FOREST ROSE MINE AND MILL COMPLEX
Beaverhead-Deerlodge National Forest

DRAFT SITE INVESTIGATION

Contract No. 53-0343-0-0009
Task Order No. HNF-MCS-03-04

Prepared for
USDA Forest Service, Region 1
PO Box 7699
Missoula, MT 59807

Prepared by
MCS Environmental, Inc.
5562 Alloy South
Missoula, MT 59808

February 13, 2004
110018.016.0

CONTENTS

TABLES

FIGURES

PHOTOGRAPHS

APPENDICES

DRAFT SITE INVESTIGATION

Forest Rose Mine and Mill Complex
Beaverhead-Deerlodge National Forest

1.0 INTRODUCTION

MCS Environmental Inc. (MCS) has prepared this Site Investigation Report for the US Department of Agriculture, Forest Service, Region 1 (USFS) under terms and conditions of Contract No. 53-343-0-0009. This report documents the completed site investigation at the Forest Rose Mine and Mill Complex, located east of Hall, Montana. The site investigation focused on tailings impoundments and associated waste rock dump areas. Tailings at the site were slurried into a series of three impoundments in the Dunkelberg valley. Previous investigations at the site indicate that tailings contain elevated metals concentrations, particularly lead. Surface water did not appear to be degraded by the site. A flood event in 1992 caused a failure at the lowest impoundment, releasing tailings into surface water below the site. The stability of the tailings impoundments has not yet been investigated. The purpose of this investigation is to document the chemical characteristics of the tailings and waste rock, and to evaluate the stability of the tailings impoundments. The mine and mill site are located on private land and lands administered by the Beaverhead-Deerlodge National Forest. The field investigation activities were completed during the summer and fall of 2003 by MCS.

This report has been prepared for the USFS in accordance with Contract No. 53-0343-0-009, Task Order No. HNF-MCS-03-04.

2.0 BACKGROUND

The Forest Rose Mine and Mill Complex is located within the historic Dunkleberg Mining District. Milling operations at the Forest Rose Mine have filled a portion of the Dunkleberg Creek Drainage with tailings and waste rock. The district is located in the northwest region of the Flint Creek Range about 50 miles northwest of Butte, Montana (Figure 2.1). The mines and prospects encompass an area of approximately 2 miles wide and 5 miles long (Pardee 1917).

2.1 SITE LOCATION

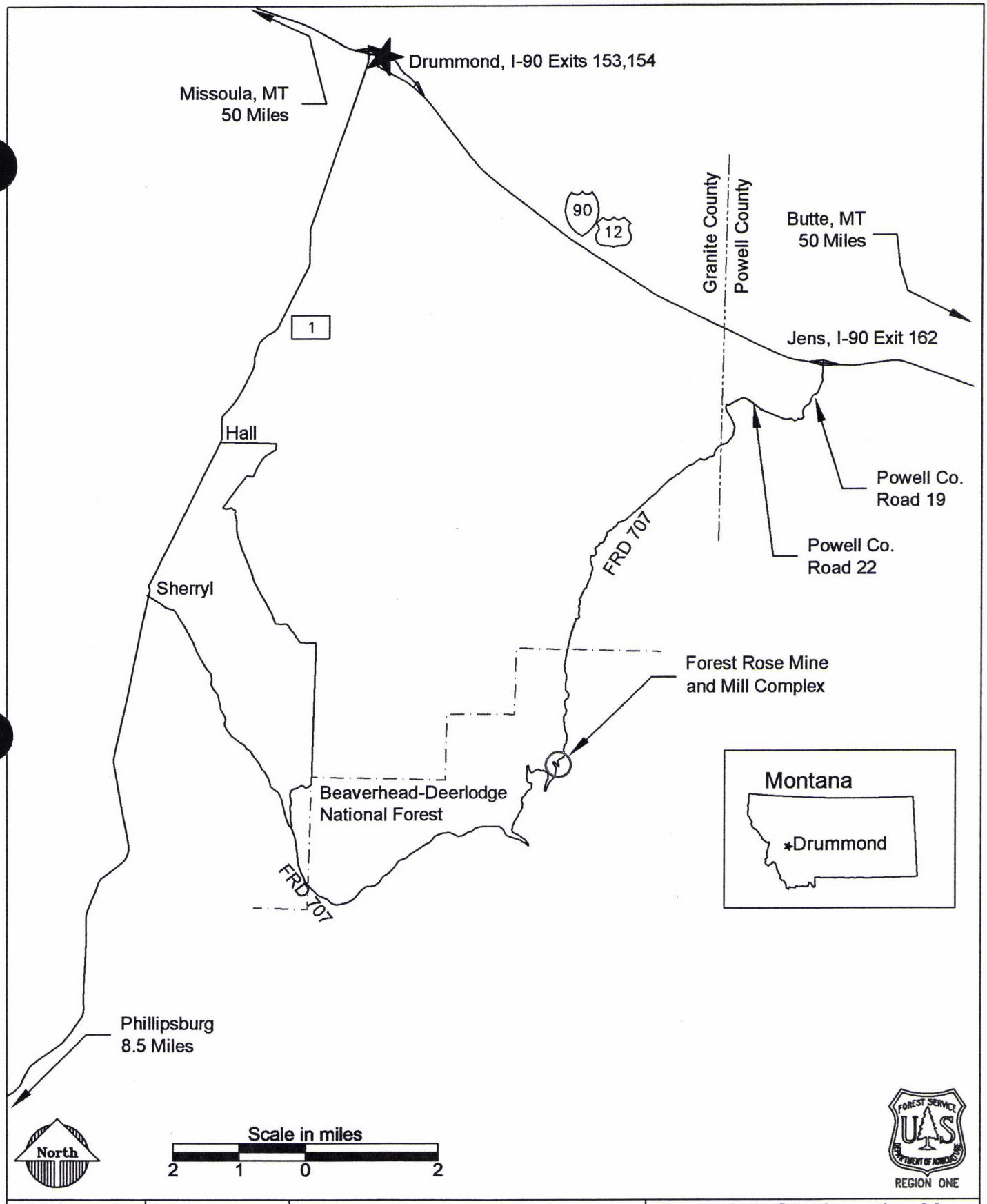
The Forest Rose Mine is located in Granite County within the Beaverhead-Deerlodge National Forest. The site is accessible from Interstate 90 approximately 8 miles east of Drummond at Exit 162 (Jens Exit), then traveling south-southwest approximately 11 miles on Dunkleberg Creek Road (FDR 707) (Figure 2.1). The Forest Rose Mine and Mill Complex is located on the east side of FDR 707. The legal description of the site is Section 22, Township 9N, Range 21W, Principle Meridian Montana.

2.2 SITE HISTORY

Lode mining began in the 1880s and several claims, including the Forest Rose, were staked in 1884. Approximately $200,000 in silver and lead was produced by 1916, about half originating from the Forest Rose claim. For this reason, many of the district's environmental problems stem from activities associated with the Forest Rose Mine. Other mines within the Dunkleberg District include the Hatta, Jackson, Monarch or Old Tanglefoot, Pearl or Happy New Year, Summit, Sunset, and Wasa. The Forest Rose, Wasa, and Jackson were the district's primary producers (MDEQ 2002).

The Forest Rose Mine is positioned west of Dunkleberg Creek on a steep slope at an elevation of approximately 5,500 feet (MDEQ 2002). In 1916, J.T. Pardee conducted a reconnaissance of the area. He observed large waste rock dumps indicating that extensive underground development had taken place, but only the surface workings were accessible for examination. At this time, the surface vein was about one foot in width and was composed of quartz, limonite, and some galena and pyrite. The dumps contained significant amounts of iron-stained quartz (Pardee 1917).

The mine was prepared for reopening in 1917. Production continued at the Forest Rose nearly nonstop from 1918 to 1927. Operations reopened again at the Forest Rose and Wasa Mines during World War II with a 100-ton concentrator being built in 1941. Associated mill works were constructed to process ore produced mainly from Forest Rose and Wasa mines. The ore was crushed using a combination of a jaw crusher and ball mill. The crushed ore was conditioned for lead



LEGEND

National Forest Boundary

County Boundary

Figure 2.1: Site Location Map

Forest Rose Mine Site

MCS Environmental
5562 ALLOY SOUTH
MISSOULA, MT 59808
(406) 728-7755
FAX (406) 728-7367

Job No.	Date	Revision No.
11.0018.016.0	Jan. 2004	NA
Scale: 1" = 2 miles		By: TWC

\Environs\Current Projects\11018_Forest Service\11018.016 Forest Rose \Drawings\Route.dwg

REF:

flotation and transferred to a bank of eight cells for concentration. The ore was then re-conditioned for zinc concentration (Popoff 1953; cited in Madison et al. 1998). Combined, both mines produced about 113,000 tons of ore, nearly equal to the whole district's production (MDEQ 2002).

2.3 SITE DESCRIPTION

The Forest Rose Mine and Mill Complex is located 5.8 miles southwest of Jens, Montana (Figure 2.1). A topographic map of the site is shown on Figure 2.2 and a site aerial photo is shown on Figure 2.3. The mine and mill workings are located on private property on the hillside west of Dunkleberg Creek (Figures 2.2 and 2.4). The mill processed ore from the Forest Rose and other mines in the area. Tailings from the mill were slurried into a series of three tailings impoundments within the Dunkleberg Creek drainage. Waste rock, produced from mine workings, was placed into drainage adjacent to and above the mill works.

The impacted area associated directly with the Forest Rose Mine site is approximately 1200 feet long and 515 feet wide at its greatest breadth and encompasses an area of approximately 4.2 acres (Figure 2.4). The total elevation relief from top to bottom of the site is approximately 180 feet. The lowest impoundments (T1 Area) is located on lands administered by the Beaverhead-Deerlodge National Forest. The upper impoundments (T2 and T3 Areas), mine and mill site, and waste rock dump are located on private land. The T1 Area represents the lowest tailings impoundment, T2 Area the middle, and T3 Area forming the uppermost impoundment. The T3 Area is located adjacent to the north of the mill works referred to in this site investigation as the mill works building area.

The waste rock area is located south and adjacent to the T3 impoundment (Figure 2.4). A waste rock dump is located at the south end of this area. The dump consists of two lobes, one that extends up the valley and a second lobe that extends to the east forming a dam across Dunkleberg Creek. A collapsed adit is located near the southwest corner of the dump. An area of red/orange waste rock is located approximately 15 feet west of the mill works building area.

2.4 T1 AREA IMPOUNDMENT DAM FAILURE

A failure of the T1 tailings impoundment occurred in 1992 releasing water and tailings as a suspended sediment load downstream and onto the floodplain adjacent to and below the impoundment. The remnant failure surface and down-gradient slide mass are located near the center of the T1 impoundment dam (Figures 2.4 and 2.5). The failure surface covers and area of approximately 3600 square feet and is approximately 60 feet in wide and 5 to 10-feet in deep. The remnant slide mass covers an area of approximately 6,402 square feet and is approximately 95 feet long and 72 feet wide. Mr. Bob Wintergerst, of the USFS Region 1, stated that the failure ultimately occurred as the result of a failed decant tower located on the east end of the lower impoundment

(Figure 2.5). The tower previously drained the lower impoundment into Dunkleberg Creek. It is hypothesized that when the decant tower failed and no longer drained the area, the lower impoundment was overtopped and/or became saturated causing the impoundment structure to fail. Mr. Wintergerst also stated that it is likely that the impoundment failed along the tailings and Blackleaf Shale interface on which the T1 impoundment dam was constructed. The Blackleaf Shale in the area is highly fractured and unstable. An emergency drainage and collection system was created in 1992 by the USFS on the west end of the T1 Area (Figure 2.5) to decrease the risk of additional failure until a permanent corrective action could be established. This system is still functioning to date.

2.5 PREVIOUS INVESTIGATIONS

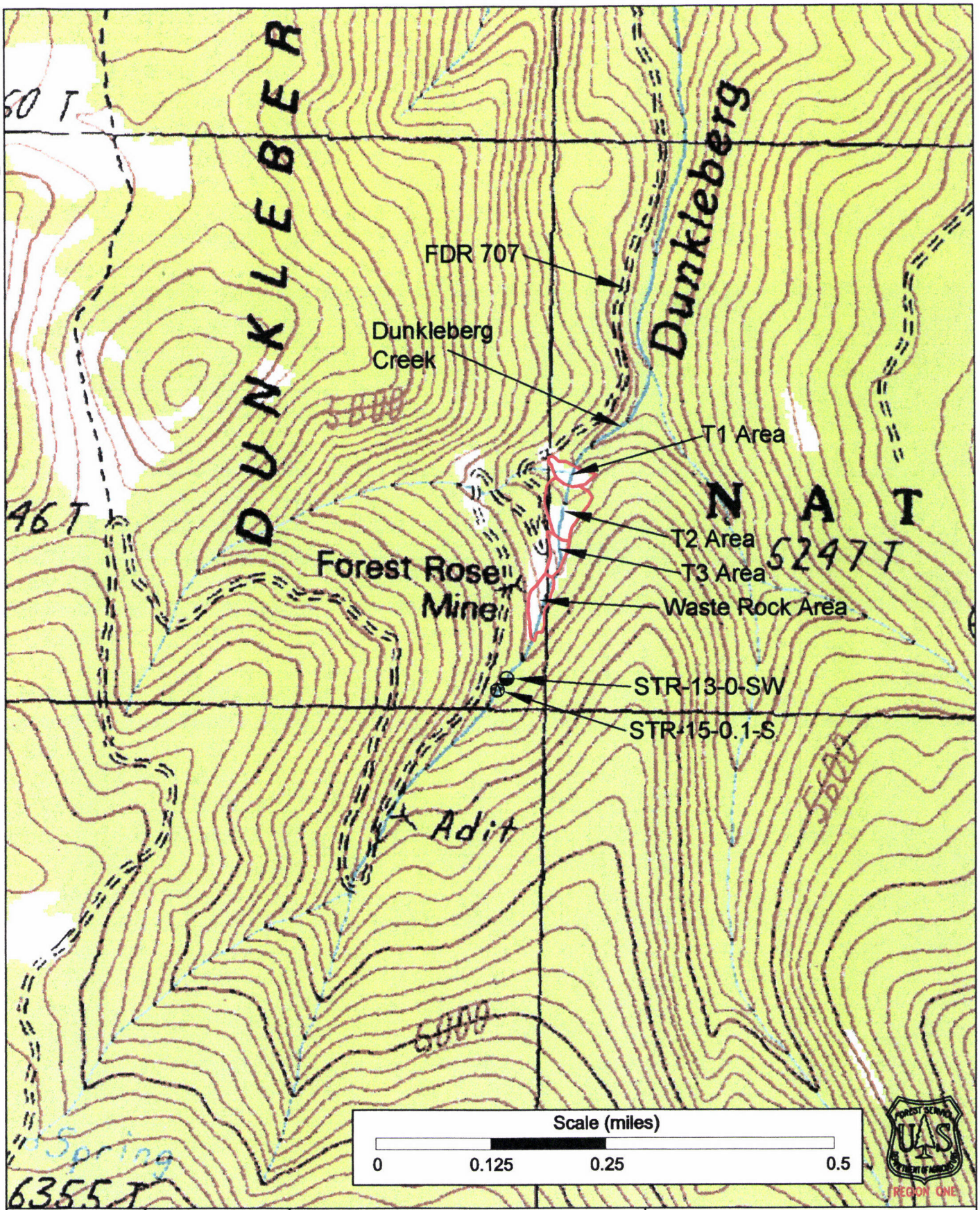
The Montana Bureau of Mines and Geology investigated abandoned mine sites in the Deerlodge National Forest (Madison et al. 1998). The Forest Rose Mine was included in this investigation. Surface water at the site was sampled at three locations. Mercury concentrations exceeded the chronic aquatic life standard in two of the samples. No other metals exceeded water quality standards in the samples.

2.6 GEOLOGY

The Forest Rose Mine is located within heavily folded and intruded Cretaceous rocks in the northeast quarter of the Sapphire tectonic block. Gabbroic and dioritic sills, up to 1000 or more feet in thickness, outcrop within a half-mile of the Forest Rose. These sills are intruded at a higher stratigraphic level than the Forest Rose and predate the local folding. The Forest Rose Mine is located near the axial plane on the west limb of a northeast trending, northward plunging anticline near a local marker bed of Lower Cretaceous Kootenai formation gastropod bearing limestone (Pardee 1917). Mineralization of the limestone produces ore that consists mainly of galena, sphalerite, pyrite, quartz, and calcite. Ore deposits are quartz veins which cross-cut the rocks. These veins are generally thin but can be up to four feet thick. The primary ore mineral is silver-bearing galena. The ores shipped from the Dunkleberg Mining District yielded 40 % lead and 40 ounces of silver per ton (Pardee 1917).

2.7 HYDRGEOLOGY

Dunkleberg Creek is a perennial stream that flows north from its origins approximately one mile to the south of the site. The Dunkleberg watershed obtains a maximum elevation of approximately 6,800 feet and a minimum elevation of approximately 4,080 feet. Dunkleberg creek empties into the Clark Fork River approximately 13 miles northeast of the site. The slope of the drainage is



MGS Environmental
5562 ALLOY SOUTH
MISSOULA, MT 59808
(406) 728-7755
FAX (406) 728-7367

LEGEND

- Approximate Location Stream Water Sample
- Approximate Location Stream Sediment Sample
- Approximate Limits of Tailings and Waste Rock Areas

North

Located in a portion of Township 9 North, Range 12 West, P.M.M.

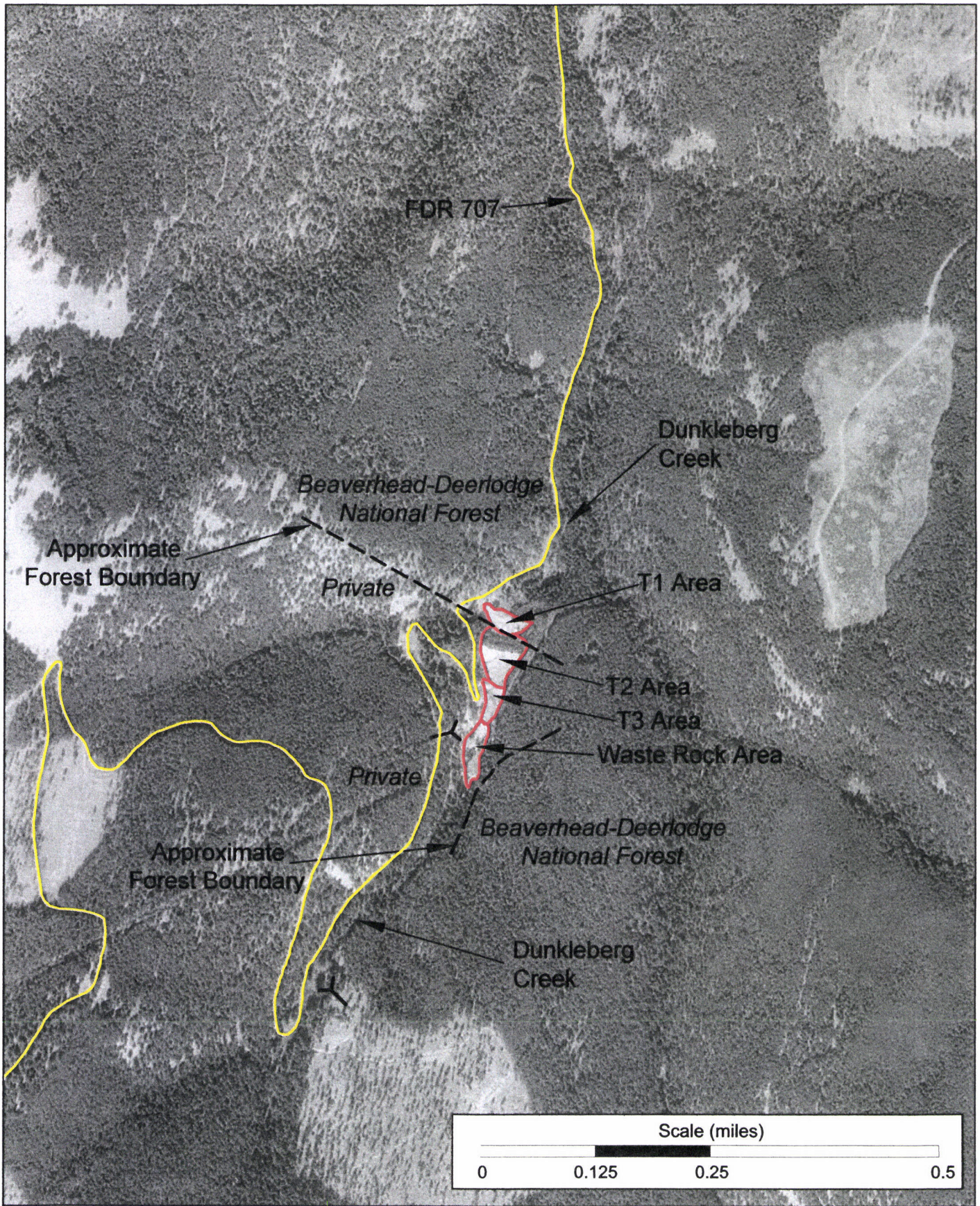
Figure 2.2: Site Vicinity Map

Forest Rose Mine Site

PROJECT NO.	DATE	REVISION NO.
110018.016.0	June 2003	NA
SCALE: bar		DRAWN BY: TWC

\Environs\11018.016 Forest Rose \Drawings\orthophoto

REF: USGS 7.5' Topo Quad Dunkleberg Creek, MT



MCS Environmental
5562 ALLOY SOUTH
MISSOULA, MT 59808
(406) 728-7755
FAX (406) 728-7367

LEGEND

- Approximate Location of Adit
- Approximate Limits of Tailings and Waste Rock Areas

North

Located in a portion of Township 9 North, Range 12 West, P.M.M.

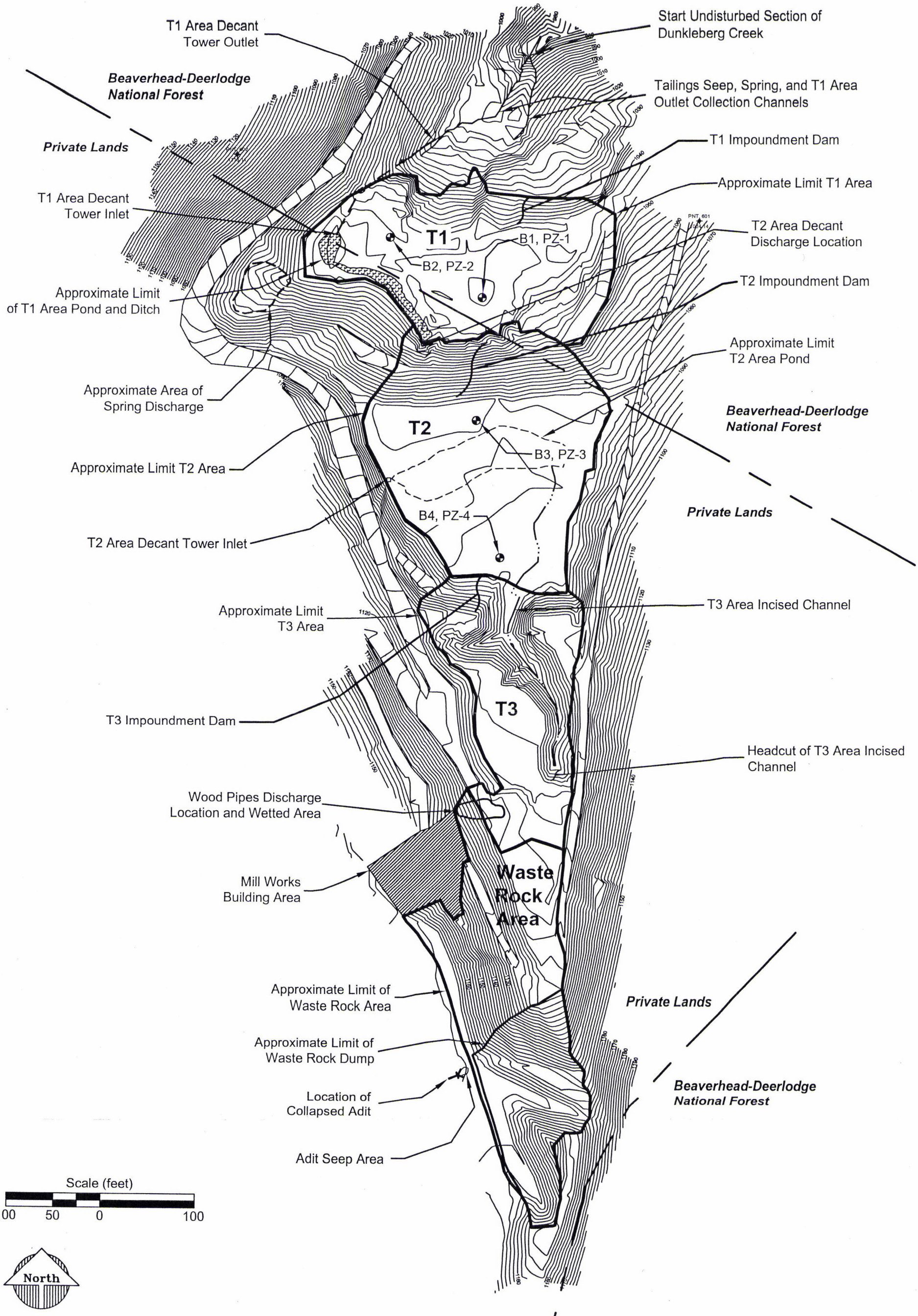
Figure 2.3: Aerial Photo

Forest Rose Mine Site

PROJECT NO.	DATE	REVISION NO.
110018.016.0	June 2003	NA
SCALE: bar		DRAWN BY: TWC

\Environs\11018.016 Forest Rose\Drawings\orthophoto

REF: USGS Orthophoto, Dunkleberg Creek Quad (photo date: 08/28/1995)



MCS Environmental
5562 ALLOY SOUTH
MISSOULA, MT 59808
(406) 728-7755
FAX (406) 728-7367

LEGEND

- Boring and Piezometer Location
- PNT 101 / 109.99 - Project Bench Mark Location, Number and Relative Elevation

NOTE: VERTICAL DATUM SET AT ARBITRARY DATUM OF 1000'

PROJECT NO.	110018.016.0
DRAWN BY	WPP
REVISION NO.	NA
DATE	January 2004

SCALE: 1 INCH = 100 FEET
CONTOUR INTERVAL: 2 FOOT

Figure 2.4: Site Detail Map

Forest Rose Mine

Beaverhead-Deerlodge National Forest
Granite County, Montana

FOREST SERVICE U.S. DEPARTMENT OF AGRICULTURE REGION ONE

\Environmental\[redacted]Projects\110018_Forest Service\110018.016 Forest Rose\Drawings\Forest_Rc[redacted]SI_Topo.

REF: Survey Data Collected by MCS Environmental Inc. on Jul[redacted]d 10, 2003; August 5, 2003; and September 3, 2003

Scale in feet

50 25 0 50

TS-07-0-SW

T1 Area
Decant Outlet

Burried T1 Area Decant
Tower Drain Pipe

Beaverhead-Deerlodge
National Forest

DT-08-0-SW

Private Lands

FDR 707

STR-01-0-SW

STR-02-0.1-S

Tailings Seep, Spring,
and T1 Area Decant
Discharge Channels

SP-03-0-SW

Approximate Limit
T1 Area Slide Mass

Approximate Limit
T1 Area Failure Surface

T1 Impoundment Dam

Approximate Limit
T1 Area

B1, PZ-1

B2; PZ-2

Approximate Area of
Spring Discharge

Approximate Area of Soil Slumping

Failed T1 Area
Decant Tower Inlet

FDR 707

DTD-09-0-SW

MCS Environmental
5562 ALLOY SOUTH
MISSOULA, MT 59808
(406) 728-7755
FAX (406) 728-7367

LEGEND

North

- ● - Tailings Composite Sample T1-04-1.2-T Sub-Sample Soil Locations
- ◒ - Surface Water Sample Location
- ◭ - Stream Sediment Sample Location
- ◓ - Boring, Piezometer, and Groundwater Sample Location
- ⚃ - Approximate Limit of T1 Area Surface Drainage Pond and Ditch

NOTE: VERTICAL DATUM SET AT ARBITRARY DATUM OF 1000'

PROJECT NO.	110018.016.0
DRAWN BY	WPP
REVISION NO.	NA
DATE	January 2004
SCALE: 1 INCH = 40 FEET CONTOUR INTERVAL: 2 FOOT	

Figure 2.5: T1 Area Sample Location Map

Forest Rose Mine

Beaverhead-Deerlodge National Forest
Granite County, Montana

FOREST SERVICE U.S. DEPARTMENT OF AGRICULTURE REGION ONE

\Environmental\Current Projects\110018_Forest Service\110018.016 Forest Rose\Drawings\Forest_Rose\dwg\SI_Topo.

REF: Survey Data Collected by MCS Environmental Inc. on July 1, 2 and 10, 2003; August 5, 2003; and September 3, 2003

approximately 13% within the mine area. The creek flows through a narrow V-shaped valley. Recurrence flood interval flows were calculated for the Dunkleberg Creek drainage using a formula developed by the USGS (Omang 1992) for ungauged streams in Montana. The watershed area used for calculations encompassed the drainage above the lower end of the site. Flood magnitude estimated at specified recurrence intervals are shown below (Table 2.1). Flood recurrence interval calculations for Dunkleberg Creek are based on an area of 0.649 square miles and an annual precipitation of 20 inches.

Table 2.1 Dunkleberg Creek Flood Recurrence Intervals

Recurrence Interval (years)	Flood Magnitude (cfs)
Q_2	2.43
Q_5	4.80
Q_{10}	6.76
Q_{25}	9.19
Q_{50}	11.38
Q_{100}	13.35
Q_{500}	18.57

Drainage area, in square miles = 0.649

Annual Precipitation, in inches 20

West Region

Formula generated using USGS Water Investigations Report 92-4048, Table 2.

2.7.1 Mine and Mill Site Hydrogeologic Summary

At the time of the site investigation (August 2003) the surface flow of Dunkleberg Creek disappeared into the subsurface approximately 250 feet above the southern extent of the waste rock dump (Figure 2.4). The flow of the stream at this location was estimated at 3-8 gallons per minute (gpm). Flow estimates were noted on August 8, 2003. Surface water flows onto and through the waste rock dump and tailings impoundment via several entry and discharge locations. A small seep is located adjacent to the collapsed adit (Figure 2.4). The discharge from this seep was estimated at 0.5 to 1 gpm. The seep disappears into the subsurface (waste rock) approximately 10 feet from the adit opening. A second groundwater source discharges to the ground surface via two small square wooden discharge pipes near the northeast corner of the mill works building area. The source of the groundwater is unknown. The southern pipe produced a water flow of approximately 2 to 4 gpm. The northern pipe discharged water at approximately 0.25 to 1.0 gpm. The water discharging from these two pipes flow down slope onto the T3 Area where it seeps into the tailings.

Groundwater discharges at a rate of approximately 3 to 8 gpm from the base of the head cut of the main incised channel located in the T3 Area (Figure 2.4). The water flows through the length of the incised channel, and across the T2 Area then enters the T2 Area pond water. Surface water flow to the pond was not observed during late September/early October site visits. The pond water drains into a decant tower located adjacent to the west central edge of the T2 Area. This water flows via an underground pipe to the toe of the T2 impoundment dam where it discharges onto the T1 Area surface (Figures 2.4 and 2.5). Surface water discharges to the T1 Area at a rate of approximately 1 to 2 gpm. Water flowing to the T1 Area is collected and flows in an excavated ditch along the toe of the T2 impoundment dam then into a pond (Figures 2.4 and 2.5). The pond collects water from both the excavated ditch and from a spring located adjacent to the southwest of pond. The USFS excavated the ditch and pond after the 1992 T1 impoundment dam failure. The T1 Area pond water is decanted via black plastic sewer drainpipe located on the north end of the pond. The water is piped beneath the west side of the T1 impoundment dam and discharges at the toe of the T1 impoundment dam. Water discharges from the sewer pipe at a rate of 15 to 30 gpm. This water combines with springs and seeps discharging from within and below the T1 Area failure surface to form Dunkleberg Creek. The flow of Dunkleberg Creek at this location was estimated to be 30 to 50 gpm.

Observations of the surface water noted during site visits conducted from May of 2003 through November of 2003 indicate a gradual decrease in surface water flow over the impoundment area. Significant surface water flow was not observed in October and November of 2003 site visits.

2.8 SITE VEGETATION

The Forest Rose Mine site is located north-south oriented valley. The site has a high potential for rich vegetative growth. There are three primary habitat types found on the different aspects of the site. The east side of the valley is classified as a lodgepole pine / grouse whortleberry *(Pinus contorta / Vaccinium scoparium)* community type (Pfister et al. 1977). The west side of the valley is open, drier, and significantly warmer than the east slope and valley bottom. Ponderosa pine and Douglas-fir co-dominate the dryer parts of the valley. The site is classified as a Douglas-fir / snowberry *(Pseudotsuga menziesii / Symphoricarpos alba)* habitat type (Pfister et.al. 1977). The valley bottom is classified as a Douglas-fir / blue huckleberry *(Pseudotsuga menziesii / Vaccinium globulare)*, blue huckleberry phase, habitat type (Pfister et al. 1977).

Multiple entry logging has taken place on the west side of the valley and both the east and the west slopes have been roaded for mining and logging access. The natural forest habitat has been disturbed within the mine, waste rock, and tailings impoundment areas. Lack of nutrients and possible phytotoxic concentrations of metals within the tailings and waste rock likely limit primary

succession. Grasses and clover, possibly from a stabilization seeding, occur along the primary forest service access road.

2.9 CLIMATE

Climate conditions within the Dunkleberg Creek drainage are influenced by continental climate regimes. The local area is relatively dry and typically experiences very warm summers and cold winters. Drummond Aviation, Montana is the nearest climate center to the Forest Rose site. During the summer, day temperatures at the Drummond locale usually range from 70 to 80° F, often extending beyond 90°. July is typically the warmest month with a mean maximum temperature of 83.9° and a mean minimum temperature of 44.9° F. During the winter, temperatures below freezing occur frequently and temperatures well below 0° are common. January and December are the coldest months having mean maximum temperatures of 31.6° (Jan.) and 31.3° F (Dec.). Mean minimum temperatures for January and December are 21.8° and 21.7° F respectively. Precipitation has ranged from 7.15 to 22.22 inches annually with an average of 12.82 inches. May and June are the wettest months, with average precipitation levels of 1.75 and 1.97 inches, respectively (WRCC 2001). Precipitation at the Forest Rose Mine is expected to be higher than at Drummond. The first snowfall usually occurs in late October or early November. However, these storms are generally followed by several weeks of fair weather. By December, the area is normally blanketed with snow. Heavy snows are frequent in the winter, as are periods of melting and freezing. Spring thaw generally occurs in April or May.

3.0 FIELD ACTIVITIES

3.1 SAMPLING METHODS

The investigation consisted of four parts: (1) collecting geotechnical soil samples sufficient to determine the stability of the impoundments at the site; (2) soil sampling to determine the chemical characteristics of tailings and waste rock at the site, as well as the lateral and vertical extent of contamination; (3) surface water and ground water sampling to determine how the solid waste impacts local water resources; and (4) surveying the site for tailing volumes calculations.

All water and soil samples were identified with an area designation (below), sample number, depth, and material sampled (below). Depth is depth below the ground surface (bgs). For example T1-01-3-T was collected from the T1 Area, sample number 01, at 3 feet bgs, and the material sampled was tailings.

Area designations are as follows:

- AD - Sample Collected from Wooden Pipes
- B1 or PZ1 - Sample Collected from Boring 1 or Piezometer 1
- B2 or PZ2 - Sample Collected from Boring 2 or Piezometer 2
- B3 or PZ3 - Sample Collected from Boring 3 or Piezometer 3
- B4 or PZ4 - Sample Collected from Boring 4 or Piezometer 4
- DT – Sample Collected near T1 Area Decant Tower
- DTD – Sample Collected from T2 Area Decant Discharge
- T1 - Sample Collected from the T1 Area
- T2 - Sample Collected from the T2 Area
- T3 - Sample Collected from the T3 Area
- TS - Sample Collected from Tailings Seep
- SP - Sample Collected from Potential Spring
- STR – Sample Collected from Dunkleberg Creek
- WRD - Sample Colleted from the Waste Rock Dump Area

Material sampled:

- T - Tailings
- S – Native Soil
- WR - Waste rock
- GW - Groundwater
- SW - Surface Water

3.1.1 Geotechnical Borings

Four soil borings were advanced into the native ground surface below the tailings-native soil contact zone. Soil borings were located at the crest (B1) of the T1 Area impoundment, north of the toe (B2) and at the crest (B3) of the T2 Area impoundment, and north of the toe (B4) of the T3 Area impoundment (Figure 2.4). The borings were excavated using a mobile B-50 geotechnical rubber track mounted drill rig by advancing hollow stem auger bits in 5-foot flights (Photo 1). A 2-inch outside diameter (OD) split spoon was advanced using a 50 lb hammer at specified intervals within each boring. An on-site geologist logged the cuttings and split spoon soil samples. Blow counts and soil samples were collected for laboratory analysis.

3.1.2 Stability Evaluation

Stability of the tailings was evaluated by geotechnical borings. Ruen Drilling advanced the borings using a Mobile B-50 hollow stem auger drill rig. Borings penetrated native ground surface below the tailings. Standard Penetration Tests were used to gage relative density and to collect samples used to determine material types and strata according to the Unified Classification System and to observe evidence of groundwater. Information obtained during drilling was used to prepare boring logs. Pertinent information on boring logs includes soil strata depths and thickness, Unified Classification System symbol and description, Standard Penetration Test results, observed water level, and total depth of boring. Data collected from soil borings were compiled into the Geotechnical report included in Appendix C.

3.1.3 Soil Sampling

Composite soil sampling was conducted from each tailings area and from the waste rock dump. MCS used the United States Geologic Survey Method for determining the average concentration of mine waste (Smith et al. 2000). The USGS method for mine waste sampling requires composite samples consisting of 30 individual samples be collected from the sample site. Individual samples were collected from approximately twelve to eighteen inches below ground surface (bgs). The method calls for the sample to be screened using a 2 mm sieve, discarding the >2 mm fraction. A total of four composite samples were completed for the Site: T1 Area sample T1-04-1.2-T; T2 Area samples T2-05-1.5-T and T2-05-1.5-T; T3 Area sample T3-10-1.5-T; and waste rock dump (WRD) sample WRD1-16-1-WR. Approximate tailings and waste rock composite sampling locations are illustrated in Figures 2.5, 3.1, and 3.2.

Sediment samples were collected above and below at the Forest Rose Mine site. Sample STR-02-0.1-S was collected below the slumped area of the T1 impoundment dam approximately 200 feet downstream from the T1 Area decant discharge point (Figure 2.5). The second stream sediment

sample STR-15-0.1-S was collected approximately 300 feet above the uppermost extent of waste rock (Figure 2.2).

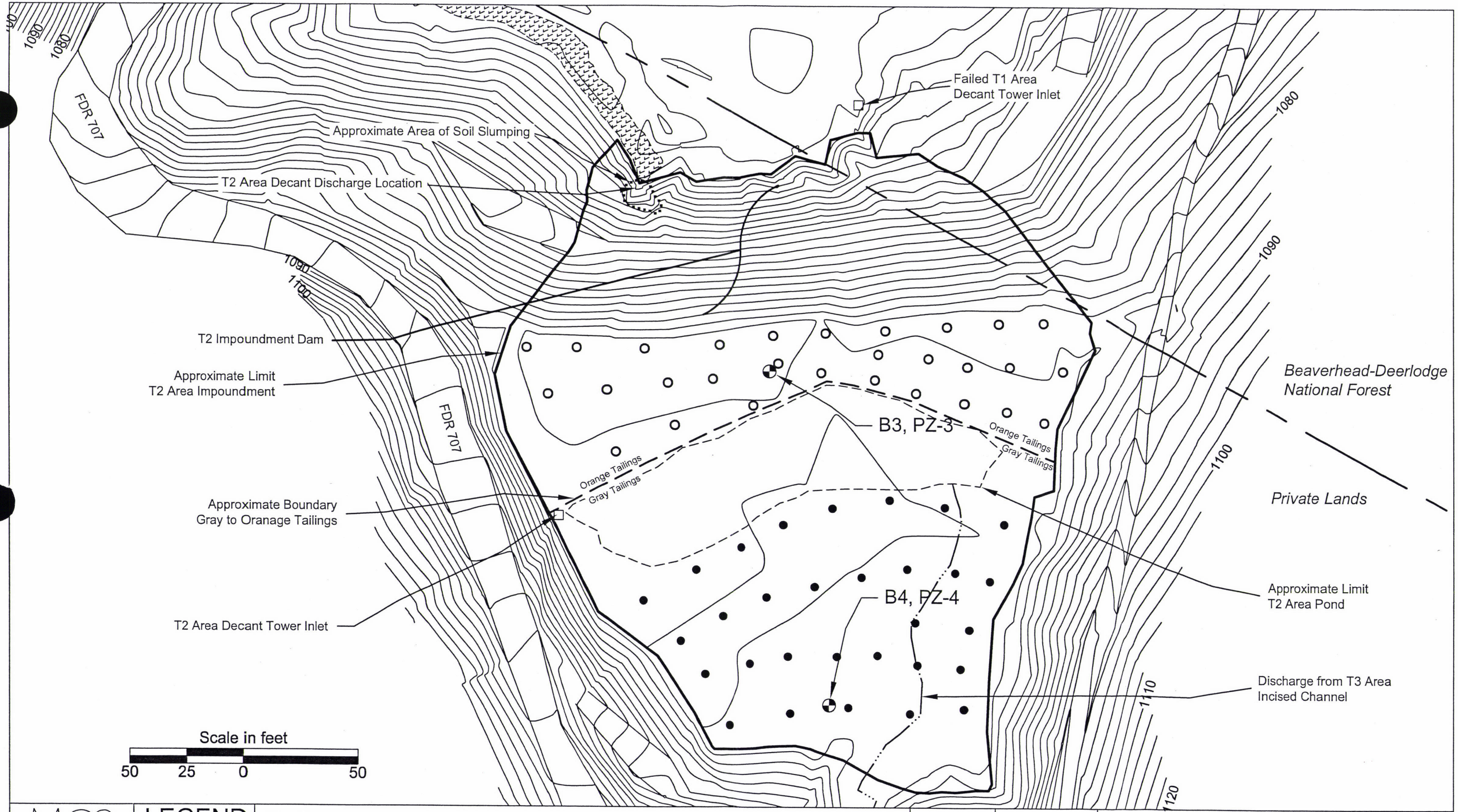
Six tailings grab samples and two native soil samples were selected for laboratory analysis from soil borings B1 and B3 (Figure 2.4). Soil grab samples collected from the B1 boring in the T1 Area are as follows: tailings sample B1-17-10-T at 10 feet bgs; tailings sample B1-18-20-T at 20 feet bgs; and from approximately 2.0 feet below the tailings in native soil (B1-19-30-S) at 30 feet bgs. Soil grab samples collected from the B3 boring in the T3 Area are as follows: tailings sample B3-22-10-T at 10 feet bgs; tailings sample B3-23-20-T at 20 feet bgs; tailings sample B3-24-40-T at 40 feet bgs; tailing sample B3-29-49-T from the base of the tailings at 49 feet bgs; and from approximately 0.5 feet below the tailings in native soil (B3-25-50.5-S) at 50.5 feet bgs.

