

INACTIVE AND ABANDONED MINE LANDS— Talisman Mine, Orient Mining District, Ferry County, Washington

by Fritz E. Wolff,
Donald T. McKay, Jr.,
and David K. Norman

WASHINGTON
DIVISION OF GEOLOGY
AND EARTH RESOURCES
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INTRODUCTION

The Washington State Department of Natural Resources (DNR), Division of Geology and Earth Resources (DGER) is building a database and geographic information system (GIS) coverage of major mines in the state. Site characterization was initiated in 1999 (Norman, 2000). Work is funded through inter-agency grants from the U.S. Forest Service, Region 6. Other agencies sharing in the project are the U.S. Bureau of Land Management (BLM), the U.S. Environmental Protection Agency (EPA), and the Washington Department of Ecology (DOE).

Over 3800 mineral properties have been located in the state during the last 100 years (Hunting, 1956). Many are undeveloped prospects of little economic importance. Therefore, in considering the population to include in the Inactive and Abandoned Mine Lands (IAML) inventory, we have identified approximately 60 sites that meet one of the following criteria: (a) more than 2000 feet of underground development, (b) more than 10,000 tons of production, (c) location of a known mill site or smelter. This subset of sites includes only metal mines no longer in operation.

We have chosen to use the term *inactive* in the project's title in addition to the term *abandoned* because it more precisely describes the land-use situation regarding mining and avoids any political or legal implications of surrendering an interest to a property that may re-open with changes in economics, technology, or commodity importance.

The IAML database focuses on physical characteristics and hazards (openings, structures, materials, and waste) and water-related issues (acid mine drainage and/or metals transport). Accurate location, current ownership, and land status information are also included. Acquisition of this information is a critical first step in any systematic approach to determine if remedial or reclamation activities are warranted at a particular mine. Open-File Reports (OFRs), such as this one, provide documentation on mines or groups of mines within specific mining districts or counties. The IAML database may be viewed with assistance from DGER personnel. IAML OFRs are posted online at <http://www.dnr.wa.gov/geology/pubs/>.

SUMMARY

This mine (Fig. 1) is located on Colville National Forest lands, in the NW¼NW¼ sec. 10, T40N R36E. It is situated on a cliff-top exposure at elevation

