

CRANBROOK REGION

PHOENIX

Property name: PHOENIX
Map number (see Appendix C): 20
Mine drainage sample numbers: LB00-1801 to 1803
MINFILE number: 082ESE020

Date: September 11, 2000
Persons present: Steve Wuschke (Mining Division, Cranbrook) and L. Barazzuol (Mining Division, Victoria).
Weather: sunny and warm, late afternoon

Regional Office: Cranbrook
NTS map sheet: 082E02E
Location: on the site of the ghost town of Phoenix, 6 miles east of Greenwood at the elevation of 1370 m.
Access: by paved road east from Greenwood or by an all weather gravel road west from the Grand Forks section of Highway 3
UTM coordinates: n/a

Type of deposit: Cu skarn
Commodities mined: Copper, Gold, Silver, Lead, Iron
Years mined (open/closed): 1900-1978

Mine Workings Inspected:

Components inspected include the tailings, waste rock dumps and tailings pond.

The tailings appear unoxidized and are coarse grained.

The waste rock piles are extensive and on the order of 100,000 tonnes. A cursory inspection was done of the dumps. Generally, the waste rock dumps appear unoxidized. Lithologies include tuff, argillite and greenstone. Carbonates are pervasive, as tested with HCl, possibly explaining the lack of visible oxidation. Disseminated pyrite is sparsely present in the dump.

The location of the former mill is northwest of the workings, along the main road. Only the foundations remain.

Mine Drainage:

There was no water flowing into the pond but ephemeral flow channels were present. No visible salts or secondary mineralization was observed. Flow into the receiving environment was not observed.



Photo 27. Phoenix tailings, tailings pond and dumps. The workings in the background include an open pit.

Observations & Analytical Results:

The tailings pond was well vegetated with signs of habitat formation. The field pH = 5.5. No conductivity measurement was taken. The riparian zone was naturally revegetating with young plant species although there was some minor iron staining. Plants included bulrush, cat tails and horse tail. There was also a dark green moss growing in the water. Amphibians were present in the pond. The water was organic smelling. Water was sampled on the east side of the tailings.

Results from the tailings pond water analysis include: pH = 8.0, [SO₄]=637 ppm, hardness = 196 ppm. The concentrations of heavy metals, both dissolved and total are below the BC water quality guidelines for aquatic life.

- only parameter of concern is the SO₄ concentration, which exceeds the numeric guideline

See Appendix B for the geochemical data set.

Additional Comments:

This inspection was very cursory due to the extensive nature of the mine. This property warrants a substantial amount of time for a proper inspection. Other components include the open pit, as well as numerous other dumps. The open pit is located in the ghost town of Phoenix.

The potential mixing of water on site makes the validity of the analytical results uncertain. It is not known at this point the proportions of surface, ground and mine water in the pond.

Ore smelted in Grand Forks.

References: See MINFILE

TREMBLAY TAILINGS

Property name: TREMBLAY TAILINGS

Map number (see Appendix C): 21

Mine drainage sample numbers: n/a

MINFILE number: 082ESE262

Date: September 11, 2000

Persons present: Steve Wuschke (Mining Division, Cranbrook) and L. Barazzuol (Mining Division, Victoria)

Weather: clear and cool, approaching dusk

Regional Office: Cranbrook

NTS map sheet: 082E02E

Location: near the ghost town of Phoenix

Access: by paved road east from Greenwood or by an all weather gravel road west from the Grand Forks section of Highway 3

UTM coordinates: n/a

Type of deposit: Tailings

Commodities mined: Copper, Gold, Silver

Years mined (open/closed): no production, only exploration

Mine Workings Inspected:

The tailings are well vegetated, a result of hydroseeding. The grain size of the tailings is coarse, especially at the dam walls where they had been cycloned. The tailings are unoxidized.

Mine Drainage:

There was no pond present although one was observed by S. Wuschke 2-3 years prior. Reference of a pond has also been made in ARIS reports. In the area of the former pond, no vegetation is present.

At the NE toe of the tailings, there was a flooded, marshy area. The source of this water is unknown and was not sampled.

References: See MINFILE



Photo 28. Tremblay tailings facility.

MOTHERLODE

Property name: MOTHER LODE (L.704)
Map number (see Appendix C): 22
Mine drainage sample numbers: LB00-1901 to 1903
MINFILE number: 082ESE034

Date: September 12, 2000

Persons present: Steve Wuschke (Mining Division, Cranbrook) and L. Barazzuol (Mining Division, Victoria)

Weather: overcast and cool

Regional Office: Cranbrook

NTS map sheet: 082E02E

Location: four kilometres northwest of Greenwood at the elevation of 1050 metres

Access: by good gravel road, which connects the property to the Mother Lode Creek road and Greenwood

UTM coordinates: n/a

Type of deposit: Cu skarn

Commodities mined: Copper, Gold, Silver

Years mined (open/closed): 1900-1962

Mine Workings Inspected:

The open pit is known as the Greyhound pit. The oxidation of the wall rock is patchy and is an orange-brown colour. The overburden is high in sulphide minerals (pyrite, chalcopyrite, pyrrhotite and magnetite) as well as carbonate minerals (reactive HCl fizz).

Waste rock dump and tailings are not located at this site.

Mine Drainage:

The lower pit is flooded with water. White salts are present around the water. The field pH=5.5 and conductivity 1680 μ s. Within the water, there are fish, brownish precipitates and dark green moss. There is no detectable odour. The water from the pit flows beneath the road but doesn't surface on the opposite side. There, the ground is only damp. The water in the pit was sampled.

Observations & Analytical Results:

The lab pH=7.98, [SO₄]=823 ppm and hardness=902 ppm. The sulphate concentration is the only parameter is above the BC water quality guidelines for aquatic life. The hardness of the water indicates the carbonates in the system are very reactive. The carbonates are buffering the acid in the system, thus explaining the non-acidic field and labs pH's.

All metal concentrations were below the BC water quality criteria for aquatic life.

See Appendix B for the geochemical data set.

Ore smelted in Greenwood.

References: See MINFILE



Photo 29. Motherlode flooded open pit.

JEWEL LAKE TAILINGS

Property name: JEWEL LAKE TAILINGS
Map number (see Appendix C): 23
Mine drainage sample numbers: n/a
MINFILE number: MINFILE uncertain, possibly 082ESE125

Date: September 12, 2000

Persons present: Steve Wuschke (Mining Division, Cranbrook) and L. Barazzuol (Mining Division, Victoria)

Weather: overcast and cool

Regional Office: Cranbrook

NTS map sheet: 082E02

Location: northwest shore of Jewel Lake, in Jewel Lake Provincial Park

Access: 12 km off Hwy 3 east of Greenwood

UTM coordinates: 381911, 5446967

Type of deposit: unknown

Commodities mined: unknown

Years mined (open/closed): unknown

Mine Workings Inspected:

The tailings are spread over an area of approximately 300 m² with one pile of tailings, about 5 m high. The tailings are mostly unoxidized – there is only minor brown oxidation. The tails toe into Jewel Lake but their depth couldn't be determined. The riparian zone is well vegetated (i.e. cattails) and trees and brush are present in areas of the dump. The dumps are used recreationally as there are mountain and motorbike tracks present.

Mine Drainage:

Toe of tailings submerged in Jewel Lake.

Additional Comments:

The source of these tailings is unknown.

References:

Unknown



Photo 30. Jewel Lake tailings.

ORO DENORO

Property name: ORO DENORO (L.692)

Map number (see Appendix C): 24

Mine drainage sample numbers: n/a

MINFILE number: 082ESE063

Date: September 12, 2000

Persons present: Steve Wuschke (Mining Division, Cranbrook) and L. Barazzuol (Mining Division, Victoria)

Weather: overcast and cool

Regional Office: Cranbrook

NTS map sheet: 082E02E

Location: 10.2 kilometres northeast of Greenwood, at elevation 1066 metres on the divide between Eholt and Fisherman creeks

Access: via the Phoenix ski mountain turnoff from Highway 3, 0.6 km north along a gravel road, which is an old rail bed. The Emma (082ESE062) is further north along the road.

UTM coordinates: 387119, 5442645.

Type of deposit: Cu skarn

Commodities mined: Copper, Gold, Silver, Cobalt

Years mined (open/closed): 1903-1917

Mine Workings Inspected:

In total, onsite adjacent to the road, there are 5 adits, an open shaft connecting one of the adits and an open pit or stope.

Of the 5 adits, 3 are open and accessible, while 2 are either backfilled or caved. One of the open adits con-

tained stagnant water, which was not sampled. There are yellow precipitates on the wall of the adit.

The stope/open pit was flooded with water. The surface of the water was ~20 metres from the surface. The water wasn't sampled because of its inaccessibility.

Malachite and iron staining is present on the wall rocks and overburden.

The overburden contains disseminated pyrite and chalcopyrite. Massive calcite crystals (~1 cm) are also prolific.

Mine Drainage:

The adit containing the stagnant drainage was not sampled. The field pH of the water was 5.5 and the conductivity 500 μ s. White salts and bright green moss were present in what appeared to be an ephemeral drainage flow path.

The subsurface flow of the water flooding the surfaced stope/open pit is unknown.

Additional Comments:

The area inspected poses to be a safety hazard, not so much an environmental. MINFILE states the workings cover 4 hectares. Only the workings adjacent to the road were inspected.

