

**TECHNICAL MEMORANDUM
BIG CREEK REPOSITORY SITE EVALUATION
Draft Final
June 30, 2004**

**Prepared by URS Group, Inc.
1501 Fourth Avenue, Suite 1400
Seattle, Washington 98101**

**Prepared for
U.S. Environmental Protection Agency
Region 10
1200 Sixth Avenue
Seattle, Washington 98101**

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CONTENTS

ABBREVIATIONS AND ACRONYMS iii

1.0 INTRODUCTION 1-1

2.0 SITE DESCRIPTION 2-1

 2.1 SITE LOCATION AND OWNERSHIP 2-1

 2.2 CURRENT SITE AND ADJACENT LAND USE 2-1

 2.3 TRANSPORTATION CORRIDORS 2-2

 2.4 PHYSIOGRAPHY 2-2

 2.5 GROUNDWATER 2-2

 2.6 SURFACE WATER AND SEDIMENT 2-3

 2.7 CURRENT SITE CONDITIONS 2-4

3.0 ENGINEERING AND PRELIMINARY DESIGN 3-1

 3.1 SUMMARY OF PRELIMINARY DESIGN 3-1

 3.2 HYDROLOGIC MODELING 3-2

 3.3 ENGINEERING CONSIDERATIONS 3-3

 3.3.1 Stability of Tailings Pond 3-3

 3.3.2 Overhead Electrical Power Lines and Natural Gas Pipeline 3-3

 3.3.3 Bank Erosion 3-4

 3.3.4 Liner and Leachate Collection System 3-4

 3.3.5 Slope Configurations 3-5

 3.4 COVER DESIGN 3-5

 3.5 STORM WATER MANAGEMENT SYSTEM 3-6

4.0 REPOSITORY OPERATIONS PLAN AND WASTE ACCEPTANCE
 CRITERIA 4-1

 4.1 WASTE ACCEPTANCE CRITERIA 4-1

 4.2 PRETREATMENT REQUIREMENTS 4-1

 4.3 REPOSITORY OPERATIONS 4-2

 4.4 POST-CLOSURE REQUIREMENTS 4-3

5.0 SUMMARY OF COMPLIANCE WITH ROD REQUIREMENTS 5-1

 5.1 PREVENTION OF ADVERSE HUMAN HEALTH OR ECOLOGICAL
 IMPACTS 5-1

 5.2 PREVENTION OF ADDITIONAL GROUNDWATER AND/OR
 SURFACE WATER IMPACTS 5-1

 5.3 INTEGRATION WITH PAST OR NEARBY CLEANUP EFFORTS 5-1

 5.4 COMPLIANCE WITH ARARS 5-2

 5.5 APPROPRIATENESS FOR THE CHARACTERISTICS OF THE
 WASTE 5-2

 5.6 COST-EFFECTIVENESS 5-3

Technical Memorandum
Big Creek Repository Site Evaluation
Draft Final as of June 30, 2004

5.7	MINIMIZATION OF LONG-TERM OPERATION AND MAINTENANCE (O&M) COSTS.....	5-3
5.8	TRANSPORTATION IMPACTS AND COSTS	5-3
5.9	ECONOMIC DEVELOPMENT OR FUTURE REUSE OF THE SITE WHERE FEASIBLE.....	5-4
5.10	ABSENCE OR PRESENCE OF MINING-RELATED CONTAMINANTS.....	5-4
5.11	GEOTECHNICAL STABILITY	5-4
5.12	AVAILABILITY OF CLEAN COVER MATERIAL	5-4
5.13	COMMUNITY ACCEPTANCE	5-5

FIGURES

1-1	Repository Location Map	1-3
3-1	Site Plan	3-7
3-2	Repository Cross Section.....	3-8
3-3	Cover Cross Section.....	3-9

TABLES

3-1	Summary of Repository Design.....	3-10
3-2	Summary of HELP Modeling	3-11
4-1	Summary of Repository Operations.....	4-4
5-1	Summary of Compliance with ARARs.....	5-6
5-2	Estimated Average Concentrations of Metals in Yard Soil	5-10
5-3	Summary of Estimated Costs.....	5-11

Technical Memorandum
Big Creek Repository Site Evaluation
Draft Final as of June 30, 2004

ABBREVIATIONS AND ACRONYMS

BCR	Big Creek Repository
BMPs	best management practices
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
cm/sec	centimeters per second
cy	cubic yards
EPA	U.S. Environmental Protection Agency
FML	flexible membrane liner
HELP	Hydrologic Evaluation of Landfill Performance
IDAPA	Idaho Administrative Procedures Act
IDEQ	Idaho Department of Environmental Quality
kV	kilovolts
MCL	Maximum Contaminant Level
mg/kg	milligrams per kilogram
MSL	mean sea level
NPDES	National Pollution Discharge Elimination System
psi	pounds per square inch
PTM	principal threat material
RCRA	Resource Conservation and Recovery Act
ROD	record of decision
TLG	Technical Leadership Group
ug/L	micrograms per liter
UPRR	Union Pacific Railroad
USACE	United States Army Corps of Engineers
USC	United States Code

1.0 INTRODUCTION

The U.S. Environmental Protection Agency (EPA) and the Idaho Department of Environmental Quality (IDEQ) have identified an inactive Sunshine Precious Metals, Inc. (Sunshine) tailings pond as a potential site for a repository for disposal of waste generated by cleanup activities conducted pursuant to the Bunker Hill Mining and Metallurgical Complex Operable Unit 3 Record of Decision (OU3 ROD). The site is located adjacent to Big Creek in Shoshone County, Idaho, approximately 0.25 mile south of I-90. The site under consideration is the more northerly of two adjacent tailings ponds formerly operated by Sunshine. The site location is shown in Figure 1-1.

The purpose of this memorandum is to provide the public and the Coeur d'Alene Basin Environmental Improvement Commission (Basin Commission), including the Basin Commission's Technical Leadership Group (TLG), with information regarding use of the old Sunshine tailings pond site as a mine waste repository pursuant to the requirements established in the OU3 ROD. An initial conceptual design report was prepared in March 2002, and door-to-door community updates were provided in late May 2002. The Shoshone County Commissioners were briefed on May 1, 2002.

The repository was operated during the 2002 and 2003 field seasons in support of the Basin Yards Program under the authority of the memorandum entitled "Special Circumstances Action Memorandum to Continue Removal Actions at Common Use Areas and Residential Properties and at Residences with Contaminated Drinking Water Wells and Interior House Dust, Kootenai and Shoshone Counties, Idaho" dated June 18, 1999 and the OU3 ROD. Field investigation and design work has continued and will be completed by a U.S. Army Corps of Engineers (USACE) design team in Spring 2004. IDEQ has acquired the property from Sunshine and will operate the facility as a mine waste repository in support of the OU3 ROD as of the 2004 field season. The facility was operated by EPA and the USACE team during the 2002 and 2003 field seasons.

This memorandum summarizes information presented in the following USACE documents.

