



***Rocky Mountain Arsenal***  
**Explanation of Significant Differences for Sand Creek Lateral and  
Other Ditches Remediation, Miscellaneous Southern Tier Soil Remediation Project,  
and Section 35 Soil Remediation Project**

***FACT SHEET***

**Introduction**

This fact sheet summarizes a significant change to the remedy for the Miscellaneous Southern Tier Soil Remediation Project (MSTS) and the Section 35 Soil Remediation Project at the Rocky Mountain Arsenal (RMA) Federal Facility Site. Areas affected by this remedy change include the Sand Creek Lateral, Basin B Drainage Ditch and South Lakes Ditches. The Lateral and ditches are located in the south and central portions of the site (*see map on page 7*). The Lateral, originally constructed by farmers in the early 1900s to provide water for flood irrigation, was used from 1942 to 1957 to discharge liquid waste and surface water runoff. The Basin B Drainage Ditch was constructed in 1946 and used through the mid 1950s to transport liquid waste to on-site disposal basins. The South Lakes Ditches carried storm water and industrial process water from a manufacturing plant to the Derby Lakes from 1942 to 1964.

As part of the Record of Decision, which outlines the Arsenal's 31 specific cleanup projects, contaminated soil from the MSTS and the Section 35 Soil Remediation Projects were excavated and taken to the on-site hazardous waste landfill or Basin A Consolidation Area depending on contamination levels. The projects were completed in 1999 and 2002.

**Explanation Of Significant Differences**

In October 2004, surface soil sampling was performed as part of remediation activities for an area adjacent to the Lateral. Although the area was being cleaned up to mitigate soil with potential risk to wildlife, composite surface soil samples indicated additional human health exceedance (HHE) and biota (wildlife) soils.

Review of historic aerial photographs identified what appeared to be prior dredging and grading activities along the entire Lateral in the 1940s and 1950s. Subsequent aerial photographs indicated that after the Lateral was dredged and the material was deposited on the banks, the area was graded. There is no record indicating whether the dredged material was removed prior to grading or if all the material was graded along the lateral banks.

Soil sampling was conducted along the length of the Lateral and additional contaminated soil was identified. The highest concentrations were located immediately adjacent to the Lateral bank. As sample locations moved outward, concentrations decreased.

Based on this discovery, historical aerial photograph review and additional soil sampling were conducted at other RMA drainage ditches to determine if similar activities might have resulted in contamination

along the banks. Four additional areas were identified with contaminated soil on the ditch banks, two areas along the Basin B Drainage Ditch and two areas along the South Lakes Ditches.

The new information resulted in significant changes to the remediation soil volumes for the MSTS and Section 35 Soil Remediation Projects. These changes resulted in a cost increase compared to the original ROD-estimated cost. *These volume and cost changes, while necessitating an ESD, do not alter the overall hazardous waste management approach that was selected in the ROD.*

The proposed changes are detailed in the “Explanation of Significant Differences for the Sand Creek Lateral and Other Ditches Remediation, Miscellaneous Southern Tier Soil Remediation Project and Section 35 Soil Remediation Project February 21, 2008”. The ESD and related RMA 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?

### Changes to the Contaminated Soil Remediation Volumes

The primary change for the contaminated soil remediation volumes results from the discovery of additional contamination along the banks of the lateral and ditches. The additional contaminated soil identified increased the HHE soil volume from 24,160 bank cubic yard (bcy) to 83,223 bcy for the MSTS project. Biota risk soil volumes increased from 46,398 bcy to 68,351 bcy. For the Section 35 Soil Project, HHE soil volume increased from 6,615 to 40,999 bcy and biota risk soil volumes increased from 120,704 bcy to 139,759 bcy (see Table 1 and 2 for volume details).

No changes were made to the disposal location for the contaminated soil. All soil was disposed in the on-site hazardous waste landfill, the enhanced landfill or Basin A depending on the level of contamination.

