NI43-101 Technical Report on the
Mount Washington Property
Vancouver Island, British Columbia

NTS 092F/11 & 092F/14
BCGS 092F074 & 092F075
Latitude 49° 45’ 39” Longitude 125° 15’ 23”
UTM NAD83 Zone 10N 337500E 5514500N

For
North Bay Resources Inc.
PO Box 162
Skippack, PA, USA 19474

By
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August 2, 2013
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Summary

The Mount Washington Property ("Property") is an advanced gold-silver-copper-molybdenum exploration property located on east-central Vancouver Island, British Columbia, Canada. The Property consists of 27 cell mineral claims covering 2,796 hectares held 100% by North Bay Resources Inc. ("North Bay"). The geology underlying the Property consists of Triassic Karmutsen mafic volcanics, Cretaceous Nanaimo Group sediments, and Eocene Mt. Washington Intrusive Suite quartz diorite and quartz feldspar porphyry dikes and sills, pyroclastic dacitic flows and breccias. The Property and adjacent properties host at least two known styles of metallic mineralization as follows:

- Gold-silver-copper bearing, shallowly-dipping quartz-sulphide veins such as the Lakeview-Domineer-Mt. Washington Copper zones (BC MINFILE’s 092F116, -117), interpreted as Eocene in age
- Copper-gold-silver-molybdenum bearing, steeply dipping silicified breccias such as the Washington, Murray, Quarry, Glacier, Oyster (MINFILE 092F365) and Murex (MINFILE 092F206) breccias, also interpreted as Eocene in age

The Lakeview-Domineer and Mt. Washington Copper zones have been partially mined in two open pits, and have been explored by extensive surface diamond drilling, trenching, bulk sampling and two underground adits mainly from 1940 to 1992 by different companies. From 1964 to 1967, 381,773 tonnes were mined by the Mt. Washington Copper Co. Ltd., yielding 131 kg. gold, 7,235 kg. silver and 3,548 t. copper, grading 0.34 g/t gold, 19 g/t silver and 0.93% copper. Historical and non-NI43-101 compliant mineral resource estimates are as follows:

- Lakeview-Domineer Zone – 550,298 tonnes @ 6.75 g/t gold, 32.23 g/t silver and 0.57% copper (Better Resources Ltd., 1989) located partially on Property
- Mt. Washington Pit Area – 305,720 tonnes @ 1.07% copper, and undocumented gold and silver contents (W.G. Stevenson, 1970) not located on Property
- Mt. Washington Tailings – 325,400 tonnes @ 0.124 g/t gold, 5.83 g/t silver, 0.102% copper, 8.54 g/t tellurium (J. Houle, 2011) located on Property

The area covering the Lakeview-Domineer Zone and the Mt. Washington Open Pits are covered by several mineral tenures with varied ownership, including four contiguous crown grant mineral claims which hold gold and silver rights and partially underlie three of North Bay’s
mineral tenures. North Bay holds mineral tenures over a portion of the Lakeview-Domineer Zone, including the 2009 bulk sample site and the adit portal. The area of previous open pit mining by the Mt. Washington Copper Co. Ltd. (“MWC”) has been identified as a source of acid rock drainage and elevated copper levels in at least one local watershed, but the recent reclamation project completed in 2012 by the provincial government appears to be effective in mitigating the problem. North Bay does not hold mineral tenures over, or any environmental liability for the immediate area of the open pits. The sites of exploration trenches, bulk sample sites and the underground adit portal excavated by previous operators are all fully reclaimed. The former MWC mill site and tailings dam are located on mineral tenures held by North Bay, and have not been reclaimed, but North Bay does not hold any environmental liability for them. The Murex Breccia Area target, the largest and most prospective located entirely on the Property, underlies the area of former mill site and tailings dam. The Mount Washington Alpine Resort lies immediately southwest of the Property, and Strathcona Provincial Park and adjacent no staking reserves are located approximately one kilometre southwest of the Property.

The Mount Washington Property is worthy of further exploration, building on past successful work, new mineral exploration and processing technology, and excellent local infrastructure. The potential exists both on and near the property to establish economically viable mineral resources of gold, silver, copper, molybdenum and/or tellurium that could be permitted, mined and processed. An initial $1 million program is designed to target primarily bulk mineable mineral resources at the Murex Breccia, other known occurrences, and new discoveries, while establishing environmental and socio-economic programs necessary for long term success.

Introduction

The Technical Report on the Mount Washington Property (“Report”) has been prepared for North Bay Resources Inc. by the author, at the request of Mr. Perry Leopold, President of North Bay. The Report is to be used to provide technical guidance to North Bay, to help market the Property, and to document assessment work for mineral tenure maintenance. Data used to complete the Report came from public sources, primarily BC government websites, private reports and maps used by the author in previous reports, and the author’s own experience on the Property (see References). The author visited the Property several times between 2000 and 2013, including a four day period during June 2013. From June 24th to June 27th, 2013 the author completed a preliminary field work program on the Property for North Bay, including select outcrop grab sampling with highlights achieved at the following locations:
• Oyster Breccia Area – 3 samples taken from three separate known mineralized sites documented in ARIS report 17193 yielded up to 1.39 g/t gold
• Wolf Lake Area – 2 samples taken from three separate known mineralized sites documented in ARIS reports 27430 and 28405 yielded up to 16.4 g/t gold and 1.18% copper in 2 different samples
• Murex Creek Area – 1 sample taken near a known mineralized site in ARIS 16412
• Murex Breccia Area – 4 samples taken from four separate known mineralized sites documented in ARIS report 18391 and 7 select outcrop grab samples taken from areas of recently exposed or previously undocumented mineralized sites yielded up to 3.55 g/t gold, 0.749% copper and 0.026% molybdenum in 2 different samples

Reliance on Other Experts

Technical information in this report was derived from private company files, government publications and published reports. Original source data has been used where available. Reasonable care and diligence has been taken by the author to verify all historical information. The author has seen no reason to doubt the validity and accuracy of this source data and historical information, most of which was generated and signed by qualified, professional persons at the times the work was done, prior to the implementation of NI 43-101. The author is not a Qualified Person in some of the more technical aspects of environmental, metallurgical, mill processing and land tenure issues, which may be of potential significance at the Mount Washington Property. The author has relied in part on the expertise of professional persons who worked on these issues in the past on the Property. No reasons have been seen by the author to doubt the validity of this data.

Property Description and Location

The Mount Washington Property is centred approximately 25 kilometres due west of the city of Courtenay, B.C. in east-central Vancouver Island at latitude 49° 46’ N. and longitude 125° 15’ W, as shown in Figure 1a. The Property covers approximately 2796 hectares, as shown in several of the accompanying figures, but best shown in Figure 2a. It is comprised of 27 cell mineral claims held 100% by North Bay as shown in Table 1, including partial overlap of portions of four crown granted mineral claims Domineer 1, 3, 4 and 6 which hold gold and silver rights only. The cell mineral claims are located on NTS maps sheets 092F/11 or 092F/14 in the Nanaimo Mining Division. The crown granted mineral claims held by Clibetre Explorations Ltd. pre-date and have precedence over mineral rights held through all overlapping cell mineral tenures.
### Table 1 – Mount Washington Property Mineral Tenures as of August 2, 2013

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</table>

**Totals 27 Mineral Claims 2796.356**

Surface rights in the area of the Mount Washington Property are held primarily by TimberWest, a large forestry company. TimberWest also has made surface tenure arrangements with the Mount Washington Alpine Resort (MWAR) for portions covering some of the resorts’ buildings and transport infrastructure, located just along the southwestern portions of the Property. The perimeters of the surface rights blocks that may in part overlap the mineral claims of the Property appear in Figures 1a and 2a, and are listed in Table 2. Verification of disposition of rights between TimberWest, Mount Washington Alpine Report, and possibly others has not been completed by the author. For the purpose of this report, surface rights in the area of the Property are held by one or the other. TimberWest holds timber rights to all or most of the area, and has agreements in place with various logging contractors to harvest timber and build and maintain logging roads. The BC government built and maintains Strathcona Parkway.
Table 2 – Surface Rights Tenures and Owners

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<th>Block No.</th>
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Legal access to the mineral claims of the Property by the tenure holder and its agents is provided through the BC Mineral Tenure Act and by providing Section 19 Notices to the overlapping surface rights tenure holders at least eight days prior to access. In addition, North Bay has entered into an agreement with TimberWest dated July 8, 2013 for access over land owned by TimberWest during a specified time period in 2013 (see Appendix 2).

Maintenance of the mineral tenures of the Property by the tenure holder is also provided through the BC Mineral Tenure Act, by completing and filing statements of costs for assessment work completed on the contiguous mineral tenures within the previous 12 month period but prior to the good to dates of those tenures, and by submitted appropriate reports to support and document the assessment work. All mineral tenure selection, assessment work filing and assessment report submitting is done online through the BC Mineral Titles Online system.
No permits are required by the mineral tenure holder and its agents for non-mechanized exploration activities on the mineral tenures, such as geochemical, geophysical and geological surveys. Mechanized exploration activities including drilling, access trail construction or modification, and bulk sampling require the tenure holder or its agent to apply for and obtain a valid mineral exploration and reclamation permit issued by the BC Inspector of Mines in advance of undertaking those activities. Permits are acquired through the online Front Counter BC Natural Resource Application system, and typically require 90 to 180 days to process and issue. Reclamation securities are required to post by the applicant in advance of programs which may impact the environment. Permits are normally issued for 5 years, and require annual notices of exploration activity to be completed and submitted by the tenure holder or its agent to the Inspector of Mines in order to maintain the permit in good standing.

Similar to many other places in British Columbia, Canada and world-wide, the ability to perform work on an exploration property like Mount Washington may be affected by other factors and risks. These can include opposition by local individuals, First Nations, and/or Non-Government Organizations; intervention by local, regional, provincial or federal governments; or weather, earthquakes, and other natural disasters.

**Accessibility, Climate, Local Resources, Infrastructure and Physiography**

The Mount Washington Property is situated along the eastern side of the insular mountains of Vancouver Island with elevations ranging from 550 metres in the east to 1,590 metres at the top of Mt. Washington. Topography ranges from steep mountains to poorly drained swamps, but is mostly covered by northeast draining creek valleys. Most of the Property is covered by second growth mixed forest including active logging areas, except the areas above 1,100 metres which are mostly primary coniferous forest including minor sub-alpine areas above 1,400 metres. The climate is warm and dry in the summer and cool and wet in the winter, with snow accumulations of up to 5 metres above 1,000 metres elevation from November to June. This allows a snow-free field season of approximately 4 months from July to October for any field work, although site specific or underground work could continue throughout the year. Forest fire hazard due to severely dry conditions typically in August, may cause field work to be suspended.

Access to the Mount Washington Property from the full service communities of Comox and Courtenay is via 4-lane Highway 19 north from the Comox Valley Parkway for 12 kilometres to
the paved 2-lane Strathcona Parkway, and west for 10 kilometres to the beginning of the Tsolum Main, Branch 62 and Branch 101 logging roads, which provide access to the eastern part of the Property. The Strathcona Parkway proceeds west for a further 5 kilometres to the Mt. Washington Alpine Resort, where lodging and basic supplies are readily available year-round. Just south of the resort, Nordic Drive branches west from the Parkway and continues northwest as Piggott Main logging road, which along with Branch 126 provides access to the western part of the Property. Comox has both an international airport and a small hospital. Campbell River, 25 kilometres north of Mt. Washington, is the mining service hub for the Myra Falls Operation and the Quinsam Coal Mine. Nanaimo, 100 kilometres southeast of Mt. Washington, is a regional government centre. Travel time from either Comox or Campbell River to the property is 45 minutes, and from Nanaimo is 1 hour and 15 minutes. See Figure 1b and 2b for infrastructure details, and Figures 3a to 3e for access details to various parts of the Property.

The nearby Mt. Washington Alpine Resort and condominium complex is connected to the provincial hydroelectric grid, but the transmission infrastructure may not have sufficient capacity to supply a mining operation, particularly a large one, without expansion of its capacity or other upgrades. The Mount Washington Property has only small lakes in its western part, including McKay Lake and Pyrrhotite Lake. The eastern side of the Property is adjacent to Wolf Lake, and has adequate water supply and suitable sites for processing plants, and waste and tailings disposal, if required.

History

The following history is summarized primarily from publicly available government sources including BC Minister of Mines, Assessment and MINFILE Summary Reports listed in Appendix 3. Panning for gold on the Oyster River, which drains an area including the western slopes of Mt. Washington, was a common occupation during the depression. Some individuals panned four dollars’ worth of gold per day (D.J.T. Carson, 1960). This work, presumably from the 1920’s, is the earliest documentation of any metallic mineral exploration in the area. M.E. Hurst of the G.S.C. identified and documented occurrences arsenic in the Wolf Lake area east of Mt. Washington (M.E. Hurst, 1227). H.C. Gunning of the G.S.C. identified and documented occurrences of gold, silver and copper in the Forbidden Plateau area, southwest of Mt. Washington (H.C. Gunning, 1930).

In 1940 J.M. MacKay discovered and staked several gold-silver-copper veins on the Central and West arms of Mt. Washington, including the No.1, No.2 and No.3 Veins on the Domineer
An access trail, trenching, channel sampling, bulk sampling and metallurgical testing were completed in 1941. The most significant results were obtained from channel sampling of the 20° west-dipping No.1 (Main) Vein by geologist D.F. Kidd as follows:

- 13.8 g/t gold
- 232 g/t silver
- 0.945 m. average thickness
- 27.4 m. strike length

The metallurgical testing consisted of flotation and cyanidation of a 12 kg. composite sample of assay rejects from the Domineer mining claim group was completed by the Canadian Bureau of Mines, including six polished thin sections, at the request of D.F. Kidd. The sample head grade assayed as follows:

- 8.23 g/t gold
- 216 g/t silver
- 5.48 % arsenic
- 1.74 % copper
- 15.33 % iron
- 13.88 % sulphur
- 0.45 % zinc
- 0.76 % lead

Mineralogical work identified pyrite, arsenopyrite, chalcopyrite, tetrahedrite and covellite in order of decreasing abundance in the sample. No native gold or silver were seen. Metallurgical test work suggested that the material was refractory, and that the gold was not amenable to gravity, cyanidation or bulk flotation. Five different tests were conducted, all showing high reagent consumptions and tailings assays, and poor metal recoveries, in part due to the oxidized nature of the sample. Results indicate that a method of selective flotation offered the best possibilities for treating the Domineer ore.
In 1944, the Domineer mining claim group was acquired by the Consolidated Mining and Smelting Co. of Canada Ltd. (Cominco), who completed geological mapping and additional trenching and sampling, along with several short adits during the period 1944-45. Cominco first identified and documented the presence of intrusive breccias on the west arm of Mt. Washington, and discovered the No.4, No.5, No.6 and No.7 Veins on the Domineer Group. Cominco located and sampled the No.8 Vein, which Kidd mapped as a possible northwest extension of the No.1 Vein, on the adjacent President Group to the west. They also recorded and assayed for base metals when present. Channel sampling results from six discontinuous trenched exposures on the 50° east-dipping No.2 Vein yielded the highest gold grades of any veins sampled to date, as follows:

- 39.1 g/t gold
- 93.7 g/t silver
- 0.107 m. average thickness
- 122 m. strike length

In 1949, G.C. Murray staked the Murex Claim Group, located approximately 3 km. east of Mt. Washington, to cover north-south quartz stringers containing chalcopyrite, pyrite, pyrrhotite, and minor arsenopyrite and sphalerite exposed in outcrop along the bed of Murex Creek.

