APPENDIX B:

Remediation Design and Implementation Schedule

Project Descriptions

November 2010

APPENDIX B

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APPENDIX B
PROJECT DESCRIPTIONS

1.0 INTRODUCTION

Appendix B has been prepared to provide the reader with a description of the Implementation Projects, Site-Wide Programs, Water Treatment and Monitoring, Program Management, and Off-Post Remedy as listed in the implementation schedule (Appendices C-P). All the components of the selected remedy (Chapter 9 of the Record of Decision (ROD)) are addressed in this Appendix. The smaller remedy components, not listed as individual projects, will be found within larger project descriptions. Two figures are located at the end of this Appendix. Figure 1 is the Remediation Implementation Areas and Figure 2 is the Conceptual Logic Flow Diagram.

It is intended that the information in this Appendix provide a general overview of the work to be performed, currently defined (approved changes) as of the defined data date for this publication. While the Remediation Venture Office (RVO) strives to ensure accuracy of this information, details concerning specific scope changes are documented in the appropriate design documents (such as Design Change Notice (DCN), Explanation of Significant Differences (ESD), and ROD Amendments), operations manuals, and/or Construction Completion Reports (CCR) for that project (reference Table B-1). For that reason the scope descriptions within the Remediation Design and Implementation Schedule (RDIS) should be used only as a reference for understanding the Rocky Mountain Arsenal (RMA) remediation program.

Table B-1 ROD Change Documentation

Project	Change Type	Applicable Sections in Appendix B	Change	EPA Approval Date *
Basins F/ Basin F Exterior	ESD	7,3	Document increases in remediation volume for human health soil and biota risk soil. Document overall decrease in project cost.	In Progress
Groundwater Remedy Changes	ESD	9.5, 9.6, 9.7, 9.8, 9.9	Shut-off criteria, Practical Quantitation Limits (PQL) process, fluoride standard The Regulatory Agencies would like to delay until approval of Long-Term Monitoring Plan (LTMP); possibly add surface water program changes; Containment System Remediation Goals (CSRG) selection process	In Progress
North Plants Soil Cover	ESD	6.6	Eliminate soil cover	January 2009

Basin F Cover	ESD	7.3	Add chemical sewer remediation and revise extent of Basin F cover to include sewer	January 2009
Basin F Wastepile	ESD	7.1	Cost decrease (volume decrease, vapor controls)	April 2009
Munitions Testing	ESD	4.5	Change in remediation volume, Munitions and Explosive of Concern (MEC) area and cost growth	November 2008
Section 36 Balance of Area (BOA)	ESD	6.2	Document soil volume and cost changes	October 2009
Off-Post Groundwater Intercept and Treatment – Northern Pathway System	Fact Sheet	12.2	Northern Pathway System relocation	In Progress
Waste Disposal	ESD	2.1, 2.2, 4.10	Off-site disposal, cost growth for Hazardous Waste Landfill (HWL), and Enhance Hazardous Waste Landfill (ELF)	September 2008
Miscellaneous Southern Tier and Section 35 Soil	ESD	4.7, 6.7	Sand Creek Lateral and other ditches volume and cost increases	June 2008
Resource Conservation and Recovery Act (RCRA)-Equivalent Covers (Basin A, South Plants CPA, Complex Army Trenches, Section 36 Lime Basins, Basin F)	Fact Sheet	2.3, 5.3, 6.4,7.3, 7.4	Change Basin A and South Plants to RCRA-Equivalent Covers; change biota barrier for Basin A and Complex Trenches from 6-inch poured concrete to 16-inch crushed concrete; add lysimeters for compliance monitoring; add geotexile for capillary break; delete 1-foot backfill for BOA	April 2008
Landfill Wastewater Treatment System	Fact Sheet	2.1	Revise discharge standards	June 2007
Shell Disposal Trenches	ESD	2.3, 5.3, 6.4, 6.5, 7.3, 7.4	Extend RCRA-Equivalent Cover area to extent of slurry wall and also to cover the former drum storage area; add 2-foot soil cover for area adjacent to the Shell Trenches; document changes to the RCRA-Equivalent Cover requirements and the associated cost increases	June 2006
Groundwater Remediation and Revegetation	ESD	8.14, 9.10, 9.11	Delete lake level maintenance requirement for purposes of groundwater contaminant plume control; add contaminant reduction system for South Tank Farm Plume and South Plants North Plume; clarify revegetation requirements to be	March 2006

			consistent with U.S. Fish and Wildlife Service (USFWS) management plan and require USFWS certification for implementation	
Section 36 Bedrock Ridge	ESD	4.8	Document change to design to replace horizontal well with vertical extraction wells and corresponding cost decrease	May 2006
Section 36 Lime Basins, Basin F	ROD Amendment	2.2, 7.2, 7.4	Change selected remedy for Section 36 Lime Basins from excavate/landfill to RCRA-Equivalent Cover and groundwater barrier wall. Change selected remedy for Basin F Principal Threat (PT) Soil form in-situ solidification to excavate and dispose in ELF	October 2005
Existing Sanitary Landfills	ESD	4.2	Documents volume changes to Human Health Exceedance (HHE) soil, biota soil and trash/debris and project cost increase	May 2005
North Boundary Containment System	Fact Sheet	9.8	North Boundary Containment System enhancements to the well field and treatment systems summary of new technology	April 2005
North Plants Structures	ESD	6.8	Documents changes to HHE soil volume and biota soil volume	September 2004
Burial Trenches	ESD	4.4	Document decrease to HHE soil volume and increase in munitions debris/soil volume; document overall project cost increase	July 2004
Section 36 BOA	ESD	6.2	Delete excavation of soil along previously excavated chemical sewer line in Sections 36; delete 1-foot and 2-foot soil covers; document boundary change between Basin A and CSA-1b and resulting volume reduction	April 2010
South Lakes Plume Monitoring	Fact Sheet	9.10	Delete ROD requirements for lake level maintenance and plume control at Lake Mary	April 2003
Hex Pit	ROD Amendment	5.2	Change selected remedy from in-situ thermal treatment to excavate and dispose in on-site landfill	April 2003
Basin F/Basin F Exterior Soil Remediation Project	Fact Sheet	7.3	Describes changes to Basin F boundary based on review of aerial photography, topography	July 2003

			and additional soil sampling. Contaminated soil between the ROD boundary and modified boundary was excavated and disposed in the HWL	
Secondary Basins	ESD	2.3, 6.3	Excavate biota soil and dispose in Basin A; delete 2-foot soil covers for Basins B, C and D	February 2002
Confined Flow System	Fact Sheet	9.4	Change well evaluation criteria	March 2002
Northwest Boundary Containment System	Fact Sheet	9.8	Change CSRGs	March 2002
On-Post and Off-Post Groundwater Containment Systems	ESD	9.5, 9.6, 9.8, 9.9,12.2	Change endrin CSRG based on change to the Colorado Basic Standard for Groundwater (CBSG)	November 2001
South Plants	ESD	5.3, 5.4	Delete 1-foot soil cover; modify 3-foot soil cover; modify 4-foot soil cover	November 2000
Chemical Sewers	ESD	6.3, 6.7	Delete excavation of soil along previously excavated chemical sewer line in Sections 26 and 35	November 2000
Toxic Storage Yards	Technical Justification	4.1	Document HHE soil volume increase	May 1999
Complex Trenches Slurry Wall Project	Fact Sheet	3.2	Design modifications to the Complex Trenches Slurry Wall Project at the RMA.	April 1997

*Dates shown for Fact Sheets represent final document date.
Planned – Document is planned but has not been started
In progress – Document is being worked, but is not final.

2.0 DISPOSAL FACILITIES – BASIN A/LANDFILLS

The disposal facilities are comprised of three projects: HWL, ELF, and Basin A Consolidation. This section provides site descriptions, project sites/history, project descriptions, and dependent project discussions.

2.1 Construction of Hazardous Waste Landfill

Site Description: The On-Post HWL is located in the western portion of Section 25.

Project Sites/History:

- NCSA-4b – Secondary Basins – Basins F Exterior – Surface contamination; includes the portion of the site within the Corrective Action Management Unit (CAMU) boundary.

Project Description:

a) Close or protect monitoring wells, as required.

b) Construct the first doubled-lined cell of a RCRA - and Toxic Substance Control Act - compliant HWL in Section 25. The construction project includes all site development and preparatory work for the overall site and all standard hazardous waste cell(s); staging and treatment facilities; fencing; leachate collection, pumping, and treatment; truck scales; landfill security, operations, and equipment storage facilities; monitoring wells; haul roads; and stormwater drainage control.

c) Construct additional cells, liners, and leachate collection systems within the overall footprint as necessary to reach the total capacity required for the RMA On-Post Remedy.

d) Construct a RCRA Cover. The cover system includes placing a minimum 16-inch layer of crushed concrete as a human/biota barrier.

e) Re-establish vegetation over the landfill and borrow areas (BA).

Dependent Projects: The HWL is the keystone project in the early years of the RMA remedy. Nine separate projects are solely dependent upon the landfill's availability to accept hazardous wastes. An additional nine projects are dependent upon both the HWL and the Basin A consolidation area. None of these 18 projects may begin until the landfill is ready for operations. Figure 2, Conceptual Logic Flow Diagram, depicts these project interrelationships. Stored drummed waste will be disposed of in the HWL.

2.2 Construction of Enhanced Hazardous Waste Landfill

Site Description: The triple-lined ELF will permanently store waste from the Basin F Wastepile and the Basin F PT Soils in two separate cells. The facility is located in the western portion of Section 25, just south of the double-lined HWL.

Project Sites/History:

- No Study Area Report (SAR) sites are associated with this project.
- The construction of the ELF consists of one site. The site includes Biota Exceedance and Priority 1 (P1) soils that need to be removed before work can begin.

Project Description:

a) Perform site study as provided in the final CAMU document.

b) Perform a chemical compatibility-testing program to document long-term performance of the compact clay liners.

c) Construct two triple-lined cells in Section 25. The total capacity of the ELF will be approximately 1,200,000 bank cubic yards (bcy).

d) Construct a leachate storage/load-out facility for off-site disposition of leachate and contaminated stormwater.

e) Construct a Contingent Contaminated Stormwater Management System to disposition incidentally contaminated waste streams to the Landfill Wastewater Treatment Facility or contaminated waste streams for off-site disposal/treatment.

f) Construct modifications to the existing Landfill Waterwater Treatment System to allow for the treatment of wastewater from the remediation of the Basin F Wastepile and the operation of the ELF. The Modifications will include the addition of an ion exchange system and supporting equipment to allow for the treatment of metals at the existing treatment plant.

g) Construct a RCRA Cover. The cover system includes placing a minimum 16-inch layer of crushed concrete as a human/biota barrier.

h) Re-establish vegetation over the landfill and BA.

Dependent Projects: The ELF is the keystone project in the middle years of the RMA remedy. Two separate projects are dependent upon the enhanced landfill's availability to accept hazardous wastes.

2.3 Basin A Consolidation and Remediation

Site Description: The Basin A project is composed of two sites: Basin A and a burn site. These sites are located in Section 36 within the high-water line of Basin A, where manufacturing effluent was received and retained from the South Plants via the Lime Settling Basins. Historic waste disposal in Basin A has resulted in elevated salt concentrations in the soil due to its high chloride content.

The Basin A group can be subdivided into three regions based on differing contaminant types and concentrations. High concentrations of organochlorine pesticides (OCP), arsenic, and chromium that exceed the human health site evaluation criteria (SEC) characterize the eastern region. The southern region is characterized by high concentrations of OCPs, and arsenic that exceed the human health SEC. The northern region is characterized by low concentrations of OCPs, arsenic, and mercury. However, chlordane is present at concentrations exceeding the human health SEC. Portions of these three regions contain agent and potentially contain Unexploded Ordnance (UXO). Additionally, parts of Basin A exceed principal threat criteria. Human health and PT exceedances may occur to an approximate depth of eight feet.

Project Sites/History:

- NCSA-1a – Basin A – located in Section 36 within the high-water line of Basin A, where manufacturing effluent was received and retained from the South Plants via the Lime Settling Basins

- NCSA-1e – Burn Site – South Plants Operations – used to incinerate munitions and trash from the South Plants

Project Description:

a) Close or protect monitoring wells, as required.

b) A foundation layer will be placed within the Basin A footprint to protect wildlife and provide a safety buffer to field workers to mitigate the cost and time required for surface UXO clearance. This foundation layer will be established with biota and P1 soils from the CAMU.

c) Stabilize Basin A soil as necessary to support material that will be consolidated in Basin A and subsequently covered. Contain the remaining exceedance soil in the former Basin A waste disposal lagoon by placing fill material to change the grade from a basin (depression) to a rise (hill). Fill material includes biota exceedance soil and trash/debris, structural debris, and clean soil fill borrowed from other RMA areas.

d) Construct a RCRA-Equivalent Cover System. The cover system includes placing a minimum 16-inch layer of crushed concrete as a human/biota barrier; final vegetation; and Engineering controls.

e) Re-establish vegetation over the disturbed remediation and BA.

Dependent Projects: The Basin A Consolidation is a keystone project in the early years of the RMA remedy. Nine separate projects are dependent upon both the HWL and the Basin A Consolidation area. With the exception of the removal of biota and P1 soils from the CAMU site (a subproject of the HWL Construction); there are no projects that are solely dependent upon the Basin A Consolidation. However, none of these nine projects may begin until Basin A is ready for operations. Figure 2, Conceptual Logic Flow Diagram, depicts these project interrelationships. The design of RCRA-Equivalent Caps for the Shell/Complex Trenches is dependent upon the design of Basin A.

3.0 EARLY START TASKS

The early start projects are comprised of three projects: Sanitary Sewer Manhole Plugging (Phase I), South Plants Central Processing Area (SPCPA), and Complex Trench

Chemical Sewer Plugging (this is one project); Shell/Complex Trench Slurry Walls; and Post-ROD Removal Actions for Structures. This section provides site descriptions, project sites/history, project descriptions, and related project discussions.

3.1 Sanitary/Chemical Sewer Manhole Plugging – Phase I

Site Description: The Sanitary/Process Sewer System includes four sites consisting of sanitary sewer lines and systems, process water lines, and sanitary sewer sediment. This project encompasses portions of the system located in Sections 1, 2, 25, 26, 35, and 36. These sites contain soil that was potentially contaminated by spillage or leakage from broken pipes or faulty joints and manholes in the sewer lines. Contamination entered these sewer lines through inadvertent disposal of liquid wastes or conveyance of contaminated groundwater. The majority of sewer piping is vitrified clay, although some sections are made of steel or cast-iron pipe. Soil around these sewer lines does not exceed human health site evaluation criteria (SEC) and does not pose risks to biota based on the average sewer line depth of 4 to 10 feet. However, these sewer lines potentially serve as conduits for migration of groundwater contamination.

The SPCPA and Complex Trench Chemical Sewer Plugging project is composed of portions of the chemical sewer system that are located within the SPCPA and the Complex Trenches. These sewer lines served the manufacturing areas in the North Plants and South Plants. The release of contaminants was caused by spillage or leakage from broken pipes or faulty joints and manholes in the sewer lines.

The chemicals of concern (COC) present for these sites that exceed the human health SEC include OCPs, chloroacetic acid, volatile organic compounds (VOC), and dibromochloropropane (DBCP). The highest concentrations of contaminants that exceed PT criteria were detected along the lines in the South Plants. Portions of the sewer lines may be characterized by the potential presence of agent. The depth of the sewer line in the South Plants is approximately 7 feet; the depth of the line in the Complex Trenches may vary from 3 to 8 feet.

Project Sites/History:

- NCSA-8a – Sewer Systems – Sanitary Sewer Lines to Sewage Treatment Plant – used as a waste lines
- WSA-7a – Sewer System – Sanitary Sewer Sediments
- CSA-3 – Chemical Sewer System – Complex Trenches Area - portions of site only

Project Description:

Sanitary Sewer Manhole Plugging – Phase I:

a) Plug the void space with concrete or grout inside approximately 100 remaining sanitary and process water sewer manholes in Sections 1, 2, 25, 26, 35, and 36. The remediation objective is to prohibit access and eliminate the sewer system as a potential migration pathway for groundwater.

b) Post-aboveground warning signs indicating sewer location every 1,000 feet.

SPCPA and Complex Trench Chemical Sewer Plugging:

a) Close or protect monitoring wells, as required.

b) Plug void space in the sewer with concrete or grout for approximately 11,000 linear feet of chemical sewer lines and approximately 60 manholes in the SPCPA in Section 1 and the Complex (Army) Trenches in Section 36. The remediation objective is to prohibit access to these lines and eliminate them as a potential migration pathway for groundwater. The plugged sewers are to be contained beneath the soil cover or the cap constructed in their respective sites.

Dependent Projects: This project is not dependent upon any other project to be completed. The Sanitary Sewer Manhole Plugging – Phase II will be a follow-on project later in the program.

3.2 Shell/Complex (Army) Disposal Trenches Slurry Walls

Site Description: The Shell Disposal Trenches Remediation project involves of one site comprised of approximately 18 trenches that were filled with a variety of solid and liquid wastes from Shell production facilities. Wastes were buried both in bulk form and in drums from 1952 through 1966. Due to the presence of high contamination levels, containerized waste, and historical evidence as a source of groundwater contamination, the entire site is considered a principal threat.

The historical contamination has been contained as part of the Shell Trenches Interim Response Action (IRA). A vertical barrier was installed around the site to reduce the migration of contaminated groundwater away from the site, and a soil cover was placed over the site to reduce rainwater infiltration through the contaminated area. The soil cover is approximately three feet thick and has been revegetated with native grasses. The vegetation types and the maintenance activities conducted at the site were designed to discourage burrowing animals from using the area for habitat.

