

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

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

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.