WW06	1,1,2-Trichloroethane	12	6/2/1995	12/8/2017	0.96	0.5	U	5	U
LHAAP 1824	18WW06	1,1-Dichloroethene	12	6/2/1995	12/8/2017	1.33	1	U	5	U
LHAAP 1824	18WW06	1,2-Dichloroethane	12	6/2/1995	12/8/2017	0.96	0.5	U	5	U
LHAAP 1824	18WW06	1,4-Dioxane	2	11/3/2015	6/20/2016	1.00	1	U	1	U
LHAAP 1824	18WW06	Carbon tetrachloride	12	6/2/1995	12/8/2017	0.96	0.5	U	5	U
LHAAP 1824	18WW06	Chloroform	12	6/2/1995	12/8/2017	3.02	0.25	U	28	
LHAAP 1824	18WW06	cis-1,2-Dichloroethene	11	11/12/2009	12/8/2017	0.59	0.5	U	1	U
LHAAP 1824	18WW06	magnesium, total	2	12/11/2013	6/4/2014	16550.00	15500		17600	
LHAAP 1824	18WW06	manganese, total	4	9/28/2012	6/26/2017	712.00	577		835	
LHAAP 1824	18WW06	Methylene chloride	12	6/2/1995	12/8/2017	2.71	0.5	U	21	
LHAAP 1824	18WW06	nickel, total	6	6/2/1995	6/26/2017	109.28	40	U	220	
LHAAP 1824	18WW06	Perchlorate	10	9/28/2012	12/8/2017	1.18	0.2	U	8.43	J
LHAAP 1824	18WW06	Tetrachloroethene	12	6/2/1995	12/8/2017	0.96	0.5	U	5	U
LHAAP 1824	18WW06	thallium, total	5	6/2/1995	6/26/2017	200.16	0.2	U	1000	U
LHAAP 1824	18WW06	Trichloroethene	12	6/2/1995	12/8/2017	1.38	0.5	U	10	
LHAAP 1824	18WW06	Vinyl chloride	12	6/2/1995	12/8/2017	1.38	0.5	U	10	U
LHAAP 1824	18WW08	1,1,1-Trichloroethane	36	6/4/1995	12/6/2017	1.49	0.25	U	5	U
LHAAP 1824	18WW08	1,1,2-Trichloroethane	35	6/4/1995	12/6/2017	1.51	0.25	U	5	U
LHAAP 1824	18WW08	1,1-Dichloroethene	36	6/4/1995	12/6/2017	1.74	0.5	U	5	U
LHAAP 1824	18WW08	1,2-Dichloroethane	36	6/4/1995	12/6/2017	1.51	0.25	U	5	U
LHAAP 1824	18WW08	1,4-Dioxane	2	10/29/2015	6/20/2016	1.00	1	U	1	U
LHAAP 1824	18WW08	Carbon tetrachloride	36	6/4/1995	12/6/2017	1.62	0.25	U	5	U
LHAAP 1824	18WW08	Chloroform	36	6/4/1995	12/6/2017	1.67	0.125	U	5	U
LHAAP 1824	18WW08	Chromium, Total	5	3/9/2010	3/8/2012	4.73	2.5	U	7	
LHAAP 1824	18WW08	cis-1,2-Dichloroethene	30	5/1/2002	12/6/2017	1.44	0.25	U	5	
LHAAP 1824	18WW08	magnesium, total	9	5/1/2002	6/23/2017	22932.78	5		42200	
LHAAP 1824	18WW08	manganese, total	15	5/1/2002	6/23/2017	1092.73	5		2060	
LHAAP 1824	18WW08	Methylene chloride	36	6/4/1995	12/6/2017	2.52	0.25		24.2	
LHAAP 1824	18WW08	nickel, total	27	6/4/1995	6/23/2017	33.06	9.51		91.9	
LHAAP 1824	18WW08	Perchlorate	40	5/25/2000	12/6/2017	5305.88	0.2	U	36300	
LHAAP 1824	18WW08	Tetrachloroethene	36	6/4/1995	12/6/2017	1.49	0.25	U	5	U
LHAAP 1824	18WW08	thallium, total	10	6/4/1995	6/23/2017	1000.22	0.2	U	10000	U
LHAAP 1824	18WW08	Trichloroethene	36	6/4/1995	12/6/2017	5.14	0.25	U	106	
LHAAP 1824	18WW08	Vinyl chloride	36	6/4/1995	12/6/2017	1.96	0.25	U	10	U
LHAAP 1824	18WW17	1,1,1-Trichloroethane	26	6/8/1995	12/5/2017	2.16	0.25	U	10	U
LHAAP 1824	18WW17	1,1,2-Trichloroethane	26	6/8/1995	12/5/2017	1.82	0.25	U	5	U
LHAAP 1824	18WW17	1,1-Dichloroethene	26	6/8/1995	12/5/2017	2.04	0.5	U	5	U
LHAAP 1824	18WW17	1,2-Dichloroethane	26	6/8/1995	12/5/2017	2.18	0.25	U	10	U
LHAAP 1824	18WW17	Carbon tetrachloride	26	6/8/1995	12/5/2017	2.34	0.25	U	10	U
LHAAP 1824	18WW17	Chloroform	25	6/8/1995	12/5/2017	2.37	0.184	J	10	U
LHAAP 1824	18WW17	cis-1,2-Dichloroethene	21	5/1/2002	12/5/2017	1.70	0.405	J	5	
LHAAP 1824	18WW17	magnesium, total	4	5/1/2002	12/5/2017	172751.25	5		247000	
LHAAP 1824	18WW17	manganese, total	5	5/1/2002	12/5/2017	51.76	5		119	
LHAAP 1824	18WW17	Methylene chloride	26	6/8/1995	12/5/2017	1.70	0.25		10	U
LHAAP 1824	18WW17	nickel, total	14	6/8/1995	12/5/2017	265.04	10.3		1090	
LHAAP 1824	18WW17	Perchlorate	50	5/25/2000	12/5/2017	93927.64	4	U	172000	
LHAAP 1824	18WW17	Tetrachloroethene	26	6/8/1995	12/5/2017	2.16	0.25	U	10	U
LHAAP 1824	18WW17	thallium, total	5	6/8/1995	12/5/2017	1000.52	0.2	U	5000	U
LHAAP 1824	18WW17	Trichloroethene	26	6/8/1995	12/5/2017	62.25	36		159	
LHAAP 1824	18WW17	Vinyl chloride	26	6/8/1995	12/5/2017	2.39	0.25	U	10	U
LHAAP 1824	18WW22	1,1,1-Trichloroethane	8	5/13/2013	12/6/2017	0.56	0.5	U	1	U
LHAAP 1824	18WW22	1,1,2-Trichloroethane	8	5/13/2013	12/6/2017	0.56	0.5	U	1	U
LHAAP 1824	18WW22	1,1-Dichloroethene	8	5/13/2013	12/6/2017	1.00	1	U	1	U
LHAAP 1824	18WW22	1,2-Dichloroethane	8	5/13/2013	12/6/2017	0.56	0.5	U	1	U
LHAAP 1824	18WW22	1,4-Dioxane	2	10/29/2015	6/21/2016	1.00	1	U	1	U
LHAAP 1824	18WW22	Carbon tetrachloride	8	5/13/2013	12/6/2017	0.56	0.5	U	1	U
LHAAP 1824	18WW22	Chloroform	8	5/13/2013	12/6/2017	0.34	0.25	U	1	U
LHAAP 1824	18WW22	cis-1,2-Dichloroethene	8	5/13/2013	12/6/2017	0.56	0.5	U	1	U
LHAAP 1824	18WW22	magnesium, total	7	5/13/2013	12/6/2017	1511.86	500	U	4230	
LHAAP 1824	18WW22	manganese, total	7	5/13/2013	12/6/2017	5.87	2.13	J	22.8	
LHAAP 1824	18WW22	Methylene chloride	8	5/13/2013	12/6/2017	0.69	0.5	U	2	U
LHAAP 1824	18WW22	nickel, total	7	5/13/2013	12/6/2017	3.94	1.12		6.48	J
LHAAP 1824	18WW22	Perchlorate	8	5/13/2013	12/6/2017	1.87	0.234	J	3.82	
LHAAP 1824	18WW22	Tetrachloroethene	8	5/13/2013	12/6/2017	0.56	0.5	U	1	U
LHAAP 1824	18WW22	thallium, total	7	5/13/2013	12/6/2017	0.45	0.129	J	2	U
LHAAP 1824	18WW22	Trichloroethene	8	5/13/2013	12/6/2017	0.56	0.5	U	1	U

Summary of COC Concentrations for LHAAP Wells and Miscellaneous Sampling Locations

Area	Location	Constituent	Count	Earliest	Latest	Avg (µg/L)	Min (µg/L)	Code	Max (µg/L)	Code
LHAAP 1824	18WW22	Vinyl chloride	8	5/13/2013	12/6/2017	0.56	0.5	U	1	U
LHAAP 1824	18WW24	1,1,1-Trichloroethane	6	12/23/2014	12/7/2017	0.58	0.5	U	1	U
LHAAP 1824	18WW24	1,1,2-Trichloroethane	6	12/23/2014	12/7/2017	0.58	0.5	U	1	U
LHAAP 1824	18WW24	1,1-Dichloroethene	6	12/23/2014	12/7/2017	1.00	1	U	1	U
LHAAP 1824	18WW24	1,2-Dichloroethane	6	12/23/2014	12/7/2017	0.58	0.5	U	1	U
LHAAP 1824	18WW24	1,4-Dioxane	1	11/2/2015	11/2/2015	1.00	1	U	1	U
LHAAP 1824	18WW24	Carbon tetrachloride	6	12/23/2014	12/7/2017	0.58	0.5	U	1	U
LHAAP 1824	18WW24	Chloroform	6	12/23/2014	12/7/2017	0.38	0.25	U	1	U
LHAAP 1824	18WW24	cis-1,2-Dichloroethene	6	12/23/2014	12/7/2017	0.58	0.5	U	1	U
LHAAP 1824	18WW24	magnesium, total	6	12/23/2014	12/7/2017	44966.67	4400		89700	
LHAAP 1824	18WW24	manganese, total	6	12/23/2014	12/7/2017	2692.50	276		4840	
LHAAP 1824	18WW24	Methylene chloride	6	12/23/2014	12/7/2017	0.75	0.5	U	2	U
LHAAP 1824	18WW24	nickel, total	6	12/23/2014	12/7/2017	94.32	13.5		186	
LHAAP 1824	18WW24	Perchlorate	6	12/23/2014	12/7/2017	0.99	0.0542	J	4	U
LHAAP 1824	18WW24	Tetrachloroethene	6	12/23/2014	12/7/2017	0.58	0.5	U	1	U
LHAAP 1824	18WW24	thallium, total	6	12/23/2014	12/7/2017	0.50	0.179	J	2	U
LHAAP 1824	18WW24	Trichloroethene	6	12/23/2014	12/7/2017	0.58	0.5	U	1	U
LHAAP 1824	18WW24	Vinyl chloride	6	12/23/2014	12/7/2017	0.58	0.5	U	1	U
LHAAP 1824	18WW25	1,1,1-Trichloroethane	5	6/29/2016	12/7/2017	0.60	0.5	U	1	U
LHAAP 1824	18WW25	1,1,2-Trichloroethane	5	6/29/2016	12/7/2017	0.60	0.5	U	1	U
LHAAP 1824	18WW25	1,1-Dichloroethene	5	6/29/2016	12/7/2017	1.00	1	U	1	U
LHAAP 1824	18WW25	1,2-Dichloroethane	5	6/29/2016	12/7/2017	0.60	0.5	U	1	U
LHAAP 1824	18WW25	1,4-Dioxane	1	6/29/2016	6/29/2016	1.00	1	U	1	U
LHAAP 1824	18WW25	Carbon tetrachloride	5	6/29/2016	12/7/2017	0.60	0.5	U	1	U
LHAAP 1824	18WW25	Chloroform	5	6/29/2016	12/7/2017	0.44	0.25	U	1	U
LHAAP 1824	18WW25	cis-1,2-Dichloroethene	5	6/29/2016	12/7/2017	0.60	0.5	U	1	U
LHAAP 1824	18WW25	magnesium, total	5	6/29/2016	12/7/2017	12646.00	8530		19600	
LHAAP 1824	18WW25	manganese, total	5	6/29/2016	12/7/2017	2948.00	1690		5290	
LHAAP 1824	18WW25	Methylene chloride	5	6/29/2016	12/7/2017	0.80	0.5	U	2	U
LHAAP 1824	18WW25	nickel, total	5	6/29/2016	12/7/2017	3.29	2	U	5.96	J
LHAAP 1824	18WW25	Perchlorate	5	6/29/2016	12/7/2017	0.39	0.2	U	1	U
LHAAP 1824	18WW25	Tetrachloroethene	5	6/29/2016	12/7/2017	0.60	0.5	U	1	U
LHAAP 1824	18WW25	thallium, total	5	6/29/2016	12/7/2017	0.79	0.2	U	2	U
LHAAP 1824	18WW25	Trichloroethene	5	6/29/2016	12/7/2017	0.60	0.5	U	1	U
LHAAP 1824	18WW25	Vinyl chloride	5	6/29/2016	12/7/2017	0.60	0.5	U	1	U
LHAAP 1824	AWD3	1,1,1-Trichloroethane	1	12/18/2017	12/18/2017	1.00	1	U	1	U
LHAAP 1824	AWD3	1,1,2-Trichloroethane	1	12/18/2017	12/18/2017	1.00	1	U	1	U
LHAAP 1824	AWD3	1,1-Dichloroethene	1	12/18/2017	12/18/2017	1.00	1	U	1	U
LHAAP 1824	AWD3	1,2-Dichloroethane	1	12/18/2017	12/18/2017	12.00	12		12	
LHAAP 1824	AWD3	Carbon tetrachloride	1	12/18/2017	12/18/2017	6.10	6.1		6.1	
LHAAP 1824	AWD3	Chloroform	1	12/18/2017	12/18/2017	1.50	1.5		1.5	
LHAAP 1824	AWD3	cis-1,2-Dichloroethene	1	12/18/2017	12/18/2017	68.00	68		68	
LHAAP 1824	AWD3	magnesium, total	1	12/18/2017	12/18/2017	3390.00	3390		3390	
LHAAP 1824	AWD3	manganese, total	1	12/18/2017	12/18/2017	255.00	255		255	
LHAAP 1824	AWD3	Methylene chloride	1	12/18/2017	12/18/2017	2.00	2	U	2	U
LHAAP 1824	AWD3	nickel, total	1	12/18/2017	12/18/2017	1980.00	1980		1980	
LHAAP 1824	AWD3	Perchlorate	1	12/18/2017	12/18/2017	8800.00	8800	J	8800	J
LHAAP 1824	AWD3	Tetrachloroethene	1	12/18/2017	12/18/2017	1.00	1	U	1	U
LHAAP 1824	AWD3	thallium, total	1	12/18/2017	12/18/2017	2.00	2	U	2	U
LHAAP 1824	AWD3	Trichloroethene	1	12/18/2017	12/18/2017	470.00	470		470	
LHAAP 1824	AWD3	Vinyl chloride	1	12/18/2017	12/18/2017	1.00	1	U	1	U
LHAAP 1824	C03	1,1,1-Trichloroethane	1	12/5/2017	12/5/2017	1.00	1	U	1	U
LHAAP 1824	C03	1,1,2-Trichloroethane	1	12/5/2017	12/5/2017	1.00	1	U	1	U
LHAAP 1824	C03	1,1-Dichloroethene	1	12/5/2017	12/5/2017	1.00	1	U	1	U
LHAAP 1824	C03	1,2-Dichloroethane	1	12/5/2017	12/5/2017	1.00	1	U	1	U
LHAAP 1824	C03	Carbon tetrachloride	1	12/5/2017	12/5/2017	1.00	1	U	1	U
LHAAP 1824	C03	Chloroform	1	12/5/2017	12/5/2017	1.00	1	U	1	U
LHAAP 1824	C03	cis-1,2-Dichloroethene	1	12/5/2017	12/5/2017	1.00	1	U	1	U
LHAAP 1824	C03	Methylene chloride	1	12/5/2017	12/5/2017	2.00	2	U	2	U
LHAAP 1824	C03	Perchlorate	1	12/5/2017	12/5/2017	170.00	170		170	
LHAAP 1824	C03	Tetrachloroethene	1	12/5/2017	12/5/2017	1.00	1	U	1	U
LHAAP 1824	C03	Trichloroethene	1	12/5/2017	12/5/2017	1.00	1	U	1	U
LHAAP 1824	C03	Vinyl chloride	1	12/5/2017	12/5/2017	1.00	1	U	1	U
LHAAP 1824	C08	1,1,1-Trichloroethane	1	12/5/2017	12/5/2017	1.00	1	U	1	U
LHAAP 1824	C08	1,1,2-Trichloroethane	1	12/5/2017	12/5/2017	1.00	1	U	1	U
LHAAP 1824	C08	1,1-Dichloroethene	1	12/5/2017	12/5/2017	1.00	1	U	1	U
LHAAP 1824	C08	1,2-Dichloroethane	1	12/5/2017	12/5/2017	1.00	1	U	1	U
LHAAP 1824	C08	Carbon tetrachloride	1	12/5/2017	12/5/2017	1.00	1	U	1	U
LHAAP 1824	C08	Chloroform	1	12/5/2017	12/5/2017	1.00	1	U	1	U
LHAAP 1824	C08	cis-1,2-Dichloroethene	1	12/5/2017	12/5/2017	1.00	1	U	1	U
LHAAP 1824	C08	magnesium, total	1	12/5/2017	12/5/2017	159000.00	159000		159000	
LHAAP 1824	C08	manganese, total	1	12/5/2017	12/5/2017	885.00	885		885	
LHAAP 1824	C08	Methylene chloride	1	12/5/2017	12/5/2017	2.00	2	U	2	U
LHAAP 1824	C08	nickel, total	1	12/5/2017	12/5/2017	5.59	5.59		5.59	
LHAAP 1824	C08	Perchlorate	1	12/5/2017	12/5/2017	1.00	1	U	1	U
LHAAP 1824	C08	Tetrachloroethene	1	12/5/2017	12/5/2017	1.00	1	U	1	U
LHAAP 1824	C08	thallium, total	1	12/5/2017	12/5/2017	2.00	2	U	2	U
LHAAP 1824	C08	Trichloroethene	1	12/5/2017	12/5/2017	0.70	0.7		0.7	
LHAAP 1824	C08	Vinyl chloride	1	12/5/2017	12/5/2017	1.00	1	U	1	U
LHAAP 1824	C09	Perchlorate	1	12/5/2017	12/5/2017	1.00	1	U	1	U
LHAAP 1824	CO9	1,1,1-Trichloroethane	1	12/5/2017	12/5/2017	1.00	1	U	1	U
LHAAP 1824	CO9	1,1,2-Trichloroethane	1	12/5/2017	12/5/2017	1.00	1	U	1	U
LHAAP 1824	CO9	1,1-Dichloroethene	1	12/5/2017	12/5/2017	1.00	1	U	1	U
LHAAP 1824	CO9	1,2-Dichloroethane	1	12/5/2017	12/5/2017	1.00	1	U	1	U
LHAAP 1824	CO9	Carbon tetrachloride	1	12/5/2017	12/5/2017	1.00	1	U	1	U
LHAAP 1824	CO9	Chloroform	1	12/5/2017	12/5/2017	1.00	1	U	1	U
LHAAP 1824	CO9	cis-1,2-Dichloroethene	1	12/5/2017	12/5/2017	1.00	1	U	1	U

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Area	Location	Constituent	Count	Earliest	Latest	Avg (µg/L)	Min (µg/L)	Code	Max (µg/L)	Code
LHAAP 1824	CO9	magnesium, total	1	12/5/2017	12/5/2017	147000.00	147000		147000	
LHAAP 1824	CO9	manganese, total	1	12/5/2017	12/5/2017	38.50	38.5		38.5	
LHAAP 1824	CO9	Methylene chloride	1	12/5/2017	12/5/2017	2.00	2	U	2	U
LHAAP 1824	CO9	nickel, total	1	12/5/2017	12/5/2017	7.69	7.69		7.69	
LHAAP 1824	CO9	Tetrachloroethene	1	12/5/2017	12/5/2017	1.00	1	U	1	U
LHAAP 1824	CO9	thallium, total	1	12/5/2017	12/5/2017	2.00	2	U	2	U
LHAAP 1824	CO9	Trichloroethene	1	12/5/2017	12/5/2017	1.00	1	U	1	U
LHAAP 1824	CO9	Vinyl chloride	1	12/5/2017	12/5/2017	1.00	1	U	1	U
LHAAP 1824	MW10	1,1,1-Trichloroethane	1	12/11/2017	12/11/2017	1.00	1	U	1	U
LHAAP 1824	MW10	1,1,2-Trichloroethane	1	12/11/2017	12/11/2017	1.00	1	U	1	U
LHAAP 1824	MW10	1,1-Dichloroethene	1	12/11/2017	12/11/2017	1.00	1	U	1	U
LHAAP 1824	MW10	1,2-Dichloroethane	1	12/11/2017	12/11/2017	1.00	1	U	1	U
LHAAP 1824	MW10	Carbon tetrachloride	1	12/11/2017	12/11/2017	1.00	1	U	1	U
LHAAP 1824	MW10	Chloroform	1	12/11/2017	12/11/2017	1.00	1	U	1	U
LHAAP 1824	MW10	cis-1,2-Dichloroethene	1	12/11/2017	12/11/2017	1.00	1	U	1	U
LHAAP 1824	MW10	Methylene chloride	1	12/11/2017	12/11/2017	2.00	2	U	2	U
LHAAP 1824	MW10	Perchlorate	1	12/11/2017	12/11/2017	1.00	1	U	1	U
LHAAP 1824	MW10	Tetrachloroethene	1	12/11/2017	12/11/2017	1.00	1	U	1	U
LHAAP 1824	MW10	Trichloroethene	1	12/11/2017	12/11/2017	1.00	1	U	1	U
LHAAP 1824	MW10	Vinyl chloride	1	12/11/2017	12/11/2017	1.00	1	U	1	U
LHAAP 1824	MW14	1,1,1-Trichloroethane	1	12/18/2017	12/18/2017	1.00	1	U	1	U
LHAAP 1824	MW14	1,1,2-Trichloroethane	1	12/18/2017	12/18/2017	3.30	3.3		3.3	
LHAAP 1824	MW14	1,1-Dichloroethene	1	12/18/2017	12/18/2017	140.00	140		140	
LHAAP 1824	MW14	1,2-Dichloroethane	1	12/18/2017	12/18/2017	90.00	90		90	
LHAAP 1824	MW14	Carbon tetrachloride	1	12/18/2017	12/18/2017	1.00	1	U	1	U
LHAAP 1824	MW14	Chloroform	1	12/18/2017	12/18/2017	5.00	5		5	
LHAAP 1824	MW14	cis-1,2-Dichloroethene	1	12/18/2017	12/18/2017	2000.00	2000		2000	
LHAAP 1824	MW14	magnesium, total	1	12/18/2017	12/18/2017	43200.00	43200		43200	
LHAAP 1824	MW14	manganese, total	1	12/18/2017	12/18/2017	3820.00	3820		3820	
LHAAP 1824	MW14	Methylene chloride	1	12/18/2017	12/18/2017	11.00	11		11	
LHAAP 1824	MW14	nickel, total	1	12/18/2017	12/18/2017	304.00	304		304	
LHAAP 1824	MW14	Perchlorate	1	12/18/2017	12/18/2017	150000.00	150000		150000	
LHAAP 1824	MW14	Tetrachloroethene	1	12/18/2017	12/18/2017	1.00	1	U	1	U
LHAAP 1824	MW14	thallium, total	1	12/18/2017	12/18/2017	2.00	2	U	2	U
LHAAP 1824	MW14	Trichloroethene	1	12/18/2017	12/18/2017	13000.00	13000		13000	
LHAAP 1824	MW14	Vinyl chloride	1	12/18/2017	12/18/2017	5.60	5.6		5.6	
LHAAP 1824	MW16	1,1,1-Trichloroethane	1	12/8/2017	12/8/2017	1.00	1	U	1	U
LHAAP 1824	MW16	1,1,2-Trichloroethane	1	12/8/2017	12/8/2017	1.00	1	U	1	U
LHAAP 1824	MW16	1,1-Dichloroethene	1	12/8/2017	12/8/2017	3.60	3.6		3.6	
LHAAP 1824	MW16	1,2-Dichloroethane	1	12/8/2017	12/8/2017	23.00	23		23	
LHAAP 1824	MW16	Carbon tetrachloride	1	12/8/2017	12/8/2017	1.00	1	U	1	U
LHAAP 1824	MW16	Chloroform	1	12/8/2017	12/8/2017	1.00	1	U	1	U
LHAAP 1824	MW16	cis-1,2-Dichloroethene	1	12/8/2017	12/8/2017	13.00	13		13	
LHAAP 1824	MW16	Methylene chloride	1	12/8/2017	12/8/2017	2.00	2	U	2	U
LHAAP 1824	MW16	Perchlorate	1	12/8/2017	12/8/2017	1.00	1	U	1	U
LHAAP 1824	MW16	Tetrachloroethene	1	12/8/2017	12/8/2017	1.00	1	U	1	U
LHAAP 1824	MW16	Trichloroethene	1	12/8/2017	12/8/2017	300.00	300		300	
LHAAP 1824	MW16	Vinyl chloride	1	12/8/2017	12/8/2017	1.00	1	U	1	U
LHAAP 1824	MW17	Perchlorate	1	12/11/2017	12/11/2017	1.00	1	U	1	U
LHAAP 1824	MW18	1,1,1-Trichloroethane	1	12/11/2017	12/11/2017	1.00	1	U	1	U
LHAAP 1824	MW18	1,1,2-Trichloroethane	1	12/11/2017	12/11/2017	1.00	1	U	1	U
LHAAP 1824	MW18	1,1-Dichloroethene	1	12/11/2017	12/11/2017	1.00	1	U	1	U
LHAAP 1824	MW18	1,2-Dichloroethane	1	12/11/2017	12/11/2017	1.00	1	U	1	U
LHAAP 1824	MW18	Carbon tetrachloride	1	12/11/2017	12/11/2017	1.00	1	U	1	U
LHAAP 1824	MW18	Chloroform	1	12/11/2017	12/11/2017	1.00	1	U	1	U
LHAAP 1824	MW18	cis-1,2-Dichloroethene	1	12/11/2017	12/11/2017	1.20	1.2		1.2	
LHAAP 1824	MW18	Methylene chloride	1	12/11/2017	12/11/2017	2.00	2	U	2	U
LHAAP 1824	MW18	Perchlorate	1	12/11/2017	12/11/2017	1.00	1	U	1	U
LHAAP 1824	MW18	Tetrachloroethene	1	12/11/2017	12/11/2017	1.00	1	U	1	U
LHAAP 1824	MW18	Trichloroethene	1	12/11/2017	12/11/2017	4.80	4.8		4.8	
LHAAP 1824	MW18	Vinyl chloride	1	12/11/2017	12/11/2017	1.00	1	U	1	U
LHAAP 1824	MW19	1,1,1-Trichloroethane	1	12/12/2017	12/12/2017	1.00	1	U	1	U
LHAAP 1824	MW19	1,1,2-Trichloroethane	1	12/12/2017	12/12/2017	1.00	1	U	1	U
LHAAP 1824	MW19	1,1-Dichloroethene	1	12/12/2017	12/12/2017	1.00	1	U	1	U
LHAAP 1824	MW19	1,2-Dichloroethane	1	12/12/2017	12/12/2017	1.00	1	U	1	U
LHAAP 1824	MW19	Carbon tetrachloride	1	12/12/2017	12/12/2017	1.00	1	U	1	U
LHAAP 1824	MW19	Chloroform	1	12/12/2017	12/12/2017	1.00	1	U	1	U
LHAAP 1824	MW19	cis-1,2-Dichloroethene	1	12/12/2017	12/12/2017	3.10	3.1		3.1	
LHAAP 1824	MW19	magnesium, total	1	12/12/2017	12/12/2017	16900.00	16900		16900	
LHAAP 1824	MW19	manganese, total	1	12/12/2017	12/12/2017	1960.00	1960		1960	
LHAAP 1824	MW19	Methylene chloride	1	12/12/2017	12/12/2017	2.00	2	U	2	U
LHAAP 1824	MW19	nickel, total	1	12/12/2017	12/12/2017	47.80	47.8		47.8	
LHAAP 1824	MW19	Perchlorate	1	12/12/2017	12/12/2017	1.00	1	U	1	U
LHAAP 1824	MW19	Tetrachloroethene	1	12/12/2017	12/12/2017	1.00	1	U	1	U
LHAAP 1824	MW19	thallium, total	1	12/12/2017	12/12/2017	2.00	2	U	2	U
LHAAP 1824	MW19	Trichloroethene	1	12/12/2017	12/12/2017	3.20	3.2		3.2	
LHAAP 1824	MW19	Vinyl chloride	1	12/12/2017	12/12/2017	1.00	1	U	1	U
LHAAP 1824	MW2	1,1,1-Trichloroethane	1	12/20/2017	12/20/2017	100.00	100	U	100	U
LHAAP 1824	MW2	1,1,2-Trichloroethane	1	12/20/2017	12/20/2017	100.00	100	U	100	U
LHAAP 1824	MW2	1,1-Dichloroethene	1	12/20/2017	12/20/2017	270.00	270		270	
LHAAP 1824	MW2	1,2-Dichloroethane	1	12/20/2017	12/20/2017	100.00	100	U	100	U
LHAAP 1824	MW2	Carbon tetrachloride	1	12/20/2017	12/20/2017	100.00	100	U	100	U
LHAAP 1824	MW2	Chloroform	1	12/20/2017	12/20/2017	100.00	100	U	100	U
LHAAP 1824	MW2	cis-1,2-Dichloroethene	1	12/20/2017	12/20/2017	34000.00	34000		34000	
LHAAP 1824	MW2	magnesium, total	1	12/20/2017	12/20/2017	54100.00	54100		54100	
LHAAP 1824	MW2	manganese, total	1	12/20/2017	12/20/2017	3470.00	3470		3470	
LHAAP 1824	MW2	Methylene chloride	1	12/20/2017	12/20/2017	140000.00	140000		140000	

Summary of COC Concentrations for LHAAP Wells and Miscellaneous Sampling Locations

Area	Location	Constituent	Count	Earliest	Latest	Avg (µg/L)	Min (µg/L)	Code	Max (µg/L)	Code
LHAAP 1824	MW2	nickel, total	1	12/20/2017	12/20/2017	50.30	50.3		50.3	
LHAAP 1824	MW2	Perchlorate	1	12/20/2017	12/20/2017	160.00	160		160	
LHAAP 1824	MW2	Tetrachloroethene	1	12/20/2017	12/20/2017	100.00	100	U	100	U
LHAAP 1824	MW2	thallium, total	1	12/20/2017	12/20/2017	2.00	2	U	2	U
LHAAP 1824	MW2	Trichloroethene	1	12/20/2017	12/20/2017	2600.00	2600		2600	
LHAAP 1824	MW2	Vinyl chloride	1	12/20/2017	12/20/2017	100.00	100	U	100	U
LHAAP 1824	MW20	1,1,1-Trichloroethane	1	12/14/2017	12/14/2017	1.00	1	U	1	U
LHAAP 1824	MW20	1,1,2-Trichloroethane	1	12/14/2017	12/14/2017	1.00	1	U	1	U
LHAAP 1824	MW20	1,1-Dichloroethene	1	12/14/2017	12/14/2017	1.00	1	U	1	U
LHAAP 1824	MW20	1,2-Dichloroethane	1	12/14/2017	12/14/2017	1.00	1	U	1	U
LHAAP 1824	MW20	Carbon tetrachloride	1	12/14/2017	12/14/2017	1.00	1	U	1	U
LHAAP 1824	MW20	Chloroform	1	12/14/2017	12/14/2017	1.00	1	U	1	U
LHAAP 1824	MW20	cis-1,2-Dichloroethene	1	12/14/2017	12/14/2017	1.00	1	U	1	U
LHAAP 1824	MW20	Methylene chloride	1	12/14/2017	12/14/2017	2.00	2	U	2	U
LHAAP 1824	MW20	Tetrachloroethene	1	12/14/2017	12/14/2017	1.00	1	U	1	U
LHAAP 1824	MW20	Trichloroethene	1	12/14/2017	12/14/2017	1.00	1	U	1	U
LHAAP 1824	MW20	Vinyl chloride	1	12/14/2017	12/14/2017	1.00	1	U	1	U
LHAAP 1824	MW21	1,1,1-Trichloroethane	1	12/18/2017	12/18/2017	1.00	1	U	1	U
LHAAP 1824	MW21	1,1,2-Trichloroethane	1	12/18/2017	12/18/2017	11.00	11		11	
LHAAP 1824	MW21	1,1-Dichloroethene	1	12/18/2017	12/18/2017	1.00	1	U	1	U
LHAAP 1824	MW21	1,2-Dichloroethane	1	12/18/2017	12/18/2017	41.00	41		41	
LHAAP 1824	MW21	Carbon tetrachloride	1	12/18/2017	12/18/2017	1.00	1	U	1	U
LHAAP 1824	MW21	Chloroform	1	12/18/2017	12/18/2017	12.00	12		12	
LHAAP 1824	MW21	cis-1,2-Dichloroethene	1	12/18/2017	12/18/2017	74.00	74		74	
LHAAP 1824	MW21	magnesium, total	1	12/18/2017	12/18/2017	138000.00	138000		138000	
LHAAP 1824	MW21	manganese, total	1	12/18/2017	12/18/2017	3150.00	3150		3150	
LHAAP 1824	MW21	Methylene chloride	1	12/18/2017	12/18/2017	2.00	2	U	2	U
LHAAP 1824	MW21	nickel, total	1	12/18/2017	12/18/2017	2480.00	2480		2480	
LHAAP 1824	MW21	Perchlorate	1	12/18/2017	12/18/2017	21000.00	21000		21000	
LHAAP 1824	MW21	Tetrachloroethene	1	12/18/2017	12/18/2017	1.00	1	U	1	U
LHAAP 1824	MW21	thallium, total	1	12/18/2017	12/18/2017	2.00	2	U	2	U
LHAAP 1824	MW21	Trichloroethene	1	12/18/2017	12/18/2017	8500.00	8500		8500	
LHAAP 1824	MW21	Vinyl chloride	1	12/18/2017	12/18/2017	37.00	37		37	
LHAAP 1824	MW22	1,1,1-Trichloroethane	1	12/18/2017	12/18/2017	1.00	1	U	1	U
LHAAP 1824	MW22	1,1,2-Trichloroethane	1	12/18/2017	12/18/2017	1.00	1	U	1	U
LHAAP 1824	MW22	1,1-Dichloroethene	1	12/18/2017	12/18/2017	1.00	1	U	1	U
LHAAP 1824	MW22	1,2-Dichloroethane	1	12/18/2017	12/18/2017	5.40	5.4		5.4	
LHAAP 1824	MW22	Carbon tetrachloride	1	12/18/2017	12/18/2017	1.00	1	U	1	U
LHAAP 1824	MW22	Chloroform	1	12/18/2017	12/18/2017	4.00	4		4	
LHAAP 1824	MW22	cis-1,2-Dichloroethene	1	12/18/2017	12/18/2017	6.10	6.1		6.1	
LHAAP 1824	MW22	magnesium, total	1	12/18/2017	12/18/2017	26800.00	26800		26800	
LHAAP 1824	MW22	manganese, total	1	12/18/2017	12/18/2017	688.00	688		688	
LHAAP 1824	MW22	Methylene chloride	1	12/18/2017	12/18/2017	2.00	2	U	2	U
LHAAP 1824	MW22	nickel, total	1	12/18/2017	12/18/2017	660.00	660		660	
LHAAP 1824	MW22	Perchlorate	1	12/18/2017	12/18/2017	40.00	40	J	40	J
LHAAP 1824	MW22	Tetrachloroethene	1	12/18/2017	12/18/2017	1.00	1	U	1	U
LHAAP 1824	MW22	thallium, total	1	12/18/2017	12/18/2017	2.00	2	U	2	U
LHAAP 1824	MW22	Trichloroethene	1	12/18/2017	12/18/2017	550.00	550		550	
LHAAP 1824	MW22	Vinyl chloride	1	12/18/2017	12/18/2017	1.50	1.5		1.5	
LHAAP 1824	MW23	1,1,1-Trichloroethane	1	12/15/2017	12/15/2017	10.00	10	U	10	U
LHAAP 1824	MW23	1,1,2-Trichloroethane	1	12/15/2017	12/15/2017	10.00	10	U	10	U
LHAAP 1824	MW23	1,1-Dichloroethene	1	12/15/2017	12/15/2017	10.00	10	U	10	U
LHAAP 1824	MW23	1,2-Dichloroethane	1	12/15/2017	12/15/2017	80.00	80		80	
LHAAP 1824	MW23	Carbon tetrachloride	1	12/15/2017	12/15/2017	10.00	10	U	10	U
LHAAP 1824	MW23	Chloroform	1	12/15/2017	12/15/2017	10.00	10	U	10	U
LHAAP 1824	MW23	cis-1,2-Dichloroethene	1	12/15/2017	12/15/2017	16.00	16		16	
LHAAP 1824	MW23	Methylene chloride	1	12/15/2017	12/15/2017	20.00	20	U	20	U
LHAAP 1824	MW23	Tetrachloroethene	1	12/15/2017	12/15/2017	10.00	10	U	10	U
LHAAP 1824	MW23	Trichloroethene	1	12/15/2017	12/15/2017	3300.00	3300		3300	
LHAAP 1824	MW23	Vinyl chloride	1	12/15/2017	12/15/2017	10.00	10	U	10	U
LHAAP 1824	MW23_121517	1,1,1-Trichloroethane	1	12/15/2017	12/15/2017	10.00	10	U	10	U
LHAAP 1824	MW23_121517	1,1,2-Trichloroethane	1	12/15/2017	12/15/2017	10.00	10	U	10	U
LHAAP 1824	MW23_121517	1,1-Dichloroethene	1	12/15/2017	12/15/2017	10.00	10	U	10	U
LHAAP 1824	MW23_121517	1,2-Dichloroethane	1	12/15/2017	12/15/2017	79.00	79		79	
LHAAP 1824	MW23_121517	Carbon tetrachloride	1	12/15/2017	12/15/2017	10.00	10	U	10	U
LHAAP 1824	MW23_121517	Chloroform	1	12/15/2017	12/15/2017	10.00	10	U	10	U
LHAAP 1824	MW23_121517	cis-1,2-Dichloroethene	1	12/15/2017	12/15/2017	15.00	15		15	
LHAAP 1824	MW23_121517	Methylene chloride	1	12/15/2017	12/15/2017	20.00	20	U	20	U
LHAAP 1824	MW23_121517	Tetrachloroethene	1	12/15/2017	12/15/2017	10.00	10	U	10	U
LHAAP 1824	MW23_121517	Trichloroethene	1	12/15/2017	12/15/2017	3200.00	3200		3200	
LHAAP 1824	MW23_121517	Vinyl chloride	1	12/15/2017	12/15/2017	10.00	10	U	10	U
LHAAP 1824	MW3	1,1,1-Trichloroethane	1	12/21/2017	12/21/2017	5.00	5	U	5	U
LHAAP 1824	MW3	1,1,2-Trichloroethane	1	12/21/2017	12/21/2017	5.00	5	U	5	U
LHAAP 1824	MW3	1,1-Dichloroethene	1	12/21/2017	12/21/2017	42.00	42		42	
LHAAP 1824	MW3	1,2-Dichloroethane	1	12/21/2017	12/21/2017	5.00	5	U	5	U
LHAAP 1824	MW3	Carbon tetrachloride	1	12/21/2017	12/21/2017	5.00	5	U	5	U
LHAAP 1824	MW3	Chloroform	1	12/21/2017	12/21/2017	5.00	5	U	5	U
LHAAP 1824	MW3	cis-1,2-Dichloroethene	1	12/21/2017	12/21/2017	84.00	84		84	
LHAAP 1824	MW3	magnesium, total	1	12/21/2017	12/21/2017	15100.00	15100		15100	
LHAAP 1824	MW3	manganese, total	1	12/21/2017	12/21/2017	2200.00	2200		2200	
LHAAP 1824	MW3	Methylene chloride	1	12/21/2017	12/21/2017	10.00	10	U	10	U
LHAAP 1824	MW3	nickel, total	1	12/21/2017	12/21/2017	7.17	7.17		7.17	
LHAAP 1824	MW3	Perchlorate	1	12/21/2017	12/21/2017	15000.00	15000		15000	
LHAAP 1824	MW3	Tetrachloroethene	1	12/21/2017	12/21/2017	5.00	5	U	5	U
LHAAP 1824	MW3	thallium, total	1	12/21/2017	12/21/2017	2.00	2	U	2	U
LHAAP 1824	MW3	Trichloroethene	1	12/21/2017	12/21/2017	470.00	470		470	
LHAAP 1824	MW3	Vinyl chloride	1	12/21/2017	12/21/2017	29.00	29		29	

Summary of COC Concentrations for LHAAP Wells and Miscellaneous Sampling Locations

Area	Location	Constituent	Count	Earliest	Latest	Avg (µg/L)	Min (µg/L)	Code	Max (µg/L)	Code
LHAAP 1824	MW5	1,1,1-Trichloroethane	1	12/20/2017	12/20/2017	1.00	1	U	1	U
LHAAP 1824	MW5	1,1,2-Trichloroethane	1	12/20/2017	12/20/2017	1.00	1	U	1	U
LHAAP 1824	MW5	1,1-Dichloroethene	1	12/20/2017	12/20/2017	1.00	1	U	1	U
LHAAP 1824	MW5	1,2-Dichloroethane	1	12/20/2017	12/20/2017	1.00	1	U	1	U
LHAAP 1824	MW5	Carbon tetrachloride	1	12/20/2017	12/20/2017	1.00	1	U	1	U
LHAAP 1824	MW5	Chloroform	1	12/20/2017	12/20/2017	1.00	1	U	1	U
LHAAP 1824	MW5	cis-1,2-Dichloroethene	1	12/20/2017	12/20/2017	12.00	12		12	
LHAAP 1824	MW5	magnesium, total	1	12/20/2017	12/20/2017	22000.00	22000		22000	
LHAAP 1824	MW5	manganese, total	1	12/20/2017	12/20/2017	150.00	150		150	
LHAAP 1824	MW5	Methylene chloride	1	12/20/2017	12/20/2017	2.00	2	U	2	U
LHAAP 1824	MW5	nickel, total	1	12/20/2017	12/20/2017	323.00	323		323	
LHAAP 1824	MW5	Perchlorate	1	12/20/2017	12/20/2017	31000.00	31000		31000	
LHAAP 1824	MW5	Tetrachloroethene	1	12/20/2017	12/20/2017	1.00	1	U	1	U
LHAAP 1824	MW5	thallium, total	1	12/20/2017	12/20/2017	2.00	2	U	2	U
LHAAP 1824	MW5	Trichloroethene	1	12/20/2017	12/20/2017	46.00	46		46	
LHAAP 1824	MW5	Vinyl chloride	1	12/20/2017	12/20/2017	1.00	1	U	1	U
LHAAP 1824	MW7	1,1,1-Trichloroethane	1	12/13/2017	12/13/2017	5.00	5	U	5	U
LHAAP 1824	MW7	1,1,2-Trichloroethane	1	12/13/2017	12/13/2017	5.00	5	U	5	U
LHAAP 1824	MW7	1,1-Dichloroethene	1	12/13/2017	12/13/2017	5.00	5	U	5	U
LHAAP 1824	MW7	1,2-Dichloroethane	1	12/13/2017	12/13/2017	17.00	17		17	
LHAAP 1824	MW7	Carbon tetrachloride	1	12/13/2017	12/13/2017	5.00	5	U	5	U
LHAAP 1824	MW7	Chloroform	1	12/13/2017	12/13/2017	11.00	11		11	
LHAAP 1824	MW7	cis-1,2-Dichloroethene	1	12/13/2017	12/13/2017	11.00	11		11	
LHAAP 1824	MW7	Methylene chloride	1	12/13/2017	12/13/2017	10.00	10	U	10	U
LHAAP 1824	MW7	Tetrachloroethene	1	12/13/2017	12/13/2017	5.00	5	U	5	U
LHAAP 1824	MW7	Trichloroethene	1	12/13/2017	12/13/2017	1600.00	1600		1600	
LHAAP 1824	MW7	Vinyl chloride	1	12/13/2017	12/13/2017	5.00	5	U	5	U
LHAAP 1824	MW8	1,1,1-Trichloroethane	1	12/12/2017	12/12/2017	1.00	1	U	1	U
LHAAP 1824	MW8	1,1,2-Trichloroethane	1	12/12/2017	12/12/2017	1.00	1	U	1	U
LHAAP 1824	MW8	1,1-Dichloroethene	1	12/12/2017	12/12/2017	1.00	1	U	1	U
LHAAP 1824	MW8	1,2-Dichloroethane	1	12/12/2017	12/12/2017	4.00	4		4	
LHAAP 1824	MW8	Carbon tetrachloride	1	12/12/2017	12/12/2017	1.00	1	U	1	U
LHAAP 1824	MW8	Chloroform	1	12/12/2017	12/12/2017	1.00	1	U	1	U
LHAAP 1824	MW8	cis-1,2-Dichloroethene	1	12/12/2017	12/12/2017	5.40	5.4		5.4	
LHAAP 1824	MW8	Methylene chloride	1	12/12/2017	12/12/2017	2.00	2	U	2	U
LHAAP 1824	MW8	Perchlorate	1	12/12/2017	12/12/2017	5500.00	5500		5500	
LHAAP 1824	MW8	Tetrachloroethene	1	12/12/2017	12/12/2017	1.00	1	U	1	U
LHAAP 1824	MW8	Trichloroethene	1	12/12/2017	12/12/2017	270.00	270		270	
LHAAP 1824	MW8	Vinyl chloride	1	12/12/2017	12/12/2017	1.00	1	U	1	U
LHAAP 1824	MW9	1,1,1-Trichloroethane	1	12/13/2017	12/13/2017	1.00	1	U	1	U
LHAAP 1824	MW9	1,1,2-Trichloroethane	1	12/13/2017	12/13/2017	1.00	1	U	1	U
LHAAP 1824	MW9	1,1-Dichloroethene	1	12/13/2017	12/13/2017	1.00	1	U	1	U
LHAAP 1824	MW9	1,2-Dichloroethane	1	12/13/2017	12/13/2017	0.82	0.82		0.82	
LHAAP 1824	MW9	Carbon tetrachloride	1	12/13/2017	12/13/2017	1.00	1	U	1	U
LHAAP 1824	MW9	Chloroform	1	12/13/2017	12/13/2017	1.70	1.7		1.7	
LHAAP 1824	MW9	cis-1,2-Dichloroethene	1	12/13/2017	12/13/2017	70.00	70		70	
LHAAP 1824	MW9	magnesium, total	1	12/13/2017	12/13/2017	2820.00	2820		2820	
LHAAP 1824	MW9	manganese, total	1	12/13/2017	12/13/2017	63.50	63.5		63.5	
LHAAP 1824	MW9	Methylene chloride	1	12/13/2017	12/13/2017	2.00	2	U	2	U
LHAAP 1824	MW9	nickel, total	1	12/13/2017	12/13/2017	83.50	83.5		83.5	
LHAAP 1824	MW9	Tetrachloroethene	1	12/13/2017	12/13/2017	1.00	1	U	1	U
LHAAP 1824	MW9	thallium, total	1	12/13/2017	12/13/2017	2.00	2	U	2	U
LHAAP 1824	MW9	Trichloroethene	1	12/13/2017	12/13/2017	930.00	930		930	
LHAAP 1824	MW9	Vinyl chloride	1	12/13/2017	12/13/2017	1.00	1	U	1	U
LHAAP 58	03WW01	1,1,1-Trichloroethane	14	11/24/2008	11/15/2017	19.04	0.625	U	50	U
LHAAP 58	03WW01	1,1,2-Trichloroethane	14	11/24/2008	11/15/2017	19.04	0.625	U	50	U
LHAAP 58	03WW01	1,1-Dichloroethene	14	11/24/2008	11/15/2017	37.73	1.25	U	100	U
LHAAP 58	03WW01	1,2-Dichloroethane	14	11/24/2008	11/15/2017	19.04	0.625	U	50	U
LHAAP 58	03WW01	1,4-Dioxane	2	12/15/2015	11/15/2017	18.45	1.4		35.5	J
LHAAP 58	03WW01	Carbon tetrachloride	14	11/24/2008	11/15/2017	19.04	0.625	U	50	U
LHAAP 58	03WW01	Chloroform	14	11/24/2008	11/15/2017	9.70	0.313	U	25	U
LHAAP 58	03WW01	CHROMIUM, TOTAL	1	11/24/2008	11/24/2008	5.23	5.23		5.23	
LHAAP 58	03WW01	cis-1,2-Dichloroethene	14	11/24/2008	11/15/2017	26.16	0.978	J	117	
LHAAP 58	03WW01	MAGNESIUM, TOTAL	1	11/24/2008	11/24/2008	115000.00	115000		115000	
LHAAP 58	03WW01	manganese, total	4	11/24/2008	11/15/2017	17294.73	58.9		60400	
LHAAP 58	03WW01	Methylene chloride	14	11/24/2008	11/15/2017	19.40	0.625	U	50	U
LHAAP 58	03WW01	NICKEL, TOTAL	1	11/24/2008	11/24/2008	23.60	23.6		23.6	
LHAAP 58	03WW01	Tetrachloroethene	14	11/24/2008	11/15/2017	288.26	5	U	2570	
LHAAP 58	03WW01	THALLIUM, TOTAL	1	11/24/2008	11/24/2008	0.14	0.139	J	0.139	J
LHAAP 58	03WW01	Trichloroethene	14	11/24/2008	11/15/2017	88.68	5	U	223	
LHAAP 58	03WW01	Vinyl chloride	14	11/24/2008	11/15/2017	19.04	0.625	U	50	U
LHAAP 58	1004TW001	1,1,1-Trichloroethane	1	12/14/2003	12/14/2003	1.00	1		1	
LHAAP 58	1004TW001	1,1,2-Trichloroethane	1	12/14/2003	12/14/2003	1.00	1		1	
LHAAP 58	1004TW001	1,1-dichloroethene	1	12/14/2003	12/14/2003	24.00	24		24	
LHAAP 58	1004TW001	1,2-Dichloroethane	1	12/14/2003	12/14/2003	1.00	1		1	
LHAAP 58	1004TW001	Carbon tetrachloride	1	12/14/2003	12/14/2003	1.00	1		1	
LHAAP 58	1004TW001	Chloroform	1	12/14/2003	12/14/2003	1.00	1		1	
LHAAP 58	1004TW001	Methylene Chloride	1	12/14/2003	12/14/2003	2.00	2		2	
LHAAP 58	1004TW001	Tetrachloroethene	1	12/14/2003	12/14/2003	1.00	1		1	
LHAAP 58	1004TW001	trichloroethene	1	12/14/2003	12/14/2003	0.20	0.2		0.2	
LHAAP 58	1004TW001	Vinyl chloride	1	12/14/2003	12/14/2003	4.10	4.1		4.1	
LHAAP 58	35AWW01	1,1,1-Trichloroethane	15	11/8/1998	11/16/2017	0.83	0.25	U	5	U
LHAAP 58	35AWW01	1,1,2-Trichloroethane	15	11/8/1998	11/16/2017	0.83	0.25	U	5	U
LHAAP 58	35AWW01	1,1-Dichloroethene	15	11/8/1998	11/16/2017	1.20	0.5	U	5	U
LHAAP 58	35AWW01	1,2-Dichloroethane	14	11/8/1998	11/16/2017	0.54	0.25	U	1	U
LHAAP 58	35AWW01	1,4-Dioxane	3	11/8/1998	11/16/2017	67.33	0.99		200	U
LHAAP 58	35AWW01	Carbon tetrachloride	15	11/8/1998	11/16/2017	0.83	0.25	U	5	U

Summary of COC Concentrations for LHAAP Wells and Miscellaneous Sampling Locations

Area	Location	Constituent	Count	Earliest	Latest	Avg (µg/L)	Min (µg/L)	Code	Max (µg/L)	Code
LHAAP 58	35AWW01	Chloroform	15	11/8/1998	11/16/2017	0.64	0.125	U	5	U
LHAAP 58	35AWW01	CHROMIUM, TOTAL	1	11/19/2008	11/19/2008	2.39	2.39		2.39	
LHAAP 58	35AWW01	cis-1,2-Dichloroethene	15	11/8/1998	11/16/2017	0.83	0.25	U	5	U
LHAAP 58	35AWW01	MAGNESIUM, TOTAL	2	11/8/1998	11/19/2008	26000.00	25000		27000	
LHAAP 58	35AWW01	MANGANESE, TOTAL	2	11/8/1998	11/19/2008	126.50	61		192	
LHAAP 58	35AWW01	Methylene chloride	15	11/8/1998	11/16/2017	0.90	0.25	U	5	U
LHAAP 58	35AWW01	NICKEL, TOTAL	2	11/8/1998	11/19/2008	20.80	1.6	J	40	
LHAAP 58	35AWW01	strontium, total	1	11/8/1998	11/8/1998	1600.00	1600		1600	
LHAAP 58	35AWW01	Tetrachloroethene	15	11/8/1998	11/16/2017	0.83	0.25	U	5	U
LHAAP 58	35AWW01	THALLIUM, TOTAL	2	11/8/1998	11/19/2008	0.58	0.05	U	1.1	J
LHAAP 58	35AWW01	Trichloroethene	15	11/8/1998	11/16/2017	0.83	0.25	U	5	U
LHAAP 58	35AWW01	Vinyl chloride	15	11/8/1998	11/16/2017	0.83	0.25	U	5	U
LHAAP 58	35AWW05	1,1,1-Trichloroethane	13	9/8/2004	11/13/2017	0.87	0.25	U	5	U
LHAAP 58	35AWW05	1,1,2-Trichloroethane	13	9/8/2004	11/13/2017	0.87	0.25	U	5	U
LHAAP 58	35AWW05	1,1-Dichloroethene	13	9/8/2004	11/13/2017	1.27	0.551	J	5	U
LHAAP 58	35AWW05	1,2-Dichloroethane	12	11/21/2008	11/13/2017	0.52	0.25	U	1	U
LHAAP 58	35AWW05	1,4-Dioxane	2	9/8/2004	11/13/2017	50.95	1.9		100	U
LHAAP 58	35AWW05	Carbon tetrachloride	12	11/21/2008	11/13/2017	0.52	0.25	U	1	U
LHAAP 58	35AWW05	Chloroform	13	9/8/2004	11/13/2017	0.66	0.125	U	5	U
LHAAP 58	35AWW05	CHROMIUM, TOTAL	1	11/21/2008	11/21/2008	20.40	20.4		20.4	
LHAAP 58	35AWW05	cis-1,2-Dichloroethene	13	9/8/2004	11/13/2017	0.87	0.25	U	5	U
LHAAP 58	35AWW05	MAGNESIUM, TOTAL	1	11/21/2008	11/21/2008	53800.00	53800		53800	
LHAAP 58	35AWW05	MANGANESE, TOTAL	1	11/21/2008	11/21/2008	4.25	4.25		4.25	
LHAAP 58	35AWW05	Methylene chloride	13	9/8/2004	11/13/2017	0.94	0.25	U	5	U
LHAAP 58	35AWW05	NICKEL, TOTAL	1	11/21/2008	11/21/2008	1.00	1	U	1	U
LHAAP 58	35AWW05	Tetrachloroethene	13	9/8/2004	11/13/2017	0.87	0.25	U	5	U
LHAAP 58	35AWW05	THALLIUM, TOTAL	1	11/21/2008	11/21/2008	0.05	0.05	U	0.05	U
LHAAP 58	35AWW05	Trichloroethene	13	9/8/2004	11/13/2017	0.87	0.25	U	5	U
LHAAP 58	35AWW05	Vinyl chloride	13	9/8/2004	11/13/2017	0.87	0.25	U	5	U
LHAAP 58	35AWW06	1,1,1-Trichloroethane	14	12/3/2008	3/8/2018	0.54	0.25	U	1	U
LHAAP 58	35AWW06	1,1,2-Trichloroethane	14	12/3/2008	3/8/2018	0.54	0.25	U	1	U
LHAAP 58	35AWW06	1,1-Dichloroethene	14	12/3/2008	3/8/2018	15.21	2.6		57.6	
LHAAP 58	35AWW06	1,2-Dichloroethane	14	12/3/2008	3/8/2018	0.54	0.25	U	1	U
LHAAP 58	35AWW06	1,4-Dioxane	2	4/29/2013	11/14/2017	0.60	0.2	U	1	U
LHAAP 58	35AWW06	Carbon tetrachloride	14	12/3/2008	3/8/2018	0.54	0.25	U	1	U
LHAAP 58	35AWW06	Chloroform	14	12/3/2008	3/8/2018	0.35	0.125	U	1	U
LHAAP 58	35AWW06	CHROMIUM, TOTAL	1	12/3/2008	12/3/2008	6.36	6.36		6.36	
LHAAP 58	35AWW06	cis-1,2-Dichloroethene	14	12/3/2008	3/8/2018	0.54	0.25	U	1	U
LHAAP 58	35AWW06	MAGNESIUM, TOTAL	1	12/3/2008	12/3/2008	280000.00	280000		280000	
LHAAP 58	35AWW06	manganese, total	12	12/3/2008	3/8/2018	432.00	125		1240	
LHAAP 58	35AWW06	Methylene chloride	14	12/3/2008	3/8/2018	0.67	0.25	U	2	U
LHAAP 58	35AWW06	NICKEL, TOTAL	1	12/3/2008	12/3/2008	56.90	56.9		56.9	
LHAAP 58	35AWW06	Tetrachloroethene	14	12/3/2008	3/8/2018	1.03	0.25	U	7.19	
LHAAP 58	35AWW06	THALLIUM, TOTAL	1	12/3/2008	12/3/2008	0.33	0.327		0.327	
LHAAP 58	35AWW06	Trichloroethene	14	12/3/2008	3/8/2018	0.58	0.25	U	1	U
LHAAP 58	35AWW06	Vinyl chloride	14	12/3/2008	3/8/2018	0.54	0.25	U	1	U
LHAAP 58	35AWW07	1,1,1-TRICHLOROETHANE	1	11/24/2008	11/24/2008	0.25	0.25	U	0.25	U
LHAAP 58	35AWW07	1,1,2-TRICHLOROETHANE	1	11/24/2008	11/24/2008	0.25	0.25	U	0.25	U
LHAAP 58	35AWW07	1,1-DICHLOROETHENE	1	11/24/2008	11/24/2008	0.50	0.5	U	0.5	U
LHAAP 58	35AWW07	1,2-DICHLOROETHANE	1	11/24/2008	11/24/2008	0.25	0.25	U	0.25	U
LHAAP 58	35AWW07	CARBON TETRACHLORIDE	1	11/24/2008	11/24/2008	0.25	0.25	U	0.25	U
LHAAP 58	35AWW07	CHLOROFORM	1	11/24/2008	11/24/2008	0.40	0.395	J	0.395	J
LHAAP 58	35AWW07	CHROMIUM, TOTAL	1	11/24/2008	11/24/2008	6.01	6.01		6.01	
LHAAP 58	35AWW07	CIS-1,2-DICHLOROETHENE	1	11/24/2008	11/24/2008	0.25	0.25	U	0.25	U
LHAAP 58	35AWW07	MAGNESIUM, TOTAL	1	11/24/2008	11/24/2008	7810.00	7810		7810	
LHAAP 58	35AWW07	MANGANESE, TOTAL	1	11/24/2008	11/24/2008	150.00	150		150	
LHAAP 58	35AWW07	METHYLENE CHLORIDE	1	11/24/2008	11/24/2008	0.25	0.25	U	0.25	U
LHAAP 58	35AWW07	NICKEL, TOTAL	1	11/24/2008	11/24/2008	5.53	5.53		5.53	
LHAAP 58	35AWW07	TETRACHLOROETHENE	1	11/24/2008	11/24/2008	0.25	0.25	U	0.25	U
LHAAP 58	35AWW07	THALLIUM, TOTAL	1	11/24/2008	11/24/2008	0.11	0.107	J	0.107	J
LHAAP 58	35AWW07	TRICHLOROETHENE	1	11/24/2008	11/24/2008	0.56	0.562	J	0.562	J
LHAAP 58	35AWW07	VINYL CHLORIDE	1	11/24/2008	11/24/2008	0.25	0.25	U	0.25	U
LHAAP 58	35AWW08	1,1,1-Trichloroethane	14	11/24/2008	11/15/2017	15.45	5	U	50	U
LHAAP 58	35AWW08	1,1,2-Trichloroethane	14	11/24/2008	11/15/2017	15.45	5	U	50	U
LHAAP 58	35AWW08	1,1-Dichloroethene	14	11/24/2008	11/15/2017	30.18	10	U	100	U
LHAAP 58	35AWW08	1,2-Dichloroethane	14	11/24/2008	11/15/2017	15.45	5	U	50	U
LHAAP 58	35AWW08	1,4-Dioxane	3	4/29/2013	11/15/2017	1.55	1	U	2.45	J
LHAAP 58	35AWW08	Carbon tetrachloride	14	11/24/2008	11/15/2017	15.45	5	U	50	U
LHAAP 58	35AWW08	Chloroform	14	11/24/2008	11/15/2017	8.08	2.5	U	25	U
LHAAP 58	35AWW08	CHROMIUM, TOTAL	1	11/24/2008	11/24/2008	4.00	4		4	
LHAAP 58	35AWW08	cis-1,2-Dichloroethene	14	11/24/2008	11/15/2017	39.00	5	U	79.6	
LHAAP 58	35AWW08	MAGNESIUM, TOTAL	1	11/24/2008	11/24/2008	205000.00	205000		205000	
LHAAP 58	35AWW08	manganese, total	11	11/24/2008	11/15/2017	29719.09	3580		81900	
LHAAP 58	35AWW08	Methylene chloride	14	11/24/2008	11/15/2017	16.16	5	U	50	U
LHAAP 58	35AWW08	NICKEL, TOTAL	1	11/24/2008	11/24/2008	114.00	114		114	
LHAAP 58	35AWW08	Tetrachloroethene	14	11/24/2008	11/15/2017	1412.50	12		9590	
LHAAP 58	35AWW08	THALLIUM, TOTAL	1	11/24/2008	11/24/2008	0.18	0.18	J	0.18	J
LHAAP 58	35AWW08	Trichloroethene	14	11/24/2008	11/15/2017	567.57	33		1150	
LHAAP 58	35AWW08	Vinyl chloride	14	11/24/2008	11/15/2017	15.74	5	U	50	U
LHAAP 58	35AWW09	1,1,1-Trichloroethane	11	8/29/2013	11/15/2017	0.55	0.5	U	1	U
LHAAP 58	35AWW09	1,1,2-Trichloroethane	11	8/29/2013	11/15/2017	0.55	0.5	U	1	U
LHAAP 58	35AWW09	1,1-Dichloroethene	11	8/29/2013	11/15/2017	1.00	1	U	1	U
LHAAP 58	35AWW09	1,2-Dichloroethane	11	8/29/2013	11/15/2017	0.55	0.5	U	1	U
LHAAP 58	35AWW09	1,4-Dioxane	1	11/15/2017	11/15/2017	1.60	1.6		1.6	
LHAAP 58	35AWW09	Carbon tetrachloride	12	8/29/2013	11/15/2017	0.54	0.5	U	1	U
LHAAP 58	35AWW09	Chloroform	12	8/29/2013	11/15/2017	0.31	0.25	U	1	U
LHAAP 58	35AWW09	cis-1,2-Dichloroethene	12	8/29/2013	11/15/2017	0.55	0.317	J	0.78	

Summary of COC Concentrations for LHAAP Wells and Miscellaneous Sampling Locations

Area	Location	Constituent	Count	Earliest	Latest	Avg (µg/L)	Min (µg/L)	Code	Max (µg/L)	Code
LHAAP 58	35AWW09	manganese, total	11	8/29/2013	11/15/2017	202.64	118		442	
LHAAP 58	35AWW09	Methylene chloride	12	8/29/2013	11/15/2017	0.63	0.5	U	2	U
LHAAP 58	35AWW09	Tetrachloroethene	12	8/29/2013	11/15/2017	174.71	21.9		350	
LHAAP 58	35AWW09	Trichloroethene	12	8/29/2013	11/15/2017	53.66	8.97		97	
LHAAP 58	35AWW09	Vinyl chloride	12	8/29/2013	11/15/2017	0.54	0.5	U	1	U
LHAAP 58	35AWW10	1,1,1-Trichloroethane	12	8/29/2013	11/15/2017	0.54	0.5	U	1	U
LHAAP 58	35AWW10	1,1,2-Trichloroethane	12	8/29/2013	11/15/2017	0.54	0.5	U	1	U
LHAAP 58	35AWW10	1,1-Dichloroethene	12	8/29/2013	11/15/2017	1.00	1	U	1	U
LHAAP 58	35AWW10	1,2-Dichloroethane	12	8/29/2013	11/15/2017	0.54	0.5	U	1	U
LHAAP 58	35AWW10	1,4-Dioxane	1	11/15/2017	11/15/2017	0.20	0.2	U	0.2	U
LHAAP 58	35AWW10	Carbon tetrachloride	12	8/29/2013	11/15/2017	0.54	0.5	U	1	U
LHAAP 58	35AWW10	Chloroform	12	8/29/2013	11/15/2017	0.31	0.25	U	1	U
LHAAP 58	35AWW10	cis-1,2-Dichloroethene	12	8/29/2013	11/15/2017	0.54	0.5	U	1	U
LHAAP 58	35AWW10	manganese, total	11	8/29/2013	11/15/2017	77.28	56.2		143	
LHAAP 58	35AWW10	Methylene chloride	12	8/29/2013	11/15/2017	0.63	0.5	U	2	U
LHAAP 58	35AWW10	Tetrachloroethene	12	8/29/2013	11/15/2017	0.53	0.401	J	1	U
LHAAP 58	35AWW10	Trichloroethene	12	8/29/2013	11/15/2017	0.53	0.366	U	1	U
LHAAP 58	35AWW10	Vinyl chloride	12	8/29/2013	11/15/2017	0.54	0.5	U	1	U
LHAAP 58	35AWW11	1,1,1-Trichloroethane	12	10/15/2013	3/7/2018	0.58	0.5	U	1	U
LHAAP 58	35AWW11	1,1,2-Trichloroethane	12	10/15/2013	3/7/2018	0.58	0.5	U	1	U
LHAAP 58	35AWW11	1,1-Dichloroethene	12	10/15/2013	3/7/2018	14.01	7.7		21.9	
LHAAP 58	35AWW11	1,2-Dichloroethane	12	10/15/2013	3/7/2018	0.58	0.5	U	1	U
LHAAP 58	35AWW11	1,4-Dioxane	1	11/14/2017	11/14/2017	1.60	1.6	J	1.6	J
LHAAP 58	35AWW11	Carbon tetrachloride	12	10/15/2013	3/7/2018	0.58	0.5	U	1	U
LHAAP 58	35AWW11	Chloroform	12	10/15/2013	3/7/2018	0.38	0.25	U	1	U
LHAAP 58	35AWW11	cis-1,2-Dichloroethene	12	10/15/2013	3/7/2018	0.57	0.292	J	1	U
LHAAP 58	35AWW11	manganese, total	11	10/15/2013	3/7/2018	645.00	383		1070	
LHAAP 58	35AWW11	Methylene chloride	12	10/15/2013	3/7/2018	0.75	0.5	U	2	U
LHAAP 58	35AWW11	Tetrachloroethene	12	10/15/2013	3/7/2018	0.58	0.5	U	1	U
LHAAP 58	35AWW11	Trichloroethene	12	10/15/2013	3/7/2018	0.58	0.5	U	1	U
LHAAP 58	35AWW11	Vinyl chloride	12	10/15/2013	3/7/2018	0.54	0.273	J	1	U
LHAAP 58	35AWW12	1,1,1-Trichloroethane	11	10/18/2013	11/16/2017	0.55	0.5	U	1	U
LHAAP 58	35AWW12	1,1,2-Trichloroethane	11	10/18/2013	11/16/2017	0.55	0.5	U	1	U
LHAAP 58	35AWW12	1,1-Dichloroethene	11	10/18/2013	11/16/2017	1.00	1	U	1	U
LHAAP 58	35AWW12	1,2-Dichloroethane	11	10/18/2013	11/16/2017	0.55	0.5	U	1	U
LHAAP 58	35AWW12	1,4-Dioxane	1	11/16/2017	11/16/2017	0.20	0.2	J	0.2	J
LHAAP 58	35AWW12	Carbon tetrachloride	11	10/18/2013	11/16/2017	0.55	0.5	U	1	U
LHAAP 58	35AWW12	Chloroform	11	10/18/2013	11/16/2017	0.32	0.25	U	1	U
LHAAP 58	35AWW12	cis-1,2-Dichloroethene	11	10/18/2013	11/16/2017	0.55	0.5	U	1	U
LHAAP 58	35AWW12	Methylene chloride	11	10/18/2013	11/16/2017	0.64	0.5	U	2	U
LHAAP 58	35AWW12	Tetrachloroethene	11	10/18/2013	11/16/2017	0.50	0.279	J	1	U
LHAAP 58	35AWW12	Trichloroethene	11	10/18/2013	11/16/2017	0.55	0.5	U	1	U
LHAAP 58	35AWW12	Vinyl chloride	11	10/18/2013	11/16/2017	0.55	0.5	U	1	U
LHAAP 58	35AWW13	1,1,1-Trichloroethane	11	10/11/2013	11/16/2017	0.55	0.5	U	1	U
LHAAP 58	35AWW13	1,1,2-Trichloroethane	11	10/11/2013	11/16/2017	0.55	0.5	U	1	U
LHAAP 58	35AWW13	1,1-Dichloroethene	11	10/11/2013	11/16/2017	1.00	1	U	1	U
LHAAP 58	35AWW13	1,2-Dichloroethane	11	10/11/2013	11/16/2017	0.55	0.5	U	1	U
LHAAP 58	35AWW13	1,4-Dioxane	1	11/16/2017	11/16/2017	1.20	1.2		1.2	
LHAAP 58	35AWW13	Carbon tetrachloride	11	10/11/2013	11/16/2017	0.55	0.5	U	1	U
LHAAP 58	35AWW13	Chloroform	11	10/11/2013	11/16/2017	0.32	0.25	U	1	U
LHAAP 58	35AWW13	cis-1,2-Dichloroethene	11	10/11/2013	11/16/2017	0.55	0.5	U	1	U
LHAAP 58	35AWW13	magnesium, total	2	4/29/2016	10/6/2016	44050.00	29300		58800	
LHAAP 58	35AWW13	manganese, total	2	4/29/2016	10/6/2016	309.50	271		348	
LHAAP 58	35AWW13	Methylene chloride	11	10/11/2013	11/16/2017	0.62	0.293	J	2	U
LHAAP 58	35AWW13	nickel, total	2	4/29/2016	10/6/2016	8.13	7.77	J	8.49	
LHAAP 58	35AWW13	Tetrachloroethene	11	10/11/2013	11/16/2017	0.55	0.5	U	1	U
LHAAP 58	35AWW13	thallium, total	2	4/29/2016	10/6/2016	0.15	0.105	J	0.2	U
LHAAP 58	35AWW13	Trichloroethene	11	10/11/2013	11/16/2017	0.55	0.5	U	1	U
LHAAP 58	35AWW13	Vinyl chloride	11	10/11/2013	11/16/2017	0.55	0.5	U	1	U
LHAAP 58	35AWW14	1,1,1-Trichloroethane	11	10/18/2013	11/17/2017	0.55	0.5	U	1	U
LHAAP 58	35AWW14	1,1,2-Trichloroethane	11	10/18/2013	11/17/2017	0.55	0.5	U	1	U
LHAAP 58	35AWW14	1,1-Dichloroethene	11	10/18/2013	11/17/2017	3.29	1.22	J	10.4	
LHAAP 58	35AWW14	1,2-Dichloroethane	11	10/18/2013	11/17/2017	0.55	0.5	U	1	U
LHAAP 58	35AWW14	1,4-Dioxane	1	11/17/2017	11/17/2017	4.10	4.1		4.1	
LHAAP 58	35AWW14	Carbon tetrachloride	11	10/18/2013	11/17/2017	0.55	0.5	U	1	U
LHAAP 58	35AWW14	Chloroform	11	10/18/2013	11/17/2017	0.32	0.25	U	1	U
LHAAP 58	35AWW14	cis-1,2-Dichloroethene	11	10/18/2013	11/17/2017	2.29	1.46		5.09	
LHAAP 58	35AWW14	Methylene chloride	11	10/18/2013	11/17/2017	0.64	0.5	U	2	U
LHAAP 58	35AWW14	Tetrachloroethene	11	10/18/2013	11/17/2017	0.55	0.5	U	1	U
LHAAP 58	35AWW14	Trichloroethene	11	10/18/2013	11/17/2017	2.30	0.612	J	10.2	
LHAAP 58	35AWW14	Vinyl chloride	11	10/18/2013	11/17/2017	0.51	0.272	J	1	U
LHAAP 58	35AWW15	1,1,1-Trichloroethane	11	10/16/2013	11/16/2017	0.55	0.5	U	1	U
LHAAP 58	35AWW15	1,1,2-Trichloroethane	11	10/16/2013	11/16/2017	0.55	0.5	U	1	U
LHAAP 58	35AWW15	1,1-Dichloroethene	11	10/16/2013	11/16/2017	1.00	1	U	1	U
LHAAP 58	35AWW15	1,2-Dichloroethane	11	10/16/2013	11/16/2017	0.55	0.5	U	1	U
LHAAP 58	35AWW15	1,4-Dioxane	1	11/16/2017	11/16/2017	0.86	0.86		0.86	
LHAAP 58	35AWW15	Carbon tetrachloride	11	10/16/2013	11/16/2017	0.55	0.5	U	1	U
LHAAP 58	35AWW15	Chloroform	11	10/16/2013	11/16/2017	0.32	0.25	U	1	U
LHAAP 58	35AWW15	cis-1,2-Dichloroethene	11	10/16/2013	11/16/2017	0.55	0.5	U	1	U
LHAAP 58	35AWW15	Methylene chloride	11	10/16/2013	11/16/2017	0.64	0.5	U	2	U
LHAAP 58	35AWW15	Tetrachloroethene	11	10/16/2013	11/16/2017	0.55	0.5	U	1	U
LHAAP 58	35AWW15	Trichloroethene	11	10/16/2013	11/16/2017	0.55	0.5	U	1	U
LHAAP 58	35AWW15	Vinyl chloride	11	10/16/2013	11/16/2017	0.55	0.5	U	1	U
LHAAP 58	35AWW16	1,1,1-Trichloroethane	11	10/22/2013	11/13/2017	0.55	0.5	U	1	U
LHAAP 58	35AWW16	1,1,2-Trichloroethane	11	10/22/2013	11/13/2017	0.55	0.5	U	1	U
LHAAP 58	35AWW16	1,1-Dichloroethene	11	10/22/2013	11/13/2017	1.00	1	U	1	U
LHAAP 58	35AWW16	1,2-Dichloroethane	11	10/22/2013	11/13/2017	0.55	0.5	U	1	U

Summary of COC Concentrations for LHAAP Wells and Miscellaneous Sampling Locations

Area	Location	Constituent	Count	Earliest	Latest	Avg (µg/L)	Min (µg/L)	Code	Max (µg/L)	Code
LHAAP 58	35AWW16	1,4-Dioxane	1	11/13/2017	11/13/2017	1.20	1.2	J	1.2	J
LHAAP 58	35AWW16	Carbon tetrachloride	11	10/22/2013	11/13/2017	0.55	0.5	U	1	U
LHAAP 58	35AWW16	Chloroform	11	10/22/2013	11/13/2017	0.32	0.25	U	1	U
LHAAP 58	35AWW16	cis-1,2-Dichloroethene	11	10/22/2013	11/13/2017	0.55	0.5	U	1	U
LHAAP 58	35AWW16	Methylene chloride	11	10/22/2013	11/13/2017	0.64	0.5	U	2	U
LHAAP 58	35AWW16	Tetrachloroethene	11	10/22/2013	11/13/2017	0.55	0.5	U	1	U
LHAAP 58	35AWW16	Trichloroethene	11	10/22/2013	11/13/2017	0.55	0.5	U	1	U
LHAAP 58	35AWW16	Vinyl chloride	11	10/22/2013	11/13/2017	0.55	0.5	U	1	U
LHAAP 58	35AWW16-111317	1,1,1-Trichloroethane	1	11/13/2017	11/13/2017	1.00	1	U	1	U
LHAAP 58	35AWW16-111317	1,1,2-Trichloroethane	1	11/13/2017	11/13/2017	1.00	1	U	1	U
LHAAP 58	35AWW16-111317	1,1-Dichloroethene	1	11/13/2017	11/13/2017	1.00	1	U	1	U
LHAAP 58	35AWW16-111317	1,2-Dichloroethane	1	11/13/2017	11/13/2017	1.00	1	U	1	U
LHAAP 58	35AWW16-111317	1,4-Dioxane	1	11/13/2017	11/13/2017	1.50	1.5		1.5	
LHAAP 58	35AWW16-111317	Carbon tetrachloride	1	11/13/2017	11/13/2017	1.00	1	U	1	U
LHAAP 58	35AWW16-111317	Chloroform	1	11/13/2017	11/13/2017	1.00	1	U	1	U
LHAAP 58	35AWW16-111317	cis-1,2-Dichloroethene	1	11/13/2017	11/13/2017	1.00	1	U	1	U
LHAAP 58	35AWW16-111317	Methylene chloride	1	11/13/2017	11/13/2017	2.00	2	U	2	U
LHAAP 58	35AWW16-111317	Tetrachloroethene	1	11/13/2017	11/13/2017	1.00	1	U	1	U
LHAAP 58	35AWW16-111317	Trichloroethene	1	11/13/2017	11/13/2017	1.00	1	U	1	U
LHAAP 58	35AWW16-111317	Vinyl chloride	1	11/13/2017	11/13/2017	1.00	1	U	1	U
LHAAP 58	35AWW17	1,1,1-Trichloroethane	11	10/18/2013	11/13/2017	0.55	0.5	U	1	U
LHAAP 58	35AWW17	1,1,2-Trichloroethane	11	10/18/2013	11/13/2017	0.55	0.5	U	1	U
LHAAP 58	35AWW17	1,1-Dichloroethene	11	10/18/2013	11/13/2017	1.00	1	U	1	U
LHAAP 58	35AWW17	1,2-Dichloroethane	11	10/18/2013	11/13/2017	0.55	0.5	U	1	U
LHAAP 58	35AWW17	1,4-Dioxane	1	11/13/2017	11/13/2017	0.70	0.7		0.7	
LHAAP 58	35AWW17	Carbon tetrachloride	10	10/18/2013	11/13/2017	0.55	0.5	U	1	U
LHAAP 58	35AWW17	Chloroform	10	10/18/2013	11/13/2017	0.33	0.25	U	1	U
LHAAP 58	35AWW17	cis-1,2-Dichloroethene	10	10/18/2013	11/13/2017	0.55	0.5	U	1	U
LHAAP 58	35AWW17	Methylene chloride	10	10/18/2013	11/13/2017	0.65	0.5	U	2	U
LHAAP 58	35AWW17	Tetrachloroethene	10	10/18/2013	11/13/2017	0.55	0.5	U	1	U
LHAAP 58	35AWW17	Trichloroethene	10	10/18/2013	11/13/2017	0.55	0.5	U	1	U
LHAAP 58	35AWW17	Vinyl chloride	10	10/18/2013	11/13/2017	0.55	0.5	U	1	U
LHAAP 58	35AWW18	1,1,1-Trichloroethane	11	10/18/2013	11/13/2017	0.55	0.5	U	1	U
LHAAP 58	35AWW18	1,1,2-Trichloroethane	11	10/18/2013	11/13/2017	0.55	0.5	U	1	U
LHAAP 58	35AWW18	1,1-Dichloroethene	11	10/18/2013	11/13/2017	1.04	0.726	J	2.13	
LHAAP 58	35AWW18	1,2-Dichloroethane	11	10/18/2013	11/13/2017	0.55	0.5	U	1	U
LHAAP 58	35AWW18	1,4-Dioxane	1	11/13/2017	11/13/2017	1.30	1.3		1.3	
LHAAP 58	35AWW18	Carbon tetrachloride	10	10/18/2013	11/13/2017	0.55	0.5	U	1	U
LHAAP 58	35AWW18	Chloroform	10	10/18/2013	11/13/2017	0.33	0.25	U	1	U
LHAAP 58	35AWW18	cis-1,2-Dichloroethene	10	10/18/2013	11/13/2017	0.55	0.5	U	1	U
LHAAP 58	35AWW18	Methylene chloride	10	10/18/2013	11/13/2017	0.65	0.5	U	2	U
LHAAP 58	35AWW18	Tetrachloroethene	10	10/18/2013	11/13/2017	0.55	0.5	U	1	U
LHAAP 58	35AWW18	Trichloroethene	10	10/18/2013	11/13/2017	0.55	0.5	U	1	U
LHAAP 58	35AWW18	Vinyl chloride	10	10/18/2013	11/13/2017	0.55	0.5	U	1	U
LHAAP 58	35AWW19	1,1,1-Trichloroethane	12	10/22/2013	3/8/2018	0.58	0.5	U	1	U
LHAAP 58	35AWW19	1,1,2-Trichloroethane	12	10/22/2013	3/8/2018	0.58	0.5	U	1	U
LHAAP 58	35AWW19	1,1-Dichloroethene	12	10/22/2013	3/8/2018	11.90	6.45		17.5	
LHAAP 58	35AWW19	1,2-Dichloroethane	12	10/22/2013	3/8/2018	2.80	1.83		3.93	
LHAAP 58	35AWW19	1,4-Dioxane	1	11/17/2017	11/17/2017	0.10	0.1	U	0.1	U
LHAAP 58	35AWW19	Carbon tetrachloride	12	10/22/2013	3/8/2018	0.58	0.5	U	1	U
LHAAP 58	35AWW19	Chloroform	12	10/22/2013	3/8/2018	0.38	0.25	U	1	U
LHAAP 58	35AWW19	cis-1,2-Dichloroethene	12	10/22/2013	3/8/2018	0.58	0.5	U	1	U
LHAAP 58	35AWW19	manganese, total	1	3/8/2018	3/8/2018	546.00	546		546	
LHAAP 58	35AWW19	Methylene chloride	12	10/22/2013	3/8/2018	0.75	0.5	U	2	U
LHAAP 58	35AWW19	Tetrachloroethene	12	10/22/2013	3/8/2018	0.58	0.5	U	1	U
LHAAP 58	35AWW19	Trichloroethene	12	10/22/2013	3/8/2018	0.82	0.379	J	1.13	
LHAAP 58	35AWW19	Vinyl chloride	12	10/22/2013	3/8/2018	0.58	0.5	U	1	U
LHAAP 58	35AWW20	1,1,1-Trichloroethane	12	10/15/2013	3/7/2018	7.46	0.5	U	12.5	U
LHAAP 58	35AWW20	1,1,2-Trichloroethane	12	10/15/2013	3/7/2018	58.23	48		82.7	
LHAAP 58	35AWW20	1,1-Dichloroethene	12	10/15/2013	3/7/2018	3996.67	1900		5660	
LHAAP 58	35AWW20	1,2-Dichloroethane	12	10/15/2013	3/7/2018	16.03	9.1		20.3	
LHAAP 58	35AWW20	1,4-Dioxane	2	12/15/2015	11/14/2017	60.00	28		92	
LHAAP 58	35AWW20	Carbon tetrachloride	12	10/15/2013	3/7/2018	7.46	0.5	U	12.5	U
LHAAP 58	35AWW20	Chloroform	12	10/15/2013	3/7/2018	4.04	0.478	J	6.26	U
LHAAP 58	35AWW20	cis-1,2-Dichloroethene	12	10/15/2013	3/7/2018	105.23	53		126	
LHAAP 58	35AWW20	manganese, total	11	10/15/2013	3/7/2018	2309.09	1340		5000	
LHAAP 58	35AWW20	Methylene chloride	12	10/15/2013	3/7/2018	7.25	0.364	J	12.5	U
LHAAP 58	35AWW20	Tetrachloroethene	12	10/15/2013	3/7/2018	7.62	0.8	J	12.5	U
LHAAP 58	35AWW20	Trichloroethene	12	10/15/2013	3/7/2018	603.08	320		843	
LHAAP 58	35AWW20	Vinyl chloride	12	10/15/2013	3/7/2018	116.23	62.4		216	
LHAAP 58	35AWW21	1,1,1-Trichloroethane	11	10/16/2013	11/13/2017	0.55	0.5	U	1	U
LHAAP 58	35AWW21	1,1,2-Trichloroethane	11	10/16/2013	11/13/2017	0.55	0.5	U	1	U
LHAAP 58	35AWW21	1,1-Dichloroethene	11	10/16/2013	11/13/2017	1.00	1	U	1	U
LHAAP 58	35AWW21	1,2-Dichloroethane	11	10/16/2013	11/13/2017	0.55	0.5	U	1	U
LHAAP 58	35AWW21	1,4-Dioxane	2	12/15/2015	11/13/2017	1.31	0.814	J	1.8	
LHAAP 58	35AWW21	Carbon tetrachloride	11	10/16/2013	11/13/2017	0.55	0.5	U	1	U
LHAAP 58	35AWW21	Chloroform	11	10/16/2013	11/13/2017	0.32	0.25	U	1	U
LHAAP 58	35AWW21	cis-1,2-Dichloroethene	11	10/16/2013	11/13/2017	0.55	0.5	U	1	U
LHAAP 58	35AWW21	Methylene chloride	11	10/16/2013	11/13/2017	0.77	0.5	U	2	U
LHAAP 58	35AWW21	Tetrachloroethene	11	10/16/2013	11/13/2017	0.55	0.5	U	1	U
LHAAP 58	35AWW21	Trichloroethene	11	10/16/2013	11/13/2017	0.55	0.5	U	1	U
LHAAP 58	35AWW21	Vinyl chloride	11	10/16/2013	11/13/2017	0.55	0.5	U	1	U
LHAAP 58	35AWW22	1,1,1-Trichloroethane	11	10/22/2013	11/17/2017	0.55	0.5	U	1	U
LHAAP 58	35AWW22	1,1,2-Trichloroethane	11	10/22/2013	11/17/2017	0.55	0.5	U	1	U
LHAAP 58	35AWW22	1,1-Dichloroethene	11	10/22/2013	11/17/2017	1.00	1	U	1	U
LHAAP 58	35AWW22	1,2-Dichloroethane	11	10/22/2013	11/17/2017	0.55	0.5	U	1	U
LHAAP 58	35AWW22	1,4-Dioxane	1	11/17/2017	11/17/2017	0.63	0.63		0.63	

