Explanation of Significant Differences for the Section 36 Balance of Areas Soil Remediation

Fact Sheet

INTRODUCTION

This fact sheet documents a significant change for the Section 36 Balance of Areas (BOA) Soil Remediation project of the Rocky Mountain Arsenal (RMA) Federal Facility Site.

The Section 36 BOA project surrounds the primary solid and liquid waste disposal areas of RMA located within the central portion of the site. Disposal of waste associated with the Army and Shell Oil Co.'s manufacturing activities occurred from the 1940s through the 1960s, which resulted in contamination of chemical sewer lines, ditches, drainage areas and surface soil.

The Section 36 BOA project originally consisted of 11 areas of soil contamination and nearby surface soil. Ten additional areas were identified during design or implementation and added to the project. These additions along with increases in remediation volumes and project costs resulted in the need for an ESD.

EXPLANATION OF SIGNIFICANT DIFFERENCES (ESD)

This ESD summarizes modifications to the Section 36 BOA project that resulted from new information developed by the Army since the Record of Decision (ROD) was signed. The ROD outlines the RMA's overall cleanup program. Significant changes include modifications to project boundaries, an increase in remediation volumes, and an increase in project cost. These changes, while resulting in the need for an ESD, do not alter the overall hazardous waste management remedy that was selected in the ROD.

The Section 36 BOA project ROD requirements included excavation and landfill of contaminated soil followed by soil sampling to ensure that all contamination was removed. While the project was underway, soil samples showed contamination remained. Most of the additional contaminated soils were removed, which significantly increased the overall remediation volume.

In addition, chemical staining and odors were identified in the area surrounding one of the disposal sites known as the Shell Disposal Trenches. Odors were also observed in the South Plants chemical sewer area. Although the ROD-identified contaminated soil was removed, these field observations, along with the post-excavation soil sample results, suggest that all contaminated soil could not be reliably located and removed as required by the ROD.

As a result, the areas were identified for soil covers to provide additional protection and minimize potential contaminant migration to

groundwater. These areas were transferred to other projects for cover construction.

The Shell Disposal Trenches Resource Conservation and Recovery Act (RCRA)-equivalent cover was extended approximately five acres south of the project site. In addition a 2-foot-thick soil cover was placed over approximately 31 acres surrounding the trenches. A six-acre area was transferred to the South Plants Central Processing Area project for inclusion beneath the South Plants RCRA-Equivalent Cover.

Changes to the project scope also resulted in significant cost growth. The most significant cost growth factor was the increased remediation volumes for chemical sewers and contaminated soil. Other significant scope additions included expanded clearance requirements for old munitions, preparation work for the surrounding soil covers, and addition of structures demolition. The ROD-estimated cost for implementing the Section 36 BOA project was approximately $7 million. Overall, project costs increased to approximately $18.7 million, which represents a cost increase of approximately 167 percent over the ROD estimate.

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 Section 36 Balance of Areas Soil Remediation" dated July 13, 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?

Change in Project Boundaries

There were two significant changes to the Section 36 BOA Project boundaries during project implementation. All identified soil contamination was excavated and completed in accordance with the ROD and design. However, soil staining was observed at or below the design excavation surface in the southern area of the Shell Disposal Trenches. Odors were also observed in the chemical sewer excavation area. Soil samples collected in these areas following excavation showed that additional contaminated soils remained, which changed the project boundaries.

Increase in Remediation Volumes

Remediation volumes increased significantly compared to the ROD estimates based on soil sampling results. All additional higher-level contaminated soil and chemical sewers were removed resulting in an increase in remediation volume from 52,828 bcy to 131,229 bcy, an approximate 148 percent increase.

Lower-level contaminated soil called biota soil (soil posing a risk to wildlife) was removed resulting in an increase in remediation volume from 166,857 bcy to 264,047 bcy, an approximate 58 percent increase. Approximately six acres of biota soil was not excavated, but was incorporated under the South Plants RCRA-Equivalent Cover. Also, soil posing a risk to wildlife (biota soil) was identified after the ROD and resulted in an additional 72,496 bcy.

The table below provides a summary of the remediation volume increases for the Section 36 BOA Project soil sites.

