



Explanation of Significant Differences for the Basin F/Basin F Exterior Remediation Project

Fact Sheet

INTRODUCTION

This fact sheet documents a significant change for the Basin F/Basin F Exterior Remediation Project of the Rocky Mountain Arsenal (RMA) Federal Facility Site.

The Basin F/Basin F Exterior Remediation area is located in the north-central portion of the site. The Basin F impoundment area was used from 1956 to 1981 for the solar evaporation of liquid waste from Army and Shell chemical manufacturing operations. Common industrial and waste disposal practices used during this time at the Basin F area and elsewhere resulted in contamination of chemical sewer lines, ditches, drainage areas and surface soil.

Prior to the Record of Decision (ROD), an Interim Response Action was conducted to drain and incinerate liquid waste from Basin F, consolidate the remaining sludges and backfill the area with a clean soil cover.

The original project outlined in the ROD involved excavating contaminated soils from Basin F and areas outside the Basin (the Basin F Exterior) and constructing a Resource Conservation and Recovery Act (RCRA)-Equivalent cover over Basin F. During design, changes were made to both site and project boundaries. These changes, along with an increase in

remediation volumes and a decrease in project costs, resulted in the need for an Explanation of Significant Differences (ESD).

EXPLANATION OF SIGNIFICANT DIFFERENCES

This ESD summarizes modifications to the Basin F/Basin F Exterior 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 an increase in remediation volumes and a decrease 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 remedy requirements for the Basin F/Basin F Exterior Remediation Project included excavation of human health exceedance (HHE) soil and biota soil (soil posing a risk to wildlife) from the areas outside Basin F (the Basin F Exterior). Excavated materials were disposed of on-site. The remedy also included constructing a protective cover over Basin F.

During design, changes were made to both site and project boundaries (including the Basin F boundary), resulting in increased volumes of both

HHE and biota risk soils requiring remediation in the Basin F Exterior areas. Sampling conducted after excavation resulted in additional remediation volume increases and contingent soil volume (CSV). (CSV is defined as all soil excavated in excess of design or actual volume that is located outside the ROD remediation limits as identified in the Soil Quantity Calculation Summary Report.)

Over-excavation beyond the required design and CSV limits to ensure complete remediation also contributed to the total volume increase. The total actual volume of HHE soil removed was 141,496 cubic yards (cy), a 97 percent increase above the ROD-identified HHE soil volume of 71,906 cy. The total actual volume of biota soil removed was 254,116 cy, a 60 percent increase above the ROD-identified biota soil volume of 158,700 cy.

Changes to the project also resulted in a significant cost decrease for the project. The ROD-estimated cost for implementation of the Basin F/Basin F Exterior Remediation Project was approximately \$32.3 million. There was some cost growth due to increased remediation volumes for HHE soil and biota risk soil, revegetation and engineering oversight and reporting cost increases. However, reduction in mobilization costs, and, most significantly, reduction of the area requiring a Resource Conservation and Recovery Act (RCRA)-equivalent cover and reduction in required gradefill volume more than offset all cost increases. Overall, project costs decreased to approximately \$19.7 million, which represents a cost decrease

of approximately 39 percent from the ROD estimate.

Although these significant remediation volume and cost changes resulted in the need for an ESD, 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 Basin F/Basin F Exterior Project” dated Jan. 13, 2011. 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?

Increase in Remediation Volumes

The three primary causes of HHE soil increases were design changes (particularly the Basin F boundary change resulting in new HHE remediation southeast of Basin F), additional soil removal (from the same area southeast of Basin F) and over-excavation. The total actual volume of HHE soil removed was 141,496 cy, a 97 percent increase above the ROD-identified HHE soil volume of 71,906 cy.

The two primary causes of biota soil increases were design changes (particularly the inclusion of stockpiles from the Basin F Interim Response

ROD-Prescribed Remedy	Modification	ROD-Prescribed Remediation Volume (bcy)^{1,2}		Actual Remediation Volume (bcy)		Percent Change
Excavate HHE soil and dispose in on-post HWL.	HHE Soil Volume increase. Design volume increased to 91,682 cy, mainly due to Basin F boundary revision (with corresponding increase in area of NCSA-4b). Added 30,985 cy of CSV and over-excavation of 37,784 cy.	HHE Soil		HHE Soil		
		Area	Volume	Area	Volume	
		NCSA-4a	3,381	NCSA-4a	7,875	
		NCSA-4b	68,525	NCSA-4b	130,922	
		NCSA 5c	0	NCSA 5c	2,699	
Total Project HHE Soil Volume Change		71,906		141,496		+ 97 %
Excavate biota risk soil and dispose in Basin A or Basin F, as designated.	Biota Risk Soil Volume Increase. Design volume increased to 209,889 cy, due to biota area transfers from Section 35 and Secondary Basins Project areas and Basin C boundary revision that transferred additional biota soil area to NCSA-4b. Added 44,227 cy of over-excavation.	Biota Soil		Biota Soil		
		Area	Volume	Area	Volume	
		NCSA-4a	4,756	NCSA-4a	5,541	
		NCSA-4b	139,566	NCSA-4b	217,973	
		NCSA-5c	14,378	NCSA-5c	0	
				Stockpiles	30,602	
Total Project Biota Risk Soil Volume Change		158,700		254,116		+ 60 %

Action, narrowing of the site within the remediation area known as the Sand Creek Lateral, and re-designation of areas that were not designated as contaminated in the ROD as biota soil) and over-excavation. The total actual volume of biota soil removed was 254,116 cy, a 60 percent increase above the ROD-identified biota soil volume of 158,700 cy.