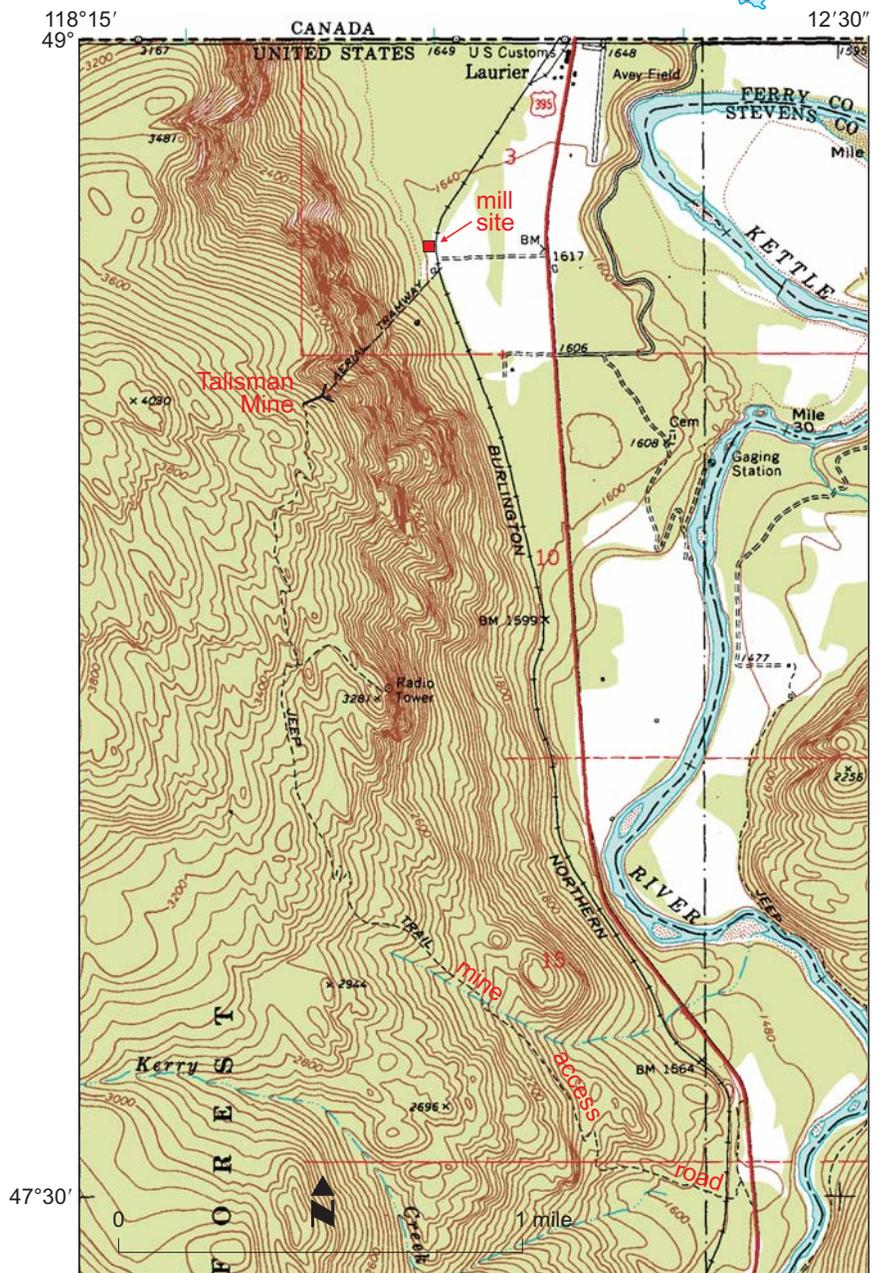
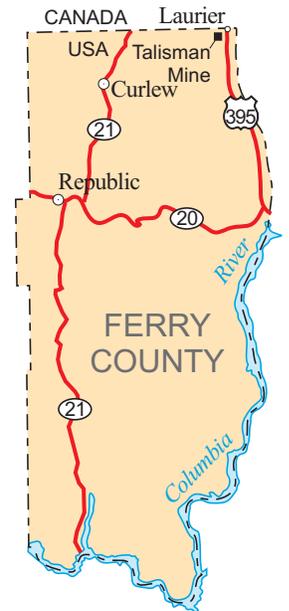


Figure 1. Map showing the general location of the Talisman mine in Ferry County (above) and a more detailed map of the mine site (below).

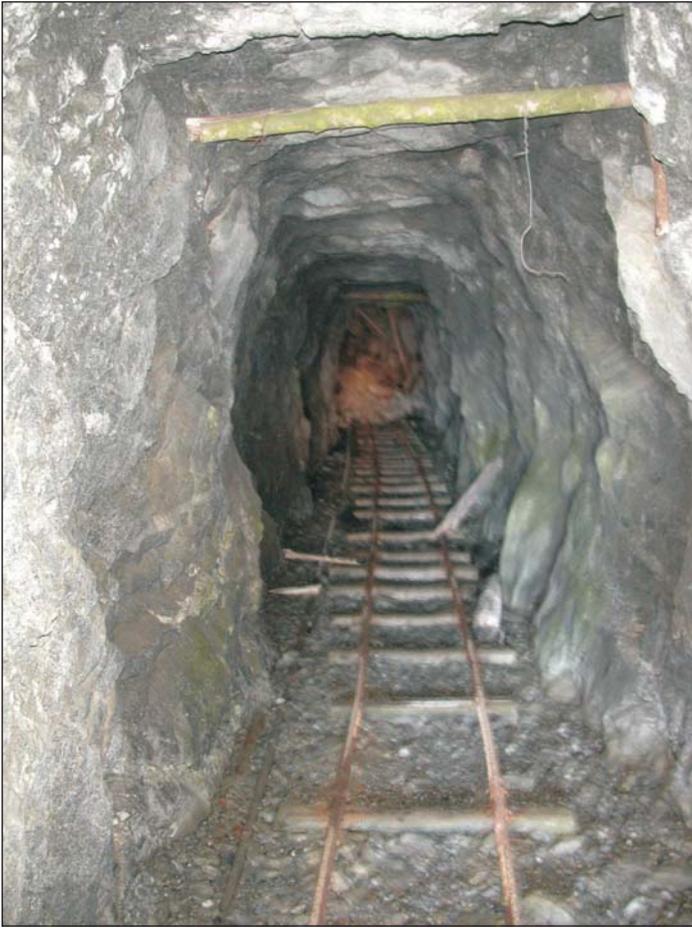


Figure 4. Interior of adit 1, the main haulage tunnel. View to the southwest. Note caved portion.