Summary of COC Concentrations for LHAAP Wells and Miscellaneous Sampling Locations

Area	Location	Constituent	Count	Earliest	Latest	Avg (µg/L)	Min (µg/L)	Code	Max (µg/L)	Code
LHAAP 58	35AWW22	Carbon tetrachloride	11	10/22/2013	11/17/2017	0.55	0.5	U	1	U
LHAAP 58	35AWW22	Chloroform	11	10/22/2013	11/17/2017	0.32	0.25	U	1	U
LHAAP 58	35AWW22	cis-1,2-Dichloroethene	11	10/22/2013	11/17/2017	0.55	0.5	U	1	U
LHAAP 58	35AWW22	Methylene chloride	11	10/22/2013	11/17/2017	0.64	0.5	U	2	U
LHAAP 58	35AWW22	Tetrachloroethene	11	10/22/2013	11/17/2017	0.55	0.5	U	1	U
LHAAP 58	35AWW22	Trichloroethene	11	10/22/2013	11/17/2017	0.55	0.5	U	1	U
LHAAP 58	35AWW22	Vinyl chloride	11	10/22/2013	11/17/2017	0.55	0.5	U	1	U
LHAAP 58	35AWW23	1,1,1-Trichloroethane	1	3/8/2018	3/8/2018	1.00	1	U	1	U
LHAAP 58	35AWW23	1,1,2-Trichloroethane	1	3/8/2018	3/8/2018	1.00	1	U	1	U
LHAAP 58	35AWW23	1,1-Dichloroethene	1	3/8/2018	3/8/2018	13.00	13		13	
LHAAP 58	35AWW23	1,2-Dichloroethane	1	3/8/2018	3/8/2018	1.00	1	U	1	U
LHAAP 58	35AWW23	Carbon tetrachloride	1	3/8/2018	3/8/2018	1.00	1	U	1	U
LHAAP 58	35AWW23	Chloroform	1	3/8/2018	3/8/2018	1.00	1	U	1	U
LHAAP 58	35AWW23	cis-1,2-Dichloroethene	1	3/8/2018	3/8/2018	21.00	21		21	
LHAAP 58	35AWW23	manganese, total	1	3/8/2018	3/8/2018	502.00	502		502	
LHAAP 58	35AWW23	Methylene chloride	1	3/8/2018	3/8/2018	2.00	2	U	2	U
LHAAP 58	35AWW23	Tetrachloroethene	1	3/8/2018	3/8/2018	1.00	1	U	1	U
LHAAP 58	35AWW23	Trichloroethene	1	3/8/2018	3/8/2018	27.00	27		27	
LHAAP 58	35AWW23	Vinyl chloride	1	3/8/2018	3/8/2018	3.10	3.1		3.1	
LHAAP 58	35AWW24	1,1,1-Trichloroethane	1	3/8/2018	3/8/2018	1.00	1	U	1	U
LHAAP 58	35AWW24	1,1,2-Trichloroethane	1	3/8/2018	3/8/2018	1.00	1	U	1	U
LHAAP 58	35AWW24	1,1-Dichloroethene	1	3/8/2018	3/8/2018	1.00	1	U	1	U
LHAAP 58	35AWW24	1,2-Dichloroethane	1	3/8/2018	3/8/2018	1.00	1	U	1	U
LHAAP 58	35AWW24	Carbon tetrachloride	1	3/8/2018	3/8/2018	1.00	1	U	1	U
LHAAP 58	35AWW24	Chloroform	1	3/8/2018	3/8/2018	1.00	1	U	1	U
LHAAP 58	35AWW24	cis-1,2-Dichloroethene	1	3/8/2018	3/8/2018	1.00	1	U	1	U
LHAAP 58	35AWW24	manganese, total	1	3/8/2018	3/8/2018	369.00	369		369	
LHAAP 58	35AWW24	Methylene chloride	1	3/8/2018	3/8/2018	2.00	2	U	2	U
LHAAP 58	35AWW24	Tetrachloroethene	1	3/8/2018	3/8/2018	1.00	1	U	1	U
LHAAP 58	35AWW24	Trichloroethene	1	3/8/2018	3/8/2018	1.00	1	U	1	U
LHAAP 58	35AWW24	Vinyl chloride	1	3/8/2018	3/8/2018	1.00	1	U	1	U
LHAAP 58	LHSMW03	1,1,1-TRICHLOROETHANE	4	11/29/1994	11/19/2008	1.61	0.2	U	5	U
LHAAP 58	LHSMW03	1,1,2-TRICHLOROETHANE	4	11/29/1994	11/19/2008	1.73	0.25	U	5	U
LHAAP 58	LHSMW03	1,1-DICHLOROETHENE	4	11/29/1994	11/19/2008	1.68	0.2	U	5	U
LHAAP 58	LHSMW03	1,2-DICHLOROETHANE	4	11/29/1994	11/19/2008	1.64	0.25	U	5	U
LHAAP 58	LHSMW03	1,4-Dioxane	1	5/13/1998	5/13/1998	200.00	200	U	200	U
LHAAP 58	LHSMW03	CARBON TETRACHLORIDE	4	11/29/1994	11/19/2008	1.84	0.25	U	5	U
LHAAP 58	LHSMW03	CHLOROFORM	4	11/29/1994	11/19/2008	1.58	0.125	U	5	U
LHAAP 58	LHSMW03	CHROMIUM, TOTAL	1	11/19/2008	11/19/2008	10.60	10.6		10.6	
LHAAP 58	LHSMW03	CIS-1,2-DICHLOROETHENE	3	8/13/1996	11/19/2008	0.48	0.2	U	1	U
LHAAP 58	LHSMW03	MAGNESIUM, TOTAL	5	11/29/1994	11/19/2008	13112.00	6200		23200	
LHAAP 58	LHSMW03	MANGANESE, TOTAL	5	11/29/1994	11/19/2008	460.00	93		1400	
LHAAP 58	LHSMW03	METHYLENE CHLORIDE	4	11/29/1994	11/19/2008	1.62	0.22	U	5	U
LHAAP 58	LHSMW03	NICKEL, TOTAL	4	1/31/1996	11/19/2008	112.50	47		246	
LHAAP 58	LHSMW03	strontium, total	4	11/29/1994	5/13/1998	253.25	150		490	
LHAAP 58	LHSMW03	TETRACHLOROETHENE	5	11/29/1994	11/19/2008	2.10	0.25	U	5	U
LHAAP 58	LHSMW03	THALLIUM, TOTAL	5	11/29/1994	11/19/2008	136.37	0.05	U	500	U
LHAAP 58	LHSMW03	TRICHLOROETHENE	4	11/29/1994	11/19/2008	1.63	0.25	U	5	U
LHAAP 58	LHSMW03	VINYL CHLORIDE	3	8/13/1996	11/19/2008	0.50	0.24	U	1	U
LHAAP 58	LHSMW06	1,1,1-Trichloroethane	17	12/1/1994	11/17/2017	1.05	0.2	U	5	U
LHAAP 58	LHSMW06	1,1,2-Trichloroethane	17	12/1/1994	11/17/2017	1.09	0.25	U	5	U
LHAAP 58	LHSMW06	1,1-Dichloroethene	17	12/1/1994	11/17/2017	5.69	0.5	U	19.2	
LHAAP 58	LHSMW06	1,2-Dichloroethane	16	12/1/1994	11/17/2017	0.82	0.25	U	5	U
LHAAP 58	LHSMW06	1,4-Dioxane	2	5/13/1998	11/17/2017	100.50	0.99		200	U
LHAAP 58	LHSMW06	Carbon tetrachloride	17	12/1/1994	11/17/2017	1.11	0.25	U	5	U
LHAAP 58	LHSMW06	Chloroform	17	12/1/1994	11/17/2017	0.91	0.125	U	5	U
LHAAP 58	LHSMW06	CHROMIUM, TOTAL	1	11/19/2008	11/19/2008	1380.00	1380		1380	
LHAAP 58	LHSMW06	cis-1,2-Dichloroethene	16	8/13/1996	11/17/2017	6.23	0.98		19	
LHAAP 58	LHSMW06	MAGNESIUM, TOTAL	5	12/1/1994	11/19/2008	77500.00	67000		98400	
LHAAP 58	LHSMW06	MANGANESE, TOTAL	5	12/1/1994	11/19/2008	987.40	436		1600	
LHAAP 58	LHSMW06	Methylene chloride	17	12/1/1994	11/17/2017	1.13	0.22	U	5	U
LHAAP 58	LHSMW06	NICKEL, TOTAL	4	2/1/1996	11/19/2008	95.73	51		130	
LHAAP 58	LHSMW06	Perchlorate	1	2/21/2007	2/21/2007	4.00	4	U	4	U
LHAAP 58	LHSMW06	strontium, total	4	12/1/1994	5/13/1998	3377.50	2790	J	4400	
LHAAP 58	LHSMW06	Tetrachloroethene	17	12/1/1994	11/17/2017	0.88	0.25	U	5	U
LHAAP 58	LHSMW06	THALLIUM, TOTAL	5	12/1/1994	11/19/2008	136.22	0.0755	J	500	U
LHAAP 58	LHSMW06	Trichloroethene	16	12/1/1994	11/17/2017	3.33	0.43		9.06	
LHAAP 58	LHSMW06	Vinyl chloride	16	8/13/1996	11/17/2017	1.43	0.25	U	5	U
LHAAP 58	LHSMW07	1,1,1-Trichloroethane	18	12/1/1994	3/7/2018	2.73	0.2	U	20	U
LHAAP 58	LHSMW07	1,1,2-Trichloroethane	20	12/1/1994	3/7/2018	4.85	0.876	J	20	U
LHAAP 58	LHSMW07	1,1-Dichloroethene	20	12/1/1994	3/7/2018	844.00	311		2100	
LHAAP 58	LHSMW07	1,2-Dichloroethane	19	12/1/1994	3/7/2018	2.70	0.5	U	20	U
LHAAP 58	LHSMW07	1,4-Dioxane	3	5/13/1998	11/14/2017	1406.67	100	U	4000	U
LHAAP 58	LHSMW07	Carbon tetrachloride	18	12/1/1994	3/7/2018	2.65	0.25	U	20	U
LHAAP 58	LHSMW07	Chloroform	19	12/1/1994	3/7/2018	2.23	0.125	U	20	U
LHAAP 58	LHSMW07	CHROMIUM, TOTAL	1	11/21/2008	11/21/2008	7.64	7.64		7.64	
LHAAP 58	LHSMW07	cis-1,2-Dichloroethene	18	8/12/1996	3/7/2018	13.97	2.5		32.4	
LHAAP 58	LHSMW07	MAGNESIUM, TOTAL	5	12/1/1994	11/21/2008	422200.00	124000		537000	
LHAAP 58	LHSMW07	manganese, total	16	12/1/1994	3/7/2018	153.44	92		560	
LHAAP 58	LHSMW07	Methylene chloride	19	12/1/1994	3/7/2018	2.82	0.22	U	20	U
LHAAP 58	LHSMW07	NICKEL, TOTAL	4	1/31/1996	11/21/2008	83.28	40	U	200	U
LHAAP 58	LHSMW07	Perchlorate	1	2/21/2007	2/21/2007	4.00	4	U	4	U
LHAAP 58	LHSMW07	STRONTIUM, TOTAL	5	12/1/1994	11/21/2008	21080.00	17500	J	23300	
LHAAP 58	LHSMW07	Tetrachloroethene	20	12/1/1994	3/7/2018	3.07	0.25	U	20	U
LHAAP 58	LHSMW07	THALLIUM, TOTAL	5	12/1/1994	11/21/2008	298.75	0.129	J	900	U
LHAAP 58	LHSMW07	Trichloroethene	20	12/1/1994	3/7/2018	44.36	5.9		118	
LHAAP 58	LHSMW07	Vinyl chloride	19	1/31/1996	3/7/2018	18.61	1.1		69.4	J

Summary of COC Concentrations for LHAAP Wells and Miscellaneous Sampling Locations

Area	Location	Constituent	Count	Earliest	Latest	Avg (µg/L)	Min (µg/L)	Code	Max (µg/L)	Code
LHAAP-001-R-01	131	magnesium, total	1	10/23/2009	10/23/2009	109000.00	109000		109000	
LHAAP-001-R-01	131	manganese, total	1	10/23/2009	10/23/2009	3950.00	3950		3950	
LHAAP-001-R-01	131	nickel, total	1	10/23/2009	10/23/2009	29.80	29.8		29.8	
LHAAP-001-R-01	131	Perchlorate	7	5/21/2000	11/21/2017	1.02	0.062		4	U
LHAAP-001-R-01	131	thallium, total	1	10/23/2009	10/23/2009	0.80	0.8	U	0.8	U
LHAAP-001-R-01	132	magnesium, total	1	10/23/2009	10/23/2009	157000.00	157000		157000	
LHAAP-001-R-01	132	manganese, total	1	10/23/2009	10/23/2009	549.00	549		549	
LHAAP-001-R-01	132	nickel, total	1	10/23/2009	10/23/2009	16.20	16.2		16.2	
LHAAP-001-R-01	132	Perchlorate	6	5/21/2000	11/21/2017	1.80	0.062		8	U
LHAAP-001-R-01	132	thallium, total	1	10/23/2009	10/23/2009	0.80	0.8	U	0.8	U
LHAAP-001-R-01	27WW01	magnesium, total	1	10/22/2009	10/22/2009	302000.00	302000		302000	
LHAAP-001-R-01	27WW01	manganese, total	1	10/22/2009	10/22/2009	7440.00	7440		7440	
LHAAP-001-R-01	27WW01	nickel, total	2	8/27/1994	10/22/2009	152.50	130		175	
LHAAP-001-R-01	27WW01	Perchlorate	7	5/23/2000	11/21/2017	10.64	0.2	U	52.6	
LHAAP-001-R-01	27WW01	thallium, total	1	10/22/2009	10/22/2009	0.80	0.8	U	0.8	U
LHAAP-001-R-01	27WW02	magnesium, total	1	10/22/2009	10/22/2009	326000.00	326000		326000	
LHAAP-001-R-01	27WW02	manganese, total	1	10/22/2009	10/22/2009	2920.00	2920		2920	
LHAAP-001-R-01	27WW02	nickel, total	1	10/22/2009	10/22/2009	396.00	396		396	
LHAAP-001-R-01	27WW02	Perchlorate	5	9/29/2000	11/20/2017	4.53	0.705		16	U
LHAAP-001-R-01	27WW02	thallium, total	1	10/22/2009	10/22/2009	0.80	0.8	U	0.8	U
LHAAP-001-R-01	27WW03	magnesium, total	1	10/23/2009	10/23/2009	359000.00	359000		359000	
LHAAP-001-R-01	27WW03	manganese, total	1	10/23/2009	10/23/2009	27900.00	27900		27900	
LHAAP-001-R-01	27WW03	nickel, total	1	10/23/2009	10/23/2009	490.00	490		490	
LHAAP-001-R-01	27WW03	Perchlorate	5	9/29/2000	11/21/2017	13.46	0.1	J	50	
LHAAP-001-R-01	27WW03	thallium, total	1	10/23/2009	10/23/2009	1.30	1.3	J	1.3	J
LHAAP-001-R-01	27WW04	magnesium, total	1	10/22/2009	10/22/2009	302000.00	302000		302000	
LHAAP-001-R-01	27WW04	manganese, total	1	10/22/2009	10/22/2009	8710.00	8710		8710	
LHAAP-001-R-01	27WW04	nickel, total	1	10/22/2009	10/22/2009	318.00	318		318	
LHAAP-001-R-01	27WW04	Perchlorate	7	5/23/2000	11/20/2017	5.24	0.062		16.4	
LHAAP-001-R-01	27WW04	thallium, total	1	10/22/2009	10/22/2009	0.80	0.8	U	0.8	U
LHAAP-12	12WW01	1,1,1-TRICHLOROETHANE	6	6/13/1993	12/19/2006	3.67	1	U	5	U
LHAAP-12	12WW01	1,1,2-TRICHLOROETHANE	6	6/13/1993	12/19/2006	3.67	1	U	5	U
LHAAP-12	12WW01	1,1-DICHLOROETHENE	6	6/13/1993	12/19/2006	3.67	1	U	5	U
LHAAP-12	12WW01	1,2-DICHLOROETHANE	6	6/13/1993	12/19/2006	3.67	1	U	5	U
LHAAP-12	12WW01	1,4-Dioxane	3	7/15/1998	12/19/2015	72.13	8.14		200	U
LHAAP-12	12WW01	CARBON TETRACHLORIDE	6	6/13/1993	12/19/2006	3.67	1	U	5	U
LHAAP-12	12WW01	CHLOROFORM	6	6/13/1993	12/19/2006	3.67	1	U	5	U
LHAAP-12	12WW01	CIS-1,2-DICHLOROETHENE	5	6/13/1993	12/19/2006	5.40	1	U	10	U
LHAAP-12	12WW01	magnesium, total	4	7/15/1998	12/8/2004	72175.00	53000		88400	
LHAAP-12	12WW01	manganese, total	4	7/15/1998	12/8/2004	1400.00	940		1650	
LHAAP-12	12WW01	METHYLENE CHLORIDE	6	6/13/1993	12/19/2006	4.67	1	U	10	U
LHAAP-12	12WW01	nickel, total	6	6/13/1993	12/8/2004	39.83	33		50	U
LHAAP-12	12WW01	Perchlorate	6	5/17/2000	2/27/2003	14.10	4	U	56	
LHAAP-12	12WW01	strontium, total	4	7/15/1998	12/8/2004	1815.00	1400		2130	
LHAAP-12	12WW01	TETRACHLOROETHENE	6	6/13/1993	12/19/2006	3.67	1	U	5	U
LHAAP-12	12WW01	thallium, total	4	6/13/1993	2/27/2003	2570.00	10	U	10000	U
LHAAP-12	12WW01	TRICHLOROETHENE	6	6/13/1993	12/19/2006	7.33	1	U	27	
LHAAP-12	12WW01	VINYL CHLORIDE	6	6/13/1993	12/19/2006	5.43	0.575	J	10	U
LHAAP-12	12WW20	1,1,1-Trichloroethane	19	1/13/2006	12/4/2017	0.97	0.25	U	5	U
LHAAP-12	12WW20	1,1,2-Trichloroethane	19	1/13/2006	12/4/2017	0.97	0.25	U	5	U
LHAAP-12	12WW20	1,1-Dichloroethene	19	1/13/2006	12/4/2017	1.21	0.5	U	5	U
LHAAP-12	12WW20	1,2-Dichloroethane	19	1/13/2006	12/4/2017	0.97	0.25	U	5	U
LHAAP-12	12WW20	1,4-Dioxane	2	12/19/2015	12/4/2017	1.36	1.02	J	1.7	J
LHAAP-12	12WW20	Carbon tetrachloride	19	1/13/2006	12/4/2017	0.97	0.25	U	5	U
LHAAP-12	12WW20	Chloroform	19	1/13/2006	12/4/2017	0.81	0.125	U	5	U
LHAAP-12	12WW20	CHROMIUM, TOTAL	1	8/10/2006	8/10/2006	20.00	20	U	20	U
LHAAP-12	12WW20	cis-1,2-Dichloroethene	19	1/13/2006	12/4/2017	0.61	0.25	U	1	U
LHAAP-12	12WW20	MAGNESIUM, TOTAL	1	8/10/2006	8/10/2006	24900.00	24900		24900	
LHAAP-12	12WW20	MANGANESE, TOTAL	1	8/10/2006	8/10/2006	333.00	333		333	
LHAAP-12	12WW20	Methylene chloride	19	1/13/2006	12/4/2017	1.50	0.25	U	5	U
LHAAP-12	12WW20	NICKEL, TOTAL	1	8/10/2006	8/10/2006	15.10	15.1	J	15.1	J
LHAAP-12	12WW20	Tetrachloroethene	19	1/13/2006	12/4/2017	0.97	0.25	U	5	U
LHAAP-12	12WW20	THALLIUM, TOTAL	1	8/10/2006	8/10/2006	0.48	0.479		0.479	
LHAAP-12	12WW20	Trichloroethene	19	1/13/2006	12/4/2017	0.80	0.263	J	1.57	
LHAAP-12	12WW20	Vinyl chloride	19	1/13/2006	12/4/2017	1.50	0.25	U	10	U
LHAAP-12	12WW21	1,1,1-Trichloroethane	19	1/12/2006	12/4/2017	0.97	0.25	U	5	U
LHAAP-12	12WW21	1,1,2-Trichloroethane	19	1/12/2006	12/4/2017	0.97	0.25	U	5	U
LHAAP-12	12WW21	1,1-Dichloroethene	19	1/12/2006	12/4/2017	1.21	0.5	U	5	U
LHAAP-12	12WW21	1,2-Dichloroethane	19	1/12/2006	12/4/2017	0.97	0.25	U	5	U
LHAAP-12	12WW21	1,4-Dioxane	2	12/19/2015	12/4/2017	1.30	1	U	1.6	J
LHAAP-12	12WW21	Carbon tetrachloride	19	1/12/2006	12/4/2017	0.97	0.25	U	5	U
LHAAP-12	12WW21	Chloroform	19	1/12/2006	12/4/2017	0.86	0.125	U	5	U
LHAAP-12	12WW21	CHROMIUM, TOTAL	1	8/10/2006	8/10/2006	20.00	20	U	20	U
LHAAP-12	12WW21	cis-1,2-Dichloroethene	18	1/12/2006	12/4/2017	1.53	0.25	U	10	U
LHAAP-12	12WW21	MAGNESIUM, TOTAL	1	8/10/2006	8/10/2006	172000.00	172000		172000	
LHAAP-12	12WW21	MANGANESE, TOTAL	1	8/10/2006	8/10/2006	1950.00	1950		1950	
LHAAP-12	12WW21	Methylene chloride	19	1/12/2006	12/4/2017	1.50	0.25	U	5	U
LHAAP-12	12WW21	NICKEL, TOTAL	1	8/10/2006	8/10/2006	18.20	18.2	J	18.2	J
LHAAP-12	12WW21	Tetrachloroethene	19	1/12/2006	12/4/2017	0.98	0.25	U	5	U
LHAAP-12	12WW21	THALLIUM, TOTAL	1	8/10/2006	8/10/2006	0.18	0.184	J	0.184	J
LHAAP-12	12WW21	Trichloroethene	19	1/12/2006	12/4/2017	0.97	0.25	U	5	U
LHAAP-12	12WW21	Vinyl chloride	19	1/12/2006	12/4/2017	1.50	0.25	U	10	U
LHAAP-12	12WW22	1,1,1-TRICHLOROETHANE	15	1/13/2006	12/1/2016	0.47	0.25	U	1	U
LHAAP-12	12WW22	1,1,2-TRICHLOROETHANE	15	1/13/2006	12/1/2016	0.47	0.25	U	1	U
LHAAP-12	12WW22	1,1-DICHLOROETHENE	15	1/13/2006	12/1/2016	0.73	0.5	U	1	U
LHAAP-12	12WW22	1,2-DICHLOROETHANE	15	1/13/2006	12/1/2016	0.47	0.25	U	1	U
LHAAP-12	12WW22	CARBON TETRACHLORIDE	15	1/13/2006	12/1/2016	0.47	0.25	U	1	U

Summary of COC Concentrations for LHAAP Wells and Miscellaneous Sampling Locations

Area	Location	Constituent	Count	Earliest	Latest	Avg (µg/L)	Min (µg/L)	Code	Max (µg/L)	Code
LHAAP-12	12WW22	CHLOROFORM	15	1/13/2006	12/1/2016	0.37	0.125	U	1.49	
LHAAP-12	12WW22	CIS-1,2-DICHLOROETHENE	14	1/13/2006	12/1/2016	0.43	0.25	U	1	U
LHAAP-12	12WW22	METHYLENE CHLORIDE	15	1/13/2006	12/1/2016	1.07	0.25	U	5	U
LHAAP-12	12WW22	TETRACHLOROETHENE	15	1/13/2006	12/1/2016	0.47	0.25	U	1	U
LHAAP-12	12WW22	TRICHLOROETHENE	15	1/13/2006	12/1/2016	0.47	0.25	U	1	U
LHAAP-12	12WW22	VINYL CHLORIDE	15	1/13/2006	12/1/2016	0.47	0.25	U	1	U
LHAAP-12	12WW23	1,1,1-TRICHLOROETHANE	15	1/13/2006	12/1/2016	0.47	0.25	U	1	U
LHAAP-12	12WW23	1,1,2-TRICHLOROETHANE	15	1/13/2006	12/1/2016	0.47	0.25	U	1	U
LHAAP-12	12WW23	1,1-DICHLOROETHENE	15	1/13/2006	12/1/2016	0.73	0.5	U	1	U
LHAAP-12	12WW23	1,2-DICHLOROETHANE	15	1/13/2006	12/1/2016	0.47	0.25	U	1	U
LHAAP-12	12WW23	1,4-Dioxane	1	12/19/2015	12/19/2015	1.00	1	U	1	U
LHAAP-12	12WW23	CARBON TETRACHLORIDE	15	1/13/2006	12/1/2016	0.47	0.25	U	1	U
LHAAP-12	12WW23	CHLOROFORM	15	1/13/2006	12/1/2016	0.28	0.125	U	1	U
LHAAP-12	12WW23	CIS-1,2-DICHLOROETHENE	15	1/13/2006	12/1/2016	0.47	0.25	U	1	U
LHAAP-12	12WW23	METHYLENE CHLORIDE	15	1/13/2006	12/1/2016	1.07	0.25	U	5	U
LHAAP-12	12WW23	TETRACHLOROETHENE	15	1/13/2006	12/1/2016	0.47	0.25	U	1	U
LHAAP-12	12WW23	TRICHLOROETHENE	15	1/13/2006	12/1/2016	0.47	0.25	U	1	U
LHAAP-12	12WW23	VINYL CHLORIDE	15	1/13/2006	12/1/2016	0.47	0.25	U	1	U
LHAAP-12	12WW24	1,1,1-Trichloroethane	16	12/19/2006	12/4/2017	3.76	0.25	U	50	U
LHAAP-12	12WW24	1,1,2-Trichloroethane	16	12/19/2006	12/4/2017	0.95	0.25	U	5	U
LHAAP-12	12WW24	1,1-Dichloroethene	16	12/19/2006	12/4/2017	1.06	0.5	U	2.5	U
LHAAP-12	12WW24	1,2-Dichloroethane	16	12/19/2006	12/4/2017	0.95	0.25	U	5	U
LHAAP-12	12WW24	1,4-Dioxane	2	12/19/2015	12/4/2017	12.65	4.8		20.5	
LHAAP-12	12WW24	Carbon tetrachloride	16	12/19/2006	12/4/2017	0.95	0.25	U	5	U
LHAAP-12	12WW24	Chloroform	16	12/19/2006	12/4/2017	0.44	0.125	U	1	U
LHAAP-12	12WW24	CHROMIUM, TOTAL	1	3/15/2007	3/15/2007	21.00	21		21	
LHAAP-12	12WW24	cis-1,2-Dichloroethene	16	12/19/2006	12/4/2017	63.42	25.3		113	
LHAAP-12	12WW24	Methylene chloride	16	12/19/2006	12/4/2017	4.26	0.25	U	50	U
LHAAP-12	12WW24	Tetrachloroethene	15	12/19/2006	12/4/2017	4.27	0.5	U	50	U
LHAAP-12	12WW24	Trichloroethene	16	12/19/2006	12/4/2017	240.94	83		396	
LHAAP-12	12WW24	Vinyl chloride	16	12/19/2006	12/4/2017	2.00	0.358	J	8.24	
LHAAP-12	12WW25	1,1,1-Trichloroethane	1	9/8/2014	9/8/2014	0.50	0.5	U	0.5	U
LHAAP-12	12WW25	1,1,2-Trichloroethane	1	9/8/2014	9/8/2014	0.50	0.5	U	0.5	U
LHAAP-12	12WW25	1,1-Dichloroethene	1	9/8/2014	9/8/2014	1.00	1	U	1	U
LHAAP-12	12WW25	1,2-Dichloroethane	1	9/8/2014	9/8/2014	0.50	0.5	U	0.5	U
LHAAP-12	12WW25	Carbon tetrachloride	1	9/8/2014	9/8/2014	0.50	0.5	U	0.5	U
LHAAP-12	12WW25	Chloroform	1	9/8/2014	9/8/2014	0.25	0.25	U	0.25	U
LHAAP-12	12WW25	cis-1,2-Dichloroethene	1	9/8/2014	9/8/2014	0.40	0.402	J	0.402	J
LHAAP-12	12WW25	Methylene chloride	1	9/8/2014	9/8/2014	0.39	0.388	J	0.388	J
LHAAP-12	12WW25	Tetrachloroethene	1	9/8/2014	9/8/2014	0.50	0.5	U	0.5	U
LHAAP-12	12WW25	TRICHLOROETHENE	1	9/8/2014	9/8/2014	0.32	0.317	J	0.317	J
LHAAP-12	12WW25	Vinyl chloride	1	9/8/2014	9/8/2014	0.50	0.5	U	0.5	U
LHAAP-16	16EW01	1,1,1-Trichloroethane	18	2/24/1996	2/7/2018	479.17	0.25	U	1250	U
LHAAP-16	16EW01	1,1,2-Trichloroethane	18	2/24/1996	2/7/2018	479.35	0.25	U	1250	U
LHAAP-16	16EW01	1,1-Dichloroethene	18	2/24/1996	2/7/2018	488.57	0.5	U	1250	U
LHAAP-16	16EW01	1,2-Dichloroethane	18	2/24/1996	2/7/2018	505.70	0.723	J	1250	U
LHAAP-16	16EW01	1,4-Dioxane	5	10/29/1997	12/16/2015	43202.51	5.85		200000	U
LHAAP-16	16EW01	Carbon tetrachloride	18	2/24/1996	2/7/2018	479.17	0.25	U	1250	U
LHAAP-16	16EW01	Chloroform	18	2/24/1996	2/7/2018	477.41	0.125	U	1250	U
LHAAP-16	16EW01	cis-1,2-Dichloroethene	11	10/29/1997	2/7/2018	6275.26	51.9		13000	
LHAAP-16	16EW01	magnesium, total	7	2/24/1996	10/29/1997	311285.71	220000		349000	
LHAAP-16	16EW01	manganese, total	7	2/24/1996	10/29/1997	603.00	380		1030	
LHAAP-16	16EW01	Methylene chloride	18	2/24/1996	2/7/2018	1294.56	0.25	U	3500	
LHAAP-16	16EW01	nickel, total	7	2/24/1996	10/29/1997	55.29	15		200	U
LHAAP-16	16EW01	Perchlorate	13	5/24/2000	2/7/2018	455.62	108	J	1050	
LHAAP-16	16EW01	strontium, total	7	2/24/1996	10/29/1997	6061.43	5490		6890	
LHAAP-16	16EW01	Tetrachloroethene	18	2/24/1996	2/7/2018	479.17	0.25	U	1250	U
LHAAP-16	16EW01	thallium, total	7	2/24/1996	10/29/1997	4285.86	1	U	5000	U
LHAAP-16	16EW01	Trichloroethene	18	2/24/1996	2/7/2018	25089.58	36.4		57000	
LHAAP-16	16EW01	Vinyl chloride	18	2/24/1996	2/7/2018	927.40	0.25	U	2500	U
LHAAP-16	16EW02	1,1,1-Trichloroethane	18	2/23/1996	2/7/2018	282.64	12.5	U	500	U
LHAAP-16	16EW02	1,1,2-Trichloroethane	18	2/23/1996	2/7/2018	282.78	15.1	J	500	U
LHAAP-16	16EW02	1,1-Dichloroethene	18	2/23/1996	2/7/2018	316.93	50	U	500	U
LHAAP-16	16EW02	1,2-Dichloroethane	18	2/23/1996	2/7/2018	290.96	50	U	500	U
LHAAP-16	16EW02	1,4-Dioxane	5	10/29/1997	12/16/2015	34004.31	8.66	J	80000	U
LHAAP-16	16EW02	Carbon tetrachloride	18	2/23/1996	2/7/2018	282.64	12.5	U	500	U
LHAAP-16	16EW02	Chloroform	18	2/23/1996	2/7/2018	264.27	10.3	J	500	U
LHAAP-16	16EW02	cis-1,2-Dichloroethene	11	3/14/1996	2/7/2018	20766.82	5	U	50100	
LHAAP-16	16EW02	magnesium, total	8	2/23/1996	10/29/1997	372500.00	300000		473000	
LHAAP-16	16EW02	manganese, total	8	2/23/1996	10/29/1997	1341.25	1130		1590	
LHAAP-16	16EW02	Methylene chloride	18	2/23/1996	2/7/2018	480.41	12.5	U	1000	U
LHAAP-16	16EW02	nickel, total	8	2/23/1996	10/29/1997	69.38	40	U	200	U
LHAAP-16	16EW02	Perchlorate	10	10/5/2000	2/7/2018	70.77	0.482		400	
LHAAP-16	16EW02	strontium, total	8	2/23/1996	10/29/1997	6758.75	5800		8500	
LHAAP-16	16EW02	Tetrachloroethene	18	2/23/1996	2/7/2018	282.64	12.5	U	500	U
LHAAP-16	16EW02	thallium, total	8	2/23/1996	10/29/1997	3875.13	1	U	5000	U
LHAAP-16	16EW02	Trichloroethene	18	2/23/1996	2/7/2018	36753.22	11000		131000	
LHAAP-16	16EW02	Vinyl chloride	18	2/23/1996	2/7/2018	642.00	175	J	1000	U
LHAAP-16	16EW03	1,1,1-Trichloroethane	11	10/29/1997	2/7/2018	30.91	10	U	62.5	U
LHAAP-16	16EW03	1,1,2-Trichloroethane	11	10/29/1997	2/7/2018	30.46	5.1	J	62.5	U
LHAAP-16	16EW03	1,1-Dichloroethene	11	10/29/1997	2/7/2018	94.17	20	U	500	U
LHAAP-16	16EW03	1,2-Dichloroethane	11	10/29/1997	2/7/2018	35.41	10	U	62.5	U
LHAAP-16	16EW03	1,4-Dioxane	5	10/29/1997	12/16/2015	4801.65	2.72		8000	U
LHAAP-16	16EW03	Carbon tetrachloride	11	10/29/1997	2/7/2018	30.91	10	U	62.5	U
LHAAP-16	16EW03	Chloroform	11	10/29/1997	2/7/2018	24.10	5	U	50	U
LHAAP-16	16EW03	cis-1,2-Dichloroethene	10	10/29/1997	2/7/2018	5528.50	23	J	16000	
LHAAP-16	16EW03	magnesium, total	1	10/29/1997	10/29/1997	120000.00	120000		120000	

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Area	Location	Constituent	Count	Earliest	Latest	Avg (µg/L)	Min (µg/L)	Code	Max (µg/L)	Code
LHAAP-16	16EW03	manganese, total	1	10/29/1997	10/29/1997	2790.00	2790		2790	
LHAAP-16	16EW03	Methylene chloride	11	10/29/1997	2/7/2018	36.42	10	U	100	U
LHAAP-16	16EW03	nickel, total	1	10/29/1997	10/29/1997	457.00	457		457	
LHAAP-16	16EW03	Perchlorate	9	10/5/2000	2/7/2018	45.38	0.139	J	390	
LHAAP-16	16EW03	strontium, total	1	10/29/1997	10/29/1997	3300.00	3300		3300	
LHAAP-16	16EW03	Tetrachloroethene	11	10/29/1997	2/7/2018	30.91	10	U	62.5	U
LHAAP-16	16EW03	thallium, total	1	10/29/1997	10/29/1997	1.00	1	U	1	U
LHAAP-16	16EW03	Trichloroethene	11	10/29/1997	2/7/2018	23071.82	2000		77400	
LHAAP-16	16EW03	Vinyl chloride	11	10/29/1997	2/7/2018	52.40	10	U	130	
LHAAP-16	16EW04	1,1,1-Trichloroethane	11	10/29/1997	2/7/2018	27.73	0.25	U	100	U
LHAAP-16	16EW04	1,1,2-Trichloroethane	11	10/29/1997	2/7/2018	27.74	0.25	U	100	U
LHAAP-16	16EW04	1,1-Dichloroethene	11	10/29/1997	2/7/2018	51.99	0.5	U	200	U
LHAAP-16	16EW04	1,2-Dichloroethane	11	10/29/1997	2/7/2018	28.27	0.488	J	100	U
LHAAP-16	16EW04	1,4-Dioxane	4	10/29/1997	12/16/2015	3252.00	8.01	J	5000	U
LHAAP-16	16EW04	Carbon tetrachloride	11	10/29/1997	2/7/2018	27.73	0.25	U	100	U
LHAAP-16	16EW04	Chloroform	11	10/29/1997	2/7/2018	17.42	0.318	J	50	U
LHAAP-16	16EW04	cis-1,2-Dichloroethene	10	10/29/1997	2/7/2018	5360.80	14	J	13000	
LHAAP-16	16EW04	magnesium, total	1	10/29/1997	10/29/1997	73000.00	73000		73000	
LHAAP-16	16EW04	manganese, total	1	10/29/1997	10/29/1997	713.00	713		713	
LHAAP-16	16EW04	Methylene chloride	11	10/29/1997	2/7/2018	27.82	0.25	U	100	U
LHAAP-16	16EW04	nickel, total	1	10/29/1997	10/29/1997	40.00	40	U	40	U
LHAAP-16	16EW04	Perchlorate	9	10/5/2000	2/7/2018	3.59	0.165	J	12.7	
LHAAP-16	16EW04	strontium, total	1	10/29/1997	10/29/1997	1730.00	1730		1730	
LHAAP-16	16EW04	Tetrachloroethene	11	10/29/1997	2/7/2018	27.73	0.25	U	100	U
LHAAP-16	16EW04	thallium, total	1	10/29/1997	10/29/1997	1.00	1	U	1	U
LHAAP-16	16EW04	Trichloroethene	11	10/29/1997	2/7/2018	19555.91	67		53500	
LHAAP-16	16EW04	Vinyl chloride	11	10/29/1997	2/7/2018	41.15	0.25	U	130	
LHAAP-16	16EW05	1,1,1-Trichloroethane	11	10/29/1997	2/7/2018	186.27	0.25	U	1000	U
LHAAP-16	16EW05	1,1,2-Trichloroethane	11	10/29/1997	2/7/2018	186.27	0.25	U	1000	U
LHAAP-16	16EW05	1,1-Dichloroethene	11	10/29/1997	2/7/2018	194.51	0.5	U	1000	U
LHAAP-16	16EW05	1,2-Dichloroethane	11	10/29/1997	2/7/2018	190.16	0.25	U	1000	U
LHAAP-16	16EW05	1,4-Dioxane	4	10/29/1997	12/16/2015	100000.25	1	U	200000	U
LHAAP-16	16EW05	Carbon tetrachloride	11	10/29/1997	2/7/2018	186.27	0.25	U	1000	U
LHAAP-16	16EW05	Chloroform	11	10/29/1997	2/7/2018	183.99	0.125	U	1000	U
LHAAP-16	16EW05	cis-1,2-Dichloroethene	10	10/29/1997	2/7/2018	4165.56	2.6		14900	
LHAAP-16	16EW05	magnesium, total	1	10/29/1997	10/29/1997	400000.00	400000		400000	
LHAAP-16	16EW05	manganese, total	1	10/29/1997	10/29/1997	5550.00	5550		5550	
LHAAP-16	16EW05	Methylene chloride	11	10/29/1997	2/7/2018	186.36	0.25	U	1000	U
LHAAP-16	16EW05	nickel, total	1	10/29/1997	10/29/1997	800.00	800	U	800	U
LHAAP-16	16EW05	Perchlorate	12	10/5/2000	2/7/2018	694.70	4.4		1950	
LHAAP-16	16EW05	strontium, total	1	10/29/1997	10/29/1997	9900.00	9900		9900	
LHAAP-16	16EW05	Tetrachloroethene	11	10/29/1997	2/7/2018	186.27	0.25	U	1000	U
LHAAP-16	16EW05	thallium, total	1	10/29/1997	10/29/1997	1.00	1	U	1	U
LHAAP-16	16EW05	Trichloroethene	11	10/29/1997	2/7/2018	13103.28	15.1		46000	
LHAAP-16	16EW05	Vinyl chloride	11	10/29/1997	2/7/2018	400.95	0.25	U	1090	
LHAAP-16	16EW06	1,1,1-Trichloroethane	11	10/29/1997	2/7/2018	45.20	1	U	400	U
LHAAP-16	16EW06	1,1,2-Trichloroethane	11	10/29/1997	2/7/2018	45.20	1	U	400	U
LHAAP-16	16EW06	1,1-Dichloroethene	11	10/29/1997	2/7/2018	47.67	1	U	400	U
LHAAP-16	16EW06	1,2-Dichloroethane	11	10/29/1997	2/7/2018	45.36	1.58	J	400	U
LHAAP-16	16EW06	1,4-Dioxane	4	10/29/1997	12/16/2015	22000.93	3.7	J	80000	U
LHAAP-16	16EW06	Carbon tetrachloride	11	10/29/1997	2/7/2018	45.20	1	U	400	U
LHAAP-16	16EW06	Chloroform	11	10/29/1997	2/7/2018	42.51	0.6		400	U
LHAAP-16	16EW06	cis-1,2-Dichloroethene	10	10/29/1997	2/7/2018	1311.20	15	J	4110	
LHAAP-16	16EW06	magnesium, total	1	10/29/1997	10/29/1997	120000.00	120000		120000	
LHAAP-16	16EW06	manganese, total	1	10/29/1997	10/29/1997	3220.00	3220		3220	
LHAAP-16	16EW06	Methylene chloride	11	10/29/1997	2/7/2018	45.30	1.25	U	400	U
LHAAP-16	16EW06	nickel, total	1	10/29/1997	10/29/1997	200.00	200	U	200	U
LHAAP-16	16EW06	Perchlorate	10	10/5/2000	2/7/2018	100.93	0.389	J	270	
LHAAP-16	16EW06	strontium, total	1	10/29/1997	10/29/1997	3610.00	3610		3610	
LHAAP-16	16EW06	Tetrachloroethene	11	10/29/1997	2/7/2018	45.20	1	U	400	U
LHAAP-16	16EW06	thallium, total	1	10/29/1997	10/29/1997	1.00	1	U	1	U
LHAAP-16	16EW06	Trichloroethene	11	10/29/1997	2/7/2018	6671.45	536		22000	
LHAAP-16	16EW06	Vinyl chloride	11	10/29/1997	2/7/2018	57.45	2.4		400	U
LHAAP-16	16EW07	1,1,1-Trichloroethane	11	10/29/1997	2/7/2018	2.84	0.25	U	12.5	U
LHAAP-16	16EW07	1,1,2-Trichloroethane	11	10/29/1997	2/7/2018	2.84	0.25	U	12.5	U
LHAAP-16	16EW07	1,1-Dichloroethene	11	10/29/1997	2/7/2018	5.54	0.5	U	25	U
LHAAP-16	16EW07	1,2-Dichloroethane	11	10/29/1997	2/7/2018	3.82	0.294	J	23.2	J
LHAAP-16	16EW07	1,4-Dioxane	4	10/29/1997	12/16/2015	150.25	1	U	200	U
LHAAP-16	16EW07	Carbon tetrachloride	11	10/29/1997	2/7/2018	2.84	0.25	U	12.5	U
LHAAP-16	16EW07	Chloroform	11	10/29/1997	2/7/2018	1.60	0.125	U	6.25	U
LHAAP-16	16EW07	cis-1,2-Dichloroethene	10	10/29/1997	2/7/2018	743.85	1	U	2910	
LHAAP-16	16EW07	magnesium, total	1	10/29/1997	10/29/1997	120000.00	120000		120000	
LHAAP-16	16EW07	manganese, total	1	10/29/1997	10/29/1997	5530.00	5530		5530	
LHAAP-16	16EW07	Methylene chloride	11	10/29/1997	2/7/2018	2.93	0.25	U	12.5	U
LHAAP-16	16EW07	nickel, total	1	10/29/1997	10/29/1997	40.00	40	U	40	U
LHAAP-16	16EW07	Perchlorate	10	10/5/2000	2/7/2018	58.14	0.2	U	490	
LHAAP-16	16EW07	strontium, total	1	10/29/1997	10/29/1997	5990.00	5990		5990	
LHAAP-16	16EW07	Tetrachloroethene	11	10/29/1997	2/7/2018	2.84	0.25	U	12.5	U
LHAAP-16	16EW07	thallium, total	1	10/29/1997	10/29/1997	1.00	1	U	1	U
LHAAP-16	16EW07	Trichloroethene	11	10/29/1997	2/7/2018	803.37	0.84	J	6040	
LHAAP-16	16EW07	Vinyl chloride	11	10/29/1997	2/7/2018	3.20	0.477	J	12.5	U
LHAAP-16	16EW08	1,1,1-Trichloroethane	11	10/29/1997	2/7/2018	1.16	0.25	U	6.25	U
LHAAP-16	16EW08	1,1,2-Trichloroethane	11	10/29/1997	2/7/2018	1.16	0.25	U	6.25	U
LHAAP-16	16EW08	1,1-Dichloroethene	11	10/29/1997	2/7/2018	1.95	0.5	U	12.5	U
LHAAP-16	16EW08	1,2-Dichloroethane	11	10/29/1997	2/7/2018	2.56	0.25	U	21.7	J
LHAAP-16	16EW08	1,4-Dioxane	4	10/29/1997	12/16/2015	150.25	1	U	200	U
LHAAP-16	16EW08	Carbon tetrachloride	11	10/29/1997	2/7/2018	1.16	0.25	U	6.25	U

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Area	Location	Constituent	Count	Earliest	Latest	Avg (µg/L)	Min (µg/L)	Code	Max (µg/L)	Code
LHAAP-16	16EW08	Chloroform	11	10/29/1997	2/7/2018	0.76	0.125	U	3.13	U
LHAAP-16	16EW08	cis-1,2-Dichloroethene	10	10/29/1997	2/7/2018	313.07	1	U	2690	
LHAAP-16	16EW08	magnesium, total	1	10/29/1997	10/29/1997	26000.00	26000		26000	
LHAAP-16	16EW08	manganese, total	1	10/29/1997	10/29/1997	1400.00	1400		1400	
LHAAP-16	16EW08	Methylene chloride	11	10/29/1997	2/7/2018	1.31	0.25	U	6.93	J
LHAAP-16	16EW08	nickel, total	1	10/29/1997	10/29/1997	40.00	40	U	40	U
LHAAP-16	16EW08	Perchlorate	12	10/5/2000	2/7/2018	65.79	0.116	J	570	
LHAAP-16	16EW08	strontium, total	1	10/29/1997	10/29/1997	1110.00	1110		1110	
LHAAP-16	16EW08	Tetrachloroethene	11	10/29/1997	2/7/2018	1.16	0.25	U	6.25	U
LHAAP-16	16EW08	thallium, total	1	10/29/1997	10/29/1997	1.00	1	U	1	U
LHAAP-16	16EW08	Trichloroethene	11	10/29/1997	2/7/2018	534.44	1	U	4870	
LHAAP-16	16EW08	Vinyl chloride	11	10/29/1997	2/7/2018	3.80	0.25	U	35	
LHAAP-16	16WW12	1,1,1-TRICHLOROETHANE	8	6/13/1995	5/23/2013	26.38	1	U	80	U
LHAAP-16	16WW12	1,1,2-TRICHLOROETHANE	8	6/13/1995	5/23/2013	26.38	1	U	80	U
LHAAP-16	16WW12	1,1-DICHLOROETHENE	10	6/13/1995	5/23/2013	22.80	1.34		80	U
LHAAP-16	16WW12	1,2-DICHLOROETHANE	10	6/13/1995	5/23/2013	34.39	5	U	80	U
LHAAP-16	16WW12	1,4-Dioxane	3	10/27/1997	6/11/1998	16000.00	16000	U	16000	U
LHAAP-16	16WW12	Carbon tetrachloride	9	6/13/1995	5/23/2013	23.50	0.5	U	80	U
LHAAP-16	16WW12	Chloroform	9	6/13/1995	5/23/2013	22.69	0.25	U	80	U
LHAAP-16	16WW12	CHROMIUM, TOTAL	1	3/18/2009	3/18/2009	107.00	107		107	
LHAAP-16	16WW12	cis-1,2-Dichloroethene	8	10/27/1997	5/23/2013	90.51	38.8		180	
LHAAP-16	16WW12	magnesium, total	4	10/27/1997	12/11/2004	155250.00	136000		210000	
LHAAP-16	16WW12	manganese, total	4	10/27/1997	12/11/2004	527.75	381		791	
LHAAP-16	16WW12	Methylene chloride	9	6/13/1995	5/23/2013	26.44	0.5	U	80	U
LHAAP-16	16WW12	nickel, total	5	6/13/1995	12/11/2004	289.00	40	U	816	
LHAAP-16	16WW12	Perchlorate	12	5/22/2000	5/23/2013	874.01	0.2	U	5990	
LHAAP-16	16WW12	strontium, total	4	10/27/1997	12/11/2004	3560.00	2920		5330	
LHAAP-16	16WW12	Tetrachloroethene	9	6/13/1995	5/23/2013	23.50	0.5	U	80	U
LHAAP-16	16WW12	thallium, total	3	6/13/1995	3/1/2003	340.33	1	U	1000	U
LHAAP-16	16WW12	Trichloroethene	11	6/13/1995	5/23/2013	3770.95	50.4		7500	E
LHAAP-16	16WW12	Vinyl chloride	10	6/13/1995	5/23/2013	25.17	0.447	J	80	U
LHAAP-16	16WW14	1,1,1-TRICHLOROETHANE	7	6/13/1995	5/21/2013	1.41	0.34		5	U
LHAAP-16	16WW14	1,1,2-TRICHLOROETHANE	7	6/13/1995	5/21/2013	1.42	0.44		5	U
LHAAP-16	16WW14	1,1-DICHLOROETHENE	7	6/13/1995	5/21/2013	1.26	0.41		5	U
LHAAP-16	16WW14	1,2-DICHLOROETHANE	7	6/13/1995	5/21/2013	1.40	0.29		5	U
LHAAP-16	16WW14	1,4-Dioxane	3	10/24/1997	6/15/1998	200.00	200	U	200	U
LHAAP-16	16WW14	Carbon tetrachloride	7	6/13/1995	5/21/2013	1.40	0.29		5	U
LHAAP-16	16WW14	Chloroform	7	6/13/1995	5/21/2013	1.37	0.25	U	5	U
LHAAP-16	16WW14	CHROMIUM, TOTAL	1	3/18/2009	3/18/2009	143.00	143		143	
LHAAP-16	16WW14	cis-1,2-Dichloroethene	6	10/24/1997	5/21/2013	2.89	0.94	J	9.3	
LHAAP-16	16WW14	magnesium, total	4	10/24/1997	12/11/2004	115250.00	109000		120000	
LHAAP-16	16WW14	manganese, total	4	10/24/1997	12/11/2004	267.25	133		483	
LHAAP-16	16WW14	Methylene chloride	7	6/13/1995	5/21/2013	2.49	0.5	U	10	U
LHAAP-16	16WW14	nickel, total	5	6/13/1995	12/11/2004	526.80	40	U	1630	
LHAAP-16	16WW14	Perchlorate	5	9/28/2000	5/21/2013	22.26	1.32		98.9	
LHAAP-16	16WW14	strontium, total	4	10/24/1997	12/11/2004	2607.50	2390		3050	
LHAAP-16	16WW14	Tetrachloroethene	7	6/13/1995	5/21/2013	1.40	0.33		5	U
LHAAP-16	16WW14	thallium, total	4	6/13/1995	2/23/2004	257.75	1	U	1000	U
LHAAP-16	16WW14	Trichloroethene	8	6/13/1995	5/21/2013	54.26	34.3		82	
LHAAP-16	16WW14	Vinyl chloride	7	6/13/1995	5/21/2013	2.66	0.55		10	U
LHAAP-16	16WW16	1,1,1-TRICHLOROETHANE	12	6/15/1995	5/22/2013	931.10	0.34		4000	U
LHAAP-16	16WW16	1,1,2-TRICHLOROETHANE	12	6/15/1995	5/22/2013	889.94	0.391	J	4000	U
LHAAP-16	16WW16	1,1-DICHLOROETHENE	12	6/15/1995	5/22/2013	1340.94	43.2		4000	
LHAAP-16	16WW16	1,2-DICHLOROETHANE	12	6/15/1995	5/22/2013	969.99	29.6		4000	U
LHAAP-16	16WW16	1,4-Dioxane	3	10/27/1997	6/15/1998	534000.00	2000	U	800000	U
LHAAP-16	16WW16	Carbon tetrachloride	12	6/15/1995	5/22/2013	931.09	0.29		4000	U
LHAAP-16	16WW16	Chloroform	11	10/27/1997	5/22/2013	1375.62	1.25	U	4000	U
LHAAP-16	16WW16	CHROMIUM, TOTAL	1	3/17/2009	3/17/2009	8.54	8.54	J	8.54	J
LHAAP-16	16WW16	cis-1,2-Dichloroethene	11	10/27/1997	5/22/2013	112840.00	3240		270000	
LHAAP-16	16WW16	magnesium, total	4	10/27/1997	12/13/2004	134500.00	119000		141000	
LHAAP-16	16WW16	manganese, total	4	10/27/1997	12/13/2004	1525.25	831		1980	
LHAAP-16	16WW16	Methylene chloride	11	10/27/1997	5/22/2013	1842.59	1.21	J	9500	
LHAAP-16	16WW16	nickel, total	5	6/15/1995	12/13/2004	122.18	42		200	U
LHAAP-16	16WW16	Perchlorate	9	5/23/2000	5/22/2013	661.89	240		1400	
LHAAP-16	16WW16	strontium, total	4	10/27/1997	12/13/2004	2757.50	2320		2940	
LHAAP-16	16WW16	Tetrachloroethene	12	6/15/1995	5/22/2013	930.76	0.332		4000	U
LHAAP-16	16WW16	thallium, total	5	6/15/1995	12/13/2004	1008.20	1	U	5000	U
LHAAP-16	16WW16	Trichloroethene	12	6/15/1995	5/22/2013	16285.83	8830		22000	
LHAAP-16	16WW16	Vinyl chloride	11	10/27/1997	5/22/2013	4813.45	564		11000	
LHAAP-16	16WW22	1,1,1-TRICHLOROETHANE	7	10/24/1997	5/21/2013	15.41	0.34		50	U
LHAAP-16	16WW22	1,1,2-TRICHLOROETHANE	7	10/24/1997	5/21/2013	15.42	0.44		50	U
LHAAP-16	16WW22	1,1-DICHLOROETHENE	7	10/24/1997	5/21/2013	16.08	0.41		50	U
LHAAP-16	16WW22	1,2-DICHLOROETHANE	8	10/24/1997	5/21/2013	18.59	0.838	J	50	U
LHAAP-16	16WW22	1,4-Dioxane	3	10/24/1997	6/11/1998	9333.33	8000	U	10000	U
LHAAP-16	16WW22	Carbon tetrachloride	7	10/24/1997	5/21/2013	15.40	0.29		50	U
LHAAP-16	16WW22	Chloroform	7	10/24/1997	5/21/2013	15.30	0.25	U	50	U
LHAAP-16	16WW22	CHROMIUM, TOTAL	1	3/17/2009	3/17/2009	69.50	69.5		69.5	
LHAAP-16	16WW22	cis-1,2-Dichloroethene	6	10/24/1997	5/21/2013	47.29	4.96	J	120	
LHAAP-16	16WW22	magnesium, total	4	10/24/1997	12/11/2004	133975.00	93900		220000	
LHAAP-16	16WW22	manganese, total	4	10/24/1997	12/11/2004	181.75	167		212	
LHAAP-16	16WW22	Methylene chloride	7	10/24/1997	5/21/2013	15.15	0.5	U	50	U
LHAAP-16	16WW22	nickel, total	4	10/24/1997	12/11/2004	560.75	200	U	765	
LHAAP-16	16WW22	Perchlorate	10	5/22/2000	5/21/2013	149.24	5	U	599	J
LHAAP-16	16WW22	strontium, total	4	10/24/1997	12/11/2004	3077.50	2000		5580	
LHAAP-16	16WW22	Tetrachloroethene	7	10/24/1997	5/21/2013	14.75	0.33		50	U
LHAAP-16	16WW22	thallium, total	3	10/24/1997	12/11/2004	10.33	1	U	20	U
LHAAP-16	16WW22	Trichloroethene	8	10/24/1997	5/21/2013	1255.00	119		4300	

Summary of COC Concentrations for LHAAP Wells and Miscellaneous Sampling Locations

Area	Location	Constituent	Count	Earliest	Latest	Avg (µg/L)	Min (µg/L)	Code	Max (µg/L)	Code
LHAAP-16	16WW22	Vinyl chloride	7	10/24/1997	5/21/2013	17.57	0.947		50	U
LHAAP-16	16WW23	1,1,1-TRICHLOROETHANE	3	10/23/1997	5/20/2013	0.83	0.5	U	1	U
LHAAP-16	16WW23	1,1,2-TRICHLOROETHANE	3	10/23/1997	5/20/2013	0.83	0.5	U	1	U
LHAAP-16	16WW23	1,1-DICHLOROETHENE	3	10/23/1997	5/20/2013	1.00	1	U	1	U
LHAAP-16	16WW23	1,2-DICHLOROETHANE	3	10/23/1997	5/20/2013	0.83	0.5	U	1	U
LHAAP-16	16WW23	1,4-Dioxane	1	10/23/1997	10/23/1997	200.00	200	U	200	U
LHAAP-16	16WW23	Carbon tetrachloride	3	10/23/1997	5/20/2013	0.83	0.5	U	1	U
LHAAP-16	16WW23	Chloroform	3	10/23/1997	5/20/2013	0.75	0.25	U	1	U
LHAAP-16	16WW23	cis-1,2-Dichloroethene	3	10/23/1997	5/20/2013	0.83	0.5	U	1	U
LHAAP-16	16WW23	magnesium, total	4	10/23/1997	12/14/2004	62200.00	43900		81000	
LHAAP-16	16WW23	MANGANESE, TOTAL	5	10/23/1997	3/19/2009	11550.00	7900		15700	
LHAAP-16	16WW23	Methylene chloride	3	10/23/1997	5/20/2013	1.17	0.5	U	2	U
LHAAP-16	16WW23	nickel, total	4	10/23/1997	12/14/2004	253.93	31.7		720	
LHAAP-16	16WW23	Perchlorate	5	9/19/2000	5/20/2013	20.16	0.2	U	80	U
LHAAP-16	16WW23	strontium, total	4	10/23/1997	12/14/2004	2110.00	1590		2900	
LHAAP-16	16WW23	Tetrachloroethene	3	10/23/1997	5/20/2013	0.83	0.5	U	1	U
LHAAP-16	16WW23	thallium, total	2	10/23/1997	3/3/2003	20.65	1	U	40.3	
LHAAP-16	16WW23	Trichloroethene	5	10/23/1997	5/20/2013	2.19	0.5	U	7.94	
LHAAP-16	16WW23	Vinyl chloride	3	10/23/1997	5/20/2013	0.83	0.5	U	1	U
LHAAP-16	16WW24	1,1,1-TRICHLOROETHANE	4	10/23/1997	5/20/2013	0.69	0.25	U	1	U
LHAAP-16	16WW24	1,1,2-TRICHLOROETHANE	4	10/23/1997	5/20/2013	0.69	0.25	U	1	U
LHAAP-16	16WW24	1,1-DICHLOROETHENE	4	10/23/1997	5/20/2013	0.88	0.5	U	1	U
LHAAP-16	16WW24	1,2-DICHLOROETHANE	4	10/23/1997	5/20/2013	0.69	0.25	U	1	U
LHAAP-16	16WW24	1,4-Dioxane	1	10/23/1997	10/23/1997	200.00	200	U	200	U
LHAAP-16	16WW24	Carbon tetrachloride	4	10/23/1997	5/20/2013	0.69	0.25	U	1	U
LHAAP-16	16WW24	Chloroform	4	10/23/1997	5/20/2013	0.49	0.125	U	1	U
LHAAP-16	16WW24	CHROMIUM, TOTAL	1	3/19/2009	3/19/2009	830.00	830		830	
LHAAP-16	16WW24	cis-1,2-Dichloroethene	4	10/23/1997	5/20/2013	0.69	0.25	U	1	U
LHAAP-16	16WW24	magnesium, total	4	10/23/1997	12/14/2004	33450.00	25000		39000	
LHAAP-16	16WW24	manganese, total	4	10/23/1997	12/14/2004	5145.00	4160		6020	
LHAAP-16	16WW24	Methylene chloride	4	10/23/1997	5/20/2013	0.94	0.25	U	2	U
LHAAP-16	16WW24	nickel, total	4	10/23/1997	12/14/2004	528.00	380		751	
LHAAP-16	16WW24	Perchlorate	7	9/19/2000	5/20/2013	19.47	0.2	U	80	U
LHAAP-16	16WW24	strontium, total	4	10/23/1997	12/14/2004	650.25	479		920	
LHAAP-16	16WW24	Tetrachloroethene	4	10/23/1997	5/20/2013	0.69	0.25	U	1	U
LHAAP-16	16WW24	thallium, total	2	10/23/1997	3/3/2003	9.15	1	U	17.3	J
LHAAP-16	16WW24	Trichloroethene	5	10/23/1997	5/20/2013	1.12	0.5	U	2.1	
LHAAP-16	16WW24	Vinyl chloride	4	10/23/1997	5/20/2013	0.69	0.25	U	1	U
LHAAP-16	16WW25	1,1,1-TRICHLOROETHANE	6	10/23/1997	5/22/2013	1.58	0.5	U	5	U
LHAAP-16	16WW25	1,1,2-TRICHLOROETHANE	6	10/23/1997	5/22/2013	1.58	0.5	U	5	U
LHAAP-16	16WW25	1,1-DICHLOROETHENE	6	10/23/1997	5/22/2013	1.67	1	U	5	U
LHAAP-16	16WW25	1,2-DICHLOROETHANE	6	10/23/1997	5/22/2013	1.58	0.5	U	5	U
LHAAP-16	16WW25	1,4-Dioxane	3	10/23/1997	6/12/1998	200.00	200	U	200	U
LHAAP-16	16WW25	Carbon tetrachloride	6	10/23/1997	5/22/2013	1.58	0.5	U	5	U
LHAAP-16	16WW25	Chloroform	6	10/23/1997	5/22/2013	7.38	0.25	U	36	
LHAAP-16	16WW25	cis-1,2-Dichloroethene	6	10/23/1997	5/22/2013	2.64	0.421	J	7.9	
LHAAP-16	16WW25	magnesium, total	4	10/23/1997	12/14/2004	206250.00	99000		277000	
LHAAP-16	16WW25	MANGANESE, TOTAL	5	10/23/1997	3/19/2009	6880.00	3190		9300	
LHAAP-16	16WW25	Methylene chloride	6	10/23/1997	5/22/2013	1.09	0.5	U	2	U
LHAAP-16	16WW25	nickel, total	2	10/23/1997	3/2/2003	99.10	20.2		178	
LHAAP-16	16WW25	Perchlorate	8	9/28/2000	5/22/2013	570.56	0.2	U	4000	U
LHAAP-16	16WW25	strontium, total	4	10/23/1997	12/14/2004	9020.00	4680		12300	
LHAAP-16	16WW25	Tetrachloroethene	6	10/23/1997	5/22/2013	0.85	0.5	U	1	U
LHAAP-16	16WW25	thallium, total	2	10/23/1997	3/2/2003	22.35	1	U	43.7	
LHAAP-16	16WW25	Trichloroethene	6	10/23/1997	5/22/2013	1.54	0.5	U	2.9	
LHAAP-16	16WW25	Vinyl chloride	6	10/23/1997	5/22/2013	2.42	0.5	U	10	U
LHAAP-16	16WW26	1,1,1-TRICHLOROETHANE	6	10/23/1997	5/23/2013	2.75	0.5	U	8	U
LHAAP-16	16WW26	1,1,2-TRICHLOROETHANE	6	10/23/1997	5/23/2013	2.00	0.275	J	8	U
LHAAP-16	16WW26	1,1-DICHLOROETHENE	7	10/23/1997	5/23/2013	3.64	1	U	8	U
LHAAP-16	16WW26	1,2-DICHLOROETHANE	7	10/23/1997	5/23/2013	1.81	0.343		8	U
LHAAP-16	16WW26	1,4-Dioxane	3	10/23/1997	6/12/1998	666.67	200	U	1600	U
LHAAP-16	16WW26	Carbon tetrachloride	6	10/23/1997	5/23/2013	2.75	0.5	U	8	U
LHAAP-16	16WW26	Chloroform	7	10/23/1997	5/23/2013	2.53	1	U	8	U
LHAAP-16	16WW26	cis-1,2-Dichloroethene	7	10/23/1997	5/23/2013	203.53	0.72	J	570	
LHAAP-16	16WW26	magnesium, total	4	10/23/1997	12/14/2004	64550.00	6900		106000	
LHAAP-16	16WW26	manganese, total	4	10/23/1997	12/14/2004	1479.00	286		2350	
LHAAP-16	16WW26	Methylene chloride	6	10/23/1997	5/23/2013	2.32	0.327	J	8	U
LHAAP-16	16WW26	nickel, total	4	10/23/1997	12/14/2004	175.50	101		265	
LHAAP-16	16WW26	Perchlorate	7	5/22/2000	5/23/2013	12.48	0.262	J	45	
LHAAP-16	16WW26	strontium, total	4	10/23/1997	12/14/2004	1345.50	122		2100	
LHAAP-16	16WW26	Tetrachloroethene	6	10/23/1997	5/23/2013	2.01	0.5	U	8	U
LHAAP-16	16WW26	thallium, total	3	10/23/1997	12/14/2004	7.87	1	U	11.9	
LHAAP-16	16WW26	Trichloroethene	8	10/23/1997	5/23/2013	2492.13	32		5300	
LHAAP-16	16WW26	Vinyl chloride	7	10/23/1997	5/23/2013	4.15	1	U	6.22	J
LHAAP-16	16WW27	1,1,1-TRICHLOROETHANE	3	10/21/1997	5/20/2013	0.83	0.5	U	1	U
LHAAP-16	16WW27	1,1,2-TRICHLOROETHANE	3	10/21/1997	5/20/2013	0.83	0.5	U	1	U
LHAAP-16	16WW27	1,1-DICHLOROETHENE	3	10/21/1997	5/20/2013	1.00	1	U	1	U
LHAAP-16	16WW27	1,2-DICHLOROETHANE	3	10/21/1997	5/20/2013	0.83	0.5	U	1	U
LHAAP-16	16WW27	1,4-Dioxane	1	10/21/1997	10/21/1997	200.00	200	U	200	U
LHAAP-16	16WW27	Carbon tetrachloride	3	10/21/1997	5/20/2013	0.83	0.5	U	1	U
LHAAP-16	16WW27	Chloroform	3	10/21/1997	5/20/2013	0.75	0.25	U	1	U
LHAAP-16	16WW27	cis-1,2-Dichloroethene	3	10/21/1997	5/20/2013	0.83	0.5	U	1	U
LHAAP-16	16WW27	magnesium, total	4	10/21/1997	12/14/2004	37475.00	29000		46400	
LHAAP-16	16WW27	manganese, total	4	10/21/1997	12/14/2004	3437.50	2620		4250	
LHAAP-16	16WW27	Methylene chloride	3	10/21/1997	5/20/2013	1.17	0.5	U	2	U
LHAAP-16	16WW27	nickel, total	3	10/21/1997	2/22/2004	214.00	50		438	
LHAAP-16	16WW27	Perchlorate	6	9/19/2000	5/20/2013	46.72	0.2	U	110	

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Area	Location	Constituent	Count	Earliest	Latest	Avg (µg/L)	Min (µg/L)	Code	Max (µg/L)	Code
LHAAP-16	16WW27	strontium, total	4	10/21/1997	12/14/2004	1300.00	1140		1500	
LHAAP-16	16WW27	Tetrachloroethene	3	10/21/1997	5/20/2013	0.83	0.5	U	1	U
LHAAP-16	16WW27	thallium, total	2	10/21/1997	3/2/2003	9.30	1	U	17.6	J
LHAAP-16	16WW27	Trichloroethene	4	10/21/1997	5/20/2013	0.79	0.5	U	1	U
LHAAP-16	16WW27	Vinyl chloride	3	10/21/1997	5/20/2013	0.83	0.5	U	1	U
LHAAP-16	16WW29	1,1,1-TRICHLOROETHANE	6	10/21/1997	5/21/2013	1.58	0.5	U	5	U
LHAAP-16	16WW29	1,1,2-TRICHLOROETHANE	6	10/21/1997	5/21/2013	1.58	0.5	U	5	U
LHAAP-16	16WW29	1,1-DICHLOROETHENE	6	10/21/1997	5/21/2013	1.67	1	U	5	U
LHAAP-16	16WW29	1,2-DICHLOROETHANE	6	10/21/1997	5/21/2013	1.58	0.5	U	5	U
LHAAP-16	16WW29	1,4-Dioxane	3	10/21/1997	6/11/1998	200.00	200	U	200	U
LHAAP-16	16WW29	Carbon tetrachloride	6	10/21/1997	5/21/2013	1.58	0.5	U	5	U
LHAAP-16	16WW29	Chloroform	6	10/21/1997	5/21/2013	1.54	0.25	U	5	U
LHAAP-16	16WW29	cis-1,2-Dichloroethene	6	10/21/1997	5/21/2013	4.06	0.57	J	11	
LHAAP-16	16WW29	magnesium, total	4	10/21/1997	12/14/2004	41075.00	37900		45000	
LHAAP-16	16WW29	manganese, total	4	10/21/1997	12/14/2004	1607.50	1460		1770	
LHAAP-16	16WW29	Methylene chloride	6	10/21/1997	5/21/2013	1.02	0.5	U	2	U
LHAAP-16	16WW29	nickel, total	4	10/21/1997	12/14/2004	26.76	6.75		46.7	
LHAAP-16	16WW29	Perchlorate	8	9/29/2000	5/21/2013	36.34	0.0956		160	
LHAAP-16	16WW29	strontium, total	4	10/21/1997	12/14/2004	2275.00	2050		2570	
LHAAP-16	16WW29	Tetrachloroethene	6	10/21/1997	5/21/2013	0.83	0.478	J	1	U
LHAAP-16	16WW29	thallium, total	3	10/21/1997	12/14/2004	12.90	1	U	24.5	
LHAAP-16	16WW29	Trichloroethene	8	10/21/1997	5/21/2013	36.44	1.07		70.5	
LHAAP-16	16WW29	Vinyl chloride	7	10/21/1997	5/21/2013	2.35	0.5	U	10	U
LHAAP-16	16WW30	1,1,1-TRICHLOROETHANE	6	10/21/1997	5/23/2013	1.58	0.5	U	5	U
LHAAP-16	16WW30	1,1,2-TRICHLOROETHANE	6	10/21/1997	5/23/2013	1.58	0.5	U	5	U
LHAAP-16	16WW30	1,1-DICHLOROETHENE	6	10/21/1997	5/23/2013	1.67	1	U	5	U
LHAAP-16	16WW30	1,2-DICHLOROETHANE	6	10/21/1997	5/23/2013	1.58	0.5	U	5	U
LHAAP-16	16WW30	1,4-Dioxane	3	10/21/1997	6/15/1998	200.00	200	U	200	U
LHAAP-16	16WW30	Carbon tetrachloride	6	10/21/1997	5/23/2013	1.58	0.5	U	5	U
LHAAP-16	16WW30	Chloroform	6	10/21/1997	5/23/2013	3.71	0.25	U	14	
LHAAP-16	16WW30	cis-1,2-Dichloroethene	6	10/21/1997	5/23/2013	8.68	0.349	J	33	
LHAAP-16	16WW30	magnesium, total	4	10/21/1997	12/14/2004	32675.00	30800		34900	
LHAAP-16	16WW30	manganese, total	4	10/21/1997	12/14/2004	1562.50	1470		1640	
LHAAP-16	16WW30	Methylene chloride	6	10/21/1997	5/23/2013	1.03	0.5	U	2	U
LHAAP-16	16WW30	nickel, total	4	10/21/1997	12/14/2004	141.98	42.9		197	
LHAAP-16	16WW30	Perchlorate	7	9/29/2000	5/23/2013	91.90	0.0699		553	
LHAAP-16	16WW30	strontium, total	4	10/21/1997	12/14/2004	1135.00	1070		1210	
LHAAP-16	16WW30	Tetrachloroethene	6	10/21/1997	5/23/2013	0.81	0.336	J	1	U
LHAAP-16	16WW30	thallium, total	2	10/21/1997	3/2/2003	15.55	12		19.1	J
LHAAP-16	16WW30	Trichloroethene	8	10/21/1997	5/23/2013	38.00	4.76		203	
LHAAP-16	16WW30	Vinyl chloride	6	10/21/1997	5/23/2013	2.42	0.5	U	10	U
LHAAP-16	16WW31	1,1,1-TRICHLOROETHANE	4	10/22/1997	5/22/2013	0.69	0.25	U	1	U
LHAAP-16	16WW31	1,1,2-TRICHLOROETHANE	4	10/22/1997	5/22/2013	0.69	0.25	U	1	U
LHAAP-16	16WW31	1,1-DICHLOROETHENE	4	10/22/1997	5/22/2013	0.88	0.5	U	1	U
LHAAP-16	16WW31	1,2-DICHLOROETHANE	4	10/22/1997	5/22/2013	0.69	0.25	U	1	U
LHAAP-16	16WW31	1,4-Dioxane	1	10/22/1997	10/22/1997	200.00	200	U	200	U
LHAAP-16	16WW31	Carbon tetrachloride	4	10/22/1997	5/22/2013	0.69	0.25	U	1	U
LHAAP-16	16WW31	Chloroform	4	10/22/1997	5/22/2013	0.49	0.125	U	1	U
LHAAP-16	16WW31	cis-1,2-Dichloroethene	4	10/22/1997	5/22/2013	0.74	0.25	U	1.22	
LHAAP-16	16WW31	magnesium, total	4	10/22/1997	12/11/2004	48775.00	38900		69000	
LHAAP-16	16WW31	manganese, total	4	10/22/1997	12/11/2004	237.45	87.8		527	
LHAAP-16	16WW31	Methylene chloride	4	10/22/1997	5/22/2013	0.94	0.25	U	2	U
LHAAP-16	16WW31	nickel, total	4	10/22/1997	12/11/2004	110.75	73.3		209	
LHAAP-16	16WW31	Perchlorate	6	9/19/2000	5/22/2013	3.79	0.2	U	10.3	J
LHAAP-16	16WW31	strontium, total	4	10/22/1997	12/11/2004	1355.00	1050		2090	
LHAAP-16	16WW31	Tetrachloroethene	4	10/22/1997	5/22/2013	0.69	0.25	U	1	U
LHAAP-16	16WW31	thallium, total	2	10/22/1997	3/1/2003	10.50	1	U	20	U
LHAAP-16	16WW31	Trichloroethene	6	10/22/1997	5/22/2013	1.66	0.5	U	6.23	
LHAAP-16	16WW31	Vinyl chloride	4	10/22/1997	5/22/2013	0.69	0.25	U	1	U
LHAAP-16	16WW32	1,1,1-TRICHLOROETHANE	4	10/22/1997	5/21/2013	0.69	0.25	U	1	U
LHAAP-16	16WW32	1,1,2-TRICHLOROETHANE	4	10/22/1997	5/21/2013	0.69	0.25	U	1	U
LHAAP-16	16WW32	1,1-DICHLOROETHENE	4	10/22/1997	5/21/2013	0.88	0.5	U	1	U
LHAAP-16	16WW32	1,2-DICHLOROETHANE	4	10/22/1997	5/21/2013	0.69	0.25	U	1	U
LHAAP-16	16WW32	1,4-Dioxane	1	10/22/1997	10/22/1997	200.00	200	U	200	U
LHAAP-16	16WW32	Carbon tetrachloride	4	10/22/1997	5/21/2013	0.69	0.25	U	1	U
LHAAP-16	16WW32	Chloroform	4	10/22/1997	5/21/2013	0.48	0.125	U	1	U
LHAAP-16	16WW32	CHROMIUM, TOTAL	1	3/17/2009	3/17/2009	50.90	50.9		50.9	
LHAAP-16	16WW32	cis-1,2-Dichloroethene	4	10/22/1997	5/21/2013	0.69	0.25	U	1	U
LHAAP-16	16WW32	magnesium, total	4	10/22/1997	12/11/2004	77850.00	51800		130000	
LHAAP-16	16WW32	manganese, total	4	10/22/1997	12/11/2004	133.63	98.5		196	
LHAAP-16	16WW32	Methylene chloride	4	10/22/1997	5/21/2013	0.94	0.25	U	2	U
LHAAP-16	16WW32	nickel, total	4	10/22/1997	12/11/2004	308.75	200	U	396	
LHAAP-16	16WW32	Perchlorate	8	9/21/2000	5/21/2013	14.73	0.2	U	58	
LHAAP-16	16WW32	strontium, total	4	10/22/1997	12/11/2004	2385.00	1490		4320	
LHAAP-16	16WW32	Tetrachloroethene	4	10/22/1997	5/21/2013	0.69	0.25	U	1	U
LHAAP-16	16WW32	thallium, total	2	10/22/1997	3/1/2003	10.50	1	U	20	U
LHAAP-16	16WW32	Trichloroethene	4	10/22/1997	5/21/2013	0.71	0.25	U	1.1	
LHAAP-16	16WW32	Vinyl chloride	4	10/22/1997	5/21/2013	0.69	0.25	U	1	U
LHAAP-16	16WW33	1,1,1-TRICHLOROETHANE	3	10/22/1997	5/18/2013	0.83	0.5	U	1	U
LHAAP-16	16WW33	1,1,2-TRICHLOROETHANE	3	10/22/1997	5/18/2013	0.83	0.5	U	1	U
LHAAP-16	16WW33	1,1-DICHLOROETHENE	3	10/22/1997	5/18/2013	1.00	1	U	1	U
LHAAP-16	16WW33	1,2-DICHLOROETHANE	3	10/22/1997	5/18/2013	0.83	0.5	U	1	U
LHAAP-16	16WW33	1,4-Dioxane	1	10/22/1997	10/22/1997	200.00	200	U	200	U
LHAAP-16	16WW33	Carbon tetrachloride	3	10/22/1997	5/18/2013	0.83	0.5	U	1	U
LHAAP-16	16WW33	Chloroform	3	10/22/1997	5/18/2013	0.65	0.25	U	1	U
LHAAP-16	16WW33	CHROMIUM, TOTAL	1	3/16/2009	3/16/2009	5.76	5.76	J	5.76	J
LHAAP-16	16WW33	cis-1,2-Dichloroethene	3	10/22/1997	5/18/2013	2.57	0.5	U	6.22	

Summary of COC Concentrations for LHAAP Wells and Miscellaneous Sampling Locations

Area	Location	Constituent	Count	Earliest	Latest	Avg (µg/L)	Min (µg/L)	Code	Max (µg/L)	Code
LHAAP-16	16WW33	magnesium, total	4	10/22/1997	12/11/2004	65700.00	54000		86000	
LHAAP-16	16WW33	manganese, total	4	10/22/1997	12/11/2004	2230.25	591		5080	
LHAAP-16	16WW33	Methylene chloride	3	10/22/1997	5/18/2013	1.17	0.5	U	2	U
LHAAP-16	16WW33	nickel, total	4	10/22/1997	12/11/2004	398.25	80	U	887	
LHAAP-16	16WW33	Perchlorate	5	9/19/2000	5/18/2013	10.19	0.2	U	40	U
LHAAP-16	16WW33	strontium, total	4	10/22/1997	12/11/2004	1867.50	1230		2970	
LHAAP-16	16WW33	Tetrachloroethene	3	10/22/1997	5/18/2013	0.83	0.5	U	1	U
LHAAP-16	16WW33	thallium, total	2	10/22/1997	3/1/2003	10.50	1	U	20	U
LHAAP-16	16WW33	Trichloroethene	3	10/22/1997	5/18/2013	3.23	0.5	U	6.2	
LHAAP-16	16WW33	Vinyl chloride	3	10/22/1997	5/18/2013	0.83	0.5	U	1	U
LHAAP-16	16WW34	1,1,1-TRICHLOROETHANE	4	10/22/1997	5/20/2013	1.88	0.5	U	5	U
LHAAP-16	16WW34	1,1,2-TRICHLOROETHANE	4	10/22/1997	5/20/2013	1.88	0.5	U	5	U
LHAAP-16	16WW34	1,1-DICHLOROETHENE	4	10/22/1997	5/20/2013	2.00	1	U	5	U
LHAAP-16	16WW34	1,2-DICHLOROETHANE	4	10/22/1997	5/20/2013	1.88	0.5	U	5	U
LHAAP-16	16WW34	1,4-Dioxane	1	10/22/1997	10/22/1997	200.00	200	U	200	U
LHAAP-16	16WW34	Carbon tetrachloride	4	10/22/1997	5/20/2013	1.88	0.5	U	5	U
LHAAP-16	16WW34	Chloroform	4	10/22/1997	5/20/2013	3.49	0.25	U	7.7	
LHAAP-16	16WW34	CHROMIUM, TOTAL	1	3/16/2009	3/16/2009	32400.00	32400		32400	
LHAAP-16	16WW34	cis-1,2-Dichloroethene	4	10/22/1997	5/20/2013	15.85	0.5	U	51.9	
LHAAP-16	16WW34	magnesium, total	4	10/22/1997	12/11/2004	31250.00	15000		74000	
LHAAP-16	16WW34	manganese, total	4	10/22/1997	12/11/2004	445.75	170		1030	
LHAAP-16	16WW34	Methylene chloride	4	10/22/1997	5/20/2013	0.97	0.398	J	2	U
LHAAP-16	16WW34	nickel, total	4	10/22/1997	12/11/2004	1059.50	699		1780	
LHAAP-16	16WW34	Perchlorate	6	9/21/2000	5/20/2013	8.88	0.2	U	40	U
LHAAP-16	16WW34	strontium, total	4	10/22/1997	12/11/2004	821.25	396		1960	
LHAAP-16	16WW34	Tetrachloroethene	4	10/22/1997	5/20/2013	0.73	0.437	J	1	U
LHAAP-16	16WW34	thallium, total	2	10/22/1997	3/1/2003	10.50	1	U	20	U
LHAAP-16	16WW34	Trichloroethene	4	10/22/1997	5/20/2013	7.85	0.5	U	18.2	
LHAAP-16	16WW34	Vinyl chloride	4	10/22/1997	5/20/2013	3.11	0.5	U	10	U
LHAAP-16	16WW35	1,1,1-TRICHLOROETHANE	6	10/24/1997	5/22/2013	3.75	1	U	8	U
LHAAP-16	16WW35	1,1,2-TRICHLOROETHANE	6	10/24/1997	5/22/2013	3.75	1	U	8	U
LHAAP-16	16WW35	1,1-DICHLOROETHENE	8	10/24/1997	5/22/2013	16.95	2.8	J	48	
LHAAP-16	16WW35	1,2-DICHLOROETHANE	8	10/24/1997	5/22/2013	2.92	0.392		8	U
LHAAP-16	16WW35	1,4-Dioxane	3	10/24/1997	6/12/1998	933.33	200	U	1600	U
LHAAP-16	16WW35	Carbon tetrachloride	6	10/24/1997	5/22/2013	3.75	1	U	8	U
LHAAP-16	16WW35	Chloroform	8	10/24/1997	5/22/2013	2.67	1.15		8	U
LHAAP-16	16WW35	cis-1,2-Dichloroethene	8	10/24/1997	5/22/2013	125.59	15		437	
LHAAP-16	16WW35	magnesium, total	4	10/24/1997	12/13/2004	440500.00	418000		484000	
LHAAP-16	16WW35	MANGANESE, TOTAL	5	10/24/1997	3/19/2009	8186.00	7350		9700	
LHAAP-16	16WW35	Methylene chloride	6	10/24/1997	5/22/2013	3.92	1	U	8	U
LHAAP-16	16WW35	nickel, total	4	10/24/1997	12/13/2004	296.25	59		1000	U
LHAAP-16	16WW35	Perchlorate	6	9/30/2000	5/22/2013	168.75	5.5	U	342	
LHAAP-16	16WW35	strontium, total	4	10/24/1997	12/13/2004	8125.00	7180		9220	
LHAAP-16	16WW35	Tetrachloroethene	6	10/24/1997	5/22/2013	3.75	1	U	8	U
LHAAP-16	16WW35	thallium, total	2	10/24/1997	3/2/2003	45.75	1	U	90.5	
LHAAP-16	16WW35	Trichloroethene	8	10/24/1997	5/22/2013	2388.75	340		5190	
LHAAP-16	16WW35	Vinyl chloride	8	10/24/1997	5/22/2013	35.04	5	U	81.1	
LHAAP-16	16WW36	1,1,1-TRICHLOROETHANE	9	10/27/1997	5/22/2013	118.44	1	U	200	U
LHAAP-16	16WW36	1,1,2-TRICHLOROETHANE	11	10/27/1997	5/22/2013	88.89	1.32		200	U
LHAAP-16	16WW36	1,1-DICHLOROETHENE	11	10/27/1997	5/22/2013	131.29	16		250	U
LHAAP-16	16WW36	1,2-DICHLOROETHANE	11	10/27/1997	5/22/2013	99.75	0.482	J	200	U
LHAAP-16	16WW36	1,4-Dioxane	3	10/27/1997	6/12/1998	27333.33	2000	U	40000	U
LHAAP-16	16WW36	Carbon tetrachloride	9	10/27/1997	5/22/2013	107.33	1	U	200	U
LHAAP-16	16WW36	Chloroform	11	10/27/1997	5/22/2013	89.10	3.7		200	U
LHAAP-16	16WW36	cis-1,2-Dichloroethene	11	10/27/1997	5/22/2013	9516.36	120	J	51800	
LHAAP-16	16WW36	magnesium, total	4	10/27/1997	12/13/2004	230425.00	82700		329000	
LHAAP-16	16WW36	manganese, total	4	10/27/1997	12/13/2004	3732.50	1390		5330	
LHAAP-16	16WW36	Methylene chloride	9	10/27/1997	5/22/2013	105.97	0.751	J	200	U
LHAAP-16	16WW36	nickel, total	4	10/27/1997	12/13/2004	133.83	17.1		400	U
LHAAP-16	16WW36	Perchlorate	9	5/24/2000	5/22/2013	82.60	0.2	U	441	
LHAAP-16	16WW36	strontium, total	4	10/27/1997	12/13/2004	3877.50	1570		5100	
LHAAP-16	16WW36	Tetrachloroethene	11	10/27/1997	5/22/2013	88.14	0.786	J	200	U
LHAAP-16	16WW36	thallium, total	2	10/27/1997	3/2/2003	3.60	1	U	6.19	J
LHAAP-16	16WW36	Trichloroethene	11	10/27/1997	5/22/2013	21565.45	4220		70600	
LHAAP-16	16WW36	Vinyl chloride	11	10/27/1997	5/22/2013	396.84	10	U	1700	
LHAAP-16	16WW37	1,1,1-TRICHLOROETHANE	6	10/21/1997	5/18/2013	17.75	0.5	U	50	U
LHAAP-16	16WW37	1,1,2-TRICHLOROETHANE	6	10/21/1997	5/18/2013	17.75	0.5	U	50	U
LHAAP-16	16WW37	1,1-DICHLOROETHENE	6	10/21/1997	5/18/2013	18.59	2.68		50	U
LHAAP-16	16WW37	1,2-DICHLOROETHANE	6	10/21/1997	5/18/2013	17.73	0.5	U	50	U
LHAAP-16	16WW37	1,4-Dioxane	3	10/21/1997	6/14/1998	6666.67	5000	U	10000	U
LHAAP-16	16WW37	Carbon tetrachloride	6	10/21/1997	5/18/2013	17.75	0.5	U	50	U
LHAAP-16	16WW37	Chloroform	6	10/21/1997	5/18/2013	17.63	0.25	U	50	U
LHAAP-16	16WW37	cis-1,2-Dichloroethene	6	10/21/1997	5/18/2013	64.08	5.66	J	220	
LHAAP-16	16WW37	magnesium, total	4	10/21/1997	12/10/2004	285250.00	269000		310000	
LHAAP-16	16WW37	manganese, total	4	10/21/1997	12/10/2004	4870.00	4490		5600	
LHAAP-16	16WW37	Methylene chloride	6	10/21/1997	5/18/2013	17.18	0.5	U	50	U
LHAAP-16	16WW37	nickel, total	4	10/21/1997	12/10/2004	169.75	58.6		400	U
LHAAP-16	16WW37	Perchlorate	9	9/28/2000	5/18/2013	99.09	10.4		193	
LHAAP-16	16WW37	strontium, total	4	10/21/1997	12/10/2004	6902.50	6240		8560	
LHAAP-16	16WW37	Tetrachloroethene	6	10/21/1997	5/18/2013	16.99	0.416	J	50	U
LHAAP-16	16WW37	thallium, total	2	10/21/1997	2/28/2003	10.50	1	U	20	U
LHAAP-16	16WW37	Trichloroethene	8	10/21/1997	5/18/2013	1115.03	85.2		1700	
LHAAP-16	16WW37	Vinyl chloride	7	10/21/1997	5/18/2013	19.85	0.461	J	50	U
LHAAP-16	16WW38	1,1,1-TRICHLOROETHANE	6	10/22/1997	5/18/2013	3.08	0.5	U	10	U
LHAAP-16	16WW38	1,1,2-TRICHLOROETHANE	6	10/22/1997	5/18/2013	3.08	0.5	U	10	U
LHAAP-16	16WW38	1,1-DICHLOROETHENE	7	10/22/1997	5/18/2013	5.20	0.486	J	16.2	
LHAAP-16	16WW38	1,2-DICHLOROETHANE	6	10/22/1997	5/18/2013	3.08	0.5	U	10	U

