Explanation of Significant Differences for
North Plants Soil Remediation of the Rocky Mountain Arsenal Federal Facility Site
Fact Sheet

Introduction

This fact sheet summarizes a significant change to the remedy for the North Plants Soil Remediation of the Rocky Mountain Arsenal (RMA) Federal Facility Site. North Plants was constructed by the Army from 1950 to 1953 as a chemical nerve agent manufacturing facility to produce sarin (GB). The complex covers approximately 90 acres located within the northern portion of the site. Production of GB began in April 1953 and continued intermittently until 1957. The Army redistilled low purity GB intermittently from 1964 to 1970. The facilities also were used by the Army to containerize, transfer, store, demilitarize/neutralize and dispose of chemicals and munitions. As part of the Record of Decision, which outlines RMA's 31 specific cleanup projects, North Plants' 59 structures were demolished by 2001 and placed into the on-site double-lined Hazardous Waste Landfill (HWL) and the on-site disposal basin known as the Basin A consolidation area (Basin A).

Summary of the Selected Remedy

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 RMA 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 RMA contamination 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.

The North Plants Soil Remediation is made up of six areas identified in the ROD consisting of chemical sewers, surface drainage areas and surface soils surrounding the old facility's structures where contamination was present. The ROD remedy requirements are described below.

- Excavate chemical sewers and associated Human Health Exceedance (HHE) soil and dispose in the on-post double-lined (HWL)
- Excavate North Plants surface HHE soil and dispose in the on-post double-lined HWL
- Monitor for chemical agent during excavation and treat agent-contaminated soil by caustic solution washing.
- Backfill HHE soil excavations with clean soil.
- Construct a two-foot-thick soil cover over soil posing a potential risk to biota and the boundary of the North Plants processing area.
- Excavate soil posing a potential risk to biota that is located outside the two-foot-thick soil cover and consolidate into Basin A for containment under a clean soil cover.
- Reseed all disturbed areas with native vegetation

Explanation Of Significant Differences (ESD)

During design for the remedy for the North Plants Soil Remediation, new information obtained by the Army during detailed document review, and developed during additional field design investigation and implementation, resulted in significant changes to the remediation volumes and project cost. Changes to remediation boundaries and depths based on the extent of HHE areas resulted in a 277 percent increase in the HHE volume. For biota risk soil, the remedy was changed to include excavation and consolidation to Basin A. Additionally; the biota risk soil remediation area decreased significantly resulting in a 58 percent decrease in the remediation volume. Together, these changes resulted in a cost increase of approximately 73 percent greater than the ROD estimate. *These changes, while necessitating an ESD, do not alter the overall hazardous waste management approach that was selected in the ROD.*

These proposed changes to the North Plants Soil Remediation are detailed in the "Explanation of Significant Differences for the North Plants Soil Remediation Volume, August 27, 2004." 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 HHE Remediation Volumes

The primary change for HHE remediation volume results from changes to the excavation depth and width of the chemical sewers trenches. These changes were based on the difference in the actual depth of the pipe compared to what was expected and over excavation of depth and width requirements during implementation. These changes increased the HHE volume from 11, 200 bank cubic yards (bcy) to 42,307 bcy.

In addition, two surface remediation areas were added to the North Plants Soil remediation during design data review. Volume excavated from the surface HHE areas increased from 222 bcy to 803 bcy,

bringing the total North Plants HHE soil volume to 43,110 bcy. Table 1 summarizes the changes in the HHE soil volumes. Overall, the HHE soil remediation volume increased from the ROD-identified volume by 62 percent during design and 277 percent during implementation.

Changes to Biota Risk Soil Remediation Volumes

For biota risk soil areas in North Plants, the ROD remedy is containment in place beneath a two-foot-thick soil cover. During design, the remedy was modified to excavation with consolidation under the Basin A cover. This change was incorporated to take advantage of implementation efficiency and to prevent cross contamination between soil and structures debris during the structures demolition and foundation removal.

The biota risk soil remediation volume was modified during design and implementation to eliminate structures footprints and other asphalt and concrete areas from the excavation boundaries. These changes decreased the total biota risk soil volume from 17,140 bcy to 7,234 bcy. Overall, the biota risk soil remediation volume decreased from the ROD-identified volume by approximately 58 percent.

The baseline estimated cost for the North Plants Soil portion of the North Plants Structure Demolition and Removal Project based was $1.1 million based on cost estimates presented in the ROD. The baseline estimate represents original ROD estimated costs reorganized to reflect implementation project descriptions in the RDIS. The final cost for excavation of North Plants HHE and biota risk soil is estimated at $1.9 million. The cost increase is directly related to the substantial HHE soil volume increase. The remedy change for biota risk soil from containment to excavation had minimal impact on project cost because the entire area was being disturbed during the structures demolition and foundation removal. Overall, this represents a cost increase of $0.8 million above the ROD-estimated cost, or a 73 percent increase. Although the cost for soil remediation in North Plants increased compared to the ROD estimate due to the HHE soil volume increase, an overall program cost savings was realized by executing the structure and soil remediation efforts jointly.