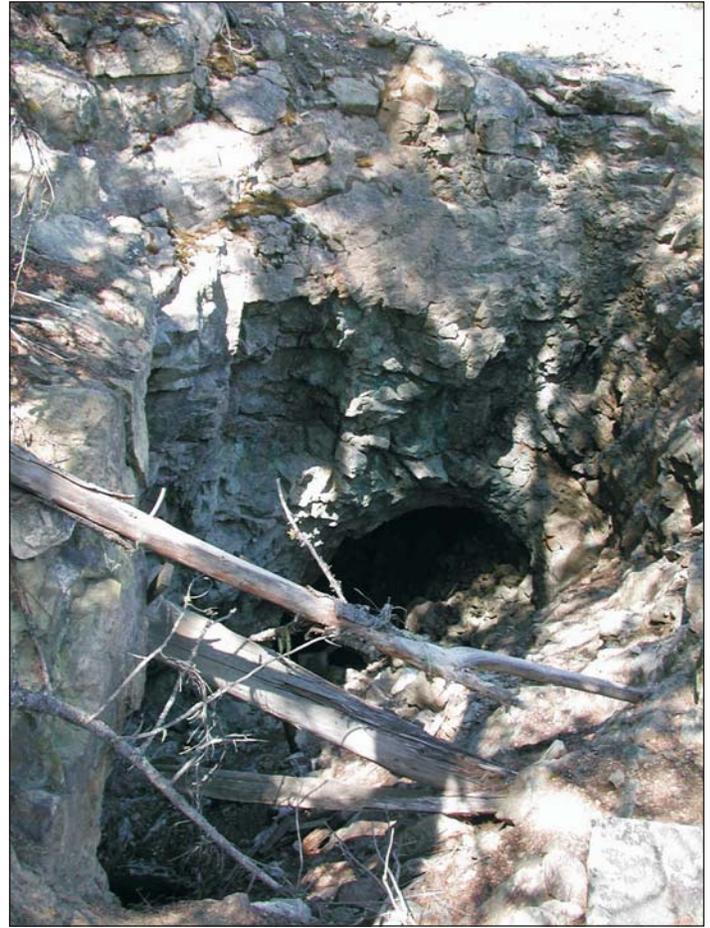


Figure 5. Surface expression of open stope with a -55 degree dip to the southwest.

3575 feet, approximately 2000 feet above the Kettle River valley floor. The ore contains copper, lead, zinc, and minor gold, silver, and tungsten. It is a contact metamorphic deposit in amphibolite schist, which is intruded by granite. Development consists of a 70-foot vertical shaft, two flat-lying stopes developed along a 350-foot horizontal adit, and several chutes and raises (Figs. 2 and 3). The shaft has caved to within 10 feet of the surface. The main haulage tunnel appears to be blocked about 90 feet from the portal at a fault (Fig. 4). We observed an unprotected opening approximately 20 feet wide, which descends into stope no. 1 at minus 55 degrees approximately 100 feet (Fig. 5). The ore body has undergone a series of post-deposition faulting, which complicated mining attempts to follow discontinuous ore zones 1 to 12 feet thick. A small pool of water collects just inside the adit entrance, otherwise the mine appears to be dry. The combination change house and blacksmith shop near the portal is still intact (Fig. 6). Nearby, two large ore bunkers have collapsed. They originally served as headworks for an aerial tramway dropping 2000 feet in elevation over a vertical cliff to the Talisman mill located on Burlington Northern tracks near Laurier (Fig. 7). The mill is in an advanced state of deterioration (Fig. 8). Approximately a dozen containers of hazardous materials are stored inside the mill including hydro-



Figure 6. Blacksmith shop/change house at portal. View to the east.

gen peroxide and sulfuric and hydrochloric acid (Figs. 9 and 10). The mill is on private property no longer connected with the mine operation *per se*. The mine can only be reached by a 3.6-mile mine-to-market road that is now little more than a trail.

