

SMITHERS REGION

BIG ONION

Property name: BIG ONION
Map number (see Appendix C): 1
Mine drainage sample numbers: LB00 - 0101 to 0103
MINFILE number: 093L 124

Date: August 14, 2000

Persons present: Bruce Graff (Mining Division, Smithers), Karl Desjarlais (Highland Helicopters, Smithers) and L. Barazzuol (Mining Division, Victoria).

Weather: sunny, clear and hot

Regional Office: Smithers

NTS map sheet: 093L15W

Location: south side of Astlais Mountain, 16 kilometres east of Smithers

Access: via helicopter. By road, access from Smithers is available along the all weather Babine Lake gravel

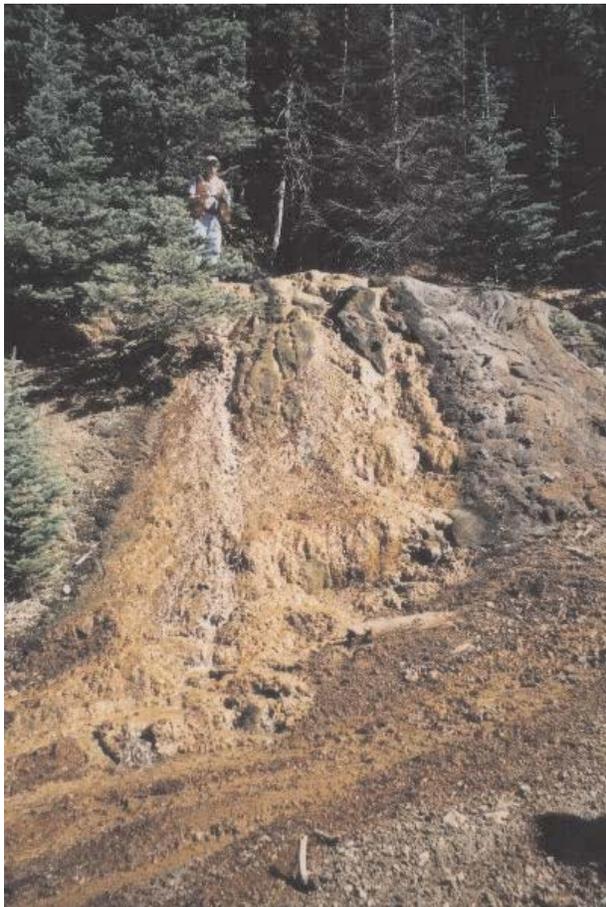


Photo 2. Drainage flowing from the Big Onion adits, located behind Bruce.

road.

UTM coordinates: 635544, 6075656 (NAD 27)

Type of deposit: Porphyry Cu \pm Mo \pm Au

Commodities: Copper, Molybdenum, Gold, Silver

Years mined (open/closed): no record

Mine Workings Inspected:

Two adits, one directly above the other, were inspected.

The adits have collapsed, burying the support timbers. Water was flowing out of the adits and was sampled.

No other mine components, including dumps, were visited or aerially inspected. MINFILE documents the history of activity as exploratory and lists 2 adits as well as trenching and drilling.

Mine Drainage:

The water flowed out of the 2 adits, down an outcrop approximately 3 m high, down a road and into the surrounding forest. The receiving watercourse of the drainage was not determined, but is likely Canyon Creek.

Observations & Analytical Results:

The water flowing from the 2 adits was draining at a net rate of approx. 80 L/min. The field pH = 4.5 and the conductivity = 430 μ S. The water had no discernible odour. White, green and red precipitates and salts



Photo 3. Downstream of the Big Onion adits

were observed. The Fe precipitates were prolific, depositing a clay-like substrate. The outcrop was covered in moss, the only vegetation within the flow of the water. The water was sampled.

The water quality results are as follows: pH=4.11, [SO₄]=215 ppm and hardness=139 ppm.

- The drainage is acidic, as indicated by the field and lab pH values.
- Sulphate is in excess of the water quality guidelines, although it is relatively low given the low value of pH.

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

- Al is 3 orders of magnitude greater than the water quality guidelines. The Al species in the drainage are primarily dissolved. The source of the Al is possibly the weathering of the alteration products. Alteration of the rocks is with sericite, kaolinite and chlorite, all of which contain Al.

- Co is 1 order of magnitude greater than the water quality guidelines. Co is primarily of a dissolved form in the drainage.
- Cu is 2 orders of magnitude higher than the water quality guidelines. The Cu is dissolved in the drainage.
- Fe is 2 orders of magnitude higher than the water quality guidelines. Fe is both dissolved and colloidal/particulate in the drainage, although the dissolved fraction is primary. The source is likely the weathering of pyrite, a primary mineral in the deposit.
- Mn is slightly in excess of the water quality guidelines. The Mn in the drainage is dissolved species.

See Appendix B for the geochemical data set.

Additional Comments:

ML/ARD is occurring onsite, although the area of disturbance of the property is small.