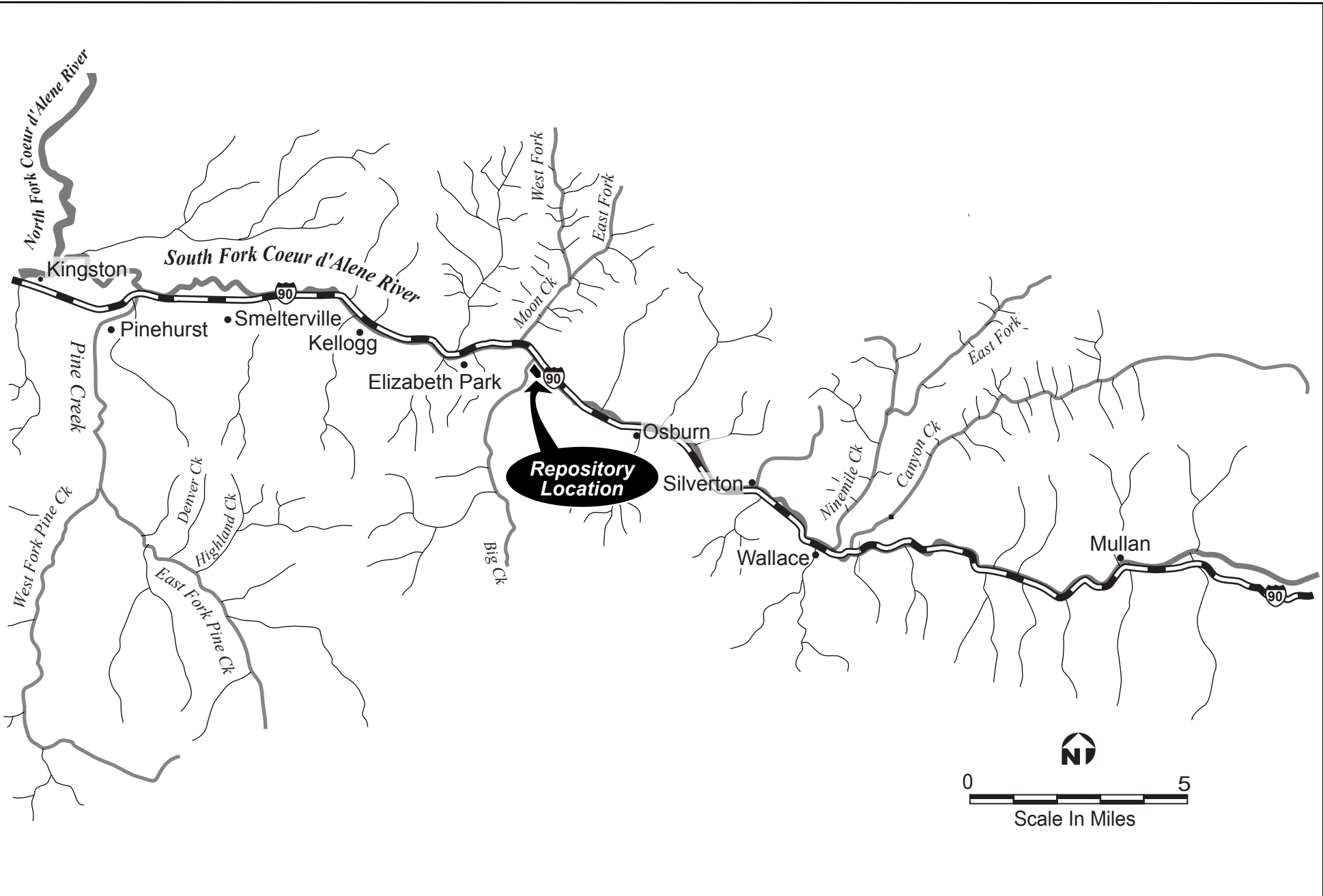
- Big Creek Repository Conceptual Design Alternatives: Technical Memorandum, March 26, 2002 (final)
- 2002 Field Season Activities Waste Disposal Report, May 5, 2003 (final)
- Big Creek Repository: Phase 1 Field Investigation Report, December 2002 (final)
- Big Creek Repository: Phase II Field Exploration Investigation Report, March 20, 2003 (draft final)
- 2003 Field Season Activities Waste Disposal Report, April 2004 (draft final)
- Big Creek Repository Design Analysis Report (DAR), April 2004 (draft final)

Technical Memorandum
Big Creek Repository Site Evaluation
Draft Final as of June 30, 2004

- Big Creek Repository Operations Plan, April 2004 (draft final)

The remainder of this memorandum is organized in four sections.

- Section 2 provides descriptions of pertinent site features
- Section 3 provides an overview of important design issues
- Section 4 describes the proposed repository operations and waste acceptance criteria
- Section 5 describes how the proposed repository will fulfill the technical evaluation criteria described in the ROD



2.0 SITE DESCRIPTION

2.1 SITE LOCATION AND OWNERSHIP

The proposed site of the Big Creek Repository (BCR) is approximately four miles east of Kellogg, Idaho, near the confluence of Big Creek and the South Fork of the Coeur d'Alene River. The site location is shown in Figure 1-1. The State of Idaho acquired the property from Sunshine in July 2003.

2.2 CURRENT SITE AND ADJACENT LAND USE

The site of the BCR is an inactive mine tailings pond formerly owned and operated by Sunshine. The footprint area of the tailings pond is approximately 22 acres. The repository is located on top of the tailings pond. The pond was used for the disposal of tailings produced from the milling of silver, lead, and zinc ore from 1968 to 1979 and has been inactive since 1979. The tailings were transported to the pond as a liquid-solid slurry through a pipeline that extended from the Sunshine Mine mill to the south end of the pond. Tailings, consisting of fine sand and silt, entered the south end of the pond for most of the operational life of the pond. A soil cover was placed on the pond at the end of operation in 1979. The site has since been used by Shoshone County as a disposal site for minor amounts of rock, dirt, and tree debris. The site is located in a rural, lightly populated area.

Easements for underground telephone and natural gas lines exist on-site on the east and south sides of the BCR, respectively. Power line easements are associated with two overhead 115 kV high-voltage power lines and one 13 kV distribution line that cross the north and south portions of the BCR as well as with subordinate electrical distribution lines along the north and west edges of the BCR.

The Union Pacific Rail Road (UPRR) owns the right-of-way directly north of the BCR. This parcel is up to 100 feet wide and extends parallel to the north property line of the BCR. The UPRR maintains a 50-foot right of way from the centerline of the former rail alignment. The rail line has been removed. The railroad bed has been covered with an asphalt bike path and is part of the "Trail of the Coeur d'Alenes." The Shoshone Country Club owns land on the west side of Big Creek. The land is overgrown with trees and is not used for recreation. The Big Creek road lies directly east of the BCR and is owned by Shoshone County. Sunshine owns land directly south of the BCR on which it has constructed a larger, newer tailings pond. A decant line for Sunshine's southern tailings pond runs along the toe of the west BCR embankment.

2.3 TRANSPORTATION CORRIDORS

Access to the site is from Big Creek Road, an all weather asphalt road that extends from US Interstate 90, Exit 54, to the former Sunshine Mine and runs parallel to the east side of the BCR. Exit 54 is approximately 300 feet north of the site. Just off Exit 54 and between the railroad

easement and the South Fork of the Coeur d'Alene River is the access road to the Shoshone Country Club. The road experiences the heaviest traffic in the summer and on weekends. In general though, the golf course road and the Big Creek road experience little overlap. Gravel-surfaced roads provide access on and adjacent to the BCR from an entrance at the southeast corner of the site. Big Creek Road runs through a rural area, so minimal disruption to residents is expected to occur during construction and operation of the repository. Big Creek Road has also provided access for heavy equipment to the Sunshine Mine for years and would require little improvement for hauling of contaminated soil to the site.

2.4 PHYSIOGRAPHY

The BCR is at the mouth of the Big Creek valley. The elevation of the valley floor is approximately 2,400 feet above mean sea level (MSL) in the site vicinity. The valley walls are steep and rise several hundred feet in elevation above the valley bottom. The valley floor, where the BCR is located, is essentially flat, as is the surface of the tailings pond.

Precipitation averages 32.5 inches per year, which falls as rain in the temperate portions of the year and as snow in the winter. Temperatures range from -10 degrees to 100 degrees Fahrenheit. Snow may fall in early October and melts by May.

2.5 GROUNDWATER

The valley alluvium contains the main aquifer at the site. This aquifer is not used as a drinking water source in the vicinity of the site. In general, groundwater flows to the north, in line with the creek flow, and ultimately discharges into Big Creek and the South Fork of the Coeur d'Alene River.

The depth to groundwater from the surface of the tailings pond is approximately 33 feet in the southeast corner and approximately 43 feet in the northwest corner. Slightly higher groundwater elevations are present along the eastern portion of the site. Groundwater seeps have not been observed in the field.

Six groundwater monitoring wells have been installed and sampled in the vicinity of the site. Analysis of samples collected from these wells indicate that groundwater quality upgradient, beneath, and downgradient of the site has been affected by past mining and milling practices within the Big Creek watershed, including disposal of tailings in the northern and southern tailings ponds. However, only antimony and arsenic have been found in dissolved groundwater samples at concentrations that exceed primary drinking water standards. The drinking water standards are 6 micrograms per liter for antimony and 10 micrograms per liter for arsenic. Concentrations of antimony ranged from less than the drinking water standard to 70 times the drinking water standard. Antimony exceeded the drinking water standard at all monitoring well locations except one near the southwest corner of the BCR. Antimony was a contaminant in the ore processed in the Big Creek watershed, and a separate antimony recovery plant was operated

by Sunshine upstream of the BCR. Concentrations of arsenic ranged from less than the drinking water standard to 3 times the drinking water standard. Arsenic exceeded the drinking water standard at all monitoring well locations within the northern one-half of the BCR and none of the monitoring well locations within the southern one-half of the BCR. Groundwater sampling results are documented in the Phase 1 Field Investigation Report and the 2003 Field Season Activities Waste Disposal Report.

2.6 SURFACE WATER AND SEDIMENT

The proposed BCR is adjacent to Big Creek, which flows along the southern and western boundaries of the site and discharges into the South Fork north of the site. The designated beneficial uses of Big Creek include cold water aquatic life, salmonid spawning, secondary contact recreation, agricultural and industrial water supply, wildlife habitat, and aesthetics (IDAPA 58.01.02.110). Currently, all designated uses are attained.

The existing toe of the west and south sides of tailings pond is within the 100-year floodplain of Big Creek. Flooding of Big Creek in 1997 eroded a portion of the southwest corner of the tailings pond. This damage has been repaired, however, additional armor to prevent future erosion of the embankment and potential slope failure of the repository into Big Creek will be required. This work will be conducted in 2004, and is described in Appendix D of the DAR.