The Shell Disposal Trenches themselves contain elevated levels of OCPs, hexachlorocyclopentadiene (HCCPD), and DBCP, which are encountered to a depth of ten feet. In addition to the COCs identified in the trenches, numerous nontarget compounds, which are intermediates and byproducts from the manufacturing of pesticides, are identified at concentrations as high as 40,000 parts per million (ppm).

Army agent-related compounds were also detected in soil samples and from nearby monitoring wells.

The Complex (Army) Trenches contain soil and debris disposed of in a series of trenches. The trenches were investigated during the Remedial Investigation (RI) and were found to contain trash and manufacturing and military waste including scrap metal, bricks, concrete and asphalt rubble, empty and full glass bottles, white phosphorous, containerized wastes, burned incendiary device casings, agent, and agent-filled ordnance and explosives (OE).

The Complex (Army) Trench areas are considered PT areas down to a depth of approximately 14 feet. In addition, contaminated soils outside of the anomalous trench areas contain chlordane exceeding human health SEC, generally within the 0- to 1-foot-depth interval. A large quantity of soil outside the trench areas contains COCs and may pose a potential risk to biota. The site is located in an area of disturbed vegetation types.

Project Sites/History:

- CSA-1a – Pesticide Pits – filled with a variety of solid and liquid wastes from Shell production facilities.

- CSA-1c – Complex Disposal Area North – used as a disposal site for manufacturing and military waste.

Project Description: The remedy for the Shell Trenches and Complex (Army) Trenches has been split into two implementation phases each: placement of the slurry walls and groundwater extraction system, and placement of the cap. The first implementation phase is addressed with this early start project and is comprised of the following:

a) Protect monitoring wells.

b) Drain trenches inside the slurry wall as determined by the approved design.

c) Correct the leaching condition originating from the disposal trenches in Section 36 by installing a slurry wall into competent bedrock around them.

d) Transport any explosive-containing munitions found to an approved site and detonate them.

e) Grade slurry wall spoil over the surface of the site.

Note: The fact sheet for the design modifications to the Complex Trenches issued in January 1998 describes the following design modifications:

1. The ROD states that the remedy for the Complex Trenches includes the installation of a slurry wall into competent bedrock around the disposal trenches to

augment the containment of contamination within this area. While the slurry walls were generally considered for only some of the trenches (Anomalous Areas D and E were excluded), the ROD language indicates that the trenches would be fully enclosed by a surrounding slurry wall. The modifications will propose installation of the slurry wall along only the western, northern, and southern boundaries of the Complex Trenches. As a result of the investigations and analyses performed, it was found that the bedrock material along the eastern boundary already serves as a cutoff and was providing a barrier to groundwater flow from the Complex Trenches. To install the slurry walls along the eastern boundary would only duplicate the existing bedrock with little-to-no additional containment achieved and three-to-seven-fold increase in cost. Construction time would also increase.

2. The ROD calls for the slurry wall to be installed into competent bedrock by keying the slurry wall into an underlying low permeability stratum.

3. As a result of the analyses conducted in the Technical Justification Report, the interdependency of the Complex Trenches and the Section 36 Bedrock Ridge project became apparent.

The slurry wall barrier technology selected is the Deep Soil Mixing method utilizing Impermix as the slurry compound.

Dependent Projects: The Shell and Complex (Army) Trenches will receive a RCRA-Equivalent Cap over the trenches and any slurry wall spoils. Vegetation will be re-established over the disturbed area. Thus, the RCRA-Equivalent Cap portion of the project depends on the slurry walls being complete. The future projects are called Shell Disposal Trenches Remediation and Complex (Army) Disposal Trenches Remediation. The RCRA-Equivalent Cap study must also be completed prior to its placement. The slurry wall project for the Complex (Army) Trenches is also related to the Section 36 Bedrock Ridge Groundwater Plume Extraction System project in that the two projects share common design goals.

3.3 Post-ROD Removal Actions for Structures

Site Description: The Post-ROD Removal Actions for Structures will take place in the North Plants and South Plants and are comprised of three separate projects. The first project includes the removal of non-agent-related chemical process equipment previously identified for removal under the Chemical Process-Related Equipment IRA in the South Plants. The second project includes the removal of remaining accessible and friable asbestos-containing material (ACM) previously identified for removal under the Asbestos Removal IRA in the North Plants. The third project is the continuation of non-agent-related chemical/process equipment removal (interior) in the South Plants.

Project Sites/History: No SAR sites are associated with this project.

Project Description:

Chemical Process-Related Equipment Removal (non-agent) (exterior):

a) Clear process-related equipment identified for removal through monitoring and removal of residual liquids. Sample removed liquids for disposal.

b) Decontaminate equipment by exterior and interior washing.

c) Cut up equipment for removal as scrap.

Asbestos Removal:

a) Remove in accordance with applicable Occupational Safety and Health Administration and U.S. Environmental Protection Agency (EPA) regulations.

Chemical Process-Related Equipment Removal (non-agent) (interior):

Design of the South Plants Interior Equipment Removal was delivered to the parties in September 1997. This project continues the efforts that began under the Chemical Process-Related Activities to the Interior of South Plants Structures, IRA 14. IRA 14 will be closed at the completion of the original Scope of Work (SOW). This SOW will be tracked under the title Phase II Chemical Process Equipment Removal (Interior), and will be subject to the requirements of the ROD and the Remedial Action process.

Related Projects: These removal actions are the completion of work begun under the Chemical Process-Related Equipment IRA and the Asbestos Removal IRA. Any chemical process equipment, piping, or asbestos remaining after completion of these actions will be performed under one of the three structures demolition projects.

4.0 PHASE I – OUTLYING AREAS

There are ten Phase I projects. These include two structure demolition projects: South Plants Structures and Miscellaneous Structures. There is one groundwater extraction project: Bedrock Ridge. The remaining seven projects are soil remediation and sanitary landfill. This section provides site descriptions, project sites/history, project descriptions, and related project discussions.

4.1 Toxic Storage Yards Soil Remediation

Site Description: The Toxic Storage Yards are a subgroup within the Agent Storage Medium Group. While the Detailed Analysis of Alternatives (DAA) identified several sites within this subgroup, only a few contain soil exceedances that will be remediate under this project. Two of the sites are located in Sections 5 and 6, respectively, in what

is known as the Old Toxic Storage Yard. The third site is located in Section 31 in the New Toxic Storage Yard. The sites are located in areas containing weedy forbs.

Primary COCs include isolated detections exceeding the human health SEC for chloroacetic acid and arsenic to a depth of six feet. These sites are considered to potentially contain agent, based on use histories and detections of agent breakdown products. However, sampling has not indicated the presence of agent.

Project Sites/History:

- ESA-3a – Agent Testing – Storage Yard – used as a storage area
- ESA-3b – Agent Testing – Old Toxic Storage Yard – used as a storage area
- ESA-3g – Agent Testing – Drum Storage/Spill Site – spill site area

Project Description:

a) Close monitoring wells, as required.

b) Excavate and dispose of HHE soil in the On-Post HWL. Screen potentially agent-contaminated excavated soil by sampling for agent, and treating any soil exceeding Army regulatory criteria.

c) Backfill the excavated area with clean soil borrowed from other RMA areas and grade as necessary to provide adequate drainage and to control erosion (Note: The New Toxic Storage Yards will be used as a BA).

d) Re-establish vegetation over the disturbed remediation and BA.

e) Demolish approximately 12 buildings and structures and haul the building debris to the Basin A Consolidation Facility for permanent disposal.

f) Remove railroad ballast, ties, and rail within and north of ESA-3b.

g) Remove infrastructure, including wooden utility poles, overhead cabling, metal light fixtures, and sanitary sewer manholes.

h) Rip the boundaries of ESA-3a and ESA-3b to a depth of 18-inches below grade. Ripping activities are to be screened with chemical agent monitoring equipment to confirm the soil was not agent contaminated.

Dependent Projects: The New Toxic Storage Yard may be used as a borrow site. The borrow site may support several other remedy projects.

4.2 Existing (Sanitary) Landfills Remediation

Site Description: The Existing (Sanitary) Landfills Remediation project consists of nine sites that include sanitary landfills and landfill trenches. These sites primarily contain trash and rubbish, but no agent or UXO. Containerized (drummed) waste was detected during site investigations. Habitats within these sites range from weedy forbs to native grasses. Several of the sites are located within the Bald Eagle Management Area (BEMA).

Characterization indicates the soil and debris contained within the landfills consist of rubbish, construction debris, wood, paper, asbestos, and metal piping. The contamination patterns are heterogeneous as various materials were disposed of in the same landfill trench.

The primary human health COCs and contaminants that potentially pose risk to biota include OCPs and Inductively-Coupled Argon Plasma (ICP) metals. Portions of the site contain mercury at levels that may pose potential risk to biota, but they are below the human health SEC. The maximum concentrations of OCPs and ICP metals and the average concentrations of isodrin, cadmium, and chromium exceed the human health SEC. The human health COCs were detected at depths ranging from the ground surface to approximately eight feet below ground surface. Soil posing potential risk to biota was found in the zero- to one-foot interval surrounding the landfills. Refuse, consisting of debris and soil, occurs to an average of eight feet below the ground surface.

Project Sites/History:

The Existing (Sanitary) Landfills Remediation project consists of nine sites. These sites include sanitary landfills and disposal trenches located in various RMA areas:

- CSA-1d – Sanitary Landfills/Incinerator 834 – used for burning and burial of contaminated and uncontaminated waste, located in Section 36.
- CSA-2d – Munitions Testing – NN3601 Incinerator Con – used for destruction of mines, located in Section 36.
- ESA-2b – Sanitary Landfill – used for disposal of On-Post sanitary waste, located in Section 30.
- SSA-4 – Sanitary Landfills/Trash Dump – used for surface disposal of miscellaneous construction debris, located in Section 1.
- WSA-2 – Sanitary Landfills West – Landfill – used for burning and disposal of uncontaminated and potentially contaminated waste, located in Section 4.
- WSA-3c – Sanitary Landfills – East Landfill/Main Area – used for burning, burial, and surface disposal of uncontaminated waste, located in Section 4.

- WSA-5a – Sanitary Landfills – North Landfill Trench – used for burning and disposal of uncontaminated and potentially contaminated water, located in Section 4.

- WSA-5c – Sanitary Landfills – North Landfill Trench – used for a landfill, located in Section 4.

- WSA-5d – Sanitary Landfills – North Landfill Trench – used for a landfill located in Section 4.

Project Description:

a) Close or protect monitoring wells, as required.

b) Construct stormwater controls.

c) Excavate and dispose of HHE soil in the On-Post HWL. Consolidate excavated biota exceedance soil and P1 soils into the Basin A Landfill.

d) Demolish structures and dispose of debris in Basin A.

e) Excavate and haul trash and debris to Basin A.

f) Backfill with clean soil borrowed from other RMA areas and grade as necessary to provide adequate drainage and to control erosion.

g) Re-establish vegetation over the disturbed remediation and BA.

Dependent Projects: There are no projects dependent upon the Existing (Sanitary) Landfills project.

4.3 Lake Sediments Remediation

Site Description: The Lake Sediments Group includes four lakes located in the southern portion of RMA and sediments from the North Bog.

These sites were grouped together based on similar contamination patterns within the lakes and physical properties of the lakebed sediments. In the past, the water from Upper Derby Lake, Lower Derby Lake, and Lake Ladora was used as process/coolant water for South Plants.

These sites contain sediments contaminated by the influx of suspended-solid or dissolved-phase contaminants transported to the lakes by groundwater or surface water. However, only Upper Derby Lake and Lower Derby Lake will be remediated. No areas

in the other lakes or North Bog exceed the human health SEC or pose any potential risk to biota.

Upper Derby Lake and Lower Derby Lake contain contamination that poses a potential risk to humans. Isolated exceedances of human health SEC include chlordane and chromium and acute exceedances of aldrin and dieldrin. These exceedance areas occur to a depth of approximately three feet. Upper Derby Lake poses a potential risk to biota. The sites containing material that exceeds human health or biota criteria are located within the BEMA.

Project Sites/History:

- SSA-1b – Lake Sediments – Upper Derby Lake – Surface Impoundment/Lagoon.

- SSA-1c – Lake Sediments – Lower Derby Lake – Surface Impoundment/Lagoon.

Project Description:

a) Protect trees while excavating contaminated soil from Upper and Lower Derby Lakes. Dispose of excavated HHE soil into the On-Post HWL. Consolidate excavated biota exceedance soil into Basin A.

b) Grade perimeters of excavation areas to provide a smooth transition from the original surface to the excavation surface.

c) Re-establish vegetation over the areas in Upper Derby Lake.

Dependent Projects: There are no projects dependent upon the Lake Sediments project.

4.4 Burial Trenches Soil Remediation

Site Description: This project addresses the Burial Trenches (BT), a subgroup within the Undifferentiated Medium Group, which initially consisted of eight ROD-identified sites. Thirty-four additional sites have been added to the BT work scope, which brings the total to 42 sites remediated under this project. The following is a summary description on how the additional 34 sites were added to the project, including haul road removal activities.

Field reconnaissance of the project site (completed as part of pre-design activities) resulted in the discovery of 12 new sites. There are 11 new munitions debris areas designated as BT 32-1 through BT 32-9 and BT 6-1 and – 2, and one site pertaining to the removal of asphalt pavement (designated as BA 10 –asphalt).

The RVO incorporated 15 new sites from Sections 4 and 9 into the BT work scope, and these sites are designated as BT4-01 through BT4-14 and BT9-01. These sites include both surface debris and trenches, and they will be remediated as a "housekeeping" exercise. Material to be removed includes: munitions debris and soil, construction debris (i.e., pipe, wire, wood, concrete, brick, and glass bottles), and ACM. The munitions debris and ACM will be disposed of in the HWL and all other material will be hauled to Basin A.

Review of historical aerial photographs resulted in the discovery of five additional sites. The first site is a burn pit in Section 32 (designated as BT32-10). The second, third, and fourth sites are trenches containing munitions debris in Sections 29 and 32 (designated as BT29-01, BT29-02, and BT-32-11). The fifth site in Section 30 (designated as BT30-01) is a halo around ESA-2c containing munitions debris.

Two additional sites were identified and added, bringing the total number of new sites added to 34. The first site is in Section 20 (designated as BT20-01) and contains red ash, and the second site (designated as BT4-15) is a debris pile consisting of railroad ballast with munitions debris that has been removed from Section 4 but had been stockpiled behind the Building 111 parking lot.

The original eight sites, and 34 new sites, will be remediated under this project. Five of the sites have COCs in the soil that exceed human health SEC for chromium and lead from a depth of approximately two to ten feet. All HHE soils, asbestos containing material, munitions debris, and soils removed with munitions debris will be excavated and disposed of in the On-Post HWL.

All sites contain vegetation ranging from weedy forbs to native grasses. Some of the sites are located within prairie dog colonies, and the majority of the sites are located within BEMA. Based on the operations that occurred there, these sites may contain agent and high explosive (HE)-filled OE. Because the four original ROD burn sites were not used for the detonation of agent-filled OE, they are assumed to potentially contain only HE-filled OE. Soil may also pose a potential risk to biota, and the potential exists for the presence of non-armed ordnance.

Project Sites/History:

The eight original ROD sites, as listed below, were used historically for the demilitarization and disposal of obsolete munitions:

- Sites ESA-2a-1, -2, and -3: Burn Pits.
- Sites ESA-2a-4, -5, -6, and -7: Burn Pits (sites include both HHE and munitions debris).
- Site ESA-2c: Open Trenches.

New Sites:

- Borrow Area 10 Asphalt: Surface Debris.
- BT4-01 through BT4-07, BT4-13, and BT4-14: Surface Debris.
- BT4-08 through BT4-12: BT.
- BT4-15: Debris pile – Railroad ballast with munitions debris.
- Site BT6-1 and BT6-2: Surface Burn Sites.
- BT9-01: Surface Debris.
- BT20-01: Red Ash Site.
- BT29-01: BT.
- BT29-02: BT.
- BT30-01: (Halo) Near Surface Debris.
- Sites BT32-01 through BT32-09: Surface Burn Sites.
- Site BT32-10: Burn Pit.
- Site BT32-11: BT.

Project Description:

a) Close or protect wells, as required.

b) Characterize geophysical targets.

c) Excavate HHE soils, munitions debris, and soil co-mingled with munitions debris and dispose of in the On-Post HWL. Transport any explosive-containing munitions to an approved demolition range and detonate; or, if unstable, detonate in place.

d) Complete an Explosive Safety Submission to be approved by the Department of Defense Explosives Safety Board (DDESB) prior to commencing remediation activities.

e) Complete a Chemical Safety Submission to be approved by the DDESB prior to remediation activities at ESA-2c.

f) Screen potential agent-contaminated excavated soil by sampling for agent, and treat any soil exceeding Army regulatory criteria.

g) Backfill with clean soil borrowed from other RMA areas and grade as necessary to provide adequate drainage and control erosion.

h) Re-establish vegetation over the disturbed remediation (approximately 35 acres) and borrow areas.

Dependent Projects: There are no projects dependent upon the BT project.

4.5 Munitions (Testing) Soil Remediation

Site Description: The Munitions Testing (MT) Group originally consisted of seven sites with similar histories and the potential presence of OE. These sites, predominantly located in the eastern portion of RMA in Sections 19, 20, 25, 29, and 30, were used for the testing and destruction of non-chemical munitions. The sites typically contain slag, debris, and potential OE in the upper 1 foot of soil and represent potential physical hazards. Site ESA-4a was an impact area for mortars and may contain HE-filled OE at depths to 6 feet. No HHE were detected within these sites.

Field reconnaissance to evaluate burn areas resulted in the discovery of a new munitions debris area (MT29-1).

During the process of clearing geophysical targets from the footprints of ESA-4a, an area surrounding former remediation site BT32-10 was determined to require additional work to address the ground surface surrounding the former burial trench. As a result, a geophysical survey and target characterization of this area were added to the MT project via design change notice.