In 1951, the Domineer Group was acquired by Noranda Mines Ltd. (Noranda), who completed 13 exploration diamond drill holes in that year. The most significant intercepts were as follows:

- DDH No.2 yielded 41.7 m. @ 0.194% copper, including:
  - 0.27 m. @ 7.2 g/t gold, 20.6 g/t silver, 0.10% copper and 6.4% zinc
- DDH No.4 yielded 1.5 m. @ 6.21% copper, 68.6 g/t silver (gold not recorded)
- DDH No.7 yielded 1.5 m. @ 4.11% copper, 34.3 g/t silver (gold not recorded)

In 1956, the Mt. Washington Copper Co. Ltd. (Mt. Washington Copper) was formed by G.C. Murray, and an access road was completed to the West Arm of Mt. Washington, along with
trenching in the Murex area. Also in 1956, A.C. Skerl, P.Eng. completed geological mapping in the Murex area, and identified an E-W striking fault breccia zone up to 6.1 m. thick containing lenses, seams and disseminations of pyrrhotite, chalcopyrite and pyrite hosted in mafic volcanics and tuffs. Five packsack exploration diamond drill holes were completed on a single section, for which no assays are recorded, but with mineralogical descriptions of massive sulphide intercepts as follows:

- Hole No.1 recovered 3.14 m. averaging 52% chalcopyrite, 34% pyrrhotite, 13% pyrite over an intercept length of 4.57 m. from 0 m. to 4.57 m. at a 75° core angle
- Hole No.5 recovered 1.83 m. containing 30% chalcopyrite, 50% pyrrhotite over an intercept length of 2.13 m. from 2.13 m. to 4.26 m. at a 45° core angle

In 1957, Noranda and Mt. Washington Copper began to jointly explore the Mt. Washington Property (Domineer and Murex areas). They completed an access road, 4 diamond drill holes, trenching, geological mapping, a self-potential survey, and soil sampling in the Murex area. No logs are available for the diamond drill holes, but a drilling summary table shows the following averaged intercepts (only copper reported):

- Hole 57-1 yielded 22.9 m. @ 0.24% copper
- Hole 57-2 yielded 18.9 m. @ 0.41% copper
- Hole 57-3 yielded 25.6 m. @ 0.63% copper
- Hole 57-4 yielded 50.3 m. @ 0.36% copper

In 1958, Noranda resumed drilling in the area of the West Arm of Mt. Washington, and completed an electromagnetic survey, mechanized stripping, and 10 diamond drill holes in two clusters 40 metres apart starting 50 metres north of the Domineer No.1 Vein. No drill logs are available for these holes, but the drill hole collar locations and traces are plotted on old map copies. As a result of the work completed in 1958, a near-surface flat-lying vein or zone containing several veins was indicated. Its thickness varied from 2 to 4.5 metres and its grade averaged about 2% copper. It outcropped at surface in several places and occurred over an area of about 75 by 200 metres (Carson, 1960).
In 1960-61, Noranda again resumed drilling, and completed 57 vertical definition diamond drill holes at nominal 50’ spacing in the West Arm area, plus 2 exploration diamond drill holes in the Murex area. The most significant intercepts from the West Arm area were as follows:

- DDH 60-9 yielded 13.0 m. @ 0.66% copper, including:
  - 1.5 m. @ 3.3% copper, 0.86 g/t gold, 55 g/t silver

- DDH P.S. 60-8 yielded 3.0 m. @ 0.72% copper, ending in mineralization

- DDH P.S. 60-9 yielded 3.1 m. @ 0.75% copper, including:
  - 1.6 m. @ 1.2% copper (gold silver not recorded) ending in mineralization

- DDH 61-MW-1 yielded 3.0 m. @ 1.6% copper, 0.17 g/t gold, 6.9 g/t silver

- DDH 61-MW-2 yielded 1.9 m. @ 2.4% copper, 1.7 g/t gold, 27 g/t silver

- DDH 61-MW-6 yielded 3.3 m. @ 1.8% copper, 0.17 g/t gold, 34 g/t silver

- DDH 61-MW-7 yielded 4.6 m. @ 1.0% copper, 0.34 g/t gold, 45 g/t silver

- DDH 61-MW-9 yielded 2.4 m. @ 1.7% copper, 0.17 g/t gold, 38 g/t silver

- DDH 61-MW-10 yielded 6.9 m. @ 1.0% copper, trace gold, 63 g/t silver, incl.:
  - 1.2 m. @ 2.8% copper

- DDH 61-MW-16 yielded 1.5 m. @ 2.9% copper

- DDH 61-MW-18 yielded 4.6 m. @ 2.1% copper, 0.34 g/t gold, 38 g/t silver

- DDH 61-MW-27 yielded 1.4 m. @ 2.9% copper, 0.17 g/t gold, 10 g/t silver

- DDH 61-MW-28 yielded 2.2 m. @ 1.9% copper, 0.17 g/t gold, 27 g/t silver

- DDH 61-MW-30 yielded 1.8 m. @ 2.9% copper, 1.0 g/t gold, 48 g/t silver

- DDH 61-MW-31 yielded 2.9 m. @ 1.7% copper, 0.17 g/t gold, 17 g/t silver

- DDH 61-MW-35 yielded 2.3 m. @ 1.4% copper, 0.17 g/t gold, 21 g/t silver

- DDH 61-MW-37 yielded 1.4 m. @ 3.5% copper, 3.8 g/t gold, 161 g/t silver

- DDH 61-MW-39 yielded 1.7 m. @ 1.8% copper, 4.1 g/t gold, 26 g/t silver
In the Murex area, one of 2 diamond drill holes (DDH 61-M1) collared 120 metres apart oriented due north at -50° intersected mafic volcanics containing multiple zones of quartz-calcite fracture controlled and locally disseminated pyrite, pyrrhotite and chalcopyrite, with intercepts achieved as follows:

- 2.7 m. @ 0.14% copper from 23.2 m. to 25.9 m., and
- 1.4 m. @ 0.17% copper from 48.7 m. to 50.1 m., and
- 1.2 m. @ 0.50% copper from 68.1 m. to 69.3 m., and
- 1.8 m. @ 0.15% copper from 75.9 m. to 77.7 m.

No records exist of any assays other than for copper from the Murex holes. Also of note, in 1960 D.J.T. Carson completed and published his M.Sc. thesis at the University of British Columbia, which was titled “Geology of Mount Washington Vancouver Island British Columbia”. Carson’s thesis documented in detail the geological setting and mineralization in the Mt. Washington area, including many of the various breccias.

In 1961, Mt. Washington Copper and Noranda formed a new company, Qualicum Mines Limited, to develop the Mt. Washington Property, and engaged consulting engineers Hill, Starck & Associates Ltd. to undertake the mining geology and engineering. An agreement was reached with the Esquimalt and Nanaimo Railway Company Limited, owners of the base metals on the Mt. Washington Property, to mine and process ore. Development of the Mt. Washington Copper Mine was commenced, including installation of an all-season camp west of McKay Lake, and driving an exploration adit, which was completed in early 1962. The 2 m. x 2.5 m. adit was driven in a northerly direction along the strike of the mineralized zone for a distance of about 210 m, at an average elevation of 1315 m., and at an average gradient of +1.4%. The mineralization exposed in the ribs of the adit was mapped, and chip or channel sampled at 5’ (1.52 m.) intervals, and assayed for copper, gold and silver. The initial (southern) portion of the adit yielded the following values:

160 m. length
2.07 m. average vertical thickness
2.03% copper
0.855 g/t gold
35.7 g/t silver

The thicknesses and grades confirmed the definition drilling results, and established the continuity of copper mineralization in the flat-lying vein structure through the southernmost of the two zones. The adit was stopped short of and not extended into the northernmost zone, and the northernmost 50 m. of the adit yielded much lower values of copper, silver and gold where chip or channel sampled. The southernmost zone was initially referred to as the Tunnel Block or the No.1 Zone, and the northernmost zone as the Noranda Block or the No.2 Zone. These were subsequently developed into the South Pit and North Pit, respectively. Pre-production mining commenced in the No. 1 Zone (South Pit), from which 4,000 tonnes of low grade ore was mined, trucked to Comox and shipped to the Britannia concentrator, plus 800 tonnes of higher grade ore was mined, trucked and shipped to the Tacoma smelter. Recovery information from the ore shipments is not available.

In 1962, an additional 31 diamond drill holes and 35 percussion drill test holes, along with stripping and trenching were completed on the No.2 Zone (North Pit) by Hill, Starck & Associates. Total indicated ore reserves were estimated at 553,400 tonnes @ 1.40% copper, 0.51 g/t gold and 41 g/t silver, consisting of 217,700 tonnes @ 1.43% copper in the No.2 Zone (North Pit) and 335,700 tonnes @ 1.39% copper in the No.1 Zone (South Pit). Open pit ratios of ore to waste were estimated at 1:1 to 1:4. Inferred ore located between the two zones was estimated at 132,500 tonnes @ 0.65% copper. The mineral resource estimates reported at this time are not to current industry standards.

In 1963-64, Mt. Washington Copper reached an agreement to complete development and construction of the Mt. Washington Mine with Consolidated Woodgreen Mines Limited, subsequently renamed Cumberland Mining Ltd. The companies formed a subsidiary company, Mount Washington Milling Co. Ltd., to operate the Mt. Washington Mine and Mill. Woodgreen/Cumberland’s 800-1000 ton per day flotation mill from the Motherlode Property near Greenwood, B.C., was dismantled, moved and erected 3.1 km. east of and 550 m. lower than the Mt. Washington mine site (7.2 km. by road). A tailings dam was constructed 2.3 km. east of and 180 m. below the mill site (2.4 km. by pipeline). Contract mining and trucking was undertaken by Tymac Construction Company. By late 1964, 82,500 tonnes of ore had been mined and stockpiled at the mill site, and 122,000 tonnes of waste had been moved. Furukawa
Mining Co. provided advance funding for startup of the mine and mill in exchange for the sale of the entire output of copper concentrate. The Mt. Washington mine was officially opened on December 5, 1964. It is significant to note that the mill was a single stage crushing, grinding and flotation plant with a design throughput of 750 TPD based on year round milling, and on seasonal mining from the open pit mine during the summer and fall.

In 1963, Cominco optioned the portion of the Mt. Washington Property below 4000’ elevation (1219 m.), and in 1963-64 completed geological mapping, ground magnetics, and 22 diamond drill holes. Cominco’s focused its exploration efforts on the bulk ore potential of the various breccias identified across the property, but only split and sampled selected portions of the core, analyzed samples routinely for copper only, and subsequently dropped the option on the property in early 1965. The following significant drill intercepts were achieved and reported by Cominco, and are listed by target area:

In 10 drill holes testing the Murex Breccia:

- Hole No. C-1 yielded:
  - 56.1 m. @ 0.25% copper from 0 to 56.1 m., and,
  - 11.4 m. @ 0.19% copper from 114.5 m. to 125.9 m.

- Hole No. C-2 yielded:
  - 37.3 m. @ 0.25% copper from 33.5 m. to 70.8 m.

- Hole No. C-14 yielded:
  - 75.7 m. @ 0.28% copper from 12.2 m. to 87.9 m.

- Hole No. C-16 yielded:
  - 5.6 m. @ 0.56% copper from 11.1 m. to 16.7 and
  - 36.6 m. @ 0.29% copper from 34.7 m. to 71.3 m.

- Hole No. C-18 yielded:
  - 19.5 m. @ 0.28% copper from 48.9 m. to 68.4 m.

- Hole No. C-19 yielded:
  - 26.8 m. @ 0.29% copper from 22.6 m. to 49.4 m., and
o 7.5 m. @ 0.39% copper from 64.0 m. to 71.5 m., and
o 8.8 m. @ 0.26% copper from 141.6 m. to 150.4 m., and
o 1.8 m. @ 4.8% copper from 195.8 m. to 197.6 m.

In 7 drill holes testing the Washington Breccia beneath, or on trend with the open pits:

• Hole No. C-5 yielded:
  o 6.4 m. @ 0.92% copper from 17.4 m. to 23.8 m., and
  o 0.8 m. @ 0.88% copper from 40.5 m. to 41.3 m.

• Hole No. C-6 yielded:
  o 2.4 m. @ 0.80% copper from 15.2 m. to 17.6 m.

• Hole No. C-7 yielded:
  o 4.1 m. @ 1.51% copper from 7.8 m. to 11.9 m., and
  o 11.9 m. @ 0.34% copper from 103.6 m. to 115.5 m.

• Hole No. C-9 yielded:
  o 26.5 m. @ 0.40% copper from 3.4 m. to 29.9 m.

• Hole No. C-10 yielded:
  o 1.8 m. @ 1.1% copper from 35.1 m. to 36.9 m., and
  o 7.3 m. @ 0.43% copper from 149.1 m. to 156.4 m.

In 2 drill holes testing the Murray Breccia southwest of the open pits:

• Hole C-15 yielded:
  o 31.7 m. @ 0.27% copper, 0.26 g/t gold & 6.7 g/t silver (61.0m.-92.7m.)
In 3 drill holes testing outcropping mineralization discovered during road construction northeast of the open pits, no significant drill intercepts were achieved.

In 1965, the Mount Washington Milling Co. mined 219,700 tonnes of ore, milled 170,100 tonnes of ore, stockpiled 49,600 tonnes of ore, and produced 8,100 tonnes of concentrate containing 1,704,300 kilograms of copper, 59,300 grams of gold and 3,723,000 grams of silver. In addition, 542,200 tonnes of waste and overburden was removed. The open pit operated from May 16th to December 10th, and the mill operated all year.

In 1966, the Mount Washington Milling Co. mined 156,100 tonnes of ore, milled 162,800 tonnes of ore, and produced 7,700 tonnes of concentrate containing 1,481,400 kilograms of copper, 67,900 grams of gold and 3,423,800 grams of silver. In addition, 273,200 tonnes of waste and overburden was removed. The open pit operated from the beginning of June to the end of November, and the mill operated all year.

In 1967, the Mount Washington Milling Co. milled 9,700 tonnes of stockpiled ore, and produced 1,400 tonnes of concentrate containing 257,500 kilograms of copper, 14,300 grams of gold and 552,700 grams of silver. At the end of March, the mill ceased operation and on April 3, 1967 the company was placed in receivership and all operations closed. The parent company maintained ownership of the property.

Over its 2 year mine life, the Mt. Washington mill processed 342,600 tonnes of ore averaging 1.005% copper, 0.413 g/t gold, and 22.5 g/t silver, generating 17,200 tonnes of concentrate containing 3,443,200 kilograms of copper, 141,500 grams of gold and 7,699,500 grams of silver. This data is from the Minister of Mines Annual Reports, and there exists conflicting data quoted elsewhere. Although mill recovery information is not available, calculated recoveries compared to the total indicated resources are estimated at 71% for copper, 81% for gold, and 55% for silver. The calculated tonnage and grades of the tailings dam are therefore estimated at 325,400 tonnes @ 0.41% copper, 0.10 g/t gold and 18 g/t silver, but is not a resource estimate to NI43-101 standards, and cannot be relied upon.
In 1966-68, the Mt. Washington Copper Co. Ltd. and Qualicum Mines Ltd. engaged consulting engineer W.G. Stevenson, P.Eng. to undertake exploration work targeting primarily porphyry copper style mineralization on the Mt. Washington property. In 1966, Stevenson completed a reconnaissance soil geochemistry survey along selected roads between Wolf Lake and McKay Lake, and analyzed several hundred samples for zinc, with poor results. In 1967, Stevenson completed geological mapping, grid-based soil geochemistry, and initiated a few widely spaced lines of ground magnetic and induced polarization (I.P.) surveys in the Murex area surrounding the mill site. Approximately two hundred samples were analyzed for copper, showing a broad area of 1.6 km. by 1 km. with elevated copper values in soils, exceeding 280 ppm, the anomalous threshold as determine by J.S. Scott, P.Eng. The geophysics delineated a co-incident magnetic high and chargeability high over an area of 1100 metres by 700 metres, co-incident with the northern portion of the soil anomaly. The magnetic survey was supervised by D.W. Smellie, P.Eng. and the I.P. survey was supervised and interpreted by D.B. Sutherland, M.A. and R.A. Bell, PhD. of McPhar Geophysics Limited, who conducted the I.P. survey.

In 1968, Marietta optioned the Mt. Washington property from the Mt. Washington Copper Co. Ltd. Marietta engaged consulting engineer W.G. Stevenson, P.Eng. to continue exploring the property for porphyry copper style mineralization. In 1968, Stevenson initiated additional I.P.-resistivity survey lines and an airborne magnetic survey was conducted over much of the Mt. Washington property. The geophysics delineated three large magnetic highs along an E-W trend across the property, flanked by chargeability highs and resistivity lows from which 4 significant targets were established, named Zones A-D. The best target, Zone A, was delineated over a length of 4 km. and a width of 750 metres. C. Elliot, Mining Geophysical Engineer, supervised and interpreted both surveys. The airborne survey was conducted by Canadian Aero Mineral Surveys Limited.

In 1968-69 on behalf of Marietta, W.G. Stevenson obtained, re-logged and selectively sampled diamond drill core from Cominco’s 1963-64 drilling programs, specifically for drill holes C-1 to C-4, C7 to C-10, C13 to C16 and C18 to C21. All sampled drill core was analyzed for copper, molybdenum, gold and silver. The following intercepts were obtained from essentially previously un-sampled core intervals from Cominco holes:

- **Hole No.C-2 from the Murex Breccia which yielded:**
  - 13.6 m. @ 0.15% copper, 0.06% molybdenum from 78.2 m. to 91.8 m., including:
  - 7.2 m. @ 0.17% copper, 0.10% molybdenum from 83.0 m. to 90.2 m.
• Hole No.C-7 from the Washington Breccia beneath the North Pit which yielded:
  o 70.4 m. @ 0.16% copper, 0.006% molybdenum from 33.2 m. to 70.4 m., including:
  o 24.3 m. @ 0.16% copper, 0.016% molybdenum from 61.0 m. to 85.3 m.
• Hole No.C-9 from the Washington Breccia east of the North Pit which yielded:
  o 76.2 m. @ 0.25% copper, 0.03% molybdenum, 0.22 g/t gold and 2.2 g/t silver from 0 m. to 76.2 m., including:
  o 42.7 m. @ 0.26% copper, 0.05% molybdenum, 0.20 g/t gold and 1.9 g/t silver from 6.1 m. to 48.8 m.
• Hole No.C-10 from the Washington Breccia south of the South Pit which yielded:
  o 30.3 m. @ 0.17% copper and 2.0 g/t silver from 4.5 m. to 34.7 m., and,
  o 43.6 m. @ 0.24% copper and 2.0 g/t silver from 34.7 m. to 78.3 m., and,
  o 34.1 m. @ 0.28% copper, 0.006% molybdenum and 1.7 g/t silver from 131.1 m. to 165.2 m.
• Hole No. C-15 from the Murray Breccia southwest of the South Pit which yielded:
  o 15.3 m. @ 0.24% copper from 94.4 m. to 109.7 m.

