DEPARTMENT OF THE ARMY
LONGHORN ARMY AMMUNITION PLANT
POST OFFICE BOX 220
RATCLIFF, AR 72951

September 13, 2019

DAIM-ODB-LO

Mr. Rich Mayer
U.S. Environmental Protection Agency, Region 6
1201 Elm Street, Suite 500
Dallas, TX 75270-2102

Re: Final Signature Page for the Explanation of Significant Differences, Record of Decision for Contingency Remedy at LHAAP-50, Former Sump Water Tank
Longhorn Army Ammunition Plant, July 2019

Dear Mr. Mayer,

Please find attached two replacement signature pages signed by the Army and EPA, and one electronic copy (compact disc) of the Final Explanation of Significant Differences for LHAAP-50, Former Sump Water Tank for your records.

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 (letter)
P. Bruckwicki, Caddo Lake NWR, TX (1 hard copy and 1 CD)
A. Williams, USACE, Tulsa District, OK (1 CD)
A. Sherman, USAEC, San Antonio, TX (1 CD)
K. Nemmers, Bhate, Lakewood, CO (1 hard copy and 1 CD for project files)
P. Srivastav, APTIM, Houston, TX

DEPARTMENT OF THE ARMY
LONGHORN ARMY AMMUNITION PLANT
POST OFFICE BOX 220
RATCLIFF, AR 72951

September 13, 2019

DAIM-ODB-LO

Ms. April Palmie
Texas Commission on Environmental Quality (TCEQ)
Superfund Section, MC-136
12100 Park 35 Circle, Bldg D
Austin, TX 78753

Re: Final Signature Page for the Explanation of Significant Differences, Record of Decision for Contingency Remedy at LHAAP-50, Former Sump Water Tank
Longhorn Army Ammunition Plant, July 2019

Dear Ms. Palmie,

Please find attached one replacement signature page signed by the Army and EPA, and one electronic copy (compact disc) of the Final Explanation of Significant Differences for LHAAP-50, Former Sump Water Tank for your records.

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 (letter only):
R. Mayer, USEPA, Region 6, Dallas, TX
P. Bruckwicki, Caddo Lake NWR, TX
A. Williams, USACE, Tulsa District, OK
A. Sherman, USAEC, San Antonio, TX
K. Nemmers, Bhate, Lakewood, CO (for project files)
P. Srivastav, APTIM, Houston, TX

FINAL
EXPLANATION OF SIGNIFICANT DIFFERENCES
RECORD OF DECISION FOR
CONTINGENCY REMEDY AT LHAAP-50
FORMER SUMP WATER TANK
LONGHORN ARMY AMMUNITION PLANT

July 2019

Contract Number: W9128F-13-D-0012
Task Order Number: W912BV17F0150

Performance-Based Remediation
Longhorn Army Ammunition Plant
Karnack, Texas

Prepared For:

Longhorn Army Ammunition Plant
Karnack, Texas

Under Contract To:

U.S. Army Corps of Engineers
Tulsa District
Tulsa, Oklahoma

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TABLE OF CONTENTS

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ACRONYMS AND ABBREVIATIONS

µg/kg	micrograms per kilogram
µg/L	micrograms per liter
AECOM	AECOM Technical Services, Inc.
APTIM	Aptim Federal Services, LLC
ARAR	applicable or relevant and appropriate requirement
AST	aboveground storage tank
BRAC	Base Realignment and Closure
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
C.F.R.	Code of Federal Regulations
COC	chemical of concern
DCA	dichloroethane
DCE	dichloroethene
EPA	see USEPA
ESD	Explanation of Significant Differences
GWP-Ind	soil MSC for industrial use based on groundwater protection
GW-Res	groundwater MSC for residential use
ISB	in situ bioremediation
Jacobs	Jacobs Engineering Group, Inc.
LHAAP	Longhorn Army Ammunition Plant
LTM	long-term monitoring
LUC	land use control
MCL	maximum contaminant level
MNA	monitored natural attenuation
MSC	medium-specific concentration
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
O&M	operations and maintenance
PCE	tetrachloroethene
PCL	protective concentration level
RAO	remedial action objective
RCRA	Resource Conservation and Recovery Act
RD	remedial design
ROD	Record of Decision
SDC-9™	APTIM's dechlorinating culture
Shaw	Shaw Environmental, Inc.
TCE	trichloroethene
TCEQ	Texas Commission on Environmental Quality
TNRCC	Texas Natural Resources Conservation Commission
TRRP	Texas Risk Reduction Program
U.S. Army	U.S. Department of the Army
U.S.C.	United States Code
USEPA	U.S. Environmental Protection Agency
VOC	volatile organic compound

