

LHAAP – 29, Former TNT Production Area

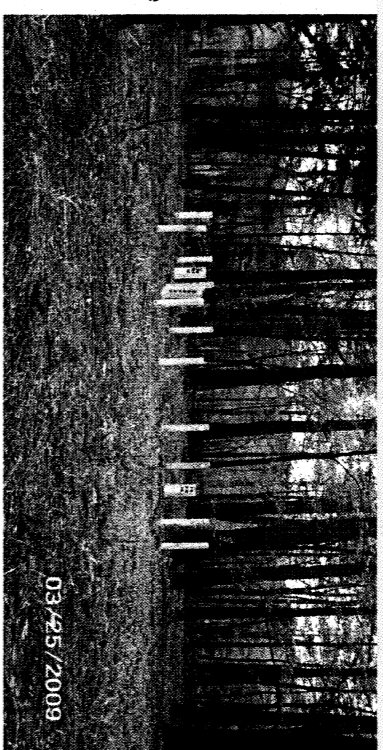
PROPOSED REMEDY: Soil Excavation, Plugging and Abandoning Process Lines, MNA and Insitu Chemical Oxidation

Site History

LHAAP-29, known as the former TNT Production Area is a heavily wooded 85 acre site located in the western central portion of the LHAAP installation. The production facilities at LHAAP-29 manufactured TNT from October 1942 to August 1945. The site previously contained one standby and five regular TNT production lines. The facility produced approximately 400 million pounds of flake TNT during its operation. Since the end of World War II, the only activity to have occurred is the "soak out" of out of specification rocket motors from 1959 to mid 1970s and involved the use of Turco®, a methylene chloride (MC) based industrial solvent. Explosive compound releases resulting from the manufacturing process of TNT, including releases from process tanks and process pipelines, are the suspected contamination sources at LHAAP-29.

Site Characteristics

Surface run off from the northern part of the site (about 40 percent of the site area) enters Goose Prairie Creek located approximately 1500 feet to the north and east of the site. In the southern portion of the site (about 60 percent of the site area), surface run off flows into a tributary of Central Creek located near the southeast portion of the site. The runoff from LHAAP-29 eventually enters Caddo Lake via these two creeks. There are three groundwater zones at LHAAP-29. The depth of the shallow groundwater zone generally ranges from 17 to 45 feet below ground surface (bgs). The depth of the intermediate zone has been measured to approximately 88 feet bgs. The predominant flow of groundwater in the shallow and intermediate zone is generally to the east/southeast in the shallow zone and east/northeast for the intermediate zone with seasonal variations.



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 soil poses an unacceptable non-cancer hazard under an industrial scenario whereas groundwater poses an unacceptable cancer risk and non-cancer hazard to a hypothetical future maintenance worker under an industrial scenario.

Ecological Risk Assessment

The Baseline Ecological Risk Assessment (BERA) was conducted for LHAAP-29 to evaluate potential hazards to ecological resources. Ecological hazards were found to be acceptable at LHAAP-29; however, elevated concentrations of explosives found at one location at the site posed a threat to small range ecological receptors. Explosives (2,4,6-TNT, 2,4-DNT and 2,6-DNT) in the soil at LHAAP-29 are considered contaminants of potential ecological concern and pose a risk to ecological receptors due to direct contact and indirect (i.e., dietary) exposure routes.

Chemicals of Concern

Between 1984 and 2008 numerous investigations were conducted in a phased approach to determine the nature and extent of contamination at LHAAP-29. Media investigated included soil, sediment, surface water, and groundwater. The chemicals of concern (COCs) in soil include three explosives (2,4,6-TNT, 2,4-DNT and 2,6-DNT) and perchlorate. The COCs in the shallow groundwater zone are perchlorate, explosives (2,4-DNT, 2,6-DNT, 2-nitrotoluene, 3-nitrotoluene, and 4-nitrotoluene), 1,2-dichloroethane (1,2-DCA), 1,1-DCA, trichloroethene (TCE) and its daughter products (1,2-dichloroethene [1,2-DCE] and vinyl chloride [VC]), arsenic, mercury, and nickel. The COCs reported in the intermediate groundwater zone are methylene chloride (MC), 1,2-DCA, TCE and its daughter products, and arsenic. No contamination was reported in the deep zone. Explosives in the process pipelines that have been detected above the groundwater medium-specific concentration for industrial use include explosives (2,4,6-TNT, 2,4-DNT, 2,6-DNT, 2-amino-4,6-DNT, and 4-amino-2,6-DNT).

Remedial Action Objectives

The RAOs for LHAAP-17, which address contamination associated with the media at the site and take into account the future uses of LHAAP streams, land, and groundwater are:

- Protection of human health by preventing human exposure to the contaminants in the soil, sediment, transite TNT wastewater line, 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 soil, sediment, and process lines (TNT wastewater and cooling water)
- Protection of human health and environment by preventing contaminated groundwater from migrating into nearby surface water
- Protection of ecological receptors by preventing exposure to the contaminated soil and sediment, and
- Return of groundwater to its potential beneficial uses as drinking water, wherever practicable

Remedial Alternatives

Alternative 1: No Action - Estimated Cost \$0

Alternative 2: Excavation and Offsite Disposal of Soil; Plug Lines; Insitu Chemical Oxidation, MNA and LUCs for Intermediate Zone

Groundwater - Estimated Cost \$3,028,000

Alternative 3: Excavation and Offsite Disposal of Soil; Plug Lines; Intermediate Zone Groundwater Extraction, MNA and LUCs for Groundwater- Estimated Cost \$2,918,000

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 and 3 will provide actions to limit exposure to contaminated groundwater through the use of LUCs until contamination is reduced to cleanup levels. The LUCs will prevent human exposure to residual groundwater and ensure no withdrawal or use of groundwater beneath the site for anything other than environmental monitoring and testing. Alternatives 2 and 3 would reduce groundwater contamination to cleanup levels through treatment (insitu chemical oxidation or exsitu treatment), MNA (passive remedial action that relies on natural biological, chemical, and physical processes), and excavation of contaminated soil above cleanup levels.

Proposed Remedy: Alternative 2

Alternative 2 is the recommended remedial alternative for LHAAP-29 and is consistent with the intended future use of the site as a national wildlife refuge. The proposed remedy involves excavation of contaminated soil above cleanup levels, plugging and abandonment of process lines, insitu chemical oxidation followed by MNA for intermediate groundwater, and MNA for shallow groundwater. Following the reduction in concentrations by insitu chemical oxidation, natural attenuation will further reduce concentrations of COCs in intermediate groundwater. Based on preliminary natural attenuation evaluation, groundwater cleanup levels in the shallow zone are expected to be met in 70 years and in the intermediate zone are expected to be met in 90 years. Alternative 2 will satisfy the RAOs through groundwater use restriction LUCs, which restrict use to only environmental monitoring and testing, and thus, ensure the protection of human health by preventing human exposure to the groundwater until the proposed remedy reduces the contamination to cleanup levels.