Metals concentrations in Big Creek surface water have been measured at four locations in the vicinity of the BCR. Metals concentrations are typically low in Big Creek surface water. Only antimony is consistently present at dissolved metal concentrations greater than its calculated background concentration for the Coeur d'Alene Basin. The calculated background concentration of antimony in surface water is 2.9 micrograms per liter. The concentrations of other dissolved metals were less than Idaho surface water quality standards, with the exception of single detections of lead and cadmium at concentrations greater than the chronic surface water quality standards for protection of aquatic organisms. Concentrations of some metals, including iron, lead, manganese, and zinc, increase during high flow periods when relatively large sediment loads are present in Big Creek. Surface water sampling results are documented in the Phase 1 Field Investigation Report and the Coeur d'Alene Basin remedial investigation (RI) report.

In December 2001, USACE conducted a synoptic surface water sampling event, including locations upgradient, adjacent, and downgradient of the BCR. No trend of increasing concentrations of the human health or ecological chemicals of concern (arsenic, cadmium, copper, lead, and zinc) was observed in Big Creek adjacent to the BCR. The data, therefore, indicate the BCR is not currently a significant source of these metals to Big Creek. Increasing concentrations of iron and manganese were observed; however, these metals are not chemicals of concern, and the measured concentrations were less than secondary drinking water standards.

Sediment samples collected from three locations in Big Creek in the vicinity of the BCR indicate sediment quality has been affected by past mining and milling practices within the Big Creek

watershed, including disposal of tailings in the northern and southern tailings ponds. Concentrations of antimony, arsenic, copper, iron, lead, manganese, silver, and zinc exceeded Coeur d'Alene River Basin background levels in one or more samples. Concentrations of lead in all samples were less than ecological (530 mg/kg) and human health (700 mg/kg) remediation goals, and concentrations of arsenic in all samples were less than human health (100 mg/kg) remediation goals. Sediment sampling results are documented in the Phase 1 Field Investigation Report.

2.7 CURRENT SITE CONDITIONS

The former tailings pond has a rectangular footprint of approximately 22 acres and rises from 20 feet to 40 feet above the valley floor on the south and north ends of the pond, respectively. The pond has steep side slopes and a relatively flat top portion. The pond embankment is composed of gravel and cobbles with sand and has slopes up to 1.5 feet horizontal to 1 foot vertical (1.5H:1V). The original embankment height was increased approximately 10 feet in 1973 by placing angular mine waste above the original embankment. The flat interior of the pond covers approximately 16 acres. The pond is unlined.

Mine tailings are as much as 45 feet thick and vary in grain size from fine-grained sand in the southern portion of the pond to very soft, saturated, silt, called "slimes," in the central and northern portion of the pond. The slime material is weak and easily deformed.

A soil cover of gravel and sand with cobbles was placed on the pond at the end of operation in the late 1970s. This cover increases in thickness from 2 feet at the center of the pond to 10 feet on the northern third of the site. The cover soil is absent over the extreme southern end of the pond. The interior of the pond is covered with sparse vegetation consisting of aspen and alder trees, and pine trees are present at the pond perimeter. Up to 40 percent of the surface of the pond is covered with pine and alder trees up to 3 inches in diameter with a few larger trees on the side slopes of the pond embankment. The southwest corner of the pond has been repaired with cobbles and boulders after being eroded during a flood of Big Creek in 1997.

3.0 ENGINEERING AND PRELIMINARY DESIGN

3.1 SUMMARY OF PRELIMINARY DESIGN

The design for the BCR is a modification of Option B, which was described in the Big Creek Repository Conceptual Design Alternatives Technical Memorandum. The final design includes the following modifications to Option B.

- Slimes dewatering, which was considered as a means to increase the repository capacity and stability, will not be conducted. Instead, phased waste placement will be used to provide for repository stability.
- Clean soil will be used in the surface layer (top 6 inches) of the entire final cover.
- Existing cover soil will not be removed.

The BCR will have a footprint area of approximately 15 acres and an estimated available capacity of 250,000 cubic yards. The anticipated operating life of the repository is about 10 years. The primary function of the BCR will be disposal of contaminated yard soil. Based on assumptions used in the ROD, approximately 140,000 cubic yards of waste will be generated by yard soil removals.¹ Therefore, the available capacity of the BCR is anticipated to be adequate for disposal of all contaminated soil generated by yard cleanups in the Basin, if required. Disposal of other mining-related contaminated soil and sediment that meets the waste acceptance criteria may also be conducted at the BCR.

The repository design is an attempt to maximize available volume without incurring additional site costs to remove or modify slimes in the north portion of the site, or costs to relocate or raise the 115 kV overhead electrical transmission lines. However, current plans call for the rerouting of the 13 kV electrical distribution line. The design can be summarized as follows:

- Estimated capacity of 250,000 cubic yards
- Final cover system will be 2 feet thick and include a 6-inch thick clean soil surface layer; the cover will be designed to limit percolation to a maximum of 4 inches per year
- Phased waste placement will be used to provide for repository stability
- Existing 13 kV overhead electrical line will be relocated; 115 kV electrical transmission lines and the natural gas pipeline remain without modification
- Maximize surface area of relatively flat, 3 percent upper slope portion of waste cells

¹ In the ROD, it is assumed yard removals will be conducted at 907 properties, with 150 cubic yards of soil removed per property.

- 3H:1V exterior sides slopes to promote runoff
- Additional armor material will be placed on the bank of Big Creek in the “critical reach” for erosion protection
- Administrative and decontamination areas located in southern portion of site
- Site access from the south
- The final land use will be open space with the final designation being developed in conjunction with Shoshone County, as the site nears completion.

The design of the BCR is summarized in Table 3-1. A plan view of the repository is shown in Figure 3-1. A cross section of the repository showing the anticipated final surface elevations is shown in Figure 3-2.

3.2 HYDROLOGIC MODELING

The repository design was developed with consideration of the results of hydrologic modeling of water percolation through the repository. The modeling was conducted using the industry-standard Hydrologic Evaluation of Landfill Performance (HELP) Model, Version 3.07. Controlling percolation is important to enhance the stability of the low-shear-strength slimes and limit impacts to groundwater.

The HELP model was used to estimate the percentage of precipitation falling on the repository surface that will percolate into the alluvial aquifer under existing conditions and after placement of waste and construction of a final cover. Several scenarios were evaluated using the HELP model, and the results are documented in the Big Creek Repository Conceptual Design Alternatives Technical Memorandum (March 26, 2002). For a 2-foot-thick soil cover with a hydraulic conductivity of 10^{-5} centimeters per second (cm/sec), the model indicates the amount of precipitation falling on the repository that percolates to the alluvial aquifer may be reduced to approximately 13.5 percent of the annual average precipitation of 32.49, or 4.4 inches per year of percolation (a reduction of 60% compared to existing conditions). Although not quantified, consolidation of the slimes following waste placement should further reduce percolation of precipitation to the alluvial aquifer. The HELP model results are summarized in Table 3-2.

In addition, site-specific contaminant transport modeling was conducted to confirm that no unacceptable adverse impacts would result to adjacent surface water and groundwater. The contaminant transport modeling, which is described in Appendix B of the DAR, predicted groundwater would not be impacted within the foreseeable future with a cover performance standard of 4 inches of percolation per year.

3.3 ENGINEERING CONSIDERATIONS

3.3.1 Stability of Tailings Pond

The repository will be constructed on top of an existing tailings pond that contains low-shear-strength tailings (“slimes”). As the weight of additional fill is added, pore water will slowly drain from the slimes, resulting in increased shear strength of the slimes. If fill is added too rapidly, the pore water may not have adequate time to drain, and the additional weight of the fill could cause slope failure. Because of the potential for slope failure, the repository will be loaded slowly using a phased filling procedure that allows the slimes to develop strength. In addition, pore water pressures and settlement will be monitored throughout the operating life of the repository. These additional data will verify that the repository is being fill in a safe manner. A geotechnical analysis of the stability of the BCR concluded that, if the site is loaded and capped properly, the repository will be stable during filling and after placement of the final cover. The stability analysis is documented in Appendix F of the DAR.

The phased filling procedure is designed to address concerns about the stability of low shear strength slimes in the northern portion of the site. An initial surcharge berm of waste soil will be placed along the top of the existing north, west, and east tailings pond slopes. Subsequent filling will build the berm progressively toward the center, until a uniform thickness of waste has been placed. In this manner, shear strength will be developed in the slimes and increase the factor of safety against slope failure.

3.3.2 Overhead Electrical Power Lines and Natural Gas Pipeline

The design height of the repository is restricted by two 115 kV and one 13 kV overhead electrical power lines that cross the site. The southern most 115 kV power line is located approximately 200 feet north of the south toe of the low-level cell. The 13 kV power line and the northernmost 115kV power line are located approximately 300 feet and 250 feet south of the tailings pond north dam wall, respectively.