These changes resulted in a significant increase in remediation volumes compared to the ROD estimates, as shown in the table above.

Decrease in Project Cost

The ROD-estimated cost for implementation of the Basin F/Basin F Exterior Remediation Project was approximately \$32.3 million. There was some cost growth due to increased remediation volumes for HHE

soil and biota risk soil, revegetation and engineering oversight and reporting cost increases. However, reduction in chemical sewer excavation volume, reduction in mobilization costs, and, most significantly, reduction of the area requiring a RCRA-equivalent cover and reduction in required gradefill volume more than offset all cost increases. Overall, project costs decreased to approximately \$19.7 million, which represents a cost decrease of approximately 39 percent from the ROD estimate.

The costs decreased significantly from the ROD estimates, as shown on the table on the next page.

Previous ESDs

An ESD was written for this project in 2000 to eliminate the ROD-required removal of contaminated soil beneath

Cost Element	ROD Cost	Actual Cost ¹	+ Increase or (Decrease)	Reason for Change
Mobilization/Demobilization	\$ 1,271,000	\$ 586,000	(\$ 685,000)	Shared Subcontractor with ICS [actual cost is to grout]
Chemical Sewer Excavation	\$ 0 ²	\$ 12,000	+\$ 12,000	
Excavation (HHE and biota soil)	\$ 3,503,000	\$ 4,233,000	+ \$ 730,000	Increase in HHE and biota risk soil volumes
Install Gradefill	\$ 11,198,000	\$366,000	(\$10,832,000)	Reduced gradefill requirements
RCRA-Equivalent Cover	\$13,733,000 ³	\$ 9,826,000	(\$ 3,907,000)	Reduced cover area
Revegetation	\$ 616,000	\$ 1,342,000	+ \$ 726,000	Incorporating soil amendments in borrow areas 3 & 4
Other Project Costs	\$ 1,980,000	\$ 3,295,000	+ \$ 1,315,000	Increased engineering, QC and QA oversight and reporting
Total Estimated Project Costs	\$ 32,301,000	\$19,660,000	(\$12,641,000)	Total % change = - 39 %

and adjacent to the former chemical sewer within the remediation area. A second ESD was written in 2009 to require the construction of a RCRA-equivalent cover over a segment of chemical sewer encountered during construction of the Basin F cover.

The required remedy, including changes from ESDs, included the following:

Soil Remediation of Basin F Exterior:

- Excavate HHE and biota soil from three sites within the Basin F Exterior Remediation project area—the Deep Well Injection Site, Basin F Exterior Soils and Sand Creek Lateral. Dispose of excavated HHE soil in the Hazardous Waste Landfill and biota soil in either Basin A or Basin F, as designated.
- Backfill remediated HHE soil areas with clean soil.

- Finish grade and revegetate all disturbed remediation and borrow areas.

Cover Construction over Basin F:

- Place additional gradefill as necessary.
- Construct the RCRA-Equivalent cover system.
- Re-vegetate all cover areas and other disturbed areas.
- Install lysimeters, drainage channels and site Engineering Controls (erosion/settlement monuments, survey monuments, signs and obelisks) and fence and perimeter access road around Army-maintained area.

SITE HISTORY

RMA is located in Adams County, Colorado, approximately 10 miles northeast of downtown Denver.

The RMA On-Post Operating Unit currently encompasses 1,038 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 Co. 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.

All fieldwork related to the 31 environmental cleanup projects outlined in the ROD has been successfully completed, within budget and a year ahead of schedule. Documentation related to program completion will conclude in 2011. Groundwater treatment will continue until all water leaving the site meets federal and state standards.

With the environmental cleanup concluding, the transformation of the Rocky Mountain Arsenal into a premier urban national wildlife refuge is nearly complete.

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. In September 2010, the Army transferred another 2,500 acres to the Service, bringing the Refuge to its final size of roughly 15,000 acres. The remaining 1,100 acres, which contain the landfills, soil cover areas and groundwater treatment plants, will be permanently retained by the Army to ensure the remedy performs as designed and remains protective of human health and the environment.

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. The Refuge also offers sanctuary to 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) 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.

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 were 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 was 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 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 were other sources of contaminant releases to the groundwater.

PUBLIC PARTICIPATION

A public notice was published beginning Nov. 30, 2010, 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 Basin F/Basin F Exterior Remediation Project. The public notice also explained how to provide comments and where the document could be obtained for review.

A presentation explaining the proposed changes was provided to the Arsenal's Restoration Advisory Board (RAB) on Nov. 9, 2010. The RAB is a community group that meets regularly to receive information and provide input on the cleanup.

The public comment period closes on Dec. 30, 2010. 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.