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1 INTRODUCTION AND STATEMENT OF PURPOSE

Site and Location: LHAAP-50 is in the north-central section of Longhorn Army Ammunition Plant (LHAAP) and covers approximately 1 acre.

Lead Agency and Supporting Agency:
Lead Agency – U.S. Department of the Army (U.S. Army)
Lead Oversight Agency – U.S. Environmental Protection Agency (USEPA) Region 6
Support Agency – Texas Commission on Environmental Quality (TCEQ)

This Explanation of Significant Differences (ESD) is in compliance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) §117 (c), 42 United States Code (U.S.C.) Section (§) 9617 (c) and National Oil and Hazardous Substances Pollution Contingency Plan (NCP) 40 Code of Federal Regulations (C.F.R.) §300.435(c)(2)(i).

Date of Record of Decision (ROD) Signature: September 2010, Administrative Record, Bate Stamp 00098892-00098976.

Need for ESD: The September 2010 ROD (Shaw, 2010), Section 1.4, specified the implementation of monitored natural attenuation (MNA) for the volatile organic compounds (VOCs) and perchlorate plume to verify that the plumes are stable, and that natural attenuation is occurring. The ROD also specified that performance objectives will be evaluated after two years of monitoring MNA and if MNA is found to be ineffective, a contingency remedy to enhance MNA will be implemented and documented in an ESD.

The 3rd Annual Remedial Action Operation Report for LHAAP-50 (APTIM, 2018) evaluated the performance of MNA for the VOCs and perchlorate plume. The report presented evidence of plume migration, increasing concentrations of perchlorate and trichloroethene (TCE), and geochemical conditions that are not optimal for MNA and recommended that an in situ bioremediation (ISB) contingency remedy be implemented at this time to enhance MNA.

The purpose of this ESD is to document the significant change from the ROD selected remedy of MNA and the proposed implementation of the ISB contingency remedy to enhance MNA. The ISB contingency remedy is consistent with the ROD requirement to enhance MNA, and is capable of degrading perchlorate and TCE to address the increased concentrations detected.

This ESD will become part of the Administrative Record file in accordance with NCP 40 CFR §300.825(a)(2). The file will be located at the Marshall Public Library:

Marshall Public Library
300 South Alamo Blvd.
Marshall, Texas 75670
Phone: 903 935 4465

Hours:
Monday, Tuesday, and Thursday 9:30 am to 7:30 pm
Wednesday and Friday 9:30 am to 5:30 pm
Saturday 9:30 am to 3:30 pm

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2 SITE HISTORY, CONTAMINATION, AND SELECTED REMEDY

2.1 SITE HISTORY AND CONTAMINATION

LHAAP-50, Former Sump Water Tank, contained a 47,000-gallon capacity aboveground storage tank (AST) which received industrial wastewater from various industrial waste production sumps throughout LHAAP between 1955 and 1988. After the solids were filtered, the storage tank contents were discharged into Goose Prairie Creek upstream of the Goose Prairie Creek bridge on South Crockett Avenue, south of 51st Street. The flow in the creek was sufficient to dilute the water to safe levels (Jacobs, 2002). If natural flow in the creek was considered insufficient, clean water was reportedly pumped into the creek to dilute the contents. The AST is no longer present.

The chemicals of concern (COCs) identified in the LHAAP-50 ROD include dissolved phase perchlorate and VOCs including tetrachloroethene (PCE), TCE, 1,1-dichloroethene (1,1-DCE), 1,2-dichloroethane (1,2-DCA), cis-1,2-dichloroethene (cis-1,2-DCE), and vinyl chloride in groundwater, and perchlorate in soil. There are no COCs in other environmental media at the site. The presence of these COCs at concentrations exceeding the human health cleanup levels in the soil and groundwater represented the primary driver for remedial action, as there were no ecological risks at the site.