3.1.4 Surface Water Sampling

Eight surface water samples were collected for laboratory analysis using a peristaltic pump. Surface water samples from Dunkleberg Creek were collected above the waste rock area (STR-13-0-SW) and below the T1 Area (STR-01-0-SW) (Figures 2.2 and 2.5). Sample STR-11-0-SW was collected near the head cut of the main incised channel within the T3 Area (Figure 3.2). Sample DT-08-0-SW was collected from the ponded area adjacent to the decant tower installed by the USFS on the western edge of the T1 Area (Figure 2.5). The DTD-09-0-SW sample was collected from the discharge of the historic decant system at the toe of the T2 impoundment (Figure 3.1).

Seeps, spring, and wood pipe discharge water samples were collected by MCS during the site investigation. These samples are as follows: SP-03-0-SW was collected from a spring or seep at the base of the T1 Area on the slope east of Dunkleberg Creek; TS-07-0-SW was collected from water seeping out the base of the slump on the toe of the T1 Area; and a wood pipe discharge (AD-12-0-SW) was sampled below the mill workings to the west of the T3 Area (Figures 2.5 and 3.2).

All surface water samples were analyzed for total arsenic, cadmium, copper, lead, mercury, and zinc. Stream water samples STR-01-0-SW and STR-13-0-SW were analyzed for dissolved arsenic cadmium, copper, lead, mercury, and zinc. All surface water samples except TS-07-0-SW were analyzed for dissolved arsenic. The laboratory analyzed all surface water samples for pH, calcium, chloride, hardness, magnesium, and sulfate. The following field parameters were measured in the field using a YSI model 556 multi-parameter system coupled with a flow through cell: temperature, pH, specific conductance (SC), conductivity, and dissolved oxygen (DO). Field alkalinity was measured in all surface water samples except TS-07-0-SW. Field alkalinity was titrated immediately in the field using a Hach kit.



MCS Environmental
5562 ALLOY SOUTH
MISSOULA, MT 59808
(406) 728-7755
FAX (406) 728-7367

LEGEND

- ○ - Tailings Composite Sample T2-05-1.5-T Sub-Sample Soil Locations
- ● - Tailings Composite Sample T2-06-1.5-T Sub-Sample Soil Locations
- ◓ - Boring, Piezometer, and Groundwater Sample Location
- ⊡ - Approximate Limit of T1 Area Surface Drainage Pond and Ditch

North

NOTE: VERTICAL DATUM SET AT ARBITRARY DATUM OF 1000'

PROJECT NO.	110018.016.0
DRAWN BY	WPP
REVISION NO.	NA
DATE	January 2004
SCALE: 1 INCH = 40 FEET CONTOUR INTERVAL: 2 FOOT	

Figure 3.1: T1 Area Sample Location Map

Forest Rose Mine

Beaverhead-Deerlodge National Forest
Granite County, Montana

FOREST SERVICE U.S. DEPARTMENT OF AGRICULTURE REGION ONE

\Environmental\Current Projects\110018_Forest Service\110018.016 Forest Rose\Drawings\Forest_Rose\dwg\SI_Topo.

REF: Survey Data Collected by MCS Environmental Inc. on July 1, 2 and 10, 2003; August 5, 2003; and September 3, 2003

Scale in feet

50 25 0 50

Approximate Limit T3 Area

T3 Impoundment Dam

Northwest Section of T3 Area

T3 Area Incised Channel

Northeast Section of T3 Area

South Section of T3 Area

STR-11-0-SW

Head Cut of T3 Area
Incised Channel

Approximate Limit of T3 Area
Waste Rock Pile

Approximate Wetted Area
From Piping Discharge

Approximate Location of
Wooden Pipes Discharge

AD-12-0-SW

Mill Works
Building Area

FDR 707

1120

1130

1140

1150

Scale in feet

50 25 0 50

MCS Environmental
5562 ALLOY SOUTH
MISSOULA, MT 59808
(406) 728-7755
FAX (406) 728-7367

LEGEND

- Tailings Composite Sample T3-10-1.5-T Sub-Sample Soil Locations
- Surface Water Sample Location

North

NOTE: VERTICAL DATUM SET AT ARBITRARY DATUM OF 1000'

PROJECT NO.	110018.016.0
DRAWN BY	WPP
REVISION NO.	NA
DATE	JANUARY 2204
SCALE: 1 INCH = 40 FEET CONTOUR INTERVAL: 2 FOOT	

Figure 3.2: T3 Area Sample Location Map

Forest Rose Mine

Beaverhead-Deerlodge National Forest
Granite County, Montana

FOREST SERVICE USDA DEPARTMENT OF AGRICULTURE REGION ONE

\Environmental\Current Projects\110018_Forest Service\110018.016 Forest Rose\Drawings\Forest_Rose\dwg\SI_Topo.

REF: Survey Data Collected by MCS Environmental Inc. on July 1, 2 and 10, 2003; August 5, 2003; and September 3, 2003

3.1.5 Groundwater Sampling

Four temporary piezometers (PZ-1, PZ-2, PZ-3, and PZ-4) were installed in the soil borings (Figure 2.4). Groundwater within the four piezometers was measured for water table elevation using an electronic tape and sampled using clean disposable bailers. Water samples from PZ-1, PZ-2, and PZ-3 were analyzed at the laboratory for alkalinity, pH, hardness, total metals, and dissolved metals. Total metals analysis including arsenic, cadmium, copper, lead, and zinc were completed for all four groundwater samples. The monitoring well PZ-4 produced a limited amount of water (~500 mL) and therefore could only be analyzed for total metals. As a result of several cyanide barrels located within the T3 Area, groundwater sample (PZ-1) was analyzed for total cyanide. No groundwater field parameters were measured during groundwater sampling efforts due to below freezing air temperatures at the time of collection.

3.1.6 Site Survey, Tailings and Volume Calculations

MCS staff completed an engineering survey of the site using a Lyca™ (Model TCR303) total station. Surveying focused on the waste rock and tailings impoundment areas. Existing USFS boundaries markers were also surveyed to estimate property boundaries. Approximately 1,000 feet of creek bottom was surveyed including adequate surrounding undisturbed topography adjacent to the mine site. Topographic contours and detailed site maps were generated using Autodesk® Land Desktop 3 and Autodesk® Civil Design 3.

The horizontal extent of tailings and waste rock located in the base and sides of the valley were field verified and surveyed. The vertical extent of tailings and waste rock within the drainage were estimated using projections of existing valley and stream slopes/elevations and soil boring data. Volumes were calculated by comparing the existing topographic surface to the calculated pre-tailings/waste rock topography of the drainage and slopes using Autodesk® Civil Design 3.

3.2 ANALYTICAL METHODS

Tailings and waste rock soil samples were analyzed for arsenic, cadmium, copper, lead, mercury, and zinc. Analysis was according to EPA Method 200.7/6010B. Samples were digested using EPA Method 3050. Selected samples used the synthetic precipitation leaching procedure (SPLP) digestion (EPA Method 1312) with analysis for the same metals. Acid base accounting (ABA) was also completed on four selected samples using the LECO furnace method with titration. Total mercury was analyzed according to EPA Method 245.1/7470, 7471.

Surface and groundwater samples were analyzed for arsenic, cadmium, copper, lead, zinc, calcium, and magnesium according to EPA Method 200.7/6010B; pH according to EPA Method 150.1; hardness according to EPA Method 2340B; and alkalinity according to EPA Method 2320B.

Chloride and sulfate were analyzed according to EPA Method 300.0. Total mercury was analyzed according to EPA Method 245.1/7470, 7471. Total cyanide in water was analyzed colormetrically according to EPA Method 335.2/335.4.

4.0 RESULTS

MCS conducted field work at Forest Rose Mine Mill Complex to characterize the tailings and waste rock chemistry and determine the stability of the T1 and T2 impoundments. MCS also characterized the chemistry of the surface and groundwater system above, within and below the impacted areas. Field work, including surveying was completed at the site between July 1, 2003 and November 5, 2003. Data Evaluation Reports are included Appendix B.

4.1 TAILINGS CHARACTERISTICS

4.1.1 T1 Area

The T1 impoundment is located at the northern edge of the site mostly on lands administered by the Beaverhead-Deerlodge National Forest (Figure 2.5). The surface area of the impoundment is approximately one acre. The impoundment surface is not vegetated and contained small areas of ponded water (Photo 2). During drilling attempts near the base of the T2 impoundment, the weight of the drill rig liquefied tailings adjacent to rig. The surface color of the tailings in the T1 Area is orange to red-orange. Surface tailings are dense, moist, poorly graded sand with a few ¼ to 3 inch angular rock clasts and iron cementing. The T1 area tailings turned gray in color at approximately two feet bgs. According to boring and test pit observations, tailings at and below approximately two feet bgs were loose to very loose, wet, gray, sandy silt or silty sand. The T1 impoundment dam face, excluding the failure surface, is vegetated with mostly pole and sapling sized spruce and lodge pole pine with grass and moss groundcover. It is likely that the tailings dam is comprised of tailings and reinforced with locally derived materials (Photo 3). The area of the tailings dam failure is readily visible. The remnant failure surface is not vegetated. The residual slide mass north of the failure surface is vegetated with grasses, shrubs, pines and spruce trees.

MCS collected a total five soil samples from the T1 Area surface and subsurface for laboratory analysis (Figure 2.5).

4.1.1.1 Surface Sample

T1-04-1.2-T

The surface composite soil sample T1-04-1.2-T consisted of 30 sub-samples collected from 1 to 1.5 feet bgs. The soil sub-samples consisted of slightly dense, moist, orange to orange-brown, silty sand. Two of the 30 sub-samples consisted of a slightly dense, moist, gray, sand. The T1-04-1.2-T composite sample analytical results are as follows: 295 mg/kg arsenic, 19.6 mg/kg cadmium, 304 mg/kg copper, 365 mg/kg lead, 2,390 mg/kg zinc, and 0.176 mg/kg mercury (Table 4.1). ABA for

Table 4.1 Soil Sample Total Metals Analytical Results

Sample ID	Arsenic	Cadmium	Copper	Lead	Zinc	Mercury
	All results in mg/kg					
Near Surface Tailings Composite Soil Samples						
T1-04-1.2-T	295	19.6	304	365	2,390	0.176
T2-05-1.5-T	302	3.47	204	633	940	NA
T2-06-1.5-T	311	43.8	412	**5,870**	4,440	NA
T3-10-1.5-T	**539**	63.1	584	**5,830**	5,950	0.200
Average	*362*	*32.49*	*376*	*3,175*	*3,430*	*0.188*
Minimum	*295*	*3.47*	*204*	*365*	*940*	*0.176*
Maximum	*539*	*63.1*	*584*	*5,870*	*5,950*	*0.200*
Subsurface Tailings and Soil Grab Samples from Borings						
B1-17-10-T	139	65.8	639	506	7,030	NA
B1-18-20-T	231	40.5	664	**4,790**	4,140	NA
B1-19-30-S	38.1	6.58	99.4	353	1,110	NA
B3-22-10-T	**540**	70.4	573	853	7,930	NA
B3-23-20-T	266	36.2	391	2,300	4,460	NA
B3-24-40-T	367	50.9	449	**3,780**	5,420	NA
B3-25-50.5-S	44.0	8.49	333	700	1,030	NA
B3-29-49-T	243	32.3	428	**6,000**	3,320	NA
Average	*204*	*46*	*577*	*3,253*	*3,320*	-------
Minimum	*38.1*	*6.58*	*99.4*	*353*	*1,030*	-------
Maximum	*540*	*70.4*	*664*	*6,000*	*7,930*	-------
Waste Rock Dump Composite Soil Sample						
WRD1-16-1-WR	**436**	51.5	366	**5,630**	5,710	1.49
Stream Sediment Soil Samples						
SRT-02-0.1-S	13.8	5.73	63.9	299	563	NA
STR-15-0.1-S	33.0	11.2	38.8	201	2,170	<0.0333
Proposed Cleanup Guidelines						
Soil Ingestion Levels Maximum Use*	370	2,079	63,616	2,572	514,412	-------
Soil Ingestion Levels Moderate Use**	741	4,158	127,231	5,144	1,000,000	-------

* Proposed cleanup guidelines for human health under a maximum use recreational rockhound/goldpanner scenario (Tetra Tech 1996)

** Proposed cleanup guidelines for human health under a moderate use recreational scenario (Tetra Tech 1996)

Bold = Exceeds proposed cleanup goal soil ingestion level maximum use scenario

NA = Not analyzed for specified analyte

the T1-04-1.2-T sample showed an acid base potential (ABP) of -82.8 T $CaCO_3$/1000 T waste rock, acid generating potential (AGP) of 89.1 T $CaCO_3$/1000 T, acid neutralization potential (ANP) of 6.20 T $CaCO_3$/1000 T, 0.040 percent non-extractable sulfur, 2.85 percent pyritic sulfur, 4.16 percent sulfate sulfur, and 7.05 percent total sulfur (Table 4.2). The SPLP extract of the T1-04-1.2-T sample contained < 0.010 mg/L arsenic, 0.0322 mg/L cadmium, <0.0030 mg/L copper, <0.0050 mg/L lead, and 0.185 mg/L zinc (Table 4.3).

Table 4.2 Acid Base Accounting Analytical Results

Sample ID	ABP[1]	AGP[2]	ANP[3]	Non-ext. Sulfur	Pyritic Sulfur	Sulfate Sulfur	Total Sulfur
	$TCaCO_3$/1000T			Percent			
Surface Tailings Composite Soil Samples							
T1-04-1.2-T	-82.8	89.1	6.20	0.040	2.85	4.16	7.05
T2-05-1.5-T	-28.7	28.8	<0.50	0.030	0.920	5.02	5.97
T3-10-1.5-T	291	198	489	0.150	6.34	0.470	6.96
Tailings Grab Samples from Soil Borings							
B1-17-10-T	117	165	282	0.050	5.27	0.570	5.89
B1-18-20-T	430	107	537	0.020	3.42	0.530	3.97
B3-22-10-T	-153	393	240	0.040	12.6	2.20	14.8
B3-23-20-T	136	223	359	0.130	7.13	0.080	7.34
B3-24-40-T	195	199	395	0.180	6.37	0.320	6.87
B3-29-49-T	512	113	625	0.030	3.60	0.420	4.05
Waste Rock Dump Composite Soil Sample							
WRD1-16-1-WR	261	101	362	0.090	3.22	0.940	4.25

[1] ABP = acid base potential
[2] AGP = acid generating potential
[3] ANP = acid neutralizing potential

Table 4.3 Synthetic Precipitation Leaching Procedure Analytical Results

Sample ID	Arsenic	Cadmium	Copper	Lead	Zinc
	SPLP (mg/L)				
T1-04-1.2-T	<0.010	**0.0322**	<0.0030	<0.0050	**0.185**
T2-05-1.5-T	<0.010	**0.0284**	**0.681**	**0.0162**	**2.43**
T3-10-1.5-T	<0.010	**0.0592**	0.0044	**0.0442**	**4.55**
WRD1-16-1-WR	<0.010	<0.0020	<0.0030	<0.0050	0.0518
Water Quality Standards					
Aquatic Life - Acute	0.034	0.0032*	0.0205*	0.1368*	0.1689*
Aquatic Life - Chronic	0.015	0.0004*	0.0132*	0.0053*	0.1689*
Human Health - Surface Water	0.018	0.005	1.3	0.015	2.0
Secondary Standard	-------	-------	1.0	-------	-------
Source Criteria Used to Derive Water Quality Standard	HA	MCL	PP	PP	HA

HA = Health advisory from EPA's "Drinking Water Standards and Health Advisories" (October 1996)
MCL = Maximum contaminant Level from the drinking water regulations
PP = Priority pollutant criteria
Bold = Exceeds one or more water quality standards
* Standard calculated at 150 mg/L hardness

4.1.1.2 Subsurface Samples

Three soil samples from the B1 geotechnical boring were analyzed for total metals concentrations (Figure 2.5). Tailings samples were collected at 10 and 20 feet bgs. A native soil sample was collected at 30 feet bgs.

B1-17-10-T

Soil sample B1-17-10-T, collected at 10 feet bgs, consisted of loose, wet, gray, sandy silt. The B1-17-10-T analytical results are as follows: 139 mg/kg arsenic, 65.8 mg/kg cadmium, 639 mg/kg copper, 506 mg/kg lead, and 7,030 mg/kg zinc (Table 4.1).

B1-18-20-T

Soil sample B1-18-20-T collected at 20 feet bgs consisted of loose, wet, gray, sandy silt. This sample contained 231 mg/kg arsenic, 40.5 mg/kg cadmium, 664 mg/kg copper, 4,790 mg/kg lead, and 4,140 mg/kg zinc (Table 4.1).

B1-19-30-S

The B1-19-30-S collected within the native soil horizon, approximately two feet below the base of the tailings and consisted of dense, wet, dark gray, silty sand with some roots and black shale rock fragments. The B1-19-30-T analytical results are as follows: 38.1 mg/kg arsenic, 6.58 mg/kg cadmium, 99.4 mg/kg copper, 353 mg/kg lead, and 1,110 mg/kg zinc (Table 4.1).

4.1.2 T2 Area

The T2 Area is located south of the T1 Area and is almost entirely on private lands (Figure 3.1). The T2 impoundment dam is intact except for a small area of slumping located near the toe of the dam (Photo 4). The area of the impoundment is approximately 1.2 acres and contains an area of ponded water (Photo 5). The impoundment surface is not vegetated, except for grass established along the northern edge of the pond. The face of the impoundment dam is vegetated with mostly pole and sapling sized spruce and lodge pole pines with grass and moss groundcover. The surface color of the tailings in the T2 Area is orange to red-orange north of the ponded area. The surface tailings south of the pond are gray in color. The orange/red-orange colored surface tailings are dense, moist, poorly graded, silty sand with some iron cementing. The gray surface tailings are dense to slightly dense, moist, sandy silt. According to boring and test pit observations, tailings at and below approximately two feet bgs were loose, wet, gray, sandy silt and silty sand with some sand layers. Orange to red-orange tailings were encountered in random test pits excavated in the gray colored surface tailings portion of the T2 Area at depth from 2 to 3 feet bgs (Photo 6).

MCS collected a total of seven soil samples from the T2 Area surface and subsurface for laboratory analysis (Figure 3.1).

4.1.2.1 Surface Samples

Two composite soil samples were collected from the T2 area surface. One sample (T2-05-1.5-T) was collected from the area of orange/orange-red colored tailings surface and one sample (T2-06-1.5-T) from gray colored tailings surface.

T2-05-1.5-T

Sample T2-05-1.5-T consisted of 30 sub-samples collected from 1 to 1.5 feet bgs. The sub-samples consisted of slightly dense, moist, orange to orange-brown, silty sand. The T2-05-1.5-T composite sample results are as follows: arsenic 302 mg/kg, cadmium 3.47 mg/kg, copper 204 mg/kg, lead 633 mg/kg, and zinc 940 mg/kg (Table 4.1). The ABA for the T2-05-1.5-T sample indicates an ABP of -28.7 T $CaCO_3$/1000 T waste rock, AGP of 28.8 T $CaCO_3$/1000 T, ANP of <0.50 T $CaCO_3$/1000 T, 0.030 percent non-extractable sulfur, 0.920 percent pyritic sulfur, 5.02 percent sulfate sulfur, and 5.97 percent total sulfur (Table 4.2). The SPLP extract of the T2-05-1.5-T sample contained <0.010

mg/L arsenic, 0.0284 mg/L cadmium, 0.681 mg/L copper, lead 0.0162 mg/L, and 2.43 mg/L zinc (Table 4.3).

T2-06-1.5-T

Sample T2-06-1.5-T consisted of 30 sub-samples collected from 1 to 1.5 feet bgs (Figure 3.1). The sub-samples consisted mostly of slightly dense, moist, gray, sandy silt. Two of the 30 sub-samples consisted of a slightly dense, moist, gray, silt. The silt was encountered at a depth of 1.0 foot bgs. The T2-06-1.5-T composite sample analytical results are as follows: 311 mg/kg arsenic, 43.8 mg/kg cadmium, 412 mg/kg copper, 5,870 mg/kg lead, and 4,440 mg/kg zinc (Table 4.1).

4.1.2.2 Subsurface samples

Five soil samples from the B3 geotechnical boring were analyzed for total metals concentrations (Figure 3.1). Tailings soil samples were collected from 10, 20, 40, and 49 feet bgs. A soil sample of native material was collected at 50.5 feet bgs.

B3-22-10-T

B3-22-10-T collected at 10 feet bgs consisted of loose, wet, gray, coarse sand with some silt. The B3-22-10-T sample contained 540 mg/kg arsenic, 70.4 mg/kg cadmium, 573 mg/kg copper, 853 mg/kg lead, and 7,930 mg/kg zinc (Table 4.1).

B3-23-20-T

Sample B3-23-20-T collected at 20 feet bgs consisted of loose, wet, gray, coarse sand with some silt. The B3-23-20-T laboratory analytical results show the following concentrations of total metals: 266 mg/kg arsenic, 36.2 mg/kg cadmium, 391 mg/kg copper, 2,300 mg/kg lead, and 4,460 mg/kg zinc (Table 4.1).

B3-24-40-T

Sample B3-24-40-T collected at 40 feet bgs consisted of loose, wet, gray, coarse to fine sand with some silt. Sample B3-24-40-T contained 367 mg/kg arsenic, 50.9 mg/kg cadmium, 449 mg/kg copper, 3,780 mg/kg lead, and 5,420 mg/kg zinc.

B3-25-49-T

Sample B3-29-49-T collected near the base of the tailings impoundment consisted of loose, wet, gray, sandy silt. The B3-29-49-T sample analytical results are as follows 243 mg/kg arsenic, 32.3 mg/kg cadmium, 428 mg/kg copper, 6,000 mg/kg lead, and 3,320 mg/kg zinc.

B3-25-50.5-S

The B3-25-50.5-S collected within the native soil horizon below the tailings consisted of dense, wet, dark gray to black, silty sand with some roots. The native soil sample B3-25-50.5-S collected at 50.5 feet bgs from the B3 boring contained 44.0 mg/kg arsenic, 8.49 mg/kg cadmium, 333 mg/kg copper, 700 mg/kg lead, and 1,030 mg/kg zinc.

4.1.3 T3 Area

The T3 Area is located south of the T2 Area and is entirely on private lands (Figure 3.2). The T3 impoundment dam is breached and an incised channel has eroded through the central portion of the dam (Figure 3.2; Photo 7). Three smaller incised tributary channels divide the T3 Area impoundment into three sections (northwest, northeast and south). The head cut of the T3 Area incised channel is covered with waste rock (Figure 3.2). The waste rock is composed mostly of gastropod limestone of the Kootenai Formation and appears to have been placed in this location after mining operations ceased. The waste rock contains some pyrite and quartz veins and is not vegetated. A car is also located at the head cut of the incised channel. Additional limestone waste rock is located in the area above the central channel. Several empty 50-gallon barrels that formerly contained cyanide are located along the western edge of this impoundment, along with woody debris.

The exposed surface area of the impoundment is approximately 0.75 acres. The impoundment surface and impoundment dam face is vegetated with only a few pine trees (Photo 8). The surface tailings consist of dense to slightly dense, moist, gray, sandy silt. The surface of the slope adjacent to the western edge of the impoundment and below FDR 707 contains waste rock.

MCS collected one composite soil sample from the T3 Area surface for laboratory analysis.

T3-10-1.5-T

Soil sample T3-10-1.5-T consisted of 30 sub-samples collected from 1 to 1.5 feet bgs. Five sub-samples were collected from the surface of the northwest section, 10 from the northeast section, and 15 from the main or south section (Figure 3.2). The soil sub-samples consisted mostly of slightly dense, moist, gray, sandy silt. The T3-10-1.5-T composite sample analytical results are as follows: 539 mg/kg arsenic, 63.1 mg/kg cadmium, 584 mg/kg copper, 5,830 mg/kg lead, and 5,950 mg/kg zinc (Table 4.1). The laboratory analysis of the T3-10-1.5-T sample for ABA showed an ABP of 291 T $CaCO_3$/1000 T waste rock, AGP of 198 T $CaCO_3$/1000 T, ANP of 489 T $CaCO_3$/1000 T, 0.150 percent non-extractable sulfur, 6.34 percent pyritic sulfur, 0.470 percent sulfate sulfur, and 6.96 percent total sulfur (Table 4.2). The SPLP extract of the T3-10-1.5-T sample contained <0.010 mg/L arsenic, cadmium 0.0592 mg/L, 0.0044 mg/L copper, 0.0442 mg/L lead, and 4.55 mg/L zinc

(Table 4.3). Arsenic was not detected above laboratory practical quantitation limits (PQLs). No geotechnical borings were completed in the T3 Area.

4.2 WASTE ROCK CHARACTERISTICS

The main waste rock area at the Forest Rose Mine and Mill Complex is located south of the mill works building area (Figure 4.1). The waste rock dump located at the south end of the site covers an area of approximately 0.4 acres. The waste rock in the dump consists mainly of mineralized limestone, iron cemented sand and silts and orange to brown silty sands. The limestone contained quartz and pyrite veins. Very little vegetation has established on the steeper slopes within the waste rock area. Vegetation including grasses, pines and spruce trees is established on gently sloped and flat portions of the waste rock area.

Two locations within the T3 Area contain waste rock (Figures 3.2 and 4.1). A waste rock pile comprised mainly of cobble sized limestone is located at the head cut and in the area above the main incised channel. The limestone cobbles contain some quartz and pyrite veins. It is likely that this waste rock was placed within and above the T3 Area tailings head cut to limit additional erosion and upward migration of the incised channel. A car body, also located at the top of the head cut, may have also been placed there for erosion control. The waste rock in this area is located over the T3 Area tailings surface. No vegetation is established in this area. Additional areas of waste rock were observed on the slope between the T3 Area and FRD 707 (Figure 3.2). The mineralized waste rock is not extensive over this slope.

Small piles of red-orange waste rock are located within and around the mill works buildings (Figure 4.1). A larger red-orange waste rock pile is located west of the former mill works buildings. The waste rock pile at this location covers an area of approximately 2,389 square feet. The pile is approximately 60 feet long, 30 feet wide and on average 3 feet thick.

MCS collected one composite soil sample from the waste rock dump surface for laboratory analysis.

WRD1-016-1-WR

MCS collected a thirty-point composite soil sample (WRD1-016-1-WR) for laboratory analysis from north and south facing slopes of the waste rock dump (Figure 4.1). Ten of the sub-samples were collected from the south facing slope and twenty from the north-facing slope. Samples were collected at approximately one-foot bgs. Total metals analysis of the composite soil sample WRD1-016-1-WR contained the following detectable concentrations of analyzed metals: 436 mg/kg arsenic, 51.5 mg/kg cadmium, 366 mg/kg copper, 5,630 mg/kg lead, 5,710 mg/kg zinc, and 1.49 mg/kg mercury (Table 4.1). The WRD1-16-1-WR composite sample T1-04-1.2-T contained an ABP of 261 T $CaCO_3$/1000 T waste rock, AGP of 101 T $CaCO_3$/1000 T, ANP of 362 T $CaCO_3$/1000 T,

0.090 percent non-extractable sulfur, 3.22 percent pyritic sulfur, 0.940 percent sulfate sulfur, and 4.25 percent total sulfur for ABA analysis (Table 4.2). The SPLP extract of the WRD1-16-1-WR sample contained 0.0518 mg/L of zinc. No other analyzed constituents were detected.

4.3 STREAM SEDIMENT SAMPLES

MCS collected two stream sediment samples from Dunkleberg Creek. Samples were collected above the waste rock dump and below the T1 Area. Stream sediment samples were collected from adjacent to the active stream channel. Surface water samples were collected at the same locations.

STR-02-0.1-S

The downgradient stream sediment sample STR-02-0.1-S was collected approximately 25 feet below the T1 slide mass (Figure 2.5). This sediment sample consisted of loose, wet, black, silty sand with some gravel, pine needles and other forest detritus. Results of the laboratory analysis for the STR-02-0.1-S sample show the following detectable concentrations of CoCs: 13.8 mg/kg arsenic, 5.73 mg/kg cadmium, 63.9 mg/kg copper, 299 mg/kg lead, and 563 mg/kg zinc (Table 4.1).

STR-15-0.1-S

MCS collected stream sediment sample STR-15-0.1-S from Dunkleberg Creek approximately 300 feet upstream of the waste rock dump (Figure 2.2). The STR-15-0.1-S soil sample consisted of loose, wet, black, fine sand silt and gravel with some pine needles and other forest detritus. This sample contained 33.0 mg/kg arsenic, 11.2 mg/kg cadmium, 38.8 mg/kg copper, 201 mg/kg lead, 2,170 mg/kg zinc, and <0.0333 mg/kg mercury (Table 4.1).

4.4 SURFACE WATER SAMPLES

MCS collected surface water samples from eight locations at the Forest Rose Mine site on August 8, 2003. Surface water samples were collected from Dunkleberg Creek above and below the mine and mill site and from six surface water locations within the mine and mill site. Water samples were collected from the center of the channel. Unfiltered/acidified water samples were collected for total metals analysis and filtered/acidified samples were collected for dissolved metals analysis. Surface water field parameter and analytical results are included in Table 4.4.

STR-01-0-SW

Surface water sample STR-01-0-SW was collected from an undisturbed portion of Dunkleberg Creek approximately 25 feet below the northern extent of the slide mass (Figure 2.5). The stream

bank at this location was highly vegetated with grasses, ferns, and mosses (Photo 9). The stream water contained no obvious suspended sediment load. Analytical results indicate the sample contained 0.0641 mg/L total zinc and 0.0655 mg/L dissolved zinc (Table 4.4). Total and dissolved arsenic, cadmium, copper, lead and mercury concentrations were below laboratory PQLs. This sample contained the following general water quality parameters: 98.9 mg/L total calcium, 12.1 mg/L total magnesium, 140 mg/L sulfate, 0.69 mg/L chloride, 297 mg/L hardness, and pH of 7.98.

STR-13-0-SW

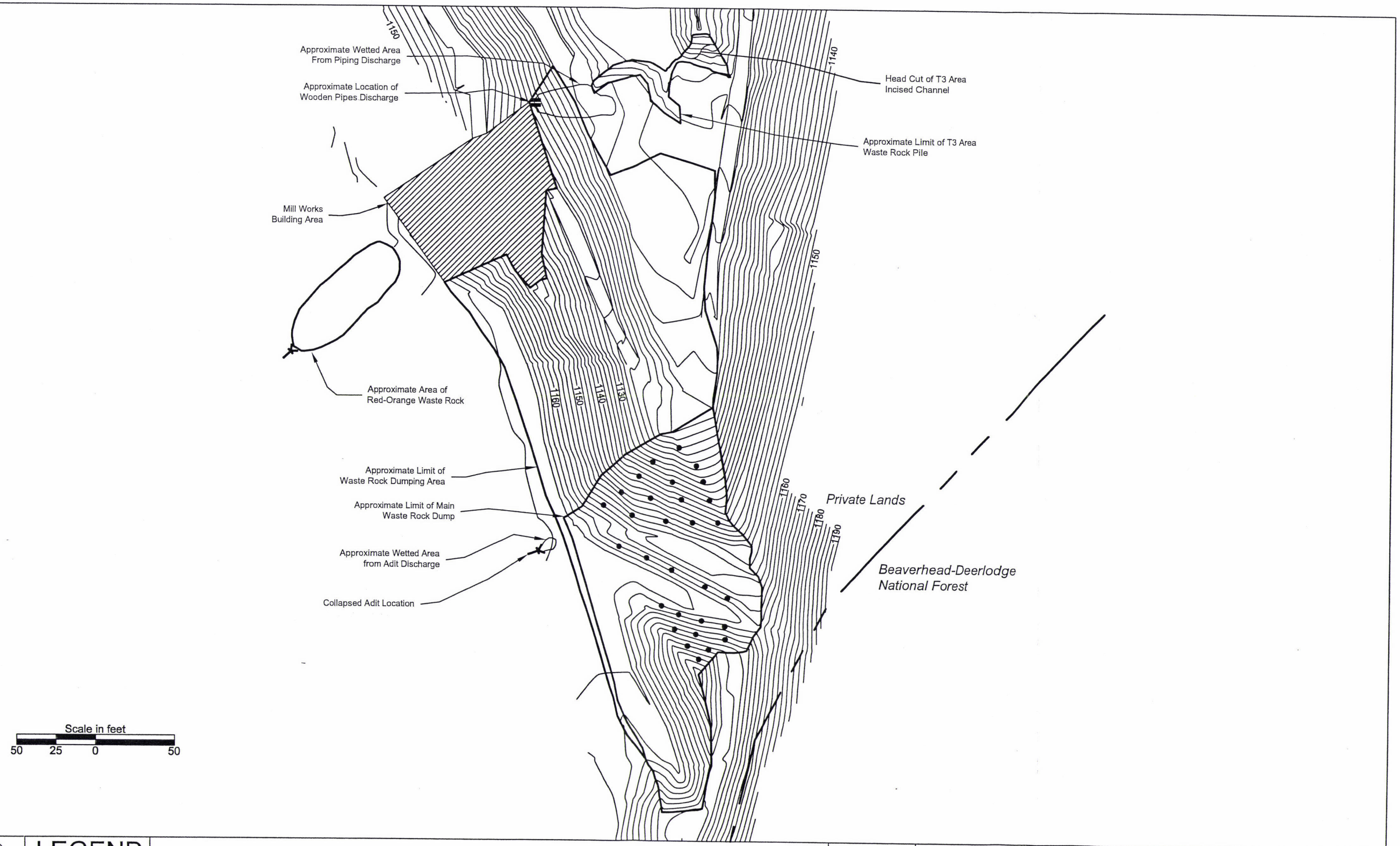
Surface water sample STR-13-0-SW was collected from an undisturbed portion of Dunkleberg Creek approximately 300 feet south of the waste rock dump (Figure 2.2). Stream banks at this location were highly vegetated with grasses, ferns, and mosses (Photo 10). The stream water contained no obvious suspended sediment load. Analytical results indicate the sample contained 0.0049 mg/L total cadmium, 0.0106 mg/L total copper, 0.187 mg/L total lead, and 0.595 mg/L total zinc (Table 4.4). Total and dissolved arsenic, and total mercury concentrations were below laboratory PQLs. This sample contained the following general water quality parameters: 69.1 mg/L total calcium, 4.18 mg/L total magnesium, 49.9 mg/L sulfate, 0.69 mg/L chloride, 190 mg/L hardness, and a pH of 7.83.

AD-12-0-SW

Surface water sample AD-12-0-SW was collected from the wooden pipe discharge below the NE corner of the mill works building area (Figure 3.2). There are two discharge pipes at this location (Photo 11). The origin of these square wooden discharge pipes is unknown. Water sample AD-12-0-SW was collected from the southern discharge pipe. The southern pipe flowed at a rate of approximately 2 to 4 gpm at the time of sample collection. The pipes discharge water onto waste rock and tailings. This water then flows onto the T3 Area where it collects and infiltrates into the sub-surface (Figure 3.2). The water sample was collected from a pool MCS excavated below the southern pipe. The area directly adjacent to the discharge pipes is not vegetated. The slope and impoundment surface that is wetted by this discharge is vegetated with shrubs, grasses and mosses. Analytical results indicate the sample contained 0.0049 mg/L total copper, 0.0087 mg/L total lead, and 0.0808 mg/L total zinc (Table 4.4). Total and dissolved arsenic, total cadmium, and total mercury concentrations were below laboratory PQLs. This sample contained the following general water quality parameters: 90.2 mg/L total calcium, 8.94 mg/L total magnesium, 102 mg/L sulfate, 0.70 mg/L chloride, 262 mg/L hardness, and a pH of 7.91.

STR-11-0-SW

Surface water sample STR-11-0-SW was collected just below the head cut of the incised channel in the T 3 Area (Figure 3.2). The incised channel is comprised of tailings and is not vegetated. A car



MCS Environmental
5562 ALLOY SOUTH
MISSOULA, MT 59808
(406) 728-7755
FAX (406) 728-7367

LEGEND

● - Waste Rock Composite Sample WRD1-16-1-WR Sub-Sample Soil Locations

North

NOTE: VERTICAL DATUM SET AT ARBITRARY DATUM OF 1000'

PROJECT NO.	110018.016.0
DRAWN BY	WPP
REVISION NO.	NA
DATE	JANUARY 2004
SCALE: 1 INCH = 60 FEET CONTOUR INTERVAL: 2 FOOT	

Figure 4.1: Waste Rock Area Sample Location Map

Forest Rose Mine

Beaverhead-Deerlodge National Forest
Granite County, Montana

USDA FOREST SERVICE REGION ONE

\Environmental\Current Projects\110018_Forest Service\110018.016 Forest Rose\Drawings\Forest_Rose\dwg\SI_Topo.

REF: Survey Data Collected by MCS Environmental Inc. on July 1, 2 and 10, 2003; August 5, 2003; and September 3, 2003

Table 4.4 Surface Water Quality Parameters

Sample Description	Sample ID	Temp (°C)	Sp. Cond. (mS/cm2)	Cond. (mS/cm)	DO (mg/L)	Alkalinity (mg/L CaCO3)	Arsenic (mg/L)	Cadmium (mg/L)	Copper (mg/L)	Lead (mg/L)	Mercury (mg/L)	Zinc (mg/L)	Calcium (mg/L)	Chloride (mg/L)	Magnesium (mg/L)	Sulfate (mg/L)	Hardness (mg/L)	Lab pH
Dunkleberg Creek below T1 Area slide mass	STR-01-0-SW (Total)	6.68	0.529	0.344	10.58	135	<0.010	<0.0020	<0.0030	<0.0050	<0.00020	0.0641	98.9	0.69	12.1	140	297	7.89
	STR-01-0-SW (Dissolved)						<0.010	<0.0020	<0.0030	<0.00020	<0.0050	0.0655						
Channel water near west edge of T1 Area slide mass	SP-03-0-SW (Total)	5.57	0.641	0.403	6.98	144	<0.010	<0.0020	<0.0030	<0.0050	<0.00020	0.0229	126	0.64	11.2	200	361	7.22
	SP-03-0-SW (Dissolved)						<0.010	NA	NA	NA	NA	NA						
Groundwater discharge from T1 Area failure surface	TS-07-0-SW (Total)	16.54	1.1413	1.184	1.26	NM	**0.033**	**0.0422**	**0.217**	**0.0859**	<0.00020	**6.13**	267	1.03	123	**854**	1,170	**5.48**
	TS-07-0-SW (Dissolved)						NA	NA	NA	NA	NA	NA						
Pond water from T1 Area	DT-08-0-SW (Total)	18.30	0.423	0.368	4.6	145	<0.010	**0.0025**	0.0110	**0.0571**	<0.00020	**0.234**	79.4	0.76	9.01	66.5	235	7.66
	DT-08-0-SW (Dissolved)						<0.010	NA	NA	NA	NA	NA						
Decant water discharge at base of T2 impoundment	DTD-09-0-SW (Total)	18.95	0.388	0.343	5.17	97	<0.010	**0.0021**	0.0091	**0.0402**	<0.00020	**0.268**	75.6	0.74	5.53	97.1	211	8.22
	DTD-09-0-SW (Dissolved)						<0.010	NA	NA	NA	NA	NA						
Wood pipe discharge at NE corner of mill building area	AD-12-0-SW (Total)	7.93	0.472	0.318	8.58	111	<0.010	<0.0020	0.0049	**0.0087**	<0.00020	0.0808	90.2	0.70	8.94	102	262	7.91
	AD-12-0-SW (Dissolved)						<0.010	NA	NA	NA	NA	NA						
Groundwater discharge from head cut of T3 Area incised channel	STR-11-0-SW (Total)	7.26	0.325	0.215	10.51	80	<0.010	**0.0049**	0.0106	**0.187**	<0.00020	**0.595**	69.1	0.68	4.18	49.9	190	7.83
	STR-11-0-SW (Dissolved)						<0.010	NA	NA	NA	NA	NA						
Dunkleberg Creek above waste rock dump	STR-13-0-SW (Total)	13.82	0.312	0.245	9.11	108	<0.010	<0.0020	<0.0030	<0.0050	<0.00020	0.108	62.1	0.69	2.91	40.6	167	8.3
	STR-13-0-SW (Dissolved)						<0.010	<0.0020	<0.0030	<0.00020	<0.0050	0.112						
Water Quality Standards																		
Aquatic Life - Acute		-------	-------	-------	-------	-------	0.034	0.0032*	0.0205*	0.1368*	0.0017	0.1689*	-------	-------	-------	-------	-------	-------
Aquatic Life - Chronic		-------	-------	-------	-------	-------	0.015	0.0004*	0.0132*	0.0053*	0.00091	0.1689*	-------	-------	-------	-------	-------	-------
Human Health - Surface		-------	-------	-------	-------	-------	0.018	0.005	1.3	0.015	0.00005	2.0	-------	-------	-------	-------	-------	-------
Secondary Standard		-------	-------	-------	-------	-------	-------	-------	1.0	-------	-------	-------	-------	-------	-------	250	-------	6.5-8.5
Source Criteria Used to Derive Standard		-------	-------	-------	-------	-------	HA	MCL	PP	PP	PP	HA	-------	-------	-------	NSDWR	-------	NSDWR

HA = Health advisory from EPA's "Drinking Water Standards and Health Advisories" (October 1996)
MCL = Maximum contaminant Level from the drinking water regulations
PP = Priority pollutant criteria
NSDWR = National Secondary Drinking Water Regulations
Bold = Exceeds one or more water quality standards
*** St**andard calculated at 150 mg/L hardness
NA = Not analyzed for specified analyte

body is located just above were the sample was collected (Photo 12). The water contained no obvious suspended sediment load and was flowing over T3 Area tailings when sampled. Analytical results indicate the sample contained 0.108 mg/L total zinc and 0.112 mg/L dissolved zinc (Table 4.4). Total and dissolved arsenic, cadmium, copper, lead and mercury concentrations were below laboratory PQLs. This sample contained the following general water quality parameters: 62.1 mg/L total calcium, 2.91 mg/L total magnesium, 40.6 mg/L sulfate, 0.69 mg/L chloride, 167 mg/L hardness, and a pH of 8.30.

DTD-09-0-SW

Surface water sample DTD-09-0-SW was collected near the outlet of the decant tower associated with the T2 Area (Figure 3.1). The discharge point is located at the west end of the T2 impoundment dam. There is no pipe located at the discharge point. Waters is flowing from the base of a slumped area at the toe of the dam onto the T1 impoundment surface. Surface sample DTD-09-0-SW was collected at the discharge point. The discharge water contained no obvious suspended sediment load.

Analytical results indicate the sample contained 0.0021 mg/L total cadmium, 0.0091 mg/L total copper, 0.0402 mg/L total lead, and 0.268 mg/L total zinc (Table 4.4). Total and dissolved arsenic and total mercury concentrations were below laboratory PQLs. This sample contained the following general water quality parameters: 75.6 mg/L total calcium, 5.53 mg/L total magnesium, 97.1 mg/L sulfate, 0.74 mg/L chloride, 211 mg/L hardness, and a pH of 8.22.