References: See MINFILE



Photo 31. Oro Denoro adit.

EMMA

Property name: EMMA (L.591)

Map number (see Appendix C): 25

Mine drainage sample numbers: n/a

MINFILE number: 082ESE062

Date: Septmeber 12, 2000

Inspectors: S. Wuschke (Mining Division, Cranbrook), L. Barazzuol (Mining Division, Victoria)

Weather: overcast and warm

Regional Office: Cranbrook

NTS map sheet: 082E02E

Location: 10.2 kilometres northeast of Greenwood, on the divide between Eholt and Fisherman creeks

Access: via the Phoenix ski mountain turnoff from Highway 3, north along a gravel road, which is an old rail bed. The Emma are north of the Oro Denoro property (082ESE063).

UTM coordinates: n/a

Type of deposit: Cu skarn

Commodities mined: Cu, Au, Ag

Years mined (open/closed): 1901-1927

Mine Workings Inspected:

Numerous surfaced, flooded stopes and an open flooded 50 m shaft.

Iron oxidation and malachite are present on the wall rock of the stopes. The stopes were flooded, with an ~50m drop to the water surface. No water samples were taken due to the inaccessibility of the water.

Mine Drainage:

Subsurface flow paths unknown.

Additional Comments:

This site is a public safety hazard with the number and depth of the openings. Some rope and fencing is present, but in general, the openings are not well marked.

Ore smelted in Greenwood.

References: See MINFILE



Photo 32. Stope at Emma.

SPITZEE

Property name: SPITZEE (L.2520)

Map number (*see Appendix C*): 26

Mine drainage sample numbers: LB00-2001 to 2003

MINFILE number: 082FSW121

Date: September 12, 2000

Persons present: S. Wuschke (Mining Division, Cranbrook), L. Barazzuol (Mining Division, Victoria), Phil Johnson (Granite Mountain Excavating, Rossland)

Weather: warm and overcast

Regional Office: Cranbrook

NTS map sheet: 082F04W

Location: The workings are located in the town of Rossland, in the gulley parallel to Union street.

Access: off Union Street, near the crest of the road - the workings are not visible from the road.

UTM coordinates: 0441707, 5435635

Type of deposit: Subvolcanic Cu-Ag-Au (As-Sb)

Commodities mined: Gold, Silver, Copper, Tungsten

Years mined (open/closed): 1900-1905

Mine Workings Inspected:

Workings on site include a backfilled portal and dumps. The dumps, although visible from above the gulley were not inspected.

The portal has been backfilled and a culvert installed. Drainage flowed from the culvert.

Mine Drainage:

The underground workings of the Spitzee are connected to the workings of the Le Roi (082FSW093). The Spitzee portal drains the 800 level of the Le Roi.

Observations & Analytical Results:

The drainage field pH=5.5, conductivity=540 μ s and flow ~120 L/min. The drainage flows continuously throughout the year. An ironsludge-like precipitate is in the water. The area of the drainage is well vegetated, with healthy mature trees and underbrush.

The results from the water analyses include: pH=8.03, [SO₄]=300 ppm and hardness=391 ppm.

- SO₄ concentration exceeds the BC water quality criteria for aquatic life.

Metals also in excess of the aquatic criteria include Al; Cu and Mn.

- Al speciation could not be determined as the dissolved concentration was below detection (<0.2 ppm). The total concentration of Al is in excess of the guidelines by 0.1 ppm.
- Cu is one order of magnitude higher than the water quality guidelines. The dissolved concentration of Cu is below detection (<0.01 ppm) so speciation is indeterminable.
- Mn concentrations slightly exceed the threshold concentration of the water quality guidelines but are of the same magnitude. The Mn in the drainage is dissolved.

See Appendix B for geochemical data.

Additional Comments:

Located in town of Rossland.

References: *See MINFILE*



Photo 33. Drainage from Spitzee adit.

GOPHER

Property name: GOPHER (L.1050)

Map number (see Appendix C): 27

Mine drainage sample numbers: LB00-2101 to 2103

MINFILE number: 082FSW125

Date: September 12, 2000

Persons present: S. Wuschke (Mining Division, Cranbrook), L. Barazzuol (Mining Division, Victoria), Phil Johnson (Granite Mountain Excavating, Rossland)

Weather: warm and overcast

Regional Office: Cranbrook

NTS map sheet: 082F04W

Location: South of Rossland on Lot 1050. The Rubberhead mountain bike trail runs past the portal.

UTM coordinates: n/a

Type of deposit: Polymetallic veins Ag-Pb-Zn±Au.

Commodities mined: Gold, Silver, Copper, Zinc, Bismuth

Years mined (open/closed): n/a

Mine Workings Inspected:

One backfilled portal with flowing drainage, situated in a forested area was inspected.

MEM recently financed the closure of the portal using Section 17.0 of the *Mines Act*. Granite Mountain Excavating performed the reclamation work (backfilling of the portal and installing a culvert). Observations of the open cut and surrounding rocks were limited as the area had recently been excavated and overturned.

Mine Drainage:

Receiving watercourse of the drainage is Trail Creek.

Observations & Analytical Results:

The field pH=5.5, conductivity 320 μ s and the flow ca. 80 L/min. The water had no odour. No vegetation present in the drainage channel. The backfilling and excavation was performed recently, thereby elevating the turbidity of the drainage. Minor Fe-staining of the rocks within the drainage was visible. The drainage was sampled.

The analytical results of the water samples are as follows: pH=7.9; [SO₄]=76 ppm and hardness=219 ppm.

- All of the metal concentrations meet the BC water quality guidelines for aquatic life. However, zinc concentrations, although in compliance, are elevated.

See Appendix B for geochemical data.

Additional Comments:

Not a reclamation priority: drainage in compliance (although Zn is elevated) and the one portal has been backfilled.

References: See MINFILE



Photo 34. Portal backfilled with a culvert in place at the Gopher mine site. The drainage was sampled.

SECOND RELIEF

Property name: SECOND RELIEF (L.2463)

Map number (see Appendix C): 28

Mine drainage sample numbers: LB00-2301 to 2307

MINFILE number: 082FSW187

Date: September 13, 2000

Persons present: Steve Wuschke (Mining Division, Cranbrook) and L. Barazzuol (Mining Division, Victoria)

Regional Office: Cranbrook

NTS map sheet: 082F06W

Location: in a mountain valley 20 km northwest of Salmo above Erie Creek

UTM coordinates: 471077, 5463369

Type of deposit: Au skarn; Cu skarn

Commodities mined: Gold, Silver, Lead, Zinc, Copper, Molybdenum

Years mined (open/closed): intermittently between 1902-1959

Mine Workings Inspected:

Workings include: 2 backfilled portals, 2 dumps (1 minor, 1 major), mill foundation, oxidized tailings.

Two portals are located at the eastern extent of the property, above the mill foundation and wooden cribbing:

- The upper portal was not draining water at the time of the inspection. Whether it drains during freshet is unknown. Outside of the portal is well vegetated and a black layer of topsoil is present.
- The lower portal is at an elevation of 3350 m. The portal has been closed with a culvert, from which drainage was flowing.

The tailings are located north of the main waste rock pile and west of the mill foundations, across the road. The elevation of the tailings is 3300 feet. The area is approximately 1 hectare. The tailings are pervasively oxidized to a red-brown colour >0.5 m deep. Within the 0.5 m oxidized layer, there was a 1 cm horizon of unoxidized tailings. Mature trees were growing in the centre area of the tailings and appeared robust. The tailings dam was composed of waste rock.

Tailings are also located east of the waste rock dump. A layer of topsoil and vegetation (trees, shrubs etc.) covers these tailings. The tailings are oxidized in the subsurface. The distribution and depth of these tailings was not determined.

The main waste rock dump is composed of greenstone and quartzites. The layout of the dump material is in multiple fingers, one of which forms the tailings dam. The dump is heavily oxidized in patches. The volume is on the order of 100,000 tonnes. Visible mineralization includes disseminated pyrite and chalcopyrite. The drainage from the upper adit

flows through this dump and resurfaces at the southern toe of the dump.

Mine Drainage:

The drainage from the lower portal infiltrates the ground above the mill, located to the west, and flows through/beneath the small upper waste rock dump and mill foundations. The water resurfaces into a ditch located at the toe of the mill and, flows westward under the road where it continues to infiltrate the tailings and lower (main) waste rock dump. The drainage flows from the toe of the main dump and is received by a marshy area, which likely acts as a natural buffer to the drainage.

Observations & Analytical Results:

1. Lower portal

The drainage flowed from the lower portal at ~20L/min. The field pH=5.0-5.5 and conductivity = 110 μ S. The water was odourless. There were no visible precipitates but some sparse staining (Fe) was evident on the surface of submerged rocks. The drainage was sampled directly outside the portal.

The water quality results of the drainage from the lower portal are: lab pH= 8.0, [SO₄]=16 ppm and the hardness=75 ppm. The metal content of the drainage is within the limits for the BC water quality guidelines for aquatic life.

2. Toe of main waste rock dump

The water flowing from the southern toe of the waste rock dump is very turbid. The field pH=5.5 and conductivity = 80 μ S. Red-brown Fe precipitate is suspended in the water and has also deposited to form a sediment 10 cm deep. Vegetation includes horsetails and mature trees, both in stable and healthy condition. The flow was too difficult to estimate given the large area and differential flow rates.