A surface sweep of a former burn area in BA 10 was added to the MT project following the recovery of OE debris in the area.

Remediation of the RMA Section 29 Demolition Range Exclusion Zone (DREZ) was added to the MT project in an effort to prepare for the eventual closure of the RMA Demolition Range.

Project Sites/History:

- ESA-1a – MT – Surface Burn 1 – used as a burn area.
- ESA-1b – MT – Surface Burn 2 – used as a burn area.
- ESA-1c – MT – Surface Burn 3 – used as a burn area.
- ESA-1d – MT – Surface Burn 4 – used as a burn area.
- ESA-4a – MT – Impact/UXO – unexploded Munitions/Ordnance.
- ESA-4b – MT – Defense Reutilization and Marketing Office Area – explosive ordnance disposal area.
- CSA-2c – MT – Incendiary MT – unexploded Munitions/Ordnance – Surface Debris.

New Sites

- MT29-1 – Surface debris site.

- BT32-10 – Geophysical Survey and Target Characterization of surface area surrounding former BT.

- Borrow Area 10 – Burn area surface sweep.

- DREZ – Demolition Range Exclusion Zone.

Project Description:

a) Complete an Explosive Safety Submission to be approved by the DDESB prior to commencing remediation activities.

b) Conduct an electromagnetic geophysical survey of ESA-4a site area and identify, locate, and retrieve designated targets to a maximum depth of four feet.

c) Excavate munitions debris and associated soil from Sections 19, 20, 25, 29, and 30 and dispose of it in the On-Post HWL. Transport any explosive-containing munitions to the approved demolition range and detonate or, if unstable, detonate in place.

d) Excavate and dispose of ACM from Site CSA-2c into the On-Post HWL. Consolidate excavated biota exceedance soil into the Basin A Landfill.

e) Perform a site characterization of area surrounding the RMA Section 29 Demolition Range consisting of a surface sweep and target characterization. Use this data to develop the path forward for characterization of the remainder of the DREZ. Perform remediation of the DREZ (includes Initial and Quality Assurance (QA) geophysical surveys and Initial and QA target characterization).

f) Perform geophysical survey and target characterization of surface area surrounding BT32-10.

g) Perform surface sweep of BA 10 burn area.

h) Perform remediation and closure of the RMA Section 29 Demolition Range.

i) Grade as necessary to provide adequate drainage and to control erosion.

j) Re-establish vegetation over the disturbed remediation areas.

Dependent Projects: There are no dependent projects for the Munitions (Testing) Soil Remediation Project.

4.6 Miscellaneous Northern Tier Soil Remediation

Site Description: The Miscellaneous Northern Tier Soil Remediation project includes the Sewage Treatment Plant, Fuse and Detonator Ditch, and the Pistol Range, which are located in Sections 24, 25, and 19, respectively.

Sewage Treatment Plant. The Sewage Treatment Plant is the former sewage treatment plant site located in the approximate center of Section 24. The site included the sewage treatment plant, two trickling filters and Imhoff tanks, a lagoon associated with sewage treatment, a road, and two 20-foot-wide ditches leading from the sewage treatment facility to First Creek. The site encompasses almost ten acres.

Organochlorine pesticides are the primary human health and biota COCs at these sites. Chromium, chloroacetic acid, and lead also exceed human health SEC at scattered locations. Portions of these sites contain soil that posed potential risks to biota in some samples. Human health COCs extend to a depth of approximately five feet, with the highest contaminant concentrations detected in the upper two feet of the soil profile.

Fuse and Detonator Ditch. The Fuse and Detonator Ditch site is located in Section 25 on the downgradient of Building 1608, in the northeastern corner of the North Plants. The site is within the portion of the man-made ditch that controls the surface drainage within the North Plants. The ditch measures 350 feet-long and ten feet-wide, encompassing approximately 3,500 square feet. The ditch contains byproducts of chemical agents, such as chloroacetic acid, historically stored in Building 1608.

The human health COCs extend to a depth of five feet, with all exceedance contamination concentrations detected in the upper two feet of the soil profile. The site was not designated as containing potential agent soil.

Pistol Range. The Pistol Range site is located in Section 19 within the BEMA. This site is roughly a rectangular area approximately 950 feet by 40 feet and encompasses 32,414 square feet.

The COC at the Pistol Range is lead. The Pistol Range contains soil that was contaminated by lead from the site's use as a shooting range. Soil in the Pistol Range is considered HHE soil based on the presence of lead exceedances.

Project Sites/History:

Sewage Treatment Plant Fuse and Detonator Ditch:

- NCSA-8b – Ditches Drainage – Sewage Treatment Plant Area – used to transport water to and from the Secondary Basins and to drain the South Plants process areas.

Fuse and Detonator Ditch:

- NPSA-4 – Buried Sed/Ditches-Fuse and Detonator Mag – used as a surface disposal area.

Pistol Range:

- Pistol Range – Surficial Soil Site – Located in Section 19.

Project Description:

a) Close or protect monitoring wells, as required.

b) Construct stormwater controls, temporary access roads, and protect existing trees.

c) Demolish existing structures and haul to Basin A.

d) Flush existing culverts with a pressure washer and leave in place.

e) Dispose of excavated HHE soil and debris into the On-Post HWL. Consolidate excavated biota exceedance soil into Basin A.

f) Backfill designated excavated areas with clean soil borrowed from the sewer line berm, and grade as necessary to provide adequate drainage and to control erosion.

g) Re-establish vegetation over disturbed remediation and BA.

Dependent Projects: There are no projects dependent upon the Miscellaneous Northern Tier Soils project.

4.7 Miscellaneous Southern Tier Soil Remediation

Site Description: The Miscellaneous Southern Tier Soils Remediation project includes the Buried Sediments and Ditches, Ditches/Drainage Area, and Surficial Soil Medium Groups located in Sections 1, 2, 3, 4, and 12.

Buried Sediment and Ditches Sites. This grouping consists of one site that carried stormwater and industrial process water from the South Plants area to Upper and Lower Derby Lakes. The RI indicated that the primary COCs at this site are OCPs. A portion of the site contains soil that poses potential risks to biota. Human health COCs extend to a depth of approximately five feet with all exceedance contaminant concentrations in the upper two feet of the soil profile.

Ditches/Drainage Area Site. The overflow basin will be remediated under this project. The overflow basin was constructed in 1955 to retain overflow from Lake Ladora. The RI indicated that the primary COCs are OCPs. The majority of samples had analytical

results below the certified reporting limits and therefore only poses a risk to biota. The majority of contaminants were detected in the zero- to one-foot-depth interval.

Sand Creek Lateral. Originally, the Sand Creek Lateral was an irrigation ditch. During RMA production times, the lateral carried waste generated by the South Plants operations and runoff during storm events and snowmelt. The RI indicated that the primary COCs at the lateral are OCPs. In addition, chromium exceeds the human health SEC at scattered locations. Portions of the lateral contain soils that pose potential risks to biota. Human health COCs extend to a depth of approximately five feet with all exceedance contaminant concentrations in the upper two feet of the soil profile.

Previously Excavated Upper and Lower Derby Lake Sediments. In 1964 and 1965, Upper and Lower Derby Lakes were dredged as part of a cleanup action that was intended to protect ducks. The sediments were deposited along the south side of 6th Avenue and covered with 18 inches of clean soil. The RI indicated that the primary sites COCs are OCPs. The COCs at the sediment mound range in depths from four to ten feet.

Isolated Detection. This site is a spill area located in the railyard in Section 3. It is a circular area with a radius of approximately 100 feet. The RI indicated that the primary COCs at this site are OCPs. A portion of the site contains soil that poses potential risks to biota. Human health COCs extend to a depth of approximately five feet with all exceedance contaminant concentrations in the upper two feet of the soil profile.

Motor Pool Ditch. This site is part of the RMA maintenance area used for servicing equipment, vehicles, and railroad cars and for storing fuel, road oil, and flammable liquids. Various wastes including degreasing solvents, washbay liquids, and other diluted materials were discharged into the ditch over the years. The RI indicated that the primary COCs are OCPs. In addition, chromium and lead exceeds the human health SEC at scattered locations. Portions of the site contain soils that pose a potential risk to biota. Human health COCs extend to a depth of approximately five feet with all exceedance contaminant concentrations in the upper three feet of the soil profile.

Surficial Soil Sites. Surficial soil sites contain soils that were primarily contaminated by windblown dust and lead from firing range activities. These sites pose a potential risk to biota and include isolated HHE areas. Surficial soil sites include P1 soil areas selected by the Biological Advisory Subcommittee (BAS) for residual biota risk remediation. The Rifle Range and the Fisherman's Parking Lot, both located in Section 12, will be remediated under this project.

Project Sites/History:

Buried Sediments and Ditch Sites

- SSA-2a – Ditches/Drainage – Process Ditch – storage area.

Ditches/Drainage Area Site

- SSA-2c – Ditches/Drainage – Lakes Overflow Basin – used to retain overflow from Lake Ladora.

Sand Creek Lateral

- SSA-2b – Buried Sediments/Ditches – Sand Creek Lateral – used to carry waste generated by South Plants operations and runoff during storm events and snowmelt.

Previously Excavated Upper and Lower Derby Lake Sediments

- SSA-3b – Buried Sediments/Ditches – Upper and Lower Derby Lakes – contaminated sediments.

Isolated Detection

- WSA-1f – Ditches –Railyard/Pesticide Detection – a spill site area.

Motor Pool Ditch

- WSA-6a – Buried Sediments/Ditches – Motor Pool Ditch – used as a disposal pit/dry well.

Surficial Soil Sites

- Rifle Range – Used for firearm qualifications and recreational target practice.
- Fisherman's Parking Lot – P1 Soil Site.

Project Description:

a) Close or protect monitoring wells as required.

b) Construct temporary site access roads and stormwater control, as necessary.

c) Demolish structures and haul to Basin A, or, in the case of existing railroad track, remove and stockpile.

d) Excavate contaminated soil from the component project areas. Dispose of excavated HHE soil into the On-Post HWL. Consolidate excavated biota exceedance soil and P1 soil into Basin A.

e) Protect trees to the maximum extent possible during all construction activities.

f) Backfill designated excavated exceedance areas with clean soil borrowed from other RMA areas, and grade as necessary to provide adequate drainage and to control erosion.

g) Re-establish vegetation over the disturbed remediation and borrow areas.

Dependent Projects: There are no projects dependent upon the Miscellaneous Southern Tier Soils Remediation project.

4.8 Section 36 Bedrock Ridge Groundwater Barrier Plume Extraction System

Site Description: The Basin A Plume Group is composed of the Section 36 Bedrock Ridge Plume, the Basin A Plume, and the South Plants North Plume. Contaminated groundwater flow in the South Plants North Plume and the Basin A Plume occurs principally within saturated alluvium, with lesser flow through the underlying weathered bedrock. However, in the Section 36 Bedrock Ridge area, the water table generally lies below the alluvium and groundwater flows predominantly within weathered bedrock. The major contaminants detected in the entire Basin A Plume Group are chloroform, methylene chloride, diisopropylmethlyphosphonate (DIMP), trichloroethylene (TCE), DBCP, and benzene.

Project Site/History:

- A-S36BR – Basin A/Section 36 Bedrock Ridge Plumes – contaminated groundwater.

Project Description: Remediation involves constructing groundwater extraction facilities to intercept and treat the Section 36 Bedrock Ridge Groundwater Plume. This will be accomplished by connecting the extraction wells to an existing facility (Basin A Neck); no modifications to the existing facility are necessary. The Bedrock Ridge system will be operated as necessary to prevent further migration.

Dependent Projects: The Bedrock Ridge project is related to the Complex (Army) Trenches Slurry Wall project. The two projects together will prevent contaminated groundwater from migrating beyond the Bedrock Ridge area. Both projects are also related to the long-term operation and maintenance of the Basin A Neck treatment plant.

4.9 South Plants Structure Demolition and Removal

Site Description: The South Plants Structures Demolition and Removal project encompasses a wide variety of structural types and materials located in Sections 1, 2, and 36. Included are all aboveground structures, buildings, foundations, basements, tanks (including underground storage tanks), process and non-process equipment (including boneyards), aboveground chemical and non-chemical pipelines, ACM, equipment and materials contaminated with polychlorinated biphenols (PCB), and other man-made objects placed at RMA. The structures have been divided into three groups: Agent History (AH) Structures, Significant Contamination History (SCH) Structures, and Other Contamination History (OCH) Structures.

Project Site/History:

- NFU-A – Structures – No Future Use, Agent–contaminated buildings.
- NFU-MNP – Structures – No Future Use, Manufacturing, Non-Process–contaminated buildings.
- NFU-MP – Structures – No Future Use, Manufacturing, Process–contaminated buildings.

Project Description:

a) Demolish all South Plants AH, SCH, and OCH Structures including removal of all aboveground piping, utilities, and selected foundations. Asbestos-containing material and PCBs encountered will be properly disposed of in the On-Post HWL.

b) Screen potentially agent-contaminated building debris by sampling for agent and treat any exceeding Army regulatory criteria.

c) Remove AH and SCH structural debris and equipment and dispose of in the On-Post HWL.

d) Remove OCH structural debris and consolidate into Basin A.

e) Demolition of structures will stop at the top of the grade. All foundations and below grade structures will be managed with the South Plants Soils Remediation project.

f) Remove drums, utilities, and debris piles staged within the South Plants boundary.

Dependent Projects: The South Plants Structures must be removed prior to beginning several soil remediation projects. These projects include: Hex Pits, Buried M-1 Pits, South Plants Balance of Areas (SPBA), and SPCPA. This project may be dependent upon the availability of a structures agent treatment facility, if the screening process to determine actual quantities of agent-contaminated materials indicates a need for this facility.

4.10 Miscellaneous RMA Structures Demolition and Removal

Site Description: This project encompasses structures and related items from all RMA areas other than Sections 1 and 2 (South Plants Structures) and Section 25 (North Plants Structures). The structures have been divided into three groups: AH Structures, SCH Structures, and OCH Structures.

Project Site/History:

- NFU-A- Structures – No Future Use, Agent–contaminated buildings.
- NFU-MNP – Structures – No Future Use, Manufacturing, Non-Process–contaminated buildings, referred to as OCH structures.
- NFU-MP – Structures – No Future Use, Manufacturing, Process–contaminated buildings, referred to as SCH structures.

Project Description:

a) Demolish all AH, SCH, and OCH Structures including removal of all aboveground piping, utilities, and selected foundations.

b) Screen potentially agent-contaminated building debris and associated soil by sampling for agent and treat any exceeding Army regulatory criteria.

c) Remove AH and SCH structural debris and dispose of in the On-Post HWL. Remove OCH structural debris and consolidate into Basin A.

d) Remove floor slabs and foundations, and plug below ground piping and utilities.

e) Backfill foundation and basement excavations with clean soil borrowed from other RMA areas, and grade as necessary to provide adequate drainage and to control erosion.

f) Remove debris piles identified by the USFWS.

g) Perform surface sweep and excavation and removal of ACM discovered in BA 9A Parcel 3 during borrow operations and Site 25CC-3 during revegetation activities.

Note: Three structures have been demolished as part of the 815-Acre Land Transfer package. The three structures include a septic tank, radio range B foundations, and a survey tower.

Dependent Projects: There are no projects dependent upon the Miscellaneous RMA Structures Demolition and Removal project.

4.10.1 Drummed Waste Handling and Disposal

According to Section 9.4 of the On-Post ROD, stored, drummed waste may be disposed of in the On-Post HWL. To meet this allowance, two tasks are being implemented to dispose of drummed material inventories that have been stored on the RMA. Each task has its own unique process to size drums and contents and assures that the materials meet

acceptance criteria when disposed of at the HWL. These two tasks have been associated with the Miscellaneous RMA Structures Demolition and Removal Project to properly document the work in the project CCR.

One task involves processing and disposing of approximately 9,700 drums that were stored in the South Plants and other miscellaneous structures around the RMA. Drums are processed through a drum-shredding machine that has been installed at Building 785. The shredding process assures compliance with HWL sizing requirements and also alleviates any concerns of liquids remaining in drums. Following shredding, any wet material is mixed with dry material to assure there are no liquids. After confirming that the processed material will meet HWL acceptance criteria, the material is loaded into a haul vehicle and transported to the HWL for disposal.

The other task involves processing and disposing approximately 4,200 drums that were stored in the North Plants area of the RMA. These drums have been screened for chemical agent and may now be disposed of in the HWL. Because the drums contain dry materials, they will be emptied into roll off containers and the contents transported to the HWL for disposal. The drums will then be processed according to their type prior to disposal at the HWL: steel drums will be crushed; fiberboard drums may go directly to the landfill for compacting; and plastic drums will be transferred to Building 785 facility for shredding. This task also involves characterizing approximately 125 drums containing liquids to determine whether they must be sent off-site for disposal or may be disposed of at the on-site Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Wastewater Treatment Facility.

5.0 PHASE II – SOUTH PLANTS AREA

The four Phase II projects are concentrated in the South Plants Area. All of these projects are soil remediation-related. This section will provide site descriptions, project sites/history, project descriptions and related project discussions.

5.1 Buried M-1 Pits Soil Remediation

Site Description: The Buried M-1 Pits are a subgroup within the Lime Basins Medium Group. The pits were used to treat waste fluids from the Lewisite Facility, primarily to precipitate arsenic out of solution. In addition, a considerable amount of mercuric chloride catalyst from a possible spill entered the pits. However, waste materials from alleged spills within the acetylene-generation building, the thionylchloride plant, and the arsenic trichloride plant were allegedly routed through floor drains and the connecting piping to the pits. The pits were backfilled in 1947, covered with several feet of soil, and were overbuilt by several structures that have since been removed. The pits are located in an area of disturbed vegetation.