DTD-08-0-SW

Surface water sample DT-08-0-SW was collected from the T1 Area pond (Figure 2.5). The water sample was collected adjacent to the T1 Area decant system created in 1992 by the USFS. There was no water was flowing through the T1 Area collection ditch at the time of sampling. A large percentage of the water contained and flowing through the pond was from the spring located SW of the pond. The pond and water sample contained no obvious suspended sediment load. Analytical results indicate the sample contained 0.0025 mg/L total cadmium, 0.00110 mg/L total copper, 0.0571 mg/L total lead, and 0.234 mg/L total zinc (Table 4.4). Total and dissolved arsenic and total mercury concentrations were below laboratory PQLs. This sample contained the following general water quality parameters: 79.4 mg/L total calcium, 9.01 mg/L total magnesium, 66.5 mg/L sulfate, 0.76 mg/L chloride, 235 mg/L hardness, and a pH of 7.66.

TS-07-0-SW

Surface water sample TS-07-0-SW was collected from a small channel water created from water seeping from within and adjacent to the T1 Area failure (Figure 2.5). The seeping and channelized

water in this area is flowing over red/orange tailings which is partially vegetated with grasses. The water flowing over the tailings surface contained no obvious suspended sediment load. However, some clay and silt sized sediment was suspended during surface water sampling and included in unfiltered samples. Analytical results indicate the sample contained 0.033 mg/L total arsenic, 0.0422 mg/L total cadmium, 0.217 mg/L total copper, 0.0859 mg/L total lead, and 6.13 mg/L total zinc (Table 4.4). Total mercury concentrations were below laboratory PQLs. This sample contained the following general water quality parameters: 267 mg/L total calcium, 123 mg/L total magnesium, 854 mg/L sulfate, 1.03 mg/L chloride, 1,170 mg/L hardness, and a pH of 5.48.

SP-03-0-SW

Surface water sample SP-03-0-SW was collected from a channel located along the west central edge of the slide mass (Figure 2.5). This channel water is a mixture of water discharging from the T1 Area failure face and from a spring or seep discharging from the slope located approximately 15 feet SE of sample SP-03-0-SW. The channel produced from water discharging from the failure surface is stained orange up to the point where it connects with the spring or seep channel (Photo 13). The combined channel, in which sample SP-03-0-SW was collected, contains sediments that are stained orange in a few locations. The channel banks at this location were highly vegetated with grasses, ferns, shrubs, and mosses (Photo 14). The water contained no obvious suspended sediment load. Analytical results indicate the sample contained 0.0229 mg/L total zinc (Table 4.4). Total and dissolved arsenic, cadmium, copper, lead and mercury concentrations were below laboratory PQLs. This sample contained the following general water quality parameters: 126 mg/L total calcium, 11.2 mg/L total magnesium, 200 mg/L sulfate, 0.64 mg/L chloride, 361 mg/L hardness, and a pH of 7.22.

4.5 GROUNDWATER SAMPLES

MCS collected groundwater samples from four piezometers (PZ-1, PZ-2, PZ-3 and PZ-4) finished within the T1 and T2 Areas (Figure 2.4). Groundwater samples were collected from the piezometers on November 5, 2003 (Photo 15). The piezometers were completed on October 1, 2003 with 10 feet of well screen located at the base of the boring excavation. Water samples were collected using a clean disposable bailer and were not field filtered. The potentrimetric surface within each well at the time of sample collection was 16.4, 9.1, 51.2, and 41.3 feet bgs in PZ-1, PZ-2, PZ-3 and PZ-4, respectively.

PZ1-30-16-GW

MCS collected groundwater sample PZ1-30-16-GW from piezometer PZ-1, located in the T1 Area near the base of the T2 impoundment dam (Figure 2.5). Analytical results indicate the sample contained 0.0035 mg/L total copper, 0.0128 mg/L total lead, and 0.201 mg/L total zinc (Table 4.5).

Total arsenic and cadmium concentrations were below laboratory PQLs. This sample contained the following general water quality parameters: 286 mg/L Alkalinity, < 0.010 mg/L total cyanide and a pH of 7.14. The water sample collected from PZ-1 contained little to no suspended sediment.

PZ2-31-9-GW

MCS collected groundwater sample PZ2-31-9-GW from piezometer PZ-2, located near the western crest of the T1 impoundment dam (Figure 2.5). Analytical results indicate the sample contained 0.0057 mg/L total copper, 0.0381 mg/L total lead, and 0.0982 mg/L total zinc (Table 4.5). Total arsenic and cadmium concentrations were below laboratory PQLs. This sample contained the following general water quality parameters: 184 mg/L Alkalinity and a pH of 7.50. The water sample collected from PZ-2 contained little to no suspended sediment.

Table 4.5 Groundwater Sample Analytical Results

Sample ID	Cyanide-TOT	Arsenic	Cadmium	Copper	Lead	Zinc	Alkalinity[1]	pH
	Results in mg/L							
PZ1-30-16-GW	<0.010	<0.010	<0.0020	0.0035	**0.0128**	**0.201**	286	7.14
PZ2-31-9-GW	NA	<0.010	<0.0020	**0.0057**	**0.0381**	0.0982	184	7.50
PZ3-32-51-GW	NA	<0.010	<0.0020	0.0038	**0.0802**	**0.469**	163	7.50
PZ4-33-41-GW	NA	**6.92**	**1.64**	**5.57**	**71.9**	**249**		
Water Quality Standards								
Human Health - Ground	0.02	0.018	1.3	0.015	0.00005	2.0	-------	-------
Secondary Standard	-------	0.02	1.0	-------	-------	-------	-------	6.5-8.5
Source Criteria Used to Derive Standard	HA	MCL	PP	PP	PP	HA	-------	NSDWR

HA = Health advisory all from EPA's "Drinking Water Standards and Health Advisories" (October 1996)
MCL = Maximum contaminant Level from the drinking water regulations
PP = Priority pollutant criteria
NSDWR = National Secondary Drinking Water Regulations
Bold = Exceeds one or more water quality standards
NA = Not analyzed for specified analyte
[1] Alkalinity as HCO_3, $CaCO_3$

PZ3-32-51-GW

MCS collected groundwater sample PZ3-32-51-GW from piezometer PZ-2 located near the central crest of the T2 impoundment dam (Figure 3.1). Analytical results indicate the sample contained 0.0038 mg/L total copper, 0.0802 mg/L total lead, and 0.469 mg/L total zinc (Table 4.5). Total arsenic and cadmium concentrations were below laboratory PQLs. This sample contained the

following general water quality parameters: 163 mg/L Alkalinity and a pH of 7.50. The water sample collected from PZ-3 contained little to no suspended sediment.

PZ4-33-41-GW

MCS collected groundwater sample PZ4-33-41-GW from piezometer PZ-4 located near the base of the T3 impoundment dam (Figure 3.1). Analytical results indicate the sample contained 6.92 mg/L total arsenic, 1.64 mg/L total cadmium, 5.57 mg/L total copper, 71.9 mg/L total lead, and 249 mg/L total zinc (Table 4.5). The water sample collected from PZ-4 contained significant suspended sediment (Photo 15).

4.6 STABLITY EVALUATION

Slope stability was modeled using XSTABL. XSTABL modeled a two-dimensional failure surface of both the T1 and T2 areas. The existing slope failure on the T1 impoundment was used to establish soil parameters. Groundwater levels at the time of the investigation were from 2 to 16 feet below ground surface. These water levels were measured at the end of the summer of a very dry year. For purposes of the model, groundwater was assumed to be at ground surface.

Model results for the T1 Area indicate that the previous failure surface is stable. However, the steeper slopes on either side of the previous failure are unstable when groundwater is at ground surface.

Model results for the T2 Area indicate that the existing dam is unstable when groundwater is at ground surface. The critical failure surface is approximately 25 feet thick. Groundwater levels in the model were dropped until the dam became stable. Stability was found when groundwater is 10 feet below ground surface at the crest of the dam. Complete model results and geotechnical report are included in Appendix C.

4.7 TAILINGS VOLUME

MCS staff estimated tailings and waste rock volumes contained at the Forest Rose Mine Site by comparing the existing topographic surface to the calculated pre-tailings/waste rock topography of the drainage using Autodesk® Civil Design 3. Pre-tailings/waste rock topography was generated by estimating the elevation and slope of the buried stream channel and flood plain. Elevation estimates were generated using existing stream and valley slope projections and soil boring data. MCS estimates that 95,000 cubic yards of tailings over an area of 2.92 acres are contained within the Dunkleberg Creek Drainage at the Forest Rose Mine Site. This estimate does not include small piles of surface tailings located within and adjacent to the mill works buildings and tailings contained

within the failure mass north of the T1 Area. According to site observations, the volume of tailings contained within the small surface tailings piles is less than 100 cubic yards. It is estimated that approximately 1,000 cubic yards of tailings and native T1 impoundment dam materials are contained within the remnant slide mass.

It is estimated that 21,000 cubic yards waste rock over an area of 0.98 acres are contained within the Dunkleberg Creek Drainage at the Forest Rose Mine Site. This estimate likely includes some native fill material that is contained within the drainage. This estimate does not include surface waste rock piles located in T3 Area, the mill works building area, and waste rock observed on the slope between the T3 Area and FDR 707. According to site observations and volume calculations the amount of waste rock contained within these areas is estimated to be less than 700 cubic yards.

Calculations indicate that the thickest tailings are located above the buried stream channel and at the crest of each tailings impoundments. It is estimated that tailings are up to approximately 52 feet thick in the T1 Area, 68 feet thick in the T2 Area, and 35 feet thick in the T3 Area. The T3 Area thickness was estimated from the base of the incised channel. The tailings located in the remnant slide mass located below the T1 Area are calculated to be up to 12 feet thick. Waste rock contained within the drainage is estimated to be up to 40 feet thick at the top of the main waste rock dump.

5.0 DISCUSSION

5.1 TAILINGS

The three tailings impoundments (T1, T2, and T3 Areas) located within the Dunkleberg Creek Drainage were created in series from north to south to dispose of tailings from the floatation milling processes that began at the Forest Rose Mine site in 1941. The milling processes were completed to concentrated and extracted both lead and zinc from ore mined and/or shipped to the site. The ore body at the Forest Rose Mine was hosted in the Kootenai Formation limestone and had a very high pyrite content. Subsequently the tailings produced from milling operations contain a very high AGP due to the pyritic sulfur content, and very high ANP because of the high limestone or calcite content (Table 4.2).

The orange to red-orange color of the near surface tailings down to two feet bgs in the T1 Area and north of the T2 pond indicate that the pyrite is oxidized (Photos 3 and 5). The near surface tailings in the T3 Area and south of the T2 Area pond are gray in color and mostly reduced (Photos 5 and 7). It is important to note that orange to red-orange tailings were encountered in random test pits excavated in the gray surface tailings south of the T2 Area pond at depths from 2 to 3 feet bgs (Photo 6). It is likely that these orange to red-orange tailings represent the oxidized surface of the T2 Area prior to erosion and transport of gray reduced tailings from the T3 Area. Deeper tailings below the oxidized zones within the T1 and T2 areas are gray in color and reduced to the base of the impoundments (Photo 16). The oxidized tailings in the T1 and T2 Areas contain lower pyritic sulfur content (0.92% and 2.85%) than those measured in subsurface tailings samples (3.42 % to 12.6 % pyritic sulfur) and the T3 Area surface tailings (6.34% pyritic sulfur) (Table 4.2). In contrast, the sulfate sulfur (4.16 % and 5.02 %) is significantly higher in the near surface tailings than at depth (0.08 % and 2.20 % sulfate sulfur) and in the T3 Area near surface tailings (0.47 % sulfate sulfur). These results indicate that pyrite oxidation and subsequent acid production is occurring within the near surface tailings in the T1 and T2 Areas and an oxidation front is located at approximately 2 feet bgs. The tailings located below this oxidation front and within the T3 Area are not oxidized and have a high potential for acid generation (Table 4.2).

In general, AGP decreases and ANP increases with depth within the T1 and T2 Areas (Table 4.2). Of particular interest is the fact most of the ANP within the orange to red-orange (oxidized) tailings has been exhausted with significant AGP still present. This relationship is a likely result acid production and immediate buffering reactions occurring within the surface tailings. Relatively low total metals concentrations measured in the composite surface soil samples, T1-04-1.2-T and T2-05-1.5-T indicate that metals are being leached from the oxidized tailings in the T1 and T2 Areas (Figures 2.5 and 3.1; Table 4.1). Most of the metals leached from these sediments are likely

precipitated at depth near the oxidation front. In contrast, deeper tailings below the oxidized zones within the T1 and T2 areas contain significantly higher metals concentrations. Samples B1-18-20-T, B3-24-40-T, and B3-29-49-T contain lead levels (3,780 ppm to 6,000 ppm) above proposed cleanup guidelines under a maximum use scenario (Figures 2.5 and 3.1; Table 4.1). The reduced surface tailings located in the T3 Area and south of the T2 Area pond also contain relatively high metal concentrations. Surface composite samples T2-06-1.5-T and T3-10-1.5-T also contain lead levels (5,870 ppm and 5,830 ppm, respectively) above proposed cleanup guidelines under a maximum use scenario. Tailings samples T3-10-1.5-T and B3-22-10-T contain arsenic levels (539 ppm and 540 ppm, respectively) above cleanup guidelines under a maximum use scenario. The metals concentration in native soil samples B1-19-30-S and B3-25-50.5-S collected beneath the T1 and T2 Areas were relatively low, but indicate metals impacts to native soils beneath the impoundments. Lead levels measured in native soils were 353 ppm and 700 ppm. SPLP results indicate that water infiltrating through the near surface tailings may leach metals into the subsurface and/or groundwater system at concentrations above water quality standards (Table 4.3).

5.2 WASTE ROCK

Most of the waste rock located at the Forest Rose Mine is contained within the main waste rock dump located at the southern end of the site (Figure 4.1). This waste rock dump extends across Dunkleberg Creek. Metals concentrations in the waste rock are relatively high, exceeding the proposed cleanup guidelines under a maximum use scenario for arsenic and lead. ABA results from the waste rock dump indicate that the mineralized waste rock has a high AGP with pyritic sulfur concentrations of 3.22 %, but also has a high ANP (Table 4.2). Low sulfate sulfur concentrations of 0.94 % in the dump indicate that very little pyrite oxidation and acid generation is occurring in the top one foot of the dump. SPLP results indicate that water infiltrating through the waste rock is not likely to leach significant metals concentrations into the subsurface (Table 4.3).

5.3 STREAM SEDIMENTS

Stream sediments above and below the impacted areas at the Forest Rose Mine contain elevated metals concentrations (Table 4.1). In particular, most metals concentrations measured in up-gradient stream sediment sample (STR-15-0.1-S) are significantly higher than those measure below the site. Historic mining activities located near the top of the drainage have also impacted the Dunkleberg Creek Drainage sediments.

5.4 SURFACE AND GROUND WATER

Surface water samples were collected during the middle (August) of a very dry summer prior to any significant rain events and represent base flow conditions. The stream water sample STR-13-0-SW collected from Dunkleberg Creek above the site contains significantly less sulfate, magnesium, and calcium than samples collected within and below the site (Figure 2.2; Table 4.4). Sulfate concentrations increase approximately three times, magnesium concentrations increase by more than four times, and calcium concentrations almost doubled in stream sample STR-01-0-SW collected in Dunkleberg Creek below the site.

Surface and Groundwater samples collected from within the tailings areas, in particular sample TS-07-0-SW, contain metals at concentrations above one or more of the water quality standards set for aquatic life and human health (Figure 2.5; Table 4.4). In contrast, stream water samples collected from Dunkleberg Creek above and below the impacted areas only contain slightly elevated zinc levels. All other total and dissolved metals concentrations measured in the stream water were below laboratory PQLs and zinc levels are below all water quality standards.

Elevated sulfate concentrations in water collected within and below the impacted areas indicate that pyrite oxidation, acid generation, and leaching of metals are occurring as water flows through the tailings areas. However, increased calcium and magnesium, and pH values greater than 7, indicate that buffering reactions are also occurring rapidly within tailings. The absence of metals in sample STR-01-0-SW, which represents surface water flowing from the site at the time of sampling, indicates that buffering reactions occurring within the tailings areas are causing precipitation of metals prior to discharging into Dunkleberg Creek below the site (Figure 2.5).

In comparison to the three other piezometers installed within the tailings impoundments, the groundwater in the sample collected from PZ-4 contained extremely high total metals concentrations (Figure 3.1; Table 4.5). This sample was also contained a significant quantity of suspended sediment for total metals analysis (Photo 15). The analytical method for total metals analysis in water adds acid and heat to the sample in order to release metals attached to colloidal or particulate matter. This process is likely responsible for the high metals concentrations measured in this sample. The total metals analysis of this sample indicate that if the sediments contained within the tailings areas are suspended and ingested they may pose a significant risk to human health and the environment. At the time of sampling no surface water contained an observable suspended sediment load. However, during runoff events tailings are likely suspended and transported down gradient into Dunkleberg Creek.

5.5 STABILITY EVALUATION

Both the T1 and T2 Area impoundment dams are potentially unstable with groundwater at ground surface, based on the XSTABL model. The model indicates that a failure of the T2 Area would be up to 25 feet deep, compared to 10 feet deep at the T1 failure. The slope of the failure surface would be about 17 degrees, the same slope as the T1 failure surface. Results of the model suggest that eventually the dams will fail to their stable slope of 17 degrees.

Groundwater at ground surface seems a reasonable assumption given that groundwater was almost at ground surface in the T1 Area at the time of the investigation. Groundwater was up to 16 feet below ground surface in the T2 Area. It is reasonable to assume that during the spring, particularly during a wet year, groundwater levels could rise to the surface in the T2 Area. Further study of the area would be required to confirm that groundwater levels in the T2 Area rise to ground surface.

Standard penetration tests conducted during the geotechnical investigation showed that the tailings had little to no cohesion. One to three blow counts were generally required to drive the split spoon 6 inches. At some places in the tailings, one blow by the hammer would drive the split spoon 18 inches. These results indicate that the tailings are highly erodable if water were to top either of the dams. The condition of the decant system in the T2 Area is questionable and a failure of the system could cause surface water to top the dam. In addition, the outlet of the T2 Area decant tower onto the T1 Area surface is not visible and water is likely discharging through the base of the T2 Area dam from a collapsed portion of the effluent pipe buried inside the T2 Area dam. It is likely that the effluent water discharging through the base of the Dam is causing the active slumping and erosion observed at this location (Figure 3.1). Continued slumping at the base of the T2 Area dam may decrease the stability of this impoundment.

6.0 SUMMARY AND CONCLUSION

Tailings at the Forest Rose Mine contain concentrations of lead, and to a lesser extent arsenic, at concentrations that exceed cleanup guidelines for a maximum use rockhound/gold panner scenario (Tetra Tech 1996). Metals concentrations in the oxidized surface tailings are much lower than in the reduced tailings at depth. Lead is the primary metal of concern at the site. Five out of 10 samples exceed the proposed cleanup guideline under a maximum use scenario of 2,572 mg/kg lead. Arsenic exceeds the proposed cleanup guideline under a maximum use scenario of 370 mg/kg in two of 10 samples. Waste rock at the site also contains lead and arsenic at concentrations above the maximum use scenario (Table 4.1).

Pyritic sulfur content of the reduced tailings ranges from 3.42% to 12.6%, making associated acid generating potential very high. The veins at area mines occurred in limestone and contained significant calcite. The presence of calcite in the reduced tailings can be seen in the very high acid neutralization. However, pyritic sulfur remains in the oxidized tailings after all the acid neutralizing potential has been used. These data suggest that at some point in time the tailings have the potential to generate acid.

Surface water in Dunkelberg Creek upstream from the Forest Rose Mine contains elevated zinc concentrations, but below aquatic and human health standards. Dunkelberg Creek below the tailings also meets all aquatic and human health standards and zinc concentrations are lower than above the mine. However, water quality within the tailings is degraded with cadmium, lead, and zinc exceeding aquatic life or human health standards in each of the samples collected in the Forest Rose Mine site. Geochemical processes occurring in the tailings are eliminating most of the metals prior to the water discharging into Dunkelberg Creek. Sampling took place at the end of the summer during one event. Metals concentrations in water discharging into Dunkelberg Creek from the tailings may increase at other times of the year as weather and water conditions vary.

Stability of the tailings at the site is an important concern because of the previous failure in the T1 impoundment dam. Modeling of the T1 and T2 Areas indicate that the impoundment dams, except for the portion that failed, are unstable if groundwater is at the tailings surface. A failure of the T2 impoundment dam would likely be up to 25 feet thick and reduce the slope to 17 degrees. If the water table stays below 10 feet below ground surface, the model indicates that the T2 dam is stable. Groundwater was present near the surface of the T1 area at the time of the investigation and it seems reasonable to assume that the water table may rise to the surface of the T2 Area under wet spring conditions. However, further investigation of seasonal groundwater levels in the T2 Area would be required to confirm this assumption. A second mode of failure would be the topping of the dam by surface water if the decant system were to fail and rapid down cutting and erosion of the tailings.

Photo 1 Excavation of B4 Boring in T2 Area using B-50 track mounted drill rig. Looking north.

Photo 2 T1 Area surface tailings. Looking east, August 2003.

Photo 3 T1 Area failure surface and scarp. Note native fill material in dam scarp. Looking west.

Photo 4 T2 Area decant discharge location and impoundment dam soil slumping. Looking south, May 2003.

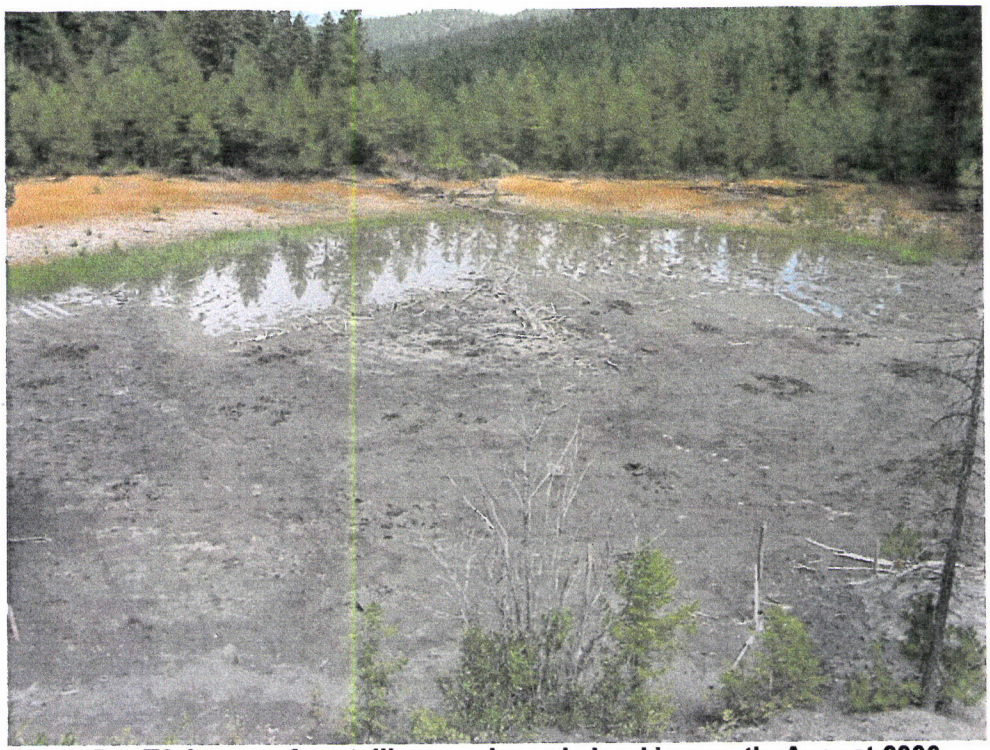


Photo 5 T2 Area surface tailings and pond. Looking north, August 2003.

Photo 6 Test pit showing orange tailings encountered beneath gray surface tailings in T2 Area.

Photo 7 T3 Area surface tailings and incised channel. Looking north.

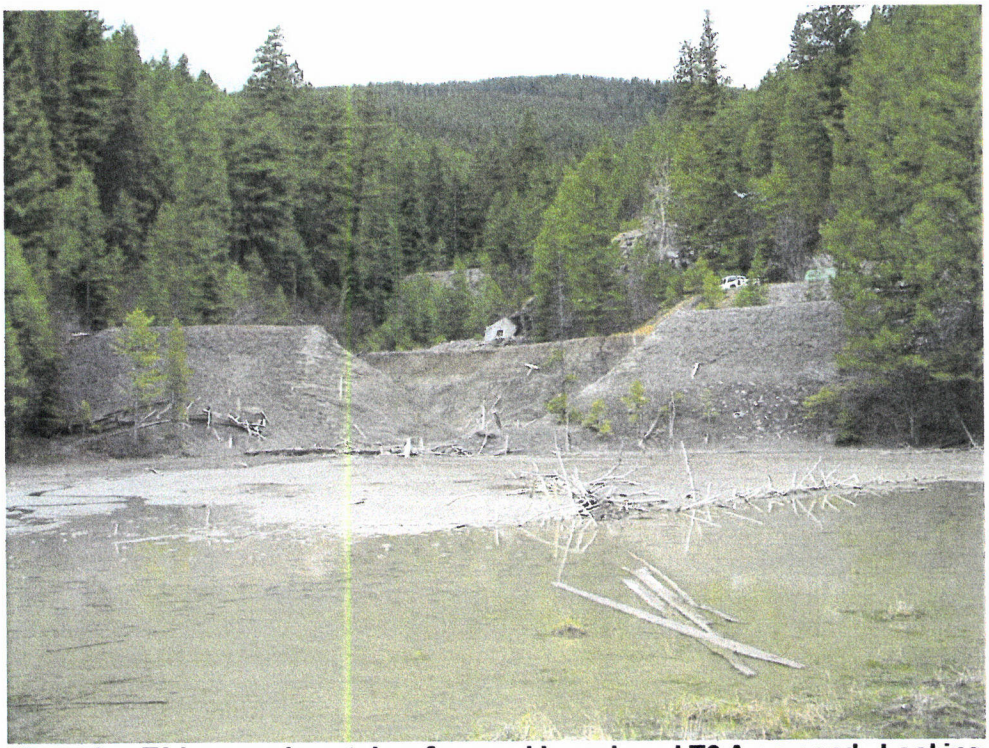


Photo 8 T3 impoundment dam face and breach and T2 Area pond. Looking south, May 2003.

Photo 9 Dunkleberg Creek down stream of Forest Rose Mine site and location of surface water sample STR-01-0-SW. Looking south, August 2003.

Photo 10 Dunkleberg Creek up stream of Forest Rose Mine site and location of surface water sample STR-13-0-SW. Looking south, August 2003.

Photo 11 Wooden pipe discharge locations and associated wetted area. Looking west, May 2003.

Photo 12 Head cut of T3 Area incised channel. Looking south.

Photo 13 Tailings seep water flowing along the east side of the T1 Area failure mass. Note orange staining on the ground surface. Looking south, August 2003.

Photo 14 Tailings seep and spring channel located along the east side of the T1 Area failure mass and location of surface water sample SP-03-0-SW. Looking south, August 2003.

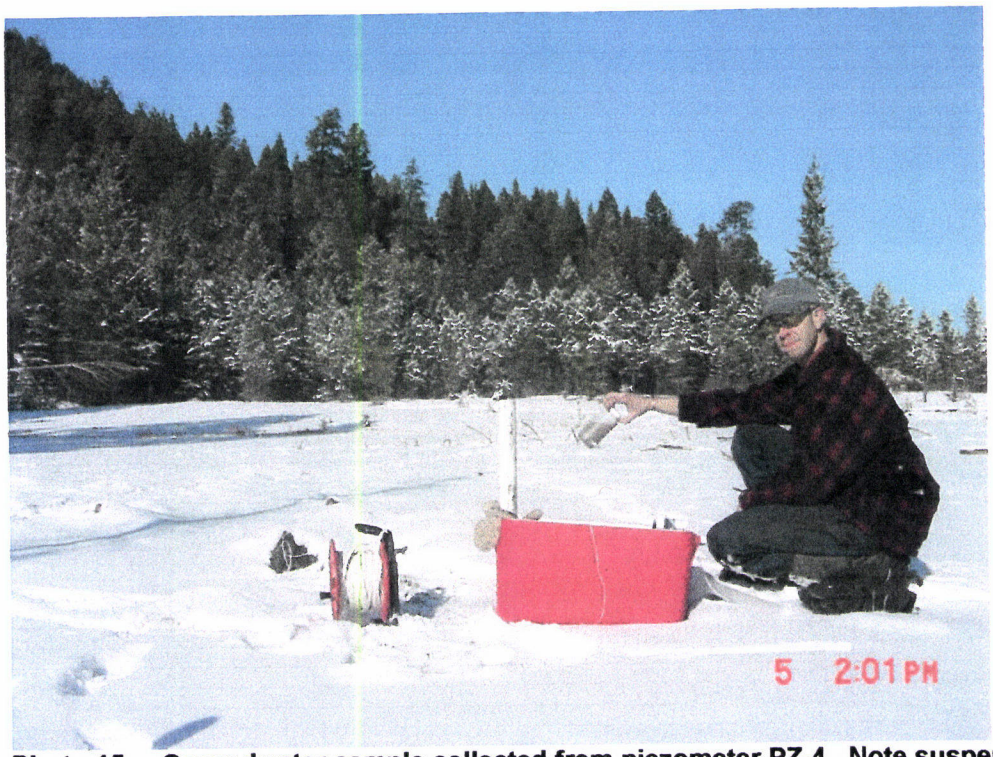


Photo 15 Groundwater sample collected from piezometer PZ-4. Note suspended sediment in water sample. Looking south-southeast.

Photo 16 Split spoon showing tailings and native soil contact in boring B2.

7.0 REFERENCES

Madison J., Lonn J., Marvin R., Metesh J., Wintergerst R., 1998. Abandoned – Inactive Mines Program, Deerlodge National Forest, Volume IV, Upper Clark Fork River Drainage. Montana Bureau of Mines and Geology, Open-File Report 346.

MDEQ (Montana Department of Environmental Quality). January 2002. [report on internet cited June 10, 2003]. Dunkleberg Mining District (Granite County). Helena, MT: Montana Department of Environmental Quality. http://www.deq.state.mt.us/Rem/mwc/linkdocs/techdocs/60tech.asp.

Omang, R.J., 1992. Analysis of the Magnitude and Frequency of Floods and the Peak-Flow Gaging Network in Montana. US Geological Survey, Water-Resources Investigations Report 92-4048. Prepared in cooperation with the Montana Department of Transportation; the US Department of Transportation, Federal Highway Administration; and the US Department of Agriculture, Forest Service. Dated July 1992.

Pardee, Joseph Thomas. 1917. The Dunkleberg Mining District, Granite County, Montana. US Geological Survey, Bull. 660, pp. 241-247.

Pfister, Robert D., Bernard L. Kovalchik, Stephen F. Arno, and Richard C. Presby. 1977. Forest habitat types of Montana. USDA For. Service. Gen. Tech. Rep.

INT -34, 174p. Intermountain Forest & Range Experiment Station, Ogden, Utah 84401.

Smith, K.S., Ramsey, C.A., and Hageman, P.L., 2000. Sampling Strategy for the Rapid Screening of Mine-Waste Dumps on Abandoned Mine Lands. Proceeding Form the Fifth International Conference on Acid Rock Drainage.

TetraTech, 1996. Risk Based Cleanup Guidelines for Abandoned Mine Sites: Final Report. Prepared for Montana Department of Environmental Quality, Abandoned Mine Reclamation Bureau. Dated February 1996.

WRCC (Western Regional Climate Center). 2001. [report on Internet cited June 10, 2003]. Drummond Aviation, Montana General Climate Summary Tables-Temperature. Reno Nevada: Western Regional Climate Center. http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?mtdrum.

APPENDIX A
LABORATORY REPORTS

VL ANALYTICAL, INC.
ıe Government Gulch ▪ P.O. Box 929 ▪ Kellogg, Idaho 83837-0929 ▪ Phone: (208)784-1258 ▪ Fax: (208)783-0891

Certificate: ID ID00019

CLIENT : MCS Environmental
PROJECT: 11018.016
IENT SAMPLE ID: T1-04-1.2-T
mple Collected: 8/08/03 11:30
ample Receipt : 8/12/03
Date of Report : 8/28/03 As Received Basis

SVL JOB: 107076
SAMPLE: 347235
% Solids: 81.8%
Matrix: SOIL

Determination	Result	Units	Dilution	Method	Analyzed
ABP	-82.8	TCaCO3/1000T		EPA600	8/15/03
Acid Generating	89.1	TCaCO3/1000T		EPA600	8/15/03
Acid Neut. Pot.	6.20	TCaCO3/1000T		EPA600	8/13/03
Non-Ext Sulfur,S	0.040	%		LECO	8/15/03
Pyritic Sulfur,S	2.85	%		LECO	8/15/03
Sulfate Sulfur,S	4.16	%		LECO	8/15/03
Total Sulfur, S	7.05	%		LECO	8/13/03
Arsenic	295	mg/kg		6010B	8/24/03
Cadmium	19.6	mg/kg		6010B	8/24/03
Copper	304	mg/kg		6010B	8/24/03
Mercury	0.176	mg/kg		7471	8/27/03
Lead	365	mg/kg		6010B	8/24/03
Zinc	2390	mg/kg		6010B	8/24/03

Reviewed By: _____ Date 8/28/03
8/28/03 12:19

SVL ANALYTICAL, INC.
One Government Gulch ▪ P.O. Box 929 ▪ Kellogg, Idaho 83837-0929 ▪ Phone: (208)784-1258 ▪ Fax: (208)783-0891
Certificate: ID ID00019

CLIENT : MCS Environmental
PROJECT: 11018.016
CLIENT SAMPLE ID: T2-05-1.5-T
Sample Collected: 8/08/03 13:00
Sample Receipt : 8/12/03
Date of Report : 8/28/03 As Received Basis

SVL JOB: 107076
SAMPLE: 34723
% Solids: 79.7%
Matrix: SOIL

Determination	Result	Units	Dilution	Method	Analyzed
ABP	-28.7	TCaCO3/1000T		EPA600	8/15/03
Acid Generating	28.8	TCaCO3/1000T		EPA600	8/15/03
Acid Neut. Pot.	<0.50	TCaCO3/1000T		EPA600	8/13/03
Non-Ext Sulfur,S	0.030	%		LECO	8/15/03
Pyritic Sulfur,S	0.920	%		LECO	8/15/03
Sulfate Sulfur,S	5.02	%		LECO	8/15/03
Total Sulfur, S	5.97	%		LECO	8/13/03
Arsenic	302	mg/kg		6010B	8/24/03
Cadmium	3.47	mg/kg		6010B	8/24/03
Copper	204	mg/kg		6010B	8/24/03
Lead	633	mg/kg		6010B	8/24/03
Zinc	940	mg/kg		6010B	8/24/03

Reviewed By: _____ Date 8/28/03
8/28/03 12:19

VL ANALYTICAL, INC.
One Government Gulch ▪ P.O. Box 929 ▪ Kellogg, Idaho 83837-0929 ▪ Phone: (208)784-1258 ▪ Fax: (208)783-0891

Certificate: ID ID00019

CLIENT : MCS Environmental
PROJECT: 11018.016
CLIENT SAMPLE ID: T2-06-1.5-T
Sample Collected: 8/08/03 14:00
Sample Receipt : 8/12/03
Date of Report : 8/28/03 As Received Basis

SVL JOB: 107076
SAMPLE: 347237

% Solids: 80.0%
Matrix: SOIL

Determination	Result	Units	Dilution	Method	Analyzed
Arsenic	311	mg/kg		6010B	8/24/03
Cadmium	43.8	mg/kg		6010B	8/24/03
Copper	412	mg/kg		6010B	8/24/03
Lead	5870	mg/kg	10	6010B	8/24/03
Zinc	4440	mg/kg		6010B	8/24/03

Reviewed By: _____ Date 8/28/03
8/28/03 12:19

SVL ANALYTICAL, INC.
One Government Gulch ▪ P.O. Box 929 ▪ Kellogg, Idaho 83837-0929 ▪ Phone: (208)784-1258 ▪ Fax: (208)783-0891

Certificate: ID ID00019

CLIENT : MCS Environmental
PROJECT: 11018.016
CLIENT SAMPLE ID: T3-10-1.5-T
Sample Collected: 8/08/03 16:00
Sample Receipt : 8/12/03
Date of Report : 8/28/03 As Received Basis

SVL JOB: 107076
SAMPLE: 34723

% Solids: 90.0%
Matrix: SOIL

Determination	Result	Units	Dilution	Method	Analyzed
ABP	291	TCaCO3/1000T		EPA600	8/15/03
Acid Generating	198	TCaCO3/1000T		EPA600	8/15/03
Acid Neut. Pot.	489	TCaCO3/1000T		EPA600	8/13/03
Non-Ext Sulfur,S	0.150	%		LECO	8/15/03
Pyritic Sulfur,S	6.34	%		LECO	8/15/03
Sulfate Sulfur,S	0.470	%		LECO	8/15/03
Total Sulfur, S	6.96	%		LECO	8/13/03
Arsenic	539	mg/kg		6010B	8/24/03
Cadmium	63.1	mg/kg		6010B	8/24/03
Copper	584	mg/kg		6010B	8/24/03
Mercury	0.200	mg/kg		7471	8/27/03
Lead	5830	mg/kg	10	6010B	8/24/03
Zinc	5950	mg/kg		6010B	8/24/03

Reviewed By: _____ Date 8/28/03
8/28/03 12:19

VL ANALYTICAL, INC.
One Government Gulch ▪ P.O. Box 929 ▪ Kellogg, Idaho 83837-0929 ▪ Phone: (208)784-1258 ▪ Fax: (208)783-0891

Certificate: ID ID00019

CLIENT : MCS Environmental
PROJECT: 11018.016
CLIENT SAMPLE ID: SRT-02-0.1-S
Sample Collected: 8/08/03 8:30
Sample Receipt : 8/12/03
Date of Report : 8/28/03 As Received Basis

SVL JOB: 107076
SAMPLE: 347239
% Solids: 59.8%
Matrix: SOIL

Determination	Result	Units	Dilution	Method	Analyzed
Arsenic	13.8	mg/kg		6010B	8/24/03
Cadmium	5.73	mg/kg		6010B	8/24/03
Copper	63.9	mg/kg		6010B	8/24/03
Lead	299	mg/kg		6010B	8/24/03
Zinc	563	mg/kg		6010B	8/24/03

Reviewed By: _____ Date 8/28/03
8/28/03 12:19

SVL ANALYTICAL, INC.

Quality Control Report
Part I Prep Blank and Laboratory Control Sample

Client :MCS Environmental

SVL JOB No: 107076

Analyte	Method	Matrix	Units	Prep Blank	True	LCS	Found	LCS %R	Analysis Date
Arsenic	6010B	SOIL	mg/kg	<1.0	110		102	92.7	8/24/03
Cadmium	6010B	SOIL	mg/kg	<0.20	101		93.5	92.6	8/24/03
Copper	6010B	SOIL	mg/kg	0.49	118		118	100.0	8/24/03
Lead	6010B	SOIL	mg/kg	<0.50	102		96.4	94.5	8/24/03
Zinc	6010B	SOIL	mg/kg	<0.50	193		176	91.2	8/24/03
Mercury	7471	SOIL	mg/kg	<0.0333	3.71		3.98	107.3	8/27/03
ABP	EPA600	SOIL	TCaCO3/k	N/A	42.0		43.0	102.4	8/15/03
Acid Generating	EPA600	SOIL	TCaCO3/k	N/A	9.31		10.0	107.4	8/15/03
Acid Neut. Pot.	EPA600	SOIL	TCaCO3/k	N/A	52.0		53.0	101.9	8/13/03
Total Sulfur, S	LECO	SOIL	%	N/A	0.298		0.320	107.4	8/13/03

LEGEND:

LCS = Laboratory Control Sample LCS %R = LCS Percent Recovery N/A = Not Applicable

S L ANALYTICAL, INC.

Quality Control Report
Part II Duplicate and Spike Analysis

Client :MCS Environmental — SVL JOB No: 107076

T...	Method	Matrix	QC SAMPLE ID Units	QC SAMPLE ID Result	Duplicate or MSD Found		Duplicate or MSD RPD%	Matrix Spike Result	Matrix Spike SPK ADD	Matrix Spike %R	Analysis Date
A...	6010B	SOIL	1 mg/kg	295	402	M	3.0	390	100	95.0	8/24/03
Cd	6010B	SOIL	1 mg/kg	19.6	102	M	0.0	102	100	82.4	8/24/03
Cu	6010B	SOIL	1 mg/kg	304	413	M	6.0	389	100	85.0	8/24/03
P...	6010B	SOIL	1 mg/kg	365	430	M	6.5	459	100	94.0	8/24/03
Z...	6010B	SOIL	1 mg/kg	2390	2470	M	3.3	2390	100	R >4S	8/24/03
Hg	7471	SOIL	1 mg/kg	0.176	0.171		2.9	0.383	0.167	124.0	8/27/03
...Sol.	999	SOIL	1 %	81.8	81.8		0.0	N/A	N/A	N/A	8/13/03
Al...	EPA600	SOIL	1 TCaCO3/	-82.8	-83.1		0.4	N/A	N/A	N/A	8/15/03
...O...	EPA600	SOIL	1 TCaCO3/	89.1	89.1		0.0	N/A	N/A	N/A	8/15/03
...NP	EPA600	SOIL	1 TCaCO3/	6.20	6.00		3.3	N/A	N/A	N/A	8/13/03
...M-EX	LECO	SOIL	1 %	0.040	0.040		0.0	N/A	N/A	N/A	8/15/03
...YR	LECO	SOIL	1 %	2.85	2.85		0.0	N/A	N/A	N/A	8/15/03
...O4	LECO	SOIL	1 %	4.16	4.17		0.2	N/A	N/A	N/A	8/15/03
...-TOT	LECO	SOIL	1 %	7.05	7.06		0.1	N/A	N/A	N/A	8/13/03

...GEND:

RPD% = (|SAM - DUP|/((SAM + DUP)/2) * 100) UDL = Both SAM & DUP not detected. *Result or *Found: Interference required dilution.

RPD% = (|SPK - MSD|/((SPK + MSD)/2) * 100) M in Duplicate/MSD column indicates MSD.