The water quality results from the toe of the dump are as follows: pH=6.8, [SO₄]=45 ppm, hardness=48 ppm. Metal concentrations above the BC water quality guidelines for aquatic life include Al, Cu, Fe, Mn and Zn.

- Al speciation could not be determined as the dissolved concentration is below detection (<0.2 ppm). The total concentration is above the guidelines by 1 order of magnitude.
- Cu in the drainage is dissolved. The concentration exceeds the guidelines by 1 order of magnitude.
- Fe is above the guidelines but of the same magnitude. There is a small dissolved component of Fe in the drainage, but it is primarily as colloids and precipitates.



Photo 35. Waste rock dump and oxidized tailings impoundment.

- Mn results are questionable due to the large error in the dissolved metals duplicate. The total concentrations of Mn are slightly above the threshold of water quality guidelines.
- Zn is dissolved in the drainage and is in excess of the guidelines by 1 order of magnitude.

See Appendix B for complete geochemical data set.

Additional Comments:

The issue at this site is alkaline rock drainage and metal leaching. It appears that the water flowing through the dumps and tailings is the source of elevated metal concentrations, not the direct adit drainage. Metals in excess include Al, Cu, Fe, Zn and

possibly Mn. The receiving wetlands likely act as a natural metal buffer. There is likely seasonal variation in the metal loading from the waste rock dumps.

Mercury amalgam was used for gold recovery in early stages of production. Solid mercury has been found in the ditch at the toe of the mill, although not on this inspection (S. Wuschke, pers. comm.).

The underground workings are extensive; the main vein has been opened on 11 levels. The workings observed at this site may not represent the mine site in its entirety, as more openings may be located at higher elevations.

References: See MINFILE

YMIR TAILINGS

Property name: YMIR TAILINGS (Dundee/Yankee Girl (L.7712))

Map number (see Appendix C): 29

Mine drainage sample numbers: LB00-2401 to 2403

MINFILE number: 082FSW067 / 082FSW068

Date: September 13, 2000

Persons present: Steve Wuschke (Mining Division, Cranbrook) and L. Barazzuol (Mining Division, Victoria)

Weather: sunny, clear and warm

Regional Office: Cranbrook

NTS map sheet: 082F06E

Location: on the east bank of the Salmo River, just south of its confluence with Ymir Creek, across from the hotel in the town of Ymir

Access: from town of Ymir

UTM coordinates: n/a

Type of deposit: Polymetallic veins Ag-Pb-Zn±Au

Commodities mined: Gold, Silver, Lead, Zinc, Cadmium

Years mined (open/closed): 1899-1951

Mine Workings Inspected:

Only the tailings were inspected. The ore source of the tailings was determined to be the Yankee Girl (082FSW067) and Dundee (082FSW068) through research after the inspection.

The tailings are deposited along the east bank of the Salmo River, across from the town of Ymir. During freshet, the river floods and entrains the tailings, washing them downstream. Erosion channels are present on the tailings. S. Wuschke indicated the volume of the tailings had decreased since his last inspection.

The tailings are heavily oxidized. The colour of the weathering is heterogeneous: copper (green-yellow) and iron (red-orange) patches. A mound of lithified, heavily Fe-oxidized tailings, on the order of 2 m³ is situated by the river. The tailings are oxidized in the subsurface.

A pool of stagnant water ~2x6m was present at the far reaches of an erosion channel. The stagnant water was sampled.

The tailings have sparse and patchy coverage of shrubs and grasses. Generally though, the tailings are devoid of plants.

The tailings are accessible by the public. Tire marks cover the tailings. This access is a hindrance to the encroachment of natural revegetation.

Mine Drainage:

The tailings form the riverbank and are seasonally flooded during freshet.



Photo 36. Ymir tailings impoundment on the Salmo River.

Observations & Analytical Results:

The stagnant pool of water had a pH=4.5 and conductivity=740 μ s. An oily, likely organic film coated the surface of the water. Pervasive Cu and Fe staining was prevalent around the stagnant pool of water.

Water quality results are: pH=4.9, [SO₄]=410 ppm and H=349 ppm.

- water is acidic and the sulphate concentration exceeds the BC water quality guidelines for aquatic life.

Metals in excess of the water quality guidelines for aquatic life include Al, Cd, Co, Cu, Fe, Pb, Mn and Zn.

- Al is dissolved in the drainage and is 2 orders of magnitude greater than the guideline threshold concentration.
- Cd is 1 order of magnitude greater than the guidelines and is of a dissolved species.
- Co is 1 order of magnitude greater than the guidelines and is dissolved in the drainage.
- Cu concentration slightly exceeds the guidelines but is of the same magnitude. The Cu is dissolved in the drainage.
- Fe species in the drainage are both dissolved and colloidal/precipitate. The dissolved concentration is in excess of the guidelines by about 0.4 ppm while the colloidal/precipitate fraction is 1 order of magnitude greater.
- Pb is slightly above the threshold values. The Pb in the drainage is primarily dissolved.

- Mn in the drainage is primarily dissolved and is 1 order of magnitude greater than the guidelines.
- Zn is 2 orders of magnitude greater than the water quality guidelines and is dissolved in the water.

See Appendix B for the geochemical data set.

Additional Comments:

There is a high potential of metals releasing from the tailings and concern over the tailings washing down the creek. The effects of evaporation may be elevating the concentration of metals in the stagnant water. The Ministry of Environment, Lands and Parks is conducting a preliminary study of the impact of the tailings on aquatic life (*see* reference below).

Genetically, they are linked to the Yankee Girl and Dundee properties, which were amalgamated in 1940. The workings at these properties, located at approximately 900 m in elevation, were not inspected. Ore was transported to the mill by tram.

References: See MINIFLE

Property files 082FSW067 / 082FSW068

Roome, R., 2002. Yankee Girl Tailings Environmental Assessment Report, Ministry of Water, Land and Air Protection, Nelson, R.C (unpublished report).

KENVILLE

Property name: KENVILLE
Map number (see Appendix C): 30
Mine drainage sample numbers: n/a
MINFILE number: 082FSW086

Date: September 14, 2000
Persons present: Steve Wuschke (Mining Division, Cranbrook) and L. Barazzuol (Mining Division, Victoria)
Weather: warm and slightly overcast

Regional Office: Cranbrook
NTS map sheet: 082F06W
Location: main camp: east side of Eagle Creek, 11 km west of Nelson
Tailings: West Arm of Kootenay Lake in the Blewett area, 5 km west of Nelson
Access: main camp is located past the town of Blewett and up Kenville Mine Road
UTM coordinates: n/a

Type of deposit: Au-quartz veins
Commodities mined: Silver, Gold, Lead, Zinc, Copper, Cadmium, Tungsten
Years mined (open/closed): 1890-1954

Mine Workings Inspected:

The tailings are located adjacent to the West Arm of Kootenay Lake. The tailings show no visible sulphide oxidation. This could be due to the metals already having been leached out as each spring the tailings are flooded by the lake (S. Wuschke). The host rock of the ore was quartz veins. Natural revegetation has occurred (mature trees) but the trees have a patchy distribution. Those areas without regrowth have been subjected to 4-wheel drive traffic as indicated by the

numerous tire tracks on the tailings. A barricade, barring access to the tailings would be needed for vegetation to be successfully established.

At the main site, workings include two portals, a mill and a lot of debris. Waste rock dump was not observed on site.

The lower adit drains the underground workings. The portal is collapsed but gated. The drainage from the adit was not sampled.

Mill buildings are on site although they were largely in disrepair. Pipes leading to the mill were leaking water although the source was the creek.

Mine Drainage:

The flow from the lower portal drains directly into Eagle Creek. Water samples were not taken at this site.

Observations & Analytical Results:

Drainage from the portal was flowing at a rate of 70-80 L/min. The pH=5.5 and conductivity=350 μ s. There were no visible precipitates or salts. The drainage flows through tall grasses. Dark green moss is within the drainage. The water had no odour.

Additional Comments:

The land and mineral tenure is held by Crown Grant.

References: See MINFILE

ARIS 22433 - elemental analysis of tailings



Photo 37. Kenville tailings.

QUEEN VICTORIA

Property name: QUEEN VICTORIA (L.368)

Map number (see Appendix C): 31

Mine drainage sample numbers: n/a

MINFILE number: 082FSW082

Date: September 14, 2000

Persons present: Steve Wuschke (Mining Division, Cranbrook) and L. Barazzuol (Mining Division, Victoria)

Weather: sunny and slightly overcast

Regional Office: Cranbrook

NTS map sheet: 082F06W

Location: 11 km west of Nelson near the settlement of Beasley

UTM coordinates: n/a

Type of deposit: Cu skarn

Commodities mined: Copper, Silver, Gold

Years mined (open/closed): 1907-1961

Mine Workings Inspected:

The historical workings include underground and surface workings.

The large open stope appeared to be the main source of ore. The wallrock is gossanous: bright green malachite and iron oxide are evident. Stagnant water was pooled in the bottom of the stope. The water wasn't sampled due to the high content of pack rat excrement in the stope. The stope is a popular camping and party area as indicated by the garbage, camp fire remnants and graffiti. The stability of the stope is unknown. There are adits driven at height, making them inaccessible for observation.

To the southwest is another set of workings, including an open pit and an underground working. The underground working is not easily accessible as it is perched on a ledge. It appeared to be an adit or a small stope.