Summary of COC Concentrations for LHAAP Wells and Miscellaneous Sampling Locations

Area	Location	Constituent	Count	Earliest	Latest	Avg (µg/L)	Min (µg/L)	Code	Max (µg/L)	Code
LHAAP-16	16WW38	1,4-Dioxane	3	10/22/1997	6/14/1998	800.00	200	U	2000	U
LHAAP-16	16WW38	Carbon tetrachloride	6	10/22/1997	5/18/2013	3.08	0.5	U	10	U
LHAAP-16	16WW38	Chloroform	6	10/22/1997	5/18/2013	2.33	0.328	J	10	U
LHAAP-16	16WW38	CHROMIUM, TOTAL	1	3/18/2009	3/18/2009	671.00	671		671	
LHAAP-16	16WW38	cis-1,2-Dichloroethene	6	10/22/1997	5/18/2013	110.29	0.52	J	520	
LHAAP-16	16WW38	magnesium, total	4	10/22/1997	12/10/2004	125500.00	119000		130000	
LHAAP-16	16WW38	manganese, total	4	10/22/1997	12/10/2004	213.25	176		253	
LHAAP-16	16WW38	Methylene chloride	6	10/22/1997	5/18/2013	2.53	0.5	U	10	U
LHAAP-16	16WW38	nickel, total	4	10/22/1997	12/10/2004	413.50	200	U	976	
LHAAP-16	16WW38	Perchlorate	10	5/22/2000	5/18/2013	3.88	0.2	U	8	U
LHAAP-16	16WW38	strontium, total	4	10/22/1997	12/10/2004	2677.50	2490		3000	
LHAAP-16	16WW38	Tetrachloroethene	6	10/22/1997	5/18/2013	2.32	0.427	J	10	U
LHAAP-16	16WW38	thallium, total	2	10/22/1997	2/28/2003	10.50	1	U	20	U
LHAAP-16	16WW38	Trichloroethene	8	10/22/1997	5/18/2013	276.59	23		1040	
LHAAP-16	16WW38	Vinyl chloride	7	10/22/1997	5/18/2013	13.08	1	U	68.1	
LHAAP-16	16WW40	1,1,1-TRICHLOROETHANE	3	10/11/2007	5/23/2013	5.83	2.5	U	10	U
LHAAP-16	16WW40	1,1,2-TRICHLOROETHANE	3	10/11/2007	5/23/2013	5.83	2.5	U	10	U
LHAAP-16	16WW40	1,1-DICHLOROETHENE	3	10/11/2007	5/23/2013	8.40	5.2	J	10	U
LHAAP-16	16WW40	1,2-DICHLOROETHANE	3	10/11/2007	5/23/2013	5.93	5	U	7.37	J
LHAAP-16	16WW40	1,4-Dioxane	1	12/16/2015	12/16/2015	1.00	1	U	1	U
LHAAP-16	16WW40	Carbon tetrachloride	3	10/11/2007	5/23/2013	5.83	2.5	U	10	U
LHAAP-16	16WW40	Chloroform	3	10/11/2007	5/23/2013	4.58	1.25	U	10	U
LHAAP-16	16WW40	cis-1,2-Dichloroethene	3	10/11/2007	5/23/2013	63.70	29.3		125	
LHAAP-16	16WW40	Methylene chloride	3	10/11/2007	5/23/2013	19.17	2.5	U	50	U
LHAAP-16	16WW40	Perchlorate	3	10/11/2007	5/23/2013	1513.77	0.208	J	4540	
LHAAP-16	16WW40	Tetrachloroethene	3	10/11/2007	5/23/2013	5.83	2.5	U	10	U
LHAAP-16	16WW40	Trichloroethene	3	10/11/2007	5/23/2013	1146.67	1060		1320	
LHAAP-16	16WW40	Vinyl chloride	3	10/11/2007	5/23/2013	5.83	2.5	U	10	U
LHAAP-16	16WW41	1,1,1-TRICHLOROETHANE	3	12/2/2008	5/22/2013	3.33	2.5	U	5	U
LHAAP-16	16WW41	1,1,2-TRICHLOROETHANE	3	12/2/2008	5/22/2013	3.33	2.5	U	5	U
LHAAP-16	16WW41	1,1-DICHLOROETHENE	3	12/2/2008	5/22/2013	8.37	5	U	15.1	J
LHAAP-16	16WW41	1,2-DICHLOROETHANE	3	12/2/2008	5/22/2013	3.33	2.5	U	5	U
LHAAP-16	16WW41	1,4-Dioxane	1	12/16/2015	12/16/2015	1.09	1.09	J	1.09	J
LHAAP-16	16WW41	Carbon tetrachloride	3	12/2/2008	5/22/2013	3.33	2.5	U	5	U
LHAAP-16	16WW41	Chloroform	3	12/2/2008	5/22/2013	1.53	1.25	U	2.08	J
LHAAP-16	16WW41	cis-1,2-Dichloroethene	3	12/2/2008	5/22/2013	366.97	58.9		833	
LHAAP-16	16WW41	Methylene chloride	3	12/2/2008	5/22/2013	6.56	5	U	8.16	J
LHAAP-16	16WW41	Perchlorate	2	3/24/2009	5/22/2013	271.00	250		292	
LHAAP-16	16WW41	Tetrachloroethene	3	12/2/2008	5/22/2013	3.33	2.5	U	5	U
LHAAP-16	16WW41	Trichloroethene	3	12/2/2008	5/22/2013	3106.67	1080		6550	
LHAAP-16	16WW41	Vinyl chloride	3	12/2/2008	5/22/2013	33.77	2.5	U	76.4	
LHAAP-16	16WW42	1,1,1-TRICHLOROETHANE	3	12/1/2008	5/21/2013	2.33	0.25	U	6.25	U
LHAAP-16	16WW42	1,1,2-TRICHLOROETHANE	3	12/1/2008	5/21/2013	2.33	0.25	U	6.25	U
LHAAP-16	16WW42	1,1-DICHLOROETHENE	3	12/1/2008	5/21/2013	4.67	0.5	U	12.5	U
LHAAP-16	16WW42	1,2-DICHLOROETHANE	3	12/1/2008	5/21/2013	2.33	0.25	U	6.25	U
LHAAP-16	16WW42	Carbon tetrachloride	3	12/1/2008	5/21/2013	2.33	0.25	U	6.25	U
LHAAP-16	16WW42	Chloroform	3	12/1/2008	5/21/2013	1.17	0.125	U	3.13	U
LHAAP-16	16WW42	cis-1,2-Dichloroethene	3	12/1/2008	5/21/2013	424.99	1.34		1270	
LHAAP-16	16WW42	Methylene chloride	3	12/1/2008	5/21/2013	7.52	0.25	U	21.8	J
LHAAP-16	16WW42	Perchlorate	2	3/24/2009	5/21/2013	0.21	0.2	U	0.22	U
LHAAP-16	16WW42	Tetrachloroethene	3	12/1/2008	5/21/2013	2.33	0.25	U	6.25	U
LHAAP-16	16WW42	Trichloroethene	3	12/1/2008	5/21/2013	1096.81	1.31		3280	
LHAAP-16	16WW42	Vinyl chloride	3	12/1/2008	5/21/2013	2.33	0.25	U	6.25	U
LHAAP-16	16WW43	1,1,1-TRICHLOROETHANE	2	12/1/2008	5/20/2013	0.38	0.25	U	0.5	U
LHAAP-16	16WW43	1,1,2-TRICHLOROETHANE	2	12/1/2008	5/20/2013	0.38	0.25	U	0.5	U
LHAAP-16	16WW43	1,1-DICHLOROETHENE	2	12/1/2008	5/20/2013	0.75	0.5	U	1	U
LHAAP-16	16WW43	1,2-DICHLOROETHANE	2	12/1/2008	5/20/2013	0.38	0.25	U	0.5	U
LHAAP-16	16WW43	Carbon tetrachloride	2	12/1/2008	5/20/2013	0.38	0.25	U	0.5	U
LHAAP-16	16WW43	Chloroform	2	12/1/2008	5/20/2013	0.34	0.25	U	0.422	J
LHAAP-16	16WW43	cis-1,2-Dichloroethene	2	12/1/2008	5/20/2013	0.38	0.25	U	0.5	U
LHAAP-16	16WW43	Methylene chloride	2	12/1/2008	5/20/2013	0.38	0.25	U	0.5	U
LHAAP-16	16WW43	Perchlorate	1	5/20/2013	5/20/2013	0.20	0.2	U	0.2	U
LHAAP-16	16WW43	Tetrachloroethene	2	12/1/2008	5/20/2013	0.38	0.25	U	0.5	U
LHAAP-16	16WW43	Trichloroethene	2	12/1/2008	5/20/2013	0.38	0.25	U	0.5	U
LHAAP-16	16WW43	Vinyl chloride	2	12/1/2008	5/20/2013	0.38	0.25	U	0.5	U
LHAAP-16	16WW44	1,1,1-TRICHLOROETHANE	2	12/1/2008	5/20/2013	0.38	0.25	U	0.5	U
LHAAP-16	16WW44	1,1,2-TRICHLOROETHANE	2	12/1/2008	5/20/2013	0.38	0.25	U	0.5	U
LHAAP-16	16WW44	1,1-DICHLOROETHENE	2	12/1/2008	5/20/2013	0.75	0.5	U	1	U
LHAAP-16	16WW44	1,2-DICHLOROETHANE	2	12/1/2008	5/20/2013	0.38	0.25	U	0.5	U
LHAAP-16	16WW44	Carbon tetrachloride	2	12/1/2008	5/20/2013	0.38	0.25	U	0.5	U
LHAAP-16	16WW44	Chloroform	2	12/1/2008	5/20/2013	0.34	0.25	U	0.428	J
LHAAP-16	16WW44	cis-1,2-Dichloroethene	2	12/1/2008	5/20/2013	0.38	0.25	U	0.5	U
LHAAP-16	16WW44	Methylene chloride	2	12/1/2008	5/20/2013	0.38	0.25	U	0.5	U
LHAAP-16	16WW44	Perchlorate	1	5/20/2013	5/20/2013	0.20	0.2	U	0.2	U
LHAAP-16	16WW44	Tetrachloroethene	2	12/1/2008	5/20/2013	0.38	0.25	U	0.5	U
LHAAP-16	16WW44	Trichloroethene	2	12/1/2008	5/20/2013	0.38	0.25	U	0.5	U
LHAAP-16	16WW44	Vinyl chloride	2	12/1/2008	5/20/2013	0.38	0.25	U	0.5	U
LHAAP-16	16WW45	1,1,1-TRICHLOROETHANE	2	12/2/2008	5/21/2013	0.38	0.25	U	0.5	U
LHAAP-16	16WW45	1,1,2-TRICHLOROETHANE	2	12/2/2008	5/21/2013	0.38	0.25	U	0.5	U
LHAAP-16	16WW45	1,1-DICHLOROETHENE	2	12/2/2008	5/21/2013	0.75	0.5	U	1	U
LHAAP-16	16WW45	1,2-DICHLOROETHANE	2	12/2/2008	5/21/2013	0.38	0.25	U	0.5	U
LHAAP-16	16WW45	Carbon tetrachloride	2	12/2/2008	5/21/2013	0.38	0.25	U	0.5	U
LHAAP-16	16WW45	Chloroform	2	12/2/2008	5/21/2013	0.43	0.25	U	0.6	J
LHAAP-16	16WW45	cis-1,2-Dichloroethene	2	12/2/2008	5/21/2013	0.38	0.25	U	0.5	U
LHAAP-16	16WW45	Methylene chloride	2	12/2/2008	5/21/2013	0.38	0.25	U	0.5	U
LHAAP-16	16WW45	Perchlorate	1	5/21/2013	5/21/2013	0.20	0.2	U	0.2	U
LHAAP-16	16WW45	Tetrachloroethene	2	12/2/2008	5/21/2013	0.38	0.25	U	0.5	U

Summary of COC Concentrations for LHAAP Wells and Miscellaneous Sampling Locations

Area	Location	Constituent	Count	Earliest	Latest	Avg (µg/L)	Min (µg/L)	Code	Max (µg/L)	Code
LHAAP-16	16WW45	Trichloroethene	2	12/2/2008	5/21/2013	0.38	0.25	U	0.5	U

Summary of COC Concentrations for LHAAP Wells and Miscellaneous Sampling Locations

Area	Location	Constituent	Count	Earliest	Latest	Avg (µg/L)	Min (µg/L)	Code	Max (µg/L)	Code
LHAAP-18	18CPT17	1,1,2-TRICHLOROETHANE	1	3/22/2013	3/22/2013	50.00	50	U	50	U
LHAAP-18	18CPT17	1,1-DICHLOROETHENE	1	3/22/2013	3/22/2013	100.00	100	U	100	U
LHAAP-18	18CPT17	1,2-DICHLOROETHANE	1	3/22/2013	3/22/2013	50.00	50	U	50	U
LHAAP-18	18CPT17	Carbon tetrachloride	1	3/22/2013	3/22/2013	50.00	50	U	50	U
LHAAP-18	18CPT17	Chloroform	1	3/22/2013	3/22/2013	25.00	25	U	25	U
LHAAP-18	18CPT17	cis-1,2-Dichloroethene	1	3/22/2013	3/22/2013	50.00	50	U	50	U
LHAAP-18	18CPT17	Methylene chloride	1	3/22/2013	3/22/2013	50.00	50	U	50	U
LHAAP-18	18CPT17	Tetrachloroethene	1	3/22/2013	3/22/2013	50.00	50	U	50	U
LHAAP-18	18CPT17	Trichloroethene	1	3/22/2013	3/22/2013	50.00	50	U	50	U
LHAAP-18	18CPT17	Vinyl chloride	1	3/22/2013	3/22/2013	50.00	50	U	50	U
LHAAP-18	18CPT18	1,1,1-TRICHLOROETHANE	2	3/20/2013	3/21/2013	0.50	0.5	U	0.5	U
LHAAP-18	18CPT18	1,1,2-TRICHLOROETHANE	2	3/20/2013	3/21/2013	0.50	0.5	U	0.5	U
LHAAP-18	18CPT18	1,1-DICHLOROETHENE	2	3/20/2013	3/21/2013	1.00	1	U	1	U
LHAAP-18	18CPT18	1,2-DICHLOROETHANE	2	3/20/2013	3/21/2013	0.50	0.5	U	0.5	U
LHAAP-18	18CPT18	Carbon tetrachloride	2	3/20/2013	3/21/2013	0.50	0.5	U	0.5	U
LHAAP-18	18CPT18	Chloroform	2	3/20/2013	3/21/2013	0.25	0.25	U	0.25	U
LHAAP-18	18CPT18	cis-1,2-Dichloroethene	2	3/20/2013	3/21/2013	0.50	0.5	U	0.5	U
LHAAP-18	18CPT18	Methylene chloride	2	3/20/2013	3/21/2013	0.50	0.5	U	0.5	U
LHAAP-18	18CPT18	Perchlorate	2	3/20/2013	3/21/2013	7.08	1.35		12.8	
LHAAP-18	18CPT18	Tetrachloroethene	2	3/20/2013	3/21/2013	0.50	0.5	U	0.5	U
LHAAP-18	18CPT18	Trichloroethene	2	3/20/2013	3/21/2013	0.50	0.5	U	0.5	U
LHAAP-18	18CPT18	Vinyl chloride	2	3/20/2013	3/21/2013	0.50	0.5	U	0.5	U
LHAAP-18	18CPT19	1,1,1-TRICHLOROETHANE	1	3/22/2013	3/22/2013	5.00	5	U	5	U
LHAAP-18	18CPT19	1,1,2-TRICHLOROETHANE	1	3/22/2013	3/22/2013	5.00	5	U	5	U
LHAAP-18	18CPT19	1,1-DICHLOROETHENE	1	3/22/2013	3/22/2013	10.00	10	U	10	U
LHAAP-18	18CPT19	1,2-DICHLOROETHANE	1	3/22/2013	3/22/2013	5.00	5	U	5	U
LHAAP-18	18CPT19	Carbon tetrachloride	1	3/22/2013	3/22/2013	5.00	5	U	5	U
LHAAP-18	18CPT19	Chloroform	1	3/22/2013	3/22/2013	2.50	2.5	U	2.5	U
LHAAP-18	18CPT19	cis-1,2-Dichloroethene	1	3/22/2013	3/22/2013	5.00	5	U	5	U
LHAAP-18	18CPT19	Methylene chloride	1	3/22/2013	3/22/2013	5.00	5	U	5	U
LHAAP-18	18CPT19	Perchlorate	1	3/22/2013	3/22/2013	10.10	10.1		10.1	
LHAAP-18	18CPT19	Tetrachloroethene	1	3/22/2013	3/22/2013	5.00	5	U	5	U
LHAAP-18	18CPT19	Trichloroethene	1	3/22/2013	3/22/2013	5.00	5	U	5	U
LHAAP-18	18CPT19	Vinyl chloride	1	3/22/2013	3/22/2013	5.00	5	U	5	U
LHAAP-18	18CPT21	1,1,1-TRICHLOROETHANE	1	3/27/2013	3/27/2013	104.00	104		104	
LHAAP-18	18CPT21	1,1,2-TRICHLOROETHANE	1	3/27/2013	3/27/2013	1.00	1	U	1	U
LHAAP-18	18CPT21	1,1-DICHLOROETHENE	1	3/27/2013	3/27/2013	456.00	456		456	
LHAAP-18	18CPT21	1,2-DICHLOROETHANE	1	3/27/2013	3/27/2013	1.00	1	U	1	U
LHAAP-18	18CPT21	Carbon tetrachloride	1	3/27/2013	3/27/2013	1.00	1	U	1	U
LHAAP-18	18CPT21	Chloroform	1	3/27/2013	3/27/2013	4.79	4.79		4.79	
LHAAP-18	18CPT21	cis-1,2-Dichloroethene	1	3/27/2013	3/27/2013	304.00	304		304	
LHAAP-18	18CPT21	Methylene chloride	1	3/27/2013	3/27/2013	7270.00	7270		7270	
LHAAP-18	18CPT21	Perchlorate	1	3/27/2013	3/27/2013	4.72	4.72		4.72	
LHAAP-18	18CPT21	Tetrachloroethene	1	3/27/2013	3/27/2013	226.00	226		226	
LHAAP-18	18CPT21	Trichloroethene	1	3/27/2013	3/27/2013	11700.00	11700		11700	
LHAAP-18	18CPT21	Vinyl chloride	1	3/27/2013	3/27/2013	18.80	18.8		18.8	
LHAAP-18	18CPT25	1,1,1-TRICHLOROETHANE	1	3/26/2013	3/26/2013	1.67	1.67	U	1.67	U
LHAAP-18	18CPT25	1,1,2-TRICHLOROETHANE	1	3/26/2013	3/26/2013	1.67	1.67	U	1.67	U
LHAAP-18	18CPT25	1,1-DICHLOROETHENE	1	3/26/2013	3/26/2013	9.99	9.99		9.99	
LHAAP-18	18CPT25	1,2-DICHLOROETHANE	1	3/26/2013	3/26/2013	1.67	1.67	U	1.67	U
LHAAP-18	18CPT25	Carbon tetrachloride	1	3/26/2013	3/26/2013	1.67	1.67	U	1.67	U
LHAAP-18	18CPT25	Chloroform	1	3/26/2013	3/26/2013	0.83	0.833	U	0.833	U
LHAAP-18	18CPT25	cis-1,2-Dichloroethene	1	3/26/2013	3/26/2013	5.55	5.55		5.55	
LHAAP-18	18CPT25	Methylene chloride	1	3/26/2013	3/26/2013	1.67	1.67	U	1.67	U
LHAAP-18	18CPT25	Tetrachloroethene	1	3/26/2013	3/26/2013	1.67	1.67	U	1.67	U
LHAAP-18	18CPT25	Trichloroethene	1	3/26/2013	3/26/2013	77.60	77.6		77.6	
LHAAP-18	18CPT25	Vinyl chloride	1	3/26/2013	3/26/2013	1.67	1.67	U	1.67	U
LHAAP-18	18CPTMW01DW	1,1,1-Trichloroethane	9	5/16/2013	6/13/2017	0.50	0.5	U	0.5	U
LHAAP-18	18CPTMW01DW	1,1,2-Trichloroethane	9	5/16/2013	6/13/2017	0.50	0.5	U	0.5	U
LHAAP-18	18CPTMW01DW	1,1-Dichloroethene	9	5/16/2013	6/13/2017	1.00	1	U	1	U
LHAAP-18	18CPTMW01DW	1,2-Dichloroethane	9	5/16/2013	6/13/2017	0.50	0.5	U	0.5	U
LHAAP-18	18CPTMW01DW	1,4-Dioxane	2	8/28/2014	6/24/2016	1.03	1	U	1.05	U
LHAAP-18	18CPTMW01DW	Carbon tetrachloride	9	5/16/2013	6/13/2017	0.50	0.5	U	0.5	U
LHAAP-18	18CPTMW01DW	Chloroform	9	5/16/2013	6/13/2017	0.25	0.25	U	0.25	U
LHAAP-18	18CPTMW01DW	cis-1,2-Dichloroethene	9	5/16/2013	6/13/2017	0.74	0.302	J	2.05	
LHAAP-18	18CPTMW01DW	magnesium, total	5	5/16/2013	6/13/2017	4980.00	1770		9660	
LHAAP-18	18CPTMW01DW	manganese, total	5	5/16/2013	6/13/2017	69.40	6.88		140	
LHAAP-18	18CPTMW01DW	Methylene chloride	9	5/16/2013	6/13/2017	5.34	0.274	J	21.8	
LHAAP-18	18CPTMW01DW	nickel, total	5	5/16/2013	6/13/2017	5.42	2.63	J	9.6	
LHAAP-18	18CPTMW01DW	Perchlorate	9	5/16/2013	6/13/2017	0.19	0.0702	J	0.31	J
LHAAP-18	18CPTMW01DW	Tetrachloroethene	9	5/16/2013	6/13/2017	0.50	0.5	U	0.5	U
LHAAP-18	18CPTMW01DW	thallium, total	5	5/16/2013	6/13/2017	0.19	0.174	J	0.2	U
LHAAP-18	18CPTMW01DW	Trichloroethene	9	5/16/2013	6/13/2017	1.37	0.63	J	2.93	
LHAAP-18	18CPTMW01DW	Vinyl chloride	9	5/16/2013	6/13/2017	0.50	0.5	U	0.5	U
LHAAP-18	18CPTMW08	1,4-Dioxane	1	10/28/2015	10/28/2015	1.02	1.02	U	1.02	U
LHAAP-18	18CPTMW19SW	1,1,1-Trichloroethane	3	6/15/2016	6/14/2017	0.50	0.5	U	0.5	U
LHAAP-18	18CPTMW19SW	1,1,2-Trichloroethane	3	6/15/2016	6/14/2017	0.50	0.5	U	0.5	U
LHAAP-18	18CPTMW19SW	1,1-Dichloroethene	3	6/15/2016	6/14/2017	1.00	1	U	1	U
LHAAP-18	18CPTMW19SW	1,2-Dichloroethane	3	6/15/2016	6/14/2017	0.50	0.5	U	0.5	U
LHAAP-18	18CPTMW19SW	1,4-Dioxane	1	6/15/2016	6/15/2016	1.00	1	U	1	U
LHAAP-18	18CPTMW19SW	Carbon tetrachloride	3	6/15/2016	6/14/2017	0.50	0.5	U	0.5	U
LHAAP-18	18CPTMW19SW	Chloroform	3	6/15/2016	6/14/2017	0.25	0.25	J	0.25	J
LHAAP-18	18CPTMW19SW	cis-1,2-Dichloroethene	3	6/15/2016	6/14/2017	0.50	0.5	U	0.5	U
LHAAP-18	18CPTMW19SW	magnesium, total	2	12/12/2016	6/14/2017	5850.00	5410		6290	
LHAAP-18	18CPTMW19SW	manganese, total	2	12/12/2016	6/14/2017	498.00	497		499	
LHAAP-18	18CPTMW19SW	Methylene chloride	3	6/15/2016	6/14/2017	0.50	0.5	U	0.5	U
LHAAP-18	18CPTMW19SW	nickel, total	2	12/12/2016	6/14/2017	3.02	2.03	J	4	U

Summary of COC Concentrations for LHAAP Wells and Miscellaneous Sampling Locations

Area	Location	Constituent	Count	Earliest	Latest	Avg (µg/L)	Min (µg/L)	Code	Max (µg/L)	Code
LHAAP-18	18CPTMW19SW	Perchlorate	3	6/15/2016	6/14/2017	1.68	0.2	U	3.58	
LHAAP-18	18CPTMW19SW	Tetrachloroethene	3	6/15/2016	6/14/2017	0.50	0.5	U	0.5	U
LHAAP-18	18CPTMW19SW	thallium, total	2	12/12/2016	6/14/2017	0.62	0.2	U	1.03	
LHAAP-18	18CPTMW19SW	Trichloroethene	3	6/15/2016	6/14/2017	0.50	0.5	U	0.5	U
LHAAP-18	18CPTMW19SW	Vinyl chloride	3	6/15/2016	6/14/2017	0.50	0.5	U	0.5	U
LHAAP-18	18CPTMW22	1,1,1-Trichloroethane	5	5/15/2013	6/15/2017	0.50	0.5	U	0.5	U
LHAAP-18	18CPTMW22	1,1,2-Trichloroethane	5	5/15/2013	6/15/2017	0.50	0.5	U	0.5	U
LHAAP-18	18CPTMW22	1,1-Dichloroethene	5	5/15/2013	6/15/2017	2.01	1	U	3.17	
LHAAP-18	18CPTMW22	1,2-Dichloroethane	5	5/15/2013	6/15/2017	0.46	0.278	J	0.5	U
LHAAP-18	18CPTMW22	Carbon tetrachloride	5	5/15/2013	6/15/2017	0.50	0.5	U	0.5	U
LHAAP-18	18CPTMW22	Chloroform	5	5/15/2013	6/15/2017	1.09	0.25	U	1.93	
LHAAP-18	18CPTMW22	cis-1,2-Dichloroethene	5	5/15/2013	6/15/2017	0.42	0.29	J	0.5	U
LHAAP-18	18CPTMW22	magnesium, total	4	5/15/2013	12/6/2016	23862.50	2150		35300	
LHAAP-18	18CPTMW22	manganese, total	5	5/15/2013	6/15/2017	89.30	52.8		145	
LHAAP-18	18CPTMW22	Methylene chloride	5	5/15/2013	6/15/2017	0.50	0.5	U	0.5	U
LHAAP-18	18CPTMW22	nickel, total	5	5/15/2013	6/15/2017	5.16	3.18	J	7.58	J
LHAAP-18	18CPTMW22	Perchlorate	5	5/15/2013	6/15/2017	58300.12	0.2	U	118000	
LHAAP-18	18CPTMW22	Tetrachloroethene	5	5/15/2013	6/15/2017	0.50	0.5	U	0.5	U
LHAAP-18	18CPTMW22	thallium, total	5	5/15/2013	6/15/2017	0.45	0.128	J	1.54	
LHAAP-18	18CPTMW22	Trichloroethene	5	5/15/2013	6/15/2017	35.32	0.5	U	66.4	
LHAAP-18	18CPTMW22	Vinyl chloride	5	5/15/2013	6/15/2017	0.50	0.5	U	0.5	U
LHAAP-18	18CPTMW22DW	1,1,1-Trichloroethane	3	6/9/2016	6/15/2017	0.50	0.5	U	0.5	U
LHAAP-18	18CPTMW22DW	1,1,2-Trichloroethane	3	6/9/2016	6/15/2017	0.50	0.5	U	0.5	U
LHAAP-18	18CPTMW22DW	1,1-Dichloroethene	3	6/9/2016	6/15/2017	1.00	1	U	1	U
LHAAP-18	18CPTMW22DW	1,2-Dichloroethane	3	6/9/2016	6/15/2017	0.50	0.5	U	0.5	U
LHAAP-18	18CPTMW22DW	1,4-Dioxane	1	6/9/2016	6/9/2016	1.00	1	U	1	U
LHAAP-18	18CPTMW22DW	Carbon tetrachloride	3	6/9/2016	6/15/2017	0.50	0.5	U	0.5	U
LHAAP-18	18CPTMW22DW	Chloroform	3	6/9/2016	6/15/2017	0.25	0.25	U	0.25	U
LHAAP-18	18CPTMW22DW	cis-1,2-Dichloroethene	3	6/9/2016	6/15/2017	0.50	0.5	U	0.5	U
LHAAP-18	18CPTMW22DW	magnesium, total	2	12/6/2016	6/15/2017	5925.00	5650		6200	
LHAAP-18	18CPTMW22DW	manganese, total	2	12/6/2016	6/15/2017	132.50	125		140	
LHAAP-18	18CPTMW22DW	Methylene chloride	3	6/9/2016	6/15/2017	0.50	0.5	U	0.5	U
LHAAP-18	18CPTMW22DW	nickel, total	2	12/6/2016	6/15/2017	4.00	4	U	4	U
LHAAP-18	18CPTMW22DW	Perchlorate	3	6/9/2016	6/15/2017	0.54	0.2	U	1.21	
LHAAP-18	18CPTMW22DW	Tetrachloroethene	3	6/9/2016	6/15/2017	0.50	0.5	U	0.5	U
LHAAP-18	18CPTMW22DW	thallium, total	2	12/6/2016	6/15/2017	1.12	0.2	U	2.03	
LHAAP-18	18CPTMW22DW	Trichloroethene	3	6/9/2016	6/15/2017	0.50	0.5	U	0.5	U
LHAAP-18	18CPTMW22DW	Vinyl chloride	3	6/9/2016	6/15/2017	0.50	0.5	U	0.5	U
LHAAP-18	18CPTMW23SW	1,1,1-Trichloroethane	4	6/15/2016	6/13/2017	3.50	0.5	U	12.5	U
LHAAP-18	18CPTMW23SW	1,1,2-Trichloroethane	4	6/15/2016	6/13/2017	3.50	0.5	U	12.5	U
LHAAP-18	18CPTMW23SW	1,1-Dichloroethene	4	6/15/2016	6/13/2017	7.00	1	U	25	U
LHAAP-18	18CPTMW23SW	1,2-Dichloroethane	4	6/15/2016	6/13/2017	3.50	0.5	U	12.5	U
LHAAP-18	18CPTMW23SW	1,4-Dioxane	1	6/15/2016	6/15/2016	1.00	1	U	1	U
LHAAP-18	18CPTMW23SW	Carbon tetrachloride	4	6/15/2016	6/13/2017	3.50	0.5	U	12.5	U
LHAAP-18	18CPTMW23SW	Chloroform	4	6/15/2016	6/13/2017	1.75	0.25	U	6.26	U
LHAAP-18	18CPTMW23SW	cis-1,2-Dichloroethene	4	6/15/2016	6/13/2017	3.50	0.5	U	12.5	U
LHAAP-18	18CPTMW23SW	magnesium, total	3	12/7/2016	6/13/2017	11433.33	11300		11700	
LHAAP-18	18CPTMW23SW	manganese, total	3	12/7/2016	6/13/2017	765.00	649		854	
LHAAP-18	18CPTMW23SW	Methylene chloride	4	6/15/2016	6/13/2017	3.47	0.373	J	12.5	U
LHAAP-18	18CPTMW23SW	nickel, total	3	12/7/2016	6/13/2017	4.00	4	U	4	U
LHAAP-18	18CPTMW23SW	Perchlorate	4	6/15/2016	6/13/2017	0.25	0.2	U	0.407	
LHAAP-18	18CPTMW23SW	Tetrachloroethene	4	6/15/2016	6/13/2017	3.50	0.5	U	12.5	U
LHAAP-18	18CPTMW23SW	thallium, total	3	12/7/2016	6/13/2017	0.73	0.2	U	1.68	
LHAAP-18	18CPTMW23SW	Trichloroethene	4	6/15/2016	6/13/2017	3.50	0.5	U	12.5	U
LHAAP-18	18CPTMW23SW	Vinyl chloride	4	6/15/2016	6/13/2017	3.50	0.5	U	12.5	U
LHAAP-18	18CPTMW26SW	1,1,1-Trichloroethane	3	6/9/2016	6/20/2017	0.50	0.5	U	0.5	U
LHAAP-18	18CPTMW26SW	1,1,2-Trichloroethane	3	6/9/2016	6/20/2017	0.50	0.5	U	0.5	U
LHAAP-18	18CPTMW26SW	1,1-Dichloroethene	3	6/9/2016	6/20/2017	1.00	1	U	1	U
LHAAP-18	18CPTMW26SW	1,2-Dichloroethane	3	6/9/2016	6/20/2017	0.50	0.5	U	0.5	U
LHAAP-18	18CPTMW26SW	1,4-Dioxane	1	6/9/2016	6/9/2016	1.00	1	U	1	U
LHAAP-18	18CPTMW26SW	Carbon tetrachloride	3	6/9/2016	6/20/2017	0.50	0.5	U	0.5	U
LHAAP-18	18CPTMW26SW	Chloroform	3	6/9/2016	6/20/2017	0.25	0.25	U	0.25	U
LHAAP-18	18CPTMW26SW	cis-1,2-Dichloroethene	3	6/9/2016	6/20/2017	0.50	0.5	U	0.5	U
LHAAP-18	18CPTMW26SW	magnesium, total	3	6/9/2016	6/20/2017	30833.33	28400		34100	
LHAAP-18	18CPTMW26SW	manganese, total	3	6/9/2016	6/20/2017	1473.33	1360		1700	
LHAAP-18	18CPTMW26SW	Methylene chloride	3	6/9/2016	6/20/2017	0.50	0.5	U	0.5	U
LHAAP-18	18CPTMW26SW	nickel, total	3	6/9/2016	6/20/2017	4.29	2.38	J	6.04	J
LHAAP-18	18CPTMW26SW	Perchlorate	3	6/9/2016	6/20/2017	2.27	0.2	U	6.42	
LHAAP-18	18CPTMW26SW	Tetrachloroethene	3	6/9/2016	6/20/2017	0.50	0.5	U	0.5	U
LHAAP-18	18CPTMW26SW	thallium, total	3	6/9/2016	6/20/2017	0.68	0.2	U	1.63	
LHAAP-18	18CPTMW26SW	Trichloroethene	3	6/9/2016	6/20/2017	0.50	0.5	U	0.5	U
LHAAP-18	18CPTMW26SW	Vinyl chloride	3	6/9/2016	6/20/2017	0.50	0.5	U	0.5	U
LHAAP-18	18WW03	1,1,1-Trichloroethane	7	6/5/1995	6/9/2017	1.14	0.5	U	5	U
LHAAP-18	18WW03	1,1,2-Trichloroethane	7	6/5/1995	6/9/2017	1.14	0.5	U	5	U
LHAAP-18	18WW03	1,1-Dichloroethene	7	6/5/1995	6/9/2017	1.57	1	U	5	U
LHAAP-18	18WW03	1,2-Dichloroethane	7	6/5/1995	6/9/2017	1.14	0.5	U	5	U
LHAAP-18	18WW03	1,4-Dioxane	2	10/31/2015	6/14/2016	0.81	0.613	J	1	U
LHAAP-18	18WW03	Carbon tetrachloride	7	6/5/1995	6/9/2017	1.14	0.5	U	5	U
LHAAP-18	18WW03	Chloroform	7	6/5/1995	6/9/2017	0.93	0.25	U	5	U
LHAAP-18	18WW03	cis-1,2-Dichloroethene	6	9/27/2012	6/9/2017	0.50	0.5	U	0.5	U
LHAAP-18	18WW03	magnesium, total	3	12/12/2013	6/9/2017	7326.67	5840		10300	
LHAAP-18	18WW03	manganese, total	4	9/27/2012	6/9/2017	137.65	91.6		193	
LHAAP-18	18WW03	Methylene chloride	7	6/5/1995	6/9/2017	1.86	0.5	U	10	U
LHAAP-18	18WW03	nickel, total	5	6/5/1995	6/9/2017	12.64	2.18	J	49	
LHAAP-18	18WW03	Perchlorate	5	9/27/2012	6/9/2017	1.37	0.2	U	6.05	
LHAAP-18	18WW03	Tetrachloroethene	7	6/5/1995	6/9/2017	1.14	0.5	U	5	U
LHAAP-18	18WW03	thallium, total	5	6/5/1995	6/9/2017	20.14	0.112	J	100	U

Summary of COC Concentrations for LHAAP Wells and Miscellaneous Sampling Locations

Area	Location	Constituent	Count	Earliest	Latest	Avg (µg/L)	Min (µg/L)	Code	Max (µg/L)	Code
LHAAP-18	18WW03	Trichloroethene	7	6/5/1995	6/9/2017	1.14	0.5	U	5	U
LHAAP-18	18WW03	Vinyl chloride	7	6/5/1995	6/9/2017	1.86	0.5	U	10	U
LHAAP-18	18WW04	1,1,1-Trichloroethane	2	6/7/1995	10/2/2012	2.75	0.5	U	5	U
LHAAP-18	18WW04	1,1,2-Trichloroethane	2	6/7/1995	10/2/2012	2.75	0.5	U	5	U
LHAAP-18	18WW04	1,1-Dichloroethene	2	6/7/1995	10/2/2012	3.00	1	U	5	U
LHAAP-18	18WW04	1,2-Dichloroethane	2	6/7/1995	10/2/2012	2.75	0.5	U	5	U
LHAAP-18	18WW04	Carbon tetrachloride	2	6/7/1995	10/2/2012	2.75	0.5	U	5	U
LHAAP-18	18WW04	Chloroform	2	6/7/1995	10/2/2012	2.63	0.25	U	5	U
LHAAP-18	18WW04	cis-1,2-Dichloroethene	1	10/2/2012	10/2/2012	0.50	0.5	U	0.5	U
LHAAP-18	18WW04	manganese, total	1	10/2/2012	10/2/2012	169.00	169		169	
LHAAP-18	18WW04	Methylene chloride	2	6/7/1995	10/2/2012	5.25	0.5	U	10	U
LHAAP-18	18WW04	nickel, total	2	6/7/1995	10/2/2012	24.66	9.32		40	U
LHAAP-18	18WW04	Perchlorate	1	10/2/2012	10/2/2012	0.20	0.2	U	0.2	U
LHAAP-18	18WW04	Tetrachloroethene	2	6/7/1995	10/2/2012	2.75	0.5	U	5	U
LHAAP-18	18WW04	thallium, total	2	6/7/1995	10/2/2012	50.10	0.2	U	100	U
LHAAP-18	18WW04	Trichloroethene	2	6/7/1995	10/2/2012	2.75	0.5	U	5	U
LHAAP-18	18WW04	Vinyl chloride	2	6/7/1995	10/2/2012	5.25	0.5	U	10	U
LHAAP-18	18WW07	1,1,1-Trichloroethane	12	6/4/1995	9/28/2012	3.58	0.5		5	U
LHAAP-18	18WW07	1,1,2-Trichloroethane	12	6/4/1995	9/28/2012	3.58	0.5		5	U
LHAAP-18	18WW07	1,1-Dichloroethene	12	6/4/1995	9/28/2012	3.67	1		5	U
LHAAP-18	18WW07	1,2-Dichloroethane	12	6/4/1995	9/28/2012	3.63	0.5	U	5	U
LHAAP-18	18WW07	Carbon tetrachloride	12	6/4/1995	9/28/2012	3.96	0.5	U	5	U
LHAAP-18	18WW07	Chloroform	12	6/4/1995	9/28/2012	3.90	0.25	U	5	U
LHAAP-18	18WW07	cis-1,2-Dichloroethene	7	5/1/2002	9/28/2012	3.79	0.5	U	5	
LHAAP-18	18WW07	magnesium, total	1	5/1/2002	5/1/2002	5.00	5		5	
LHAAP-18	18WW07	manganese, total	2	5/1/2002	9/28/2012	130.50	5		256	
LHAAP-18	18WW07	Methylene chloride	12	6/4/1995	9/28/2012	3.92	0.25		10	U
LHAAP-18	18WW07	nickel, total	12	6/4/1995	9/28/2012	35.66	4.06	J	199	
LHAAP-18	18WW07	Perchlorate	16	5/25/2000	6/11/2015	3.70	0.2	U	9.72	J
LHAAP-18	18WW07	Tetrachloroethene	12	6/4/1995	9/28/2012	3.58	0.5		5	U
LHAAP-18	18WW07	thallium, total	2	6/4/1995	9/28/2012	500.10	0.2	U	1000	U
LHAAP-18	18WW07	Trichloroethene	12	6/4/1995	9/28/2012	12.13	0.5		112	
LHAAP-18	18WW07	Vinyl chloride	12	6/4/1995	9/28/2012	4.83	0.5		10	U
LHAAP-18	18WW09	1,1,1-Trichloroethane	28	6/4/1995	6/23/2017	2.40	0.25	U	22.2	
LHAAP-18	18WW09	1,1,2-Trichloroethane	27	6/4/1995	6/23/2017	2.41	0.25	U	21.1	
LHAAP-18	18WW09	1,1-Dichloroethene	28	6/4/1995	6/23/2017	2.64	0.5	U	22.8	
LHAAP-18	18WW09	1,2-Dichloroethane	28	6/4/1995	6/23/2017	2.50	0.25	U	24.5	
LHAAP-18	18WW09	1,4-Dioxane	2	10/29/2015	6/20/2016	1.00	1	U	1	U
LHAAP-18	18WW09	Carbon tetrachloride	28	6/4/1995	6/23/2017	2.50	0.25	U	20.4	
LHAAP-18	18WW09	Chloroform	28	6/4/1995	6/23/2017	3.06	0.125	U	22.4	
LHAAP-18	18WW09	Chromium, Total	5	3/9/2010	3/8/2012	49.73	7.48	J	173	
LHAAP-18	18WW09	cis-1,2-Dichloroethene	22	5/1/2003	6/23/2017	2.26	0.25	U	22.3	
LHAAP-18	18WW09	magnesium, total	11	9/23/2009	6/23/2017	8556.36	4650		9510	
LHAAP-18	18WW09	manganese, total	17	3/12/2008	6/23/2017	705.59	174		995	
LHAAP-18	18WW09	Methylene chloride	28	6/4/1995	6/23/2017	3.65	0.25		31.7	
LHAAP-18	18WW09	nickel, total	30	6/4/1995	6/23/2017	196.94	3.02	J	743	
LHAAP-18	18WW09	Perchlorate	34	5/25/2000	6/23/2017	10.26	0.1	U	160	
LHAAP-18	18WW09	Tetrachloroethene	28	6/4/1995	6/23/2017	2.30	0.25	U	19.4	
LHAAP-18	18WW09	thallium, total	13	6/4/1995	6/23/2017	77.12	0.173	J	1000	U
LHAAP-18	18WW09	Trichloroethene	28	6/4/1995	6/23/2017	2.65	0.25	U	18.7	
LHAAP-18	18WW09	Vinyl chloride	28	6/4/1995	6/23/2017	3.37	0.25	U	34.3	
LHAAP-18	18WW11	1,1,1-TRICHLOROETHANE	12	6/2/1995	12/17/2013	0.81	0.25	U	5	U
LHAAP-18	18WW11	1,1,2-TRICHLOROETHANE	11	6/2/1995	12/17/2013	0.80	0.25	U	5	U
LHAAP-18	18WW11	1,1-DICHLOROETHENE	12	6/2/1995	12/17/2013	1.04	0.5	U	5	U
LHAAP-18	18WW11	1,2-DICHLOROETHANE	12	6/2/1995	12/17/2013	0.81	0.25	U	5	U
LHAAP-18	18WW11	1,4-Dioxane	1	10/28/2015	10/28/2015	1.00	1	U	1	U
LHAAP-18	18WW11	Carbon tetrachloride	12	6/2/1995	12/17/2013	0.81	0.25	U	5	U
LHAAP-18	18WW11	Chloroform	12	6/2/1995	12/17/2013	1.36	0.125	U	13	
LHAAP-18	18WW11	Chromium, Total	3	3/11/2010	3/16/2011	6.93	4.46	J	10.1	
LHAAP-18	18WW11	cis-1,2-Dichloroethene	10	9/15/2007	12/17/2013	0.32	0.25	U	0.5	U
LHAAP-18	18WW11	magnesium, total	4	9/22/2009	12/17/2013	7400.00	7220		7800	
LHAAP-18	18WW11	manganese, total	9	3/11/2008	12/17/2013	384.74	9.66		483	
LHAAP-18	18WW11	Methylene chloride	11	3/7/2007	12/17/2013	5.70	0.25	U	58.6	
LHAAP-18	18WW11	nickel, total	12	6/2/1995	12/17/2013	61.78	5.25	J	302	
LHAAP-18	18WW11	Perchlorate	16	5/25/2000	12/17/2013	7.82	0.1	U	80	U
LHAAP-18	18WW11	Tetrachloroethene	12	6/2/1995	12/17/2013	0.81	0.25	U	5	U
LHAAP-18	18WW11	thallium, total	6	6/2/1995	12/17/2013	16.86	0.2	U	100	U
LHAAP-18	18WW11	Trichloroethene	12	6/2/1995	12/17/2013	2.33	0.25	U	19.2	
LHAAP-18	18WW11	Vinyl chloride	12	6/2/1995	12/17/2013	1.23	0.25	U	10	U
LHAAP-18	18WW16	1,1,1-Trichloroethane	3	6/1/1995	6/26/2017	2.00	0.5	U	5	U
LHAAP-18	18WW16	1,1,2-Trichloroethane	3	6/1/1995	6/26/2017	2.00	0.5	U	5	U
LHAAP-18	18WW16	1,1-Dichloroethene	3	6/1/1995	6/26/2017	2.33	1	U	5	U
LHAAP-18	18WW16	1,2-Dichloroethane	3	6/1/1995	6/26/2017	2.00	0.5	U	5	U
LHAAP-18	18WW16	Carbon tetrachloride	3	6/1/1995	6/26/2017	2.00	0.5	U	5	U
LHAAP-18	18WW16	Chloroform	3	6/1/1995	6/26/2017	1.83	0.25	U	5	U
LHAAP-18	18WW16	cis-1,2-Dichloroethene	2	6/16/2016	6/26/2017	0.50	0.5	U	0.5	U
LHAAP-18	18WW16	magnesium, total	2	10/24/2009	6/16/2016	130000.00	114000		146000	
LHAAP-18	18WW16	manganese, total	3	10/24/2009	6/26/2017	2596.00	548		4120	
LHAAP-18	18WW16	Methylene chloride	3	6/1/1995	6/26/2017	3.67	0.5	U	10	U
LHAAP-18	18WW16	nickel, total	4	6/1/1995	6/26/2017	7617.00	78		14300	
LHAAP-18	18WW16	Perchlorate	7	5/23/2000	6/26/2017	8.63	5.24		22.7	
LHAAP-18	18WW16	Tetrachloroethene	3	6/1/1995	6/26/2017	2.00	0.5	U	5	U
LHAAP-18	18WW16	thallium, total	4	6/1/1995	6/26/2017	250.40	0.2	U	1000	U
LHAAP-18	18WW16	Trichloroethene	3	6/1/1995	6/26/2017	2.00	0.5	U	5	U
LHAAP-18	18WW16	Vinyl chloride	3	6/1/1995	6/26/2017	3.67	0.5	U	10	U
LHAAP-18	18WW18	1,1,1-Trichloroethane	6	6/8/1995	6/9/2017	1.33	0.5	U	5	U
LHAAP-18	18WW18	1,1,2-Trichloroethane	6	6/8/1995	6/9/2017	1.33	0.5	U	5	U

Summary of COC Concentrations for LHAAP Wells and Miscellaneous Sampling Locations

Area	Location	Constituent	Count	Earliest	Latest	Avg (µg/L)	Min (µg/L)	Code	Max (µg/L)	Code
LHAAP-18	18WW18	1,1-Dichloroethene	6	6/8/1995	6/9/2017	1.67	1	U	5	U
LHAAP-18	18WW18	1,2-Dichloroethane	6	6/8/1995	6/9/2017	1.33	0.5	U	5	U
LHAAP-18	18WW18	1,4-Dioxane	1	6/21/2016	6/21/2016	1.00	1	U	1	U
LHAAP-18	18WW18	Carbon tetrachloride	7	6/8/1995	6/9/2017	1.21	0.5	U	5	U
LHAAP-18	18WW18	Chloroform	7	6/8/1995	6/9/2017	4.04	0.25	U	22	
LHAAP-18	18WW18	cis-1,2-Dichloroethene	6	11/12/2009	6/9/2017	0.58	0.5	U	1	U
LHAAP-18	18WW18	magnesium, total	2	5/7/2013	6/21/2016	29450.00	24900		34000	
LHAAP-18	18WW18	manganese, total	4	10/2/2012	6/9/2017	1540.00	1350		1860	
LHAAP-18	18WW18	Methylene chloride	7	6/8/1995	6/9/2017	2.50	0.5	U	10	U
LHAAP-18	18WW18	nickel, total	6	6/8/1995	6/9/2017	82.82	5.51	J	340	
LHAAP-18	18WW18	Perchlorate	12	5/25/2000	6/9/2017	9.69	0.14	J	80	U
LHAAP-18	18WW18	Tetrachloroethene	7	6/8/1995	6/9/2017	1.21	0.5	U	5	U
LHAAP-18	18WW18	thallium, total	5	6/8/1995	6/9/2017	20.16	0.2	U	100	U
LHAAP-18	18WW18	Trichloroethene	7	6/8/1995	6/9/2017	1.21	0.5	U	5	U
LHAAP-18	18WW18	Vinyl chloride	7	6/8/1995	6/9/2017	1.93	0.5	U	10	U
LHAAP-18	18WW19	1,1,1-Trichloroethane	5	6/5/1995	6/21/2017	1.40	0.5	U	5	U
LHAAP-18	18WW19	1,1,2-Trichloroethane	5	6/5/1995	6/21/2017	1.40	0.5	U	5	U
LHAAP-18	18WW19	1,1-Dichloroethene	5	6/5/1995	6/21/2017	1.80	1	U	5	U
LHAAP-18	18WW19	1,2-Dichloroethane	5	6/5/1995	6/21/2017	1.40	0.5	U	5	U
LHAAP-18	18WW19	1,4-Dioxane	1	10/30/2015	10/30/2015	1.00	1	U	1	U
LHAAP-18	18WW19	Carbon tetrachloride	5	6/5/1995	6/21/2017	1.40	0.5	U	5	U
LHAAP-18	18WW19	Chloroform	5	6/5/1995	6/21/2017	1.20	0.25	U	5	U
LHAAP-18	18WW19	cis-1,2-Dichloroethene	4	10/2/2012	6/21/2017	0.50	0.5	U	0.5	U
LHAAP-18	18WW19	magnesium, total	2	6/20/2016	6/21/2017	2425.00	1590		3260	
LHAAP-18	18WW19	manganese, total	3	10/2/2012	6/21/2017	276.67	221		336	
LHAAP-18	18WW19	Methylene chloride	5	6/5/1995	6/21/2017	2.40	0.5	U	10	U
LHAAP-18	18WW19	nickel, total	4	6/5/1995	6/21/2017	12.49	2.25	J	40	U
LHAAP-18	18WW19	Perchlorate	8	5/26/2000	6/21/2017	10.82	0.2	U	80	U
LHAAP-18	18WW19	Tetrachloroethene	5	6/5/1995	6/21/2017	1.40	0.5	U	5	U
LHAAP-18	18WW19	thallium, total	4	6/5/1995	6/21/2017	25.17	0.2	U	100	U
LHAAP-18	18WW19	Trichloroethene	5	6/5/1995	6/21/2017	1.40	0.5	U	5	U
LHAAP-18	18WW19	Vinyl chloride	5	6/5/1995	6/21/2017	2.40	0.5	U	10	U
LHAAP-18	18WW20	1,1,1-Trichloroethane	23	6/5/1995	6/21/2017	1.04	0.25	U	5	U
LHAAP-18	18WW20	1,1,2-Trichloroethane	23	6/5/1995	6/21/2017	1.04	0.25	U	5	U
LHAAP-18	18WW20	1,1-Dichloroethene	23	6/5/1995	6/21/2017	1.30	0.5	U	5	U
LHAAP-18	18WW20	1,2-Dichloroethane	23	6/5/1995	6/21/2017	1.04	0.25	U	5	U
LHAAP-18	18WW20	1,4-Dioxane	2	10/30/2015	6/20/2016	1.00	1	U	1	U
LHAAP-18	18WW20	Carbon tetrachloride	23	6/5/1995	6/21/2017	1.04	0.25	U	5	U
LHAAP-18	18WW20	Chloroform	23	6/5/1995	6/21/2017	0.91	0.125	U	5	U
LHAAP-18	18WW20	Chromium, Total	5	3/10/2010	3/9/2012	2.21	1.04	J	2.5	U
LHAAP-18	18WW20	cis-1,2-Dichloroethene	18	9/15/2007	6/21/2017	0.39	0.25	U	1	U
LHAAP-18	18WW20	magnesium, total	7	9/23/2009	12/15/2016	1684.29	1450		2140	
LHAAP-18	18WW20	manganese, total	14	3/12/2008	6/21/2017	141.94	35.7		279	
LHAAP-18	18WW20	Methylene chloride	23	6/5/1995	6/21/2017	1.73	0.25	U	12.1	J
LHAAP-18	18WW20	nickel, total	21	6/5/1995	6/21/2017	10.53	1.67	J	40	U
LHAAP-18	18WW20	Perchlorate	27	5/25/2000	6/21/2017	4.15	0.1	U	80	U
LHAAP-18	18WW20	Tetrachloroethene	23	6/5/1995	6/21/2017	1.04	0.25	U	5	U
LHAAP-18	18WW20	thallium, total	10	6/5/1995	6/21/2017	10.28	0.2	U	100	U
LHAAP-18	18WW20	Trichloroethene	22	6/5/1995	6/21/2017	7.71	0.25	U	149	
LHAAP-18	18WW20	Vinyl chloride	23	6/5/1995	6/21/2017	1.70	0.25	U	10	U
LHAAP-18	18WW21	1,1,1-Trichloroethane	6	9/3/2004	9/27/2012	2.92	0.5	U	5	U
LHAAP-18	18WW21	1,1,2-Trichloroethane	6	9/3/2004	9/27/2012	2.92	0.5	U	5	U
LHAAP-18	18WW21	1,1-Dichloroethene	6	9/3/2004	9/27/2012	3.00	1	U	5	U
LHAAP-18	18WW21	1,2-Dichloroethane	5	5/10/2005	9/27/2012	2.50	0.5	U	5	
LHAAP-18	18WW21	1,4-Dioxane	1	9/3/2004	9/3/2004	100.00	100	U	100	U
LHAAP-18	18WW21	Carbon tetrachloride	5	5/10/2005	9/27/2012	2.50	0.5	U	5	
LHAAP-18	18WW21	Chloroform	6	9/3/2004	9/27/2012	3.54	0.25	U	5	U
LHAAP-18	18WW21	cis-1,2-Dichloroethene	3	9/3/2004	9/27/2012	2.17	0.5	U	5	U
LHAAP-18	18WW21	manganese, total	1	9/27/2012	9/27/2012	833.00	833		833	
LHAAP-18	18WW21	Methylene chloride	6	9/3/2004	9/27/2012	3.58	0.5	U	5	U
LHAAP-18	18WW21	nickel, total	5	5/10/2005	9/27/2012	13.00	1	U	40	U
LHAAP-18	18WW21	Perchlorate	5	9/3/2004	9/27/2012	2.45	0.2	U	5.86	
LHAAP-18	18WW21	Tetrachloroethene	6	9/3/2004	9/27/2012	2.92	0.5	U	5	U
LHAAP-18	18WW21	thallium, total	1	9/27/2012	9/27/2012	0.20	0.2	U	0.2	U
LHAAP-18	18WW21	Trichloroethene	6	9/3/2004	9/27/2012	2.92	0.5	U	5	U
LHAAP-18	18WW21	Vinyl chloride	6	9/3/2004	9/27/2012	4.58	0.5	U	10	
LHAAP-37	102	1,1,1-Trichloroethane	22	4/1/1994	6/9/2017	2.94	0.25	U	5	
LHAAP-37	102	1,1,2-Trichloroethane	20	4/1/1994	6/9/2017	2.74	0.25	U	5	
LHAAP-37	102	1,1-Dichloroethene	27	4/1/1994	6/9/2017	3.43	0.5	U	5	
LHAAP-37	102	1,2-Dichloroethane	27	4/1/1994	6/9/2017	3.34	0.25	U	5	
LHAAP-37	102	1,4-Dioxane	1	11/2/2015	11/2/2015	0.63	0.633	J	0.633	J
LHAAP-37	102	Carbon tetrachloride	27	4/1/1994	6/9/2017	3.49	0.25	U	5	
LHAAP-37	102	Chloroform	27	11/18/1982	6/9/2017	3.26	0.125	U	5	
LHAAP-37	102	cis-1,2-Dichloroethene	17	12/1/1996	6/9/2017	3.19	0.25	U	5	
LHAAP-37	102	magnesium, total	5	4/1/1994	6/9/2017	5341.00	5		12000	
LHAAP-37	102	manganese, total	9	11/18/1982	6/9/2017	127.02	5		476	
LHAAP-37	102	Methylene chloride	36	2/1/1986	6/9/2017	5.61	0.25		28	
LHAAP-37	102	nickel, total	24	11/18/1982	6/9/2017	26.03	0.5		233	
LHAAP-37	102	Perchlorate	16	10/1/2000	6/9/2017	81.84	5		326	J
LHAAP-37	102	strontium, total	1	11/18/1982	11/18/1982	444.00	444		444	
LHAAP-37	102	Tetrachloroethene	22	4/1/1994	6/9/2017	2.94	0.25	U	5	
LHAAP-37	102	thallium, total	8	11/18/1982	6/9/2017	8.80	0.162	J	50	
LHAAP-37	102	Trichloroethene	37	11/18/1982	6/9/2017	3.52	0.25	U	7	
LHAAP-37	102	Vinyl chloride	27	4/1/1994	6/9/2017	3.69	0.25	U	10	
LHAAP-37	108	1,1,1-Trichloroethane	34	1/19/1995	12/16/2004	1.33	0.2	U	5	U
LHAAP-37	108	1,1,2-Trichloroethane	32	1/19/1995	12/16/2004	1.43	0.65	U	5	U
LHAAP-37	108	1,1-dichloroethene	33	1/19/1995	12/16/2004	1.42	1	U	5	U

Summary of COC Concentrations for LHAAP Wells and Miscellaneous Sampling Locations

Area	Location	Constituent	Count	Earliest	Latest	Avg (µg/L)	Min (µg/L)	Code	Max (µg/L)	Code
LHAAP-37	108	1,2-Dichloroethane	34	1/19/1995	12/16/2004	1.33	0.31	U	5	U
LHAAP-37	108	1,4-Dioxane	1	6/3/1998	6/3/1998	200.00	200	U	200	U
LHAAP-37	108	Carbon tetrachloride	34	1/19/1995	12/16/2004	1.36	1	U	5	U
LHAAP-37	108	Chloroform	34	1/19/1995	12/16/2004	1.33	0.2	U	5	U
LHAAP-37	108	cis-1,2-Dichloroethene	29	1/19/1995	8/20/2003	1.39	0.2	U	5	U
LHAAP-37	108	magnesium, total	31	1/19/1995	12/16/2004	65561.94	100		185000	
LHAAP-37	108	manganese, total	30	1/19/1995	12/16/2004	3442.43	296		9180	
LHAAP-37	108	Methylene chloride	33	1/19/1995	12/16/2004	3.66	0.22	U	10	U
LHAAP-37	108	nickel, total	31	6/20/1995	12/16/2004	58.07	7.13		153	
LHAAP-37	108	PERCHLORATE	28	9/23/1999	6/29/2016	6.83	0.1	U	80	U
LHAAP-37	108	strontium, total	30	1/19/1995	12/16/2004	2427.47	123	J	7630	
LHAAP-37	108	tetrachloroethene	33	1/19/1995	12/16/2004	1.34	0.25	U	5	U
LHAAP-37	108	thallium, total	30	1/19/1995	12/16/2004	69.29	2	U	310	U
LHAAP-37	108	trichloroethene	34	1/19/1995	12/16/2004	1.33	0.25	U	5	U
LHAAP-37	108	Vinyl chloride	34	1/19/1995	12/16/2004	1.62	0.24	U	10	U
LHAAP-37	110	1,1,1-Trichloroethane	34	9/28/1994	12/16/2004	1.45	0.2	U	5	U
LHAAP-37	110	1,1,2-Trichloroethane	32	9/28/1994	12/16/2004	1.52	0.65	U	5	U
LHAAP-37	110	1,1-dichloroethene	34	9/28/1994	12/16/2004	1.51	0.2	U	5	U
LHAAP-37	110	1,2-Dichloroethane	34	9/28/1994	12/16/2004	1.45	0.31	U	5	U
LHAAP-37	110	1,4-Dioxane	1	6/3/1998	6/3/1998	200.00	200	U	200	U
LHAAP-37	110	Carbon tetrachloride	34	9/28/1994	12/16/2004	1.47	1	U	5	U
LHAAP-37	110	Chloroform	34	9/28/1994	12/16/2004	1.45	0.2	U	5	U
LHAAP-37	110	cis-1,2-Dichloroethene	29	9/28/1994	8/20/2003	1.52	0.2	U	5	U
LHAAP-37	110	magnesium, total	33	9/28/1994	12/16/2004	149478.79	94800		218000	
LHAAP-37	110	manganese, total	33	9/28/1994	12/16/2004	5443.94	1290		9770	
LHAAP-37	110	Methylene chloride	34	9/28/1994	12/16/2004	3.95	0.22	U	10	U
LHAAP-37	110	nickel, total	33	9/28/1994	12/16/2004	46.66	20		103	
LHAAP-37	110	PERCHLORATE	25	9/22/1999	6/29/2016	10.73	0.2	U	100	U
LHAAP-37	110	strontium, total	33	9/28/1994	12/16/2004	5466.06	3500		7890	
LHAAP-37	110	tetrachloroethene	34	9/28/1994	12/16/2004	1.45	0.25	U	5	U
LHAAP-37	110	thallium, total	32	9/28/1994	12/16/2004	81.80	4	U	310	U
LHAAP-37	110	trichloroethene	34	9/28/1994	12/16/2004	1.45	0.25	U	5	U
LHAAP-37	110	Vinyl chloride	34	9/28/1994	12/16/2004	1.89	0.24	U	10	U
LHAAP-37	111	1,1,1-Trichloroethane	33	9/27/1994	12/16/2004	1.46	0.2	U	5	U
LHAAP-37	111	1,1,2-Trichloroethane	31	9/27/1994	12/16/2004	1.54	0.65	U	5	U
LHAAP-37	111	1,1-dichloroethene	33	9/27/1994	12/16/2004	1.52	0.2	U	5	U
LHAAP-37	111	1,2-Dichloroethane	33	9/27/1994	12/16/2004	1.46	0.31	U	5	U
LHAAP-37	111	1,4-Dioxane	1	6/3/1998	6/3/1998	200.00	200	U	200	U
LHAAP-37	111	Carbon tetrachloride	33	9/27/1994	12/16/2004	1.49	1	U	5	U
LHAAP-37	111	Chloroform	33	9/27/1994	12/16/2004	1.46	0.2	U	5	U
LHAAP-37	111	cis-1,2-Dichloroethene	29	9/27/1994	8/20/2003	1.52	0.2	U	5	U
LHAAP-37	111	magnesium, total	30	9/27/1994	12/16/2004	24460.00	2710		213000	
LHAAP-37	111	manganese, total	29	9/27/1994	12/16/2004	726.28	62		6520	
LHAAP-37	111	Methylene chloride	33	9/27/1994	12/16/2004	4.03	0.22	U	10	U
LHAAP-37	111	nickel, total	30	9/27/1994	12/16/2004	38.75	4.15	J	590	
LHAAP-37	111	PERCHLORATE	23	9/22/1999	6/30/2016	3.34	0.2	U	16	U
LHAAP-37	111	strontium, total	29	9/27/1994	12/16/2004	792.09	70		3930	
LHAAP-37	111	tetrachloroethene	33	9/27/1994	12/16/2004	1.46	0.25	U	5	U
LHAAP-37	111	thallium, total	28	9/27/1994	12/16/2004	67.24	1.4	J	310	U
LHAAP-37	111	trichloroethene	33	9/27/1994	12/16/2004	1.46	0.25	U	5	U
LHAAP-37	111	Vinyl chloride	33	9/27/1994	12/16/2004	1.92	0.24	U	10	U
LHAAP-37	112	1,1,1-Trichloroethane	34	9/29/1994	12/16/2004	1.45	0.2	U	5	U
LHAAP-37	112	1,1,2-Trichloroethane	32	9/29/1994	12/16/2004	1.52	0.65	U	5	U
LHAAP-37	112	1,1-dichloroethene	34	9/29/1994	12/16/2004	1.51	0.2	U	5	U
LHAAP-37	112	1,2-Dichloroethane	34	9/29/1994	12/16/2004	1.45	0.31	U	5	U
LHAAP-37	112	1,4-Dioxane	1	6/3/1998	6/3/1998	200.00	200	U	200	U
LHAAP-37	112	Carbon tetrachloride	34	9/29/1994	12/16/2004	1.47	1	U	5	U
LHAAP-37	112	Chloroform	34	9/29/1994	12/16/2004	1.45	0.2	U	5	U
LHAAP-37	112	cis-1,2-Dichloroethene	29	9/29/1994	8/20/2003	1.52	0.2	U	5	U
LHAAP-37	112	magnesium, total	33	9/29/1994	12/16/2004	237410.00	3530		370000	
LHAAP-37	112	manganese, total	32	9/29/1994	12/16/2004	2913.63	706		5200	
LHAAP-37	112	Methylene chloride	34	9/29/1994	12/16/2004	3.97	0.22	U	10	U
LHAAP-37	112	nickel, total	33	9/29/1994	12/16/2004	23.44	10		61	
LHAAP-37	112	PERCHLORATE	27	9/22/1999	6/30/2016	7.42	0.2	U	80	U
LHAAP-37	112	strontium, total	32	9/29/1994	12/16/2004	5001.44	176		7070	
LHAAP-37	112	tetrachloroethene	34	9/29/1994	12/16/2004	1.45	0.25	U	5	U
LHAAP-37	112	thallium, total	31	9/29/1994	12/16/2004	70.18	1.3	J	310	U
LHAAP-37	112	trichloroethene	34	9/29/1994	12/16/2004	1.45	0.25	U	5	U
LHAAP-37	112	Vinyl chloride	34	9/29/1994	12/16/2004	1.89	0.24	U	10	U
LHAAP-37	116	1,1,1-Trichloroethane	5	5/15/1993	8/24/2014	2.50	0.5	U	5	U
LHAAP-37	116	1,1,2-Trichloroethane	5	5/15/1993	8/24/2014	2.50	0.5	U	5	U
LHAAP-37	116	1,1-Dichloroethene	5	5/15/1993	8/24/2014	2.60	1	U	5	U
LHAAP-37	116	1,2-Dichloroethane	5	5/15/1993	8/24/2014	2.50	0.5	U	5	U
LHAAP-37	116	1,4-Dioxane	1	7/9/1998	7/9/1998	200.00	200	U	200	U
LHAAP-37	116	Carbon tetrachloride	5	5/15/1993	8/24/2014	2.50	0.5	U	5	U
LHAAP-37	116	Chloroform	5	5/15/1993	8/24/2014	2.24	0.25	U	5	U
LHAAP-37	116	CHROMIUM, TOTAL	1	10/21/2008	10/21/2008	41.50	41.5		41.5	
LHAAP-37	116	cis-1,2-Dichloroethene	4	5/15/1993	8/24/2014	1.88	0.5	U	5	U
LHAAP-37	116	MAGNESIUM, TOTAL	2	7/9/1998	10/21/2008	262500.00	170000		355000	
LHAAP-37	116	MANGANESE, TOTAL	2	7/9/1998	10/21/2008	225.00	176		274	
LHAAP-37	116	Methylene chloride	5	5/15/1993	8/24/2014	5.10	1	U	10	U
LHAAP-37	116	NICKEL, TOTAL	4	5/15/1993	10/21/2008	60.38	40	U	87.6	
LHAAP-37	116	Perchlorate	6	9/16/2000	8/24/2014	1205.96	0.747		2010	
LHAAP-37	116	strontium, total	1	7/9/1998	7/9/1998	7600.00	7600	J	7600	J
LHAAP-37	116	Tetrachloroethene	5	5/15/1993	8/24/2014	2.50	0.5	U	5	U
LHAAP-37	116	THALLIUM, TOTAL	4	5/15/1993	10/21/2008	252.81	0.257		1000	U
LHAAP-37	116	Trichloroethene	5	5/15/1993	8/24/2014	2.50	0.5	U	5	U

Summary of COC Concentrations for LHAAP Wells and Miscellaneous Sampling Locations

Area	Location	Constituent	Count	Earliest	Latest	Avg (µg/L)	Min (µg/L)	Code	Max (µg/L)	Code
LHAAP-37	116	Vinyl chloride	5	5/15/1993	8/24/2014	4.50	0.5	U	10	U
LHAAP-37	125	1,1,1-Trichloroethane	18	4/1/1994	6/9/2017	3.23	0.5		5	
LHAAP-37	125	1,1,2-Trichloroethane	16	4/1/1994	6/9/2017	3.01	0.5		5	
LHAAP-37	125	1,1-Dichloroethene	23	4/1/1994	6/9/2017	3.71	1	U	5	
LHAAP-37	125	1,2-Dichloroethane	24	9/20/1988	6/9/2017	5.57	0.5	U	50	
LHAAP-37	125	Carbon tetrachloride	23	4/1/1994	6/9/2017	3.81	0.5	U	5	
LHAAP-37	125	Chloroform	23	11/19/1982	6/9/2017	3.54	0.25	U	5	
LHAAP-37	125	cis-1,2-Dichloroethene	15	12/1/1996	6/9/2017	3.58	0.5	U	5	
LHAAP-37	125	magnesium, total	4	4/1/1994	5/1/2002	1401.25	5		2500	
LHAAP-37	125	manganese, total	8	11/19/1982	6/9/2017	202.03	5		1340	
LHAAP-37	125	Methylene chloride	34	7/1/1984	6/9/2017	253.79	0.25		6500	
LHAAP-37	125	nickel, total	21	11/19/1982	6/9/2017	45.39	2.83	J	377	
LHAAP-37	125	Perchlorate	12	10/1/2000	6/9/2017	380.72	1		3120	
LHAAP-37	125	strontium, total	1	11/19/1982	11/19/1982	7440.00	7440		7440	
LHAAP-37	125	Tetrachloroethene	19	9/20/1988	6/9/2017	3.16	0.5		5	
LHAAP-37	125	thallium, total	6	11/19/1982	6/9/2017	26.35	0.118	J	140	
LHAAP-37	125	Trichloroethene	35	11/19/1982	6/9/2017	5.51	0.5		50	
LHAAP-37	125	Vinyl chloride	23	4/1/1994	6/9/2017	3.83	0.5		10	
LHAAP-37	127	1,1,1-Trichloroethane	1	3/24/1993	3/24/1993	5.00	5	U	5	U
LHAAP-37	127	1,1,2-Trichloroethane	1	3/24/1993	3/24/1993	5.00	5	U	5	U
LHAAP-37	127	1,1-Dichloroethene	1	3/24/1993	3/24/1993	5.00	5	U	5	U
LHAAP-37	127	1,2-Dichloroethane	1	3/24/1993	3/24/1993	5.00	5	U	5	U
LHAAP-37	127	Carbon Tetrachloride	1	3/24/1993	3/24/1993	5.00	5	U	5	U
LHAAP-37	127	Chloroform	1	3/24/1993	3/24/1993	5.00	5	U	5	U
LHAAP-37	127	magnesium, total	1	10/24/2009	10/24/2009	92300.00	92300		92300	
LHAAP-37	127	manganese, total	1	10/24/2009	10/24/2009	1940.00	1940		1940	
LHAAP-37	127	Methylene Chloride	1	3/24/1993	3/24/1993	5.00	5	U	5	U
LHAAP-37	127	nickel, total	2	3/24/1993	10/24/2009	45.10	40.2		50	
LHAAP-37	127	Perchlorate	5	5/23/2000	9/29/2016	6.55	0.062	U	26.8	
LHAAP-37	127	Tetrachloroethene	1	3/24/1993	3/24/1993	5.00	5	U	5	U
LHAAP-37	127	thallium, total	2	3/24/1993	10/24/2009	1.40	0.8	U	2	U
LHAAP-37	127	Trichloroethene	1	3/24/1993	3/24/1993	5.00	5	U	5	U
LHAAP-37	127	Vinyl Chloride	1	3/24/1993	3/24/1993	10.00	10	U	10	U
LHAAP-37	128	1,1,1-Trichloroethane	2	3/19/1993	3/24/1993	5.00	5	U	5	U
LHAAP-37	128	1,1,2-Trichloroethane	2	3/19/1993	3/24/1993	5.00	5	U	5	U
LHAAP-37	128	1,1-Dichloroethene	2	3/19/1993	3/24/1993	5.00	5	U	5	U
LHAAP-37	128	1,2-Dichloroethane	2	3/19/1993	3/24/1993	5.00	5	U	5	U
LHAAP-37	128	Carbon Tetrachloride	2	3/19/1993	3/24/1993	5.00	5	U	5	U
LHAAP-37	128	Chloroform	2	3/19/1993	3/24/1993	5.00	5	U	5	U
LHAAP-37	128	magnesium, total	1	10/24/2009	10/24/2009	75200.00	75200		75200	
LHAAP-37	128	manganese, total	1	10/24/2009	10/24/2009	1620.00	1620		1620	
LHAAP-37	128	Methylene Chloride	2	3/19/1993	3/24/1993	5.00	5	U	5	U
LHAAP-37	128	nickel, total	3	3/19/1993	10/24/2009	485.27	5.8		1400	
LHAAP-37	128	Perchlorate	5	5/23/2000	9/29/2016	6.07	0.062	U	20.4	
LHAAP-37	128	Tetrachloroethene	2	3/19/1993	3/24/1993	5.00	5	U	5	U
LHAAP-37	128	thallium, total	3	3/19/1993	10/24/2009	67.60	0.8	U	200	U
LHAAP-37	128	Trichloroethene	2	3/19/1993	3/24/1993	5.00	5	U	5	U
LHAAP-37	128	Vinyl Chloride	2	3/19/1993	3/24/1993	10.00	10	U	10	U
LHAAP-37	129	1,1,1-Trichloroethane	26	4/1/1994	6/9/2017	3.61	0.5		5	
LHAAP-37	129	1,1,2-Trichloroethane	24	4/1/1994	6/9/2017	45.26	0.5		1000	U
LHAAP-37	129	1,1-Dichloroethene	31	4/1/1994	6/9/2017	37.12	1	U	1000	U
LHAAP-37	129	1,2-Dichloroethane	32	9/19/1988	6/9/2017	73.69	1		655	
LHAAP-37	129	1,4-Dioxane	2	11/2/2015	6/16/2016	6.66	6.52		6.79	J
LHAAP-37	129	Carbon tetrachloride	31	4/1/1994	6/9/2017	6.63	0.647	J	84	
LHAAP-37	129	Chloroform	31	11/17/1982	6/9/2017	8.63	1		61.6	
LHAAP-37	129	Chromium, Total	1	9/21/2011	9/21/2011	2.50	2.5	U	2.5	U
LHAAP-37	129	cis-1,2-Dichloroethene	21	12/1/1996	6/9/2017	23.38	4	J	340	
LHAAP-37	129	magnesium, total	10	4/1/1994	6/9/2017	8209.50	5		23000	
LHAAP-37	129	manganese, total	15	11/17/1982	6/9/2017	94.98	5		780	
LHAAP-37	129	Methylene chloride	43	7/1/1984	6/9/2017	141.36	0.25		4200	
LHAAP-37	129	nickel, total	31	11/17/1982	6/9/2017	15.34	0.5		100	
LHAAP-37	129	Perchlorate	20	10/1/2000	6/9/2017	43162.80	557		134000	
LHAAP-37	129	strontium, total	1	11/17/1982	11/17/1982	1060.00	1060		1060	
LHAAP-37	129	Tetrachloroethene	27	9/19/1988	6/9/2017	3.70	0.5		5	
LHAAP-37	129	thallium, total	13	11/17/1982	6/9/2017	11.64	0.105	J	130	
LHAAP-37	129	Trichloroethene	44	11/17/1982	6/9/2017	4750.39	1		18000	
LHAAP-37	129	Vinyl chloride	31	4/1/1994	6/9/2017	42.67	0.5		1000	U
LHAAP-37	133	1,1,1-Trichloroethane	34	9/30/1994	12/16/2004	1.59	1	U	5	U
LHAAP-37	133	1,1,2-Trichloroethane	33	9/30/1994	12/16/2004	1.64	1	U	5	U
LHAAP-37	133	1,1-dichloroethene	34	9/30/1994	12/16/2004	1.65	1	U	5	U
LHAAP-37	133	1,2-Dichloroethane	34	9/30/1994	12/16/2004	1.59	1	U	5	U
LHAAP-37	133	1,4-Dioxane	1	6/2/1998	6/2/1998	200.00	200	U	200	U
LHAAP-37	133	Carbon tetrachloride	34	9/30/1994	12/16/2004	1.47	1	U	5	U
LHAAP-37	133	Chloroform	34	9/30/1994	12/16/2004	1.67	1	U	7.7	
LHAAP-37	133	cis-1,2-Dichloroethene	29	9/30/1994	8/19/2003	1.69	1	U	5	U
LHAAP-37	133	magnesium, total	34	9/30/1994	12/16/2004	3656.18	1900		14200	
LHAAP-37	133	manganese, total	34	9/30/1994	12/16/2004	322.53	4.23	J	2060	
LHAAP-37	133	Methylene chloride	32	9/30/1994	12/16/2004	3.13	0.4	J	10	U
LHAAP-37	133	nickel, total	35	9/30/1994	12/16/2004	12.54	1.64	J	64	J
LHAAP-37	133	PERCHLORATE	36	9/23/1999	6/30/2016	2.09	0.3	U	4	U
LHAAP-37	133	strontium, total	33	9/30/1994	12/16/2004	184.52	80		1350	
LHAAP-37	133	tetrachloroethene	33	9/30/1994	12/16/2004	1.61	1	U	5	U
LHAAP-37	133	thallium, total	33	9/30/1994	12/16/2004	78.12	2	U	310	U
LHAAP-37	133	trichloroethene	34	9/30/1994	12/16/2004	1.59	1	U	5	U
LHAAP-37	133	Vinyl chloride	34	9/30/1994	12/16/2004	1.91	1	U	10	U
LHAAP-37	134	1,1,1-Trichloroethane	37	10/5/1994	8/24/2014	1.42	0.2	U	5	U
LHAAP-37	134	1,1,2-Trichloroethane	35	10/5/1994	8/24/2014	1.49	0.5	U	5	U

Summary of COC Concentrations for LHAAP Wells and Miscellaneous Sampling Locations

