Explanation of Significant Differences for Munitions (Testing) Soil Remediation Project

Fact Sheet

Introduction
This fact sheet summarizes significant changes to the Munitions (Testing) Soil remediation project at the Rocky Mountain Arsenal (RMA) Federal Facility Site. These project changes resulted from new information developed by the Army since the Record of Decision (ROD) was signed. The ROD outlines the overall cleanup program.

The significant changes involve the following:

- Decrease in soil remediation volume
- Increase in project boundaries for areas with former munitions and munitions debris
- Increase in project cost

Explanation Of Significant Differences (ESD)
The Munitions Testing (MT) project consisted of seven ROD-identified areas. An additional five areas were identified during design and/or implementation and added to the MT remediation project. The MT areas were used during the 1940s – 1970s and are located in the northeast portion of the Arsenal. Historically, the areas were used for testing and destruction of conventional, non-chemical munitions.

Decrease in Soil Remediation Volume
During the MT remediation project design, soil sampling and analysis was conducted to determine if the soil around munition debris exceeded regulatory levels (Toxicity Characteristic Leaching Procedure (TCLP) criteria). Results showed that none of the soil in contact with munitions debris exceeded these levels so the soil did not require excavation. This change resulted in a significant decrease in soil volume.

Also during design, the project boundaries were modified based on extensive field investigation of munition debris distribution. These changes were applied to visually impacted areas and generally resulted in larger remediation areas. This change moderately increased the remediation volume.

The results of these adjustments were a 61 percent decrease in overall project volume. The amount of soil not requiring removal was far greater than the increase due to boundary changes, which resulted in a significant decrease in project volume.

Where soil removal was not required, munitions and munitions debris were located using site characterization and geophysical surveys. The items were

removed and disposed of in the Arsenal's two on-site landfills. During the removal, one project area had asbestos-containing material mixed with the soil. The asbestos was removed along with the soil, which resulted in an additional scope of work for the MT project.

Increase in Project Boundaries
Removal of former munitions debris and/or munitions that did not function as designed was performed throughout the MT project areas in accordance with the ROD. The total project areas identified in the ROD was approximately 55 acres. However, during project implementation, one ROD-identified area was expanded to 224 acres based on new information developed during extensive site record reviews and geophysical surveys. Additionally, five new areas were discovered with the potential to contain former munitions and munitions debris. These areas were added to the MT project, which expanded the total area to 710 acres. Like the other MT project sites, these areas underwent site characterization and geophysical surveys to locate and remove the munitions and debris, which were disposed of in the Arsenal's two on-site landfills.

Cost Increase
The changes lead to significant cost growth for the MT project. The ROD-estimated cost was $2.75 million. Initial cleanup costs decreased approximately $0.5 million by eliminating soil excavation in specified areas; however, the additional project scope far outweighed the savings from the initial remediation. Overall, the project cost increased to approximately $7.03 million. This represents a cost increase of approximately 156 percent over the ROD estimate.

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 proposed changes are detailed in the "Explanation of Significant Differences for the Munitions (Testing) Soil Remediation Project," dated September 25, 2008. Design documents are available for public review and comment (see bottom of fact sheet for locations).

What are the Significant Changes?
The significant changes involve transporting remediation waste to an off-site approved disposal facility because the Arsenal's landfills are now closed.

The HWL and ELF had significant cost increases, which are detailed below in Tables 1 and 2. The HWL and ELF projects increased in cost by 185 and 77 percent respectively due to cell construction, operations, closure and project oversight/support. Even with these cost increases, the overall cleanup program remains on budget due to cost savings on other cleanup projects.