The waste rock dumps are located near the surface workings. The cumulative volume of the dumps is relatively small (on the order of 10,000 m³) given the extent of the workings. Mineralization includes disseminated and clusters of pyrite and chalcopyrite. Malachite and iron oxides are visible weathering products. The lithologies of the waste rock are garnetite and quartzite.

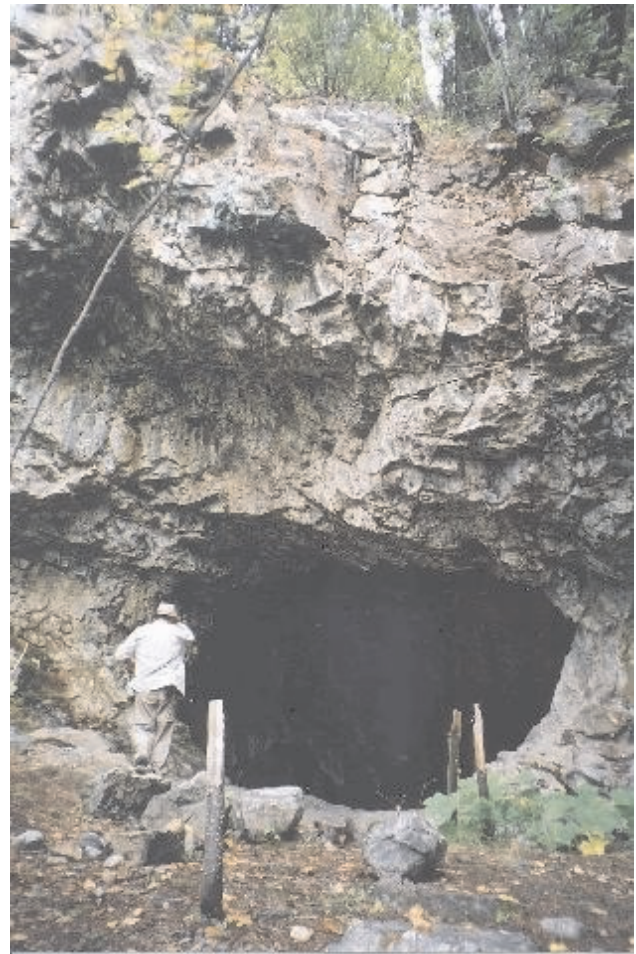


Photo 38. Queen Victoria stope.

Two deteriorating wooden buildings are located up slope of the workings.

Mine Drainage:

Stagnant water was pooled in the bottom of the stope. The water was not sampled due to the high content of pack rat excrement in the stope. The water may drain from the stope into the receiving environment during freshet but this must be confirmed by an inspection in the spring.

References: See MINFILE

KOOTENAY FLORENCE

Property name: KOOTENAY FLORENCE

Map number (see Appendix C): 32

Mine drainage sample numbers: LB00-2501 to 2503

MINFILE number: 082FNE016

Date: September 14, 2000

Persons present: Steve Wuschke (Mining Division, Cranbrook) and L. Barazzuol (Mining Division, Victoria)

Weather: sunny and warm

Regional Office: Cranbrook

NTS map sheet: 082F15W

Location: west side of Kootenay Lake between Cedar Creek and the South Fork of Woodbury Creek. The mill is visible from Highway 31.

Access: via the road to Cody Caves. Take the first left, which is adjacent to a house. The workings are located on the other side of the large lot.

UTM coordinates: 506501, 5512306; elevation: 868 m

Type of deposit: Polymetallic manto Ag-Pb-Zn

Commodities mined: Silver, Lead, Zinc, Gold, Cadmium

Years mined (open/closed): 1912-1972

Mine Workings Inspected:

Of the 2 reported adits, only the lower adit was inspected. Westmin/Boliden has backfilled the adit with 3 culverts. Drainage flowed from only one of the culverts.

Mill foundations are present on site. They are situated downslope of the portal, above Kootenay Lake. Some scrap metal is on site. In the lake at the foot of the property, old docking pillars still stand where the ore was loaded onto steamships and transported for processing.

Reports state the tailings from the mill were dumped into the lake.

No waste rock dumps were observed.



Photo 39. Mine drainage from Kootenay Florence adit. The portal was backfilled and 3 culverts installed.

Mine Drainage:

The drainage flows down slope from the portal to the highway, where it enters a culvert and directly drains into Kootenay Lake. The rocks at the outflow of the culvert are stained red.

Observations & Analytical Results:

The flow rate of the drainage from the portal was high, approximately 120 L/min. The field pH=5.5-6.0 and the conductivity=910 μ s. The odour of the drainage was slightly sour. Horse tail grew sparsely in the drainage. Iron precipitate (orange-red) was prolific - it was widespread but appeared to be a coating only. The iron precipitate was present over the entire flow path of the drainage (to the highway).

Water quality results are as follows: pH=7.7; [SO₄]=412 ppm and H=580 ppm.

- SO₄ concentration is in excess of the BC water quality guidelines for aquatic life.
- The concentrations of Fe, Mn and Zn are in excess of the BC water quality guidelines for aquatic life.
- For Fe, the dissolved concentration is below detection where as the total is one order of magnitude above the water quality guidelines ([Fe]=7.13 ppm). Thus, the Fe species are in precipitate (as observed) or colloidal form.
- The total Mn concentration is slightly above the threshold value of the water quality guidelines. The total concentration of Mn is lower than that of dissolved, which is possibly due to contamination during filtering.
- Zn concentrations, in both dissolved and totals forms, are in excess.

See Appendix B for the geochemical data set.

Additional Comments:

Tailings were dredged up from the lake and re-milled, likely for Zn.

References: See MINFILE

HIGHLAND

Property name: HIGHLAND (L.258)

Map number (see Appendix C): 33

Mine drainage sample numbers: LB00-2601 to 2603
MINFILE number: 082FNE015

Date: September 14, 2000

Persons present: Steve Wuschke (Mining Division, Cranbrook) and L. Barazzuol (Mining Division, Victoria)

Weather: hot and sunny

Regional Office: Cranbrook

NTS map sheet: 082F15W

Location: about 1.6 km west of Kootenay Lake and 300 metres north of Cedar Creek

Access: main forestry road running along ~900 m contour, west of the Cody Caves access road. The road is marked on the NTS map sheet and reaches a dead end on the north side of Cedar Creek. The trail head to the portal is hidden - it is downslope of the main forestry road. The trail is well cut once found.

UTM coordinates: 505317, 5510899; elevation: 802 m

Type of deposit: Polymetallic veins Ag-Pb-Zn±Au

Commodities mined: Silver, Lead, Zinc, Cadmium, Gold

Years mined (open/closed): 1896-1954

Mine Workings Inspected:

Only the lower portal, which acted as the main haulage tunnel, was inspected. The portal was closed with 3 culverts, about 2 years prior by Westmin/Boliden. Drainage was flowing from the adit. There was a pres-

sure blow out at this portal prior to it being backfilled. The portal became blocked and dammed the drainage. Red iron precipitate still is plastered 4 metres up the tree trunks.

Higher elevation portals are documented but were not inspected or located.

Also on site is a deteriorating tramline and loading station. The wooden structure was used as a loading station and is collapsed. The line is on the ground and travels upslope from the inspected adit, possibly leading to the other workings. The terminus of the line is unknown. The tram tower has fallen since S. Wuschke's last inspection (~2 years prior).

No waste rock dumps were observed on site.

Mine Drainage:

From the portal, the drainage flows downslope a few hundred metres, directly into Cedar Creek.

Observations & Analytical Results:

The flow rate of the drainage from the lower portal was approximately 80 L/min. The pH=5.5, the water had a metallic odour and conductivity=750 μ s. Fe-precipitate was flowing heavily from the adit. The drainage path was lined with the orange-red precipitate down to where the drainage flowed into Cedar Creek (a couple hundred metres below). The rocks outside of the portal were stained red from the drainage. Water samples were taken.



Photo 40. Collapsed tram load out station at Highland mine site.

The water quality results are as follows: pH=7.4, [SO₄]=497 ppm and H=557 ppm. The sulphate concentration exceeds the BC water quality guidelines for aquatic life. Metals in excess include Al, Cd, Co, Fe, Mn and Zn.

For Al, the dissolved concentration is less than the total, which implies the Al is largely in a colloidal fraction. The dissolved fraction of Al is not above the water quality guidelines for aquatic life nor drinking water thresholds.

The total and dissolved concentrations of Cd are both 0.01 ppm, implying that the Cd species are in dissolved form. The concentration of Cd is 3 orders of magnitude above the aquatic life water quality guidelines.

Co concentrations, for both dissolved and total are equal (0.01 ppm). Co resides in the drainage as a dissolved species and is 1 order of magnitude above the water quality guidelines.

For Fe, the species are partitioned between both colloidal and dissolved fractions. Both species concentrations exceed the water quality guidelines. The dissolved fraction is of the same order of magnitude as the threshold value and the total fraction is 2 orders of magnitude higher.

Mn is in the dissolved form and exceeds the water quality guidelines, but is of the same magnitude as the threshold value. The concentration of dissolved Mn is greater than the total concentration, which points to an error in analytical protocol.

Zn is primarily dissolved and is one order of magnitude greater than the water quality guidelines.

See Appendix B for the geochemical data set.