Area	Location	Constituent	Count	Earliest	Latest	Avg (µg/L)	Min (µg/L)	Code	Max (µg/L)	Code
LHAAP-37	134	1,1-Dichloroethene	37	10/5/1994	8/24/2014	1.46	0.2	U	5	U
LHAAP-37	134	1,2-Dichloroethane	37	10/5/1994	8/24/2014	1.43	0.31	U	5	U
LHAAP-37	134	1,4-Dioxane	1	6/2/1998	6/2/1998	200.00	200	U	200	U
LHAAP-37	134	Carbon tetrachloride	37	10/5/1994	8/24/2014	1.45	0.5	U	5	U
LHAAP-37	134	Chloroform	37	10/5/1994	8/24/2014	1.44	0.2	U	5	U
LHAAP-37	134	cis-1,2-Dichloroethene	32	10/5/1994	8/24/2014	1.46	0.2	U	5	U
LHAAP-37	134	magnesium, total	33	10/5/1994	12/16/2004	10990.61	1880		277000	
LHAAP-37	134	manganese, total	31	10/5/1994	12/16/2004	203.78	10.9		2340	
LHAAP-37	134	Methylene chloride	36	10/5/1994	8/24/2014	3.30	0.22	U	10	U
LHAAP-37	134	nickel, total	34	10/5/1994	12/16/2004	11.15	1.64	J	50	
LHAAP-37	134	PERCHLORATE	36	9/22/1999	6/30/2016	29.68	0.3	U	1000	U
LHAAP-37	134	strontium, total	32	10/5/1994	12/16/2004	321.12	10	U	6150	
LHAAP-37	134	Tetrachloroethene	37	10/5/1994	8/24/2014	1.41	0.5	U	5	U
LHAAP-37	134	thallium, total	33	10/5/1994	12/16/2004	68.77	2	U	310	U
LHAAP-37	134	Trichloroethene	37	10/5/1994	8/24/2014	1.40	0.25	U	5	U
LHAAP-37	134	Vinyl chloride	37	10/5/1994	8/24/2014	1.83	0.24	U	10	U
LHAAP-37	35BSW01	1,1,1-Trichloroethane	2	10/17/2013	2/12/2018	0.50	0.5	U	0.5	U
LHAAP-37	35BSW01	1,1,2-Trichloroethane	2	10/17/2013	2/12/2018	0.50	0.5	U	0.5	U
LHAAP-37	35BSW01	1,1-Dichloroethene	2	10/17/2013	2/12/2018	0.75	0.5	U	1	U
LHAAP-37	35BSW01	1,2-Dichloroethane	2	10/17/2013	2/12/2018	0.50	0.5	U	0.5	U
LHAAP-37	35BSW01	Carbon tetrachloride	2	10/17/2013	2/12/2018	0.50	0.5	U	0.5	U
LHAAP-37	35BSW01	Chloroform	2	10/17/2013	2/12/2018	0.38	0.25	U	0.5	U
LHAAP-37	35BSW01	cis-1,2-Dichloroethene	2	10/17/2013	2/12/2018	0.50	0.5	U	0.5	U
LHAAP-37	35BSW01	Methylene chloride	2	10/17/2013	2/12/2018	0.75	0.5	U	1	U
LHAAP-37	35BSW01	Tetrachloroethene	2	10/17/2013	2/12/2018	0.50	0.5	U	0.5	U
LHAAP-37	35BSW01	Trichloroethene	2	10/17/2013	2/12/2018	0.50	0.5	U	0.5	U
LHAAP-37	35BSW01	Vinyl chloride	2	10/17/2013	2/12/2018	0.50	0.5	U	0.5	U
LHAAP-37	35BSW02	1,1,1-Trichloroethane	2	10/17/2013	2/12/2018	0.50	0.5	U	0.5	U
LHAAP-37	35BSW02	1,1,2-Trichloroethane	2	10/17/2013	2/12/2018	0.50	0.5	U	0.5	U
LHAAP-37	35BSW02	1,1-Dichloroethene	2	10/17/2013	2/12/2018	0.75	0.5	U	1	U
LHAAP-37	35BSW02	1,2-Dichloroethane	2	10/17/2013	2/12/2018	0.50	0.5	U	0.5	U
LHAAP-37	35BSW02	Carbon tetrachloride	2	10/17/2013	2/12/2018	0.50	0.5	U	0.5	U
LHAAP-37	35BSW02	Chloroform	2	10/17/2013	2/12/2018	0.38	0.25	U	0.5	U
LHAAP-37	35BSW02	cis-1,2-Dichloroethene	2	10/17/2013	2/12/2018	0.50	0.5	U	0.5	U
LHAAP-37	35BSW02	Methylene chloride	2	10/17/2013	2/12/2018	0.75	0.5	U	1	U
LHAAP-37	35BSW02	Tetrachloroethene	2	10/17/2013	2/12/2018	0.50	0.5	U	0.5	U
LHAAP-37	35BSW02	thallium, total	1	3/27/2018	3/27/2018	1.00	1	U	1	U
LHAAP-37	35BSW02	Trichloroethene	2	10/17/2013	2/12/2018	0.50	0.5	U	0.5	U
LHAAP-37	35BSW02	Vinyl chloride	2	10/17/2013	2/12/2018	0.50	0.5	U	0.5	U
LHAAP-37	35BWW01	1,1,1-Trichloroethane	7	11/8/1998	2/14/2018	2.57	0.5	U	5	U
LHAAP-37	35BWW01	1,1,2-Trichloroethane	7	11/8/1998	2/14/2018	2.57	0.5	U	5	U
LHAAP-37	35BWW01	1,1-Dichloroethene	7	11/8/1998	2/14/2018	2.64	0.5	U	5	U
LHAAP-37	35BWW01	1,2-Dichloroethane	7	11/8/1998	2/14/2018	2.57	0.5	U	5	U
LHAAP-37	35BWW01	1,4-Dioxane	2	11/8/1998	9/10/2004	150.00	100	U	200	U
LHAAP-37	35BWW01	Carbon tetrachloride	7	11/8/1998	2/14/2018	2.57	0.5	U	5	U
LHAAP-37	35BWW01	Chloroform	7	11/8/1998	2/14/2018	2.54	0.25	U	5	U
LHAAP-37	35BWW01	cis-1,2-Dichloroethene	7	11/8/1998	2/14/2018	4.00	0.5	U	10	U
LHAAP-37	35BWW01	magnesium, total	1	11/8/1998	11/8/1998	5000.00	5000	U	5000	U
LHAAP-37	35BWW01	manganese, total	1	11/8/1998	11/8/1998	72.00	72		72	
LHAAP-37	35BWW01	Methylene chloride	7	11/8/1998	2/14/2018	2.79	0.5	U	5	U
LHAAP-37	35BWW01	nickel, total	1	11/8/1998	11/8/1998	40.00	40	U	40	U
LHAAP-37	35BWW01	strontium, total	1	11/8/1998	11/8/1998	50.00	50	U	50	U
LHAAP-37	35BWW01	Tetrachloroethene	7	11/8/1998	2/14/2018	2.57	0.5	U	5	U
LHAAP-37	35BWW01	thallium, total	2	11/8/1998	3/29/2018	1.40	1	U	1.8	J
LHAAP-37	35BWW01	Trichloroethene	7	11/8/1998	2/14/2018	2.57	0.5	U	5	U
LHAAP-37	35BWW01	Vinyl chloride	7	11/8/1998	2/14/2018	4.00	0.5	U	10	U
LHAAP-37	35BWW04	1,1,1-Trichloroethane	4	12/16/2006	2/14/2018	1.75	0.5	U	5	U
LHAAP-37	35BWW04	1,1,2-Trichloroethane	4	12/16/2006	2/14/2018	1.75	0.5	U	5	U
LHAAP-37	35BWW04	1,1-Dichloroethene	5	12/16/2006	2/14/2018	1.63	0.5	U	3.34	J
LHAAP-37	35BWW04	1,2-Dichloroethane	5	12/16/2006	2/14/2018	0.53	0.294	J	1	U
LHAAP-37	35BWW04	1,4-Dioxane	2	5/4/2013	12/21/2015	1.18	0.984	J	1.38	J
LHAAP-37	35BWW04	Carbon tetrachloride	5	12/16/2006	2/14/2018	1.50	0.5	U	5	U
LHAAP-37	35BWW04	Chloroform	5	12/16/2006	2/14/2018	0.46	0.178	J	1	U
LHAAP-37	35BWW04	cis-1,2-Dichloroethene	5	12/16/2006	2/14/2018	0.70	0.5	U	1	U
LHAAP-37	35BWW04	manganese, total	2	12/21/2015	2/17/2016	6.03	5.94		6.12	
LHAAP-37	35BWW04	Methylene chloride	5	12/16/2006	2/14/2018	1.80	0.5	U	5	U
LHAAP-37	35BWW04	Tetrachloroethene	5	12/16/2006	2/14/2018	24.00	6.1		66.5	
LHAAP-37	35BWW04	thallium, total	1	2/14/2018	2/14/2018	1.00	1	U	1	U
LHAAP-37	35BWW04	Trichloroethene	5	12/16/2006	2/14/2018	5.06	0.786	J	11.4	
LHAAP-37	35BWW04	Vinyl chloride	5	12/16/2006	2/14/2018	2.50	0.5	U	10	U
LHAAP-37	35BWW05	1,1,1-Trichloroethane	5	12/14/2006	2/16/2018	1.50	0.5	U	5	U
LHAAP-37	35BWW05	1,1,2-Trichloroethane	5	12/14/2006	2/16/2018	1.50	0.5	U	5	U
LHAAP-37	35BWW05	1,1-Dichloroethene	5	12/14/2006	2/16/2018	1.70	0.5	U	5	U
LHAAP-37	35BWW05	1,2-Dichloroethane	5	12/14/2006	2/16/2018	1.50	0.5	U	5	U
LHAAP-37	35BWW05	1,4-Dioxane	2	5/4/2013	12/21/2015	4.22	1	U	7.44	
LHAAP-37	35BWW05	Carbon tetrachloride	5	12/14/2006	2/16/2018	1.50	0.5	U	5	U
LHAAP-37	35BWW05	Chloroform	5	12/14/2006	2/16/2018	1.40	0.25	U	5	U
LHAAP-37	35BWW05	cis-1,2-Dichloroethene	5	12/14/2006	2/16/2018	2.46	0.295	J	10	U
LHAAP-37	35BWW05	Methylene chloride	5	12/14/2006	2/16/2018	1.80	0.5	U	5	U
LHAAP-37	35BWW05	Tetrachloroethene	5	12/14/2006	2/16/2018	1.62	1	J	2.8	
LHAAP-37	35BWW05	thallium, total	1	3/27/2018	3/27/2018	1.00	1	U	1	U
LHAAP-37	35BWW05	Trichloroethene	5	12/14/2006	2/16/2018	10.55	7		14	
LHAAP-37	35BWW05	Vinyl chloride	5	12/14/2006	2/16/2018	2.50	0.5	U	10	U
LHAAP-37	35BWW06	1,1,1-Trichloroethane	5	12/14/2006	2/16/2018	1.50	0.5	U	5	U
LHAAP-37	35BWW06	1,1,2-Trichloroethane	5	12/14/2006	2/16/2018	1.50	0.5	U	5	U
LHAAP-37	35BWW06	1,1-Dichloroethene	5	12/14/2006	2/16/2018	1.70	0.5	U	5	U
LHAAP-37	35BWW06	1,2-Dichloroethane	5	12/14/2006	2/16/2018	1.50	0.5	U	5	U

Summary of COC Concentrations for LHAAP Wells and Miscellaneous Sampling Locations

Area	Location	Constituent	Count	Earliest	Latest	Avg (µg/L)	Min (µg/L)	Code	Max (µg/L)	Code
LHAAP-37	35BWW06	Carbon tetrachloride	5	12/14/2006	2/16/2018	1.50	0.5	U	5	U
LHAAP-37	35BWW06	Chloroform	5	12/14/2006	2/16/2018	1.40	0.25	U	5	U
LHAAP-37	35BWW06	cis-1,2-Dichloroethene	5	12/14/2006	2/16/2018	2.50	0.5	U	10	U
LHAAP-37	35BWW06	manganese, total	3	10/19/2015	2/16/2016	152.33	134		176	
LHAAP-37	35BWW06	Methylene chloride	5	12/14/2006	2/16/2018	1.80	0.5	U	5	U
LHAAP-37	35BWW06	Tetrachloroethene	5	12/14/2006	2/16/2018	1.50	0.5	U	5	U
LHAAP-37	35BWW06	thallium, total	1	3/27/2018	3/27/2018	1.00	1	U	1	U
LHAAP-37	35BWW06	Trichloroethene	5	12/14/2006	2/16/2018	1.50	0.5	U	5	U
LHAAP-37	35BWW06	Vinyl chloride	5	12/14/2006	2/16/2018	2.50	0.5	U	10	U
LHAAP-37	35BWW07	1,1,1-Trichloroethane	5	9/14/2007	2/13/2018	0.70	0.5	U	1	
LHAAP-37	35BWW07	1,1,2-Trichloroethane	5	9/14/2007	2/13/2018	0.70	0.5	U	1	
LHAAP-37	35BWW07	1,1-Dichloroethene	5	9/14/2007	2/13/2018	0.90	0.5	U	1	
LHAAP-37	35BWW07	1,2-Dichloroethane	5	9/14/2007	2/13/2018	0.70	0.5	U	1	
LHAAP-37	35BWW07	Carbon tetrachloride	5	9/14/2007	2/13/2018	0.70	0.5	U	1	
LHAAP-37	35BWW07	Chloroform	5	9/14/2007	2/13/2018	0.60	0.25	U	1	
LHAAP-37	35BWW07	cis-1,2-Dichloroethene	5	9/14/2007	2/13/2018	0.70	0.5	U	1	
LHAAP-37	35BWW07	manganese, total	3	10/20/2015	2/17/2016	51.50	23.2		67.2	
LHAAP-37	35BWW07	Methylene chloride	5	9/14/2007	2/13/2018	1.20	0.5	U	2	
LHAAP-37	35BWW07	Tetrachloroethene	5	9/14/2007	2/13/2018	0.70	0.5	U	1	
LHAAP-37	35BWW07	thallium, total	1	3/29/2018	3/29/2018	1.00	1	U	1	U
LHAAP-37	35BWW07	Trichloroethene	5	9/14/2007	2/13/2018	0.70	0.5	U	1	
LHAAP-37	35BWW07	Vinyl chloride	5	9/14/2007	2/13/2018	0.70	0.5	U	1	
LHAAP-37	35BWW08	1,1,1-Trichloroethane	5	9/14/2007	2/14/2018	0.70	0.5	U	1	
LHAAP-37	35BWW08	1,1,2-Trichloroethane	5	9/14/2007	2/14/2018	0.70	0.5	U	1	
LHAAP-37	35BWW08	1,1-Dichloroethene	5	9/14/2007	2/14/2018	0.90	0.5	U	1	
LHAAP-37	35BWW08	1,2-Dichloroethane	5	9/14/2007	2/14/2018	0.70	0.5	U	1	
LHAAP-37	35BWW08	1,4-Dioxane	2	5/4/2013	12/21/2015	1.40	1	U	1.79	J
LHAAP-37	35BWW08	Carbon tetrachloride	5	9/14/2007	2/14/2018	0.70	0.5	U	1	
LHAAP-37	35BWW08	Chloroform	5	9/14/2007	2/14/2018	0.60	0.25	U	1	
LHAAP-37	35BWW08	cis-1,2-Dichloroethene	5	9/14/2007	2/14/2018	0.58	0.388	J	1	U
LHAAP-37	35BWW08	manganese, total	3	10/20/2015	2/16/2016	4.29	2.77	J	7.18	
LHAAP-37	35BWW08	Methylene chloride	5	9/14/2007	2/14/2018	1.20	0.5	U	2	
LHAAP-37	35BWW08	Tetrachloroethene	5	9/14/2007	2/14/2018	0.69	0.5	U	1	U
LHAAP-37	35BWW08	thallium, total	1	2/14/2018	2/14/2018	1.00	1	U	1	U
LHAAP-37	35BWW08	Trichloroethene	5	9/14/2007	2/14/2018	39.44	0.5	U	151	
LHAAP-37	35BWW08	Vinyl chloride	5	9/14/2007	2/14/2018	0.70	0.5	U	1	
LHAAP-37	35BWW09	1,1,1-Trichloroethane	4	10/8/2013	2/13/2018	0.63	0.5	U	1	U
LHAAP-37	35BWW09	1,1,2-Trichloroethane	4	10/8/2013	2/13/2018	0.63	0.5	U	1	U
LHAAP-37	35BWW09	1,1-Dichloroethene	4	10/8/2013	2/13/2018	0.84	0.5	U	1	U
LHAAP-37	35BWW09	1,2-Dichloroethane	4	10/8/2013	2/13/2018	0.63	0.5	U	1	U
LHAAP-37	35BWW09	Carbon tetrachloride	4	10/8/2013	2/13/2018	0.63	0.5	U	1	U
LHAAP-37	35BWW09	Chloroform	4	10/8/2013	2/13/2018	0.50	0.25	U	1	U
LHAAP-37	35BWW09	cis-1,2-Dichloroethene	4	10/8/2013	2/13/2018	0.87	0.5	U	1.7	
LHAAP-37	35BWW09	manganese, total	3	10/19/2015	2/17/2016	85.53	54.8		146	
LHAAP-37	35BWW09	Methylene chloride	4	10/8/2013	2/13/2018	1.00	0.5	U	2	U
LHAAP-37	35BWW09	Tetrachloroethene	4	10/8/2013	2/13/2018	0.63	0.5	U	1	U
LHAAP-37	35BWW09	thallium, total	1	3/20/2018	3/20/2018	1.00	1	U	1	U
LHAAP-37	35BWW09	Trichloroethene	4	10/8/2013	2/13/2018	139.50	49		180	
LHAAP-37	35BWW09	Vinyl chloride	4	10/8/2013	2/13/2018	0.63	0.5	U	1	U
LHAAP-37	35BWW10	1,1,1-Trichloroethane	4	10/4/2013	2/16/2018	0.63	0.5	U	1	U
LHAAP-37	35BWW10	1,1,2-Trichloroethane	4	10/4/2013	2/16/2018	0.63	0.5	U	1	U
LHAAP-37	35BWW10	1,1-Dichloroethene	4	10/4/2013	2/16/2018	0.88	0.5	U	1	U
LHAAP-37	35BWW10	1,2-Dichloroethane	4	10/4/2013	2/16/2018	0.63	0.5	U	1	U
LHAAP-37	35BWW10	Carbon tetrachloride	4	10/4/2013	2/16/2018	0.63	0.5	U	1	U
LHAAP-37	35BWW10	Chloroform	4	10/4/2013	2/16/2018	0.50	0.25	U	1	U
LHAAP-37	35BWW10	cis-1,2-Dichloroethene	4	10/4/2013	2/16/2018	0.63	0.5	U	1	U
LHAAP-37	35BWW10	Methylene chloride	4	10/4/2013	2/16/2018	1.00	0.5	U	2	U
LHAAP-37	35BWW10	Tetrachloroethene	4	10/4/2013	2/16/2018	21.36	4.45		31	
LHAAP-37	35BWW10	thallium, total	1	3/27/2018	3/27/2018	1.00	1	U	1	U
LHAAP-37	35BWW10	Trichloroethene	4	10/4/2013	2/16/2018	38.05	23.9		56.3	
LHAAP-37	35BWW10	Vinyl chloride	4	10/4/2013	2/16/2018	0.63	0.5	U	1	U
LHAAP-37	35BWW11	1,1,1-Trichloroethane	4	10/8/2013	2/12/2018	0.63	0.5	U	1	U
LHAAP-37	35BWW11	1,1,2-Trichloroethane	4	10/8/2013	2/12/2018	0.63	0.5	U	1	U
LHAAP-37	35BWW11	1,1-Dichloroethene	4	10/8/2013	2/12/2018	0.88	0.5	U	1	U
LHAAP-37	35BWW11	1,2-Dichloroethane	4	10/8/2013	2/12/2018	0.63	0.5	U	1	U
LHAAP-37	35BWW11	Carbon tetrachloride	4	10/8/2013	2/12/2018	0.63	0.5	U	1	U
LHAAP-37	35BWW11	Chloroform	4	10/8/2013	2/12/2018	0.50	0.25	U	1	U
LHAAP-37	35BWW11	cis-1,2-Dichloroethene	4	10/8/2013	2/12/2018	0.63	0.5	U	1	U
LHAAP-37	35BWW11	manganese, total	3	10/19/2015	2/16/2016	87.40	14.8		226	J
LHAAP-37	35BWW11	Methylene chloride	4	10/8/2013	2/12/2018	1.00	0.5	U	2	U
LHAAP-37	35BWW11	Tetrachloroethene	4	10/8/2013	2/12/2018	0.64	0.252	J	1	U
LHAAP-37	35BWW11	thallium, total	1	3/27/2018	3/27/2018	1.00	1	U	1	U
LHAAP-37	35BWW11	Trichloroethene	4	10/8/2013	2/12/2018	0.63	0.5	U	1	U
LHAAP-37	35BWW11	Vinyl chloride	4	10/8/2013	2/12/2018	0.63	0.5	U	1	U
LHAAP-37	35BWW12	1,1,1-Trichloroethane	4	10/3/2013	2/14/2018	0.63	0.5	U	1	U
LHAAP-37	35BWW12	1,1,2-Trichloroethane	4	10/3/2013	2/14/2018	0.63	0.5	U	1	U
LHAAP-37	35BWW12	1,1-Dichloroethene	4	10/3/2013	2/14/2018	0.88	0.5	U	1	U
LHAAP-37	35BWW12	1,2-Dichloroethane	4	10/3/2013	2/14/2018	0.63	0.5	U	1	U
LHAAP-37	35BWW12	Carbon tetrachloride	4	10/3/2013	2/14/2018	0.63	0.5	U	1	U
LHAAP-37	35BWW12	Chloroform	4	10/3/2013	2/14/2018	0.50	0.25	U	1	U
LHAAP-37	35BWW12	cis-1,2-Dichloroethene	4	10/3/2013	2/14/2018	0.63	0.5	U	1	U
LHAAP-37	35BWW12	Methylene chloride	4	10/3/2013	2/14/2018	1.00	0.5	U	2	U
LHAAP-37	35BWW12	Tetrachloroethene	4	10/3/2013	2/14/2018	7.82	4.06		15.3	
LHAAP-37	35BWW12	thallium, total	1	2/14/2018	2/14/2018	1.00	1	U	1	U
LHAAP-37	35BWW12	Trichloroethene	4	10/3/2013	2/14/2018	0.91	0.473	J	2.04	
LHAAP-37	35BWW12	Vinyl chloride	4	10/3/2013	2/14/2018	0.63	0.5	U	1	U
LHAAP-37	35BWW13	1,1,1-Trichloroethane	4	10/7/2013	2/13/2018	0.63	0.5	U	1	U

Summary of COC Concentrations for LHAAP Wells and Miscellaneous Sampling Locations

Area	Location	Constituent	Count	Earliest	Latest	Avg (µg/L)	Min (µg/L)	Code	Max (µg/L)	Code
LHAAP-37	35BWW13	1,1,2-Trichloroethane	4	10/7/2013	2/13/2018	0.63	0.5	U	1	U
LHAAP-37	35BWW13	1,1-Dichloroethene	4	10/7/2013	2/13/2018	0.88	0.5	U	1	U
LHAAP-37	35BWW13	1,2-Dichloroethane	4	10/7/2013	2/13/2018	0.63	0.5	U	1	U
LHAAP-37	35BWW13	Carbon tetrachloride	4	10/7/2013	2/13/2018	0.63	0.5	U	1	U
LHAAP-37	35BWW13	Chloroform	4	10/7/2013	2/13/2018	0.50	0.25	U	1	U
LHAAP-37	35BWW13	cis-1,2-Dichloroethene	4	10/7/2013	2/13/2018	0.63	0.5	U	1	U
LHAAP-37	35BWW13	Methylene chloride	4	10/7/2013	2/13/2018	1.00	0.5	U	2	U
LHAAP-37	35BWW13	Tetrachloroethene	4	10/7/2013	2/13/2018	1.88	0.5	U	4.14	
LHAAP-37	35BWW13	thallium, total	1	3/28/2018	3/28/2018	1.00	1	U	1	U
LHAAP-37	35BWW13	Trichloroethene	4	10/7/2013	2/13/2018	0.96	0.5	U	1.84	
LHAAP-37	35BWW13	Vinyl chloride	4	10/7/2013	2/13/2018	0.63	0.5	U	1	U
LHAAP-37	35BWW14	1,1,1-Trichloroethane	4	10/9/2013	2/15/2018	0.63	0.5	U	1	U
LHAAP-37	35BWW14	1,1,2-Trichloroethane	4	10/9/2013	2/15/2018	0.63	0.5	U	1	U
LHAAP-37	35BWW14	1,1-Dichloroethene	4	10/9/2013	2/15/2018	19.03	0.5	U	57.2	
LHAAP-37	35BWW14	1,2-Dichloroethane	4	10/9/2013	2/15/2018	0.61	0.429	J	1	U
LHAAP-37	35BWW14	Carbon tetrachloride	4	10/9/2013	2/15/2018	0.63	0.5	U	1	U
LHAAP-37	35BWW14	Chloroform	4	10/9/2013	2/15/2018	0.45	0.129	J	1	U
LHAAP-37	35BWW14	cis-1,2-Dichloroethene	4	10/9/2013	2/15/2018	5.31	1.1		14.3	
LHAAP-37	35BWW14	manganese, total	3	10/20/2015	2/16/2016	25.40	21.1		27.6	
LHAAP-37	35BWW14	Methylene chloride	4	10/9/2013	2/15/2018	1.00	0.5	U	2	U
LHAAP-37	35BWW14	Tetrachloroethene	4	10/9/2013	2/15/2018	34.03	19		53	
LHAAP-37	35BWW14	thallium, total	1	2/15/2018	2/15/2018	1.00	1	U	1	U
LHAAP-37	35BWW14	Trichloroethene	4	10/9/2013	2/15/2018	41.63	20		82.8	
LHAAP-37	35BWW14	Vinyl chloride	4	10/9/2013	2/15/2018	1.72	0.301	J	5.09	
LHAAP-37	35BWW15	1,1,1-Trichloroethane	4	1/14/2014	2/13/2018	0.63	0.5	U	1	U
LHAAP-37	35BWW15	1,1,2-Trichloroethane	4	1/14/2014	2/13/2018	0.63	0.5	U	1	U
LHAAP-37	35BWW15	1,1-Dichloroethene	4	1/14/2014	2/13/2018	12.13	2.2		35.5	
LHAAP-37	35BWW15	1,2-Dichloroethane	4	1/14/2014	2/13/2018	0.63	0.5	U	1	U
LHAAP-37	35BWW15	Carbon tetrachloride	4	1/14/2014	2/13/2018	0.63	0.5	U	1	U
LHAAP-37	35BWW15	Chloroform	4	1/14/2014	2/13/2018	0.49	0.213	J	1	U
LHAAP-37	35BWW15	cis-1,2-Dichloroethene	4	1/14/2014	2/13/2018	2.40	0.5	U	6.25	
LHAAP-37	35BWW15	Methylene chloride	4	1/14/2014	2/13/2018	1.00	0.5	U	2	U
LHAAP-37	35BWW15	Tetrachloroethene	4	1/14/2014	2/13/2018	11.80	8.69		14.5	
LHAAP-37	35BWW15	thallium, total	1	3/29/2018	3/29/2018	1.00	1	U	1	U
LHAAP-37	35BWW15	Trichloroethene	4	1/14/2014	2/13/2018	23.25	14		43.5	
LHAAP-37	35BWW15	Vinyl chloride	4	1/14/2014	2/13/2018	1.36	0.5	U	3.42	
LHAAP-37	35BWW16	1,1,1-Trichloroethane	4	10/7/2013	2/13/2018	0.63	0.5	U	1	U
LHAAP-37	35BWW16	1,1,2-Trichloroethane	4	10/7/2013	2/13/2018	0.63	0.5	U	1	U
LHAAP-37	35BWW16	1,1-Dichloroethene	4	10/7/2013	2/13/2018	0.81	0.5	U	1.1	
LHAAP-37	35BWW16	1,2-Dichloroethane	4	10/7/2013	2/13/2018	0.63	0.5	U	1	U
LHAAP-37	35BWW16	1,4-Dioxane	1	12/21/2015	12/21/2015	0.84	0.843	J	0.843	J
LHAAP-37	35BWW16	Carbon tetrachloride	4	10/7/2013	2/13/2018	0.63	0.5	U	1	U
LHAAP-37	35BWW16	Chloroform	4	10/7/2013	2/13/2018	0.50	0.25	U	1	U
LHAAP-37	35BWW16	cis-1,2-Dichloroethene	4	10/7/2013	2/13/2018	0.63	0.5	U	1	U
LHAAP-37	35BWW16	Methylene chloride	4	10/7/2013	2/13/2018	1.00	0.5	U	2	U
LHAAP-37	35BWW16	Tetrachloroethene	4	10/7/2013	2/13/2018	6.69	0.447	J	12	
LHAAP-37	35BWW16	thallium, total	1	3/29/2018	3/29/2018	1.00	1	U	1	U
LHAAP-37	35BWW16	Trichloroethene	4	10/7/2013	2/13/2018	4.00	2.57		5.8	
LHAAP-37	35BWW16	Vinyl chloride	4	10/7/2013	2/13/2018	0.63	0.5	U	1	U
LHAAP-37	35BWW17	1,1,1-Trichloroethane	4	2/4/2014	2/13/2018	0.63	0.5	U	1	U
LHAAP-37	35BWW17	1,1,2-Trichloroethane	4	2/4/2014	2/13/2018	0.63	0.5	U	1	U
LHAAP-37	35BWW17	1,1-Dichloroethene	4	2/4/2014	2/13/2018	0.88	0.5	U	1	U
LHAAP-37	35BWW17	1,2-Dichloroethane	4	2/4/2014	2/13/2018	0.63	0.5	U	1	U
LHAAP-37	35BWW17	Carbon tetrachloride	4	2/4/2014	2/13/2018	0.63	0.5	U	1	U
LHAAP-37	35BWW17	Chloroform	4	2/4/2014	2/13/2018	0.50	0.25	U	1	U
LHAAP-37	35BWW17	cis-1,2-Dichloroethene	4	2/4/2014	2/13/2018	0.63	0.5	U	1	U
LHAAP-37	35BWW17	Methylene chloride	4	2/4/2014	2/13/2018	1.00	0.5	U	2	U
LHAAP-37	35BWW17	Tetrachloroethene	4	2/4/2014	2/13/2018	2.78	0.5	U	7.5	
LHAAP-37	35BWW17	thallium, total	1	3/29/2018	3/29/2018	1.00	1	U	1	U
LHAAP-37	35BWW17	Trichloroethene	4	2/4/2014	2/13/2018	1.25	0.5	U	2.9	
LHAAP-37	35BWW17	Vinyl chloride	3	2/4/2014	2/13/2018	0.50	0.5	U	0.5	U
LHAAP-37	35BWW18	1,1,1-Trichloroethane	4	10/2/2013	2/13/2018	0.63	0.5	U	1	U
LHAAP-37	35BWW18	1,1,2-Trichloroethane	4	10/2/2013	2/13/2018	0.63	0.5	U	1	U
LHAAP-37	35BWW18	1,1-Dichloroethene	4	10/2/2013	2/13/2018	0.88	0.5	U	1	U
LHAAP-37	35BWW18	1,2-Dichloroethane	4	10/2/2013	2/13/2018	0.63	0.5	U	1	U
LHAAP-37	35BWW18	Carbon tetrachloride	4	10/2/2013	2/13/2018	0.63	0.5	U	1	U
LHAAP-37	35BWW18	Chloroform	4	10/2/2013	2/13/2018	0.50	0.25	U	1	U
LHAAP-37	35BWW18	cis-1,2-Dichloroethene	4	10/2/2013	2/13/2018	0.63	0.5	U	1	U
LHAAP-37	35BWW18	Methylene chloride	4	10/2/2013	2/13/2018	1.00	0.5	U	2	U
LHAAP-37	35BWW18	Tetrachloroethene	4	10/2/2013	2/13/2018	0.63	0.5	U	1	U
LHAAP-37	35BWW18	thallium, total	1	3/27/2018	3/27/2018	1.00	1	U	1	U
LHAAP-37	35BWW18	Trichloroethene	4	10/2/2013	2/13/2018	0.63	0.5	U	1	U
LHAAP-37	35BWW18	Vinyl chloride	4	10/2/2013	2/13/2018	0.63	0.5	U	1	U
LHAAP-37	35BWW19	1,1,1-Trichloroethane	4	10/7/2013	2/13/2018	0.63	0.5	U	1	U
LHAAP-37	35BWW19	1,1,2-Trichloroethane	4	10/7/2013	2/13/2018	0.63	0.5	U	1	U
LHAAP-37	35BWW19	1,1-Dichloroethene	4	10/7/2013	2/13/2018	0.88	0.5	U	1	U
LHAAP-37	35BWW19	1,2-Dichloroethane	4	10/7/2013	2/13/2018	0.63	0.5	U	1	U
LHAAP-37	35BWW19	Carbon tetrachloride	4	10/7/2013	2/13/2018	0.63	0.5	U	1	U
LHAAP-37	35BWW19	Chloroform	4	10/7/2013	2/13/2018	0.50	0.25	U	1	U
LHAAP-37	35BWW19	cis-1,2-Dichloroethene	4	10/7/2013	2/13/2018	0.63	0.5	U	1	U
LHAAP-37	35BWW19	Methylene chloride	4	10/7/2013	2/13/2018	1.00	0.5	U	2	U
LHAAP-37	35BWW19	Tetrachloroethene	4	10/7/2013	2/13/2018	0.63	0.5	U	1	U
LHAAP-37	35BWW19	thallium, total	1	3/27/2018	3/27/2018	1.00	1	U	1	U
LHAAP-37	35BWW19	Trichloroethene	4	10/7/2013	2/13/2018	0.63	0.5	U	1	U
LHAAP-37	35BWW19	Vinyl chloride	4	10/7/2013	2/13/2018	0.63	0.5	U	1	U
LHAAP-37	35BWW20	1,1,1-Trichloroethane	4	10/4/2013	2/12/2018	0.63	0.5	U	1	U
LHAAP-37	35BWW20	1,1,2-Trichloroethane	4	10/4/2013	2/12/2018	0.63	0.5	U	1	U

Summary of COC Concentrations for LHAAP Wells and Miscellaneous Sampling Locations

Area	Location	Constituent	Count	Earliest	Latest	Avg (µg/L)	Min (µg/L)	Code	Max (µg/L)	Code
LHAAP-37	35BWW20	1,1-Dichloroethene	4	10/4/2013	2/12/2018	0.88	0.5	U	1	U
LHAAP-37	35BWW20	1,2-Dichloroethane	4	10/4/2013	2/12/2018	0.63	0.5	U	1	U
LHAAP-37	35BWW20	Carbon tetrachloride	4	10/4/2013	2/12/2018	0.63	0.5	U	1	U
LHAAP-37	35BWW20	Chloroform	4	10/4/2013	2/12/2018	0.50	0.25	U	1	U
LHAAP-37	35BWW20	cis-1,2-Dichloroethene	4	10/4/2013	2/12/2018	0.63	0.5	U	1	U
LHAAP-37	35BWW20	Methylene chloride	4	10/4/2013	2/12/2018	1.00	0.5	U	2	U
LHAAP-37	35BWW20	Tetrachloroethene	4	10/4/2013	2/12/2018	29.20	25		34	
LHAAP-37	35BWW20	thallium, total	1	3/27/2018	3/27/2018	1.00	1	U	1	U
LHAAP-37	35BWW20	Trichloroethene	4	10/4/2013	2/12/2018	6.05	4.7		7.04	
LHAAP-37	35BWW20	Vinyl chloride	4	10/4/2013	2/12/2018	0.63	0.5	U	1	U
LHAAP-37	35BWW23	1,1,1-Trichloroethane	4	7/1/2014	2/15/2018	0.63	0.5	U	1	U
LHAAP-37	35BWW23	1,1,2-Trichloroethane	4	7/1/2014	2/15/2018	0.63	0.5	U	1	U
LHAAP-37	35BWW23	1,1-Dichloroethene	4	7/1/2014	2/15/2018	0.88	0.5	U	1	U
LHAAP-37	35BWW23	1,2-Dichloroethane	4	7/1/2014	2/15/2018	0.63	0.5	U	1	U
LHAAP-37	35BWW23	Carbon tetrachloride	4	7/1/2014	2/15/2018	0.63	0.5	U	1	U
LHAAP-37	35BWW23	Chloroform	4	7/1/2014	2/15/2018	0.50	0.25	U	1	U
LHAAP-37	35BWW23	cis-1,2-Dichloroethene	4	7/1/2014	2/15/2018	0.63	0.5	U	1	U
LHAAP-37	35BWW23	Methylene chloride	4	7/1/2014	2/15/2018	1.00	0.5	U	2	U
LHAAP-37	35BWW23	Tetrachloroethene	4	7/1/2014	2/15/2018	0.63	0.5	U	1	U
LHAAP-37	35BWW23	thallium, total	1	2/15/2018	2/15/2018	1.00	1	U	1	U
LHAAP-37	35BWW23	Trichloroethene	4	7/1/2014	2/15/2018	0.63	0.5	U	1	U
LHAAP-37	35BWW23	Vinyl chloride	4	7/1/2014	2/15/2018	0.63	0.5	U	1	U
LHAAP-37	35BWW24	1,1,1-Trichloroethane	3	8/19/2016	2/16/2018	0.67	0.5	U	1	U
LHAAP-37	35BWW24	1,1,2-Trichloroethane	3	8/19/2016	2/16/2018	0.67	0.5	U	1	U
LHAAP-37	35BWW24	1,1-Dichloroethene	3	8/19/2016	2/16/2018	0.83	0.5	U	1	U
LHAAP-37	35BWW24	1,2-Dichloroethane	3	8/19/2016	2/16/2018	0.67	0.5	U	1	U
LHAAP-37	35BWW24	Carbon tetrachloride	3	8/19/2016	2/16/2018	0.67	0.5	U	1	U
LHAAP-37	35BWW24	Chloroform	3	8/19/2016	2/16/2018	0.58	0.25	U	1	U
LHAAP-37	35BWW24	cis-1,2-Dichloroethene	3	8/19/2016	2/16/2018	0.67	0.5	U	1	U
LHAAP-37	35BWW24	Methylene chloride	3	8/19/2016	2/16/2018	1.17	0.5	U	2	U
LHAAP-37	35BWW24	Tetrachloroethene	3	8/19/2016	2/16/2018	0.67	0.5	U	1	U
LHAAP-37	35BWW24	thallium, total	1	3/28/2018	3/28/2018	1.00	1	U	1	U
LHAAP-37	35BWW24	Trichloroethene	3	8/19/2016	2/16/2018	0.64	0.415	J	1	U
LHAAP-37	35BWW24	Vinyl chloride	3	8/19/2016	2/16/2018	0.67	0.5	U	1	U
LHAAP-37	35BWW25	1,1,1-Trichloroethane	3	8/19/2016	2/16/2018	0.67	0.5	U	1	U
LHAAP-37	35BWW25	1,1,2-Trichloroethane	3	8/19/2016	2/16/2018	0.67	0.5	U	1	U
LHAAP-37	35BWW25	1,1-Dichloroethene	3	8/19/2016	2/16/2018	0.83	0.5	U	1	U
LHAAP-37	35BWW25	1,2-Dichloroethane	3	8/19/2016	2/16/2018	0.67	0.5	U	1	U
LHAAP-37	35BWW25	Carbon tetrachloride	3	8/19/2016	2/16/2018	0.67	0.5	U	1	U
LHAAP-37	35BWW25	Chloroform	3	8/19/2016	2/16/2018	0.58	0.25	U	1	U
LHAAP-37	35BWW25	cis-1,2-Dichloroethene	3	8/19/2016	2/16/2018	0.67	0.5	U	1	U
LHAAP-37	35BWW25	Methylene chloride	3	8/19/2016	2/16/2018	1.17	0.5	U	2	U
LHAAP-37	35BWW25	Tetrachloroethene	3	8/19/2016	2/16/2018	0.67	0.5	U	1	U
LHAAP-37	35BWW25	thallium, total	1	3/28/2018	3/28/2018	1.00	1	U	1	U
LHAAP-37	35BWW25	Trichloroethene	3	8/19/2016	2/16/2018	8.05	5.55		11	
LHAAP-37	35BWW25	Vinyl chloride	3	8/19/2016	2/16/2018	0.67	0.5	U	1	U
LHAAP-37	35BWW26	1,1,1-Trichloroethane	3	8/17/2016	2/14/2018	0.67	0.5	U	1	U
LHAAP-37	35BWW26	1,1,2-Trichloroethane	3	8/17/2016	2/14/2018	0.67	0.5	U	1	U
LHAAP-37	35BWW26	1,1-Dichloroethene	3	8/17/2016	2/14/2018	0.83	0.5	U	1	U
LHAAP-37	35BWW26	1,2-Dichloroethane	3	8/17/2016	2/14/2018	0.67	0.5	U	1	U
LHAAP-37	35BWW26	Carbon tetrachloride	3	8/17/2016	2/14/2018	0.67	0.5	U	1	U
LHAAP-37	35BWW26	Chloroform	3	8/17/2016	2/14/2018	0.58	0.25	U	1	U
LHAAP-37	35BWW26	cis-1,2-Dichloroethene	3	8/17/2016	2/14/2018	0.67	0.5	U	1	U
LHAAP-37	35BWW26	Methylene chloride	3	8/17/2016	2/14/2018	1.17	0.5	U	2	U
LHAAP-37	35BWW26	Tetrachloroethene	3	8/17/2016	2/14/2018	0.67	0.5	U	1	U
LHAAP-37	35BWW26	thallium, total	1	2/14/2018	2/14/2018	1.00	1	U	1	U
LHAAP-37	35BWW26	Trichloroethene	3	8/17/2016	2/14/2018	0.67	0.5	U	1	U
LHAAP-37	35BWW26	Vinyl chloride	3	8/17/2016	2/14/2018	0.67	0.5	U	1	U
LHAAP-37	37DPT01	1,1,1-TRICHLOROETHANE	1	7/30/2013	7/30/2013	0.50	0.5	U	0.5	U
LHAAP-37	37DPT01	1,1,2-TRICHLOROETHANE	1	7/30/2013	7/30/2013	0.50	0.5	U	0.5	U
LHAAP-37	37DPT01	1,1-DICHLOROETHENE	1	7/30/2013	7/30/2013	11.80	11.8		11.8	
LHAAP-37	37DPT01	1,2-DICHLOROETHANE	1	7/30/2013	7/30/2013	0.50	0.5	U	0.5	U
LHAAP-37	37DPT01	Carbon tetrachloride	1	7/30/2013	7/30/2013	0.50	0.5	U	0.5	U
LHAAP-37	37DPT01	Chloroform	1	7/30/2013	7/30/2013	0.21	0.206	J	0.206	J
LHAAP-37	37DPT01	cis-1,2-Dichloroethene	1	7/30/2013	7/30/2013	3.30	3.3		3.3	
LHAAP-37	37DPT01	Methylene chloride	1	7/30/2013	7/30/2013	0.50	0.5	U	0.5	U
LHAAP-37	37DPT01	Tetrachloroethene	1	7/30/2013	7/30/2013	20.90	20.9		20.9	
LHAAP-37	37DPT01	Trichloroethene	1	7/30/2013	7/30/2013	41.30	41.3		41.3	
LHAAP-37	37DPT01	Vinyl chloride	1	7/30/2013	7/30/2013	0.87	0.866	J	0.866	J
LHAAP-37	37DPT02	1,1,1-TRICHLOROETHANE	1	7/29/2013	7/29/2013	0.50	0.5	U	0.5	U
LHAAP-37	37DPT02	1,1,2-TRICHLOROETHANE	1	7/29/2013	7/29/2013	0.50	0.5	U	0.5	U
LHAAP-37	37DPT02	1,1-DICHLOROETHENE	1	7/29/2013	7/29/2013	1.00	1	U	1	U
LHAAP-37	37DPT02	1,2-DICHLOROETHANE	1	7/29/2013	7/29/2013	0.50	0.5	U	0.5	U
LHAAP-37	37DPT02	Carbon tetrachloride	1	7/29/2013	7/29/2013	0.50	0.5	U	0.5	U
LHAAP-37	37DPT02	Chloroform	1	7/29/2013	7/29/2013	0.25	0.25	U	0.25	U
LHAAP-37	37DPT02	cis-1,2-Dichloroethene	1	7/29/2013	7/29/2013	0.50	0.5	U	0.5	U
LHAAP-37	37DPT02	Methylene chloride	1	7/29/2013	7/29/2013	0.50	0.5	U	0.5	U
LHAAP-37	37DPT02	Tetrachloroethene	1	7/29/2013	7/29/2013	0.55	0.549	J	0.549	J
LHAAP-37	37DPT02	Trichloroethene	1	7/29/2013	7/29/2013	1.17	1.17		1.17	
LHAAP-37	37DPT02	Vinyl chloride	1	7/29/2013	7/29/2013	0.50	0.5	U	0.5	U
LHAAP-37	37DPT03	1,1,1-Trichloroethane	2	7/30/2013	8/27/2013	0.90	0.5	U	1.3	
LHAAP-37	37DPT03	1,1,2-Trichloroethane	2	7/30/2013	8/27/2013	1.50	0.5	U	2.5	
LHAAP-37	37DPT03	1,1-Dichloroethene	2	7/30/2013	8/27/2013	1.15	1	U	1.3	
LHAAP-37	37DPT03	1,2-Dichloroethane	2	7/30/2013	8/27/2013	1.50	0.5	U	2.5	
LHAAP-37	37DPT03	Carbon tetrachloride	2	7/30/2013	8/27/2013	0.90	0.5	U	1.3	
LHAAP-37	37DPT03	Chloroform	2	7/30/2013	8/27/2013	0.78	0.25	U	1.3	
LHAAP-37	37DPT03	cis-1,2-Dichloroethene	2	7/30/2013	8/27/2013	0.90	0.5	U	1.3	

Summary of COC Concentrations for LHAAP Wells and Miscellaneous Sampling Locations

Area	Location	Constituent	Count	Earliest	Latest	Avg (µg/L)	Min (µg/L)	Code	Max (µg/L)	Code
LHAAP-37	37DPT03	Methylene chloride	2	7/30/2013	8/27/2013	7.25	0.5	U	14	
LHAAP-37	37DPT03	Tetrachloroethene	2	7/30/2013	8/27/2013	1.50	0.5	U	2.5	
LHAAP-37	37DPT03	Trichloroethene	2	7/30/2013	8/27/2013	0.90	0.5	U	1.3	
LHAAP-37	37DPT03	Vinyl chloride	2	7/30/2013	8/27/2013	0.90	0.5	U	1.3	
LHAAP-37	37DPT04	1,1,1-TRICHLOROETHANE	1	7/30/2013	7/30/2013	0.50	0.5	U	0.5	U
LHAAP-37	37DPT04	1,1,2-TRICHLOROETHANE	1	7/30/2013	7/30/2013	0.50	0.5	U	0.5	U
LHAAP-37	37DPT04	1,1-DICHLOROETHENE	1	7/30/2013	7/30/2013	1.00	1	U	1	U
LHAAP-37	37DPT04	1,2-DICHLOROETHANE	1	7/30/2013	7/30/2013	0.50	0.5	U	0.5	U
LHAAP-37	37DPT04	Carbon tetrachloride	1	7/30/2013	7/30/2013	0.50	0.5	U	0.5	U
LHAAP-37	37DPT04	Chloroform	1	7/30/2013	7/30/2013	0.25	0.25	U	0.25	U
LHAAP-37	37DPT04	cis-1,2-Dichloroethene	1	7/30/2013	7/30/2013	0.50	0.5	U	0.5	U
LHAAP-37	37DPT04	Methylene chloride	1	7/30/2013	7/30/2013	0.50	0.5	U	0.5	U
LHAAP-37	37DPT04	Tetrachloroethene	1	7/30/2013	7/30/2013	0.50	0.5	U	0.5	U
LHAAP-37	37DPT04	Trichloroethene	1	7/30/2013	7/30/2013	0.50	0.5	U	0.5	U
LHAAP-37	37DPT04	Vinyl chloride	1	7/30/2013	7/30/2013	0.50	0.5	U	0.5	U
LHAAP-37	37DPT05	1,1,1-TRICHLOROETHANE	1	7/31/2013	7/31/2013	0.50	0.5	U	0.5	U
LHAAP-37	37DPT05	1,1,2-TRICHLOROETHANE	1	7/31/2013	7/31/2013	0.50	0.5	U	0.5	U
LHAAP-37	37DPT05	1,1-DICHLOROETHENE	1	7/31/2013	7/31/2013	1.00	1	U	1	U
LHAAP-37	37DPT05	1,2-DICHLOROETHANE	1	7/31/2013	7/31/2013	0.50	0.5	U	0.5	U
LHAAP-37	37DPT05	Carbon tetrachloride	1	7/31/2013	7/31/2013	0.50	0.5	U	0.5	U
LHAAP-37	37DPT05	Chloroform	1	7/31/2013	7/31/2013	0.25	0.25	U	0.25	U
LHAAP-37	37DPT05	cis-1,2-Dichloroethene	1	7/31/2013	7/31/2013	0.50	0.5	U	0.5	U
LHAAP-37	37DPT05	Methylene chloride	1	7/31/2013	7/31/2013	0.50	0.5	U	0.5	U
LHAAP-37	37DPT05	Tetrachloroethene	1	7/31/2013	7/31/2013	0.50	0.5	U	0.5	U
LHAAP-37	37DPT05	Trichloroethene	1	7/31/2013	7/31/2013	0.50	0.5	U	0.5	U
LHAAP-37	37DPT05	Vinyl chloride	1	7/31/2013	7/31/2013	0.50	0.5	U	0.5	U
LHAAP-37	37DPT06	1,1,1-TRICHLOROETHANE	2	7/30/2013	8/26/2013	0.50	0.5	U	0.5	U
LHAAP-37	37DPT06	1,1,2-TRICHLOROETHANE	2	7/30/2013	8/26/2013	0.50	0.5	U	0.5	U
LHAAP-37	37DPT06	1,1-DICHLOROETHENE	2	7/30/2013	8/26/2013	1.00	1	U	1	U
LHAAP-37	37DPT06	1,2-DICHLOROETHANE	2	7/30/2013	8/26/2013	0.50	0.5	U	0.5	U
LHAAP-37	37DPT06	Carbon tetrachloride	2	7/30/2013	8/26/2013	0.50	0.5	U	0.5	U
LHAAP-37	37DPT06	Chloroform	2	7/30/2013	8/26/2013	0.25	0.25	U	0.25	U
LHAAP-37	37DPT06	cis-1,2-Dichloroethene	2	7/30/2013	8/26/2013	0.50	0.5	U	0.5	U
LHAAP-37	37DPT06	Methylene chloride	2	7/30/2013	8/26/2013	0.50	0.5	U	0.5	U
LHAAP-37	37DPT06	Tetrachloroethene	2	7/30/2013	8/26/2013	0.50	0.5	U	0.5	U
LHAAP-37	37DPT06	Trichloroethene	2	7/30/2013	8/26/2013	0.50	0.5	U	0.5	U
LHAAP-37	37DPT06	Vinyl chloride	2	7/30/2013	8/26/2013	0.50	0.5	U	0.5	U
LHAAP-37	37DPT07	1,1,1-TRICHLOROETHANE	1	7/31/2013	7/31/2013	0.50	0.5	U	0.5	U
LHAAP-37	37DPT07	1,1,2-TRICHLOROETHANE	1	7/31/2013	7/31/2013	0.50	0.5	U	0.5	U
LHAAP-37	37DPT07	1,1-DICHLOROETHENE	1	7/31/2013	7/31/2013	1.00	1	U	1	U
LHAAP-37	37DPT07	1,2-DICHLOROETHANE	1	7/31/2013	7/31/2013	0.50	0.5	U	0.5	U
LHAAP-37	37DPT07	Carbon tetrachloride	1	7/31/2013	7/31/2013	0.50	0.5	U	0.5	U
LHAAP-37	37DPT07	Chloroform	1	7/31/2013	7/31/2013	0.25	0.25	U	0.25	U
LHAAP-37	37DPT07	cis-1,2-Dichloroethene	1	7/31/2013	7/31/2013	0.50	0.5	U	0.5	U
LHAAP-37	37DPT07	Methylene chloride	1	7/31/2013	7/31/2013	0.50	0.5	U	0.5	U
LHAAP-37	37DPT07	Tetrachloroethene	1	7/31/2013	7/31/2013	37.60	37.6		37.6	
LHAAP-37	37DPT07	Trichloroethene	1	7/31/2013	7/31/2013	5.02	5.02		5.02	
LHAAP-37	37DPT07	Vinyl chloride	1	7/31/2013	7/31/2013	0.50	0.5	U	0.5	U
LHAAP-37	37DPT08	1,1,1-Trichloroethane	1	5/1/2014	5/1/2014	0.50	0.5	U	0.5	U
LHAAP-37	37DPT08	1,1,2-Trichloroethane	1	5/1/2014	5/1/2014	0.50	0.5	U	0.5	U
LHAAP-37	37DPT08	1,1-Dichloroethene	1	5/1/2014	5/1/2014	9.14	9.14		9.14	
LHAAP-37	37DPT08	1,2-Dichloroethane	1	5/1/2014	5/1/2014	0.50	0.5	U	0.5	U
LHAAP-37	37DPT08	Carbon tetrachloride	1	5/1/2014	5/1/2014	0.50	0.5	U	0.5	U
LHAAP-37	37DPT08	Chloroform	1	5/1/2014	5/1/2014	0.25	0.25	U	0.25	U
LHAAP-37	37DPT08	cis-1,2-Dichloroethene	1	5/1/2014	5/1/2014	1.77	1.77		1.77	
LHAAP-37	37DPT08	Methylene chloride	1	5/1/2014	5/1/2014	0.50	0.5	U	0.5	U
LHAAP-37	37DPT08	Tetrachloroethene	1	5/1/2014	5/1/2014	23.00	23		23	
LHAAP-37	37DPT08	Trichloroethene	1	5/1/2014	5/1/2014	45.30	45.3		45.3	
LHAAP-37	37DPT08	Vinyl chloride	1	5/1/2014	5/1/2014	0.91	0.907	J	0.907	J
LHAAP-37	37DPT09	1,1,1-Trichloroethane	1	5/2/2014	5/2/2014	0.50	0.5	U	0.5	U
LHAAP-37	37DPT09	1,1,2-Trichloroethane	1	5/2/2014	5/2/2014	0.50	0.5	U	0.5	U
LHAAP-37	37DPT09	1,1-Dichloroethene	1	5/2/2014	5/2/2014	1.00	1	U	1	U
LHAAP-37	37DPT09	1,2-Dichloroethane	1	5/2/2014	5/2/2014	0.50	0.5	U	0.5	U
LHAAP-37	37DPT09	Carbon tetrachloride	1	5/2/2014	5/2/2014	0.50	0.5	U	0.5	U
LHAAP-37	37DPT09	Chloroform	1	5/2/2014	5/2/2014	0.25	0.25	U	0.25	U
LHAAP-37	37DPT09	cis-1,2-Dichloroethene	1	5/2/2014	5/2/2014	0.50	0.5	U	0.5	U
LHAAP-37	37DPT09	Methylene chloride	1	5/2/2014	5/2/2014	0.50	0.5	U	0.5	U
LHAAP-37	37DPT09	Tetrachloroethene	1	5/2/2014	5/2/2014	2.41	2.41		2.41	
LHAAP-37	37DPT09	Trichloroethene	1	5/2/2014	5/2/2014	34.60	34.6		34.6	
LHAAP-37	37DPT09	Vinyl chloride	1	5/2/2014	5/2/2014	0.50	0.5	U	0.5	U
LHAAP-37	37DPT10	1,1,1-Trichloroethane	1	5/3/2014	5/3/2014	0.50	0.5	U	0.5	U
LHAAP-37	37DPT10	1,1,2-Trichloroethane	1	5/3/2014	5/3/2014	0.50	0.5	U	0.5	U
LHAAP-37	37DPT10	1,1-Dichloroethene	1	5/3/2014	5/3/2014	1.00	1	U	1	U
LHAAP-37	37DPT10	1,2-Dichloroethane	1	5/3/2014	5/3/2014	0.50	0.5	U	0.5	U
LHAAP-37	37DPT10	Carbon tetrachloride	1	5/3/2014	5/3/2014	0.50	0.5	U	0.5	U
LHAAP-37	37DPT10	Chloroform	1	5/3/2014	5/3/2014	0.25	0.25	U	0.25	U
LHAAP-37	37DPT10	cis-1,2-Dichloroethene	1	5/3/2014	5/3/2014	0.50	0.5	U	0.5	U
LHAAP-37	37DPT10	Methylene chloride	1	5/3/2014	5/3/2014	0.50	0.5	U	0.5	U
LHAAP-37	37DPT10	Tetrachloroethene	1	5/3/2014	5/3/2014	0.50	0.5	U	0.5	U
LHAAP-37	37DPT10	Trichloroethene	1	5/3/2014	5/3/2014	0.50	0.5	U	0.5	U
LHAAP-37	37DPT10	Vinyl chloride	1	5/3/2014	5/3/2014	0.50	0.5	U	0.5	U
LHAAP-37	37DPT11	1,1,1-Trichloroethane	1	5/21/2014	5/21/2014	0.50	0.5	U	0.5	U
LHAAP-37	37DPT11	1,1,2-Trichloroethane	1	5/21/2014	5/21/2014	0.50	0.5	U	0.5	U
LHAAP-37	37DPT11	1,1-Dichloroethene	1	5/21/2014	5/21/2014	1.00	1	U	1	U
LHAAP-37	37DPT11	1,2-Dichloroethane	1	5/21/2014	5/21/2014	0.50	0.5	U	0.5	U
LHAAP-37	37DPT11	Carbon tetrachloride	1	5/21/2014	5/21/2014	0.50	0.5	U	0.5	U
LHAAP-37	37DPT11	Chloroform	1	5/21/2014	5/21/2014	0.25	0.25	U	0.25	U

Summary of COC Concentrations for LHAAP Wells and Miscellaneous Sampling Locations

Area	Location	Constituent	Count	Earliest	Latest	Avg (µg/L)	Min (µg/L)	Code	Max (µg/L)	Code
LHAAP-37	37DPT11	cis-1,2-Dichloroethene	1	5/21/2014	5/21/2014	0.26	0.261	J	0.261	J
LHAAP-37	37DPT11	Methylene chloride	1	5/21/2014	5/21/2014	0.45	0.445	J	0.445	J
LHAAP-37	37DPT11	Tetrachloroethene	1	5/21/2014	5/21/2014	0.50	0.5	U	0.5	U
LHAAP-37	37DPT11	Trichloroethene	1	5/21/2014	5/21/2014	1.31	1.31		1.31	
LHAAP-37	37DPT11	Vinyl chloride	1	5/21/2014	5/21/2014	0.50	0.5	U	0.5	U
LHAAP-37	37DPT12	1,1,1-Trichloroethane	1	5/12/2014	5/12/2014	0.50	0.5	U	0.5	U
LHAAP-37	37DPT12	1,1,2-Trichloroethane	1	5/12/2014	5/12/2014	0.50	0.5	U	0.5	U
LHAAP-37	37DPT12	1,1-Dichloroethene	1	5/12/2014	5/12/2014	14.30	14.3		14.3	
LHAAP-37	37DPT12	1,2-Dichloroethane	1	5/12/2014	5/12/2014	0.50	0.5	U	0.5	U
LHAAP-37	37DPT12	Carbon tetrachloride	1	5/12/2014	5/12/2014	0.50	0.5	U	0.5	U
LHAAP-37	37DPT12	Chloroform	1	5/12/2014	5/12/2014	0.24	0.244	J	0.244	J
LHAAP-37	37DPT12	cis-1,2-Dichloroethene	1	5/12/2014	5/12/2014	4.03	4.03		4.03	
LHAAP-37	37DPT12	Methylene chloride	1	5/12/2014	5/12/2014	0.50	0.5	U	0.5	U
LHAAP-37	37DPT12	Tetrachloroethene	1	5/12/2014	5/12/2014	4.03	4.03		4.03	
LHAAP-37	37DPT12	Trichloroethene	1	5/12/2014	5/12/2014	38.60	38.6		38.6	
LHAAP-37	37DPT12	Vinyl chloride	1	5/12/2014	5/12/2014	1.05	1.05		1.05	
LHAAP-37	37DPT13	1,1,1-Trichloroethane	1	5/13/2014	5/13/2014	0.50	0.5	U	0.5	U
LHAAP-37	37DPT13	1,1,2-Trichloroethane	1	5/13/2014	5/13/2014	0.50	0.5	U	0.5	U
LHAAP-37	37DPT13	1,1-Dichloroethene	1	5/13/2014	5/13/2014	1.00	1	U	1	U
LHAAP-37	37DPT13	1,2-Dichloroethane	1	5/13/2014	5/13/2014	0.50	0.5	U	0.5	U
LHAAP-37	37DPT13	Carbon tetrachloride	1	5/13/2014	5/13/2014	0.50	0.5	U	0.5	U
LHAAP-37	37DPT13	Chloroform	1	5/13/2014	5/13/2014	0.25	0.25	U	0.25	U
LHAAP-37	37DPT13	cis-1,2-Dichloroethene	1	5/13/2014	5/13/2014	0.50	0.5	U	0.5	U
LHAAP-37	37DPT13	Methylene chloride	1	5/13/2014	5/13/2014	0.50	0.5	U	0.5	U
LHAAP-37	37DPT13	Tetrachloroethene	1	5/13/2014	5/13/2014	0.50	0.5	U	0.5	U
LHAAP-37	37DPT13	Trichloroethene	1	5/13/2014	5/13/2014	0.50	0.5	U	0.5	U
LHAAP-37	37DPT13	Vinyl chloride	1	5/13/2014	5/13/2014	0.50	0.5	U	0.5	U
LHAAP-37	C-01	1,1,1-Trichloroethane	20	4/1/1994	6/17/2016	3.20	0.5		5	
LHAAP-37	C-01	1,1,2-Trichloroethane	18	4/1/1994	6/17/2016	3.00	0.5		5	
LHAAP-37	C-01	1,1-Dichloroethene	25	4/1/1994	6/17/2016	3.64	1	U	5	
LHAAP-37	C-01	1,2-Dichloroethane	25	4/1/1994	6/17/2016	3.58	0.5	U	5	
LHAAP-37	C-01	1,4-Dioxane	1	10/30/2015	10/30/2015	1.00	1	U	1	U
LHAAP-37	C-01	Carbon tetrachloride	25	4/1/1994	6/17/2016	3.74	0.5	U	5	
LHAAP-37	C-01	Chloroform	24	4/1/1994	6/17/2016	3.61	0.25	U	5	
LHAAP-37	C-01	cis-1,2-Dichloroethene	15	12/1/1996	6/17/2016	3.57	0.5	U	5	
LHAAP-37	C-01	magnesium, total	6	4/1/1994	6/17/2016	52467.50	5		96700	
LHAAP-37	C-01	manganese, total	8	4/1/1994	6/17/2016	16.41	5		42	
LHAAP-37	C-01	Methylene chloride	28	9/1/1984	6/17/2016	27.21	0.25		370	
LHAAP-37	C-01	nickel, total	23	4/1/1994	6/17/2016	11.53	0.5		50	
LHAAP-37	C-01	Perchlorate	21	5/23/2000	6/17/2016	4.67	0.2	U	25.7	
LHAAP-37	C-01	Tetrachloroethene	20	4/1/1994	6/17/2016	3.20	0.5		5	
LHAAP-37	C-01	thallium, total	7	4/1/1994	6/17/2016	2.91	0.2	U	5	
LHAAP-37	C-01	Trichloroethene	27	9/1/1984	6/17/2016	15.44	0.256	J	130	
LHAAP-37	C-01	Vinyl chloride	25	4/1/1994	6/17/2016	3.96	0.5		10	
LHAAP-37	C-02	1,1,1-Trichloroethane	35	4/1/1994	6/20/2017	2.01	0.25	U	5	
LHAAP-37	C-02	1,1,2-Trichloroethane	32	4/1/1994	6/20/2017	1.85	0.25	U	5	
LHAAP-37	C-02	1,1-Dichloroethene	40	4/1/1994	6/20/2017	2.54	0.5	U	5	
LHAAP-37	C-02	1,2-Dichloroethane	41	9/28/1988	6/20/2017	2.46	0.25	U	5	
LHAAP-37	C-02	1,4-Dioxane	1	11/2/2015	11/2/2015	1.00	1	U	1	U
LHAAP-37	C-02	Carbon tetrachloride	40	4/1/1994	6/20/2017	2.49	0.25	U	5	
LHAAP-37	C-02	Chloroform	39	4/1/1994	6/20/2017	2.33	0.125	U	5	
LHAAP-37	C-02	Chromium, Total	3	3/15/2010	3/17/2011	2.22	1.65	J	2.5	U
LHAAP-37	C-02	cis-1,2-Dichloroethene	29	12/1/1996	6/20/2017	1.96	0.25	U	5	
LHAAP-37	C-02	magnesium, total	10	4/1/1994	3/21/2017	10470.50	5		12800	
LHAAP-37	C-02	manganese, total	18	4/1/1994	6/20/2017	1150.56	5		1490	
LHAAP-37	C-02	Methylene chloride	47	9/1/1984	6/20/2017	247.48	0.25		11000	
LHAAP-37	C-02	nickel, total	36	9/28/1988	6/20/2017	11.49	0.5		50	
LHAAP-37	C-02	Perchlorate	33	5/25/2000	6/20/2017	4.18	0.1	U	80	U
LHAAP-37	C-02	Tetrachloroethene	36	9/28/1988	6/20/2017	2.30	0.25	U	12.7	
LHAAP-37	C-02	thallium, total	12	4/1/1994	6/20/2017	1.81	0.133	J	7	
LHAAP-37	C-02	Trichloroethene	46	9/1/1984	6/20/2017	113.14	0.25	U	4700	
LHAAP-37	C-02	Vinyl chloride	40	4/1/1994	6/20/2017	2.63	0.25	U	10	
LHAAP-37	C-03	1,1,1-Trichloroethane	36	4/1/1994	6/12/2017	1.84	0.25	U	5	
LHAAP-37	C-03	1,1,2-Trichloroethane	33	4/1/1994	6/12/2017	1.67	0.25	U	5	
LHAAP-37	C-03	1,1-Dichloroethene	41	4/1/1994	6/12/2017	2.40	0.5	U	5	
LHAAP-37	C-03	1,2-Dichloroethane	42	9/27/1988	6/12/2017	2.30	0.25	U	5	
LHAAP-37	C-03	1,4-Dioxane	2	11/2/2015	6/14/2016	1.00	1	U	1	U
LHAAP-37	C-03	Carbon tetrachloride	41	4/1/1994	6/12/2017	2.34	0.25	U	5	
LHAAP-37	C-03	Chloroform	40	4/1/1994	6/12/2017	2.16	0.125	U	5	
LHAAP-37	C-03	Chromium, Total	5	3/11/2010	3/9/2012	2.47	2.36		2.5	U
LHAAP-37	C-03	cis-1,2-Dichloroethene	31	12/1/1996	6/12/2017	1.76	0.25	U	5	
LHAAP-37	C-03	magnesium, total	11	4/1/1994	6/12/2017	26873.18	5		37700	
LHAAP-37	C-03	manganese, total	20	4/1/1994	6/12/2017	1419.50	5		2140	
LHAAP-37	C-03	Methylene chloride	46	9/1/1984	6/12/2017	95.84	0.25		2200	
LHAAP-37	C-03	nickel, total	37	9/27/1988	6/12/2017	9.04	0.5		50	
LHAAP-37	C-03	Perchlorate	31	10/1/2000	6/12/2017	666.36	1.2	U	2620	
LHAAP-37	C-03	Tetrachloroethene	37	9/27/1988	6/12/2017	1.93	0.25	U	5	
LHAAP-37	C-03	thallium, total	13	4/1/1994	6/12/2017	1.75	0.2	U	5	
LHAAP-37	C-03	Trichloroethene	45	9/1/1984	6/12/2017	41.66	0.25	U	1300	
LHAAP-37	C-03	Vinyl chloride	41	4/1/1994	6/12/2017	2.35	0.25	U	10	
LHAAP-37	C-04	1,1,1-Trichloroethane	35	4/1/1994	6/21/2016	2.00	0.25	U	5	
LHAAP-37	C-04	1,1,2-Trichloroethane	32	4/1/1994	6/21/2016	1.84	0.25	U	5	
LHAAP-37	C-04	1,1-Dichloroethene	40	4/1/1994	6/21/2016	2.53	0.5	U	5	
LHAAP-37	C-04	1,2-Dichloroethane	41	9/26/1988	6/21/2016	2.45	0.25	U	5	
LHAAP-37	C-04	1,4-Dioxane	1	10/29/2015	10/29/2015	1.00	1	U	1	U
LHAAP-37	C-04	Carbon tetrachloride	40	4/1/1994	6/21/2016	2.49	0.25	U	5	
LHAAP-37	C-04	Chloroform	39	4/1/1994	6/21/2016	2.33	0.125	U	5	

Summary of COC Concentrations for LHAAP Wells and Miscellaneous Sampling Locations

Area	Location	Constituent	Count	Earliest	Latest	Avg (µg/L)	Min (µg/L)	Code	Max (µg/L)	Code
LHAAP-37	C-04	Chromium, Total	5	3/15/2010	3/9/2012	1.87	0.606	J	2.5	U
LHAAP-37	C-04	cis-1,2-Dichloroethene	29	12/1/1996	6/21/2016	2.02	0.25	U	5	
LHAAP-37	C-04	magnesium, total	9	4/1/1994	6/21/2016	5480.56	5		11600	
LHAAP-37	C-04	manganese, total	19	4/1/1994	6/21/2016	196.95	5		399	
LHAAP-37	C-04	Methylene chloride	47	9/1/1984	6/21/2016	12.08	0.25		270	
LHAAP-37	C-04	nickel, total	37	9/26/1988	6/21/2016	10.06	0.5		50	
LHAAP-37	C-04	Perchlorate	35	5/25/2000	6/21/2016	4.06	0.1	U	80	U
LHAAP-37	C-04	Tetrachloroethene	36	9/26/1988	6/21/2016	115.83	0.25	U	4100	
LHAAP-37	C-04	thallium, total	11	4/1/1994	6/21/2016	1.77	0.125	U	5	
LHAAP-37	C-04	Trichloroethene	46	9/1/1984	6/21/2016	46.85	0.25	U	1900	
LHAAP-37	C-04	Vinyl chloride	40	4/1/1994	6/21/2016	2.63	0.25	U	10	
LHAAP-37	C-04A	1,1,1-Trichloroethane	17	4/1/1994	10/2/2012	3.65	0.5		5	
LHAAP-37	C-04A	1,1,2-Trichloroethane	15	4/1/1994	10/2/2012	3.47	0.5		5	
LHAAP-37	C-04A	1,1-Dichloroethene	22	4/1/1994	10/2/2012	4.00	1	U	5	
LHAAP-37	C-04A	1,2-Dichloroethane	22	4/1/1994	10/2/2012	3.98	0.5	U	5	
LHAAP-37	C-04A	Carbon tetrachloride	22	4/1/1994	10/2/2012	4.16	0.5	U	5	
LHAAP-37	C-04A	Chloroform	21	4/1/1994	10/2/2012	3.87	0.25	U	5	
LHAAP-37	C-04A	cis-1,2-Dichloroethene	12	12/1/1996	10/2/2012	4.01	0.5	U	5	
LHAAP-37	C-04A	magnesium, total	3	4/1/1994	5/1/2002	2135.00	5		3600	
LHAAP-37	C-04A	manganese, total	6	4/1/1994	10/2/2012	130.33	5		219	
LHAAP-37	C-04A	Methylene chloride	25	11/1/1992	10/2/2012	87.56	0.25		2000	
LHAAP-37	C-04A	nickel, total	19	4/1/1994	10/2/2012	18.32	0.5		113	
LHAAP-37	C-04A	Perchlorate	13	10/1/2000	10/2/2012	4.19	0.2	U	14.9	
LHAAP-37	C-04A	Tetrachloroethene	17	4/1/1994	10/2/2012	3.65	0.5		5	
LHAAP-37	C-04A	thallium, total	6	4/1/1994	10/2/2012	3.37	0.2	U	5	
LHAAP-37	C-04A	Trichloroethene	25	11/1/1992	10/2/2012	6.17	0.5		31	
LHAAP-37	C-04A	Vinyl chloride	22	4/1/1994	10/2/2012	4.41	0.5		10	
LHAAP-37	C-05	1,1,1-Trichloroethane	8	4/1/1994	10/1/2012	3.19	0.5	U	5	
LHAAP-37	C-05	1,1,2-Trichloroethane	6	4/1/1994	10/1/2012	2.58	0.5	U	5	
LHAAP-37	C-05	1,1-Dichloroethene	13	4/1/1994	10/1/2012	3.92	1	U	5	
LHAAP-37	C-05	1,2-Dichloroethane	14	9/25/1988	10/1/2012	3.96	0.5	U	5	
LHAAP-37	C-05	1,4-Dioxane	1	10/29/2015	10/29/2015	1.00	1	U	1	U
LHAAP-37	C-05	Carbon tetrachloride	13	4/1/1994	10/1/2012	3.88	0.5	U	5	
LHAAP-37	C-05	Chloroform	12	4/1/1994	10/1/2012	3.73	0.25	U	5	
LHAAP-37	C-05	cis-1,2-Dichloroethene	7	12/1/1996	10/1/2012	3.79	0.5	U	5	
LHAAP-37	C-05	magnesium, total	2	4/1/1994	5/1/1998	3200.00	2900		3500	
LHAAP-37	C-05	manganese, total	5	4/1/1994	10/1/2012	253.40	5		727	
LHAAP-37	C-05	Methylene chloride	19	9/1/1984	10/1/2012	405.78	0.25		5700	
LHAAP-37	C-05	nickel, total	12	9/25/1988	10/1/2012	14.11	0.5		50	
LHAAP-37	C-05	Perchlorate	5	9/16/2000	10/1/2012	3.04	0.2	U	5	
LHAAP-37	C-05	Tetrachloroethene	9	9/25/1988	10/1/2012	3.39	0.5	U	5	
LHAAP-37	C-05	thallium, total	6	4/1/1994	10/1/2012	3.37	0.2	U	5	
LHAAP-37	C-05	Trichloroethene	18	9/1/1984	10/1/2012	154.09	0.5		2500	
LHAAP-37	C-05	Vinyl chloride	13	4/1/1994	10/1/2012	3.88	0.5	U	5	
LHAAP-37	C-06	1,1,1-Trichloroethane	29	4/1/1994	12/16/2016	2.28	0.25	U	5	
LHAAP-37	C-06	1,1,2-Trichloroethane	26	4/1/1994	12/16/2016	2.13	0.25	U	5	
LHAAP-37	C-06	1,1-Dichloroethene	34	4/1/1994	12/16/2016	2.81	0.5	U	5	
LHAAP-37	C-06	1,2-Dichloroethane	34	4/1/1994	12/16/2016	2.70	0.25	U	5	
LHAAP-37	C-06	1,4-DIOXANE	1	12/15/2015	12/15/2015	1.00	1	U	1	U
LHAAP-37	C-06	Carbon tetrachloride	34	4/1/1994	12/16/2016	2.82	0.25	U	5	
LHAAP-37	C-06	Chloroform	33	4/1/1994	12/16/2016	2.56	0.125	U	5	
LHAAP-37	C-06	Chromium, Total	5	3/16/2010	3/13/2012	2.20	1.01	J	2.5	U
LHAAP-37	C-06	cis-1,2-Dichloroethene	23	12/1/1996	12/16/2016	2.35	0.25	U	5	
LHAAP-37	C-06	magnesium, total	9	4/1/1994	12/16/2016	14745.00	5		23000	
LHAAP-37	C-06	manganese, total	18	4/1/1994	12/16/2016	1020.22	5		2000	
LHAAP-37	C-06	Methylene chloride	38	9/1/1984	12/16/2016	15.99	0.25		300	
LHAAP-37	C-06	nickel, total	33	4/1/1994	12/16/2016	12.64	0.5		50	
LHAAP-37	C-06	Perchlorate	28	9/16/2000	12/16/2016	2.07	0.1	U	5.7	
LHAAP-37	C-06	Tetrachloroethene	29	4/1/1994	12/16/2016	2.28	0.25	U	5	
LHAAP-37	C-06	thallium, total	11	4/1/1994	12/16/2016	1.98	0.2	U	5	
LHAAP-37	C-06	Trichloroethene	37	9/1/1984	12/16/2016	8.46	0.25	U	90	
LHAAP-37	C-06	Vinyl chloride	34	4/1/1994	12/16/2016	2.89	0.25	U	10	
LHAAP-37	C-07	1,1,1-Trichloroethane	10	5/28/1993	11/14/2017	3.13	0.25	U	5	U
LHAAP-37	C-07	1,1,2-Trichloroethane	8	5/28/1993	11/14/2017	2.66	0.25	U	5	U
LHAAP-37	C-07	1,1-Dichloroethene	15	5/28/1993	11/14/2017	3.77	0.5	U	5	U
LHAAP-37	C-07	1,2-Dichloroethane	15	5/28/1993	11/14/2017	3.75	0.25	U	5	U
LHAAP-37	C-07	Carbon tetrachloride	15	5/28/1993	11/14/2017	3.75	0.25	U	5	U
LHAAP-37	C-07	Chloroform	14	5/28/1993	11/14/2017	3.62	0.125	U	5	U
LHAAP-37	C-07	cis-1,2-Dichloroethene	9	5/28/1993	11/14/2017	3.58	0.25	U	5	U
LHAAP-37	C-07	magnesium, total	3	4/1/1994	1/25/1999	9300.00	9000		9600	
LHAAP-37	C-07	manganese, total	5	4/1/1994	1/25/1999	8.08	5		11	
LHAAP-37	C-07	Methylene chloride	16	2/1/1986	11/14/2017	9.91	0.25		50	
LHAAP-37	C-07	nickel, total	12	5/28/1993	11/1/2001	18.88	0.5		50	U
LHAAP-37	C-07	Perchlorate	7	9/26/2000	11/14/2017	76.31	1		496	
LHAAP-37	C-07	Tetrachloroethene	10	5/28/1993	11/14/2017	3.13	0.25	U	5	U
LHAAP-37	C-07	thallium, total	6	5/28/1993	1/25/1999	5.00	2	U	10	U
LHAAP-37	C-07	Trichloroethene	15	5/28/1993	11/14/2017	9.05	0.25	U	49	
LHAAP-37	C-07	Vinyl chloride	15	5/28/1993	11/14/2017	3.88	0.25	U	10	U
LHAAP-37	C-08	1,1,1-Trichloroethane	37	4/1/1994	6/12/2017	1.80	0.25	U	5	
LHAAP-37	C-08	1,1,2-Trichloroethane	35	4/1/1994	6/12/2017	1.74	0.25	U	5	
LHAAP-37	C-08	1,1-Dichloroethene	42	4/1/1994	6/12/2017	2.37	0.5	U	5	
LHAAP-37	C-08	1,2-Dichloroethane	42	4/1/1994	6/12/2017	2.14	0.25	U	5	
LHAAP-37	C-08	1,4-Dioxane	2	11/2/2015	6/14/2016	1.00	1	U	1	U
LHAAP-37	C-08	Carbon tetrachloride	42	4/1/1994	6/12/2017	2.29	0.25	U	5	
LHAAP-37	C-08	Chloroform	41	4/1/1994	6/12/2017	2.11	0.125	U	5	
LHAAP-37	C-08	Chromium, Total	5	3/9/2010	3/7/2012	4.22	2.5	U	8.06	J
LHAAP-37	C-08	cis-1,2-Dichloroethene	32	12/1/1996	6/12/2017	1.78	0.25	U	5	

Summary of COC Concentrations for LHAAP Wells and Miscellaneous Sampling Locations

Area	Location	Constituent	Count	Earliest	Latest	Avg (µg/L)	Min (µg/L)	Code	Max (µg/L)	Code
LHAAP-37	C-08	magnesium, total	15	4/1/1994	6/12/2017	134793.67	5		200000	
LHAAP-37	C-08	manganese, total	24	4/1/1994	6/12/2017	450.76	4.54	J	3150	
LHAAP-37	C-08	Methylene chloride	44	2/1/1986	6/12/2017	2.78	0.25		14	
LHAAP-37	C-08	nickel, total	41	4/1/1994	6/12/2017	12.20	0.5		50	
LHAAP-37	C-08	Perchlorate	37	5/25/2000	6/12/2017	5.66	0.1	U	45	J
LHAAP-37	C-08	Tetrachloroethene	37	4/1/1994	6/12/2017	1.80	0.25	U	5	
LHAAP-37	C-08	thallium, total	17	4/1/1994	6/12/2017	1.16	0.2	U	5	
LHAAP-37	C-08	Trichloroethene	43	11/1/1992	6/12/2017	8.21	0.5		56.2	
LHAAP-37	C-08	Vinyl chloride	42	4/1/1994	6/12/2017	2.35	0.25	U	10	
LHAAP-37	C-09	1,1,1-Trichloroethane	19	4/1/1994	12/2/2015	1.59	0.25	U	5	
LHAAP-37	C-09	1,1,2-Trichloroethane	16	4/1/1994	12/2/2015	1.20	0.25	U	5	
LHAAP-37	C-09	1,1-Dichloroethene	24	4/1/1994	12/2/2015	2.44	0.5	U	5	
LHAAP-37	C-09	1,2-Dichloroethane	24	4/1/1994	12/2/2015	2.30	0.25	U	5	
LHAAP-37	C-09	1,4-Dioxane	1	11/3/2015	11/3/2015	0.60	0.602	J	0.602	J
LHAAP-37	C-09	CARBON TETRACHLORIDE	24	4/1/1994	12/2/2015	2.30	0.25	U	5	
LHAAP-37	C-09	CHLOROFORM	23	4/1/1994	12/2/2015	2.08	0.125	U	5	
LHAAP-37	C-09	Chromium, Total	3	3/15/2010	3/14/2011	5.61	4.53		7.61	J
LHAAP-37	C-09	CIS-1,2-DICHLOROETHENE	17	12/1/1996	12/2/2015	1.78	0.25	U	5	
LHAAP-37	C-09	magnesium, total	8	4/1/1994	12/20/2014	216551.25	2110		470000	
LHAAP-37	C-09	manganese, total	15	4/1/1994	12/2/2015	133.64	5		560	
LHAAP-37	C-09	METHYLENE CHLORIDE	26	2/1/1986	12/2/2015	8.02	0.25		80	
LHAAP-37	C-09	nickel, total	23	4/1/1994	12/2/2015	31.27	0.5		220	
LHAAP-37	C-09	PERCHLORATE	15	10/1/2000	12/2/2015	3.20	0.11	U	8	U
LHAAP-37	C-09	TETRACHLOROETHENE	19	4/1/1994	12/2/2015	1.59	0.25	U	5	
LHAAP-37	C-09	thallium, total	11	4/1/1994	12/2/2015	2.11	0.2	U	5	
LHAAP-37	C-09	TRICHLOROETHENE	25	4/1/1986	12/2/2015	7.15	0.25	U	93	
LHAAP-37	C-09	VINYL CHLORIDE	24	4/1/1994	12/2/2015	2.18	0.25	U	5	
LHAAP-37	C-10	1,1,1-TRICHLOROETHANE	17	4/1/1994	12/10/2013	3.65	0.5		5	
LHAAP-37	C-10	1,1,2-TRICHLOROETHANE	15	4/1/1994	12/10/2013	3.47	0.5		5	
LHAAP-37	C-10	1,1-DICHLOROETHENE	22	4/1/1994	12/10/2013	4.00	1	U	5	
LHAAP-37	C-10	1,2-DICHLOROETHANE	22	4/1/1994	12/10/2013	3.87	0.5	U	5	
LHAAP-37	C-10	1,4-Dioxane	1	11/3/2015	11/3/2015	1.00	1	U	1	U
LHAAP-37	C-10	Carbon tetrachloride	22	4/1/1994	12/10/2013	4.16	0.5	U	5	
LHAAP-37	C-10	Chloroform	21	4/1/1994	12/10/2013	3.87	0.25	U	5	
LHAAP-37	C-10	cis-1,2-Dichloroethene	12	12/1/1996	12/10/2013	4.29	0.5	U	5	
LHAAP-37	C-10	magnesium, total	5	4/1/1994	12/10/2013	31861.00	5		53600	
LHAAP-37	C-10	manganese, total	7	4/1/1994	12/10/2013	256.14	5		1090	
LHAAP-37	C-10	Methylene chloride	24	2/1/1986	12/10/2013	39.00	0.25		690	
LHAAP-37	C-10	nickel, total	20	4/1/1994	12/10/2013	13.56	0.5		50	
LHAAP-37	C-10	Perchlorate	13	10/1/2000	12/10/2013	14.24	1		46.8	
LHAAP-37	C-10	Tetrachloroethene	17	4/1/1994	12/10/2013	3.65	0.5		5	
LHAAP-37	C-10	thallium, total	6	4/1/1994	12/10/2013	3.37	0.2	U	5	
LHAAP-37	C-10	Trichloroethene	23	4/1/1986	12/10/2013	17.67	0.5		122	
LHAAP-37	C-10	Vinyl chloride	22	4/1/1994	12/10/2013	4.27	0.5		10	
LHAAP-37	LHSMW58	1,1,1-Trichloroethane	11	12/11/1994	2/12/2018	8.54	0.5	U	37	
LHAAP-37	LHSMW58	1,1,2-Trichloroethane	10	12/11/1994	2/12/2018	2.42	0.5	U	5	U
LHAAP-37	LHSMW58	1,1-Dichloroethene	10	12/11/1994	2/12/2018	11.63	0.5	U	58	
LHAAP-37	LHSMW58	1,2-Dichloroethane	10	12/11/1994	2/12/2018	2.38	0.31	U	5	U
LHAAP-37	LHSMW58	1,4-Dioxane	2	5/20/1998	9/10/2004	150.00	100	U	200	U
LHAAP-37	LHSMW58	Carbon tetrachloride	10	12/11/1994	2/12/2018	2.46	0.5	U	5	U
LHAAP-37	LHSMW58	Chloroform	10	12/11/1994	2/12/2018	1.94	0.25	U	5	U
LHAAP-37	LHSMW58	cis-1,2-Dichloroethene	8	8/21/1996	2/12/2018	1.34	0.5	U	5	U
LHAAP-37	LHSMW58	magnesium, total	4	12/11/1994	5/20/1998	3317.50	1400		5000	
LHAAP-37	LHSMW58	manganese, total	7	12/11/1994	2/17/2016	52.71	6.72		200	
LHAAP-37	LHSMW58	Methylene chloride	10	12/11/1994	2/12/2018	2.52	0.22	U	5	U
LHAAP-37	LHSMW58	nickel, total	3	2/10/1996	5/20/1998	23.53	7.6	U	40	U
LHAAP-37	LHSMW58	Perchlorate	2	5/18/2000	10/3/2000	4.05	1	U	7.1	
LHAAP-37	LHSMW58	strontium, total	4	12/11/1994	5/20/1998	185.50	96		300	
LHAAP-37	LHSMW58	Tetrachloroethene	11	12/11/1994	2/12/2018	15.58	7.9		21.8	J
LHAAP-37	LHSMW58	thallium, total	4	12/11/1994	3/27/2018	150.18	1	U	500	U
LHAAP-37	LHSMW58	Trichloroethene	11	12/11/1994	2/12/2018	12.06	0.5	U	33	
LHAAP-37	LHSMW58	Vinyl chloride	9	8/21/1996	2/12/2018	3.19	0.24	U	10	U
LHAAP-37	MW-1	1,1,1-Trichloroethane	24	4/1/1994	6/19/2017	29.86	0.5		500	U
LHAAP-37	MW-1	1,1,2-Trichloroethane	22	4/1/1994	6/19/2017	7.83	0.437	J	100	U
LHAAP-37	MW-1	1,1-Dichloroethene	29	4/1/1994	6/19/2017	32.54	1	U	195	
LHAAP-37	MW-1	1,2-Dichloroethane	30	9/18/1988	6/19/2017	1006.43	1		28000	
LHAAP-37	MW-1	1,4-Dioxane	2	7/23/1998	10/29/2015	103.83	7.65		200	U
LHAAP-37	MW-1	Carbon tetrachloride	29	4/1/1994	6/19/2017	7.13	0.411	J	100	U
LHAAP-37	MW-1	Chloroform	28	4/1/1994	6/19/2017	40.62	1.43		500	U
LHAAP-37	MW-1	cis-1,2-Dichloroethene	19	12/1/1996	6/19/2017	178.65	5		1540	
LHAAP-37	MW-1	magnesium, total	10	4/1/1994	6/19/2017	60510.50	5		130000	
LHAAP-37	MW-1	manganese, total	13	4/1/1994	6/19/2017	2435.38	5		5900	
LHAAP-37	MW-1	Methylene chloride	31	9/18/1988	6/19/2017	208238.54	0.25		4200000	
LHAAP-37	MW-1	nickel, total	29	9/18/1988	6/19/2017	998.72	5		6550	
LHAAP-37	MW-1	Perchlorate	18	10/1/2000	6/19/2017	55911.11	14400		120000	
LHAAP-37	MW-1	strontium, total	1	7/23/1998	7/23/1998	4400.00	4400		4400	
LHAAP-37	MW-1	Tetrachloroethene	25	9/18/1988	6/19/2017	1649.70	0.5		41000	
LHAAP-37	MW-1	thallium, total	12	4/1/1994	6/19/2017	2.01	0.2	U	5	
LHAAP-37	MW-1	Trichloroethene	31	9/18/1988	6/19/2017	20699.58	734		200000	
LHAAP-37	MW-1	Vinyl chloride	29	4/1/1994	6/19/2017	31.75	1		500	U
LHAAP-37	MW-10	1,1,1-Trichloroethane	28	4/1/1994	6/20/2017	2.43	0.5		5	
LHAAP-37	MW-10	1,1,2-Trichloroethane	26	4/1/1994	6/20/2017	2.23	0.5		5	
LHAAP-37	MW-10	1,1-Dichloroethene	33	4/1/1994	6/20/2017	3.00	1	U	5	
LHAAP-37	MW-10	1,2-Dichloroethane	34	9/27/1988	6/20/2017	2.90	0.5	U	5	
LHAAP-37	MW-10	1,4-Dioxane	2	10/28/2015	6/9/2016	1.00	1	U	1	U
LHAAP-37	MW-10	Carbon tetrachloride	33	4/1/1994	6/20/2017	2.95	0.5	U	5	
LHAAP-37	MW-10	Chloroform	32	4/1/1994	6/20/2017	2.77	0.25	U	5	