S... KE ADD column, A = Post Digest Spike; %R = Percent Recovery N/A = Not Analyzed; R > 4S = Result more than 4X the Spike Added

Q... Sample 1: SVL SAM No.: 347235 Client Sample ID: T1-04-1.2-T

8/28/03 12:19

CHAIN OF CUSTODY RECORD

Page 1 of 2

Client: MCS Environmental
Contact: Warren
Address: 5562 - Alloy South
Missoula, MT 59808
Phone Number: 406 - 728 - 7755
FAX Number: 406 - 728 - 7367

NOTES:
1) Ensure proper container packaging.
2) Ship samples promptly following collection.
* 3) Designate Sample Reject Disposition
PO#: 11018.016
Project Name: Forest Rose Mine

Table 1. -- Matrix Type
1 = Surface Water, 2 = Ground Water
3 = Soil/Sediment, 4 = Rinsate, 5 = Oil
6 = Waste, 7 = Other (Specify) ____

FOR SVL USE ONLY
SVL JOB # 107076

Samplers Signature: Warren D. Phillips

Lab Name: SVL Analytical, Inc. (208) 784-1258 FAX (208) 783-0891
Address: One Government Gulch, Kellogg, ID 83837-0929

Sample ID	Collection: Date	Collection: Time	Misc: Collected by: (Init.)	Misc: Matrix Type From Table 1	Misc: No. of Containers	Misc: Sample Filtered ? Y/N	Preservative(s): Unpreserved (Ice Only)	Preservative(s): HNO3	Preservative(s): HCL	Preservative(s): H2SO4	Preservative(s): NAOH	Preservative(s): Other (Specify)	Analyses Required: Acid Base Accounting	Analyses Required: SPLP (Ag, Cd, Cu, Pb, Zn)	Analyses Required: SPLP Mercury	Analyses Required: Total Metals (Ag, Cd, Cu, Pb, Zn)	Analyses Required: Total Mercury	Comments
1. T1-04-1.2-T	8/8/03	11:30	WPP	3	1								X	X		X	X	ABA and SPLP
2. T2-05-1.5-T	8/8/03	13:00	WPP	3	1								X	X		X		
3. T2-06-1.5-T	8/8/03	14:00	WPP	3	1								[redacted]	[redacted]		X		
4. T3-10-1.5-T	8/8/03	16:00	WPP	3	1								X	X		X	X	
5. STR-02-0.1-S	8/8/03	8:30	WPP	3	1											X	[redacted]	
6.																		
7.																		
8.																		
9.																		
10.																		

Relinquished by:	Date:	Time:	Received by:	Date:	Time:
Warren D. Phillips	8/11/03	16:30	CRSeus	8/12/03	10:00
Relinquished by:	Date:	Time:	Received by:	Date:	Time:

* S[redacted] Reject: [ ] Return [ ] Dispose [ ] Store (30 Days)

White: LAB COPY Yellow: CUSTOMER COPY

[redacted]OC 12/95

SVL ANALYTICAL, INC.
One Government Gulch ▪ P.O. Box 929 ▪ Kellogg, Idaho 83827-0929 ▪ Phone: (208)784-1258 ▪ Fax: (208)783-0891

REPORT OF ANALYTICAL RESULTS

CLIENT : MCS Environmental
PROJECT: 11018.016

Sample Receipt: 8/12/03
Report Date: 8/26/03

SVL JOB: 107077

SVL ID	CLIENT SAMPLE ID		As 6010B	Cd 6010B	Cu 6010B	Pb 6010B	Zn 6010B
E347242	T1-04-1.2-T	8/08/03	<0.010mg/L E	0.0322mg/L E	<0.0030mg/L E	<0.0050mg/L E	0.185mg/L E
E347243	T2-05-1.5-T	8/08/03	<0.010mg/L E	0.0284mg/L E	0.681mg/L E	0.0162mg/L E	2.43mg/L E
E347244	T3-10-1.5-T	8/08/03	<0.010mg/L E	0.0592mg/L E	0.0044mg/L E	0.0442mg/L E	4.55mg/L E
E347287	EXTRACTION FLUID		<0.010mg/L E	<0.0020mg/L E	<0.0030mg/L E	<0.0050mg/L E	<0.0050mg/L E

Samples with SVL ID prefix 'E' were extracted according to: SPLP
Certificate: ID ID00019

Reviewed By: _____ Date: 8/26/03

SVL ANALYTICAL, INC.

Quality Control Report
Part I Prep Blank and Laboratory Control Sample

Client :MCS Environmental

SVL JOB No: 107077

Analyte	Method	Matrix	Units	Prep Blank	True	LCS	Found	LCS %R	Analysis Date
Arsenic	6010B	ESOIL	mg/L EXT	<0.010	1.00		1.01	101.0	8/25/03
Cadmium	6010B	ESOIL	mg/L EXT	<0.0020	1.00		1.01	101.0	8/25/03
Copper	6010B	ESOIL	mg/L EXT	<0.0030	1.00		1.04	104.0	8/25/03
Lead	6010B	ESOIL	mg/L EXT	<0.0050	1.00		0.999	99.9	8/25/03
Zinc	6010B	ESOIL	mg/L EXT	<0.0050	1.00		0.991	99.1	8/25/03

LEGEND:

LCS = Laboratory Control Sample LCS %R = LCS Percent Recovery N/A = Not Applicable

S L ANALYTICAL, INC.

Quality Control Report
Part II Duplicate and Spike Analysis

lient :MCS Environmental — SVL JOB No: 107077

T	Method	Matrix	QC SAMPLE ID Units	Result	Duplicate or MSD Found	RPD%	Matrix Spike Result	SPK ADD	%R	Analysis Date
A	6010B	ESOIL	1 mg/L EX	<0.010	<0.010	UDL	1.03	1.00	103.0	8/25/03
Ca	6010B	ESOIL	1 mg/L EX	0.0322	0.0332	3.1	0.968	1.00	93.6	8/25/03
Cu	6010B	ESOIL	1 mg/L EX	<0.0030	<0.0030	UDL	1.07	1.00	107.0	8/25/03
P	6010B	ESOIL	1 mg/L EX	<0.0050	<0.0050	UDL	0.964	1.00	96.4	8/25/03
Z	6010B	ESOIL	1 mg/L EX	0.185	0.190	2.7	1.10	1.00	91.5	8/25/03

LEGEND:

R)% = (|SAM - DUP|/((SAM + DUP)/2) * 100) UDL = Both SAM & DUP not detected. *Result or *Found: Interference required dilution.

R)% = (|SPK - MSD|/((SPK + MSD)/2) * 100) M in Duplicate/MSD column indicates MSD.

SPIKE ADD column, A = Post Digest Spike; %R = Percent Recovery N/A = Not Analyzed; R > 4S = Result more than 4X the Spike Added

QC Sample 1: SVL SAM No.: 347242 Client Sample ID: T1-04-1.2-T

8/26/03 13:35

SVL ANALYTICAL

CHAIN OF CUSTODY RECORD

Client: MCS Environmental
Contact: Warren
Address: 5562 - Alloy South
Missoula, MT 59808
Phone Number: 406 - 728-7755
FAX Number: 406-728-7367

NOTES:
1) Ensure proper container packaging.
2) Ship samples promptly following collection.
* 3) Designate Sample Reject Disposition
PO#: 11018.016
Project Name: Forest Rose Mine

Table 1. -- Matrix Type
1 = Surface Water, 2 = Ground Water
3 = Soil/Sediment, 4 = Rinsate, 5 = Oil
6 = Waste, 7 = Other (Specify) ____

FOR SVL USE ONLY
SVL JOB # 107077

Samplers Signature:

Lab Name: SVL Analytical, Inc. (208) 784-1258 FAX (208) 783-0891
Address: One Government Gulch, Kellogg, ID 83837-0929

Sample ID	Collection: Date	Collection: Time	Misc: Collected by: (Init.)	Misc: Matrix Type From Table 1	Misc: No. of Containers	Misc: Sample Filtered ? Y/N	Preservative(s): Unpreserved (Ice Only)	Preservative(s): HNO3	Preservative(s): HCL	Preservative(s): H2SO4	Preservative(s): NAOH	Preservative(s): Other (Specify)	Analyses Required: Acid Base Accounting	Analyses Required: SPLP (Ag, Cd, Cu, Pb, Zn)	Analyses Required: SPLP Mercury	Analyses Required: Total Metals (Ag, Cd, Cu, Pb, Zn)	Analyses Required: Total Mercury	Comments
1. T1-04-1.2-T	8/8/03	11:30	WPP	3	1								X	X		X	X	ABA and SPLP
2. T2-05-1.5-T	8/8/03	13:00	WPP	3	1								X	X		X		
3. T2-06-1.5-T	8/8/03	14:00	WPP	3	1								X	X		X		
4. T3-10-1.5-T	8/8/03	16:00	WPP	3	1								X	X		X	X	
5. STR-02-0.1-S	8/8/03	8:30	WPP	3	1											X	X	
6.																		
7.																		
8.																		
9.																		
10.																		

Relinquished by:	Date:	Time:	Received by:	Date:	Time:
	8/11/03	16:30			
Relinquished by:	Date:	Time:	Received by:	Date:	Time:

COPY

* Sa... Reject: [ ] Return [ ] Dispose [ ] Store (30 Days)

White: LAB COPY Yellow: CUSTOMER COPY

...COC 12/95

SVL ANALYTICAL, INC.
One Government Gulch ▪ P.O. Box 929 ▪ Kellogg, Idaho 83837-0929 ▪ Phone: (208)784-1258 ▪ Fax: (208)783-0891

Certificate: ID ID00019

CLIENT : MCS Environmental
PROJECT: 11018.016
CLIENT SAMPLE ID: STR-01-0-SW
Sample Collected: 8/08/03 8:30
Sample Receipt : 8/12/03
Date of Report : 8/27/03

SVL JOB: 107092
SAMPLE: 347510
TOT/DIS

Matrix: WATER

	Determination	Result	Units	Dilution	Method	Analyzed
T	pH	7.89			150.1	8/13/03
T	Calcium	98.9	mg/L		200.7	8/24/03
T	Chloride	0.69	mg/L		300.0	8/22/03
T	Hardness	297	mg CaCO3/L		2340B	8/24/03
T	Magnesium	12.1	mg/L		200.7	8/24/03
T	Sulfate, SO4	140	mg/L	10	300.0	8/22/03
T	Arsenic	<0.010	mg/L		200.7	8/24/03
T	Cadmium	<0.0020	mg/L		200.7	8/24/03
T	Copper	<0.0030	mg/L		200.7	8/24/03
T	Mercury	<0.00020	mg/L		245.1	8/26/03
T	Lead	<0.0050	mg/L		200.7	8/24/03
T	Zinc	0.0641	mg/L		200.7	8/24/03
D	Arsenic	<0.010	mg/L		200.7	8/24/03
D	Cadmium	<0.0020	mg/L		200.7	8/24/03
D	Copper	<0.0030	mg/L		200.7	8/24/03
D	Mercury	<0.00020	mg/L		245.1	8/26/03
D	Lead	<0.0050	mg/L		200.7	8/24/03
D	Zinc	0.0655	mg/L		200.7	8/24/03

Filtered fraction: 347518

Reviewed By: _____ Date 8/27/03
8/27/03 9:57

SVL ANALYTICAL, INC.
One Government Gulch ▪ P.O. Box 929 ▪ Kellogg, Idaho 83837-0929 ▪ Phone: (208)784-1258 ▪ Fax: (208)783-0891
Certificate: ID ID00019

CLIENT : MCS Environmental
PROJECT: 11018.016
CLIENT SAMPLE ID: SP-03-0-SW
Sample Collected: 8/08/03 11:00
Sample Receipt : 8/12/03
Date of Report : 8/27/03

SVL JOB: 107092
SAMPLE: 34751
TOT/DIS

Matrix: WATER

	Determination	Result	Units	Dilution	Method	Analyzed
T	pH	7.22			150.1	8/13/03
T	Calcium	126	mg/L		200.7	8/24/03
T	Chloride	0.64	mg/L		300.0	8/22/03
T	Hardness	361	mg CaCO3/L		2340B	8/24/03
T	Magnesium	11.2	mg/L		200.7	8/24/03
T	Sulfate, SO4	200	mg/L	10	300.0	8/22/03
T	Arsenic	<0.010	mg/L		200.7	8/24/03
T	Cadmium	<0.0020	mg/L		200.7	8/24/03
T	Copper	<0.0030	mg/L		200.7	8/24/03
T	Mercury	<0.00020	mg/L		245.1	8/26/03
T	Lead	<0.0050	mg/L		200.7	8/24/03
T	Zinc	0.0229	mg/L		200.7	8/24/03
D	Arsenic	<0.010	mg/L		200.7	8/24/03

Filtered fraction: 347519

Reviewed By: _____ Date 8/27/03
8/27/03 9:57

/L ANALYTICAL, INC.
One Government Gulch ▪ P.O. Box 929 ▪ Kellogg, Idaho 83837-0929 ▪ Phone: (208)784-1258 ▪ Fax: (208)783-0891

Certificate: ID ID00019

CLIENT : MCS Environmental
OJECT: 11018.016
ENT SAMPLE ID: TS-07-0-SW
ample Collected: 8/08/03 14:30
Sample Receipt : 8/12/03
Date of Report : 8/27/03

SVL JOB: 107092
SAMPLE: 347512

Matrix: WATER

Determination	Result	Units	Dilution	Method	Analyzed
pH	5.48			150.1	8/13/03
Calcium	267	mg/L		200.7	8/24/03
Chloride	1.03	mg/L		300.0	8/22/03
Hardness	1170	mg CaCO3/L		2340B	8/24/03
Magnesium	123	mg/L		200.7	8/24/03
Sulfate, SO4	854	mg/L	50	300.0	8/22/03
Arsenic	0.033	mg/L		200.7	8/24/03
Cadmium	0.0422	mg/L		200.7	8/24/03
Copper	0.217	mg/L		200.7	8/24/03
Mercury	<0.00020	mg/L		245.1	8/26/03
Lead	0.0859	mg/L		200.7	8/24/03
Zinc	6.13	mg/L		200.7	8/24/03

Reviewed By: _____ Date 8/27/03
8/27/03 9:57

SVL ANALYTICAL, INC.
One Government Gulch ▪ P.O. Box 929 ▪ Kellogg, Idaho 83837-0929 ▪ Phone: (208)784-1258 ▪ Fax: (208)783-0891

Certificate: ID ID00019

CLIENT : MCS Environmental
PROJECT: 11018.016
CLIENT SAMPLE ID: DT-08-0-SW
Sample Collected: 8/08/03 15:30
Sample Receipt : 8/12/03
Date of Report : 8/27/03

SVL JOB: 107092
SAMPLE: 347521
TOT/DIS

Matrix: WATER

	Determination	Result	Units	Dilution	Method	Analyzed
T	pH	7.66			150.1	8/13/03
T	Calcium	79.4	mg/L		200.7	8/24/03
T	Chloride	0.76	mg/L		300.0	8/22/03
T	Hardness	235	mg CaCO3/L		2340B	8/24/03
T	Magnesium	9.01	mg/L		200.7	8/24/03
T	Sulfate, SO4	66.5	mg/L	5	300.0	8/22/03
T	Arsenic	<0.010	mg/L		200.7	8/24/03
T	Cadmium	0.0025	mg/L		200.7	8/24/03
T	Copper	0.0110	mg/L		200.7	8/24/03
T	Mercury	<0.00020	mg/L		245.1	8/26/03
T	Lead	0.0571	mg/L		200.7	8/24/03
T	Zinc	0.234	mg/L		200.7	8/24/03
D	Arsenic	<0.010	mg/L		200.7	8/24/03

Filtered fraction: 347521

Reviewed By: _____ Date 8/27/03
8/27/03 9:57

SVL ANALYTICAL, INC.
One Government Gulch ▪ P.O. Box 929 ▪ Kellogg, Idaho 83837-0929 ▪ Phone: (208)784-1258 ▪ Fax: (208)783-0891

Certificate: ID ID00019

CLIENT : MCS Environmental
PROJECT: 11018.016
CLIENT SAMPLE ID: DTD-09-0-SW
Sample Collected: 8/08/03 16:15
Sample Receipt : 8/12/03
Date of Report : 8/27/03

SVL JOB: 107092
SAMPLE: 347514
TOT/DIS

Matrix: WATER

	Determination	Result	Units	Dilution	Method	Analyzed
T	pH	8.22			150.1	8/13/03
T	Calcium	75.6	mg/L		200.7	8/24/03
T	Chloride	0.74	mg/L		300.0	8/22/03
T	Hardness	211	mg CaCO3/L		2340B	8/24/03
T	Magnesium	5.53	mg/L		200.7	8/24/03
T	Sulfate, SO4	97.1	mg/L	5	300.0	8/22/03
T	Arsenic	<0.010	mg/L		200.7	8/24/03
T	Cadmium	0.0021	mg/L		200.7	8/24/03
T	Copper	0.0091	mg/L		200.7	8/24/03
T	Mercury	<0.00020	mg/L		245.1	8/26/03
T	Lead	0.0402	mg/L		200.7	8/24/03
T	Zinc	0.268	mg/L		200.7	8/24/03
D	Arsenic	<0.010	mg/L		200.7	8/24/03

Filtered fraction: 347522

Reviewed By: _____ Date 8/27/03

8/27/03 9:57

SVL ANALYTICAL, INC.
One Government Gulch ▪ P.O. Box 929 ▪ Kellogg, Idaho 83837-0929 ▪ Phone: (208)784-1258 ▪ Fax: (208)783-0891

Certificate: ID ID00019

CLIENT : MCS Environmental
PROJECT: 11018.016
CLIENT SAMPLE ID: AD-12-0-SW
Sample Collected: 8/08/03 16:45
Sample Receipt : 8/12/03
Date of Report : 8/27/03

SVL JOB: 107092
SAMPLE: 34751
TOT/DIS

Matrix: WATER

	Determination	Result	Units	Dilution	Method	Analyzed
T	pH	7.91			150.1	8/13/03
T	Calcium	90.2	mg/L		200.7	8/24/03
T	Chloride	0.70	mg/L		300.0	8/22/03
T	Hardness	262	mg CaCO3/L		2340B	8/24/03
T	Magnesium	8.94	mg/L		200.7	8/24/03
T	Sulfate, SO4	102	mg/L	5	300.0	8/22/03
T	Arsenic	<0.010	mg/L		200.7	8/24/03
T	Cadmium	<0.0020	mg/L		200.7	8/24/03
T	Copper	0.0049	mg/L		200.7	8/24/03
T	Mercury	<0.00020	mg/L		245.1	8/26/03
T	Lead	0.0087	mg/L		200.7	8/24/03
T	Zinc	0.0808	mg/L		200.7	8/24/03
D	Arsenic	<0.010	mg/L		200.7	8/24/03

Filtered fraction: 347523

Reviewed By: _____ Date 8/27/03

8/27/03 9:57

SVL ANALYTICAL, INC.
One Government Gulch ▪ P.O. Box 929 ▪ Kellogg, Idaho 83837-0929 ▪ Phone: (208)784-1258 ▪ Fax: (208)783-0891

Certificate: ID ID00019

CLIENT : MCS Environmental
PROJECT: 11018.016
CLIENT SAMPLE ID: STR-11-0-SW
Sample Collected: 8/08/03 17:30
Sample Receipt : 8/12/03
Date of Report : 8/27/03

SVL JOB: 107092
SAMPLE: 347516
TOT/DIS

Matrix: WATER

	Determination	Result	Units	Dilution	Method	Analyzed
T	pH	7.83			150.1	8/13/03
T	Calcium	69.1	mg/L		200.7	8/24/03
T	Chloride	0.68	mg/L		300.0	8/22/03
T	Hardness	190	mg CaCO3/L		2340B	8/24/03
T	Magnesium	4.18	mg/L		200.7	8/24/03
T	Sulfate, SO4	49.9	mg/L	5	300.0	8/22/03
T	Arsenic	<0.010	mg/L		200.7	8/24/03
T	Cadmium	0.0049	mg/L		200.7	8/24/03
T	Copper	0.0106	mg/L		200.7	8/24/03
T	Mercury	<0.00020	mg/L		245.1	8/26/03
T	Lead	0.187	mg/L		200.7	8/24/03
T	Zinc	0.595	mg/L		200.7	8/24/03
D	Arsenic	<0.010	mg/L		200.7	8/24/03

Filtered fraction: 347524

Reviewed By: _____ Date 8/27/03
8/27/03 9:57

SVL ANALYTICAL, INC.
One Government Gulch ▪ P.O. Box 929 ▪ Kellogg, Idaho 83837-0929 ▪ Phone: (208)784-1258 ▪ Fax: (208)783-0891

Certificate: ID ID00019

CLIENT : MCS Environmental
PROJECT: 11018.016
CLIENT SAMPLE ID: STR-13-0-SW
Sample Collected: 8/08/03 18:00
Sample Receipt : 8/12/03
Date of Report : 8/27/03

SVL JOB: 107092
SAMPLE: 34751
TOT/DIS

Matrix: WATER

	Determination	Result	Units	Dilution	Method	Analyzed
T	pH	8.30			150.1	8/13/03
T	Calcium	62.1	mg/L		200.7	8/24/03
T	Chloride	0.69	mg/L		300.0	8/22/03
T	Hardness	167	mg CaCO3/L		2340B	8/24/03
T	Magnesium	2.91	mg/L		200.7	8/24/03
T	Sulfate, SO4	40.6	mg/L	5	300.0	8/22/03
T	Arsenic	<0.010	mg/L		200.7	8/24/03
T	Cadmium	<0.0020	mg/L		200.7	8/24/03
T	Copper	<0.0030	mg/L		200.7	8/24/03
T	Mercury	<0.00020	mg/L		245.1	8/26/03
T	Lead	<0.0050	mg/L		200.7	8/24/03
T	Zinc	0.108	mg/L		200.7	8/24/03
D	Arsenic	<0.010	mg/L		200.7	8/24/03
D	Cadmium	<0.0020	mg/L		200.7	8/24/03
D	Copper	<0.0030	mg/L		200.7	8/24/03
D	Mercury	<0.00020	mg/L		245.1	8/26/03
D	Lead	<0.0050	mg/L		200.7	8/24/03
D	Zinc	0.112	mg/L		200.7	8/24/03

Filtered fraction: 347525

Reviewed By: _____ Date 8/27/03
8/27/03 9:57

S L ANALYTICAL, INC.

Quality Control Report
Part I Prep Blank and Laboratory Control Sample

Client :MCS Environmental

SVL JOB No: 107092

Analyte	Method	Matrix	Units	Prep Blank	True—LCS—Found	LCS %R	Analysis Date
Arsenic	200.7	WATER	mg/L	<0.010	1.00 0.940	94.0	8/24/03
Calcium	200.7	WATER	mg/L	<0.040	20.0 20.1	100.5	8/24/03
Cadmium	200.7	WATER	mg/L	<0.0020	1.00 0.942	94.2	8/24/03
Copper	200.7	WATER	mg/L	<0.0030	1.00 1.00	100.0	8/24/03
Hardness	2340B	WATER	mg/L	<0.265	132 131	99.2	8/24/03
Magnesium	200.7	WATER	mg/L	<0.040	20.0 19.5	97.5	8/24/03
Lead	200.7	WATER	mg/L	<0.0050	1.00 0.954	95.4	8/24/03
Zinc	200.7	WATER	mg/L	<0.0050	1.00 0.941	94.1	8/24/03
Mercury	245.1	WATER	mg/L	<0.0002	0.0050 0.0047	94.0	8/26/03
Chloride	300.0	WATER	mg/L	<0.20	5.00 5.01	100.2	8/22/03
Sulfate, SO4	300.0	WATER	mg/L	<0.30	10.0 9.56	95.6	8/22/03
pH	150.1	WATER		5.79	6.10 6.11	100.2	8/13/03

LEGEND:
LCS = Laboratory Control Sample LCS %R = LCS Percent Recovery N/A = Not Applicable

8/27/03 9:59

SVL ANALYTICAL, INC.

Quality Control Report
Part II Duplicate and Spike Analysis

Client :MCS Environmental — SVL JOB No: 107092

Test	Method	Matrix	QC SAMPLE ID	Units	Result	Duplicate or MSD Found	RPD%	Matrix Spike Result	SPK ADD	%R	Analysis Dat
As	200.7	WATER	1	mg/L	<0.010	<0.010	UDL	0.973	1.00	97.3	8/24/03
As	200.7	WATER	2	mg/L	<0.010	<0.010	UDL	1.03	1.00	103.0	8/24/03
Ca	200.7	WATER	1	mg/L	98.9	101	2.1	119	20.0	100.5	8/24/03
Cd	200.7	WATER	1	mg/L	<0.0020	<0.0020	UDL	0.920	1.00	92.0	8/24/03
Cd	200.7	WATER	2	mg/L	<0.0020	<0.0020	UDL	0.976	1.00	97.6	8/24/03
Cu	200.7	WATER	1	mg/L	<0.0030	<0.0030	UDL	0.990	1.00	99.0	8/24/03
Cu	200.7	WATER	2	mg/L	<0.0030	<0.0030	UDL	0.975	1.00	97.5	8/24/03
Hdns	2340B	WATER	1	mg/L	297	303	2.0	426	132	97.7	8/24/03
Mg	200.7	WATER	1	mg/L	12.1	12.3	1.6	31.2	20.0	95.5	8/24/03
Pb	200.7	WATER	1	mg/L	<0.0050	<0.0050	UDL	0.936	1.00	93.6	8/24/03
Pb	200.7	WATER	2	mg/L	<0.0050	<0.0050	UDL	0.991	1.00	99.1	8/24/03
Zn	200.7	WATER	1	mg/L	0.0641	0.0646	0.8	0.970	1.00	90.6	8/24/03
Zn	200.7	WATER	2	mg/L	0.0655	0.0653	0.3	1.04	1.00	97.5	8/24/03
Hg	245.1	WATER	1	mg/L	<0.0002	<0.0002	UDL	0.0011	0.0010	110.0	8/26/03
Hg	245.1	WATER	2	mg/L	<0.0002	<0.0002	UDL	0.0011	0.0010	110.0	8/26/03
Cl	300.0	WATER	1	mg/L	0.69	0.69	0.0	2.52	2.00	91.5	8/22/03
SO4	300.0	WATER	1	mg/L	140	140	0.0	192	50.0	104.0	8/22/03
pH	150.1	WATER	1		7.89	7.91	0.3	N/A	N/A	N/A	8/13/03

LEGEND:

RPD% = (|SAM - DUP| /((SAM + DUP)/2) * 100) UDL = Both SAM & DUP not detected. *Result or *Found: Interference required dilution.

RPD% = (|SPK - MSD| /((SPK + MSD)/2) * 100) M in Duplicate/MSD column indicates MSD.

SPIKE ADD column, A = Post Digest Spike; %R = Percent Recovery N/A = Not Analyzed; R > 4S = Result more than 4X the Spike Added

QC Sample 1: SVL SAM No.: 347510 Client Sample ID: STR-01-0-SW ^T

QC Sample 2: SVL SAM No.: 347518 Client Sample ID: STR-01-0-SW ^D

8/27/03

CHAIN OF CUSTODY RECORD

Client: MCS Environmental
Contact: Warren
Address: 5562 Alloy South
Missoula, MT 59808
Phone Number: 406-728-7755
FAX Number: 406-728-7307

NOTES:
1) Ensure proper container packaging.
2) Ship samples promptly following collection.
* 3) Designate Sample Reject Disposition

PO#: 11018.016
Project Name: Forest Rose Mine

Table 1. -- Matrix Type
1 = Surface Water, 2 = Ground Water
3 = Soil/Sediment, 4 = Rinsate, 5 = Oil
6 = Waste, 7 = Other (Specify) ____

FOR SVL USE ONLY
SVL JOB # 107092

Samplers Signature: Warren Phillips

Lab Name: SVL Analytical, Inc. (208) 784-1258 FAX (208) 783-0891
Address: One Government Gulch, Kellogg, ID 83837-0929

Sample ID	Collection: Date	Collection: Time	Collected by: (Init.)	Matrix Type From Table 1	No. of Containers	Sample Filtered ? Y/N	Preservative(s): Unpreserved (Ice Only)	HNO3	HCL	H2SO4	NAOH	Other (Specify)	Analyses Required: pH	Total Metals (As, Cd, Cu, Pb, Zn)	Dis. Metals (As, Cd, Cu, Pb, Zn)	Total Mercury	Comments
1. STR-01-0-SW	8/8/03	8:30	WPP	1	3	Y	X	X					X	X	X	X	
2. SP-03-0-SW	8/8/03	11:00	WPP	1	3	Y	X	X					X	X			
3. TS-07-0-SW	8/8/03	14:30	WPP	1	2	N	X	X					X	X			extra filtered sample received, extra NaOH samples received. Do not analyze, per Warren Phillips 8/12/03
4. DT-08-0-SW	8/8/03	15:30	WPP	1	3	Y	X	X					X	X			
5. PTD-04-0-SW	8/8/03	16:15	WPP	1	3	Y	X	X					X	X			
6. AD-12-0-SW	8/8/03	16:45	WPP	1	4	Y	X	X			X		X	X			
7. STR-11-0-SW	8/8/03	17:30	WPP	1	4	Y	X	X			X		X	X			
8. STR-13-0-SW	8/8/03	16:00	WPP	1	3	Y	X	X					X	X	X	X	
9.																	
10.																	

Relinquished by: Warren Phillips	Date: 8/11/03	Time: 16:30	Received by: Ben Matt	Date: 8/12/03	Time: 10:00
Relinquished by:	Date:	Time:	Received by:	Date:	Time:

* Sample Reject: [ ] Return [ ] Dispose [ ] Store (30 Days)

White: LAB COPY Yellow: CUSTOMER COPY

SVL-COC 12/95

SVL ANALYTICAL, INC.
One Government Gulch - Kellogg, ID 83837-0929

CLIENT: WARREN PHILLIPS
MCS Environmental
5563 Alloy South

Missoula MT 59808
FAX: (406)728-7367

SAMPLE RECEIPT CONFIRMATION

SVL JOB No: 107092
Received: 8/12/03
Expected Due date: 8/26/03

SVL#	M	ClientID		Sampled	Time	By	Received	Sample Comments
347510*	W	STR-01-0-SW	^T	8/08/03	8:30	WPP	8/12/03	
347511*	W	SP-03-0-SW	^T	8/08/03	11:00	WPP	8/12/03	
347512	W	TS-07-0-SW		8/08/03	14:30	WPP	8/12/03	
347513*	W	DT-08-0-SW	^T	8/08/03	15:30	WPP	8/12/03	
347514*	W	DTD-09-0-SW	^T	8/08/03	16:15	WPP	8/12/03	
347515*	W	AD-12-0-SW	^T	8/08/03	16:45	WPP	8/12/03	
347516*	W	STR-11-0-SW	^T	8/08/03	17:30	WPP	8/12/03	
347517*	W	STR-13-0-SW	^T	8/08/03	18:00	WPP	8/12/03	
347518*	W	STR-01-0-SW	^D	8/08/03	8:30	WPP	8/12/03	
347519*	W	SP-03-0-SW	^D	8/08/03	11:00	WPP	8/12/03	SAMPLE WILL NOT BE ANALYZED FOR DISSOLVED METALS, PER WARREN PHILLIP
347521*	W	DT-08-0-SW	^D	8/08/03	15:30	WPP	8/12/03	SAMPLE WILL NOT BE ANALYZED FOR DISSOLVED METALS, PER WARREN PHILLIP
347522*	W	DTD-09-0-SW	^D	8/08/03	16:15	WPP	8/12/03	SAMPLE WILL NOT BE ANALYZED FOR DISSOLVED METALS, PER WARREN PHILLIP
347523*	W	AD-12-0-SW	^D	8/08/03	16:45	WPP	8/12/03	SAMPLE WILL NOT BE ANALYZED FOR DISSOLVED METALS, PER WARREN PHILLIP
347524*	W	STR-11-0-SW	^D	8/08/03	17:30	WPP	8/12/03	SAMPLE WILL NOT BE ANALYZED FOR DISSOLVED METALS, PER WARREN PHILLIP
347525*	W	STR-13-0-SW	^D	8/08/03	18:00	WPP	8/12/03	

*We track Total (^T), Tot. Rec. (^R), Pot. Diss. (^P) and Dissolved (^D) fractions separately. Field samples may appear twice.

ADDITIONAL COMMENTS FOR JOB: Sample Cooler temp: 12°C.

[ ] These samples will be DISPOSED 45 days after job completion.
[X] These samples will be ARCHIVED 45 days, then you will receive a letter requesting disposal options.

Please contact Crystal Sevy (208-784-1258) if you have questions regarding the receipt of these samples. 8/12/03 15:06

CONFIRMATION REPORT - MEMORY SEND

Time : AUG-12-03 15:03
Fax number: +2087830891
Name : SVL ANALYTICAL

Job : 042
Date : AUG-12 14:49
To : 914067287367
Doc. pages : 01
Start time : AUG-12 15:02
End time : AUG-12 15:03
Pages sent : 01

Job:042 *** SEND SUCCESSFUL ***

/L ANALYTICAL, INC.
One Government Gulch ▪ P.O. Box 929 ▪ Kellogg, Idaho 83837-0929 ▪ Phone: (208)784-1258 ▪ Fax: (208)783-0891

Certificate: ID ID00019

CLIENT : MCS ENVIRONMENTAL
OJECT: 11018.016
ENT SAMPLE ID: STR-15-0.1-S
ample Collected: 9/03/03 16:30
Sample Receipt : 9/05/03
Date of Report : 9/19/03 As Received Basis

SVL JOB: 107482
SAMPLE: 352344
% Solids: 70.2%
Matrix: SOIL

Determination	Result	Units	Dilution	Method	Analyzed
Arsenic	33.0	mg/kg		6010B	9/17/03
Cadmium	11.2	mg/kg		6010B	9/17/03
Copper	38.8	mg/kg		6010B	9/17/03
MERCURY	<0.0333	mg/kg		7471A	9/12/03
Lead	201	mg/kg		6010B	9/18/03
Zinc	2170	mg/kg		6010B	9/17/03

Reviewed By: _____ Date 9/19/03
9/19/03 10:13

SVL ANALYTICAL, INC.
One Government Gulch ▪ P.O. Box 929 ▪ Kellogg, Idaho 83837-0929 ▪ Phone: (208)784-1258 ▪ Fax: (208)783-0891

Certificate: ID ID00019

CLIENT : MCS ENVIRONMENTAL
PROJECT: 11018.016
CLIENT SAMPLE ID: WRD1-16-1-WR
Sample Collected: 9/03/03 17:00
Sample Receipt : 9/05/03
Date of Report : 9/19/03

SVL JOB: 10748
SAMPLE: 35234

% Solids: 92.2%
Matrix: SOIL

Determination	Result	Units	Dilution	Method	Analyzed
ABP	261	TCaCO3/1000T		EPA600	9/12/03
Acid Generating	101	TCaCO3/1000T		EPA600	9/12/03
Acid Neut. Pot.	362	TCaCO3/1000T		EPA600	9/12/03
Non-Ext Sulfur,S	0.090	%		LECO	9/12/03
Pyritic Sulfur,S	3.22	%		LECO	9/12/03
Sulfate Sulfur,S	0.940	%		LECO	9/12/03
Total Sulfur, S	4.25	%		LECO	9/12/03
Arsenic	436	mg/kg		6010B	9/17/03
Cadmium	51.5	mg/kg		6010B	9/17/03
Copper	366	mg/kg		6010B	9/17/03
MERCURY	1.49	mg/kg	4	7471A	9/12/03
Lead	5630	mg/kg	10	6010B	9/18/03
Zinc	5710	mg/kg		6010B	9/17/03

SAMPLE SIEVED TO 2MM

Reviewed By: _____ Date 9/19/03
9/19/03 10:13

Client :MCS ENVIRONMENTAL

SVL JOB No: 107482

Analyte	Method	Matrix	Units	Prep Blank	True—LCS—Found		LCS %R	Analysis Date
[illegible]ic	6010B	SOIL	mg/kg	<1.0	110	107	97.3	9/17/03
[illegible]ium	6010B	SOIL	mg/kg	<0.20	101	99.1	98.1	9/17/03
Copper	6010B	SOIL	mg/kg	<0.30	118	121	102.5	9/17/03
Lead	6010B	SOIL	mg/kg	<0.50	102	105	102.9	9/18/03
Zinc	6010B	SOIL	mg/kg	<0.50	193	191	99.0	9/17/03
MERCURY	7471A	SOIL	mg/kg	<0.0333	3.71	3.94	106.2	9/12/03
Acid Neut. Pot.	EPA600	SOIL	TCaCO3/k	N/A	52.0	50.6	97.3	9/12/03
Non-Ext Sulfur,S	LECO	SOIL	%	<0.010	N/A		N/A	9/12/03
Pyritic Sulfur,S	LECO	SOIL	%	<0.010	N/A		N/A	9/12/03
Sulfate Sulfur,S	LECO	SOIL	%	<0.010	N/A		N/A	9/12/03
Total Sulfur, S	LECO	SOIL	%	<0.010	0.298	0.320	107.4	9/12/03

LEGEND:
LCS = Laboratory Control Sample LCS %R = LCS Percent Recovery N/A = Not Applicable

SVL ANALYTICAL, INC.

Quality Control Report
Part II Duplicate and Spike Analysis

Client :MCS ENVIRONMENTAL

SVL JOB No: 107482

Test	Method	Matrix	QC SAMPLE ID	Units	Result	Duplicate or MSD Found		RPD%	Matrix Spike Result	SPK ADD	%R	Analysis Date
As	6010B	SOIL	1	mg/kg	436	577	M	2.1	565	100	R >4S	9/17
Cd	6010B	SOIL	1	mg/kg	51.5	140	M	0.0	140	100	88.5	9/17/03
Cu	6010B	SOIL	1	mg/kg	366	516	M	11.7	459	100	93.0	9/17/03
Pb	6010B	SOIL	1	mg/kg	5630	6550	M	29.6	4860	100	R >4S	9/18/03
Zn	6010B	SOIL	1	mg/kg	5710	6050	M	0.3	6070	100	R >4S	9/17/03
Hg	7471A	SOIL	1	mg/kg	1.49	1.34		10.6	1.53	0.167	R >4S	9/12/03
% Sol.	999	SOIL	1	%	92.2	93.5		1.4	N/A	N/A	N/A	9/09/03
ABP	EPA600	SOIL	1	TCaCO3/	261	258		1.2	N/A	N/A	N/A	9/12/03
AGP	EPA600	SOIL	1	TCaCO3/	101	103		2.0	N/A	N/A	N/A	9/12/03
ANP	EPA600	SOIL	1	TCaCO3/	362	361		0.3	N/A	N/A	N/A	9/12/03
% N-EX	LECO	SOIL	1	%	0.090	0.090		0.0	N/A	N/A	N/A	9/12/03
%-PYR	LECO	SOIL	1	%	3.22	3.29		2.2	N/A	N/A	N/A	9/12/03
%-SO4	LECO	SOIL	1	%	0.940	0.880		6.6	N/A	N/A	N/A	9/12/03
%-TOT	LECO	SOIL	1	%	4.25	4.26		0.2	N/A	N/A	N/A	9/12/03

LEGEND:

RPD% = (|SAM - DUP| /((SAM + DUP)/2) * 100) UDL = Both SAM & DUP not detected. *Result or *Found: Interference required dilution.

RPD% = (|SPK - MSD| /((SPK + MSD)/2) * 100) M in Duplicate/MSD column indicates MSD.

SPIKE ADD column, A = Post Digest Spike; %R = Percent Recovery N/A = Not Analyzed; R > 4S = Result more than 4X the Spike Added

Control limits for MS recoveries apply only if the spike add is at least 0.25 times the concentration of the analyte in the sample.

Control limits for the RPD apply only if the concentration of the analyte in the sample is at least five times the reporting limit.

QC Sample 1: SVL SAM No.: 352342 Client Sample ID: WRD1-16-1-WR

CHAIN OF CUSTODY RECORD

Page 1 of 1

Client: MCS ENVIRONMENTAL, INC
Contact: WARREN PHILLIPS
Address: 5569 ALLOY SOUTH
MISSOULA, MT 59808
Phone Number: 406. 728. 7755
FAX Number: 406. 728. 7367

NOTES:
1) Ensure proper container packaging.
2) Ship samples promptly following collection.
* 3) Designate Sample Reject Disposition
PO#: 11018.010
Project Name: FOREST ROSE

Table 1. -- Matrix Type
1 = Surface Water, 2 = Ground Water
3 = Soil/Sediment, 4 = Rinsate, 5 = Oil
6 = Waste, 7 = Other (Specify) _____

Samplers Signature:

FOR SVL USE ONLY
SVL JOB # 107482

Lab Name: SVL Analytical, Inc. (208) 784-1258 FAX (208) 783-0891
Address: One Government Gulch, Kellogg, ID 83837-0929

Sample ID	Collection: Date	Collection: Time	Misc: Collected by: (Init.)	Misc: Matrix Type From Table 1	Misc: No. of Containers	Misc: Sample Filtered ? Y/N	Preservative(s): Unpreserved (Ice Only)	Preservative(s): HNO3	Preservative(s): HCL	Preservative(s): H2SO4	Preservative(s): NAOH	Preservative(s): Other (Specify)	Analyses Required: ABA	Analyses Required: TOTAL METALS for As, Cd, Cu, Pb, Hg, Zn	Comments
1. WRD1-10-1-WR	9/3/03	17:02	WPP	3	2	N	X						X	X	
2. WRD2-14-1-WR	9/3/03	16:07	WPP	3	2	N	X								HOLD SAMPLE
3. STR-15-0.1-0.5'	9/3/03	16:30	WPP	3	1	N	X							X	
4.															per Warren Phil
5.															Air dry & sieve to 2
6.															before Analysis
7.															BM
8.															9/10/03
9.															
10.															

Relinquished by:	Date:	Time:	Received by:	Date:	Time:
[signature]	9/4/03	4:02pm	Crystal Sears	9/5/03	10:00
Relinquished by:	Date:	Time:	Received by:	Date:	Time:

* Sample Reject: [ ] Return [ ] Dispose [ ] Store (30 Days)

White: LAB COPY Yellow: CUSTOMER COPY

SVL 12/95

SVL ANALYT[redacted]L, INC.
One Government Gulch - [redacted]logg, ID 83837-0929

CLIENT: TOM MCCAMANT
MCS ENVIRONMENTAL
5562 ALLOY SOUTH

MISSOULA MT 59808
FAX: (406)728-7367

SAMPLE RECEIPT CONFIRMATION

SVL JOB No: 107482
Received: 9/05/03
Expected Due date: 9/19/03

SVL#	M	ClientID	Sampled	Time	By	Received	Sample Comments
352342	S	WRD1-16-1-WR	9/03/03	17:00	WPP	9/05/03	
352343	S	WRD2-14-1-WR	9/03/03	10:00	WPP	9/05/03	SVL TO HOLD SAMPLE PER COC
352344	S	STR-15-0.1'-0.5'	9/03/03	16:30	WPP	9/05/03	

ADDITIONAL COMMENTS FOR JOB: Sample Cooler temp: 14°C.

[X] These samples will be DISPOSED 45 days after job completion.
[ ] These samples will be ARCHIVED 45 days, then you will receive a letter requesting disposal options.

Please contact Crystal Sevy (208-784-1258) if you have questions regarding the receipt of these samples. 9/05/03 16:27

SVL ANALYTICAL, INC.
One Government Gulch ▪ P.O. Box 929 ▪ Kellogg, Idaho 83837-0929 ▪ Phone: (208)784-1258 ▪ Fax: (208)783-0891

Certificate: ID ID00019

CLIENT : MCS ENVIRONMENTAL
PROJECT: 11018.016
CLIENT SAMPLE ID: WRD1-16-1-WR
Sample Collected: 9/03/03 17:00
Sample Receipt : 9/23/03
Date of Report : 10/06/03

SVL JOB: 107808
SAMPLE: 356174

Matrix: ESOIL
Extraction: SPLP

Determination	Result	Units	Dilution	Method	Analyzed
Arsenic	<0.010	mg/L EXT		200.7	10/05/03
Cadmium	<0.0020	mg/L EXT		200.7	10/05/03
Copper	<0.0030	mg/L EXT		200.7	10/05/03
Lead	<0.0050	mg/L EXT		200.7	10/05/03
Zinc	0.0518	mg/L EXT		200.7	10/05/03

SAMPLE FROM PREVIOUS SVL JOB #107482

Reviewed By: _____ Date 10/6/03
10/06/03 13:48

SVL ANALYTICAL, INC.