References: See MINFILE

NATIVE (LORRAINE)

Property name: NATIVE (LORRAINE)
Map number (*see Appendix C*): 2
Mine drainage sample numbers: n/a
MINFILE number: 093L 129

Date: August 14, 2000

Persons present: Bruce Graff (Mining Division, Smithers), Karl Desjarlais (Highland Helicopters, Smithers) and L. Barazzuol (Mining Division, Victoria).

Weather: sunny, clear and hot

Regional Office: Smithers
NTS map sheet: 093L15W
Location: head of Higgins Creek at ca. 5300 feet
Access: via helicopter.
UTM coordinates: n/a

Type of deposit: Polymetallic veins Ag-Pb-Zn±Au
Commodities: Silver, Lead, Zinc, Copper
Years mined (open/closed): no record

Mine Workings Inspected:

The waste rock dump is composed of a series of amalgamated mounds. The particle size ranged from sand to boulder. The dump en masse has no apparent oxidation. It is composed primarily of phyllite and argillite containing ~1-2% disseminated pyrite. Minor galena and chalcopyrite hosted in quartz are present and are slightly oxidized to a red colour. No seeps were observed. The dumps are sparsely vegetated on top with grasses. Wooden debris is mixed in with the dump material.

A collapsed adit with rail tracks is present. Slumped rocks, primarily phyllite and barite, barricade the portal. The wooden structure in front of the portal is collapsed. A trickle of water (~0.5 L/min) was flowing from the adit. The flow rate was so low samples were not taken.

Numerous old wooden buildings are on site, all in a state of decay. Other collapsed wooden structures were noted. Scrap steel also litters the site.

Mine Drainage:

Trickle of drainage from the adit.



Photo 4. Native (Lorraine) caved portal and waste rock dumps. Drainage flows from the adit.

Observations & Analytical Results:

The water draining from the portal had a field pH = 5.5. Conductivity wasn't measured as the water was too shallow. The water was odourless. No precipitates or salts were visible. Outside the portal was well vegetated with grasses.

Additional Comments:

Small scale site, relatively inaccessible, mainly physical remnants (buildings and debris) to be addressed.

References: *See* MINFILE

CRONIN

Property name: CRONIN

Map number (*see Appendix C*): 3

Mine drainage sample numbers: LB00 - 0301 to 0302; 0305 to 0307

MINFILE number: 093L 127

Date: August 14, 2000

Persons present: Bruce Graff (Mining Division, Smithers), Karl Desjarlais (Highland Helicopters, Smithers) and L. Barazzuol (Mining Division, Victoria).

Weather: sunny, clear and hot

Regional Office: Smithers

NTS map sheet: 093L15W

Location: on Cronin Creek, on the east side of Mount Cronin, 28 kilometres northeast of Smithers. The mine site is located in Babine Mountain Provincial Park.

Access: via helicopter. Road access from Smithers by Babine Hwy to Km 32, turn west into access road for 10 km to the mine.

UTM coordinates: tailings/mill: 641678, 6088260 (NAD27); elev'n: 3720 ft

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

Commodities: Silver, Lead, Zinc, Gold, Copper, Cad-

mium

Years mined (open/closed): 1917-1974

Mine Workings Inspected:

At about 6,000 feet, there is a backfilled ventilation shaft. The shaft was used as a raise to transport waste rock and ore to surface. A small wooden hut is adjacent to the shaft.

The waste rock from the shaft is down slope on a steep grade. The dump is about 40 m high and contains rhyolite, quartz vein and argillite. Mineralization present includes 2-3% pyrite, chalcopyrite and pyrrhotite. The waste dump has undergone minor oxidation to a red colour.

The upper adit has been backfilled with talus, making it inaccessible. No surface drainage was observed. The corresponding waste rock dump is down slope on a steep grade. The dump is composed primarily of rhyolite and argillite.

The lower adit (elev. 4720 feet) is backfilled with a small metal pipe to drain the adit water. Some drainage was flowing through the pipe, but most was seeping through the backfill material. The drainage was sampled. The adit is inaccessible.



Photo 5. Cronin lower portal. Note the adit drainage flowing over the dump.



Photo 6. Cronin mill and tailings.

The lower waste rock dump is deposited on a steep grade below the lower adit. The composition is primarily rhyolite and argillite with <1% sulphides. The dump height is approximately 15 feet. Wood debris is embedded in the dump.

The tailings and old mill site are situated at an elevation of 3,200 feet. The mill site is upslope and due west of the tailings.

The tailings are situated at the foot of the mill in 3 impoundments alongside Cronin Creek. The tailings are sand sized and appeared unoxidized. There are 2 ponds present, both with horsetail. No seeps were observed. At the time of the inspection the constructed spillways contained white salts and/or thick moss. The area of the moss and salts extended beyond the spillways and into the areas of ephemeral drainage flow. The salts will dissolve and the metals will be transported when they next interact with water. Scrap wood is embedded in the tailings. A small, intact, wooden shack is adjacent to the tailings. Its stability is unknown.

A ditch is situated between the mill and the tailings. Seepage was draining from the foot of the mill site.