DGER personnel visited the site on August 2, 2001, and June 10, 2004.

OWNERSHIP

The mine lands fall under jurisdiction of the USFS. The last active claims in the area were located in 1991 and closed in 1992 (BLM LR2000 database, May 2004). The Talisman mill site lies on the Kettle River valley floor adjacent to Burlington Northern railroad tracks. It is owned by W. T. Bray of Laurier, Wash. (Ferry Co. Assessor, written commun., 2004). Glen L. Brink and Charles Moomaw owned the property from 1915 to 1951, extending leases to Talisman Mining and Leasing Company, Henry T. Born president (DGER mine files).

HISTORY

Little is known about the pre-1950 history of the property, but shipments totaling \$52,000 net smelter returns were made in 1915 and 1916. Seasonal operations were conducted from 1946 to 1953. Total tonnage mined is unknown. Huntting (1956) reports shipment of 1260 tons of concentrate. In 1951, Talisman Mining and Leasing Company emerged from receivership and obtained a \$22,000 loan from the Defense Minerals Exploration Administration (DMEA) to conduct diamond drilling and development work. The loan was intended to extend the known ore reserves with a focus on tungsten content. Work was conducted under lease in the summer of 1952 by Spokane Mining Syndicate, Inc., resulting in the stockpiling of approximately 2000 tons of ore and a partial carload of copper/zinc concentrate. Riblet Tramway of Spokane replaced the aerial tramline at this time. The DMEA loan and associated development work appears to have come to a close in 1953 (DGER mine file). Laurier Mining Co. leased the property to a Coeur d'Alene group in 1969, which represents the last known interest in the property.

GEOLOGIC SETTING

The deposit is in a gneissic amphibolite schist, which appears to have been intruded by a white medium-grained granite composed largely of quartz, orthoclase, and a small amount of biotite. The schistosity strikes northwest and dips 15 to 85 degrees west. The metamorphic rocks are part of the Kettle metamorphic core complex of undetermined age (Stoffel, 1990).

OPENINGS

The principal opening is a horizontal adit entering the cliff crest at elevation 3575 feet. It bears S52W to a point 220 feet from the portal and then extends due west 100 feet. It is open and unfenced, but appears to be partially caved about 90 feet from the entrance. Two stopes lie approximately 25 feet above the adit. The vertical shaft shown on Magill's 1950 maps has caved about 10 feet from the surface (Fig. 3). An open stope at elevation 3630 feet dips 55 degrees to the west and extends downward an estimated 100 feet. It is partly caved but accessible. Although the main haulage adit appears sound up to a point 90 feet from the entrance, the flat-lying stopes and openings to the surface are extremely hazardous.