Quality Control Report
Part I Prep Blank and Laboratory Control Sample

Client :MCS ENVIRONMENTAL

SVL JOB No: 107808

Analyte	Method	Matrix	Units	Prep Blank	True	LCS	Found	LCS %R	Analysis Date
Arsenic	200.7	ESOIL	mg/L EXT	<0.010	1.00		0.948	94.8	10/05/
Cadmium	200.7	ESOIL	mg/L EXT	<0.0020	1.00		0.974	97.4	10/05/03
Copper	200.7	ESOIL	mg/L EXT	<0.0030	1.00		1.01	101.0	10/05/03
Lead	200.7	ESOIL	mg/L EXT	<0.0050	1.00		0.964	96.4	10/05/03
Zinc	200.7	ESOIL	mg/L EXT	<0.0050	1.00		0.962	96.2	10/05/03

LEGEND:

LCS = Laboratory Control Sample LCS %R = LCS Percent Recovery N/A = Not Applicable

Client :MCS ENVIRONMENTAL

SVL JOB No: 107808

Test	Method	Matrix	QC SAMPLE ID Units	Result	Duplicate or MSD Found	RPD%	Matrix Spike Result	SPK ADD	%R	Analysis Date
A	200.7	ESOIL	1 mg/L EX	<0.010	<0.010	UDL	0.930	1.00	93.0	10/05/03
Cu	200.7	ESOIL	1 mg/L EX	<0.0020	<0.0020	UDL	0.933	1.00	93.3	10/05/03
Cu	200.7	ESOIL	1 mg/L EX	<0.0030	<0.0030	UDL	1.03	1.00	103.0	10/05/03
P	200.7	ESOIL	1 mg/L EX	<0.0050	<0.0050	UDL	0.948	1.00	94.8	10/05/03
Z	200.7	ESOIL	1 mg/L EX	0.0518	0.0515	0.6	0.952	1.00	90.0	10/05/03

LEGEND:

R)% = (|SAM - DUP|/((SAM + DUP)/2) * 100) UDL = Both SAM & DUP not detected. *Result or *Found: Interference required dilution.

R)% = (|SPK - MSD|/((SPK + MSD)/2) * 100) M in Duplicate/MSD column indicates MSD.

SPIKE ADD column, A = Post Digest Spike; %R = Percent Recovery N/A = Not Analyzed; R > 4S = Result more than 4X the Spike Added

Control limits for MS recoveries apply only if the spike add is at least 0.25 times the concentration of the analyte in the sample.

C ntrol limits for the RPD apply only if the concentration of the analyte in the sample is at least five times the reporting limit.

Sample 1: SVL SAM No.: 356174 Client Sample ID: WRD1-16-1-WR

107808

Chris Meyer

From: Warren Phillips [warren.p@mcs-environmental.com]
Sent: Friday, September 19, 2003 11:47 AM
To: Chris Meyer
Subject: RE: Forest Rose Sample

Re: #107482 (sample #352342)

- SPLP w/ As, Cd, Cu, Pb, Zn

80+20+(5x4)+10 = 130 -15% = $110.50

Ar, Cd, Cu, Pb, Zn

-----Original Message-----
From: Chris Meyer [mailto:chris@svl.net]
Sent: Friday, September 19, 2003 12:28 PM
To: Warren Phillips
Subject: RE: Forest Rose Sample

Warren....
Which metals do you want analyzed on the SPLP extract? We'll set it up once I know which metals you need. Thanks.....

> -----Original Message-----
> From: Warren Phillips [mailto:warren.p@mcs-environmental.com]
> Sent: Friday, September 19, 2003 11:31 AM
> To: chris@svl.net
> Subject: Forest Rose Sample
>
>
> Hi Chris could you please analyze sample #352342 for Job: 107482
> for SPLP please
>
> Thanks,
>
> Warren
>

From

SVL ANALYTICAL, INC.
One Government Gulch - Kellogg, ID 83837-0929

SAMPLE RECEIPT CONFIRMATION

CLIENT: TOM MCCAMANT
MCS ENVIRONMENTAL
5562 ALLOY SOUTH

MISSOULA MT 59808
FAX: (406)728-7367

SVL JOB No: 107482
Received: 9/05/03
Expected Due date: 9/19/03

SVL#	M	ClientID	Sampled	Time	By	Received	Sample Comments
352342	S	WRD1-16-1-WR	9/03/03	17:00	WPP	9/05/03	SAMPLE SIEVED TO 2MM
352343	S	WRD2-14-1-WR	9/03/03	10:00	WPP	9/05/03	SVL TO HOLD SAMPLE PER COC
352344	S	STR-15-0.1-S	9/03/03	16:30	WPP	9/05/03	

ADDITIONAL COMMENTS FOR JOB: Sample Cooler temp: 14°C.

[X] These samples will be DISPOSED 45 days after job completion.
[ ] These samples will be ARCHIVED 45 days, then you will receive a letter requesting disposal options.

Please cont[redacted]rystal Sevy (208-784-1258) if you have question[redacted]arding the receipt of these samples. 9/23[redacted]7:32

SVL ANALYTICAL, INC.
One Government Gulch ▪ P.O. Box 929 ▪ Kellogg, Idaho 83837-0929 ▪ Phone: (208)784-1258 ▪ Fax: (208)783-0891

Certificate: ID ID00019

CLIENT : MCS ENVIRONMENTAL
PROJECT: 11018.016
CLIENT SAMPLE ID: B1-17-10-T
Sample Collected: 9/30/03 11:00
Sample Receipt : 10/03/03
Date of Report : 10/21/03 As Received Basis

SVL JOB: 108046
SAMPLE: 358890
% Solids: 73.1%
Matrix: SOIL

Determination	Result	Units	Dilution	Method	Analyzed
ABP	117	TCaCO3/1000T		EPA600	10/17/03
Acid Generating	165	TCaCO3/1000T		EPA600	10/17/03
Acid Neut. Pot.	282	TCaCO3/1000T		EPA600	10/17/03
Non-Ext Sulfur,S	0.050	%		LECO	10/17/03
Pyritic Sulfur,S	5.27	%		LECO	10/17/03
Sulfate Sulfur,S	0.570	%		LECO	10/17/03
Total Sulfur, S	5.89	%		LECO	10/17/03
Arsenic	139	mg/kg		6010B	10/20/03
Cadmium	65.8	mg/kg		6010B	10/20/03
Copper	639	mg/kg	10	6010B	10/20/03
Lead	506	mg/kg		6010B	10/20/03
Zinc	7030	mg/kg		6010B	10/20/03

Reviewed By: _____ Date 10/21/03
10/21/03 11:16

SVL ANALYTICAL, INC.
One Government Gulch ▪ P.O. Box 929 ▪ Kellogg, Idaho 83837-0929 ▪ Phone: (208)784-1258 ▪ Fax: (208)783-0891

Certificate: ID ID00019

CLIENT : MCS ENVIRONMENTAL
PROJECT: 11018.016
CLIENT SAMPLE ID: B1-18-20-T
Sample Collected: 9/30/03 12:30
Sample Receipt : 10/03/03
Date of Report : 10/21/03 As Received Basis

SVL JOB: 108046
SAMPLE: 358897

% Solids: 74.6%
Matrix: SOIL

Determination	Result	Units	Dilution	Method	Analyzed
ABP	430	TCaCO3/1000T		EPA600	10/17/03
Acid Generating	107	TCaCO3/1000T		EPA600	10/17/03
Acid Neut. Pot.	537	TCaCO3/1000T		EPA600	10/17/03
Non-Ext Sulfur,S	0.020	%		LECO	10/17/03
Pyritic Sulfur,S	3.42	%		LECO	10/17/03
Sulfate Sulfur,S	0.530	%		LECO	10/17/03
Total Sulfur, S	3.97	%		LECO	10/17/03
Arsenic	231	mg/kg		6010B	10/20/03
Cadmium	40.5	mg/kg		6010B	10/20/03
Copper	664	mg/kg	10	6010B	10/20/03
Lead	4790	mg/kg	10	6010B	10/20/03
Zinc	4140	mg/kg		6010B	10/20/03

Reviewed By: _____ Date 10/21/03
10/21/03 11:16

SVL ANALYTICAL, INC.
One Government Gulch ▪ P.O. Box 929 ▪ Kellogg, Idaho 83837-0929 ▪ Phone: (208)784-1258 ▪ Fax: (208)783-0891

Certificate: ID ID00019

CLIENT : MCS ENVIRONMENTAL
PROJECT: 11018.016
CLIENT SAMPLE ID: B1-19-30-S
Sample Collected: 9/30/03 13:30
Sample Receipt : 10/03/03
Date of Report : 10/21/03 As Received Basis

SVL JOB: 108046
SAMPLE: 35889
% Solids: 82.5%
Matrix: SOIL

Determination	Result	Units	Dilution	Method	Analyzed
Arsenic	38.1	mg/kg		6010B	10/20/03
Cadmium	6.58	mg/kg		6010B	10/20/03
Copper	99.4	mg/kg		6010B	10/20/03
Lead	353	mg/kg		6010B	10/20/03
Zinc	1110	mg/kg		6010B	10/20/03

Reviewed By: _____ Date 10/21/03
10/21/03 11:16

SVL ANALYTICAL, INC.
One Government Gulch ▪ P.O. Box 929 ▪ Kellogg, Idaho 83837-0929 ▪ Phone: (208)784-1258 ▪ Fax: (208)783-0891

Certificate: ID ID00019

CLIENT : MCS ENVIRONMENTAL
PROJECT: 11018.016
CLIENT SAMPLE ID: B3-22-10-T
Sample Collected: 10/01/03 8:00
Sample Receipt : 10/03/03
Date of Report : 10/21/03 As Received Basis

SVL JOB: 108046
SAMPLE: 358901

% Solids: 88.0%
Matrix: SOIL

Determination	Result	Units	Dilution	Method	Analyzed
ABP	-153	TCaCO3/1000T		EPA600	10/17/03
Acid Generating	393	TCaCO3/1000T		EPA600	10/17/03
Acid Neut. Pot.	240	TCaCO3/1000T		EPA600	10/17/03
Non-Ext Sulfur,S	0.040	%		LECO	10/17/03
Pyritic Sulfur,S	12.6	%		LECO	10/17/03
Sulfate Sulfur,S	2.20	%		LECO	10/17/03
Total Sulfur, S	14.8	%		LECO	10/17/03
Arsenic	540	mg/kg		6010B	10/20/03
Cadmium	70.4	mg/kg		6010B	10/20/03
Copper	573	mg/kg	10	6010B	10/20/03
Lead	853	mg/kg		6010B	10/20/03
Zinc	7930	mg/kg		6010B	10/20/03

Reviewed By: _____ Date 10/22/03
10/21/03 11:16

SVL ANALYTICAL, INC.
One Government Gulch ▪ P.O. Box 929 ▪ Kellogg, Idaho 83837-0929 ▪ Phone: (208)784-1258 ▪ Fax: (208)783-0891

Certificate: ID ID00019

CLIENT : MCS ENVIRONMENTAL
PROJECT: 11018.016
CLIENT SAMPLE ID: B3-23-20-T
Sample Collected: 10/01/03 8:45
Sample Receipt : 10/03/03
Date of Report : 10/21/03 As Received Basis

SVL JOB: 108046
SAMPLE: 35890

% Solids: 77.1%
Matrix: SOIL

Determination	Result	Units	Dilution	Method	Analyzed
ABP	136	TCaCO3/1000T		EPA600	10/17/03
Acid Generating	223	TCaCO3/1000T		EPA600	10/17/03
Acid Neut. Pot.	359	TCaCO3/1000T		EPA600	10/17/03
Non-Ext Sulfur,S	0.130	%		LECO	10/17/03
Pyritic Sulfur,S	7.13	%		LECO	10/17/03
Sulfate Sulfur,S	0.080	%		LECO	10/17/03
Total Sulfur, S	7.34	%		LECO	10/17/03
Arsenic	266	mg/kg		6010B	10/20/03
Cadmium	36.2	mg/kg		6010B	10/20/03
Copper	391	mg/kg	10	6010B	10/20/03
Lead	2300	mg/kg		6010B	10/20/03
Zinc	4460	mg/kg		6010B	10/20/03

Reviewed By: _____ Date 10/21/03
10/21/03 11:16

SVL ANALYTICAL, INC.
One Government Gulch ▪ P.O. Box 929 ▪ Kellogg, Idaho 83837-0929 ▪ Phone: (208)784-1258 ▪ Fax: (208)783-0891

Certificate: ID ID00019

CLIENT : MCS ENVIRONMENTAL
PROJECT: 11018.016
CLIENT SAMPLE ID: B3-24-40-T
Sample Collected: 10/01/03 9:30
Sample Receipt : 10/03/03
Date of Report : 10/21/03 As Received Basis

SVL JOB: 108046
SAMPLE: 358903
% Solids: 73.9%
Matrix: SOIL

Determination	Result	Units	Dilution	Method	Analyzed
ABP	195	TCaCO3/1000T		EPA600	10/17/03
Acid Generating	199	TCaCO3/1000T		EPA600	10/17/03
Acid Neut. Pot.	395	TCaCO3/1000T		EPA600	10/17/03
Non-Ext Sulfur,S	0.180	%		LECO	10/17/03
Pyritic Sulfur,S	6.37	%		LECO	10/17/03
Sulfate Sulfur,S	0.320	%		LECO	10/17/03
Total Sulfur, S	6.87	%		LECO	10/17/03
Arsenic	367	mg/kg		6010B	10/20/03
Cadmium	50.9	mg/kg		6010B	10/20/03
Copper	449	mg/kg	10	6010B	10/20/03
Lead	3780	mg/kg		6010B	10/20/03
Zinc	5420	mg/kg		6010B	10/20/03

Reviewed By: _____ Date 10/22/03
10/21/03 11:16

SVL ANALYTICAL, INC.
One Government Gulch ▪ P.O. Box 929 ▪ Kellogg, Idaho 83837-0929 ▪ Phone: (208)784-1258 ▪ Fax: (208)783-0891

Certificate: ID ID00019

CLIENT : MCS ENVIRONMENTAL
PROJECT: 11018.016
CLIENT SAMPLE ID: B3-25-50.5-S
Sample Collected: 10/01/03 10:30
Sample Receipt : 10/03/03
Date of Report : 10/21/03 As Received Basis

SVL JOB: 108046
SAMPLE: 35890

% Solids: 87.4%
Matrix: SOIL

Determination	Result	Units	Dilution	Method	Analyzed
Arsenic	44.0	mg/kg		6010B	10/20/03
Cadmium	8.49	mg/kg		6010B	10/20/03
Copper	333	mg/kg		6010B	10/20/03
Lead	700	mg/kg		6010B	10/20/03
Zinc	1030	mg/kg		6010B	10/20/03

Reviewed By: _____ Date 10/21/03
10/21/03 11:16

SVL ANALYTICAL, INC.
One Government Gulch ▪ P.O. Box 929 ▪ Kellogg, Idaho 83837-0929 ▪ Phone: (208)784-1258 ▪ Fax: (208)783-0891

Certificate: ID ID00019

CLIENT : MCS ENVIRONMENTAL
PROJECT: 11018.016
CLIENT SAMPLE ID: B3-24-40-T
Sample Collected: 10/01/03 9:30
Sample Receipt : 10/03/03
Date of Report : 10/21/03 As Received Basis

SVL JOB: 108046
SAMPLE: 358903
% Solids: 73.9%
Matrix: SOIL

Determination	Result	Units	Dilution	Method	Analyzed
ABP	195	TCaCO3/1000T		EPA600	10/17/03
Acid Generating	199	TCaCO3/1000T		EPA600	10/17/03
Acid Neut. Pot.	395	TCaCO3/1000T		EPA600	10/17/03
Non-Ext Sulfur,S	0.180	%		LECO	10/17/03
Pyritic Sulfur,S	6.37	%		LECO	10/17/03
Sulfate Sulfur,S	0.320	%		LECO	10/17/03
Total Sulfur, S	6.87	%		LECO	10/17/03
Arsenic	367	mg/kg		6010B	10/20/03
Cadmium	50.9	mg/kg		6010B	10/20/03
Copper	449	mg/kg	10	6010B	10/20/03
Lead	3780	mg/kg		6010B	10/20/03
Zinc	5420	mg/kg		6010B	10/20/03

Reviewed By: _____ Date 10/22/03
10/21/03 11:16

SVL ANALYTICAL, INC.
One Government Gulch ▪ P.O. Box 929 ▪ Kellogg, Idaho 83837-0929 ▪ Phone: (208)784-1258 ▪ Fax: (208)783-0891

Certificate: ID ID00019

CLIENT : MCS ENVIRONMENTAL
PROJECT: 11018.016
CLIENT SAMPLE ID: B3-25-50.5-S
Sample Collected: 10/01/03 10:30
Sample Receipt : 10/03/03
Date of Report : 10/21/03 As Received Basis

SVL JOB: 108046
SAMPLE: 35890

% Solids: 87.4%
Matrix: SOIL

Determination	Result	Units	Dilution	Method	Analyzed
Arsenic	44.0	mg/kg		6010B	10/20/03
Cadmium	8.49	mg/kg		6010B	10/20/03
Copper	333	mg/kg		6010B	10/20/03
Lead	700	mg/kg		6010B	10/20/03
Zinc	1030	mg/kg		6010B	10/20/03

Reviewed By: _____ Date 10/21/03
10/21/03 11:16

SVL ANALYTICAL, INC.
One Government Gulch ▪ P.O. Box 929 ▪ Kellogg, Idaho 83837-0929 ▪ Phone: (208)784-1258 ▪ Fax: (208)783-0891

Certificate: ID ID00019

CLIENT : MCS ENVIRONMENTAL
PROJECT: 11018.016
CLIENT SAMPLE ID: B3-29-49-T
Sample Collected: 10/01/03 10:15
Sample Receipt : 10/03/03
Date of Report : 10/21/03 As Received Basis

SVL JOB: 108046
SAMPLE: 358908
% Solids: 77.3%
Matrix: SOIL

Determination	Result	Units	Dilution	Method	Analyzed
ABP	512	TCaCO3/1000T		EPA600	10/17/03
Acid Generating	113	TCaCO3/1000T		EPA600	10/17/03
Acid Neut. Pot.	625	TCaCO3/1000T		EPA600	10/17/03
Non-Ext Sulfur,S	0.030	%		LECO	10/17/03
Pyritic Sulfur,S	3.60	%		LECO	10/17/03
Sulfate Sulfur,S	0.420	%		LECO	10/17/03
Total Sulfur, S	4.05	%		LECO	10/17/03
Arsenic	243	mg/kg		6010B	10/20/03
Cadmium	32.3	mg/kg		6010B	10/20/03
Copper	428	mg/kg	10	6010B	10/20/03
Lead	6000	mg/kg	10	6010B	10/20/03
Zinc	3320	mg/kg		6010B	10/20/03

Reviewed By: _____ Date 10/21/03
10/21/03 11:16

SVL ANALYTICAL, INC.

Quality Control Report
Part I Prep Blank and Laboratory Control Sample

Client :MCS ENVIRONMENTAL

SVL JOB No: 108046

Analyte	Method	Matrix	Units	Prep Blank	True	LCS	Found	LCS %R	Analysis Date
Arsenic	6010B	SOIL	mg/kg	<1.0	110		117	106.4	10/20/
Cadmium	6010B	SOIL	mg/kg	<0.20	101		105	104.0	10/20/03
Copper	6010B	SOIL	mg/kg	<0.30	118		129	109.3	10/20/03
Lead	6010B	SOIL	mg/kg	<0.50	102		105	102.9	10/20/03
Zinc	6010B	SOIL	mg/kg	<0.50	193		189	97.9	10/20/03
Acid Neut. Pot.	EPA600	SOIL	TCaCO3/k	N/A	52.0		49.2	94.6	10/17/03
Non-Ext Sulfur,S	LECO	SOIL	%	<0.010	N/A			N/A	10/17/03
Pyritic Sulfur,S	LECO	SOIL	%	<0.010	N/A			N/A	10/17/03
Sulfate Sulfur,S	LECO	SOIL	%	<0.010	N/A			N/A	10/17/03
Total Sulfur, S	LECO	SOIL	%	<0.010	0.298		0.280	94.0	10/17/03

LEGEND:

LCS = Laboratory Control Sample LCS %R = LCS Percent Recovery N/A = Not Applicable

Client :MCS ENVIRONMENTAL

SVL JOB No: 108046

Test	Method	Matrix	QC SAMPLE ID	Units	Result	Duplicate or MSD Found		RPD%	Matrix Spike Result	SPK ADD		%R	Analysis Date
[illegible]	6010B	SOIL	1	mg/kg	139	244	M	22.5	306	100		167.0	10/20/03
[illegible]	6010B	SOIL	1	mg/kg	139	N/A		N/A	231	100	A	92.0	10/20/03
[illegible]d	6010B	SOIL	1	mg/kg	65.8	144	M	20.0	176	100		110.2	10/20/03
[illegible]	6010B	SOIL	1	mg/kg	639	667	M	32.8	929	100		R >4S	10/20/03
[illegible]	6010B	SOIL	1	mg/kg	506	521	M	106.6	1710	100		R >4S	10/20/03
[illegible]	6010B	SOIL	1	mg/kg	7030	5730	M	40.4	8630	100		R >4S	10/20/03
[illegible] Sol.	999	SOIL	1	%	73.1			N/A	N/A	N/A		N/A	10/15/03
[illegible]	EPA600	SOIL	1	TCaCO3/	117	115		1.7	N/A	N/A		N/A	10/17/03
[illegible]	EPA600	SOIL	1	TCaCO3/	165	166		0.6	N/A	N/A		N/A	10/17/03
[illegible]	EPA600	SOIL	1	TCaCO3/	282	281		0.4	N/A	N/A		N/A	10/17/03
[illegible] N-EX	LECO	SOIL	1	%	0.050	0.050		0.0	N/A	N/A		N/A	10/17/03
[illegible] YR	LECO	SOIL	1	%	5.27	5.30		0.6	N/A	N/A		N/A	10/17/03
[illegible] O4	LECO	SOIL	1	%	0.570	0.540		5.4	N/A	N/A		N/A	10/17/03
[illegible]-TOT	LECO	SOIL	1	%	5.89	5.89		0.0	N/A	N/A		N/A	10/17/03

LEGEND:

R[illegible]% = (|SAM - DUP|/((SAM + DUP)/2) * 100) UDL = Both SAM & DUP not detected. *Result or *Found: Interference required dilution.

RPD% = (|SPK - MSD|/((SPK + MSD)/2) * 100) M in Duplicate/MSD column indicates MSD.

S[illegible]KE ADD column, A = Post Digest Spike; %R = Percent Recovery N/A = Not Analyzed; R > 4S = Result more than 4X the Spike Added

C[illegible]trol limits for MS recoveries apply only if the spike add is at least 0.25 times the concentration of the analyte in the sample.

Control limits for the RPD apply only if the concentration of the analyte in the sample is at least five times the reporting limit.

QC Sample 1: SVL SAM No.: 358896 Client Sample ID: B1-17-10-T

CHAIN OF CUSTODY RECORD

Page _____ of _____

Client: Forest MCS Environmental Inc
Contact: Warren
Address: 5562 Alley South
Missoula, MT, 59808
Phone Number: 406-728-7755
FAX Number: 406-728-7367

NOTES:
1) Ensure proper container packaging.
2) Ship samples promptly following collection.
* 3) Designate Sample Reject Disposition
PO#: 11014.016
Project Name: Forest Rose Mine

Table 1. -- Matrix Type
1 = Surface Water, 2 = Ground Water
3 = Soil/Sediment, 4 = Rinsate, 5 = Oil
6 = Waste, 7 = Other (Specify) _____

FOR SVL USE ONLY
SVL JOB # 108046

Samplers Signature:

Lab Name: SVL Analytical, Inc. (208) 784-1258 FAX (208) 783-0891
Address: One Government Gulch, Kellogg, ID 83837-0929

Sample ID	Collection: Date	Collection: Time	Misc: Collected by: (Init.)	Misc: Matrix Type From Table 1	Misc: No. of Containers	Misc: Sample Filtered ? Y/N	Preservative(s): Unpreserved (Ice Only)	Preservative(s): HNO3	Preservative(s): HCL	Preservative(s): H2SO4	Preservative(s): NAOH	Preservative(s): Other (Specify)	Analyses Required: As Cd Cu Pb Zn (6010B)	Analyses Required: ABAs	Analyses per Warren Phillips 10/6/03 3:00 PM	Hold others
1. B1-17-10-T	9/30/03	11:00	WPP	3	1	N	X						X	X		
2. B1-18-20-T	9/30/03	12:30	WPP	3	1	N	X						X	X		
3. B1-19-30-S	9/30/03	13:30	WPP	3	1	N	X						X	X		
4. B2-20-10-T	9/30/03	15:00	WPP	3	1	N	X									
5. B2-21-19.5-T	9/30/03	15:30	WPP	3	1	N	X									
6. B3-22-10-T	10/1/03	8:00	WPP	3	1	N	X						X	X		
7. B3-23-20-T	10/1/03	8:45	WPP	3	1	N	X						X	X		
8. B3-24-40-T	10/1/03	9:30	WPP	3	1	N	X						X	X		
9. B3-25-50.5-S	10/1/03	10:30	WPP	3	1	N	X						X			
10. B4-26-10-T	10/1/03	12:30	WPP	3	1	N	X									

Please Call on Monday
Comments for Analysis Request
Hold

Relinquished by: Warren Phillips	Date: 10/2/03	Time: 17:00	Received by: Heidi Barnes	Date: 10-3-03	Time: 10:00
Relinquished by:	Date:	Time:	Received by:	Date:	Time:

* S[illegible] Reject: [ ] Return [ ] Dispose [ ] Store (30 Days)

White: LAB COPY Yellow: CUSTOMER COPY

OC 12/95

CHAIN OF CUSTODY RECORD

Page ____ of ____

Client: MCS Environmental Inc.
Contact: Warren
Address: 5562 Alloy South
Missoula, MT 59808
Phone Number: 406-728-7367
FAX Number: 406-728-7755

NOTES:
1) Ensure proper container packaging.
2) Ship samples promptly following collection.
* 3) Designate Sample Reject Disposition
PO#:
Project Name:

Table 1. -- Matrix Type
1 = Surface Water, 2 = Ground Water
3 = Soil/Sediment, 4 = Rinsate, 5 = Oil
6 = Waste, 7 = Other (Specify) _____

Samplers Signature:

FOR SVL USE ONLY
SVL JOB # 108046

Lab Name: SVL Analytical, Inc. (208) 784-1258 FAX (208) 783-0891
Address: One Government Gulch, Kellogg, ID 83837-0929

Sample ID	Collection		Miscellaneous				Preservative(s)						Analyses Required										Comments
	Date	Time	Collected by: (Init.)	Matrix Type From Table 1	No. of Containers	Sample Filtered ? Y/N	Unpreserved (Ice Only)	HNO3	HCL	H2SO4	NAOH	Other (Specify)	As, Cd, Cu, Pb, Zn 6010B	TCLP	VOA								
1. B4-27-20-T	10/1/03	13:00	WPP	3	1	N	X																Please Hold
2. B4-28-30-T	10/1/03	13:30	WPP	3	1	N	X																↓
3. B3-29-49-T	10/1/03	10:15	WPP	3	1	N	X						X	X									
4.																							
5.																							
6.																							
7.																							
8.																							
9.																							
10.																							

Relinquished by: Warren Mallegos	Date: 10/2/03	Time: 7:00	Received by: Heidi Barnes	Date: 10-3-03	Time: 10:00
Relinquished by:	Date:	Time:	Received by:	Date:	Time:

* Sample Reject: [ ] Return [ ] Dispose [ ] Store (30 Days)

White: LAB COPY Yellow: CUSTOMER COPY SVL-COC 12/95

SVL ANALYTICAL, INC.
One Government Gulch ▪ P.O. Box 929 ▪ Kellogg, Idaho 83837-0929 ▪ Phone: (208)784-1258 ▪ Fax: (208)783-0891

Certificate: ID ID00019

CLIENT : MCS ENVIRONMENTAL
PROJECT: 11018.016
CLIENT SAMPLE ID: PZ1-30-16-GW
Sample Collected: 11/05/03 11:20
Sample Receipt : 11/06/03
Date of Report : 11/16/03

SVL JOB: 108526
SAMPLE: 364036

Matrix: WATERG

Determination	Result	Units	Dilution	Method	Analyzed
ALKALINITY	286	mg CaCO3/L		2320B	11/12/03
CO3, CaCO3	<1.0	mg CaCO3/L		2320B	11/12/03
HCO3, CaCO3	286	mg CaCO3/L		2320B	11/12/03
pH	7.14			150.1	11/12/03
Cyanide-TOT	<0.010	mg/L		335.4	11/18/03
Arsenic	<0.010	mg/L		200.7	11/17/03
Cadmium	<0.0020	mg/L		200.7	11/17/03
Copper	0.0035	mg/L		200.7	11/17/03
Lead	0.0128	mg/L		200.7	11/17/03
Zinc	0.201	mg/L		200.7	11/17/03

Reviewed By: _____ Date 1/6/04
1/06/04 9:22

SVL ANALYTICAL, INC.
One Government Gulch ▪ P.O. Box 929 ▪ Kellogg, Idaho 83837-0929 ▪ Phone: (208)784-1258 ▪ Fax: (208)783-0891

Certificate: ID ID00019

CLIENT : MCS ENVIRONMENTAL
PROJECT: 11018.016
CLIENT SAMPLE ID: PZ2-31-9-GW
Sample Collected: 11/05/03 11:50
Sample Receipt : 11/06/03
Date of Report : 11/16/03

SVL JOB: 108526
SAMPLE: 364037

Matrix: WATERG

Determination	Result	Units	Dilution	Method	Analyzed
ALKALINITY	184	mg CaCO3/L		2320B	11/12/03
CO3, CaCO3	<1.0	mg CaCO3/L		2320B	11/12/03
HCO3, CaCO3	184	mg CaCO3/L		2320B	11/12/03
pH	7.50			150.1	11/12/03
Arsenic	<0.010	mg/L		200.7	11/17/03
Cadmium	<0.0020	mg/L		200.7	11/17/03
Copper	0.0057	mg/L		200.7	11/17/03
Lead	0.0381	mg/L		200.7	11/17/03
Zinc	0.0982	mg/L		200.7	11/17/03

Reviewed By: _____ Date 1/6/04
1/06/04 9:22

SVL ANALYTICAL, INC.
One Government Gulch ▪ P.O. Box 929 ▪ Kellogg, Idaho 83837-0929 ▪ Phone: (208)784-1258 ▪ Fax: (208)783-0891

Certificate: ID ID00019

CLIENT : MCS ENVIRONMENTAL
PROJECT: 11018.016
CLIENT SAMPLE ID: PZ3-32-51-GW
Sample Collected: 11/05/03 12:30
Sample Receipt : 11/06/03
Date of Report : 11/16/03

SVL JOB: 108526
SAMPLE: 3640

Matrix: WATERG

Determination	Result	Units	Dilution	Method	Analyzed
ALKALINITY	163	mg CaCO3/L		2320B	11/12/03
CO3, CaCO3	<1.0	mg CaCO3/L		2320B	11/12/03
HCO3, CaCO3	163	mg CaCO3/L		2320B	11/12/03
pH	7.50			150.1	11/12/03
Arsenic	<0.010	mg/L		200.7	11/17/03
Cadmium	<0.0020	mg/L		200.7	11/17/03
Copper	0.0038	mg/L		200.7	11/17/03
Lead	0.0802	mg/L		200.7	11/17/03
Zinc	0.469	mg/L		200.7	11/17/03

Reviewed By: _____ Date 1/6/04
1/06/04 9:22

SVL ANALYTICAL, INC.
One Government Gulch ▪ P.O. Box 929 ▪ Kellogg, Idaho 83837-0929 ▪ Phone: (208)784-1258 ▪ Fax: (208)783-0891

Certificate: ID ID00019

CLIENT : MCS ENVIRONMENTAL
PROJECT: 11018.016
CLIENT SAMPLE ID: PZ4-33-41-GW
Sample Collected: 11/05/03 12:50
Sample Receipt : 11/06/03
Date of Report : 11/16/03

SVL JOB: 108526
SAMPLE: 364039

Matrix: WATERG

Determination	Result	Units	Dilution	Method	Analyzed
Arsenic	6.92	mg/L		200.7	11/17/03
Cadmium	1.64	mg/L		200.7	11/17/03
Copper	5.57	mg/L		200.7	11/17/03
Lead	71.9	mg/L	10	200.7	11/17/03
Zinc	249	mg/L	10	200.7	11/17/03

Reviewed By: _____ Date 1/6/04
1/06/04 9:22

SVL ANALYTICAL, INC.

Quality Control Report
Part I Prep Blank and Laboratory Control Sample

Client :MCS ENVIRONMENTAL

SVL JOB No: 108526

Analyte	Method	Matrix	Units	Prep Blank	True	LCS	Found	LCS %R	Analysis Date
Arsenic	200.7	WATER	mg/L	<0.010	1.00		0.963	96.3	11/1[redacted]
Cadmium	200.7	WATER	mg/L	<0.0020	1.00		0.992	99.2	11/17/03
Copper	200.7	WATER	mg/L	<0.0030	1.00		1.06	106.0	11/17/03
Lead	200.7	WATER	mg/L	<0.0050	1.00		0.987	98.7	11/17/03
Zinc	200.7	WATER	mg/L	<0.0050	1.00		0.971	97.1	11/17/03
Cyanide-TOT	335.4	WATER	mg/L	<0.010	0.150		0.158	105.3	11/18/03
ALKALINITY	2320B	WATER	mg/L	<1.0	55.0		57.8	105.1	11/12/03
pH	150.1	WATER		5.52	7.42		7.43	100.1	11/12/03

LEGEND:

LCS = Laboratory Control Sample LCS %R = LCS Percent Recovery N/A = Not Applicable

SVL ANALYTICAL, INC.

Quality Control Report
Part II Duplicate and Spike Analysis

Client :MCS ENVIRONMENTAL

SVL JOB No: 108526

Test	Method	Mtx	QC SAMPLE ID	Units	Result	Duplicate or MSD Found	RPD%	Matrix Spike Result	SPK ADD	%R	Analysis Date
[redacted]	200.7	W	1	mg/L	<0.010	<0.010	UDL	0.976	1.00	97.6	11/17/03
Cd	200.7	W	1	mg/L	<0.0020	<0.0020	UDL	0.937	1.00	93.7	11/17/03
Cu	200.7	W	1	mg/L	0.0035	<0.0030	200.0	1.04	1.00	103.7	11/17/03
Pb	200.7	W	1	mg/L	0.0128	0.0123	4.0	0.962	1.00	94.9	11/17/03
Zn	200.7	W	1	mg/L	0.201	0.199	1.0	1.09	1.00	88.9	11/17/03
CN	335.4	W	1	mg/L	<0.010	<0.010	UDL	0.118	0.100	118.0	11/18/03
ALK	2320B	W	1	mg/L	286	287	0.3	N/A	N/A	N/A	11/12/03
HCO3	2320B	W	1	mg/L	<1.0	<1.0	UDL	N/A	N/A	N/A	11/12/03
CO3	2320B	W	1	mg/L	286	287	0.3	N/A	N/A	N/A	11/12/03
pH	150.1	W	1		7.14	7.16	0.3	N/A	N/A	N/A	11/12/03

LEGEND:

RPD% = (|SAM - DUP| /((SAM + DUP)/2) * 100) UDL = Both SAM & DUP not detected. *Result or *Found: Interference required dilution.

RPD% = (|SPK - MSD| /((SPK + MSD)/2) * 100) M in Duplicate/MSD column indicates MSD.

SPIKE ADD column, A = Post Digest Spike; %R = Percent Recovery N/A = Not Analyzed; R > 4S = Result more than 4X the Spike Added

QC limits for MS recoveries apply only if the spike is at least 1/4 the concentration of the analyte in the sample.

Control limits for the RPD apply only if the concentration of the analyte in the sample is at least five times the reporting limit.

QC Sample 1: SVL SAM No.: 364036 Client Sample ID: PZ1-30-16-GW

CHAIN OF CUSTODY RECORD

Page _____ of _____

Client: MCS Environmental
Contact: Warren
Address: 5562 Alley South
Missoula, MT, 59808
Phone Number: 406-728-7755
FAX Number: 406-728-7367

NOTES:
1) Ensure proper container packaging.
2) Ship samples promptly following collection.
* 3) Designate Sample Reject Disposition

PO#: 11018 016
Project Name: Forest Rose Mine

Table 1. -- Matrix Type
1 = Surface Water, 2 = Ground Water
3 = Soil/Sediment, 4 = Rinsate, 5 = Oil
6 = Waste, 7 = Other (Specify) _____

FOR SVL USE ONLY
SVL JOB # 108526

Samplers Signature: Warren Miller

Lab Name: SVL Analytical, Inc. (208) 784-1258 FAX (208) 783-0891
Address: One Government Gulch, Kellogg, ID 83837-0929

Sample ID	Collection: Date	Collection: Time	Misc: Collected by: (Init.)	Misc: Matrix Type From Table 1	Misc: No. of Containers	Misc: Sample Filtered ? Y/N	Preservative(s): Unpreserved (Ice Only)	Preservative(s): HNO3	Preservative(s): HCL	Preservative(s): H2SO4	Preservative(s): NAOH	Preservative(s): Other (Specify)	Analyses Required: PH	Analyses Required: Total Metals (As, Cd, Cu, Pb, Zn)	Analyses Required: Alkalinity	Analyses Required: Total Cyanide	Comments
1. PZ1-30-16-GW	11-5-03	11:20	WPP	~~H2O~~ 3	3	N	X	X			X		X	X	X	X	
2. PZ2-31-9-GW	11-5-03	11:50	WPP	2	2	N	X	X					X	X	X		
3. PZ3-32-51-GW	11-5-03	12:30	WPP	2	2	N	X	X					X	X	X		
4. PZ4-33-41-GW	11-5-03	12:50	WPP	2	1	N	~~X~~	X						X			
5.																	
6.																	
7.																	
8.																	
9.																	
10.																	

Relinquished by:	Date:	Time:	Received by:	Date:	Time:
Warren Miller	11-5-03	16:50	Crystal Sears	11/6/03	9:45
Relinquished by:	Date:	Time:	Received by:	Date:	Time:

* Sa[redacted]eject: [ ] Return [ ] Dispose [ ] Store (30 Days)

White: LAB COPY Yellow: CUSTOMER COPY S[redacted]C 12/95

NALYTICAL, INC.
Government Gulch - Kellogg, ID 83837-0929

SAMPLE RECEIPT CONFIRMATION

SVL JOB No: 108526
Received: 11/06/03
Expected Due date: 11/20/03

a	By	Received	Sample Comments
)	WPP	11/06/03	
)	WPP	11/06/03	
)	WPP	11/06/03	
)	WPP	11/06/03	

emp: 3°C.

after job completion.
then you will receive a letter requesting disposal options.

you have questions regarding the receipt of these samples. 11/07/03 7:45

TRANSMISSION VERIFICATION REPORT

TIME : 11/07/2003 11:31
NAME : SVL ANALYTICAL
FAX : 2087830891
TEL : 2087841258
SER.# : BROF3J496071

DATE,TIME 11/07 11:31
FAX NO./NAME 914067287367
DURATION 00:00:24
PAGE(S) 01
RESULT OK
MODE FINE ECM

APPENDIX B
DATA EVALUATION REPORTS

FOREST ROSE MINE AND MILL COMPLEX
BEAVERHEAD-DEERLODGE NATIONAL FOREST
DATA EVALUATION CHECKLIST

MCS Project Name: Forest Rose Mine and Mill Complex
MCS Project No.: 110018.016.0
Sampling Event: Site Investigation
Evaluation Prepared By: Rhianna Berge
Date Completed: January 26, 2004
Date Samples Collected: August 8, 2003
Sample Matrix: Soil (includes tailings and soil)
Project Sample ID#s: T1-04-1.2-T, T2-05-1.5-T, T2-06-1.5-T, T3-10-1.5-T, SRT-02-0.1-S
Analytical Laboratory: SVL Analytical, Inc. Kellogg, Idaho
Laboratory Job No: 107076
Analytical Laboratory Sample ID#s: 347235, 347236, 347237, 347238, 347239
Methods of Analysis: Arsenic, Cadmium, Copper, Lead, and Zinc: Method 6010B; Mercury: Method 7471; Acid Base Accounting (ABA): Method EPA 600 and LECO

---

1. Is a Work Plan, Sampling and Analysis Plan, or Quality Assurance Project Plan available for the project?

Yes. The Work Plan is: Forest Rose Mine Site, Beaverhead-Deerlodge National Forest, Site Investigation Work Plan. Prepared for USDA Forest Service, Region 1. Dated June 20, 2003.

2. Chain of Custody (COC) Records:

Are the COCs present?
Yes, the COC is present with the data set.

Were the COCs complete and signed off?
Yes, the COC was completed and signed off as appropriate.

Were the samples received at 4°±2°C?
No. Samples were received by the laboratory at 24°C. Preservation of metals by cooling is recommended, not required.

Were all the samples on the COCs analyzed?
Yes, all five samples on the COC were analyzed by the laboratory.

Were any problems noted on the COCs?
No problems were noted on the COC.

3. Was a project narrative provided by the laboratory?

No. A project narrative was not included with the analytical results.

Were any problems noted in the narrative?
Not applicable.

4. Were all sample holding times met?

Yes. All samples were analyzed within the six month holding time for metals and the 28 day holding time for mercury.

5. Was the frequency stated in the Work Plan or Sampling and Analysis Plan for field duplicates, equipment rinsate blanks, and field blanks met?

The Work Plan did not require the collection of any soil field duplicates, equipment rinsate blanks, or field blanks. No soil field duplicates or blanks were collected during the project.

6. ***Were all equipment rinsate, field blank, and method blank results less than the method detection limit (practical quantitation limit, etc.)?***

Yes. No constituents in the laboratory preparation blanks were detected at or above the method detection limit. No other blanks were analyzed in this data set for the project.

7. ***Were all matrices, units, and detection limits reported correctly?***

Yes. The matrix reported was soil. Soil metals results were reported as mg/kg. Acid base accounting (ABA) results for method EPA 600 were reported as $TCaCO_3/1000T$ and results for the LECO method were reported as percent.

8. ***Were all MS recoveries and field and laboratory RPDs within control limits?***

MS control limits (75% to 125%): MS recoveries ranged from 82.4% to 124.0%, within control limits. Spike recovery limits do not apply to one zinc value because the sample concentration exceeded the spike concentration by a factor of 4 or more. This result is therefore acceptable for use.

Laboratory Duplicates/MSD (±20% water; ±30% soil): Duplicate RPDs ranged from 0% to 6.5%, within control limits.

Field Duplicates (±30% water; ±50% soil): No field duplicates were collected.

9. ***Were all LCS spike recoveries within control limits (80% to 120%)?***

Yes. LCS recoveries ranged from 91.2% to 107.4%, within control limits.

10. ***What are the DQOs for the project?***

A. The data quality objectives of the project are to: 1) delineate the areal extent of tailings within Dunkleberg Creek drainage; 2) perform sampling to evaluate the nature and extent of tailings and impacted soil in the drainage; and 3) evaluate whether the tailings in the drainage pose a threat to human health and the environment and if reclamation is warranted, if so, determine appropriate reclamation alternatives.