The entire site is considered to exceed principal threat criteria, and based on the history of the site, potentially contains agent. The pits are characterized by soil/sludge mixtures with high pH levels and percentage levels of arsenic and mercury to a depth of 10 feet.

Project Site/History:

- SPSA-1e – Lime Basins/M1-Pits – used to treat waste fluids from the Lewisite Facility

Project Description:

a) Perform necessary treatability testing during design to select the best mixture of solidification/stabilization agents. This treatability testing will be used to verify the effectiveness of the treatment process and establish operating parameters for the design of the full-scale operation.

b) Close or protect monitoring wells as required.

c) Excavate principal threat and HHE soil from the M-1 Pits in Section 1.

d) Monitor for potentially agent-contaminated excavated soil by sampling for agent, and treat any soil exceeding Army regulatory criteria.

e) Treat with a solidification technology, stabilize, and dispose of treated soil in the On-Post HWL.

f) Control vapors and odors at every remediation stage using necessary measures.

g) Backfill with P1 soils from BA 3 and grade as necessary to provide adequate drainage and control erosion. A soil cover will be placed and vegetation re-established by the SPCPA Soil Remediation project over this site.

Dependent Projects: This project may be dependent upon the availability of a soils agent treatment facility, if the screening process to determine actual quantities of agent-contaminated materials indicates a need for this facility, and may also be dependent upon the removal of all the South Plants structures that cover or are immediately adjacent to the site and the SPCPA Soil Remediation project.

5.2 Hex Pit Soil Remediation

Site Description: The Hex Pit is a subgroup within the Disposal Trenches Medium Group. The Hex Pit was historically used to dispose of residual materials (tarry, chlorinated, resinous materials called hex bottoms) resulting from the production of hexachlorocyclopentadiene (HCCPD). This material was buried in thin-gauge barrels and in bulk. The site is partially underneath Building 571B in Section 1, in an area of

disturbed vegetation. The entire site is considered a principal threat based on the presence of containerized waste and high levels of contamination to a depth of ten feet.

Project Site/History:

- SPSA-1f – Disposal Trenches – Hexa Barrels – used to dispose of residual materials (tarry, chlorinated, resinous materials called hex bottoms) resulting from the production of HCCPD.

Project Description:

a) The Regulatory Agencies will complete the evaluation of several innovative thermal technologies to determine if any of the technologies can meet all evaluation criteria described in the dispute resolution agreement (Program Manager Rocky Mountain Arsenal 1996). If none of the innovative thermal technologies meet all evaluation criteria, then solidification/stabilization will become the selected remedy.

b) If an innovative thermal technology is the selected remedy, treatability testing will be performed during design to verify the effectiveness of the process and establish operating parameters for the design of the full-scale operation. After treatability testing, if it is determined that the innovative thermal technology cannot meet all of the evaluation criteria, and then the selected remedy reverts to solidification/stabilization.

c) If solidification/stabilization is the selected remedy, treatability testing will be performed during design to verify the effectiveness of the solidification process and determine appropriate solidification/stabilization agents.

d) Treat approximately 2,550 cubic yards of contaminated material (principal threat soil) from the Hex Pit Section 1 with an innovative thermal technology or solidify and stabilize (if the evaluation criteria cannot be met for the thermal technology).

NOTE: UPDATE – The innovative thermal technology titled "In-Situ Thermal Destruction" was selected, designed and implemented. However, a few days into the treatment process, the technology failed and had to be terminated.

Due to the failed technology, a ROD Amendment was prepared with the purpose of changing the preferred remediation approach to excavation and disposal of the Hex Pit material into the HWL.

e) Excavate and dispose Hex Pit contaminated soil (also considered PT exceedance soil), into the HWL.

f) Control emissions at every remediation stage using necessary measures.

g) Backfill with biota exceedance soil from the South Plants and grade as necessary to provide adequate drainage and to control erosion. A soil cover will be placed and vegetation re-established over this site by the SPCPA Soil Remediation project.

Dependent Projects: The Hex Pit Soil Remediation project is dependent upon the South Plants Structures Removal and Demolition project and the SPCPA Soil Remediation project.

5.3 South Plants Balance of Areas and Central Processing Area Soil Remediation Project – Phase II

Site Description (Note: Also see, Site Description for Phase I, Section 5.4)

This phase of the project addresses the SPBA and Central Processing Area SPCPA, which is a subgroup of the South Plants Medium Group. This site was the main processing area within the South Plants. Soil contamination resulted from the manufacture, storage and disposal of chemicals and from the demilitarization of agent-filled ordnance. The area exhibits areas of disturbed vegetation.

A portion of this area is located within a ROD-identified potential agent boundary. The COC in the soil that exceed the human health and PT criteria include, but are not limited to volatiles, OCPs, and arsenic. Remediation of these COCs is limited to a depth of five feet in the SPCPA.

Project Site/History

The South Plants Study Area is comprised of the following Study Areas Report Sites:

- SPSA – 1a – SPCPA – used as the main processing area within the South Plants.
- SPSA – 4B – Spill Site (foundation only).
- SPSA – 3E – Spill Site (foundation only).
- SPSA – 1G – Spill Site (foundation only).
- SPSA – 5B– Spill Site (foundation only).
- SPSA – 9A – Drainage Ditches (foundation only).
- SPSA – 9B – Spill Site (foundation only).
- SPSA – 10 – Sewer Systems – Chemical Sewer – Waste Lines.
- SPSA – 11 – Sewer Systems – Sanitary – used as a sanitary sewer system.
- *SPSA – 12c – Sewer Systems – Process Water – used as process water lines.

**Note: ***SPSA – 12c is also defined as and referred to as SPSA – 12 in other documents.

Foundation only means the excavation of HHE Soil blocks within the foundation footprint, (see note SPBA & Central Processing Area Phase I).

Phase II Project Description

a) Close or protect existing monitoring wells, as required.

b) Excavate approximately 110,000 bcy of principal threat and HHE soil in SPCPA up to a depth of five feet and dispose of in the On-Post HWL.

c) Excavate approximately 317,000 bcy of biota soil to a depth of one foot. This material will be used as backfill in deeper excavations or gradefill beneath either the 3.25-foot SPBA or 4.5-foot SPCPA cover areas.

d) Remove SCH and OCH foundations that are located within HHE soil excavation areas to the depth of the surrounding ROD-identified soil exceedance as measured from existing soil grade adjacent to the foundation and dispose of in the HWL.

e) Remove SCH and OCH foundations located outside the 3.25-foot cover area. Use removed debris as backfill or gradefill beneath either the 3.25-foot SPBA or 4.5-foot SPCPA cover areas. Those SCH and OCH structures will be used as backfill or gradefill or will be disposed in Basin A.

f) Where grading requires, excavated SCH and OCH foundations located within the 3.25-foot cover area or located in biota soil areas for use as backfill or gradefill beneath either the 3.25-foot SPBA or 4.5-foot SPCPA cover areas. Those SCH and OCH foundations not used as backfill or gradefill and left in place must be fractured.

g) Remove AH foundations remaining after the removal of the superstructure under the South Plants Structure Demolition and Removal Project. The AH foundations will be disposed of in the HWL after chemical agent screening and/or ROD 3X decontamination has been performed and certified. Debris not meeting ROD 3X certification requirements shall be segregated and stored.

h) Chemical sewers within the SPCPA will be addressed in one of two ways: removal or plugging. Sewers identified at a depth greater than five feet below ground surface (bgs) have been plugged during a previous project. Remaining sewers encountered during excavation of soil will be removed and disposed in the HWL or plugged. Sewer segments in the SPCPA outside the soil excavation limits that were not previously plugged will be plugged or removed at the discretion of the subcontractor.

i) All manholes associated with the process water lines and sanitary sewers will be plugged.

j) The final cover system for the SPCPA will be RCRA-Equivalent Cover (in accordance with the South Plants Agreement) constructed in accordance with the requirements defined in the Integrated Cover System Design. Soils meeting the geotechnical Acceptance Zone and agronomic properties defined, as part of the Basin F Exterior Project will be used for the SPCPA. The BA 10 will be the source.

k) Prevent biota and humans from accessing contaminated soils in the SPCPA by constructing a 1.5-foot thick biota barrier comprised of crushed concrete overlain by 4 feet of clean soil.

l) Construct the 3-foot cover system for the SPBA with soils that have a fines content ranging from 20 to 35 percent to minimize the infiltration through the SPBA cover. Haul soil from BA 3 for the cover.

m) Haul soil from BA 3 and BA 10 for use as backfill and gradefill beneath SPBA and SPCPA cover areas and for gradefill in the 1-foot backfill area.

n) Minimize soil losses by wind and water erosion through revegetation while providing necessary slopes for runoff and ponding control.

Dependent Projects: The SPCPA is dependent upon the removal of the South Plant structures, completion of the M-1 Pit and Hex Pit Remediation projects, and the SPBA Soil Remediation project. This project may be dependent upon the availability of a soils agent treatment facility, if the screening process to determine actual quantities of agent-contaminated materials indicates a need for this facility.

5.4 South Plants Balance of Areas and Central Processing Area Soil Remediation Project – Phase I

Site Description

The SPBA Soil Remediation project will be implemented in two phases. Phase I of work will consist of HHE soil excavation/foundation removal in the SPBA. Phase II of work will include completing the remainder of foundation removal/cracking in the SPBA and SPCPA, SPBA biota excavation, SPCPA HHE soil excavation, and construction of the required covers over South Plants.

The ROD identifies several groups and subgroups for soil in the South Plants that exceed human health and biota exceedance criteria. The South Plants Medium Group and Sewer Systems Medium groups are within the HHE category.

The South Plants Medium Group includes the South Plants Ditches and SPBA subgroups. The Sewer Systems Medium Group includes the Chemical Sewers and Sanitary/Process Water Sewers subgroups.

The SPBA Soil Remediation Project involves the SPBA Subgroup, South Plants Ditches Subgroup, Chemical Sewers Subgroup, and the Sanitary/Process Water Sewers Subgroup.

There is a potential OE area identified in the ROD located within the southern portion of the SPBA, which will not be excavated as part of the Phase I work.

The SPBA project area has ROD-identified potentially agent-contaminated areas that require screening for the presence of chemical agent materiel and possible treatment to attain ROD 3X certification.

The selected remedy in the ROD for South Plants includes the placement of soil covers. No cover construction will occur as part of Phase I work.

Project Sites/History:

- SPSA-BAL – This site is comprised of the following SAR sites:
  - SPSA-1g – South Plants Balance – Miscellaneous – Spill Site (Phase II foundations).
  - SPSA-4b – South Plants Balance – Miscellaneous – Spill Site (Phase II foundations).
  - SPSA-7b – South Plants Balance – Depression – Spill Site.
  - SPSA-9b – South Plants Balance – Miscellaneous/Surface Contamination – Spill Site (Phase II foundations).
  - SPSA-3e – South Plants Balance – Miscellaneous – Spill Site (Phase II foundations).
  - SPSA-8c – SPSA8 Balance/Surface Contamination – Spill Site.
  - SPSA-2e – South Plants Balance – Surface Deposition – Spill Site.
  - SPSA-5b – South Plants Balance – Miscellaneous – Spill Site (Phase II foundations).
  - SPSA-7c – South Plants Balance – Miscellaneous/Surface Contamination – Spill Site.
  - SPSA-6 – Hydrazine Fuel Blending/Storage Facility – Spill Site.
  - SPSA-7a – Balance SPSA/Surface Contamination – Spill Site.
  - SPSA-12a – South Tanks Balance – Aeration Basin – Surface/Lagoon.
  - SPSA-12b – South Plants Balance – Sediment Pond – Surface/Lagoon.
  - SPSA-1b – South Plants Balance – Unknown Mounds – Contaminated Soil Piles.
  - SPSA-1c – South Plants Balance – Lime Pits – Disposal Pit/Dry Well.
  - SPSA-3b – South Plants Balance-Storage Pad – Storage Area.
  - SPSA-2b – South Plants – Open Storage Area – Storage Area.
  - SPSA-3c – South Plants Balance – Tank Storage Area – Aboveground Storage Tank.
  - SPSA-3d – South Plants Balance – Tank Storage Area – Aboveground Storage Tank.
  - SPSA-2a – South Plants-South Tank Farm – Aboveground Storage Tank.
  - SPSA-8a – South Plants Balance – Sanitary Landfill – Landfill.
  - SPSA-1d – South Plants – Drainage Ditches – Surface Disposal Area.
  - SPSA-2d – South Plants – Drainage Ditches – Surface Disposal Area.
  - SPSA-3a – South Plants – Drainage Ditches – Surface Disposal Area.
  - SPSA-4a – South Plants – Drainage Ditches – Surface Disposal Area.
  - SPSA-5a – South Plants – Drainage Ditches – Surface Disposal Area.
  - SPSA-8b – South Plants – Drainage Ditches – Surface Disposal Area.

- SPSA-9a – South Plants – Drainage Ditches – Surface Disposal Area (Phase II foundations).
- SPSA-2c – South Plants Balance – Salvage Yard – Storage Area.
- SPSA-10 – Sewer Systems – Chemical Sewer – Waste Lines.

Note: Phase II foundations means that HHE soil blocks within foundation footprints will be excavated as part of Phase II. All other SAR sites will be excavated to remove all HHE blocks.

Phase I Project Description

The following is a list of the project tasks for Phase I work in SPBA as outlined in the ROD or as agreed to with the Regulatory Agencies:

a) In potentially agent-contaminated soil areas that are to be excavated, screen soil for the presence of chemical agent materiel to attain ROD 3X certification. Segregate soil that does not meet ROD 3X certification requirements.

b) Close or protect monitoring wells as required.

c) Excavate chemical sewer lines and associated contaminated soil (approximately 31,784 bcy) to a depth of ten feet bgs or two feet below the invert of the sewer pipe, whichever is deeper. Screen chemical sewers and associated contaminated soil for the presence of chemical agent materiel to attain ROD 3X certification. Segregate soil/chemical sewer debris not meeting ROD 3X certification requirements.

d) Excavate and dispose of approximately 171,141 bcy of HHE soil in the On-Post HWL as prescribed in the ROD.

e) Excavate and dispose of approximately 9,302 additional bcy of HHE soil in the HWL. The additional HHE volume was identified as a result of the following activities:

   - Data review of modeled exceedances occurring outside of the ROD-determined volume.
   - Boundary remodeling and relocation.
   - SPBA Sampling and Analysis Project.
   - Anticipated cut and fill plan for cover construction during Phase II of the SPBA and Central Processing Area Soil Remediation Project.

f) Excavate soil contaminated with PCB concentrations greater than 250 ppm and dispose of in the HWL.

g) Remove SCH foundations and OCH foundations remaining in HHE soil excavation areas greater than three feet in depth after the removal of the superstructure (under the South Plants Structure Demolition and Removal Project – Phase I (Foster Wheeler 1998a)) to the depth of the surrounding ROD-identified soil exceedance as measured from existing soil grade adjacent to the foundation. Dispose of demolition debris in the HWL. Foundations located in HHE soil excavation areas less than three feet in depth will be removed during Phase II.

h) Remove foundations 571B and TF0103 to allow for work activities associated with the M-1 and Hex Pit Projects.

i) Remove existing underground storage tanks (UST) regardless of tank depth, and remove (or grout) associated piping systems within the horizontal limits of the excavation in the SPBA. Concrete tanks (including sumps) or concrete appurtenances that are located below ten feet in depth will be fractured and left in place. Fracture UST vaults. Remove stained soils from previous UST removal actions with COC above the SEC to a maximum depth of 10 feet and horizontally to the approximate extent of previous removals.

j) Fill excavations to within five feet of existing grades with soils obtained from borrow sources adjacent to (Borrow Source 1) or within (Borrow Source 2 and 3) the South Plants Soils project boundary (for the Phase 1 work) or other contractor-approved borrow sources. Note: Excavations located outside the 3.25-foot soil cover boundary in the SPBA will be backfilled with clean soil.

k) Prior to excavation, in the area outside of the SPBA 3.25-foot soil cover, collect discrete soil samples from 12 to 18 inch in depth, four to five feet in depth and nine to ten feet in depth. At designated locations, collect 12 18-inch depth composite soil samples. Analyze samples to determine whether HHE criteria are exceeded. Excavate soil in excess of HHE criteria and dispose of in the HWL. Utilize the SPBA Field Sampling and Analysis Plan developed for collecting soil samples. Note: This sampling exceeds the ROD requirement of two samples per acre over this area.

l) Establish temporary vegetation over the remediation areas.

Dependent Project: The SPBA project is dependent upon the removal of the South Plant structures. This project may be dependent upon the availability of a soils agent treatment facility, if the screening process to determine actual quantities of agent-contaminated materials indicates a need for this facility.

6.0 PHASE III – SECTIONS 35 AND 36 SITES

There are eight Phase III projects. Two projects will remediate the North Plants buildings and soils. Two projects will complete the Army and Shell Trenches site. Three projects are soils remediation and one project is Phase II of Sanitary Sewer Plugging. This section will provide site descriptions, project sites/history, project descriptions, and related project discussions.

6.1 Sanitary Sewer Manhole Plugging Project – Phase II

Site Description: The Sanitary/Process Sewer System includes four sites. Portions of the system that are located in Sections 3, 4, 24, 25, 26, 34, and 35 are included in this project. These sites contain soil that was potentially contaminated by spillage or leakage from broken pipes or faulty joints and manholes in the sewer lines. Contamination entered

these sewer lines through inadvertent disposal of liquid wastes or conveyance of contaminated groundwater. The majority of sewer piping is vitrified clay, although some sections are steel or cast-iron pipe.

Soil around these sewer lines does not exceed the human health SEC and does not pose risks to biota based on the average depth of the sewer lines of six to ten feet.