References: See MINFILE

CANEX TAILINGS

Property name: CANEX TAILINGS

Map number (*see Appendix C*): 34

Mine drainage sample numbers: LB00-2701 to 2703

MINFILE number: 082FSW010, 082FSW009, 082FSW247, 082FSW310, 082FSW011, 082FSW218

Date: September 15, 2000

Persons present: Steve Wuschke (Mining Division, Cranbrook) and L. Barazzuol (Mining Division, Victoria)

Weather: sunny and warm but slightly overcast

Regional Office: Cranbrook

NTS map sheet: 082F03E

Location: the west side of Hwy 3, south of Salmo near Sheep Creek

Access: Hwy 3, south of Salmo near Sheep Creek

UTM coordinates: n/a

Type of deposit: W skarn

Commodities mined: Lead, Zinc, Silver, Cadmium, Tungsten, Molybdenum, Bismuth, Gold

Years mined (open/closed): 1906-1970

Mine Workings Inspected:

Only the tailings were inspected. The source of the ore was determined after the inspection.

The tailings are deposited as a large mound with steep slopes. A series of houses, which are occupied, have been built on top of the dump. The housing restricted the access to the tailings - the road was gated and a guard dog was on the property.

The extent and volume of the tailings is unknown as an estimate of the dimensions wasn't possible. The tailings were silt sized and appeared unoxidized. Digging into the tails from the side of the bank, there

wasn't any observable sub-surface oxidation and the tailings were dry. The slope of the tailings dump was sparsely vegetated.

A semi-stagnant marsh/pond is located between the tailings and the highway. This water was sampled.

Mine Drainage:

Surface flow paths of the marsh/pond were not evident. A sub-surface flow component may exist.

Observations & Analytical Results:

The stagnant marsh/pond had a field pH= 5.5 and conductivity=230 μ s. The water had an organic, semi-rotten smell to it. Sedge (riparian plants) was growing in and near the shallow water and was especially dense at the northern limit of the pond. Healthy, mature trees were present around the periphery of the pond. The water was sampled for further analysis, as this site has been a concern for the Cranbrook regional office.

Water quality results are as follows: pH=8.1, [SO₄]=37 ppm and H=104 ppm. Elevated metal concentrations above the BC water quality guidelines for aquatic life include Al and Fe.

Both Al and Fe are primarily in the water as colloidal species, given that the dissolved concentration is proportionally high relative to the total. The problem with the water quality results is one of source: does the water interact with the tailings before settling into the marshy pond or is it independent of them?

See Appendix B for the geochemical data set.

References: *See MINFILE*



Photo 41. Pond at toe of the Canex tailings.

MIDWAY

Property name: MIDWAY

Map number (see Appendix C): 35

Mine drainage sample numbers: LB00-2801 to 2806

MINFILE number: 082GSW021

Date: September 15, 2000

Persons present: Steve Wuschke (Mining Division, Cranbrook) and L. Barazzuol (Mining Division, Victoria)

Weather: warm, bright and overcast

Regional Office: Cranbrook

NTS map sheet: 082G04W

Location: North side of Highway 3 east of Yahk. The Moyie River is visible to the east.

Access: located directly on Highway 3 between Moyie and Yahk.

UTM coordinates: n/a

Type of deposit: Polymetallic veins Ag-Pb-Zn±Au

Commodities mined: Lead, Zinc, Silver, Gold, Copper, Tin, Antimony

Years mined (open/closed): 1933-1962

Mine Workings Inspected:

Two portals and two waste rock dumps were inspected, which matches the inventory given by MINFILE.

The upper portal is located at the crest of the upper waste rock dump. The portal was gated and appeared to be in stable condition. The upper portal has tracks from the adit leading to a small trestle, which was an end dump for the upper waste rock dump. The trestle is deteriorating. A trickle of water (2-3 L/min) was draining from the adit. The water was sampled.

The upper waste rock dump was formed by end dumping waste rock directly from the adit. The resultant is a gravity separated, two level dump mostly comprised of fines. The dump volume is approximately 7000 m³ and the slope of the dump face is about 40 degrees. Rock lithologies include sandstone and milky quartzite. Although there is no visible mineralization, the rocks and fines are heavily weathered. The waste rock (10-40 cm) has oxidized to one of 2 colours: a red-brown or black-brown colour. The oxidation of the fines varies between the upper and lower levels of the dump. The upper level of the dump is a yellow-brown colour with some patches of light green oxidation. The lower portion of the waste dump is mainly comprised of oxidized, orange-brown fines. The lower waste rock fines were sampled. There was no vegetation growing on the dump.

The lower portal is located at the foot of the upper waste rock dump and to the northeast. The portal was gated and appeared to be in stable condition. Water was draining from the adit. The drainage was sampled, but downstream of the portal.

The lower dump is situated directly below the lower adit. The dump is mostly comprised of oxidized fines of a yellow-brown and brown-orange colour. The fines of the upper reaches of the dump are lithified. It appears that some waste rock in the lower reaches of the dump has been removed. The volume of the dump is approximately 3100 m³.

Mine Drainage:

Both the upper and the lower portals were draining water.

The drainage from the upper portal flowed down the south side of the waste rock dump into the surrounding forest. The fate of the drainage is unknown.

The water from the lower adit drains down the lower dump, continues north around the toe of the dump, and east through a culvert under the highway where it drains into a marshy area of anomalously tall (1.25 m) horsetail. The drainage was sampled at the draining end of the culvert because the water becomes more acidic through the chemical interaction with the oxidized, lower dump.

Observations & Analytical Results:

For both portals, there does not appear to be a relationship between pH and sulphate concentration; the concentration of sulphate is low given the acidic nature of the drainage. Metal leaching is a definite concern. Similar suites of metals are leaching from both portals (Al, Co, Fe, Mn and Zn), except As and Cu, which are exclusive to the upper portal.

1. Upper portal drainage

The drainage from the upper portal was precipitating a red-brown Fe-oxide. Judging from the distribution of the precipitate on the ground, the drainage was at low flow. The pH=4.0 and conductivity 390 µs. The water was odourless. No vegetation was present. The drainage was sampled for analysis.

Results from the water quality analysis of the upper adit drainage are: pH=3.85, [SO₄]=160 ppm and H=94 ppm. Metal concentrations above the BC water quality guidelines for aquatic life thresholds include Al, As, Co, Cu, Fe, Mn and Zn.

- Al is 1 order of magnitude higher than the guidelines, for both dissolved and total concentrations. Proportionally, most of the Al in the drainage is dissolved.
- As is mainly in a colloidal form, and is 1 order of magnitude greater than the guideline threshold.
- The Co in the drainage is dissolved and is 2 orders of magnitude above the guidelines threshold concentration.
- Cu is of the same magnitude as the guidelines for both dissolved and total concentrations. Of the Cu



Photo 42. Mine drainage at the foot of the lower dump. The drainage originates from the lower adit and terminates in a field of horsetail.

in the drainage, most is in the dissolved form rather than colloidal.

- Fe exists as both dissolved and colloidal/precipitate species: it is 1 order of magnitude higher than the guideline threshold value for the dissolved concentration and 2 orders of magnitude greater for the total concentration.
- All of the Mn is in a dissolved form, which is slightly above the water quality guideline threshold.
- The Zn component of the drainage is dissolved. Zn is 1 order of magnitude above the water quality guidelines.

2. Lower portal drainage

The drainage from the lower portal was flowing at a rate of ~10 L/min and precipitating an orange Fe precipitate. The drainage had a strong metallic odour. The field pH = 5.0 and conductivity=390 μ s. There was no vegetation within the water although the water flowed through some dispersed, mature trees. The drainage flowed east down the lower waste rock dump.

The drainage from the lower portal as tested after it flowed over the lower waste rock dump and through the culvert under the highway had a field pH=3.5, conductivity=530 μ s and a flow of <1.0 L/min. The ground was heavily laden with orange precipitate and the water had an organic oily film on the surface of the water. The culvert was very corroded, undoubtedly from the acidic drainage. The lower pH and increased conductivity values at the culvert prompted the sampling of the drainage after its interactions with the lower dump.

Water quality results from the lower adit as sampled at the culvert, are: pH=3.3, [SO₄]=256 ppm and H=150 ppm. Metals in excess of the BC water quality guidelines are Al, Co, Fe, Mn and Zn.

- Al is 1 order of magnitude higher than the water quality guidelines for the dissolved concentration and 2 orders of magnitude for the total concentration. Al is primarily in the dissolved species.
- Co is 1 order of magnitude greater than the water quality guidelines. The Co is in the dissolved species.
- Fe is both dissolved and as colloids/precipitates in the drainage. The dissolved concentration is 1 order of magnitude greater than the guidelines, whereas the total concentration is 2 orders of magnitude higher.
- Mn is dissolved in the drainage exceeds but is within the same magnitude as the BC water quality guidelines. Some error exists in the Mn concentrations reported as the dissolved concentration is greater than the total.
- Zn values are also erroneous as the dissolved concentration is greater than the total. Zn is dissolved in the drainage and is in excess of the BC water quality guidelines, but of the same order of magnitude as the threshold value.

See Appendix B for the geochemical data set.

Additional Comments:

This site has ML/ARD concerns and should be sampled during freshet. The area of disturbance is small scale and is very accessible.