B. The number of samples and sample locations was determined in the field upon examination of Site conditions. Analysis of the samples includes arsenic, cadmium, copper, lead, mercury, zinc, and acid base accounting (ABA).

C. The general quality assurance objective for this project was to collect data of known quality and to verify and document that the samples collected are representative of the actual field conditions. To accomplish this, the analytical data should have an appropriate degree of accuracy, precision, and be reproducible. Samples should be comparable to other samples collected at the Site and other sites with similar conditions.

Specific QA objectives for this project are as follows:

- Establish sampling techniques in such a manner that the analytical results are complete, reproducible, precise, accurate, and representative of the media and conditions.
- Collect and analyze a sufficient number of field and/or laboratory duplicate samples to assess the laboratory performance.
- No field quality control samples were required in the Work Plan for this portion of the project.

11. ***Discussion of DQOs for the data set:***

A. The data set meets the objective for #10A. All samples within this data set were collected to characterize the variability of tailings material and concentrations of metals within the tailings and

underlying native soil. Samples were collected and analyzed from the appropriate areas for characterization of the tailings and underlying native soil and evaluate whether concentrations of metals in the tailing pose a potential threat to human health and the environment. The results in this data package are suitable for use to evaluate possible reclamation alternatives.

B. The data set meets the objective for #10B above.

C. Quality assurance objectives (#10C) for the data set is as follows:

- ***Accuracy:*** There were no field blanks or equipment rinsate blanks collected for the data set to assess the accuracy of the data with respect to blanks collected in the field. No laboratory preparation blanks were at or above method control limits. Laboratory MS and LCS sample recoveries were within acceptable control limits.

- ***Precision:*** Laboratory duplicate results were within control limits. No field duplicates were collected.

- ***Representativeness:*** The data set meets the objectives in #10A and #10B for the collection of samples to characterize tailings and soil and for use to evaluate potential threats to human health and the environment and for use in evaluating reclamation alternatives. The analytes were selected to assess the concentration of particular metals at each of these areas based on other similar sites and Site history.

- ***Comparability:*** The data would be comparable to other data collected in the same manner and analyzed by the same analytical methods.

12. Was the project completeness goal met?

All soil samples listed on the COCs were received and analyzed by the laboratory as requested. No sample results were rejected during the evaluation process. The project is 100% complete.

Comments:

The data is of Level B quality.

FOREST ROSE MINE AND MLL COMPLEX
BEAVERHEAD-DEERLODGE NATIONAL FOREST
DATA EVALUATION CHECKLIST

MCS Project Name: Forest Rose Mine and Mill Complex
MCS Project No.: 110018.016.0
Sampling Event: Site Investigation
Evaluation Prepared By: Rhianna Berge
Date Completed: January 26, 2004
Date Samples Collected: August 8, 2003
Sample Matrix: Soil extract
Project Sample ID#s: T1-04-1.2-T, T2-05-1.5-T, T3-10-1.5-T, EXTRACTION FLUID
Analytical Laboratory: SVL Analytical, Inc. Kellogg, Idaho
Laboratory Job No: 107077
Analytical Laboratory Sample ID#s: E347242, E347243, E347244, E347287
Methods of Analysis: Synthetic Precipitation Leaching Procedure (SPLP) with analysis for Arsenic, Cadmium, Copper, Lead, and Zinc: Method 6010B

---

1. Is a Work Plan, Sampling and Analysis Plan, or Quality Assurance Project Plan available for the project?

Yes. The Work Plan is: Forest Rose Mine Site, Beaverhead-Deerlodge National Forest, Site Investigation Work Plan. Prepared for USDA Forest Service, Region 1. Dated June 20, 2003.

2. Chain of Custody (COC) Records:

Are the COCs present?
Yes, the COC is present with the data set.

Were the COCs complete and signed off?
Yes, the COC was completed and signed off as appropriate.

Were the samples received at 4°±2°C?
No. Samples were received by the laboratory at 24°C. Preservation of metals by cooling is recommended, not required.

Were all the samples on the COCs analyzed?
Yes, the three samples on the COC were analyzed by the laboratory.

Were any problems noted on the COCs?
No problems were noted on the COC.

3. Was a project narrative provided by the laboratory?

No. A project narrative was not included with the analytical results.

Were any problems noted in the narrative?
Not applicable.

4. Were all sample holding times met?

Yes. All samples were extracted within the six month holding time for metals.

5. Was the frequency stated in the Work Plan or Sampling and Analysis Plan for field duplicates, equipment rinsate blanks, and field blanks met?

The Work Plan did not require collection of field duplicates, equipment rinsate blanks, or field blanks. No field duplicates or blanks were collected during the project.

6. Were all equipment rinsate, field blank, and method blank results less than the method detection limit (practical quantitation limit, etc.)?

Yes. No constituents in the laboratory preparation blanks were detected at or above the method detection limit. No other blanks were analyzed in this data set for the project.

7. Were all matrices, units, and detection limits reported correctly?

Yes. The matrix reported was soil extract. All soil extract results were reported as mg/L.

8. Were all MS recoveries and field and laboratory RPDs within control limits?

MS control limits (75% to 125%): MS recoveries within control limits ranged from 93.6% to 107.0%, within control limits.

Laboratory Duplicates/MSD (±20% water; ±30% soil): Duplicate RPDs ranged from 2.7% to 3.1%, within control limits. For one arsenic, one copper, and one lead value, neither the sample nor the duplicate was detected; therefore, these results are acceptable for use.

Field Duplicates (±30% water; ±50% soil): No field duplicates were collected.

9. Were all LCS spike recoveries within control limits (80% to 120%)?

Yes. LCS recoveries ranged from 99.1% to 104.0%, within control limits.

10. What are the DQOs for the project?

A. The data quality objectives of the project are to: 1) evaluate the potential for precipitation and infiltrating water to leach metals from the tailings at the Site; 2) evaluate whether leaching metals at the Site poses a threat to human health or the environment; and 3) evaluate the possible use of the data for selecting reclamation alternatives.

B. The number of samples and sample locations was determined in the field upon examination of Site conditions. Analysis of the SPLP extracted soil samples included arsenic, cadmium, copper, lead, and zinc.

C. The general quality assurance objective for this project was to collect data of known quality and to verify and document that the samples collected are representative of the actual field conditions. To accomplish this, the analytical data should have an appropriate degree of accuracy, precision, and be reproducible. Samples should be comparable to other samples collected at the Site and other sites with similar conditions.

Specific QA objectives for this project are as follows:

- Establish sampling techniques in such a manner that the analytical results are complete, reproducible, precise, accurate, and representative of the media and conditions.
- Collect and analyze a sufficient number of field and/or laboratory duplicate samples to assess the laboratory performance.
- No field quality control samples were required in the Work Plan for this portion of the project.

11. Discussion of DQOs for the data set:

A. The data set meets the objective for #10A. Results characterize the possible concentrations of leachable metals. Samples collected and analyzed were from the appropriate areas for characterize the tailings at the Site. Samples are suitable for the evaluation of whether concentrations of metals in the leachate from the tailings pose a potential threat to human health and the environment. The results in this data package are suitable for use to evaluate possible reclamation alternatives.

B. The data set meets the objective for #10B above. All constituents for the samples were analyzed.

C. Quality assurance objectives (#10C) for the data set is as follows:

- ***Accuracy:*** There were no field blanks or equipment rinsate blanks collected for the data set to assess the accuracy of the data with respect to blanks collected in the field. No laboratory preparation blanks were at or above method control limits. Laboratory MS and LCS sample recoveries were within acceptable control limits.

- ***Precision:*** Field and laboratory duplicate results were within control limits.

- ***Representativeness:*** The data set meets the objectives in #10A and #10B for the collection of samples to characterize tailings for use to evaluate potential threats to human health and the environment and for use in evaluating reclamation alternatives. The analytes were selected to assess the concentration of particular metals in leachate from the tailings based on other similar sites and Site history.

- ***Comparability:*** The data would be comparable to other data collected in the same manner and analyzed by the same analytical methods.

12. Was the project completeness goal met?

All soil samples listed on the COCs were received and analyzed by the laboratory as requested. No sample results were objected during the evaluation process. The project is 100% complete.

Comments:

The data is of Level B quality.

FOREST ROSE MINE AND MILL COMPLEX
BEAVERHEAD-DEERLODGE NATIONAL FOREST
DATA EVALUATION CHECKLIST

MCS Project Name: Forest Rose Mine and Mill Complex
MCS Project No.: 110018.016.0

Sampling Event: Site Investigation
Evaluation Prepared By: Rhianna Berge
Date Completed: January 27, 2004

Date Samples Collected: August 8, 2003
Sample Matrix: Surface Water

Project Sample ID#s: STR-01-0-SW,SP-03-0-SW, TS-07-0-SW, DT-08-0-SW, DTD-09-0-SW, AD-12-0-SW, STR-11-0-SW, STR-13-0-SW,

Analytical Laboratory: SVL Analytical, Inc. Kellogg, Idaho
Laboratory Job No: 107092

Analytical Laboratory Sample ID#s: 347510,347511, 347512, 347513, 347514, 347515, 347516, 347517

Methods of Analysis: Dissolved: Arsenic, Cadmium, Copper, Lead, and Zinc: Method 200.7; Mercury: Method 245.1; Total: Chloride and Sulfate: Method 300.0; Calcium, Magnesium, Arsenic, Cadmium, Copper, Iron, Lead, and Zinc: Method 200.7; Mercury: Method 245.1; Hardness: Method 2340B

---

1. ***Is a Work Plan, Sampling and Analysis Plan, or Quality Assurance Project Plan available for the project?***

   Yes. The Work Plan is: Forest Rose Mine Site, Beaverhead-Deerlodge National Forest, Site Investigation Work Plan. Prepared for USDA Forest Service, Region 1. Dated June 20, 2003.

2. ***Chain of Custody (COC) Records:***

   Are the COCs present?
   Yes, the COC is present with the data set.

   Were the COCs complete and signed off?
   Yes, the COC was completed and signed off as appropriate.

   Were the samples received at 4°±2°C?
   No. Samples were received by the laboratory at 12°C. Preservation of metals by cooling is recommended, not required.

   Were all the samples on the COCs analyzed?
   Yes, the eight samples on the COC were analyzed by the laboratory.

   Were any problems noted on the COCs?
   No problems were noted on the COC.

3. ***Was a project narrative provided by the laboratory?***

   No. A project narrative was not included with the analytical results.

   Were any problems noted in the narrative?
   Not applicable.

4. ***Were all sample holding times met?***

   Yes. All samples were analyzed within the six month holding time for metals and the 28 day holding time for anions and mercury.

5. Was the frequency stated in the Work Plan or Sampling and Analysis Plan for field duplicates, equipment rinsate blanks, and field blanks met?

The Work Plan did not require the collection of any water field duplicates, equipment rinsate blanks, or field blanks. No water field duplicates or blanks were collected during the project.

6. Were all equipment rinsate, field blank, and method blank results less than the method detection limit (practical quantitation limit, etc.)?

Yes. No constituents in the laboratory preparation blanks were detected at or above the method detection limit. No other blanks were analyzed in this data set for the project.

7. Were all matrices, units, and detection limits reported correctly?

Yes. The matrix reported was water. Water results were reported as mg/L. Hardness was reported as mg $CaCO_3$/L and pH was in standard units.

8. Were all MS recoveries and field and laboratory RPDs within control limits?

MS control limits (75% to 125%): MS recoveries within control limits ranged from 90.6% to 110.0%, within control limits.

Laboratory Duplicates/MSD (±20% water; ±30% soil): Duplicate RPDs ranged from 0% to 2.1%, within control limits. For two arsenic, two cadmium, two copper, two lead, and two mercury values, neither the sample nor the duplicate was detected; therefore, these results are acceptable for use.

Field Duplicates (±30% water; ±50% soil): No field duplicates were collected.

9. Were all LCS spike recoveries within control limits (80% to 120%)?

Yes. LCS recoveries ranged from 94.0% to 100.5%, within control limits.

10. What are the DQOs for the project?

A. The data quality objectives of the project are to: 1) perform surface water sampling to determine the chemical characteristics of the surface water at the Site; 2) evaluate whether tailings have impacted the chemistry of surface water at the Site; and 3) evaluate whether surface water at the Site poses a threat to human health or the environment and if reclamation is warranted.

B. The number of surface water and groundwater samples and sample locations was determined in the field upon examination of Site conditions. Analysis of the samples included (dissolved) arsenic, cadmium, copper, lead, mercury, and zinc and (total) calcium, chloride, magnesium, sulfate, arsenic, cadmium, copper, lead, mercury, zinc, hardness, and pH.

C. The general quality assurance objective for this project was to collect data of known quality and to verify and document that the samples collected are representative of the actual field conditions. To accomplish this, the analytical data should have an appropriate degree of accuracy, precision, and be reproducible. Samples should be comparable to other samples collected at the Site and other sites with similar conditions.

Specific QA objectives for this project are as follows:

- Establish sampling techniques in such a manner that the analytical results are complete, reproducible, precise, accurate, and representative of the media and conditions.
- Collect and analyze a sufficient number of field and/or laboratory duplicate samples to assess the laboratory performance.

11. Discussion of DQOs for the data set:

A. The data set meets the objective for #10A. All samples within this data set were collected from surface water to evaluate current conditions of the Site. Results characterize the concentrations of metals and general chemistry parameters within the surface water. Samples collected and analyzed were from the appropriate areas for characterization of surface water potentially impacted by tailings at the Site. Samples are suitable for the evaluation of whether concentrations of metals in the surface water pose a potential threat to human health and the environment. The results in this data package are suitable for use to evaluate possible reclamation alternatives.

B. The data set meets the objective for #10B above. All constituents for the samples were analyzed as requested and by appropriate methods.

C. Quality assurance objectives (#10C) for the data set is as follows:

- ***Accuracy:*** There were no field blanks or equipment rinsate blanks collected for the data set to assess the accuracy of the data with respect to blanks collected in the field. No laboratory preparation blanks contained analytes at or above method reporting limits. Laboratory MS and LCS sample recoveries were within acceptable control limits.

- ***Precision:*** Laboratory duplicate results were within control limits.

- ***Representativeness:*** The data set meets the objectives in #10A and #10B for the collection of samples to characterize surface water potentially impacted by tailings, for use to evaluate potential threats to human health and the environment, and for use in evaluating reclamation alternatives. The analytes were selected to assess the concentration of particular metals in surface water potentially impacted by tailings at the Site and were based on other similar sites and Site history.

- ***Comparability:*** The data would be comparable to other data collected in the same manner and analyzed by the same analytical methods.

12. Was the project completeness goal met?

All water samples listed on the COCs were received and analyzed by the laboratory as requested. No sample results were rejected during the evaluation process. The project is 100% complete.

Comments:

The data is of Level B quality.

FOREST ROSE MINE AND MILL COMPLEX
BEAVERHEAD-DEERLODGE NATIONAL FOREST
DATA EVALUATION CHECKLIST

MCS Project Name: Forest Rose Mine and Mill Complex

MCS Project No.: 110018.016.0

Sampling Event: Site Investigation

Evaluation Prepared By: Rhianna Berge

Date Completed: January 30, 2004

Date Samples Collected: September 3, 2003

Sample Matrix: Soil (includes tailings and soil)

Project Sample ID#s: STR-15-0.1-S, WRD1-16-1-WR

Analytical Laboratory: SVL Analytical, Inc. Kellogg, Idaho

Laboratory Job No: 107482

Analytical Laboratory Sample ID#s: 352344, 352342

Methods of Analysis: Arsenic, Cadmium, Copper, Lead, and Zinc: Method 6010B; Mercury: Method 7471A; Acid Base Accounting (ABA): Method EPA 600 and LECO

---

1. Is a Work Plan, Sampling and Analysis Plan, or Quality Assurance Project Plan available for the project?

Yes. The Work Plan is: Forest Rose Mine Site, Beaverhead-Deerlodge National Forest, Site Investigation Work Plan. Prepared for USDA Forest Service, Region 1. Dated June 20, 2003.

2. Chain of Custody (COC) Records:

Are the COCs present?

Yes, the COC is present with the data set.

Were the COCs complete and signed off?

Yes, the COC was completed and signed off as appropriate.

Were the samples received at 4°±2°C?

No. Samples were received by the laboratory at 14°C. Preservation of metals by cooling is recommended, not required.

Were all the samples on the COCs analyzed?

Yes, the two samples on the COC were analyzed by the laboratory. One sample (WRD2-14-1-WR) was requested not to be analyzed.

Were any problems noted on the COCs?

No problems were noted on the COC.

3. Was a project narrative provided by the laboratory?

No. A project narrative was not included with the analytical results.

Were any problems noted in the narrative?

Not applicable.

4. Were all sample holding times met?

Yes. All samples were analyzed within the six month holding time for metals and the 28 day holding time for mercury.

5. Was the frequency stated in the Work Plan or Sampling and Analysis Plan for field duplicates, equipment rinsate blanks, and field blanks met?

The Work Plan did not require the collection of any soil field duplicates, equipment rinsate blanks, or field blanks. No soil field duplicates or blanks were collected during the project.

6. ***Were all equipment rinsate, field blank, and method blank results less than the method detection limit (practical quantitation limit, etc.)?***

Yes. No constituents in the laboratory preparation blanks were detected at or above the method detection limit. No other blanks were analyzed in this data set for the project.

7. ***Were all matrices, units, and detection limits reported correctly?***

Yes. The matrix reported was soil. Soil metals results were reported as mg/kg. Acid base accounting (ABA) results for method EPA 600 were reported as $TCaCO_3/1000T$ and results for the LECO method were reported as percent.

8. ***Were all MS recoveries and field and laboratory RPDs within control limits?***

MS control limits (75% to 125%): MS recoveries ranged from 88.5% to 93.0%, within control limits. Spike recovery limits do not apply to one arsenic, one copper, one lead, and one zinc value because the sample concentrations exceeded the spike concentrations by a factor of 4 or more. These results are therefore acceptable for use.

Laboratory Duplicates/MSD (±20% water; ±30% soil): Duplicate RPDs ranged from 0% to 29.6%, within control limits.

Field Duplicates (±30% water; ±50% soil): No field duplicates were collected.

9. ***Were all LCS spike recoveries within control limits (80% to 120%)?***

Yes. LCS recoveries ranged from 97.3% to 107.4%, within control limits.

10. ***What are the DQOs for the project?***

A. The data quality objectives of the project are to: 1) delineate the areal extent of tailings within Dunkleberg Creek drainage; 2) perform sampling to evaluate the nature and extent of tailings and impacted soil in the drainage; and 3) evaluate whether the tailings in the drainage pose a threat to human health and the environment and if reclamation is warranted, if so, determine appropriate reclamation alternatives.

B. The number of samples and sample locations was determined in the field upon examination of Site conditions. Analysis of the samples included arsenic, cadmium, copper, lead, mercury, zinc, and acid base accounting (ABA).

C. The general quality assurance objective for this project was to collect data of known quality and to verify and document that the samples collected are representative of the actual field conditions. To accomplish this, the analytical data should have an appropriate degree of accuracy, precision, and be reproducible. Samples should be comparable to other samples collected at the Site and other sites with similar conditions.

Specific QA objectives for this project are as follows:

- Establish sampling techniques in such a manner that the analytical results are complete, reproducible, precise, accurate, and representative of the media and conditions.
- Collect and analyze a sufficient number of field and/or laboratory duplicate samples to assess the laboratory performance.
- No field quality control samples were required in the Work Plan for this portion of the project.

11. Discussion of DQOs for the data set:

A. The data set meets the objective for #10A. All samples within this data set were collected to characterize the variability of tailings material and concentrations of metals within the tailings and underlying native soil. Samples were collected and analyzed from the appropriate areas for characterization of the tailings and underlying native soil and evaluate whether concentrations of metals in the tailing pose a potential threat to human health and the environment. The results in this data package are suitable for use to evaluate possible reclamation alternatives.

B. The data set meets the objective for #10B above.

C. Quality assurance objectives (#10C) for the data set is as follows:

- ***Accuracy:*** There were no field blanks or equipment rinsate blanks collected for the data set to assess the accuracy of the data with respect to blanks collected in the field. No laboratory preparation blanks were at or above method control limits. Laboratory MS and LCS sample recoveries were within acceptable control limits.

- ***Precision:*** Laboratory duplicate results were within control limits. No field duplicates were collected.

- ***Representativeness:*** The data set meets the objectives in #10A and #10B for the collection of samples to characterize tailings and soil and for use to evaluate potential threats to human health and the environment and for use in evaluating reclamation alternatives. The analytes were selected to assess the concentration of particular metals at each of these areas based on other similar sites and Site history.

- ***Comparability:*** The data would be comparable to other data collected in the same manner and analyzed by the same analytical methods.

12. Was the project completeness goal met?

All soil samples listed on the COCs were received and analyzed by the laboratory as requested. No sample results were rejected during the evaluation process. The project is 100% complete.

Comments:

The data is of Level B quality.

FOREST ROSE MINE AND MLL COMPLEX
BEAVERHEAD-DEERLODGE NATIONAL FOREST
DATA EVALUATION CHECKLIST

MCS Project Name: Forest Rose Mine and Mill Complex
MCS Project No.: 110018.016.0

Sampling Event: Site Investigation
Evaluation Prepared By: Rhianna Berge
Date Completed: January 30, 2004

Date Samples Collected: September 3, 2003
Sample Matrix: Soil extract

Project Sample ID#s: WRD1-16-1-WR

Analytical Laboratory: SVL Analytical, Inc. Kellogg, Idaho
Laboratory Job No: 107808

Analytical Laboratory Sample ID#s: 107808

Methods of Analysis: Synthetic Precipitation Leaching Procedure (SPLP) with analysis for Arsenic, Cadmium, Copper, Lead, and Zinc: Method 6010B

---

1. Is a Work Plan, Sampling and Analysis Plan, or Quality Assurance Project Plan available for the project?

Yes. The Work Plan is: Forest Rose Mine Site, Beaverhead-Deerlodge National Forest, Site Investigation Work Plan. Prepared for USDA Forest Service, Region 1. Dated June 20, 2003.

2. Chain of Custody (COC) Records:

Are the COCs present?
Yes, the COC is present with the data set.

Were the COCs complete and signed off?
Yes, the COC was completed and signed off as appropriate.

Were the samples received at 4°±2°C?
No. Samples were received by the laboratory at 14°C. Preservation of metals by cooling is recommended, not required.

Were all the samples on the COCs analyzed?
Yes, the one sample on the COC was analyzed by the laboratory.

Were any problems noted on the COCs?
No problems were noted on the COC.

3. Was a project narrative provided by the laboratory?

No. A project narrative was not included with the analytical results.

Were any problems noted in the narrative?
Not applicable.

4. Were all sample holding times met?

Yes. All samples were extracted within the six month holding time for metals.

5. Was the frequency stated in the Work Plan or Sampling and Analysis Plan for field duplicates, equipment rinsate blanks, and field blanks met?

The Work Plan did not require collection of field duplicates, equipment rinsate blanks, or field blanks. No field duplicates or blanks were collected during the project.

6. ***Were all equipment rinsate, field blank, and method blank results less than the method detection limit (practical quantitation limit, etc.)?***

Yes. No constituents in the laboratory preparation blanks were detected at or above the method detection limit. No other blanks were analyzed in this data set for the project.

7. ***Were all matrices, units, and detection limits reported correctly?***

Yes. The matrix reported was soil extract. All soil extract results were reported as mg/L.

8. ***Were all MS recoveries and field and laboratory RPDs within control limits?***

MS control limits (75% to 125%): MS recoveries within control limits ranged from 90.0% to 103.0%, within control limits.

Laboratory Duplicates/MSD (±20% water; ±30% soil): The duplicate RPD for zinc was 0.6%, within control limits. For one arsenic, one copper, one lead value, and one zinc value neither the sample nor the duplicate was detected; therefore, these results are acceptable for use.

Field Duplicates (±30% water; ±50% soil): No field duplicates were collected.

9. ***Were all LCS spike recoveries within control limits (80% to 120%)?***

Yes. LCS recoveries ranged from 94.8% to 101.0%, within control limits.

10. ***What are the DQOs for the project?***

A. The data quality objectives of the project are to: 1) evaluate the potential for precipitation and infiltrating water to leach metals from the tailings at the Site; 2) evaluate whether leaching metals at the Site poses a threat to human health or the environment; and 3) evaluate the possible use of the data for selecting reclamation alternatives.

B. The number of samples and sample locations was determined in the field upon examination of Site conditions. Analysis of the SPLP extracted soil samples included arsenic, cadmium, copper, lead, and zinc.

C. The general quality assurance objective for this project was to collect data of known quality and to verify and document that the samples collected are representative of the actual field conditions. To accomplish this, the analytical data should have an appropriate degree of accuracy, precision, and be reproducible. Samples should be comparable to other samples collected at the Site and other sites with similar conditions.

Specific QA objectives for this project are as follows:

- Establish sampling techniques in such a manner that the analytical results are complete, reproducible, precise, accurate, and representative of the media and conditions.
- Collect and analyze a sufficient number of field and/or laboratory duplicate samples to assess the laboratory performance.
- No field quality control samples were required in the Work Plan for this portion of the project.

11. ***Discussion of DQOs for the data set:***

A. The data set meets the objective for #10A. Results characterize the possible concentrations of leachable metals. Samples collected and analyzed were from the appropriate areas for characterize the tailings at the Site. Samples are suitable for the evaluation of whether concentrations of metals in the leachate from the tailings pose a potential threat to human health and the environment. The results in this data package are suitable for use to evaluate possible reclamation alternatives.

B. The data set meets the objective for #10B above. All constituents for the samples were analyzed.

C. Quality assurance objectives (#10C) for the data set is as follows:

- ***Accuracy:*** There were no field blanks or equipment rinsate blanks collected for the data set to assess the accuracy of the data with respect to blanks collected in the field. No laboratory preparation blanks were at or above method control limits. Laboratory MS and LCS sample recoveries were within acceptable control limits.

- ***Precision:*** Field and laboratory duplicate results were within control limits.

- ***Representativeness:*** The data set meets the objectives in #10A and #10B for the collection of samples to characterize tailings for use to evaluate potential threats to human health and the environment and for use in evaluating reclamation alternatives. The analytes were selected to assess the concentration of particular metals in leachate from the tailings based on other similar sites and Site history.

- ***Comparability:*** The data would be comparable to other data collected in the same manner and analyzed by the same analytical methods.

12. Was the project completeness goal met?

All soil samples listed on the COCs were received and analyzed by the laboratory as requested. No sample results were objected during the evaluation process. The project is 100% complete.

Comments:

The data is of Level B quality.

FOREST ROSE MINE AND MILL COMPLEX
BEAVERHEAD-DEERLODGE NATIONAL FOREST
DATA EVALUATION CHECKLIST

MCS Project Name: Forest Rose Mine and Mill Complex

MCS Project No.: 110018.016.0

Sampling Event: Site Investigation

Evaluation Prepared By: Rhianna Berge

Date Completed: January 30, 2004

Date Samples Collected: September 3, 2003

Sample Matrix: Soil (includes tailings and soil)

Project Sample ID#s: B1-17-10-T, B1-18-20-T, B1-19-3-S, B3-22-10-T, B3-23-20-T, B3-24-40-T, B3-25-50.5-S, B3-29-49-T

Analytical Laboratory: SVL Analytical, Inc. Kellogg, Idaho

Laboratory Job No: 108046

Analytical Laboratory Sample ID#s: 358896, 358897, 358898, 358901, 358902, 358903, 358904, 358908

Methods of Analysis: Arsenic, Cadmium, Copper, Lead, and Zinc: Method 6010B; Acid Base Accounting (ABA): Method EPA 600 and LECO

---

1. Is a Work Plan, Sampling and Analysis Plan, or Quality Assurance Project Plan available for the project?

Yes. The Work Plan is: Forest Rose Mine Site, Beaverhead-Deerlodge National Forest, Site Investigation Work Plan. Prepared for USDA Forest Service, Region 1. Dated June 20, 2003.

2. Chain of Custody (COC) Records:

Are the COCs present?

Yes, the COC is present with the data set.

Were the COCs complete and signed off?

Yes, the COC was completed and signed off as appropriate.

Were the samples received at 4°±2°C?

The temperature of the sample container was not recorded upon receipt by the laboratory.

Were all the samples on the COCs analyzed?

Yes, the eight samples on the COC were analyzed by the laboratory.

Were any problems noted on the COCs?

No problems were noted on the COC.

3. Was a project narrative provided by the laboratory?

No. A project narrative was not included with the analytical results.

Were any problems noted in the narrative?

Not applicable.

4. Were all sample holding times met?

Yes. All samples were analyzed within the six month holding time for metals.

5. Was the frequency stated in the Work Plan or Sampling and Analysis Plan for field duplicates, equipment rinsate blanks, and field blanks met?

The Work Plan did not require the collection of any soil field duplicates, equipment rinsate blanks, or field blanks. No soil field duplicates or blanks were collected during the project.

6. ***Were all equipment rinsate, field blank, and method blank results less than the method detection limit (practical quantitation limit, etc.)?***

Yes. No constituents in the laboratory preparation blanks were detected at or above the method detection limit. No other blanks were analyzed in this data set for the project.

7. ***Were all matrices, units, and detection limits reported correctly?***

Yes. The matrix reported was soil. Soil metals results were reported as mg/kg. Acid base accounting (ABA) results for method EPA 600 were reported as $TCaCO_3/1000T$ and results for the LECO method were reported as percent.

8. ***Were all MS recoveries and field and laboratory RPDs within control limits?***

MS control limits (75% to 125%): The MS recovery for one cadmium value was 110.2%, within control limits. Spike recovery limits do not apply to one copper, one copper, one lead, and one zinc value because the sample concentrations exceeded the spike concentrations by a factor of 4 or more. These results are therefore acceptable for use. One arsenic value was outside control limits at 167.0%. For this reason, a post digest spike was analyzed. This result of 92.0% is acceptable for use.

Laboratory Duplicates/MSD (±20% water; ±30% soil): Duplicate RPDs ranged from 0% to 22.5%, within control limits. One copper, one lead, and one zinc value were outside control limits; however no corrective action was required because sample results were more than 4 times the spike added.

Field Duplicates (±30% water; ±50% soil): No field duplicates were collected.

9. ***Were all LCS spike recoveries within control limits (80% to 120%)?***

Yes. LCS recoveries ranged from 94.0% to 109.3%, within control limits.

10. ***What are the DQOs for the project?***

A. The data quality objectives of the project are to: 1) delineate the areal extent of tailings within Dunkleberg Creek drainage; 2) perform sampling to evaluate the nature and extent of tailings and impacted soil in the drainage; and 3) evaluate whether the tailings in the drainage pose a threat to human health and the environment and if reclamation is warranted, if so, determine appropriate reclamation alternatives.

B. The number of samples and sample locations was determined in the field upon examination of Site conditions. Analysis of the samples included arsenic, cadmium, copper, lead, zinc, and acid base accounting (ABA).

C. The general quality assurance objective for this project was to collect data of known quality and to verify and document that the samples collected are representative of the actual field conditions. To accomplish this, the analytical data should have an appropriate degree of accuracy, precision, and be reproducible. Samples should be comparable to other samples collected at the Site and other sites with similar conditions.

Specific QA objectives for this project are as follows:

- Establish sampling techniques in such a manner that the analytical results are complete, reproducible, precise, accurate, and representative of the media and conditions.
- Collect and analyze a sufficient number of field and/or laboratory duplicate samples to assess the laboratory performance.
- No field quality control samples were required in the Work Plan for this portion of the project.

11. Discussion of DQOs for the data set:

A. The data set meets the objective for #10A. All samples within this data set were collected to characterize the variability of tailings material and concentrations of metals within the tailings and underlying native soil. Samples were collected and analyzed from the appropriate areas for characterization of the tailings and underlying native soil and evaluate whether concentrations of metals in the tailing pose a potential threat to human health and the environment. The results in this data package are suitable for use to evaluate possible reclamation alternatives.

B. The data set meets the objective for #10B above.

C. Quality assurance objectives (#10C) for the data set is as follows:

- ***Accuracy:*** There were no field blanks or equipment rinsate blanks collected for the data set to assess the accuracy of the data with respect to blanks collected in the field. No laboratory preparation blanks were at or above method control limits. Laboratory MS and LCS sample recoveries were within acceptable control limits.

- ***Precision:*** Laboratory duplicate results were within control limits. No field duplicates were collected.

- ***Representativeness:*** The data set meets the objectives in #10A and #10B for the collection of samples to characterize tailings and soil and for use to evaluate potential threats to human health and the environment and for use in evaluating reclamation alternatives. The analytes were selected to assess the concentration of particular metals at each of these areas based on other similar sites and Site history.

- ***Comparability:*** The data would be comparable to other data collected in the same manner and analyzed by the same analytical methods.

12. Was the project completeness goal met?

All soil samples listed on the COC were received and analyzed by the laboratory as requested. No sample results were rejected during the evaluation process. The project is 100% complete.

Comments:

The data is of Level B quality.

FOREST ROSE MINE AND MILL COMPLEX
BEAVERHEAD-DEERLODGE NATIONAL FOREST
DATA EVALUATION CHECKLIST

MCS Project Name: Forest Rose Mine and Mill Complex
MCS Project No.: 110018.016.0

Sampling Event: Site Investigation
Evaluation Prepared By: Rhianna Berge
Date Completed: February 2, 2004

Date Samples Collected: November 5, 2003
Sample Matrix: Groundwater

Project Sample ID#s: PZ-1-30-16-GW, PZ2-31-9-GW, PZ3-32-51-GW, PZ4-33-41-GW

Analytical Laboratory: SVL Analytical, Inc. Kellogg, Idaho
Laboratory Job No: 108526

Analytical Laboratory Sample ID#s: 364036, 364037, 364038, 364039

Methods of Analysis: Alkalinity, CO_3, HCO_3: Method 2320B; pH: Method 150.1; Cyanide: Method 335.4; Arsenic, Cadmium, Copper, Lead, Zinc: Method 200.7

---

1. Is a Work Plan, Sampling and Analysis Plan, or Quality Assurance Project Plan available for the project?

Yes. The Work Plan is: Forest Rose Mine Site, Beaverhead-Deerlodge National Forest, Site Investigation Work Plan. Prepared for USDA Forest Service, Region 1. Dated June 20, 2003.

2. Chain of Custody (COC) Records:

Are the COCs present?
Yes, the COC is present with the data set.

Were the COCs complete and signed off?
Yes, the COC was completed and signed off as appropriate.

Were the samples received at 4°±2°C?
Yes. Samples were received by the laboratory at 3°C.

Were all the samples on the COCs analyzed?
Yes, the four samples on the COC were analyzed by the laboratory.

Were any problems noted on the COCs?
No problems were noted on the COC.

3. Was a project narrative provided by the laboratory?

No. A project narrative was not included with the analytical results.

Were any problems noted in the narrative?
Not applicable.

4. Were all sample holding times met?

Yes. All samples were analyzed within the six month holding time for metals and the 28 day holding time for anions.

5. Was the frequency stated in the Work Plan or Sampling and Analysis Plan for field duplicates, equipment rinsate blanks, and field blanks met?

The Work Plan did not require the collection of any water field duplicates, equipment rinsate blanks, or field blanks. No water field duplicates or blanks were collected during the project.

6. Were all equipment rinsate, field blank, and method blank results less than the method detection limit (practical quantitation limit, etc.)?

Yes. No constituents in the laboratory preparation blanks were detected at or above the method detection limit. No other blanks were analyzed in this data set for the project.

7. Were all matrices, units, and detection limits reported correctly?

Yes. The matrix reported was water. Water results were reported as mg/L. Alkalinity, CO_3, and HCO_3 were reported as mg $CaCO_3$/L and pH was in standard units.

8. Were all MS recoveries and field and laboratory RPDs within control limits?

MS control limits (75% to 125%): MS recoveries within control limits ranged from 88.9% to 118.0%, within control limits.

Laboratory Duplicates/MSD (±20% water; ±30% soil): Duplicate RPDs ranged from 0.3% to 4.0%, within control limits. For one arsenic, one cadmium, one cyanide, and one CO_3 value, neither the sample nor the duplicate was detected; therefore, these results are acceptable for use. One copper value was outside control limits at 200.0%. Both the sample and duplicate values are less than 5 times the CRDL and within ±CRDL; therefore, no action is required.

Field Duplicates (±30% water; ±50% soil): No field duplicates were collected.

9. Were all LCS spike recoveries within control limits (80% to 120%)?

Yes. LCS recoveries ranged from 96.3% to 106.0%, within control limits.

10. What are the DQOs for the project?

A. The data quality objectives of the project are to: 1) perform groundwater sampling to determine the chemical characteristics of the groundwater at the Site; 2) evaluate whether tailings have impacted the chemistry of groundwater at the Site; and 3) evaluate whether groundwater at the Site poses a threat to human health or the environment and if reclamation is warranted.

B. The number of surface water and groundwater samples and sample locations was determined in the field upon examination of Site conditions. Analysis of the samples included alkalinity, CO_3, HCO_3, pH, cyanide, arsenic, cadmium, copper, lead, and zinc.

C. The general quality assurance objective for this project was to collect data of known quality and to verify and document that the samples collected are representative of the actual field conditions. To accomplish this, the analytical data should have an appropriate degree of accuracy, precision, and be reproducible. Samples should be comparable to other samples collected at the Site and other sites with similar conditions.

Specific QA objectives for this project are as follows:

- Establish sampling techniques in such a manner that the analytical results are complete, reproducible, precise, accurate, and representative of the media and conditions.
- Collect and analyze a sufficient number of field and/or laboratory duplicate samples to assess the laboratory performance.

11. Discussion of DQOs for the data set:

A. The data set meets the objective for #10A. All samples within this data set were collected from groundwater to evaluate current conditions of the Site. Results characterize the concentrations of metals and general chemistry parameters within the groundwater. Samples collected and analyzed were from the appropriate areas for characterization of groundwater

potentially impacted by tailings at the Site. Samples are suitable for the evaluation of whether concentrations of metals in the groundwater pose a potential threat to human health and the environment. The results in this data package are suitable for use to evaluate possible reclamation alternatives.

B. The data set meets the objective for #10B above. All constituents for the samples were analyzed as requested and by appropriate methods.

C. Quality assurance objectives (#10C) for the data set is as follows:

- ***Accuracy:*** There were no field blanks or equipment rinsate blanks collected for the data set to assess the accuracy of the data with respect to blanks collected in the field. No laboratory preparation blanks contained analytes at or above method reporting limits. Laboratory MS and LCS sample recoveries were within acceptable control limits.

- ***Precision:*** Laboratory duplicate results were within control limits.

- ***Representativeness:*** The data set meets the objectives in #10A and #10B for the collection of samples to characterize groundwater potentially impacted by tailings, for use to evaluate potential threats to human health and the environment, and for use in evaluating reclamation alternatives. The analytes were selected to assess the concentration of particular metals in surface water potentially impacted by tailings at the Site and were based on other similar sites and Site history.

- ***Comparability:*** The data would be comparable to other data collected in the same manner and analyzed by the same analytical methods.

12. Was the project completeness goal met?

All water samples listed on the COCs were received and analyzed by the laboratory as requested. No sample results were rejected during the evaluation process. The project is 100% complete.

Comments:

The data is of Level B quality.

APPENDIX C
STABILITY EVALUATION

ORION
Engineering, Inc.
Geotechnical Consultants • Drilling Services

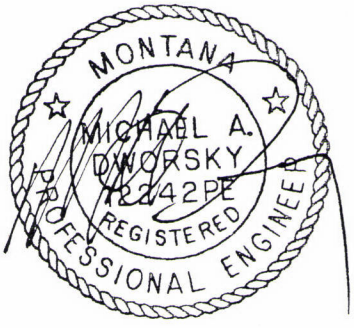
STABILITY EVALUATION

Tailing Impoundment Dams
Forest Rose Mine
Jens, Montana

December 15, 2003

Prepared For:
MCS Environmental
5562 Alloy South
Missoula, MT 59808

Project Number:
030243



P.O. Box 788, Missoula MT 59806 • Ph: 406-543-3100 Fax: 406-721-6629

TABLE OF CONTENTS

STABILITY EVALUATION

Tailing Impoundment Dams
Forest Rose Mine
Jens, Montana

1.0 INTRODUCTION

1.1 Project Information

The Forest Rose Mine site is located approximately 5.8 miles southwest of Jens, Montana, and approximately 8 miles east of Drummond, Montana in S22, T9N, R21W. The Tailings Impoundment Dams are located in the floodplain of Dunkleberg Creek, where mill tailings were slurried. Three dams have been identified (T1, T2, and T3), from lower to upper respectively. Our evaluation considered T1 and T2 only. Dam T1 exhibits a previous failure near the center of the Dam structure approximately 50-feet in width and 5 to 10-feet in depth. Both T1 and T2 Dams have a decant structure in-place within the pond areas behind the Dams. Recent slumping and water active water seepage was noted during our site evaluation. Please refer to Figure 1 for details.

1.2 Purpose

The purpose of this evaluation is to access the general stability of Dams T1 and T2 based on limited subsurface investigation, and to present critical factors affecting stability. Probable failure types and conceptual mitigation methods are also presented. The evaluation is considered preliminary in nature, and is intended to address general stability of the existing Dam structures. It was not the purpose of this report to provide specific recommendations or designs regarding stability mitigation. Additional investigation, groundwater data, laboratory testing, and analysis is required to address the probability of specific failure types, and to design a mitigation system.

1.3 Scope of Work

The scope of work involved with this project is limited to:

Site Evaluation and Subsurface Investigation:

1. Log Soil Borings to establish soil stratum depths and a general soil profiles.
2. Visually classify each soil strata according to the Unified Soil Classification System.
3. Investigate and characterize subsurface water conditions present at the site.
4. Record Standard Penetration Tests (SPT's) at specific depths for the purpose of establishing soil parameters for engineering analysis.

5. Record site observations pertinent to stability evaluation including evidence of instability and active water seepage.

Engineering Evaluation: Information obtained by the subsurface investigation and site observations is used to perform computerized slope stability evaluation of the Tailing Impoundment Dams identified as T1 and T2.

2.0 SUBSURFACE INVESTIGATION OUTLINE

2.1 Exploration Scope and Test Locations

The subsurface exploration took place September 30 to October 1, 2002. A total of four (4) soil borings were performed to depths ranging from 28.5 to 60.5-feet below existing ground surface elevation. MCS environmental, and Orion Engineering jointly determined the boring locations. Boring locations are presented in Figure 1 of the Appendix.

2.2 Soil Borings

Reun Drilling, using a Mobile B-50 drill rig, performed soil borings. Drilling services were contracted by others. Borings were advanced using a rotary auger system and hollow-stem auger. Standard Penetration Tests (SPT's) were used to gage relative density and to gather samples used to determine material types and strata according to the Unified Classification System as described in ASTM D 2488, and to observe any evidence of groundwater. Stratum depth changes were noted and select samples were collected by the field geologist.

Information obtained during drilling is presented on the attached Boring Logs. One Log is provided for each drill location. Key information provided on the Logs include:

1. Soil strata depths and thickness.
2. Unified Classification System symbol and description.
3. Standard Penetration Test results.
4. Observed water level, if present.
5. Total test depth.

2.3 Water Conditions

While performing drilling operations, moisture conditions were noted and recorded. If groundwater was detected, the location and depths were recorded.

