



Explanation Of Significant Differences For The Basin F Wastepile Remediation Project

Fact Sheet

Introduction

This fact sheet documents a significant decrease in cleanup cost for the Basin F Wastepile (Wastepile) Remediation Project of the Rocky Mountain Arsenal (RMA) Federal Facility Site.

Basin F was constructed in 1956 in the northern portion of the site and was used until 1981. The basin was a 93-acre solar evaporation impoundment that contained approximately 243 million gallons of liquid waste from Army and Shell manufacturing operations. Waste was transported from the manufacturing facilities to Basin F through a chemical sewer line that operated from 1957 to 1981.

After manufacturing operations ceased, the Basin F liquid waste, sludge and soil were remediated during the late 1980s. The solid wastes were dried, consolidated and then transferred to the Wastepile. This process generated odors at the site and in the nearby community until a soil cover was placed over the project work area. The liquid waste was removed and transferred for interim storage into three lined tanks and two surface impoundments. The liquid was incinerated from 1993 to 1995.

A final cleanup for the Wastepile was outlined in the RMA's 1996 Record of Decision (ROD), which outlines the site's

cleanup projects. The Wastepile cleanup involved excavating the soil and disposing of it in the RMA's on-site enhanced landfill. The project began in 2006 and was completed in 2007, four months ahead of schedule, significantly under budget, and with no odor impacts to the community.

Explanation Of Significant Differences (ESD)

This ESD summarizes a decrease in cleanup cost for the Wastepile Project. The estimated ROD cost was \$85.6 million. However, project modifications resulted in a final remediation cost of \$28.4 million, a 67 percent decrease. All modifications were based on new information developed by the Army since the ROD was signed.

The reduced cleanup costs are mainly due to reduced excavation and material-drying costs. Excavation costs decreased significantly due to changes in odor control methods. The vapor enclosure system assumed in the ROD estimate was replaced by composite, foam and geomembrane (thick plastic) covers based on their effectiveness during the treatability study, cleanup design and project implementation. In addition, the cleanup volume decreased from an estimated 600,000 bank cubic yards (bcy) to 489,396 bcy. Soil-drying costs were nearly eliminated because all Wastepile soil

met specified moisture criteria and did not require drying prior to landfill disposal.

Although these significant cost changes result in the need for an Explanation of Significant Differences, the overall hazardous waste management approach that was selected in the ROD was not changed.

The proposed changes are detailed in the "Explanation of Significant Differences for the Basin F Wastepile Remediation Project," dated March 5, 2009. Design documents are available for public review and comment (see bottom of fact sheet for locations).

What Are The Significant Changes To The Remediation Project?

There were no significant changes to the Wastepile cleanup requirements; however, modifications to the project resulted in significant cost decreases. A summary of the Wastepile project cost change is provided in Table 1 (see below).

Remediation Volume

The ROD cost figure was based on an estimated cleanup volume of 600,000 bcy. However, during design, the volume estimate was revised to 480,000 bcy based on review of Wastepile record drawings and field surveys. Project records show the final cleanup volume for the Wastepile as 489,396 bcy, which represents an approximately 18 percent decrease compared to the ROD estimate.

Odor Control

Because of the high odor potential associated with the Wastepile soil, the ROD included a requirement for odor control measures during excavation. The ROD planned for a vapor enclosure system but acknowledged that other control measures could be evaluated during the cleanup design.

A Treatability Study performed before the project began involved collecting samples of Wastepile material, analyzing the samples for odor levels, and then using the samples to test various odor control methods and

materials. The study showed that using foams, soil covers and/or tarps could control odors effectively during excavation.

During project design, additional emission and odor modeling was performed to further evaluate the odor controls identified during the Treatability Study. Modeling results showed that the proposed design approach using foam and soil covers to control odors would meet the project requirements. In addition, a geomembrane and foam odor control demonstration was conducted to evaluate specific products that could be used during the Wastepile excavation. The products effective in controlling odors were selected and included in the project specifications.

The odor control methods were further evaluated and verified during the initial phase of the project, which involved a reduced excavation rate. The controls proved to be successful and were then used in full-scale operations. Throughout the project no air or odor action levels were exceeded. Odor monitoring was also used to evaluate operational changes such as increased excavation rates, changes in use of foam, and increasing the allowable hours for excavation. These operational changes were instrumental in decreasing the project cost as well as accelerating the project schedule.

Excavation Cost Summary

The ROD projected the total excavation costs, including Wastepile soil excavation and odor control costs, at \$45.4 million. The final project cost for excavation activities was \$12.4 million.

Combined excavation cost savings due to volume reduction and change in odor control methods is approximately \$33 million. Although the odor control costs were not tracked separately from the excavation cost, eliminating the vapor enclosure system represents the bulk of these savings.

Drying Costs

To meet waste acceptance criteria for disposal in the RMA's enhanced landfill, all Wastepile soil was required to pass EPA's paint filter test (PFT) to avoid land disposal of free liquids. Therefore, the ROD included a requirement to use a dryer in an enclosed structure for soil that failed the PFT.