The tables on the next page show the actual volume excavated compared to the volumes identified in the ROD remedy. All other aspects of the remedy were implemented as detailed in the 1996 ROD.

Site History

RMA is located in Adams County, Colorado, approximately 10 miles northeast of downtown Denver. The RMA On-Post OU encompasses 17.2 square miles 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 described the site-wide remedy for 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. 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.

SUMMARY OF THE ROD REMEDY AND THE ESD CHANGES

Table 1: Changes to Human Health Soil Remediation Volumes

ROD-Prescribed Remedy	Modification	Total HHE Soil Volume (bcy)		
		ROD	Design	Actual
Excavate ROD HHE volume and dispose in on-post HWL.	**Increase: Volume Changes from Adjustments to Excavation Depths and Over excavation.** Chemical sewer depths were shallower than previously identified, resulting in additional HHE soil excavation to achieve the minimum 10-foot depth requirement. Other increases resulted from over excavation of required widths and depths due to excavation methods.	**11,442**	**18,589**	**43,110**
Percent Change from ROD			**+ 62 %**	**+ 277 %**

Table 2: Changes to Biota Risk Soil Remediation Volumes

ROD-Prescribed Remedy	Modification	Total Biota Risk Soil Volume (bcy)		
		ROD[1]	Design[2]	Actual[3]
Construct 2-ft-thick soil cover over biota risk soil area.	**Enhancement: Eliminate containment in place.** Excavate ROD biota risk soil volume and consolidate to Basin A. **Reduction: Volume decrease due to change in actual biota risk area.** Eliminate excavation for structures footprints and other asphalt or concrete areas.			
Excavate biota risk soil volume and consolidate to Basin A.	**No Change.** ROD-identified biota risk soil volume excavated and consolidated to Basin A. Volume increase due to over excavation.			
Total Biota Risk Soil Volume		**17,140**	**10,167**	**7,234**
Percent Change from ROD			**- 41 %**	**- 58 %**

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.

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

Site Contamination

The contaminated areas within the On-Post Operable Unit include 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 metal 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 August 20, 2004 in the *Denver Post* and *Rocky Mountain 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 proposed changes contained in the ESD will be provided to the RMA Restoration Advisory Board (RAB) on August 26, 2004. The RAB is a community group that meets monthly to receive information and provide input on the cleanup being conducted at RMA. The public comment period will close on September 20, 2004. 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 volume change to the North Plants Soil Remediation Project.

This ESD and all documents that support the volume change 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 303-289-0362. 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 North Plants Soil project remedy, with the modifications described, satisfies the requirements of CERCLA Section 121, is protective of human 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.

For more information, please contact:

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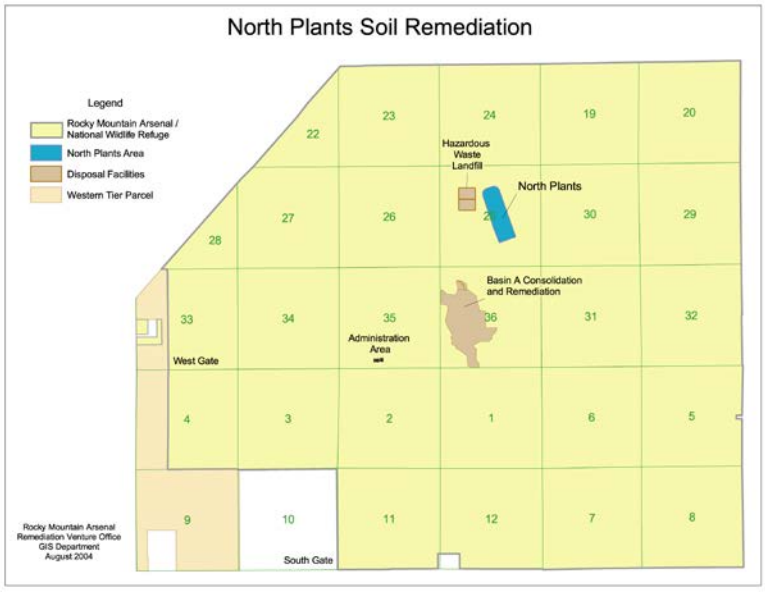
  (303) 312-6660

- Colorado Department of Public Health & Environment
  Barbara Nabors
  State Project Officer
  (303) 692-3393

Document Locations

- Joint Administrative Record and Document Facility (JARDF)
  Rocky Mountain Arsenal, Building 129
  Commerce City, Colorado 80022
  Monday – Friday 12 – 4 p.m. or by appointment (303) 289-0362

- EPA Superfund Records Center
  999 18th Street
  Denver, CO 80202
  303-312-6473
  Monday – Friday 8 – 4 p.m.



North Plants Soil Remediation Areas