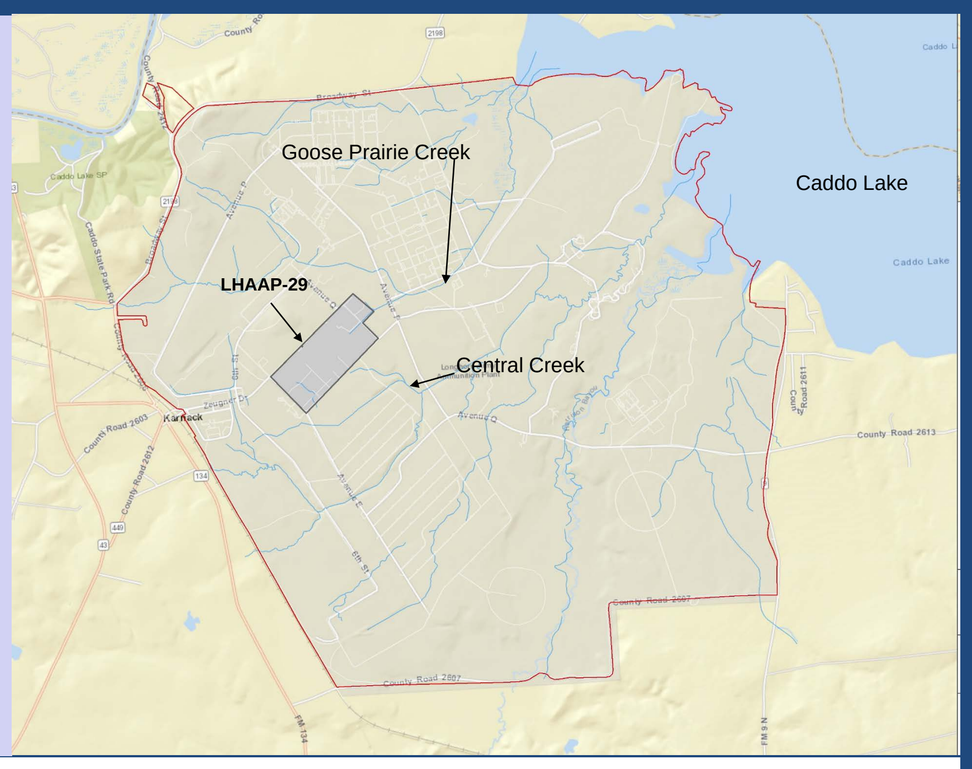
LHAAP-29, Former TNT Production Area

PREFERRED REMEDY: Excavation and Offsite Disposal of Soil, Flushing and Plugging of Process Lines, In Situ Thermal Desorption for Intermediate Groundwater, Monitored Natural Attenuation for Shallow Groundwater, and Land Use Controls

Site History

LHAAP-29, known as the former trinitrotoluene (TNT) Production Area, is located in the west-central portion of LHAAP and covers approximately 85 acres. The site was used as a TNT manufacturing facility from October 1942 to August 1945. The facility produced approximately 400 million pounds of flake TNT during its operation using six TNT production lines. From 1959 to the mid-1970s, the site was used for "soak out" or solvent bath of out-of-specification rocket motors using a methylene chloride-based industrial solvent. After a Proposed Plan was completed a supplementary investigation was conducted to refine the extent of groundwater contamination and additional remedial alternatives were evaluated in a Feasibility Study Addendum. The Proposed Plan was revised and the preferred remedy identified as Excavation and Offsite Disposal of Soil, Flushing and Plugging of Process lines, In Situ Thermal Desorption (ISTD) for Intermediate Groundwater, Monitored Natural Attenuation (MNA) for Shallow Groundwater, and implementation of Land Use Controls (LUCs).



Site Characteristics

The surface features at LHAAP-29 include the foundations for the former production facilities and the underground pipelines that were originally built for cooling water drainage and TNT wastewater conveyance. The site is currently heavily wooded. Surface runoff is collected by ditches constructed in 1942 when the production facility was built. Surface runoff from the northern part of the site (about 40 percent of the site) enters Goose Prairie Creek located approximately 1,500 feet to the north and east of the site. Surface water runoff in the southern portion of the site (about 60 percent of the site) flows into a tributary of Central Creek located near the south-east portion of the site. Eventually, runoff from the two creeks enters Caddo Lake. The lake is a source of drinking water for several neighboring communities in Louisiana.

Human Health Risk Assessment

The Baseline Human Health Risk Assessment (BHHRA) was conducted for LHAAP-29 to determine current and future effects of contaminants on human health. Based on the BHHRA, it was concluded that chemicals in soil pose an unacceptable non-cancer hazard for a hypothetical future maintenance worker under an industrial scenario. The groundwater was also determined to pose an unacceptable cancer risk and an unacceptable non-cancer hazard to a hypothetical future maintenance worker. The risk and HI values are based on the industrial exposure scenario that includes drinking the water or using the water for hand washing or showering.

