Comments on the *Final Proposed Plan for LHAAP-04*
Former Pilot Wastewater Treatment Plant
***Longhorn Army Ammunition Plant, Karnack, Texas*, December 2012**

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These comments are submitted on behalf of the Caddo Lake Institute. They are based on an evaluation of the *Final Proposed Plan for LHAAP-04, Former Pilot Wastewater Treatment Plant, Longhorn Army Ammunition Plant, Karnack, Texas* [1], as well as supporting documents (see references).

Site history and setting

LHAAP-04 is a 1/2 acre[2] site in the northwest portion of the Longhorn Army Ammunition Plant (LHAAP). It was the site of a wastewater treatment plant. The plant treated wastewater trucked in from sumps throughout LHAAP[3]. It began operating in 1984 and most of it was demolished in 1997[4]. A portion of a concrete slab (approximately 40 ft. x 80 ft.) that supported storage tanks and other components of the plant was left in place[5].

The site drains to Goose Prairie Creek[6], which discharges to Caddo Lake approximately 1.5 miles northeast of the site. The site is underlain by sands, silts, and clays[7]. Depth to groundwater ranges from about five feet to about 15 feet below land surface[8]. Groundwater flow directions appear to vary, sometimes flowing to the southwest[9], and other times flowing radially from the site, to the southwest, south, and southeast[10].

A currently used water well, the fire station well, is about 400 feet southeast of the site[11].

Soil and groundwater contamination

The soil at LHAAP-04 was contaminated with mercury and perchlorate[12]. In 2009, the Army excavated 3406 cubic yards of contaminated soil. The soil was sent to a landfill[13]. However, due to infiltration of groundwater, cleanup confirmation samples could not be collected from some portions of the excavation. The Army has stated that contaminated soil probably remains beneath some portions of the excavation[14].

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[1] AECOM, 2012a
[2] US Army Corps of Engineers, 2009, page 2-1.
[3] US Army Corps of Engineers, 2009, pages 1-1 and 2-1.
[4] US Army Corps of Engineers, 2009, page 2-1.
[5] US Army Corps of Engineers, 2009, page 2-1 and figure 2-2.
[6] US Army Corps of Engineers, 2009, page 2-2.
[7] US Army Corps of Engineers, 2009, figure 2-5.
[8] US Army Corps of Engineers, 2009, figure 2-5.
[9] US Army Corps of Engineers, 2009, figure 2-3.
[10] Shaw, 2012, figure 1-4.
[11] EPA, 2012, comment 7.
[12] Shaw 2011, page 1-3.
[13] Shaw 2011, pages 2-2, 2-4, and 2-5.
[14] Shaw 2011, pages 2-5 and 2-8; and Shaw 2012, page 1-6.

Seven monitor wells have been installed in the vicinity of LHAAP-04, although only one has been installed on the site itself[15]. The on-site well, 04WW04, contains high concentrations of perchlorate[16]. Well 04WW04 does not appear to have been analyzed for contaminants other than perchlorate[17].

A sample was collected from the fire station well in 2002. Perchlorate was not detected[18].

Proposed cleanup plan

The Army evaluated five cleanup alternatives:[19]

1. No action. Cost: $0.
2. Monitored natural attenuation (MNA) with land use controls (LUCs). Cost: $565,000.
3. In-situ bioremediation with LUCs. Cost: $638,000.
4. Extraction and treatment with LUCs. Cost: $730,000.
5. Interceptor collection trenches, extraction and treatment, with MNA and LUCs. Cost: $783,000.

The Army chose alternative 3; in-situ bioremediation with LUCs[20]. Under this alternative, bacteria and/or bacterial nutrients would be injected into the contaminated groundwater[21]. If it works as intended, the bacteria will consume (biodegrade) the perchlorate. The LUCs would prohibit residential use of the site, and the use of groundwater for potable purposes[22]. LUCs would be maintained until contaminant concentrations were reduced to acceptable levels[23]. The Army estimates that cleanup and monitoring activities would last eight years[24].

The Army would install three additional monitor wells, two in the shallow zone and one in the intermediate zone[25]. The fire station well would also be monitored[26].

[15] Shaw, 2012, figure 2-1. Well installed August 18, 2010 (Shaw, 2012, appendix A).
[16] Concentrations ranged from 1580 µg/L to 5410 µ/L between September 2010 and February 2011 (Shaw, 2012, appendix A, table A-1).
[17] Shaw, 2012, appendix A, table A-1.
[18] Shaw 2012, page 1-4
[19] AECOM, 2012a, pages 7 and 8.
[20] AECOM, 2012a, page 10.
[21] Shaw, 2012, pages 5-6 and 5-7.
[22] AECOM, 2012a, page 6.
[23] AECOM, 2012a, page 6.
[24] AECOM, 2012a, pages 7 and 8.
[25] Shaw, 2012a, page 5-5.
[26] AECOM, 2012a, page 7.

Comments and Recommendations

In general, the cleanup plan proposed by the Army is reasonable. However, it has some deficiencies, as described below.

Extent of groundwater contamination

The only monitor well at the site, well 04WW04, contains high concentrations of perchlorate[27]. This well is only 18 feet deep[28]. A single well is insufficient. Both the lateral and vertical extent of groundwater contamination are unknown.