Under the current design, the alignment and height above existing grade of the 115 kV lines will not be modified. However, the 13 kV lines will be moved. If at some future date the State and the EPA feel the cost to move the 115 kV lines to accommodate expansion of the BCR is warranted, they may also be moved. Nonetheless, the current plan will restrict the height of the BCR in the locations near the power line, primarily for safety reasons. The height of the repository will be restricted to provide a minimum clearance of 30 feet, measured from finished grade. It may be necessary to restrict the size and operation of equipment during construction and waste placement to provide adequate clearance to these power lines. Construction will always follow OSHA requirements for work under a high voltage power line.

A natural gas pipeline runs parallel to the south toe of the BCR. This 6-inch-diameter pipeline is pressurized at 200 pounds per square inch (psi) and may be exposed in the channel of Big Creek. In addition, the pipeline may not be covered with fill. The precise location of the pipeline will be determined during the repository design phase, and appropriate measures will be included in the

design and operation of the repository to limit the potential for damage to the pipeline. The BCR will not be expanded to the south and will have no impact on the pipeline.

3.3.3 Bank Erosion

Flooding of Big Creek in 1997 eroded a portion of the southwest corner of the tailings pond. Sunshine repaired this damage. The potential exists for future damage to the south and west embankments due to significant flood events. Therefore, an erosion control plan will be implemented in 2004 to protect the BCR along the “critical reach” of Big Creek. The location of the “critical reach” is shown in Figure 3-1. The hydrologic analysis of Big Creek is documented in Appendix D of the DAR.

The potential for impacts from flooding of the South Fork Coeur d’Alene River are expected to be limited to backwater ponding within Big Creek, which is not expected to result in erosion of the repository side slopes. The top of bank elevation of the South Fork at its confluence with Big Creek (approximately 2,405 feet) is lower than the existing elevation of the repository slope toe adjacent to Big Creek (2,411 feet). The repository would be further protected from South Fork flood water by the presence of the former railroad embankment.

3.3.4 Liner and Leachate Collection System

An engineered liner and leachate collection system will not be required beneath waste material placed in the BCR for several reasons:

- Based on contaminant transport modeling (Appendix B or the DAR), the 4-inch percolation performance standard will reduce percolation by 60 percent or more and will be adequate to control offsite discharges to groundwater or surface water
- Based on laboratory testing, the “slimes” underlying the repository have a hydraulic conductivity of approximately 3×10^{-6} cm/sec, which will be further reduced due to consolidation of the slimes
- Groundwater beneath the site is already impacted and not expected to further degrade over time as a result of waste placement, based on contaminant transport modeling
- There are no current or anticipated future alluvial groundwater users
- Highly concentrated principal threat material (e.g., metal concentrates) will not be disposed of in the BCR (see Section 5.5)

3.3.5 Slope Configurations

To maximize repository volume beneath the cover system, the BCR will be designed with steeper side slopes and a relatively flat top slope. Side slopes will not exceed 3H:1V, and top

slopes will be 3 percent. The slope configurations have been designed to be stable, reduce erosion and percolation, limit human health risks, and have low long-term O&M requirements.

3.4 COVER DESIGN

Facility closure will include construction of a cover over waste placement areas. The cover will be designed to reduce erosion and percolation, limit human health risks, protect beneficial uses of Big Creek, and have low long-term O&M requirements. The final cover system will consist of a 2-foot compacted soil layer that will permit not more than 4 inches of percolation per year to the alluvial aquifer. The final cover system (i.e., soil and vegetation) will be optimized to maximize evapotranspiration and minimize percolation. Special materials and/or a geosynthetic layer may also be used as part of the final cover system to further reduce percolation, if necessary.

The 2-foot soil layer will consist of a minimum 6-inch topsoil layer and an 18-inch select fill layer that will meet specific requirements for organic content, pH, and texture (i.e., grain size) in order to support vegetative growth. The 6-inch topsoil layer will meet criteria for "clean fill" as defined by contaminant concentrations that are <100 mg/kg lead, <100 mg/kg zinc, <100 mg/kg arsenic, <5 mg/kg cadmium, and <5 mg/kg antimony. The 18-inch select fill layer will not contain more than 1000 mg/kg lead (this should permit a wider range of source areas for final cover material, including some material segregated from incoming waste streams, while not compromising the integrity of waste containment in the repository).

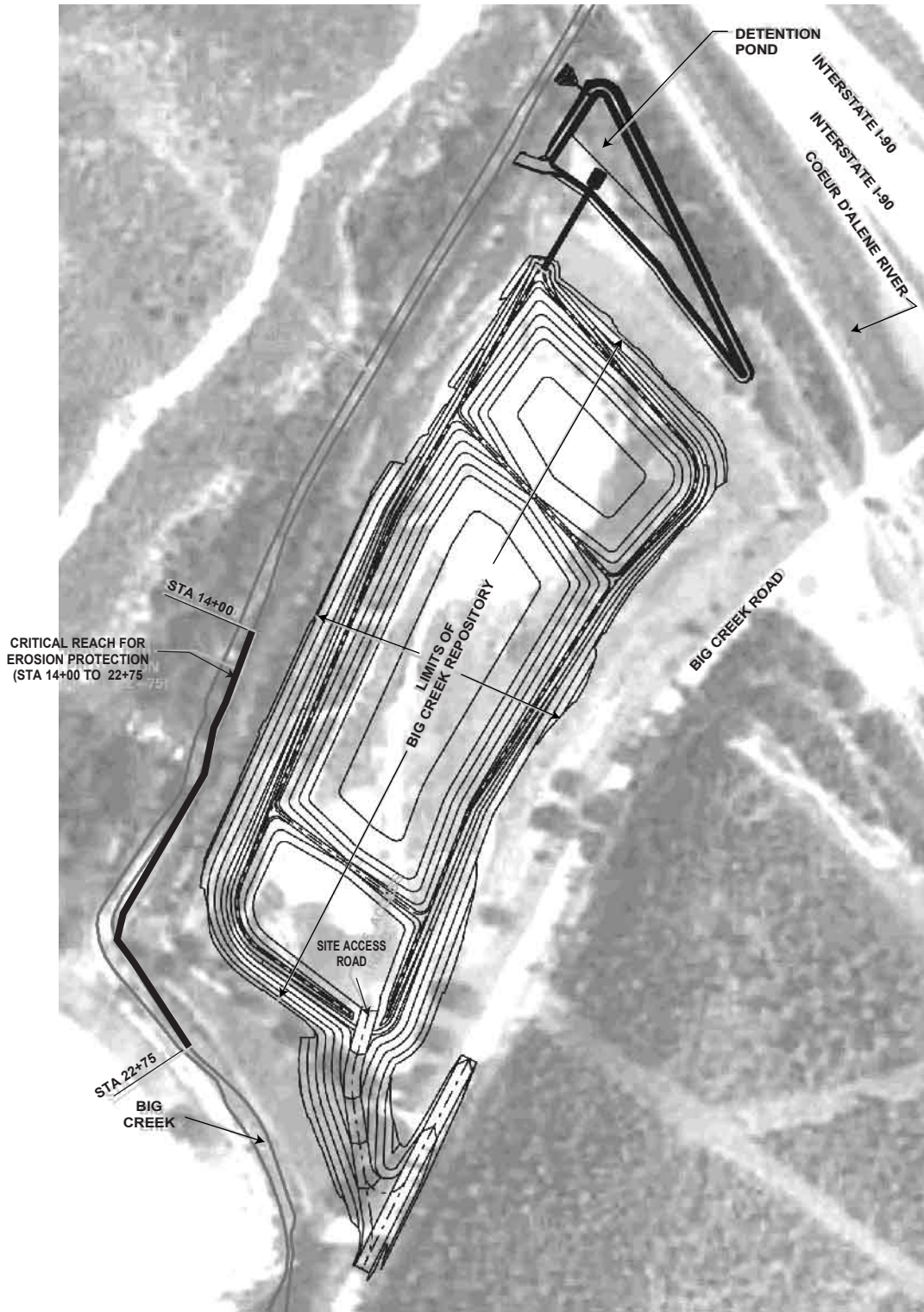
Topsoil will receive a suitable seed mix that will result in appropriate vegetative cover. The plant species selected should provide protection from erosion, not be an attractant to ungulate wildlife species, and be stable and capable of regeneration while minimizing long-term maintenance requirements. Shrubs and trees should not be planted unless they are incorporated into the function of the final cover design.

The percolation performance standard (maximum of 4 inches per year) was selected considering the results of contaminant transport modeling and other evaluations, which is documented in Appendix B of the Big Creek Repository Design Analysis Report. The transport modeling evaluated the potential for waste materials placed in the repository to impact groundwater and surface water. At this maximum percolation rate, modeling indicates that metals (antimony, arsenic, cadmium, lead, and zinc) leached from waste materials placed in the repository would not impact groundwater or surface water at concentrations exceeding surface water quality standards within the foreseeable future. HELP modeling indicates the percolation performance standard could be achieved by a 2-foot cover with a hydraulic conductivity of 10^{-5} cm/sec to 10^{-6} cm/sec. Appendix B of the DAR contains an additional evaluation performed by IDEQ of options for achieving the 4-inch percolation performance standard using a soil cover system.