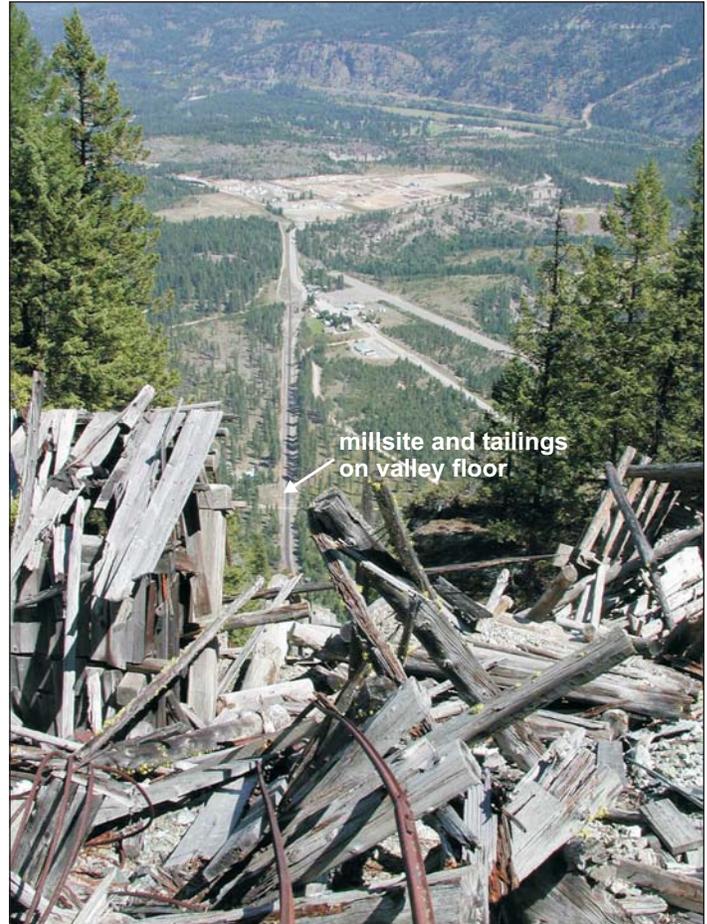


Figure 7. Upper tramway terminus and ore storage bunkers. View to the northwest.



Figure 8. Talisman mill. View to the north. Burlington Northern tracks out of the picture on the far right.

MATERIALS AND STRUCTURES

A building identified as a change house and blacksmith shop lies on a bench adjacent to the adit. The roof is still covered with corrugated sheet metal, but the sides have been stripped. Two ore bunkers that served as headworks for the aerial tramway have collapsed. The aerial tramway cable can be observed draping discontinuously over the cliff face.

WATER

A pool of water approximately 12 square feet in area and 2 inches deep was observed at the main adit entrance. No water sample was taken.

MILLING OPERATIONS

The Talisman mill, which first operated in 1948, is intact but open to the weather and deteriorating. It served as the lower terminus of an aerial tramway spanning a 3200-foot slope distance (Fig. 7). It is located on private property no longer connected with the mine. It contains a resin extraction pilot plant possibly related to reprocessing the mill tailings. A variety of circa-2000 reagent containers were found in the mill—hydrochloric and sulfuric acid, sodium hypochlorite, solvent, resins, ferric chloride, and hydrogen peroxide. A tailings impoundment 150 feet long by 60 feet wide lies 100 feet north of the mill. It contains an estimated 1000 to 1500 cubic yards of material, most of which has been partially re-deposited in conical heaps next to the railway tracks (Fig. 11). Chemical analysis of a grab sample indicates that the tailings exceed state standards for land use shown in Table 3 for copper, lead, and zinc. (Standards for tungsten, silver, and gold have not been determined.)

WASTE ROCK DUMPS

Approximately 1000 cubic yards of unmineralized waste rock cascades downslope from the adit portal past the ore bunkers.

GENERAL INFORMATION

Name(s): Talisman, Laurier

MAS/MILS number: 0530190050

Access: off-road vehicle or hike

Status of mining activity: none

Claim status: closed

Current ownership: USFS

Surrounding land status: Okanogan National Forest

Location and map information:

Mine name	County	Mine location	Decimal latitude	Decimal longitude	1:24,000 quad.	1:100,000 quad.
Talisman	Ferry	sec. 10, T40N R36E	48.9864	118.23821	Laurier	Republic

Table 1. Mine features. N/A, not applicable

Description	Condition	Fenced (yes/no)	Length (feet)	Width (feet)	Height/depth (feet)	True bearing	Elev. (feet)	Decimal latitude	Decimal longitude
adit (main haulage tunnel)	open, caved 90 feet from portal	no	340	7	8	S52W	3575	48.98696	118.23821
open stope	dips 55°W	no	~100	20	5	N60W	3630	48.98676	118.23839
shaft	open, caved shut	no	5	6	10	vertical	3640	48.98653	118.23826
mill	intact	no	N/A	N/A	N/A	N/A	1617	48.99174	118.23191