## SUMMARY OF THE ROD REMEDY AND THE ESD CHANGES

**Table 1: Changes to Miscellaneous Southern Tier Soil Project Remediation Volumes**

ROD-Prescribed Remedy	Modification	Area	ROD Remediation Volume (bcy)	Initial Remediation Volume (bcy)	Final Remediation Volume (bcy)	Percent Change from ROD
Excavate ROD HHE soil volume in ditches and dispose in the on-post HWL.	<b>Addition: Volume increase due to identification of additional exceedance soil located along the banks of the ditches.</b> Excavated soil was disposed at the HWL or ELF.	SSA-2a	737	7,277	7,277	
		SSA-2b	5,352	14,613	61,779	
		Other <sup>1</sup>	18,071	14,167	14,167	
<b>Total HHE Soil Volume Change</b>			24,160	36,057	83,223	+ 244 %
Excavate ROD biota risk soil volume in ditches and dispose in Basin A.	<b>Addition: Volume increase due to identification of additional exceedance soil located along the banks of the ditches.</b> Excavated soil was disposed at Basin A.	SSA-2a	15,157	3,325	5,550	
		SSA-2b	16,939	2,181	44,565	
		Other <sup>1</sup>	14,302	18,236	18,236	
<b>Total Biota Risk Soil Volume Change</b>			46,398	23,742	68,351	+ 47 %

<sup>1</sup> Other project remediation areas that are not affected by this ESD. Specific remediation volumes are documented in the MSTS CCR (RVO 2006). Volumes are included here for total project calculation.

**Table 2: Changes to Section 35 Soil Project Remediation Volumes**

ROD-Prescribed Remedy	Modification	Area	ROD Remediation Volume (bcy)	Initial Remediation Volume (bcy)	Final Remediation Volume (bcy)	Percent Change from ROD
Excavate ROD HHE soil volume in ditches and dispose in the on-post HWL.	<b>Addition: Volume increase due to identification of additional exceedance soil located along the banks of the ditches.</b> Excavated soil was disposed at the HWL or ELF.	NCSA-5b NCSA-5c Other <sup>1</sup>	<b>81</b> <b>5,614</b> <b>920</b>	<b>3,189</b> <b>12,479</b> <b>1,186</b>	<b>7,402</b> <b>32,411</b> <b>1,186</b>	
<b>Total HHE Soil Volume Change</b>			<b>6,615</b>	<b>16,854</b>	<b>40,999</b>	<b>+ 520 %</b>
Excavate ROD biota risk soil volume in ditches and dispose in Basin A.	<b>Addition: Volume increase due to identification of additional exceedance soil located along the banks of the ditches.</b> Excavated soil was disposed at Basin A.	NCSA-5b NCSA-5c Other <sup>1</sup>	<b>6,511</b> <b>8,444</b> <b>105,749</b>	<b>2,438</b> <b>0</b> <b>86,763</b>	<b>11,804</b> <b>41,192</b> <b>86,763</b>	
<b>Total Biota Risk Soil Volume Change</b>			<b>120,704</b>	<b>89,201</b>	<b>139,759</b>	<b>+ 16 %</b>

<sup>1</sup> Other project remediation areas that are not affected by this ESD. Specific remediation volumes are documented in the Section 35 Soil CCR (TtFW 2004). Volumes are included here for total project calculation.

**Cost**

The estimated cost for implementing the MSTs project was \$2.27 million with the final cost being \$5.84 million. The estimated cost for implementing the Section 35 Soil Project was \$4.15 million with the final cost being \$4.44 million (see Table 3 for details). The primary factor contributing to the cost change is the significant increases in remediation volumes for both projects. In addition, the discovery of new contaminated areas after the initial remedy was completed resulted in separate additional design efforts to define and document the remediation, and additional mobilization costs to perform the remedy.