In 1969, on behalf of Marietta, W.G. Stevenson completed 15 diamond drill holes on the Mt. Washington property, following up new surface targets, geophysical targets and Cominco’s drilling targets. Most of the holes were split and sampled over their entire lengths, and the samples analyzed for copper, molybdenum, silver and gold. The following drill results were achieved by Marietta, listed by target area:

In four holes testing I.P. target Zone A in the Murex area, no significant intercepts achieved, the best being:

• Hole 69-1 yielded 3 m. @ 0.26% copper, 5 ppm molybdenum and 2 ppm silver from 115.8 m. to 119.8 m., but averaged approximately 350 ppm copper over its entire 141 m. logged as mainly Karmutsen volcanics with some intrusives
• Hole 69-3 yielded 3 m. @ 0.03% copper and 0.02% ppm molybdenum from 100.6 m. to 103.6 m., but averaged approximately 250 ppm copper and 15 ppm molybdenum from 40 m. to the bottom of the hole at 305 m., logged as entirely Karmutsen volcanics

• Hole 69-6 yielded 3 m. @ 0.20% copper and 2.2 ppm silver from 116 m. to 119 m., but averaged approximately 250 ppm copper over its entire 152 m. depth, logged as entirely Karmutsen volcanics

In one hole testing co-incident I.P. target Zone C and magnetic target Body B in the Murex area, no significant intercepts achieved, the best being:

• Hole 69-2 yielded 3.0 m. @ 0.24% copper, 0.003% molybdenum and 1.8 ppm silver from 128 m. to 131 m., but averaged approximately 450 ppm copper over its entire 155 m. depth, logged as entirely Karmutsen volcanics

In one hole testing co-incident I.P. target Zone B and magnetic target Body A in the Murex area, the following significant intercept was achieved:

• Hole 69-4 yielded 3 m. @ 0.40% copper, 0.001% molybdenum and 5 ppm silver from 122 m. to 125 m., in silicified and sulphidic Karmutsen volcanics

In one hole testing magnetic target Body A in the Murex area, no significant intercepts achieved, the best being:

• Hole 69-7 yielded 3 m. @ 0.05% copper, 0.03% molybdenum and 1.5 ppm silver from 54.9 m. to 57.9 m., and was logged as hornblende syenite over its entire 305 m. length

In three holes testing surface copper-molybdenum mineralization exposed in a road cut east of McKay Lake, the following significant intercept, and two non-significant intercepts achieved:

• Hole 69-13 yielded 27.4 m. @ 0.009% copper and 0.0375% molybdenum in a mineralized breccia body (later named the Quarry Breccia), and minor intrusives

• Hole 69-8 yielded 4.6 m. @ 0.14% copper from 1.5 m. to 6.1 m., and averaged approximately 250 ppm copper over its entire 67 m. depth, intersecting intrusives surrounding a breccia body
• Hole 69-9 yielded 3 m. @ 0.05% ppm molybdenum at 85 m. to 88 m., and averaged approximately 250 ppm copper over its entire 93 m. depth, intersecting intrusives, Karmutsen volcanics and minor breccias

In two holes testing co-incident I.P. target Zone C and magnetic target Body B in the Murex area, the following two significant intercepts achieved:

• Hole 69-10 yielded 82.3 m. @ 0.20% copper, 0.015% molybdenum and 3.3 g/t silver from surface to 82.3 m. in mineralized Murex Breccia

• Hole 69-14 yielded 27.4 m. @ 0.22% copper, 0.005% molybdenum and 3.4 g/t silver from surface to 27.4 m. in mineralized quartzite and intrusives

In one hole following up Cominco’s hole C-9 in the Washington Breccia east of the North Pit, the following significant intercept achieved:

• Hole 69-11 yielded 45.7 m. @ 0.09% copper, 0.028% molybdenum and 1.8 g/t silver from surface to 45.7 m., intersecting mineralized Washington Breccia

In one hole following up Cominco’s holes C-10 and C-15 testing surface mineralization in the Washington Breccia south of the South Pit, the following significant intercept achieved:

• Hole 69-15 yielded 19.5 m. @ 0.17% copper, 0.003% molybdenum and 4.2 g/t silver from 1.8 m. to 21.3 m., intersecting mineralized intrusives overlying Washington Breccia

In 1970, Marietta Resources Ltd. dropped the option on the Mt. Washington Property. R. Dunsmore, Geologist, supervised a ground electromagnetic survey over portions of property for the Mt. Washington Copper Co. in 1970, and located many anomalies.

In early 1972, the Minerals Section of Imperial Oil Limited (Esso) optioned the Mt. Washington property from Mt. Washington Copper Co. Ltd. Esso also completed agreements with all other tenure holders over an extensive area surrounding Mt. Washington, including five separate agreements with Canadian Pacific Oil & Gas (C.P.O.G.), the base metals rights holders, and surface rights holders, prior to commencing exploration work.
In 1972, Esso commenced a multi-year, systematic exploration program of the Mt. Washington Property under the direction of geologist D.A. Bridge. In the first year, Esso completed detailed geological mapping and chip sampling of the open pits and road cuts, assaying all samples for copper, molybdenum, gold and silver, plus selected samples for arsenic. A grid was established and two baselines were soil sampled, and soils analyzed for copper and molybdenum. An I.P. survey was conducted along one of the grid baselines. No significant results were reported by Esso in 1972.

In 1973, Esso completed an airborne magnetic and electromagnetic (E.M.) geophysical survey over most of the property, a ground E.M. survey, an induced polarization (I.P.) survey, and seven diamond drill holes. The airborne geophysical survey was supervised by D.C. Fraser, Ph.D. of Aerodat Limited. The survey detected a large, elliptical east-west magnetic high 5 km. by 2.5 km. in size in the southeast portion of the property, corresponding with the Murex Breccia and quartz diorite intrusions, with numerous electromagnetic conductors along its northeast and southeast flanks. The survey also detected two circular, 500 m. diameter magnetic highs, one centred just northwest of McKay Lake, and one centred just west of Pyrrhotite Lake, corresponding with the North open pit and with the Oyster Breccia, respectively. The aeromagnetic high northwest of McKay Lake also displayed several electromagnetic conductors along its northern and western flanks. The ground E.M. survey was undertaken to locate airborne conductors near the open pits, and conducted by F.S. Eeg, C.E.T., but was terminated prior to its completion. The I.P. survey was conducted by P.E. Walcott, P.Eng., and was undertaken on two areas of the Murex Breccia, with nebulous results.

The drilling program in 1973 consisted of 7 holes in the Murex area, the first hole (Hole 73-1) which was abandoned in overburden. The fifth hole (Hole 73-5) was drilled to test an E.M. anomaly in the vicinity of Marietta drill hole M-1, and failed to achieve any significant intercepts, but only two core samples were taken over its 134 m. depth in spite of many notations of pyrite and chalcopyrite mineralization. The last hole (Hole 73-7) tested E.M. anomalies along the northeast flank of the large, elliptical magnetic anomaly in the vicinity of Marietta drill hole 69-3, and failed to achieve significant intercepts, the best being:

- Hole 73-7 yielded 50.3 m. @ 0.05% copper from 9.1 m. to 59.4 m.
The remaining four drill holes (Holes 73-2, 73-3, 73-4, and 73-6) were clustered in the vicinity of Marietta drill holes 69-8, 69-9 and 69-13, and yielded the following significant intercepts:

- **Hole 73-3**, which was systematically sampled and assayed for copper only, yielded:
  - 120.2 m. @ 0.24% copper from 3.2 m. to 123.4 m., including:
    - 12.0 m. @ 0.48% copper from 3.2 m. to 15.2 m., and,
    - 12.2 m. @ 0.61% copper from 36.6 m. to 48.8 m., and,
    - 6.1 m. @ 0.65% copper from 117.3 m. to 123.4 m.
- **Hole 73-4**, which was only selectively sampled and generally assayed only for copper, yielded:
  - 6.1 m. @ 0.40% copper, 0.019% molybdenum and 0.26 g/t silver from 83.2 m. to 89.3 m. (only section assayed for anything but copper), and
  - 2.0 m. @ 0.22% copper from 94.2 m. to 96.2 m., and,
  - 3.1 m. @ 0.15% copper from 129.5 m. to 132.6 m., and,
  - 2.6 m. @ 0.24% copper from 134.1 m. to 136.7 m., and,
  - 1.8 m. @ 0.27% copper from 137.8 m. to 139.6 m., and,
  - 0.8 m. @ 0.20% copper from 144.9 m. to 145.7 m.
- **Hole 73-6**, which was systematically sampled and assayed for copper only, yielded:
  - 60.3 m. @ 0.20% copper from 2.6 m. to 62.9 m., including:
    - 33.5 m. @ 0.27% copper from 6.1 m. to 39.6 m., and,
  - 15.9 m. @ 0.15% copper from 72.5 m. to 88.4 m., including:
    - 3.1 m. @ 0.39% copper from 85.3 m. to 88.4 m., and,
  - 13.4 m. @ 0.31% copper from 139.6 m. to 153.0 m., ending in good mineralization, according to the drill log
In 1974, Esso completed exploration work in 10 areas on the Mt. Washington property, consisting of geological mapping, prospecting, trenching, geochemical sampling, ground magnetic and electromagnetic surveys, and 21 diamond drill holes in 4 of those areas.

Two drill holes were completed in the northeast portion of the Murex area, referred to as the Murex Trend Breccia, with significant results as follows:

- Hole 74-2 intersected biotitic, mineralized shock breccia which yielded:
  - 46.5 m. @ 0.53% copper, 0.17 g/t gold and 7.2 g/t silver from 9.1 m. to 55.6 m., and
  - 30.0 m. @ 0.245% copper, 0.003 g/t gold and 4.1 g/t silver from 62.9 m. to 89.9 m.

In the Upper Murex Breccia, located in the southwest portion of the Murex area, and described as being clast-supported with a quartz-sulphide matrix, twenty one trenches and four drill holes were completed, with significant results as follows:

- Trench 1 chip sampling yielded 2.1 m. @ 0.32% copper, 0.79 g/t gold and 45 g/t silver, and
- Trench 4 chip sampling yielded 1.0 m. @ 0.28% copper, 9.8 g/t gold and 6.2 g/t silver
- Hole 74-3 yielded 57.15 m. @ 0.058% copper, 0.73 g/t gold and 2.1 g/t silver from 0 m. to 57.15 m., including:
  - 21.3 m. @ 0.082% copper, 1.6 g/t gold and 2.3 g/t silver from 18.3 m. to 39.6 m.
- Hole 74-5 yielded 91.4 m. @ 0.13% copper, 0.08 g/t gold and 2.9 g/t silver from 0 m. to 91.4 m. ending in mineralization, and including:
  - 33.5 m. @ 0.17% copper, 0.11 g/t gold and 3.5 g/t silver from 10.7 m. to 44.2 m., and
  - 12.5 m. @ 0.14% copper, 0.21 g/t gold and 4.1 g/t silver from 78.9 m. to 91.4 m., ending in mineralization
In the West Murex Zone, grid-based soil sampling upslope from hole 69-10 yielded an area of approximately 200 m. by 100 m. with six samples exceeding 410 ppm copper, corresponding to a ground magnetic high trend. No drilling was done here in 1974.

In the Tsolum Breccia Zone, located at the east end of the Murex area, grid-based soil sampling and ground magnetics were conducted in the vicinity of an outcrop of intrusive breccia which contains visible chalcopyrite mineralization over approximately 25 m. Geophysics yielded a magnetic low over an area of approximately 300 m. by 100 m., and geochemistry yielded six corresponding soil samples exceeding 320 ppm copper, and two samples exceeding 28 ppm molybdenum. No drilling was done here in 1974.

In the Oyster Ridge Breccia, described as a collapse breccia with a matrix of quartz, chlorite, calcite and iron oxides, and located west of Pyrrhotite Lake, grid-based soil sampling and a ground magnetic survey were completed in 1974. No significant result were obtained from the breccia, and no drilling was completed here in 1974, but outcrop chip sampling from intrusive dikes exposed in Pyrrhotite Creek 100 m. to the southwest yielded the following significant results:

- 0.9 m. @ 7.5 g/t gold, 5.2% arsenic, 0.05% copper, 0.13% lead and 0.05% zinc in a sulphidic intrusive breccia, and

- 0.9 m. @ 2.67% copper, 0.69 g/t gold, 27 g/t silver from a chalcopyrite-bornite bearing shear zone

In the Meadows Anomaly, located on the west flank of Mt. Washington, prospecting, grid-based soil sampling, a ground electromagnetic survey, and seven drill holes were completed in 1974. Prospecting yielded three sulphide showings in outcrop, one which yielded significant values from grab sampling as follows:

- 29 g/t gold, 142 g/t silver, 24% arsenic and 0.83% copper

The Murray Vein (probably synonymous with the Domineer No.1 Vein), exposed in outcrop 550 metres east of the Meadows Anomaly, yielded significant values from two grab samples as follows:
• 2.7 to 20 g/t gold, 244 to 376 g/t silver, 1.7 to 4.7% arsenic, and 1.4 to 3.2% copper

Also at the Meadows Anomaly, soil geochemistry yielded two parallel, north-south elongate zones of co-incident anomalous copper, silver and gold. Geophysics yielded numerous electromagnetic conductors. Drilling in 1974 consisted of a fence of four holes (74-12, -13, -14 and -19) testing the geochemical anomaly to the east of the outcrop showing, and another three holes (74-16, -17 and -18) testing the geophysical conductors, with potentially significant results as follows, considering that no gold analyses were completed on the core samples:

• Hole 74-12 intersected multiple fractured limonitic zones, including two which yielded:
  o 3.1 m. @ 0.043% copper, 0.128% arsenic and 13.4 g/t silver from 3.0 m. to 6.1 m., and,
  o 0.8 m. @ 0.64% copper, 0.052% arsenic and 5.0 g/t silver from 18.3 m. to 19.1 m.

• Hole 74-13 intersected multiple fractured limonitic zones, including two which yielded:
  o 0.6 m. @ 0.22% copper, 0.022% arsenic and 3.1 g/t silver from 6.1 m. to 6.7 m.,
  and
  o 3.7 m. @ 0.027% copper, 0.32% arsenic and 12.1 g/t silver from 12.8 m. to 16.5 m.

• Hole 74-15 intersected multiple thin sulphidic zones, including one which yielded 1.2 m. @ 0.32% copper, 0.013% arsenic and 3.0 g/t silver from 2.8 m. to 4.0 m.

• Hole 74-17 intersected multiple thin sulphidic zones, including one which yielded 1.5 m. @ 0.15% copper, 0.024% arsenic and 2.5 g/t silver from 0.9 m. to 2.4 m.

• Hole 74-19 intersected fractured, limonitic and sulphidic zones, including one which yielded 3.1 m. @ 0.35% copper, 1.8% arsenic and 43 g/t silver from 1.5 m. to 4.6 m.

In the area of the former Mt. Washington Copper open pits, seven drill holes (74-6, 74-7, 74-8, 74-9, 74-10, 74-20 and 74-21) were completed in 1974 to test both for vein extensions and for disseminated copper mineralization within 300 metres of the pits. The following significant results were achieved:

• Hole 74-6 yielded 97.5 m. @ 0.20% copper, 0.14 g/t gold and 5.3 g/t silver from 23.8 m. to 121.3 m. (only 60.9 m. of the section were analyzed for gold and silver), including:
• Hole 74-7 yielded 80.2 m. @ 0.13% copper, 0.96% arsenic, 0.18 g/t gold, and 3.1 g/t silver from 19.5 m. to 99.7 m., including:
  o 0.9 m. @ 1.64% copper, 0.022% arsenic, 0.10 g/t gold and 45 g/t silver from 25.6 to 26.5 m., and
  o 3.0 m. @ 0.142% copper, 2.25% arsenic, 2.6 g/t gold and 69 g/t silver from 69.2 m. to 72.2 m.
• Hole 74-9 yielded 31.4 m. @ 0.146% copper, 0.007% arsenic, 0.017 g/t gold and 3.03 g/t silver from 10.7 m. to 42.1 m., including:
  o 10.2 m. @ 0.252% copper, 0.002% arsenic, 0.013 g/t gold and 4.43 g/t silver from 13.7 m. to 23.9 m.
• Hole 74-10 yielded 115.8 m. @ 0.094% copper (only copper analyzed consistently) from 1.5 m. to 117.3 m. (the entire hole), including:
  o 1.5 m. @ 0.678% copper, 0.034 g/t gold and 8.57 g/t silver from 38.1 m. to 39.6 m.
• Hole 74-21 yielded 21.6 m. @ 0.097% copper (only copper analyzed consistently) from 0 m. to 21.6 m. (the entire hole), including:
  o 0.9 m. @ 0.298% copper, 0.041% arsenic, 0.103 g/t gold and 9.26 g/t silver from 11.0 m. to 11.9 m.

Additional soil geochemistry and prospecting were completed by Esso in 1974 in three other areas: McKay Creek, the 101 Zone and the South Comox Zone, but no significant results were obtained.

In 1975, Esso completed work in 4 areas on the Mt. Washington property, including a ground magnetic survey, soil sampling and trenching in the Murex area, trenching and a test induced polarization line over the Tsolum Breccia, and three drill holes in two other areas.

In the Oyster Ridge Breccia, two widely spaced drill holes (75-1, -2) were completed, but with no significant results. In the Murray Breccia, one drill vertical hole (75-3) was completed from the ridge crest to a depth of 300.8 m., yielding several significant intercepts as follows:
• 3.2 m. @ 3.6 g/t gold, 7.5 g/t silver from 102.4 m. to 105.6 m. (abundant arsenopyrite in quartz, suggesting the Murray/Domineer No.1 Vein), and,

• 32.3 m. @ 0.117% copper, 0.008 g/t gold (no other analyses) from 210.6 m. to 242.9 m., including:
  o 15.4 m. @ 0.173% copper and 0.027 g/t gold (no other analyses) from 224.5 m. to 239.9 m., and

• 15.2 m. @ 0.200% copper and 0.062 g/t gold (no other analyses) from 279.5 m. to 294.7 m.

In the Tsolum Breccia, the I.P. test line was inconclusive, and two trenches 9 metres apart yielded the following significant results from bulk sampling:

• 3.7 m. @ 0.40% copper, and

• 1.5 m. @ 0.21% copper

In the Murex area, the ground survey confirmed a magnetic low response from the previous airborne survey. Soil sampling indicated a 65 m. diameter molybdenum anomaly from the edge of the magnetic low. A rock chip sample from fractured siltstone within the magnetic low yielded 0.172% copper and 0.039% molybdenum.

Also in 1975, P.J. McGuigan completed a B.Sc. thesis at the University of British Columbia entitled, “Certain Breccias of the Mount Washington Property, Vancouver Island”, based on work completed while he was working for Esso in 1972 and 1973.