Summary of COC Concentrations for LHAAP Wells and Miscellaneous Sampling Locations

Area	Location	Constituent	Count	Earliest	Latest	Avg (µg/L)	Min (µg/L)	Code	Max (µg/L)	Code
LHAAP-37	MW-10	cis-1,2-Dichloroethene	23	12/1/1996	6/20/2017	2.50	0.45	J	5	
LHAAP-37	MW-10	magnesium, total	10	4/1/1994	3/20/2017	8605.50	5		14000	
LHAAP-37	MW-10	manganese, total	14	4/1/1994	6/20/2017	774.00	5		1310	
LHAAP-37	MW-10	Methylene chloride	37	9/27/1988	6/20/2017	65.12	0.25		2100	
LHAAP-37	MW-10	nickel, total	30	9/27/1988	6/20/2017	77.60	0.5		730	
LHAAP-37	MW-10	Perchlorate	23	10/1/2000	6/20/2017	9.27	0.2	U	156	
LHAAP-37	MW-10	Tetrachloroethene	29	9/27/1988	6/20/2017	2.52	0.5		5	
LHAAP-37	MW-10	thallium, total	12	4/1/1994	6/20/2017	1.76	0.2	U	5	
LHAAP-37	MW-10	Trichloroethene	37	9/27/1988	6/20/2017	15.74	0.447	J	190	
LHAAP-37	MW-10	Vinyl chloride	33	4/1/1994	6/20/2017	3.03	0.5		10	
LHAAP-37	MW-12	1,1,1-Trichloroethane	22	4/1/1994	6/20/2017	2.98	0.5		5	
LHAAP-37	MW-12	1,1,2-Trichloroethane	20	4/1/1994	6/20/2017	2.81	0.5		5	
LHAAP-37	MW-12	1,1-Dichloroethene	27	4/1/1994	6/20/2017	12.01	0.572	J	102	
LHAAP-37	MW-12	1,2-Dichloroethane	28	9/29/1988	6/20/2017	6.03	1	U	40	
LHAAP-37	MW-12	1,4-Dioxane	1	10/30/2015	10/30/2015	139.00	139		139	
LHAAP-37	MW-12	Carbon tetrachloride	27	4/1/1994	6/20/2017	3.52	0.5	U	5	
LHAAP-37	MW-12	Chloroform	26	4/1/1994	6/20/2017	3.56	0.25	U	5	
LHAAP-37	MW-12	cis-1,2-Dichloroethene	17	12/1/1996	6/20/2017	101.27	5		840	
LHAAP-37	MW-12	magnesium, total	4	4/1/1994	5/1/2002	13526.25	5		23100	
LHAAP-37	MW-12	manganese, total	8	4/1/1994	6/20/2017	1206.25	5		2390	
LHAAP-37	MW-12	Methylene chloride	28	9/29/1988	6/20/2017	451.48	0.25		8000	
LHAAP-37	MW-12	nickel, total	24	9/29/1988	6/20/2017	34.92	5		216	
LHAAP-37	MW-12	Perchlorate	17	10/1/2000	6/20/2017	36.15	0.2	J	257	
LHAAP-37	MW-12	Tetrachloroethene	23	9/29/1988	6/20/2017	4.59	0.5		40	
LHAAP-37	MW-12	thallium, total	6	4/1/1994	6/20/2017	3.06	0.185	J	5	
LHAAP-37	MW-12	Trichloroethene	28	9/29/1988	6/20/2017	2337.93	5		18000	
LHAAP-37	MW-12	Vinyl chloride	27	4/1/1994	6/20/2017	4.13	0.346	J	10	
LHAAP-37	MW-13	1,1,1-Trichloroethane	21	4/1/1994	6/20/2017	3.05	0.5		5	
LHAAP-37	MW-13	1,1,2-Trichloroethane	19	4/1/1994	6/20/2017	2.84	0.5		5	
LHAAP-37	MW-13	1,1-Dichloroethene	26	4/1/1994	6/20/2017	3.54	1	U	5	
LHAAP-37	MW-13	1,2-Dichloroethane	27	9/30/1988	6/20/2017	3.50	0.5	U	5	
LHAAP-37	MW-13	Carbon tetrachloride	26	4/1/1994	6/20/2017	3.60	0.5	U	5	
LHAAP-37	MW-13	Chloroform	25	4/1/1994	6/20/2017	3.42	0.25	U	8.2	
LHAAP-37	MW-13	CHROMIUM, TOTAL	1	5/22/2006	5/22/2006	371.00	371		371	
LHAAP-37	MW-13	cis-1,2-Dichloroethene	16	12/1/1996	6/20/2017	3.37	0.5	U	5.4	
LHAAP-37	MW-13	magnesium, total	6	4/1/1994	6/20/2017	10700.83	5		16700	
LHAAP-37	MW-13	manganese, total	9	4/1/1994	6/20/2017	830.00	5		1560	
LHAAP-37	MW-13	Methylene chloride	30	9/30/1988	6/20/2017	23.96	0.25		590	
LHAAP-37	MW-13	nickel, total	23	9/30/1988	6/20/2017	58.60	0.5		365	
LHAAP-37	MW-13	Perchlorate	18	10/1/2000	6/20/2017	2.40	0.2	U	5	
LHAAP-37	MW-13	Tetrachloroethene	22	9/30/1988	6/20/2017	3.14	0.5		5	
LHAAP-37	MW-13	thallium, total	7	4/1/1994	6/20/2017	2.65	0.175	J	5	
LHAAP-37	MW-13	Trichloroethene	30	9/30/1988	6/20/2017	8.97	0.5		62	
LHAAP-37	MW-13	Vinyl chloride	26	4/1/1994	6/20/2017	3.69	0.5		10	
LHAAP-37	MW-14	1,1,1-Trichloroethane	28	4/1/1994	6/26/2017	16.96	0.5		200	U
LHAAP-37	MW-14	1,1,2-Trichloroethane	26	4/1/1994	6/26/2017	18.49	0.5		200	U
LHAAP-37	MW-14	1,1-Dichloroethene	33	4/1/1994	6/26/2017	66.73	1		271	
LHAAP-37	MW-14	1,2-Dichloroethane	34	9/30/1988	6/26/2017	45.50	1		233	
LHAAP-37	MW-14	1,4-Dioxane	5	7/23/1998	6/7/2016	9009.42	67.1		40000	U
LHAAP-37	MW-14	Carbon tetrachloride	33	4/1/1994	6/26/2017	15.08	0.5	U	200	U
LHAAP-37	MW-14	Chloroform	32	4/1/1994	6/26/2017	14.00	0.5		200	U
LHAAP-37	MW-14	cis-1,2-Dichloroethene	23	12/1/1996	6/26/2017	1106.09	5		2550	
LHAAP-37	MW-14	magnesium, total	11	4/1/1994	6/26/2017	40682.27	5		80000	
LHAAP-37	MW-14	manganese, total	15	4/1/1994	6/26/2017	2974.67	5		5200	
LHAAP-37	MW-14	Methylene chloride	34	9/30/1988	6/26/2017	720.22	0.25		13000	
LHAAP-37	MW-14	nickel, total	30	9/30/1988	6/26/2017	236.42	0.5		3170	
LHAAP-37	MW-14	Perchlorate	22	10/1/2000	6/26/2017	97681.82	1410		288000	J
LHAAP-37	MW-14	strontium, total	1	7/23/1998	7/23/1998	4400.00	4400		4400	
LHAAP-37	MW-14	Tetrachloroethene	29	9/30/1988	6/26/2017	16.65	0.5		200	U
LHAAP-37	MW-14	thallium, total	14	4/1/1994	6/26/2017	1.39	0.2	U	5	
LHAAP-37	MW-14	Trichloroethene	35	9/30/1988	6/26/2017	5277.34	189		16800	
LHAAP-37	MW-14	Vinyl chloride	33	4/1/1994	6/26/2017	16.29	0.5		200	U
LHAAP-37	MW-16	1,1,1-Trichloroethane	42	4/1/1994	6/13/2017	1.80	0.25	U	5	
LHAAP-37	MW-16	1,1,2-Trichloroethane	39	4/1/1994	6/13/2017	1.65	0.25	U	5	
LHAAP-37	MW-16	1,1-Dichloroethene	47	4/1/1994	6/13/2017	3.55	0.5	U	12.6	
LHAAP-37	MW-16	1,2-Dichloroethane	46	4/1/1994	6/13/2017	10.75	0.25	U	72.1	
LHAAP-37	MW-16	1,4-Dioxane	2	10/27/2015	6/21/2016	20.90	18		23.8	
LHAAP-37	MW-16	Carbon tetrachloride	47	4/1/1994	6/13/2017	2.23	0.25	U	5	
LHAAP-37	MW-16	Chloroform	46	4/1/1994	6/13/2017	2.04	0.125	U	5	
LHAAP-37	MW-16	Chromium, Total	5	3/10/2010	3/8/2012	19.56	3	J	52.1	
LHAAP-37	MW-16	cis-1,2-Dichloroethene	36	12/1/1996	6/13/2017	7.28	0.25	U	34	
LHAAP-37	MW-16	magnesium, total	13	4/1/1994	3/22/2017	17568.85	5		88000	
LHAAP-37	MW-16	manganese, total	22	4/1/1994	6/13/2017	651.18	5		1080	
LHAAP-37	MW-16	Methylene chloride	50	11/1/1992	6/13/2017	3.27	0.25		37.3	
LHAAP-37	MW-16	nickel, total	40	4/1/1994	6/13/2017	13.24	0.5		50	
LHAAP-37	MW-16	Perchlorate	38	10/1/2000	6/13/2017	1017.91	0.1	U	11600	
LHAAP-37	MW-16	Tetrachloroethene	42	4/1/1994	6/13/2017	1.79	0.25	U	5	
LHAAP-37	MW-16	thallium, total	16	4/1/1994	6/13/2017	2.81	0.107	J	23	D
LHAAP-37	MW-16	Trichloroethene	50	11/1/1992	6/13/2017	107.79	0.27	J	1020	
LHAAP-37	MW-16	Vinyl chloride	47	4/1/1994	6/13/2017	2.17	0.25	U	10	
LHAAP-37	MW-17	1,1,1-Trichloroethane	27	4/1/1994	6/21/2017	2.47	0.25	U	5	
LHAAP-37	MW-17	1,1,2-Trichloroethane	25	4/1/1994	6/21/2017	2.27	0.25	U	5	
LHAAP-37	MW-17	1,1-Dichloroethene	32	4/1/1994	6/21/2017	3.11	0.5	U	12	
LHAAP-37	MW-17	1,2-Dichloroethane	32	4/1/1994	6/21/2017	2.76	0.25	U	5	
LHAAP-37	MW-17	1,4-Dioxane	2	10/28/2015	6/20/2016	1.03	1	U	1.06	U
LHAAP-37	MW-17	Carbon tetrachloride	32	4/1/1994	6/21/2017	2.88	0.25	U	5	
LHAAP-37	MW-17	Chloroform	31	4/1/1994	6/21/2017	2.84	0.125	U	5	

Summary of COC Concentrations for LHAAP Wells and Miscellaneous Sampling Locations

Area	Location	Constituent	Count	Earliest	Latest	Avg (µg/L)	Min (µg/L)	Code	Max (µg/L)	Code
LHAAP-37	MW-17	Chromium, Total	3	3/24/2011	3/9/2012	4.44	2.85	J	6.14	J
LHAAP-37	MW-17	cis-1,2-Dichloroethene	22	12/1/1996	6/21/2017	2.18	0.25	U	5	
LHAAP-37	MW-17	magnesium, total	8	4/1/1994	6/4/2014	16763.13	5		25700	
LHAAP-37	MW-17	manganese, total	14	4/1/1994	6/21/2017	552.07	5		1630	
LHAAP-37	MW-17	Methylene chloride	33	11/1/1992	6/21/2017	5.95	0.25		87	
LHAAP-37	MW-17	nickel, total	29	4/1/1994	6/21/2017	382.55	5		1400	
LHAAP-37	MW-17	Perchlorate	28	5/25/2000	6/21/2017	125.20	0.1	U	550	
LHAAP-37	MW-17	Tetrachloroethene	27	4/1/1994	6/21/2017	2.47	0.25	U	5	
LHAAP-37	MW-17	thallium, total	11	4/1/1994	6/21/2017	1.93	0.2	U	5	
LHAAP-37	MW-17	Trichloroethene	33	11/1/1992	6/21/2017	58.27	0.5	U	180	
LHAAP-37	MW-17	Vinyl chloride	32	4/1/1994	6/21/2017	2.96	0.25	U	10	
LHAAP-37	MW-18	1,1,1-Trichloroethane	23	4/1/1994	6/21/2017	1.67	0.25	U	5	
LHAAP-37	MW-18	1,1,2-Trichloroethane	21	4/1/1994	6/21/2017	1.36	0.25	U	5	
LHAAP-37	MW-18	1,1-Dichloroethene	28	4/1/1994	6/21/2017	2.45	0.5	U	5	
LHAAP-37	MW-18	1,2-Dichloroethane	28	4/1/1994	6/21/2017	2.27	0.25	U	5	
LHAAP-37	MW-18	1,4-Dioxane	2	7/21/1998	11/2/2015	101.42	2.84		200	U
LHAAP-37	MW-18	Carbon tetrachloride	28	4/1/1994	6/21/2017	2.27	0.25	U	5	
LHAAP-37	MW-18	Chloroform	27	4/1/1994	6/21/2017	2.21	0.125	U	5	
LHAAP-37	MW-18	cis-1,2-Dichloroethene	22	12/1/1996	6/21/2017	2.15	0.25	U	5	
LHAAP-37	MW-18	magnesium, total	10	4/1/1994	12/15/2016	5364.50	5		12200	
LHAAP-37	MW-18	manganese, total	14	4/1/1994	6/21/2017	338.95	5		612	
LHAAP-37	MW-18	Methylene chloride	29	11/1/1992	6/21/2017	3.00	0.25		10	
LHAAP-37	MW-18	nickel, total	21	4/1/1994	6/21/2017	49.23	4	U	183	
LHAAP-37	MW-18	Perchlorate	25	5/23/2000	6/21/2017	2.03	0.11	U	10.6	
LHAAP-37	MW-18	strontium, total	1	7/21/1998	7/21/1998	120.00	120		120	
LHAAP-37	MW-18	Tetrachloroethene	23	4/1/1994	6/21/2017	1.67	0.25	U	5	
LHAAP-37	MW-18	thallium, total	14	4/1/1994	6/21/2017	1.77	0.05	U	5	
LHAAP-37	MW-18	Trichloroethene	29	11/1/1992	6/21/2017	9.90	0.371	J	130	
LHAAP-37	MW-18	Vinyl chloride	28	4/1/1994	6/21/2017	2.16	0.25	U	5	
LHAAP-37	MW-19	1,1,1-Trichloroethane	30	4/1/1994	6/20/2017	5.48	0.25	U	100	U
LHAAP-37	MW-19	1,1,2-Trichloroethane	29	4/1/1994	6/20/2017	2.08	0.25	U	5	
LHAAP-37	MW-19	1,1-Dichloroethene	35	4/1/1994	6/20/2017	2.76	0.5	U	5	
LHAAP-37	MW-19	1,2-Dichloroethane	35	4/1/1994	6/20/2017	5.38	0.31	J	100	U
LHAAP-37	MW-19	1,4-Dioxane	2	7/23/1998	10/30/2015	100.58	1.16	J	200	U
LHAAP-37	MW-19	Carbon tetrachloride	35	4/1/1994	6/20/2017	2.71	0.25	U	5	
LHAAP-37	MW-19	Chloroform	34	4/1/1994	6/20/2017	5.45	0.125	U	100	U
LHAAP-37	MW-19	cis-1,2-Dichloroethene	26	12/1/1996	6/20/2017	6.53	0.27	J	100	U
LHAAP-37	MW-19	magnesium, total	15	4/1/1994	6/20/2017	52576.33	5		95000	
LHAAP-37	MW-19	manganese, total	18	4/1/1994	6/20/2017	2024.28	5		3510	
LHAAP-37	MW-19	Methylene chloride	36	11/1/1992	6/20/2017	8.75	0.25		200	U
LHAAP-37	MW-19	nickel, total	31	4/1/1994	6/20/2017	149.25	0.5		880	
LHAAP-37	MW-19	Perchlorate	33	5/23/2000	6/20/2017	68.80	0.2	U	524	
LHAAP-37	MW-19	strontium, total	1	7/23/1998	7/23/1998	3700.00	3700		3700	
LHAAP-37	MW-19	Tetrachloroethene	30	4/1/1994	6/20/2017	2.18	0.25	U	5	
LHAAP-37	MW-19	thallium, total	15	4/1/1994	6/20/2017	1.44	0.2	U	5	
LHAAP-37	MW-19	Trichloroethene	36	11/1/1992	6/20/2017	15.96	1.2		176	
LHAAP-37	MW-19	Vinyl chloride	35	4/1/1994	6/20/2017	5.61	0.25	U	100	U
LHAAP-37	MW-2	1,1,1-Trichloroethane	39	4/1/1994	6/13/2017	3510.47	1		100000	U
LHAAP-37	MW-2	1,1,2-Trichloroethane	36	4/1/1994	6/13/2017	3734.79	1		100000	U
LHAAP-37	MW-2	1,1-Dichloroethene	44	4/1/1994	6/13/2017	3846.30	1		100000	U
LHAAP-37	MW-2	1,2-Dichloroethane	45	9/19/1988	6/13/2017	4133.25	1		100000	U
LHAAP-37	MW-2	1,4-Dioxane	4	7/23/1998	6/24/2016	5000007.65	7.21		20000000	U
LHAAP-37	MW-2	Carbon tetrachloride	44	4/1/1994	6/13/2017	3107.06	0.25	U	100000	U
LHAAP-37	MW-2	Chloroform	42	4/1/1994	6/13/2017	4076.38	1		100000	U
LHAAP-37	MW-2	Chromium, Total	5	3/8/2010	3/13/2012	471.40	119		806	
LHAAP-37	MW-2	cis-1,2-Dichloroethene	33	12/1/1996	6/13/2017	27051.82	5		100000	U
LHAAP-37	MW-2	magnesium, total	17	4/1/1994	6/13/2017	88923.82	5		142000	
LHAAP-37	MW-2	manganese, total	26	4/1/1994	6/13/2017	2564.85	5		3880	
LHAAP-37	MW-2	Methylene chloride	47	9/19/1988	6/13/2017	3997691.26	189	J	26720000	
LHAAP-37	MW-2	nickel, total	44	9/19/1988	6/13/2017	147.63	5		1170	
LHAAP-37	MW-2	Perchlorate	34	10/1/2000	6/13/2017	8465.55	0.847		32200	
LHAAP-37	MW-2	strontium, total	1	7/23/1998	7/23/1998	3600.00	3600		3600	
LHAAP-37	MW-2	Tetrachloroethene	40	9/19/1988	6/13/2017	3879.37	1		100000	U
LHAAP-37	MW-2	thallium, total	20	4/1/1994	6/13/2017	1.46	0.109	J	5	
LHAAP-37	MW-2	Trichloroethene	47	9/19/1988	6/13/2017	205190.85	4240	J	1520000	
LHAAP-37	MW-2	Vinyl chloride	44	4/1/1994	6/13/2017	3162.40	1		100000	U
LHAAP-37	MW-20	1,1,1-Trichloroethane	30	4/1/1994	12/6/2016	2.11	0.25	U	5	
LHAAP-37	MW-20	1,1,2-Trichloroethane	28	4/1/1994	12/6/2016	2.04	0.25	U	5	
LHAAP-37	MW-20	1,1-Dichloroethene	35	4/1/1994	12/6/2016	2.64	0.5	U	5	
LHAAP-37	MW-20	1,2-Dichloroethane	35	4/1/1994	12/6/2016	2.54	0.25	U	5	
LHAAP-37	MW-20	Carbon tetrachloride	35	4/1/1994	12/6/2016	2.65	0.25	U	5	
LHAAP-37	MW-20	Chloroform	34	4/1/1994	12/6/2016	2.50	0.125	U	5	
LHAAP-37	MW-20	Chromium, Total	4	3/8/2010	3/7/2012	9.99	7.41	J	13.6	
LHAAP-37	MW-20	cis-1,2-Dichloroethene	25	12/1/1996	12/6/2016	2.32	0.25	U	5	
LHAAP-37	MW-20	Magnesium, Total	7	4/1/1994	3/15/2011	4970.71	5		9840	
LHAAP-37	MW-20	Manganese, Total	14	4/1/1994	3/7/2012	85.13	5		218	
LHAAP-37	MW-20	Methylene chloride	36	11/1/1992	12/6/2016	5.07	0.25		74	
LHAAP-37	MW-20	Nickel, Total	31	4/1/1994	3/7/2012	90.08	0.5		976	
LHAAP-37	MW-20	Perchlorate	31	5/23/2000	12/6/2016	5.01	0.1	U	59.1	
LHAAP-37	MW-20	Tetrachloroethene	30	4/1/1994	12/6/2016	2.01	0.25	U	5	
LHAAP-37	MW-20	Thallium, Total	7	4/1/1994	3/15/2011	2.40	0.25	U	5	
LHAAP-37	MW-20	Trichloroethene	36	11/1/1992	12/6/2016	6.37	0.25	U	86	
LHAAP-37	MW-20	Vinyl chloride	35	4/1/1994	12/6/2016	2.72	0.25	U	10	
LHAAP-37	MW-21	1,1,1-Trichloroethane	30	4/1/1994	6/16/2017	18.45	0.5		128	
LHAAP-37	MW-21	1,1,2-Trichloroethane	28	4/1/1994	6/16/2017	19.20	0.5		112	
LHAAP-37	MW-21	1,1-Dichloroethene	35	4/1/1994	6/16/2017	28.57	1	U	100	U
LHAAP-37	MW-21	1,2-Dichloroethane	35	4/1/1994	6/16/2017	38.62	0.364	J	225	

Summary of COC Concentrations for LHAAP Wells and Miscellaneous Sampling Locations

Area	Location	Constituent	Count	Earliest	Latest	Avg (µg/L)	Min (µg/L)	Code	Max (µg/L)	Code
LHAAP-37	MW-21	1,4-Dioxane	3	8/25/2014	6/22/2016	2.11	1.55	J	2.99	J
LHAAP-37	MW-21	Carbon tetrachloride	35	4/1/1994	6/16/2017	13.04	0.5	U	50	U
LHAAP-37	MW-21	Chloroform	34	4/1/1994	6/16/2017	18.82	1		91	
LHAAP-37	MW-21	Chromium, Total	2	9/21/2011	3/12/2012	406.50	279		534	
LHAAP-37	MW-21	cis-1,2-Dichloroethene	25	12/1/1996	6/16/2017	90.10	5		352	D
LHAAP-37	MW-21	magnesium, total	12	4/1/1994	6/16/2017	177833.75	5		276000	
LHAAP-37	MW-21	manganese, total	18	4/1/1994	6/16/2017	2359.44	5		4700	
LHAAP-37	MW-21	Methylene chloride	36	11/1/1992	6/16/2017	146200.36	5.21		1270000	
LHAAP-37	MW-21	nickel, total	33	4/1/1994	6/16/2017	486.15	5		2090	
LHAAP-37	MW-21	Perchlorate	24	10/1/2000	6/16/2017	33604.58	4510		54800	
LHAAP-37	MW-21	Tetrachloroethene	30	4/1/1994	6/16/2017	17.82	0.5		109	
LHAAP-37	MW-21	thallium, total	15	4/1/1994	6/16/2017	1.45	0.1	J	5	
LHAAP-37	MW-21	Trichloroethene	36	11/1/1992	6/16/2017	5950.64	5		15400	
LHAAP-37	MW-21	Vinyl chloride	35	4/1/1994	6/16/2017	30.78	1		118	
LHAAP-37	MW-22	1,1,1-Trichloroethane	33	4/1/1994	6/12/2017	5.30	0.5		89	
LHAAP-37	MW-22	1,1,2-Trichloroethane	31	4/1/1994	6/12/2017	5.91	0.5		107	
LHAAP-37	MW-22	1,1-Dichloroethene	38	4/1/1994	6/12/2017	15.66	0.977	J	220	
LHAAP-37	MW-22	1,2-Dichloroethane	38	4/1/1994	6/12/2017	9.27	1	U	97.2	
LHAAP-37	MW-22	1,4-Dioxane	2	8/26/2014	10/29/2015	6.32	4.6		8.03	J
LHAAP-37	MW-22	Carbon tetrachloride	38	4/1/1994	6/12/2017	5.41	0.5	U	92.1	
LHAAP-37	MW-22	Chloroform	37	4/1/1994	6/12/2017	11.73	1		91.5	
LHAAP-37	MW-22	Chromium, Total	4	9/9/2010	3/13/2012	446.00	137		1200	
LHAAP-37	MW-22	cis-1,2-Dichloroethene	28	12/1/1996	6/12/2017	106.65	2.13		920	
LHAAP-37	MW-22	magnesium, total	13	4/1/1994	6/12/2017	23823.46	5		40100	
LHAAP-37	MW-22	manganese, total	19	4/1/1994	6/12/2017	97.01	3.5	J	743	
LHAAP-37	MW-22	Methylene chloride	39	11/1/1992	6/12/2017	612.27	0.25		8100	
LHAAP-37	MW-22	nickel, total	34	4/1/1994	6/12/2017	556.61	5		5600	
LHAAP-37	MW-22	Perchlorate	27	10/1/2000	6/12/2017	6031.44	214		15400	
LHAAP-37	MW-22	Tetrachloroethene	33	4/1/1994	6/12/2017	5.68	0.5		103	
LHAAP-37	MW-22	thallium, total	16	4/1/1994	6/12/2017	1.39	0.2	U	5	
LHAAP-37	MW-22	Trichloroethene	39	11/1/1992	6/12/2017	1396.23	5		5500	
LHAAP-37	MW-22	Vinyl chloride	38	4/1/1994	6/12/2017	9.16	0.354	J	86	
LHAAP-37	MW-23	1,1,1-Trichloroethane	30	4/1/1994	6/19/2017	3.37	0.5		5	
LHAAP-37	MW-23	1,1,2-Trichloroethane	28	4/1/1994	6/19/2017	3.23	0.351	J	5	
LHAAP-37	MW-23	1,1-Dichloroethene	35	4/1/1994	6/19/2017	4.72	0.995	J	10	U
LHAAP-37	MW-23	1,2-Dichloroethane	35	4/1/1994	6/19/2017	45.40	1		78.9	
LHAAP-37	MW-23	1,4-Dioxane	2	8/27/2014	10/28/2015	3.26	3.24	J	3.27	J
LHAAP-37	MW-23	Carbon tetrachloride	35	4/1/1994	6/19/2017	3.70	0.608	J	5	
LHAAP-37	MW-23	Chloroform	34	4/1/1994	6/19/2017	4.22	0.5		7.32	J
LHAAP-37	MW-23	Chromium, Total	2	9/21/2011	3/13/2012	47.65	31.5		63.8	
LHAAP-37	MW-23	cis-1,2-Dichloroethene	25	12/1/1996	6/19/2017	6.60	2.62	J	14.6	
LHAAP-37	MW-23	magnesium, total	8	4/1/1994	6/19/2017	24935.63	5		47800	
LHAAP-37	MW-23	manganese, total	13	4/1/1994	6/19/2017	86.09	3.07	J	201	
LHAAP-37	MW-23	Methylene chloride	36	11/1/1992	6/19/2017	300.91	0.25		5150	
LHAAP-37	MW-23	nickel, total	28	4/1/1994	6/19/2017	215.28	5		580	
LHAAP-37	MW-23	Perchlorate	25	10/1/2000	6/19/2017	50743.20	4080		87600	J
LHAAP-37	MW-23	Tetrachloroethene	30	4/1/1994	6/19/2017	3.36	0.3	J	5	
LHAAP-37	MW-23	thallium, total	10	4/1/1994	6/19/2017	2.10	0.2	U	5	
LHAAP-37	MW-23	Trichloroethene	36	11/1/1992	6/19/2017	1363.67	547		2530	
LHAAP-37	MW-23	Vinyl chloride	35	4/1/1994	6/19/2017	3.76	0.44	J	10	
LHAAP-37	MW-3	1,1,1-Trichloroethane	28	4/1/1994	6/13/2017	2.53	0.25	U	5	
LHAAP-37	MW-3	1,1,2-Trichloroethane	26	4/1/1994	6/13/2017	2.34	0.25	U	5	
LHAAP-37	MW-3	1,1-Dichloroethene	33	4/1/1994	6/13/2017	8.24	1		42.1	
LHAAP-37	MW-3	1,2-Dichloroethane	34	9/20/1988	6/13/2017	3.37	0.25	U	19	
LHAAP-37	MW-3	1,4-Dioxane	1	11/3/2015	11/3/2015	7.82	7.82		7.82	
LHAAP-37	MW-3	Carbon tetrachloride	32	4/1/1994	6/13/2017	3.09	0.25	U	5	
LHAAP-37	MW-3	Chloroform	32	4/1/1994	6/13/2017	3.18	0.5		5	
LHAAP-37	MW-3	cis-1,2-Dichloroethene	23	12/1/1996	6/13/2017	40.00	5		89.2	
LHAAP-37	MW-3	magnesium, total	12	4/1/1994	6/13/2017	17308.75	5		35100	
LHAAP-37	MW-3	manganese, total	16	4/1/1994	6/13/2017	1769.06	5		5140	
LHAAP-37	MW-3	Methylene chloride	34	9/20/1988	6/13/2017	8329.94	0.25		243000	
LHAAP-37	MW-3	nickel, total	32	9/20/1988	6/13/2017	29.55	3.93	J	210	
LHAAP-37	MW-3	Perchlorate	22	10/1/2000	6/13/2017	133809.09	10800		973000	
LHAAP-37	MW-3	Tetrachloroethene	28	9/20/1988	6/13/2017	3.17	0.25	U	19	
LHAAP-37	MW-3	thallium, total	14	4/1/1994	6/13/2017	3.64	0.2	U	29.3	
LHAAP-37	MW-3	Trichloroethene	35	9/20/1988	6/13/2017	1187.37	142		13600	
LHAAP-37	MW-3	Vinyl chloride	33	4/1/1994	6/13/2017	18.72	1		41	
LHAAP-37	MW-4	1,1,1-Trichloroethane	19	4/1/1994	9/29/2012	3.56	0.5		5	
LHAAP-37	MW-4	1,1,2-Trichloroethane	17	4/1/1994	9/29/2012	3.39	0.5		5	
LHAAP-37	MW-4	1,1-Dichloroethene	24	4/1/1994	9/29/2012	8.38	1		84	
LHAAP-37	MW-4	1,2-Dichloroethane	25	9/21/1988	9/29/2012	5.41	0.5	U	42	
LHAAP-37	MW-4	Carbon tetrachloride	24	4/1/1994	9/29/2012	4.05	0.5	U	5	
LHAAP-37	MW-4	Chloroform	23	4/1/1994	9/29/2012	4.14	0.5		6.7	
LHAAP-37	MW-4	cis-1,2-Dichloroethene	14	12/1/1996	9/29/2012	43.23	5		131	
LHAAP-37	MW-4	magnesium, total	4	4/1/1994	5/1/2002	40001.25	5		56000	
LHAAP-37	MW-4	manganese, total	7	4/1/1994	9/29/2012	246.14	5		536	
LHAAP-37	MW-4	Methylene chloride	26	9/21/1988	9/29/2012	596.95	0.25		7900	
LHAAP-37	MW-4	nickel, total	23	9/21/1988	9/29/2012	86.04	5		335	
LHAAP-37	MW-4	Perchlorate	13	10/1/2000	9/29/2012	41569.23	12000		65500	
LHAAP-37	MW-4	Tetrachloroethene	20	9/21/1988	9/29/2012	5.54	0.305	J	42	
LHAAP-37	MW-4	thallium, total	6	4/1/1994	9/29/2012	3.37	0.2	U	5	
LHAAP-37	MW-4	Trichloroethene	26	9/21/1988	9/29/2012	777.85	150		3100	
LHAAP-37	MW-4	Vinyl chloride	24	4/1/1994	9/29/2012	58.50	1		141	
LHAAP-37	MW-5	1,1,1-Trichloroethane	25	4/1/1994	6/14/2017	2.65	0.25	U	5	
LHAAP-37	MW-5	1,1,2-Trichloroethane	23	4/1/1994	6/14/2017	2.45	0.25	U	5	
LHAAP-37	MW-5	1,1-Dichloroethene	30	4/1/1994	6/14/2017	3.74	0.715	J	21	
LHAAP-37	MW-5	1,2-Dichloroethane	31	9/22/1988	6/14/2017	3.00	0.25	U	5	

Summary of COC Concentrations for LHAAP Wells and Miscellaneous Sampling Locations

Area	Location	Constituent	Count	Earliest	Latest	Avg (µg/L)	Min (µg/L)	Code	Max (µg/L)	Code
LHAAP-37	MW-5	1,4-Dioxane	2	10/27/2015	6/8/2016	1.15	0.819	J	1.48	J
LHAAP-37	MW-5	Carbon tetrachloride	30	4/1/1994	6/14/2017	3.19	0.25	U	5	
LHAAP-37	MW-5	Chloroform	29	4/1/1994	6/14/2017	3.04	0.238	J	5	
LHAAP-37	MW-5	cis-1,2-Dichloroethene	20	12/1/1996	6/14/2017	10.60	5		18	
LHAAP-37	MW-5	magnesium, total	10	4/1/1994	6/14/2017	22230.50	5		37400	
LHAAP-37	MW-5	manganese, total	13	4/1/1994	6/14/2017	82.45	5		158	
LHAAP-37	MW-5	Methylene chloride	32	9/22/1988	6/14/2017	21.20	0.25		510	
LHAAP-37	MW-5	nickel, total	28	9/22/1988	6/14/2017	55.86	5		237	
LHAAP-37	MW-5	Perchlorate	19	10/1/2000	6/14/2017	25447.37	13700		32200	
LHAAP-37	MW-5	Tetrachloroethene	26	9/22/1988	6/14/2017	2.73	0.25	U	5	
LHAAP-37	MW-5	thallium, total	11	4/1/1994	6/14/2017	2.03	0.101	J	8	
LHAAP-37	MW-5	Trichloroethene	32	9/22/1988	6/14/2017	68.54	22.5		220	
LHAAP-37	MW-5	Vinyl chloride	30	4/1/1994	6/14/2017	7.38	0.5		19	
LHAAP-37	MW-6	1,1,1-Trichloroethane	24	4/1/1994	6/15/2017	2.78	0.25	U	5	
LHAAP-37	MW-6	1,1,2-Trichloroethane	22	4/1/1994	6/15/2017	2.58	0.25	U	5	
LHAAP-37	MW-6	1,1-Dichloroethene	29	4/1/1994	6/15/2017	3.75	0.597	J	17	
LHAAP-37	MW-6	1,2-Dichloroethane	30	9/23/1988	6/15/2017	3.28	0.25	U	5	
LHAAP-37	MW-6	Carbon tetrachloride	29	4/1/1994	6/15/2017	3.32	0.25	U	5	
LHAAP-37	MW-6	Chloroform	28	4/1/1994	6/15/2017	3.17	0.125	U	5	
LHAAP-37	MW-6	cis-1,2-Dichloroethene	19	12/1/1996	6/15/2017	8.86	4.7		15	
LHAAP-37	MW-6	magnesium, total	7	4/1/1994	6/15/2017	24957.86	5		32100	
LHAAP-37	MW-6	manganese, total	10	4/1/1994	6/15/2017	160.37	5		480	
LHAAP-37	MW-6	Methylene chloride	31	9/23/1988	6/15/2017	33.62	0.25		560	
LHAAP-37	MW-6	nickel, total	25	9/23/1988	6/15/2017	90.78	5		325	
LHAAP-37	MW-6	Perchlorate	18	10/1/2000	6/15/2017	7185.56	1940		11300	
LHAAP-37	MW-6	Tetrachloroethene	25	9/23/1988	6/15/2017	2.87	0.25	U	5	
LHAAP-37	MW-6	thallium, total	9	4/1/1994	6/15/2017	2.53	0.2	U	7	
LHAAP-37	MW-6	Trichloroethene	31	9/23/1988	6/15/2017	54.72	14		440	
LHAAP-37	MW-6	Vinyl chloride	29	4/1/1994	6/15/2017	6.31	0.5	U	13	
LHAAP-37	MW-7	1,1,1-Trichloroethane	29	4/1/1994	6/23/2017	21.33	0.5	U	500	U
LHAAP-37	MW-7	1,1,2-Trichloroethane	27	4/1/1994	6/23/2017	22.54	0.293	J	500	U
LHAAP-37	MW-7	1,1-Dichloroethene	34	4/1/1994	6/23/2017	73.22	1		500	U
LHAAP-37	MW-7	1,2-Dichloroethane	35	9/24/1988	6/23/2017	97.33	1		500	U
LHAAP-37	MW-7	1,4-Dioxane	4	4/30/2013	6/24/2016	14.97	7.27	J	21.2	
LHAAP-37	MW-7	Carbon tetrachloride	34	4/1/1994	6/23/2017	62.25	1		500	U
LHAAP-37	MW-7	Chloroform	33	4/1/1994	6/23/2017	121.23	1		2500	U
LHAAP-37	MW-7	Chromium, Total	2	9/20/2011	3/7/2012	341.50	221		462	
LHAAP-37	MW-7	cis-1,2-Dichloroethene	24	12/1/1996	6/23/2017	34.07	5		500	U
LHAAP-37	MW-7	magnesium, total	8	4/1/1994	6/23/2017	10381.88	5		16000	
LHAAP-37	MW-7	manganese, total	13	4/1/1994	6/23/2017	53.40	3.95	J	183	
LHAAP-37	MW-7	Methylene chloride	36	9/24/1988	6/23/2017	150.97	0.25		2500	U
LHAAP-37	MW-7	nickel, total	29	9/24/1988	6/23/2017	544.53	5		2000	
LHAAP-37	MW-7	Perchlorate	24	10/1/2000	6/23/2017	68354.17	12300		157000	
LHAAP-37	MW-7	Tetrachloroethene	30	9/24/1988	6/23/2017	29.50	0.419	J	500	U
LHAAP-37	MW-7	thallium, total	10	4/1/1994	6/23/2017	2.09	0.143	J	5	
LHAAP-37	MW-7	Trichloroethene	36	9/24/1988	6/23/2017	10791.00	1570		22300	
LHAAP-37	MW-7	Vinyl chloride	34	4/1/1994	6/23/2017	19.13	0.322	J	500	U
LHAAP-37	MW-8	1,1,1-Trichloroethane	37	4/1/1994	6/16/2017	3.90	0.25	U	50	U
LHAAP-37	MW-8	1,1,2-Trichloroethane	34	4/1/1994	6/16/2017	2.64	0.5		5	
LHAAP-37	MW-8	1,1-Dichloroethene	42	4/1/1994	6/16/2017	4.85	0.551	J	50	U
LHAAP-37	MW-8	1,2-Dichloroethane	43	9/25/1988	6/16/2017	39.85	0.592	J	480	
LHAAP-37	MW-8	1,4-Dioxane	3	4/30/2013	6/9/2016	10.92	0.649	J	27.6	
LHAAP-37	MW-8	Carbon tetrachloride	42	4/1/1994	6/16/2017	4.14	0.25	U	50	U
LHAAP-37	MW-8	Chloroform	41	4/1/1994	6/16/2017	4.42	0.431	J	50	U
LHAAP-37	MW-8	Chromium, Total	5	3/9/2010	3/8/2012	204.06	12.3		385	
LHAAP-37	MW-8	cis-1,2-Dichloroethene	31	12/1/1996	6/16/2017	14.59	0.867	J	99	
LHAAP-37	MW-8	magnesium, total	12	4/1/1994	6/16/2017	12884.58	5		35800	
LHAAP-37	MW-8	manganese, total	20	4/1/1994	6/16/2017	241.24	5		599	
LHAAP-37	MW-8	Methylene chloride	44	9/25/1988	6/16/2017	157.16	0.25		5500	
LHAAP-37	MW-8	nickel, total	39	9/25/1988	6/16/2017	311.20	5		954	
LHAAP-37	MW-8	Perchlorate	33	10/1/2000	6/16/2017	34437.91	1	U	78000	
LHAAP-37	MW-8	Tetrachloroethene	38	9/25/1988	6/16/2017	16.43	0.31	J	480	
LHAAP-37	MW-8	thallium, total	14	4/1/1994	6/16/2017	1.62	0.105	J	5	
LHAAP-37	MW-8	Trichloroethene	44	9/25/1988	6/16/2017	3109.14	5		13000	
LHAAP-37	MW-8	Vinyl chloride	42	4/1/1994	6/16/2017	4.19	0.25	U	50	U
LHAAP-37	MW-9	1,1,1-Trichloroethane	28	4/1/1994	6/23/2017	39.50	0.5		1000	U
LHAAP-37	MW-9	1,1,2-Trichloroethane	26	4/1/1994	6/23/2017	41.96	0.4	J	1000	U
LHAAP-37	MW-9	1,1-Dichloroethene	33	4/1/1994	6/23/2017	36.24	0.794	J	1000	U
LHAAP-37	MW-9	1,2-Dichloroethane	34	9/26/1988	6/23/2017	47.93	0.304	J	1000	U
LHAAP-37	MW-9	1,4-Dioxane	3	8/21/2014	6/22/2016	5.42	1.77	J	11.1	
LHAAP-37	MW-9	Carbon tetrachloride	33	4/1/1994	6/23/2017	34.41	0.5	U	1000	U
LHAAP-37	MW-9	Chloroform	32	4/1/1994	6/23/2017	160.52	0.5		5000	U
LHAAP-37	MW-9	Chromium, Total	2	9/14/2011	3/7/2012	196.50	184		209	
LHAAP-37	MW-9	cis-1,2-Dichloroethene	23	12/1/1996	6/23/2017	138.74	5		1000	U
LHAAP-37	MW-9	magnesium, total	9	4/1/1994	6/23/2017	5647.22	5		14300	
LHAAP-37	MW-9	manganese, total	15	4/1/1994	6/23/2017	95.07	5		246	
LHAAP-37	MW-9	Methylene chloride	35	9/26/1988	6/23/2017	1941.40	0.25		60000	
LHAAP-37	MW-9	nickel, total	31	9/26/1988	6/23/2017	182.65	5		1700	
LHAAP-37	MW-9	Perchlorate	23	10/1/2000	6/23/2017	920.38	70.9		4410	
LHAAP-37	MW-9	Tetrachloroethene	29	9/26/1988	6/23/2017	72.61	0.263	J	1000	
LHAAP-37	MW-9	thallium, total	12	4/1/1994	6/23/2017	1.78	0.2	U	5	
LHAAP-37	MW-9	Trichloroethene	35	9/26/1988	6/23/2017	5522.57	5		53000	
LHAAP-37	MW-9	Vinyl chloride	33	4/1/1994	6/23/2017	34.23	0.321	J	1000	U
LHAAP-46	46DPT10	1,1,1-TRICHLOROETHANE	1	4/22/2013	4/22/2013	0.50	0.5	U	0.5	U
LHAAP-46	46DPT10	1,1,2-TRICHLOROETHANE	1	4/22/2013	4/22/2013	0.50	0.5	U	0.5	U
LHAAP-46	46DPT10	1,1-DICHLOROETHENE	1	4/22/2013	4/22/2013	1.00	1	U	1	U
LHAAP-46	46DPT10	1,2-DICHLOROETHANE	1	4/22/2013	4/22/2013	0.50	0.5	U	0.5	U

Summary of COC Concentrations for LHAAP Wells and Miscellaneous Sampling Locations

Area	Location	Constituent	Count	Earliest	Latest	Avg (µg/L)	Min (µg/L)	Code	Max (µg/L)	Code
LHAAP-46	46DPT10	CARBON TETRACHLORIDE	1	4/22/2013	4/22/2013	0.50	0.5	U	0.5	U
LHAAP-46	46DPT10	CHLOROFORM	1	4/22/2013	4/22/2013	0.25	0.25	U	0.25	U
LHAAP-46	46DPT10	CIS-1,2-DICHLOROETHENE	1	4/22/2013	4/22/2013	0.50	0.5	U	0.5	U
LHAAP-46	46DPT10	METHYLENE CHLORIDE	1	4/22/2013	4/22/2013	0.50	0.5	U	0.5	U
LHAAP-46	46DPT10	TETRACHLOROETHENE	1	4/22/2013	4/22/2013	0.50	0.5	U	0.5	U
LHAAP-46	46DPT10	TRICHLOROETHENE	1	4/22/2013	4/22/2013	0.50	0.5	U	0.5	U
LHAAP-46	46DPT10	VINYL CHLORIDE	1	4/22/2013	4/22/2013	0.50	0.5	U	0.5	U
LHAAP-46	46DPT11	1,1,1-TRICHLOROETHANE	1	4/22/2013	4/22/2013	0.50	0.5	U	0.5	U
LHAAP-46	46DPT11	1,1,2-TRICHLOROETHANE	1	4/22/2013	4/22/2013	0.50	0.5	U	0.5	U
LHAAP-46	46DPT11	1,1-DICHLOROETHENE	1	4/22/2013	4/22/2013	1.00	1	U	1	U
LHAAP-46	46DPT11	1,2-DICHLOROETHANE	1	4/22/2013	4/22/2013	0.50	0.5	U	0.5	U
LHAAP-46	46DPT11	CARBON TETRACHLORIDE	1	4/22/2013	4/22/2013	0.50	0.5	U	0.5	U
LHAAP-46	46DPT11	CHLOROFORM	1	4/22/2013	4/22/2013	0.25	0.25	U	0.25	U
LHAAP-46	46DPT11	CIS-1,2-DICHLOROETHENE	1	4/22/2013	4/22/2013	0.50	0.5	U	0.5	U
LHAAP-46	46DPT11	METHYLENE CHLORIDE	1	4/22/2013	4/22/2013	0.50	0.5	U	0.5	U
LHAAP-46	46DPT11	TETRACHLOROETHENE	1	4/22/2013	4/22/2013	0.50	0.5	U	0.5	U
LHAAP-46	46DPT11	TRICHLOROETHENE	1	4/22/2013	4/22/2013	0.50	0.5	U	0.5	U
LHAAP-46	46DPT11	VINYL CHLORIDE	1	4/22/2013	4/22/2013	0.50	0.5	U	0.5	U
LHAAP-46	46DPT12	1,1,1-TRICHLOROETHANE	1	4/23/2013	4/23/2013	0.50	0.5	U	0.5	U
LHAAP-46	46DPT12	1,1,2-TRICHLOROETHANE	1	4/23/2013	4/23/2013	0.50	0.5	U	0.5	U
LHAAP-46	46DPT12	1,1-DICHLOROETHENE	1	4/23/2013	4/23/2013	1.00	1	U	1	U
LHAAP-46	46DPT12	1,2-DICHLOROETHANE	1	4/23/2013	4/23/2013	0.50	0.5	U	0.5	U
LHAAP-46	46DPT12	CARBON TETRACHLORIDE	1	4/23/2013	4/23/2013	0.50	0.5	U	0.5	U
LHAAP-46	46DPT12	CHLOROFORM	1	4/23/2013	4/23/2013	0.25	0.25	U	0.25	U
LHAAP-46	46DPT12	CIS-1,2-DICHLOROETHENE	1	4/23/2013	4/23/2013	0.50	0.5	U	0.5	U
LHAAP-46	46DPT12	METHYLENE CHLORIDE	1	4/23/2013	4/23/2013	0.50	0.5	U	0.5	U
LHAAP-46	46DPT12	TETRACHLOROETHENE	1	4/23/2013	4/23/2013	0.50	0.5	U	0.5	U
LHAAP-46	46DPT12	TRICHLOROETHENE	1	4/23/2013	4/23/2013	0.50	0.5	U	0.5	U
LHAAP-46	46DPT12	VINYL CHLORIDE	1	4/23/2013	4/23/2013	0.50	0.5	U	0.5	U
LHAAP-46	46DPT13	1,1,1-TRICHLOROETHANE	1	5/3/2014	5/3/2014	0.50	0.5	U	0.5	U
LHAAP-46	46DPT13	1,1,2-TRICHLOROETHANE	1	5/3/2014	5/3/2014	0.50	0.5	U	0.5	U
LHAAP-46	46DPT13	1,1-DICHLOROETHENE	1	5/3/2014	5/3/2014	1.00	1	U	1	U
LHAAP-46	46DPT13	1,2-DICHLOROETHANE	1	5/3/2014	5/3/2014	0.50	0.5	U	0.5	U
LHAAP-46	46DPT13	CARBON TETRACHLORIDE	1	5/3/2014	5/3/2014	0.50	0.5	U	0.5	U
LHAAP-46	46DPT13	CHLOROFORM	1	5/3/2014	5/3/2014	0.25	0.25	U	0.25	U
LHAAP-46	46DPT13	CIS-1,2-DICHLOROETHENE	1	5/3/2014	5/3/2014	0.50	0.5	U	0.5	U
LHAAP-46	46DPT13	METHYLENE CHLORIDE	1	5/3/2014	5/3/2014	0.50	0.5	U	0.5	U
LHAAP-46	46DPT13	TETRACHLOROETHENE	1	5/3/2014	5/3/2014	0.50	0.5	U	0.5	U
LHAAP-46	46DPT13	TRICHLOROETHENE	1	5/3/2014	5/3/2014	0.50	0.5	U	0.5	U
LHAAP-46	46DPT13	VINYL CHLORIDE	1	5/3/2014	5/3/2014	0.50	0.5	U	0.5	U
LHAAP-46	46SW09	1,1,1-TRICHLOROETHANE	2	9/30/2013	7/18/2014	0.50	0.5	U	0.5	U
LHAAP-46	46SW09	1,1,2-TRICHLOROETHANE	2	9/30/2013	7/18/2014	0.50	0.5	U	0.5	U
LHAAP-46	46SW09	1,1-DICHLOROETHENE	2	9/30/2013	7/18/2014	1.00	1	U	1	U
LHAAP-46	46SW09	1,2-DICHLOROETHANE	2	9/30/2013	7/18/2014	0.50	0.5	U	0.5	U
LHAAP-46	46SW09	CARBON TETRACHLORIDE	2	9/30/2013	7/18/2014	0.50	0.5	U	0.5	U
LHAAP-46	46SW09	CHLOROFORM	2	9/30/2013	7/18/2014	0.25	0.25	U	0.25	U
LHAAP-46	46SW09	CIS-1,2-DICHLOROETHENE	2	9/30/2013	7/18/2014	0.50	0.5	U	0.5	U
LHAAP-46	46SW09	METHYLENE CHLORIDE	2	9/30/2013	7/18/2014	0.50	0.5	U	0.5	U
LHAAP-46	46SW09	TETRACHLOROETHENE	2	9/30/2013	7/18/2014	0.50	0.5	U	0.5	U
LHAAP-46	46SW09	TRICHLOROETHENE	2	9/30/2013	7/18/2014	0.50	0.5	U	0.5	U
LHAAP-46	46SW09	VINYL CHLORIDE	2	9/30/2013	7/18/2014	0.50	0.5	U	0.5	U
LHAAP-46	46SW10	1,1,1-Trichloroethane	3	12/29/2015	2/22/2018	0.50	0.5	U	0.5	U
LHAAP-46	46SW10	1,1,2-Trichloroethane	3	12/29/2015	2/22/2018	0.50	0.5	U	0.5	U
LHAAP-46	46SW10	1,1-Dichloroethene	3	12/29/2015	2/22/2018	0.83	0.5	U	1	U
LHAAP-46	46SW10	1,2-Dichloroethane	3	12/29/2015	2/22/2018	0.50	0.5	U	0.5	U
LHAAP-46	46SW10	Carbon tetrachloride	3	12/29/2015	2/22/2018	0.50	0.5	U	0.5	U
LHAAP-46	46SW10	Chloroform	3	12/29/2015	2/22/2018	0.33	0.25	U	0.5	U
LHAAP-46	46SW10	cis-1,2-Dichloroethene	3	12/29/2015	2/22/2018	0.50	0.5	U	0.5	U
LHAAP-46	46SW10	Methylene chloride	3	12/29/2015	2/22/2018	0.67	0.5	U	1	U
LHAAP-46	46SW10	Tetrachloroethene	3	12/29/2015	2/22/2018	0.50	0.5	U	0.5	U
LHAAP-46	46SW10	Trichloroethene	3	12/29/2015	2/22/2018	0.50	0.5	U	0.5	U
LHAAP-46	46SW10	Vinyl chloride	3	12/29/2015	2/22/2018	0.50	0.5	U	0.5	U
LHAAP-46	46WW01	1,1,1-TRICHLOROETHANE	5	10/1/1998	8/4/2016	0.67	0.37	U	1	U
LHAAP-46	46WW01	1,1,2-TRICHLOROETHANE	5	10/1/1998	8/4/2016	0.73	0.5	U	1	U
LHAAP-46	46WW01	1,1-DICHLOROETHENE	5	10/1/1998	8/4/2016	0.94	0.68	U	1	U
LHAAP-46	46WW01	1,2-DICHLOROETHANE	5	10/1/1998	8/4/2016	0.71	0.5	U	1	U
LHAAP-46	46WW01	1,4-Dioxane	3	10/1/1998	5/2/2013	133.67	1	U	200	U
LHAAP-46	46WW01	CARBON TETRACHLORIDE	5	10/1/1998	8/4/2016	0.70	0.5	U	1	U
LHAAP-46	46WW01	CHLOROFORM	5	10/1/1998	8/4/2016	0.63	0.25	U	1	U
LHAAP-46	46WW01	CIS-1,2-DICHLOROETHENE	4	10/1/1998	8/4/2016	0.80	0.5	U	1.2	
LHAAP-46	46WW01	magnesium, total	2	10/1/1998	11/7/1998	5000.00	5000	U	5000	U
LHAAP-46	46WW01	manganese, total	2	10/1/1998	11/7/1998	237.50	171		304	
LHAAP-46	46WW01	METHYLENE CHLORIDE	5	10/1/1998	8/4/2016	0.73	0.5	U	1	U
LHAAP-46	46WW01	nickel, total	2	10/1/1998	11/7/1998	95.00	60		130	
LHAAP-46	46WW01	Perchlorate	5	5/19/2000	2/19/2007	4.82	1	U	11.1	
LHAAP-46	46WW01	strontium, total	2	10/1/1998	11/7/1998	55.00	50	U	60	
LHAAP-46	46WW01	TETRACHLOROETHENE	5	10/1/1998	8/4/2016	0.75	0.5	U	1	U
LHAAP-46	46WW01	thallium, total	2	10/1/1998	11/7/1998	1.15	1	U	1.3	J
LHAAP-46	46WW01	TRICHLOROETHENE	5	10/1/1998	8/4/2016	1.85	0.5	U	6.6	
LHAAP-46	46WW01	VINYL CHLORIDE	5	10/1/1998	8/4/2016	0.66	0.32	U	1	U
LHAAP-46	46WW02	1,1,1-Trichloroethane	14	11/6/1998	2/20/2018	0.49	0.25	U	1	U
LHAAP-46	46WW02	1,1,2-Trichloroethane	14	11/6/1998	2/20/2018	0.51	0.25	U	1	U
LHAAP-46	46WW02	1,1-Dichloroethene	14	11/6/1998	2/20/2018	1.47	0.5	U	2.28	
LHAAP-46	46WW02	1,2-Dichloroethane	14	11/6/1998	2/20/2018	0.50	0.25	U	1	U
LHAAP-46	46WW02	1,4-Dioxane	3	11/6/1998	12/17/2015	67.36	1	U	200	U
LHAAP-46	46WW02	Carbon tetrachloride	14	11/6/1998	2/20/2018	0.50	0.25	U	1	U
LHAAP-46	46WW02	Chloroform	14	11/6/1998	2/20/2018	0.31	0.125	U	0.66	U

Summary of COC Concentrations for LHAAP Wells and Miscellaneous Sampling Locations

Area	Location	Constituent	Count	Earliest	Latest	Avg (µg/L)	Min (µg/L)	Code	Max (µg/L)	Code
LHAAP-46	46WW02	CHROMIUM, TOTAL	1	9/7/2007	9/7/2007	8.87	8.87	J	8.87	J
LHAAP-46	46WW02	cis-1,2-Dichloroethene	13	11/6/1998	2/20/2018	1.53	0.52	J	2.09	
LHAAP-46	46WW02	MAGNESIUM, TOTAL	2	11/6/1998	9/7/2007	18500.00	17000		20000	
LHAAP-46	46WW02	manganese, total	3	11/6/1998	2/20/2018	180.33	167		196	
LHAAP-46	46WW02	Methylene chloride	14	11/6/1998	2/20/2018	0.54	0.25	U	1	U
LHAAP-46	46WW02	NICKEL, TOTAL	2	11/6/1998	9/7/2007	75.80	61.6		90	
LHAAP-46	46WW02	Perchlorate	3	3/10/2002	2/20/2007	5.67	4	U	9.01	
LHAAP-46	46WW02	strontium, total	1	11/6/1998	11/6/1998	220.00	220		220	
LHAAP-46	46WW02	Tetrachloroethene	14	11/6/1998	2/20/2018	0.52	0.25	U	1	U
LHAAP-46	46WW02	thallium, total	4	11/6/1998	9/19/2013	1.40	0.239	J	3.88	J
LHAAP-46	46WW02	Trichloroethene	14	11/6/1998	2/20/2018	28.42	16.6		38.2	
LHAAP-46	46WW02	Vinyl chloride	14	11/6/1998	2/20/2018	0.48	0.25	U	1	U
LHAAP-46	46WW03	1,1,1-Trichloroethane	12	11/6/1998	2/26/2018	0.52	0.25	U	1	U
LHAAP-46	46WW03	1,1,2-Trichloroethane	12	11/6/1998	2/26/2018	0.52	0.25	U	1	U
LHAAP-46	46WW03	1,1-Dichloroethene	12	11/6/1998	2/26/2018	0.92	0.5	U	1	U
LHAAP-46	46WW03	1,2-Dichloroethane	12	11/6/1998	2/26/2018	0.52	0.25	U	1	U
LHAAP-46	46WW03	1,4-Dioxane	1	11/6/1998	11/6/1998	200.00	200	U	200	U
LHAAP-46	46WW03	Carbon tetrachloride	12	11/6/1998	2/26/2018	0.52	0.25	U	1	U
LHAAP-46	46WW03	Chloroform	12	11/6/1998	2/26/2018	5.99	0.125	U	69	
LHAAP-46	46WW03	cis-1,2-Dichloroethene	12	11/6/1998	2/26/2018	0.52	0.25	U	1	U
LHAAP-46	46WW03	magnesium, total	1	11/6/1998	11/6/1998	24000.00	24000		24000	
LHAAP-46	46WW03	manganese, total	1	11/6/1998	11/6/1998	128.00	128		128	
LHAAP-46	46WW03	Methylene chloride	12	11/6/1998	2/26/2018	0.60	0.25	U	1.4	
LHAAP-46	46WW03	nickel, total	1	11/6/1998	11/6/1998	40.00	40	U	40	U
LHAAP-46	46WW03	Perchlorate	2	3/11/2002	9/23/2002	4.00	4	U	4	U
LHAAP-46	46WW03	strontium, total	1	11/6/1998	11/6/1998	550.00	550		550	
LHAAP-46	46WW03	Tetrachloroethene	12	11/6/1998	2/26/2018	0.52	0.25	U	1	U
LHAAP-46	46WW03	thallium, total	3	11/6/1998	9/26/2013	0.43	0.1	U	1	U
LHAAP-46	46WW03	Trichloroethene	12	11/6/1998	2/26/2018	0.52	0.25	U	1	U
LHAAP-46	46WW03	Vinyl chloride	12	11/6/1998	2/26/2018	0.52	0.25	U	1	U
LHAAP-46	46WW04	1,1,1-TRICHLOROETHANE	8	11/7/1998	2/3/2016	0.55	0.37	U	1	U
LHAAP-46	46WW04	1,1,2-TRICHLOROETHANE	8	11/7/1998	2/3/2016	0.58	0.5	U	1	U
LHAAP-46	46WW04	1,1-DICHLOROETHENE	8	11/7/1998	2/3/2016	0.96	0.68	U	1	U
LHAAP-46	46WW04	1,2-DICHLOROETHANE	8	11/7/1998	2/3/2016	0.57	0.5	U	1	U
LHAAP-46	46WW04	1,4-Dioxane	2	11/7/1998	5/3/2013	100.66	1.32	J	200	U
LHAAP-46	46WW04	CARBON TETRACHLORIDE	8	11/7/1998	2/3/2016	0.57	0.5	U	1	U
LHAAP-46	46WW04	CHLOROFORM	8	11/7/1998	2/3/2016	0.40	0.25	U	1	U
LHAAP-46	46WW04	CHROMIUM, TOTAL	2	9/7/2007	10/27/2008	299.95	90.9		509	
LHAAP-46	46WW04	CIS-1,2-DICHLOROETHENE	7	11/7/1998	2/3/2016	0.57	0.5	U	1	U
LHAAP-46	46WW04	MAGNESIUM, TOTAL	3	11/7/1998	10/27/2008	145666.67	47000		225000	
LHAAP-46	46WW04	MANGANESE, TOTAL	3	11/7/1998	10/27/2008	1572.33	177		3440	
LHAAP-46	46WW04	METHYLENE CHLORIDE	8	11/7/1998	2/3/2016	0.58	0.5	U	1	U
LHAAP-46	46WW04	NICKEL, TOTAL	3	11/7/1998	10/27/2008	1783.33	200		3040	
LHAAP-46	46WW04	Perchlorate	5	9/15/2000	2/19/2007	17.60	4	U	30	
LHAAP-46	46WW04	strontium, total	1	11/7/1998	11/7/1998	1500.00	1500		1500	
LHAAP-46	46WW04	TETRACHLOROETHENE	8	11/7/1998	2/3/2016	0.59	0.5	U	1	U
LHAAP-46	46WW04	THALLIUM, TOTAL	3	11/7/1998	10/27/2008	2.92	0.05	U	7.61	J
LHAAP-46	46WW04	TRICHLOROETHENE	8	11/7/1998	2/3/2016	0.54	0.5	U	0.71	J
LHAAP-46	46WW04	VINYL CHLORIDE	8	11/7/1998	2/3/2016	0.54	0.32	U	1	U
LHAAP-46	46WW05	1,1,1-Trichloroethane	12	10/9/2008	2/26/2018	0.46	0.25	U	0.5	U
LHAAP-46	46WW05	1,1,2-Trichloroethane	12	10/9/2008	2/26/2018	0.46	0.25	U	0.5	U
LHAAP-46	46WW05	1,1-Dichloroethene	12	10/9/2008	2/26/2018	5.62	0.5	U	10.4	
LHAAP-46	46WW05	1,2-Dichloroethane	12	10/9/2008	2/26/2018	0.46	0.25	U	0.5	U
LHAAP-46	46WW05	1,4-Dioxane	1	12/17/2015	12/17/2015	0.69	0.691	J	0.691	J
LHAAP-46	46WW05	Carbon tetrachloride	12	10/9/2008	2/26/2018	0.46	0.25	U	0.5	U
LHAAP-46	46WW05	Chloroform	12	10/9/2008	2/26/2018	0.25	0.125	U	0.5	U
LHAAP-46	46WW05	cis-1,2-Dichloroethene	12	10/9/2008	2/26/2018	6.41	0.5	U	10.9	
LHAAP-46	46WW05	manganese, total	1	2/26/2018	2/26/2018	14100.00	14100		14100	
LHAAP-46	46WW05	Methylene chloride	12	10/9/2008	2/26/2018	0.50	0.25	U	1	U
LHAAP-46	46WW05	Tetrachloroethene	11	10/9/2008	2/26/2018	0.48	0.25	U	0.5	U
LHAAP-46	46WW05	thallium, total	1	9/24/2013	9/24/2013	0.71	0.714		0.714	
LHAAP-46	46WW05	Trichloroethene	12	10/9/2008	2/26/2018	82.70	5.9		144	
LHAAP-46	46WW05	Vinyl chloride	12	10/9/2008	2/26/2018	1.27	0.25	U	2.53	
LHAAP-46	46WW06	1,1,1-Trichloroethane	12	10/9/2008	2/26/2018	0.48	0.25	U	0.5	U
LHAAP-46	46WW06	1,1,2-Trichloroethane	12	10/9/2008	2/26/2018	0.48	0.25	U	0.5	U
LHAAP-46	46WW06	1,1-Dichloroethene	12	10/9/2008	2/26/2018	0.92	0.5	U	1	U
LHAAP-46	46WW06	1,2-Dichloroethane	12	10/9/2008	2/26/2018	0.48	0.25	U	0.5	U
LHAAP-46	46WW06	Carbon tetrachloride	12	10/9/2008	2/26/2018	0.48	0.25	U	0.5	U
LHAAP-46	46WW06	Chloroform	11	5/24/2013	2/26/2018	0.27	0.25	U	0.5	U
LHAAP-46	46WW06	cis-1,2-Dichloroethene	12	10/9/2008	2/26/2018	0.48	0.25	U	0.5	U
LHAAP-46	46WW06	Methylene chloride	12	10/9/2008	2/26/2018	0.52	0.25	U	1	U
LHAAP-46	46WW06	Tetrachloroethene	12	10/9/2008	2/26/2018	0.48	0.25	U	0.5	U
LHAAP-46	46WW06	Trichloroethene	12	10/9/2008	2/26/2018	0.48	0.25	U	0.5	U
LHAAP-46	46WW06	Vinyl chloride	12	10/9/2008	2/26/2018	0.48	0.25	U	0.5	U
LHAAP-46	46WW07	1,1,1-Trichloroethane	11	5/25/2013	2/23/2018	0.50	0.5	U	0.5	U
LHAAP-46	46WW07	1,1,2-Trichloroethane	11	5/25/2013	2/23/2018	0.50	0.5	U	0.5	U
LHAAP-46	46WW07	1,1-Dichloroethene	11	5/25/2013	2/23/2018	0.95	0.5	U	1	U
LHAAP-46	46WW07	1,2-Dichloroethane	11	5/25/2013	2/23/2018	0.50	0.5	U	0.5	U
LHAAP-46	46WW07	Carbon tetrachloride	11	5/25/2013	2/23/2018	0.50	0.5	U	0.5	U
LHAAP-46	46WW07	Chloroform	11	5/25/2013	2/23/2018	0.27	0.25	U	0.5	U
LHAAP-46	46WW07	cis-1,2-Dichloroethene	11	5/25/2013	2/23/2018	0.50	0.5	U	0.5	U
LHAAP-46	46WW07	Methylene chloride	11	5/25/2013	2/23/2018	0.55	0.5	U	1	U
LHAAP-46	46WW07	Tetrachloroethene	11	5/25/2013	2/23/2018	0.50	0.5	U	0.5	U
LHAAP-46	46WW07	thallium, total	2	5/25/2013	9/21/2013	0.20	0.2	U	0.2	U
LHAAP-46	46WW07	Trichloroethene	11	5/25/2013	2/23/2018	0.50	0.5	U	0.5	U
LHAAP-46	46WW07	Vinyl chloride	11	5/25/2013	2/23/2018	0.50	0.5	U	0.5	U
LHAAP-46	46WW08	1,1,1-Trichloroethane	11	5/25/2013	2/23/2018	0.50	0.5	U	0.5	U

Summary of COC Concentrations for LHAAP Wells and Miscellaneous Sampling Locations

Area	Location	Constituent	Count	Earliest	Latest	Avg (µg/L)	Min (µg/L)	Code	Max (µg/L)	Code
LHAAP-46	46WW08	1,1,2-Trichloroethane	11	5/25/2013	2/23/2018	0.50	0.5	U	0.5	U
LHAAP-46	46WW08	1,1-Dichloroethene	11	5/25/2013	2/23/2018	0.95	0.5	U	1	U
LHAAP-46	46WW08	1,2-Dichloroethane	11	5/25/2013	2/23/2018	0.50	0.5	U	0.5	U
LHAAP-46	46WW08	Carbon tetrachloride	11	5/25/2013	2/23/2018	0.50	0.5	U	0.5	U
LHAAP-46	46WW08	Chloroform	11	5/25/2013	2/23/2018	0.27	0.25	U	0.5	U
LHAAP-46	46WW08	cis-1,2-Dichloroethene	11	5/25/2013	2/23/2018	0.50	0.5	U	0.5	U
LHAAP-46	46WW08	Methylene chloride	11	5/25/2013	2/23/2018	0.55	0.5	U	1	U
LHAAP-46	46WW08	Tetrachloroethene	11	5/25/2013	2/23/2018	0.50	0.5	U	0.5	U
LHAAP-46	46WW08	thallium, total	1	9/21/2013	9/21/2013	0.20	0.2	U	0.2	U
LHAAP-46	46WW08	Trichloroethene	11	5/25/2013	2/23/2018	0.50	0.5	U	0.5	U
LHAAP-46	46WW08	Vinyl chloride	11	5/25/2013	2/23/2018	0.50	0.5	U	0.5	U
LHAAP-46	46WW09	1,1,1-Trichloroethane	10	9/24/2013	2/22/2018	0.50	0.5	U	0.5	U
LHAAP-46	46WW09	1,1,2-Trichloroethane	10	9/24/2013	2/22/2018	0.50	0.5	U	0.5	U
LHAAP-46	46WW09	1,1-Dichloroethene	10	9/24/2013	2/22/2018	0.95	0.5	U	1	U
LHAAP-46	46WW09	1,2-Dichloroethane	10	9/24/2013	2/22/2018	0.50	0.5	U	0.5	U
LHAAP-46	46WW09	Carbon tetrachloride	10	9/24/2013	2/22/2018	0.50	0.5	U	0.5	U
LHAAP-46	46WW09	Chloroform	10	9/24/2013	2/22/2018	0.28	0.25	U	0.5	U
LHAAP-46	46WW09	cis-1,2-Dichloroethene	10	9/24/2013	2/22/2018	0.50	0.5	U	0.5	U
LHAAP-46	46WW09	manganese, total	1	2/22/2018	2/22/2018	2580.00	2580		2580	
LHAAP-46	46WW09	Methylene chloride	10	9/24/2013	2/22/2018	0.55	0.5	U	1	U
LHAAP-46	46WW09	Tetrachloroethene	10	9/24/2013	2/22/2018	0.50	0.5	U	0.5	U
LHAAP-46	46WW09	thallium, total	1	9/24/2013	9/24/2013	0.20	0.2	U	0.2	U
LHAAP-46	46WW09	Trichloroethene	10	9/24/2013	2/22/2018	0.50	0.5	U	0.5	U
LHAAP-46	46WW09	Vinyl chloride	10	9/24/2013	2/22/2018	0.50	0.5	U	0.5	U
LHAAP-46	46WW10	1,1,1-TRICHLOROETHANE	10	5/25/2013	8/4/2016	0.50	0.5	U	0.5	U
LHAAP-46	46WW10	1,1,2-TRICHLOROETHANE	10	5/25/2013	8/4/2016	0.50	0.5	U	0.5	U
LHAAP-46	46WW10	1,1-DICHLOROETHENE	10	5/25/2013	8/4/2016	1.00	1	U	1	U
LHAAP-46	46WW10	1,2-DICHLOROETHANE	10	5/25/2013	8/4/2016	0.50	0.5	U	0.5	U
LHAAP-46	46WW10	CARBON TETRACHLORIDE	10	5/25/2013	8/4/2016	0.50	0.5	U	0.5	U
LHAAP-46	46WW10	CHLOROFORM	10	5/25/2013	8/4/2016	0.25	0.25	U	0.25	U
LHAAP-46	46WW10	CIS-1,2-DICHLOROETHENE	10	5/25/2013	8/4/2016	0.50	0.5	U	0.5	U
LHAAP-46	46WW10	METHYLENE CHLORIDE	10	5/25/2013	8/4/2016	0.50	0.5	U	0.5	U
LHAAP-46	46WW10	TETRACHLOROETHENE	10	5/25/2013	8/4/2016	0.50	0.5	U	0.5	U
LHAAP-46	46WW10	thallium, total	2	5/25/2013	9/21/2013	0.20	0.2	U	0.2	U
LHAAP-46	46WW10	TRICHLOROETHENE	10	5/25/2013	8/4/2016	0.50	0.5	U	0.5	U
LHAAP-46	46WW10	VINYL CHLORIDE	10	5/25/2013	8/4/2016	0.50	0.5	U	0.5	U
LHAAP-46	46WW11	1,1,1-Trichloroethane	11	8/14/2013	2/20/2018	0.50	0.5	U	0.5	U
LHAAP-46	46WW11	1,1,2-Trichloroethane	11	8/14/2013	2/20/2018	0.50	0.5	U	0.5	U
LHAAP-46	46WW11	1,1-Dichloroethene	11	8/14/2013	2/20/2018	0.95	0.5	U	1	U
LHAAP-46	46WW11	1,2-Dichloroethane	11	8/14/2013	2/20/2018	0.50	0.5	U	0.5	U
LHAAP-46	46WW11	Carbon tetrachloride	11	8/14/2013	2/20/2018	0.50	0.5	U	0.5	U
LHAAP-46	46WW11	Chloroform	11	8/14/2013	2/20/2018	0.27	0.25	U	0.5	U
LHAAP-46	46WW11	cis-1,2-Dichloroethene	11	8/14/2013	2/20/2018	1.24	0.325	J	2.12	
LHAAP-46	46WW11	manganese, total	1	2/20/2018	2/20/2018	52.00	52		52	
LHAAP-46	46WW11	Methylene chloride	11	8/14/2013	2/20/2018	0.55	0.5	U	1	U
LHAAP-46	46WW11	Tetrachloroethene	11	8/14/2013	2/20/2018	0.50	0.5	U	0.5	U
LHAAP-46	46WW11	thallium, total	1	9/19/2013	9/19/2013	0.20	0.2	U	0.2	U
LHAAP-46	46WW11	Trichloroethene	11	8/14/2013	2/20/2018	55.40	18		90.6	
LHAAP-46	46WW11	Vinyl chloride	11	8/14/2013	2/20/2018	0.50	0.5	U	0.5	U
LHAAP-46	46WW13	1,1,1-TRICHLOROETHANE	2	5/29/2013	9/24/2013	0.38	0.25	U	0.5	U
LHAAP-46	46WW13	1,1,2-TRICHLOROETHANE	2	5/29/2013	9/24/2013	0.38	0.25	U	0.5	U
LHAAP-46	46WW13	1,1-DICHLOROETHENE	2	5/29/2013	9/24/2013	3.94	3.76		4.12	
LHAAP-46	46WW13	1,2-DICHLOROETHANE	2	5/29/2013	9/24/2013	0.38	0.25	U	0.5	U
LHAAP-46	46WW13	CARBON TETRACHLORIDE	2	5/29/2013	9/24/2013	0.38	0.25	U	0.5	U
LHAAP-46	46WW13	CHLOROFORM	2	5/29/2013	9/24/2013	0.22	0.19	U	0.25	U
LHAAP-46	46WW13	CIS-1,2-DICHLOROETHENE	2	5/29/2013	9/24/2013	36.40	35.5		37.3	
LHAAP-46	46WW13	METHYLENE CHLORIDE	2	5/29/2013	9/24/2013	0.38	0.25	U	0.5	U
LHAAP-46	46WW13	TETRACHLOROETHENE	2	5/29/2013	9/24/2013	0.35	0.317	J	0.386	J
LHAAP-46	46WW13	thallium, total	1	5/29/2013	5/29/2013	0.10	0.1	U	0.1	U
LHAAP-46	46WW13	TRICHLOROETHENE	2	5/29/2013	9/24/2013	105.00	103		107	
LHAAP-46	46WW13	VINYL CHLORIDE	2	5/29/2013	9/24/2013	11.47	9.83		13.1	
LHAAP-46	46WW14	1,1,1-TRICHLOROETHANE	9	5/29/2013	8/2/2016	0.47	0.25	U	0.5	U
LHAAP-46	46WW14	1,1,2-TRICHLOROETHANE	9	5/29/2013	8/2/2016	0.47	0.25	U	0.5	U
LHAAP-46	46WW14	1,1-DICHLOROETHENE	9	5/29/2013	8/2/2016	0.94	0.5	U	1	U
LHAAP-46	46WW14	1,2-DICHLOROETHANE	9	5/29/2013	8/2/2016	0.47	0.25	U	0.5	U
LHAAP-46	46WW14	CARBON TETRACHLORIDE	9	5/29/2013	8/2/2016	0.47	0.25	U	0.5	U
LHAAP-46	46WW14	CHLOROFORM	9	5/29/2013	8/2/2016	0.24	0.184	U	0.25	U
LHAAP-46	46WW14	CIS-1,2-DICHLOROETHENE	9	5/29/2013	8/2/2016	0.47	0.25	U	0.5	U
LHAAP-46	46WW14	METHYLENE CHLORIDE	9	5/29/2013	8/2/2016	0.47	0.25	U	0.5	U
LHAAP-46	46WW14	TETRACHLOROETHENE	9	5/29/2013	8/2/2016	0.47	0.25	U	0.5	U
LHAAP-46	46WW14	thallium, total	2	5/29/2013	9/19/2013	0.15	0.1	U	0.2	U
LHAAP-46	46WW14	TRICHLOROETHENE	9	5/29/2013	8/2/2016	0.47	0.25	U	0.5	U
LHAAP-46	46WW14	VINYL CHLORIDE	9	5/29/2013	8/2/2016	0.47	0.25	U	0.5	U
LHAAP-46	46WW16	1,1,1-Trichloroethane	8	7/1/2014	2/22/2018	0.50	0.5	U	0.5	U
LHAAP-46	46WW16	1,1,2-Trichloroethane	8	7/1/2014	2/22/2018	0.50	0.5	U	0.5	U
LHAAP-46	46WW16	1,1-Dichloroethene	8	7/1/2014	2/22/2018	0.94	0.5	U	1	U
LHAAP-46	46WW16	1,2-Dichloroethane	8	7/1/2014	2/22/2018	0.50	0.5	U	0.5	U
LHAAP-46	46WW16	Carbon tetrachloride	8	7/1/2014	2/22/2018	0.50	0.5	U	0.5	U
LHAAP-46	46WW16	Chloroform	8	7/1/2014	2/22/2018	0.28	0.25	U	0.5	U
LHAAP-46	46WW16	cis-1,2-Dichloroethene	8	7/1/2014	2/22/2018	0.50	0.5	U	0.5	U
LHAAP-46	46WW16	manganese, total	1	2/22/2018	2/22/2018	1440.00	1440		1440	
LHAAP-46	46WW16	Methylene chloride	8	7/1/2014	2/22/2018	0.56	0.5	U	1	U
LHAAP-46	46WW16	Tetrachloroethene	8	7/1/2014	2/22/2018	0.50	0.5	U	0.5	U
LHAAP-46	46WW16	Trichloroethene	8	7/1/2014	2/22/2018	0.50	0.5	U	0.5	U
LHAAP-46	46WW16	Vinyl chloride	8	7/1/2014	2/22/2018	0.50	0.5	U	0.5	U
LHAAP-46	LHSMW08	1,1,1-TRICHLOROETHANE	4	12/3/1994	9/21/2013	1.68	0.2	U	5	U
LHAAP-46	LHSMW08	1,1,2-TRICHLOROETHANE	4	12/3/1994	9/21/2013	1.79	0.5	U	5	U

Summary of COC Concentrations for LHAAP Wells and Miscellaneous Sampling Locations

Area	Location	Constituent	Count	Earliest	Latest	Avg (µg/L)	Min (µg/L)	Code	Max (µg/L)	Code
LHAAP-46	LHSMW08	1,1-DICHLOROETHENE	4	12/3/1994	9/21/2013	1.90	0.58		5	U
LHAAP-46	LHSMW08	1,2-DICHLOROETHANE	4	12/3/1994	9/21/2013	1.70	0.31	U	5	U
LHAAP-46	LHSMW08	1,4-Dioxane	1	5/13/1998	5/13/1998	200.00	200	U	200	U
LHAAP-46	LHSMW08	CARBON TETRACHLORIDE	4	12/3/1994	9/21/2013	1.90	0.5	U	5	U
LHAAP-46	LHSMW08	CHLOROFORM	4	12/3/1994	9/21/2013	1.61	0.2	U	5	U
LHAAP-46	LHSMW08	CIS-1,2-DICHLOROETHENE	3	8/13/1996	9/21/2013	0.57	0.2	U	1	U
LHAAP-46	LHSMW08	magnesium, total	4	12/3/1994	5/13/1998	27400.00	12000		57500	
LHAAP-46	LHSMW08	manganese, total	4	12/3/1994	5/13/1998	350.00	217		680	
LHAAP-46	LHSMW08	METHYLENE CHLORIDE	4	12/3/1994	9/21/2013	1.68	0.22	U	5	U
LHAAP-46	LHSMW08	nickel, total	3	2/1/1996	5/13/1998	25.00	15	U	40	U
LHAAP-46	LHSMW08	strontium, total	4	12/3/1994	5/13/1998	736.25	290		1500	
LHAAP-46	LHSMW08	TETRACHLOROETHENE	4	12/3/1994	9/21/2013	1.69	0.25	U	5	U
LHAAP-46	LHSMW08	thallium, total	4	12/3/1994	5/13/1998	170.25	1	U	500	U
LHAAP-46	LHSMW08	TRICHLOROETHENE	3	8/13/1996	9/21/2013	0.58	0.25	U	1	U
LHAAP-46	LHSMW08	VINYL CHLORIDE	3	8/13/1996	9/21/2013	0.58	0.24	U	1	U
LHAAP-46	LHSMW14	1,1,1-TRICHLOROETHANE	4	11/29/1994	9/24/2013	1.68	0.2	U	5	U
LHAAP-46	LHSMW14	1,1,2-TRICHLOROETHANE	4	11/29/1994	9/24/2013	1.79	0.5	U	5	U
LHAAP-46	LHSMW14	1,1-DICHLOROETHENE	5	11/29/1994	9/24/2013	1.64	0.2	U	5	U
LHAAP-46	LHSMW14	1,2-DICHLOROETHANE	4	11/29/1994	9/24/2013	1.70	0.31	U	5	U
LHAAP-46	LHSMW14	1,4-Dioxane	1	5/14/1998	5/14/1998	200.00	200	U	200	U
LHAAP-46	LHSMW14	CARBON TETRACHLORIDE	4	11/29/1994	9/24/2013	1.90	0.5	U	5	U
LHAAP-46	LHSMW14	CHLOROFORM	5	11/29/1994	9/24/2013	1.49	0.2	U	5	U
LHAAP-46	LHSMW14	CHROMIUM, TOTAL	1	9/10/2007	9/10/2007	62.70	62.7		62.7	
LHAAP-46	LHSMW14	CIS-1,2-DICHLOROETHENE	3	8/14/1996	9/24/2013	0.57	0.2	U	1	U
LHAAP-46	LHSMW14	MAGNESIUM, TOTAL	5	11/29/1994	9/10/2007	3470.00	1610	J	6500	
LHAAP-46	LHSMW14	MANGANESE, TOTAL	5	11/29/1994	9/10/2007	100.74	23.7		270	
LHAAP-46	LHSMW14	METHYLENE CHLORIDE	5	11/29/1994	9/24/2013	1.54	0.22	U	5	U
LHAAP-46	LHSMW14	NICKEL, TOTAL	4	2/6/1996	9/10/2007	37.63	13.5	J	90	
LHAAP-46	LHSMW14	strontium, total	4	11/29/1994	5/14/1998	82.50	50	U	160	
LHAAP-46	LHSMW14	TETRACHLOROETHENE	5	11/29/1994	9/24/2013	1.55	0.25	U	5	U
LHAAP-46	LHSMW14	thallium, total	5	11/29/1994	9/24/2013	136.24	0.2	U	500	U
LHAAP-46	LHSMW14	TRICHLOROETHENE	5	11/29/1994	9/24/2013	1.55	0.25	U	5	U
LHAAP-46	LHSMW14	VINYL CHLORIDE	4	2/6/1996	9/24/2013	0.69	0.24	U	1	U
LHAAP-46	LHSMW16	1,1,1-Trichloroethane	3	11/29/1994	5/14/1998	2.07	0.2	U	5	U
LHAAP-46	LHSMW16	1,1,2-Trichloroethane	3	11/29/1994	5/14/1998	2.22	0.65	U	5	U
LHAAP-46	LHSMW16	1,1-Dichloroethene	4	11/29/1994	5/14/1998	1.80	0.2	U	5	U
LHAAP-46	LHSMW16	1,2-Dichloroethane	3	11/29/1994	5/14/1998	2.10	0.31	U	5	U
LHAAP-46	LHSMW16	1,4-Dioxane	1	5/14/1998	5/14/1998	200.00	200	U	200	U
LHAAP-46	LHSMW16	Carbon tetrachloride	3	11/29/1994	5/14/1998	2.37	1	U	5	U
LHAAP-46	LHSMW16	Chloroform	4	11/29/1994	5/14/1998	1.80	0.2	U	5	U
LHAAP-46	LHSMW16	cis-1,2-Dichloroethene	2	8/15/1996	5/14/1998	0.60	0.2	U	1	U
LHAAP-46	LHSMW16	magnesium, total	4	11/29/1994	5/14/1998	75700.00	69200	J	90500	
LHAAP-46	LHSMW16	manganese, total	4	11/29/1994	5/14/1998	494.00	49		1800	
LHAAP-46	LHSMW16	Methylene chloride	4	11/29/1994	5/14/1998	1.81	0.22	U	5	U
LHAAP-46	LHSMW16	nickel, total	3	2/6/1996	5/14/1998	35.33	20	U	46	
LHAAP-46	LHSMW16	strontium, total	4	11/29/1994	5/14/1998	1455.00	1300		1700	
LHAAP-46	LHSMW16	Tetrachloroethene	4	11/29/1994	5/14/1998	1.81	0.25	U	5	U
LHAAP-46	LHSMW16	thallium, total	5	11/29/1994	5/29/2013	118.76	0.1	U	500	U
LHAAP-46	LHSMW16	Trichloroethene	4	11/29/1994	5/14/1998	1.81	0.25	U	5	U
LHAAP-46	LHSMW16	Vinyl chloride	3	2/6/1996	5/14/1998	0.75	0.24	U	1	U
LHAAP-46	LHSMW18	1,1,1-TRICHLOROETHANE	5	12/2/1994	3/29/2016	1.41	0.2	U	5	U
LHAAP-46	LHSMW18	1,1,2-TRICHLOROETHANE	5	12/2/1994	3/29/2016	1.56	0.5	U	5	U
LHAAP-46	LHSMW18	1,1-DICHLOROETHENE	6	12/2/1994	3/29/2016	2.06	0.68	U	3.8	
LHAAP-46	LHSMW18	1,2-DICHLOROETHANE	5	12/2/1994	3/29/2016	1.47	0.31	U	5	U
LHAAP-46	LHSMW18	1,4-Dioxane	1	5/14/1998	5/14/1998	200.00	200	U	200	U
LHAAP-46	LHSMW18	CARBON TETRACHLORIDE	5	12/2/1994	3/29/2016	1.62	0.5	U	5	U
LHAAP-46	LHSMW18	CHLOROFORM	6	12/2/1994	3/29/2016	1.35	0.2	U	5	U
LHAAP-46	LHSMW18	CIS-1,2-DICHLOROETHENE	4	8/15/1996	3/29/2016	4.67	1.28		9.8	
LHAAP-46	LHSMW18	magnesium, total	4	12/2/1994	5/14/1998	116500.00	108000	J	125000	
LHAAP-46	LHSMW18	manganese, total	4	12/2/1994	5/14/1998	3455.00	2290		6500	
LHAAP-46	LHSMW18	METHYLENE CHLORIDE	6	12/2/1994	3/29/2016	1.40	0.22	U	5	U
LHAAP-46	LHSMW18	nickel, total	3	2/12/1996	5/14/1998	145.67	120		165	
LHAAP-46	LHSMW18	Perchlorate	6	5/19/2000	2/20/2007	2.95	0.71	U	4	U
LHAAP-46	LHSMW18	strontium, total	4	12/2/1994	5/14/1998	2180.00	1990	J	2400	
LHAAP-46	LHSMW18	TETRACHLOROETHENE	6	12/2/1994	3/29/2016	1.61	0.5	U	5	U
LHAAP-46	LHSMW18	thallium, total	4	12/2/1994	5/14/1998	170.25	1	U	500	U
LHAAP-46	LHSMW18	TRICHLOROETHENE	6	12/2/1994	3/29/2016	18.11	3.35		38	
LHAAP-46	LHSMW18	VINYL CHLORIDE	5	2/12/1996	3/29/2016	0.64	0.32	U	1	U
LHAAP-46	LHSMW19	1,1,1-Trichloroethane	16	12/2/1994	2/20/2018	0.75	0.2	U	5	U
LHAAP-46	LHSMW19	1,1,2-Trichloroethane	16	12/2/1994	2/20/2018	0.80	0.25	U	5	U
LHAAP-46	LHSMW19	1,1-Dichloroethene	17	12/2/1994	2/20/2018	1.20	0.2	U	5	U
LHAAP-46	LHSMW19	1,2-Dichloroethane	16	12/2/1994	2/20/2018	0.77	0.25	U	5	U
LHAAP-46	LHSMW19	1,4-Dioxane	2	5/15/1998	12/17/2015	100.31	0.611	J	200	U
LHAAP-46	LHSMW19	Carbon tetrachloride	16	12/2/1994	2/20/2018	0.82	0.25	U	5	U
LHAAP-46	LHSMW19	Chloroform	17	12/2/1994	2/20/2018	0.77	0.125	U	5	U
LHAAP-46	LHSMW19	CHROMIUM, TOTAL	1	9/11/2007	9/11/2007	16.40	16.4	J	16.4	J
LHAAP-46	LHSMW19	cis-1,2-Dichloroethene	15	8/15/1996	2/20/2018	1.51	0.2	U	2.98	
LHAAP-46	LHSMW19	MAGNESIUM, TOTAL	5	12/2/1994	9/11/2007	31400.00	17000		44800	
LHAAP-46	LHSMW19	manganese, total	6	12/2/1994	2/20/2018	182.25	15	U	700	
LHAAP-46	LHSMW19	Methylene chloride	17	12/2/1994	2/20/2018	0.93	0.22	U	5	U
LHAAP-46	LHSMW19	NICKEL, TOTAL	4	2/6/1996	9/11/2007	38.70	19		75.8	
LHAAP-46	LHSMW19	Perchlorate	3	3/10/2002	2/20/2007	4.00	4	U	4	U
LHAAP-46	LHSMW19	strontium, total	4	12/2/1994	5/15/1998	2892.50	1600		3400	
LHAAP-46	LHSMW19	Tetrachloroethene	17	12/2/1994	2/20/2018	0.91	0.25	U	5	U
LHAAP-46	LHSMW19	thallium, total	7	12/2/1994	9/24/2013	84.99	0.1	U	500	U
LHAAP-46	LHSMW19	Trichloroethene	17	12/2/1994	2/20/2018	37.91	2.4		85.5	
LHAAP-46	LHSMW19	Vinyl chloride	16	2/6/1996	2/20/2018	0.63	0.24	U	3	U