Project Site/History:

- NCSA-8a – Sewer Systems – Sanitary Sewer to Sewage Treatment Plant – used as waste lines.

- WSA-7a – Sewer System – Sanitary Sewer Sediments – used as waste lines.

Project Description:

a) Plug the void space inside remaining sanitary and process water sewer manholes with concrete or grout in Sections 3, 4, 24, 25, 26, 34, and 35. The remediation objective is to prohibit access and eliminate the sewer system as a potential migration pathway for groundwater.

b) Post aboveground warning signs indicating sewer locations every 1,000 feet.

Dependent Projects: There are no dependent projects for the Sanitary Sewer Manhole Plugging Phase II project.

6.2 Section 36 Balance of Areas Soil Remediation

Site Description: The Section 36 BOA Soil Remediation project includes the Section 36 BOA Medium Subgroup as described in the DAA, as well as sites within the Chemical Sewers (including those within the footprint of Basin A), Ditches/Drainage Areas, and Surficial Soil Medium Groups that are located in the Section 36.

Section 36 Balance of Areas Sites. Section 36 BOA is a subgroup within the Undifferentiated Medium Group and includes four sites located in the southern portion of Section 36. The sites do not have unique site-type characteristics or contamination patterns. COCs in the soil exceeding human health SEC include OCPs and chloroacetic acid to a depth of 10 feet. These sites are also characterized by the potential presence of agent and agent-filled OE.

Chemical Sewers Sites. Sections of both the North Plants and South Plants chemical sewer lines located within Section 36 will be remediated under this project. Three sites are part of the chemical sewer system that served the manufacturing areas in the South Plants and North Plants. Release of contaminants was caused by spillage or leakage from

broken pipes or faulty joints and manholes in the sewer lines. The majority of sewer piping is vitrified clay, although some sections are steel or cast-iron pipe.

The COCs present that exceed the human health criteria include OCPs, chloroacetic acid, VOCs, and DBCP. Portions of the sewer lines may be characterized by the potential presence of agent. The depth of the sewer lines ranges from approximately 6 to 8 feet.

Ditches/Drainage Areas Sites. Ditches/drainage area sites have varied disposal and release histories. They were primarily used to convey surface water from other sites so they only sporadically contain water.

The primary COCs are OCPs. Detections of OCPs, as well as detections of arsenic and mercury, are below the certified reporting limits (CRL) in the majority of the samples collected, and so only pose potential risk to biota. The majority of contaminants were detected in the zero- to one-foot depth interval.

Surficial Soil. Surficial soil sites contain soil that was primarily contaminated by windblown dust and lead from firing range activities. These sites pose potential risk to biota and include isolated HHE areas. Surficial soils sites include P1 soil areas selected by BAS for residual biota risk remediation. There is a relatively small area in the very southwest corner of Section 36 that will be remediated under this project. Sampling was typically limited to the uppermost 2 inches of soil. Results indicate the primary COCs to be OCPs.

Project Sites/History:

Section 36 Balance of Areas Sites

- CSA-1b – Undifferentiated – Section 36 Balance – Complex Disposal Area South.
- CSA-2a – Undifferentiated – Section 36 Balance – Munitions Testing Area.
- CSA-4 – Undifferentiated – Section 36 Balance – contaminated fill.
- NCSA-1g – Surficial Soils – General Surface Contamination – contaminated fill.
- NCSA-1b – Lime Basins – Settling Basins – surface disposal area.

Chemical Sewers Sites

- CSA-3 – Sewer Systems – Chemical/Basins A to F – used as waste lines.

- NCSA-6a – Sewer Systems – South Plants/Basin F (Chemical) – used as waste lines. Only portions of this site in Section 36 are to be remediated under this project.

- NCSA-6b – Sewer Systems – North Plants/Basin F (Chemical) – used as waste lines.

Ditches/Drainage Areas Sites

- CSA-2b – Ditches/Drainage – Section 36 Metal Debris – used as a storage area.

- NCSA-1d – Ditches/Drainage – Runoff Storage – used as a surface impoundment/lagoon.

- NCSA-1f – Buried Sediment/Ditches – South Plants Ditches – used as a surface area disposal.

- CSA-1d – Sanitary Landfills/Incinerator 834 – used for burning and burial of contaminated and uncontaminated waste. Located in Section 36. Remaining portion not remediated under the Existing (Sanitary) Landfills Remediation Project, the portion that lay under the high-density polyethylene dewatering line.

Project Description:

a) Close or protect monitoring wells, as required.

b) Excavate contaminated soil, OE debris, and associated sewer line debris from the sites within Section 36, as identified above. Set aside clean overburden from the Chemical Sewer excavation sites for replacement after backfilling.

c) Screen potentially agent-contaminated excavated soil for agent and treat any soil exceeding Army regulatory criteria prior to landfilling at the On-Post HWL.

d) Transport any explosive-containing munitions to an approved site and detonate, if unstable, or detonate in place.

e) Dispose of excavated HHE soil and OE debris into the On-Post HWL. Consolidate excavated biota soil into Basin A.

f) Perform a geophysical survey in areas that will not be maintained by the Army, and characterize geophysical targets.

g) Perform composite sampling of the site to confirm removal of contaminated soil. Excavate and dispose of soil with residual biota risk.

h) Replace excavated overburden for HHE and OE debris areas and grade as necessary to provide adequate drainage and to control erosion; interim revegetate the disturbed areas.

i) Provide gradefill and grade as necessary to match the final contours of adjacent projects and the site drainage plan.

j) Perform composite sampling of the site to confirm that no residual biota risk is present at final grades.

k) Re-establish vegetation over the disturbed remediation and borrow areas.

Dependent Projects: This project may be dependent upon the availability of a soils agent treatment facility if the screening process to determine actual quantities of agent-contaminated materials indicates a need for this facility.

6.3 Secondary Basins Soil Remediation

Site Description: This project includes portions of the Secondary Basins Medium Group as well as Sand Creek Lateral and Surficial Soil Medium Group/Subgroup sites that are located in Section 26 and west of Basin C.

Secondary Basins Sites. As presented in the DAA, this group consists of five sites: four inactive liquid disposal basins (Basins B, C, D, and E) and the Deep Well Disposal Facility.

This project will address remediation for two sites within the group: Basin C and Basin D. The other sites within the group will either be addressed by other remediation projects or do not contain soil that exceeds remediation criteria.

Basins C and D contain soil contaminated by infiltrating wastewater that flowed through ditches from Basin A. They are also expected to contain slightly elevated concentrations of salts because they were used to store wastewater with high chloride contents. The habitat contains weedy forbs and areas of disturbed vegetation.

The primary contaminants are OCPs. The human health SEC is exceeded by maximum concentrations of OCPs at depths ranging from 0 to 10 feet below ground surface. Fewer than two percent of the samples for any OCP exceed the human health SEC. Soil in the zero- to one-foot depth interval potentially poses risks to biota.

Surficial Soil Sites. A relatively small area in the southeastern portion of Basin D will be remediated under this project. Surficial soil sites contain soil that was essentially contaminated by windblown dust and pose potential risks to biota and surficial

contamination. Sampling was typically limited to the uppermost two inches of soil. The COCs are primarily OCPs.

Sand Creek Lateral Site. The Sand Creek Lateral is a subgroup within the Buried Sediments/Ditches Medium Group. The Basin B to Basin D ditch will be remediated under this project. Primary contaminants are OCPs found in the upper one foot of soil.

Project Sites/History:

Secondary Basins Sites

- NCSA-2a – Secondary Basins-Basin C – used as a surface disposal area.

- NCSA-2b – Secondary Basins –Basin D – used as a surface disposal area.

Surficial Soil Sites

- No SAR sites are associated with this project.

Sand Creek Lateral Site

- NCSA-2d – Ditches/Drainage-B to D/B – used as a surface disposal area.

- NCSA-4b – Secondary Basins – Basin F Exterior – surface contamination.

- NCSA-5c – Buried Sediments/Ditches – Sand Creek Lateral – surface disposal area.

Project Description:

a) Close or protect monitoring wells, as required.

b) Excavate contaminated soil from the Secondary Basin, Sand Creek Lateral, and Surficial Soil medium groups in the Section 26 project area. Dispose of excavated HHE soil into the On-Post HWL. Consolidate excavated biota exceedance soil into Basin A.

c) Backfill with clean soil borrowed from other RMA areas and grade as necessary to provide adequate drainage and to control erosion.

d) Re-establish vegetation over the disturbed remediation and borrow areas.

Dependent Projects: There are no dependent projects for the Secondary Basins Soil Remediation project.

6.4 Complex (Army) Disposal Trenches Remediation - Cover

Site Description: The Complex (Army) Trenches is a subgroup within the Disposal Trenches Medium Group. This site contains soil and debris disposed of in a series of trenches. The trenches were investigated during the RI and were found to contain trash and manufacturing/military waste including scrap metal, bricks, concrete and asphalt rubble, empty and full glass bottle, white phosphorous, containerized wastes, burned incendiary device casings, agent, and agent-filled OE.

The trench areas are considered principal threat areas down to a depth of approximately 14 feet. In addition, contaminated soil outside of the anomalous trench areas contains chlordane exceeding human health SEC, generally within the zero- to one-foot depth interval. A large quantity of soil outside the trench areas contains COCs and may pose potential risk to biota. The site is located in an area of disturbed vegetation types.

Project Site/History:

- CSA-1c – Disposal Trenches/Complex Trenches – used as a disposal area.

Project Description: This is implementation of Phase II of this project (Phase I – Slurry Walls was conducted as an early start project) and includes:

a) Close the Complex (Army) Disposal Trenches by placing a RCRA-Equivalent Cap, including placement of a minimum 16-inch layer of crushed concrete as a human/biota barrier and sufficient soil to establish and support vegetation, over the Complex Trenches to the slurry wall.

b) Re-establish vegetation over the disturbed remediation and borrow areas.

Dependent Projects: This project is dependent upon the Shell/Complex Trenches Slurry Walls, an early start project, the RCRA cap equivalency study, and the Basin A Consolidation and Remediation design.

6.5 Shell Disposal Trenches Remediation - Cover

Site Description: This project addresses the Shell Trenches, which are a subgroup within the Disposal Trenches Medium Group. This site contains approximately 18 trenches that were filled with a variety of solid and liquid wastes from Shell production facilities. Wastes were buried both in bulk form and in drums from 1952 through 1966. Due to the presence of high contamination levels, containerized waste, and historical evidence as a source of groundwater contamination, the entire site is considered a PT.

The historical contamination has been contained as part of the Shell Trenches IRA. A vertical barrier was installed around the site to reduce the migration of contaminated groundwater away from the site, and a soil cover was placed over the site to reduce rainwater infiltration through the contaminated area. The soil cover is approximately three feet thick and has been revegetated with native grasses. However, the vegetation types and the maintenance activities conducted at the site are designed to discourage burrowing animals from using the area for habitat.

The disposal trenches themselves contain elevated levels of OCPs, HCCPD, and DBCP, which are encountered to a depth of ten feet. In addition to the COCs identified in the trenches, numerous nontarget compounds, which are intermediates and byproducts from the manufacturing of pesticides, are identified at concentrations as high as 40,000 ppm. Army agent-related compounds were also detected in soil samples and from nearby monitoring wells.

Project Site/History:

- CSA-1a – Disposal Trenches-Shell Trenches – used as a disposal area.
- CSA-1b – Undifferentiated – Section 36 Balance – Complex Disposal Area South.
- CSA-4 – Undifferentiated – Section 36 Balance – surface contamination.

Project Description: This is implementation Phase II of this project (Phase I – Slurry Walls was conducted as an early start project) and includes:

a) Close the Shell Disposal Trenches by placing a RCRA-Equivalent Cap, including placement of a minimum 16-inch layer of crushed concrete as a human/biota barrier and soil to establish and support vegetation, and a moisture monitoring system (not required by the ROD) to aide in assessment of RCRA-Equivalent Cap performance.

b) Construct 2-ft-thick soil cover.

c) Re-establish vegetation over the disturbed remediation and borrow areas.

Dependent Projects: This project is dependent upon the Shell/Complex Trenches Slurry Wall, an early start project, and the RCRA-Equivalent Cap equivalency study.

6.6 North Plants Soil Remediation - Cover

Site Description: This project includes the North Plants Subgroup of the Agent Storage Medium Group and portions of the Chemical Sewers Medium Group located in the North Plants area.

Project Sites/History:

There are no SAR sites in this implementation project (see North Plants Structure Demolition and Removal).

Project Description:

The North Plants Soil Remediation Project ESD was approved in January 2009 resulting in the deletion of the ROD requirement of a soil cover and elimination of the remaining remedy requirement for the North Plants. All remedy requirements identified in the ROD are either complete or transferred to other projects or, in the case of the soil cover, eliminated. No further design documents will be prepared and therefore no CCR is required. As a result, no further work is required under the North Plants Soil Remediation Project.

6.7 Section 35 Soil Remediation

Site Description: The Section 35 Soil Remediation project includes Secondary Basins Medium Group site Basin B and portions of the Chemical Sewers, Sand Creek Lateral, Ditches/Drainage Areas, and Surficial Soil Medium Groups/Subgroups that are located in Section 35.

Secondary Basins Site. The only Secondary Basins Medium Group site remediation under this project is Basin B, which contains soil contaminated by infiltrating wastewater that flowed through ditches from Basin A.

Although the majority of contamination potentially poses risks to biota only, COCs detected in the soil above the human health criteria include OCPs to a depth of approximately one foot.

Chemical Sewers Site. The portion of the former South Plants Chemical Sewer, located within Sections 35 and 26, will no longer be remediated under this project in accordance with an ESD approved by the Regulatory Agencies in Fiscal Year (FY) 00. This site was part of the chemical sewer system that served the South Plants manufacturing areas and transported waste from the South Plants to Basin F. The Program Management Contractor (PMC) performed site sampling that confirmed that no contamination exists along the former sewer that the Army removed in 1982. The Regulatory Agencies concurred with the sampling results and an ESD that eliminated the requirement to further remediate this site.

Sand Creek Lateral Sites. The Sand Creek Lateral is a subgroup within the Buried Sediments/Ditches Medium Group and includes segments of the Sand Creek Lateral that transported runoff from the SPCPA during storm events and snowmelt, and of drainage ditches used to transport water to and from the Secondary Basins and to drain the South

Plants and North Plants process areas. The habitat varies from weedy forbs to native grasses.

Organochlorine pesticides are the primary human health and biota COCs present at these sites. Portions of these sites contain soils that pose potential risks to biota in some samples. Human health COCs extend to a depth of approximately five feet, with the highest contaminant concentrations detected in the upper one foot of the soil profile.

Ditches/Drainage Areas Sites. Ditches/Drainage Area sites have varied disposal and release histories. They were primarily used to convey surface water away from other sites so they only sporadically contained water.

The primary COCs are OCPs. Detections of OCPs, as well as detections of arsenic and mercury are below the CRLs in the majority of the samples collected, and so only pose potential risk to biota. The majority of contaminants were detected in the zero- to one-foot depth interval.

Surficial Soil. Surficial soil sites contain soil that was essentially contaminated by windblown dust and pose potential risks to biota. Surficial soil sites include P1 soil areas selected by the BAS for residual biota risk remediation. Areas in the northeastern and southeastern corner of Section 35 will be remediated under this project.

Sampling was typically limited to the uppermost two inches of soils. Results indicate the primary COCs to be OCPs.

Project Sites/History:

Secondary Basins Site

- NCSA-5a – Secondary Basins – Basin B – used as a surface disposal area.

Chemical Sewers Site

- NCSA-6a – Sewer Systems-South Plants/Basins F (Chemical) – used as waste lines. Removed in 1982 along with surrounding soil.

Sand Creek Lateral Sites

- NCSA-5b – Buried Sediments/Ditches – A, B, C, D Ditches – surface disposal area.

- NCSA-5c – Buried Sediments/Ditches – Sand Creek Lateral – surface disposal area.

Ditches/Drainage Areas Sites

- NCSA-1c – Buried Sediment/Ditches – North Plants Ditch – surface disposal area.

- NCSA-5d – Ditches/Drainage – Surface Canal/Basin A – surface disposal area.

Surficial Soil – No SAR sites are associated with this project.

Project Description:

a) Close or protect monitoring wells, as required.

b) Excavate contaminated soil from the Secondary Basin, Sand Creek Lateral, Ditches, and Surficial Soil Medium Groups in Section 35.

c) Dispose of excavated HHE soil into the On-Post HWL. Consolidate excavated biota exceedance soil into Basin A.

d) Backfill with clean soil borrowed from other RMA areas and grade as necessary to provide adequate drainage and to control erosion.

e) Re-establish vegetation over the disturbed remediation and borrow areas.

Dependent Projects: There are no dependent projects for the Section 35 Soil Remediation project.

6.8 North Plants Structure Demolition and Removal

Site Description: The North Plants Structure Demolition and Removal project encompasses a wide variety of structural types and materials located in Section 25 including all aboveground structures, buildings, foundations, basements, tanks (including underground storage tanks), process and non-process equipment (including boneyards), aboveground chemical and non-chemical pipelines, ACM, equipment and materials contaminated with PCBs, and other man-made objects placed at RMA. The structures have been divided into two groups identified as AH Structures and OCH Structures. Also included with structure demolition is soil remediation of the Agent Storage Medium/North Plans Subgroup and portions of the Sewer Systems Medium/Chemical Sewers Subgroup located in the North Plants area.

The North Plants Subgroup is composed of sites potentially containing agent based on historical use or based on the presence of agent breakdown products. In addition, these sites contain isolated HHE in soil to a depth of approximately one foot and contaminants at concentrations that potentially pose a risk to biota. Arsenic is the only contaminant that exceeds the human health SEC at these sites.