In 1976, Esso drilled a single 344 metre hole (MW-84) collared at -60 in a southwest direction, approximately 400 metres southwest of McKay Lake. The hole tested the area near the Murray Breccia, was logged only in a cursory way by P.J. McGuigan, was only selectively sampled, and those samples were consistently analyzed only for copper. Hole MW-84 yielded multiple significant and largely un-bracketed intercepts as follows:

• 146.3 m. @ 0.284% copper from 9.1 m. to 155.4 m. and,
• 9.1 m. @ 0.222% copper from 167.6 m. to 173.7 m. and,
• 3.0 m. @ 0.143% copper from 192.0 m. to 195.0 m. and,
• 3.0 m. @ 0.203% copper from 204.2 m. to 207.2 m. and,
• 3.0 m. @ 0.192% copper from 216.4 m. to 219.4 m. and,
• 3.0 m. @ 0.131% copper from 228.6 m. to 231.6 m. and,
• 3.0 m. @ 0.103% copper from 240.8 m. to 243.8 m. and,
• 3.0 m. @ 0.205% copper from 253.0 m. to 256.0 m. and,
• 3.0 m. @ 0.193% copper from 265.2 m. to 268.2 m. and,
• 3.0 m. @ 0.225% copper from 277.4 m. to 280.4 m. and,
• 11.6 m. @ 0.134% copper from 290.2 m. to 301.8 m. and,
• 9.1 m. @ 0.396% copper from 306.9 m. to 316.0 m. and,
• 3.0 m. @ 0.499% copper from 338.4 m. to 341.4 m.

From 1977 to 1982, Esso did not undertake any more exploration work on the Mt. Washington property, but instead concentrated primarily on metallurgical studies to investigate the feasibility of an on-site, low grade, heap leach copper operation. The lead consultant for these studies was A. Bruynesteyn of B.C. Research, and the project manager with Esso was R. Somerville, P.Eng. This time period coincided with a gradual decrease in the market price for copper, but also high volatility in the market prices for gold, silver and molybdenum, the other metals of potential interest at Mt. Washington. Esso terminated agreements covering the Mt. Washington property, and returned the mineral claims and crown grants to Mt. Washington Copper in 1982.

In late 1982, the mineral claims and crown grants covering the Mt. Washington property were acquired by Veerman-Botel Ltd. through an agreement with Mt. Washington Copper. Veerman-Botel did little work on the property before optioning it to Better Resources Ltd. (Better) in early 1983. In May, 1983, K.E. Northcote, P.Eng., completed a summary report on the property for Better Resources, and recommended that future exploration work be focused on both the high grade gold potential in the flat lying silicified zone, and the on the bulk
tonnage gold potential of the breccia zones. He also noted that previous drilling was done using small diameter core, yielding poor recoveries in the fractured, weathered mineralized zones, and that the core samples were not systematically analyzed for gold. Mr. Northcote recommended a 2-phase, $310,000 exploration program on the Mt. Washington property, commencing with detailed re-evaluations of all previous work, including gold analyses of selected sample rejects. Better then staked many more claims, covering the West Arm, Murex Breccia and Oyster Breccia areas, and completed agreements with both Fording Coal Ltd. for the base metal rights and with the surface rights owner for the area covering the mineral claims and crown grants.

From 1983 to 1990, Better completed systematic exploration work targeting primarily the gold potential in the West Arm area of Mt. Washington. Most of Better’s work on the Mt. Washington property was done under the direction of either J.F. Bristow, P.Eng. or C.C. Rennie, P.Eng., both former presidents and directors of Better. The company completed extensive grid-based soil geochemistry and targeted trenching across the property and chip sampling of showings, but the main exploration technique utilized was diamond drilling, using large diameter (generally NQ size) core, routinely analyzing core samples for gold, and surveying all drill collar locations.

In 1983 and 1984 on their Lupus Property in the Wolf Lake area, Proquest Resource Corporation discovered two new gold-bearing quartz-sulphide veins named the Lake Showing (north of Wolf Lake) and the Creek Showing (east of Wolf Lake). Select outcrop grab sampling from the showings yielded significant values as follows:

- 70.1 g/t gold, 115 g/t silver, 6.1% arsenic and 7.2% zinc (Lake Showing)
- 11.9 g/t gold, 2.9% arsenic (Creek Showing)

In 1985, Homestake Mineral Development Company acquired and expanded Proquest’s Lupus Property and completed extensive soil and rock geochemistry surveys. Select outcrop grab sampling from quartz-sulphide veins at the known Lake showings and a new showing both on the Lupus 1 claim northwest of Wolf Lake yielded significant values as follows:

- 35.6 g/t gold, 44.5 g/t silver, 5.59% zinc (Lake Showing)
• 5.9 g/t gold, 55.0 g/t silver, 1.54% copper (Lupus 4 and possibly Bluff Zone)

In 1985, west of Wolf Lake, St. James Minerals Ltd. discovered disseminated pyrite and pyrrhotite in altered volcanics exposed for 250 metres in an east-flowing creek bed, from which an outcrop grab sample yielded elevated values as follows:

• 12.7 g/t silver and 0.37% copper

In 1986, Pan World Ventures Inc. acquired Proquest’s Lupus Property, completed geological mapping, soil and rocks geochemistry and geophysical I.P. surveys. Outcrop chip sampling on quartz-sulphide veins the Lake Showing and Creek Showing, and sub-crop grab sampling on the Road Showing, a new discovery west of Wolf Lake, yielded significant values as follows:

• 92.5 g/t gold, 195 g/t silver, 0.96% copper, 0.45% lead, 5.98% zinc, 5.74% arsenic over 0.09 metres (Lake Showing)

• 4.49 g/t gold, 145 g/t silver, 0.54% copper, 2.1% lead, 1.61% zinc and 4.95% arsenic over 0.2 metres (Creek Showing)

• 21.9 g/t gold, 30.9 g/t silver, 0.66% copper (Road Showing)

In 1986, Westmin Resources Ltd. acquired the Dove Property located between Wolf Lake and Mt. Washington from J. Paquet, and completed geological mapping and prospecting, including outcrop grab sampling from narrow quartz-sulphide veins in Murex Creek and Murex Breccia areas which yielded significant values as follows:

• 9.87 g/t gold, 24.9 g/t silver, 0.82% lead and 1.18% zinc over 0.02 metres (Lower Murex Creek)

• 0.42% copper and 2.43% zinc over 0.06 metre (Central Murex Creek)

• 0.45% copper over 0.05 metres (Eastern Murex Breccia area)
By the end of 1986, Better had completed 55 drill holes in the West Arm area of Mt. Washington, renamed the Lakeview-Domineer area; and 10 holes in the Murex area. Most of the drill holes in the Lakeview-Domineer area yielded significant intercepts in gold and/or silver, including some of the better intercepts as follows:

- **Hole 83-2** yielded 2.7 m. @ 9.8 g/t gold, 121 g/t silver and 3.2% arsenic from 7.3 m. to 10.0 m. including:
  - 1.2 m. @ 16.2 g/t gold, 263 g/t silver and 4.1% arsenic from 8.8 m. to 10.0 m.
    (5% chalcopyrite logged but not analyzed for copper)

- **Hole 84-15** yielded 0.9 m. @ 17.5 g/t gold, 120 g/t silver and 2.0% arsenic from 17.4 m. to 18.3 m.

- **Hole 86-5** yielded 5.3 m. @ 7.5 g/t gold, 36.6 g/t silver and 1.6% arsenic from 4.6 m. to 9.9 m., including:
  - 1.5 m. @ 13.0 g/t gold, 3.8 g/t silver and 0.25% arsenic from 4.6 m. to 6.1 m., and
  - 1.6 m. @ 24.3 g/t gold, 111.4 g/t silver, 2.15% copper and 4.8% arsenic from 8.3 m. to 9.9 m.

- **Hole 86-17** yielded 0.9 m. @ 9.3 g/t gold, 8.8 g/t silver, 0.08% copper and 1.35% arsenic from 4.3 m. to 5.2 m. and,

- 1.5 m. @ 13.4 g/t gold, 20.9 g/t silver, 0.58% copper and 4.2% arsenic from 15.8 m. to 17.3 m.

In 1987, Cactus West Explorations Ltd. completed prospecting work on its Lake and Bluff claims northwest of Wolf Lake, and reported the following significant outcrop chip and grab sample results:

- 78.9 g/t gold, 145 g/t silver and 9.48% zinc over 0.11 m. (Lake Zone), and

- 90.5 g/t gold, 192 g/t silver and 9.58% zinc over 0.11 m. (Lake Zone), and

- 75.8 g/t gold (grab from Bluff Zone)
In February, 1987 J.J. McDougall, P.Eng. completed a summary report on the Mt. Washington Property for Better Resources, and completed preliminary mineral resource estimates using only drilling data (historical and not to current standards) for the Lakeview-Domineer area as follows:

**Drill-Indicated Underground:**

<table>
<thead>
<tr>
<th>Area/Zone</th>
<th>Min. Grade</th>
<th>Min. Thickness</th>
<th>Tonnes</th>
<th>Gold</th>
<th>Silver</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lakeview</td>
<td>3.4 g/t gold</td>
<td>3.0 metres</td>
<td>176,632</td>
<td>7.9 g/t</td>
<td>33.6 g/t</td>
</tr>
<tr>
<td>Domineer</td>
<td>3.4 g/t gold</td>
<td>3.0 metres</td>
<td>37,387</td>
<td>7.2 g/t</td>
<td>66.5 g/t</td>
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**Drill-Indicated Open Pit:**

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<tr>
<th>Area/Zone</th>
<th>Min. Grade</th>
<th>Min. Thickness</th>
<th>Tonnes</th>
<th>Gold</th>
<th>Silver</th>
</tr>
</thead>
<tbody>
<tr>
<td>West Grid</td>
<td>1.7 g/t</td>
<td>not specified</td>
<td>119,115</td>
<td>2.4 g/t</td>
<td>15.4 g/t</td>
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**Inferred Underground:**

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<th>Area/Zone</th>
<th>Min. Grade</th>
<th>Min. Thickness</th>
<th>Tonnes</th>
<th>Gold</th>
<th>Silver</th>
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<tbody>
<tr>
<td>Central</td>
<td>not specified</td>
<td>not specified</td>
<td>440,627</td>
<td>6.2 g/t</td>
<td>not specified</td>
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In the Murex area, the following significant drill intercepts were achieved in 1986, but none of the core samples were analyzed for molybdenum:

- Hole MX-86-1 yielded 16.0 m. @ 6.1 g/t gold, 4.2 g/t silver and 0.17% copper from 1.5 m. to 17.5 m., including:
  - 6.8 m. @ 11.0 g/t gold, 5.0 g/t silver and 0.27% copper from 10.7 m. to 17.5 m.
- Hole MX-86-6 yielded 22.0 m. @ 0.32 g/t gold, 0.92 g/t silver and 0.10% copper from 15.2 m. to 37.2 m., including:
  - 7.8 m. @ 0.77 g/t gold, 1.84 g/t silver and 0.15% copper from 23.9 m. to 31.7 m.
- Hole MX-86-7 yielded 19.8 m. @ 0.22 g/t gold, 9.9 g/t silver & 1.5% copper from 29.4 m. to 49.2 m. and,
- 6.8 m. @ 0.38 g/t gold, 21 g/t silver & 3.3% copper from 55.5 m. to 62.3 m.
In 1987, Better completed an additional 113 drill holes to increase the confidence in the Lakeview-Domineer area mineral resource, plus an additional 5 drill holes in the Murex area, and grid-based geological mapping, soil and rock geochemistry and ground magnetic surveys, along with 8 diamond drill holes in the area of the Oyster Breccia.

The Lakeview-Domineer definition drilling was reasonably successful and the company commenced an underground exploration adit, which was completed in early 1988. The 3 m. x 3 m. adit was driven in an east-northeasterly direction along the strike of the mineralized zone for a total distance of about 290 m., including a northeasterly crosscut, at an average elevation of 1375 m., and at an average gradient of +2.5%. The mineralization exposed in both ribs of the adit was geologically mapped after the initial 45 m., and channel or panel sampled at roughly 10’ (3 m.) intervals more or less in its entirety, and samples assayed for gold, silver, copper and arsenic. Grab samples from blast rock (muck grabs) were also routinely taken along the adit while it was being advanced. The initial (un-mapped) western portion of the adit yielded the following values from 35 channel samples along 15 consecutive cuts in the southeast rib:

45 m. length
1.4 m. average vertical thickness
21.8 g/t gold
139 g/t silver
0.73% copper
6.30% arsenic

A portion of the adit yielded the following values from 8 consecutive muck grab samples over 10 m. length from near the middle of the initial 45 m. un-mapped portion:

10 m. length
3 m. assumed vertical height
9.67 g/t gold
94.3 g/t silver
0.41% copper
2.04% arsenic

In the initial western portion of the adit, drift sampling results confirmed the thickness and exceeded the grades of the definition drilling results, and established the continuity of gold-silver-copper-arsenic mineralization of the flat-lying vein structure in that portion of the drift. However, it appears from the channel sampling information that the vein structure may dip eastward into the footwall of the drift at the 45 m. mark, beyond which channel, panel and muck grab sampling results were extremely erratic and much lower in values. It has been suggested by C.C. Rennie that this section of the adit obliquely intersected one of a series of en echelon, gently southeast dipping “sigmoid” veins within the flat-dipping shear structure along which the adit was driven.

In the 1987 Murex drilling, the drill core was only sporadically sampled, and analyzed routinely only for copper, gold and silver, but yielded the following significant intercepts:

- Hole MX-87-11 yielded 1.5 m. @ 0.31% copper and 1.0 g/t silver from 32 to 33.5 m., and 1.5 m. @ 0.29% copper and 1.0 g/t silver from 38.5 to 40 m.
- Hole MX-87-13 yielded 3.2 m. @ 0.40% copper and 2.5 g/t silver from 12 to 15.2 m., including 1.7 m. @ 0.52% copper and 3.8 g/t silver from 12 to 13.7 m.
- Hole MX-87-14 yielded 1.1 m. @ 0.44% copper and 2.1 g/t silver from 41.6 m. to 42.7 m., and 1.5 m. @ 0.37% copper & 2.1 g/t silver from 45.1 m. to 46.6 m.
- Hole MX-87-15 yielded 4.6 m. @ 0.56% copper and 4.8 g/t silver from 48.9 m. to 53.5 m., and 4.6 m. @ 0.13% copper from 61.3 m. to 65.9 m.
- Hole MX-87-15A yielded 4.3 m. @ 0.71% copper, 0.28 g/t gold and 8.9 g/t silver from 46.8 m. to 53.1 m.

In the 1987 Oyster Breccia work, soil geochemistry and ground magnetic surveys failed to yield significant results. Select outcrop rock grab samples taken from four locations along the southern, eastern and northern perimeter of the 450 metre diameter Oyster Breccia yielded significant values in 6 of 7 samples as follows:

- Sample 87-P-2 yielded 13.2 g/t gold, 29.1 g/t silver, 1.04% lead, 8.01% arsenic from a 0.3 m. silicified fault breccia along the southern perimeter
• Sample 87-P-3 yielded 4.72 g/t gold, 4.38 g/t silver, 0.18% copper, 3.16% arsenic from a 0.15 m. flat lying zone along the southeast perimeter

• Sample 87-P-4 yielded 626 g/t silver, 2.76% arsenic from a 0.05 m. brecciated quartzite along the southeast perimeter

• Sample 87-P-5 yielded 626 g/t silver, 0.36% arsenic from a 0.05 m. vuggy, brecciated quartzite along the northeast perimeter

• Sample 87-P-6 yielded 12.4 g/t gold, 23.5 g/t silver, 1.15% arsenic from a 0.2 m. silicified massive pyrite zone along the eastern perimeter

• Sample 87-P-7 yielded 626 g/t silver, 20.01% arsenic from a 0.3 m. vuggy, silicified and brecciated quartzite along the southern perimeter

Better completed 8 drill holes from 3 setups over a 40 metre strike length to test down-dip beneath samples 87-P-1, -2 and -7 along the southern perimeter of the Oyster Breccia, but failed to yield any significant intercepts, the best being as follows:

• Hole 87-116 yielded 0.4 m. @ 2.8 g/t gold, 6.9 g/t silver, 0.07% copper and 3.7% arsenic from 38.7 m. to 39.1 m. from a vuggy, kaolinized, limonitic brecciated volcanic containing pyrite, arsenopyrite and chalcopyrite

In September, 1987 Noranda Exploration Company Ltd. (Noranda) optioned a 51% interest in the Murex portion of the Mt. Washington property (Murex property) from Better Resources. From 1987 to 1989, Noranda completed systematic exploration work on the Murex property, targeting primarily the copper-gold potential of the breccia bodies.

In 1987, Noranda completed an airborne magnetics and electromagnetic survey (see Figure 2f), grid-based geological mapping, rock, soil and stream sediment geochemistry, ground magnetic and electromagnetic surveys, down-hole Mise-a-la Masse (on Better’s drill hole MX-86-01), and test induced polarization surveys on the Murex Property.