Summary of COC Concentrations for LHAAP Wells and Miscellaneous Sampling Locations

Area	Location	Constituent	Count	Earliest	Latest	Avg (µg/L)	Min (µg/L)	Code	Max (µg/L)	Code
LHAAP-46	LHSMW21	1,1,1-TRICHLOROETHANE	4	12/4/1994	9/25/2013	1.68	0.2	U	5	U
LHAAP-46	LHSMW21	1,1,2-TRICHLOROETHANE	4	12/4/1994	9/25/2013	1.79	0.5	U	5	U
LHAAP-46	LHSMW21	1,1-DICHLOROETHENE	5	12/4/1994	9/25/2013	1.64	0.2	U	5	U
LHAAP-46	LHSMW21	1,2-DICHLOROETHANE	4	12/4/1994	9/25/2013	1.70	0.31	U	5	U
LHAAP-46	LHSMW21	1,4-Dioxane	1	5/15/1998	5/15/1998	200.00	200	U	200	U
LHAAP-46	LHSMW21	CARBON TETRACHLORIDE	4	12/4/1994	9/25/2013	1.90	0.5	U	5	U
LHAAP-46	LHSMW21	CHLOROFORM	5	12/4/1994	9/25/2013	1.49	0.2	U	5	U
LHAAP-46	LHSMW21	CIS-1,2-DICHLOROETHENE	3	8/15/1996	9/25/2013	10.60	0.2	U	30.6	
LHAAP-46	LHSMW21	magnesium, total	4	12/4/1994	5/15/1998	209750.00	196000	J	230000	
LHAAP-46	LHSMW21	manganese, total	4	12/4/1994	5/15/1998	1336.00	417		3700	
LHAAP-46	LHSMW21	METHYLENE CHLORIDE	5	12/4/1994	9/25/2013	1.54	0.22	U	5	U
LHAAP-46	LHSMW21	nickel, total	3	2/7/1996	5/15/1998	45.67	43		50	
LHAAP-46	LHSMW21	strontium, total	4	12/4/1994	5/15/1998	5660.00	3800		10000	
LHAAP-46	LHSMW21	TETRACHLOROETHENE	5	12/4/1994	9/25/2013	1.55	0.25	U	5	U
LHAAP-46	LHSMW21	thallium, total	6	12/4/1994	9/25/2013	126.30	0.1	U	500	U
LHAAP-46	LHSMW21	TRICHLOROETHENE	4	2/7/1996	9/25/2013	0.97	0.25	U	1.64	
LHAAP-46	LHSMW21	VINYL CHLORIDE	4	2/7/1996	9/25/2013	0.92	0.24	U	1.44	
LHAAP-46	LHSMW25	1,1,1-Trichloroethane	15	12/4/1994	2/22/2018	0.80	0.2	U	5	U
LHAAP-46	LHSMW25	1,1,2-Trichloroethane	15	12/4/1994	2/22/2018	0.83	0.25	U	5	U
LHAAP-46	LHSMW25	1,1-Dichloroethene	16	12/4/1994	2/22/2018	1.14	0.2	U	5	U
LHAAP-46	LHSMW25	1,2-Dichloroethane	15	12/4/1994	2/22/2018	0.80	0.25	U	5	U
LHAAP-46	LHSMW25	1,4-Dioxane	1	5/15/1998	5/15/1998	200.00	200	U	200	U
LHAAP-46	LHSMW25	Carbon tetrachloride	15	12/4/1994	2/22/2018	0.86	0.25	U	5	U
LHAAP-46	LHSMW25	Chloroform	16	12/4/1994	2/22/2018	0.65	0.125	U	5	U
LHAAP-46	LHSMW25	cis-1,2-Dichloroethene	14	8/20/1996	2/22/2018	0.50	0.2	U	1	U
LHAAP-46	LHSMW25	magnesium, total	4	12/4/1994	5/15/1998	197500.00	142000		250000	
LHAAP-46	LHSMW25	manganese, total	4	12/4/1994	5/15/1998	300.50	107		750	
LHAAP-46	LHSMW25	Methylene chloride	16	12/4/1994	2/22/2018	0.84	0.22	U	5	U
LHAAP-46	LHSMW25	nickel, total	3	2/7/1996	5/15/1998	42.33	26	J	61	
LHAAP-46	LHSMW25	strontium, total	4	12/4/1994	5/15/1998	6577.50	3700		12000	
LHAAP-46	LHSMW25	Tetrachloroethene	16	12/4/1994	2/22/2018	0.81	0.25	U	5	U
LHAAP-46	LHSMW25	thallium, total	5	12/4/1994	9/25/2013	118.58	0.2	U	500	U
LHAAP-46	LHSMW25	Trichloroethene	16	12/4/1994	2/22/2018	0.81	0.25	U	5	U
LHAAP-46	LHSMW25	Vinyl chloride	15	2/7/1996	2/22/2018	0.53	0.24	U	1	U
LHAAP-50	50DPT01A	1,1,1-TRICHLOROETHANE	2	8/11/2013	8/12/2013	0.50	0.5	U	0.5	U
LHAAP-50	50DPT01A	1,1,2-TRICHLOROETHANE	2	8/11/2013	8/12/2013	0.50	0.5	U	0.5	U
LHAAP-50	50DPT01A	1,1-DICHLOROETHENE	2	8/11/2013	8/12/2013	1.00	1	U	1	U
LHAAP-50	50DPT01A	1,2-DICHLOROETHANE	2	8/11/2013	8/12/2013	0.50	0.5	U	0.5	U
LHAAP-50	50DPT01A	CARBON TETRACHLORIDE	2	8/11/2013	8/12/2013	0.50	0.5	U	0.5	U
LHAAP-50	50DPT01A	CHLOROFORM	2	8/11/2013	8/12/2013	0.25	0.25	U	0.25	U
LHAAP-50	50DPT01A	CIS-1,2-DICHLOROETHENE	2	8/11/2013	8/12/2013	0.56	0.306	J	0.804	J
LHAAP-50	50DPT01A	magnesium, total	2	8/11/2013	8/12/2013	76250.00	73600		78900	
LHAAP-50	50DPT01A	METHYLENE CHLORIDE	2	8/11/2013	8/12/2013	0.50	0.5	U	0.5	U
LHAAP-50	50DPT01A	PERCHLORATE	2	8/11/2013	8/12/2013	0.71	0.605		0.806	
LHAAP-50	50DPT01A	TETRACHLOROETHENE	2	8/11/2013	8/12/2013	0.50	0.5	U	0.5	U
LHAAP-50	50DPT01A	TRICHLOROETHENE	2	8/11/2013	8/12/2013	3.26	1.9		4.62	
LHAAP-50	50DPT01A	VINYL CHLORIDE	2	8/11/2013	8/12/2013	0.50	0.5	U	0.5	U
LHAAP-50	50DPT03A	1,1,1-TRICHLOROETHANE	1	8/8/2013	8/8/2013	0.50	0.5	U	0.5	U
LHAAP-50	50DPT03A	1,1,2-TRICHLOROETHANE	1	8/8/2013	8/8/2013	0.50	0.5	U	0.5	U
LHAAP-50	50DPT03A	1,1-DICHLOROETHENE	1	8/8/2013	8/8/2013	2.25	2.25		2.25	
LHAAP-50	50DPT03A	1,2-DICHLOROETHANE	1	8/8/2013	8/8/2013	4.75	4.75		4.75	
LHAAP-50	50DPT03A	CARBON TETRACHLORIDE	1	8/8/2013	8/8/2013	0.50	0.5	U	0.5	U
LHAAP-50	50DPT03A	CHLOROFORM	1	8/8/2013	8/8/2013	0.21	0.208	J	0.208	J
LHAAP-50	50DPT03A	CIS-1,2-DICHLOROETHENE	1	8/8/2013	8/8/2013	11.90	11.9		11.9	
LHAAP-50	50DPT03A	magnesium, total	1	8/8/2013	8/8/2013	129000.00	129000		129000	
LHAAP-50	50DPT03A	METHYLENE CHLORIDE	1	8/8/2013	8/8/2013	0.50	0.5	U	0.5	U
LHAAP-50	50DPT03A	PERCHLORATE	1	8/8/2013	8/8/2013	884.00	884		884	
LHAAP-50	50DPT03A	TETRACHLOROETHENE	1	8/8/2013	8/8/2013	0.39	0.385	J	0.385	J
LHAAP-50	50DPT03A	TRICHLOROETHENE	1	8/8/2013	8/8/2013	371.00	371		371	
LHAAP-50	50DPT03A	VINYL CHLORIDE	1	8/8/2013	8/8/2013	0.50	0.5	U	0.5	U
LHAAP-50	50WW01	1,1,1-Trichloroethane	8	9/30/1998	5/12/2016	1.16	0.25	U	5	U
LHAAP-50	50WW01	1,1,2-Trichloroethane	8	9/30/1998	5/12/2016	1.16	0.25	U	5	U
LHAAP-50	50WW01	1,1-Dichloroethene	8	9/30/1998	5/12/2016	1.44	0.5	U	5	U
LHAAP-50	50WW01	1,2-Dichloroethane	8	9/30/1998	5/12/2016	1.16	0.25	U	5	U
LHAAP-50	50WW01	1,4-Dioxane	1	9/30/1998	9/30/1998	200.00	200	U	200	U
LHAAP-50	50WW01	Carbon tetrachloride	8	9/30/1998	5/12/2016	1.16	0.25	U	5	U
LHAAP-50	50WW01	Chloroform	8	9/30/1998	5/12/2016	1.02	0.125	U	5	U
LHAAP-50	50WW01	cis-1,2-Dichloroethene	8	9/30/1998	5/12/2016	1.15	0.25	U	5	U
LHAAP-50	50WW01	magnesium, total	1	9/30/1998	9/30/1998	9700.00	9700		9700	
LHAAP-50	50WW01	manganese, total	1	9/30/1998	9/30/1998	112.00	112		112	
LHAAP-50	50WW01	Methylene chloride	8	9/30/1998	5/12/2016	1.66	0.25	U	5	U
LHAAP-50	50WW01	nickel, total	1	9/30/1998	9/30/1998	40.00	40	U	40	U
LHAAP-50	50WW01	Perchlorate	13	10/22/1998	5/12/2016	1.41	0.158	J	4	U
LHAAP-50	50WW01	strontium, total	1	9/30/1998	9/30/1998	240.00	240		240	
LHAAP-50	50WW01	Tetrachloroethene	8	9/30/1998	5/12/2016	1.16	0.25	U	5	U
LHAAP-50	50WW01	thallium, total	1	9/30/1998	9/30/1998	1.00	1	U	1	U
LHAAP-50	50WW01	Trichloroethene	7	9/30/1998	5/12/2016	0.72	0.25	U	1.2	
LHAAP-50	50WW01	Vinyl chloride	8	9/30/1998	5/12/2016	1.16	0.25	U	5	U
LHAAP-50	50WW05	1,1,1-Trichloroethane	15	5/11/2005	11/10/2017	0.66	0.37	U	1.25	U
LHAAP-50	50WW05	1,1,2-Trichloroethane	15	5/11/2005	11/10/2017	0.63	0.275	J	1.25	U
LHAAP-50	50WW05	1,1-Dichloroethene	15	5/11/2005	11/10/2017	9.68	1.42	J	100	U
LHAAP-50	50WW05	1,2-Dichloroethane	15	5/11/2005	11/10/2017	10.08	1.3		100	U
LHAAP-50	50WW05	1,4-Dioxane	2	5/4/2013	12/16/2015	1.67	1	U	2.33	
LHAAP-50	50WW05	Carbon tetrachloride	15	5/11/2005	11/10/2017	7.27	0.5	U	100	U
LHAAP-50	50WW05	Chloroform	15	5/11/2005	11/10/2017	0.37	0.129	J	1	U
LHAAP-50	50WW05	cis-1,2-Dichloroethene	14	5/11/2005	11/10/2017	25.17	9.81		66.7	
LHAAP-50	50WW05	MAGNESIUM, TOTAL	1	8/5/2010	8/5/2010	48500.00	48500		48500	

Summary of COC Concentrations for LHAAP Wells and Miscellaneous Sampling Locations

Area	Location	Constituent	Count	Earliest	Latest	Avg (µg/L)	Min (µg/L)	Code	Max (µg/L)	Code
LHAAP-50	50WW05	MANGANESE, TOTAL	1	8/5/2010	8/5/2010	453.00	453		453	
LHAAP-50	50WW05	Methylene chloride	15	5/11/2005	11/10/2017	34.04	0.5	U	500	U
LHAAP-50	50WW05	NICKEL, TOTAL	1	8/5/2010	8/5/2010	21.40	21.4		21.4	
LHAAP-50	50WW05	Perchlorate	16	9/21/2002	11/10/2017	414.12	0.134	J	5850	
LHAAP-50	50WW05	Tetrachloroethene	15	5/11/2005	11/10/2017	8.04	0.565	J	100	U
LHAAP-50	50WW05	THALLIUM, TOTAL	1	8/5/2010	8/5/2010	0.25	0.25	U	0.25	U
LHAAP-50	50WW05	Trichloroethene	15	5/11/2005	11/10/2017	557.00	129		3130	
LHAAP-50	50WW05	Vinyl chloride	15	5/11/2005	11/10/2017	7.42	0.5	U	100	U
LHAAP-50	50WW06	1,1,1-Trichloroethane	14	5/11/2005	11/13/2017	0.54	0.25	U	1	U
LHAAP-50	50WW06	1,1,2-Trichloroethane	15	8/30/2004	11/13/2017	0.86	0.25	U	5	U
LHAAP-50	50WW06	1,1-Dichloroethene	15	8/30/2004	11/13/2017	1.21	0.5	U	5	U
LHAAP-50	50WW06	1,2-Dichloroethane	14	5/11/2005	11/13/2017	0.54	0.25	U	1	U
LHAAP-50	50WW06	1,4-Dioxane	2	5/4/2013	12/17/2015	1.00	1	U	1	U
LHAAP-50	50WW06	Carbon tetrachloride	14	5/11/2005	11/13/2017	0.56	0.25	U	1	U
LHAAP-50	50WW06	Chloroform	15	8/30/2004	11/13/2017	0.69	0.125	U	5	U
LHAAP-50	50WW06	cis-1,2-Dichloroethene	14	8/30/2004	11/13/2017	1.19	0.25	U	5	U
LHAAP-50	50WW06	manganese, total	3	5/10/2016	11/13/2017	188.23	55.7		265	
LHAAP-50	50WW06	Methylene chloride	15	8/30/2004	11/13/2017	1.19	0.25	U	5	U
LHAAP-50	50WW06	Perchlorate	15	8/30/2004	11/13/2017	1791.10	4	U	5860	
LHAAP-50	50WW06	Tetrachloroethene	15	8/30/2004	11/13/2017	0.87	0.25	U	5	U
LHAAP-50	50WW06	Trichloroethene	15	8/30/2004	11/13/2017	29.32	2		59.4	
LHAAP-50	50WW06	Vinyl chloride	15	8/30/2004	11/13/2017	0.84	0.25	U	5	U
LHAAP-50	50WW07	1,1,1-Trichloroethane	12	2/19/2008	5/11/2016	0.44	0.25	U	0.5	U
LHAAP-50	50WW07	1,1,2-Trichloroethane	12	2/19/2008	5/11/2016	0.44	0.25	U	0.5	U
LHAAP-50	50WW07	1,1-Dichloroethene	12	2/19/2008	5/11/2016	0.88	0.5	U	1	U
LHAAP-50	50WW07	1,2-Dichloroethane	12	2/19/2008	5/11/2016	0.44	0.25	U	0.5	U
LHAAP-50	50WW07	Carbon tetrachloride	12	2/19/2008	5/11/2016	0.44	0.25	U	0.5	U
LHAAP-50	50WW07	Chloroform	12	2/19/2008	5/11/2016	0.22	0.125	U	0.25	U
LHAAP-50	50WW07	cis-1,2-Dichloroethene	12	2/19/2008	5/11/2016	0.44	0.25	U	0.5	U
LHAAP-50	50WW07	Methylene chloride	12	2/19/2008	5/11/2016	0.44	0.25	U	0.5	U
LHAAP-50	50WW07	Perchlorate	10	4/4/2009	5/11/2016	0.32	0.2	U	1.08	
LHAAP-50	50WW07	Tetrachloroethene	12	2/19/2008	5/11/2016	0.44	0.25	U	0.5	U
LHAAP-50	50WW07	Trichloroethene	12	2/19/2008	5/11/2016	0.43	0.25	U	0.5	U
LHAAP-50	50WW07	Vinyl chloride	12	2/19/2008	5/11/2016	0.44	0.25	U	0.5	U
LHAAP-50	50WW08	1,1,1-Trichloroethane	10	3/11/2014	11/13/2017	1.13	0.5	U	2.5	U
LHAAP-50	50WW08	1,1,2-Trichloroethane	10	3/11/2014	11/13/2017	1.13	0.5	U	2.5	U
LHAAP-50	50WW08	1,1-Dichloroethene	10	3/11/2014	11/13/2017	2.20	0.812	J	5	U
LHAAP-50	50WW08	1,2-Dichloroethane	10	3/11/2014	11/13/2017	2.99	0.98	J	5.73	
LHAAP-50	50WW08	1,4-Dioxane	1	12/16/2015	12/16/2015	0.71	0.71	J	0.71	J
LHAAP-50	50WW08	Carbon tetrachloride	10	3/11/2014	11/13/2017	1.13	0.5	U	2.5	U
LHAAP-50	50WW08	Chloroform	10	3/11/2014	11/13/2017	0.59	0.25	U	1.25	U
LHAAP-50	50WW08	cis-1,2-Dichloroethene	10	3/11/2014	11/13/2017	53.83	17.7		103	
LHAAP-50	50WW08	manganese, total	3	5/3/2016	11/13/2017	31.67	26.8		39.2	
LHAAP-50	50WW08	Methylene chloride	10	3/11/2014	11/13/2017	1.23	0.5	U	2.5	U
LHAAP-50	50WW08	Perchlorate	10	3/11/2014	11/13/2017	106.72	27		200	
LHAAP-50	50WW08	Tetrachloroethene	10	3/11/2014	11/13/2017	1.68	1		2.55	
LHAAP-50	50WW08	Trichloroethene	10	3/11/2014	11/13/2017	551.30	180	J	852	
LHAAP-50	50WW08	Vinyl chloride	10	3/11/2014	11/13/2017	1.11	0.374	J	2.5	U
LHAAP-50	50WW09	1,1,1-Trichloroethane	11	11/1/2013	11/10/2017	0.55	0.5	U	1	U
LHAAP-50	50WW09	1,1,2-Trichloroethane	11	11/1/2013	11/10/2017	0.55	0.5	U	1	U
LHAAP-50	50WW09	1,1-Dichloroethene	11	11/1/2013	11/10/2017	1.00	1	U	1	U
LHAAP-50	50WW09	1,2-Dichloroethane	11	11/1/2013	11/10/2017	0.78	0.5	U	1.66	
LHAAP-50	50WW09	Carbon tetrachloride	11	11/1/2013	11/10/2017	0.55	0.5	U	1	U
LHAAP-50	50WW09	Chloroform	11	11/1/2013	11/10/2017	0.34	0.205	J	1	U
LHAAP-50	50WW09	cis-1,2-Dichloroethene	11	11/1/2013	11/10/2017	8.72	0.36	J	29.4	
LHAAP-50	50WW09	Methylene chloride	11	11/1/2013	11/10/2017	0.64	0.5	U	2	U
LHAAP-50	50WW09	Perchlorate	11	11/1/2013	11/10/2017	0.65	0.196	J	4	U
LHAAP-50	50WW09	Tetrachloroethene	11	11/1/2013	11/10/2017	0.50	0.344	J	1	U
LHAAP-50	50WW09	Trichloroethene	11	11/1/2013	11/10/2017	93.50	0.26	J	235	
LHAAP-50	50WW09	Vinyl chloride	11	11/1/2013	11/10/2017	0.55	0.5	U	1	U
LHAAP-50	50WW10	1,1,1-Trichloroethane	11	11/5/2013	11/10/2017	0.55	0.5	U	1	U
LHAAP-50	50WW10	1,1,2-Trichloroethane	11	11/5/2013	11/10/2017	0.55	0.5	U	1	U
LHAAP-50	50WW10	1,1-Dichloroethene	11	11/5/2013	11/10/2017	1.00	1	U	1	U
LHAAP-50	50WW10	1,2-Dichloroethane	11	11/5/2013	11/10/2017	0.55	0.5	U	1	U
LHAAP-50	50WW10	Carbon tetrachloride	11	11/5/2013	11/10/2017	0.55	0.5	U	1	U
LHAAP-50	50WW10	Chloroform	11	11/5/2013	11/10/2017	0.32	0.25	U	1	U
LHAAP-50	50WW10	cis-1,2-Dichloroethene	11	11/5/2013	11/10/2017	0.55	0.5	U	1	U
LHAAP-50	50WW10	Methylene chloride	11	11/5/2013	11/10/2017	0.64	0.5	U	2	U
LHAAP-50	50WW10	Perchlorate	11	11/5/2013	11/10/2017	0.64	0.2	U	4	U
LHAAP-50	50WW10	Tetrachloroethene	11	11/5/2013	11/10/2017	0.55	0.5	U	1	U
LHAAP-50	50WW10	Trichloroethene	11	11/5/2013	11/10/2017	0.57	0.494	J	1	U
LHAAP-50	50WW10	Vinyl chloride	11	11/5/2013	11/10/2017	0.55	0.5	U	1	U
LHAAP-50	50WW11	1,1,1-Trichloroethane	11	10/28/2013	11/13/2017	2.57	0.5	U	10	U
LHAAP-50	50WW11	1,1,2-Trichloroethane	11	10/28/2013	11/13/2017	2.57	0.5	U	10	U
LHAAP-50	50WW11	1,1-Dichloroethene	11	10/28/2013	11/13/2017	13.14	1.03	J	33	
LHAAP-50	50WW11	1,2-Dichloroethane	11	10/28/2013	11/13/2017	13.54	1.2		30	
LHAAP-50	50WW11	Carbon tetrachloride	11	10/28/2013	11/13/2017	2.57	0.5	U	10	U
LHAAP-50	50WW11	Chloroform	11	10/28/2013	11/13/2017	1.83	0.25	U	10	U
LHAAP-50	50WW11	cis-1,2-Dichloroethene	11	10/28/2013	11/13/2017	34.74	2.4		78	
LHAAP-50	50WW11	manganese, total	3	5/10/2016	11/13/2017	92.20	69.6		104	
LHAAP-50	50WW11	Methylene chloride	11	10/28/2013	11/13/2017	3.48	0.5	U	20	U
LHAAP-50	50WW11	Perchlorate	11	10/28/2013	11/13/2017	12219.09	1140		22800	
LHAAP-50	50WW11	Tetrachloroethene	11	10/28/2013	11/13/2017	3.52	0.275	J	10	U
LHAAP-50	50WW11	Trichloroethene	11	10/28/2013	11/13/2017	1844.45	230		4700	
LHAAP-50	50WW11	Vinyl chloride	11	10/28/2013	11/13/2017	2.95	0.5	U	10	U
LHAAP-50	50WW12	1,1,1-Trichloroethane	11	10/23/2013	11/14/2017	0.55	0.5	U	1	U
LHAAP-50	50WW12	1,1,2-Trichloroethane	11	10/23/2013	11/14/2017	0.55	0.5	U	1	U

Summary of COC Concentrations for LHAAP Wells and Miscellaneous Sampling Locations

Area	Location	Constituent	Count	Earliest	Latest	Avg (µg/L)	Min (µg/L)	Code	Max (µg/L)	Code
LHAAP-50	50WW12	1,1-Dichloroethene	11	10/23/2013	11/14/2017	1.60	0.81	J	7.35	
LHAAP-50	50WW12	1,2-Dichloroethane	11	10/23/2013	11/14/2017	0.85	0.389	J	3.93	
LHAAP-50	50WW12	Carbon tetrachloride	11	10/23/2013	11/14/2017	0.55	0.5	U	1	U
LHAAP-50	50WW12	Chloroform	11	10/23/2013	11/14/2017	0.31	0.195	J	1	U
LHAAP-50	50WW12	cis-1,2-Dichloroethene	11	10/23/2013	11/14/2017	0.57	0.5	U	1	U
LHAAP-50	50WW12	manganese, total	3	5/10/2016	11/14/2017	53.63	33		74.3	
LHAAP-50	50WW12	Methylene chloride	11	10/23/2013	11/14/2017	0.64	0.5	U	2	U
LHAAP-50	50WW12	Perchlorate	11	10/23/2013	11/14/2017	35290.91	14300		87800	
LHAAP-50	50WW12	Tetrachloroethene	11	10/23/2013	11/14/2017	0.55	0.5	U	1	U
LHAAP-50	50WW12	Trichloroethene	11	10/23/2013	11/14/2017	56.93	0.257	J	417	
LHAAP-50	50WW12	Vinyl chloride	11	10/23/2013	11/14/2017	0.55	0.5	U	1	U
LHAAP-50	50WW13	1,1,1-Trichloroethane	10	3/12/2014	11/13/2017	11.40	0.5	U	50	U
LHAAP-50	50WW13	1,1,2-Trichloroethane	10	3/12/2014	11/13/2017	11.40	0.5	U	50	U
LHAAP-50	50WW13	1,1-Dichloroethene	10	3/12/2014	11/13/2017	19.83	0.74	J	50	U
LHAAP-50	50WW13	1,2-Dichloroethane	10	3/12/2014	11/13/2017	26.11	1.78		83	
LHAAP-50	50WW13	Carbon tetrachloride	10	3/12/2014	11/13/2017	11.40	0.5	U	50	U
LHAAP-50	50WW13	Chloroform	10	3/12/2014	11/13/2017	8.47	0.131	J	50	U
LHAAP-50	50WW13	cis-1,2-Dichloroethene	10	3/12/2014	11/13/2017	143.19	10.7		410	
LHAAP-50	50WW13	manganese, total	2	11/1/2016	11/13/2017	71.90	44.1		99.7	
LHAAP-50	50WW13	Methylene chloride	10	3/12/2014	11/13/2017	16.40	0.5	U	100	U
LHAAP-50	50WW13	Perchlorate	10	3/12/2014	11/13/2017	5870.00	126		13000	
LHAAP-50	50WW13	Tetrachloroethene	10	3/12/2014	11/13/2017	11.87	0.554	J	50	U
LHAAP-50	50WW13	Trichloroethene	10	3/12/2014	11/13/2017	4610.80	322		13000	
LHAAP-50	50WW13	Vinyl chloride	10	3/12/2014	11/13/2017	11.22	0.5	U	50	U
LHAAP-50	50WW14	1,1,1-Trichloroethane	11	10/28/2013	11/13/2017	0.55	0.5	U	1	U
LHAAP-50	50WW14	1,1,2-Trichloroethane	11	10/28/2013	11/13/2017	0.55	0.5	U	1	U
LHAAP-50	50WW14	1,1-Dichloroethene	11	10/28/2013	11/13/2017	1.00	1	U	1	U
LHAAP-50	50WW14	1,2-Dichloroethane	11	10/28/2013	11/13/2017	0.61	0.5	U	1.16	
LHAAP-50	50WW14	Carbon tetrachloride	11	10/28/2013	11/13/2017	0.55	0.5	U	1	U
LHAAP-50	50WW14	Chloroform	11	10/28/2013	11/13/2017	0.32	0.25	U	1	U
LHAAP-50	50WW14	cis-1,2-Dichloroethene	11	10/28/2013	11/13/2017	5.35	0.826	J	14.2	
LHAAP-50	50WW14	manganese, total	4	11/5/2014	11/13/2017	497.75	436		625	
LHAAP-50	50WW14	Methylene chloride	11	10/28/2013	11/13/2017	0.64	0.5	U	2	U
LHAAP-50	50WW14	Perchlorate	11	10/28/2013	11/13/2017	2.55	0.121	J	7.5	
LHAAP-50	50WW14	Tetrachloroethene	11	10/28/2013	11/13/2017	0.55	0.5	U	1	U
LHAAP-50	50WW14	Trichloroethene	11	10/28/2013	11/13/2017	21.24	1.75		93.8	
LHAAP-50	50WW14	Vinyl chloride	11	10/28/2013	11/13/2017	0.55	0.5	U	1	U
LHAAP-50	50WW15	1,1,1-Trichloroethane	11	10/25/2013	11/10/2017	0.55	0.5	U	1	U
LHAAP-50	50WW15	1,1,2-Trichloroethane	11	10/25/2013	11/10/2017	0.55	0.5	U	1	U
LHAAP-50	50WW15	1,1-Dichloroethene	11	10/25/2013	11/10/2017	1.00	1	U	1	U
LHAAP-50	50WW15	1,2-Dichloroethane	11	10/25/2013	11/10/2017	0.52	0.258	J	1	U
LHAAP-50	50WW15	Carbon tetrachloride	11	10/25/2013	11/10/2017	0.55	0.5	U	1	U
LHAAP-50	50WW15	Chloroform	11	10/25/2013	11/10/2017	0.32	0.25	U	1	U
LHAAP-50	50WW15	cis-1,2-Dichloroethene	11	10/25/2013	11/10/2017	10.22	4.2		14.3	
LHAAP-50	50WW15	Methylene chloride	11	10/25/2013	11/10/2017	0.64	0.5	U	2	U
LHAAP-50	50WW15	Perchlorate	11	10/25/2013	11/10/2017	0.69	0.2	U	4	U
LHAAP-50	50WW15	Tetrachloroethene	11	10/25/2013	11/10/2017	2.55	1.3		3.34	
LHAAP-50	50WW15	Trichloroethene	11	10/25/2013	11/10/2017	18.02	3.6		48.3	
LHAAP-50	50WW15	Vinyl chloride	11	10/25/2013	11/10/2017	1.88	0.5	U	3.24	
LHAAP-50	50WW16	1,1,1-Trichloroethane	11	10/25/2013	11/14/2017	0.55	0.5	U	1	U
LHAAP-50	50WW16	1,1,2-Trichloroethane	11	10/25/2013	11/14/2017	0.55	0.5	U	1	U
LHAAP-50	50WW16	1,1-Dichloroethene	11	10/25/2013	11/14/2017	1.00	1	U	1	U
LHAAP-50	50WW16	1,2-Dichloroethane	11	10/25/2013	11/14/2017	0.55	0.5	U	1	U
LHAAP-50	50WW16	1,4-Dioxane	1	12/17/2015	12/17/2015	1.00	1	U	1	U
LHAAP-50	50WW16	Carbon tetrachloride	11	10/25/2013	11/14/2017	0.55	0.5	U	1	U
LHAAP-50	50WW16	Chloroform	11	10/25/2013	11/14/2017	0.32	0.25	U	1	U
LHAAP-50	50WW16	cis-1,2-Dichloroethene	11	10/25/2013	11/14/2017	0.56	0.471	J	1	U
LHAAP-50	50WW16	manganese, total	2	11/2/2016	11/14/2017	33.25	10.8		55.7	
LHAAP-50	50WW16	Methylene chloride	11	10/25/2013	11/14/2017	0.64	0.5	U	2	U
LHAAP-50	50WW16	Perchlorate	11	10/25/2013	11/14/2017	0.65	0.101	J	4	U
LHAAP-50	50WW16	Tetrachloroethene	11	10/25/2013	11/14/2017	0.55	0.5	U	1	U
LHAAP-50	50WW16	Trichloroethene	11	10/25/2013	11/14/2017	4.60	0.287	J	18.1	
LHAAP-50	50WW16	Vinyl chloride	11	10/25/2013	11/14/2017	0.55	0.5	U	1	U
LHAAP-50	50WW17	1,1,1-Trichloroethane	11	10/25/2013	11/10/2017	0.55	0.5	U	1	U
LHAAP-50	50WW17	1,1,2-Trichloroethane	11	10/25/2013	11/10/2017	0.55	0.5	U	1	U
LHAAP-50	50WW17	1,1-Dichloroethene	11	10/25/2013	11/10/2017	1.00	1	U	1	U
LHAAP-50	50WW17	1,2-Dichloroethane	11	10/25/2013	11/10/2017	0.55	0.5	U	1	U
LHAAP-50	50WW17	Carbon tetrachloride	11	10/25/2013	11/10/2017	0.55	0.5	U	1	U
LHAAP-50	50WW17	Chloroform	11	10/25/2013	11/10/2017	0.32	0.25	U	1	U
LHAAP-50	50WW17	cis-1,2-Dichloroethene	11	10/25/2013	11/10/2017	0.55	0.5	U	1	U
LHAAP-50	50WW17	Methylene chloride	11	10/25/2013	11/10/2017	0.64	0.5	U	2	U
LHAAP-50	50WW17	Perchlorate	10	10/25/2013	11/10/2017	0.77	0.193	J	4	U
LHAAP-50	50WW17	Tetrachloroethene	11	10/25/2013	11/10/2017	0.55	0.5	U	1	U
LHAAP-50	50WW17	Trichloroethene	11	10/25/2013	11/10/2017	0.55	0.5	U	1	U
LHAAP-50	50WW17	Vinyl chloride	11	10/25/2013	11/10/2017	0.55	0.5	U	1	U
LHAAP-50	50WW18	1,1,1-Trichloroethane	11	10/23/2013	11/10/2017	0.55	0.5	U	1	U
LHAAP-50	50WW18	1,1,2-Trichloroethane	11	10/23/2013	11/10/2017	0.55	0.5	U	1	U
LHAAP-50	50WW18	1,1-Dichloroethene	11	10/23/2013	11/10/2017	1.00	1	U	1	U
LHAAP-50	50WW18	1,2-Dichloroethane	11	10/23/2013	11/10/2017	0.55	0.5	U	1	U
LHAAP-50	50WW18	Carbon tetrachloride	10	10/23/2013	11/3/2016	0.50	0.5	U	0.5	U
LHAAP-50	50WW18	Chloroform	11	10/23/2013	11/10/2017	0.32	0.25	U	1	U
LHAAP-50	50WW18	cis-1,2-Dichloroethene	11	10/23/2013	11/10/2017	0.55	0.5	U	1	U
LHAAP-50	50WW18	manganese, total	1	5/3/2016	5/3/2016	11.70	11.7		11.7	
LHAAP-50	50WW18	Methylene chloride	11	10/23/2013	11/10/2017	0.64	0.5	U	2	U
LHAAP-50	50WW18	Perchlorate	11	10/23/2013	11/10/2017	0.62	0.144	J	4	U
LHAAP-50	50WW18	Tetrachloroethene	10	10/23/2013	11/3/2016	0.50	0.5	U	0.5	U
LHAAP-50	50WW18	Trichloroethene	11	10/23/2013	11/10/2017	0.55	0.5	U	1	U

Summary of COC Concentrations for LHAAP Wells and Miscellaneous Sampling Locations

Area	Location	Constituent	Count	Earliest	Latest	Avg (µg/L)	Min (µg/L)	Code	Max (µg/L)	Code
LHAAP-50	50WW18	Vinyl chloride	11	10/23/2013	11/10/2017	0.55	0.5	U	1	U
LHAAP-50	50WW19	1,1,1-Trichloroethane	10	1/14/2014	11/4/2016	0.50	0.5	U	0.5	U
LHAAP-50	50WW19	1,1,2-Trichloroethane	10	1/14/2014	11/4/2016	0.50	0.5	U	0.5	U
LHAAP-50	50WW19	1,1-Dichloroethene	10	1/14/2014	11/4/2016	1.00	1	U	1	U
LHAAP-50	50WW19	1,2-Dichloroethane	10	1/14/2014	11/4/2016	0.50	0.5	U	0.5	U
LHAAP-50	50WW19	Carbon tetrachloride	10	1/14/2014	11/4/2016	0.50	0.5	U	0.5	U
LHAAP-50	50WW19	Chloroform	10	1/14/2014	11/4/2016	0.25	0.25	U	0.25	U
LHAAP-50	50WW19	cis-1,2-Dichloroethene	10	1/14/2014	11/4/2016	0.50	0.5	U	0.5	U
LHAAP-50	50WW19	Methylene chloride	10	1/14/2014	11/4/2016	0.50	0.5	U	0.5	U
LHAAP-50	50WW19	Perchlorate	9	1/14/2014	11/4/2016	0.24	0.2	U	0.48	
LHAAP-50	50WW19	Tetrachloroethene	10	1/14/2014	11/4/2016	0.50	0.5	U	0.5	U
LHAAP-50	50WW19	Trichloroethene	10	1/14/2014	11/4/2016	0.50	0.5	U	0.5	U
LHAAP-50	50WW19	Vinyl chloride	10	1/14/2014	11/4/2016	0.50	0.5	U	0.5	U
LHAAP-50	50WW20	1,1,1-Trichloroethane	9	11/7/2013	5/11/2016	0.50	0.5	U	0.5	U
LHAAP-50	50WW20	1,1,2-Trichloroethane	9	11/7/2013	5/11/2016	0.50	0.5	U	0.5	U
LHAAP-50	50WW20	1,1-Dichloroethene	9	11/7/2013	5/11/2016	1.00	1	U	1	U
LHAAP-50	50WW20	1,2-Dichloroethane	9	11/7/2013	5/11/2016	0.50	0.5	U	0.5	U
LHAAP-50	50WW20	Carbon tetrachloride	9	11/7/2013	5/11/2016	0.50	0.5	U	0.5	U
LHAAP-50	50WW20	Chloroform	9	11/7/2013	5/11/2016	0.25	0.25	U	0.25	U
LHAAP-50	50WW20	cis-1,2-Dichloroethene	9	11/7/2013	5/11/2016	0.50	0.5	U	0.5	U
LHAAP-50	50WW20	Methylene chloride	9	11/7/2013	5/11/2016	0.50	0.5	U	0.5	U
LHAAP-50	50WW20	Perchlorate	8	11/7/2013	5/11/2016	0.26	0.168	J	0.697	
LHAAP-50	50WW20	Tetrachloroethene	9	11/7/2013	5/11/2016	0.50	0.5	U	0.5	U
LHAAP-50	50WW20	Trichloroethene	9	11/7/2013	5/11/2016	0.50	0.5	U	0.5	U
LHAAP-50	50WW20	Vinyl chloride	9	11/7/2013	5/11/2016	0.50	0.5	U	0.5	U
LHAAP-50	50WW21	1,1,1-Trichloroethane	11	10/25/2013	11/10/2017	0.55	0.5	U	1	U
LHAAP-50	50WW21	1,1,2-Trichloroethane	11	10/25/2013	11/10/2017	0.55	0.5	U	1	U
LHAAP-50	50WW21	1,1-Dichloroethene	11	10/25/2013	11/10/2017	1.00	1	U	1	U
LHAAP-50	50WW21	1,2-Dichloroethane	11	10/25/2013	11/10/2017	0.55	0.5	U	1	U
LHAAP-50	50WW21	Carbon tetrachloride	11	10/25/2013	11/10/2017	0.55	0.5	U	1	U
LHAAP-50	50WW21	Chloroform	11	10/25/2013	11/10/2017	0.32	0.25	U	1	U
LHAAP-50	50WW21	cis-1,2-Dichloroethene	11	10/25/2013	11/10/2017	0.55	0.5	U	1	U
LHAAP-50	50WW21	Methylene chloride	11	10/25/2013	11/10/2017	0.64	0.5	U	2	U
LHAAP-50	50WW21	Perchlorate	10	10/25/2013	11/10/2017	1.01	0.398	J	4	U
LHAAP-50	50WW21	Tetrachloroethene	11	10/25/2013	11/10/2017	0.55	0.5	U	1	U
LHAAP-50	50WW21	Trichloroethene	11	10/25/2013	11/10/2017	0.54	0.447	J	1	U
LHAAP-50	50WW21	Vinyl chloride	11	10/25/2013	11/10/2017	0.55	0.5	U	1	U
LHAAP-50	50WW22	1,1,1-Trichloroethane	11	10/23/2013	11/13/2017	0.55	0.5	U	1	U
LHAAP-50	50WW22	1,1,2-Trichloroethane	11	10/23/2013	11/13/2017	0.55	0.5	U	1	U
LHAAP-50	50WW22	1,1-Dichloroethene	11	10/23/2013	11/13/2017	1.00	1	U	1	U
LHAAP-50	50WW22	1,2-Dichloroethane	11	10/23/2013	11/13/2017	0.55	0.5	U	1	U
LHAAP-50	50WW22	Carbon tetrachloride	11	10/23/2013	11/13/2017	0.55	0.5	U	1	U
LHAAP-50	50WW22	Chloroform	11	10/23/2013	11/13/2017	0.32	0.25	U	1	U
LHAAP-50	50WW22	cis-1,2-Dichloroethene	11	10/23/2013	11/13/2017	0.55	0.5	U	1	U
LHAAP-50	50WW22	manganese, total	3	5/10/2016	11/13/2017	10.76	2.48	J	25.9	
LHAAP-50	50WW22	Methylene chloride	11	10/23/2013	11/13/2017	0.64	0.5	U	2	U
LHAAP-50	50WW22	Perchlorate	11	10/23/2013	11/13/2017	2.46	0.642	J	6.97	
LHAAP-50	50WW22	Tetrachloroethene	11	10/23/2013	11/13/2017	0.55	0.5	U	1	U
LHAAP-50	50WW22	Trichloroethene	11	10/23/2013	11/13/2017	0.53	0.339	J	1	U
LHAAP-50	50WW22	Vinyl chloride	11	10/23/2013	11/13/2017	0.55	0.5	U	1	U
LHAAP-50	50WW23	1,1,1-Trichloroethane	11	10/29/2013	11/14/2017	0.55	0.5	U	1	U
LHAAP-50	50WW23	1,1,2-Trichloroethane	11	10/29/2013	11/14/2017	0.55	0.5	U	1	U
LHAAP-50	50WW23	1,1-Dichloroethene	11	10/29/2013	11/14/2017	1.00	1	U	1	U
LHAAP-50	50WW23	1,2-Dichloroethane	11	10/29/2013	11/14/2017	0.55	0.5	U	1	U
LHAAP-50	50WW23	Carbon tetrachloride	11	10/29/2013	11/14/2017	0.55	0.5	U	1	U
LHAAP-50	50WW23	Chloroform	11	10/29/2013	11/14/2017	0.32	0.25	U	1	U
LHAAP-50	50WW23	cis-1,2-Dichloroethene	11	10/29/2013	11/14/2017	0.55	0.5	U	1	U
LHAAP-50	50WW23	manganese, total	3	5/10/2016	11/14/2017	42.70	12.1		87.2	
LHAAP-50	50WW23	Methylene chloride	11	10/29/2013	11/14/2017	0.64	0.5	U	2	U
LHAAP-50	50WW23	Perchlorate	11	10/29/2013	11/14/2017	3.35	0.182	J	23.3	
LHAAP-50	50WW23	Tetrachloroethene	11	10/29/2013	11/14/2017	0.55	0.5	U	1	U
LHAAP-50	50WW23	Trichloroethene	11	10/29/2013	11/14/2017	0.55	0.5	U	1	U
LHAAP-50	50WW23	Vinyl chloride	11	10/29/2013	11/14/2017	0.55	0.5	U	1	U
LHAAP-50	50WW24	1,1,1-Trichloroethane	11	10/29/2013	11/10/2017	0.55	0.5	U	1	U
LHAAP-50	50WW24	1,1,2-Trichloroethane	11	10/29/2013	11/10/2017	0.55	0.5	U	1	U
LHAAP-50	50WW24	1,1-Dichloroethene	11	10/29/2013	11/10/2017	1.00	1	U	1	U
LHAAP-50	50WW24	1,2-Dichloroethane	11	10/29/2013	11/10/2017	0.55	0.5	U	1	U
LHAAP-50	50WW24	Carbon tetrachloride	11	10/29/2013	11/10/2017	0.55	0.5	U	1	U
LHAAP-50	50WW24	Chloroform	11	10/29/2013	11/10/2017	0.32	0.25	U	1	U
LHAAP-50	50WW24	cis-1,2-Dichloroethene	11	10/29/2013	11/10/2017	0.55	0.5	U	1	U
LHAAP-50	50WW24	manganese, total	1	5/10/2016	5/10/2016	11.60	11.6		11.6	
LHAAP-50	50WW24	Methylene chloride	11	10/29/2013	11/10/2017	0.64	0.5	U	2	U
LHAAP-50	50WW24	Perchlorate	11	10/29/2013	11/10/2017	13.95	0.2	U	110	
LHAAP-50	50WW24	Tetrachloroethene	11	10/29/2013	11/10/2017	0.55	0.5	U	1	U
LHAAP-50	50WW24	Trichloroethene	11	10/29/2013	11/10/2017	0.52	0.268	J	1	U
LHAAP-50	50WW24	Vinyl chloride	11	10/29/2013	11/10/2017	0.55	0.5	U	1	U
LHAAP-50	50WW25	1,1,1-Trichloroethane	8	10/23/2013	5/3/2016	0.50	0.5	U	0.5	U
LHAAP-50	50WW25	1,1,2-Trichloroethane	8	10/23/2013	5/3/2016	0.50	0.5	U	0.5	U
LHAAP-50	50WW25	1,1-Dichloroethene	8	10/23/2013	5/3/2016	1.00	1	U	1	U
LHAAP-50	50WW25	1,2-Dichloroethane	8	10/23/2013	5/3/2016	0.50	0.5	U	0.5	U
LHAAP-50	50WW25	Carbon tetrachloride	8	10/23/2013	5/3/2016	0.50	0.5	U	0.5	U
LHAAP-50	50WW25	Chloroform	8	10/23/2013	5/3/2016	0.25	0.25	U	0.25	U
LHAAP-50	50WW25	cis-1,2-Dichloroethene	8	10/23/2013	5/3/2016	0.50	0.5	U	0.5	U
LHAAP-50	50WW25	manganese, total	1	5/3/2016	5/3/2016	54.10	54.1		54.1	
LHAAP-50	50WW25	Methylene chloride	8	10/23/2013	5/3/2016	0.50	0.5	U	0.5	U
LHAAP-50	50WW25	Perchlorate	8	10/23/2013	5/3/2016	24.49	0.2	U	96.6	
LHAAP-50	50WW25	Tetrachloroethene	8	10/23/2013	5/3/2016	0.50	0.5	U	0.5	U

Summary of COC Concentrations for LHAAP Wells and Miscellaneous Sampling Locations

Area	Location	Constituent	Count	Earliest	Latest	Avg (µg/L)	Min (µg/L)	Code	Max (µg/L)	Code
LHAAP-50	50WW25	Trichloroethene	8	10/23/2013	5/3/2016	0.50	0.5	U	0.5	U
LHAAP-50	50WW25	Vinyl chloride	8	10/23/2013	5/3/2016	0.50	0.5	U	0.5	U
LHAAP-50	50WW26	1,1,1-Trichloroethane	9	11/6/2013	5/12/2016	0.50	0.5	U	0.5	U
LHAAP-50	50WW26	1,1,2-Trichloroethane	9	11/6/2013	5/12/2016	0.50	0.5	U	0.5	U
LHAAP-50	50WW26	1,1-Dichloroethene	9	11/6/2013	5/12/2016	1.00	1	U	1	U
LHAAP-50	50WW26	1,2-Dichloroethane	9	11/6/2013	5/12/2016	0.50	0.5	U	0.5	U
LHAAP-50	50WW26	Carbon tetrachloride	9	11/6/2013	5/12/2016	0.50	0.5	U	0.5	U
LHAAP-50	50WW26	Chloroform	9	11/6/2013	5/12/2016	0.25	0.25	U	0.25	U
LHAAP-50	50WW26	cis-1,2-Dichloroethene	9	11/6/2013	5/12/2016	0.50	0.5	U	0.5	U
LHAAP-50	50WW26	Methylene chloride	9	11/6/2013	5/12/2016	0.50	0.5	U	0.5	U
LHAAP-50	50WW26	Perchlorate	8	11/6/2013	5/12/2016	0.20	0.2	U	0.2	U
LHAAP-50	50WW26	Tetrachloroethene	9	11/6/2013	5/12/2016	0.50	0.5	U	0.5	U
LHAAP-50	50WW26	Trichloroethene	9	11/6/2013	5/12/2016	0.50	0.5	U	0.5	U
LHAAP-50	50WW26	Vinyl chloride	9	11/6/2013	5/12/2016	0.50	0.5	U	0.5	U
LHAAP-50	50WW27	1,1,1-Trichloroethane	11	11/6/2013	11/10/2017	0.55	0.5	U	1	U
LHAAP-50	50WW27	1,1,2-Trichloroethane	11	11/6/2013	11/10/2017	0.55	0.5	U	1	U
LHAAP-50	50WW27	1,1-Dichloroethene	11	11/6/2013	11/10/2017	1.00	1	U	1	U
LHAAP-50	50WW27	1,2-Dichloroethane	11	11/6/2013	11/10/2017	0.55	0.5	U	1	U
LHAAP-50	50WW27	Carbon tetrachloride	11	11/6/2013	11/10/2017	0.55	0.5	U	1	U
LHAAP-50	50WW27	Chloroform	11	11/6/2013	11/10/2017	0.32	0.25	U	1	U
LHAAP-50	50WW27	cis-1,2-Dichloroethene	11	11/6/2013	11/10/2017	0.62	0.33	J	1	U
LHAAP-50	50WW27	Methylene chloride	11	11/6/2013	11/10/2017	0.64	0.5	U	2	U
LHAAP-50	50WW27	Perchlorate	11	11/6/2013	11/10/2017	0.61	0.124	J	4	U
LHAAP-50	50WW27	Tetrachloroethene	11	11/6/2013	11/10/2017	0.55	0.5	U	1	U
LHAAP-50	50WW27	Trichloroethene	11	11/6/2013	11/10/2017	0.55	0.5	U	1	U
LHAAP-50	50WW27	Vinyl chloride	11	11/6/2013	11/10/2017	0.52	0.251	J	1	U
LHAAP-50	50WW28	1,1,1-Trichloroethane	6	11/12/2014	5/11/2016	0.50	0.5	U	0.5	U
LHAAP-50	50WW28	1,1,2-Trichloroethane	6	11/12/2014	5/11/2016	0.50	0.5	U	0.5	U
LHAAP-50	50WW28	1,1-Dichloroethene	6	11/12/2014	5/11/2016	1.00	1	U	1	U
LHAAP-50	50WW28	1,2-Dichloroethane	6	11/12/2014	5/11/2016	0.50	0.5	U	0.5	U
LHAAP-50	50WW28	Carbon tetrachloride	6	11/12/2014	5/11/2016	0.50	0.5	U	0.5	U
LHAAP-50	50WW28	Chloroform	6	11/12/2014	5/11/2016	0.25	0.25	U	0.25	U
LHAAP-50	50WW28	cis-1,2-Dichloroethene	6	11/12/2014	5/11/2016	0.50	0.5	U	0.5	U
LHAAP-50	50WW28	Methylene chloride	6	11/12/2014	5/11/2016	0.50	0.5	U	0.5	U
LHAAP-50	50WW28	Perchlorate	6	11/12/2014	5/11/2016	1.32	0.688		2.01	J
LHAAP-50	50WW28	Tetrachloroethene	6	11/12/2014	5/11/2016	0.50	0.5	U	0.5	U
LHAAP-50	50WW28	Trichloroethene	6	11/12/2014	5/11/2016	0.50	0.5	U	0.5	U
LHAAP-50	50WW28	Vinyl chloride	6	11/12/2014	5/11/2016	0.50	0.5	U	0.5	U
LHAAP-50	GPW-1	1,1,1-Trichloroethane	3	3/14/2014	8/17/2016	0.50	0.5	U	0.5	U
LHAAP-50	GPW-1	1,1,2-Trichloroethane	3	3/14/2014	8/17/2016	0.50	0.5	U	0.5	U
LHAAP-50	GPW-1	1,1-Dichloroethene	3	3/14/2014	8/17/2016	1.00	1	U	1	U
LHAAP-50	GPW-1	1,2-Dichloroethane	3	3/14/2014	8/17/2016	0.50	0.5	U	0.5	U
LHAAP-50	GPW-1	Carbon tetrachloride	3	3/14/2014	8/17/2016	0.50	0.5	U	0.5	U
LHAAP-50	GPW-1	Chloroform	3	3/14/2014	8/17/2016	0.25	0.25	U	0.25	U
LHAAP-50	GPW-1	cis-1,2-Dichloroethene	3	3/14/2014	8/17/2016	0.50	0.5	U	0.5	U
LHAAP-50	GPW-1	Methylene chloride	3	3/14/2014	8/17/2016	0.50	0.5	U	0.5	U
LHAAP-50	GPW-1	Perchlorate	20	12/14/2011	2/21/2018	0.95	0.162	J	6.59	
LHAAP-50	GPW-1	Tetrachloroethene	3	3/14/2014	8/17/2016	0.50	0.5	U	0.5	U
LHAAP-50	GPW-1	Trichloroethene	3	3/14/2014	8/17/2016	0.50	0.5	U	0.5	U
LHAAP-50	GPW-1	Vinyl chloride	3	3/14/2014	8/17/2016	0.50	0.5	U	0.5	U
LHAAP-50	GPW-1A	1,1,1-TRICHLOROETHANE	1	2/17/2015	2/17/2015	0.50	0.5	U	0.5	U
LHAAP-50	GPW-1A	1,1,2-TRICHLOROETHANE	1	2/17/2015	2/17/2015	0.50	0.5	U	0.5	U
LHAAP-50	GPW-1A	1,1-DICHLOROETHENE	1	2/17/2015	2/17/2015	1.00	1	U	1	U
LHAAP-50	GPW-1A	1,2-DICHLOROETHANE	1	2/17/2015	2/17/2015	0.50	0.5	U	0.5	U
LHAAP-50	GPW-1A	CARBON TETRACHLORIDE	1	2/17/2015	2/17/2015	0.50	0.5	U	0.5	U
LHAAP-50	GPW-1A	CHLOROFORM	1	2/17/2015	2/17/2015	0.25	0.25	U	0.25	U
LHAAP-50	GPW-1A	CIS-1,2-DICHLOROETHENE	1	2/17/2015	2/17/2015	0.50	0.5	U	0.5	U
LHAAP-50	GPW-1A	METHYLENE CHLORIDE	1	2/17/2015	2/17/2015	0.50	0.5	U	0.5	U
LHAAP-50	GPW-1A	Perchlorate	3	2/17/2015	2/21/2018	15.12	0.865		38.2	
LHAAP-50	GPW-1A	TETRACHLOROETHENE	1	2/17/2015	2/17/2015	0.50	0.5	U	0.5	U
LHAAP-50	GPW-1A	TRICHLOROETHENE	1	2/17/2015	2/17/2015	0.50	0.5	U	0.5	U
LHAAP-50	GPW-1A	VINYL CHLORIDE	1	2/17/2015	2/17/2015	0.50	0.5	U	0.5	U
LHAAP-50	GPW-3	Perchlorate	14	12/14/2011	5/24/2017	0.64	0.141	J	1.74	
LHAAP-50	GWP-1	Perchlorate	1	1/18/2017	1/18/2017	0.15	0.15	J	0.15	J
LHAAP-50	GWP-1A	Perchlorate	1	1/18/2017	1/18/2017	14.90	14.9		14.9	
LHAAP-58	1004TW006	1,1,1-Trichloroethane	1	12/13/2003	12/13/2003	1.00	1		1	
LHAAP-58	1004TW006	1,1,2-Trichloroethane	1	12/13/2003	12/13/2003	0.31	0.31		0.31	
LHAAP-58	1004TW006	1,1-dichloroethene	1	12/13/2003	12/13/2003	370.00	370		370	
LHAAP-58	1004TW006	1,2-Dichloroethane	1	12/13/2003	12/13/2003	1.00	1		1	
LHAAP-58	1004TW006	1,4-Dioxane	1	12/13/2003	12/13/2003	17.00	17		17	
LHAAP-58	1004TW006	Carbon tetrachloride	1	12/13/2003	12/13/2003	1.00	1		1	
LHAAP-58	1004TW006	Chloroform	1	12/13/2003	12/13/2003	0.36	0.36		0.36	
LHAAP-58	1004TW006	magnesium, total	1	12/13/2003	12/13/2003	273000.00	273000		273000	
LHAAP-58	1004TW006	manganese, total	1	12/13/2003	12/13/2003	2350.00	2350		2350	
LHAAP-58	1004TW006	Methylene Chloride	1	12/13/2003	12/13/2003	2.00	2		2	
LHAAP-58	1004TW006	nickel, total	1	12/13/2003	12/13/2003	29.30	29.3		29.3	
LHAAP-58	1004TW006	strontium, total	1	12/13/2003	12/13/2003	9100.00	9100		9100	
LHAAP-58	1004TW006	Tetrachloroethene	1	12/13/2003	12/13/2003	1.00	1		1	
LHAAP-58	1004TW006	thallium, total	1	12/13/2003	12/13/2003	0.21	0.21		0.21	
LHAAP-58	1004TW006	trichloroethene	1	12/13/2003	12/13/2003	0.31	0.31		0.31	
LHAAP-58	1004TW006	Vinyl chloride	1	12/13/2003	12/13/2003	7.00	7		7	
LHAAP-58	35AWW02	1,1,1-TRICHLOROETHANE	4	11/8/1998	10/22/2013	1.69	0.25	U	5	U
LHAAP-58	35AWW02	1,1,2-TRICHLOROETHANE	4	11/8/1998	10/22/2013	1.69	0.25	U	5	U
LHAAP-58	35AWW02	1,1-DICHLOROETHENE	4	11/8/1998	10/22/2013	1.88	0.5	U	5	U
LHAAP-58	35AWW02	1,2-DICHLOROETHANE	4	11/8/1998	10/22/2013	1.69	0.25	U	5	U
LHAAP-58	35AWW02	1,4-Dioxane	2	11/8/1998	9/10/2004	150.00	100	U	200	U
LHAAP-58	35AWW02	Carbon tetrachloride	4	11/8/1998	10/22/2013	1.69	0.25	U	5	U

Summary of COC Concentrations for LHAAP Wells and Miscellaneous Sampling Locations

Area	Location	Constituent	Count	Earliest	Latest	Avg (µg/L)	Min (µg/L)	Code	Max (µg/L)	Code
LHAAP-58	35AWW02	Chloroform	4	11/8/1998	10/22/2013	9.34	0.125	U	32	
LHAAP-58	35AWW02	CHROMIUM, TOTAL	1	11/26/2008	11/26/2008	38.90	38.9		38.9	
LHAAP-58	35AWW02	cis-1,2-Dichloroethene	4	11/8/1998	10/22/2013	1.69	0.25	U	5	U
LHAAP-58	35AWW02	MAGNESIUM, TOTAL	2	11/8/1998	11/26/2008	13945.00	2890		25000	U
LHAAP-58	35AWW02	MANGANESE, TOTAL	2	11/8/1998	11/26/2008	125.00	85		165	
LHAAP-58	35AWW02	Methylene chloride	3	11/8/1998	10/22/2013	0.57	0.25	U	0.97	J
LHAAP-58	35AWW02	NICKEL, TOTAL	2	11/8/1998	11/26/2008	310.00	280		340	
LHAAP-58	35AWW02	strontium, total	1	11/8/1998	11/8/1998	250.00	250	U	250	U
LHAAP-58	35AWW02	Tetrachloroethene	4	11/8/1998	10/22/2013	1.69	0.25	U	5	U
LHAAP-58	35AWW02	THALLIUM, TOTAL	2	11/8/1998	11/26/2008	0.97	0.144	J	1.8	J
LHAAP-58	35AWW02	Trichloroethene	4	11/8/1998	10/22/2013	1.69	0.25	U	5	U
LHAAP-58	35AWW02	Vinyl chloride	4	11/8/1998	10/22/2013	1.69	0.25	U	5	U
LHAAP-58	35AWW05FD	1,1,1-Trichloroethane	1	1/23/2015	1/23/2015	0.50	0.5	U	0.5	U
LHAAP-58	35AWW05FD	1,1,2-Trichloroethane	1	1/23/2015	1/23/2015	0.50	0.5	U	0.5	U
LHAAP-58	35AWW05FD	1,1-Dichloroethene	1	1/23/2015	1/23/2015	1.00	1	U	1	U
LHAAP-58	35AWW05FD	1,2-Dichloroethane	1	1/23/2015	1/23/2015	0.50	0.5	U	0.5	U
LHAAP-58	35AWW07R	1,1,1-TRICHLOROETHANE	1	10/16/2013	10/16/2013	0.50	0.5	U	0.5	U
LHAAP-58	35AWW07R	1,1,2-TRICHLOROETHANE	1	10/16/2013	10/16/2013	0.50	0.5	U	0.5	U
LHAAP-58	35AWW07R	1,1-DICHLOROETHENE	1	10/16/2013	10/16/2013	1.00	1	U	1	U
LHAAP-58	35AWW07R	1,2-DICHLOROETHANE	1	10/16/2013	10/16/2013	0.50	0.5	U	0.5	U
LHAAP-58	35AWW07R	Carbon tetrachloride	1	10/16/2013	10/16/2013	0.50	0.5	U	0.5	U
LHAAP-58	35AWW07R	Chloroform	1	10/16/2013	10/16/2013	0.25	0.25	U	0.25	U
LHAAP-58	35AWW07R	cis-1,2-Dichloroethene	1	10/16/2013	10/16/2013	0.71	0.709	J	0.709	J
LHAAP-58	35AWW07R	Methylene chloride	1	10/16/2013	10/16/2013	0.50	0.5	U	0.5	U
LHAAP-58	35AWW07R	Tetrachloroethene	1	10/16/2013	10/16/2013	0.59	0.586	J	0.586	J
LHAAP-58	35AWW07R	Trichloroethene	1	10/16/2013	10/16/2013	1.03	1.03		1.03	
LHAAP-58	35AWW07R	Vinyl chloride	1	10/16/2013	10/16/2013	0.50	0.5	U	0.5	U
LHAAP-58	35AWW08F	manganese, total	2	5/20/2014	10/4/2016	32935.00	7970		57900	
LHAAP-58	58DPT10	1,1,1-Trichloroethane	1	8/20/2013	8/20/2013	0.25	0.25	U	0.25	U
LHAAP-58	58DPT10	1,1,2-Trichloroethane	1	8/20/2013	8/20/2013	1.30	1.3		1.3	
LHAAP-58	58DPT10	1,1-Dichloroethene	1	8/20/2013	8/20/2013	11.00	11		11	
LHAAP-58	58DPT10	1,2-Dichloroethane	1	8/20/2013	8/20/2013	0.92	0.92	J	0.92	J
LHAAP-58	58DPT10	Carbon tetrachloride	1	8/20/2013	8/20/2013	0.25	0.25	U	0.25	U
LHAAP-58	58DPT10	Chloroform	1	8/20/2013	8/20/2013	0.25	0.25	U	0.25	U
LHAAP-58	58DPT10	cis-1,2-Dichloroethene	1	8/20/2013	8/20/2013	20.00	20		20	
LHAAP-58	58DPT10	Methylene chloride	1	8/20/2013	8/20/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT10	Tetrachloroethene	1	8/20/2013	8/20/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT10	Trichloroethene	1	8/20/2013	8/20/2013	0.25	0.25	U	0.25	U
LHAAP-58	58DPT10	Vinyl chloride	1	8/20/2013	8/20/2013	12.00	12		12	
LHAAP-58	58DPT11	1,1,1-Trichloroethane	1	8/21/2013	8/21/2013	0.25	0.25	U	0.25	U
LHAAP-58	58DPT11	1,1,2-Trichloroethane	1	8/21/2013	8/21/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT11	1,1-Dichloroethene	1	8/21/2013	8/21/2013	0.25	0.25	U	0.25	U
LHAAP-58	58DPT11	1,2-Dichloroethane	1	8/21/2013	8/21/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT11	Carbon tetrachloride	1	8/21/2013	8/21/2013	0.25	0.25	U	0.25	U
LHAAP-58	58DPT11	Chloroform	1	8/21/2013	8/21/2013	0.25	0.25	U	0.25	U
LHAAP-58	58DPT11	cis-1,2-Dichloroethene	1	8/21/2013	8/21/2013	0.25	0.25	U	0.25	U
LHAAP-58	58DPT11	Methylene chloride	1	8/21/2013	8/21/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT11	Tetrachloroethene	1	8/21/2013	8/21/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT11	Trichloroethene	1	8/21/2013	8/21/2013	0.25	0.25	U	0.25	U
LHAAP-58	58DPT11	Vinyl chloride	1	8/21/2013	8/21/2013	0.25	0.25	U	0.25	U
LHAAP-58	58DPT12	1,1,1-Trichloroethane	1	8/20/2013	8/20/2013	0.25	0.25	U	0.25	U
LHAAP-58	58DPT12	1,1,2-Trichloroethane	1	8/20/2013	8/20/2013	13.00	13		13	
LHAAP-58	58DPT12	1,1-Dichloroethene	1	8/20/2013	8/20/2013	790.00	790		790	
LHAAP-58	58DPT12	1,2-Dichloroethane	1	8/20/2013	8/20/2013	11.00	11		11	
LHAAP-58	58DPT12	Carbon tetrachloride	1	8/20/2013	8/20/2013	0.25	0.25	U	0.25	U
LHAAP-58	58DPT12	Chloroform	1	8/20/2013	8/20/2013	0.28	0.28	J	0.28	J
LHAAP-58	58DPT12	cis-1,2-Dichloroethene	1	8/20/2013	8/20/2013	240.00	240		240	
LHAAP-58	58DPT12	Methylene chloride	1	8/20/2013	8/20/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT12	Tetrachloroethene	1	8/20/2013	8/20/2013	0.47	0.47	J	0.47	J
LHAAP-58	58DPT12	Trichloroethene	1	8/20/2013	8/20/2013	61.00	61		61	
LHAAP-58	58DPT12	Vinyl chloride	1	8/20/2013	8/20/2013	24.00	24		24	
LHAAP-58	58DPT13	1,1,1-Trichloroethane	1	8/22/2013	8/22/2013	0.25	0.25	U	0.25	U
LHAAP-58	58DPT13	1,1,2-Trichloroethane	1	8/22/2013	8/22/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT13	1,1-Dichloroethene	1	8/22/2013	8/22/2013	0.25	0.25	U	0.25	U
LHAAP-58	58DPT13	1,2-Dichloroethane	1	8/22/2013	8/22/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT13	Carbon tetrachloride	1	8/22/2013	8/22/2013	0.25	0.25	U	0.25	U
LHAAP-58	58DPT13	Chloroform	1	8/22/2013	8/22/2013	0.25	0.25	U	0.25	U
LHAAP-58	58DPT13	cis-1,2-Dichloroethene	1	8/22/2013	8/22/2013	0.25	0.25	U	0.25	U
LHAAP-58	58DPT13	Methylene chloride	1	8/22/2013	8/22/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT13	Tetrachloroethene	1	8/22/2013	8/22/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT13	Trichloroethene	1	8/22/2013	8/22/2013	0.25	0.25	U	0.25	U
LHAAP-58	58DPT13	Vinyl chloride	1	8/22/2013	8/22/2013	0.25	0.25	U	0.25	U
LHAAP-58	58DPT14	1,1,1-TRICHLOROETHANE	1	8/24/2013	8/24/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT14	1,1,2-TRICHLOROETHANE	1	8/24/2013	8/24/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT14	1,1-DICHLOROETHENE	1	8/24/2013	8/24/2013	1.00	1	U	1	U
LHAAP-58	58DPT14	1,2-DICHLOROETHANE	1	8/24/2013	8/24/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT14	Carbon tetrachloride	1	8/24/2013	8/24/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT14	Chloroform	1	8/24/2013	8/24/2013	0.25	0.25	U	0.25	U
LHAAP-58	58DPT14	cis-1,2-Dichloroethene	1	8/24/2013	8/24/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT14	Methylene chloride	1	8/24/2013	8/24/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT14	Tetrachloroethene	1	8/24/2013	8/24/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT14	Trichloroethene	1	8/24/2013	8/24/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT14	Vinyl chloride	1	8/24/2013	8/24/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT15	1,1,1-Trichloroethane	1	8/22/2013	8/22/2013	0.25	0.25	U	0.25	U
LHAAP-58	58DPT15	1,1,2-Trichloroethane	1	8/22/2013	8/22/2013	1.90	1.9		1.9	
LHAAP-58	58DPT15	1,1-Dichloroethene	1	8/22/2013	8/22/2013	63.00	63		63	
LHAAP-58	58DPT15	1,2-Dichloroethane	1	8/22/2013	8/22/2013	9.00	9		9	

Summary of COC Concentrations for LHAAP Wells and Miscellaneous Sampling Locations

Area	Location	Constituent	Count	Earliest	Latest	Avg (µg/L)	Min (µg/L)	Code	Max (µg/L)	Code
LHAAP-58	58DPT15	Carbon tetrachloride	1	8/22/2013	8/22/2013	0.25	0.25	U	0.25	U
LHAAP-58	58DPT15	Chloroform	1	8/22/2013	8/22/2013	0.25	0.25	U	0.25	U
LHAAP-58	58DPT15	cis-1,2-Dichloroethene	1	8/22/2013	8/22/2013	8.70	8.7		8.7	
LHAAP-58	58DPT15	Methylene chloride	1	8/22/2013	8/22/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT15	Tetrachloroethene	1	8/22/2013	8/22/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT15	Trichloroethene	1	8/22/2013	8/22/2013	6.00	6		6	
LHAAP-58	58DPT15	Vinyl chloride	1	8/22/2013	8/22/2013	11.00	11		11	
LHAAP-58	58DPT15A	1,1,1-TRICHLOROETHANE	1	9/6/2013	9/6/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT15A	1,1,2-TRICHLOROETHANE	1	9/6/2013	9/6/2013	0.37	0.368	J	0.368	J
LHAAP-58	58DPT15A	1,1-DICHLOROETHENE	1	9/6/2013	9/6/2013	49.60	49.6		49.6	
LHAAP-58	58DPT15A	1,2-DICHLOROETHANE	1	9/6/2013	9/6/2013	11.50	11.5		11.5	
LHAAP-58	58DPT15A	Carbon tetrachloride	1	9/6/2013	9/6/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT15A	Chloroform	1	9/6/2013	9/6/2013	0.25	0.25	U	0.25	U
LHAAP-58	58DPT15A	cis-1,2-Dichloroethene	1	9/6/2013	9/6/2013	1.42	1.42		1.42	
LHAAP-58	58DPT15A	Methylene chloride	1	9/6/2013	9/6/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT15A	Tetrachloroethene	1	9/6/2013	9/6/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT15A	Trichloroethene	1	9/6/2013	9/6/2013	6.82	6.82		6.82	
LHAAP-58	58DPT15A	Vinyl chloride	1	9/6/2013	9/6/2013	0.30	0.302	J	0.302	J
LHAAP-58	58DPT15B	1,1,1-TRICHLOROETHANE	1	9/17/2013	9/17/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT15B	1,1,2-TRICHLOROETHANE	1	9/17/2013	9/17/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT15B	1,1-DICHLOROETHENE	1	9/17/2013	9/17/2013	0.86	0.86	J	0.86	J
LHAAP-58	58DPT15B	1,2-DICHLOROETHANE	1	9/17/2013	9/17/2013	0.52	0.518	J	0.518	J
LHAAP-58	58DPT15B	Carbon tetrachloride	1	9/17/2013	9/17/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT15B	Chloroform	1	9/17/2013	9/17/2013	0.25	0.25	U	0.25	U
LHAAP-58	58DPT15B	cis-1,2-Dichloroethene	1	9/17/2013	9/17/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT15B	Methylene chloride	1	9/17/2013	9/17/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT15B	Tetrachloroethene	1	9/17/2013	9/17/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT15B	Trichloroethene	1	9/17/2013	9/17/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT15B	Vinyl chloride	1	9/17/2013	9/17/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT16	1,1,1-TRICHLOROETHANE	1	8/13/2013	8/13/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT16	1,1,2-TRICHLOROETHANE	1	8/13/2013	8/13/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT16	1,1-DICHLOROETHENE	1	8/13/2013	8/13/2013	1.00	1	U	1	U
LHAAP-58	58DPT16	1,2-DICHLOROETHANE	1	8/13/2013	8/13/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT16	Carbon tetrachloride	1	8/13/2013	8/13/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT16	Chloroform	1	8/13/2013	8/13/2013	0.25	0.25	U	0.25	U
LHAAP-58	58DPT16	cis-1,2-Dichloroethene	1	8/13/2013	8/13/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT16	Methylene chloride	1	8/13/2013	8/13/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT16	Tetrachloroethene	1	8/13/2013	8/13/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT16	Trichloroethene	1	8/13/2013	8/13/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT16	Vinyl chloride	1	8/13/2013	8/13/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT17	1,1,1-TRICHLOROETHANE	1	8/13/2013	8/13/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT17	1,1,2-TRICHLOROETHANE	1	8/13/2013	8/13/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT17	1,1-DICHLOROETHENE	1	8/13/2013	8/13/2013	1.00	1	U	1	U
LHAAP-58	58DPT17	1,2-DICHLOROETHANE	1	8/13/2013	8/13/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT17	Carbon tetrachloride	1	8/13/2013	8/13/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT17	Chloroform	1	8/13/2013	8/13/2013	0.25	0.25	U	0.25	U
LHAAP-58	58DPT17	cis-1,2-Dichloroethene	1	8/13/2013	8/13/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT17	Methylene chloride	1	8/13/2013	8/13/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT17	Tetrachloroethene	1	8/13/2013	8/13/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT17	Trichloroethene	1	8/13/2013	8/13/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT17	Vinyl chloride	1	8/13/2013	8/13/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT18	1,1,1-TRICHLOROETHANE	1	8/12/2013	8/12/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT18	1,1,2-TRICHLOROETHANE	1	8/12/2013	8/12/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT18	1,1-DICHLOROETHENE	1	8/12/2013	8/12/2013	1.00	1	U	1	U
LHAAP-58	58DPT18	1,2-DICHLOROETHANE	1	8/12/2013	8/12/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT18	Carbon tetrachloride	1	8/12/2013	8/12/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT18	Chloroform	1	8/12/2013	8/12/2013	0.25	0.25	U	0.25	U
LHAAP-58	58DPT18	cis-1,2-Dichloroethene	1	8/12/2013	8/12/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT18	Methylene chloride	1	8/12/2013	8/12/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT18	Tetrachloroethene	1	8/12/2013	8/12/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT18	Trichloroethene	1	8/12/2013	8/12/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT18	Vinyl chloride	1	8/12/2013	8/12/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT19	1,1,1-TRICHLOROETHANE	1	8/10/2013	8/10/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT19	1,1,2-TRICHLOROETHANE	1	8/10/2013	8/10/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT19	1,1-DICHLOROETHENE	1	8/10/2013	8/10/2013	1.00	1	U	1	U
LHAAP-58	58DPT19	1,2-DICHLOROETHANE	1	8/10/2013	8/10/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT19	Carbon tetrachloride	1	8/10/2013	8/10/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT19	Chloroform	1	8/10/2013	8/10/2013	0.25	0.25	U	0.25	U
LHAAP-58	58DPT19	cis-1,2-Dichloroethene	1	8/10/2013	8/10/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT19	Methylene chloride	1	8/10/2013	8/10/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT19	Tetrachloroethene	1	8/10/2013	8/10/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT19	Trichloroethene	1	8/10/2013	8/10/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT19	Vinyl chloride	1	8/10/2013	8/10/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT20	1,1,1-TRICHLOROETHANE	1	8/5/2013	8/5/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT20	1,1,2-TRICHLOROETHANE	1	8/5/2013	8/5/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT20	1,1-DICHLOROETHENE	1	8/5/2013	8/5/2013	1.00	1	U	1	U
LHAAP-58	58DPT20	1,2-DICHLOROETHANE	1	8/5/2013	8/5/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT20	Carbon tetrachloride	1	8/5/2013	8/5/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT20	Chloroform	1	8/5/2013	8/5/2013	0.25	0.25	U	0.25	U
LHAAP-58	58DPT20	cis-1,2-Dichloroethene	1	8/5/2013	8/5/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT20	Methylene chloride	1	8/5/2013	8/5/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT20	Tetrachloroethene	1	8/5/2013	8/5/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT20	Trichloroethene	1	8/5/2013	8/5/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT20	Vinyl chloride	1	8/5/2013	8/5/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT21	1,1,1-TRICHLOROETHANE	1	8/6/2013	8/6/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT21	1,1,2-TRICHLOROETHANE	1	8/6/2013	8/6/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT21	1,1-DICHLOROETHENE	1	8/6/2013	8/6/2013	1.00	1	U	1	U

Summary of COC Concentrations for LHAAP Wells and Miscellaneous Sampling Locations

Area	Location	Constituent	Count	Earliest	Latest	Avg (µg/L)	Min (µg/L)	Code	Max (µg/L)	Code
LHAAP-58	58DPT21	1,2-DICHLOROETHANE	1	8/6/2013	8/6/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT21	Carbon tetrachloride	1	8/6/2013	8/6/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT21	Chloroform	1	8/6/2013	8/6/2013	0.25	0.25	U	0.25	U
LHAAP-58	58DPT21	cis-1,2-Dichloroethene	1	8/6/2013	8/6/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT21	Methylene chloride	1	8/6/2013	8/6/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT21	Tetrachloroethene	1	8/6/2013	8/6/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT21	Trichloroethene	1	8/6/2013	8/6/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT21	Vinyl chloride	1	8/6/2013	8/6/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT22	1,1,1-TRICHLOROETHANE	1	8/13/2013	8/13/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT22	1,1,2-TRICHLOROETHANE	1	8/13/2013	8/13/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT22	1,1-DICHLOROETHENE	1	8/13/2013	8/13/2013	1.00	1	U	1	U
LHAAP-58	58DPT22	1,2-DICHLOROETHANE	1	8/13/2013	8/13/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT22	Carbon tetrachloride	1	8/13/2013	8/13/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT22	Chloroform	1	8/13/2013	8/13/2013	0.25	0.25	U	0.25	U
LHAAP-58	58DPT22	cis-1,2-Dichloroethene	1	8/13/2013	8/13/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT22	Methylene chloride	1	8/13/2013	8/13/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT22	Tetrachloroethene	1	8/13/2013	8/13/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT22	Trichloroethene	1	8/13/2013	8/13/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT22	Vinyl chloride	1	8/13/2013	8/13/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT23	1,1,1-TRICHLOROETHANE	1	8/6/2013	8/6/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT23	1,1,2-TRICHLOROETHANE	1	8/6/2013	8/6/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT23	1,1-DICHLOROETHENE	1	8/6/2013	8/6/2013	1.00	1	U	1	U
LHAAP-58	58DPT23	1,2-DICHLOROETHANE	1	8/6/2013	8/6/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT23	Carbon tetrachloride	1	8/6/2013	8/6/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT23	Chloroform	1	8/6/2013	8/6/2013	0.25	0.25	U	0.25	U
LHAAP-58	58DPT23	cis-1,2-Dichloroethene	1	8/6/2013	8/6/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT23	Methylene chloride	1	8/6/2013	8/6/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT23	Tetrachloroethene	1	8/6/2013	8/6/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT23	Trichloroethene	1	8/6/2013	8/6/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT23	Vinyl chloride	1	8/6/2013	8/6/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT24	1,1,1-TRICHLOROETHANE	2	8/10/2013	8/23/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT24	1,1,2-TRICHLOROETHANE	2	8/10/2013	8/23/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT24	1,1-DICHLOROETHENE	2	8/10/2013	8/23/2013	1.00	1	U	1	U
LHAAP-58	58DPT24	1,2-DICHLOROETHANE	2	8/10/2013	8/23/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT24	Carbon tetrachloride	2	8/10/2013	8/23/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT24	Chloroform	2	8/10/2013	8/23/2013	0.25	0.25	U	0.25	U
LHAAP-58	58DPT24	cis-1,2-Dichloroethene	2	8/10/2013	8/23/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT24	Methylene chloride	2	8/10/2013	8/23/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT24	Tetrachloroethene	2	8/10/2013	8/23/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT24	Trichloroethene	2	8/10/2013	8/23/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT24	Vinyl chloride	2	8/10/2013	8/23/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT26	1,1,1-Trichloroethane	1	8/21/2013	8/21/2013	0.25	0.25	U	0.25	U
LHAAP-58	58DPT26	1,1,2-Trichloroethane	1	8/21/2013	8/21/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT26	1,1-Dichloroethene	1	8/21/2013	8/21/2013	0.25	0.25	U	0.25	U
LHAAP-58	58DPT26	1,2-Dichloroethane	1	8/21/2013	8/21/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT26	Carbon tetrachloride	1	8/21/2013	8/21/2013	0.25	0.25	U	0.25	U
LHAAP-58	58DPT26	Chloroform	1	8/21/2013	8/21/2013	0.25	0.25	U	0.25	U
LHAAP-58	58DPT26	cis-1,2-Dichloroethene	1	8/21/2013	8/21/2013	0.25	0.25	U	0.25	U
LHAAP-58	58DPT26	Methylene chloride	1	8/21/2013	8/21/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT26	Tetrachloroethene	1	8/21/2013	8/21/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT26	Trichloroethene	1	8/21/2013	8/21/2013	0.25	0.25	U	0.25	U
LHAAP-58	58DPT26	Vinyl chloride	1	8/21/2013	8/21/2013	0.25	0.25	U	0.25	U
LHAAP-58	58DPT27	1,1,1-TRICHLOROETHANE	1	8/6/2013	8/6/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT27	1,1,2-TRICHLOROETHANE	1	8/6/2013	8/6/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT27	1,1-DICHLOROETHENE	1	8/6/2013	8/6/2013	1.00	1	U	1	U
LHAAP-58	58DPT27	1,2-DICHLOROETHANE	1	8/6/2013	8/6/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT27	Carbon tetrachloride	1	8/6/2013	8/6/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT27	Chloroform	1	8/6/2013	8/6/2013	0.25	0.25	U	0.25	U
LHAAP-58	58DPT27	cis-1,2-Dichloroethene	1	8/6/2013	8/6/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT27	Methylene chloride	1	8/6/2013	8/6/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT27	Tetrachloroethene	1	8/6/2013	8/6/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT27	Trichloroethene	1	8/6/2013	8/6/2013	0.50	0.5	U	0.5	U
LHAAP-58	58DPT27	Vinyl chloride	1	8/6/2013	8/6/2013	0.50	0.5	U	0.5	U
LHAAP-58	LHSMW04	1,1,1-Trichloroethane	9	12/1/1994	4/13/2016	1.62	0.2	U	5	U
LHAAP-58	LHSMW04	1,1,2-Trichloroethane	9	12/1/1994	4/13/2016	1.70	0.25	U	5	U
LHAAP-58	LHSMW04	1,1-Dichloroethene	9	12/1/1994	4/13/2016	1.88	0.2	U	5	U
LHAAP-58	LHSMW04	1,2-Dichloroethane	8	12/1/1994	4/13/2016	1.23	0.25	U	5	U
LHAAP-58	LHSMW04	1,4-Dioxane	1	5/13/1998	5/13/1998	200.00	200	U	200	U
LHAAP-58	LHSMW04	Carbon tetrachloride	9	12/1/1994	4/13/2016	1.74	0.25	U	5	U
LHAAP-58	LHSMW04	Chloroform	9	12/1/1994	4/13/2016	1.54	0.125	U	5	U
LHAAP-58	LHSMW04	CHROMIUM, TOTAL	1	11/25/2008	11/25/2008	451.00	451		451	
LHAAP-58	LHSMW04	cis-1,2-Dichloroethene	8	8/12/1996	4/13/2016	1.23	0.2	U	5	U
LHAAP-58	LHSMW04	MAGNESIUM, TOTAL	5	12/1/1994	11/25/2008	37380.00	11000		128000	
LHAAP-58	LHSMW04	MANGANESE, TOTAL	5	12/1/1994	11/25/2008	363.40	160		702	
LHAAP-58	LHSMW04	Methylene chloride	9	12/1/1994	4/13/2016	2.10	0.22	U	5	U
LHAAP-58	LHSMW04	NICKEL, TOTAL	4	1/31/1996	11/25/2008	571.95	73		1990	
LHAAP-58	LHSMW04	Perchlorate	1	2/20/2007	2/20/2007	4.00	4	U	4	U
LHAAP-58	LHSMW04	strontium, total	4	12/1/1994	5/13/1998	837.25	729		1080	J
LHAAP-58	LHSMW04	Tetrachloroethene	9	12/1/1994	4/13/2016	96.45	0.25	U	419	
LHAAP-58	LHSMW04	THALLIUM, TOTAL	5	12/1/1994	11/25/2008	136.23	0.157	J	500	U
LHAAP-58	LHSMW04	Trichloroethene	9	12/1/1994	4/13/2016	25.00	0.25	U	106	
LHAAP-58	LHSMW04	Vinyl chloride	8	8/12/1996	4/13/2016	1.20	0.24	U	5	U
LHAAP-67	67DPT08	1,1,1-TRICHLOROETHANE	1	4/3/2013	4/3/2013	0.50	0.5	U	0.5	U
LHAAP-67	67DPT08	1,1,2-TRICHLOROETHANE	1	4/3/2013	4/3/2013	8.26	8.26		8.26	
LHAAP-67	67DPT08	1,1-DICHLOROETHENE	1	4/3/2013	4/3/2013	539.00	539		539	
LHAAP-67	67DPT08	1,2-DICHLOROETHANE	1	4/3/2013	4/3/2013	75.90	75.9		75.9	
LHAAP-67	67DPT08	Carbon tetrachloride	1	4/3/2013	4/3/2013	0.50	0.5	U	0.5	U