**Table 3: Cost Change Summary for MSTs and Section 35 Soil Remediation Projects**

Project	ROD-Estimated Baseline Cost for Implementation	Initial Implementation Cost (including Deep Acute HHE Soil Remediation)	SCL and Other Ditches Implementation Cost	Total Project Cost	Percent Change from ROD
Miscellaneous Southern Tier Soil	\$2,274,491	\$2,725,021	<b>\$3,111,764</b>	<b>\$5,836,785</b>	+ 157%
Section 35 Soil	\$4,147,853	\$2,148,992	<b>\$2,293,448</b>	<b>\$4,442,440</b>	+ 7%

## Site History

RMA is located in Adams County, Colorado, approximately 10 miles northeast of downtown Denver. The Arsenal On-Post OU encompasses 4,000 acres and is currently on the U.S. Environmental Protection Agency (EPA) National Priorities List 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 Arsenal, 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 Arsenal 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.

Currently, the Arsenal is undergoing an extensive environmental cleanup of the site's soil, structures and groundwater. Once cleanup is complete, the Arsenal's vast open spaces will constitute one of the nation's largest, urban wildlife refuges. By fall 2006, more than 12,000 acres of Arsenal land had been transferred from the U.S. Army to the U.S. Fish and Wildlife Service, officially establishing and later expanding the Rocky Mountain Arsenal National Wildlife Refuge. After the Arsenal's remaining cleanup projects are completed and areas removed from the EPA's National Priorities List, the Army will transfer about 2,500 acres to the Service to increase the size of the Refuge to more than 15,000 acres. By 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.

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 boundaries of the Arsenal. The Off-Post Operable Unit addresses contamination north and northwest of the Arsenal.

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

- Interception and treatment of contaminated groundwater at the three existing on-site treatment plants.
- Construction of a new Resource Conservation and Recovery Act (RCRA)- and Toxic Substances Control Act-compliant HWL on-post.
- Demolition of structures with no designated future use and disposal of the debris in either the HWL or Basin A, depending upon the degree of contamination.
- The contaminated soil at the Arsenal is addressed primarily through containment in the on-post HWL, 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 a 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 is 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) are located in the central manufacturing, transport and waste disposal areas. The highest contaminant concentrations tend to occur 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 are located.

Groundwater contaminant plumes predominantly consist of organic compounds, arsenic, fluoride and chloride. The overall concentrations and configurations of the plumes suggest that the greatest contaminant releases to the unconfined flow system have occurred from Basin A, the Lime Settling Basins, the South Plants Chemical Sewers, the South Plants Tank Farm and Production Area, the U.S. Army and Shell Trenches in Section 36, and the former Basin F. Plumes flowing from the Motor Pool, Rail Yard and North Plants areas are other sources of contaminant releases to the unconfined flow system.

### **Public Participation**

A public notice was published on February 26, 2008, in the *Denver Post*, *Rocky Mountain News*, *Brighton Blade*, *Commerce City Beacon* and *Commerce City Gateway* newspapers announcing the document's public comment period, how to provide comments and where the document is available for review. A presentation explaining the ESD was provided to the Arsenal's Restoration Advisory Board (RAB) on January 24, 2008. The RAB is a community group that meets regularly to receive information and provide input on the cleanup. The public comment period will close on March 27, 2008. 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 303-312-6473. Hours of operation are Monday through Friday from 8 a.m. to 4:00 p.m.

### **Affirmation of Statutory Determinations**

Considering the new information presented in this ESD, the U.S. Army, in consultation with EPA and CDPHE, believes that the MSTs and Section 35 Soil Remediation Project cleanup, with the modifications described, satisfies the requirements of CERCLA Section 121, is protective of public health and the environment, complies with federal and state requirements that are legally applicable or relevant and appropriate to the remedial action, uses a permanent solution through proper disposal and containment of the wastes in the on-post HWL and Basin A, and is cost effective.

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**Document Locations**

- Joint Administrative Record and Document Facility (JARDF)  
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