Ecological Risk Assessment

A baseline ecological risk assessment (BERA) was performed for the industrial area including LHAAP-29. Although there were no unacceptable hazards within the greater industrial area, elevated concentrations of nitrotoluenes (2,4-DNT, 2,6-DNT, and 2,4,6-TNT) and dioxin were identified at one location at LHAAP-29. Detected concentrations of these chemicals in soil in this 'hot spot' exceeded the Industrial Sub-Area ecological preliminary remediation goal and are targeted for excavation.

Chemicals of Concern

- In the soil, chemicals of concern (COCs) are explosives (2,4,6-trinitrotoluene [TNT], 2,4-dinitrotoluene [DNT], 2,6-DNT) and perchlorate; and chemicals of potential ecological concern (COPECs) are explosives (2,4,6-TNT, 2,4-DNT, 2,6-DNT).
- In the shallow groundwater zone, the COCs are perchlorate, volatile organic compounds (VOCs) (1,2-dichloroethane [DCA], trichloroethene [TCE], and TCE daughter products cis-1,2-dichloroethene (DCE), trans-1,2-DCE, and vinyl chloride [VC]), explosives 2,4-DNT, 2,6-DNT, 2-nitrotoluene (NT), 3-NT, and 4-NT, and metals arsenic, mercury, and nickel.
- In the intermediate groundwater zone, the COCs are methylene chloride (MC), TCE, 1,2-DCA, 1,1-DCE, TCE daughter products (cis-1,2-DCE, trans-1,2-DCE, VC), and arsenic.
- In the transite TNT wastewater line, solid residue COCs are 1,3-dinitrobenzene (DNB), 2,4,6-TNT, 2,4-DNT, 2-amino-4,6-DNT and 4-amino-2,6-DNT.
- In the vitrified clay cooling water line, solid residue COCs are 2,4,6-TNT, 2,4-DNT, 2,6-DNT, 2-amino-4,6-DNT and 4-amino-2,6-DNT.

Remedial Action Objectives (RAOs)

- Protection of human health by preventing human exposure to the contaminants in the soil, sediment, transite TNT wastewater line, vitrified clay cooling water lines, and groundwater.
- Protection of human health and the environment by preventing the migration of contaminants to groundwater and surface water from potential sources in the soil, sediment, and process lines (TNT transite wastewater and vitrified clay cooling water lines).
- Protection of human health and the environment by preventing contaminated groundwater from migrating into nearby surface water.
- Protection of ecological receptors by preventing exposure to contaminated soil and sediment.
- Return groundwater to its beneficial uses, wherever practicable, within a timeframe that is reasonable given the particular circumstances of the site.

Remedial Alternatives

Alternative 1 – No Action Alternative – Estimated Cost $0.
Alternative 2 - Excavation and Off-site Disposal for Soil; Flush and Plug Lines; In Situ Chemical Oxidation, MNA and LUCs for Intermediate Zone Groundwater, and MNA and LUCs for Shallow Zone Groundwater – Estimated Cost $9,140,000.
Alternative 3 - Excavation and Off-site Disposal of Soil; Flush and Plug Lines; Intermediate Zone Groundwater Extraction and Treatment, MNA and LUCs for Intermediate and Shallow Zone Groundwater – Estimated Cost - $3,330,000.
Alternative 4 - Excavation and Off-site Disposal for Soil; Flush and Plug Lines; ISTD, MNA and LUCs for Intermediate Zone Groundwater; MNA and LUCs for Shallow Zone Groundwater – Estimated Cost Alternative 4a $4,740,000, Alternative 4b $5,720,000.

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Remedial Alternatives (continued)

The alternatives were evaluated based on effectiveness, implementability, and cost. The No Action alternative provides a comparative baseline, but does not meet the objectives. Alternatives 2, 3, and 4 would remove the contaminated soil and residue in lines and provide access and use restrictions for residual contamination. Alternatives 2, 3, and 4 would also rely on LUCs to prevent access to shallow and intermediate groundwater until cleanup levels are achieved by MNA. Only Alternative 4 is expected to provide effective treatment of the primary COC, methylene chloride, in the intermediate zone. Alternative 4 is expected to achieve the methylene chloride cleanup within 5-10 years for MNA following the ISTD treatment in the intermediate zone. Alternative 4a or 4b will be selected during the remedial design.

Description of the Preferred Remedy:

Soil Excavation:

The excavation will remove soil contaminated with explosives and perchlorate for off-site disposal that is a direct risk to the hypothetical future maintenance worker, is a potential source of contaminant migration to groundwater, and poses a risk to ecological receptors.

Flush, Plug and Abandon Transite Wastewater and Vitrified Clay Cooling Water Lines:

The lines will be flushed with water, inspected, and the inlets and outlets will be abandoned by plugging with a bentonite slurry. The rinsate will be tested following Toxic Characteristics Leaching Procedures to determine the proper disposal method.

Shallow Zone Groundwater:

Shallow groundwater will be addressed by MNA to confirm that the contaminated groundwater remains localized with minimal migration and that contaminant concentrations are being reduced to cleanup levels. Shallow groundwater zone MNA is estimated to take 70 years.