ROD-Prescribed Remedy	Modification	ROD-Prescribed Remediation Volume (bcy)[1]	Actual Remediation Volume (bcy)	Percent Change
Excavate chemical sewers and HHE soil and dispose in on-post HWL.	**Chemical Sewers Volume increase.** Four additional chemical sewer lines were identified during design. Excavation along lines 6 and 7 added based on field observation of remaining pipe bedding. Expanded excavation widths for lines 1 and 2. Over-excavation of minimum depths.	**Area** **HHE Soil Volume** CSA-3 2,035 NCSA-6a 1,100 NCSA-6b 805	**Area** **HHE Soil Volume** CSA-3 5,062 NCSA-6a 24,447 NCSA-6b 1,024	
	HHE Soil Volume increase. Soil sampling following design excavation showed extensive HHE soil remaining. Additional excavation of stained and odorous soil. Over-excavation of minimum depths.	**Area** **HHE Soil Volume** CSA-1b 29,102 CSA-4 17,404 NCSA-1b NA NCSA-1g 1,885 Surface Areas 497	**Area** **HHE Soil Volume** CSA-1b 69,400 CSA-4 27,851 NCSA-1b 135 NCSA-1g 2,670 Surface Areas 640	
Total Project HHE Soil Volume Change		**52,828**	**131,229**	**+ 148 %**
Excavate biota risk soil and dispose in Basin A.	**Biota Risk Soil Volume Increase.** Soil sampling following design excavation showed extensive biota risk soil remaining. Over-excavation of minimum depth.	**Area** **Biota Soil Volume** CSA-1b 28,602 CSA-1d NA CSA-2b 8,668 CSA-4 82,727 NCSA-1c 282 NCSA-1d 3,169 NCSA-1f 1,137 NCSA-1g 30,775 Surface 11,497 Debris Piles NA	**Area** **Biota Soil Volume** CSA-1b 81,705 CSA-1d 641 CSA-2b 11,590 CSA-4 113,066 NCSA-1c 0 NCSA-1d 4,278 NCSA-1f 4,053 NCSA-1g 35,169 Surface 7,889 Debris Piles 5,656	
Total Project Biota Risk Soil Volume Change		**166,857**	**264,047**	**+ 58 %**
Refinement of surface soil areas for remediation.	RER soil areas identified in accordance with the ROD. Excavate RER soil and dispose in Basin A.	NA	**Area** **RER Soil Volume** P1 East 10,400 P1 North 11,813 P1 West 35,523 CSA-1b 185 36NW-4-B 10,102 36NW-5-A 4,473	
Total Project RER Soil Volume Change			**72,496**	**NA**

Increase in Project Cost

The estimated cost for implementing the Section 36 BOA project was $7.0 million based on cost estimates presented in the ROD and modified by the design ESD. However, changes in project scope resulted in a significant increase in project cost. The final cost is estimated at $18.7 million.

Cost Element	ROD Cost[1]	Actual Cost[2]	Reason for Change
Mobilization/Demobilization	$ 464,000	$ 622,000	Additional mob/demob for Part 2 subgrade construction
Chemical Sewer Excavation	$ 405,000	$ 1,264,000	Increase in sewer remediation volume
Excavation	$ 2,750,000	$ 8,292,000	Increase in HHE and biota risk soil volumes, addition of RER soils
Geophysical Survey and MEC Clearance	$ 1,249,000	$ 1,807,000	Expanded MEC clearance area
Backfill	$ 532,000	$ 257,000	Reduced backfill requirements
Demolition	NA[3]	$ 497,000	Added scope
Subgrade	NA[3]	$ 1,758,000	Added scope
Revegetation	$ 475,000	$ 335,000	Reduced revegetation area
Other Project Costs (includes procurement, subcontractor incentives, engineering oversight, and reporting)	$ 1,126,000	$ 3,848,000	Odor monitoring, QC oversight, expanded scope
Total Estimated Project Costs	**$ 7,001,000**	**$ 18,680,000**	**Total % change = + 167 %**

PREVIOUS ESD

An ESD was written for this project in April 2003 based on changes to the chemical sewer lines, soil covers and munitions clearance area. The ESD included the following:

Chemical Sewer Lines

- Excavate an additional four chemical sewer lines that were not identified in the ROD and dispose into the on-site landfill
- Reduce the amount of excavated soil from 10 feet to 4 feet laterally from both sides of the sewer line. The reduction was based on soil samples.
- Eliminate soil excavation along location of previously removed chemical sewer lines. This reduction was based on soil samples.

Soil Covers

- Use only clean soil to backfill excavation areas outside the soil covers
- Eliminate the need for 1-foot and 2-foot thick soil covers because all identified contaminated soil was removed
- Engineering controls and revegetation standards are no longer applicable for the soil cover areas. The controls and standards will be consistent with general site requirements

Munitions Clearance

- A survey for old munitions will be expanded after soil excavation

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 July 20, 2009, in the *Denver Post, Brighton Blade and Gateway News* newspapers announcing the 30-day public comment period for the Explanation of Significant Differences for the Section 36 BOA Soil 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 will be provided to the Arsenal's Restoration Advisory Board (RAB) on July 16, 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 August 19, 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

Considering the new information presented in this ESD, the Army, in consultation with EPA and CDPHE, believes that the Section 36 BOA 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

- **Joint Administrative Record and Document Facility (JARDF)**
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