Geological mapping of the Murex Property by D.R. Bull of Noranda led to the interpretation of the Murex area as a post-intrusive collapse structure containing multi-phase intrusions, four types of related breccias and local quartz-sulphide mineralization. Soil geochemistry and ground geophysics outlined 4 target areas worthy of follow-up work, and were identified as Zones A, B, C, and D. The Mise a la Mass survey failed to reach the target zone due to caving of
the hole above it. Select outcrop rock grab samples (81) were systematically analyzed for copper, silver, gold and arsenic, of which 7 were also analyzed for lead, zinc and molybdenum. These samples contained various amounts of pyrite, pyrrhotite and chalcopyrite, occasionally with magnetite or realgar, and many yielded elevated values in copper, and occasionally in silver, gold, arsenic and/or molybdenum as well. Some of the more significant samples were as follows:

- Sample 17333 yielded 0.085% copper, 8.0 g/t silver and >100 g/t gold from a pyritic, pyrrhotitic alteration zone in a mixed lithology breccia from Zone D
- Sample 17348 yielded 0.47% copper, 6.2 g/t silver, 0.14 g/t gold and 0.0026% molybdenum from a quartz veinlet in basalt with pyrite, pyrrhotite and chalcopyrite from Zone A
- Sample 19012 yielded >1% copper, 18.2 g/t silver and 0.22 g/t gold from a quartz fracture filling in basalt from Zone B
- Sample 19017 yielded >1% copper, 42.0 g/t silver and 1.4 g/t gold from a breccia containing pyrite, chalcopyrite and pyrrhotite from Zone B
- Sample 19022 yielded >1% copper, 11.8 g/t silver and 0.22 g/t gold from a basalt fragment breccia containing pyrite, chalcopyrite & pyrrhotite from Zone B
- Sample 19024 yielded >1% copper, 38.0 g/t silver and 0.24 g/t gold from gangue filled fractures in basalt from Zone B
- Sample 27568 yielded 0.194% copper, 3.2 g/t silver and >1% arsenic from a pyritic, realgar bearing alteration zone between diorite and basalt from north of the grid area
- Sample 27583 yielded >1% copper, 54.0 g/t silver and 0.12 g/t gold from an alteration zone in a pyritic diorite breccia from Zone C
- Sample 27584 yielded >1% copper, 10.8 g/t silver and 0.08 g/t gold from pyrite and chalcopyrite bearing quartz veinlets in fractured basalt from Zone D

In 1988, Better completed 66 additional definition drill holes into, and commenced metallurgical studies for, the Lakeview-Domineer Zone, and also deepened Esso hole MX-75-1 in the Oyster Breccia on the Mt. Washington Property. The Esso hole MX-75-1 was deepened from 184 m. to 542 m., and failed to yield any significant intercepts, but was only sporadically sampled and those samples analyzed only for gold and silver.
The definition drilling at the Lakeview-Domineer Zone was reasonably successful, and also confirmed the presence of multiple en-echelon quartz-sulphide veins within the much thicker, flat-lying shear structure as interpreted from geological mapping and sampling of the adit. The vein intercepts displayed a continuum from gold-rich to copper-rich, and of various thicknesses, as exemplified in the following drill holes:

- Hole 88-183 yielded the following intercepts:
  - 2.0 m. @ 0.34 g/t gold, 2.1 g/t silver, 0.77% copper and <0.01% arsenic from 54.7 to 56.7 m. and,
  - 8.4 m. @ 0.89 g/t gold, 10.8 g/t silver, 0.79% copper and 0.40% arsenic from 61.9 to 70.3 m. and,
  - 1.9 m. @ 1.70 g/t gold, 12.4 g/t silver, 0.12% copper & 1.13% arsenic from 73.1 to 75.0 m. and,
  - 8.3 m. @ 1.04 g/t gold, 9.7 g/t silver, 0.91% copper and 0.05% arsenic from 82.9 to 91.2 m.

- Hole 88-185 yielded the following intercepts:
  - 3.6 m. @ 7.6 g/t gold, 11.7 g/t silver, 0.08% copper and 2.77% arsenic from 66.1 to 69.0 m. and,
  - 1.8 m. @ 1.2 g/t gold, 12.3 g/t silver, 1.98% copper and 0.20% arsenic from 89.2 to 87.4 m.

- Hole 88-202 yielded the following intercepts:
  - 2.8 m. @ 0.07 g/t gold, 1.9 g/t silver, 0.55% copper & <0.01% arsenic from 38.1 to 40.9 m. and,
  - 5.3 m. @ 0.22 g/t gold, 6.7 g/t silver, 0.87% copper & <0.01% arsenic from 50.6 to 55.9 m. and,
  - 3.9 m. @ 0.39 g/t gold, 4.4 g/t silver, 1.20% copper & <0.01% arsenic from 59.3 to 63.2 m. and,
  - 3.0 m. @ 0.75 g/t gold, 6.2 g/t silver, 1.83% copper & <0.01% arsenic from 79.2 to 82.2 m. and,
Better’s metallurgical studies for the Lakeview-Domineer Zone were conducted by G.W. Hawthorne, P.Eng., and culminated in the design of an on-site 200 ton per day concentrator using a 5 step process to produce two products: a flotation gold-copper concentrate containing 26% of the gold and 68% of the copper, and gold bullion containing 66% of the gold using a combination of bio-oxidation and cyanidation. The recovery of silver was not considered in the process, and the on-site tailings pond would contain 8% of the gold, 32% of the copper and 99% of the arsenic (as ferric arsenate after bio-oxidation). The total cost of the plant and site services was estimated to be approximately C$7 million in 1988. As part of the metallurgical work, microscope studies including photomicrographs were completed by J.F. Harris, Ph.D., who identified and described the relationships between the following metallic minerals in the flotation concentrate: pyrite, arsenopyrite, pyrrhotite, chalcopyrite, tetrahedrite, gold, sphalerite and galena.

In 1988 on the Murex Property, Noranda completed geological mapping and outcrop rock geochemistry along grid lines, road cuts and stream beds, grid-based soil geochemistry, ground geophysics including magnetics, electromagnetics and induced polarization surveys, and 9 diamond drill holes. Geophysics identified targets in Zone A and Zone D. Geological mapping identified a fifth distinct breccia type exposed in outcrop. Soil geochemistry including test pits identified elevated values in gold, silver, copper and arsenic associated with Zone D and the Zone E. Rock geochemistry from select float or outcrop grab samples, or representative outcrop chip or panel samples, yielded numerous significant values in gold, silver, copper and/or arsenic as follows:

- Sample R-28001 yielded 1.3 g/t gold, 63 g/t silver, 5.1% copper from a select outcrop grab of massive sulphide in a basaltic breccia in Zone A
- Sample R-28002 yielded 0.56 g/t gold, 26 g/t silver, 2.2% copper from a select outcrop grab of chalcopyrite vein in a basaltic breccia in Zone A
- Sample R-28042 yielded 12 g/t gold, 28 g/t silver, 0.36% copper, >10% arsenic from a select float grab of sulphidic basalt in Zone A
• Sample R-28052 yielded 0.12 g/t gold, 17 g/t silver, 2.5% copper from a select matrix only outcrop grab sample from a mixed lithology breccia in Zone A
• Sample R-44004 yielded 0.24 g/t gold, 27 g/t silver, 2.2% copper from a select outcrop grab sample of a fractured basalt with quartz and sulphides in Zone A
• Sample R-43017 yielded 1.4 g/t gold, 17 g/t silver, 1.9% copper from a 1 m. square panel sample of sulphidic basaltic breccia in Zone A
• Sample R-44028 yielded 0.74 g/t gold, 31 g/t silver, 3.8% copper from a select matrix only outcrop grab sample from a sulphidic basaltic breccia in Zone A
• Sample R-27605 yielded 9.3 g/t gold, 125 g/t silver, 7.0% copper from a select outcrop grab of a sulphidic mixed lithology breccia in Zone D
• Sample R-27606 yielded 6.9 g/t gold, 2.1 g/t silver, 0.23% copper from a select outcrop grab of a sulphidic mixed lithology breccia in Zone D
• Sample R-28625 yielded 0.07 g/t gold, 83 g/t silver, 4.5% copper from a select outcrop grab of a sulphidic alteration zone in diorite breccia in Zone D
• Sample R-28628 yielded 3.4 g/t gold, 54 g/t silver, 2.5% copper from a select outcrop grab of a sulphidic alteration zone with quartz veinlets in Zone D
• Sample R-28010 yielded 4.8 g/t gold, 128 g/t silver, 5.7% copper from a select outcrop grab of a sheared, sulphidic basaltic breccia in Zone D
• Sample R-28026 yielded 7.4 g/t gold, 0.5 g/t silver, 0.07% copper from a 0.27 m. chip sample from a sheared, quartz and iron oxide rich basalt in Zone D
• Sample R-28089 yielded 9.0 g/t gold, 4.9 g/t silver, 0.26% copper from a select outcrop grab of a sulphidic basaltic breccia in Zone D
• Sample R-28092 yielded 4.0 g/t gold, 31 g/t silver, 0.98% copper from a 0.88 m. channel sample of an altered, sulphidic shear in basalt breccia in Zone D
• Sample R-28098 yielded 4.0 g/t gold, 16 g/t silver, 1.0% copper from a 0.19 m. channel sample of an altered shear zone in basalt breccia in Zone D
• Sample R-28014 yielded 2.3 g/t gold, 22 g/t silver, 2.8% copper from a 0.1 m. channel sample of a sulphidic quartz vein in Zone D
• Sample R-28120 yielded 5.0 g/t gold, 2.1 g/t silver, 0.13% copper from a 0.5 m. channel sample of a basaltic breccia in Zone D

• Sample R-28122 yielded 10.4 g/t gold, 1.5 g/t silver, 0.13% copper from a 0.5 m. channel sample of a basaltic breccia in Zone D

• Sample R-28123 yielded 4.3 g/t gold, 28 g/t silver, 1.4% copper from a 0.5 m. channel sample of a basaltic breccia in Zone D

• Sample R-28124 yielded 4.4 g/t gold, 106 g/t silver, 5.9% copper from a 0.1 m. channel sample of a massive sulphide pod in a basaltic breccia in Zone D

• Sample R-79784 yielded 8.5 g/t gold, 4.3 g/t silver, 0.12% copper from a 5 m. chip sample of a sulphidic mixed lithology breccia in Zone D

• Sample R-79797 yielded 1.1 g/t gold, 28 g/t silver, 2.8% copper from a sample of a sheared sulphidic quartz vein in basalt in Zone D

1988 Diamond drilling on the Murex Property by Noranda yielded intercepts as follows:

• NMX-88-17 yielded 0.25m. @ 3.7 g/t gold, 46 g/t silver and 9.7% copper from 196.5 to 197.21 m. from a massive sulphide vein in Zone A

• NMX-88-19 intersected a sulphidic mixed lithology breccia in Zone D yielding:
  o 11.0 m. @ 5.0 g/t gold, 0.50 g/t silver and 0.10% copper from 12.7 m. to 23.7 m., including:
    o 3.0 m. @ 12 g/t gold, 1.4 g/t silver, 0.22% copper from 20.7 to 23.7 m.

• NMX-88-20 intersected a sulphidic mixed lithology breccia in Zone D yielding:
  o 12.4 m. @ 1.1 g/t gold, 2.0 g/t silver, 0.16% copper and 0.004% molybdenum from 28.9 m. to 41.3 m. and,
    o 8.0 m. @ 1.2 g/t gold, 2.6 g/t silver, 0.21% copper and 0.002% molybdenum from 45.7 to 53.7 m.

• NMX-88-22 yielded 0.52 m. @ 0.14% molybdenum from 33.65 to 34.17 m. in a quartz vein hosted in basalt in Zone D
• NMX-88-23 yielded 1.54 m. @ 19 g/t silver and 1.6% copper from 72.48 to 74.02 m. in a mixed lithology breccia in Zone D

Also in 1988, the 3 following academic geology papers on the Property area were completed:

• Tertiary Low-Angle Faulting and Related Gold and Copper Mineralization on Mount Washington, Vancouver Island by J.E. Muller, Consulting Geologist


In 1987 and 1988 on the Dove Property, Westmin Resources Ltd. completed an airborne magnetic and electromagnetic geophysical survey. This survey covered the eastern half of the current Mount Washington Property, and extended far to the northwest and to the southeast. The area of greatest magnetic high responses and frequency of high amplitude conductors lies in and around the Murex Breccia Zone. Westmin also completed extensive line-cutting over various portions of the Dove Property, including the Main and Murex grids partially on the current Mount Washington Property.

In 1989, Better completed and published a revised mineral resource estimate for the Lakeview-Domineer Zone as follows, which are not to current industry standards:

**Drill-Indicated Underground:**

<table>
<thead>
<tr>
<th>Area/Zone</th>
<th>Min. Grade</th>
<th>Min. Thickness</th>
<th>Tonnes</th>
<th>Gold</th>
<th>Silver</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lakeview-Domineer</td>
<td>3.4 g/t gold</td>
<td>2.0 metres</td>
<td>301,270</td>
<td>7.2 g/t</td>
<td>37.7 g/t</td>
</tr>
</tbody>
</table>

**Drill-Indicated Open Pit:**

<table>
<thead>
<tr>
<th>Area/Zone</th>
<th>Min. Grade</th>
<th>Min. Thickness</th>
<th>Tonnes</th>
<th>Gold</th>
<th>Silver</th>
</tr>
</thead>
<tbody>
<tr>
<td>West Grid</td>
<td>1.7 g/t</td>
<td>not specified</td>
<td>249,546</td>
<td>6.2 g/t</td>
<td>25.4 g/t</td>
</tr>
</tbody>
</table>
Better also completed outcrop trenching and sampling, and 17 drill holes testing in two areas west of the Lakeview-Domineer Zone on the Mt. Washington property. Trenching was completed in two areas, referred to as the Sump Area (SW of the adit) and the Float Area (North of the adit). In the Float Area, 3 trenches each 15 m. apart exposed a N-S trending shear zone over a strike length of 30 m. from which 4 chip samples yielded the following average width and values:

- 1.3 m. @ 11 g/t gold, 42 g/t silver, 0.48% copper and 12% arsenic

In the Sump Area, 5 chip samples taken from a N-S trending vertical breccia yielded the following average widths and values:

- 1.1 m. @ 5.1 g/t gold, 24 g/t silver, 0.66% copper

None of the 5 holes in the Float Area yielded any significant intercepts. Although sampling of the drill core was very selective and samples only analyzed for gold, silver and copper, many of the 12 holes from the Sump Area intersected multiple veins with a continuum of significant gold-rich to copper-rich intercepts, as follows:

- Hole 89-221 yielded the following intercepts:
  - 0.2 m. @ 0.10 g/t gold, 0.35 g/t silver, 0.88% copper from 9.1 to 9.4 m.,
  - 2.7 m. @ 2.3 g/t gold, 16 g/t silver, 0.96% copper from 10.6 to 21.3 m.,
  - 3.0 m. @ 1.5 g/t gold, 5.1 g/t silver, 0.14% copper and 0.18% arsenic from 25.9 to 28.9 m.

- Hole 89-222 yielded 2.9 m. @ 0.65 g/t gold, 2.4% copper from 3.0 to 5.9 m.

- Hole 89-224 yielded the following intercepts:
  - 1.4 m. @ 1.1 g/t gold and 2.4% copper from 3.3 to 4.7 m. and,
  - 4.0 m. @ 2.0 g/t gold, 28 g/t silver, 1.6% copper from 27.9 to 37.8 m.,
  - 1.1 m. @ 3.1 g/t gold, 50 g/t silver, 9.7% copper from 36.7 to 37.8 m.,
  - 9.8 m. @ 4.7 g/t gold, 36 g/t silver, 2.7% copper from 40.5 to 50.3 m.

- Hole 89-225 yielded the following intercepts:
  - 2.9 m. @ 5.0 g/t gold, 37 g/t silver, 2.1% copper from 25.4 to 28.3 m.,
  - 3.0 m. @ 0.7 g/t gold, 25 g/t silver, 1.6% copper from 47.0 to 50.0 m.,
Hole 89-227 yielded the following intercepts:

- 1.4 m @ 6.2 g/t gold, 9.9 g/t silver, 0.29% copper from 2.7 to 4.1 m.,
- 0.3 m. @ 0.27 g/t gold, 32 g/t silver, 2.0% copper from 17.1 to 17.4 m.,
- 1.6 m. @ 1.6 g/t gold, 7.9 g/t silver, 1.8% copper from 21.8 to 24.4 m.,
- 0.7 m. @ 0.7 g/t gold and 3.0% copper from 30.8 to 32.3 m. and,
- 0.8 m. @ 1.6 g/t gold and 3.1% copper from 43.6 to 44.4 m.