At the mill site, barrels and burned debris are present. Two ore piles, a fine and a coarse, are situated at the mill site. The fine ore dump is composed of massive

and veinlets of quartz hosted in rhyolite containing <5% disseminated sulphides (chalcopyrite and pyrrhoitite) and <2% secondary malachite. The dump is oxidized to a red-brown colour. Scrap metal and cables, concrete foundations, wooden debris and caved wooden structures litter the mill site.

Water samples were taken from Cronin Creek downstream of the tailings. This is the estimated drainage point of the mine.

Mine Drainage:

The flow from the lower portal drains east down the adjacent waste rock pile where it infiltrates the talus at the base and continues to flow in the subsurface.

At the tailings/mill site, seepage was present at the toe of the mill. The seeping water flowed into the adjacent creek. The seep was not sampled. Ephemeral drainage paths containing salts and moss were present on the tailings surface. Cronin Creek was sampled below the tailings as this was the estimated drainage point for the Cronin mine site.

Observations & Analytical Results:

1. Lower Adit

The flow from the lower adit was ca. 40 L/min. Moss was growing in the vicinity of the water flow. The pH = 5.5 and the conductivity = 230 μ S. The water was odourless. Fe precipitates were observed but no salts were present.

Water quality results from the lower adit are: pH=7.37, [SO₄]=24 ppm and hardness = 191 ppm. Mn is the only metal in excess of the BC water quality guidelines for aquatic life.

- Mn is slightly above the water quality guidelines and is in the drainage as a dissolved species.

2. Seep from toe of mill

The seep from the toe of the mill was draining at a rate of approximately 2L/min. The water flowed south into the adjacent Cronin Creek. The pH = 5.5 and conductivity = 190 μ S. No samples were taken.

3. Cronin Creek downstream of tailings

Cronin Creek had a field pH = 5.0 and the conductivity = 50 μ S.

The water quality results for Cronin Creek are as follows: pH=7.41, [SO₄]=4 ppm and hardness = 37 ppm. All metal concentrations are below the BC water quality guidelines.

See Appendix B for the geochemical data set.

Additional Comments:

The Mining Division has been addressing health and safety hazards at this site as Babine Mountain Provincial Park is popular with recreationalists.

References: See MINFILE

RED ROSE

Property name: RED ROSE

Map number (see Appendix C): 4

Mine drainage sample numbers: LB00 - 0402 to 0404
MINFILE number: 093M 067

Date: August 15, 2000

Persons present: Bruce Graff, Esther Burchett (Mining Division, Smithers), Karl Desjarlais (Highland Helicopters, Smithers) and L. Barazzuol (Mining Division, Victoria).

Weather: overcast and cool

Regional Office: Smithers

NTS map sheet: 093M04E

Location: Red Rose is in the Rocher Deboule Mountains on the ridge (~6,500 ft) between Armagosa and Red Rose Creeks. The mill camp (~4,000 ft) is located on Red Rose Creek.

Access: by helicopter.

UTM coordinates: tailings: 587816, 6110240 (NAD 27)

Type of deposit: W veins

Commodities: Tungsten, Copper, Gold, Silver, Molybdenum, Uranium

Years mined (open/closed): 1942-1954

Mine Workings Inspected:

The site consists of 2 camps: the upper mine camp and the lower mill camp.

1. Upper mine camp

The lower portal, known as the 800 level portal, is collapsed. The adit is open but rotting timbers and slumping talus were barring access. Blue drainage was flowing from the adit. The drainage was sampled.

Downslope of the 800 level portal is a waste rock dump. The drainage infiltrated the dump.

The upper portal, known as the 600 level, is closed by a wooden door. No water was flowing from this adit. The 600 level portal served as the main haulage portal. The ore was transported by aerial tramway from the portal to the lower mill camp.

Two portals, the 100 and 200 level portal, located above the 600 level were not inspected.

Numerous decaying wooden buildings are on site, including the former bunkhouses, assay lab, core shack, maintenance buildings and tram structures. No tram machinery was observed. Core, scrap metal and garbage were littered around the camp.

2. Lower mill camp

The lower mill camp is situated in the Red Rose Creek valley, south of the upper camp. The lower camp is comprised of the mill foundation, old camp buildings, and the tailings pond. Only the tailings facilities were inspected on the ground.

The tailings (elev. 3800 ft) extend along the length of the valley from the mill to the tailings impoundment, approximately 400 m down slope. The area is about 400 m by 100 m. Red Rose Creek flows through the length of the tailings. Red Rose Creek has undoubtedly entrained the tailings, washing them downstream. Mature trees, lichen, moss and shrubs are growing throughout the valley, in the tailings. The tailings impoundment is approximately 65 m by 50 m by 0.5 m. Sparse malachite was mineralizing from the coarse grained tailings. No seeps were observed. Lichen and moss were sparsely growing from the tailings contained in the impoundment.

Mine Drainage:

The drainage from the 800 level portal infiltrates the adjacent waste rock dump. The drainage was not observed downstream of the dump. The receiving environment is Red Rose Creek, which eventually flows into the Kitseguela River.