References: See MINFILE

CORK-PROVINCE

Property name: CORK-PROVINCE

Map number (*see Appendix C*): 36

Mine drainage sample numbers: LB00-2901 to 2903

MINFILE number: 082FNW094

Date: September 18, 2000

Persons present: Steve Wuschke (Mining Division, Cranbrook), Gregg Stewart (Mining Division, Victoria) and L. Barazzuol (Mining Division, Victoria)

Weather: overcast and warm

Regional Office: Cranbrook

NTS map sheet: 082F14E

Location: south of Keen Creek, just west of the mouth of Ben Hur Creek

UTM coordinates: 494509, 5528382; elevation: 1068 m

Type of deposit: Polymetallic veins Ag-Pb-Zn±Au

Commodities mined: Silver, Zinc, Lead, Cadmium, Gold, Copper

Years mined (open/closed): 1900-1966

Mine Workings Inspected:

Only one portal, located southeast of the dumps above the road was inspected although MINFILE documents at least 4 adits and a vertical shaft. The portal is partially blocked by slumped debris and the roof of the portal is failing. No oxidation, precipitates or salts were observed. A draft was coming from the adit, indicating an open shaft. Water was draining from the adit and was sampled.

A small waste rock dump is located east of the road and adjacent to the portal. The volume of the dump is approximately 1000 m³.

The main waste rock is west of the road and adjacent to the old mill. The volume of the waste rock is approximately 250,000 m³. A deteriorating wooden framed structure is situated on top.

The silt-sized tailings are located down slope from the waste rock dump and the mill. Keen Creek runs along the northwest side of the tailings, likely washing some of the tailings downstream. The colour is chocolate brown, which is consistent with depth. The tailings forming a bank above the creek hosted various seeps as well as an embedded pipe. No drainage was flowing from the pipe. The inaccessible seeps created red stains and sustained some vegetation. Vegetation on the slope of the tailings includes conifers, thick, dark green-brown moss mats, horsetail and grasses. The top of the tailings is sparsely vegetated with sparse horsetail but most of the vegetation was on the creek-side slope. The tailings fizzed rapidly with HCl indicating carbonates. A spillway leading to the creek is located on the west side of the tailings impoundment. The area of the tailings is about 15,000 m² and the volume about 300,000 m³. The tailings were sampled.

Remnants of the mill include the foundations as well as scrap metal and wood.



Photo 43. Cork Province tailings.



Photo 44. Cork-Province mill.

Mine Drainage:

The drainage flowing from the adit infiltrates the ground.

Seeps from the tailings were observed but not sampled due to their inaccessibility.

Observations & Analytical Results:

The drainage from the adit was flowing at a rate of ~35 L/min. The field pH paper=5.0-5.5 and the conductivity=120 μ s. The water was odourless and very cold. Water samples were taken for further analysis. Horsetail was growing in the vicinity.

Water quality results are as follows: pH=8.05, [SO₄]=36 ppm and H=114 ppm. Only Zn is above the water quality guidelines for aquatic life.

- Zn is one order of magnitude above the water quality guidelines and present as a dissolved species only. There is obviously some degree of error in these Zn values given the dissolved concentration is greater than the total. The source of this Zn may be some form of Zn-oxide, a weathering product of sphalerite.

See Appendix B for the geochemical data set.

Additional Comments:

The drainage is neutral/basic, sulphate concentrations are low, the hardness is low and no other metals other than Zn are concentrated in the waters.

References: See MINFILE

CAMBORNE

Property name: CAMBORNE TAILINGS

Map number (see Appendix C): 37

Mine drainage sample numbers: LB00-3001 to 3003

MINFILE number: 082KNW076??, 082KNW064 ??

Date: September 18, 2000

Persons present: Steve Wuschke (Mining Division, Cranbrook), Gregg Stewart (Mining Division, Victoria) and L. Barazzuol (Mining Division, Victoria)

Weather: overcast and cool. The onset of dusk hurried the completion of the inspection.

Regional Office: Cranbrook

NTS map sheet: 082K13E

Location: Trout Lake area

UTM coordinates: n/a

Type of deposit: n/a

Commodities mined: n/a

Years mined (open/closed): n/a

Mine Workings Inspected:

There were few workings present at the site of the tailings. Mine infrastructure included a mill, an ore tunnel and tailings.

An adit, which probably served as ore tunnel, is located upslope of the mill and above a small debris/waste rock dump. The wooden structure adjoining the portal has since collapsed. Access to the adit is partially obstructed by rotting wood and corrugated metal sheets, although it is still accessible. Rail tracks and stagnant water were present in the adit. It is uncertain which mine site this adit adjoins. Water samples were taken despite this water being stagnant. The mill foundations are adjacent to the ore tunnel to the southwest. A creek of an unknown name is located

to the west. There is scrap metal and wood debris remaining at the mill site.

The waste rock dump is located south of the mill. The volume of the dump is approximately 2,300 m³.

The tailings are located south of the waste rock and are surrounded by dense trees. The area of the tailings is approximately 6,000 m² while the volume is about 50,000 m³. There are numerous oxidation colours: red-orange-brown, yellow and chocolate brown. The distribution of colours is in a patchwork-like fashion. The weathering of the tailings is pervasive both aerially and with depth. The yellow colour may represent 'wash' as the tailings are a red-orange in the sub-surface. Water was pooling in areas of the tailings. This was not sampled. The tailings were sampled in one location.

Mine Drainage:

Stagnant drainage was present in the adit. Whether this water flows seasonally is unknown.

Also, water was pooling in areas of the tailings. This water was not sampled. No seeps were observed.

Observations & Analytical Results:

The stagnant water in the adit had a field pH=5.5 and a slightly metallic odour. The water was red from the Fe-ppt in the water. No vegetation was present in the water.

Water quality results from the stagnant water in the adit are: pH=5.4, [SO₄]=434 ppm, H=270 ppm. The sulphate concentration exceeds the water quality guidelines for aquatic life. Metals also in excess are Al, Cd, Co, Cu, Pb, Mn and Zn. Cd and Zn are especially elevated.



Photo 45. View of Camborne tailings from mill.



Photo 46. Camborne adit. The mine water was stagnant when sampled.



Photo 47. Camborne mill and tailings.

- Cd is 4 orders of magnitude higher than the water quality guidelines and is a dissolved species in the drainage.
- Co is 1 order of magnitude greater than the guidelines. The Co in the drainage is dissolved.
- Cu in the stagnant water is dissolved and resides as a dissolved species.
- Pb is 1 order of magnitude greater than the guidelines. The Pb species are both dissolved and colloidal in the drainage.
- Mn is slightly above the guidelines and is a dissolved species.
- Zn is 2 orders of magnitude greater than the guidelines and is present as a dissolved species.

See Appendix B for the geochemical data set.

Additional Comments:

Because the water sampled was stagnant, evaporation may have concentrated the metal content. Many of the metals in excess (Al, Cd, Co, Cu, Fe, Pb, Mn,) are dissolved species. Analyzing water at freshet when the water is flowing would provide a clearer picture of the geochemistry.

The tailings originate from various properties, including Goldfinch and Sunshine-Lardeau.

- Al is 1 order of magnitude greater than the water quality guidelines. The Al is primarily dissolved.

References: See MINFILE

JACKSON

Property name: JACKSON

Map number (see Appendix C): 38

Mine drainage sample numbers: LB00-3101 to 3106

MINFILE number: 082KSW015

Date: September 19, 2000

Persons present: Steve Wuschke (Mining Division, Cranbrook), Gregg Stewart (Mining Division, Victoria) and L. Barazzuol (Mining Division, Victoria)

Weather: sunny with a few clouds and cool

Regional Office: Cranbrook

NTS map sheet: 082K03E, 082F14E

Location: eastern extent of Jackson Basin, due west of Stenson Creek

UTM coordinates: stope at mill: 488470, 5538921; elevation: 1740 m. UTM coordinates for other workings are in the text.

Type of deposit: Polymetallic veins Ag-Pb-Zn±Au

Commodities mined: Zinc, Silver, Lead, Cadmium, Gold, Copper

Years mined (open/closed): 1894-1975

Mine Workings Inspected:

Mine components located include 4 adits, a stope, mill foundations and 4 waste rock dumps. The adits are situated one above the other with waste rock dumps in between. No tailings were found on site; they may have been disposed of in Stenson Creek. The historic site has an overprint of modern exploration (trenching and drilling).

The 1887 m adit #1, the uppermost adit, has coordinates of 488291, 5539048. The portal is timbered and is 70% blocked by slumped shaley rock containing fine grained, disseminated galena. The shale and overburden is naturally revegetating. The adit was dry.

The corresponding waste rock dump to the 1887 m adit is located directly down slope. The dump volume is approximately 700 m³. Oxidation of the dump is minor.

The 1862 m adit is located at the 488353, 5538955 and is to the west of 1887 m waste rock dump. The portal is partially blocked by slumped rock. Water was draining from the portal and was sampled.

The corresponding waste rock dump (1862 m dump) has minor oxidation. The volume of the dump is on the order of 35,000 m³.

The 1796 m adit is located beneath the 1862 m dump at 488353, 5538955. There was no drainage in this portal. The adit is partially blocked by slumped overburden as well as metal and wooden debris. Scrap metal (corrugated sheets, large metal pipe) is littered outside the adit. The adit rail tracks are still present.

The corresponding waste rock dump (1796 m dump) is located down slope from the adit. The dump wasn't inspected closely. The volume of the dump is on the

order of 35,000 m³ and the rocks have undergone minor oxidation.