Approximately 183 cubic yards of perchlorate-contaminated soil was removed and disposed offsite in September 2013 as described in the Final Remedial Action Completion Report (AECOM, 2016). An area of groundwater contamination is present in the shallow groundwater (upper and lower zones) that poses an unacceptable carcinogenic risk and non-carcinogenic hazard to a future maintenance worker under an industrial exposure scenario. There is no groundwater contamination in the intermediate groundwater zone.

The cleanup levels are the maximum contaminant level (MCL) for the VOCs and the Texas Risk Reduction Program (TRRP) protective concentration level (PCL) for residential use for perchlorate (USEPA, 2014). Concentrations of perchlorate, TCE, 1,1-DCE, and 1,2-DCA have been detected above the cleanup levels. The maximum concentration of perchlorate was detected in the eastern portion of the plume at 91,000 micrograms per liter (µg/L) in May 2018 above the Texas Residential Groundwater PCL. The maximum concentration of TCE as of May 2018 was detected at 620 µg/L in the central part of the plume; 1,1-DCE concentrations were below the MCL as of May 2018; an isolated detection of 1,2-DCA was observed at 83 µg/L as of May 2018.

A Federal Facility Agreement became effective December 30, 1991, among USEPA, the U.S. Army, and the Texas Natural Resources Conservation Commission (TNRCC), now the TCEQ. LHAAP-50 has been added to the list of National Priorities List sites at LHAAP with concurrence from the U.S. Army and USEPA Headquarters.

2.2 SELECTED REMEDY

The selected remedy identified as Alternative 2 in Section 2.12.2 of the ROD for LHAAP-50 includes soil removal, MNA and land use controls (LUCs). This alternative was selected because it was consistent with the intended future use of the site as a wildlife refuge. The alternative also satisfied the remedial action objectives (RAOs) for the site through LUC groundwater restriction, which would ensure protection of human health by preventing human exposure to contaminated groundwater. MNA, and a contingency remedy to enhance MNA, if MNA is found to be ineffective, would return the contaminated water to its potential beneficial use, wherever practicable. Furthermore, long-term monitoring (LTM) would assure that human health and the environment are being protected by verifying that contaminated groundwater does not migrate into nearby surface water bodies at levels that exceed MCLs. This alternative offered a high degree of long-term effectiveness that could be easily implemented at a lower cost than other alternatives.

The following language is taken from Section 2.12.2, Description of the Selected Remedy, of the ROD (Shaw, 2010):

- Excavation of the contaminated soil and disposal in a Resource Conservation and Recovery Act (RCRA)-permitted landfill will remove soil that is considered to be a contaminant source to groundwater, thereby, protecting groundwater. The estimated volume of soil to be removed is 150 cubic yards and is based on the conservative TCEQ soil medium-specific concentration (MSC) for industrial use based on groundwater protection (GWP-Ind) of 7,200 micrograms per kilogram (µg/kg) for perchlorate in soil. The removal of soil contamination will be verified by collecting confirmation samples from the walls and floors of the excavation area and submitting them for laboratory analysis for perchlorate.
- Semi-annual performance monitoring of Goose Prairie Creek adjacent to the LHAAP-50 will be conducted at two locations after excavation of the contaminated perchlorate pathway. Evaluation of this data will be included in the annual reports. The frequency and locations of sampling may be modified after evaluation of data. If perchlorate levels in the creek are consistently above the groundwater MSC for residential use (GW-Res) after two years of monitoring, then additional evaluation will be conducted, and any proposed actions will be included in the annual evaluation report to be submitted after Year 2. The need to continue creek sampling will be evaluated during the five-year reviews.
- *MNA to return groundwater to its potential beneficial use, wherever practicable.* Historic data suggest that natural attenuation of COCs is occurring at the site; however, additional data collection is necessary to fully evaluate natural attenuation. Monitoring wells will be sampled for eight consecutive quarters to evaluate and confirm the occurrence of natural attenuation in conjunction with historical data. Data from the eight quarterly events will be combined with historic data to evaluate the effectiveness of various natural physical, chemical, and biological processes in reducing contaminant concentrations.

