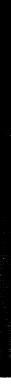


FACT SHEET – Investigation and Risk Assessment Summary LHAAP – 47 Plant 3 Area

March 2011

Site History: LHAAP-47 covers approximately 275 acres and is located in the north-central portion of LHAAP. Rocket motors were produced from 1954 to the early 1980s. The rocket motor production facilities were converted to produce pyrotechnic and illumination devices; this operation continued until 1997. Industrial solid wastes and possibly hazardous wastes such as parts cleaners and spent solvents may have been generated by these activities.

Site Characteristics: LHAAP-47 is a mixture of asphalt paved roads, parking areas, building foundation remnants, old buildings, and areas overgrown with grass and trees. The topography in this area is relatively flat with the surface drainage flowing into tributaries of Goose Prairie Creek, which discharges into Caddo Lake. The groundwater at LHAAP-47 is divided into three zones: shallow, intermediate and deep. The shallow and intermediate groundwater zones are interconnected over much of the site and several wells have been designated as shallow/intermediate wells. In some areas they are separated by a clay layer, whereas in other areas no clay layer is present. The wells in the shallow zone range from 12.5 to 35.5 feet below ground surface (bgs); wells designated as shallow/intermediate range from 25 to 51.7 feet bgs; wells in the intermediate zone range from 42 to 64.5 feet bgs; wells in the deep zone range from 83 to 95 feet bgs. The groundwater flow direction is to the northeast.



Summary of Investigation Activities: Investigations were conducted by several contractors and US Army Corp of Engineers from 1984 through 2010. Based on the findings of each investigation, more sampling was performed to further evaluate the nature and extent of contamination in the soil, sediment, surface water and groundwater. Each investigation was approved by TCEQ and USEPA. Samples have been analyzed for metals, cyanide, volatile organic compounds (VOCs), semi-volatile organic compounds, explosives, anions, pesticides/PCBs, metals and/or dioxins and furans. Between 2000 and 2002, additional samples were collected for the analysis of perchlorate in both the soil and groundwater. Surface water samples were also collected from Goose Prairie Creek for perchlorate analysis to check for potential perchlorate migration to Goose Prairie Creek. In summary, more than 700 soil/sediment samples have been collected from depths ranging from the surface to 10 feet bgs to evaluate and delineate soil and sediment contamination. The shallow and intermediate zones are interconnected over a wide area and the two groundwater zones have been treated as one combined groundwater zone called the shallow/intermediate zone. Several monitoring wells were installed in the groundwater zones (48 shallow wells, 10 shallow/intermediate wells, 6 intermediate wells, and 3 deep wells) and more than 350 groundwater samples were collected to evaluate the extent of groundwater contamination. Several areas have higher TCE concentrations within the TCE plume, including 13,300 µg/l at monitoring well 47WW25 and 6,240 µg/l at monitoring well LHSMW43, both near buildings where rocket solvents were used. The highest perchlorate concentrations (56,600 µg/l) are found in monitoring well LHSMW60 near two buildings where rocket engines were tested. Investigations were performed in August 2010 to better define the nature and extent of contamination to support the development of alternatives for the Feasibility Study.

Investigation Findings: Samples collected from the investigation activities reported soil and groundwater contamination at LHAAP-47. The surface water samples collected from Goose Prairie Creek for perchlorate analysis have consistently been below TCEQ surface water contact recreation level and the groundwater medium specific concentration for residential use. The sample results were compared to both federal and state standards. A Baseline Human Health Risk Assessment (BHHR) and Ecological Screening Evaluation was conducted in 2002 to evaluate risk to the hypothetical future maintenance worker and screen data to further assess if an ecological risk assessment was needed. Based on the ecological screening data, it was concluded that an ecological risk assessment was needed. A Baseline Ecological Risk Assessment (BERA) was conducted in 2007.

Human Health Risk Assessment: The Baseline Human Health Risk Assessment (BHHR) was conducted for LHAAP-47 to determine current and future effects of contaminants on human health. Based on the BHHR, it was concluded that soil does not pose any unacceptable cancer or non-cancer risk whereas the groundwater poses an unacceptable cancer risk and non-cancer hazard to a hypothetical future maintenance worker.

Ecological Risk Assessment: A Baseline Ecological Risk Assessment (BERA) was conducted for LHAAP-47 to evaluate potential hazards to ecological resources. Ecological hazards were found to be within acceptable limits at LHAAP-47.

Chemicals of Potential Concern (COPCs):

Soil: Based on the BHHR and evaluation of data collected since the BHHR, it was determined that soil at LHAAP-47 did not pose an unacceptable risk to human or ecological receptors. Though the risk assessment identified no risk from soil, an emerging contaminant perchlorate was detected in soil at elevated levels which could be acting as a potential source for groundwater contamination. As part of an interim action in November 1999, a plastic liner material was placed over the soil contaminated with perchlorate to prevent migration of perchlorate into Goose Prairie Creek.

Groundwater: The COPCs identified in the BHHR that contribute to a risk or hazard to the hypothetical future maintenance worker in groundwater at LHAAP-47 are perchlorate, trichloroethene (TCE), tetrachloroethene (PCE), vinyl chloride (VC), 1,1-dichloroethene (1,1-DCE), chloroform, 1,2-dichloroethane (1,2-DCA), cis-1,2-dichloroethene (cis-1,2-DCE), acetone, pentachlorophenol, bis(2-ethylhexyl)phthalate, 2,4,6-trinitrofluorene (2,4,6-TNT), thallium, cadmium, nickel, silver, tin, antimony, manganese, aluminum, strontium, vanadium, cobalt and chromium. The COPCs that are found to be widespread across LHAAP-47 include perchlorate, TCE, VC, 1,1-DCE, cis-1,2-DCE, and PCE and the extent as of August 2010 is indicated in the figure. The remaining COPCs have localized occurrence and are not widespread.

General Response Actions to be Evaluated:

The following general response actions that were evaluated in the Feasibility Study:

- **No Action:** Provides a comparative baseline against which other alternatives can be evaluated.
- **Land Use Controls:** Establish access/administrative/physical controls that would eliminate/reduce access to the site.
- **Removal:** Remove contaminated media or waste material to either relocate or prepare it for treatment or disposal. Some examples include excavation of soil or extraction of contaminated groundwater.
- **Long Term Monitoring:** Perform groundwater sampling to monitor groundwater for reduction in toxicity, mobility or volume of contaminated medium.
- **Monitored Natural Attenuation:** Monitors the natural subsurface processes such as dilution, volatilization, biodegradation, adsorption, and chemical reactions until contaminant concentrations are reduced to acceptable levels.
- **In Situ Treatment:** Addition of chemical or biological additives to soil/groundwater which modifies the physical/biological properties of the medium resulting in reduced toxicity, mobility or volume of the contaminant medium. Some examples are, in-situ chemical oxidation, permeable reactive barrier and enhanced bioremediation.
- **Ex Situ Treatment:** Provide varying levels of waste treatment following removal of waste to reduce volume, mobility or toxicity of the waste. Some examples include pump and treat systems.
- **Disposal:** Involves disposal of removed wastes at new or existing, permitted disposal facilities.