Observations & Analytical Results:

1. 800 level portal

Turbid, odourless, blue water was flowing out of the 800 level portal at approximately 30 L/min. The field pH = 5.0, conductivity = 640 μ S and the temperature ~5C. Heavy malachite precipitation was evident in the drainage ponds outside of the portal. Deposition of the malachite was up to 15 cm deep. No vegetation was present in the alpine.

Water quality results are as follows: pH=7.11, [SO₄]=405 ppm, hardness=430 ppm.

Elevated metals in excess of the BC water quality guidelines for aquatic life include Al, Co, Cu and Fe.

- Al is 1 order of magnitude higher than the water quality guidelines. The species of Al is colloidal/particulate.
- Co is 1 order of magnitude greater than the water quality guidelines. Co is dissolved in the drainage.
- Cu is 2 orders of magnitude above the water quality guidelines. Cu is both dissolved and colloidal/particulate. The particulate fraction is high as malachite was unavoidably sampled with the drainage.
- Dissolved Fe is below the water quality guidelines but the total concentration (dissolved + colloidal/particulate species) is of the same magnitude but above the threshold concentration. No precipitates were observed.



Photo 7. Upper camp of the Red Rose mine. The site is a favoured backcountry destination.



Photo 8. Drainage with malachite precipitate flowing from the 800 level portal, Red Rose mine.

See Appendix B for the geochemical data set.

Additional Comments:

Closed due to fire, leaving 20,000 tonnes of broken and blocked out ore in stopes.

Dilution, coupled with the remoteness and altitude of this site puts this property in a lower risk category in terms of environmental impacts.

This site is considered a destination area by backcountry skiers and hikers. Locals expressed their

interest keeping the historic buildings and infrastructure for their 'tourism' value.

References: See MINFILE

Sutherland Brown, A., 1960. Geology of Rocher Deboule Range. British Columbia Department of Mines and Petroleum Resources, Bulletin No. 43, 78 pages.

ROCHER DEBOULE

Property name: ROCHER DEBOULE
Map number (see Appendix C): 5
Mine drainage sample numbers: LB00-0501 to 0503
MINFILE number: 093M 071

Date: August 15, 2000

Persons present: Bruce Graff, Esther Burchett (Mining Division, Smithers), Karl Desjarlais (Highland Helicopters, Smithers) and L. Barazzuol (Mining Division, Victoria).

Weather: overcast and cool

Regional Office: Smithers

NTS map sheet: 093M04E

Location: northeastern portion of Rocher Deboule Mountain, 11 kilometres south of Hazelton

Access: by helicopter

UTM coordinates: mill: 586715, 6112944

Type of deposit: Polymetallic veins Ag-Pb-Zn±Au.; W veins; Subvolcanic Cu-Ag-Au (As-Sb)

Commodities: Copper, Silver, Gold, Tungsten, Zinc, Lead, Uranium, Molybdenum, Cobalt

Years mined (open/closed): 1915-1929

Mine Workings Inspected:

The portals were aerially inspected, as they are located on the steep face of Rocher Deboule Mountain. About nine adits in total were observed. Of

those, three were draining water. The rocks surrounding the portals are oxidized; iron staining and malachite were observed. Train tracks still run along the mountain although they are rusted and bent. The wooden trestle is collapsing, cascading wooden debris down the slope. The tram head and line are still present. A massive waste rock pile is situated below the tramline, running down the mountain slope from the train trestle.

The mill site is located in the valley at an elevation of 4080 ft. The ore was brought to the mill site via the tram. The mill site is in a state of disrepair with numerous decaying, collapsed buildings that are potential health and safety risks. The wooden structure, possibly a load out station is still erect. Fine and coarse ore bins are on site but no ore piles were found. Wood debris, core and core boxes, concrete foundations and scrap metal (cars frames, bikes) noted on site.

End dumped waste rock (diorite and quartz) is situated at the head of the mill site. The dump is located on a hill slope with approximate dimensions of 40 m by 20 m. Observable mineralization is sparse to non-existent. Oxidation and secondary malachite are sparse.

No tailings are present. They were most likely flushed into Juniper Creek, east of the mill. Water was sampled from Juniper Creek.



Photo 9. Rocher Deboule mill site.

Mine Drainage:

Surface drainage observed was from 3 inaccessible portals on the face of Rocher Deboule Mountain.

The tailings were likely flushed down Juniper Creek, a tributary of the Kitsuegula River.

Observations & Analytical Results:

Juniper creek had a field pH = 5.0, conductivity = 50 s.

The geochemical results of the stream water are as follows: pH=7.5, [SO₄]=19 ppm and H=27 ppm. No metals are elevated above the BC Water Quality guidelines for aquatic life.

See Appendix B for the geochemical data set.

Additional Comments:

Juniper Creek is also the receiving creek for the Red Rose mine (093M 067) and another past producer, Highland Boy (093M 070). Highland Boy is located northeast of Rocher Deboule mine, at the headwaters of Juniper Creek. It was a small, short-lived property having 68 tonnes of ore extracted in 1917.