HWL Cost

Table 1: Changes to HWL Project Costs[1]

Cost Element	ROD Baseline Cost[2]	Escalated ROD Cost	Actual or Estimated Cost	Difference from ROD	Percent Change
Cell Construction	**$ 14,833**	**$ 16,985**	**$ 29,494**	**$ 14,661**	
Excavate Biota/HHE Soil	$ 1,808[4]	$ 2,070	$ 2,833	$ 1,025	
Materials/Cell Construction	$ 6,610	$ 7,569	$ 10,121	$ 3,511	
Leachate Treatment System	NA	NA	$ 5,684	$ 5,684	
Leachate Conveyance System	NA	NA	$ 2,104	$ 2,104	
Ancillary Systems	NA	NA	$ 3,818	$ 3,818	
Operations	**$ 12,156**	**$ 15,425**	**$ 24,976**	**$ 12,821**	
Increase in disposal volume	NA	NA	$ 6,091	$ 6,091	
Facility maintenance	NA	NA	$ 897	$ 897	
Operational Groundwater Monitoring	NA	NA	$ 1,306	$ 1,306	
Intermediate Cover	NA	NA	$ 2,303	$ 2,303	
Sludge Management	NA	NA	$ 133	$ 133	
Closure[3]	**$ 8,076**	**$ 11,960**	**$ 30,113**	**$ 22,037**	
Final cap components	$ 7,176	$ 10,627	$ 19,370	$ 12,194	
Gravel Capping Layer	NA	NA	$ 3,039	$ 3,039	
Miscellaneous Construction	NA	NA	$ 4,611	$ 4,611	
Revegetation	$ 344	$ 509	$ 1,980	$ 1,637	
Project Oversight/Support	**$ 1,717**	**$ 2,225**	**$ 20,153**	**$ 18,435**	
Total Estimated Project Costs	**$ 36,781**	**$ 46,596**	**$ 104,736**	**$ 67,955**	**+ 185 %**

[1]Costs presented in $1,000s.

[2]ROD costs are in 1995 dollars.

[3]Costs based on estimate at completion.

[4]Cost for excavation of HHE soil ($210) is included in the ELF project in the ROD baseline estimate.

ELF Cost

Table 2: Changes to ELF Project Costs[1]

Cost Element	ROD Baseline Cost[2]	Escalated ROD Cost	Actual or Estimated Cost	Difference from ROD	Percent Change
Cell Construction	**$ 13,472**	**$ 18,059**	**$ 20,523**	**$ 7,051**	
Materials/Cell Construction	$ 10,513	$ 14,093	$ 15,053	$ 4,540	
Leachate Riser Control Houses	NA	NA	$ 1,017	$ 1,017	
Leachate Storage/Loadout Facility	NA	NA	$ 847	$ 847	
Ion Exchange System (LWTS)	NA	NA	$ 271	$ 271	
CCSCS	NA	NA	$ 1,390	$ 1,390	
Support Facilities	$1,166	$1,563	NA	($1,166)	
Operations	**$ 22,283**	**$ 31,815**	**$ 22,607**	**$ 324**	
Waste Placement / Emission Control	$ 21,735	$ 31,032	$ 19,035	($ 2,699)	
Facility maintenance	NA	NA	$ 428	$ 428	
Operational Groundwater Monitoring	NA	NA	$ 647	$ 647	
Operations Facility Demolition	NA	NA	$ 825	$ 825	
Closure[3]	**$ 5,526**	**$ 8,554**	**$ 22,099**	**$ 16,573**	
Final cap components	$ 4,928	$ 7,630	$ 15,751	$ 10,823	
Leachate Disposal	NA	NA	$ 724	$ 724	
Revegetation	$ 49	$ 76	$ 2,674	$ 2,625	
Project Oversight/Support	**$ 1,912**	**$ 2,532**	**$ 11,107**	**$ 9,195**	
Total Estimated Project Costs	**$ 43,193**	**$ 60,961**	**$ 76,336**	**$ 33,143**	**+ 77 %**

[1]Costs presented in $1,000s.

[2]ROD costs are in 1995 dollars.

[3]Costs based on estimate at completion.

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 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) 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 beginning June 13, 2008, in the *Denver Post*, *Rocky Mountain News, Brighton Blade, Commerce City Beacon and Gateway News* 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 April 10, 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 July 14, 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 Army, in consultation with EPA and CDPHE, believes that the HWL and ELF Projects, 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 HWL, ELF, or approved off-site facility, and are cost effective.

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Document Locations

- Joint Administrative Record and Document Facility (JARDF)
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