3.0 SUMMARY OF FINDINGS

3.1 Surface Conditions

Please refer to Figure 1 in the Appendix. Dam T1 was characterized by a remnant failure surface and down-gradient residual slide mass. The failure surface was well defined and the failure had occurred near the center of the dam. The failure area is approximately 60-feet in width and 5 to 10-feet in depth. Numerous active water seepage zones were noted within the face of the failure surface. Based on the failure surface geometry and presence of seepage zones, it is likely that the failure mechanism is block or circular, and that failure was directly related to pore pressure increase due to phreatic groundwater levels. However, it is possible that erosion related to overtopping and/or piping had contributed to the failure. Based on visual observations of exposed materials within the failure surface, it appears that the dam had been reinforced at some time in the past using an imported gravel. The reinforcement appears to have occurred prior to the noted failure.

Dam T2 is relatively intact with the exception of some minor slumping near the toe of the dam. The slumping may be a localized condition associated with erosion or piping related to the decant structure effluent.

A decant structure was present in each of the two ponds just upstream of Dams T1 and T2. The decant structures consisted of an open-ended inlet and an underground effluent pipe; each discharging near the toe of the Dams. The purpose of the structures is to control the water levels in the ponds. The decant structures appeared to be in questionable condition, and may not be functional.

Standing water was noted in each of the two ponds upstream of Dams T1 and T2 as depicted in Figure 1 of the Appendix.

3.2 Subsurface Materials

In general, subsurface materials consist of fine-grained Silt (ML) and Sand (SP) tailings mixtures in a loose to very loose relative density state. The material directly underlying the tailing deposit is a thin and dense layer of native Silt/Sand over bedrock. Bedrock consisted of black Shale. Please refer to the Boring Logs in the Appendix for details.

3.3 Water Conditions

The borings were observed for groundwater both during and upon completion of the drilling. Static subsurface water level observations (if any) are indicated on the attached Boring Logs. Water level at boring locations varied from 2 to 16-feet below existing ground surface elevation.

Based on the presence of standing water in ponds, it is expected that groundwater levels reach the ground surface on a seasonal basis.

4.0 STABILITY ANALYSIS

4.1 Methodology

The computer program utilized for slope stability analysis is XSTABL. XSTABL is a fully integrated slope stability program that performs a two-dimensional limit-equilibrium analysis to compute a factor of safety for a slope according to generation of trial failure surfaces. Soil parameters were developed for this project from field-testing and back-calculation using the calibration procedure described below. The cross-section was created using the survey data and topographic map produced by MCS Environmental. The bedrock interface was incorporated based on the soil boring program results.

4.2 Model Calibration

The existing slope failure at Dam T1 was used to establish soil parameters. Please refer to file "ROSEINI" in the Appendix. The failure surface was modeled using both the Simplified Bishop (circular failure), and Spencer's Method (block failure), with groundwater at existing ground surface. Soil parameters were varied until a safety factor just less than 1.0 was achieved (Safety Factor = 0.896). Based on model calibration using existing features and based on field test results, the following soil parameters were used for tailings:

Moist Unit Weight	90 pcf
Saturated Unit Weight	115 pcf
Cohesion	50 psf
Friction Angle	27 deg

4.3 Results

Dam T1: Please refer to file "ROSE1" in the Appendix. The center of the Dam where failure had occurred is stable based on groundwater no higher than existing ground surface elevation (Safety Factor = 1.107). The steeper slopes on either side of the failure surface is unstable when groundwater reached existing ground surface elevation.

Dam T2: Please refer to file "ROSE2" in the Appendix. The existing Dam was found to be unstable based on groundwater at existing ground surface (Safety Factor = 0.913). The critical failure surface is approximately 25-feet thick. Groundwater was then dropped to determine a

level where the dam becomes stable. Stability was found with 10-feet deep groundwater at the crest of the Dam slope (Safety Factor = 1.067). Please refer to file "ROSE3" in the Appendix.

5.0 CONCLUSIONS

Both Dams T1 and T2 are currently unstable based on groundwater at existing ground elevation. The center portion of Dam T1 (failed surface) will be stable based on groundwater at existing ground elevation. Therefore, over time, both Dams will probably fail to a slope near that of the failed surface at Dam T1 (approximately 17-degrees). Our evaluation indicates that a failure in Dam T2 could be relatively deep-seated (up to 25-feet deep) as compared to the failure that has occurred at Dam T1 (approximately 10-feet deep). Instability conclusions are based on a groundwater level equal to that of existing ground surface. Given the groundwater readings from soil borings and presence of standing water in ponds, we feel that our groundwater assumption is reasonable. Even if decant structures are properly functioning, they will likely have a minimal effect on groundwater reduction for groundwater levels equal to or less than existing ground surface.

Our evaluation indicates that limiting the groundwater level to 10-feet below existing ground surface elevation at Dam T2 will result in a stable condition.

The exposed tailings at the Dam locations are highly erodable. In addition to potential slope failure, it is expected that sediment transport from erosion and piping will be an ongoing issue, especially if decant structures are not functioning properly.

6.0 RECOMMENDATIONS

Available stabilization measures to consider include:

1. *Horizontal Drains:* Horizontal drains are typically installed near the toe of an unstable slope and drilled horizontally a distance that penetrates the critical slip surface, or into bedrock. The purpose of horizontal drains is to reduce groundwater to an acceptable level.

2. *Spillway Channel:* A Spillway Channel consists of a recessed channel near the center of the Dams. The channel depth is based on the critical groundwater level required for stability. Spillway Channels are typically lined with a waterproof geomembrane and reinforced with riprap.

3. *Dam Removal:* Removing the existing tailings.

Other stabilization measures including cut-off trenches, buttresses, and relief wells are considered impractical at this time.

Any remedial effort short of removal will likely result in significant water flows. Sediment transport management may require the design and construction of stilling basins, energy dissipation structures, and/or settling ponds.

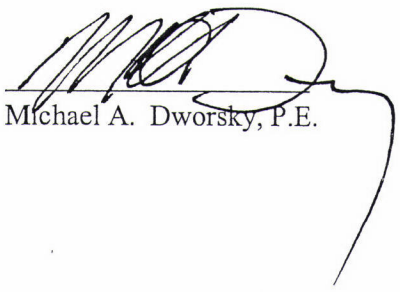
Based on our preliminary evaluation, the most practical and economic remedial plan may be the Spillway Channel.

7.0 CLOSURE

The conclusions and recommendations presented in this report are based on limited information. Additional field investigation, laboratory testing, and water level readings are required in order to verify specific conclusions, and to provide specific recommendations and designs required to stabilize the tailing impoundment dams.

If you have any questions regarding the contents of this report, please notify the undersigned. We appreciate the opportunity to be of service to you.

Respectfully submitted,
Orion Engineering, Inc.



Michael A. Dworsky, P.E.

APPENDIX

Figure 1: Boring Locations and Surface Features

Soil Boring Logs

Slope Stability Output

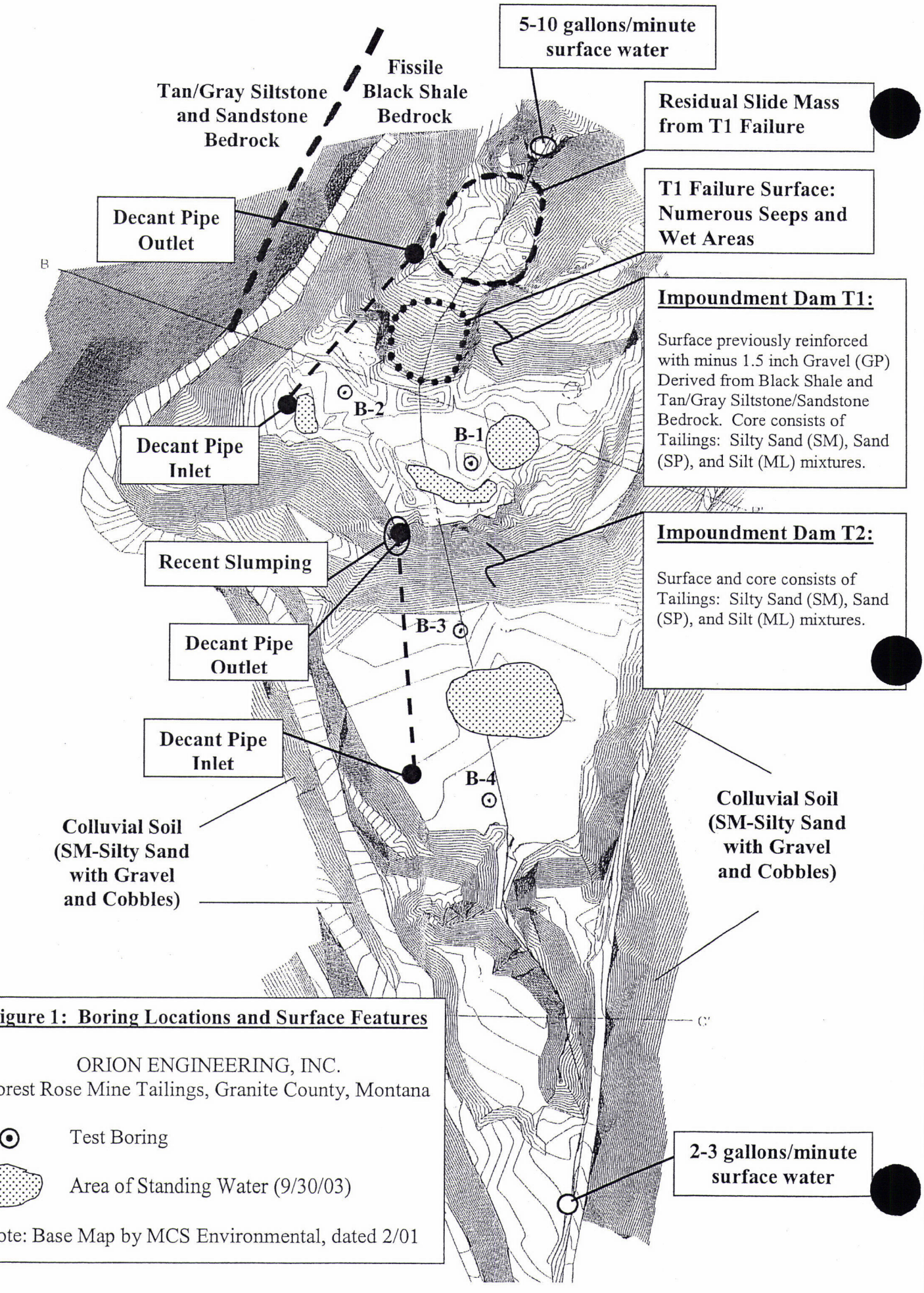


Figure 1: Boring Locations and Surface Features

ORION ENGINEERING, INC.
Forest Rose Mine Tailings, Granite County, Montana

⊙ Test Boring

Area of Standing Water (9/30/03)

Note: Base Map by MCS Environmental, dated 2/01

ORION Engineering, Inc.

SOIL BORING LOG

Project:	Forest Rose Mine			**BORING NO:**	**B-1**
Location:	Granite County, Montana			Sheet 1 of 2	
Client:	MCS Environmental	Drilling Equipment:	Mobiledrill B-50	Location:	see site map
Project #:	030243	Drilling Method:	HSA	Surface Elevation (Ft):	
Project Manager:	Michael Dworsky	Date Logged:	9/30/03	Overburden (Ft):	
Driller:	Ken Jones, Ruen Drilling	Logged By:	Peter Kurisoo	Rock (Ft):	Not Encountered

DEPTH (ft)	GRAPHIC LOG	SAMPLES: SAMPLE TYPE	SAMPLES: SPT BLOWS PER 6-in	SAMPLES: RECOVERY %	SAMPLES: RQD %	MATERIAL DESCRIPTION (ASTM D-2488)	USCS SYMBOL	WATER LEVEL DEPTH	REMARKS
						Loose, moist, orange brown, Poorly Graded Sand (TAILINGS).	SP		
		AUGER				Loose, wet, gray, Silty Sand (TAILINGS).	SM	2	Tailings wet below 2.0'.
5		SS	3 3 3						
		AUGER							
						Very Loose, wet, gray, sandy Silt (TAILINGS), some interbedded sandy layers.	ML		Tailings totally saturated below 8.0'.
10		SS	1/18"						
									No meaningful auger cuttings below 12.0'.
15		AUGER							
20		SS	1/18"						

SAMPLER TYPE
S - 2" OD Split Spoon
SB - 3" OD Split Spoon
ST - Shelby Tube
NQ - Rock Core, 1-7/8"
NX - Rock Core, 2-1/8"
CU - Cuttings
BH - Backhoe Grab
HA - Hand Auger

DRILLING METHOD
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
DC - Driving Casing
RW- Rotary Wash
RC - Rock Core

GROUNDWATER INFORMATION:
Cuttings wet below 2.0'.

BORING NO: B-1

BORING_PIT FEE.GPJ ORION.GDT 12/15/03

ORION Engineering, Inc.

SOIL BORING LOG

Project:	Forest Rose Mine			**BORING NO:**	**B-1**
Location:	Granite County, Montana			Sheet 2 of 2	
Client:	MCS Environmental	Drilling Equipment:	Mobiledrill B-50	Location:	see site map
Project #:	030243	Drilling Method:	HSA	Surface Elevation (Ft):	
Project Manager:	Michael Dworsky	Date Logged:	9/30/03	Overburden (Ft):	
Driller:	Ken Jones, Ruen Drilling	Logged By:	Peter Kurisoo	Rock (Ft):	Not Encountered

DEPTH (ft)	GRAPHIC LOG	SAMPLES: SAMPLE TYPE	SAMPLES: SPT BLOWS PER 6-in	SAMPLES: RECOVERY %	SAMPLES: RQD %	MATERIAL DESCRIPTION (ASTM D-2488)	USCS SYMBOL	WATER LEVEL DEPTH	REMARKS
25		AUGER							
						Medium dense to dense, wet, dark gray, sandy Silt (NATIVE SOIL), with 25% angular gravel (black shale fragments), some roots and wood fragments, moderately plastic.	ML		Numerous roots around auger bit from 28.0'-30.0'.
30			13						
		SS	13 24			BEDROCK - fissile black shale.	Bedrock		
						Boring Terminated at 31.5 Feet.			
35									
40									
45									

SAMPLER TYPE
SS - 2" OD Split Spoon
SB - 3" OD Split Spoon
ST - Shelby Tube
NQ - Rock Core, 1-7/8"
NX - Rock Core, 2-1/8"
CU - Cuttings
BH - Backhoe Grab
HA - Hand Auger

DRILLING METHOD
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
DC - Driving Casing
RW- Rotary
RC - Rock C

GROUNDWATER INFORMATION:
Cuttings wet below 2.0'.

BORING NO: B-1

BORING_PIT FEET 030243.GPJ ORION.GDT 12/15/03

ORION Engineering, Inc.

SOIL BORING LOG

Project:	Forest Rose Mine			**BORING NO:**	**B-2**
Location:	Granite County, Montana			Sheet 1 of 2	
Client:	MCS Environmental	Drilling Equipment:	Mobiledrill B-50	Location:	see site map
Project #:	030243	Drilling Method:	HSA	Surface Elevation (Ft):	
Project Manager:	Michael Dworsky	Date Logged:	9/30/03	Overburden (Ft):	
Driller:	Ken Jones, Ruen Drilling	Logged By:	Peter Kurisoo	Rock (Ft):	Not Encountered

DEPTH (ft)	GRAPHIC LOG	SAMPLES: SAMPLE TYPE	SAMPLES: SPT BLOWS PER 6-in	SAMPLES: RECOVERY %	SAMPLES: RQD %	MATERIAL DESCRIPTION (ASTM D-2488)	USCS SYMBOL	WATER LEVEL DEPTH	REMARKS
0						Loose, moist, brown, Poorly Graded Sand (TAILINGS).	SP		
		AUGER							
5						Very loose, moist to wet, gray, Poorly Graded Sand (TAILINGS), with some thin silt interbeds.	SP		
								▽ 8.5	Tailings wet and saturated below 8.5'.
10		SS	2/18"						
		AUGER							No meaningful auger cuttings below 10.0'.
15		SS	3 1/12"						
		AUGER							
		SS	3 4						
20			13			Medium dense, wet, dark brownish gray, sandy Silt (NATIVE SOIL), with 20% angular gravel (tan siltstone/sandstone), some organic material, moderately plastic.	ML SM		
		SS	6 7 7						
		SS	12 8 5			Medium dense, wet, tan brown, Silty Sand (NATIVE SOIL), with 20-30% angular gravel (tan siltstone/sandstone, black shale), tr. clay.			Soft drilling 23.5'-27.0'.

SAMPLER TYPE

- S - 2" OD Split Spoon
- SB - 3" OD Split Spoon
- ST - Shelby Tube
- NQ - Rock Core, 1-7/8"
- NX - Rock Core, 2-1/8"
- CU - Cuttings
- BH - Backhoe Grab
- HA - Hand Auger

DRILLING METHOD

- HSA - Hollow Stem Augers
- CFA - Continuous Flight Augers
- DC - Driving Casing
- RW- Rotary Wash
- RC - Rock Core

GROUNDWATER INFORMATION:

Cuttings wet below 8.5'.

BORING NO: B-2

BORING_PIT FEB.GPJ ORION.GDT 12/15/03

ORION Engineering, Inc.

SOIL BORING LOG

Project: Forest Rose Mine			**BORING NO: B-2** Sheet 2 of 2
Location: Granite County, Montana			
Client: MCS Environmental	Drilling Equipment:	Mobiledrill B-50	Location: see site map
Project #: 030243	Drilling Method:	HSA	Surface Elevation (Ft):
Project Manager: Michael Dworsky	Date Logged:	9/30/03	Overburden (Ft):
Driller: Ken Jones, Ruen Drilling	Logged By:	Peter Kurisoo	Rock (Ft): Not Encountered

DEPTH (ft)	GRAPHIC LOG	SAMPLES: SAMPLE TYPE	SPT BLOWS PER 6-in	RECOVERY %	RQD %	MATERIAL DESCRIPTION (ASTM D-2488)	USCS SYMBOL	WATER LEVEL DEPTH	REMARKS
25		AUGER							
		SS	4 6 7						
30						**Boring Terminated at 28.5 Feet**			
35									
40									
45									

SAMPLER TYPE

SS - 2" OD Split Spoon
SB - 3" OD Split Spoon
ST - Shelby Tube
NQ - Rock Core, 1-7/8"
NX - Rock Core, 2-1/8"
CU - Cuttings
BH - Backhoe Grab
HA - Hand Auger

DRILLING METHOD

HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
DC - Driving Casing
RW- Rotary W
RC - Rock Core

GROUNDWATER INFORMATION:

Cuttings wet below 8.5'.

BORING NO: B-2

BORING_PIT FEET 030243.GPJ ORION.GDT 12/15/03

ORION Engineering, Inc.

SOIL BORING LOG

Project:	Forest Rose Mine			**BORING NO:**	**B-3**
Location:	Granite County, Montana			Sheet 1 of 3	
Client:	MCS Environmental	Drilling Equipment:	Mobiledrill B-50	Location:	see site map
Project #:	030243	Drilling Method:	HSA	Surface Elevation (Ft):	
Project Manager:	Michael Dworsky	Date Logged:	10/1/03	Overburden (Ft):	
Driller:	Ken Jones, Ruen Drilling	Logged By:	Peter Kurisoo	Rock (Ft):	Not Encountered

DEPTH (ft)	GRAPHIC LOG	SAMPLES: SAMPLE TYPE	SAMPLES: SPT BLOWS PER 6-in	SAMPLES: RECOVERY %	SAMPLES: RQD %	MATERIAL DESCRIPTION (ASTM D-2488)	USCS SYMBOL	WATER LEVEL DEPTH	REMARKS
						Loose, moist, orange brown, Poorly Graded Sand (TAILINGS).	SP		Tailings moist 0'-3.5'.
						Loose, moist to wet, gray, Poorly Graded Sand, with 20-25% thin interbeds of sandy silt (TAILINGS).	SP-SM		Tailings intermittantly wet 3.5'-5.0'.
		AUGER							Tailings moist 5.0'-16.0'.
5									
		SS	2 3 2						
10									
		AUGER							
15								▽ 16	Tailings wet and saturated below 16.0'.
		SS	1 3 5						
20									

SAMPLER TYPE
S - 2" OD Split Spoon; SB - 3" OD Split Spoon; ST - Shelby Tube; NQ - Rock Core, 1-7/8"; NX - Rock Core, 2-1/8"; CU - Cuttings; BH - Backhoe Grab; HA - Hand Auger

DRILLING METHOD
HSA - Hollow Stem Augers; CFA - Continuous Flight Augers; DC - Driving Casing; RW- Rotary Wash; RC - Rock Core

GROUNDWATER INFORMATION:
Cuttings intermittantly wet 3.5'-5.0' and consistantly wet below 16.0'.

BORING NO: B-3

BORING_PIT FEB.GPJ ORION.GDT 12/15/03

ORION Engineering, Inc.

SOIL BORING LOG

Project:	Forest Rose Mine			**BORING NO:**	**B-3**
Location:	Granite County, Montana			Sheet 2 of 3	
Client:	MCS Environmental	Drilling Equipment:	Mobiledrill B-50	Location:	see site map
Project #:	030243	Drilling Method:	HSA	Surface Elevation (Ft):	
Project Manager:	Michael Dworsky	Date Logged:	10/1/03	Overburden (Ft):	
Driller:	Ken Jones, Ruen Drilling	Logged By:	Peter Kurisoo	Rock (Ft):	Not Encountered

DEPTH (ft)	GRAPHIC LOG	SAMPLES: SAMPLE TYPE	SAMPLES: SPT BLOWS PER 6-in	SAMPLES: RECOVERY %	SAMPLES: RQD %	MATERIAL DESCRIPTION (ASTM D-2488)	USCS SYMBOL	WATER LEVEL DEPTH	REMARKS
25		AUGER							
30		SS	3 3 3						
35		AUGER							
40		SS	3 3 3						
45		AUGER							

SAMPLER TYPE
SS - 2" OD Split Spoon
SB - 3" OD Split Spoon
ST - Shelby Tube
NQ - Rock Core, 1-7/8"
NX - Rock Core, 2-1/8"
CU - Cuttings
BH - Backhoe Grab
HA - Hand Auger

DRILLING METHOD
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
DC - Driving Casing
RW- Rotary W
RC - Rock Core

GROUNDWATER INFORMATION:
Cuttings intermittantly wet 3.5'-5.0' and consistantly wet below 16.0'.

BORING NO: B-3

BORING_PIT FEET 030243.GPJ ORION.GDT 12/15/03

ORION Engineering, Inc.

SOIL BORING LOG

Project: Forest Rose Mine			**BORING NO: B-3** Sheet 3 of 3
Location: Granite County, Montana			
Client: MCS Environmental	Drilling Equipment:	Mobiledrill B-50	Location: see site map
Project #: 030243	Drilling Method:	HSA	Surface Elevation (Ft):
Project Manager: Michael Dworsky	Date Logged:	10/1/03	Overburden (Ft):
Driller: Ken Jones, Ruen Drilling	Logged By:	Peter Kurisoo	Rock (Ft): Not Encountered

DEPTH (ft)	GRAPHIC LOG	SAMPLES: SAMPLE TYPE	SAMPLES: SPT BLOWS PER 6-in	SAMPLES: RECOVERY %	SAMPLES: RQD %	MATERIAL DESCRIPTION (ASTM D-2488)	USCS SYMBOL	WATER LEVEL DEPTH	REMARKS
50		SS	7 7 8			Medium dense, wet, dark gray, sandy Silt (NATIVE SOIL), with 20-25% angular gravel, some roots and wood fragments, slightly to moderately plastic.	ML		
						Medium dense, wet, dark tan brown, Silty Sand (NATIVE SOIL), with 40-45% angular gravel, slightly plastic.	SM		Auger cuttings very wet 51.5'-54.0'
	AUGER								
55		SS	12 13 10						Rough auger drilling 54.0'-59.0'.
	AUGER								
						Medium dense, wet, tan brown to brown, sandy Silt (NATIVE SOIL), with 20-25% angular gravel, some roots and wood fragments, moderately plastic.	ML		
60		SS	3 3 8						
						Boring Terminated at 60.5 Feet.			
65									
70									

SAMPLER TYPE
SS - 2" OD Split Spoon
SB - 3" OD Split Spoon
ST - Shelby Tube
NQ - Rock Core, 1-7/8"
NX - Rock Core, 2-1/8"
CU - Cuttings
BH - Backhoe Grab
HA - Hand Auger

DRILLING METHOD
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
DC - Driving Casing
RW- Rotary Wash
RC - Rock Core

GROUNDWATER INFORMATION:
Cuttings intermittantly wet 3.5'-5.0' and consistantly wet below 16.0'.

BORING NO: B-3

BORING_PIT FEET.PJ ORION.GDT 12/15/03

ORION Engineering, Inc.

SOIL BORING LOG

Project: Forest Rose Mine			**BORING NO: B-4** Sheet 1 of 2
Location: Granite County, Montana			
Client: MCS Environmental	Drilling Equipment: Mobiledrill B-50		Location: see site map
Project #: 030243	Drilling Method: HSA		Surface Elevation (Ft):
Project Manager: Michael Dworsky	Date Logged: 10/1/03		Overburden (Ft):
Driller: Ken Jones, Ruen Drilling	Logged By: Peter Kurisoo		Rock (Ft): Not Encountered

DEPTH (ft)	GRAPHIC LOG	SAMPLES: SAMPLE TYPE	SAMPLES: SPT BLOWS PER 6-in	SAMPLES: RECOVERY %	SAMPLES: RQD %	MATERIAL DESCRIPTION (ASTM D-2488)	USCS SYMBOL	WATER LEVEL DEPTH	REMARKS
0						Loose, moist to wet, gray brown, Poorly Graded Sand (TAILINGS)	SP	2	Tailings wet and saturated below 2.0'.
		AUGER							
5						Loose to medium dense, wet, brown gray to gray, Poorly Graded Sand, with 10-20% thin sandy silt interbeds (TAILINGS).	SP-SM		
10		SS	2 3 2						
		AUGER							
15									
20		SS	7 7 8						

SAMPLER TYPE
SS - 2" OD Split Spoon
SB - 3" OD Split Spoon
ST - Shelby Tube
NQ - Rock Core, 1-7/8"
NX - Rock Core, 2-1/8"
CU - Cuttings
BH - Backhoe Grab
HA - Hand Auger

DRILLING METHOD
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
DC - Driving Casing
RW - Rotary W
RC - Rock Co

GROUNDWATER INFORMATION:
Cuttings wet below 2.0'.

BORING NO: B-4

BORING_PIT FEET 030243.GPJ ORION.GDT 12/15/03

ORION Engineering, Inc.

SOIL BORING LOG

Project: Forest Rose Mine			**BORING NO: B-4** Sheet 2 of 2
Location: Granite County, Montana			
Client: MCS Environmental	Drilling Equipment:	Mobiledrill B-50	Location: see site map
Project #: 030243	Drilling Method:	HSA	Surface Elevation (Ft):
Project Manager: Michael Dworsky	Date Logged:	10/1/03	Overburden (Ft):
Driller: Ken Jones, Ruen Drilling	Logged By:	Peter Kurisoo	Rock (Ft): Not Encountered

DEPTH (ft)	GRAPHIC LOG	SAMPLES: SAMPLE TYPE	SPT BLOWS PER 6-in	RECOVERY %	RQD %	MATERIAL DESCRIPTION (ASTM D-2488)	USCS SYMBOL	WATER LEVEL DEPTH	REMARKS
25		AUGER							
30		SS	3 3 1						
		AUGER							
35		SS	5 9 37			Medium dense, wet, gray brown, sandy Silt (NATIVE SOIL), with 10-20% angular gravel, some roots and wood fragments, moderately plastic.	ML		Drilling slower below 34.5'.
						Medium dense to dense, wet, tan brown, Silty Sand (NATIVE SOIL), with 40-45% angular gravel, cobbley at 37.0', slighty plastic.	SM		Rough drilling 36.0'-42.0'.
		AUGER							
40		SS	12 23 22			BEDROCK - fissile black shale.	Bedrock		
45						**Boring Terminated at 43.5 Feet.**			

SAMPLER TYPE
SS - 2" OD Split Spoon
SB - 3" OD Split Spoon
ST - Shelby Tube
NQ - Rock Core, 1-7/8"
NX - Rock Core, 2-1/8"
CU - Cuttings
BH - Backhoe Grab
HA - Hand Auger

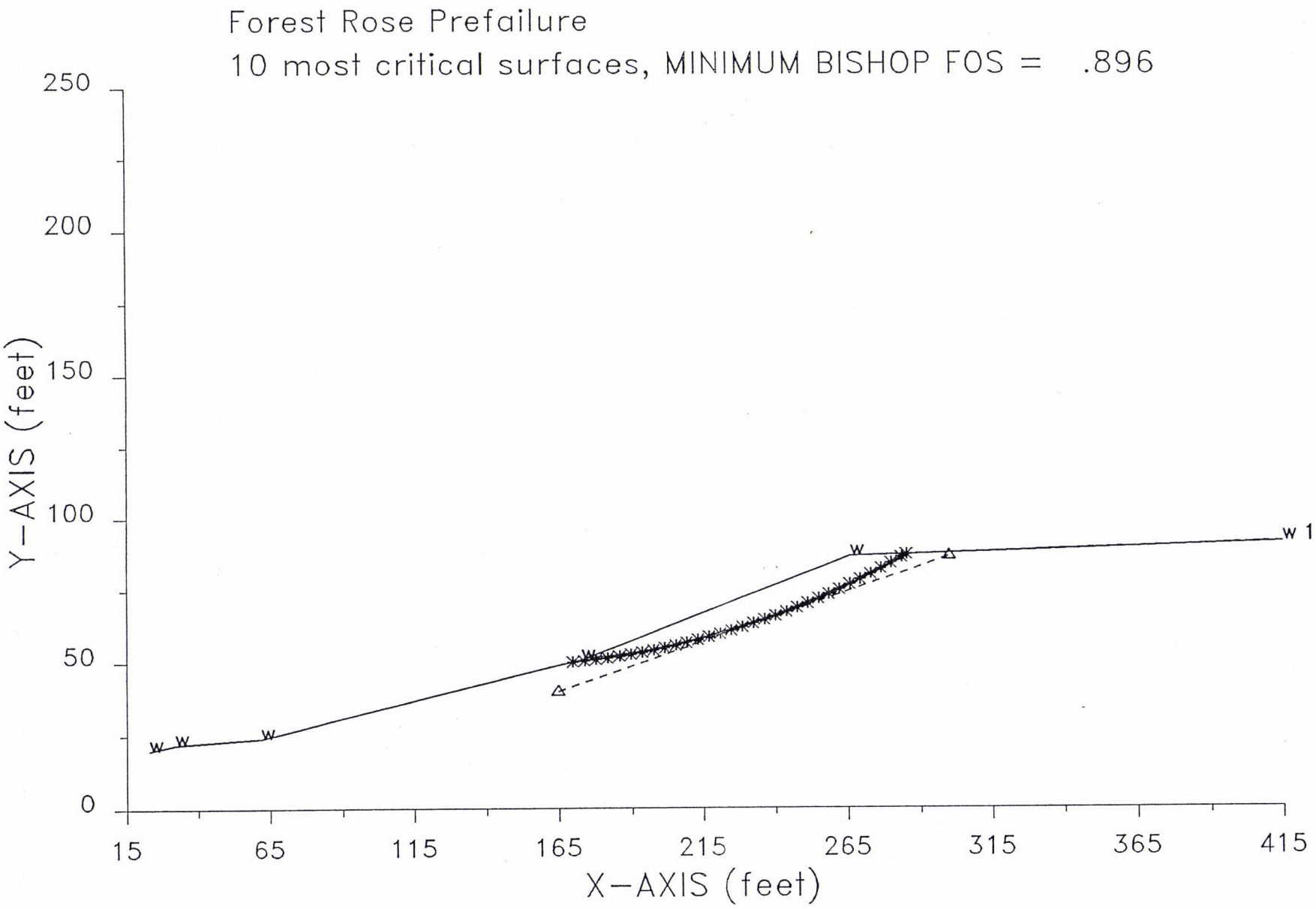
DRILLING METHOD
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
DC - Driving Casing
RW- Rotary Wash
RC - Rock Core

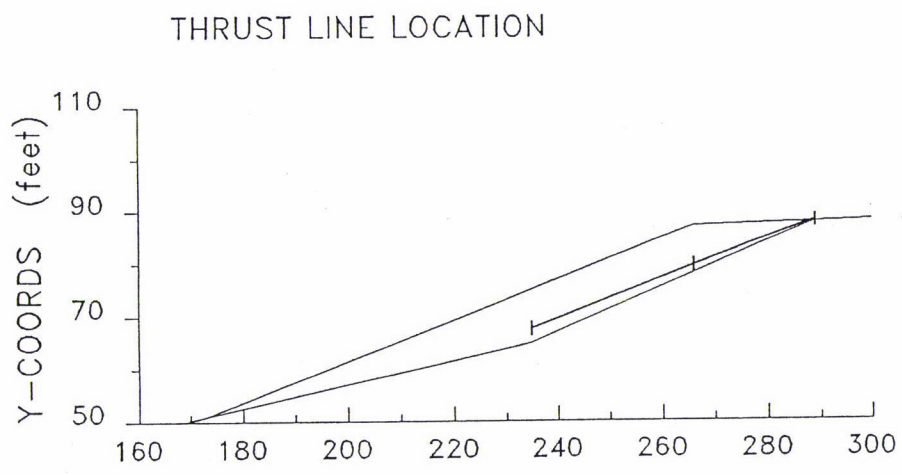
GROUNDWATER INFORMATION:
Cuttings wet below 2.0'.

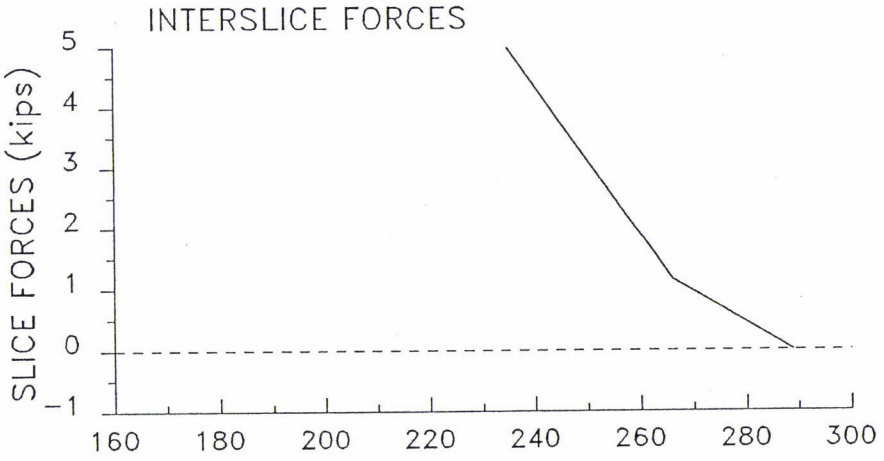
BORING NO: B-4

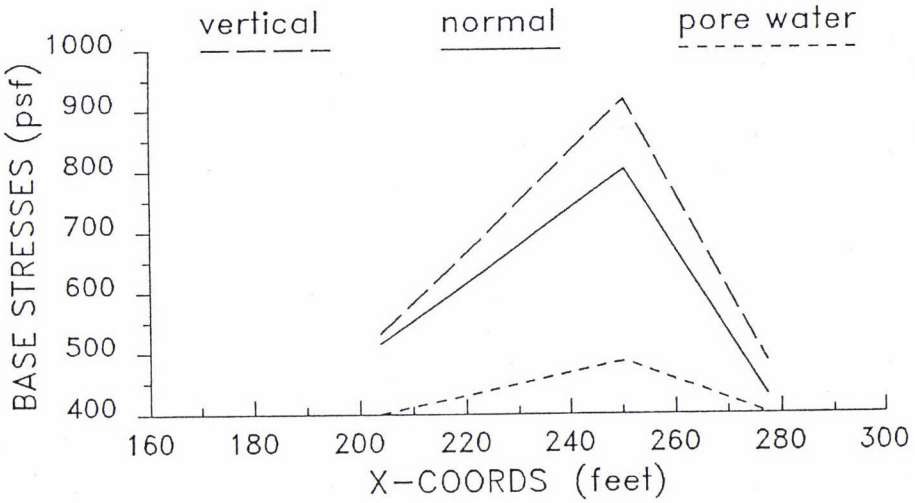
BORING_PIT FEET.PJ ORION.GDT 12/15/03

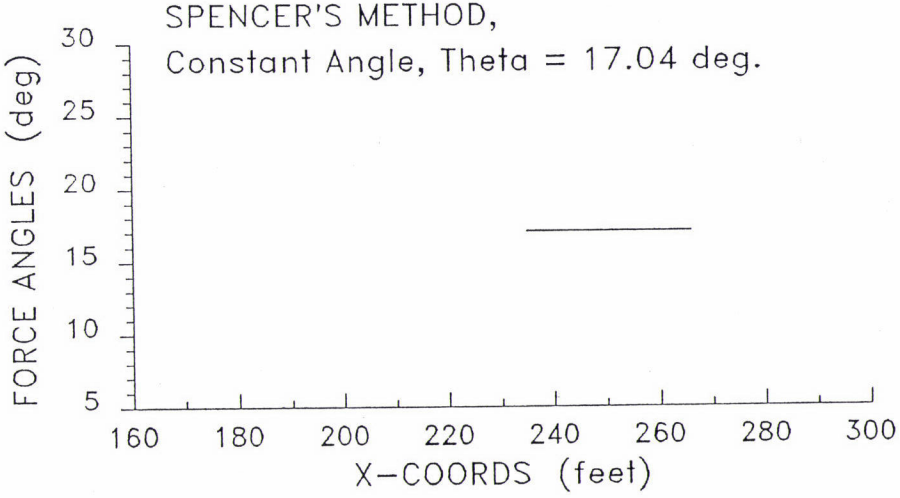
ROSEINI 12-09-** 10:12











Forest Rose Prefailure Block Surface
SPENCER'S METHOD, FOS for Specified Surface = .960

XSTABL File: ROSEINI 12-09-** 10:12

```
*****************************************
*              X S T A B L              *
*                                       *
*        Slope Stability Analysis       *
*               using the               *
*            Method of Slices           *
*                                       *
*         Copyright (C) 1992 - 97       *
*   Interactive Software Designs, Inc.  *
*        Moscow, ID 83843, U.S.A.       *
*                                       *
*          All Rights Reserved          *
*                                       *
*  Ver. 5.202                96 - 1570  *
*****************************************
```

Problem Description : Forest Rose Prefailure

SEGMENT BOUNDARY COORDINATES

---

5 SURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	23.0	20.0	32.0	22.0	1
2	32.0	22.0	62.0	24.0	1
3	62.0	24.0	173.0	51.0	1
4	173.0	51.0	266.0	87.0	1
5	266.0	87.0	415.0	92.0	1

ISOTROPIC Soil Parameters

---

1 Soil unit(s) specified

Soil Unit No.	Unit Weight Moist (pcf)	Unit Weight Sat. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Parameter Ru	Pore Pressure Constant (psf)	Water Surface No.
1	90.0	115.0	50.0	27.00	.000	.0	1

1 Water surface(s) have been specified

Unit weight of water = 62.40 (pcf)

****
PHREATIC SURFACE,
****

Point No.	x-water (ft)	y-water (ft)
1	23.00	20.00
2	32.00	22.00
3	62.00	24.00
4	173.00	51.00
5	266.00	87.00
6	415.00	92.00

BOUNDARIES THAT LIMIT SURFACE GENERATION HAVE BEEN SPECIFIED

LOWER limiting boundary of 1 segments:

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)
1	165.0	40.0	300.0	87.0

A critical failure surface searching method, using a random technique for generating CIRCULAR surfaces has been specified.

500 trial surfaces will be generated and analyzed.

100 Surfaces initiate from each of 5 points equally spaced along the ground surface between x = 170.0 ft
and x = 180.0 ft

Each surface terminates between x = 285.0 ft
and x = 295.0 ft

Unless further limitations were imposed, the minimum elevation at which a surface extends is y = .0 ft

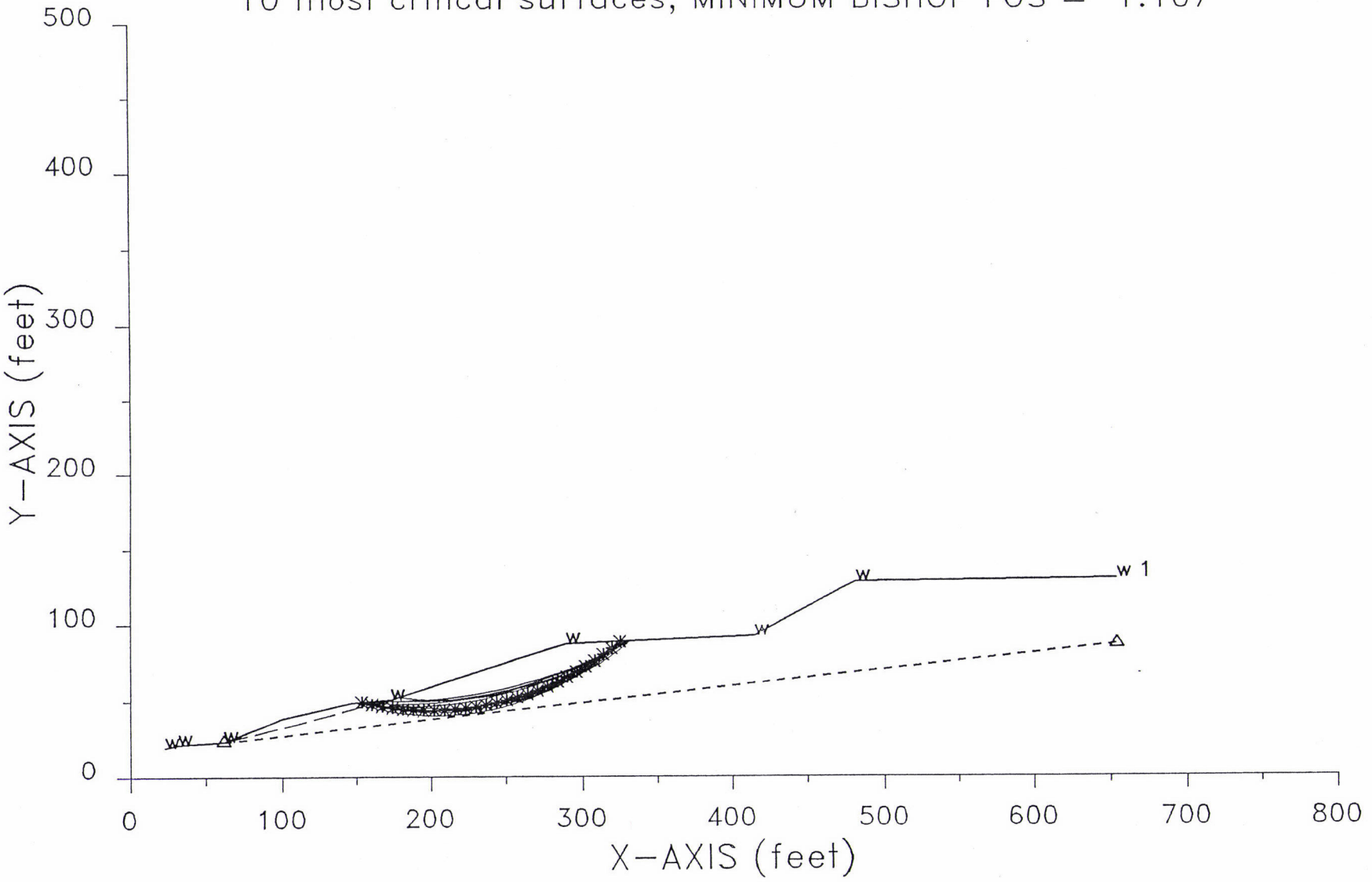
* * * * * DEFAULT SEGMENT LENGTH SELECTED BY XSTABL * * * * *

4.0 ft line segments define each trial failure surface.