Recommendation: The three additional monitor wells the Army plans to install will better define the extent of contamination. However, they may not be sufficient. The Army should be prepared to install more monitor wells if needed to determine the full extent of contamination

Groundwater contaminants

Samples from well 04WW04 do not appear to have been analyzed for contaminants other than perchlorate[29]. Other groundwater contaminants may be present.

Recommendation: The Army should sample all monitor wells and the fire station well for all contaminants that might reasonably be expected to occur at the site. In addition to perchlorate, this would include volatile organic compounds (VOCs) (e.g., methylene chloride, TCE), explosives (e.g., TNT, DNT), and metals (e.g., arsenic, thallium). If contaminants are found that are not amenable to restoration under the proposed plan (e.g., metals), the Army should modify the plan to ensure that all the contaminants will be cleaned up.

Residual soil contamination

The Army has stated that contaminated soil probably remains beneath some portions of the site[30].

Recommendation: The Army should either perform an assessment to determine whether the contaminated soil is likely to be a source of groundwater contamination, or explain why such an assessment is not necessary.

Concrete slab

The Army does not appear to have investigated the soil or groundwater beneath the concrete slab.

Recommendation: The Army should either perform an investigation, or explain why it is not necessary.

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[27] Well 04WW04. Concentrations ranged from 1580 µg/L to 5410 µ/L between September 2010 and February 2011 (Shaw, 2012, appendix A, table A-1).
[28] Shaw, 2012, appendix A, completion diagram for well 04WW04.
[29] Shaw, 2012, appendix A, table A-1.
[30] Shaw 2011, pages 2-5 and 2-8; and Shaw 2012, page 1-6.

Perchlorate cleanup standard

The Army's cleanup standard for perchlorate in groundwater is the same as the State of Texas' standard for industrial use (GWP-Ind): 72 µg/L[31]. However, the EPA has decided to regulate perchlorate under the Safe Drinking Water Act and has established an Interim Drinking Water Health Advisory of 15 µg/L[32]. The EPA and the Army are currently discussing this issue[33].

Recommendation: Pending the outcome of discussions with the EPA, the Army should assume that the perchlorate cleanup level will be 15 µg/L, and plan accordingly.

Note - the purpose of excavating the perchlorate contaminated soils was to protect the underlying groundwater[34]. A more stringent perchlorate groundwater standard may mean that the cleanup standard for soils will also have to be more stringent.

Surface water modeling

The Army has concluded that contaminated groundwater will not adversely affect surface water in Goose Prairie Creek[35]. This conclusion is based on modeling performed in 2007[36]. However, in its proposed plan for LHAAP-47, the Army stated that the uncertainties associated with the model were unacceptable, and it would not be used to assess the effect of groundwater contaminants on Goose Prairie Creek[37].

Recommendation: The Army should explain why it is using the model at LHAAP-04 but not at LHAAP-47

References

AECOM, 2012a, *Final Proposed Plan for LHAAP-04, Former Pilot Wastewater Treatment Plant, Longhorn Army Ammunition Plant, Karnack, Texas*, December 2012.

AECOM, 2012b, *Draft Final Proposed Plan for LHAAP-47 Plant 3 Area, Solid Rocket Motor Fuel Production Longhorn Army Ammunition Plant, Karnack, Texas*, December 2012.

EPA (U.S. Environmental Protection Agency), 2012, *Comments on Draft Final Feasibility Study for Groundwater, LHAAP-04, Former Pilot Wastewater Treatment Plant (published November 2011), Longhorn Army Ammunition Plant, Karnack, Texas, January/February 2012*, May 2012 (attached to Shaw, 2012).

EPA, 2012b, *Technical Fact Sheet – Perchlorate*, EPA 505-F-11-003, May 2012.

[31] AECOM, 2012a, page 6; and Shaw 2012, table 3-2.
[32] EPA, 2012, page 3.
[33] Inside EPA, 2012.
[34] Shaw, 2011, table 1-1.
[35] AECOM, 2012a, page 6.
[36] Shaw, 2007 (AECOM, 2012a, page 6).
[37] AECOM, 2012b, page 5.

Inside EPA, 2012, *EPA, Army Fight At Texas Site Tests 'Applicable' Perchlorate Cleanup Levels*, posted on website http://insideepa.com, December 12, 2012.

Shaw, 2007 (Shaw Environmental, Inc.), *Final Modeling Report, Derivation of Soil and Groundwater Concentrations Protective of Surface Water and Sediment, Longhorn Army Ammunition Plant, Karnack, Texas*, February 2007.

Shaw, 2011, Final Completion Report, Non-Time-Critical Removal Action at LHAAP-04, Former Pilot Wastewater Treatment Plant, Group 4, Longhorn Army Ammunition Plant, August, 2011.

Shaw, 2012, *Final Feasibility Study for Groundwater, LHAAP-04, Former Pilot Wastewater Treatment Plant, Longhorn Army Ammunition Plant, Karnack, Texas*, August 2012.

US Army Corps of Engineers, 2009, *Final Engineering Evaluation and Cost Analysis, Former Pilot Wastewater Treatment Plant, Group 4, Longhorn Army Ammunition Plant, Karnack, Texas*, March, 2009.