3.5 STORM WATER MANAGEMENT SYSTEM

A storm water management system is necessary to collect and control runoff during storm events, prevent the erosion of cover material, provide stability for all hydraulic conveyance structures, and limit impacts to water quality in Big Creek. Storm water management is described in Section 6.1 of the DAR and Appendix B of the Operations Plan. Runoff from the facility will be directed into a detention pond for removal of suspended solids prior to discharge from the site. Because site conditions prohibit sizing the detention pond to contain the entire expected 100-year runoff volume, the detention pond will be sized to contain the excess runoff compared to pre-project conditions that would be generated during a 100-year storm event. The 100-year storm is defined as the precipitation event for which there is an estimated probability of occurrence of 1% each year. The capacity of the detention pond will be approximately 2.4 acre-feet, which will contain approximately 58% of the expected 100-year runoff volume (see Appendix C of the DAR for details). Any runoff that could not be contained would be discharged to Big Creek through a low-level outlet pipe and an overflow spillway. The pond location is shown in Figure 3-1.

The critical period for runoff control is during filling of the repository, prior to placement of the final cover, because waste materials may be exposed to erosion. The repository contractor will be required to develop a work plan for controlling runoff. Best management practices (BMPs) will be implemented to limit erosion and offsite transport of waste materials, including channelization of runoff, use of geosynthetic erosion control materials and silt fences, placement of temporary cover soils, and revegetation. The final repository cover includes a surface layer of clean, vegetated soil, which will limit the potential impacts to water quality in Big Creek from runoff water after closure of the repository.



Approximate Scale In Feet

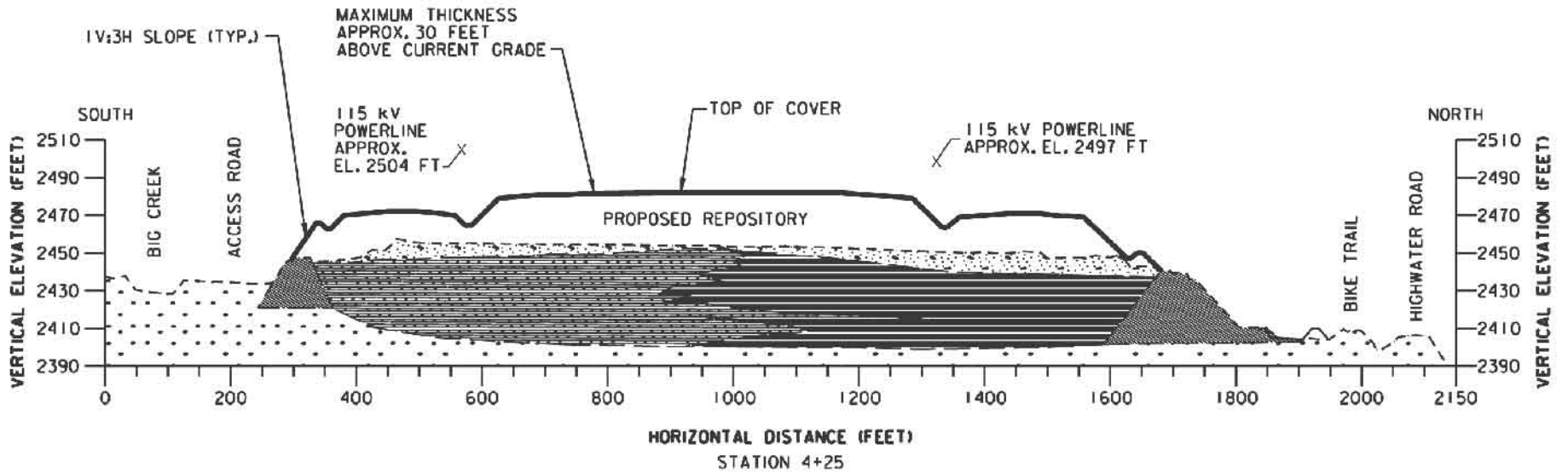
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Coeur d'Alene Basin
BIG CREEK REPOSITORY

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EPA No. 18.4

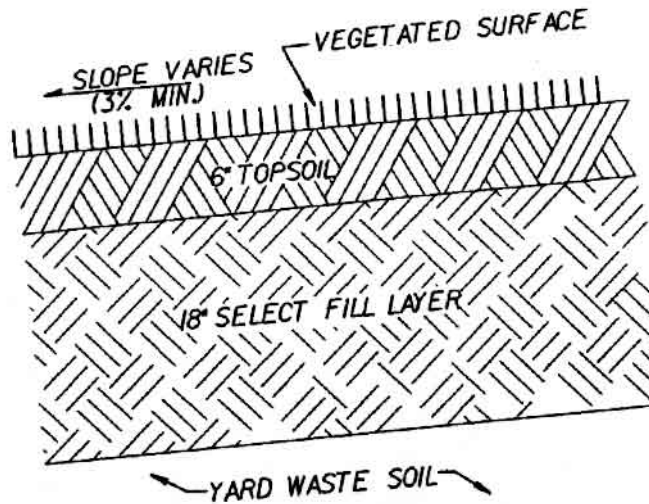
Figure 3-1
Site Plan



VERTICAL EXAGGERATION = 3
 HORIZONTAL SCALE: 1 INCH = 250 FEET
 250' 0 250'

LEGEND		

NOTE: CROSS-SECTION OF COVER SYSTEM IN SEPARATE FIGURE



Notes:

1. The final cover system will be comprised of a two-foot compacted soil layer that will permit not more than 4 inches of percolation per year. These are minimum requirements. The final cover system (i.e., soil and vegetation) will be optimized to maximize evapotranspiration and minimize percolation. Special materials and/or a geosynthetic layer may also be used as part of the final cover system to further reduce percolation, if necessary.
2. The two-foot soil layer will be comprised of a 6-inch topsoil layer (minimum) and an 18-inch select fill layer that shall meet specific requirements for organic content, pH, and texture (i.e., grain size) in order to support vegetative growth.
3. The 6-inch topsoil layer will meet criteria for "clean fill" as defined by contaminant concentrations that are <100 mg/kg lead, <100 mg/kg zinc, <100 mg/kg arsenic, <5 mg/kg cadmium, and <5 mg/kg antimony. The 18-inch select fill layer shall not have contaminant concentrations that exceed 1000 mg/kg lead (this should permit a wider range of source areas for final capping material, including some material segregated from incoming waste streams, while not compromising the integrity of waste containment in the repository).
4. Topsoil shall receive a suitable seed mix that will result in appropriate vegetative cover. The plant species selected should provide protection from erosion; not be an attractant to ungulate wildlife species; and be stable and capable of regeneration while minimizing long-term maintenance requirements. Shrubs and trees should not be planted unless they are incorporated into the function of the final cover design.

Technical Memorandum
Big Creek Repository Site Evaluation
Draft Final as of June 30, 2004

Table 3-1
Summary of Repository Design

Design Component	Description
Property owner	State of Idaho has acquired the property from Sunshine Precious Metals, Inc.
Current site use	Not currently used -- former tailings pond
Capacity	Approximately 250,000 cubic yards
Total repository footprint area	Approximately 22 acres
Area of waste placement	Approximately 15 acres
Expected operating life	Approximately 10 years
Transportation corridors	Access via Big Creek Road, approximately 0.25 mile south of I-90
Utilities	Overhead electrical power lines and natural gas pipeline. 30 feet clearance will be provided for overhead power lines. 13 kV line will be raised; 115 kV lines will not be relocated. Natural gas pipeline is adjacent to southern boundary of site and will not be disturbed.
Final cover system	2 feet thick, including a 6-inch thick clean soil surface layer; the cover will be designed to limit percolation to a maximum of 4 inches per year
Sideslope erosion protection	Additional armoring will be provided within the "critical reach" to limit potential for erosion of tailings pond side slopes by Big Creek
Storm water management system	Designed for excess runoff compared to pre-project conditions resulting from peak 100-year, 24-hour precipitation event.