- *Performance objectives to evaluate the MNA remedy performance after two years.* Each of the general performance objectives must be met as indicated below. If the criteria are not met to illustrate that MNA is an effective remedy, a contingency action would be initiated. If MNA is effective, a baseline will be established from the data to this point in time. Specific evaluation criteria will be developed in the Remedial Design (RD). The MNA evaluation will be based on the USEPA lines of evidence (USEPA, 1999) and the anaerobic screening (USEPA, 1998) as follows:
  - MNA potential based on evaluating biodegradation screening scores using USEPA guidance.
  - Plume stability (i.e., the plume concentrations are decreasing in the majority of performance wells, and the plume is not expanding in area as demonstrated with compliance wells).
  - MNA Process Evaluation demonstrated based on an attenuation rate calculated with empirical performance monitoring data, and MNA Process Demonstration based on the presence of daughter products and bacterial culture counts.
- *A contingency remedy to enhance MNA to reach the RAO if MNA is found to be ineffective*. The contingency remedy will use elements from other active remedial alternatives included in this ROD to address the ineffective aspects of MNA. The area and the elements of the contingency remedy would be selected based on the entire data set available. If a contingency remedy is implemented, it will be documented in an ESD.
- *Initiate LTM*. If MNA is determined to be effective, monitoring will be conducted to evaluate the remedy performance and determine if the plume conditions remain constant, improve or worsen after the baseline is established. Monitoring will continue after the initial eight quarters at a frequency of semiannual for three years, then annually until the next five-year review. The performance monitoring plan will be developed in the RD and will be based on USEPA guidance (USEPA, 2004).
- *Continue LTM* every five years to evaluate remedy performance and determine if plume conditions remain constant, improve, or worsen. The baseline of the plume for future five-year reviews will be established as part of the MNA evaluation program. The initial LTM plan will be developed during RD.
- LUC to restrict access to the contaminated groundwater to environmental monitoring and testing only until cleanup levels are reached. LUC implementation details will be included in the RD. The recordation notification for the site to be filed with Harrison County will include a description of the LUC. The boundary of the LUC will encompass the site boundaries and the plume boundaries.

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3 BASIS FOR THE DOCUMENT

The September 2010 ROD (Shaw, 2010), Section 2.12.2, contingency remedy component states that if a contingency remedy is implemented, it will be documented in an ESD. The 3rd Annual Remedial Action Operation Report for LHAAP-50 (APTIM, 2018) presented data that indicated geochemical conditions were not optimal for MNA. The 3rd Annual Remedial Action Operation Report for LHAAP-50 documented that MNA was found to be ineffective through several lines of evidence (APTIM, 2018). The TCE groundwater plume has expanded beyond its baseline footprint and now extends to 50WW12, the current downgradient monitoring well within the plume. At 50WW12, TCE concentrations increased from 0.5 µg/L in October 2013 to 79 µg/L in May 2018 while perchlorate concentrations increased from 23,600 µg/L in October 2013 to 91,000 µg/L in May 2018 suggesting continued migration within the current plume boundary. Though the perchlorate plume was relatively stable, a decreasing trend was observed only at one well (APTIM, 2018). The U.S. Army, USEPA, and TCEQ agree that MNA is currently not effective and that the contingency remedy should be implemented at this time (APTIM, 2018).

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4 DESCRIPTION OF SIGNIFICANT DIFFERENCES

As stated in Section 2.9.1 of the ROD, the groundwater remedy includes Excavation, MNA and LUC. The ROD states that a contingency remedy to enhance MNA will be implemented to reach the RAOs, if MNA is found to be ineffective, and will be documented in an ESD. The contingency remedy selected in this ESD to enhance MNA is ISB.