Construction of the drying facility was completed during the Wastepile project. The estimated ROD cost for drying facility construction is \$2.26 million. The actual cost for construction of the facility was \$1.62 million, a \$0.64 million savings.

The ROD assumed that up to 150,000 cubic yards of Wastepile soil would require drying, at an estimated cost of \$28.6 million. Before design began, a Treatability Study characterized the soil moisture content and evaluated methods for reducing moisture content to meet the landfill waste acceptance criteria. All Wastepile soil samples passed the PFT, therefore the estimate of material that would require drying prior to disposal was revised to 5,000 cubic yards. This volume estimate was based on the potential of precipitation during project implementation that could result in Wastepile soil failing the PFT.

While the project was under way, samples of Wastepile soil were visually inspected or tested for free liquids to ensure the soil met landfill acceptance criteria. No Wastepile material required drying prior to disposal. However, the drying facility was used to dry decontamination solids on a few occasions. Also, during the initial remediation phases, haul trucks were parked overnight and over weekends in the facility. Actual costs for drying facility operation are approximately \$240,000. Compared to the ROD estimate of \$28.6 million, this change represents a decrease in project cost of nearly \$28.4 million.

Mobilization/Demobilization

The ROD estimate reflects mobilization and demobilization cost activities including construction of contractor-support facilities, equipment mobilization, relocation of personnel and decontamination and demobilization of facilities and equipment. For the Wastepile project, these combined costs were estimated at \$4.7 million.

To facilitate efficient Wastepile remediation, several mobilization activities were added to the project. These additional activities included construction of contaminated, potentially contaminated and uncontaminated storm water control systems, and construction of a dedicated haul road from the Wastepile to the enhanced landfill. The final combined mobilization and demobilization costs are \$6.75 million, a \$2.05 million increase.

Demolition

A system that captured storm water once it had percolated through the contaminated material was included in the initial Wastepile construction. Called the leachate collection system, it included leachate conveyance piping, storage tanks and two structures adjacent to the Wastepile to facilitate leachate storage and transfer for off-site disposal. These structures were not identified in the ROD for demolition. During design, demolition of these structures along with removal of all leachate piping and storage tanks was added to the project scope. All demolition debris was disposed in the RMA's landfill. Demolition costs contributed approximately \$1.04 million to the overall project cost.

Project Oversight

Although the ROD estimate included project support and oversight costs, the level of oversight required for the Wastepile project exceeded what was anticipated in the ROD. The project support costs account for approximately \$4.5 million compared to the ROD estimate of \$2.3 million, or a \$2.2 million increase.

Table 1: Changes to Basin F Wastepile Project Costs

Cost Element	ROD Cost	Actual Cost ¹	Reason for Change
Mobilization/Demobilization	\$4,700,000	\$6,750,000	Stormwater controls; haul road construction
Excavation			
Excavate IRA Soil Cover	\$ 664,000		
Vapor/Odor Control	\$ 31,704,000		
Excavate Wastepile Material	\$ 13,043,000		
Subtotal Excavation Costs ²	\$ 45,411,000	\$ 12,438,000	Volume reduction; vapor/odor control methods
Drying			
Construct Drying Facility	\$ 2,267,000	\$ 1,623,000	No thermal drying unit required
Wastepile Material Drying	\$ 28,612,000	\$ 239,000	No wet material, drying not required
Facility Demolition	NA ³	\$ 1,044,000	Not identified in ROD
Leachate Disposal	\$ 1,301,000	\$ 1,289,000	
Backfill	\$ 1,001,000	\$ 550,000	
Other Project Costs (includes procurement, subcontractor incentives, engineering oversight, and reporting)	\$ 2,334,000	\$ 4,463,000	Odor monitoring; QC oversight; CQAE
Total Estimated Project Costs	\$ 85,625,000	\$ 28,396,000	Total % change = - 67 %

¹Costs presented are estimate at completion as of January 30, 2009.

²Actual cost includes all excavation and vapor/odor control costs combined.

³Demolition of BFWP structures was not included in the ROD.

Site History

RMA is located in Adams County, Colorado, approximately 10 miles northeast of downtown Denver. The RMA On-Post OU currently encompasses 4,000 acres and is on the EPA's National Priorities List (NPL) for environmental cleanup as a result of contamination released during previous RMA operations. The On-Post ROD, which describes the site-wide remedy for the RMA, was signed by the U.S. Army, EPA, and the State of Colorado, with concurrence from Shell Oil Company (Shell) and the U.S. Fish and Wildlife Service, on June 11, 1996. The selected remedy includes 31 different cleanup plans for soils, structures and the treatment of groundwater contaminants.

The RMA was established in 1942 by the U.S. Army to manufacture chemical warfare agents and incendiary munitions for use as a deterrent in World War II. Following the war and through the early 1980s, the

facilities continued to be used by the U.S. Army. Beginning in 1946, some facilities were leased to private companies to manufacture industrial and agricultural chemicals. Shell, the principal lessee, manufactured pesticides from 1952 to 1982. Common industrial and waste disposal practices used during these years resulted in contamination of structures, soil, surface water and groundwater.