Summary of COC Concentrations for LHAAP Wells and Miscellaneous Sampling Locations

Area	Location	Constituent	Count	Earliest	Latest	Avg (µg/L)	Min (µg/L)	Code	Max (µg/L)	Code
LHAAP-67	67DPT08	Chloroform	1	4/3/2013	4/3/2013	0.74	0.737	J	0.737	J
LHAAP-67	67DPT08	cis-1,2-Dichloroethene	1	4/3/2013	4/3/2013	2.20	2.2		2.2	
LHAAP-67	67DPT08	Methylene chloride	1	4/3/2013	4/3/2013	0.50	0.5	U	0.5	U
LHAAP-67	67DPT08	Tetrachloroethene	1	4/3/2013	4/3/2013	0.50	0.5	U	0.5	U
LHAAP-67	67DPT08	Trichloroethene	1	4/3/2013	4/3/2013	3.48	3.48		3.48	
LHAAP-67	67DPT08	Vinyl chloride	1	4/3/2013	4/3/2013	0.47	0.469	J	0.469	J
LHAAP-67	67DPT09A	1,1,1-TRICHLOROETHANE	1	7/31/2013	7/31/2013	0.50	0.5	U	0.5	U
LHAAP-67	67DPT09A	1,1,2-TRICHLOROETHANE	1	7/31/2013	7/31/2013	0.50	0.5	U	0.5	U
LHAAP-67	67DPT09A	1,1-DICHLOROETHENE	1	7/31/2013	7/31/2013	1.00	1	U	1	U
LHAAP-67	67DPT09A	1,2-DICHLOROETHANE	1	7/31/2013	7/31/2013	0.50	0.5	U	0.5	U
LHAAP-67	67DPT09A	Carbon tetrachloride	1	7/31/2013	7/31/2013	0.50	0.5	U	0.5	U
LHAAP-67	67DPT09A	Chloroform	1	7/31/2013	7/31/2013	0.25	0.25	U	0.25	U
LHAAP-67	67DPT09A	cis-1,2-Dichloroethene	1	7/31/2013	7/31/2013	0.50	0.5	U	0.5	U
LHAAP-67	67DPT09A	Methylene chloride	1	7/31/2013	7/31/2013	0.50	0.5	U	0.5	U
LHAAP-67	67DPT09A	Tetrachloroethene	1	7/31/2013	7/31/2013	0.50	0.5	U	0.5	U
LHAAP-67	67DPT09A	Trichloroethene	1	7/31/2013	7/31/2013	0.50	0.5	U	0.5	U
LHAAP-67	67DPT09A	Vinyl chloride	1	7/31/2013	7/31/2013	0.50	0.5	U	0.5	U
LHAAP-67	67DPT11	1,1,1-TRICHLOROETHANE	1	4/4/2013	4/4/2013	0.50	0.5	U	0.5	U
LHAAP-67	67DPT11	1,1,2-TRICHLOROETHANE	1	4/4/2013	4/4/2013	0.50	0.5	U	0.5	U
LHAAP-67	67DPT11	1,1-DICHLOROETHENE	1	4/4/2013	4/4/2013	32.00	32		32	
LHAAP-67	67DPT11	1,2-DICHLOROETHANE	1	4/4/2013	4/4/2013	1.13	1.13		1.13	
LHAAP-67	67DPT11	Carbon tetrachloride	1	4/4/2013	4/4/2013	0.50	0.5	U	0.5	U
LHAAP-67	67DPT11	Chloroform	1	4/4/2013	4/4/2013	0.25	0.25	U	0.25	U
LHAAP-67	67DPT11	cis-1,2-Dichloroethene	1	4/4/2013	4/4/2013	0.50	0.5	U	0.5	U
LHAAP-67	67DPT11	Methylene chloride	1	4/4/2013	4/4/2013	0.50	0.5	U	0.5	U
LHAAP-67	67DPT11	Tetrachloroethene	1	4/4/2013	4/4/2013	0.50	0.5	U	0.5	U
LHAAP-67	67DPT11	Trichloroethene	1	4/4/2013	4/4/2013	0.50	0.5	U	0.5	U
LHAAP-67	67DPT11	Vinyl chloride	1	4/4/2013	4/4/2013	0.50	0.5	U	0.5	U
LHAAP-67	67DPT11A	1,1,1-TRICHLOROETHANE	1	4/16/2013	4/16/2013	0.50	0.5	U	0.5	U
LHAAP-67	67DPT11A	1,1,2-TRICHLOROETHANE	1	4/16/2013	4/16/2013	0.50	0.5	U	0.5	U
LHAAP-67	67DPT11A	1,1-DICHLOROETHENE	1	4/16/2013	4/16/2013	1.00	1	U	1	U
LHAAP-67	67DPT11A	1,2-DICHLOROETHANE	1	4/16/2013	4/16/2013	0.50	0.5	U	0.5	U
LHAAP-67	67DPT11A	Carbon tetrachloride	1	4/16/2013	4/16/2013	0.50	0.5	U	0.5	U
LHAAP-67	67DPT11A	Chloroform	1	4/16/2013	4/16/2013	0.25	0.25	U	0.25	U
LHAAP-67	67DPT11A	cis-1,2-Dichloroethene	1	4/16/2013	4/16/2013	0.50	0.5	U	0.5	U
LHAAP-67	67DPT11A	Methylene chloride	1	4/16/2013	4/16/2013	0.50	0.5	U	0.5	U
LHAAP-67	67DPT11A	Tetrachloroethene	1	4/16/2013	4/16/2013	0.50	0.5	U	0.5	U
LHAAP-67	67DPT11A	Trichloroethene	1	4/16/2013	4/16/2013	0.50	0.5	U	0.5	U
LHAAP-67	67DPT11A	Vinyl chloride	1	4/16/2013	4/16/2013	0.50	0.5	U	0.5	U
LHAAP-67	67DPT13A	1,1,1-TRICHLOROETHANE	1	7/31/2013	7/31/2013	0.50	0.5	U	0.5	U
LHAAP-67	67DPT13A	1,1,2-TRICHLOROETHANE	1	7/31/2013	7/31/2013	5.78	5.78		5.78	
LHAAP-67	67DPT13A	1,1-DICHLOROETHENE	1	7/31/2013	7/31/2013	140.00	140		140	
LHAAP-67	67DPT13A	1,2-DICHLOROETHANE	1	7/31/2013	7/31/2013	11.20	11.2		11.2	
LHAAP-67	67DPT13A	Carbon tetrachloride	1	7/31/2013	7/31/2013	0.50	0.5	U	0.5	U
LHAAP-67	67DPT13A	Chloroform	1	7/31/2013	7/31/2013	0.45	0.446	J	0.446	J
LHAAP-67	67DPT13A	cis-1,2-Dichloroethene	1	7/31/2013	7/31/2013	0.45	0.447	J	0.447	J
LHAAP-67	67DPT13A	Methylene chloride	1	7/31/2013	7/31/2013	0.50	0.5	U	0.5	U
LHAAP-67	67DPT13A	Tetrachloroethene	1	7/31/2013	7/31/2013	0.50	0.5	U	0.5	U
LHAAP-67	67DPT13A	Trichloroethene	1	7/31/2013	7/31/2013	1.28	1.28		1.28	
LHAAP-67	67DPT13A	Vinyl chloride	1	7/31/2013	7/31/2013	0.48	0.484	J	0.484	J
LHAAP-67	67DPT13B	1,1,1-TRICHLOROETHANE	1	8/24/2013	8/24/2013	0.50	0.5	U	0.5	U
LHAAP-67	67DPT13B	1,1,2-TRICHLOROETHANE	1	8/24/2013	8/24/2013	4.16	4.16		4.16	
LHAAP-67	67DPT13B	1,1-DICHLOROETHENE	1	8/24/2013	8/24/2013	518.00	518		518	
LHAAP-67	67DPT13B	1,2-DICHLOROETHANE	1	8/24/2013	8/24/2013	103.00	103		103	
LHAAP-67	67DPT13B	Carbon tetrachloride	1	8/24/2013	8/24/2013	0.50	0.5	U	0.5	U
LHAAP-67	67DPT13B	Chloroform	1	8/24/2013	8/24/2013	2.49	2.49		2.49	
LHAAP-67	67DPT13B	cis-1,2-Dichloroethene	1	8/24/2013	8/24/2013	1.25	1.25		1.25	
LHAAP-67	67DPT13B	Methylene chloride	1	8/24/2013	8/24/2013	0.50	0.5	U	0.5	U
LHAAP-67	67DPT13B	Tetrachloroethene	1	8/24/2013	8/24/2013	0.50	0.5	U	0.5	U
LHAAP-67	67DPT13B	Trichloroethene	1	8/24/2013	8/24/2013	1.39	1.39		1.39	
LHAAP-67	67DPT13B	Vinyl chloride	1	8/24/2013	8/24/2013	0.28	0.277	J	0.277	J
LHAAP-67	67DPT13C	1,1,1-TRICHLOROETHANE	1	9/5/2013	9/5/2013	0.50	0.5	U	0.5	U
LHAAP-67	67DPT13C	1,1,2-TRICHLOROETHANE	1	9/5/2013	9/5/2013	0.50	0.5	U	0.5	U
LHAAP-67	67DPT13C	1,1-DICHLOROETHENE	1	9/5/2013	9/5/2013	2.47	2.47		2.47	
LHAAP-67	67DPT13C	1,2-DICHLOROETHANE	1	9/5/2013	9/5/2013	0.39	0.386	J	0.386	J
LHAAP-67	67DPT13C	Carbon tetrachloride	1	9/5/2013	9/5/2013	0.50	0.5	U	0.5	U
LHAAP-67	67DPT13C	Chloroform	1	9/5/2013	9/5/2013	0.25	0.25	U	0.25	U
LHAAP-67	67DPT13C	cis-1,2-Dichloroethene	1	9/5/2013	9/5/2013	0.50	0.5	U	0.5	U
LHAAP-67	67DPT13C	Methylene chloride	1	9/5/2013	9/5/2013	0.50	0.5	U	0.5	U
LHAAP-67	67DPT13C	Tetrachloroethene	1	9/5/2013	9/5/2013	0.50	0.5	U	0.5	U
LHAAP-67	67DPT13C	Trichloroethene	1	9/5/2013	9/5/2013	0.50	0.5	U	0.5	U
LHAAP-67	67DPT13C	Vinyl chloride	1	9/5/2013	9/5/2013	0.50	0.5	U	0.5	U
LHAAP-67	67DPT14	1,1,1-Trichloroethane	1	6/16/2014	6/16/2014	0.50	0.5	U	0.5	U
LHAAP-67	67DPT14	1,1,2-Trichloroethane	1	6/16/2014	6/16/2014	0.50	0.5	U	0.5	U
LHAAP-67	67DPT14	1,1-Dichloroethene	1	6/16/2014	6/16/2014	1.00	1	U	1	U
LHAAP-67	67DPT14	1,2-Dichloroethane	1	6/16/2014	6/16/2014	0.50	0.5	U	0.5	U
LHAAP-67	67DPT14	Carbon tetrachloride	1	6/16/2014	6/16/2014	0.50	0.5	U	0.5	U
LHAAP-67	67DPT14	Chloroform	1	6/16/2014	6/16/2014	0.25	0.25	U	0.25	U
LHAAP-67	67DPT14	cis-1,2-Dichloroethene	1	6/16/2014	6/16/2014	0.50	0.5	U	0.5	U
LHAAP-67	67DPT14	Methylene chloride	1	6/16/2014	6/16/2014	0.50	0.5	U	0.5	U
LHAAP-67	67DPT14	Tetrachloroethene	1	6/16/2014	6/16/2014	0.50	0.5	U	0.5	U
LHAAP-67	67DPT14	Trichloroethene	1	6/16/2014	6/16/2014	0.50	0.5	U	0.5	U
LHAAP-67	67DPT14	Vinyl chloride	1	6/16/2014	6/16/2014	0.50	0.5	U	0.5	U
LHAAP-67	67WW01	1,1,1-Trichloroethane	14	12/8/1998	11/28/2017	41.70	0.25	U	560	
LHAAP-67	67WW01	1,1,2-Trichloroethane	13	12/8/1998	11/28/2017	3.26	0.25	U	29	
LHAAP-67	67WW01	1,1-Dichloroethene	14	12/8/1998	11/28/2017	385.14	139		728	
LHAAP-67	67WW01	1,2-Dichloroethane	13	12/8/1998	11/28/2017	23.93	6.37		52.6	

Summary of COC Concentrations for LHAAP Wells and Miscellaneous Sampling Locations

Area	Location	Constituent	Count	Earliest	Latest	Avg (µg/L)	Min (µg/L)	Code	Max (µg/L)	Code
LHAAP-67	67WW01	1,4-Dioxane	4	12/8/1998	11/28/2017	530.29	4.15		2000	U
LHAAP-67	67WW01	Carbon tetrachloride	14	12/8/1998	11/28/2017	2.41	0.25	U	10	U
LHAAP-67	67WW01	Chloroform	14	12/8/1998	11/28/2017	2.13	0.125	U	10	U
LHAAP-67	67WW01	cis-1,2-Dichloroethene	13	12/8/1998	11/28/2017	2.03	0.872	J	10	U
LHAAP-67	67WW01	magnesium, total	1	12/8/1998	12/8/1998	75000.00	75000		75000	
LHAAP-67	67WW01	manganese, total	1	12/8/1998	12/8/1998	430.00	430		430	
LHAAP-67	67WW01	Methylene chloride	14	12/8/1998	11/28/2017	2.48	0.25	U	10	U
LHAAP-67	67WW01	nickel, total	1	12/8/1998	12/8/1998	50.00	50		50	
LHAAP-67	67WW01	strontium, total	1	12/8/1998	12/8/1998	3000.00	3000		3000	
LHAAP-67	67WW01	Tetrachloroethene	14	12/8/1998	11/28/2017	2.41	0.25	U	10	U
LHAAP-67	67WW01	thallium, total	1	12/8/1998	12/8/1998	1.20	1.2		1.2	
LHAAP-67	67WW01	Trichloroethene	13	12/8/1998	11/28/2017	4.07	2.1		10	U
LHAAP-67	67WW01	Vinyl chloride	13	12/8/1998	11/28/2017	2.71	1	J	10	U
LHAAP-67	67WW02	1,1,1-Trichloroethane	15	12/8/1998	11/28/2017	10.72	0.25	U	140	E
LHAAP-67	67WW02	1,1,2-Trichloroethane	15	12/8/1998	11/28/2017	1.81	0.25	U	6.4	
LHAAP-67	67WW02	1,1-Dichloroethene	15	12/8/1998	11/28/2017	7.28	0.5	U	67.6	
LHAAP-67	67WW02	1,2-Dichloroethane	15	12/8/1998	11/28/2017	1.44	0.25	U	5	U
LHAAP-67	67WW02	1,4-Dioxane	5	12/8/1998	11/28/2017	60.94	0.26		200	U
LHAAP-67	67WW02	Carbon tetrachloride	15	12/8/1998	11/28/2017	1.45	0.25	U	5	U
LHAAP-67	67WW02	Chloroform	15	12/8/1998	11/28/2017	1.29	0.125	U	5	U
LHAAP-67	67WW02	cis-1,2-Dichloroethene	15	12/8/1998	11/28/2017	2.12	0.25	U	10	U
LHAAP-67	67WW02	magnesium, total	1	12/8/1998	12/8/1998	60000.00	60000		60000	
LHAAP-67	67WW02	manganese, total	1	12/8/1998	12/8/1998	436.00	436		436	
LHAAP-67	67WW02	Methylene chloride	15	12/8/1998	11/28/2017	1.52	0.25	U	5	U
LHAAP-67	67WW02	nickel, total	1	12/8/1998	12/8/1998	570.00	570		570	
LHAAP-67	67WW02	strontium, total	1	12/8/1998	12/8/1998	1400.00	1400		1400	
LHAAP-67	67WW02	Tetrachloroethene	15	12/8/1998	11/28/2017	1.45	0.25	U	5	U
LHAAP-67	67WW02	thallium, total	1	12/8/1998	12/8/1998	1.00	1	U	1	U
LHAAP-67	67WW02	Trichloroethene	15	12/8/1998	11/28/2017	1.45	0.25	U	5	U
LHAAP-67	67WW02	Vinyl chloride	15	12/8/1998	11/28/2017	2.10	0.25	U	10	U
LHAAP-67	67WW03	1,1,1-Trichloroethane	7	12/8/1998	5/19/2016	259.50	0.5	U	1800	
LHAAP-67	67WW03	1,1,2-Trichloroethane	7	12/8/1998	5/19/2016	5.79	0.5	U	24	
LHAAP-67	67WW03	1,1-Dichloroethene	7	12/8/1998	5/19/2016	7.71	1	U	36	
LHAAP-67	67WW03	1,2-Dichloroethane	7	12/8/1998	5/19/2016	5.21	0.5	U	20	U
LHAAP-67	67WW03	1,4-Dioxane	2	12/8/1998	9/12/2004	2050.00	100	U	4000	U
LHAAP-67	67WW03	Carbon tetrachloride	7	12/8/1998	5/19/2016	5.21	0.5	U	20	U
LHAAP-67	67WW03	Chloroform	7	12/8/1998	5/19/2016	5.11	0.25	U	20	U
LHAAP-67	67WW03	cis-1,2-Dichloroethene	7	12/8/1998	5/19/2016	6.64	0.5	U	20	U
LHAAP-67	67WW03	magnesium, total	1	12/8/1998	12/8/1998	150000.00	150000		150000	
LHAAP-67	67WW03	manganese, total	1	12/8/1998	12/8/1998	457.00	457		457	
LHAAP-67	67WW03	Methylene chloride	7	12/8/1998	5/19/2016	5.21	0.5	U	20	U
LHAAP-67	67WW03	nickel, total	1	12/8/1998	12/8/1998	80.00	80		80	
LHAAP-67	67WW03	strontium, total	1	12/8/1998	12/8/1998	7600.00	7600		7600	
LHAAP-67	67WW03	Tetrachloroethene	7	12/8/1998	5/19/2016	5.21	0.5	U	20	U
LHAAP-67	67WW03	thallium, total	1	12/8/1998	12/8/1998	2.10	2.1		2.1	
LHAAP-67	67WW03	Trichloroethene	7	12/8/1998	5/19/2016	5.21	0.5	U	20	U
LHAAP-67	67WW03	Vinyl chloride	7	12/8/1998	5/19/2016	6.64	0.5	U	20	U
LHAAP-67	67WW05	1,1,1-Trichloroethane	15	12/19/2000	11/28/2017	1.39	0.1	U	5	U
LHAAP-67	67WW05	1,1,2-Trichloroethane	15	12/19/2000	11/28/2017	1.39	0.1	U	5	U
LHAAP-67	67WW05	1,1-Dichloroethene	15	12/19/2000	11/28/2017	1.71	0.2	U	5	U
LHAAP-67	67WW05	1,2-Dichloroethane	15	12/19/2000	11/28/2017	1.39	0.1	U	5	U
LHAAP-67	67WW05	1,4-Dioxane	2	9/12/2004	11/28/2017	50.27	0.53		100	U
LHAAP-67	67WW05	Carbon tetrachloride	15	12/19/2000	11/28/2017	1.39	0.1	U	5	U
LHAAP-67	67WW05	Chloroform	15	12/19/2000	11/28/2017	1.23	0.1	U	5	U
LHAAP-67	67WW05	cis-1,2-Dichloroethene	15	12/19/2000	11/28/2017	2.06	0.1	U	10	U
LHAAP-67	67WW05	magnesium, total	1	12/19/2000	12/19/2000	46700.00	46700		46700	
LHAAP-67	67WW05	manganese, total	1	12/19/2000	12/19/2000	407.00	407		407	
LHAAP-67	67WW05	Methylene chloride	14	12/19/2000	11/28/2017	1.27	0.25	U	5	U
LHAAP-67	67WW05	nickel, total	1	12/19/2000	12/19/2000	160.00	160		160	
LHAAP-67	67WW05	Perchlorate	1	12/19/2000	12/19/2000	0.30	0.3	U	0.3	U
LHAAP-67	67WW05	strontium, total	1	12/19/2000	12/19/2000	993.00	993		993	
LHAAP-67	67WW05	Tetrachloroethene	15	12/19/2000	11/28/2017	1.39	0.1	U	5	U
LHAAP-67	67WW05	thallium, total	1	12/19/2000	12/19/2000	5.00	5	U	5	U
LHAAP-67	67WW05	Trichloroethene	15	12/19/2000	11/28/2017	1.39	0.1	U	5	U
LHAAP-67	67WW05	Vinyl chloride	15	12/19/2000	11/28/2017	2.06	0.2	U	10	U
LHAAP-67	67WW06	1,1,1-Trichloroethane	9	12/19/2000	11/29/2017	1.96	0.1	U	5	U
LHAAP-67	67WW06	1,1,2-Trichloroethane	9	12/19/2000	11/29/2017	1.96	0.1	U	5	U
LHAAP-67	67WW06	1,1-Dichloroethene	9	12/19/2000	11/29/2017	2.11	0.2	U	5	U
LHAAP-67	67WW06	1,2-Dichloroethane	9	12/19/2000	11/29/2017	2.51	1		5	U
LHAAP-67	67WW06	1,4-Dioxane	4	9/12/2004	11/29/2017	25.93	1	U	100	U
LHAAP-67	67WW06	Carbon tetrachloride	9	12/19/2000	11/29/2017	1.96	0.1	U	5	U
LHAAP-67	67WW06	Chloroform	9	12/19/2000	11/29/2017	2.19	0.125	U	5	U
LHAAP-67	67WW06	cis-1,2-Dichloroethene	9	12/19/2000	11/29/2017	3.07	0.1	U	10	U
LHAAP-67	67WW06	magnesium, total	1	12/19/2000	12/19/2000	197000.00	197000		197000	
LHAAP-67	67WW06	manganese, total	1	12/19/2000	12/19/2000	3410.00	3410		3410	
LHAAP-67	67WW06	Methylene chloride	9	12/19/2000	11/29/2017	2.34	0.25	U	5	U
LHAAP-67	67WW06	nickel, total	1	12/19/2000	12/19/2000	155.00	155	J	155	J
LHAAP-67	67WW06	PERCHLORATE	2	12/19/2000	8/6/2010	8.05	0.1	U	16	U
LHAAP-67	67WW06	strontium, total	1	12/19/2000	12/19/2000	6570.00	6570		6570	
LHAAP-67	67WW06	Tetrachloroethene	9	12/19/2000	11/29/2017	1.96	0.1	U	5	U
LHAAP-67	67WW06	thallium, total	1	12/19/2000	12/19/2000	5.00	5	U	5	U
LHAAP-67	67WW06	Trichloroethene	9	12/19/2000	11/29/2017	1.96	0.15	J	5	U
LHAAP-67	67WW06	Vinyl chloride	9	12/19/2000	11/29/2017	3.08	0.2	U	10	U
LHAAP-67	67WW07	1,1,1-Trichloroethane	15	12/19/2000	11/29/2017	1.39	0.1	U	5	U
LHAAP-67	67WW07	1,1,2-Trichloroethane	15	12/19/2000	11/29/2017	1.39	0.1	U	5	U
LHAAP-67	67WW07	1,1-Dichloroethene	15	12/19/2000	11/29/2017	1.71	0.2	U	5	U
LHAAP-67	67WW07	1,2-Dichloroethane	15	12/19/2000	11/29/2017	1.77	0.33	J	5	U

Summary of COC Concentrations for LHAAP Wells and Miscellaneous Sampling Locations

Area	Location	Constituent	Count	Earliest	Latest	Avg (µg/L)	Min (µg/L)	Code	Max (µg/L)	Code
LHAAP-67	67WW07	1,4-Dioxane	2	9/12/2004	11/29/2017	50.27	0.53		100	U
LHAAP-67	67WW07	Carbon tetrachloride	15	12/19/2000	11/29/2017	1.39	0.1	U	5	U
LHAAP-67	67WW07	Chloroform	15	12/19/2000	11/29/2017	1.23	0.1	U	5	U
LHAAP-67	67WW07	cis-1,2-Dichloroethene	15	12/19/2000	11/29/2017	2.06	0.1	U	10	U
LHAAP-67	67WW07	magnesium, total	1	12/19/2000	12/19/2000	84300.00	84300		84300	
LHAAP-67	67WW07	manganese, total	1	12/19/2000	12/19/2000	2410.00	2410		2410	
LHAAP-67	67WW07	Methylene chloride	15	12/19/2000	11/29/2017	1.52	0.25	U	5	U
LHAAP-67	67WW07	nickel, total	1	12/19/2000	12/19/2000	182.00	182	J	182	J
LHAAP-67	67WW07	Perchlorate	1	12/19/2000	12/19/2000	0.30	0.3	U	0.3	U
LHAAP-67	67WW07	strontium, total	1	12/19/2000	12/19/2000	2560.00	2560		2560	
LHAAP-67	67WW07	Tetrachloroethene	15	12/19/2000	11/29/2017	1.39	0.1	U	5	U
LHAAP-67	67WW07	thallium, total	1	12/19/2000	12/19/2000	5.00	5	U	5	U
LHAAP-67	67WW07	Trichloroethene	15	12/19/2000	11/29/2017	1.39	0.1	U	5	U
LHAAP-67	67WW07	Vinyl chloride	15	12/19/2000	11/29/2017	2.06	0.2	U	10	U
LHAAP-67	67WW08	1,1,1-Trichloroethane	11	6/3/2013	11/28/2017	3.98	0.25	U	5	U
LHAAP-67	67WW08	1,1,2-Trichloroethane	11	6/3/2013	11/28/2017	5.09	1	U	7.74	J
LHAAP-67	67WW08	1,1-Dichloroethene	11	6/3/2013	11/28/2017	1484.55	340		2320	
LHAAP-67	67WW08	1,2-Dichloroethane	11	6/3/2013	11/28/2017	81.62	13		106	
LHAAP-67	67WW08	1,4-Dioxane	1	11/28/2017	11/28/2017	22.00	22	J	22	J
LHAAP-67	67WW08	Carbon tetrachloride	11	6/3/2013	11/28/2017	3.98	0.25	U	5	U
LHAAP-67	67WW08	Chloroform	11	6/3/2013	11/28/2017	3.05	1	U	5.13	J
LHAAP-67	67WW08	cis-1,2-Dichloroethene	11	6/3/2013	11/28/2017	3.76	1	U	5	U
LHAAP-67	67WW08	Methylene chloride	11	6/3/2013	11/28/2017	3.92	0.25	U	5	U
LHAAP-67	67WW08	Tetrachloroethene	11	6/3/2013	11/28/2017	3.98	0.25	U	5	U
LHAAP-67	67WW08	Trichloroethene	11	6/3/2013	11/28/2017	3.75	1	U	5	U
LHAAP-67	67WW08	Vinyl chloride	11	6/3/2013	11/28/2017	4.04	0.951	J	5	U
LHAAP-67	67WW09	1,1,1-Trichloroethane	11	6/1/2013	11/27/2017	0.50	0.25	U	1	U
LHAAP-67	67WW09	1,1,2-Trichloroethane	11	6/1/2013	11/27/2017	0.50	0.25	U	1	U
LHAAP-67	67WW09	1,1-Dichloroethene	11	6/1/2013	11/27/2017	8.18	0.5	U	20.8	
LHAAP-67	67WW09	1,2-Dichloroethane	11	6/1/2013	11/27/2017	0.48	0.25	U	1	U
LHAAP-67	67WW09	1,4-Dioxane	1	11/27/2017	11/27/2017	1.20	1.2		1.2	
LHAAP-67	67WW09	Carbon tetrachloride	11	6/1/2013	11/27/2017	0.50	0.25	U	1	U
LHAAP-67	67WW09	Chloroform	11	6/1/2013	11/27/2017	0.30	0.125	U	1	U
LHAAP-67	67WW09	cis-1,2-Dichloroethene	11	6/1/2013	11/27/2017	0.50	0.25	U	1	U
LHAAP-67	67WW09	Methylene chloride	11	6/1/2013	11/27/2017	0.59	0.25	U	2	U
LHAAP-67	67WW09	Tetrachloroethene	11	6/1/2013	11/27/2017	0.50	0.25	U	1	U
LHAAP-67	67WW09	Trichloroethene	11	6/1/2013	11/27/2017	0.50	0.25	U	1	U
LHAAP-67	67WW09	Vinyl chloride	11	6/1/2013	11/27/2017	0.50	0.25	U	1	U
LHAAP-67	67WW09A	1,1,1-Trichloroethane	10	9/27/2013	11/29/2017	0.55	0.5	U	1	U
LHAAP-67	67WW09A	1,1,2-Trichloroethane	10	9/27/2013	11/29/2017	0.55	0.5	U	1	U
LHAAP-67	67WW09A	1,1-Dichloroethene	10	9/27/2013	11/29/2017	1.00	1	U	1	U
LHAAP-67	67WW09A	1,2-Dichloroethane	10	9/27/2013	11/29/2017	0.55	0.5	U	1	U
LHAAP-67	67WW09A	1,4-Dioxane	1	11/29/2017	11/29/2017	3.60	3.6		3.6	
LHAAP-67	67WW09A	Carbon tetrachloride	10	9/27/2013	11/29/2017	0.55	0.5	U	1	U
LHAAP-67	67WW09A	Chloroform	10	9/27/2013	11/29/2017	0.33	0.25	U	1	U
LHAAP-67	67WW09A	cis-1,2-Dichloroethene	10	9/27/2013	11/29/2017	0.55	0.5	U	1	U
LHAAP-67	67WW09A	Methylene chloride	10	9/27/2013	11/29/2017	0.65	0.5	U	2	U
LHAAP-67	67WW09A	Tetrachloroethene	10	9/27/2013	11/29/2017	0.55	0.5	U	1	U
LHAAP-67	67WW09A	Trichloroethene	10	9/27/2013	11/29/2017	0.55	0.5	U	1	U
LHAAP-67	67WW09A	Vinyl chloride	10	9/27/2013	11/29/2017	0.55	0.5	U	1	U
LHAAP-67	67WW10	1,1,1-Trichloroethane	10	9/27/2013	11/29/2017	0.55	0.5	U	1	U
LHAAP-67	67WW10	1,1,2-Trichloroethane	10	9/27/2013	11/29/2017	0.55	0.5	U	1	U
LHAAP-67	67WW10	1,1-Dichloroethene	10	9/27/2013	11/29/2017	1.00	1	U	1	U
LHAAP-67	67WW10	1,2-Dichloroethane	10	9/27/2013	11/29/2017	0.55	0.5	U	1	U
LHAAP-67	67WW10	1,4-Dioxane	1	11/29/2017	11/29/2017	0.23	0.23		0.23	
LHAAP-67	67WW10	Carbon tetrachloride	10	9/27/2013	11/29/2017	0.55	0.5	U	1	U
LHAAP-67	67WW10	Chloroform	10	9/27/2013	11/29/2017	0.33	0.25	U	1	U
LHAAP-67	67WW10	cis-1,2-Dichloroethene	10	9/27/2013	11/29/2017	0.55	0.5	U	1	U
LHAAP-67	67WW10	Methylene chloride	10	9/27/2013	11/29/2017	0.65	0.5	U	2	U
LHAAP-67	67WW10	Tetrachloroethene	10	9/27/2013	11/29/2017	0.55	0.5	U	1	U
LHAAP-67	67WW10	Trichloroethene	10	9/27/2013	11/29/2017	0.55	0.5	U	1	U
LHAAP-67	67WW10	Vinyl chloride	10	9/27/2013	11/29/2017	0.55	0.5	U	1	U
LHAAP-67	67WW11	1,1,1-Trichloroethane	10	6/1/2013	11/27/2017	0.53	0.25	U	1	U
LHAAP-67	67WW11	1,1,2-Trichloroethane	10	6/1/2013	11/27/2017	0.53	0.25	U	1	U
LHAAP-67	67WW11	1,1-Dichloroethene	10	6/1/2013	11/27/2017	30.57	5.2		47.1	
LHAAP-67	67WW11	1,2-Dichloroethane	10	6/1/2013	11/27/2017	0.67	0.396	J	1	U
LHAAP-67	67WW11	1,4-Dioxane	1	11/27/2017	11/27/2017	18.00	18		18	
LHAAP-67	67WW11	Carbon tetrachloride	10	6/1/2013	11/27/2017	0.53	0.25	U	1	U
LHAAP-67	67WW11	Chloroform	10	6/1/2013	11/27/2017	0.31	0.125	U	1	U
LHAAP-67	67WW11	cis-1,2-Dichloroethene	10	6/1/2013	11/27/2017	0.53	0.25	U	1	U
LHAAP-67	67WW11	Methylene chloride	10	6/1/2013	11/27/2017	0.63	0.25	U	2	U
LHAAP-67	67WW11	Tetrachloroethene	10	6/1/2013	11/27/2017	0.53	0.25	U	1	U
LHAAP-67	67WW11	Trichloroethene	10	6/1/2013	11/27/2017	0.53	0.25	U	1	U
LHAAP-67	67WW11	Vinyl chloride	10	6/1/2013	11/27/2017	0.47	0.25	U	1	U
LHAAP-67	67WW12	1,1,1-Trichloroethane	11	6/1/2013	11/29/2017	0.52	0.25	U	1	U
LHAAP-67	67WW12	1,1,2-Trichloroethane	11	6/1/2013	11/29/2017	0.52	0.25	U	1	U
LHAAP-67	67WW12	1,1-Dichloroethene	11	6/1/2013	11/29/2017	1.03	0.5	U	2.2	
LHAAP-67	67WW12	1,2-Dichloroethane	11	6/1/2013	11/29/2017	0.52	0.25	U	1	U
LHAAP-67	67WW12	1,4-Dioxane	2	12/16/2015	11/29/2017	0.80	0.6	J	1	U
LHAAP-67	67WW12	Carbon tetrachloride	11	6/1/2013	11/29/2017	0.52	0.25	U	1	U
LHAAP-67	67WW12	Chloroform	11	6/1/2013	11/29/2017	0.31	0.125	U	1	U
LHAAP-67	67WW12	cis-1,2-Dichloroethene	11	6/1/2013	11/29/2017	0.52	0.25	U	1	U
LHAAP-67	67WW12	Methylene chloride	11	6/1/2013	11/29/2017	0.61	0.25	U	2	U
LHAAP-67	67WW12	Tetrachloroethene	11	6/1/2013	11/29/2017	0.52	0.25	U	1	U
LHAAP-67	67WW12	Trichloroethene	11	6/1/2013	11/29/2017	0.52	0.25	U	1	U
LHAAP-67	67WW12	Vinyl chloride	11	6/1/2013	11/29/2017	0.52	0.25	U	1	U
LHAAP-67	67WW13	1,1,1-Trichloroethane	11	5/31/2013	11/28/2017	1.07	0.25	U	2.5	U

Summary of COC Concentrations for LHAAP Wells and Miscellaneous Sampling Locations

Area	Location	Constituent	Count	Earliest	Latest	Avg (µg/L)	Min (µg/L)	Code	Max (µg/L)	Code
LHAAP-67	67WW13	1,1,2-Trichloroethane	11	5/31/2013	11/28/2017	4.52	1.99	J	7.66	
LHAAP-67	67WW13	1,1-Dichloroethene	11	5/31/2013	11/28/2017	468.09	240		762	
LHAAP-67	67WW13	1,2-Dichloroethane	11	5/31/2013	11/28/2017	26.54	13.7		42.6	
LHAAP-67	67WW13	1,4-Dioxane	2	12/16/2015	11/28/2017	57.15	36		78.3	
LHAAP-67	67WW13	Carbon tetrachloride	11	5/31/2013	11/28/2017	1.07	0.25	U	2.5	U
LHAAP-67	67WW13	Chloroform	11	5/31/2013	11/28/2017	1.00	0.336	J	2.27	J
LHAAP-67	67WW13	cis-1,2-Dichloroethene	11	5/31/2013	11/28/2017	1.57	0.755	J	2.75	
LHAAP-67	67WW13	Methylene chloride	10	5/31/2013	5/19/2016	1.11	0.25	U	2.88	J
LHAAP-67	67WW13	Tetrachloroethene	11	5/31/2013	11/28/2017	1.07	0.25	U	2.5	U
LHAAP-67	67WW13	Trichloroethene	11	5/31/2013	11/28/2017	2.27	1	U	3.32	
LHAAP-67	67WW13	Vinyl chloride	11	5/31/2013	11/28/2017	1.44	0.644	J	2.55	
LHAAP-67	67WW14	1,1,1-Trichloroethane	10	10/1/2013	11/27/2017	0.55	0.5	U	1	U
LHAAP-67	67WW14	1,1,2-Trichloroethane	10	10/1/2013	11/27/2017	0.55	0.5	U	1	U
LHAAP-67	67WW14	1,1-Dichloroethene	10	10/1/2013	11/27/2017	6.59	1.82	J	26.3	
LHAAP-67	67WW14	1,2-Dichloroethane	10	10/1/2013	11/27/2017	1.83	0.64	J	5.83	
LHAAP-67	67WW14	1,4-Dioxane	1	11/27/2017	11/27/2017	17.00	17		17	
LHAAP-67	67WW14	Carbon tetrachloride	10	10/1/2013	11/27/2017	0.55	0.5	U	1	U
LHAAP-67	67WW14	Chloroform	10	10/1/2013	11/27/2017	0.33	0.25	U	1	U
LHAAP-67	67WW14	cis-1,2-Dichloroethene	10	10/1/2013	11/27/2017	0.55	0.5	U	1	U
LHAAP-67	67WW14	Methylene chloride	10	10/1/2013	11/27/2017	0.65	0.5	U	2	U
LHAAP-67	67WW14	Tetrachloroethene	10	10/1/2013	11/27/2017	0.55	0.5	U	1	U
LHAAP-67	67WW14	Trichloroethene	10	10/1/2013	11/27/2017	0.55	0.5	U	1	U
LHAAP-67	67WW14	Vinyl chloride	10	10/1/2013	11/27/2017	0.53	0.297	J	1	U
LHAAP-67	67WW15	1,1,1-Trichloroethane	2	5/19/2016	11/27/2017	5.50	1	U	10	U
LHAAP-67	67WW15	1,1,2-Trichloroethane	2	5/19/2016	11/27/2017	14.15	5.6		22.7	
LHAAP-67	67WW15	1,1-Dichloroethene	2	5/19/2016	11/27/2017	1485.00	510		2460	
LHAAP-67	67WW15	1,2-Dichloroethane	2	5/19/2016	11/27/2017	56.75	27		86.5	
LHAAP-67	67WW15	1,4-Dioxane	1	11/27/2017	11/27/2017	12.00	12		12	
LHAAP-67	67WW15	Carbon tetrachloride	2	5/19/2016	11/27/2017	5.50	1	U	10	U
LHAAP-67	67WW15	Chloroform	2	5/19/2016	11/27/2017	3.00	1	U	5	U
LHAAP-67	67WW15	cis-1,2-Dichloroethene	2	5/19/2016	11/27/2017	3.80	1.5		6.1	J
LHAAP-67	67WW15	Methylene chloride	2	5/19/2016	11/27/2017	6.00	2	U	10	U
LHAAP-67	67WW15	Tetrachloroethene	2	5/19/2016	11/27/2017	5.50	1	U	10	U
LHAAP-67	67WW15	Trichloroethene	2	5/19/2016	11/27/2017	3.24	1	U	5.48	J
LHAAP-67	67WW15	Vinyl chloride	2	5/19/2016	11/27/2017	5.50	1	U	10	U
LHAAP-67	67WW16	1,1,1-Trichloroethane	1	5/18/2016	5/18/2016	0.50	0.5	U	0.5	U
LHAAP-67	67WW16	1,1,2-Trichloroethane	1	5/18/2016	5/18/2016	0.50	0.5	U	0.5	U
LHAAP-67	67WW16	1,1-Dichloroethene	1	5/18/2016	5/18/2016	1.00	1	U	1	U
LHAAP-67	67WW16	1,2-Dichloroethane	1	5/18/2016	5/18/2016	0.50	0.5	U	0.5	U
LHAAP-67	67WW16	Carbon tetrachloride	1	5/18/2016	5/18/2016	0.50	0.5	U	0.5	U
LHAAP-67	67WW16	Chloroform	1	5/18/2016	5/18/2016	0.25	0.25	U	0.25	U
LHAAP-67	67WW16	cis-1,2-Dichloroethene	1	5/18/2016	5/18/2016	0.50	0.5	U	0.5	U
LHAAP-67	67WW16	Methylene chloride	1	5/18/2016	5/18/2016	0.50	0.5	U	0.5	U
LHAAP-67	67WW16	Tetrachloroethene	1	5/18/2016	5/18/2016	0.50	0.5	U	0.5	U
LHAAP-67	67WW16	Trichloroethene	1	5/18/2016	5/18/2016	0.50	0.5	U	0.5	U
LHAAP-67	67WW16	Vinyl chloride	1	5/18/2016	5/18/2016	0.50	0.5	U	0.5	U
LHAAP-67	67WW16I	1,1,1-Trichloroethane	1	11/29/2017	11/29/2017	1.00	1	U	1	U
LHAAP-67	67WW16I	1,1,2-Trichloroethane	1	11/29/2017	11/29/2017	1.00	1	U	1	U
LHAAP-67	67WW16I	1,1-Dichloroethene	1	11/29/2017	11/29/2017	1.00	1	U	1	U
LHAAP-67	67WW16I	1,2-Dichloroethane	1	11/29/2017	11/29/2017	1.00	1	U	1	U
LHAAP-67	67WW16I	1,4-Dioxane	1	11/29/2017	11/29/2017	0.33	0.33		0.33	
LHAAP-67	67WW16I	Carbon tetrachloride	1	11/29/2017	11/29/2017	1.00	1	U	1	U
LHAAP-67	67WW16I	Chloroform	1	11/29/2017	11/29/2017	1.00	1	U	1	U
LHAAP-67	67WW16I	cis-1,2-Dichloroethene	1	11/29/2017	11/29/2017	1.00	1	U	1	U
LHAAP-67	67WW16I	Methylene chloride	1	11/29/2017	11/29/2017	2.00	2	U	2	U
LHAAP-67	67WW16I	Tetrachloroethene	1	11/29/2017	11/29/2017	1.00	1	U	1	U
LHAAP-67	67WW16I	Trichloroethene	1	11/29/2017	11/29/2017	1.00	1	U	1	U
LHAAP-67	67WW16I	Vinyl chloride	1	11/29/2017	11/29/2017	1.00	1	U	1	U
LHAAP-67	LHAAP67VAULT	1,1,1-Trichloroethane	1	9/11/2014	9/11/2014	0.50	0.5	U	0.5	U
LHAAP-67	LHAAP67VAULT	1,1,2-Trichloroethane	1	9/11/2014	9/11/2014	0.50	0.5	U	0.5	U
LHAAP-67	LHAAP67VAULT	1,1-Dichloroethene	1	9/11/2014	9/11/2014	1.00	1	U	1	U
LHAAP-67	LHAAP67VAULT	1,2-Dichloroethane	1	9/11/2014	9/11/2014	0.50	0.5	U	0.5	U
LHAAP-67	LHAAP67VAULT	Carbon tetrachloride	1	9/11/2014	9/11/2014	0.50	0.5	U	0.5	U
LHAAP-67	LHAAP67VAULT	Chloroform	1	9/11/2014	9/11/2014	0.25	0.25	U	0.25	U
LHAAP-67	LHAAP67VAULT	cis-1,2-Dichloroethene	1	9/11/2014	9/11/2014	0.50	0.5	U	0.5	U
LHAAP-67	LHAAP67VAULT	Methylene chloride	1	9/11/2014	9/11/2014	0.50	0.5	U	0.5	U
LHAAP-67	LHAAP67VAULT	Tetrachloroethene	1	9/11/2014	9/11/2014	0.50	0.5	U	0.5	U
LHAAP-67	LHAAP67VAULT	Trichloroethene	1	9/11/2014	9/11/2014	0.50	0.5	U	0.5	U
LHAAP-67	LHAAP67VAULT	Vinyl chloride	1	9/11/2014	9/11/2014	0.50	0.5	U	0.5	U

Notes:

Concentrations = micrograms per liter (µg/L)

U = Not Detected: The analyte was analyzed for, but not detected.

J = Estimated Value: The analyte was positively identified, the result is an estimation due to discrepencies in certain analyte-specific quality control criteria.

2019 Five-Year Review ProUCL Trend Summary
Longhorn Army Ammunition Plant, Karnack Texas

Location Name	Well Name	1,1,1-trichloroethane	1,1,2-trichloroethane	1,1-dichloroethene	1,2-dichloroethane	1,4-dioxane	carbon tetrachloride	chloroform	cis-1,2-dichloroethene	methylene chloride	perchlorate	tetrachloroethene	trichloroethene	vinyl chloride
ALL	EW-1	N/A	N/A	Insufficient	N/A	N/A	N/A	N/A	Insufficient	Decreasing	Decreasing	N/A	Insufficient	N/A
ALL	HBW-1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
ALL	HBW-10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
ALL	HBW-7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
AREA 18/24	AWD-1	N/A	N/A	Insufficient	Increasing	N/A	N/A	N/A	Insufficient	Decreasing	Decreasing	N/A	Decreasing	Increasing
AREA 18/24	AWD-2	N/A	N/A	N/A	Insufficient	N/A	N/A	N/A	N/A	Decreasing	Insufficient	N/A	Insufficient	N/A
AREA 18/24	AWD-3	N/A	N/A	N/A	Insufficient	N/A	N/A	N/A	N/A	Decreasing	Insufficient	N/A	N/A	N/A
AREA 18/24	AWD-4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Insufficient	Increasing	N/A	Insufficient	N/A
AREA 18/24	DOWNWIND_NORTHERLY	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
AREA 18/24	DOWNWIND_SOUTHERLY	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
AREA 18/24	FACILITY WATER NORTH	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
AREA 18/24	ICT-11	N/A	Insufficient	Insufficient	Insufficient	N/A	Insufficient	N/A	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient
AREA 18/24	ICT-12A	N/A	Insufficient	N/A	Insufficient	N/A	Insufficient	N/A	N/A	Decreasing	Insufficient	Insufficient	Insufficient	Insufficient
AREA 18/24	ICT-12B	N/A	Insufficient	Insufficient	Insufficient	N/A	Increasing	N/A	N/A	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient
AREA 18/24	ICT-12C	N/A	Insufficient	Insufficient	Insufficient	N/A	Insufficient	N/A	N/A	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient
AREA 18/24	ICT-12D	Insufficient	Insufficient	Insufficient	Increasing	N/A	Insufficient	N/A	Increasing	Decreasing	Insufficient	Insufficient	Insufficient	Insufficient
AREA 18/24	ICT-12E	Insufficient	Insufficient	Insufficient	Insufficient	N/A	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Decreasing
AREA 18/24	ICT-13A	N/A	Insufficient	Insufficient	Insufficient	N/A	Insufficient	N/A	Insufficient	Decreasing	Insufficient	Insufficient	Decreasing	Insufficient
AREA 18/24	ICT-13B	N/A	Insufficient	Insufficient	Decreasing	N/A	Insufficient	N/A	Insufficient	Insufficient	Decreasing	Insufficient	Insufficient	Insufficient
AREA 18/24	ICT-13C	N/A	Insufficient	Insufficient	Insufficient	N/A	Insufficient	N/A	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient
AREA 18/24	ICT-13D	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Insufficient	N/A	Insufficient	N/A
AREA 18/24	ICT-13E	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Increasing	N/A	N/A	N/A
AREA 18/24	ICT-13F	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
AREA 18/24	ICT-14A	N/A	Insufficient	Insufficient	Insufficient	N/A	Insufficient	N/A	N/A	Insufficient	Decreasing	Insufficient	Decreasing	Insufficient
AREA 18/24	ICT-14B	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Decreasing	N/A	Increasing	Insufficient
AREA 18/24	ICT-14C	N/A	Insufficient	Increasing	Insufficient	N/A	Insufficient	N/A	Increasing	Increasing	Decreasing	Insufficient	Increasing	Increasing
AREA 18/24	ICT-14D	N/A	Insufficient	Increasing	Insufficient	N/A	Insufficient	N/A	Increasing	Increasing	Insufficient	Insufficient	Insufficient	Insufficient
AREA 18/24	ICT-14E	N/A	Insufficient	Insufficient	Insufficient	N/A	Insufficient	N/A	N/A	Insufficient	Insufficient	Insufficient	Decreasing	Insufficient
AREA 18/24	ICT-2	N/A	Insufficient	N/A	Insufficient	N/A	Insufficient	N/A	N/A	Decreasing	Insufficient	Insufficient	Insufficient	Decreasing
AREA 18/24	ICT-4	N/A	Insufficient	Increasing	Decreasing	N/A	Insufficient	N/A	N/A	Decreasing	Decreasing	Insufficient	Decreasing	Increasing
AREA 18/24	ICT-7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Increasing	N/A	N/A	N/A
AREA 18/24	ICT-8	Increasing	Insufficient	Insufficient	Increasing	N/A	Insufficient	Insufficient	Insufficient	Decreasing	Decreasing	Insufficient	Decreasing	Insufficient
AREA 18/24	PRODUCTION2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
AREA 58	35ASW03	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
GWTP	FILTERCAKE	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
GWTP	GWTP_AIR	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
GWTP	GWTP_DOWNWIND	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
GWTP	GWTP_STRIPPER	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
GWTP	GWTPFLOOR	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
GWTP	SP103-7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Decreasing	N/A	N/A	N/A
GWTP	SP140-7	N/A	N/A	Insufficient	Increasing	N/A	N/A	N/A	Increasing	Decreasing	Decreasing	N/A	Insufficient	N/A
GWTP	SP650-6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Increasing	Decreasing	Too Many Samples	N/A	Increasing	Insufficient

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Location Name	Well Name	1,1,1-trichloroethane	1,1,2-trichloroethane	1,1-dichloroethene	1,2-dichloroethane	1,4-dioxane	carbon tetrachloride	chloroform	cis-1,2-dichloroethene	methylene chloride	perchlorate	tetrachloroethene	trichloroethene	vinyl chloride
LHAAP 1824	109	N/A	N/A	Insufficient	N/A	N/A	N/A	N/A	N/A	Decreasing	Insufficient	N/A	Increasing	Decreasing
LHAAP 1824	120	N/A	N/A	N/A	Increasing	N/A	N/A	N/A	Increasing	Decreasing	Insufficient	Increasing	Insufficient	N/A
LHAAP 1824	123	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Decreasing	Decreasing	N/A	Insufficient	N/A
LHAAP 1824	126	N/A	N/A	N/A	Insufficient	N/A	N/A	N/A	N/A	Decreasing	N/A	N/A	Insufficient	N/A
LHAAP 1824	18CPTMW01SW	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Decreasing	N/A	N/A	Decreasing	N/A
LHAAP 1824	18CPTMW03SW	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP 1824	18CPTMW04	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Increasing	N/A	Increasing	N/A
LHAAP 1824	18CPTMW04SW	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP 1824	18CPTMW06	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Decreasing	N/A	N/A	N/A	N/A
LHAAP 1824	18CPTMW07	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP 1824	18CPTMW08DW	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Increasing	N/A	N/A	N/A
LHAAP 1824	18CPTMW08SW	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Decreasing	N/A	Insufficient	Decreasing
LHAAP 1824	18CPTMW10DW	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP 1824	18CPTMW10SW	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP 1824	18CPTMW12DW	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP 1824	18CPTMW12SW	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP 1824	18CPTMW14	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Insufficient	N/A	Insufficient	N/A
LHAAP 1824	18CPTMW15	N/A	N/A	N/A	Insufficient	N/A	N/A	N/A	N/A	N/A	Decreasing	N/A	Decreasing	N/A
LHAAP 1824	18CPTMW16	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP 1824	18CPTMW18	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP 1824	18CPTMW19	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP 1824	18CPTMW22R	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP 1824	18CPTMW22SW	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP 1824	18CPTMW23	N/A	N/A	N/A	Insufficient	N/A	N/A	N/A	N/A	N/A	Insufficient	N/A	Insufficient	N/A
LHAAP 1824	18CPTMW24	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Insufficient	N/A	Decreasing	N/A
LHAAP 1824	18WCPTMW19	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP 1824	18WW02	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP 1824	18WW06	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP 1824	18WW08	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Decreasing	N/A	Insufficient	N/A
LHAAP 1824	18WW17	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Insufficient	N/A	Decreasing	N/A
LHAAP 1824	18WW22	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP 1824	18WW24	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP 1824	18WW25	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP 1824	AWD3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP 1824	C03	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP 1824	C08	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP 1824	C09	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP 1824	CO9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP 1824	MW10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP 1824	MW14	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP 1824	MW16	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP 1824	MW17	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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Longhorn Army Ammunition Plant, Karnack Texas

Location Name	Well Name	1,1,1-trichloroethane	1,1,2-trichloroethane	1,1-dichloroethene	1,2-dichloroethane	1,4-dioxane	carbon tetrachloride	chloroform	cis-1,2-dichloroethene	methylene chloride	perchlorate	tetrachloroethene	trichloroethene	vinyl chloride
LHAAP 1824	MW18	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP 1824	MW19	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP 1824	MW2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP 1824	MW20	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP 1824	MW21	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP 1824	MW22	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP 1824	MW23	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP 1824	MW23_121517	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP 1824	MW3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP 1824	MW5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP 1824	MW7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP 1824	MW8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP 1824	MW9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP 1824	Trip Blank	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP 58	03WW01	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Decreasing	Decreasing	N/A
LHAAP 58	1004TW001	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP 58	35AWW01	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP 58	35AWW05	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP 58	35AWW06	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP 58	35AWW07	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP 58	35AWW08	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Decreasing	Decreasing	N/A
LHAAP 58	35AWW09	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Increasing	Increasing	N/A
LHAAP 58	35AWW10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP 58	35AWW11	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP 58	35AWW12	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP 58	35AWW13	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP 58	35AWW14	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP 58	35AWW15	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP 58	35AWW16	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP 58	35AWW16-111317	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP 58	35AWW17	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP 58	35AWW18	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP 58	35AWW19	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP 58	35AWW20	N/A	Insufficient	Insufficient	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Insufficient	Insufficient
LHAAP 58	35AWW21	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP 58	35AWW22	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP 58	35AWW23	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP 58	35AWW24	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP 58	LHSMW03	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP 58	LHSMW06	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP 58	LHSMW07	N/A	N/A	Insufficient	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Increasing	Insufficient
LHAAP 58	Trip Blank	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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LHAAP 58	Trip Blank ALS	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-001-R-01	131	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-001-R-01	132	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-001-R-01	27WW01	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-001-R-01	27WW02	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-001-R-01	27WW03	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-001-R-01	27WW04	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-12	12WW01	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-12	12WW20	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-12	12WW21	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-12	12WW22	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-12	12WW23	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-12	12WW24	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Decreasing	N/A
LHAAP-12	12WW25	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-16	16EW01	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Insufficient	Decreasing	Insufficient	N/A	Decreasing	N/A
LHAAP-16	16EW02	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Increasing	N/A	Decreasing	N/A	Increasing	N/A
LHAAP-16	16EW03	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Increasing	N/A	Insufficient	N/A	Insufficient	Insufficient
LHAAP-16	16EW04	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Insufficient	N/A	N/A	N/A	Insufficient	Insufficient
LHAAP-16	16EW05	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Insufficient	N/A	Insufficient	N/A	Decreasing	Insufficient
LHAAP-16	16EW06	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Insufficient	N/A	Insufficient	N/A	Insufficient	N/A
LHAAP-16	16EW07	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Insufficient	N/A	Insufficient	N/A	Insufficient	N/A
LHAAP-16	16EW08	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Insufficient	N/A	Decreasing	N/A	Insufficient	Insufficient
LHAAP-16	16WW12	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Insufficient	N/A	Insufficient	N/A
LHAAP-16	16WW14	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Insufficient	N/A
LHAAP-16	16WW16	N/A	N/A	Decreasing	N/A	N/A	N/A	N/A	Decreasing	Insufficient	Insufficient	N/A	Insufficient	Decreasing
LHAAP-16	16WW22	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Insufficient	N/A	Decreasing	N/A
LHAAP-16	16WW23	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-16	16WW24	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-16	16WW25	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-16	16WW26	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Increasing	N/A
LHAAP-16	16WW27	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-16	16WW29	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Insufficient	N/A
LHAAP-16	16WW30	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Insufficient	N/A
LHAAP-16	16WW31	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-16	16WW32	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-16	16WW33	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-16	16WW34	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-16	16WW35	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Insufficient	Insufficient
LHAAP-16	16WW36	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Increasing	N/A	Insufficient	N/A	Insufficient	Increasing
LHAAP-16	16WW37	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Insufficient	N/A	Insufficient	N/A
LHAAP-16	16WW38	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Insufficient	N/A
LHAAP-16	16WW40	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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Longhorn Army Ammunition Plant, Karnack Texas

Location Name	Well Name	1,1,1-trichloroethane	1,1,2-trichloroethane	1,1-dichloroethene	1,2-dichloroethane	1,4-dioxane	carbon tetrachloride	chloroform	cis-1,2-dichloroethene	methylene chloride	perchlorate	tetrachloroethene	trichloroethene	vinyl chloride
LHAAP-16	16WW41	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-16	16WW42	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-16	16WW43	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-16	16WW44	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-16	16WW45	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-16	16WW46	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-16	Trip Blank	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18/24 STOCKPILE	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPT01	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPT02	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPT03	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPT05	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPT06	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPT07	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPT08	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPT09	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPT10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPT12	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPT13	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPT15	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPT17	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPT18	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPT19	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPT20	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPT21	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPT25	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPT26	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPT27	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPTACD01	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPTACD02	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPTACD03	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPTACD04	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPTACD05	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPTACD06	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPTACD07	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPTACD12	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPTACD13	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPTACD14	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPTACD15	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPTBB01	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPTBB02	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPTMW01DW	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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LHAAP-18	18CPTMW01SW	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Decreasing	N/A	N/A	Decreasing	N/A
LHAAP-18	18CPTMW03SW	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPTMW04	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Increasing	N/A	Increasing	N/A
LHAAP-18	18CPTMW04SW	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPTMW06	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Decreasing	N/A	N/A	N/A	N/A
LHAAP-18	18CPTMW07	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPTMW08	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPTMW08DW	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Increasing	N/A	N/A	N/A
LHAAP-18	18CPTMW08SW	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Decreasing	N/A	Insufficient	Decreasing
LHAAP-18	18CPTMW10DW	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPTMW10SW	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPTMW12DW	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPTMW12SW	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPTMW14	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Insufficient	N/A	Insufficient	N/A
LHAAP-18	18CPTMW15	N/A	N/A	N/A	Insufficient	N/A	N/A	N/A	N/A	N/A	Decreasing	N/A	Decreasing	N/A
LHAAP-18	18CPTMW16	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPTMW18	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPTMW19	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPTMW19SW	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPTMW22	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPTMW22DW	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPTMW22R	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPTMW22SW	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPTMW23	N/A	N/A	N/A	Insufficient	N/A	N/A	N/A	N/A	N/A	Insufficient	N/A	Insufficient	N/A
LHAAP-18	18CPTMW23SW	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPTMW24	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Insufficient	N/A	Decreasing	N/A
LHAAP-18	18CPTMW26SW	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPTPB01	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPTPB02	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPTPB03	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPTPB04	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPTPB05	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPTPB06	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPTPB07	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPTPB08	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPTPB09	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPTPB10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPTPB11	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPTPB12	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPTPB13	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPTPB14	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPTPB15	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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Longhorn Army Ammunition Plant, Karnack Texas

Location Name	Well Name	1,1,1-trichloroethane	1,1,2-trichloroethane	1,1-dichloroethene	1,2-dichloroethane	1,4-dioxane	carbon tetrachloride	chloroform	cis-1,2-dichloroethene	methylene chloride	perchlorate	tetrachloroethene	trichloroethene	vinyl chloride
LHAAP-18	18CPTPB16	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPTPB17	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPTUEP01	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPTUEP02	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPTUEP03	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPTUEP04	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPTUEP05	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPTUEP06	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPTUEP07	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPTUEP08	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPTUEP09	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPTUEP10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPTUEP11	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPTUEP12	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPTUEP13	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPTUEP14	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPTUEP15	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPTUEP16	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPTUEP17	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18CPTUEP18	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18DPT01	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18DPT02	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18DPT03	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18DPT04	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18DPT05	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18DPT06	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18DPT07	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18DPT08	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18DPT09	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18DPT10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18DPT11	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18DPT12	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18DPT13	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18DPT14	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18DPT15	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18DPT16	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18DPT17	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18WW02	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18WW03	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18WW04	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18WW06	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18WW07	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Insufficient	N/A

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LHAAP-18	18WW08	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Decreasing	N/A	Insufficient	N/A
LHAAP-18	18WW09	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Insufficient
LHAAP-18	18WW11	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Insufficient	N/A	N/A	N/A	N/A
LHAAP-18	18WW16	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18WW17	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Insufficient	N/A	Decreasing	N/A
LHAAP-18	18WW18	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18WW19	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18WW20	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Insufficient	N/A
LHAAP-18	18WW21	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18WW22	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18WW23	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18WW24	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-18	18WW25	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-37	102	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Increasing	N/A	N/A	N/A
LHAAP-37	108	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-37	109	N/A	N/A	Insufficient	N/A	N/A	N/A	N/A	N/A	Decreasing	Insufficient	N/A	Increasing	Decreasing
LHAAP-37	110	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-37	111	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-37	112	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-37	116	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-37	123	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Decreasing	Decreasing	N/A	Insufficient	N/A
LHAAP-37	125	N/A	N/A	N/A	Insufficient	N/A	N/A	N/A	N/A	Decreasing	Increasing	N/A	Insufficient	N/A
LHAAP-37	126	N/A	N/A	N/A	Insufficient	N/A	N/A	N/A	N/A	Decreasing	N/A	N/A	Insufficient	N/A
LHAAP-37	127	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-37	128	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-37	129	N/A	N/A	N/A	Insufficient	N/A	Insufficient	N/A	N/A	Decreasing	Insufficient	N/A	Insufficient	N/A
LHAAP-37	131	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-37	132	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-37	133	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-37	134	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-37	35BSW01	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-37	35BSW02	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-37	35BWW01	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-37	35BWW04	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-37	35BWW05	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-37	35BWW06	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-37	35BWW07	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-37	35BWW08	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-37	35BWW09	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-37	35BWW10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-37	35BWW11	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-37	35BWW12	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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LHAAP-37	35BWW13	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-37	35BWW14	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-37	35BWW15	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-37	35BWW16	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-37	35BWW17	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-37	35BWW18	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-37	35BWW19	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-37	35BWW20	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-37	35BWW23	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-37	35BWW24	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-37	35BWW25	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-37	35BWW26	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-37	37DPT01	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-37	37DPT02	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-37	37DPT03	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-37	37DPT04	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-37	37DPT05	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-37	37DPT06	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-37	37DPT07	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-37	37DPT08	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-37	37DPT09	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-37	37DPT10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-37	37DPT11	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-37	37DPT12	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-37	37DPT13	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-37	C-01	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Insufficient	N/A	N/A	Insufficient	N/A
LHAAP-37	C-02	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Decreasing	N/A	N/A	Decreasing	N/A
LHAAP-37	C-03	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Decreasing	Decreasing	N/A	Decreasing	N/A
LHAAP-37	C-04	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Decreasing	N/A	Decreasing	Decreasing	N/A
LHAAP-37	C-04A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Insufficient	N/A	N/A	N/A	N/A
LHAAP-37	C-05	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Insufficient	N/A	N/A	Insufficient	N/A
LHAAP-37	C-06	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Decreasing	N/A	N/A	Decreasing	N/A
LHAAP-37	C-07	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Insufficient	N/A	N/A	N/A	N/A
LHAAP-37	C-08	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Insufficient	N/A
LHAAP-37	C-09	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Decreasing	N/A	N/A	Decreasing	N/A
LHAAP-37	C-10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Insufficient	N/A	N/A	Insufficient	N/A
LHAAP-37	CAN TRANSFORMERS	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-37	LHSMW58	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-37	MW-1	N/A	N/A	Insufficient	Insufficient	N/A	N/A	N/A	Increasing	Decreasing	Decreasing	Insufficient	Decreasing	N/A
LHAAP-37	MW-10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Decreasing	N/A	N/A	Decreasing	N/A
LHAAP-37	MW-12	N/A	N/A	Insufficient	N/A	N/A	N/A	N/A	Insufficient	Decreasing	Decreasing	N/A	Decreasing	N/A
LHAAP-37	MW-13	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Insufficient	N/A	N/A	Insufficient	N/A

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Longhorn Army Ammunition Plant, Karnack Texas

Location Name	Well Name	1,1,1-trichloroethane	1,1,2-trichloroethane	1,1-dichloroethene	1,2-dichloroethane	1,4-dioxane	carbon tetrachloride	chloroform	cis-1,2-dichloroethene	methylene chloride	perchlorate	tetrachloroethene	trichloroethene	vinyl chloride
LHAAP-37	MW-14	N/A	N/A	Increasing	Insufficient	N/A	N/A	N/A	Increasing	Insufficient	Insufficient	N/A	Insufficient	N/A
LHAAP-37	MW-16	N/A	N/A	N/A	Insufficient	N/A	N/A	N/A	N/A	N/A	Insufficient	N/A	Increasing	N/A
LHAAP-37	MW-17	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Decreasing	Decreasing	N/A	Decreasing	N/A
LHAAP-37	MW-18	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Insufficient	N/A
LHAAP-37	MW-19	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Decreasing	N/A	Insufficient	N/A
LHAAP-37	MW-2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Decreasing	Decreasing	N/A	Decreasing	N/A
LHAAP-37	MW-20	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Decreasing	N/A	N/A	Decreasing	N/A
LHAAP-37	MW-21	N/A	Increasing	N/A	Increasing	N/A	N/A	N/A	N/A	Decreasing	Increasing	Increasing	Increasing	Increasing
LHAAP-37	MW-22	N/A	Insufficient	Insufficient	Insufficient	N/A	Insufficient	N/A	Decreasing	Decreasing	Decreasing	Insufficient	Decreasing	Decreasing
LHAAP-37	MW-23	N/A	N/A	N/A	Insufficient	N/A	N/A	N/A	N/A	Insufficient	Increasing	N/A	Insufficient	N/A
LHAAP-37	MW-3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Decreasing	Decreasing	N/A	Decreasing	Insufficient
LHAAP-37	MW-4	N/A	N/A	Insufficient	N/A	N/A	N/A	N/A	N/A	Insufficient	Insufficient	N/A	Decreasing	Decreasing
LHAAP-37	MW-5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Decreasing	Increasing	N/A	Decreasing	N/A
LHAAP-37	MW-6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Decreasing	Insufficient	N/A	Decreasing	N/A
LHAAP-37	MW-7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Decreasing	N/A	Decreasing	N/A
LHAAP-37	MW-8	N/A	N/A	N/A	Decreasing	N/A	N/A	N/A	N/A	Decreasing	Insufficient	Decreasing	Decreasing	N/A
LHAAP-37	MW-9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Insufficient	Insufficient	Insufficient	Decreasing	N/A
LHAAP-46	46DPT10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-46	46DPT11	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-46	46DPT12	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-46	46DPT13	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-46	46SW09	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-46	46SW10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-46	46W009	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-46	46WW01	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-46	46WW02	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-46	46WW03	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-46	46WW04	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-46	46WW05	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Decreasing	N/A
LHAAP-46	46WW06	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-46	46WW07	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-46	46WW08	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-46	46WW09	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-46	46WW10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-46	46WW11	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Decreasing	N/A
LHAAP-46	46WW13	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-46	46WW14	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-46	46WW16	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-46	LHSMW08	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-46	LHSMW14	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-46	LHSMW16	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-46	LHSMW18	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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LHAAP-46	LHSMW19	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Decreasing	N/A
LHAAP-46	LHSMW21	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-46	LHSMW25	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-50	50DPT01A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-50	50DPT03A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-50	50WW01	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-50	50WW05	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Insufficient	N/A	Decreasing	N/A
LHAAP-50	50WW06	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Increasing	N/A	Increasing	N/A
LHAAP-50	50WW07	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-50	50WW08	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Insufficient	N/A	Decreasing	N/A
LHAAP-50	50WW09	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Insufficient	N/A
LHAAP-50	50WW10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-50	50WW11	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Insufficient	N/A	Insufficient	N/A
LHAAP-50	50WW12	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Insufficient	N/A	Increasing	N/A
LHAAP-50	50WW13	N/A	N/A	N/A	Insufficient	N/A	N/A	N/A	N/A	N/A	Insufficient	N/A	Insufficient	N/A
LHAAP-50	50WW14	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Decreasing	N/A
LHAAP-50	50WW15	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-50	50WW16	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-50	50WW17	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-50	50WW18	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-50	50WW19	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-50	50WW20	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-50	50WW21	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-50	50WW22	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-50	50WW23	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-50	50WW24	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-50	50WW25	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-50	50WW26	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-50	50WW27	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-50	50WW28	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-50	GPW-1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-50	GPW-1A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-50	GPW-3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-50	GWP-1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-50	GWP-1A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-58	1004TW001	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-58	1004TW006	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-58	35AWW01	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-58	35AWW02	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-58	35AWW05	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-58	35AWW05FD	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-58	35AWW07	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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LHAAP-58	35AWW07R	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-58	35AWW08	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Decreasing	Decreasing	N/A
LHAAP-58	35AWW08F	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-58	35AWW09	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Increasing	Increasing	N/A
LHAAP-58	35AWW10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-58	35AWW11	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-58	35AWW12	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-58	35AWW13	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-58	35AWW14	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-58	35AWW15	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-58	35AWW16	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-58	35AWW17	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-58	35AWW18	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-58	35AWW19	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-58	35AWW20	N/A	Insufficient	Insufficient	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Insufficient	Insufficient
LHAAP-58	35AWW21	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-58	35AWW22	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-58	58DPT10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-58	58DPT11	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-58	58DPT12	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-58	58DPT13	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-58	58DPT14	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-58	58DPT15	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-58	58DPT15A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-58	58DPT15B	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-58	58DPT16	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-58	58DPT17	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-58	58DPT18	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-58	58DPT19	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-58	58DPT20	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-58	58DPT21	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-58	58DPT22	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-58	58DPT23	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-58	58DPT24	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-58	58DPT26	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-58	58DPT27	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-58	LHSMW03	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-58	LHSMW04	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Increasing	Increasing	N/A
LHAAP-58	LHSMW06	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-58	LHSMW07	N/A	N/A	Insufficient	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Increasing	Insufficient
LHAAP-67	67DPT08	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-67	67DPT09A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Increasing - Statistically significant evidence of an increasing trend at the specified level of significance.
Decreasing - Statistically significant evidence of a decreasing trend at the specified level of significance.
Insufficient - Insufficient evidence to identify a significant trend at the specified level of significance.
Too Many Samples - The size of the data was too large to perform Theil-Sen trend Analysis.
N/A - Trend analysis not conducted due to any of several factors, including:
- Not at all or since 2012
- Maximum concentration during period of record is non-detect
- Fewer than 8 samples during period of record
- Maximum concentration during period of record less than 10 times the MCL

2019 Five-Year Review ProUCL Trend Summary
Longhorn Army Ammunition Plant, Karnack Texas

Location Name	Well Name	1,1,1-trichloroethane	1,1,2-trichloroethane	1,1-dichloroethene	1,2-dichloroethane	1,4-dioxane	carbon tetrachloride	chloroform	cis-1,2-dichloroethene	methylene chloride	perchlorate	tetrachloroethene	trichloroethene	vinyl chloride
LHAAP-67	67DPT11	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-67	67DPT11A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-67	67DPT13A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-67	67DPT13B	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-67	67DPT13C	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-67	67DPT14	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-67	67WW01	N/A	N/A	Increasing	Increasing	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-67	67WW02	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-67	67WW03	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-67	67WW05	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-67	67WW06	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-67	67WW07	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-67	67WW08	N/A	N/A	Insufficient	Insufficient	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-67	67WW09	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-67	67WW09A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-67	67WW10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-67	67WW11	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-67	67WW12	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-67	67WW13	N/A	N/A	Insufficient	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-67	67WW14	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-67	67WW15	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-67	67WW16	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-67	67WW16I	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LHAAP-67	LHAAP67VAULT	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Increasing - Statistically significant evidence of an increasing trend at the specified level of significance.
Decreasing - Statistically significant evidence of a decreasing trend at the specified level of significance.
Insufficient - Insufficient evidence to identify a significant trend at the specified level of significance.
Too Many Samples - The size of the data was too large to perform Theil-Sen trend Analysis.
N/A - Trend analysis not conducted due to any of several factors, including:
- Not at all or since 2012
- Maximum concentration during period of record is non-detect
- Fewer than 8 samples during period of record
- Maximum concentration during period of record less than 10 times the MCL

APPENDIX G – LAND USE CONTROL INSPECTION FORMS

LHAAP-12

- **2013 – LUC Inspection Performed**
- **2014 – LUC Inspection Performed**
- **2015 – LUC Inspection Performed**
- **2016 – LUC Inspection Performed**
- **2017 – LUC Inspection Performed**
- **2018 – No LUC inspection through May 2018**

LUC Inspection and Maintenance Log - LHAAP 12

Date	Inspected by:	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 degredation -e.g. desiccation cracks, erosion, or gullying	Continued compliance verified for no digging or disturbance of landfill cover or contents	Verified no withdrawl of use of groundwater (other than environmental testing)		
10/29/2013	Wacker	Completed and maintained except as noted in corrective action section.	Completed and maintained	Vegetative cover lacking in 6 locations requiring re-seeding or erosion control matting to be installed.	Evidence of animal burrows along north east edge of cap; and two depressed areas of subsidence requiring soil and seeding	Completed and verified.	Reseeding of bare areas completed, followed by erosion control matting in the spring if seeding not effective; Addition of soil and seeding to areas of subsidence and animal borrows	Re-seeding with winter rye completed November 2013.

LUC Inspection and Maintenance Log - LHAAP 12

Date	Inspected by:	Inspection / MaintenanceActivitiesYearly, 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 degredation -e.g. desiccation cracks, erosion, or gullying	Continued compliance verified for no digging or disturbance of landfill cover or contents	Verified no withdrawl of use of groundwater (other than environmental testing)		
11/21/2014	Wacker, D.	Completed and maintained. Vegetative cover is in good condition. See photos 2 and 4 of the photo log.	Tree down along fence line at SW edge of LF.	No cover degredation observed.	No evidence of animal burrows along north east edge of cap, as seen during the 2013 inspection.	Completed and verified.	Remove tree from fence line at SW edge of LF.	Tree removed from fence line at SW edge of LF during inspection. See photo 1 of the photo log.
11/21/2014	Wacker, D.		Remainder of fencing and signage in good repair.		Small area of subsidence, ~18" deep, along western edge of LF.		No corrective action required.	Continue to observe subsidance, and ensure LF cap continues to cover contents.

LUC Inspection and Maintenance Log - LHAAP 12

Date	Inspected by:	Inspection / MaintenanceActivitiesYearly, 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)		
7/30/2015	Beesinger, S.	Maintained. Vegetative cover is in good condition.	Fence and signage in good repair.	Cover subsidence observed and repaired on July 30, 3015	No evidence of animal burrowing in the cap.	Completed and verified.	Subsidence repaired by adding topsoil and vegetative cover. See photos below.	Continue to observe subsidence, and ensure LF cap continues to cover contents.

LUC Inspection and Maintenance Log - LHAAP 12

Date	Inspected by:	Inspection / MaintenanceActivitiesYearly, 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)		
7/29/2016	Beesinger, S.	Maintained. Vegetative cover is in good condition.	Fence and signage in good repair.	Cover observed and found to be in good condition. Areas of erosion and subsidence repaired in 2015 in good condition. No erosion, cracks, degradation or gullying were found.	No evidence of animal burrowing in the cap.	Completed and verified.	None	None

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)		
7/26/2017	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, degradation 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

LHAAP-12, Landfill 12 Parcel
Annual Land Use Control Compliance Certification

Land use controls (LUC) at LHAAP-12 in the Landfill 12 Parcel:

• Land use restriction – Prohibition of any activities that would affect the integrity of the cap (i.e. no digging or disturbing the existing cover or contents of the landfill) and of residential use or residential development of the property

• Groundwater use restriction – Prohibition of any activities that would cause exposure to contaminated groundwater (i.e. no withdrawal or use of groundwater for other than environmental monitoring and testing)

Compliance with land use controls:

• No use of groundwater or installation of new groundwater wells (except that required for environmental monitoring and testing), or tampering with existing wells at LHAAP-12

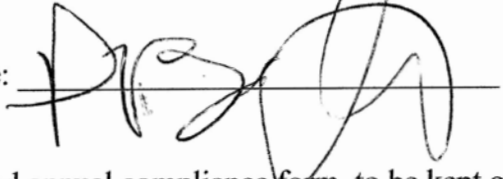
• No reuse activity at LHAAP-12 that would adversely affect the integrity of the landfill cap (i.e no digging or disturbing the existing cover or contents of the landfill) and cap protective components (fencing and signage), and no residential use or residential development of the property

Inspection: In accordance with the LHAAP-12 Remedial Design Addendum dated 21 June 2007, an inspection of LHAAP-12 was conducted by Paul Bruckwicki on May 2, 2016 to visually confirm compliance with the LUCs.

I, the undersigned, do document that the inspection was performed as indicated above, and that the above information is true and correct to the best of my knowledge, information, and belief.

Date: 05/02/2016

Name/Title Paul Bruckwicki / Contaminant Biologist

Signature: 

Completed annual compliance form, to be kept on file at the Administrative Office of the Caddo Lake National Wildlife Refuge by the Refuge staff and available to EPA, TCEQ and Army upon request. The certification shall be conducted no later than March 1 of each year for the previous calendar year.

LHAAP-12, Landfill 12 Parcel
Annual Land Use Control Compliance Certification

Land use controls (LUC) at LHAAP-12 in the Landfill 12 Parcel:

• Land use restriction – Prohibition of any activities that would affect the integrity of the cap (i.e. no digging or disturbing the existing cover or contents of the landfill) and of residential use or residential development of the property

• Groundwater use restriction – Prohibition of any activities that would cause exposure to contaminated groundwater (i.e. no withdrawal or use of groundwater for other than environmental monitoring and testing)

Compliance with land use controls:

• No use of groundwater or installation of new groundwater wells (except that required for environmental monitoring and testing), or tampering with existing wells at LHAAP-12

• No reuse activity at LHAAP-12 that would adversely affect the integrity of the landfill cap (i.e no digging or disturbing the existing cover or contents of the landfill) and cap protective components (fencing and signage), and no residential use or residential development of the property

Inspection: In accordance with the LHAAP-12 Remedial Design Addendum dated 21 June 2007, an inspection of LHAAP-12 was conducted by P Bruckwicki on 3/1/2017 to visually confirm compliance with the LUCs.

I, the undersigned, do document that the inspection was performed as indicated above, and that the above information is true and correct to the best of my knowledge, information, and belief.

Date: 3/1/2017

Name/Title P Bruckwicki / Biologist

Signature: PB

Completed annual compliance form, to be kept on file at the Administrative Office of the Caddo Lake National Wildlife Refuge by the Refuge staff and available to EPA, TCEQ and Army upon request. The certification shall be conducted no later than March 1 of each year for the previous calendar year.

LHAAP-37

- **2015 – LUC Deed Recordation March 16, 2015 (Reported in 2016 RACR)**
- **2016 – RACR Published September 28, 2016**
- **2017 – No RAO/LUC Inspection due to Bio Plug Study Recovery**
- **2018 – No LUC inspection through May 2018**

LHAAP-46

- **2013 – No LUC Inspection (LUCs Deed Recorded December 9, 2014)**
- **2014 – LUC Inspection Performed**
- **2015 – LUC Inspection Performed**
- **2016 – LUC inspection Performed**
- **2017 – No LUC inspection Due to Contract Transition**
- **2018 – No LUC inspection through May 2018**

AECOM

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 Aecom Technical Services on July 10, 2014

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 goals 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-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: July 10, 2014

Name/Title: Scott Beesinger / Senior Technician

Signature: Scott Beesinger

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 AECOM Technical Services, Inc. on July 2015.

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-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: July 14, 2015

Name/Title: MARWAN SALAMEH / Deputy Project Manager

Signature: 

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 AECOM Technical Services, Inc. on 7/29/16.

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-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: 7/29/16

Name/Title: Scott Beesinger / Senior Technician

Signature: 

LHAAP-50

- **2013 – No LUC inspection**
- **2014 – No LUC inspection (LUC Deed Recordation June 18, 2015)**
- **2015 – LUC Inspection Performed**
- **2016 – LUC Inspection Performed**
- **2017 – No LUC inspection due to contract transition**
- **2018 – No LUC inspection through May 2018**

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 AECOM Technical Services, Inc. on July 4, 2015.

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-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: 3/23/2016

Name/Title: Marwan Salamch / Deputy Project Manager

Signature: 

Annual Land Use Control Compliance Certification Documentation

In accordance with the Remedial Design dated September 30, 2011, for LHAAP-50 a certification of site was conducted by AECOM Technical Services, Inc. on July 21, 2015.

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).

Groundwater restrictions are still required at LHAAP-50.

A summary of compliance with land use and restriction covenants is as follows:

- There are 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. I also certify that the non-residential use assumption that forms the basis of the remedy remains the same.

Date: July 22, 2015

Name/Title: Marwan Salameh, PhD, PE/Deputy Project Manager

Signature: 

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 Design dated September 2011, for LHAAP-50 a certification of site was conducted by AECOM Technical Services, Inc. on 8/1/16.

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-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: 8/1/16

Name/Title: Scott Beesinger / Senior Technician

Signature: Scott Beesinger

LHAAP-58

- **2013 – No LUC inspection**
- **2014 – No LUC inspection (LUC Deed Recordation March 16, 2015)**
- **2015 – LUC Inspection Performed**
- **2016 – LUC Inspection Performed**
- **2017 – No LUC inspection due to contract transition**
- **2018 – No LUC inspection through May 2018**

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 AECOM Technical Services, Inc. on July 2015.

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 14, 2015

Name/Title: MARWAN SALAMEH / Deputy Project Manager

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 AECOM Technical Services, Inc. on 8/1/16.

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: 8/1/16

Name/Title: Scott Beasinger / Senior Technician

Signature: Scott Beasinger

LHAAP-67

- **2013 – No LUC inspection (LUC Deed Recordation December 9, 2014)**
- **2014 – LUC Inspection Performed**
- **2015 – LUC Inspection Performed**
- **2016 – LUC Inspection Performed**
- **2017 – No LUC inspection due to contract transition**
- **2018 – No LUC inspection through May 2018**

AECOM

Annual Land Use Control Compliance Certification Documentation

In accordance with the Remedial Design dated September 2013 for LHAAP-67 a certification of site was conducted by Aecom Technical Services on July 10, 2014

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 goals 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 10, 2014

Name/Title: Scott Beesinger / Senior Technician

Signature: Scott Beesinger

Annual Land Use Control Compliance Certification Documentation

In accordance with the Remedial Design dated August 2011, for LHAAP-67 a certification of site was conducted by AECOM Technical Services, Inc. on July 14, 2015.