In 1989, Noranda completed grid-based soil geochemistry, detailed outcrop channel or chip sampling and geochemistry, detailed geological mapping, geophysical surveys consisting of electromagnetics and induced polarization, and 2 diamond drill holes focusing entirely on the D Zone of the Murex property. The outcrop channel sampling yielded significant values in gold, silver and/or copper in the D Zone as follows:

- Sample R112764 yielded 3 m. @ 3.2 g/t silver and 0.39% copper from a Karmutsen-Comox breccia with 2% sulphides
- Sample R112794 yielded 3.5 m. @ 2.0 g/t silver, 0.22% copper and 0.18% arsenic from a siliceous breccia with 1% pyrite
- Sample R112800 yielded 3 m. @ 11 g/t silver and 0.32% copper from a limonitic, siliceous diorite with 1% pyrrhotite
- Sample R112802 yielded 2.5 m. @ 5.5 g/t silver and 0.39% copper from an altered, malachitic diorite
- Sample R112805 yielded 3 m. @ 22 g/t silver and >1% copper from an altered, siliceous, malachitic diorite with 1-2 % sulphides
- Sample R112809 yielded 0.5 m. @ 10 g/t silver and >1% copper from a 0.1 m. quartz-sulphide vein containing 60% sulphides mostly pyrite, with chalcopyrite, arsenopyrite
Drilling yielded two significant intercepts 100 metres apart stepping out 100-200 metres east of Better’s 1986 drill hole cluster in the D Zone as follows:

- NMX-89-25 yielded 4.0 m. @ 6.5 g/t gold, 30 g/t silver and 4.1% copper from 29 to 33 m., including:
  - 1.0 m. @ 21 g/t gold, 71 g/t silver and 9.3% copper from 29 to 30 m. in a massive sulphide vein in basalt with pyrrhotite, chalcopyrite and pyrite
- NMX-89-26 yielded 6.5 m. @ 0.23 g/t gold, 7.3 g/t silver and 1.1% copper from 16.2 to 22.7 m. in a siliceous basaltic breccia with pyrrhotite and chalcopyrite

In late 1989, Noranda terminated its option agreement, returning the Murex Property to Better Resources. In 1990, Better engaged in the B.C. Mine Development Review process, completed acid-base accounting studies on the 6,000 tonne stockpile of rock extracted from the adit driven to test the Lakeview-Domineer Zone, and drilled an additional 5 holes south of the Sump Area. Only one of the holes yielded a significant intercept as follows:

- 90-237 yielded 12 m. @ 1.5 g/t gold, 20 g/t silver & 0.95% copper in an altered feldspar porphyry with patches and veinlets of pyrrhotite, pyrite and chalcopyrite

In late 1990, North Slope Minerals Inc. (North Slope) commissioned a summary report on the Murex Property by J.J. McDougall, P.Eng., and subsequently negotiated an option agreement with Better. In 1991, North Slope engaged L. Sookochoff, P.Eng. who managed a 6 hole drilling program on the Murex property based largely on recommendations made by McDougall to follow up results from Noranda’s 1989 drilling program. North Slope’s 1991 drilling program consisted of 3 holes (NSM 91-1 to 3) fanning down-dip of and on-section with NMX-89-25, 2 holes (NSM 91-4 & 5) fanning down-dip of and on-section with NMX-89-26, and 1 hole testing Noranda’s EM Conductor C, approximately 200 metres to the south. Although the core was only sporadically split and sampled, several significant intercepts were achieved:

- Hole NSM 91-1 (−70⁰) yielded the following intercepts:
  - 1.0 m. @ 2.7 g/t silver and 0.50% copper from 33 to 34 m. including a 0.3 m. thick massive sulphide vein in a wider breccia zone in basalt and,
  - 1.0 m. @ 0.8 g/t silver and 0.22% copper from 62 to 63 m. including a 0.3 m. thick semi-massive sulphide vein in a second wider breccia zone
• Hole NSM 91-2 (-84⁰) yielded the following intercept:
  - 4.0 m. @ 0.27% copper from 32 to 36 m. within a wider zone of sulphidic breccia in basalt

• Hole NSM 91-3 (-88⁰) yielded the following intercept:
  - 1.0 m. @ 2.5 g/t silver and 1.3% copper from 32.5 to 33.5 m. including a 0.55 m. thick massive sulphide vein within a wider breccia zone in basalt

• Hole NSM 91-4 (-75⁰) yielded the following intercept:
  - 4.0 m. @ 5.5 g/t silver and 1.2% copper from 34.8 to 38.8 m. hosted by quartz-carbonate-sulphide veins in a breccia zone in basalt, including:
    - 2.0 m. @ 0.11 g/t gold, 8.3 g/t silver and 1.7% copper from 34.8 to 36.6 m. and,
  - 2.0 m. @ 2.1 g/t silver and 0.59% copper from 67.5 to 69.5 m. in basalt containing sulphide patches and quartz-sulphide veins and,
  - 1.0 m. @ 3.9 g/t silver and 0.87% copper from 77.5 to 78.5 m. in a 1 m. thick quartz-carbonate-sulphide vein in basalt

• Hole NSM 91-5 (-88⁰) was stopped short of its intended target and not sampled

• Hole NSM 91-6 was sampled by selecting, splitting and analyzing only short (<0.15 m.) portions of the mineralized sections, so drill intercepts cannot be calculated, but the selected sampling yielded the following significant values from sulphide veins hosted in silicified and hornfelsed sandstone:
  - 8.3 g/t silver, 0.68% copper and 0.04% zinc at 77.4 m. and,
  - 13.4 g/t silver, 0.03% copper, 0.07% lead and 0.01% zinc at 78.9 m. and,
  - 1.5 g/t silver and 0.22% copper at 104.9 m. and,
  - 1.5 g/t silver and 0.37% copper at 112.2 m. and,
  - 2.4 g/t silver and 0.38% copper at 138.1 m.
In 1992, North Slope Minerals dropped the option on the Murex Property and returned it to Better Resources. Also in 1992, Montgomery Consulting completed computer-based geochemical modeling of rock and drill core data for the Lakeview-Domineer area for Better.

In 1992, Westmin Resources completed geological mapping and rock geochemistry on the Dove Property, and subsequently dropped the option and returned the property to Mr. Paquet in 1993 after completing ground geophysical surveys on the northern part of the property.

The period from 1992 to 2003 was one of low metal prices, coinciding with mine closures, significant increases in parks, and low mineral exploration activity levels in British Columbia, and particularly on Vancouver Island. Better Resources was caught in this economic down-cycle for the mineral exploration and mining industry, closed the adit in the Lakeview-Domineer Zone, and reclaimed the waste dumps outside it. No significant exploration activity took place on the area of the Mount Washington property from 1992 to 2003, and only limited work since.

In 2004, Warren Geiger, Ph.D., P.Eng., P.Geol. described and documented the geology and mineralization on James Laird’s Wolf Lake Property, including the Lake Zone (on claims adjacent to and surrounded by the Mount Washington Property) and the Road and Bluff Zones, located on the Mount Washington Property. At the Lake Zone, 10 outcrop samples yielded elevated values in gold, silver and/or zinc including a 0.11 m. chip sample which yielded 90.5 g/t gold, 192 g/t silver and 9.58% zinc. At the Bluff Zone, 14 outcrop samples from 1987 yielded elevated values in gold, silver, copper and/or zinc, including one which yielded 75.8 g/t gold. Outcrop sampling previously documented in 1986 from the Road Zone was also described.

In 2005, Gary Thomson, P.Geo. and James Laird documented mineralogical and metallurgical work completed on behalf of Pearl Asian Mining Industries Inc. on samples from the Lake Zone of the Wolf Lake Property. John Payne, Ph.D., P.Geol. described quartz vein/replacement mineralization in two samples containing sphalerite, arsenopyrite, pyrite, chalcopryite, tetrahedrite, galena, pyrrhotite, bornite and native gold (which occurs with arsenopyrite and tetrahedrite). Ishwinder Grewal, M.A.Sc., P.Eng. documented the results of gravity concentration tests on a 9.45 kg. sample with head grades and recoveries of 39.3 g/t gold (24.6% recovery), 61.7 g/t silver (12.9% recovery) and 0.01 g/t platinum (12.3% recovery).
In 2006, North Bay Resources Inc. (formerly Enterayon Inc.) began acquiring cell mineral claims in the area of Mt. Washington and Constitution Hill.

In 2007, the author was engaged by Blue Rock Resources Ltd. (formerly Better Resources) to complete a summary report on the Mt. Washington Property. In 2008 the claims of the Mt. Washington Property was transferred to private company Clibetre Explorations Ltd.

In 2009 Clibetre extracted a 168 tonne bulk sample from a portion of the Lakeview- Domineer Vein exposed near the portal adit. The bulk sampled material was trucked to and stockpiled at a secure storage facility located on the property of M.R. Rennie in Courtenay, B.C., and the extraction site was reclaimed. In 2010, Clibetre engaged Mr. Finley Bakker, P.Geo., who completed representative sampling of the stockpiled material, yielding an estimated average grade of 51.53 g/t gold. In addition, most of the geochemical analyses from the stockpile yielded values exceeding 1% in copper and arsenic, and highly elevated values of silver, cobalt, antimony, bismuth, tellurium, iron and sulphur.

Also in 2009-2011, the B.C. government commissioned and funded a reclamation program at the North Pit of the former Mt. Washington Copper Mine to mitigate environmental damage.

In 2011, the author was engaged by Clibetre Explorations Ltd. to design, supervise and report on a sampling program of the tailings dam from the former Mt. Washington Copper Mine. Fifteen holes totaling 65 m. were completed, collecting 77 whole core tailings samples from the accessible northwest half of the tailings dam. Average values for the accessible portion of the tailings dam yielded elevated levels as follows:

- 0.124 g/t gold
- 5.83 g/t silver
- 0.102 % copper
- 8.54 g/t tellurium
- 0.088 % arsenic
- 1.22% calcium
4.17% iron
1.05% sulphur

In 2012, Clibetre inadvertently allowed all of its mineral claims in the Mt. Washington area to forfeit, leading to cell acquisition by multiple tenure owners and resulting in complete fractionation of the mineral tenure situation in the immediate area covering the former Mt. Washington Copper open pits and the Lake-Domineer Resource area. Clibetre retained ownership of the underlying Domineer crown granted mineral claims covering a portion of the Lakeview-Domineer Resource area. North Bay expanded its cell mineral claims over the areas covering the Oyster Breccia, Murex Breccia and Mt. Washington Copper Mine tailings.

**Geological Setting and Mineralization**

The regional geological setting of the Mount Washington property is very complex, reflecting the multiple sedimentary, tectonic and plutonic events in the geological history of mid-Vancouver Island. Within 75 km. of the property are exposed and mapped examples of four volcano-sedimentary successions and four intrusive suites, as shown in Figure 1c, and summarized in the following geological legend:

<table>
<thead>
<tr>
<th>Age</th>
<th>Volcano-sedimentary Units</th>
<th>Intrusive Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eocene</td>
<td>(unnamed) volcanics, pyroclastics</td>
<td>Mt. Washington</td>
</tr>
<tr>
<td>Cretaceous</td>
<td>Nanaimo Group sediments</td>
<td></td>
</tr>
<tr>
<td>Jurassic</td>
<td>Bonanza Group Lemare Lake volcanics</td>
<td>Island</td>
</tr>
<tr>
<td>Triassic</td>
<td>Bonanza Group Parson Bay volc’s., sed’s.</td>
<td></td>
</tr>
<tr>
<td>Triassic</td>
<td>Vancouver Group Quatsino limestones</td>
<td></td>
</tr>
<tr>
<td>Triassic</td>
<td>Vancouver Group Karmutsen volcanics</td>
<td>Mt. Hall</td>
</tr>
<tr>
<td>Permian</td>
<td>Buttle Lake Group sediments</td>
<td></td>
</tr>
<tr>
<td>Devonian</td>
<td>Sicker Group volcanics</td>
<td>West Coast</td>
</tr>
</tbody>
</table>
In the mid-Vancouver Island area, these volcano-stratigraphic units are gently folded along northwest-trending axes, and are generally gently northeast-dipping, with the younger units more extensive along the east side of the island. The West Coast intrusives are re-crystallized rocks of various origins occurring mainly along the Pacific coast. The Mt. Hall intrusive suites are relatively uncommon, basic intrusives coeval with the Karmutsen plateau basalts. The Jurassic Island Intrusives are the most extensive, forming elongate northwest-trending felsic batholiths, stocks and dykes, and often show magnetic high expressions (see Figure 1d). The Mt. Washington intrusives are felsic to intermediate, and occur in isolated clusters of small stocks both along the Pacific coast, and along a northeast corridor between Tofino and Comox.

Structurally, mid-Vancouver Island is dominated by steeply-dipping, northwest-trending horst and graben structures, and by steeply dipping, north-south strike-slip faults. There are also many short strike length, steeply-dipping, northeast-trending (possibly early) faults, and occasional, shallowly-dipping thrust faults. This complex structural history combined with the multiple intrusive events have served to juxtapose the various volcano-sedimentary units in unexpected relative positions, usually only apparent after detailed geological mapping and three dimensional (drilling) data compilation by very skilled and experienced geoscientists. Such detailed information is generally only available in areas of current or prior economic interest, such as at the former Forbidden Plateau area projects now in Strathcona Park (5-15 km southwest), the Myra Falls Mine (30 km southwest), the Catface Copper Project (75 km southwest), OK Copper Project (50 km northeast), and at Mt. Washington itself.

The local area around the Mount Washington Property from Strathcona Park in the west to Constitution Hill in the east (Figure 2c) hosts exposures of only three ages of rocks:

- Eocene volcanics, pyroclastics; and Mt. Washington intrusives and breccias
- Cretaceous Nanaimo Group sediments
- Triassic Vancouver Group Karmutsen volcanics and tuffs

Most of the local area is underlain and surrounded by massive, pillowed, or porphyritic volcanic flows and tuffs of the Triassic Karmutsen Formation, which are extensively faulted and locally brecciated and/or hornfelsed near intrusions. Gently east-dipping Cretaceous Nanaimo Group conglomerates, sandstones and/or siltstones increase eastwards in exposure, and unconformably overlie the Karmutsen volcanics. Some rocks previously mapped as hornfelsed
Nanaimo Group sandstones (Carson, 1960) have been re-interpreted as Tertiary volcaniclastics and/or intrusive sills (Dahl et al., 1988; and Muller, 1988). Eocene Mt. Washington Intrusive Suite fine to medium grained and porphyritic felsic to intermediate stocks, sills, dikes and various breccias occur as circular to elliptical, upright cylindrical bodies and intrude all other rock types in the local area. These intrusions and related breccias are probably sub-volcanic, and may be more extensive and numerous at depth, where some may even coalesce.

The Mount Washington Property geology is particularly complex, probably due to what has been interpreted as a collapsed volcanic dome structure (Dahl et al.). Shallow-dipping thrust and normal faults are cut by variably trending, steeply-dipping faults. At least two sub-parallel thrust faults have apparently displaced the peaks of both Mt. Washington and Constitutional Hill, possibly along bedding planes of the Nanaimo sediments and/or Eocene volcaniclastics. This has been interpreted as a detachment fault environment similar to that found in the southwestern USA (Muller). Nine different breccia bodies have been mapped on the property, and range widely in texture and composition, some of which are associated with intrusive stocks, sills and dikes. All breccia bodies are spatially associated with polymetallic sulphide mineralization hosted in faults, veins, and breccia matrix. Economically important elements in the mineralization include gold, silver, copper, molybdenum and possibly tellurium. It appears that mineralization post-dates the breccias, the intrusions and the faulting, possibly including the detachment style thrust faulting. The northeast-trending faults appear to be oldest, and possibly control the emplacement of intrusions and breccias.

Twenty four distinct metallic mineral occurrences have been discovered and documented, and are located completely, partially or immediately adjacent to the Mount Washington Property as per the History section of this report and shown in by type in Figure 2b, with approximate locations, orientations and dimensions as follows:

**Quartz-Sulphide Veins and Zones:**

**Domineer No.1 Vein (contiguous with Lakeview Zone) (on crown grants on Property)**

- Centred at 5514250 N, 334250 E, 1415 m. elevation
- Orientation 0° Strike, 20° Dip West
- Dimension 750 m. length x 150 m. width x 1 m. thick
Delineated by mapping, sampling of 10-15 trenches, 50-75 drill holes

**Domineer No. 2 Vein (on crown grants on Property)**
- Centred at 5514100 N, 334650 E, 1355 m. elevation
- Orientation 030° Strike, 50° Dip Southwest
- Dimension 125 m. length x unknown width x 0.1 m. thick
- Delineated by mapping, sampling of 5 trenches, possibly 1 drill hole

**Domineer No. 3 Vein (on crown grants on Property)**
- Centred at 5514100 N, 334900 E, 1415 m. elevation
- Orientation 020° Strike, Dip unknown
- Dimension 20 m. length x unknown width x 1 m. thick
- Delineated by mapping, sampling of 3 trenches, not drill-tested

**Domineer No. 4 Vein (on crown grants on Property)**
- Centred at 5514200 N, 334350 E, 1395 m. elevation
- Orientation 320° Strike, 25° Dip Northeast
- Dimension 50 m. length x unknown width x 0.5 m. thick
- Delineated by 10-15 trenches, possibly 3 drill holes

**Mt. Washington Copper No.1 Zone (Tunnel Block, South Pit) (adjacent to Property)**
- Centred at 5514800 N, 334200 E, 1315 m. elevation
- Orientation 0° Dip (Flat)
- Dimension 250 m. north-south x 200 m. east-west x 2 m. thick
• Delineated by trenching, 100’s of drill holes, and 210 m. underground adit
• Largely mined out by open pit in the 1960’s

**Mt. Washington Copper No.2 Zone (Noranda Block, North Pit) (adjacent to Property)**

• Centred at 55115230 N, 3342000 E, 1315 m. elevation
• Orientation 0° Dip (Flat)
• Dimension 250 m. length x 200 m. width x 2 m. thick
• Delineated by trench and 100’s of drill holes
• Largely mined out by open pit in the 1960’s; reclaimed 2009-2010

**Lakeview Zone (West Grid, Meadows, Domineer No.1 Vein) (partially on Property)**

• Centred at 5514200 N, 333850 E, 1375 m. elevation
• Orientation 0° Dip (Flat)
• Dimension 750 m. north-south x 375 m. east-west x 1-3 m. thick
• Delineated by trench samples, about 200 drill holes and 290 m. underground adit
• Mineral resource estimate of 550,298 tonnes @ 6.75 g/t gold, 32.23 g/t silver includes Domineer, West Grid (Historical, and not to NI43-101 standards)

**Sump Zone (on Property)**

• Centred at 5514100 N, 333800 E, 1315 m. elevation
• Orientation 0° Strike, Steeply West Dipping
• Dimension 60 m. length x unknown width x 40 m. thick (4-5 veins)
• Delineated by trench samples, 12 drill holes
Float Area (adjacent to Property)
- Centred at 5514800 N, 333750 E, 1330 m. elevation
- Orientation 0° Strike, Dip unknown
- Dimension 30 m. length x unknown width x 1 m. thick
- Delineated by trench samples, about 200 drill holes

Lower Murex Creek Vein (on Property)
- Centred at 5517468 N, 339641 E, 220 m. elevation
- Orientation 240° Strike, 10° West Dip
- Dimension 1 m. length x 1 m. width x 0.02 m. thick
- Delineated by outcrop samples, 1 drill hole

Central Murex Creek Vein (on Property)
- Centred at 5516180 N, 339410 E, 250 m. elevation
- Orientation 010° Strike, Dip unknown
- Dimension unknown
- Delineated by outcrop samples

Lupus Lake Zone (adjacent to Property)
- Centred at 5516350 N, 341700 E, 200 m. elevation
- Orientation 10° Strike, 30° East Dip
- Dimension 10 m. length x 5 m. width x 0.01 to 0.1 m. thick
- Delineated by trench samples
**Lupus Road Zone (on Property)**
- Centred at 5515935 N, 340737 E, 335 m. elevation
- Orientation 315° Strike, 25° Northeast Dip
- Dimension 10 m. length x 5 m. width x 0.1 m. thick
- Delineated by outcrop samples

**Lupus Bluff Zone (on Property)**
- Centred at 5515888 N, 341123 E, 317 m. elevation
- Orientation 305° Strike, 20° Northeast Dip
- Dimension 50 m. length x 2 m. width x 0.1 m. thick
- Delineated by outcrop samples