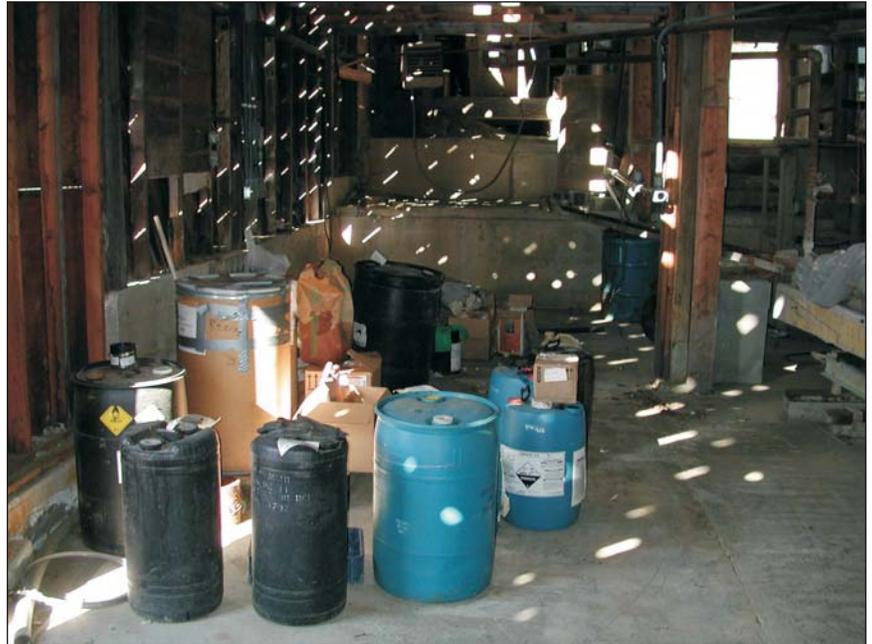


Figure 9. Reagent containers in mill.



Figure 10. Resin extraction pilot plant.

Directions: Three miles south of the Canadian border crossing at Laurier, an abandoned road leaves U.S. 395 just north of Kerry Creek. The mine is located 3.6 miles to the northwest along this track. We recommend access by off-road vehicle with

a skilled operator or on foot. The mill is located on the far west side of Laurier adjacent to a junk yard and the Burlington Northern railway track.

MINE OPERATIONS DATA

Type of mine: underground
Commodities mined: copper, zinc, silver, tungsten
Geologic setting: Amphibolite schist intruded by granite. The rocks are part of the Kettle metamorphic core complex (Stoffel, 1990).
Ore minerals: chalcopyrite (CuFeS₂), sphalerite (ZnS), galena (PbS), scheelite (CaWO₄)
Non-ore minerals: pyrite, magnetite, garnet, epidote, zoisite
Period of production: 1915–1916, 1946–1953
Development: approximately 2000 feet of drifts and stopes
Production: 5000 tons (estimate)
Mill data: The remains of a ball mill and flotation circuit are still in the mill, along with a Wilfley table for gravity separation of scheelite.

PHYSICAL ATTRIBUTES

Features: see Table 1
Materials: None at mine. At millsite—hydrochloric and sulfuric acid, sodium hypochlorite, solvent, resins, ferric chloride, and 35 percent hydrogen peroxide, plus 6400 feet of 1-inch-diameter tram cable.
Machinery: none
Structures: dry house, ore bunkers (collapsed), mill building
Waste rock dumps, tailings, impoundments, highwalls, or pit walls: waste rock dumps in excess of 1000 cubic yards
Analysis of tailings and dumps: see Tables 2 and 3
Waste rock, tailings, or dumps in excess of 500 cubic yards: yes
Reclamation activity: none

VEGETATION

Sparse fir and pine. The waste rock dumps are barren.

WILDLIFE

See Table 4.

WATER QUALITY

Surface waters observed: Kettle River and Kerry Creek
Proximity to surface waters: 2 and 4 miles, respectively
Domestic use: none
Acid mine drainage or staining: none
Surface water migration: none