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-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 14, 2015

Name/Title: MARWAN SALAMEH / Deputy Project Manager

Signature: 

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 AECOM Technical Services, Inc. on 8/1/16.

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-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: 8/1/16

Name/Title: Scott Beesinger / Senior Technician

Signature: Scott Beesinger

DEPARTMENT OF THE ARMY
LONGHORN ARMY AMMUNITION PLANT
POST OFFICE BOX 220
RATCLIFF, AR 72951

May 16, 2019

DAIM-ODB-LO

Mr. Rich Mayer
U.S. Environmental Protection Agency
Federal Facilities Section R6
1445 Ross Avenue
Dallas, TX 75202-2733

Re: Draft 2018 Remedial Action Operation Report, Landfill 12 (LHAAP-12), Longhorn Army Ammunition Plant, Karnack, Texas, May 2019

Dear Mr. Mayer,

One hard copy and one compact disc (CD) of the above-referenced document is being transmitted to you for your review. Review comments are requested by June 17, 2019.

The document was prepared by Bhate Environmental Associates, Inc., (Bhate) team, on behalf of the Army as part of Bhate's Performance Based Remediation contract for the facility. I ask that Kim Nemmers, 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 479-635-0110, or by email at rose.m.zeiler.civ@mail.mil.

Sincerely,

Rose M. Zeiler, Ph.D.
Longhorn AAP Site Manager

Copies furnished:
A. Palmie, TCEQ, Austin, TX (letter)
P. Bruckwicki, Caddo Lake NWR, TX (1 hard copy and 1 CD)
A. Williams, USACE, Tulsa District, OK (1 CD)
R. Smith, USACE, Tulsa District, OK (electronic only)
A. Maly, USAEC, San Antonio, TX (1 CD)
K. Nemmers, Bhate, Lakewood, CO (1 CD)
P. Srivastav, APTIM, Houston, TX (letter)

DEPARTMENT OF THE ARMY
LONGHORN ARMY AMMUNITION PLANT
POST OFFICE BOX 220
RATCLIFF, AR 72951

May 16, 2019

DAIM-ODB-LO

Ms. April Palmie
Texas Commission on Environmental Quality
Superfund Section, MC-136
12100 Park 35 Circle, Bldg D
Austin, TX 78753

Re: Draft 2018 Remedial Action Operation Report, Landfill 12 (LHAAP-12), Longhorn Army Ammunition Plant, Karnack, Texas, May 2019

Dear Ms. Palmie,

One hard copy and one compact disc (CD) of the above-referenced document is being transmitted to you for your review. Review comments are requested by June 17, 2019.

The document was prepared by Bhate Environmental Associates, Inc., (Bhate) team, on behalf of the Army as part of Bhate's Performance Based Remediation contract for the facility. I ask that Kim Nemmers, 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 479-635-0110, or by email at rose.m.zeiler.civ@mail.mil.

Sincerely,

Rose M. Zeiler, Ph.D.
Longhorn AAP Site Manager

Copies furnished:
R. Mayer, USEPA Region 6, Dallas, TX (letter)
P. Bruckwicki, Caddo Lake NWR, TX (1 hard copy and 1 CD)
A. Williams, USACE, Tulsa District, OK (1 CD)
R. Smith, USACE, Tulsa District, OK (Electronic only)
A. Maly, USAEC, San Antonio, TX (1 CD)
K. Nemmers, Bhate, Lakewood, CO (1 CD)
P. Srivastav, APTIM, Houston, TX (letter)

Subject:	**Final Minutes, Monthly Managers' Meeting (MMM), Longhorn Army Ammunition Plant (LHAAP)**
Location of Meeting:	**Karnack Community Center**
Date of Meeting:	**25 April 2019– 11:35 AM Central Standard Time (CDT)**

Attendees:

Army BRAC:	Rose Zeiler (RMZ)
EPA:	Rich Mayer (RM) and Dorelle Harrison
TCEQ:	April Palmie (AP)
USFWS:	Paul Bruckwicki (PB) and Eric Duerkop
USACE:	Aaron Williams (AW) and John Doran
AEC:	Andrew Maly (AM)
USGS:	Kent Betcher (KB)
Bhate:	Kim Nemmers (KN)
APTIM:	Bill Foss (BF) and Praveen Srivastav (PS)

Action Items
Bhate/APTIM

Defense Environmental Restoration Program (DERP) Performance Based Remediation (PBR) Update

KN stated that the power line is down at the GWTP due to the transformer being down. KN stated two poles are significantly leaning and are only being held up by the wires. So the power to LHAAP-18/24 was shut down while we await the repairs. KAN stated that means no extraction for a week and a half from LHAAP-18/24. KN stated that there is also a plan to repair other sections damaged from a tree hitting the line. RMZ stated that this is a good argument for using in situ remedies. KN then explained that the potable water did go down when power was lost to the area last week but that once the system it was bled the pressure went back up.

AW stated that the transformer replacement will be sole sourced and that the reactivation of the SAM registration being awaited. RMZ asked when the next sampling was planned for LHAAP-16. KN stated that the last sampling was completed in February 2019 so the next sampling will be part of the in situ implementation baseline. RMZ asked if the groundwater sampling was semi-annual, to which KN stated that the compliance sampling is annual. RM stated that the data is in the data validation package sent out. KN stated that the data will also be in the 1st Quarter 2019 GWTP Report also. PS asked about using a subset of monitoring wells for the baseline sampling event versus resampling all of the monitoring wells again. PS stated that the subset would include wells where the concentrations may have changed but not include all the wells from before that included wells far away from the plume. RMZ stated that she had no issue with a subset if it was passed through the team. PS stated that the list of wells proposed for sampling would be prepared. RMZ also reminded that wells would need to be sampled after the system was running for a while. PS stated that one well still needs to be finished and the two other wells will be installed before the sampling is completed. BF stated that the hope is to get the wells installed in July, which RMZ felt should give one month of pumping and that a month of the extraction system running was acceptable.

KN asked everyone to refer to the Document and Issues Tracking Table dated April 25, 2019.

- **Task 1** (Project Management) -

  - KN stated that the March 2019 MMM Minutes were final.
  - KN stated that the Restoration Advisory Board (RAB) Meeting Minutes should be finalized at the meeting tonight.
- **Task 3** (LHAAP-03) – PS stated that RD/RAWP for LHAAP-03 is currently under Army review. PS stated that the document should be submitted in May 2019 ahead of schedule. RMZ pointed out that LHAAP-29 was submitted last night ahead of the enforceable schedule and that the LHAAP-03 RD/RAWP will be submitted ahead of schedule. PS stated that the current plan is to complete the excavation when LHAAP-17 is done.
- **Task 4** (LHAAP-04 Technical Memorandum for Plume Delineation) – PS stated that the Draft Final RD/RAWP went out on 3 April 2019. AP approved of the document on 10 April 2019. PS stated that no input has been received from RM.
- **Task 5** (LHAAP-12 Annual RA-O Report) – PS stated that the 2018 RA-O Report is currently in Army's review. PS stated that the document will be submitted in May 2019.
- **Task 6** (LHAAP-16) – KN stated that the validated data from the compliance sampling is in the validated data package for this meeting.
- **Task 7** (LHAAP-17) - PS stated that Draft Final RD/RAWP replacement pages went out 4 April 2019. AP and RM stated that they had received the files.
- **Task 9** (LHAAP-37) – PS stated that validated data from the February 2019 sampling event is included in the April 2019 MMM package.
- **Task 10** (LHAAP-46) Year 4 RA-O Report – PS stated that validated data from the February 2019 sampling event is included in the April 2019 MMM package.
- **Task 11** (LHAAP-50) – PS stated that sampling is schedule for May 2019 so the data should be available for the July 2019 meeting. PS stated that the Explanation of Significant Difference (ESD) for a contingency remedy of in situ bioremediation was just sent out for regulatory review. RMZ clarified that the ESD is not necessary to complete the work. BF stated that the RD/RAWP is in preparation. AP asked if the underground injection control (UIC) information would be provided with the RD/RAWP. BF concurred that the information will be sent similar to how LHAAP-16 was submitted. PS clarified that since the RD/RAWP had not been issued to the Army for review yet that the draft will likely be the end of May or early June 2019.
- **Task 12** (LHAAP-58) – KN stated that the western plume will be sampled at LHAAP-58 was completed in March 2019, which will be provided for next month's meeting. KN stated that the next sampling event is in June 2019 and will include both portions of the plume.
- **Task 13** (LHAAP-67) – PS stated that 2nd semi-annual Year 5 sampling will be completed in May 2019 and the data package should be available by July 2019.
- **Task 14** (LHAAP-001-R and –003-R) - KN stated that the groundwater technical memorandum will be placed into the Administrative Record (AR). The LHAAP-001-R-01 and the LHAAP-003-R-01 Long Term Monitoring Report is now final and will also be placed into the AR.
- **Task 16** (GWTP) **–** KN stated that the 4th Quarter GWTP Report is currently under internal quality control (QC) reviews and had not yet been submitted to the Army for review. KN stated that the 1st Quarter 2019 GWTP report will follow pretty closely to the 4th Quarter due to the timing of the other report.
- **Task 17** (LHAAP-18/24) – KN stated that LHAAP-18/24 will be sampled next in June 2019. KN stated that more of the monitoring wells will be analyzed for 1,4-dioxane based upon a comment from RM. RM asked if the three wells were in the northwest corner to which KN concurred.

- **Task 18** (Surface Water) - KN stated that surface water samples for 2nd quarter were collected in April 2019. The results are in the validated data package.
- **Administrative Record (AR) –**PS stated that hard copies are being completed current and will then be reviewed. PS stated that the next cutoff date of February 2019 is already being prepared.

Update on other DERP Sites

- **LHAAP 18/24** – AW explained that the Final Proposed Plan (PP) for LHAAP-18/24 was is final and that the Public Review and comment gores through 3 May 2019. The ROD will be prepared for Regulator review in September 2019. RM asked if the ROD has to go to headquarters. RMZ stated that there is no decision on who has to sign. AW stated that the public comments will need to be incorporated into the ROD also.
- **LHAAP-29** – RMZ stated that the LHAAP-29 ROD will be signed by BRAC but asked if the minutes from the PP Public Meeting had been edited. AW stated that he doesn't think anything was edited. RMZ stated that that AP and RW should look at the transcripts also because some of it didn't make sense. AP and RM stated that they had not seen the transcripts. RMZ will send what she has to AP and RM and that nothing was really terrible. AW stated that the ROD was sent out and should be delivered that day (25 April 2019). AW stated that the notification email was sent in the morning of 25 April 2019.
- **LHAAP-47** – AW stated that the Post-Screening Investigation (PSI) Report replacement pages were sent and that the document is going to be final, going into the AR. AW stated that there will also be a PSI Addendum Report that will include the surface water sampling. AW stated that the report will be short. RMZ stated that historically that there had been detections in the creek so the fact that there are not or very low detections is good. AW stated that the ROD is expected to go to the Regulators in August 2019. AP asked if the previous draft final ROD was used. AW stated that it was used. RMZ stated that the title needs to be discussed. AW suggest Revised Draft but RMZ stated that maybe it could be Revised Draft Final. AP stated that she didn't care so much about the name but that the changes from the previous Draft Final document could be clearly marked. RM wanted to confirm that EPA could still comment. RMZ stated that Regulators would be able to comment. RMZ stated that the language will change because the shallow zone no longer has much of a plume. AP stated that some of the text will not change, which is why it is good to see what is changing. AW stated that the document could be more red with changes than black without changes. AP stated that Revised Draft Final ROD makes sense because it doesn't make sense to go back to draft. AP asked if the PP and Public Meeting are still good. RMZ stated that the remedy is not changing; only where the remedy is being implemented. AW stated that the Army believes the PP is still valid since the remedy has not changed. AP stated that it is something to look at once the draft is available. RMZ stated that the meeting is being held 21 May 2019 to scope the work for LHAAP-18/24-47 and -29. AW stated that the award is planned for the first quarter of Fiscal Year 2020. RMZ stated that RD and RA will be issued as one contract. RMZ stated that they will likely do a 30/60/90 percent design for LHAAP-18/24. AP stated that the additional pre-design information is minor compared the site itself.
- **Five- Year Review (FYR)** – RMZ stated that there were a few comments to resolve on the FYR. PB stated that he had spoken with Mary Maddox, who is the regional expert and was with the Bureau of Land Management (BLM) for a dozen years. Ms. Maddox returned PB's call to discuss the water rights for private landowners but is not sure how it applies to government-owned property. PB stated that USFWS probably has enough legal rights to not allow the water well to be installed based upon Ms. Maddox's experience but Ms.

Maddox plans to look into it further. PB also stated that a special use permit would need to be issued for the water well to be installed at which point the answer could be no. RMZ stated that it could depend upon our plumes in the area and their depths. PB stated that often the wells don't produce enough water. RMZ stated that there are two sites, including LHAAP-18/24, where the clay does not separate the zones. RMZ stated that the boundaries could be expanded to manage this issue so PB is going asked to expand the boundaries. AP asked if it would be taken further another to which that RMZ said she was not sure. KB stated that a model had been done previously to assess the radius of influence and how it affected the City of Uncertain.

- RMZ also discussed some of the other comments with the Regulators to understand the best way to respond. AP also discuss the redundancy of the FYR.
- **Additional monitoring well installation.** PS stated that the RA-O Report were reviewed and requests for additional wells were identified for three sites.
    - PS discussed the placement of an additional well at LHAAP-12 due seasonal variations. The groundwater flow is based upon December 2018/January 2019 water levels. The proposal is to install the well to the east. RMZ stated that the previous well in the area had to be installed deeper to produce water. RMZ stated that the area is laterally discontinuous. RMZ stated that monitoring well 12WW10 previously had high hits but was removed and not re-installed. PS stated that he will pull up the well log for 12WW10. RMZ pulled up amended cross-sections to ensure that we are in the same sands and suggested that this be evaluated. RMZ stated that there was a detection of 14.5 ppb for TCE in 12WW10.
    - PS explains that the LHAAP-50 data is from the last RA-O report with data from May 2018. The comment is that the plume is not bounded from 50WW12. The comment is for there to be a well between 50WW12 and 50WW18. RMZ asked if the monitoring well will be a used in the contingency remedy as a performance monitoring well. AW pointed out that the use of the well will depend upon the analytical results of the well. BF stated that if the results are clean then it will become a sentry well and if the results are impacted then it would become a performance monitoring well.
    - PS discussed that the groundwater flow is north-northwest for LHAAP-67. The comment that was found was that the well was suggested to the north of 67WW02, which had 1,1-Dichloroethene detected at 190 ppb. AP asked if LHAAP-67 had a LUC. RMZ stated that the well was proposed right at the LUC boundary. AW stated that 67WW02 was clean and was supposed to bound the site. AP stated that she was good with the well and that the LUC boundary will be moved if the data suggests that it is needed. PS stated that the second well is to the northwest and can be move slightly but is to bound 67WW13. PS stated that the work will be completed in the summer.

Schedule Next Managers' Meeting

The next MMM will be held on May 16, 2019 at 10:00 am CDT via conference call.

ACRONYM LIST

AM	Andrew Maly
AP	April Palmie
APTIM	APTIM Federal Services, LLC
AR	Administrative Record
AW	Aaron Williams

BF	Bill Foss
Bhate	Bhate Environmental Associates, Inc.
BRAC	Base Realignment and Closure
CD	Compact Disc
CDT	Central Daylight Time
DERP	Defense Environmental Restoration Program
DH	Dorelle Harrison
EPA	United States Environmental Protection Agency
ESD	Explanation of Significant Differences
FYR	Five Year Review
GWTP	Ground Water Treatment Plant
KN	Kim Nemmers
LHAAP	Longhorn Army Ammunition Plant
LUC	Land Use Control
MMM	Monthly Managers' Meeting
MNA	Monitored Natural Attenuations
PBR	Performance-Based Remediation
PP	Proposed Plan
PS	Praveen Srivastav
PSI	Post-Screening Investigation
RAB	Restoration Advisory Board
RA-O	remedial action – operation
RAWP	Remedial Action Work Plan
RD	Remedial Design
ROD	Record of Decision
RM	Rich Mayer
RMZ	Rose M. Zeiler
TCEQ	Texas Commission on Environmental Quality
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Service

LHAAP Validated Data Packages for April 2019 Monthly Managers Meeting

	Analytic Method
LHAAP-35B(37)	*Year 2 Quarter 2 Remedial Action Operation Sampling - February 2019* VOCs (SW8260)
LHAAP-46	*Year 5 Remedial Action Operation Sampling - February 2019* VOCs (SW8260)
LHAAP-16	*Annual Sampling – February 2019* VOC (8260C) Perchlorate (6850)
GWTP Effluent	*Weekly Perchlorate Sampling – February/March 2019* Perchlorate (6850)
GWTP Effluent	*Weekly, Bi-Weekly, and Monthly Sampling – February/March 2019* Ammonia (350.3) Ortho-Phosphate (365.3) Organic Carbon (415.1) VOC (8260C) Metals (6020A) Hexavalent Chromium (7196A) 1,4-Dioxane (8270D-SIM) Anions (9056)
GWTP Influent	*Monthly Sampling – February/March 2019* Metals (6020A) Perchlorate (6850) Hexavalent Chromium (7196A)
GWTP Quarterly	*Influent and Effluent – March 2019* Oil and Grease (1664A) Perchlorate (6850) Metals (6020A) 1,4-Dioxane (8270D-SIM) Chemical Oxygen Demand (410.4) VOC (8260C) Anions (9056)
LHAAP Surface Water	*Quarterly Perchlorate Sampling - April 2019* Perchlorate (6850)

LHAAP-35B (37) Year 2 Quarter 2 Remedial Action Operation Sampling - February 2019

	Location Code		35BWW01				35BWW04		35BWW05	
	Sample ID		35BWW01-190212		35BWW01-190212-FD		35BWW04-190213		35BWW05-190213	
	Sample Date		2/12/2019		2/12/2019		2/13/2019		2/13/2019	
	Location Description:		Shallow zone, unimpacted, within site boundary		Shallow zone, unimpacted, 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
1,1-Dichloroethene	µg/L	7	< 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
Tetrachloroethene	µg/L	5	< 0.5	U	< 0.5	U	5.3		1.9	
Trichloroethene	µg/L	5	< 0.5	U	< 0.5	U	0.59	J	9.6	
Vinyl chloride	µg/L	2	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U

Notes:

Blue highlighting indicates concentrations above the MCL

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

ug/L - micrograms per liter

LHAAP-35B (37) Year 2 Quarter 2 Remedial Action Operation Sampling - February 2019

	Location Code		35BWW07		35BWW08		35BWW09		35BWW10	
	Sample ID		35BWW07-190214		35BWW08-190212		35BWW09-190213		35BWW10-190212	
	Sample Date		2/14/2019		2/12/2019		2/13/2019		2/12/2019	
	Location Description:		Shallow zone, unimpacted downgradient		Shallow zone, unimpacted, within site boundary		Shallow zone, impacted outside site boundary		Shallow, impacted, within site boundary	
Parameter	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
1,1-Dichloroethene	µg/L	7	< 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	1.1		< 0.5	U
Tetrachloroethene	µg/L	5	< 0.5	U	< 0.5	U	< 0.5	U	37	
Trichloroethene	µg/L	5	< 0.5	U	< 0.5	U	410		50	
Vinyl chloride	µg/L	2	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U

Notes:

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U - Undetected: The analyte was analyzed for, but not detected.

MCL - Maximum Contaminant Limit

ug/L - micrograms per liter

LHAAP-35B (37) Year 2 Quarter 2 Remedial Action Operation Sampling - February 2019

	Location Code		35BWW11		35BWW12				35BWW13	
	Sample ID		35BWW11-190213		35BWW12-190213		35BWW12-190213-FD		35BWW13-190214	
	Sample Date		2/13/2019		2/13/2019		2/13/2019		2/14/2019	
	Location Description:		Shallow zone, unimpacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, unimpacted, crossgradient	
Parameter	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
1,1-Dichloroethene	µg/L	7	< 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
Tetrachloroethene	µg/L	5	< 0.5	U	8		8.2		< 0.5	U
Trichloroethene	µg/L	5	< 0.5	U	0.91	J	0.88	J	< 0.5	U
Vinyl chloride	µg/L	2	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U

Notes:

Blue highlighting indicates concentrations above the MCL

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U - Undetected: The analyte was analyzed for, but not detected.

MCL - Maximum Contaminant Limit

ug/L - micrograms per liter

LHAAP-35B (37) Year 2 Quarter 2 Remedial Action Operation Sampling - February 2019

	Location Code		35BWW14		35BWW15		35BWW16		35BWW17	
	Sample ID		35BWW14-190212		35BWW15-190214		35BWW16-190215		35BWW17-190214	
	Sample Date		2/12/2019		2/14/2019		2/15/2019		2/14/2019	
	Location Description:		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, outside site boundary		Shallow zone, impacted, within site boundary	
Parameter	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
1,1-Dichloroethene	µg/L	7	5.6		1.9		1		< 0.5	U
cis-1,2-Dichloroethene	µg/L	70	2.1		0.65	J	< 0.5	U	< 0.5	U
Tetrachloroethene	µg/L	5	37		12		11		< 0.5	U
Trichloroethene	µg/L	5	22		11		4.7		< 0.5	U
Vinyl chloride	µg/L	2	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U

Notes:

Blue highlighting indicates concentrations above the MCL

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U - Undetected: The analyte was analyzed for, but not detected.

MCL - Maximum Contaminant Limit

ug/L - micrograms per liter

LHAAP-35B (37) Year 2 Quarter 2 Remedial Action Operation Sampling - February 2019

	Location Code		35BWW18		35BWW19		35BWW20		35BWW23	
	Sample ID		35BWW18-190214		35BWW19-190214		35BWW20-190213		35BWW23-190212	
	Sample Date		2/14/2019		2/14/2019		2/13/2019		2/12/2019	
	Location Description:		Shallow zone, unimpacted, outside site boundary		Shallow zone, unimpacted, outside site boundary		Shallow sone, impacted, within site boundary		Shallow zone, unimpacted, outside site boundary	
Parameter	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
1,1-Dichloroethene	µg/L	7	< 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
Tetrachloroethene	µg/L	5	< 0.5	U	< 0.5	U	34		< 0.5	U
Trichloroethene	µg/L	5	< 0.5	U	< 0.5	U	6		< 0.5	U
Vinyl chloride	µg/L	2	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U

Notes:

Blue highlighting indicates concentrations above the MCL

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

ug/L - micrograms per liter

LHAAP-35B (37) Year 2 Quarter 2 Remedial Action Operation Sampling - February 2019

	Location Code		35BWW24		35BWW25				35BWW26	
	Sample ID		35BWW24-190215		35BWW25-190215		35BWW25-190215-FD		35BWW26-190212	
	Sample Date		2/15/2019		2/15/2019		2/15/2019		2/12/2019	
	Location Description:		Shallow zone, unimpacted, outside site boundary		Shallow zone, impacted, outside site boundary		Shallow zone, impacted, outside site boundary		Shallow zone, unimpacted, within site boundary	
Parameter	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
1,1-Dichloroethene	µg/L	7	< 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
Tetrachloroethene	µg/L	5	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
Trichloroethene	µg/L	5	2.6		14		14		< 0.5	U
Vinyl chloride	µg/L	2	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U

Notes:

Blue highlighting indicates concentrations above the MCL

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

ug/L - micrograms per liter

LHAAP-35B (37) Year 2 Quarter 2 Remedial Action Operation Sampling - February 2019

	Location Code		LHSMW58	
	Sample ID		LHSMW58-190213	
	Sample Date		2/13/2019	
	Location Description:		Shallow zone, impacted, within site boundary	
Parameter	Units	MCL	Result	Val Qual
1,1-Dichloroethene	µg/L	7	< 0.5	U
cis-1,2-Dichloroethene	µg/L	70	< 0.5	U
Tetrachloroethene	µg/L	5	6.1	
Trichloroethene	µg/L	5	< 0.5	U
Vinyl chloride	µg/L	2	< 0.5	U

Notes:

Blue highlighting indicates concentrations above the MCL

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

ug/L - micrograms per liter

LHAAP-46 Year 5 Remedial Action Operation Sampling - February 2019

	Location Code		46WW02		46WW03		46WW05	
	Sample ID		46WW02-190221		46WW03-190220		46WW05-190225	
	Sample Date		2/21/2019		2/20/2019		2/25/2019	
	Location Description:		Central, inside site boundary. Intermediate Zone.		Central, inside site boundary.		North, inside site boundary. Intermediate Zone.	
Parameter	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual
cis-1,2-Dichloroethene	µg/L	70	1		< 0.5	U	2.2	
Trichloroethene	µg/L	5	16		< 0.5	U	27	
Vinyl chloride	µg/L	2	< 0.5	U	< 0.5	U	< 0.5	U

Notes:

Blue highlighting indicates concentrations above the MCL

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

ug/L - micrograms per liter

LHAAP-46 Year 5 Remedial Action Operation Sampling - February 2019

	Location Code		46WW06		46WW07		46WW08	
	Sample ID		46WW06-190220		46WW07-190220		46WW08-190220	
	Sample Date		2/20/2019		2/20/2019		2/20/2019	
	Location Description:		West, inside site boundary. Intermediate Zone.		North, inside site boundary. Intermediate Zone.		North-Northwest, inside site boundary. Intermediate Zone.	
Parameter	Units	MCL	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
Trichloroethene	µg/L	5	< 0.5	U	< 0.5	U	< 0.5	U
Vinyl chloride	µg/L	2	< 0.5	U	< 0.5	U	< 0.5	U

Notes:

Blue highlighting indicates concentrations above the MCL

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

ug/L - micrograms per liter

LHAAP-46 Year 5 Remedial Action Operation Sampling - February 2019

	Location Code		46WW09				46WW11	
	Sample ID		46WW09-190225		46WW09-190225-FD		46WW11-190221	
	Sample Date		2/25/2019		2/25/2019		2/21/2019	
	Location Description:		Central, within site boundary. Intermediate Zone.		Central, within site boundary. Intermediate Zone.		Central, within site boundary.	
Parameter	Units	MCL	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
Trichloroethene	µg/L	5	< 0.5	U	< 0.5	U	13	
Vinyl chloride	µg/L	2	< 0.5	U	< 0.5	U	< 0.5	U

Notes:

Blue highlighting indicates concentrations above the MCL

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

ug/L - micrograms per liter

LHAAP-46 Year 5 Remedial Action Operation Sampling - February 2019

	Location Code		46WW16		LHSMW18		LHSMW21		LHSMW25	
	Sample ID		46WW16-190221		LH18MW19-190220		LHSMW21-190225		LHSMW25-190225	
	Sample Date		2/21/2019		2/20/2019		2/25/2019		2/25/2019	
	Location Description:		North, within site boundary. Intermediate Zone.		Southwest, within site boundary.		Northeast, within site boundary.		East, within site boundary. Intermediate zone.	
Parameter	Units	MCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
cis-1,2-Dichloroethene	µg/L	70	< 0.5	U	3.9		100		< 0.5	U
Trichloroethene	µg/L	5	< 0.5	U	16		20		< 0.5	U
Vinyl chloride	µg/L	2	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U

Notes:

Blue highlighting indicates concentrations above the MCL

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

ug/L - micrograms per liter

LHAAP 16 Annual Sampling - February 2019

Location ID: / Sample Date:	Units	MCL/PCL/ MSC	16EW01_ 022619	16EW02_ 022619	16EW03_ 022619	16EW04_ 022619	16EW05_ 022619	16EW05_ 022619_a	16EW06_ 022619	16EW07_ 022619	16EW08_ 022619
Location Description			Site 16 – NE, middle region Sampled Annually	Site 16 – NE, middle region Sampled Annually	Site 16 – NE middle region Sampled Annually	Site 16 – ENE, middle region Sampled Annually	Site 16 – NE middle region Sampled Annually	Site 16 – NE middle region Sampled Annually Duplicate.	Site 16 – NE, middle region Sampled Annually	Site 16 – NE, middle region Sampled Annually	Site 16 – ENE, middle region Sampled Annually
Perchlorate (6850)											
Perchlorate	µg/L	17*	**51 J**	< 2.0 U	< 2.0 U	< 2.0 U	**230**	**240**	< 2.0 U	< 2.0 U	< 2.0 U
Volatile Organic Compounds (8260C)											
1,1,1,2-Tetrachloroethane	µg/L	110	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
1,1,1-Trichloroethane	µg/L	200	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
1,1,2,2-Tetrachloroethane	µg/L	14	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
1,1,2-Trichloroethane	µg/L	5	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
1,1-Dichloroethane	µg/L	10000	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	**1.4**	**1.4**	< 0.50 U	< 0.50 U	< 0.50 U
1,1-Dichloroethene	µg/L	7	**14**	**86**	**12**	**0.88 J**	**6.0**	**6.5**	**0.95 J**	**1.7**	**0.76 J**
1,1-Dichloropropene	µg/L	2.9	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
1,2,3-Trichlorobenzene	µg/L	310	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
1,2,3-Trichloropropane	µg/L	0.0041	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
1,2,4-Trichlorobenzene	µg/L	70	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
1,2,4-Trimethylbenzene	µg/L	5100	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
1,2-Dibromo-3-chloropropane	µg/L	0.2	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
1,2-Dibromoethane	µg/L	0.05	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
1,2-Dichlorobenzene	µg/L	600	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
1,2-Dichloroethane	µg/L	5	**12**	**34 J**	**6.2 J**	**0.55 J**	**6.0**	**6.4**	**0.56 J**	< 0.50 U	< 0.50 U
1,2-Dichloropropane	µg/L	5	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
1,3,5-Trimethylbenzene	µg/L	5100	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
1,3-Dichlorobenzene	µg/L	3100	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
1,3-Dichloropropane	µg/L	29	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
1,4-Dichlorobenzene	µg/L	75	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
2,2-Dichloropropane	µg/L	42	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
2-Butanone	µg/L	61000	< 5.0 U	< 25 U	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U

LHAAP 16 Annual Sampling - February 2019

Location ID: / Sample Date:	Units	MCL/PCL/ MSC	16EW01_ 022619	16EW02_ 022619	16EW03_ 022619	16EW04_ 022619	16EW05_ 022619	16EW05_ 022619_a	16EW06_ 022619	16EW07_ 022619	16EW08_ 022619
Location Description			Site 16 – NE, middle region Sampled Annually	Site 16 – NE, middle region Sampled Annually	Site 16 – NE middle region Sampled Annually	Site 16 – ENE, middle region Sampled Annually	Site 16 – NE middle region Sampled Annually	Site 16 – NE middle region Sampled Annually Duplicate.	Site 16 – NE, middle region Sampled Annually	Site 16 – NE, middle region Sampled Annually	Site 16 – ENE, middle region Sampled Annually
2-Chlorotoluene	µg/L	2000	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
2-Hexanone	µg/L	6100	< 5.0 U	< 50 U	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
4-Chlorotoluene	µg/L	2000	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
4-Isopropyltoluene	µg/L	10000	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
4-Methyl-2-pentanone	µg/L	8200	< 5.0 U	< 50 U	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Acetone	µg/L	92000	< 10 U	< 100 U	< 20 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U
Benzene	µg/L	5	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
Bromobenzene	µg/L	2000	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
Bromochloromethane	µg/L	4100	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
Bromodichloromethane	µg/L	4.6	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
Bromoform	µg/L	36	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
Bromomethane	µg/L	140	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
Carbon disulfide	µg/L	10000	< 5.0 U	< 50 U	< 10 U	< 0.50 U	< 1.0 U	< 1.0 U	< 0.50 U	< 0.50 U	< 0.50 U
Carbon tetrachloride	µg/L	5	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
Chlorobenzene	µg/L	100	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
Chloroethane	µg/L	41000	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
Chloroform	µg/L	1000	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
Chloromethane	µg/L	220	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
cis-1,2-Dichloroethene	µg/L	70	**3,700 J**	**17,000**	**2,000**	**260**	**1,000**	**1,200**	**180**	**340**	**170**
cis-1,3-Dichloropropene	µg/L	5.3	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
Dibromochloromethane	µg/L	34	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
Dibromomethane	µg/L	380	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
Dichlorodifluoromethane	µg/L	20000	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
Ethylbenzene	µg/L	700	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
Hexachlorobutadiene	µg/L	20	< 5.0 U	< 50 U	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U

LHAAP 16 Annual Sampling - February 2019

Location ID: / Sample Date:	Units	MCL/PCL/ MSC	16EW01_ 022619	16EW02_ 022619	16EW03_ 022619	16EW04_ 022619	16EW05_ 022619	16EW05_ 022619_a	16EW06_ 022619	16EW07_ 022619	16EW08_ 022619
Location Description			Site 16 – NE, middle region Sampled Annually	Site 16 – NE, middle region Sampled Annually	Site 16 – NE middle region Sampled Annually	Site 16 – ENE, middle region Sampled Annually	Site 16 – NE middle region Sampled Annually	Site 16 – NE middle region Sampled Annually Duplicate.	Site 16 – NE, middle region Sampled Annually	Site 16 – NE, middle region Sampled Annually	Site 16 – ENE, middle region Sampled Annually
Isopropylbenzene	µg/L	1000	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
m,p-Xylene	µg/L	10000	< 5.0 U	< 50 U	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Methylene chloride	µg/L	5	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
Naphthalene	µg/L	2000	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
n-Butylbenzene	µg/L	4100	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
n-Propylbenzene	µg/L	4100	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
o-Xylene	µg/L	10000	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
sec-Butylbenzene	µg/L	4100	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
Styrene	µg/L	100	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
tert-Butylbenzene	µg/L	4100	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
Tetrachloroethene	µg/L	5	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
Toluene	µg/L	1000	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
trans-1,2-Dichloroethene	µg/L	100	**8.7**	**24 J**	< 5.0 U	**0.72 J**	**3.7**	**3.9**	< 0.50 U	**0.84 J**	**0.64 J**
trans-1,3-Dichloropropene	µg/L	29	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
Trichloroethene	µg/L	5	**3,700**	**34,000**	**7,400**	**900**	**1,700**	**1,900**	**250**	**81**	**170**
Trichlorofluoromethane	µg/L	31000	< 2.5 U	< 25 U	< 5.0 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U	< 0.50 U
Vinyl chloride	µg/L	2	**45**	**51**	**7.5 J**	**0.47 J**	**260 J**	**420 J**	< 0.50 U	**25**	**0.86 J**

Blue Highlighting Indicates concentrations above the MCL/PCL/MSC

MCL/PCL/MSC - Maximum Contaminant Limit/Protective Concentration Level/Medium-Specific Concentrations

µg/L - micrograms per liter

J - estimated value between the limit of quantitation and the detection limit and/or estimated due to QC discrepancies

U- Undetected: The analyte was analyzed for, but not detected and reported to the limit of detection.

*PCL – Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level

GWTP Weekly/Effluent Perchlorate Sampling - February 2019

Location ID: Sample Date:	Units	Daily Maximum Conc	LH18/24-SP650_022119_BIX 2/21/19	LH18/24-SP650_022819_BIX 2/28/19	LH18/24-SP650_022819_BIX 2/28/19
Location Description			**Collected from a spigot on the discharge of effluent TK-650.**		
			Weekly	Weekly	Monthly EFF
Perchlorate (6850)					
Perchlorate	µg/L	589	< 2.0 U	< 2.0 U	< 2.0 U

µg/L - micrograms per liter

U- Undetected: The analyte was analyzed for, but not detected and reported to the limit of detection.

BIX - before ion exchange

GWTP Weekly Sampling - February 2019

Location ID: Sample Date:	Units	Daily Maximum Conc	LH18/24-SP650_022119 2/21/19	LH18/24-SP650_022819 2/28/19
Location Description			**GWTP–Collected from a spigot on the discharge of effluent TK-650. Sampled**	
Ammonia as N (350.3)				
Ammonia as N	mg/L	NV	**15**	**9.5**
Ortho-Phosphate (365.3)				
Ortho-Phosphate	mg/L	NV	**4.2**	**1.69**
Organic Carbon (415.1)				
Total Organic Carbon (TOC)	mg/L	NV	**8.4**	**5.1**

mg/L - milligrams per liter

NV - No Value

GWTP Bi-Weekly Sampling - February 2019

Location ID: / Sample Date:	Units	Daily Maximum Conc	LH18/24-SP650_022119 2/21/19
Location Description			**GWTP – Collected from a spigot on the discharge of effluent TK-650. Sampled Biweekly.**
Volatile Organic Compounds (8260C)			
1,1,1-Trichloroethane	µg/L	7,230	< 0.5 U
1,1,2-Trichloroethane	µg/L	216.9	< 0.5 U
1,1-Dichloroethane	µg/L	14,032	< 0.5 U
1,1-Dichloroethene	µg/L	253	< 0.5 U
1,2-Dichloroethane	µg/L	181	< 0.5 U
1,2-Dichloropropane	µg/L	5	< 0.5 U
Acetone	µg/L	2,395	< 1.0 U
Benzene	µg/L	181	< 0.5 U
Carbon tetrachloride	µg/L	181	< 0.5 U
Chlorobenzene	µg/L	47,180	< 0.5 U
Chloroform	µg/L	3,615	< 0.5 U
Ethylbenzene	µg/L	57,025	< 0.5 U
m,p-Xylene	µg/L	83.6	< 1.0 U
Methylene chloride	µg/L	1,699	< 1.0 U
o-Xylene	µg/L	83.6	< 0.5 U
Styrene	µg/L	5,987	< 0.5 U
Tetrachloroethene	µg/L	180.7	< 0.5 U
Toluene	µg/L	4,189	< 0.5 U
Trichloroethene	µg/L	181	**0.70 J**
Vinyl chloride	µg/L	72	< 0.5 U
Anions (9056)			
Chloride	mg/L	NV	**320**
Sulfate	mg/L	NV	**29.8**

µg/L - micrograms per liter

mg/L - milligrams per liter

U- Undetected: The analyte was analyzed for, but not detected and reported to the limit of detection.

NV - No Value

J - estimated value between the detection limit and limit of quantitation and/or due to quality contol issues

GWTP Monthly Effluent Sampling - February 2019

Location ID: / Sample Date:	Units	Daily Maximum Conc	LH18/24-SP650_022819 2/28/19
Location Description			GWTP – Collected from a spigot on the discharge of effluent TK-650. Sampled monthly
Volatile Organic Compounds (8260C)			
1,1,1-Trichloroethane	µg/L	7,230	< 0.5 U
1,1,2-Trichloroethane	µg/L	216.9	< 0.5 U
1,1-Dichloroethane	µg/L	14,032	< 0.5 U
1,1-Dichloroethene	µg/L	253	< 0.5 U
1,2-Dichloroethane	µg/L	181	< 0.5 U
1,2-Dichloropropane	µg/L	5	< 0.5 U
Acetone	µg/L	2,395	< 1.0 U
Benzene	µg/L	181	< 0.5 U
Carbon tetrachloride	µg/L	181	< 0.5 U
Chlorobenzene	µg/L	47,180	< 0.5 U
Chloroform	µg/L	3,615	< 0.5 U
Ethylbenzene	µg/L	57,025	< 0.5 U
m,p-Xylene	µg/L	83.6	< 1.0 U
Methylene chloride	µg/L	1,699	< 1.0 U
o-Xylene	µg/L	83.6	< 0.5 U
Styrene	µg/L	5,987	< 0.5 U
Tetrachloroethene	µg/L	180.7	< 0.5 U
Toluene	µg/L	4,189	< 0.5 U
Trichloroethene	µg/L	181	**0.80 J**
Vinyl chloride	µg/L	72	< 0.5 U
Metals (6020A)			
Barium	mg/L	2	**0.137**
Lead	mg/L	0.0046	< 0.00100 U
Selenium	mg/L	0.012	< 0.00250 U
Silver	mg/L	0.003	< 0.000500 U
Hexavalent Chromium (7196A)			
Hexavalent Chromium	mg/L	0.1244	< 0.0100 U
Semi-Volatile Organic Compounds (8270D SIM)			
1,4-Dioxane	µg/L	134.2	**4.3**

µg/L - micrograms per liter

mg/L - milligrams per liter

U- Undetected: The analyte was analyzed for, but not detected and reported to the limit of detection.

J - estimated value between the detection limit and limit of quantitation and/or due to quality contol issues

GWTP Monthly Influent Sampling - February 2019

Location ID: Sample Date:	Units	LH18/24-SP140_022819 2/28/19
Location Description		**GWTP – Collected from a spigot on the influent to TK-140. Sampled Monthly.**
Metals (6020A)		
Selenium	mg/L	< 0.00250 U
Silver	mg/L	< 0.000500 U
Hexavalent Chromium (7196A)		
Hexavalent Chromium	mg/L	< 0.0100 U
Perchlorate (6850)		
Perchlorate	µg/L	**3,700**

mg/L - milligrams per liter

µg/L - micrograms per liter

U- Undetected: The analyte was analyzed for, but not detected and reported to the limit of detection.

GWTP Weekly/Effluent Perchlorate Sampling - March 2019

Location ID: Sample Date:	Units	Daily Maximum Conc	LH18/24-SP650_030619_BIX 3/6/19	LH18/24-SP650_031419_BIX 3/14/19	LH18/24-SP650_031419_BIX 3/14/19	LH18/24-SP650_032119_BIX 3/21/19	LH18/24-SP650_032719_BIX 3/27/19	LH18/24-SP650_032719_BIX 3/27/19
Location Description			**Collected from a spigot on the discharge of effluent TK-650.**					
			Weekly	Weekly	Monthly EFF	Weekly	Weekly	Quarterly EFF
Perchlorate (6850)								
Perchlorate	µg/L	589	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	**2.6 J**	**2.3 J**

µg/L - micrograms per liter

U- Undetected: The analyte was analyzed for, but not detected and reported to the limit of detection.

BIX - before ion exchange

J - estimated value between the detection limit and limit of quantitation and/or due to quality contol issues

GWTP Bi-Weekly Sampling - March 2019

Location ID: / Sample Date:	Units	Daily Maximum Conc	LH18/24-SP650_030619 3/06/19	LH18/24-SP650_032119 3/21/19
Location Description			**GWTP – Collected from a spigot on the discharge of effluent TK-650. Sampled Biweekly.**	
Volatile Organic Compounds (8260C)				
1,1,1-Trichloroethane	µg/L	7,230	< 0.5 U	< 0.5 U
1,1,2-Trichloroethane	µg/L	216.9	< 0.5 U	< 0.5 U
1,1-Dichloroethane	µg/L	14,032	< 0.5 U	< 0.5 U
1,1-Dichloroethene	µg/L	253	< 0.5 U	< 0.5 U
1,2-Dichloroethane	µg/L	181	< 0.5 U	< 0.5 U
1,2-Dichloropropane	µg/L	5	< 0.5 U	< 0.5 U
Acetone	µg/L	2,395	< 2.0 U	< 2.0 U
Benzene	µg/L	181	< 0.5 U	< 0.5 UJ
Carbon tetrachloride	µg/L	181	< 0.5 U	< 0.5 U
Chlorobenzene	µg/L	47,180	< 0.5 U	< 0.5 U
Chloroform	µg/L	3,615	< 0.5 U	< 0.5 U
Ethylbenzene	µg/L	57,025	< 0.5 U	< 0.5 U
m,p-Xylene	µg/L	83.6	< 1.0 U	< 1.0 U
Methylene chloride	µg/L	1,699	< 0.5 U	< 0.5 U
o-Xylene	µg/L	83.6	< 0.5 U	< 0.5 U
Styrene	µg/L	5,987	< 0.5 U	< 0.5 U
Tetrachloroethene	µg/L	180.7	< 0.5 U	< 0.5 U
Toluene	µg/L	4,189	< 0.5 U	< 0.5 UJ
Trichloroethene	µg/L	181	**0.74 J**	**0.71 J**
Vinyl chloride	µg/L	72	< 0.5 U	< 0.5 U
Anions (9056)				
Chloride	mg/L	NV	**312**	**314**
Sulfate	mg/L	NV	**13.9**	**26.8**

µg/L - micrograms per liter

mg/L - milligrams per liter

U- Undetected: The analyte was analyzed for, but not detected and reported to the limit of detection.

NV - No Value

J - estimated value between the detection limit and limit of quantitation and/or due to quality contol issues

UJ - estimated non-detect due to quality control issue

GWTP Weekly Sampling - March 2019

Location ID: Sample Date:	Units	Daily Maximum Conc	LH18/24-SP650_030619 3/6/19	LH18/24-SP650_031419 3/14/19	LH18/24-SP650_032119 3/21/19	LH18/24-SP650_032719 3/27/19
Location Description			**GWTP–Collected from a spigot on the discharge of effluent TK-650. Sampled Weekly.**			
Ammonia as N (350.3)						
Ammonia as N	mg/L	NV	**5.5**	**18**	**16**	**11**
Ortho-Phosphate (365.3)						
Ortho-Phosphate	mg/L	NV	**0.48**	**4.65**	**4.15**	**2.42**
Organic Carbon (415.1)						
Total Organic Carbon (TOC)	mg/L	NV	**2.94**	**2.96**	**2.50**	**2.29**

mg/L - milligrams per liter

NV - No Value

GWTP Monthly Effluent Sampling - March 2019

Location ID: / Sample Date:	Units	Daily Maximum Conc	LH18/24-SP650_031419 3/14/19
Location Description			GWTP – Collected from a spigot on the discharge of effluent TK-650. Sampled monthly
Volatile Organic Compounds (8260C)			
1,1,1-Trichloroethane	µg/L	7,230	< 0.5 U
1,1,2-Trichloroethane	µg/L	216.9	< 0.5 U
1,1-Dichloroethane	µg/L	14,032	< 0.5 U
1,1-Dichloroethene	µg/L	253	< 0.5 U
1,2-Dichloroethane	µg/L	181	**0.53 J**
1,2-Dichloropropane	µg/L	5	< 0.5 U
Acetone	µg/L	2,395	< 2.0 U
Benzene	µg/L	181	< 0.5 U
Carbon tetrachloride	µg/L	181	< 0.5 U
Chlorobenzene	µg/L	47,180	< 0.5 U
Chloroform	µg/L	3,615	< 0.5 U
Ethylbenzene	µg/L	57,025	< 0.5 U
m,p-Xylene	µg/L	83.6	< 1.0 U
Methylene chloride	µg/L	1,699	< 0.5 U
o-Xylene	µg/L	83.6	< 0.5 U
Styrene	µg/L	5,987	< 0.5 U
Tetrachloroethene	µg/L	180.7	< 0.5 U
Toluene	µg/L	4,189	< 0.5 U
Trichloroethene	µg/L	181	**0.74 J**
Vinyl chloride	µg/L	72	< 0.5 U
Metals (6020A)			
Barium	mg/L	2	**0.139**
Lead	mg/L	0.0046	< 0.00100 U
Selenium	mg/L	0.012	< 0.00250 U
Silver	mg/L	0.003	< 0.000500 U
Hexavalent Chromium (7196A)			
Hexavalent Chromium	mg/L	0.1244	< 0.0100 U
Semi-Volatile Organic Compounds (8270D SIM)			
1,4-Dioxane	µg/L	134.2	**3.1 J**

µg/L - micrograms per liter

mg/L - milligrams per liter

U- Undetected: The analyte was analyzed for, but not detected and reported to the limit of detection.

J - estimated value between the detection limit and limit of quantitation and/or due to quality contol issues

GWTP Monthly Influent Sampling - March 2019

Location ID: Sample Date:	Units	LH18/24-SP140_031419 3/14/19
Location Description		**GWTP – Collected from a spigot on the influent to TK-140. Sampled Monthly.**
Metals (6020A)		
Selenium	mg/L	< 0.00250 U
Silver	mg/L	< 0.000500 U
Hexavalent Chromium (7196A)		
Hexavalent Chromium	mg/L	< 0.0100 U
Perchlorate (6850)		
Perchlorate	µg/L	**8,300**

mg/L - milligrams per liter

µg/L - micrograms per liter

U- Undetected: The analyte was analyzed for, but not detected and reported to the limit of detection.

GWTP Quarterly Effluent Sampling - March 2019

Location ID: Sample Date:	Units	Daily Maximum Conc	LH18/24-SP650_032719 3/27/19
Location Description			GWTP – Collected from a spigot on the discharge of effluent TK-650. Sampled Quarterly.
Oil and Grease (1664A)			
Oil & Grease	mg/L	15	**2.08**
Chemical Oxygen Demand (410.4)			
Chemical Oxygen Demand	mg/L	200	**21**
Volatile Organic Compounds (8260C)			
1,1,1-Trichloroethane	µg/L	7,230	< 0.5 U
1,1,2-Trichloroethane	µg/L	216.9	< 0.5 U
1,1-Dichloroethane	µg/L	14,032	< 0.5 U
1,1-Dichloroethene	µg/L	253	< 0.5 U
1,2-Dichloroethane	µg/L	181	**0.57 J**
1,2-Dichloropropane	µg/L	5	< 0.5 U
Acetone	µg/L	2,395	< 2.0 U
Benzene	µg/L	181	< 0.5 U
Carbon tetrachloride	µg/L	181	< 0.5 U
Chlorobenzene	µg/L	47,180	< 0.5 U
Chloroform	µg/L	3,615	< 0.5 U
Ethylbenzene	µg/L	57,025	< 0.5 U
m,p-Xylene	µg/L	83.6	< 1.0 U
Methylene chloride	µg/L	1,699	< 0.5 U
o-Xylene	µg/L	83.6	< 0.5 U
Styrene	µg/L	5,987	< 0.5 U
Tetrachloroethene	µg/L	180.7	< 0.5 U
Toluene	µg/L	4,189	< 0.5 U
Trichloroethene	µg/L	181	**0.85 J**
Vinyl chloride	µg/L	72	< 0.5 U
Metals (6020A)			
Aluminum	mg/L	1.644	**0.0311**
Antimony	mg/L	NV	**0.00101 J**
Arsenic	mg/L	0.722	**0.000860 J**
Barium	mg/L	2	**0.132**
Beryllium	mg/L	NV	< 0.00250 U
Cadmium	mg/L	0.0034	< 0.000500 U
Calcium	mg/L	NV	**14.5**
Chromium	mg/L	0.752	**0.00142 J**
Cobalt	mg/L	11.495	**0.00112 J**
Iron	mg/L	2.395	**0.125 J**
Lead	mg/L	0.0046	< 0.00100 U
Magnesium	mg/L	NV	**12.9**

Manganese	mg/L	15.494	**0.0678**
Nickel	mg/L	0.184	**0.00344**
Potassium	mg/L	NV	**1.27**
Selenium	mg/L	0.012	< 0.00250 U
Silver	mg/L	0.003	< 0.000500 U
Sodium	mg/L	NV	**339**
Thallium	mg/L	NV	< 0.00100 U
Vanadium	mg/L	3.592	0.00382 UB
Zinc	mg/L	0.31	**0.0363**
Mercury	mg/L	NV	< 0.000100 U
Anions (9056)			
Chloride	mg/L	NV	**317**
Sulfate	mg/L	NV	**28.5**
Semi-Volatile Organic Compounds (8270D SIM)			
1,4-Dioxane	µg/L	134.2	**11.0**

µg/L - micrograms per liter

mg/L - milligrams per liter

J - estimated value between the detection limit and limit of quantitation and/or due to quality contol issues

NV - No Value

U- Undetected: The analyte was analyzed for, but not detected and reported to the limit of detection.

UB – considered an artifact of blank contamination

GWTP Quarterly Influent Sampling - March 2019

Location ID: / Sample Date:	Units	LH18/24-SP140_032719 3/27/19
Location Description		**GWTP – Collected from a spigot on the influent to TK-140. Sampled Quarterly.**
Oil and Grease (1664A)		
Oil & Grease	mg/L	**0.729 J**
Chemical Oxygen Demand (410.4)		
Chemical Oxygen Demand	mg/L	**6.0 J**
Perchlorate (6850)		
Perchlorate	µg/L	**6,500**
Volatile Organic Compounds (8260C)		
1,1,1,2-Tetrachloroethane	µg/L	< 5.0 U
1,1,1-Trichloroethane	µg/L	< 5.0 U
1,1,2,2-Tetrachloroethane	µg/L	< 5.0 U
1,1,2-Trichloroethane	µg/L	< 5.0 U
1,1-Dichloroethane	µg/L	**6.4 J**
1,1-Dichloroethene	µg/L	< 5.0 U
1,1-Dichloropropene	µg/L	< 5.0 U
1,2,3-Trichlorobenzene	µg/L	< 5.0 U
1,2,3-Trichloropropane	µg/L	< 5.0 U
1,2,4-Trichlorobenzene	µg/L	< 5.0 U
1,2,4-Trimethylbenzene	µg/L	< 5.0 U
1,2-Dibromo-3-chloropropane	µg/L	< 5.0 U
1,2-Dibromoethane	µg/L	< 5.0 UJ
1,2-Dichlorobenzene	µg/L	< 5.0 U
1,2-Dichloroethane	µg/L	**58**
1,2-Dichloropropane	µg/L	< 5.0 U
1,3,5-Trimethylbenzene	µg/L	< 5.0 U
1,3-Dichlorobenzene	µg/L	< 5.0 U
1,3-Dichloropropane	µg/L	< 5.0 U
1,4-Dichlorobenzene	µg/L	< 5.0 U
2,2-Dichloropropane	µg/L	< 5.0 U
2-Butanone	µg/L	< 10.0 U
2-Chlorotoluene	µg/L	< 5.0 U
2-Hexanone	µg/L	< 10.0 U
4-Chlorotoluene	µg/L	< 5.0 U
4-Isopropyltoluene	µg/L	< 5.0 U
4-Methyl-2-pentanone	µg/L	< 10.0 U
Acetone	µg/L	< 20 U
Benzene	µg/L	**7.8 J**
Bromobenzene	µg/L	< 5.0 U
Bromochloromethane	µg/L	< 5.0 U
Bromodichloromethane	µg/L	< 5.0 U

Bromoform	µg/L	< 5.0 UJ
Bromomethane	µg/L	< 5.0 U
Carbon disulfide	µg/L	< 10.0 U
Carbon tetrachloride	µg/L	**25**
Chlorobenzene	µg/L	< 5.0 U
Chloroethane	µg/L	< 5.0 U
Chloroform	µg/L	**9.1 J**
Chloromethane	µg/L	< 5.0 U
cis-1,2-Dichloroethene	µg/L	**1,900**
cis-1,3-Dichloropropene	µg/L	< 5.0 U
Dibromochloromethane	µg/L	< 5.0 UJ
Dibromomethane	µg/L	< 5.0 U
Dichlorodifluoromethane	µg/L	< 5.0 U
Ethylbenzene	µg/L	< 5.0 U
Hexachlorobutadiene	µg/L	< 10.0 U
Isopropylbenzene	µg/L	< 5.0 U
m,p-Xylene	µg/L	< 10.0 U
Methylene chloride	µg/L	**110**
Naphthalene	µg/L	< 5.0 U
n-Butylbenzene	µg/L	< 5.0 U
n-Propylbenzene	µg/L	< 5.0 U
o-Xylene	µg/L	< 5.0 U
sec-Butylbenzene	µg/L	< 5.0 U
Styrene	µg/L	< 5.0 U
tert-Butylbenzene	µg/L	< 5.0 U
Tetrachloroethene	µg/L	**15**
Toluene	µg/L	< 5.0 U
trans-1,2-Dichloroethene	µg/L	**5.1 J**
trans-1,3-Dichloropropene	µg/L	< 5.0 U
Trichloroethene	µg/L	**5,600**
Trichlorofluoromethane	µg/L	< 5.0 U
Vinyl chloride	µg/L	**41**
Metals (6020A)		
Aluminum	mg/L	**0.0643**
Antimony	mg/L	**0.00216**
Arsenic	mg/L	**0.000971 J**
Barium	mg/L	**0.223**
Beryllium	mg/L	< 0.00250 U
Cadmium	mg/L	< 0.000500 U
Calcium	mg/L	**16.8**
Chromium	mg/L	**0.00307 J**
Cobalt	mg/L	**0.00548**
Iron	mg/L	**0.317**
Lead	mg/L	< 0.00100 U
Magnesium	mg/L	**13.8**
Manganese	mg/L	**0.214**

Nickel	mg/L	**0.0114**
Potassium	mg/L	**1.30**
Selenium	mg/L	< 0.00250 U
Silver	mg/L	< 0.000500 U
Sodium	mg/L	**196**
Thallium	mg/L	< 0.00100 U
Vanadium	mg/L	0.00237 UB
Zinc	mg/L	**0.119**
Mercury	mg/L	< 0.000100 U
Anions (9056)		
Chloride	mg/L	**197**
Sulfate	mg/L	**32**
Semi-Volatile Organic Compounds (8270D SIM)		
1,4-Dioxane	µg/L	**16**

µg/L - micrograms per liter

mg/L - milligrams per liter

J -estimated value between the detection limit and limit of quantitation and/or due to quality contol issues

U- Undetected: The analyte was analyzed for, but not detected and reported to the limit of detection.

UB – considered an artifact of blank contamination

UJ - estimated non-detect due to quality control issue

LHAAP-Quarterly Surface Water Sampling - April 2019

Location ID: / Sample Date:	Units	PCL	HBW7_040119 4/3/19	HBW7_040119_a 4/3/19	HBW10_040119 4/3/19	HBW1_040119 4/3/19	GPW1_040119 4/3/19	GPW3_040119 4/3/19
Perchlorate (6850)			Harrison Bayou				Goose Prairie Creek	
Perchlorate	µg/L	17	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U

PCL – Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level

µg/L - micrograms per liter

U - Undetected: The analyte was analyzed for, but not detected and reported to the limit of detection.

DEPARTMENT OF THE ARMY
LONGHORN ARMY AMMUNITION PLANT
POST OFFICE BOX 220
RATCLIFF, AR 72951

May 17, 2019

DAIM-ODB-LO

Mr. Rich Mayer
U.S. Environmental Protection Agency
Federal Facilities Section R6
1445 Ross Avenue
Dallas, TX 75202-2733

Re: Draft Remedial Design/Remedial Action Work Plan, LHAAP-03, Former Waste Collection Pad, Building 722-P Paint Shop Longhorn Army Ammunition Plant, Karnack, Texas, May 2019

Dear Mr. Mayer,

One hard copy and one compact disc (CD) of the above-referenced document is being transmitted to you for your review. Review comments are requested by June 19, 2019.

The document was prepared by Bhate Environmental Associates, Inc., (Bhate) team, on behalf of the Army as part of Bhate's Performance Based Remediation contract for the facility. I ask that Kim Nemmers, 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 479-635-0110, or by email at rose.m.zeiler.civ@mail.mil.

Sincerely,

Rose M. Zeiler, Ph.D.
Longhorn AAP Site Manager

Copies furnished:
A. Palmie, TCEQ, Austin, TX (letter)
P. Bruckwicki, Caddo Lake NWR, TX (1 hard copy and 1 CD)
A. Williams, USACE, Tulsa District, OK (1 CD)
R. Smith, USACE, Tulsa District, OK (Electronic only)
A. Maly, USAEC, San Antonio, TX (1 CD)
K. Nemmers, Bhate, Lakewood, CO (1 CD)
P. Srivastav, APTIM, Houston, TX (letter)

DEPARTMENT OF THE ARMY
LONGHORN ARMY AMMUNITION PLANT
POST OFFICE BOX 220
RATCLIFF, AR 72951

May 17, 2019

DAIM-ODB-LO

Ms. April Palmie
Texas Commission on Environmental Quality
Superfund Section, MC-136
12100 Park 35 Circle, Bldg D
Austin, TX 78753

Re: Draft Remedial Design/Remedial Action Work Plan, LHAAP-03
Former Waste Collection Pad, Building 722-P Paint Shop
Longhorn Army Ammunition Plant, Karnack, Texas, May 2019

Dear Ms. Palmie,

One hard copy and one compact disc (CD) of the above-referenced document are being transmitted to you for your review. Review comments are requested by June 19, 2019.

The document was prepared by Bhate Environmental Associates, Inc., (Bhate) team, on behalf of the Army as part of Bhate's Performance Based Remediation contract for the facility. I ask that Kim Nemmers, 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 479-635-0110, or by email at rose.m.zeiler.civ@mail.mil.

Sincerely,

Rose M. Zeiler, Ph.D.
Longhorn AAP Site Manager

Copies furnished:
R. Mayer, USEPA Region 6, Dallas, TX (letter)
P. Bruckwicki, Caddo Lake NWR, TX (1 hard copy and 1 CD)
A. Williams, USACE, Tulsa District, OK (1 CD)
R. Smith, USACE, Tulsa District, OK (Electronic only)
A. Maly, USAEC, San Antonio, TX (1 CD)
K. Nemmers, Bhate, Lakewood, CO (1 CD)
P. Srivastav, APTIM, Houston, TX (letter)

Subject:	**Final Minutes, Monthly Managers' Meeting (MMM), Longhorn Army Ammunition Plant (LHAAP)**
Location of Meeting:	**Teleconference**
Date of Meeting:	**16 May 2019– 10:00 AM Central Standard Time (CDT)**

Attendees:

Army BRAC:	Rose Zeiler (RMZ)
EPA:	Rich Mayer (RM)
TCEQ:	April Palmie (AP)
USFWS:	Paul Bruckwicki (PB)
USACE:	Aaron Williams (AW)
USGS:	Kent Becher (KB)
Bhate:	Kim Nemmers (KN) and Mark Stapleton
APTIM:	Bill Foss (BF) and Praveen Srivastav (PS)

Action Items

Army: RMZ stated that the LHAAP-29 Proposed Plan (PP) transcript was sent to AP and RM, who did not make changes. AW stated that an email had been sent to HDR, Inc. (HDR) but no final PP transcript had been received. RMZ clarified that the PP transcript is placed on the website and the administrative record (AR) to which AW concurred. PS stated that it could be placed onto the website if received shortly and requested information about the timeframe. AW stated that he emailed HDR for a status.

Bhate/APTIM: PS stated that drillers are scheduled to mobilize to LHAAP-16 on 15 July 2019. Following completion of the monitoring wells, the baseline sampling of a subset of wells will be completed. PS stated that the sampling is expected to be completed the 3rd or 4th week in July 2019. PS indicated that the proposed baseline sampling list has not yet been prepared. RM clarified that a baseline sampling event had been completed previously. PS concurred that a baseline sampling event was completed in October 2018. RMZ clarified that Bhate would like to propose a list of wells that would be a subset of the monitoring wells to establish the baseline. PS responded that this was correct and that the list would include the new wells to be installed as well as a subset of the wells.

RMZ then asked about the status of the transformer. AW stated that the award to Ark-La-Tex is expected by the end of May 2019, and that transformer is expected to be operational by the end of June 2019. RMZ stated that a change in the LHAAP-16 flow regime is expected with the extraction system being shut-down. RM asked if there was a potentiometric map prepared recently with the system shut-down. KN stated that the extraction wells are still measured monthly but clarified that it was only a few of the wells. RMZ cautioned Bhate/APTIM on the effect the flow might have on the remedy performance evaluation. AP stated that the remedy was based upon the plant being back online and the baseline resampling should be conducted when the wells are pumping. PS stated that Bhate/APTIM will wait to conduct the baseline resampling until the system was online. PS also clarified that the design is set in the RD/RAWP and will not change even if groundwater regime has changed somewhat. RMZ concurred but wants to see the baseline analytical results to evaluate the effect on remedy performance. AP stated that the assumption was that the system would be running until the RA was in place, but now it is not operating and there have been large amounts of rainfall such that the baseline is not truly known. RMZ suggested that Bhate/APTIM and the team think about this further. AP suggested that Bhate/APTIM propose a path forward. KN asked if it was helpful to get water level measurements now while the system is down. RMZ

stated that this depends upon wells that Bhate/APTIM identifies as important since it is the performance criteria that is the concern. KN stated that she and PS will discuss offline.

Defense Environmental Restoration Program (DERP) Performance Based Remediation (PBR) Update

KN discussed that a significant increase was recently noted (past month or so) for the difference between the total flows recorded from the LHAAP-18/24 individual well heads compared to the influent and effluent readings at the groundwater treatment plant (GWTP). KN stated that an area was observed where ponding had not dissipated or was not typical. This area was excavated over the past two days. KN stated that the first thing that was found was electrical has been installed on top of the pipes and the line was hit, which tripped the breaker. KN stated that the leak was initially thought to be a "t" connection due to the location. However, KN stated that a leak was found in a small stretch (less than 2 feet) of piping that has separated. KN explained that finding someone to complete the thermoplastic welding has been difficult. KN stated that the wells currently shut-down due to the electrical line being hit are the ICT 14 wells, ICT 8 and 18WW17. Once the repair to the electrical is complete, KN stated that ICTs 14A, 14B and 14C and 18WW17 will remain down until the pipe is repaired. RM asked if 18WW17 was the one with high concentrations. RMZ concurred and asked about the timetable for repairs. KN stated she didn't know yet but that she would keep everyone updated.

KN asked everyone to refer to the Document and Issues Tracking Table dated May 16, 2019.

- **Task 1** (Project Management) -
  - KN stated that the April 2019 MMM Minutes were issued to the Regulators for review earlier in the week.
  - KN stated that the Restoration Advisory Board (RAB) Meeting Minutes would be issued this week.
- **Task 3** (LHAAP-03) – PS stated that RD/RAWP for LHAAP-03 is being prepared for submittal to the Regulators this week.
- **Task 4** (LHAAP-04) – PS stated that there are no current documents.
- **Task 5** (LHAAP-12) – PS stated that the 2018 Annual Remedial Action Operation (RA-O) Report is in the process of being shipped to the Regulators at the time of the meeting. PS stated that this report is the second document the Regulators will received for LHAAP this week.
- **Task 6** (LHAAP-16) – PS stated that no documents are currently in process for LHAAP-16.
- **Task 7** (LHAAP-17) – PS stated that no documents are currently in process for LHAAP-17.
- **Task 9** (LHAAP-37) – PS stated that LHAAP-37 is being sampled this month for the Year 2, Quarter 3. PS stated that the validated data should be available for the July 2019 MMM.
- **Task 10** (LHAAP-46) – PS stated that the Year 5 1st Semi-Annual sampling event was completed in February and that the 2nd Semi-Annual event is planned for August 2019.
- **Task 11** (LHAAP-50) – PS stated that sampling is being completed so the data should be available for the July 2019 meeting. PS stated that the Regulatory comments on the Explanation of Significant Difference (ESD) for a contingency remedy were received and that responses to the ESD comments are being prepared. PS also stated that the Remedial Design (RD)/Remedial Action Work Plan (RAWP) is being prepared for submittal to the Regulators in June 2019.
- **Task 12** (LHAAP-58) – KN stated that the validated analytical results from the sampling completed within the western plume at LHAAP-58 was included in the validated data for the call. KN stated the chlorinated volatile organic compounds (CVOCs) in monitoring well

(MW)-20 had reduced since the December 2018 quarterly sampling event. KN further explained that only MW-20 had detections of CVOCs that exceeded clean up levels. KN stated that the next sampling event is in June 2019 for both plume areas at LHAAP-58, which will be documented in the Year 5 RA-O Report.

- **Task 13** (LHAAP-67) – PS stated no documents are being prepared but that 2nd semi-annual Year 5 sampling was being performed this month. PS stated that validated data from the May 2019 event will be available for the July 2019 MMM.
- **Task 14** (LHAAP-001-R and –003-R) - KN stated that no documents are in process.
- **Task 16** (GWTP) **–** KN stated that the 4th Quarter GWTP Report and the 1st Quarter 2019 GWTP Report are in process between Bhate and the Army.
- **Task 17** (LHAAP-18/24) – No discussion.
- **Task 18** (Surface Water) – No discussion.
- **AR –** No discussion.

Update on other DERP Sites

- **LHAAP 18/24** – AW explained that the Final PP for LHAAP-18/24 is final and will be placed into the AR. AW stated that the ROD will be prepared for Regulator review in September 2019.
- **LHAAP-29** – AW stated that the LHAAP-29 ROD is currently under Regulatory review and that comments are due by 28 May 2019. RM stated he expected to have comments by 17 May 2019. AP stated that her comments would not be early but would be ready by the due date.
- **LHAAP-47** – AW stated that the Post-Screening Investigation (PSI) Report will be placed into the AR. RMZ asked about the resolution of the figures to which AW stated that HDR is working to get the figures improved. RM stated that some of the figures are also too small. AW stated that the Addendum to the PSI Report that will include the surface water sampling is planned for submittal after this month. AW stated that the ROD for LHAAP-47 is under review and that he is catching errors from the previous version.
- **Five Year Review (FYR)** – AP asked if someone could provide an overall email notification regarding the FYR to be able to respond to it following review. RMZ stated that she would send out an email regarding the transmittal of the FYR.

USFWS – PB explained that power was out at the USFWS from Friday until Tuesday afternoon. PS stated that there are numerous lines down within LHAAP. PB explained that lines are down from Avenue Q to the GWTP due to the storms that had heavy rain (5.5 inches last Wednesday) and high winds. PB asked about the lines being installed for LHAAP-17. BF stated that lines are planned to come from the entrance to LHAAP-17 to the existing system lines south of Avenue Q. PB stated that it will take a while for Ark-La-Tex to be able to get into these areas. KB stated that more rainfall is coming on Saturday.

KN asked about the oil and gas water well drilling impact discussion. PB stated that information is being reviewed internally and that he had not heard back. RMZ asked for this to be included as an action item on the Agendas going forward to keep tracking it. KN agreed to include in the agenda.

KN stated that Bhate is aware of the trees that have fallen and the electrical damage. KN stated that she is coordinating with AW for the transformer replacement to ensure that all the repairs are made ahead of the transformer being installed.

Schedule Next Managers' Meeting

The next MMM will be held on 20 June 2019 at 10:00 am CDT via conference call.

Call concluded at 10:45 am CDT.

ACRONYM LIST

AP	April Palmie
APTIM	APTIM Federal Services, LLC
AR	Administrative Record
AW	Aaron Williams
BF	Bill Foss
Bhate	Bhate Environmental Associates, Inc.
BRAC	Base Realignment and Closure
CDT	Central Daylight Time
CVOC	Chlorinated Volatile Organic Compound
DERP	Defense Environmental Restoration Program
EPA	United States Environmental Protection Agency
ESD	Explanation of Significant Differences
FYR	Five Year Review
GWTP	Ground Water Treatment Plant
HDR	HDR, Inc.
KB	Kent Becher
KN	Kim Nemmers
LHAAP	Longhorn Army Ammunition Plant
MMM	Monthly Managers' Meeting
PBR	Performance-Based Remediation
PP	Proposed Plan
PS	Praveen Srivastav
PSI	Post-Screening Investigation
RAB	Restoration Advisory Board
RA-O	remedial action – operation
RAWP	Remedial Action Work Plan
RD	Remedial Design
ROD	Record of Decision
RM	Rich Mayer
RMZ	Rose M. Zeiler
TCEQ	Texas Commission on Environmental Quality
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Service

LHAAP Validated Data Packages for May 2019 Monthly Managers Meeting

GWTP Effluent	*Weekly Perchlorate Sampling – April 2019* Perchlorate (6850)
GWTP Effluent	*Weekly, Bi-Weekly, and Monthly Sampling – April 2019* Ammonia (350.3) Ortho-Phosphate (365.3) Organic Carbon (415.1) VOC (8260C) Metals (6020A) Hexavalent Chromium (7196A) 1,4-Dioxane (8270D-SIM) Anions (9056)
GWTP Influent	*Monthly Sampling – April 2019* Metals (6020A) Perchlorate (6850) Hexavalent Chromium (7196A)
LHAAP-58	*West Plume Quarterly Performance Sampling Event– March 2019* Anions (9056) VOC (8260C) Total Organic Carbon (415.1) Metabolic Acids (HPLC-METACIDS) Dechlorinating Bacteria (CENSUS) Dissolved Gases (RSK-175)

GWTP Weekly/Effluent Perchlorate Sampling - April 2019

Location ID: Sample Date:	Units	Daily Maximum Conc	LH18/24-SP650_040419_BIX 4/4/19	LH18/24-SP650_041019_BIX 4/10/19	LH18/24-SP650_041019_BIX 4/10/19	LH18/24-SP650_041719_BIX 4/17/19
Location Description			**Collected from a spigot on the discharge of effluent TK-650.**			
			Weekly	Weekly	Monthly EFF	Weekly
Perchlorate (6850)						
Perchlorate	µg/L	589	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U

µg/L - micrograms per liter

U- Undetected: The analyte was analyzed for, but not detected and reported to the limit of detection.

BIX - before ion exchange

GWTP Weekly Sampling - April 2019

Location ID: Sample Date:	Units	Daily Maximum Conc	LH18/24-SP650_040419 4/4/19	LH18/24-SP650_041019 4/10/19	LH18/24-SP650_041719 4/17/19
Location Description			**GWTP–Collected from a spigot on the discharge of effluent TK-650. Sampled Weekly.**		
Ammonia as N (350.3)					
Ammonia as N	mg/L	NV	**17**	**15**	**17**
Ortho-Phosphate (365.3)					
Ortho-Phosphate	mg/L	NV	**3.63**	**3.92**	**4.37**
Organic Carbon (415.1)					
Total Organic Carbon (TOC)	mg/L	NV	**2.23**	**2.37**	**1.89**

mg/L - milligrams per liter

NV - No Value

GWTP Bi-Weekly Sampling - April 2019

Location ID: Sample Date:	Units	Daily Maximum Conc	LH18/24-SP650_040419 4/4/19	LH18/24-SP650_041719 4/17/19
Location Description			**GWTP – Collected from a spigot on the discharge of effluent TK-650. Sampled Biweekly.**	
Volatile Organic Compounds (8260C)				
1,1,1-Trichloroethane	µg/L	7,230	< 0.5 U	< 0.5 U
1,1,2-Trichloroethane	µg/L	216.9	< 0.5 U	< 0.5 U
1,1-Dichloroethane	µg/L	14,032	< 0.5 U	< 0.5 UJ
1,1-Dichloroethene	µg/L	253	< 0.5 U	< 0.5 U
1,2-Dichloroethane	µg/L	181	**0.58 J**	< 0.5 U
1,2-Dichloropropane	µg/L	5	< 0.5 U	< 0.5 U
Acetone	µg/L	2,395	< 1.0 U	< 1.0 U
Benzene	µg/L	181	< 0.5 U	< 0.5 UJ
Carbon tetrachloride	µg/L	181	< 0.5 UJ	< 0.5 U
Chlorobenzene	µg/L	47,180	< 0.5 U	< 0.5 UJ
Chloroform	µg/L	3,615	< 0.5 U	< 0.5 UJ
Ethylbenzene	µg/L	57,025	< 0.5 U	< 0.5 U
m,p-Xylene	µg/L	83.6	< 1.0 U	< 1.0 U
Methylene chloride	µg/L	1,699	< 1.0 U	< 1.0 UJ
o-Xylene	µg/L	83.6	< 0.5 U	< 0.5 U
Styrene	µg/L	5,987	< 0.5 U	**37 J**
Tetrachloroethene	µg/L	180.7	< 0.5 UJ	< 0.5 U
Toluene	µg/L	4,189	< 0.5 U	**1.8 J**
Trichloroethene	µg/L	181	**0.78 J**	< 0.5 U
Vinyl chloride	µg/L	72	< 0.5 U	< 0.5 U
Anions (9056)				
Chloride	mg/L	NV	**377 J**	**344**
Sulfate	mg/L	NV	**29.6**	**25.6**

µg/L - micrograms per liter

mg/L - milligrams per liter

U- Undetected: The analyte was analyzed for, but not detected and reported to the limit of detection.

NV - No Value

J - estimated value between the detection limit and limit of quantitation and/or due to quality contol issues

UJ - estimated non-detect due to quality control issues

GWTP Monthly Effluent Sampling - April 2019

Location ID: / Sample Date:	Units	Daily Maximum Conc	LH18/24-SP650_041019 4/10/19
Location Description			GWTP – Collected from a spigot on the discharge of effluent TK-650. Sampled monthly
Volatile Organic Compounds (8260C)			
1,1,1-Trichloroethane	µg/L	7,230	< 0.5 U
1,1,2-Trichloroethane	µg/L	216.9	< 0.5 U
1,1-Dichloroethane	µg/L	14,032	< 0.5 U
1,1-Dichloroethene	µg/L	253	< 0.5 U
1,2-Dichloroethane	µg/L	181	**0.67 J**
1,2-Dichloropropane	µg/L	5	< 0.5 U
Acetone	µg/L	2,395	< 1.0 U
Benzene	µg/L	181	< 0.5 U
Carbon tetrachloride	µg/L	181	< 0.5 UJ
Chlorobenzene	µg/L	47,180	< 0.5 U
Chloroform	µg/L	3,615	< 0.5 U
Ethylbenzene	µg/L	57,025	< 0.5 U
m,p-Xylene	µg/L	83.6	< 1.0 U
Methylene chloride	µg/L	1,699	< 1.0 U
o-Xylene	µg/L	83.6	< 0.5 U
Styrene	µg/L	5,987	< 0.5 U
Tetrachloroethene	µg/L	180.7	< 0.5 UJ
Toluene	µg/L	4,189	< 0.5 U
Trichloroethene	µg/L	181	**0.82 J**
Vinyl chloride	µg/L	72	< 0.5 U
Metals (6020A)			
Barium	mg/L	2	**0.154**
Lead	mg/L	0.0046	< 0.00100 U
Selenium	mg/L	0.012	< 0.00250 U
Silver	mg/L	0.003	< 0.000500 U
Hexavalent Chromium (7196A)			
Hexavalent Chromium	mg/L	0.1244	< 0.0100 U
Semi-Volatile Organic Compounds (8270D SIM)			
1,4-Dioxane	µg/L	134.2	**7.9**

µg/L - micrograms per liter

mg/L - milligrams per liter

U- Undetected: The analyte was analyzed for, but not detected and reported to the limit of detection.

J - estimated value between the detection limit and limit of quantitation and/or due to quality contol issues

UJ - estimated non-detect due to quality control issues

GWTP Monthly Influent Sampling - April 2019

Location ID: Sample Date:	Units	LH18/24-SP140_041019 4/10/19
Location Description		**GWTP – Collected from a spigot on the influent to TK-140. Sampled Monthly.**
Metals (6020A)		
Selenium	mg/L	< 0.00250 U
Silver	mg/L	< 0.000500 U
Hexavalent Chromium (7196A)		
Hexavalent Chromium	mg/L	< 0.0100 U
Perchlorate (6850)		
Perchlorate	µg/L	**5,600**

mg/L - milligrams per liter

µg/L - micrograms per liter

U- Undetected: The analyte was analyzed for, but not detected and reported to the limit of detection.

LHAAP-58 Remedial Action Operation Validated Data - March 2019

Location ID: / Sample Date:	Units	MCL/MSC	35AWW06_031919 03/19/19	35AWW06_031919_a 03/19/19	35AWW11_031919 03/19/19	35AWW19_031919 03/19/19	35AWW20_031919 03/19/19	35AWW24_031919 03/19/19	LHSMW07_031919 03/19/19
Location Description			Site 58 - SW, outside site boundary.	Site 58 - SW, outside site boundary. Duplicate	Site 58 - SE, inside site boundary.	Site 58 - S, outside site boundary.	Site 58 - SW, inside site boundary.	Downgradient Western Plume well	Site 58 - SW, outside site boundary.
Location Depth			Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow
Lab Package			HS19031013						
Total Organic Carbon (415.1/SM5310C)									
Total Organic Carbon	mg/L	NV	**407**	**386**	**485**	**2.20**	**12**	**1.68 J**	**4.11**
Volatile Organic Compounds (8260C)									
1,1,1,2-Tetrachloroethane	µg/L	110	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 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 UJ	< 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	< 0.5 U	< 0.5 U
1,1,2-Trichloroethane	µg/L	5	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	**38 J**	< 0.5 U	< 0.5 U
1,1-Dichloroethane	µg/L	10000	< 0.5 U	< 0.5 U	< 0.5 U	**0.97 J**	**190**	< 0.5 U	**15**
1,1-Dichloroethene	µg/L	7	< 0.5 U	**1.4**	< 0.5 U	**3.6**	**1,500**	**0.81 J**	< 0.5 U
1,1-Dichloropropene	µg/L	2.9	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U
1,2,3-Trichlorobenzene	µg/L	310	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U
1,2,3-Trichloropropane	µg/L	0.041	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
1,2,4-Trichlorobenzene	µg/L	70	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U
1,2,4-Trimethylbenzene	µg/L	5100	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U
1,2-Dibromo-3-chloropropane	µg/L	0.2	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
1,2-Dibromoethane	µg/L	0.05	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U
1,2-Dichlorobenzene	µg/L	600	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	**7.6 J**	< 0.5 U	< 0.5 U
1,2-Dichloroethane	µg/L	5	< 0.5 U	< 0.5 U	< 0.5 U	**1.5**	**14 J**	< 0.5 U	**0.95 J**
1,2-Dichloropropane	µg/L	5	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U
1,3,5-Trimethylbenzene	µg/L	5100	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U
1,3-Dichlorobenzene	µg/L	3100	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U
1,3-Dichloropropane	µg/L	29	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U
1,4-Dichlorobenzene	µg/L	75	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U
2,2-Dichloropropane	µg/L	42	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U
2-Butanone	µg/L	61000	**62**	**59**	**240**	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
2-Chlorotoluene	µg/L	2000	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U
2-Hexanone	µg/L	6100	**6.6**	**5.9**	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
4-Chlorotoluene	µg/L	2000	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U
4-Isopropyltoluene	µg/L	10000	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U
4-Methyl-2-pentanone	µg/L	8200	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Acetone	µg/L	92000	**250**	**240**	**260**	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U
Benzene	µg/L	5	< 0.5 UJ	< 0.5 UJ	< 0.5 UJ	< 0.5 UJ	**3.0 J**	< 0.5 UJ	< 0.5 UJ
Bromobenzene	µg/L	2000	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U
Bromochloromethane	µg/L	4100	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U
Bromodichloromethane	µg/L	4.6	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 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	< 0.5 U	< 0.5 U
Bromomethane	µg/L	140	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U
Carbon disulfide	µg/L	10000	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ	< 1.0 U	< 1.0 U
Carbon tetrachloride	µg/L	5	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U
Chlorobenzene	µg/L	100	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U
Chloroethane	µg/L	41000	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Chloroform	µg/L	1000	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U
Chloromethane	µg/L	220	< 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	< 0.5 U	< 0.5 U	**49 J**	< 0.5 U	< 0.5 U
cis-1,3-Dichloropropene	µg/L	5.3	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U
Dibromochloromethane	µg/L	34	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U
Dibromomethane	µg/L	380	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U
Dichlorodifluoromethane	µg/L	20000	< 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 UJ	< 0.5 U	< 0.5 U
Hexachlorobutadiene	µg/L	20	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ	< 1.0 U	< 1.0 U
Isopropylbenzene	µg/L	10000	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U
m,p-Xylene	µg/L	10000	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ	< 1.0 U	< 1.0 U
Methylene chloride	µg/L	5	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U
n-Butylbenzene	µg/L	4100	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U
n-Propylbenzene	µg/L	4100	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U
Naphthalene	µg/L	2000	< 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	10000	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U
sec-Butylbenzene	µg/L	4100	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U
Styrene	µg/L	100	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 0.5 U	< 0.5 U
tert-Butylbenzene	µg/L	4100	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 UJ	< 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
Toluene	µg/L	1000	< 0.5 UJ	< 0.5 UJ	< 0.5 UJ	< 0.5 UJ	< 0.5 UJ	< 0.5 UJ	< 0.5 UJ
trans-1,2-Dichloroethene	µg/L	100	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	**4.9 J**	< 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 UJ	< 0.5 U	< 0.5 U
Trichloroethene	µg/L	5	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	**180**	< 0.5 U	**1.1**
Trichlorofluoromethane	µg/L	31000	< 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	**54 J**	< 0.5 U	< 0.5 U
Volatile Fatty Acids (HPLC-METACIDS)									
Acetic Acid	mg/L	NV	**250**	**230**	**180**	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U
Butyric Acid	mg/L	NV	**61**	**56**	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Lactic Acid	mg/L	NV	< 2.5 U	< 2.5 U	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Propionic Acid	mg/L	51	**320**	**310**	**620**	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Pyruvic Acid	mg/L	NV	< 0.25 UJ	< 0.25 UJ	< 0.50 UJ	< 0.10 UJ	< 0.10 UJ	< 0.10 UJ	< 0.10 UJ
Anions (9056A)									
Chloride	mg/L	NV	**919**	**900**	**2,150**	**1,140**	**1,090**	**115**	**1,980**
Nitrate	mg/L	10	< 0.500 U	< 0.500 U	< 0.500 U	< 0.500 U	< 0.500 U	< 0.100 U	< 0.500 U
Sulfate	mg/L	NV	**2.33 J**	**2.13 J**	**172**	**994**	**1,120**	**70**	**2,390**
Dissolved Gases (RSK-175)									
Carbon Dioxide	µg/L	NV	**720,000**	**670,000**	**940,000**	**790,000**	**890,000**	**680,000**	**440,000**
Ethane	µg/L	NV	< 0.47 U	< 0.47 U	< 0.47 U	< 0.47 U	< 0.47 UJ	< 0.47 U	**0.52 J**
Ethene	µg/L	NV	< 0.55 U	< 0.55 U	< 0.55 U	< 0.55 U	**0.94 J**	< 0.55 U	**25**
Methane	µg/L	NV	**3,100**	**2,900**	**450**	**1.3 J**	**840 J**	**7.8**	**270**
Dechlorinating Bacteria									
BAV1 Vinyl Chloride Reductase	cells/mL	NV	< 0.80 U	NA	< 0.90 U	< 0.50 U	< 1.50 U	< 0.80 U	**2.5**
Dehalobacter spp.	cells/mL	NV	**21200**	NA	**818000**	**91.5**	**14000**	< 8.30 U	**61400**
Dehalococoides	cells/mL	NV	**12.3**	NA	**231**	< 0.50 U	< 1.50 U	< 0.80 U	**10000**
tceA Reductase	cells/mL	NV	< 0.80 U	NA	< 0.90 U	< 0.50 U	< 1.50 U	< 0.80 U	< 1.40 U
Vinyl Chloride Reductase	cells/mL	NV	**0.20 J**	NA	**42.2**	< 0.50 U	< 1.50 U	< 0.80 U	**4840**

Blue Highlighting Indicates concentrations above the MCL/MSC

MCL/MSC - Maximum Contaminant Limit/Medium-Specific Concentrations

NA - Not Analyzed

µg/L - micrograms per liter

mg/L - milligrams per liter

J - Estimated: Between the method detection limit and reporting limit and/or due to discrepancies in meeting certain analyte-specific quality control criteria.

UJ - The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.

U - Undetected: The analyte was analyzed for, but not detected.

NV - No Value