Technical Memorandum
Big Creek Repository Site Evaluation
Draft Final as of June 30, 2004

Table 3-2
Summary of HELP Modeling

Area	Estimated Percentage of Precipitation ¹ that will Percolate to Alluvial Aquifer	
	Existing Conditions (no cover soil)	2' Cover Soil (K=10 ⁻⁵ cm/sec)
North	39.0%	12.9%
Central	36.6%	13.0%
South	20.6%	14.6%
Average	32%	13%
Reduction Compared to Existing Conditions	Not applicable	60%

Notes

¹ Average annual precipitation = 32.5 inches

HELP = Hydrologic Evaluation of Landfill Performance

K = hydraulic conductivity

cm/sec = centimeters per second

4.0 REPOSITORY OPERATIONS PLAN AND WASTE ACCEPTANCE CRITERIA

4.1 WASTE ACCEPTANCE CRITERIA

The Big Creek Repository has been designated for disposal of material contaminated by historic mining activity (which include contaminated soils and tailings material, some concrete debris, and some organic (wood) debris). The Big Creek Repository is the primary disposal location for waste generated by human health-based remedial actions authorized by the Bunker Hill OU3 ROD. As such, acceptable waste concentrations for this repository are based on more than 4000 samples collected from residential properties throughout the Coeur d'Alene Basin in support of the Bunker Hill OU3 ROD. Until funding sources change and/or until such time that waste disposal issues are addressed in a Basin-Wide Institutional Controls plan, material disposed in the Big Creek Repository will be limited to projects that are authorized by the Bunker Hill OU3 ROD and funded by resources allocated to support the implementation of CERCLA response actions in the Coeur d'Alene Basin.

Material disposed of at the repository must conform to the current waste acceptance criteria, which are described in Appendix A of the Operations Plan and summarized in this section. To maximize beneficial utilization of available repository capacity, all material disposed of at the repository will have concentrations of mining-related metals exceeding 700 milligrams per kilogram (mg/kg) lead and/or 100 mg/kg arsenic. No material containing listed or regulated constituents, other than Bevill-exempt mining-related waste, will be disposed of at the repository. In addition, no uncontaminated soil or building debris or highly concentrated material will be disposed of at the repository without prior approval by IDEQ and EPA. Maximum concentrations of metals in soil that may be disposed of at the BCR are:

Antimony: 623 mg/kg
Arsenic: 3,610 mg/kg
Cadmium: 194 mg/kg
Lead: 67,100 mg/kg
Zinc: 25,800 mg/kg

4.2 PRETREATMENT REQUIREMENTS

Material containing excess moisture will be dried prior to placement and compaction in the soil disposal area. Drying would be accomplished in a designated drying area near the south end of the site that drains to the storm water management system. Materials must be able to pass the paint filter test prior to placement in the BCR. Very wet material that cannot be readily dewatered will not be accepted at the BCR.

4.3 REPOSITORY OPERATIONS

Repository operations will follow the current Big Creek Repository Operations Plan, which is summarized in this section. The current Operations Plan is dated April 2004. The facility will be accessed from the south, utilizing the existing north/south gravel road located immediately south of Interstate 90, Exit 54. Public access will be restricted by a perimeter fence and locked access gate. There will be no onsite operator, but oversight will be provided by IDEQ and/or their technical support contractor. Site users will be required to provide advance notice to the IDEQ or their oversight contractor, who will provide the user with a key to the access gate and discuss sampling and reporting requirements. Signs will be used to direct site users to the designated waste placement areas. Site users will also be responsible for decontaminating the exteriors of their vehicles using the facility's decontamination area. All sampling data and disposal logs need to be sent to IDEQ within a reasonable timeframe. It is important that all contractors hauling material to the BCR have an alternate disposal site. In the event that conditions require an early closure of the BCR or material does not meet the Waste Acceptance Criteria, the government will not provide an alternate site for material disposal.

IDEQ and/or their technical support contractor will oversee repository operations, but will not maintain personnel at the site unless it is deemed necessary. Responsibilities will include:

- Determining waste placement areas and heights prior to each disposal season, based on requirements for maintaining site stability
- Compacting material placed at the facility
- Conducting periodic (once or twice daily) inspections on days when material is disposed at the repository
- Assessing the overall geotechnical stability of the facility, including periodic inspections for seeps, side slope sloughing, or other signs of distress and collection and analysis of pore water pressure data
- Assessing potential environmental impacts, including sampling and analysis of groundwater and Big Creek surface water

Best management practices (BMPs) will be implemented to limit erosion and offsite transport of waste materials, including channelization of runoff, use of geosynthetic erosion control materials and silt fences, placement of temporary cover soils, and revegetation. Runoff water will be captured in a detention pond for sediment removal.

4.4 POST-CLOSURE REQUIREMENTS

A post-closure plan will be developed that includes requirements for monitoring, maintenance, and land and groundwater use limitations.

4.4.1 Monitoring

Post-closure monitoring will be conducted following the post-closure plan that will be developed for the site and will address the following areas.

Groundwater
Surface water
Settlement
Vegetation
Public Access

4.4.2 Maintenance

A maintenance program will be designed and implemented to provide for the proper functioning and integrity of the cap, storm water management system, fence, and other elements of the repository. Potential maintenance issues include, but are not limited to:

- Maintenance of site BMPs
- Damage to the cap or storm water management system from storm water, animal activities, or human activities
- Erosion of the toe of the side slopes by Big Creek during high flow periods
- Inadequate surface water drainage (ponding) due to settlement
- Inadequate vegetative growth
- Damage to the fence

4.4.3 Land and Groundwater Use Limitations

The State of Idaho has determined that the final land use for the Big Creek Repository will be open space. The site will not be designated for recreation, industrial uses, or private uses without an intensive investigation into the potential for unacceptable impacts to human health or the environment as a result of such use. IDEQ owns the property and will ensure that administrative controls are maintained to ensure appropriate land uses and prohibit development of impacted site groundwater for use as drinking water.

Technical Memorandum
Big Creek Repository Site Evaluation
Draft Final as of June 30, 2004

Table 4-1
Summary of Repository Operations

Operational Element	Description
Type of Material Accepted	Predominately yard soil from Basin cleanup; other contaminated, non-PTM, mining-related waste may also be accepted
Access	Site access controlled using perimeter fence and locked gate. Possession of keys to gate will be limited to authorized contractors and personnel. Entrance at south end of site.
Vehicle Decontamination	Trucks will be decontaminated before leaving site. Loads will be covered during transport.
Waste Pre-Treatment	Excess moisture will be removed on drying pad prior to final placement in BCR. Waste that cannot be readily dewatered will not be accepted. Other treatment (e.g., stabilization) is not anticipated.
Site Stability/Waste Placement	Pore water pressures will be monitored and used to guide waste placement and limit the potential for slope failure.
Dust Suppression	Road treatment (e.g., magnesium chloride) during the active season and temporary cover during the inactive season.
Post-Closure	
Monitoring	Will include surface water, groundwater, vegetation, and settlement monitoring.
Maintenance	Maintenance program will be designed and implemented to provide for proper functioning of final cover, stormwater management system, fence, and other elements.
Land and Groundwater Use Limitations	Planned future land use is open space. IDEQ owns the property and will ensure that administrative controls are maintained.

5.0 SUMMARY OF COMPLIANCE WITH ROD REQUIREMENTS

5.1 PREVENTION OF ADVERSE HUMAN HEALTH OR ECOLOGICAL IMPACTS

The design and operation of the BCR should prevent adverse human health or ecological impacts. During construction, direct exposure to and airborne transport of contaminated soil and dust will be limited through use of access restrictions (fences) and dust suppression (watering and temporary cover). Adverse impacts to nearby residents will be limited by the rural location of the site, requirements for load covering, and truck decontamination procedures. Adverse human health or ecological impacts due to offsite waterborne transport of contaminated soil will be limited by implementation of site BMPs, a surface water management system, placement of additional slope armoring, as needed, to prevent erosion, and engineering controls to minimize the potential for slope failure.

5.2 PREVENTION OF ADDITIONAL GROUNDWATER AND/OR SURFACE WATER IMPACTS

Placement of a repository on top of the existing tailings pond should result in reduced rates of migration of metals to groundwater compared to existing conditions. Hydrologic modeling indicates that percolation of water through the tailings pond to groundwater will be reduced by about 60 percent or more after placement of the final cover compared to existing conditions.

Surface water monitoring, as described in Section 2.6, indicates that concentrations of the human health and ecological chemicals of concern (arsenic, cadmium, copper, lead, and zinc) in Big Creek do not increase as a result of discharge of groundwater from beneath the BCR to Big Creek. Placement of a final cover, implementation of a surface water management system, placement of additional slope armoring to prevent erosion, and engineering controls to minimize the potential for slope failure should further limit surface water impacts.

The final cover system will be required to meet a percolation performance standard of 4 inches per year (maximum). Contaminant transport modeling, which is documented in Appendix B of the Big Creek Repository Design Analysis Report, was used to evaluate the potential for waste materials placed in the repository to impact groundwater and surface water. At this maximum percolation rate, modeling indicates that metals (antimony, arsenic, cadmium, lead, and zinc) leached from waste materials placed in the repository would not impact groundwater or surface water at concentrations exceeding surface water quality standards within the foreseeable future.