Chemical Sewers Site. The portion of the North Plants chemical sewer line that is located in the North Plants complex is included in this project. This sewer served the manufacturing areas in the North Plants. Release of contaminants was caused by spillage

or leakage from broken pipes or faulty joints and manholes in the sewer lines. The majority of the sewer piping is vitrified clay, although some sections are steel or cast-iron pipe.

The COCs present that may exceed the human health SEC include OCPs, chloroacetic acid, and arsenic. Portions of the sewer lines may be characterized by the potential presence of agent. The average depth of the sewer line is approximately eight to nine feet.

Project Sites/History: Structures

- NFU-A – Structures – No Future Use, Agent-contaminated buildings.

- NFU-MNP – Structures – No Future Use, Manufacturing, Nonprocess–contaminated buildings.

- NFU-MP – Structures – No Future Use, Manufacturing, Process-contaminated buildings.

Project Sites/History: Soils

- NPSA-3 – Agent Testing – Sarin (GB) Manufacturing Area – used as GB Manufacturing Area.

- NPSA-5 – Agent Testing – Special Weapons Plant – used as a Special Weapons Plant.

- NPSA-6 – Agent Testing Underground Spill Area – underground Spill Area.

- Soil surrounding and beneath:
  Building 1601 (GB and Bomb Plant)
  Building 1606 (Cluster Assembly Building)
  Building 1607 (Warehouse)

- NPSA-8c – Surface Drainage Area – contaminated sediments.

- NPSA-9f – Investigated Area – Arsenic Detection – spill site area.

Chemical Sewer Sites

- NPSA-1 – Sewer Systems – Chemical Sewers – used as waste lines.

Project Description:

a) Demolish all North Plants AH and OCH Group structures in Sections 25 including removal of all aboveground piping, utilities, and selected foundations. Asbestos-containing material and PCBs encountered will be disposed of in the On-Post HWL.

b) Destroy, document and dispose of specialized equipment in accordance with the Detailed Destruction Plan under the Chemical Weapons Convention Treaty.

c) Screen potentially agent-contaminated building debris and excavated soil by sampling for agent and treat any material exceeding Army regulatory criteria.

d) Remove AH Group structural debris and equipment and dispose of in the On-Post HWL. Consolidate OCH Medium Group structural debris into Basin A.

e) In most cases, floor slabs and foundations for the OCH Structures will be left behind after demolition (unless contaminated soil is to be subsequently excavated from beneath the slabs or foundations). Floor slabs will be cracked or broken to reduce ponding of water.

f) Backfill foundation and basement excavations with clean soil borrowed from other RMA areas and grade as necessary to provide adequate drainage and to control erosion.

g) Close or protect monitoring wells, as required.

h) Excavate North Plants and Chemical Sewer Medium Group contaminated soil and associated sewer line debris in Section 25 up to a depth of 10 feet. Screen potentially agent-contaminated excavated soil by sampling for agent and treat any soil exceeding Army regulatory criteria.

i) Dispose of approximately 17,000 bcy of excavated HHE soil and debris into the On-Post HWL.

j) Backfill with clean soil borrowed from other RMA areas and grade as necessary to provide adequate drainage and to control erosion.

k) Re-establish vegetation over the disturbed remediation and borrow areas.

Dependent Projects: This project may be dependent upon the availability of a structure agent treatment and soil agent treatment facilities if the screening process to determine actual quantities of agent-contaminated materials indicates a need for one or both facilities.

7.0 PHASE IV – BASIN F/LIME BASINS

This final phase of the RMA ROD remedy contains four projects. This section will provide site descriptions, project sites/history, project descriptions, and related project discussions.

7.1 Basin F Wastepile Remediation

Site Description: This project consists of the Basin F Wastepile, a subgroup of the Basin F Medium Group, which was formed as a result of the Basin F IRA. The IRA included incineration of Basin F liquids in the Submerged Quench Incinerator, excavation of Basin F soil from below the original asphalt liner, and the final grading, capping, and revegetation of the excavated area.

The Basin F Wastepile consists of excavated sediment and soil that are contaminated with organic compounds, arsenic, and metals at concentrations exceeding human health and principal threat criteria. The total concentrations of organics are inferred to be in the order of 1,000 to 10,000 ppm. This material also contains elevated levels of salts due to the high chloride content in the wastewater stored in the former Basin F.

Project Site/History:

- FWASTEPILE – Basin F Wastepile – contaminated soil pile.

Project Description:

a) Perform necessary treatability studies during design to select the best odor control technology.

b) Excavate Basin F Wastepile soil and debris in Section 26, including the bottom liners. Prior to excavation of the wastepile, set aside clean overburden from the existing cover. This material will subsequently be used to either backfill the excavated area (along with clean soil borrowed from other RMA areas) to achieve desired grade or used for odor control purposes. Soil exceeding the EPA's paint filter test will be dried by blending with an absorbent in an enclosed structure. Volatile and semivolatile organic compounds released during the drying process will be recovered and treated.

c) Dispose of the wastepile materials in a dedicated cell at the ELF.

d) Control vapors and odors at every stage of the remediation using any necessary measures.

e) Backfill with the stockpiled clean overburden and clean soil borrowed from other RMA areas and grade as necessary to provide adequate drainage and to control erosion.

f) Re-establish vegetation over the borrow areas.

Dependent Projects: The Basin F PT Soil project is partially dependent upon this project along with the Basin F and Basin F Exterior Remediation project.

7.2 Former Basin F Principle Threat Soil Remediation

Site Description: This project addresses principal threat soil within the Former Basin F, which is a subgroup of the Basin F Medium Group. This site consists of a portion of the former basin area. Basin F received wastewater through the chemical sewer system, and the site is expected to contain elevated levels of salts due to the high chloride content in the wastewater. The Basin F IRA was conducted in 1988-1989, to remove Basin F liquid and sludge, the asphalt liner of the basin, and highly contaminated soil from beneath the liner. The soil, sludge, and liner material were placed in the Basin F Wastepile during the IRA. The thick soil cover (average thickness of 3 feet) and up to ten feet of gradefill was placed over the former Basin F following construction of the wastepile. The soil cover was revegetated at the conclusion of the IRA.

The Former Basin F contains soil contaminated by wastewater that infiltrated during Basin F operations. The human health criteria are exceeded by average concentrations of OCPs and maximum concentrations of CLC_2A. Concentrations of aldrin and dieldrin also exceed the principal threat criteria in specific areas. The human health COCs were found from 0 to 10 feet below ground surface, but were primarily detected in the 0- to 5-foot depth interval. However, residual contamination exists from below 10 feet to the water table (approximately 40 feet).

Project Site/History:

- NCSA-3 – Secondary Basins – Former Basin F – surface impoundment/lagoon.

Project Description:

a) Perform necessary field investigations and pre-design studies prior to design to select the best odor control technology.

b) Close or protect wells, as required.

c) Excavate and dispose of designated Basin F PT soil in the ELF.

d) Excavate the additional volume of HHE soil Identified by the Regulatory Agencies in the October 2005 ROD Amendment to the Basin F/Lime Basin Projects and dispose of the ELF.

e) Backfill with soil from a designated borrow area or Basin F Exterior.

f) Excavate and relocate Basin F Key Cut soil as gradefill within the RCRA-Equivalent cover boundary to reduce the overall quantity of gradefill required for RCRA-Equivalent cover construction.

Dependent Projects: The Basin F and Basin F Exterior Remediation are dependent upon this project.

7.3 Basin F and Basin F Exterior Remediation

Site Description: This project includes Former Basin F and Basin F Exterior. Other sites within the Sand Creek Lateral, Secondary Basins, and Surficial Soil Medium Groups/Subgroups that are located in the project area will also be remediated under this project. The Chemical Sewers site has been transferred to the Section 35 Soil Remediation Project.

Sand Creek Lateral Site Description. The Sand Creek Lateral, a subgroup within the Buried Sediments/Ditches Medium Group, is an active drainage ditch that enters RMA at the southern boundary, travels north through Sections 2, 26, and 35, and joins First Creek in Section 25. It serves as part of the RMA stormwater management system. Flows are intermittent and include runoff from the adjacent areas during storm events and snowmelt. The habitat varies from weedy forbs to native grasses.

The primary COCs at this site are OCPs that exceed human health SEC in surficial soils.

Secondary Basins Site Description. The Deep Well Site (NCSA-4a) is a remediation site within the Secondary Basins Medium Group. It contains isolated contamination that is probably the result of spills or leaks that occurred during operation of the well in the early 1960s. The habitat contains weedy forbs and areas of disturbed vegetation.

COC detected in the soil above the human health SEC include OCPs to depth ranging from 0 to 10 feet; the majority of contamination potentially poses risks to biota only.

Surficial Soil Site Description. The Basin F Exterior is a large site adjacent to Former Basin F and is part of the Surficial Soil Medium Group. This site contains soil that was essentially contaminated by windblown dust and primarily poses potential risks to biota and surficial contamination. However, this site contains several locations where OCPs were detected above the human health SEC in the top 1-foot of soil.

Project Site/History:

Sand Creek Lateral Site Description

- NCSA-5c – Buried Sediment/Ditches – Sand Creek Lateral – surface disposal area.

Secondary Basins Site Description

- NCSA-4a – Secondary Basins-Deep Well – disposal pit/dry well.

Surficial Soil Site Description

- NCSA-4b – Secondary Basins – Basin F Exterior – surface contamination.

Chemical Sewers Site

- NCSA-6a – Chemical Sewer Sites – sewers/surface contamination.

Project Description:

a) Close or protect monitoring wells, as required.

b) Excavate contaminated soil from Sand Creek Lateral, Surficial Soil, and Secondary Basins Medium Groups in Sections 23, 25, and 26.

c) Dispose of principal threat and HHE soil into the On-Post HWL.

d) Consolidate biota exceedance surface soil into the site of former Basin F and Basin A.

e) Grout chemical sewer pipe.

f) Contain the consolidated biota exceedance, and the remaining HHE soil in Basin F, and the chemical sewer pipe and sewer related HHE soil, by placing a RCRA-equivalent cap, which includes a burrowing animal barrier (biota barrier), and soil to establish and support vegetation over the former Basin F including the site of the former wastepile.

g) Backfill with clean soil borrowed from other RMA areas and grade as necessary to provide adequate drainage and to control erosion over the excavation areas outside of Basin F.

h) Re-establish vegetation over the disturbed remediation and borrow areas.

Dependent Projects: There are no projects dependent upon the Basin F and Basin F Exterior Remediation project.

7.4 Section 36 Lime Basins Soil Remediation

Site Description: This project addresses the Section 36 Lime Basins, which are a subgroup within the Lime Basins Medium Group. The Lime Basins subgroup contains one site (Site NCSA-1b), which was used for the neutralization of process wastes related to agent production. The IRA activities at this site involved placing a soil cover over the entire site. The boundary between the Basin A Consolidation Area and the Section 36 Lime Basins Project was relocated to a topographic feature (i.e., top of berm), which is the operational boundary between the two projects.

The basins are characterized by soil/sludge mixtures to a thickness of ten feet with high pH levels and the potential presence of agent. Contaminants of concern in the soil/sludge exceeding human health criteria include primarily OCPs, but low-level inorganic contamination is also present.

Project Site/History:

- NCSA-1b – Lime Basins – Settling Basins – surface disposal area.

Project Description:

a) Close or protect monitoring wells, as required.

b) Install multiple groundwater extraction wells for dewatering of the site. Treat extracted groundwater at the Basin A Neck Treatment System. Treated groundwater will be recharged in the Basin A Neck recharge trenches.

c) Install a groundwater barrier wall around the Basins using deep soil mixing construction methods. The barrier wall will be keyed into competent bedrock. Conduct agent screening during barrier wall installation.

d) Place gradefill over the Lime Basins area in Section 36 and grade as necessary to provide adequate drainage.

e) Construct a RCRA-Equivalent Cover, including final vegetation and Engineering Controls over the entire Lime Basin site.

Dependent Projects: There are no dependent projects for the Section 36 Lime Basin Soil Remediation project.

8.0 SITE-WIDE PROGRAMS

The site-wide programs consist of studies, monitoring, and agent treatment and borrow operations. This section will provide a brief narrative of the program and any related projects.

8.1 RCRA Cap Equivalency

The RCRA-Equivalent Cap effort is to assess alternative cost-effective cap designs compared to the typical Subtitle C cap design(s) recommended by EPA guidance. The primary basis for evaluating alternative designs is because of unique climatological characteristics (i.e., high evapotranspiration rates versus precipitation) in the Denver area. These characteristics significantly limit natural deep percolation rates through well-drained vegetated areas. Thus, the focus of the effort is to develop alternative designs that are cost-effective and rely primarily on the natural materials in the vegetative cover and evapotranspiration to limit deep percolation.

The effort to demonstrate equivalence is being conducted in a phased manner. The first phase involves hydrologic modeling to evaluate whether alternative designs can provide adequately low deep percolation based on theoretical considerations. Collection of field data to develop model parameters is also being conducted to provide some additional assurance as to the representativeness of model predications.

If modeling results indicate that RCRA equivalence can likely be achieved for alternative designs, and then a field program is envisioned to demonstrate that the model results are reliable. The details of the field program will be developed after the modeling work has been completed and a decision to proceed on the field program has been made.

Six projects are dependent upon this study: Basin F and Basin F Exterior Remediation, Complex (Army) Disposal Trenches Remediation, Shell Disposal Trenches Remediation, South Plants BOA and Central Processing Areas Soil Remediation – Phase II, Lime Basins, and Basin A Consolidation and Remediation.

8.2 Borrow Area Operations

The RMA remedy, as described in the ROD and based upon the design assumptions in the DAA, will require approximately 12 million cubic yards of borrow materials to backfill excavations, build structural fills, establish cover grades, and construct liner and cover components to complete the various remedial actions. The Army has completed an initial borrow plan that identifies those areas within the RMA boundary where borrow operations would be appropriate, estimates the material types available at the sources, estimates sizes of areas impacted by borrow excavations, allocates and manages BA operations, and provides operational alternatives and options for the BA. The Army will update this plan on an annual basis throughout the execution of the remedy projects. Borrow operations will impact nearly all the implementation projects.

Note: The BAS has identified potential biota residual risk areas and classified them as containing either P1 or Terrestrial Residual Ecological Risk (TRER) soils. These soils are located within the upper one foot of the soil profile in these areas. The BA boundary

selection was focused on inclusion of areas containing P1 soils. TRER soils will be excavated and used as borrow if necessary. The P1 borrow soils will not be used as top soil or liner soil, nor will it be placed within the upper two feet of backfilled excavations or cap/cover system. Development of BA 10 will screen for agent (Reference: Design Refinement of Excavation Boundaries for Surficial Soil and Reduction of Residual Biota Risk, Section 4.0, Appendix C). The BAS, through subsequent risk evaluation, identified additional soil with residual ecological risk. This soil, termed TRER soil, was identified for remediation through either soil tilling or removal. Remediation of the TRER soil areas is also documented in the annual borrow plan updates.

8.3 Structures and Soil Agent Treatment Facilities

The ROD states that all AH Structures will be monitored for the presence of Army chemical agents during dismantling operations. Building debris or soils that are determined to contain agent will be treated by caustic washing as necessary prior to disposal. The agent treatment facilities will potentially support four main projects: South Plants Structures Demolition, SPCPA Soil Remediation, North Plants Structures Demolition, and North Plants Soil Remediation. The design efforts of these projects will provide a process to screen and determine actual quantities of agent-contaminated materials and provide for their segregation and special handling. This information will allow for a more effective design of agent treatment facilities, if necessary, at a later date. As such, agent treatment facilities have been removed from the RDIS as site-wide programs. However, placeholders will be preserved within the RDIS in the event the facilities are required (Reference: Section 4, Appendix C).

8.4 Site-Wide Biota Monitoring – BAS

The BAS was established as a result of the "Agreement for a Conceptual Remedy for the Cleanup of the Rocky Mountain Arsenal" to permit the further investigation of other identified areas of potential residual risk outside the areas set for remediation. The BAS will focus on the planning and conduct of both the USFWS biomonitoring programs and the Supplemental Field Study/risk assessment process and will provide interpretation of results and recommendations to the Parties' decision makers. The BAS will serve as a technical resource to the Parties' decision makers by using technical expertise in analyzing, and potentially collecting data sufficient to support design refinement for surficial soil areas and aquatic resources in order to break unacceptable exposure pathways in consideration of minimizing habitat disturbance. Further, it will assess through monitoring, the efficacy of remedies on breaking unacceptable exposure pathways to biota.

8.5 Site-Wide Air Monitoring – Air Pathways Analysis

The Air Pathways Analysis (APA) program is designed to protect the health of all on-site construction and management personnel, RMA visitors, and nearby communities. It is also designed to minimize nuisance odors. It is comprised of six individual tasks: Air Criteria Development; Tier I Emission Measurements; Integrated Comprehensive APA Model Packaging; Predictive Emission Model Development; Air Monitoring during Remediation; and Development of Remediation and Waste Handling Scenarios. All six tasks are basically complete, although refinements to the air pathway modeling scenarios and emissions controls will continue throughout the remedy. Specific protocols and reporting mechanisms are identified in the site-wide air and odor plans, if certain air, odor or dust criteria are met. Site-wide ambient air and odor monitoring will be performed at the RMA fenceline, at on-site locations, and in the community to verify that impacts from remediation activities are below Air Criteria

8.6 Contingent Soil Volume

Contingent Soil Volumes (CSV) will be identified based on visual field observations and analytical results of confirmatory samples. Fourteen samples from the North Plants, Toxic Storage Yards, Lake Sediments, Sand Creek Lateral, and Burial Trenches and up to 1,000 additional confirmatory samples may be used to identify the CSV requiring excavation. A total remedy CSV of up to 150,000 bcy may be identified for excavation and landfill.

Identification, sampling, and excavation of CSV will be performed as part of each project. However, for purposes of costing and incorporation of all ROD elements, CSV are identified as a separate project in the RDIS.