**Sulphide Breccia Zones:**

**Washington & Glacier Breccias (on adjacent property)**
- Centred at 5514650 N, 334200 E, 1315 m. elevation
- Orientation 350° Azimuth, unknown plunge
- Dimension 1100 m. length x 500 m. width x unknown depth
- Delineated by outcrop and trench mapping and sampling, 15-25 drill holes

**Murray Breccia (on Property)**
- Centred at 5514300 N, 333900 E, 1300 m. elevation
- Orientation 340° Azimuth, unknown plunge
- Dimension 750 m. length x 300 m. width x unknown depth
- Delineated by outcrop and trench mapping and sampling, 5-10 drill holes
Quarry Breccia (on Property)

- Centred at 5515000 N, 336000 E, 990 m. elevation
- Orientation circular / cylindrical with unknown plunge
- Dimension 200 m. diameter x unknown depth
- Delineated by outcrop and trench mapping and sampling, 5-10 drill holes

Oyster Breccia (on Property)

- Centred at 5516500 N, 334300 E, 1110 m. elevation
- Orientation circular / cylindrical with unknown plunge
- Dimension 400 m. diameter x unknown depth
- Delineated by outcrop and trench mapping and sampling, 9 drill holes

Murex Breccia Lower Creek Zone (Zone A, may include Tsolum Breccia) (on Property)

- Centred at 5514750 N, 337500 E, 750 m. elevation
- Orientation 315° Strike, Steep plunge
- Dimension 750 m. length x unknown width x 175 m. thick (4 zones)
- Delineated by outcrop and trench mapping and sampling, 10-15 drill holes

Murex Breccia Upper Creek Zone (Zone D) (on Property)

- Centred at 5514100 N, 337250 E, 900 m. elevation
- Orientation 300° Azimuth, Steep plunge
- Dimension 750 m. length x unknown width x 175 m. thick (2-3 zones)
- Delineated by outcrop trenching and mapping, 20-30 drill holes
Murex Breccia East Zone (on Property)
- Centred at 5513750 N, 339500 E, 575 m. elevation
- Orientation 300° Azimuth, Steep plunge
- Dimension unknown length x unknown width x 3 m. thick
- Delineated by outcrop trenching and mapping, 1 drill hole

Murex Creek Copper Moly Zone (on Property)
- Centred at 5516175 N, 339406 E, 331 m. elevation
- Orientation 010° Strike, 25° East Dip
- Dimension 5 m. length x 1 m. width x 0.25 m. thick
- Delineated by outcrop sampling

Mill Site Zone (on Property)
- Centred at 5514003 N, 337837 E, 777 m. elevation
- Orientation 110° Strike, 90° Dip
- Dimension 10 m. length x 1 m. width x 0.3 m. thickness
- Delineated by outcrop sampling

Other Types
Mt. Washington Copper Mine Tailings (on Property)
- Centred at 5513650 N, 304150 E, 580 m. elevation (sampled portion)
- Orientation flat lying
- Dimension 500 m. length x 200 m. width x 5 m. thick
• Delineated in part (50% of area) by core drilling

• Non-compliant mineral resource estimate 325,400 tonnes @ 0.124 g/t gold, 5.83 g/t silver, 0.102% copper, 8.54 g/t tellurium

Deposit Types

The mineral deposits that have been historically explored, developed and mined on the Mt. Washington property could be classified as one or more of the following types under the B.C. Mineral Deposit Profile categories which appear in Appendix 3 as follows:

• Epithermal Au-Ag-Cu: High Sulphidation - H04

• Epithermal Au-Ag: Low Sulphidation – H05

• Subvolcanic Cu-Au-Ag (As-Sb) – L01

• Porphyry Cu-Mo-Au – L04

The Lakeview-Domineer Developed Prospect (MINFILE 092F116) and the Mt. Washington Copper Past Producer (MINFILE 092F117) were classified under both the High Sulphidation Epithermal (H04) and Porphyry (L04) categories when last updated in MINFILE in 1989-90. The Murex Prospect (MINFILE 092F206) was classified as a Porphyry (L04) and the Oyster Prospect (MINFILE 092F365) as a Low Sulphidation Epithermal (L05), both in 1990. However, the Subvolcanic (L01) category created by the BC Geological Survey in 1995 (Panteleyev, 1995) to capture the Equity Silver Past Producer (MINFILE 093L001) in central B.C. appropriately describes all the metallic mineral occurrences in the Mount Washington Property area, in the author’s opinion. Other deposits mined worldwide and allocated to the same category include Rochester (Nevada, USA), Kori Kollo (Bolivia), Bor (Serbia), part of Resck (Hungary), and part of Lepanto (Philippines).

Metal grades and tonnage ranges for Subvolcanic Cu-Au-Ag deposits worldwide are 10-200 million tonnes @ 0.25 - 2.5% copper, 1–10 g/t gold, and 10–100 g/t silver, and most are Tertiary or Eocene in Age. At current metal prices, many of these types of deposits may have sufficient grades and dimensions to permit bulk underground mining, and are therefore well worth exploring beyond the depth limits of open pit mining methods. They are often spatially and genetically associated with all three of the other deposit types listed above, which have many
economically significant examples worldwide, including several in British Columbia. The Mount Washington Property area has the correct geological setting to host one or more fully preserved porphyry, sub-volcanic and epithermal deposits and/or deposit clusters, in the author’s opinion. Regional geochemistry data (Figures 1e to 1g and 2e to 2g) suggest high background geochemical values for copper, gold molybdenum in the area and the Property.

In the area of Central Vancouver Island and the South Coast, significant mineral prospects of the Porphyry type have been developed which occur in a similar geological setting as the Mount Washington Property, shown in Figure 1b, as follows:

- Catface Copper (MINFILE 092F120) – 56,863,000 tonnes @ 0.40% copper indicated mineral resources, 262,448,000 tonnes @ 0.38% copper inferred mineral resources (Selkirk Metals Corp., 2009)
- OK North (MINFILE 092K008) – 86,800,000 tonnes @ 0.31% copper, 0.014% molybdenum inferred mineral resources (Prophecy Resources Corp., 2006)

Exploration

The 50+ years of exploration work in the Mount Washington Property area described in the History section has identified a cluster of gold-silver-copper-molybdenum-arsenic occurrences over an area of 10 km. by 3 km. The mineral occurrences vary in style, orientation, size, content of metals, and development status from showings to developed prospects and past producers. The geological complexity of the Property has provided very different settings for the mineralization, ranging from steeply-plunging, pipe-like, sulphidic breccia bodies to flat-lying, structurally controlled quartz-sulphide vein systems. Mineral zonation ranges from gold-arsenic rich to copper-gold-molybdenum rich in different mineral occurrences. In early programs (1940-1966), explorers such as MacKay, Noranda and Cominco explored primarily for high grade (+10 g/t gold or +1% copper) deposits, and Mt. Washington Copper targeted only high grade copper deposits in their mining operations. W.G. Stevenson brought his porphyry copper expertise from the southwestern US and initiated exploration programs targeting large tonnage (+50 Mt.) copper-molybdenum deposits by Mount Washington, Marietta and Esso (1967-1982). As a result of the significantly increased gold price, Better Resources Ltd. targeted primarily moderate-high grade (+5 g/t) gold deposits (1982-1992), and Noranda targeted large tonnage copper-gold-molybdenum deposits (1987-1989) on the Murex area of the Property in their
respective exploration programs. It has been estimated that total exploration expenditures on
the property to be $5 million, exclusive of mining and development costs.

Historical sampling of stream sediments, soils, outcrops, trenches and drill core was generally
done either by, or under the supervision of, qualified geoscientists engaged by the operators at
the time the work was done using industry standard techniques of those times. Generally, in
the earlier exploration programs (1940-1964), sampling was done very carefully due to the low
cost of labour, and very selectively due to the high cost of assays. It appears that assays for
specific elements were only requested and undertaken if minerals likely to contain those
elements were visible in the media sampled, and only if those elements were of potential
economic interest. For example, several notations of minor chalcopyrite or molybdenite occur
in drill core logs, but no samples were taken, or the samples taken were not analyzed for
copper or particularly molybdenum, which were only of economic interest at that time in high
quantities. Another example is the notation of massive pyrrhotite or pyrite in drill core logs
where samples were either not taken, or taken and not analyzed for gold or silver.

In the later exploration programs (1965 onwards), sampling tended to be much more extensive
but also less specific. There are examples in the drill logs of continuous sampling of drill core
through wide but variably mineralized sections using consistent 10’ (3.0 m.) sample intervals,
regardless of variations in the lithology, or the amount and type of mineralization. Such
sampling could blur contacts between higher grade and lower grade sections intersected, and
cause grades of higher grade sections to be under-stated. Also, there are examples in trench
and rock sampling records of samples exceeding the analytical limits in a metal of economic
interest, say >10,000 ppm. or >1% copper using atomic absorption methods, for which no
follow-up assays are available. This could result in grades of some zones to be understated as
well. In the History section, the author has converted all of the units to metric formats,
precious metal analyses to grams per tonne, and base metal analyses to percentages (unless
very low) for consistency within the report, and with current industry standards.

Since the last significant exploration programs occurred on the Mount Washington Property in
1992, prices for target commodities gold, silver, copper, molybdenum and tellurium have
greatly increased. The understanding of mineral deposits by economic geologists has improved
substantially, and the exploration techniques used have improved dramatically. In addition,
the property has been the focus of several academic geology papers by qualified geoscientists,
including highly experienced government personnel. The understanding of mineral deposits by
economic geologists has improved substantially since the last exploration and academic work was done in the Property area. The bulk sampling program completed in 2009 and the tailings sampling program completed in 2011 by Clibetre Explorations Ltd. were implemented primarily to fulfill mineral tenure requirements, but the limited work completed was done to modern industry standards. These more recent sample locations appear in Figures 2h, with detailed locations appearing by area in Figure 3d (Domineer Area) and Figure 3e (MWC Tailings).

In 2013, the author completed a preliminary field work program on Property for North Bay Resources Inc., consisting of re-locating and sampling of selected, known and accessible mineralized occurrences in outcrops. Sample locations appear in Figures 2h, with detailed locations and geochemistry highlights for copper, gold, and variably antimony, silver, arsenic and/or molybdenum appearing by area in Figures 3a, 4a, 5a, 6a and 7a (Oyster Breccia), Figures 3b, 4b, 5b, 6b and 7b (Murex Breccia) and Figures 3c, 4c, 5c, 6c and 7c (Wolf Lake). This work was implemented to both fulfill mineral tenure requirements as well as to document and verify various settings, styles, and grades of those mineralized occurrences, as follows.

- Oyster Breccia Area – 3 select outcrop grab samples taken from three separate known mineralized sites documented in ARIS report 17193
- Wolf Lake Area – 2 select outcrop grab samples taken from three separate known mineralized sites documented in ARIS report 28405
- Murex Creek Area – 1 select outcrop grab samples taken near a known mineralized site
- Murex Breccia Area – 4 select outcrop grab samples taken from four separate known mineralized sites documented in ARIS report 18391; and 7 select outcrop grab samples taken from areas of recently exposed or previously undocumented mineralized sites

The 2013 field program was prefaced in mid-June by a review of available data in BC ARIS reports, selecting and estimating the locations of targeted mineralized occurrences, and entering those locations as waypoints on a handheld Garmin GPSmap 60CSx GPS unit. As is required in British Columbia, prior notice of entry was provided to overlapping surface rights tenure holders including TimberWest and Mount Washington Alpine Resort on June 7, 2013. A 1 day pre-program site visit was also completed by the author on June 12, 2013 including meeting with the CEO of the resort, and checking the status of various access roads to the targeted mineralized occurrences. Arrangements for accommodations at the resort village
were made, and field equipment and supplies were prepared during mid-June. An access agreement for future work programs from August 15 to October 15, 2013 was completed on July 8, 2013 at the request of Timberwest on behalf of North Bay, which appears in Appendix 2.

From June 24 to June 27, 2013 four full days were spent by the author accompanied by a field assistant traversing by truck and on foot, and sampling of, the targeted mineralized occurrences at 17 different locations on the Mount Washington Property (see Figure 2h). All 17 rock samples were taken from blasted rock cuts along logging roads or quarries, or natural outcrops including creek beds, with rock sample locations and site details shown in Appendix 1. At each sample site, GPS locations and site characteristics were recorded on water-proof forms, digital photographs were taken, and metal tags with sample numbers and flagging tape were affixed to adjacent shrubs or tree branches. All 17 rock samples were taken in duplicate, and one of each duplicate sample pair was sent on June 28, 2013 by the author via Greyhound Bus Parcel Express to AGAT Laboratories in Burnaby, B.C. for geochemical analysis, as per the chain of custody form which appears in Appendix 1. The other duplicate sample pair was retained by the author, cut into 1 cm. thick slabs by the author using a rock saw, and analyzed using a binocular microscope with descriptions shown in Appendix 1. On July 17, 2013 final geochemical results were received from AGAT Laboratories in Report 13V731930, which is also shown in Appendix 1, which also contains table of geochemistry results and selected highlights. All rock sample taken were select grabs with the sole purpose of characterizing the mineralization, and should not be assumed to be representative of the mineralization.

The significant results and interpretation of the 2013 rock sample sites is discussed by target area and by sample as follows:

**Oyster Breccia Area: see Figures 3a, 4a, 5a, 6a, 7a**

**E5123127: 5516609 N, 334464 E, 1069 m. elevation on cell mineral claim 752243**

East Pyrrhotite Creek Pyrite Gold Zone at sample site 87-P-6 in ARIS 17193 is located in a small waterfall near the mouth of a small tributary along the east side of Pyrrhotite Creek. It consists of rusty, vuggy quartz-calcite-sulphide stockwork veins oriented at 040/40 and 105/80, exposed over 2.5 m. thickness, and hosted by heterolithic breccia. The sample yielded an elevated value of **58 ppm antimony**; and a slightly elevated value of 132 ppm zinc. Access to the sample site
was from the resort north by truck via Piggott Main and east via Branch 126, and north by foot along Pyrrhotite Creek.

E5123128:  5516495 N, 334354 E, 1084 m. elevation on cell mineral claim 752243

Middle Pyrrhotite Creek Flat Gold Zone at sample site 87-P-3 in ARIS 17193 is located along the west bank in a small waterfall along Pyrrhotite Creek. It consists of a monolithic volcanic clast breccia with a vuggy quartz-carbonate-sulphide matrix with veins oriented at 205/90, exposed over 0.75 m. thickness, and containing sulphide aggregates including traces of pyrite, arsenopyrite and chalcopyrite. The sample yielded elevated values of 377 ppm arsenic and 107 ppm antimony; and slightly elevated values of 0.589 ppm gold, 313 ppm copper and 43.3 ppm molybdenum. Access to the sample site was from the resort north by truck via Piggott Main and east via Branch 126, and north by foot along Pyrrhotite Creek.

E5123129:  5516461 N, 334029E, 1136 m. elevation on cell mineral claim 1018530

Upper Pyrrhotite Creek Pyrite Gold Zone at sample site 87-P-2 or 87-P-1 in ARIS 17193 is located in small cascade in Pyrrhotite Creek. It consists of brecciated, altered sandstone containing banded and fractured quartz-carbonate-sulphide stockwork veins oriented at 285/50 and 020/10, exposed over 1 m. thickness, and containing banded and fractured sulphide aggregates including arsenopyrite, pyrite and chalcopyrite. The sample yielded elevated values of 1.39 g/t gold, 1530 ppm arsenic, 206 ppm antimony and 1200 ppm zinc; and slightly elevated values of 3.2 ppm silver and 479 ppm copper. Access to the sample site was from the resort north by truck via Piggott Main and east via Branch 126, and north by foot along Pyrrhotite Creek.

The Oyster Breccia sampling yielded variably elevated values in gold, silver, arsenic, copper, molybdenum, antimony and zinc from isolated but focused quartz-carbonate-sulphide veins, stockworks and matrix aggregates within brecciated and variable host rocks. This is consistent with the form and geochemical signature of BC Mineral Deposit Profile Epithermal Au-Ag-Cu: High Sulphidation - H04, or Subvolcanic Cu-Au-Ag (As-Sb) - L01, but the sizes and grades found to date are far too small and low for economic considerations. However, larger and higher grade mineralized bodies may exist nearby, and modern geophysical techniques may be useful to detect such bodies, if they exist.
Wolf Lake Area: see Figures 3c, 4c, 5c, 6c, 7c

E5123137: 5515935 N, 340737 E, 335 m. elevation on cell mineral claim 939370

Lupus Road Zone at sample sites documented in ARIS 15034 and 28405 is located in an outcrop road cut along the southwest side of logging road Branch 101A about 1 km. west of Wolf Lake. It consists of a quartz-sulphide vein oriented at 314/25, exposed over 0.1 m. thickness, and containing zoned clusters and bands of sulphides including pyrite, chalcopyrite and sphalerite, and hosted in mafic volcanics. The sample yielded elevated values of 27.5 g/t silver, 1.18% copper, 67 ppm bismuth, 26 ppm tellurium and 390 ppm zinc; and slightly elevated values of 0.142 g/t gold. Access to the sample site was from Strathcona Parkway north along Branch 101 to Rossiter Main, and southeast along Branch 101A.

E5123138: 5515888 N, 341123 E, 317 m. elevation on cell mineral claim 939370

Lupus Bluff Zone at sample sites documented in ARIS 28405 is located in a small bluff along the southwest side of an elongated outcrop adjacent to a small creek about 600 m. west of Wolf Lake. It consists of a rusty and vuggy quartz-sulphide oriented at 305/20, exposed over 0.05 m. thickness and hosted in mafic volcanics, from which only a small sample could be extracted due to surface weathering. The sample yielded elevated values of 16.4 g/t gold, 13.6 g/t silver, 1360 ppm arsenic, 1090 ppm copper and 1120 ppm zinc; and a slightly elevated value of 20 ppm bismuth. Access to the sample site was from Strathcona Parkway north along Branch 101 to Rossiter Main, southeast along Branch 101A, and east on foot across the small creek.