5.3 INTEGRATION WITH PAST OR NEARBY CLEANUP EFFORTS

The proposed BCR is not the location of any past cleanup actions or future remedial actions under the ROD. However, the site is centrally located and easily accessed for disposal of yard waste and other materials generated by remedial actions implemented under the ROD. In

addition, use of an existing tailings pond eliminates the negative impact of using clean, unaffected land for a waste disposal site.

5.4 COMPLIANCE WITH ARARS

RCRA Subtitle D (40 CFR Part 257, Subpart A) criteria are applicable for management and disposal of material generated by cleanup activities pursuant to the Selected Remedy. Idaho Solid Waste Management Rules (IDAPA 58.01.06) explicitly do not apply to “waste dumps, tailings and other materials uniquely associated with mineral extraction, beneficiation or processing operation” and thus are not applicable.

RCRA Subtitle C criteria are not applicable because solid wastes from the extraction, beneficiation, and some processing of ores and minerals are excluded from Subtitle C requirements by the Bevill Amendment (42 USC§6921(b)(3)(A)). However, Idaho Solid Waste Management Rules Tier II (non-municipal solid waste) landfill requirements are relevant and appropriate. Idaho Solid Waste Management Rules Tier III (non-municipal solid waste where leachate or gas may be formed) and Subtitle C requirements are not relevant and appropriate because no metal concentrates will be disposed of in the BCR and all material must meet the waste acceptance criteria. Table 5-1 summarizes how the BCR will achieve compliance with the applicable requirements of RCRA Subtitle D, the relevant and appropriate requirements of the Idaho Solid Waste Management Rules for Tier II facilities, and other applicable or relevant and appropriate requirements identified in the OU3 ROD.

5.5 APPROPRIATENESS FOR THE CHARACTERISTICS OF THE WASTE

The BCR will be used primarily for disposal of contaminated yard soil and incidental debris and is appropriate for disposal of these materials. The yard soil will typically contain lead at concentrations ranging from 700 to 67,000 mg/kg and arsenic at concentrations up to 3,600 mg/kg (ROD Table 5.2-2). The estimated average concentrations of lead and arsenic in yard soil that will be disposed of in the BCR are 1,764 mg/kg and 34 mg/kg, respectively. Estimated average concentrations of metals in yard soil that will be disposed of in the BCR are summarized in Table 5-2. The yard soil is not considered principal threat material because it is not a metal concentrate and contains concentrations below the principal threat material levels established for the Bunker Hill Box². Material must meet the waste acceptance criteria and be managed in a manner appropriate for its characteristics. The BCR may also be used for disposal of other mining-related contaminated soil and sediment. The maximum concentrations of contaminants in this material will be limited by the waste acceptance criteria. Consequently, this material also does not meet the definition of principal threat material.

² Concentrations used to identify principal threat material within the Bunker Hill Box were: 127,000 ppm antimony; 15,000 ppm arsenic; 71,000 ppm cadmium; 84,600 ppm lead; 33,000 ppm mercury (Source: Bunker Hill Non-Populated Areas ROD, ROD ID: EPA/ROD/R10-92/041, Date: 09/22/1992).

5.6 COST-EFFECTIVENESS

The estimated capital cost through closure of the BCR is approximately \$3,200,000. Assuming 140,000 cubic yards of yard waste are placed in the repository (the total repository capacity is approximately 250,000 cubic yards), the estimated capital cost per cubic yard of waste disposed is approximately \$23. The estimated net present value of 30 years of post-closure operations and maintenance (O&M) is approximately \$600,000, based on a discount rate of 3.5 percent. The estimated average annual O&M cost is approximately \$33,000.

5.7 MINIMIZATION OF LONG-TERM OPERATION AND MAINTENANCE (O&M) COSTS

One objective of the repository design, operations plan, and closure plan is to minimize O&M costs. Measures that will be included in the repository design, operation, and closure to minimize O&M costs include, but are not limited to:

- The repository side slopes and final cover will be designed to limit erosion and minimize O&M costs associated with repair of the cover and treatment of collected runoff water
- BMPs will be implemented to minimize erosion
- Waste placed in the repository will be compacted to limit erosion prior to placement of the final cover and to minimize potential settlement
- Controlled placement of waste will be used to limit the potential for slope failure
- Additional armoring will be placed along the channel of Big Creek, as needed, to limit future erosion by Big Creek during high flow periods

5.8 TRANSPORTATION IMPACTS AND COSTS

Waste material will be delivered to the BCR by truck, using the existing paved Big Creek Road. The road is suitable for the truck volumes and weights that will result from operation of the repository, however, it is anticipated that there will be some increase in the frequency of required road maintenance. Big Creek Road runs through a rural area, so minimal disruption to residents would occur during construction and operation of the repository.

Yard soil will be trucked to the BCR from throughout the Basin; however, based on estimates made for the FS, about 80 percent of the yard soil will come from the Upper Basin between Mullan and Elizabeth Park.

The annual truck traffic volume will depend on the number of yards remediated each year and the average volume of soil removed from the yards. For a typical yard in the Basin,

approximately 150 cubic yards (cy) of soil will be removed. For example, if 100 yards are remediated each year, the annual traffic for a 10-cy truck would be 1,500 trucks.

5.9 ECONOMIC DEVELOPMENT OR FUTURE REUSE OF THE SITE WHERE FEASIBLE

The State of Idaho has determined that the final land use for the Big Creek Repository will be open space. The site will not be designated for recreation, industrial uses, or private uses without an intensive investigation into the potential for unacceptable impacts to human health or the environment as a result of such use. IDEQ owns the property and will ensure that institutional controls are maintained to ensure appropriate land uses.

5.10 ABSENCE OR PRESENCE OF MINING-RELATED CONTAMINANTS

The existing tailings pond contains metals, including antimony and arsenic, at concentrations that could limit future site redevelopment due to concerns for protection of human health. Thus, use of the site as a yard soil repository would not further limit economic development in the Silver Valley.

5.11 GEOTECHNICAL STABILITY

The repository will be loaded slowly using a phased filling procedure that allows the tailings material to develop strength and limit the potential for slope failure. In addition, pore water pressures and settlement will be monitored throughout the operating life of the repository. These additional data will verify that the repository is being fill in a safe manner. Long-term stability will be further enhanced by placing a final cover that limits percolation of surface water. A geotechnical analysis of the stability of the BCR concluded that, if the site is loaded and capped properly, the repository will be stable during filling and after placement of the final cover.

5.12 AVAILABILITY OF CLEAN COVER MATERIAL

Clean, low permeability soil or topsoil is expected to be scarce, and the cover design has been selected with consideration of this limitation. The cover will consist of a minimum 6-inch topsoil layer and an 18-inch select fill layer. The select fill layer may contain up to 1,000 mg/kg lead to permit a wider range of source areas for final cover material, potentially including some material segregated from incoming waste streams.

5.13 COMMUNITY ACCEPTANCE

Community involvement activities included a briefing of the Shoshone County Commissioners on May 1, 2002, a meeting with representatives of the Shoshone Country Club on May 15, 2002,

Technical Memorandum
Big Creek Repository Site Evaluation
Draft Final as of June 30, 2004

and door-to-door community updates on May 15, 2002. No objections to the repository location were raised. Numerous briefings have also been provided to the Basin Commission TLG, and use of this location has been explicitly discussed in the 2003, 2004, and 5-year Basin Commission Work Plans with no objections being raised.

Technical Memorandum
Big Creek Repository Site Evaluation
Draft Final as of June 30, 2004

**Table 5-1
Summary of Compliance with ARARs**

Citation	Summary of Requirements	Status ¹	How Compliance Will Be Achieved
40CFR257 Subpart A (RCRA Subtitle D)	Facility or practices in floodplains will not restrict flow of base flood, reduce the temporary water storage capacity of the floodplain, or otherwise result in a washout of solid waste.	Applicable	The existing tailings ponds is within the 100-year floodplain; however, the BCR will not restrict flood flows or storage. Armoring of sideslopes will be used, as needed, to limit erosion of the tailings pond during flood flows. The armoring process will not significantly reduce the flood flow capacity of Big Creek.
	Facility or practices shall not cause or contribute to taking of any endangered or threatened species.		Gray wolf (<i>Canis lupus</i>) is the only listed (threatened or endangered) species likely to occur within the active portion of the facility. The closed facility will not be incompatible with wolf presence. Listed fish (e.g., bull trout) that could occur in Big Creek are protected through use of surface water controls within the BCR.
	Facility or practices shall not result in the destruction or abuse of critical habitat.		Site does not represent critical habitat.
	Facility or practices shall not cause discharge of pollutants into waters of the U.S. in violation of a NPDES permit.		CERCLA actions do not require permits; however, surface water monitoring will be conducted to evaluate whether point discharges meet substantive permit requirements, including surface water quality ARARs identified in the ROD. The storm water management system will be designed to limit the concentrations of metals in point discharges.
	Facility or practices shall not cause discharge of dredged or fill material into waters of the U.S.		BMPs will be used to limit erosion during construction. Establishment of grass cover and implementation of maintenance plan will limit post-construction erosion. Detention pond will limit transport of suspended sediment.

