



## **Status Update Regarding Dense Non-Aqueous Phase Liquid (DNAPL) at the Section 36 Lime Basins**

### *Fact Sheet*

#### **INTRODUCTION**

This fact sheet provides a status update regarding the assessment of Dense Non-Aqueous Phase Liquid (DNAPL) identified at the Section 36 Lime Basins area of the Rocky Mountain Arsenal Federal Facility Site. RMA is located in Adams County, Colorado, approximately 10 miles northeast of downtown Denver. The former Lime Basins, constructed in 1942, were located in the southwestern portion of Section 36. Each of the three unlined basins covered an area measuring approximately 195 feet by 230 feet and was approximately 10 feet deep.

In August 2009, monitoring of the Section 36 Lime Basins dewatering wells indicated the presence of DNAPL composed primarily of 1,2-dichlorobenzene and 1,4-dichlorobenzene. Lesser amounts of 1,3-dichlorobenzene, chlorobenzene, and dicyclopentadiene were also determined to be part of the DNAPL. These chemicals were used in the manufacturing processes conducted in

the South Plants. Liquid wastes from these processes were disposed into the Lime Basins between 1942 and 1957, after which liquid wastes were rerouted to Basin F.

A Non-Aqueous Phase Liquid (NAPL) is a liquid that does not mix freely with water. An example of a light NAPL would be oil that floats on top of water.

DNAPLs, however, are heavier than water, which causes them to sink in groundwater. DNAPLs can be either a single-component liquid (composed of solely one chemical) or a mixed liquid (composed of several chemicals), as is the case at the Lime Basins.

Because DNAPLs are generally considered to be principal threat wastes (EPA 1996), the August 2009 discovery of DNAPL triggered the application of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) process and performance of a Remedial Investigation/Feasibility

Study (RI/FS). This fact sheet provides a summary of the remedial alternative recommended from among those considered and developed through the completion of the RI/FS.

### **EXISTING REMEDY**

As part of the On-Post Record of Decision (ROD), which governs those areas with RMA boundaries, the Lime Basins were isolated from surrounding groundwater by 1) installing a vertical groundwater barrier wall (slurry wall), 2) extraction of groundwater from within the barrier wall, and 3) construction of a Resource Conservation and Recovery Act (RCRA)-equivalent cover over the entire Lime Basins area to minimize the potential for migration of contaminants from the site. Remedy construction was completed in 2010 (TtEC 2010a, 2010b).

The dewatering system includes six dewatering wells located along the north side of the wall. The extracted groundwater is transferred to the Basin A Neck System (BANS) treatment plant, where it is treated to ensure that Containment System Remediation Goals (CSRGs) are met.

### **REMEDIAL INVESTIGATION**

The DNAPL RI evaluated existing data from areas where the DNAPL chemicals have been detected and potential migration areas within Basin A. The findings of the RI, completed in 2010, were presented in the Lime Basins Dense Non-Aqueous Phase Liquid (DNAPL) Remedial Investigation Summary Report (RISR) (TtEC 2010c).

The RISR identified three DNAPL source zones. It also showed that DNAPL-containing materials may have been mixed with slurry, soil and rock

material used to construct the slurry wall in the north/northeast portion of Lime Basins. While some data uncertainty was identified in the evaluation, the RISR concluded that “continued monitoring for DNAPL in the dewatering wells and monitoring wells will provide the most useful information” to support the FS.

Therefore, the RISR recommends “that the project proceed to the feasibility study phase, where possible effects of the DNAPL on the slurry wall and the need for additional data and/or analysis to support the feasibility study will be determined. In addition, the path forward should include the ongoing monitoring for, and removal of, DNAPL in the dewatering wells and monitoring wells.”

### **PRESUMPTIVE REMEDY**

Since Superfund's inception in 1980, the U.S. Environmental Protection Agency (EPA) has found that certain categories of sites have similar characteristics, such as types of disposal practices and contaminants present, including DNAPLs. The EPA has also noted similarities in how environmental media are affected by types of disposal practices and contaminants. Based on information acquired from evaluating and cleaning up these sites, EPA has developed presumptive remedies to streamline site investigations and speed up selection of cleanup actions (EPA 2009).

A response strategy for DNAPL sites is included in EPA's guidance and, with the concurrence of the Regulatory Agencies, the presumptive remedy approach is being used to guide and expedite the RI/FS process. For DNAPL sites, the presumptive remedy recommended by EPA guidance is

source containment and removal to the extent practicable (EPA 1996).

The presumptive remedy approach is consistent with the requirements of the National Contingency Plan for selection of remedial alternatives. The approach consolidates information from similar sites to streamline the remedy selection process by excluding remedial alternatives that are routinely and appropriately screened out on the basis of effectiveness, implementability or excessive cost. Consistent with this process, three remedial alternatives are being considered for the FS. The FS is expected to be completed in June 2011.

### **OPERABLE UNITS**

The RMA On-Post Record of Decision addresses contamination in the On-Post Operable Unit within the RMA boundaries. (The RMA Off-Post Record of Decision addresses groundwater contamination north and northwest of the RMA outside the site boundaries.)

The contaminated areas within the On-Post Operable Unit included approximately 3,000 acres of soil, 15 groundwater plumes and 798 structures. The most highly contaminated areas were located in the central manufacturing, transport and waste disposal areas. The primary contaminants found in the soil and/or groundwater at these areas were pesticides, solvents, heavy metals, and chemical agent by-products.

The overall remedy required by the 1996 ROD for the On-Post Operable Unit (OU) included:

- Interception and treatment of contaminated groundwater at four onsite treatment plants.

- Construction of two on-post RCRA-compliant landfills.
- Demolition of structures with no designated future use and disposal of the debris in either the two landfills or the Basin A consolidation area, depending upon the degree of contamination.
- Containment of contaminated soil in the on-post landfills, under caps/covers, or through treatment, depending upon the type and degree of contamination. Areas that have caps or covers require long-term maintenance and will be retained by the Army. These areas will not be part of the Rocky Mountain Arsenal National Wildlife Refuge.
- Consolidation of biota risk soil and structural debris from other Arsenal-contaminated areas in the Basin A disposal area. After all waste was received, a wildlife barrier and soil cover was placed over Basin A.

## REFERENCES

EPA (U. S. Environmental Protection Agency) 2009 (Oct.) *Presumptive Remedies: Policy and Procedures*  
<http://www.epa.gov/superfund/policy/remedy/presump/pol.htm>.

EPA 1996 (Oct.) *Presumptive Response Strategy and Ex-Situ Treatment Technologies for Contaminated Ground Water at CERCLA Sites, Final Guidance, OSWER Directive 9283.1-12*.

TtEC (Tetra Tech EC Inc.) 2010a (Aug. 18) *Section 36 Lime Basins Soil Remediation Project, Slurry/Barrier Wall Construction, Construction Completion Report. Revision 0*.

TtEC 2010b (Sept. 9) *Integrated Cover System Project (Basin A, Complex Army Trenches, Lime Basins, Shell Disposal Trenches, South Plants) Subgrade and Cover Construction, Construction Completion Report – Part 1. Revision 0*.

TtEC 2010c (Sept. 21) *Lime Basins Dense Non-Aqueous Phase Liquid (DNAPL) Remedial Investigation Summary Report*.

TtEC 2005 (Oct. 20) *Amendment to the Record of Decision for the On-Post Operable Unit, Rocky Mountain Arsenal Federal Facility Site, Section 36 Lime Basins Remediation, Basin F Principal Threat Soil Remediation. Revision 0*.

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