The lower adit is located beneath the 1796 m dump. The UTM coordinates were not taken but the elevation is approximate 1770 m. The portal is inaccessible due to slumped waste rock blocking the portal. Other debris such as rusting barrels, rail tracks and rotting wood is also present at the portal. Drainage was coming from the portal and was sampled.

The lower waste rock dump (~1770 m) down slope has 2 small seeps, which were too minor to sample. Bright green, carpet-like moss is growing in the vicinity of these seeps. There was also minor iron precipitation at these localities. The dump has a volume on the order of 200,000 m³.

Waste rock also surrounds the mill. The volume was not recorded.

Remains of the mill include old foundations, a heap of rotting wood and scrap, rusty metal. An old ore bin adjacent to the mill is standing, as was a small wooden cabin.

A flooded break through stope is located east of the mill, just above Stenson Creek at 488470, 5538921 and 1740 m elevation. The drainage was flowing into the creek but was not sampled.

Mine Drainage:

Drainage was flowing from the 1862 m adit and the 1770 m adit. The drainage in both cases infiltrated the overburden. The drainage from these adits was sampled.

Two small seeps were observed in the lower waste rock dump (~1770 m). The seeps were too minor to sample.

The drainage from the surfaced stope was draining into Stenson creek at a rate of ca. 20 L/min. The drainage was not sampled.

Observations & Analytical Results:

1. 1862 m adit

Drainage from the 1862 m adit was flowing at a rate of 1-2 L/min. The field pH=5.5 and conductivity 380 µs. The drainage was odourless and very cold. There were no visible precipitates or salts. Vegetation consisted of bright green, mat-like moss, which was growing in the flow.

Water quality analysis results for 1862 m adit are: pH=8.09, [SO₄]=106 ppm and H=260 ppm. The sulphate level is above the water quality guidelines for aquatic life but only by a minor fraction. The only elevated metal is Zn.



Photo 48. Jackson adit (elevation 1760 m). The drainage flowing from the adit is not visible in the photo.

- Zn concentration is above but of the same magnitude as the guidelines. The Zn in the drainage is dissolved.

2. Lower adit (~1770 m)

The drainage from the lower adit (~1770 m) was flowing at a rate of ~10 L/min. The pH=5.5 and conductivity 280 μ s. There were no visible salts or precipitates and no odour. The water was sampled for geochemical analysis.

Water quality results are: pH=8.11, [SO₄]=74 ppm and H=194 ppm. Elevated metal concentrations above the water quality guidelines for aquatic life are Cd and Zn.

- Cd is 3 orders of magnitude above the guidelines. The degree of the dissolved component of Cd in the drainage is unknown as the dissolved concentration is below detection (<0.1 ppm).
- Zn is 1 order of magnitude greater than the guidelines. The Zn in the drainage is dissolved.

3. Break through stope

The drainage from the break through stope had a field pH=5.0 and conductivity 270 μ s. The drainage flowed at a rate of approximately 20 L/min. No vegetation was present and the water had no discernible odour. The drainage was not sampled.

See Appendix B for the geochemical data set.

Additional Comments:

Zn and Co are the only metals which exceed the water quality guidelines for aquatic life. The scenario at Jackson appears to be one of alkaline rock drainage and related metal leaching. A possible source of zinc could be ZnO, a product of sphalerite weathering.

References: See MINFILE

LUCKY JIM

Property name: LUCKY JIM

Map number (see Appendix C): 39

Mine drainage sample numbers: n/a

MINFILE number: 082KSW023

Date: September 19, 2000

Persons present: Steve Wuschke (Mining Division, Cranbrook), Gregg Stewart (Mining Division, Victoria) and L. Barazzuol (Mining Division, Victoria)

Weather: sunny with a few clouds and cool

Regional Office: Cranbrook

NTS map sheet: 082K03E

Access: on Highway 31A, 6 km east of the Sandon-New Denver junction

UTM coordinates: 485149, 5542742; elevation: 1061 m

Type of deposit: Polymetallic veins Ag-Pb-Zn±Au

Commodities mined: Zinc, Silver, Lead, Cadmium, Gold, Tin

Years mined (open/closed): 1893-1959

Mine Workings Inspected:

The site was not inspected, as it is located on the other (south) side of Seaton Creek from the highway and the crossing was difficult. While on site, the name of the property was unknown.

The workings observed include deteriorating mill foundations, several portals, numerous waste dumps, tailings and an abandoned tram station 2.5 km west along the highway.

The tailings are in Seaton Creek but are probably not exclusively from the Lucky Jim mill. The tailings have a reddish colour. A beaver dam in Seaton Creek is immediately due west of the workings.

About 2.5 km west along Highway 31A is an abandoned tram station and dump material. The UTM coordinates are 483072, 5541524, elevation 955 m. The tram is also located south of the creek but the creek was passable. Tailings are still present in the creek at this location. An old mining road is situated above the tram. The old abandoned workings observed from the highway could not be located via this road.

Mine Drainage:

n/a

Additional Comments:

From the UTM coordinates taken (485149, 5542742, elevation 1061 m) the property was determined to be the MINFILE past producer Lucky Jim. MINFILE describes the site locations as located immediately southwest of Bear Lake and the historic mining community of Zincton. This description corresponds to an abandoned mine marked on NTS map 082K03 on the (reverted?) Crown Grant L.847.

References: See MINFILE



Photo 49. Dumps at Lucky Jim property. Drainage is visibly flowing over the middle dump.

SLOCAN SOVEREIGN

Property name: SLOCAN SOVEREIGN (L.1927)

Map number (see Appendix C): 40

Mine drainage sample numbers: LB00-3201 to 3203

MINFILE number: 082FNW036

Date: September 19, 2000

Persons present: Steve Wuschke (Mining Division, Cranbrook), Gregg Stewart (Mining Division, Victoria) and L. Barazzuol (Mining Division, Victoria)

Weather: sunny and warm

Regional Office: Cranbrook

NTS map sheet: 082F14E

Location: situated on Crown grant Lot 1927, on the north side of Carpenter Creek about 1.5 kilometres north of the community of Cody

Access: forest road north of Cody

UTM coordinates: upper portal - 485759, 5537007; elevation 1564 m.

Type of deposit: Polymetallic veins Ag-Pb-Zn±Au

Commodities mined: Lead, Silver, Zinc, Gold, Copper

Years mined (open/closed): 1898-1968

Mine Workings Inspected:

On site are a tram tower and relics, extensive waste rock dumps, numerous derelict buildings, 1 stope and 1 adit.

An open stope/drift is situated along the access path west of the road. There was no water draining from or in the opening. No visible oxidation was apparent.

The upper portal is situated west of the surfaced stope. Railroad tracks exit the portal and lead to a curved trestle, which is stable. Scrap wood is littered around the trestle. The portal is boarded but not locked providing easy access to the adit. Water was draining from the portal and was sampled.

A total of 8 waste rock dumps are located at various elevations on either side of the draw above the Slocan Sovereign workings. Most of the dumps are at higher elevations. The volume of the waste rock dumps was difficult to estimate as they were numerous, widespread and distant. An air photo may show the distribution of the dumps.

The lower portal was not inspected due to safety concerns. The portal appears to have a load out station (for the tram?), which is in a state of ruin. Drainage was flowing from the portal at ~ 70 L/min. From a distance, no obvious oxidation could be observed.

Mine Drainage:

Drainage was flowing from both the upper and lower portals. The drainage from both adits flowed into the valley. Carpenter Creek is the receiving water course.

Observations & Analytical Results:

The drainage from the upper portal was draining at a rate of ~ 60 L/min. The field pH=5.5 and conductivity= 340 μ s. No visible precipitates or salts were present. Bright green, stringy, individual moss-like plants



Photo 50. Slocan Sovereign adit with flowing drainage.

were growing within the flow. The drainage had no discernible odour. Water samples were taken for analysis.

Analytical results of the water sampled from the upper portal are as follows: pH=8.09, [SO₄]=106 ppm and H=244 ppm. Zn is the only metal above the water quality guidelines for aquatic life.

- Zn is of the same order of magnitude as the guidelines, although the Zn in the drainage is dissolved.

See Appendix B for the geochemical data set.

Additional Comments:

At the time of the inspection, the name of the site was unknown. The location, access route and aspects of the MINFILE description of the Slocan Sovereign mine site all correspond to the inspection details.

The eight waste rock dumps reside on the workings of the Slocan Sovereign, Deadman (085FNW037) and American Boy (082FNW181) properties. It will be difficult to accurately assign the dumps to the appropriate mine site.

References: See MINFILE

RENO

Property name: RENO (L.12684)

Map number (*see Appendix C*): 41

Mine drainage sample numbers: LB00-3301 to 3303

MINFILE number: 082FSW036

Date: September 20, 2000

Persons present: Steve Wuschke (Mining Division, Cranbrook), Gregg Stewart (Mining Division, Victoria) and L. Barazzuol (Mining Division, Victoria)

Weather: mostly overcast, with some sun and cool temperatures

Regional Office: Cranbrook

NTS map sheet: 082F03E

Location: on Reno mountain at the headwaters of Nugget Creek, a tributary of Sheep Creek

Access: Rough road up Sheep Creek and Reno mountain. The journey was time consuming and took the better part of the day.