ROSE1 12-09-** 17:15

Forest Rose Lower Failure

10 most critical surfaces, MINIMUM BISHOP FOS = 1.107



XSTABL File: ROSE1 12-09-** 10:33

```
*****************************************
*              X S T A B L              *
*                                       *
*        Slope Stability Analysis       *
*               using the               *
*            Method of Slices           *
*                                       *
*         Copyright (C) 1992 - 97       *
*   Interactive Software Designs, Inc.  *
*        Moscow, ID 83843, U.S.A.       *
*                                       *
*          All Rights Reserved          *
*                                       *
*  Ver. 5.202                 96 - 1570 *
*****************************************
```

Problem Description : Forest Rose Lower Failure

SEGMENT BOUNDARY COORDINATES

---

9 SURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	23.0	20.0	32.0	22.0	1
2	32.0	22.0	62.0	24.0	1
3	62.0	24.0	100.0	39.0	1
4	100.0	39.0	147.0	49.0	1
5	147.0	49.0	173.0	51.0	1
6	173.0	51.0	289.0	87.0	1
7	289.0	87.0	415.0	92.0	1
8	415.0	92.0	481.0	128.0	1
9	481.0	128.0	654.0	130.0	1

ISOTROPIC Soil Parameters

---

1 Soil unit(s) specified

Soil Unit No.	Unit Weight Moist (pcf)	Unit Weight Sat. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Parameter Ru	Pore Pressure Constant (psf)	Water Surface No.
1	90.0	115.0	50.0	27.00	.000	.0	1

1 Water surface(s) have been specified

Unit weight of water = 62.40 (pcf)

Water Surface No. 1 specified by 8 coordinate points

****
PHREATIC SURFACE,
****

Point No.	x-water (ft)	y-water (ft)
1	23.00	20.00
2	32.00	22.00
3	62.00	24.00
4	173.00	51.00
5	289.00	87.00
6	415.00	92.00
7	481.00	128.00
8	654.00	130.00

BOUNDARIES THAT LIMIT SURFACE GENERATION HAVE BEEN SPECIFIED

LOWER limiting boundary of 1 segments:

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)
1	62.0	24.0	654.0	86.5

A critical failure surface searching method, using a random technique for generating CIRCULAR surfaces has been specified.

500 trial surfaces will be generated and analyzed.

10 Surfaces initiate from each of 50 points equally spaced along the ground surface between x = 75.0 ft
and x = 250.0 ft

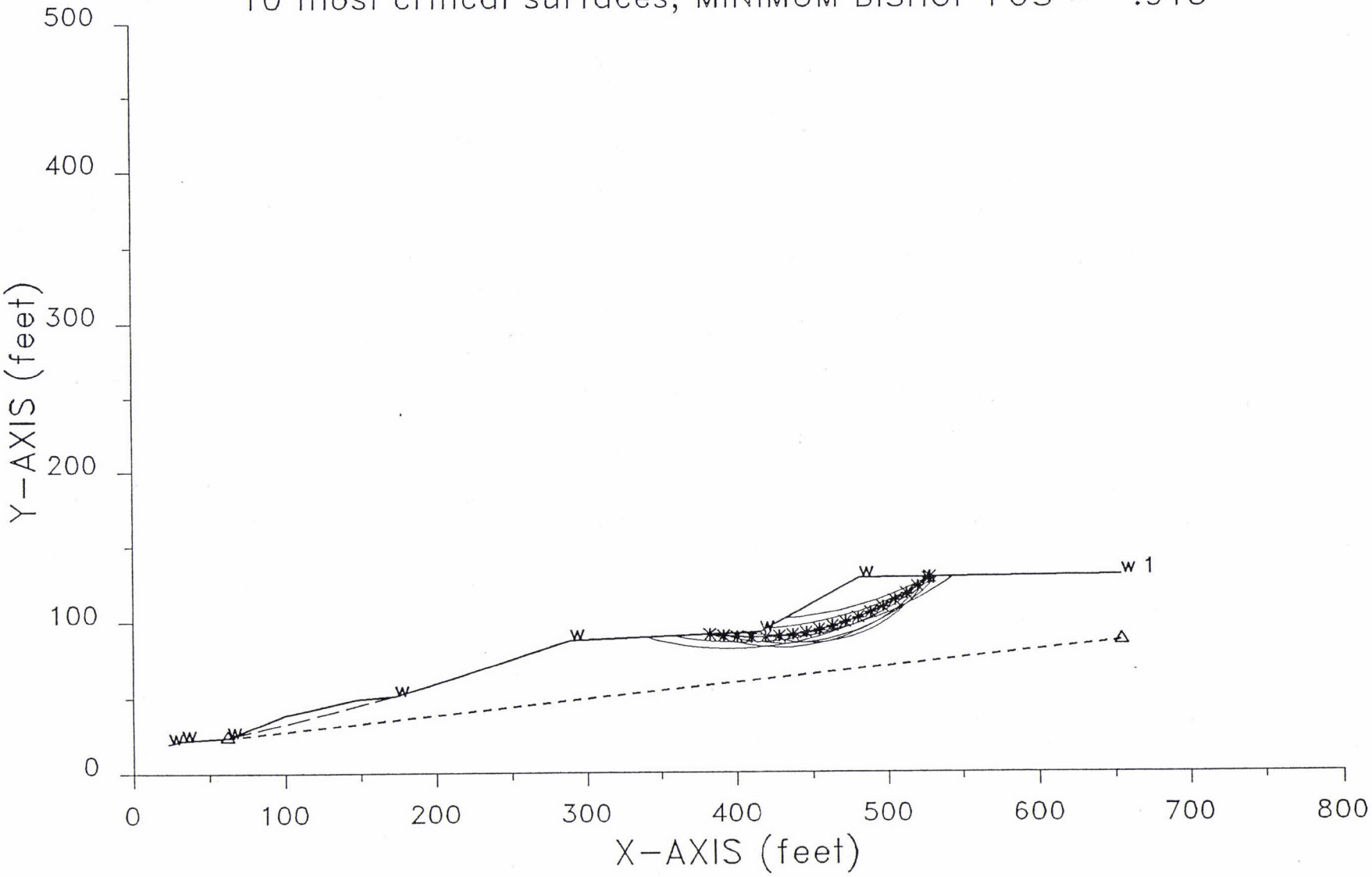
Each surface terminates between x = 325.0 ft
and x = 400.0 ft

Unless further limitations were imposed, the minimum elevation at which a surface extends is y = .0 ft

* * * * * DEFAULT SEGMENT LENGTH SELECTED BY XSTABL * * * * *

7.0 ft line segments define each trial failure surface.

Forest Rose Upper Failure
10 most critical surfaces, MINIMUM BISHOP FOS = .913



XSTABL File: ROSE2 12-09-** 10:43

```
*****************************************
*              X S T A B L              *
*                                       *
*        Slope Stability Analysis       *
*               using the               *
*           Method of Slices            *
*                                       *
*         Copyright (C) 1992 - 97       *
*   Interactive Software Designs, Inc.  *
*        Moscow, ID 83843, U.S.A.       *
*                                       *
*          All Rights Reserved          *
*                                       *
*  Ver. 5.202                 96 - 1570 *
*****************************************
```

Problem Description : Forest Rose Upper Failure

SEGMENT BOUNDARY COORDINATES

---

9 SURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	23.0	20.0	32.0	22.0	1
2	32.0	22.0	62.0	24.0	1
3	62.0	24.0	100.0	39.0	1
4	100.0	39.0	147.0	49.0	1
5	147.0	49.0	173.0	51.0	1
6	173.0	51.0	289.0	87.0	1
7	289.0	87.0	415.0	92.0	1
8	415.0	92.0	481.0	128.0	1
9	481.0	128.0	654.0	130.0	1

ISOTROPIC Soil Parameters

---

1 Soil unit(s) specified

Soil Unit No.	Unit Weight Moist (pcf)	Unit Weight Sat. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Parameter Ru	Pore Pressure Constant (psf)	Water Surface No.
1	90.0	115.0	50.0	27.00	.000	.0	1

1 Water surface(s) have been specified

Unit weight of water = 62.40 (pcf)

Water Surface No. 1 specified by 8 coordinate points

****
PHREATIC SURFACE,
****

Point No.	x-water (ft)	y-water (ft)
1	23.00	20.00
2	32.00	22.00
3	62.00	24.00
4	173.00	51.00
5	289.00	87.00
6	415.00	92.00
7	481.00	128.00
8	654.00	130.00

BOUNDARIES THAT LIMIT SURFACE GENERATION HAVE BEEN SPECIFIED

LOWER limiting boundary of 1 segments:

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)
1	62.0	24.0	654.0	86.5

A critical failure surface searching method, using a random technique for generating CIRCULAR surfaces has been specified.

1000 trial surfaces will be generated and analyzed.

20 Surfaces initiate from each of 50 points equally spaced along the ground surface between x = 150.0 ft
and x = 450.0 ft

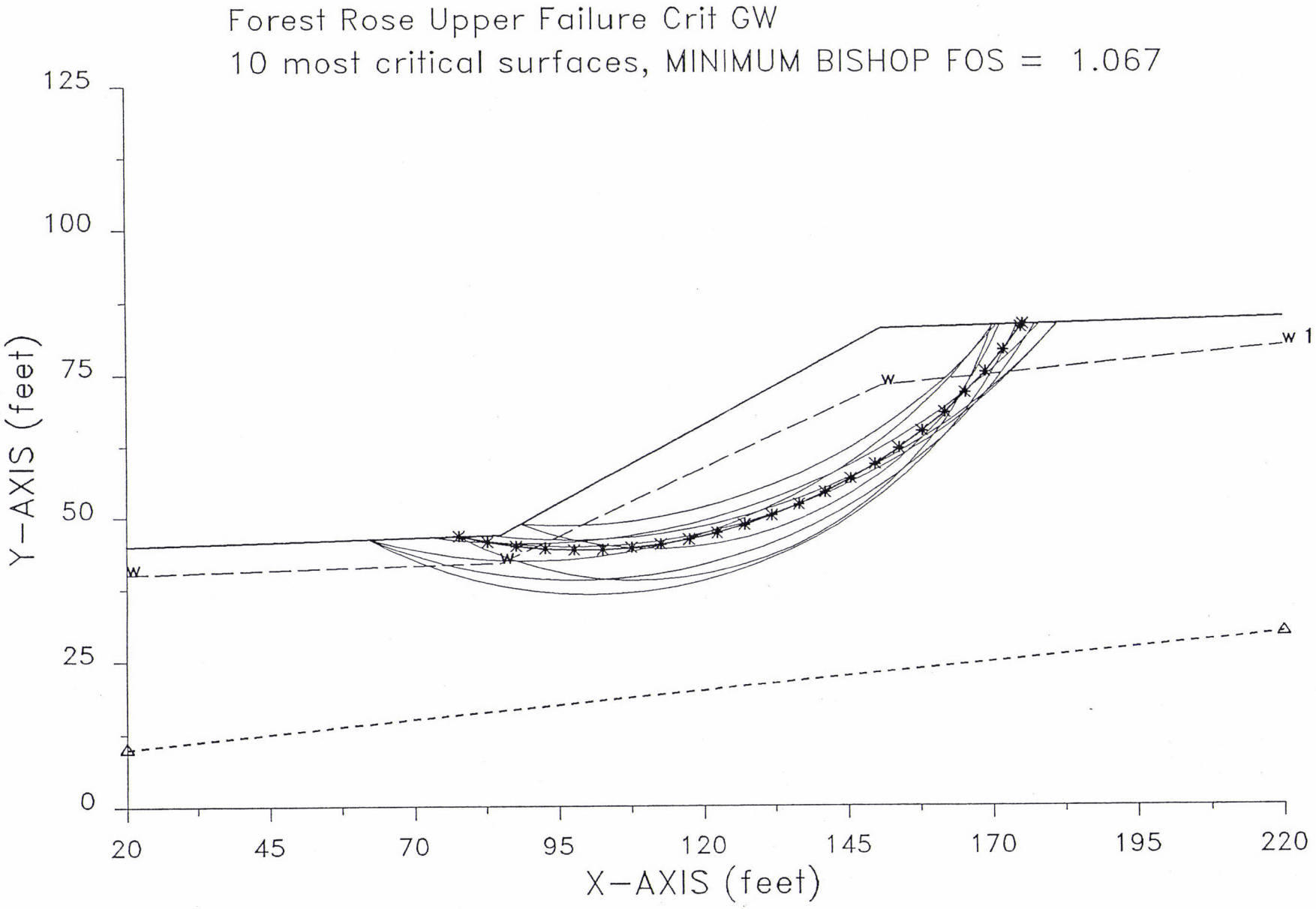
Each surface terminates between x = 525.0 ft
and x = 650.0 ft

Unless further limitations were imposed, the minimum elevation at which a surface extends is y = .0 ft

* * * * * DEFAULT SEGMENT LENGTH SELECTED BY XSTABL * * * * *

9.0 ft line segments define each trial failure surface.

ROSE3 12-09-** 17:03



```
*******************************************
*              X S T A B L                *
*                                         *
*        Slope Stability Analysis         *
*               using the                 *
*            Method of Slices             *
*                                         *
*         Copyright (C) 1992 - 97         *
*   Interactive Software Designs, Inc.    *
*        Moscow, ID 83843, U.S.A.         *
*                                         *
*          All Rights Reserved            *
*                                         *
*  Ver. 5.202                96 - 1570    *
*******************************************
```

Problem Description : Forest Rose Upper Failure Crit GW

SEGMENT BOUNDARY COORDINATES

---

3 SURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	20.0	45.0	85.0	47.0	1
2	85.0	47.0	151.0	83.0	1
3	151.0	83.0	220.0	85.0	1

ISOTROPIC Soil Parameters

---

1 Soil unit(s) specified

Soil Unit No.	Unit Weight Moist (pcf)	Unit Weight Sat. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Parameter Ru	Pore Pressure Constant (psf)	Water Surface No.
1	90.0	115.0	50.0	27.00	.000	.0	1

1 Water surface(s) have been specified

Unit weight of water = 62.40 (pcf)

PHREATIC SURFACE,
****

Point No.	x-water (ft)	y-water (ft)
1	20.00	40.00
2	85.00	42.00
3	151.00	73.00
4	220.00	80.00

BOUNDARIES THAT LIMIT SURFACE GENERATION HAVE BEEN SPECIFIED

LOWER limiting boundary of 1 segments:

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)
1	20.0	10.0	220.0	30.0

A critical failure surface searching method, using a random technique for generating CIRCULAR surfaces has been specified.

1000 trial surfaces will be generated and analyzed.

50 Surfaces initiate from each of 20 points equally spaced along the ground surface between x = 20.0 ft
and x = 120.0 ft

Each surface terminates between x = 170.0 ft
and x = 220.0 ft

Unless further limitations were imposed, the minimum elevation at which a surface extends is y = .0 ft

* * * * * DEFAULT SEGMENT LENGTH SELECTED BY XSTABL * * * * *

5.0 ft line segments define each trial failure surface.

ANGULAR RESTRICTIONS

The first segment of each failure surface will be inclined

APPENDIX D
FIELD NOTES

1175 - TLS - EDG start
1178 - end
1179 - 80 - RD EDG.
1181 - Spring Discharge
* 1182 - Bad pnt start RD EDG.
1183 - 84 RD EG
1185 - other side.
New - RD EDG
1886 - 1192
Start RD EDG - 1193
RD EDG - 1197 - Next to Building
Start RD EDG - 1198
END - 1201
1202 - CP-11 Steel post on Ground
Near center Northern Post.
Shot as RD EDG

Forest Rose Mine 8/8/03 1

Clear 60°F
on-site 7:15 am
Warren of MCS
Mike Morgan of MCS

Warren of MCS proceeded below Tailings Damn one and failure to Dankleberg Creek. Aproximately 130' North of failure exent. Tailings Damn 1 (TD1)
Calibrated YSI 556 MPS for pH. at 7:30 am
pH calibration on instrument is not accurate probe drifted and out of range on curve. accepted calibration, for field will send sample to lab to verify pH.

j

8/8/03 2

Down stream Dunkleberg Creek Sampling site Flow ~ 40-80 gallons a minute. Stream channel 1.0 -2.0 wide vegetated both sides slopes up to stream channel

Disk 1 Photo 1 - sampling location soil-

Disk 1 photo 2 - upstream view of site looking towards TD1 -S-SW

Temperature: 6.69 °C
SC - 0.529 mS/cm
Con - 344 µS/cm
DO - 10.58 mg/L
PH - Not accurate.
ORP - 261.0
Alkalinity - 420 X 0.4 =
14
1680
Alkalinity - 135 X 1.0 = 135 mg/L

8/8/03 3

Collected Stream water Sample

STR-01-0-SW 8:30
1-500ml - unfiltered unacid
" " " " Acid "
" " Filtered " "

Collected ~~702~~ 9.2 stream soil sample.

STR-02-0.1'-S 9:30
Collected sample directly adjacent to stream channel edge

Face of TD1 ath Failure scarp seeps water that collects and ~~fl~~ channelizes on east side of Failure surface. Channel connects to spring that discharges From the east base of TD 1.

Disk 1 Photo 3 - Spring and Seep
" " 4 - Spring and Seep looking South.

The seep is stained orange at base of water channel connects to Spring channel and new channel sediments are not stained. Slightly in some areas.

? - Spring is discharging at ~1.0 - 2.0 gallon per minute. * Slope Failure at spring location. → Disk 2 - photo 10.
Seep is discharging ~.05 gal/min

Collecting water sample - 10' below were seep and Spring come together

Disk 1 - Photo 5 - View above seep and spring

Disk 1 - Photo 6. - Seep channel-S
Disk 1 - Phot 7. - " "-S
Disk 1 - Photo 8 - Seep channel pool-SE below TD1 - East side Failure

Temperature: 5.57°C
SC : 0.641 mS/cm
Cond : 403 µS/cm
DO : 6.98
ORP : -283.5

Alkalinity: 144 mg/L

SP-03-0-SW - 11:00
1 - 500 ml - Un-Filtered unacid
" " - " " acid
" " - Filtered + " "

Several other Tailings Seeps are located over the Failure surface. These waters move slowly over the tailings failure surface and connect to existing channelized areas and discharge into the stream below the Tailings Dam.
Disk 1 Photo 9 - Tailings Seep NE side of TD1 failure surface

Collected 30pt composite soil sample from ~1.2' bgs over top of TD1 or T1 area

Soils were mostly silt sands orange in color, with angular rock clasts 1/4" - 3" dia

Two of the composite soil sample locations contained layer of sand that was gray, moist and slightly dense.

We included some of the gray material from these two locations into the composite sample.

T1-04-1.2-T - 1130

Disk 1 - Photo 10 - East across T1 Area - Composite Sample locations.

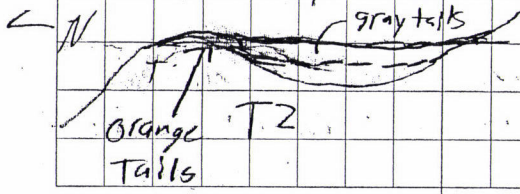
T2 area.

Approximately 1/3 of the T2 area has red orange Tailings exposed and 2/3 has gray tailings exposed.

The red orange tailings is starts along the North edge of the ponded water and is crecent shaped.

Disk 2 photo 1 - T2 pond edge gray Tails

It is suspected that when the T3 are dam breached it filled in a deeper ponded area ~~on~~ located on top of the T2 area



Collected 30 point composite of orange red tails and 30 point of gray tails

dug test pit Near North edge (approximately 20' South) and encountered ~~gra~~ orange red tails at a depth of ~ 12" or 1.0'.

Disk 2 Photo 2 - photo ororange red tails below gray tails.

Disk 2 Photo 3- South facing of T2 area pond and orange red Tails

Tailings slope up from edge of T2 area pond indicate former pond area.

Decant tower located along west edge of of T2 ared ~5' from slope and at edge of

small road located on slope.

Water that drains through T3 area channel which collects in ~~pond~~ T2 pond and water that collects in T2 pond drain toward and out T2 ared decant tower.

Disk 2- Photos 4 and 5 - T2 area Decant tower - SE

Orange/Red tails in T2 area are fine grained sand and silt. Some is coarse grain sand and silt with some iron cementing.

Gray Tails in T2 ared contain a fine grain Sandy silt moiste and dense. Some test holes contain a gray ~~clay~~ silt at a depth of ~1.0' - 2 holes of gray silt were included in Composite

8/18/03 10

Disk 2 - Photo 6
Photo of gray clay layer in test pit.

Orange Tails T2 composite

T2-05-1.5-T 13:00

Gray Tails T2 composite 14:00

T2-06-1.5-T

Disk 2 - Photo 8 - Tails Failure Seep
Looking North - Sampling point
Photo 9 - Same

8/18/03 11

Tails Seep Base T1 Dam

Temp 16.54

SC - 1,413
cond - 1184
DO: 1.26
ORP: -284.1
Sample - TS-07-0-SW - 14:30

Disk 2 - Photo 10 -
T2-area 3 composite sites - W

T1 - Decant Tower water
Sample - Discharge 15-30 gal/min
Includes water from
Spring located in SW
corner - T1 Area
and water flowing
through T2 area decant and
flowing over T1 surface

DT-08-0-SW
Disk 3 - Photo - Decant
Sample - S

8/8/03 12

Temp. 16.30
SC : 0.423
Cond : 368
DO - 4.60
ORP - -226.2
ALK: 145 mg/L

Sampling T2 are discharge decant tower prior to discharging on to T3 area
DTD-09-0-SW
Discharge 1-2 gal/min

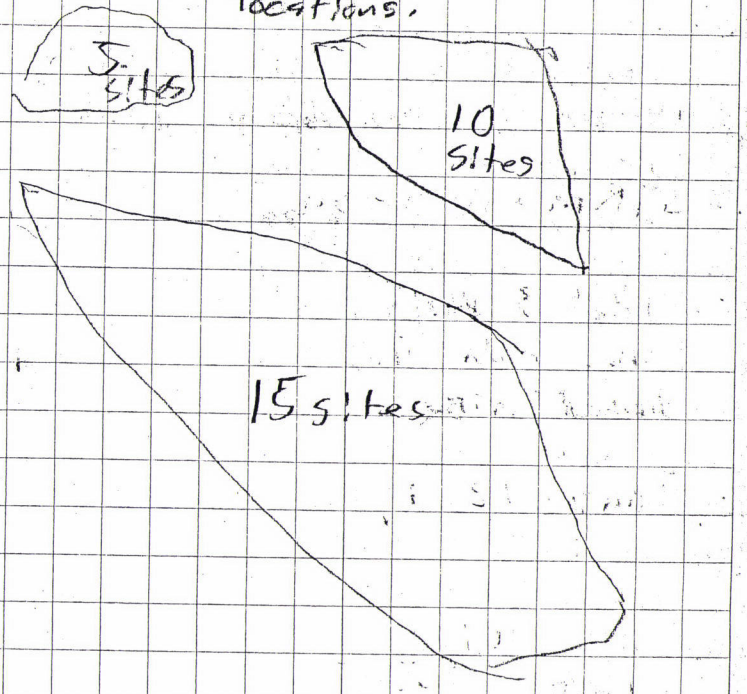
Temp: 16.95
SC : 0.388
Cond: 343
DO: 5.17
ALK: 97 mg/L

Disk 3- Photo 2 & 3 - T2-decant discharge Sample.-S

8/8/03 13

T3 Area 30 point Composite Sample T3-10-1.5-T 1600

Disk 3 photo 4- T3 area - North including Composite Soil sample locations.



Soil sample T3-10-1.5-T consisted of 30 composites over 3 surfaces dissected by incised erosional channels. Soils consisted of a gray fine grained sandy silt, which was moiste and dense

8/8/03 14

STRM-11-0-SW

Disk 3 Photo - 5, 6, 7
up stream T3 Stream Sample location - 5

Temp: 7.26°C
SC: 0.325
Cond 215
DO: 10.51
ORP: -252.5
ALK = 80mg/l

Discharge - 3-4 gals./min

8/8/03 15

AD-12-0-SW

Temp: 7.93°C
SC: 0.472 mS/cm
Cond 318 µS/cm
DO: 8.58
ORP: -253.1
ALK: 111 mg/L

2 discharg locations from slope just above T3 area and adjacent to Mill site

Southern Discharges from wooden Flume est. approx. 1-4 gal/min

Northern Discharger from wooden Flume est ~ 0.25-1 gal/min

Disk 3 photo 8 - AD discharge - South

8/8/03 16

Up Stream Dunkleberg Creek
Sample: STR-13-0-SW

Stream bed dry for ~250'-300' above valley from base of last WR dump.
Collected water sample ~ 40' before it disapears

Disk 3 photos 9 and 10

Temp: 13:82 °C
SC: 0.312
Cond: 245 µs
DO: 9.11
ORP: -263.0
A/K: 108 mg/L

STR-13-0-SW

549-4288 - Nat
Summy side

Survey -
IH - 5.5

100 - PZ-6
101 - PZ-5
102 - PZ-4 - Bad
102 - PZ-4 - Good
103 - PZ-3
104 - PZ-2
105 - PZ-1
106 - PZ-7
107 - P
107 - Top of Strm Water - mid
108 - "
109 - "
110 - 127 - GS - Strm - Bank
128-135 GS - Top old Channe
136 - RD - E6
153-154 - BLD
156 - Bad - 153-156
157-158 - BLD
159-160 - RD E6
162-164 - Tri RD_E6
721 - 5570 - mw

888-467-2669

9/3/03 Forest Rose
Clear 55°C 9:00am On-Site

Russ Fox and Warren Phillips of MCS.

Russ and Warren Walked access road for driving drill rig on to upper and lower tailings damns.

Warren walked over and observed waste rock piles above tailings area.

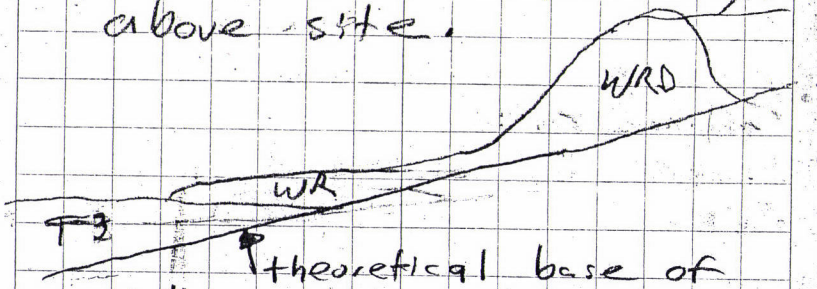
Three areas of differing Waste Rock / ore rock mix.

Russ proceeded with cutting access road.

Warren proceeded with sampling tree waste rock piles.

Forest Rose Mine 9/3/03

It appears that TD-3 extends beneath obvious WR at surface in valley above site.



Hand augered boring in area expose ~ 30' above edge of obvious WR on-top of T3 area. encountered gray sandy tailings.

Excavated 7 pits in WR covered slope located on west side of slope adjacent to south of main mill complex.

9/3/03 Forest Rose Mine 3

Soils consisted of orange and gray waste rock, on surface. Test pit soils were.

WRD 1 - 14

Collected 7 point composite soil sample from approx. 1 test pits. WR thickness in the area of slope is estimated to be b/w 1 and 4' thick.

Sample Name:
WRD 2 14-1-WR

Russ completed road work 11:00am
Started Survey 11:30 am.

9/3/03 Forest Rose Survey 4

1203 → RD-EG
1219
1220- 400IT - Tressle Center Main addit.

1221- Potential Addit
1222 - 1226 WR - Bld edg structures
1227 - 1236 - WR
1237 - GS
1243 - GS
1244 - BM - Boundary FS Section Corner rock Boundary Rock 3057
1245 - RD EDG
1247 "
1248 - GS - WR ?
1249 - " "
1250 - GS - RD_EG - Mtn slope btm
1252 - "
1253 - RD-EG
1254 - WR-EG.
1258 - END
1259 - St WR Bench

1264 end

9/3/03 Forest Rose Survey

1265 - WR line str.
66
1267 - WR-EG
1268 - WR-ED
1269 - GS-Str.
1277 - GS - FS - BNDRY
1279 - End
1280 - WR - Top Strt - Ln
1285 - "
1286 - WR - Btm Ln - Strt,
1292 " " end
1293 - WR - Top - Sedge str.
1312 " " end
1315 - Strait - LW - WR
1318 - end
1319 - RD str
1321 - end.
1322 - RD str g Btm Slope
1325 - End
1326 - GS - Slope.
1330 end GS
1331 - CP-2
1333 - CP-3
1335 - 1336 - Line Btm - WR - DG

Forest Rose Mine 9/3/03

1337 - Gully btm - Ln - WR EDG.
1340 - end.

1341 - Btm - west side WR Dump,
1345 - End
1346 - Strait east OG - slope - Btm Creek
1349 - " " end Btm

1350 - West Side OG slope Creek Btm.
1352 - end
1353 - GS
1358 - GS ↓ FS BNDRY

9/3/03 Forest Rise Mine

Completed survey at aprox. 4:20pm

Russ started the excavation of test pits in Main Waste Rock Dump - WRD-1

Warren of MCS collected stream sediment soil sample STR-15-0.1'-S, -4:30 pm

Sample was collected adjacent to stream channel edge in saturated sediments. Soils were a fine gravel sand and silt.

Russ excavated 10 test pits on South side of WRD-1 and 20 test pits on North side. Depth of test pits were aprox. 1' deep. Warren of MCS collected a 30pnt. composite soil sample of from test pits.

WRD 1-16-1-WR -5:00pm

Soils encountered in tests pits included.

9/3/03 Forest Rose Mine

Wasterock consisted of silty sands that were iron stained and in places cemented and orange to brown sands. The waste rock dump contained limestone with diameters up to two to thee inches. Some limestone chuncks contained Quartz veins with pyrite.

off site 5:30 pm

9/30/03 Forest Rose Mine 1

on-site 8:45am

Met drillers at 8:30 1 mile below site. Walking drill rig up to site. Met Peter Kurisoo on Lower Tailings Dam (TI queen) discussed site and drill hole placement. Decant discharge area from T2 onto T1 has ceased since last site visit on 9/3/03. Spring on south west corner of T1 responsible for most of the discharge being piped off of T1 damn. Decant discharge from T2 to T1 appears to be actively eroding since 5/21/03 site visit.

Started set up for B1 adjacent to base of T2 damn. Tailings began to liquify. Moved B1 on top of Tailings NOV approximately 20' south of original site. Began drilling 10:40am.

Eric Smart MES onsite 9:40am

9/30/03 2

0'-Surface conditions - orange/red Waste Rock - silty sand orange/red, moist and ~~dense~~ loose

0'-~~16.5~~ 15' - ~~orange~~ silty sand, orange/red, moist and ~~dense~~ loose

1.5' - 5.~~0~~5 silty ~~sand~~, gray, wet and ~~dense~~ loose

Tailings became saturated at approximately 8' bgs

No cuttings rising to surface during augering. Logging boring from split spoons.

9'- 10.5' - Inter-bedded silty sand and sandy silts, gray, wet, loose

10.5 - 19.0 - Likely, sandy silt, gray, wet, loose

19'-20.5' - silt w/some sand, gray, wet, soft

20.5 - 30.0' - Hybrid drilling 28-29' - Soft drilling up to 29.0' - Jumping 29-30'

~~30.0 - 31.5'~~ soil start ~28.0'

~~30.0~~ - 30.5' - Soil silty sandy, gray, wet, dense

~~30.5~~ - 31.5' - Black leaf shale

roots

Steve Kelly - District Minerals Tech
on-site 11:00 - 11:30 am
Started B2 at approximately
2 pm on west side of T1
Area, Finished B2 at aprox. 17:00

Collected Soil Samples from
B1 boring and finished
as piezometer with 10'
of screen and 20' of
casing, placed 3 bags of
silica sand and 4 bags of
bentonite seal to complete
well and well cap and end point
Collected Soil sample
B1-17-10-T at 11:00 am
Soil was a gray sandy silt

~~B1-19-30-T~~
B1-18-20-T at 12:30 am
Soil was a gray sand silt

B1-19-30-S at 13:30 pm
Soil was a dark gray, silty sand with
some root debris and shale frags.

Collected Soil sample
B2-20-10-T at 15:00 from
B2 boring soil was mostly
fine to medium sand with
some silt gray ~~moist~~ wet and
dense

B2-21-19.5-T at 15:30
Soil was a sandy silt, gray,
wet and dense.

Finshed B2 as well with
10' well screen and ~15'
casing - well pull back during
auger removal Boring was
completed to 28.5' Finished
boring with 3 bags silica sand
and 4 bags of bentonite
and well cap and end point
All offsite 17:30 pm

Clear ~~50°~~ 45°F

On-site 7:45am drillers (Ruiz)
on-site at 7:30am start drilling
Peter Kwisoo on-site 7:20 am
Started drilling 7:30 am
B3 ~~near~~ North central end
of Tailings area 2.
Collected soil sample B3-22-10-T
at 8:00am.
Collected soil sample B3-23-20-T
Soil sample B3-22-10-T
coarse sand with some silt, gray
moiste and dense
Soil sample B3-23-~~20~~-T
coarse sand with some silt, gray
Moist and wet. Material
became wet in boring at
approximately ~~30' bgs~~ 18' bgs

Collected soil sample B3-24-40-T
~~Collected Soil Sa~~ at approximately 9:30am
Soil was a coarse ~~sa~~ to fine sand
with some silt, ~~wet~~, gray, wet, dense.
Tailing Soil contact located in
boring at 50' bgs

B3 located 43.5' east of CPG
and ~ 22' south of edge
of T2 Tailing Damn edge.
Placed well in B3 boring
10' screen 50' of casing
4 ~~3~~ bags of silica sand and
4 bags of bentonite /
Cap and end cap point

Started B4 on south west side
of ~~T3~~ T2 area just
below west side of T3
damn erosional channel.
Started at 12:00

Collected Soil sample B3-25-50.5-
S of Soil just below tailings
dark gray to black, soil, with roots
Sandy silt, gray to black, wet
dense. Collected at 10:30am

Collected Soil sample B4-20-10-T
at 12:30pm Soil was a coarse to
fine sand with some silt, moiste
and dense

10/1/03 Forest Rose Mine 7

Collected Soil Sample B4-27-20-T at approximately 13:00 pm Soil Sample was a coarse sand with some, silt, ~~Moiste~~, gray, moiste and deuse

Collected Soil Sample B4-28-30-T at approximately 13:30 p.m. Soil ~~Sample~~ was a silty sand, gray, ~~moiste~~ wet and deuse

Collected Soil sample B3-29-49-T at approximately 10:15am Soil Sample was a ~~silty sand~~ sandy silt, gray, wet and dense

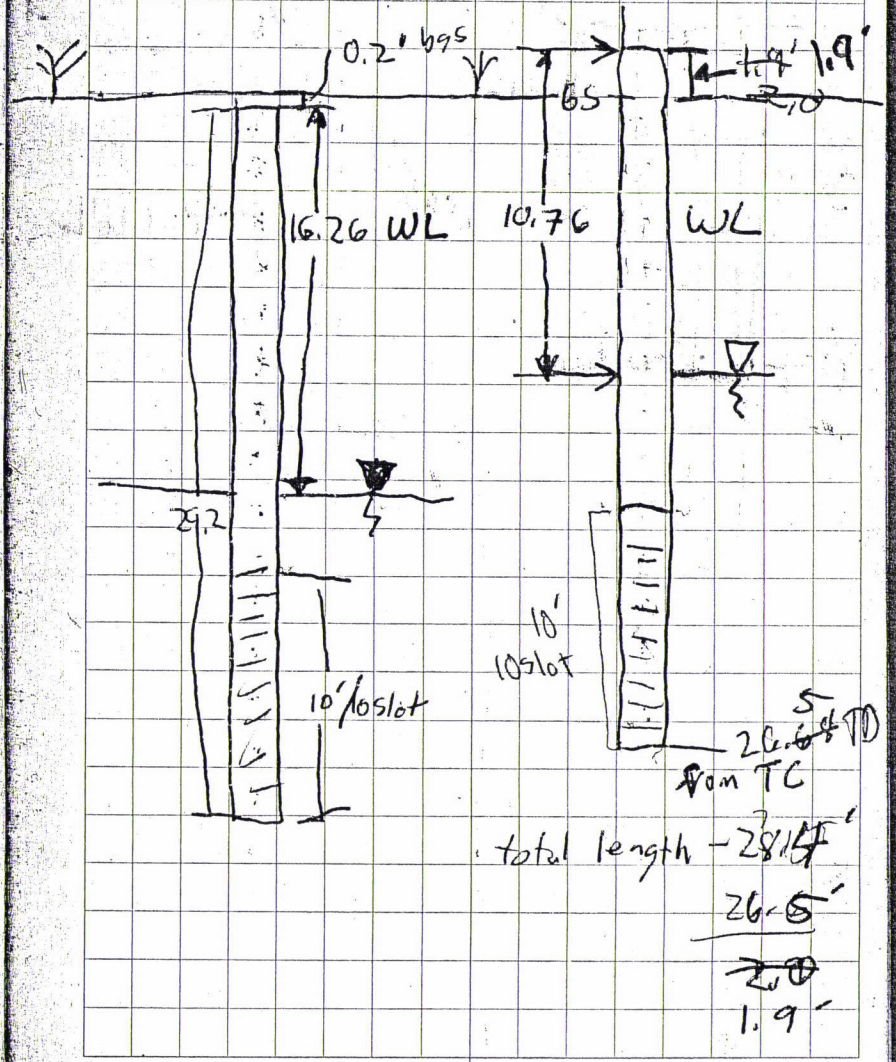
Completed boring B4 at 4:00 pm drills offsite 4:20 demobing rig back to truck - 20min lunch break

Completed ~~B4~~ as PZ-4 with 3 bags of silica sand - sealed w/ 4 bags of bentonite, tip and cap 1-10' screen - 4.5 - 10' sections of casing

10-1/03 8

B1-PZ-1 Piezometer #1

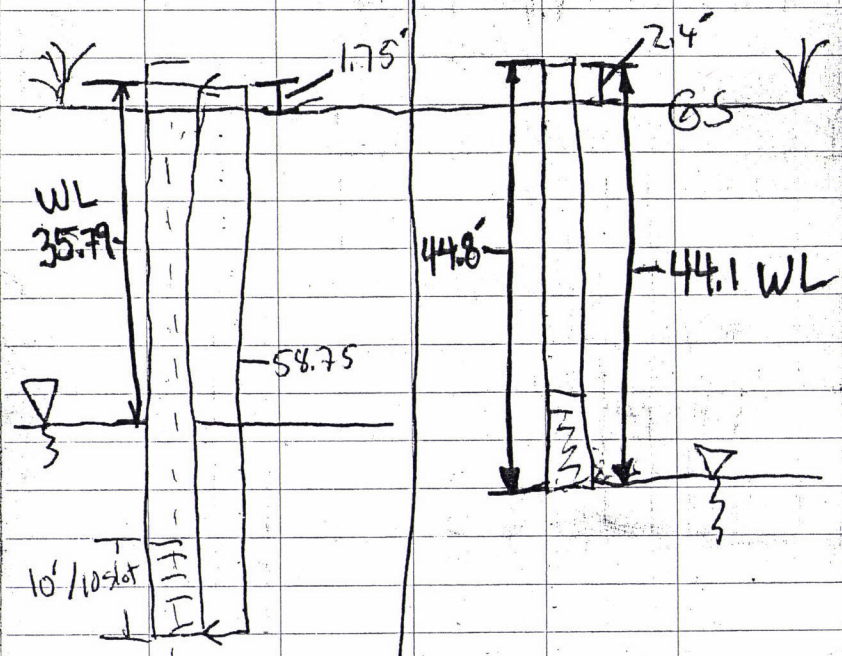
B2-PZ-2 Piezometer 2



Total depth may be inaccurate due to sand in base of piezometer

B3- PZ-3
Piezometer 3

10/1/03 9



58.75 35.79

44.8 47.2

47.2

Mansfield UST Removal
10/3/03 48°F Clear
1737 Mansfield
project # 11112.001

On-site 8:00 am
Warren P. Phillips of MCS unscrewed fill port and placed 27 lbs of dry ice into fill port of Diesel UST. 8:00 - 8:30 pm

Calibrated LEL, O_2, H_2S, CO meter 8:40 am

Kirk Mace WMS contracting on-site 9:10 am

Lorin Peterson on-site 9:10 am
offsite 9:20 am

Measured O_2 in UST at 9:30 am measured 6.4 %

Nov. 4/03

plastic had snow on it. Andy of Stone and Warren of MCS loaded plastic into back of 3/4 ton pickup. Plastic was secured for transport and disposal at BFI. at approximately 15:00 - 15:30.

11/5/04 Forest Rose Mine 1

~20°F on-site @ 10°F

On-site at 11:00 am with Mr. Russ Fox and Warren Phillips of MCS.

Proceeded to Lower Tailings area to collect Water Levels sample and collect field measurements in PZ-1 and PZ-2

PZ-1 sample PZ1-30-16-GW

Depth to Water: 16.57'

Collected 3 500 mL Samples using a dedicated bailer. did not purge well. Used first bailer to collect

11:20am 1-500 ml - Non Filter Preserved

1-500 ml Non Filter - Nitric

Used a second grab w/ Bailer to collect a Non-Filtered NaOH preserved 500 ml Sample. To Cold to use YSI multi-probe to collect field parameters. Use unfiltered un-pres. Sample to measure pH at Lab.

42.95° SE of CP-1

PZ-2 Sample PZ2-31-9-GW

Depth to Water: 11.01'

Collected 2-500ml samples
1-500ml - un-filtered - un-pres.
1-500ml - un-filt, + Nitric.
Collected samples 11:45 am

PZ-3 - 12:30 pm PZ3-32-51-GW

Collected 2-500ml samples
1-500ml - un-filtered - un-preserved.
1-500ml un-filtered + Nitric
Collected samples ~12:30 pm

Depth to Water: 52.96'

PZ-3 is 42.92' East of CP-6

PZ-4 → 12:50pm
Sample PZ4-33-41-GW
Collected 3-500ml Samples
~~1-500ml un-filt. un-pres.~~
1-500ml un-filt- Nitric
~~1-500ml un-filt- NaOH~~

Depth to Water: 43.71'

Not enough water in PZ-4 to sample. Well went dry after ~500ml removed
Sample Hisly turbid.

Check addit discharge above Near-WR Dumps- was not flowing
Water pooled in area. Did not sample due to potential dilution from snow/ice melting in sun. Also not flowing not major contributor to water budget - No staining or iron-oxide precipitation.