8.7 Site-Wide Plume Monitoring

Site-wide monitoring will be conducted to evaluate the effectiveness of the remedy and verify that the remedy is protective of human health and the environment with regard to groundwater and surface water. Site-wide monitoring also is intended to measure changing conditions during and after remediation and provide data for the CERCLA 5-Year Site Reviews. Site-wide monitoring is divided into three categories: Groundwater Monitoring, Surface Water Monitoring, and Surface Water Management. Each of these categories will be discussed in more detail in subsequent sections.

Groundwater Monitoring

Groundwater monitoring at RMA includes many components with the purposes of evaluating the effectiveness of the remedy, measuring changing conditions during and after remediation, and providing data for the CERCLA 5-Year Site Reviews. These groundwater monitoring components include groundwater containment system monitoring, project-specific monitoring, confined flow system monitoring, Off-Post CSRG exceedance monitoring, site-wide monitoring, and HWL monitoring. Each of these groundwater-monitoring components may include different monitoring categories. For example, groundwater containment system monitoring supports system performance validation and includes operational, conformance, and compliance monitoring categories. Monitoring reports for the groundwater containment systems are submitted to the Regulatory Agencies. Project-specific monitoring conducted at specific sites such as soil cover areas and closure/post closure areas include water level and water-quality components. Confined flow system (CFS) monitoring is conducted to determine if groundwater contamination is migrating into the CFS. The CFS underlies the unconfined flow system, which contains the majority of the groundwater contamination. Off-post CSRG exceedance monitoring is intended to track the changes in off-post plumes exceeding CRSGs and is conducted twice in each five-year period. Site-wide monitoring evaluates changes in the hydrology and the effectiveness of the site-wide remedy and is conducted annually.

Some of the more rigorous groundwater monitoring is associated with the HWL. Groundwater monitoring is required prior to waste placement, during operations, and during closure and post closure of HWL. The HWL and ELF groundwater-monitoring project includes quarterly monitoring for up to 39 monitoring wells surrounding the HWL and proposed ELF site. Results from the sampling events are submitted to the Rocky Mountain Arsenal Environment Database (RMAED) and summarized in monitoring reports that are approved by the Regulatory Agencies.

Surface Water Monitoring

The implementation of the surface water-monitoring program serves two objectives: the off-post surface water monitoring is performed in accordance with the Off-Post ROD to evaluate the effect of groundwater treatment on surface water quality, while the on-post objective is the protection of aquatic ecosystems. Surface water monitoring includes the collection of water quality samples and water stage measurements on all lakes and major inflows and outflows from the RMA. Samples are collected at various sites annually or semiannually and after storm events. Upon review of all quality control and quality assurance data, the data is placed in the RMAED.

Surface Water Management

Planning for the utilization of surface water at RMA is conducted each year. A Surface Water Management Plan is developed which provides an assessment of water needs at RMA and establishes priorities for the use of this water. The implementation of the Surface Water Management Plan is monitored using continuous water-stage recorders on lakes and streams at the RMA that transmit water-level data every four hours. These data are used in conjunction with daily well-pumpage rates to determine where surface water supplies are to be stored and to meet requirements of water rights accounting with the State Engineers Office.

8.8 Confined Flow System Monitoring

As part of site-wide plume monitoring, deep (confined aquifer) wells are monitored in the South Plants, Basin A, and Basin F areas. Initially, wells are expected to be monitored twice in five years for water quality, and annually for water levels. However, the frequency of monitoring may be increased if the data indicates that conditions are changing more rapidly as a result of implementation of the remedy. Specific wells and analytes are identified in the approved Long-Term Monitoring Plan.

8.9 Medical Monitoring Program

The ROD included a provision for a medical monitoring program for communities surrounding the RMA for the duration of the soil cleanup. This was incorporated due to citizen concerns that potentially hazardous levels of airborne chemicals could be released from contaminated soil during the remediation. The Colorado Department of Public Health and Environment (CDPHE) have taken the lead role in facilitating the medical monitoring program development.

The ROD also called for the formation of a Medical Monitoring Advisory Group (MMAG), a diverse panel of community members, physicians, nurses, scientists, and state and local health officials, and representatives from EPA, Army, Shell, and the USFWS. The MMAG is responsible for using scientific and medical data and community input to prepare sound and responsive recommendations on program components.

The MMAG submitted twelve core recommendations to the CDPHE in October 1998 as the “Rocky Mountain Arsenal Medical Monitoring Program Recommendation Final Report.” All of the recommendations were accepted and are being implemented as the RMA Medical Monitoring Program. The program will continue through the duration of the environmental cleanup.

8.10 Traffic Management Plan

The purpose of the Traffic Management Plan is to coordinate traffic flow to accommodate RMA site activities. This plan addresses the conceptual layout for site traffic, the final layout, design factors, site access requirements, and haul roads. Several types of traffic will use RMA site roads during remediation. The road use philosophy of the RVO is to maximize site access to all users while maintaining safe construction practices.

Project waste haul, borrow haul, and construction traffic will be separated from public and administrative traffic. The PMC is responsible for road layout and organizing work activities and schedules to provide traffic separation. This plan provides a conceptual input to the phased approach of the site-wide remediation and addresses concerns and issues of the various entities at the site. The specifics of this plan provide guidance to the PMC for planning. The PMC changes to the Traffic Management Plan must be approved by the RVO prior to implementation.

All site roads including haul roads for waste material will be maintained and considered clean. Preventive measures, such as covered haul vehicles and decontamination and excavation practices, will be used to maintain non-contaminated roads. If an accidental spill occurs, all waste will be cleared from the road and removed. Traffic management will also maintain roadbeds, stormwater drainage systems, install, and maintain traffic controls, and designate safety standards during haul road use.

As site cleanup progresses, many roads in the outlying areas will not be needed for further operations. The RVO may then direct the PMC to remove those roads. At the direction of the RVO, the PMC will remove the identified road, use the excavated material where possible, and restore the former road area to blend with the natural topography. At RVO direction, the PMC may also convert all or portions of former haul roads into tram routes for USFWS use.

8.11 Geophysical Surveying

The purpose of the Geophysical Surveying is to minimize the risk of potential hazards from Munitions and Explosives of Concern (MEC) and underground anomalies during the remediation process. Geophysical Surveying will be done in areas designated by the RVO as potential MEC sites prior to the commencement of work in those areas.

8.12 UXO Disposal

An onsite UXO team has been assembled to provide emergency response to identify and manage anomalies that have the potential for being explosively energetic or containing recovered chemical warfare materials. The UXO manager is responsible for managing UXO subcontractors and UXO related geophysical activities in support of remediation efforts.

Additional support is available if needed from the Technical Escort Unit (TEU). The TEU is an Army unit based in Aberdeen, Maryland and specializes in the identification, handling, transportation, and emergency destruction of OE and UXO.

8.13 Biota Barrier

The Stapleton concrete project identifies and provides funds for the purchase of reclaimed concrete from the former Stapleton International Airport for the use as biota barrier materials for several remediation projects at RMA. The concrete will be reclaimed, processed, and stockpiled at Stapleton until required for cap construction. The concrete, which must be reclaimed from Stapleton redevelopment acreage, is a cost-effective purchase for RVO remediation due to short travel distance and the correct match of source quantities with required end use quantities. The project has developed standards for concrete of acceptable strength, density, gradation of concrete pieces, and purity of content to serve as biota barrier material. The project will also designate stockpile areas and methods of supplier delivery. The project is not a remediation activity in itself, but takes advantage of economies of scale, answers a current civic need, and provides a large quantity of material essential to remediation activities.

8.14 Permanent Revegetation/Irrigation/Mitigation Program

The ROD-required remedy components include reconditioning the surface soil and revegetation of areas disturbed during remediation with locally adapted perennial vegetation. The objective of this program is to design, schedule and implement a plan for efficient permanent revegetation of disturbed sites, as well as other areas of low quality habitat at RMA. Work will be conducted jointly by the USFWS and the PMC. The plan will be based upon the 1997 Habitat Restoration Plan and updates to the associated Terrestrial Revegetation Map. Soil amendments, site-wide water requirements, seeding, irrigation, erosion potential, prairie dog colony expansion and small mammal recolonization will be considered. The plan will determine a year-by-year schedule and be updated annually based upon current revegetation requirements.

8.15 Drummed Waste Handling (Plan Development Only)

This project includes an evaluation of a centralized versus decentralized drummed waste disposal handling facility. If a centralized facility is recommended, the location of the centralized facility will be identified. Also included will be a determination of how drummed waste will be managed, including, but not limited to; inventory and waste profile analysis, transportation requirements, storage requirements, liquids management, compatibility, evaluation of shredding empty versus full drums, verification that material will pass paint filter, work plans which include health and safety requirements, quality assurance and air monitoring plans, and coordination with HWL operations.

8.16 Site-Wide Well Abandonment

The Well Abandonment project is tasked with abandonment of wells within the Central Remediation Area (CRA) that will not be used in long-term groundwater monitoring. In the past, wells were abandoned each year based on the implementation projects scheduled for that year. To save costs for mobilization and oversight, a consolidated campaign to abandon all wells that will not be used in the CRA will be implemented. The second half of this site wide program was the development of a well network retention and closure program. On an annual basis, a listing of all remaining wells will be reviewed and all wells not needed for monitoring purposes will be included in a list of wells available for closure. Wells will be closed from this list based on available funding.

9.0 WATER TREATMENT/MONITORING

The water treatment and monitoring activities consist of operation and maintenance of existing treatment plants, deep well abandonment, and South Adams County water supply. This section will provide a brief narrative of the programs.

9.1 South Adams County Water Supply/Henderson Distribution

The Army and Shell are to provide $48.8 million to South Adams County Water and Sanitation District (SACWSD). The money is to be used for two projects. The first project is to acquire and deliver 4000 acre-feet of potable water as an additional water source for the residents served by SACWSD. To accomplish this, SACWSD, with the concurrence of the Army and Shell, hired an independent qualified agent (water resource expert) to research potential sources of water and negotiate the acquisition of 4000 acre-feet of Denver Water. Currently, SACWSD and Denver Water are obtaining storage reservoirs and conveyance systems as part of the water agreement signed in November 1998 by the SACWSD, Denver Water Board, U.S. Army, and the USFWS. If a complete water delivery system is not in place and operational by September 2004, the unused portion of the money and responsibility for acquiring a supplemental water supply reverts to the Army and Shell. The Army has completed all National Environmental Policy Act requirements. The second project is to complete and provide potable water to the residents within the DIMP plume footprint north of RMA, primarily in Henderson.

9.2 On-Post Water Supply

The Army and the USFWS will seek to enter into an agreement with the Denver Water Board to acquire an interim and long-term nonpotable water supply. The interim water, will service the RMA's remediation and revegetation needs. The permanent water deliveries will maintain lakes and wetlands on the National Wildlife Refuge in perpetuity.

9.3 Section 36 Bedrock Ridge Groundwater Plume Extraction System (Monitoring)

This item is the long-term operations and maintenance (O&M) of the Bedrock Ridge Groundwater Plume Extraction System. Long-term O&M will be performed under the Basin A Neck system (See Sections 4.8 and 9.6).

9.4 Confined Flow System Well Closures

Monitoring wells that penetrate the deep (confined) aquifer were evaluated to determine if they represent pathways for water from the overlying (unconfined) aquifer to migrate downward to the deep aquifer. Fifty-one wells are to be closed and sealed. No replacement wells are to be installed during this task.

9.5 Irondale Containment System

The Irondale System, located in Sections 33 and 28, consists of extraction and recharge wells and carbon adsorption for removal of organic contaminants. In addition, extraction systems located in Sections 3 and 4 remove contaminants from the rail classification yard and motor pool plumes. Contaminants for which CSRGs have been established in the ROD include TCE and DBCP. The Army and Shell will continue to operate the system for two years from the signing of the ROD, or until the railyard and motorpool plumes no longer require treatment at the Irondale system.

9.6 Basin A Neck System

The Basin A Neck System (BANS), located in Sections 35 and 26, consists of extraction wells and recharge trenches, a slurry wall, and carbon adsorption for removal of organics. Contaminants for which CSRGs have been established in the ROD include volatile halogenated organics, volatile hydrocarbon compounds, volatile aromatic organics, organosulfur compounds related to mustard agent and herbicides, organophosphorus compounds related to pesticides, organochlorine pesticides, arsenic, and mercury. The Army and Shell will continue to operate the system until the shutdown criteria identified in the ROD, Chapter 9 have been met.

In addition, water from the well north of former Basin F is piped to the system for treatment and reinjection. The water north of Basin F is air-stripped for volatiles prior to mixing with the BANS influent. Starting in FY00, groundwater from the Section 36 Bedrock Ridge Groundwater Plume Extraction System will be piped to the system for treatment and reinjection.

North of Basin F Groundwater Plume Remediation

The north of Basin F groundwater contamination plume is located to the north of the central area of the Arsenal. The contamination plume contains many organic chemicals, including TCE, tetrachloroethylene, chloroform, methylene chloride, vinyl chloride, dieldrin, dicyclopentadiene, and DIMP. Up until August 2000 this groundwater plume was pumped from the ground and treated at Basin A Neck. This type of treatment is very costly and creates secondary hazardous waste that must be disposed.

Under an EPA lead program, the EPA will test an in situ groundwater treatment using Hydrogen Release Compound (HRC). The HRC is an environmentally safe, food quality product that increases bacterial breakdown of groundwater contamination. The program will first conduct laboratory tests to show that HRC works to destroy the groundwater contamination present at the Arsenal. Based on favorable lab results, the next step will be to construct a field test at the Arsenal. The test will consist of injecting HRC at 41 points to a depth of 50 to 54 feet and installing monitoring wells both up and down gradient of the test area. Reduction in the contamination levels will be determined by the testing of samples from the monitoring wells, and sample results will be evaluated to determine the effectiveness of the technology.

9.7 CERCLA Wastewater Treatment Facility

The CERCLA Wastewater Treatment Facility was built primarily for treatment of investigation or remediation derived liquid waste. The CERCLA Wastewater Treatment Facility treats wastewater using any or all of a multistage process including chemical precipitation, dual media filtration, activated alumina adsorption, air stripping, carbon adsorption, and ultraviolet oxidation. Treated water is piped to the BANS for reinjection.

Mass Removal System

Modifications to the existing treatment plant will be performed to allow for the treatment of groundwater extracted from the South Tank Farm Plume and Lime Basins Groundwater Mass Removal Systems. These modifications will include: the addition of storage and pumping systems to allow for the return of the tested groundwater to its respective recharge systems; and minor modification to the piping and control systems to accommodate the revised process configurations planned for the existing systems.

9.8 Northwest Boundary Containment System

The Northwest Boundary Containment System (NBCS), located in Sections 22 and 27, consists of extraction and recharge wells and trenches, a slurry wall, and carbon adsorption for removal of organics. Contaminants for which CSRGs have been established in the ROD include volatile halogenated organics, DIMP,

n-nitrosodimethylamine (NDMA), organochlorine pesticides, and arsenic. The Army and Shell will continue to operate the system until the shutdown criteria as identified in Chapter 9 of the ROD have been met.

9.9 North Boundary Containment System

The NBCS, located in Sections 23 and 24, consists of extraction and recharge wells and trenches, a slurry wall, and carbon adsorption for removal or organics. Based on the results of the NDMA Alternatives Evaluation study, a future modification will also treat NDMA by ultraviolet oxidation following the carbon adsorption treatment. Although CSRGs have been defined for chloride and sulfate, the system is not designed to treat for them. They are expected to attenuate naturally as described in the Site Wide Plume project. In addition, part of the high sulfate is naturally occurring; the CSRG may be the background concentration. Contaminants for which CSRGs have been established in the ROD include volatile halogenated organics, volatile hydrocarbon compounds, volatile aromatic organics, organosulfur compounds related to mustard agent and herbicides, DIMP, organophosphorus compounds related to pesticides, organochlorine pesticides, DBCP, NDMA, arsenic, and the anions fluoride, chloride, and sulfate. The Army and Shell will continue to operate the system until the shutdown criteria identified in the ROD, Chapter 9 have been met.

An agreement by the RMA Committee to modify the NBCS was signed May 28, 1997. The modification includes acquiring and installing a ultraviolet oxidation treatment system to remediate NDMA contaminants.

Following a EPA Superfund Innovative Technology Evaluation (SITE) program demonstration to test the effectiveness of a HRC bioremediation process; a HRC enhancement program has been added to the NBCS.

9.10 South Lakes Plume Monitoring

The ROD states: “Lake level maintenance or other means of hydraulic containment or plume control will be used to prevent South Plants plumes from migrating into the lakes at concentrations exceeding CSRGs in groundwater at the point of discharge. Groundwater monitoring will be used to demonstrate compliance.” Monitoring wells have been constructed to monitor contamination and lake levels.

9.11 Groundwater Mass Removal

Site Description: Per an agreement entitled, Resolution Agreement Groundwater Extraction/Contaminant Mass Removal Systems at the RMA; this remedy entails the extraction of groundwater from the South Tank Farm Plume and the Lime Basins area with treatment of the extracted groundwater to reduce the contaminant mass within the respective plumes.

As part of this agreement, extracted groundwater is to be processed at the CERCLA Wastewater Treatment Plant for recharge to the vicinity of the respective extraction well fields.

South Tank Farm Plume. The South Tank Farm Plume is located in the southern half of Sections 1 and 2 on the RMA. Benzene is the primary component of a composite plume. Benzene has the highest concentrations and comprises the majority of the dissolved contaminant mass in groundwater in the South Tank Farm Plume. Other contaminants include 1, 2-dischloropropane, 1, 3-dimethylbenzene, chlorobenzene, ethylbenzene, toluene, xylene, bicyclohepta, and dicyclopentadiene.