UTM coordinates: upper portal - 490700, 5447893; elevation 1959 m

Type of deposit: Au-quartz veins

Commodities mined: Gold, Lead, Zinc, Silver, Copper, Mercury (1942 only)

Years mined (open/closed): 1906-1979

Mine Workings Inspected:

The upper portal is located at 490700, 5447893, elevation 1959 m. No drainage was flowing out of the collapsed portal.

The lower portal is accessible and was draining water at the time of the inspection. Tracks exit the portal and lead to a trestle above the road. The drainage was sampled. The UTM coordinates of the lower portal are 490510, 5447819, elevation: 1886 m. A collapsing wooden structure is outside of the portal

There are 3 waste rock dumps on site. With the exception of the dump below the lower portal, the waste rock dumps are weathered at the surface to an orange-brown colour.

Also on site are extensive mine ruins including ore bins and buildings. Many buildings are half collapsed although there are a few still standing. Scrap metal, pipes, barrels and wooden debris are strewn over the site.

The tailings were not located although there is documentation of an impoundment.



Photo 51. Waste rock dump, Reno mine site.



Photo 52. Lower adit. The drainage from the adit is being sampled.

Mine Drainage:

The drainage from the lower portal infiltrates an unoxidized area of a waste rock dump. The drainage resurfaces at the foot of the dump on the road. Its flow path is unknown beyond this point.

Observations & Analytical Results:

The drainage from the lower portal has a field pH = 5.0, conductivity = 80 μ S and the flow was ~ 15 L/min. The water had a slight metallic odour. Bright green

mat-like moss was growing proximal to the flow. The water was sampled.

The water quality results are as follows: pH=8.09, [SO₄]=11 ppm and H=44 ppm. Zn is the only metal in excess of the water quality guidelines for aquatic life.

- Zn is dissolved in the drainage. Its concentration is 0.002 ppm above the water quality guidelines. See Appendix B for the geochemical data set.

References: See MINFILE

UNKNOWN MILL NEAR SANDON

Property name: UNKNOWN MILL NEARSANDON

Map number (see Appendix C): 42

Mine drainage sample numbers: n/a

MINFILE number: Unknown

Date: September 19, 2000

Persons present: Steve Wuschke (Mining Division, Cranbrook), Gregg Stewart (Mining Division, Victoria) and L. Barazzuol (Mining Division, Victoria)

Weather: sunny with clouds and cool

Regional Office: Cranbrook

NTS map sheet: 082F14E

Location: in the Cody area, south of Rico Mountain

Access: via the Carpenter Lake Forest Road from Sandon. The mill straddles the road.

UTM coordinates: 486041, 5536288; elevation: 953 m

Type of deposit: n/a

Commodities mined: n/a

Years mined (open/closed): n/a

Mine Workings Onspected:

The mill is located on a hill slope and straddles Carpenter road; access is from above and below. A creek, a tributary of Carpenter creek, is at the foot of the property.

No equipment remains on site although the foundations remain. A few juvenile trees are growing within the confines of the foundation structure.

Various wooden mill buildings remain on site, including an ore bin, processing plant and a trestle. The ore bin and plant appear to be in good condition but the trestle is collapsing. Other unidentified, collapsed wooden structures are on site.

Ore is littered around the site containing fine grain, disseminate sulphides, including pyrite, galena and sphalerite.

No tailings were visible on site. They likely were disposed of in the adjacent creek.

Mine Drainage:

n/a

Additional Comments:

Given the location of the mill, the ore was likely transported to the mill and could have processed ore from more than one mine site. Two properties that are located close to the mill at higher elevations are Chambers (L.1752) and Number One (L.4560). MINFILE makes no reference to the fate of the ore from these properties and it is uncertain whether these properties are related to the mill.

References: See MINFILE



Photo 53. Unknown mill near Sandon, B.C. The mill could not be linked to specific mine sites.

UNKNOWN WORKINGS ON IDAHO PEAK

Property name: UNKNOWN WORKINGS ON IDAHO PEAK

Map number (see Appendix C): 43-45

Mine drainage sample numbers: n/a

MINFILE number: unknown

Date: September 19, 2000

Persons present: Steve Wuschke (Mining Division, Cranbrook), Gregg Stewart (Mining Division, Victoria) and L. Barazzuol (Mining Division, Victoria)

Weather: sunny and warm

Regional Office: Cranbrook

NTS map sheet: 082F14E

Location: Idaho peak, southwest of Sandon

Access: Idaho peak lookout road and environs

UTM coordinates: see specific workings

Type of deposit: n/a

Commodities mined: n/a

Years mined (open/closed): n/a

Mine Workings Inspected:

1. Unknown adit

An unknown adit was located on the Idaho Peak lookout road, including a partially collapsed mill. S. Wuschke noted that the tailings had previously been sampled. UTM coordinates: 480898, 5537557, elevation 1419 m. These workings could be part of the Queen Bess property (082FNW010).

2. Unknown waste rock dump and portal

Located on the Queen Bess Ltd. Road, the waste rock dump was dry with some minor oxidation. At the top of the dump was a collapsed portal. Both the portal and dump were dry. The UTM coordinates: 479909, 5537500; elevation 1689 m. The coordinates taken on site correlate with those of the MINFILE property Silverite (082FNW011).

3. Unknown adit

A partially collapsed portal with drainage was inspected. The pH of the drainage was 5.5 and conductivity 170 μ s. The flow was ~ 5 L/min and the drainage odourless. No oxidation was visible around the portal. A small waste rock dump was situated to the west of the portal. The UTM coordinates: 481630, 5536572; elevation 1316m. The workings could be part of the New Springfield (082FNW199) mine site.



Photo 54. Unknown adit on Idaho Peak, elevation 1419 m.



References:

Possibly MINFILE Queen Bess (082FNW010), Silverite (082FNW011) and New Springfield (082FNW199)

Photo 55. Unknown adit on Idaho Peak, elevation 1316 m.

UNKNOWN PORTAL NEAR KOOTENAY FLORENCE (082FNW016)

Property name: UNKNOWN PORTAL NEAR KOOTENAY FLORENCE

Map number (*see Appendix C*): 46
Mine drainage sample numbers: n/a
MINFILE number: unknown

Date: September 14, 2000

Persons present: Steve Wuschke (Mining Division, Cranbrook) and L. Barazzuol (Mining Division, Victoria)

Weather: hot and sunny

Regional Office: Cranbrook

NTS map sheet: 082FNW016

Location: Cedar Creek area/road to Cody Caves

Access: west of the road to Cody Caves, on the main forest road, which is unmarked

UTM coordinates: 505914, 5512001; elevation: 787 m

Type of deposit: unknown

Commodities mined: unknown

Years mined (open/closed): unknown

Mine Workings Inspected:

The portal had been backfilled with a culvert installed by Westmin/Boliden (S. Wuschke). Drainage was flowing from the portal. The forest licensee has placed a sign reading "domestic water" by the culvert. No precipitates or salts were visible.

A series of waste rock dumps are adjacent to the portal. The surface rocks of the dump are not visibly oxidized. The dumps were not inspected due to time constraints.

Mine Drainage:

n/a

UNKNOWN ADITS ON MONTE CRISTO MT., ROSSLAND, BC

Property name: UNKNOWN ADITS ON MONTE CRISTO MOUNTAIN, ROSSLAND B.C.

Map number (see Appendix C): 47-48

Mine drainage sample numbers: n/a

MINFILE number: unknown

Date: September 13, 2001

Persons present: Steve Wuschke (Mining Division, Cranbrook, Phil Johnson (Granite Mountain Excavating, Rossland) and L. Barazzuol (Mining Division, Victoria).

Weather: overcast and cloudy

Regional Office: Smithers

NTS map sheet: 082F04

Location: Rossland, BC

Access: outskirts of Rossland

UTM coordinates: see below

Type of deposit: unknown

Commodities: unknown

Years mined (open/closed): unknown

Mine Workings Inspected:

The names of the following portals could not be determined but are all located on Monte Cristo Mountain.

1. UTM coordinates: 0441519, 5437741

- elevation: 1231 m
- portal was backfilled by Granite Mountain Excavating. There was only a minute trickle of water draining from the portal which subsequently infiltrated the ground. The pH=5.5 and conductivity was 410 μ s. No water sample was taken for analysis. The water was odourless. Little vegetation is present due to the recent reclamation works.
- Prior to the excavation, the adit was flooded. When the reclamation work was performed, large volumes of creamy water flowed out (as reported by Phil Johnson). The creamy substance, possibly a clay, was still present on the ground although much of it had been washed away. Where it was present, it was approximately 3 cm thick. The kaolinite-like-substance was not sampled.

2. UTM coordinates: 0442066, 5437754

- located on the east side of Monte Cristo Mt.
- the portal entrance was driven ~west.
- the adit is possibly connected with the "Evening Star" workings.
- portal recently backfilled with a culvert installed. Work performed by Granite Mountain Excavating.



Photo 56. Unknown backfilled adit (UTM coordinates: 0441519, 5437741) on Monte Cristo Mountain., Rossland, B.C.

- film of oil/gas in water from heavy machinery.
- water flowed from the culvert at a rate of ~5 L/ min. The flow diminished with distance and eventually infiltrates the ground.
- juvenile amphibians were present in the water.
- plant life within the drainage included green moss.
- pH=5.5; conductivity=410 μ s.
- the water was not sampled for analysis.

Mine Drainage:

n/a

References: Unknown