References: See MINFILE

Sutherland Brown, A., 1960. Geology of Rocher Deboule Range. British Columbia Department of Mines and Petroleum Resources, Bulletin No. 43, 78 pages.

SULTANA

Property name: SULTANA

Map number (see Appendix C): 6

Mine drainage sample numbers: LB00-0601 to 0603

MINFILE number: 093M 061

Date: August 15, 2000

Persons present: Bruce Graff, Esther Burchett (Mining Division, Smithers), Karl Desjarlais (Highland Helicopters, Smithers) and L. Barazzuol (Mining Division, Victoria).

Weather: overcast and cool

Regional Office: Smithers

NTS map sheet: 093M04E

Location: southeast side of the Rocher Deboule Range, in the alpine, near the headwaters of Boulder Creek, 16 kilometres south of New Hazelton.

Access: by helicopter. Access road appears overgrown.

UTM coordinates: 593259, 6106746; elevation: 4980 ft

Type of deposit: Polymetallic veins Ag-Pb-Zn±Au; Porphyry Cu ± Mo ± Au

Commodities: Silver, Copper, Molybdenum, Gold

Years mined (open/closed): no record

Mine Workings Inspected:

The site is comprised of one exploration adit, a waste rock dump and the remains of an exploration camp.

The waste rock is pervasively oxidized to a very distinct orange-red colour. Crystals (1cm) of pyrite and chalcopyrite are prolific in the dump, comprising

about 5-10% of the rock. Dump lithologies include granodiorite as well as quartz veins, both of which contain sulphide minerals. MINFILE states there is molybdenite and tetrahedrite mineralization, which were not observed. The waste rock is strewn over an area of approximately 600 m². One dump of waste rock, about 10 m high by 20 m x15 m is centred in the waste rock area. The rocks were very reactive and sulphide rich. No vegetation was present.

The portal was capped by snow. Red water was flowing from the adit. The drainage was sampled.

Remnants of the exploration camp (E594251, N6106792) adjacent to the workings include numerous empty barrels, scrap steel, collapsed wooden structures and a dilapidated hut.

Mine Drainage:

The drainage from the adit pooled on the oxidized waste rock, before draining into the receiving environment. The termination of drainage was not determined, although the mine is within the Boulder Creek watershed. Boulder Creek is a tributary of the Bulkley River. The flow from the adit was higher earlier in the season as indicated by the numerous and small, ephemeral channels observed in the waste rock area.

Observations & Analytical Results:

Drainage from the adit was flowing at an approximate rate of 30 L/min. The field pH = 5.0, conductiv-

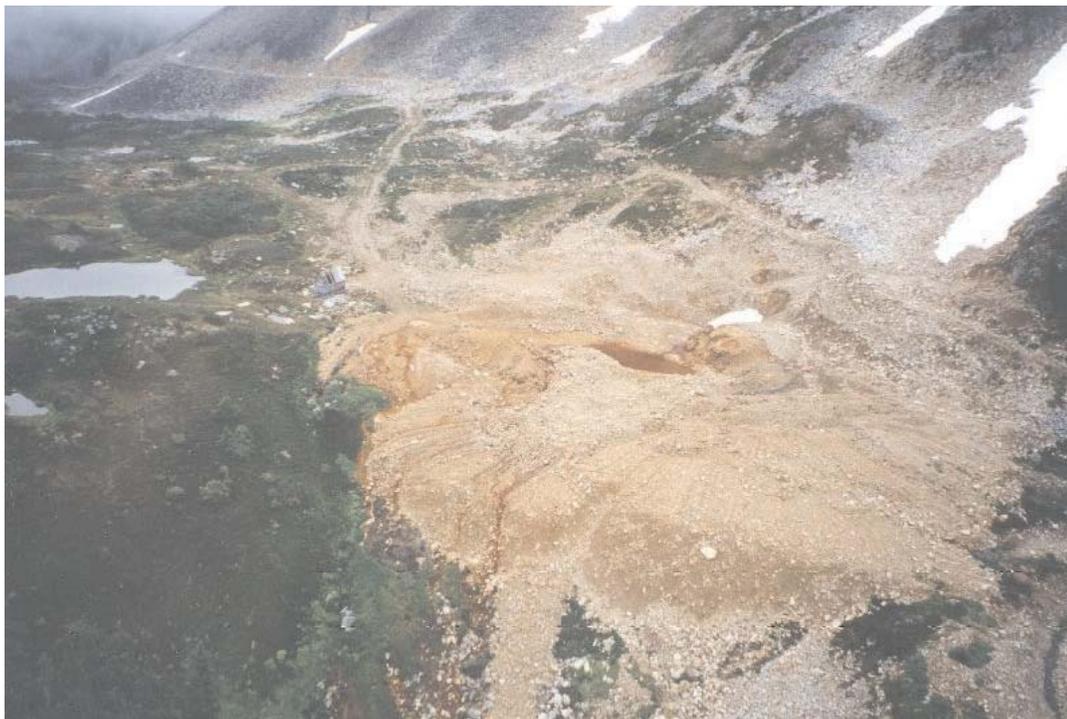


Photo 10. Area of disturbance at the Sultana mine site. The portal is located under the patch of snow. Note the drainage pooling and draining from the portal (dark red).

ity = 50 s, the smell of the water was slightly sulphurous and iron precipitate was concentrated heavily in the water, explaining the red, turbid nature of the drainage. The water from the adit flowed over the waste rock area and off site. Water samples were taken outside the portal.