Lime Basins Groundwater. The extraction system will be located in the southwestern corner of Section 36. Chloroform is the primary component of the composite groundwater plume with numerous constituents. Chloroform has the highest concentrations and comprises the majority of the dissolved contaminant mass in groundwater. Other contaminants with high concentrations include 1, 2-dichlorobenze, 1,4-dichlorobenzene, arsenic, benzene, chlorobenzene, acetone and methylene chloride.

Project Description:

a) Install mass removal system in the South Tank Farm Plume to include extraction wells, recharge trenches, pumps electrical supply, and piping.

b) Install mass removal system in the Lime Basins area to include extraction wells recharge trench, pumps, electrical supply, and piping.

c) Install upgrades to the CERCLA Water Treatment Plant.

9.12 North Plants Light Non-Aqueous Phase Liquid

Site Description: This project is related to the North Plants Structure Demolition and Removal Project and the North Plants Soil Remediation Cover Project, and includes the North Plants Subgroup of the Agent Storage Medium Group and portions of the Chemical Sewer Medium Group located in the North Plants Area.

A Petroleum Release Evaluation and Action Plan (PREAP)(TTFW 2007) was prepared by the RVO to address the investigation of a potential remediation of the groundwater contamination associated with the historical release of fuel oil in the North Plants. Characterization and evaluation of the groundwater contamination was conducted in accordance with the requirements of Division of Oil and Public Safety (OPS) Guidance (CDLE 1999), and concluded that no action was required for groundwater. As concluded in the PREAP, concentrations of contaminants in soil do not exceed the Tier 1 RBSLs presented in the guidance. However, the presence of light non-aqueous phase liquids (LNAPL) also referred to as free product, in several monitoring well locations requires evaluation of actions to satisfy requirements under the OPS Guidance for LNAPL

removal. Specifically, the LNAPL must be removed to the maximum extent practicable and in a manner that minimizes the spread of contamination. To satisfy these requirements, the RVO has agreed to undertake an LNAPL removal action that will include: 1) implementation of a pilot LNAPL removal action for gathering of operating data necessary to support the implementation of a full-scale LNAPL removal action; and 2) potential implementation of a full-scale LNAPL removal system based on the data and criteria developed during the pilot action.

Project Sites/History:

There are no specific SAR sites in this implementation project.

Project Description:

Pilot LNAPL Removal Action

a) Install new monitoring piezometers to refine characterization of LNAPL Plume.

b) Install two LNAPL recovery wells with pumps for recovery of LNAPL.

c) Operate the pilot LNAPL removal system and monitor the plume for a duration necessary to support the design of the full-scale LNAPL removal system.

Full-Scale LNAPL Removal System

a) Incorporate pilot action piezometers and LNAPL recovery wells into the full-scale system to the maximum extent possible.

b) Install additional piezometers and LNAPL recovery wells necessary to achieve the project objective for LNAPL removal.

c) Operate full-scale LNAPL removal system until project objectives are met.

d) Decommission the LNAPL removal system when project objectives are met.

e) Removal or abandon in-place the piezometers and LNAPL recovery wells.

Dependent Projects: This project is not dependent on the completion or execution of other projects.

9.13 Dense Non-Aqueous Phase Liquid Remedial Investigation/Feasibility Study

Site Description: The Dense Non-Aqueous Phase Liquid (DNAPL) Investigation project is located near the Section 36 Lime Basins, where DNAPL was discovered in two dewatering wells.

Project/Sites History: The Site falls within the Section 36 Lime Basins Slurry Wall project Boundary. In August 2009, field monitoring of the Lime Basins dewatering wells indicated the potential presence of DNAPL. Subsequent sampling confirmed DNAPL was present in two of the wells.

Project Description: Prepare an RI/FS Work Plan and conduct an RI/FS to assess the nature and extent of the DNAPL. The RI/FS will include review of existing hydrogeological and chemical analytical data, development of trend analysis evaluations including data presentation, and preparation of a Remedial Investigation Summary Report (RISR) with recommendations for future activities if required.

Dependent Projects: This project is not dependent on the completion or execution of other projects.

10.0 Remediation Venture Office

The RVO (Army, Shell, and USFWS) is responsible for the overall management and execution of the remedy to include: Program Management; Remedy Support and Operations; Remedy Execution; Mitigation/Restoration; Program Controls; and Public Outreach. For scheduling purposes, this section includes mission support shared costs, such as EPA and State costs, facilities maintenance, estimated PMC costs, and other costs incurred during the execution of the ROD remedy.

11.0 Program Management

This section includes party-specific costs for five major sections: Program Management, Remedy Support, Remedy Execution, Mitigation/Restoration, and Program Controls. This section also includes discussion of the completion of the remedial action and the trust fund.

11.1 Completion of Remedial Action

A milestone date defined as when all remediation/construction (fieldwork) excluding long-term operations and maintenance activities, are complete.

11.2 Trust Fund

The ROD states, “During the formulation and selection of the remedy, members of the public and some local government organizations expressed keen interest in the creation of a Trust Fund to help ensure the long-term operation and maintenance of the remedy once the remedial structures and systems are installed. In response to this interest, the Parties have committed to good-faith best efforts to establish a Trust Fund for the operation and

maintenance of the remedy, including habitat and surficial soil." The target date to have the trust fund established is 2008.

12.0 OFF-POST REMEDY

The Off-Post remedy section discusses three projects identified in the Off-Post Implementation Plan: off-post surficial soil, off-post water treatment, and off-post well closure. These three items are provided on the On-Post RDIS schedule to account for the funds necessary to accomplish these projects. A more detailed discussion of the projects may be found in the Off-Post ROD.

12.1 Off-Post Surficial Soil

Approximately 160 acres located in the southeast portion of Section 14 and the southwest portion of Section 13 are to be revegetated. The surficial soil is to be tilled and thoroughly mixed to a depth of about 12 inches below the surface; then, the area is to be seeded with a mix of plant species to protect soil from erosion and establish a self-sustaining plant community.

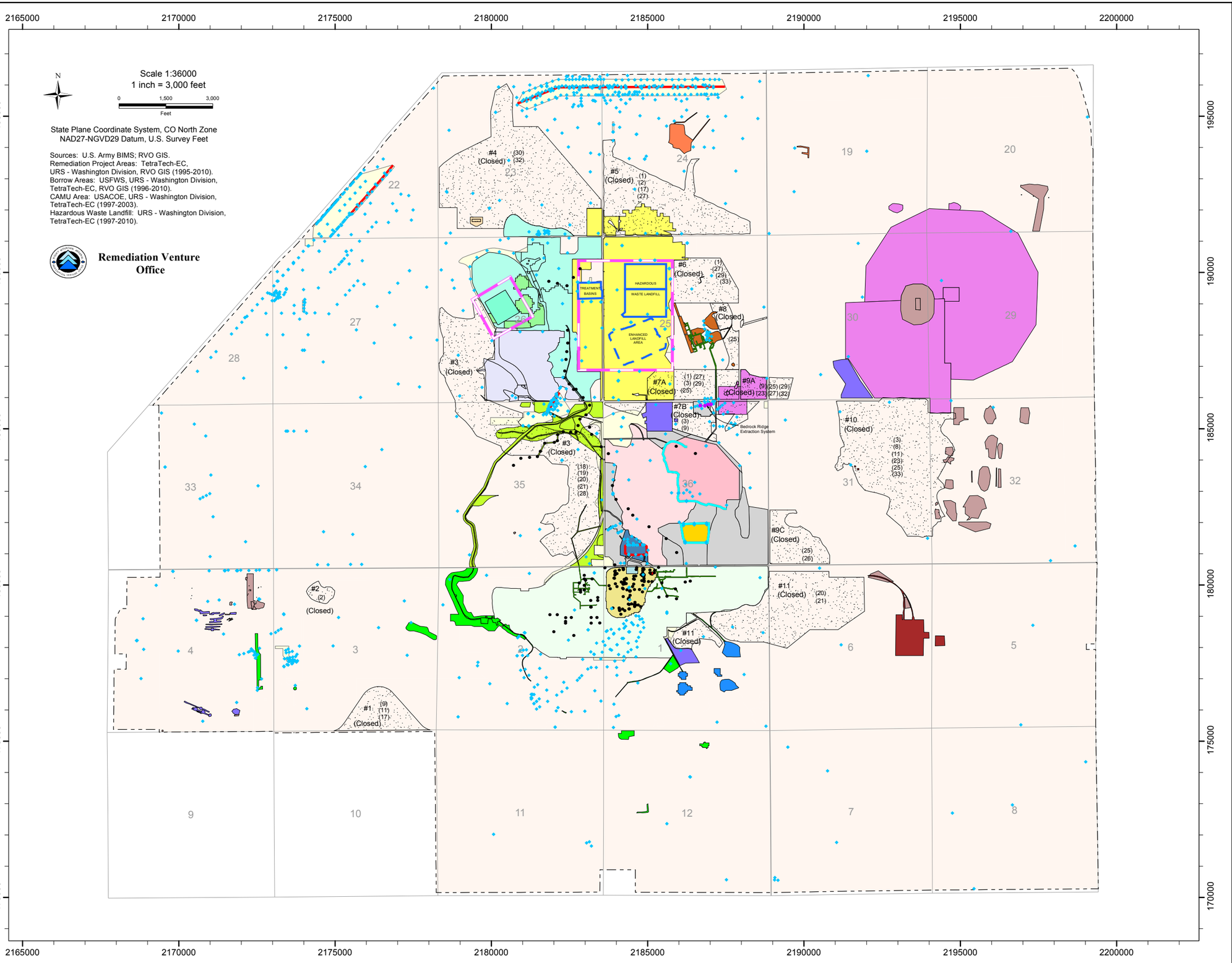
12.2 Off-Post Water Treatment Facility

The Off-Post Groundwater Intercept and Treatment System was designed to extract and treat contaminated alluvial groundwater from the First Creek and Northern Pathways downgradient of the NBCS, and return treated water to the alluvial aquifer. The system consists of a network of upgradient extraction wells, located in two separate well fields, an activated carbon adsorption treatment system for removal of organics, and a network of recharge wells or trenches. Contaminants for which CSRGs have been established in the Implementation Plant for the Off-Post Operable Unit (OU) include volatile halogenated organics, volatile hydrocarbon compounds, volatile aromatic organics, organosulfur compounds, DIMP, organophosphorus pesticides, organochlorine pesticides, DBCP, NDMA, arsenic, and the anions fluoride, chloride, and sulfate. The Army and Shell will continue to operate the system until the shutdown criteria identified in the Implementation Plan for the Off-Post OU have been met.

12.3 Off-Post Well Closure

Five wells located within the off-post study area are to be closed because the wells were poorly constructed and potentially acting as a downward contaminant migration pathway into the Arapahoe Aquifer. Monitoring wells that are no longer in use will also be closed. Specific criteria to determine if wells will be closed are identified in Section 7.4 of the Implementation Plan for the Off-Post OU. A list of wells meeting the closure criteria was

agreed to by the technical staffs representing the RVO, EPA, CDPHE, and Tri-County Health Department.



Disposal Facilities - Basin A/Landfills

- Construct Hazardous Waste Landfill, Associated Influent/Effluent Basins, and Uncontaminated Detention Basin (1)
- CAMU Area Site Project (1)
- Operational Construction of Enhanced Hazardous Waste Landfill (2)
- Basin A Consolidation & Remediation (3)

Early Start Projects

- Sanitary Sewer Manhole Plugging - Phase I (4)
- South Plants Central Processing Area and Complex Trench Chemical Sewer Plugging (5)
- Shell/Complex Trench Slurry Walls (6)
- Post-ROD Removal Actions for Structures (7) (Not Shown)

PHASE I: Outlying Areas

- Toxic Storage Yards Soil Remediation (8)
- Existing Sanitary Landfill Remediation (9)
- Lake Sediments Remediation (10)
- Burial Trenches Soil Remediation (11)
- Munitions (Testing) Soil Remediation (12)
- Miscellaneous Northern Tier Soil Remediation (13)
- Miscellaneous Southern Tier Soil Remediation (14)
- Section 36 Bedrock Ridge Extraction System (15)
- South Plants Structures Demolition (16) and Removal (Not Shown)
- Miscellaneous Structures Demolition (17) and Removal (Not Shown)

PHASE II: South Plants

- Buried M-1 Pits Soil Remediation (18)
- Hex Pit Soil Remediation (19)
- South Plants Central Processing Area (20) Soil Remediation
- South Plants Balance of Areas Soil Remediation (21)

PHASE III: Sections 35 & 36 Sites

- Sanitary Sewer Manhole Plugging - Phase II (22)
- Section 36 Balance of Areas Soil Remediation (23)
- Secondary Basins Soil Remediation (24)
- Complex (Army) Disposal Trenches Remediation (25)
- Shell Disposal Trenches Remediation (26)
- North Plants Soil Remediation (27)
- Section 35 Soil Remediation (28)
- North Plants Structures Demolition and Removal (29) (Not Shown)

PHASE IV: Basin F and Lime Basins

- Basin F Waste Pile Remediation (30)
- Former Basin F Principal Threat Soil Remediation (31)
- Basin F & Basin F Exterior Remediation (32)
- Section 36 Lime Basins Soil Remediation (33)

Site Wide Programs

- R.C.R.A. Cap Equivalency (34)
- Borrow Areas: # = Borrow Number, () = WBS Project Number; (35)
- CAMU Configuration (47)
- On-Post Long Term Monitoring Plan Wells (41, 42)
- Treatment System Slurry Walls (48, 50, 51)
- Chemical Sewer Excavation in South Plants Balance of Areas (Phase II) and North Plants Soil Remediation (Phase III).
- Rocky Mountain Arsenal (U.S. Army Jurisdiction)
- USFWS National Wildlife Refuge

Rocky Mountain Arsenal
Commerce City, Colorado

Remediation Implementation Areas

Project Phases

Figure 1 FY 11

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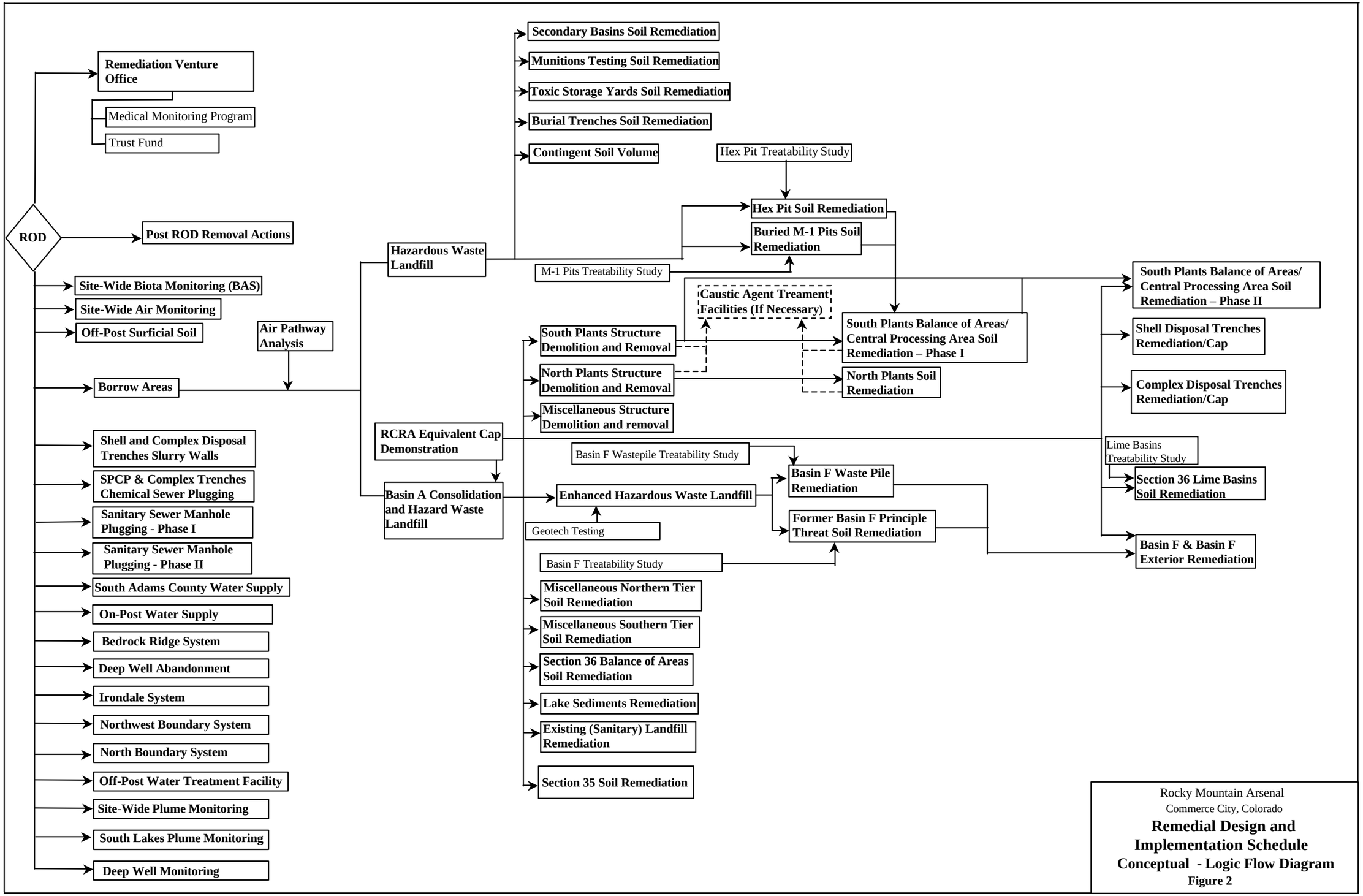

Rocky Mountain Arsenal
Commerce City, Colorado

Remedial Design and Implementation Schedule
Conceptual - Logic Flow Diagram
Figure 2