To date, about 80 percent of RMA land has been removed from the EPA's NPL and all contaminated soil excavation projects outlined in the ROD have been successfully completed. Groundwater treatment will continue after the land area cleanup is complete. Most remaining cleanup work involves clean construction, which means moving clean soils and materials to build covers over the landfills and consolidation areas.

Once cleanup is complete, the RMA's vast open spaces will constitute one of the nation's largest urban wildlife refuges. The Rocky Mountain Arsenal National Wildlife Refuge was officially established in 2004, when approximately 5,000 acres of RMA land was transferred from the Army to the U.S. Fish and Wildlife Service (Service) after the land was removed from EPA's NPL. In 2006, a second land transfer expanded the Refuge to 12,000 acres. By the end of 2010, the cleanup program will be finished, and the Army will retain approximately 1,100 acres to maintain its landfills, soil cover areas, and groundwater treatment plants. After the RMA's remaining cleanup projects are completed and final areas removed from the EPA's NPL, the Army will transfer about 2,500 acres to the Service to increase the Refuge to its final size of more than 15,000 acres.

The Refuge now provides environmental education and interpretive programs, catch-and-release recreational fishing, close to nine miles of trails, wildlife viewing opportunities and site tours for the public, and is a sanctuary for more than 330 species of animals, including wild bison, deer, coyotes, bald eagles and burrowing owls.

Operable Units

The On-Post Operable Unit is one of two operable units at RMA. The On-Post Operable Unit addresses contamination within the RMA boundaries. The Off-Post Operable Unit addresses groundwater contamination north and northwest of the RMA.

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

- Interception and treatment of contaminated groundwater at four on-site treatment plants.
- Construction of two on-post Resource Conservation and Recovery Act (RCRA)-compliant landfills on-post.

- 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.
- The contaminated soil at the RMA is addressed primarily through containment 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.
- The Basin A disposal area is used for consolidating structural debris from other Arsenal contaminated areas and soil that poses a risk to wildlife, known as biota soil. Once all of the waste is received, a wildlife barrier and soil cover will be placed over Basin A.

Site Contamination

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 sites were identified in South Plants (i.e., Central Processing Area, Hex Pit, Buried M-1 Pits, Chemical Sewers), Basins A and F, the Lime Basins, and the U.S. Army and Shell Trenches. The primary contaminants found in the soil and/or groundwater at these areas are pesticides, solvents, heavy metals, and chemical agent by-products.

The most contaminated areas (those showing the highest concentrations and/or the greatest variety of contaminants) were located in the central manufacturing, transport and waste disposal areas. The highest contaminant concentrations occurred in soil within about five feet of the ground surface, though the higher contamination is also found at greater depths particularly

where burial trenches, disposal basins or manufacturing complexes were located.

The characteristics and locations of the groundwater plumes suggest that the greatest contaminant releases to the groundwater have occurred from Basin A and the Lime Basins, the South Plants chemical sewer, the South Plants tank farm and production area, the Complex (Army) and Shell Trenches in Section 36, and the former Basin F. The Motor Pool/Rail Yard and North Plants areas have been other sources of contaminant releases to the groundwater.

Public Participation

A public notice was published beginning March 9, 2009, in the *Denver Post*, *Brighton Blade*, *Commerce City Beacon* and *Gateway News* newspapers announcing the public comment period for the Explanation of Significant Differences for the Basin F Wastepile Remediation Project. The public notice also explained how to provide comments and where the document is available for review. A presentation explaining the proposed changes was provided to the Arsenal's Restoration Advisory Board (RAB) on February 12, 2009. The RAB is a community group that meets regularly to receive information and provide input on the cleanup. The public comment period closes on April 8, 2009. Upon completion of the comment period,

the Army, in consultation with the EPA and the State of Colorado, will evaluate each comment and any significant new data received before issuing a final report documenting the project changes.

This ESD and all documents that support the changes and clarifications are part of the Administrative Record and are available at the Joint Administrative Records and Document Facility (JARDF) and the EPA Region 8 Superfund Records Center. The JARDF can be reached at 303-289-0983. Hours of operation are Monday through Friday 12 p.m. to 4 p.m. or by appointment. EPA's Superfund Record Center can be reached at 303-312-7287. Hours of operation are Monday through Friday from 8 a.m. to 4 p.m.

Affirmation Of Statutory Determinations

Considering the new information presented in this ESD, the Army, in consultation with EPA and CDPHE, believes that the Basin F Wastepile Remediation Project, with the modifications described, satisfy the requirements of CERCLA Section 121 and are protective of human health and the environment, comply with federal and state requirements that are legally applicable or relevant and appropriate to the remedial action, use a permanent solution through proper disposal and containment of the wastes in the on-post landfills or Basin A, and are cost effective.

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Document Locations

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