Technical Memorandum
Big Creek Repository Site Evaluation
Draft Final as of June 30, 2004

Table 5-1 (Continued)
Summary of Compliance with ARARs

Citation	Summary of Requirements	Status ¹	How Compliance Will Be Achieved
40CFR257 Subpart A (RCRA Subtitle D) (Continued)	Facility or practices shall not contaminate underground drinking water source beyond facility boundaries.	Applicable	Cover system will reduce percolation and potential for contamination of groundwater compared to conditions prior to disposal of the wastes in the BCR. Contaminant fate and transport modeling indicates that metals leached from waste materials placed in the repository would not impact groundwater at concentrations exceeding surface water quality standards within the foreseeable future. Groundwater monitoring will be conducted to verify compliance.
	The concentration of explosive gases generated at the facility shall not exceed 25% of the LEL for gases in facility structures and shall not exceed the LEL for the gases at the facility boundary.		Little organic material in wastes; no detectable gas generation anticipated.
	Facility or practices shall not pose a hazard to the safety of persons or property from fire.		No flammable materials accepted except wood and vegetation.
	Facility or practices shall not allow uncontrolled public access so as to expose the public to potential health and safety hazards.		The facility will be fenced, and the gate will be locked. Only authorized contractors will have keys to the gate. Public access will not be allowed unless an attendant is present.
IDAPA 58.01.06.012 ² (Tier II Non-Municipal Solid Waste Landfills)	Drainage and Erosion Control. The owner and operator shall install appropriate measures to control erosion and install appropriate measures to control the run-on and runoff from a twenty-five (25) year, twenty-four (24) hour storm event and to provide for the diversion of other surface waters from the closed facility. (.05(d))	Relevant and appropriate	The storm water management system will be designed to collect and control excess runoff compared to pre-project conditions and control erosion based on the 100-year, 24-hour precipitation event.
40 CFR261, 262, and 264 (RCRA Subtitle C)	No applicable or relevant and appropriate requirements	Not applicable or relevant and appropriate	Principal threat material will not be disposed of at the BCR.

Technical Memorandum
Big Creek Repository Site Evaluation
Draft Final as of June 30, 2004

Table 5-1 (Continued)
Summary of Compliance with ARARs

Citation	Summary of Requirements	Status ¹	How Compliance Will Be Achieved
IDAPA 58.01.18.27 (Land Remediation Rules)	Institutional controls may be used to assure both the continued protection of human health and the environment and the integrity of a cleanup action where a cleanup action results in residual concentrations of hazardous substances or petroleum which exceed risk-based health standards.	Relevant and appropriate	Post-closure plan will include administrative controls to ensure appropriate future land use and engineering controls to maintain the integrity of the cover system.
IDAPA 20.03.02 (Surface Mining Regulations)	Section 069. Contains requirements for borrow sources for clean fill for landfill caps, including reclamation plan	Applicable	Source(s) of borrow material have not been identified at this time. If borrow is obtained from a site without an approved reclamation plan, a plan would be developed in accordance with the requirements of the regulation. BMPs will be used during operation and closure of the BCR.
	Section 140. Contains best management practices for placement and consolidation of contaminated material, including nonpoint source sediment control, clearing and grubbing, placement of topsoil conducive to the growth of vegetation, backfilling and grading, and erosion control.	Relevant and appropriate	
IDAPA 58.01.02 (Surface Water Quality Standards)	Point-source surface water discharges must not cause exceedances in the receiving water body of the Idaho water quality standards that had been approved by EPA at the date of the ROD.	Applicable	BMPs will be used to limit erosion and metals transport during construction. Establishment of grass cover and implementation of maintenance plan will limit post-construction erosion. Detention pond will limit transport of suspended sediment. Surface water monitoring will be conducted to evaluate whether point discharges meet Idaho water quality standards.
Clean Water Act Section 304 66FR 18935-18936 (April 12, 2001)	Point-source surface water discharges must not contain cadmium at concentrations that exceed the revised Ambient Water Quality Aquatic Life Criterion.	Relevant and appropriate	Erosion controls and storm water management measures described above will be used to limit concentrations of cadmium in point discharges. Surface water monitoring will be conducted to evaluate whether point discharges meet the revised criterion for cadmium.

Technical Memorandum
Big Creek Repository Site Evaluation
Draft Final as of June 30, 2004

Table 5-1 (Continued)
Summary of Compliance with ARARs

Citation	Summary of Requirements	Status ¹	How Compliance Will Be Achieved
IDAPA 37.03.07 (Stream Channel Alteration Regulations)	Provides minimum standards for design and construction of channel armoring.	Applicable	Riprap channel armoring would be constructed in accordance with the requirements of IDAPA 37.03.07.057 (Dumped rock riprap).
IDAPA 58.01.08.050 (Idaho Drinking Water Regulations) and 40 CFR 141 (Safe Drinking Water Act, National Primary Drinking Water Regulations)	Contaminant concentrations in public drinking water systems must remain below MCLs and non-zero MCL goals.	Relevant and appropriate	There are no public drinking water systems. Therefore, MCLs are not applicable, but may be relevant and appropriate. Antimony and arsenic are present at levels that exceed primary drinking water standards under existing conditions. Cleanup of existing groundwater contamination is outside of the scope of the interim measures selected in the ROD. Closure cover system will reduce water percolation through contaminated repository waste and tailings and limit additional impacts. Use restrictions will be instituted to prohibit installation of drinking water wells in impacted areas.
40 CFR Parts 17, 402 (Endangered Species Act)	Repository construction and operation must not adversely affect any federally-designated threatened or endangered species	Applicable	Gray wolf (<i>Canis lupus</i>) is the only listed (threatened or endangered) species likely to occur within the active portion of the facility. The closed facility will not be incompatible with wolf presence. Listed fish (e.g., bull trout) that could occur in Big Creek are protected through use of surface water controls within the BCR.
16 USC 703 et seq (Migratory Bird Treaty Act)	Unlawful to “hunt, take, capture, kill” or take various other actions adversely affecting a broad range of migratory birds.	Relevant and appropriate	Site is not currently habitat for migratory birds. At closure, waste will be covered with a layer of clean soil that would limit ingestion of contaminants by migratory birds.

Notes

¹ “Applicable” requirements specifically address a hazardous substance, remedial action, location, or other circumstance at a site. “Relevant and appropriate” requirements, while not *applicable*, address problems or situations sufficiently similar to those encountered at the site that their use is well suited to the site.

² Relevant and appropriate requirements for Tier II facilities that are in addition to the 40CFR257 Subpart A requirements

Technical Memorandum
Big Creek Repository Site Evaluation
Draft Final as of June 30, 2004

Table 5-2
Estimated Average Concentrations of Metals in Yard Soil

Metal	Number of Samples	Average Concentration, mg/kg
Antimony	3210	12
Arsenic	3327	34
Cadmium	3327	5.8
Lead	3327	1,764
Zinc	3327	889

Notes

1. Data set used is yard soil samples collected under Remedial Investigation Field Sampling Plan Amendments 6, 12, and 16 between July 1998 and March 2000. A total of 177 residences were sampled.
2. Data set was screened for residences with one or more samples containing >1,000 mg/kg lead (i.e., residences requiring yard soil cleanup). 144 residences were retained. For each residence retained, a mean concentration was computed using all samples. Volume-weighted values of mean, standard deviation, and 90 percent confidence interval reported in this table were computed using the mean concentrations for each residence.

Technical Memorandum
 Big Creek Repository Site Evaluation
 Draft Final as of June 30, 2004

Table 5-3
Summary of Estimated Costs

Cost Item	Description	Cost
Big Creek Erosion Protection	Riprap 855 ft critical reach	\$195,000
Haul Roads	Construction of on-site haul roads	\$215,000
Storm Water Management System	Includes construction of detention pond, conveyance pipes, and channels	\$253,000
Waste Placement	Includes relocation of 13 kV line, waste placement and compaction, surveying, BMPs	\$1,097,000
Final Cover	2-foot-thick soil cover	\$696,000
Subtotal, Direct Capital Cost		\$2,455,000
Contingency, 15%	15% of direct capital cost	\$368,000
Engineering Support, 6%	6% of direct capital cost plus contingency	\$169,000
Supervision and Administration, 6%	6% of direct capital cost plus contingency	\$169,000
Total Capital Cost		\$3,162,000
Annual Long-Term Operations and Maintenance (O&M) Cost	Includes monitoring, surveying, and maintenance of storm water management system	\$33,000
Present Worth of O&M	30 years of O&M using a 3.5% discount rate	\$602,000
TOTAL CAPITAL + LONG-TERM O&M PRESENT WORTH COST		\$3,764,000

Source: USACE, Big Creek Repository Design Analysis Report