Intermediate Zone Groundwater:

One of two ISTD process options will be selected to treat the intermediate zone groundwater where methylene chloride dense non-aqueous phase liquid (DNAPL) is inferred. One of two process options, Electrical Resistance Heating (ERH - Alternative 4a) or Thermal Conductance Heating (TCH - Alternative 4b) will be selected during the remedial design phase. The remaining contamination will be addressed through MNA following the ISTD treatment. Intermediate zone groundwater MNA is estimated to take 5-10 years.

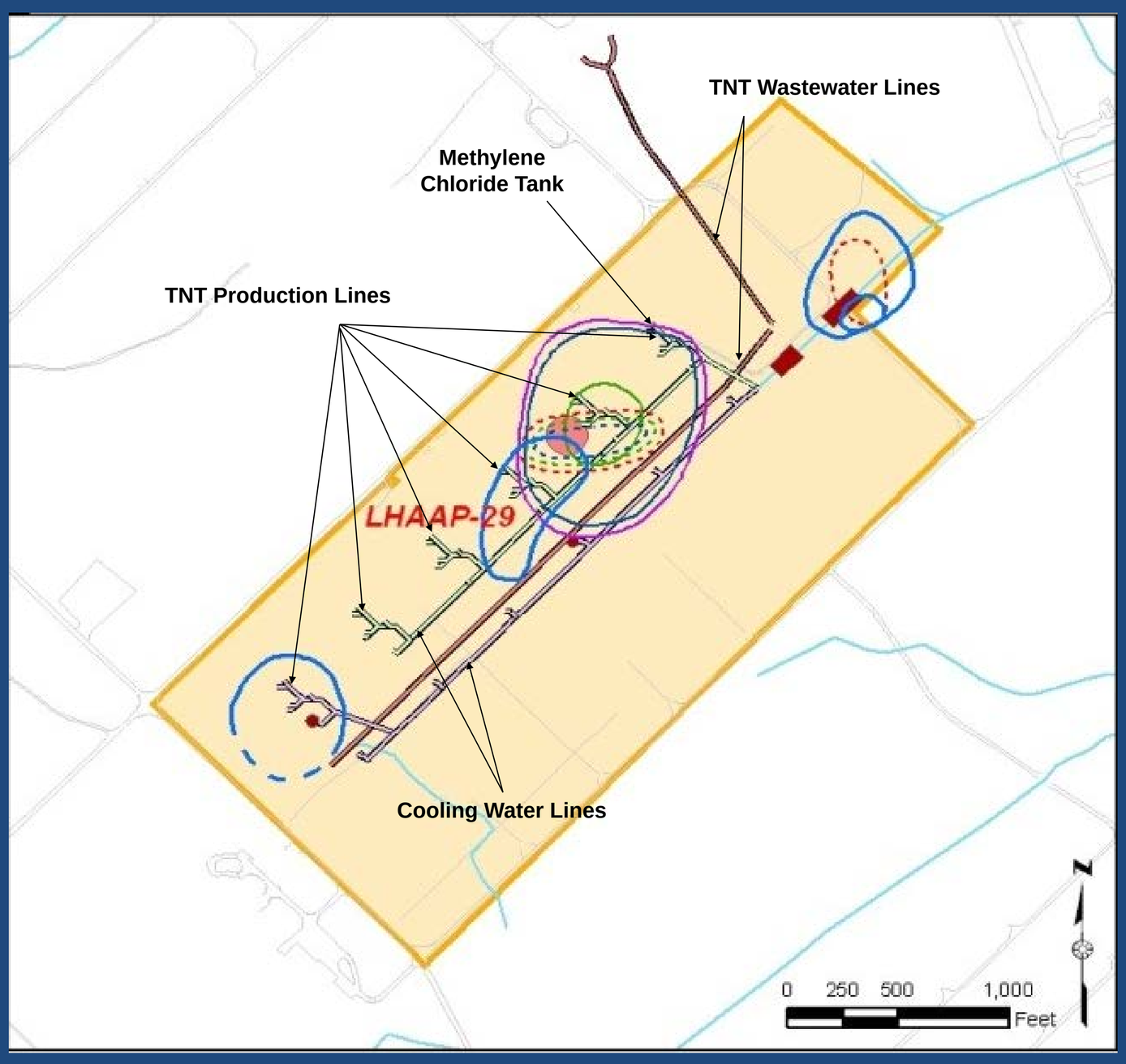
Long-term Monitoring (LTM):

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.

Implementation of LUCs:

- LUC to restrict land use to non-residential use until it is demonstrated that the COCs in soil and groundwater are at levels that allow for unlimited use and unrestricted exposure.
- LUC prohibiting potable use of groundwater above cleanup levels until it is demonstrated that the COCs are at levels that allow for unlimited use and unrestricted exposure.
- LUC to maintain the remedial and monitoring systems associated with the groundwater remedies until these components of the remedy are no longer needed to achieve cleanup levels, and cleanup levels have been achieved.

CERCLA Five Year Reviews until the levels of COCs in soil and groundwater allow for unlimited use and unrestricted exposure.



LHAAP-29 Soil and Groundwater Contamination