Geochemical results from the water sampling are: pH=3.54, [SO₄]=78 ppm and hardness =24 ppm.

- drainage is acidic as indicated by the lab pH. The field pH = 5.0, which is less acidic than the lab results. The sulphate concentration is considerably low, given the acidity of the drainage. The sulphate may be chemically combining with other cations in the drainage.
- the buffering capacity of the system is low, as indicated by the hardness.

Fe is the only metal in excess of the water quality guidelines for aquatic life. Cu and Zn are also above the guidelines but their results are suspect; the dissolved concentrations are greater than the total for both cations.

- Dissolved iron is below the water quality guidelines while colloidal/particulate Fe is 1 order of magni-

tude higher. The drainage was heavy in iron precipitate, thereby increasing the Fe concentration of the water.

See Appendix B for the geochemical data set.

Additional Comments:

MINFILE property status is listed as “showing.” This status does not reflect the extent of disturbance on site.

Geochemical Results of the adit drainage indicate ML/ARD issues on site. In addition, the waste rock contains visible sulphides and is strongly oxidized. The mine site is remote and the disturbance is small scale (approximately 600 m²). The drainage was not sampled downstream of its chemical interactions with the oxidized waste rock.

REFERENCES: See MINFILE

Sutherland Brown, A., 1960. Geology of Rocher Deboule Range. British Columbia Department of Mines and Petroleum Resources, Bulletin No. 43, 78 pages.

EMERALD GLACIER

Property name: EMERALD GLACIER

Map number (see Appendix C): 7

Mine drainage sample numbers: LB00-0701, 0703, 0704

MINFILE number: 093E 001

Date: August 16, 2000

Persons present: Bruce Graff (Mining Division, Smithers) and L. Barazzuol (Mining Division, Victoria).

Weather: cool and overcast

Regional Office: Smithers

NTS map sheet: 093E11W

Location: south side of Mount Sweeney in the Sibola Range about 6 miles from Tahtsa River. The workings are centred on the Crown Granted Lots 2760-2763.

Access: Sweeney Lake road, accessible from Houston

UTM coordinates: n/a

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

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

Years mined (open/closed): 1951-53; 1966-68

Mine Workings Inspected:

The site consists of 2 camps: the upper mine camp and the lower mill camp.

1. Upper mine camp

The workings are accessible by a road east of Rhine Creek. The access road is passable; Telus uses this road to access their repeater.

Four portals are on site although only two are open (B. Graff, aerial inspection, 1999). The 6000' and 6400' adits were inspected at the mine site.

The 6000' adit is open and accessible with good ventilation, as indicated by the strong draft. The portal is collared with timbers. Snow was still present in the mouth of the adit. Tracks run out of the portal and on to the crest of the adjacent waste rock dump. No drainage was present.

End dumping formed the 6000' waste rock dump. Few visible sulphides are present in the sandstone and dacite. No visible salts or oxidation are present. Wood debris and metal are scattered on and imbedded in the dump.

The 6400' portal is accessible with good ventilation, as indicated by the draft from the adit. The portal is collared with timbers. Drainage was flowing from the adit, which was sampled. Tracks lead out of the adit on to the adjacent dump.

A waste rock dump is situated below the 6400' portal. Tracks lead onto the crest of the dump; this waste rock was end dumped down the mountain slope. The

waste rock is oxidized in patches to a red colour. The dump contains very few observable sulphides. No salts were present. A wooden structure, possibly a trestle, is collapsed on the dump.

A dilapidated wooden shed as well as lots of wooden and metal debris, is also on site.

The miner's camp is situated at about 5,100 feet and consists of three or so collapsed buildings that were likely bunkhouses.

Above the camp, a collapsed portal was noted. This was possibly the 5400' level portal.

2. Lower mill camp

The access road to the mill is to the east of the upper camp access road. There are snowmobile/ski club cabins on this road.

The tailings are located at the foot of the mountain, southeast of the mine. The tailings were deposited in 2 impoundments.

The northern tailings impoundment is about 100 m by 20 m by 0.1 m. The periphery of the tailings is vegetated with immature trees and red lichen. No seeps, signs of oxidation or salts were observed.

The approximate distribution of the lower tailings is 70 m by 15 m by 0.5 m. An unnamed creek runs along the eastern edge. In the main area of the tailings, vegetation is scarce although the peripheral areas are heavily vegetated with grasses and immature trees. The tailings are dammed by a collapsing wooden picket fence. The tailings are silt size with no distinguishable minerals. The oxidation colour is red-brown, present on the surface and in the subsurface to an approximate depth of 40 cm. The saturation of the tailings increased with depth although no observable seeps were present.