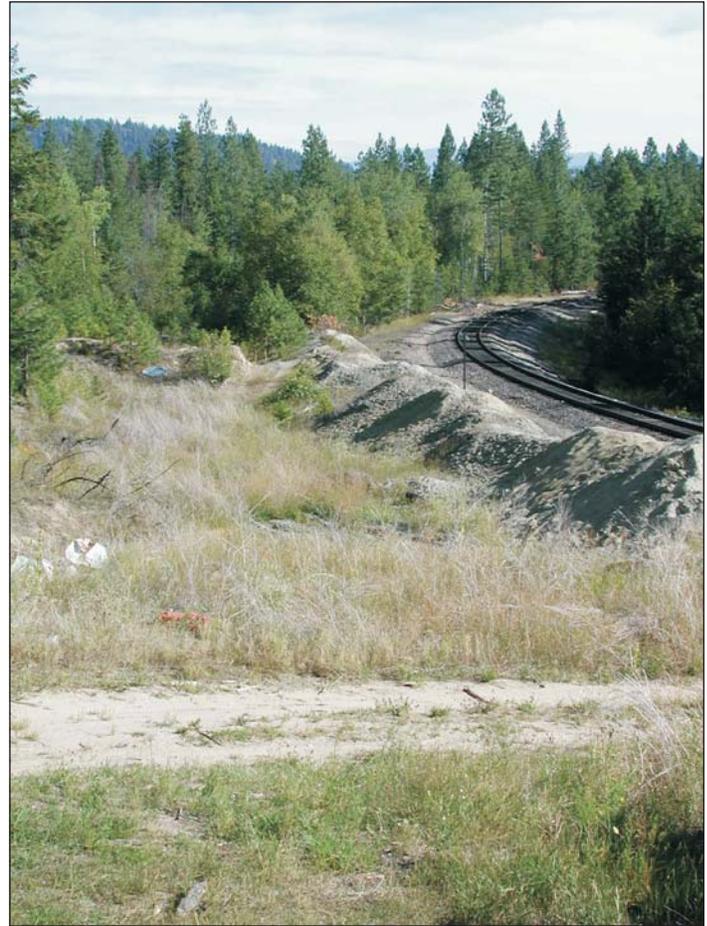


Figure 11. Tailings impoundment.

Table 2. Soil analysis. Metal concentrations are mg/kg. ≤, indicates metal was not detected; the number following is the practical quantitation limit above which results are accurate for the particular analysis method—the metal could be present in any concentration up to that limit and not be detected. ---, no data. Analyses in bold indicate levels that exceed one or more standards for land use shown in Table 3

Sample location	Arsenic ^{III}	Cadmium	Copper	Tungsten	Lead	Mercury	Zinc	Silver	Gold
tailings impoundment	---	---	650	381	472	---	2680	5	≤5.4

Table 3. WAC 173-340-900, Model Toxics Control Act, Table 749-2: Priority contaminants of ecological concern for sites that qualify for the simplified terrestrial ecological evaluation procedure (partial data). Concentrations are mg/kg. N/A, not applicable, levels for silver, gold, and tungsten are not specified

Metals	Arsenic ^{III}	Cadmium	Copper	Tungsten	Lead	Mercury	Zinc	Silver	Gold
Unrestricted land use	20	25	100	N/A	220	9	270	N/A	N/A
Industrial or commercial use	20	36	550	N/A	220	9	970	N/A	N/A

Table 4. Bat information. N/A, not applicable

Opening	Aspect	Air temp. (°F) at portal	Air flow: exhaust	Air flow: intake	Multiple interconnected openings	Bats or bat evidence
stope	SW	64	yes	N/A	yes	no
adit	NE	64	N/A	yes	yes	no

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Appendix

METHODS

We recorded observations and measurements in the field. Longitude and latitude were determined using a global positioning system (GPS) unit and recorded in NAD83 decimal degree format. Literature research provided data on underground development, which was verified in the field when possible.

Soil samples from dumps or tailings were taken from subsurface material and double bagged in polyethylene. Chain of custody was maintained. Soil samples were analyzed for metals by inductively coupled plasma/mass spectrometry (ICP/MS) following USEPA Method 6010.

Holding times for metals of interest were observed (28 days for mercury, 180 days for other metals). Instrument calibration was performed before each analytical run and checked by standards and blanks. Matrix spike and matrix spike duplicates were performed with each set.

FIELD EQUIPMENT

barometric altimeter
binoculars
digital camera
flashlight
Garmin GPS III+, handheld GPS unit
Hanna Instruments DiST WP-3 digital conductivity meter
and calibration solution
litmus paper, range 0–14, and 4–7
Oakton digital pH meter
Oakton digital electrical conductivity meter
Taylor model 9841 digital thermometer