Change to Remedy Scope Presented in the ROD:

The only change to the remedy proposed in the ROD is the implementation of the contingency remedy (ISB) to enhance MNA. After three years of MNA performance monitoring, MNA was found to be ineffective (APTIM, 2018). The contingency remedy will consist of injection of emulsified vegetable oil, a microbial culture (SDC-9™), and nutrients to enhance the MNA remedy in an approximately 6,000 square foot area near monitoring wells 50WW12 and 50WW13. Upon implementation of the contingency remedy (ISB), two years of quarterly performance monitoring will be conducted. ISB will be the contingency remedy implemented for the impacted groundwater.

ROD Performance Objectives for the Groundwater Remedy, Section 2.12.2 Description of the Selected Remedy, paragraph 2:

> The MNA evaluation will be based on the USEPA lines of evidence (USEPA, 1999) and the anaerobic screening (USEPA, 1998) as follows:
>
> - MNA potential based on evaluating biodegradation screening scores using USEPA guidance.
> - Plume stability (i.e., the plume concentrations are decreasing in the majority of performance wells, and the plume is not expanding in area as demonstrated with compliance wells).
> - MNA Process Evaluation demonstrated based on an attenuation rate calculated with empirical performance monitoring data and MNA Process Demonstration based on the presence of daughter products and bacterial culture counts.

Change to Performance Objectives:

No change to the performance objectives in the ROD is proposed. MNA is not currently meeting the performance objectives. The 3rd Annual Remedial Action Operation Report for LHAAP-50 (APTIM, 2018) presented evidence of plume migration, increasing COC trends and geochemical conditions that are not optimal for MNA. The contingency remedy (ISB) will enhance MNA and performance objectives will be re-evaluated after two years of quarterly monitoring.

ROD Implementability Determination, Section 2.10.6, Implementability, paragraph 2:

> Alternative 2 (MNA) is easily implemented from a technical standpoint with minimal construction activities followed by long-term sampling, maintenance and enforcement of the LUC.

Change to Implementability:

The contingency remedy (ISB) would be somewhat more difficult to implement due to the specialized expertise required for design and construction. However, ISB is effective in creating conditions conducive to reductive dechlorination and reducing VOC and perchlorate concentrations.

ROD Protection of Human Health and the Environment, Section 2.13.1, Protection of Human Health and the Environment, paragraph 1:

> The selected remedy, Alternative 2, will protect human health and the environment, and achieve the RAOs for LHAAP-50. Although this alternative does not provide for human intervention to remediate groundwater, the alternative is a passive subsurface remedial action conducted by natural processes and mechanisms. The contaminated groundwater will be reduced to protective applicable or relevant and appropriate requirement (ARAR) levels, and the soil above protective ARAR levels will be removed. LUC would prevent human exposure to the contaminated groundwater by prohibiting the construction of potable wells within the LUC boundaries. Surface water monitoring of the creek will verify that the soil removal effectively mitigated the soil-to-groundwater pathway.

Change to Protection of Human Health and the Environment:

Currently, based on the 3rd Annual Remedial Action Operation Report for LHAAP-50 (APTIM, 2018), there is evidence of plume migration, increasing COC trends and geochemical conditions that are not optimal for MNA. The implementation of the contingency remedy (ISB) will enhance MNA and reduce groundwater contaminant concentrations which will prevent contaminated groundwater from migrating into nearby surface water at levels that may present an unacceptable risk to human health and the environment. Monitoring activities associated with the enhanced MNA would assure the protection of human health and the environment by documenting the return of the groundwater to its potential beneficial use as a drinking water supply, and by documenting reduction of the contaminant mass and protection of surface water through containment of the plume.

ROD Cost Estimate for the Selected Remedy, Section 2.12.3, paragraphs 1 and 2:

> Table 2-8 in the ROD (Shaw, 2010) presents the present worth analysis of the cost for the selected remedy, Alternative 2. The information in this table is based on the best available information regarding the anticipated scope of the remedial alternative. The quantities used in the estimate are for estimating purposes only. Changes in the cost estimates are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative. Major changes may be documented in the form of a memorandum in the Administrative Record, an ESD, or a ROD amendment. This is an order of magnitude engineering cost estimate that is expected to be within -30 to +50 percent of the actual project cost.