The wooden mill buildings, including the fine and coarse grain ore bins and load out station, are standing, although the buildings are generally in a state of disrepair. No equipment remains on site. A small pile of ore is present. Remains of Zn-concentrate are in the mill. Wooden debris litters the site.

Mine Drainage:

The drainage from the 6400' adit flowed from the adit and infiltrated the ground. The receiving water body is the Rhine Creek, a tributary of Tahtsa Reach.

Observations & Analytical Results:

1. 6400' adit

The flow from the 6400' adit was approximately 5 L/min, the field pH = 5.0 and conductivity = 150 μ S.



Photo 11. Emerald Glacier tailings. The workings are located on Mount Sweeney, located in the background.

No precipitates, salts or vegetation were present. The water was odourless.

Geochemical results from the drainage sampling are: pH=6.73, [SO₄]=30 ppm and hardness=88 ppm. The acid generating and buffering capacity of this system appear to be low.

The only metal in excess of the BC water quality guidelines for aquatic life is Zn (primarily dissolved).

- Zn is 3 orders of magnitude higher than the water quality guidelines. The Zn species in the drainage are dissolved. (diss=4.19 ppm, tot=4.22 ppm, WQ guideline=0.033).
- Fe and Pb concentrations are both approaching the water quality guideline threshold concentrations.

The concentration of these metals may fluctuate seasonally. Both metal species are colloidal/particulate.

See Appendix B for the geochemical data set.

Additional Comments:

The site is small and remote.

References: See MINFILE

Geological Survey of Canada, Memoir 299, p 84-87.

MARMOT (Montana)

Property Name: MARMOT [MONTANA (L.4974)]
Map number (*see Appendix C*): 8
Mine drainage sample numbers: LB00-0801, 0803, 0804
MINFILE number: 103P 129

Date: August 19, 2000

Persons present: Bruce Graff (Mining Division, Smithers) and L. Barazzuol (Mining Division, Victoria).

Weather: overcast and raining

Regional Office: Smithers
NTS map sheet: 103P13W

Location: at approximately 5,000 feet on the north side of the Marmot River, 9 kilometres east of the Portland Canal and 11 kilometres southeast of Stewart.

Access: Helicopter only.

UTM coordinates: n/a

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

Commodities: Silver, Zinc, Lead, Gold, Copper

Years mined (open/closed): 1913, 1915, 1930

Mine Workings Inspected:

There are 3 portals documented on the Marmot property. Only 2 were located.

Portal 2 is the middle portal and was observed aerially. No drainage or oxidation was observed from the air.

Portal 1, located adjacent to the camp, is open and accessible. The portal is timbered. The water flowing from the adit was sampled. Water was dripping from the roof of the adit. Iron pipes were running along the

ground and the ceiling of the adit. Scrap pipes and PVC tubing lay in the mouth of the adit. A rusted compressor is located outside the adit.

No waste rock dump observed on site.

The camp, comprising 4 bunkhouses, is still standing and habitable. Gear and furniture are inside the buildings.

Mine Drainage:

The drainage flowing from portal 1 infiltrated the talus.

Observations & Analytical Results:

The drainage flowing from portal 1 was draining at about 20L/min. The field pH = 5.0 and conductivity = 60 μ S/cm. The water had no odour. Grasses were growing alongside the drainage

The geochemical water results are: pH=7.2, [SO₄]=16 ppm and H=44 ppm.

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

See Appendix B for the geochemical data set.

Additional Comments:

This site is low risk in terms of environmental liabilities.

References: *See* MINFILE

Geological Survey of Canada, Memoir 159, p. 66-67.



Photo 12. Marmot exploration camp.

PORTER IDAHO

Property name: PORTER-IDAHO

Map number (*see Appendix C*): 9

Mine drainage sample numbers: LB00-0901, 0903, 0904

MINFILE number: 103P 089

Date: August 19, 2000

Persons present: Bruce Graff (Mining Division, Smithers) and L. Barazzuol (Mining Division, Victoria)

Weather: rainy, windy and at some points foggy. Some snow on ground.

Regional Office: Smithers

NTS map sheet: 103P13W

Location: the south slope of Mount Rainey, 5.5 kilometres southeast of Stewart at about 4,200 to 6,000 feet.

Access: by helicopter

UTM coordinates: n/a

Type of deposit: Polymetallic veins Ag-Pb-Zn±Au; Subaqueous hot spring Ag-Au

Commodities: Silver, Lead, Zinc, Gold, Copper

Years mined (open/closed): intermittently, 1922-50; 1981 (22 tonnes - exploration?)

Mine Workings Inspected:

The site was inspected aerially with the exception of the 4700' portal waste rock dump. Poor visibility

forced us to land at the 4700' portal, prompting the inspection.

1. Ground Inspection

The 4700' portal is open and accessible. Rail tracks are coming from the timbered portal. The drainage flowing from the adit was sampled. Garbage was lying in the portal. Adjacent to the portal are numerous collapsed wooden buildings, barrels and rusting metal pipes.