The total project present worth cost of this alternative is approximately $639,000, using a discount rate of 2.8%. The capital cost is estimated at $215,000. The total operations and maintenance (O&M) present value cost is estimated at approximately $424,000. The O&M cost includes evaluation of MNA, maintenance of LUC, and LTM through Year 30. The LTM would support the required CERCLA five-year reviews.

Change to Cost Estimate for the Selected Remedy:

The implementation of the contingency remedy (ISB) for Alternative 2 will increase the overall costs associated with this remedial alternative. This increase in cost is due to the capital cost associated with the use of ISB technology to enhance MNA.

It is estimated that implementation of the contingency remedy (ISB) associated with Alternative 3 will increase the original estimate for this alternative by approximately $280,000.

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5 SUPPORT AGENCY COMMENTS

The USEPA and TCEQ have reviewed this ESD and support the changes to the selected remedy.

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6 STATUTORY DETERMINATION

The modification presented herein satisfies CERCLA §121, 42 U.S.C. §9621. The contingency remedy (ISB) will enhance MNA and reduce groundwater contaminant concentrations.

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7 PUBLIC PARTICIPATION

A notice summarizing the ESD shall be published in the Marshall News Messenger upon finalization of the ESD. This ESD and all supporting ESD documentation will be made a part of the Administrative Record file in accordance with the NCP at 40 C.F.R. §300.825(a)(2). The Administrative Record will be located at the repository identified in Section 1.0 of this document. All public participation requirements set out in NCP at 40 C.F.R. §300.435(c)(2)(i) have been met.

The Proposed Plan for Remedial Action at the site was released for public comments on 25 January 2010. The Proposed Plan identified the preferred alternative to be Alternative 2:

- Excavation and off-site disposal of perchlorate contaminated soil
- MNA of groundwater and LUCs
- A contingency remedy to enhance MNA, if MNA is found to be ineffective

The U.S. Army reviewed all written and oral comments submitted during the public comment period. There were no significant comments captured related to the groundwater remedy.

Authorizing Signature:

Thomas C Lederle

Date: 6 Aug 2019

Thomas E. Lederle
Chief, ACSIM BRAC Division
U.S. Department of the Army

Authorizing Signature:
I have reviewed this document, and any comments I had have been addressed and/or incorporated:

Wren Stenger

Date: 8/29/19

Wren Stenger
Director
Superfund Division
U.S. Environmental Protection Agency, Region 6

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8 REFERENCES

AECOM Technical Services, Inc. (AECOM), 2016, Final Remedial Action Report, LHAAP-50, Former Sump Water Tank, Longhorn Army Ammunition Plant, Karnack, Texas. June.

Aptim Federal Services, LLC (APTIM), 2018, *Draft Final 3rd Annual Remedial Action Operation Report, LHAAP-50 Shops Former Sump Water Tank, Longhorn Army Ammunition Plant, Karnack, Texas.* July.

Jacobs Engineering Group, Inc. (Jacobs), 2002, Final Remedial Investigation Report for the Group 4 Sites, Sites 35A, 35B, 35C, 46, 47, 48, 50, 60, 67, and Goose Prairie Creek, Longhorn Army Ammunition Plant, Karnack, Texas, Oak Ridge, TN, January (RI).

Shaw Environmental, Inc. (Shaw), 2010, *Final Record of Decision LHAAP-50, Former Sump Water Tank, Longhorn Army Ammunition Plant, Karnack, Texas.* July.

U.S. Environmental Protection Agency (USEPA), 1998, *Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Ground Water, EPA/600/R-98/128,* September.

USEPA, 1999, *Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites*, Directive 9200.4-17P, April.

USEPA, 2004, *Performance Monitoring of MNA Remedies for VOCs in Ground Water*, EPA/600/R-04/027, April.

USEPA, 2014, Transmittal of Final Dispute Decision, Letter dated October 31, 2014, from Gina McCarthy, USEPA Administrator, to John McHugh, Secretary of the Army, and Bryan Shaw, Chairman of TCEQ. Longhorn Army Ammunition Plant, Karnack, Texas, Administrative Record, Volume 4, 2014, 00192717-00192750.

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