Tracks run out of the adit to a waste rock dump. The dump cascades down the hillside for about 500 m below the adit. The waste rock dump is slightly oxidized. Some vegetation is growing on the dump. Minor galena is hosted in quartz and andesite.

2. Aerial Inspection

The 4250' portal was located - no water flow.

5400' portal backfilled - no observable water drainage.

Drainage was flowing from an undetermined portal - flow ca. 40-50 L/min. The portal is situated under debris.

The mill buildings on site are in a state of decay.

Numerous wooden buildings and structures are collapsing or have collapsed. Wooden debris, garbage, scrap steel, pipes and barrels are strewn over the site. The remains of a concrete foundation, water tank and



Photo 13. Porter-Idaho portal (unknown level). The drainage flowing from the adit was sampled.

stone building are also present. The tram towers are still standing.

Mine Drainage:

The water flowed from the adit to the SE, and then to the NE around the periphery of the waste rock pile. The mine is within the Kate Ryan Creek watershed, which flows into the Marmot River. The confluence of the Kate Ryan Creek and Marmot River is proximal to the Portland Canal.

Observations & Analytical Results:

The drainage from the 4700' portal flowed at an approximate rate of 40 L/min. The water temperature was approximately 4 C, pH = 5.0 and conductivity = 90 μ S. No salts were present, only iron precipitate.

This absence of salts may be attributable to the recent rainfall. The drainage was odourless. Water was sampled inside the portal.

Water quality results for the 4700' portal are as follows: pH=7.3, [SO₄]=15 ppm and hardness=63 ppm. Zn is the only metal in excess of the BC water quality guidelines.

- Zn is of the same order of magnitude as the water quality guidelines. The Zn in the drainage is dissolved.

See Appendix B for the geochemical data set.

References: See MINFILE

Geological Survey of Canada, Memoir 175, p. 138-141.

DUNWELL

Property name: DUNWELL

Map number (see Appendix C): 10

Mine drainage sample numbers: LB00-1002 to 1004

MINFILE number: 103P 052

Date: August 19, 2000

Persons present: Bruce Graff (Mining Division, Smithers) and L. Barazzuol (Mining Division, Victoria)

Weather: overcast, raining lightly

Regional Office: Smithers

NTS map sheet: 103P13W

Location: 7.5 kilometres northeast of Stewart on the north side of Glacier Creek, a tributary of Bear River.

Access: by helicopter

UTM coordinates: n/a

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

Commodities: Zinc, Gold, Silver, Lead

Years mined (open/closed): 1926-37

Mine Workings Inspected:

Only the 1200' portal and associated waste rock dump was inspected. The mill site was not located but was reported to exist.

The 1200' portal is open and accessible. A strong breeze was blowing from the timbered adit. Rail tracks are intact in the adit. The turbid, red drainage flowing from the adit was sampled.

The waste rock dump is an amalgamation of 3 dumps deposited in an arcuate shape on a hill slope. The dump was approximately 15m high and 40 m long. Sparse disseminated pyrite and galena is hosted in quartz and argillite. The dump is heavily oxidized. Water was seeping from the toe of the southern part of the dump, near to where the 1200' portal drainage was flowing over the dump. The dump wasn't saturated enough to fill a test pit. Rusted tanks, pipes, rubber hoses, wood and other debris are scattered about and embedded in the dump.

Mine Drainage:

Water flowed from the adit, southeast along a road and down the southern end of the waste rock dump. From the foot of the waste rock dump, the water flowed overland into a marsh. Ephemeral flow paths near the portal indicated the flow of drainage was higher earlier in the season. The receiving water body is Dunwell Creek, which merges with Glacier Creek. Downstream of the property, red drainage flowing through the forest was observed from the air.

Observations & Analytical Results:

The drainage from the 1200' portal was turbid from the heavy iron precipitation. Sedimentation of the precipitates was up to 10 cm in places. The flow from the adit was about 20 L/min. Zinc precipitates were



Photo 14. Dunwell 1200' portal. The drainage was sampled.

also present but were less prolific than the iron precipitates. The water was sampled at the foot of the waste rock dump. The pH = 5.0 and conductivity = 380 μ S. The water was organic smelling. No vegetation was present proximal to the adit. At the foot of the waste rock dump shrubs and lichen were present.

The water quality results are as follows: pH=6.9, [SO₄]=118 ppm and hardness =154 ppm. The drainage is neutral and the acid generating and buffering capacities of the system are low. Metals with reliable data, in excess of the BC water quality guidelines include Cd and Mn.

- Cd is dissolved in the drainage and is 3 orders of magnitude higher than the water quality guidelines.
- Mn is dissolved in the drainage and is of the same magnitude as the water quality guidelines.

Duplicates of the dissolved metal content were not consistent for all metals. Metals with inconsistencies in data that are above the BC water quality guidelines include Al, Cu, Fe, and Zn. The data are not reliable enough to make conclusions.

See Appendix B for the geochemical data set.

Additional Comments:

Receiving water body is the Bear River, which flows through the town of Stewart.

References: See MINFILE