The Wolf Lake Area yielded variably elevated values in gold, silver, copper, arsenic, bismuth, tellurium and zinc from gently northeast-dipping, parallel and possibly stacked, narrow quartz-sulphide veins following geological structures and contacts, hosted by mafic volcanics. This is consistent with the form and geochemical signature of BC Mineral Deposit Profiles Epithermal Au-Ag-Cu: High Sulphidation - H04, or Epithermal Au-Ag: Low Sulphidation - H05, but the dimensions and grades found to date are far too small and low for economic considerations. However, neither of these occurrences have been tested by drilling or bulk sampling, which could substantially advance them, as was done at the Lakeview-Domineer Zone. Modern geophysical techniques may also be useful to guide drilling programs.
Murex Creek Area: see Figures 3c, 4c, 5c, 6c, 7c

E5123139: 5516175 N, 339406 E, 331 m. elevation on cell mineral claim 1017938

The Central Murex Creek Vein at sample sites documented in ARIS 16412 is located along the east side in Murex Creek 10 m. south of a small tributary entering the creek from the southeast. Murex Creek occupies a linear 1.5 km. long fault structure oriented 010° in this area, and creek water levels were very high at the time of sampling, preventing access to much of the creek bed. The sample was taken from a 0.25 m. thick exposure of sheared and brecciated siltstone containing quartz-calcite-sulphide stockwork veins with trace fine grained sulphides, oriented at 010/20, which may not be the site of previous positive sampling results. The sample yielded only slightly elevated values of 0.306 g/t gold, 243 ppm copper and 240 ppm zinc. Access to the sample site was from Strathcona Parkway north along Branch 101, and then west on foot.

Two other sample sites along Murex Creek (Lower Murex Creek Vein and Murex Creek Copper-Moly Zone) were targeted during the 2013 field program, but could not be accessed due to very high creek water levels at the time. The results of the sampling in the Murex Creek area are inconclusive, but the geological setting is similar, and possibly related, to that found to the east in the Wolf Lake Area. The three occurrences should be sampled when accessible, and all structures in the area should be carefully prospected for epithermal vein type mineralization.

Murex Breccia Area: see Figures 3b, 4b, 5b, 6b, 7b

E5123130: 5513817 N, 337502 E, 956 m. elevation on cell mineral claim 980310

The Murex D Zone at sample sites documented in ARIS 18391 is located along the northeast flank of Mt. Washington, between logging roads and about 400 m. southwest of the former MWC mill site. It consists of silicified, chloritic, weakly magnetic monomictic hydrothermal breccia containing mafic volcanic clasts and quartz-sulphide-epidote stockwork stringers and matrix fill including chalcopyrite and pyrrhotite, sampled over a 2 m. thick outcrop exposure oriented at 215/65. The sample yielded elevated values of 3.55 g/t gold, 11.9 g/t silver, 0.749% copper, 70.6 ppm molybdenum and 327 ppm zinc; and a slightly elevated value of 11 ppm bismuth. Access to the sample site was from Strathcona Parkway northwest along Branch 62 past the former MWC mill site, southeast along a new switchback logging road, and by foot.
E5123131: 5514041 N, 337435 E, 902 m. elevation on cell mineral claim 980310

The Murex D Zone at sample sites documented in ARIS 18391 is located near logging roads about 400 m. west of the former MWC mill site. It consists of magnetic, chloritic, polymictic hydrothermal breccia containing mafic volcanic and sandstone clasts and quartz-epidote-sulphide matrix including chalcopyrite, pyrrhotite and pyrite, sampled over a 1 m. thick outcrop exposure oriented at 180/70. The sample yielded only slightly elevated values of 249 ppm copper. Access to the sample site was from Strathcona Parkway northwest along Branch 62 past the former MWC mill site, southeast along a new switchback logging road, and by foot.

E5123132: 5514065 N, 337426 E, 891 m. elevation on cell mineral claim 980310

The Murex D Zone exposed at this sample site is located along a recent logging road cut about 400 m. west of the former MWC mill site, and was not exposed during historical field programs. It consists of magnetic, chloritic, polymictic hydrothermal breccia containing mafic volcanic and felsic intrusive clasts and brecciated quartz-chlorite-epidote-sulphide matrix including pyrrhotite, chalcopyrite and pyrite, sampled over a 1 m. thick rock cut exposure oriented at 085/90. The sample yielded an elevated value of 82 ppm tungsten, and a slightly elevated value of 438 ppm copper. Access to the sample site is the same as E5123131.

E5123133: 5513912 N, 337555 E, 879 m. elevation on cell mineral claim 980310

The Murex D Zone exposed at this sample site is located along a recent logging road cut about 300 m. southwest of the former MWC mill site, and was not exposed during historical field programs. It consists of vuggy, rusty, chloritic, matrix-supported hydrothermal breccia with mixed lithology clasts and brecciated quartz-sulphide-epidote matrix with coarse sulphides including pyrite, pyrrhotite, chalcopyrite and arsenopyrite, sampled over a 0.2 m. thick vein-like exposure oriented at 215/85. The sample yielded elevated values of 154 ppm arsenic and 23 ppm tellurium; and a slightly elevated value of 457 ppm copper. Access to the sample site is the same as E5123131.

E5123134: 5513934 N, 337550 E, 878 m. elevation on cell mineral claim 980310

The Murex D Zone exposed at this sample site is located along a recent logging road cut about 300 m. southwest of the former MWC mill site, and was not exposed during historical field programs. It consists of...

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programs. It consists of a silicified, Polymictic intrusive/hydrothermal breccia with mixed
lithology clasts and quartz-epidote-chlorite-sulphide stringers, clusters and disseminations
including pyrrhotite, chalcopyrite, pyrite and sphalerite, sampled over a 20 m. thick exposure
oriented at 240/75. The sample yielded an elevated value of 638 ppm copper, and a slightly
elevated value of 23 ppm tungsten. Access to the sample site is the same as E5123131.

E5123135: 5514003 N, 337837 E, 777 m. elevation on cell mineral claim 980310

The Murex D Zone exposed at this sample site documented in ARIS 18391 is located in the rock
cut at the northwest side of the MWC mill site crusher. It consists of magnetic, chloritic, matrix-
supported intrusive/hydrothermal breccia containing mix lithology clasts and quartz-epidote-
chlorite-biotite-sulphide stringers containing clustered and disseminated sulphides including
pyrrhotite, chalcopyrite, pyrite and sphalerite, sampled over a 0.3 m. thick exposure oriented at
110/90 paralleling a narrow felsic intrusive dike. The sample yielded an elevated value of 953
ppm copper, and a slightly elevated value of 14.4 ppm molybdenum. Access to the sample site
is from Strathcona Parkway northwest along Branch 62 to the former MWC mill site.

E5123136: 5514678 N, 337553 E, 700 m. elevation on cell mineral claim 980271

The Murex A Zone exposed at this sample site documented in ARIS 18391 is located within
Murex Creek along its southeast bank at the confluence of a small north-flowing creek. It
consists of magnetic, massive mafic volcanics containing fine grained sulphides as fracture
fillings, elongate clusters and disseminations including pyrrhotite, pyrite and chalcopyrite,
sample over a 2 m. thick exposure oriented at 230/60, paralleling Murex Creek. The sample
yielded an elevated value of 2580 ppm copper, and slightly elevated values of 1.7 ppm silver
and 20.1 ppm molybdenum. Access to the sample site is from Strathcona Parkway northwest
along Branch 62 to a northwest trending logging road and on foot to Murex Creek.

E5123140: 5514512 N, 336861 E, 910 m. elevation on cell mineral claim 966609

The Murex B Zone exposed at this sample site documented in ARIS 18391 is located in a road
cut along the southwest side of Branch 62 300 m. northwest of Murex Creek. It consists of
weakly magnetic, silicified, chloritic, massive to brecciated mafic volcanics containing quartz-
sulphide stockwork stringers, seams and blebs including pyrrhotite, pyrite and chalcopyrite,
sampled in a 0.02 m. thick exposed vein oriented at 250/90. The sample yielded elevated
values of **1020 ppm copper and 264 ppm molybdenum**, and a slightly elevated value of 19 ppm tungsten. Access to the sample site is from Strathcona Parkway northwest along Branch 62.

**E5123141:** 5514194 N, 337005 E, 896 m. elevation on cell mineral claim 966609

The Murex B Zone exposed at this sample site documented in ARIS 18391 is located in a road cut along the southwest side of Branch 62 just northwest of Murex Creek. It consists of highly silicified, matrix-supported Polymictic intrusive/hydrothermal breccia containing quartz-sulphide stringers and disseminated and clustered sulphides including pyrrhotite, chalcopyrite and pyrite, sampled in a 0.25 m. thick exposure with veins oriented at 020/80 and 010/55. The sample yielded elevated values of **0.474% copper and 159 ppm molybdenum**; and slightly elevated values of 4.5 g/t silver and 129 ppm zinc. Access to the site is the sample same as E5123140.

**E5123142:** 5513911 N, 337956 E, 799 m. elevation on cell mineral claim 966609

The Murex D Zone exposed at this sample site documented in ARIS 18391 is located in a road cut along the southwest side of Branch 62 about 100 m. southeast of the MWC mill site. It consists of a weakly magnetic, mixed lithology sample across a geological contact between chloritic, biotitic, brecciated mafic volcanics and an epidotic feldspar porphyry dike, containing elongated blebs, clusters and disseminations of sulphides including pyrrhotite, chalcopyrite, pyrite and bornite, sampled in a 0.1 m. thick exposed quartz vein oriented at 050/90. The sample yielded an elevated value of **1730 ppm copper**, and a slightly elevated value of 98.7 ppm zinc. Access to the sample site is the same as E5123140.

**E5123143:** 5513709 N, 338152 E, 810 m. elevation on cell mineral claim 966609

The Murex D Zone exposed at this sample site documented in ARIS 18391 is located in a road cut along the southwest side of Branch 62 about 500 m. southeast of the MWC mill site. It consists of magnetic, epidotic, matrix-supported intrusive breccia containing stockwork and net-textured veinlets and clusters of sulphides, including pyrrhotite, pyrite and chalcopyrite, sampled in a 0.2 m. thick exposed quartz vein oriented at 030/50. The sample yielded a slightly elevated value of **775 ppm copper**. Access to the sample site is the same as E5123140.
The Murex Breccia area samples from the 2013 field program yielded variably elevated values in copper, gold, silver, molybdenum, arsenic, bismuth, tellurium, tungsten and/or zinc. Many of the samples were from narrow quartz-sulphide veins cutting highly variable brecciated host rocks, and in all cases the sulphide mineralization occurs in stockwork veins, clusters and disseminations which appear to post-date the breccias. This is consistent with the form and geochemical signature of BC Mineral Deposit Profiles Subvolcanic Cu-Au-Ag (As-Sb) – L01, or Porphyry Cu-Mo-Au – L04; but the dimensions and grades found to date are far too small and low for economic considerations.

Pyrrhotite, chalcopyrite and pyrite are the dominant sulphide minerals in the 2013 samples, which are variably magnetic depending on their pyrrhotite content. Extensive historic diamond drilling from the Murex Breccia area yield much higher sulphide contents (primarily pyrrhotite and chalcopyrite) and also higher intercept values in copper and gold than did either the historic or recent surface rock samples. It is probable that grades increase with depth in the Murex Breccia, and if the contents of pyrrhotite and chalcopyrite (and copper grade) continue to correlate, it is reasonable to assume that magnetism can be used to target areas of higher grades. Based on this assumption, the large and intense magnetic high response (see Figure 2d) in the eastern portion of the Murex Breccia area is a good target area for future exploration at depth.

Drilling

Since no diamond core drilling has been done since 1992 on the Mount Washington Property, relevant details of all drilling have been included in the History section of this report. No attempt has been made by the author to tabulate or verify total numbers of holes or total metres drilled, particularly since details of most of the pre-production definition percussion and diamond drilling by Mt. Washington Copper during the early 1960’s is not available. All other operators used exclusively diamond drilling, and since the early 1980’s all operators used primarily NQ size drill core, but earlier operators generally used smaller diameter drill core.

Generally, drilling of the flat-lying tabular zones and veins at the Mount Washington Copper North and South Pits and at the Lakeview-Domineer Zone was done using vertical or steeply inclined drill holes, and core angles of mineralized structures were generally recorded in the drill logs. Therefore, drill intercepts for these zones and veins are generally close to true thicknesses, confirmed in the underground adits and in the exposures in the open pits.
sulphidic breccia zones in the Oyster Breccia and Murex Breccia areas, these mineralized zones have not been sufficiently drilled to establish their shapes and orientations, and therefore the relationships between drill intercepts and true thickness for these zones are unknown.

Sample Preparation, Analyses and Security

During the time period that extensive exploration work was conducted on the Mount Washington Property, it appears that industry standard methods were used for sample quality control, preparation, analyses and security by the operators undertaking the work. All field work was supervised by qualified and experienced professional geoscientists, who would have been able to identify unexpected discrepancies between sampled media and analytical results obtained from them. Although the use of blind analytical blanks and standards may have been employed on a few programs, it was neither a common practice nor routine procedure at the time the exploration work was done. In most cases, independent commercial analytical laboratories were used by the operators to prepare and analyses samples, and some certificates of analyses from those laboratories are available in ARIS reports for some of the exploration programs. However, the larger integrated exploration and mining companies such as Cominco and Noranda operated and utilized in-house analytical laboratories to process samples from at least some of their exploration programs. Although the author cannot certify any of the historical work, there is no reason to doubt the adequacy of sample preparation, security and analytical procedures related to sampling on the Mount Washington Property during its exploration history.

During the 2013 field program, the author used AGAT Laboratories to prepare and analyze the 17 rock samples taken, and the Chain of Custody Records, the Certificate of Analysis, and AGAT’s Accreditation documentation appear in Appendix 1. The samples were shipped by the author on June 28, 2013 via Greyhound Bus Parcel Express Station to Door from Nanaimo, BC to AGAT’s Burnaby, BC Laboratory, where the samples were received and sample preparation was completed using their 226-001 sample preparation method, crushing 75% of each sample to 2 mm, and pulverizing 250 g. to 85% to 75 microns. AGAT then shipped the sample pulps to their Mississauga, Ont. Laboratory where geochemical analyses were completed using their 201-070 method for multi-elements including 4-acid digestion and ICP-OES finish, and their 202-055 method for precious metals including fire assays for gold, platinum and palladium and ICP-OES finish. As per the author’s instructions, for 3 samples exceeding 50 ppm molybdenum, analyses for rhenium were done as well; for 1 sample exceeding 1% copper, the Cu-OL 201-072 method was used; and for the 1 sample exceeding 10 g/t gold, the Au-Grav 202-064 method was used.
No duplicate samples, blanks or standards were submitted by the author to AGAT. For the 17 samples analyzed from the 2013 field program, only the internal QA/QC procedures used by AGAT Laboratories were utilized and relied upon, which is deemed sufficient for the size and scope of the program, in the author’s opinion.

Data Verification

At the time that exploration work was conducted in the Mount Washington Property area, it appears that industry standard methods were used for quality control and data verification. Although the author cannot verify any of the historical work, there is no reason to doubt the adequacy of quality control measures and data verification procedures related to sampling during the exploration history of the area, and the Property.

In addition to the work completed in 2013 and described in the Exploration section, the author visited some of the mineralized exposures on the Mt. Washington property on three occasions between 2000 and 2005 as per the Introduction section of this report, with highlights summarized as follows:

September 14, 2000

The author visited the Mount Washington Property area as Regional Geologist for the B.C. Ministry of Energy and Mines, accompanied by District Manager Greg Carriere, P.Eng., and Cliff Rennie, P.Eng., President of Better Resources Ltd. Visits were made to the Lakeview-Domineer adit portal, the Domineer adits, and the Mt. Washington Copper North and South pits. The author took six selected grab samples, from which reference pieces were cut by the author and microscopically analyzed, and the remaining samples sent by the author to Acme Analytical Laboratories where they were crushed, pulverized and analyzed for multi-elements using induced coupled plasma (ICP) methods. The descriptions and analytical results were reported to Mr. Rennie and added to the ministry’s property files, with highlights by sample number as follows:

- **Sample 170569** was a select muck grab taken from the Lakeview-Domineer Adit Portal consisting of a massive sulphide vein containing 50% pyrite, 15% arsenopyrite, 10% chalcopyrite, with possible chalcocite, tetrathedrite and orpiment, and yielded 61.1 g/t gold, >10 g/t silver, 5.77% copper and >10% arsenic.
• **Sample 170570** was a select outcrop grab taken from outside the Lakeview-Domineer Adit Portal consisting of 0.1 m. from a 2 m. thick quartz-alunite-sulphide breccia striking 020° and dipping 15° east, containing 10% pyrite, 5% arsenopyrite, 2% chalcocite or tetrahedrite, and 1% chalcopyrite, and yielded 11.7 g/t gold, >10 g/t silver, 1.20% copper and 3.22% arsenic.

• **Sample 170571** was a select outcrop grab taken from the north wall of the South Pit and consisting of 3 m. thick vuggy quartz-sulphide-alunite vein striking 290° and dipping 15° north, containing 25% chalcocite or tetrahedrite, 5% chalcopyrite, with traces of arsenopyrite, bornite, pyrite and orpiment, and yielded 1.51 g/t gold, 4.62 g/t silver, 5.12% copper and 0.03% arsenic.

• **Sample 170572** was a select outcrop grab taken from the north wall of the South Pit and consisting of a quartz-sulphide vein of unknown thickness striking 135° and dipping 90°, containing 30% chalcopyrite, 5% bornite and minor chalcocite or tetrahedrite, azurite and malachite, and yielded 6.82 g/t gold, >10 g/t silver, 8.46% copper and 0.20% arsenic.

• **Sample 170573** was a select outcrop grab taken from the upper adit of the Domineer No.1 Vein and consisting of a 2 m. thick quartz-sulphide vein striking 240° and dipping 15° north, containing 50% arsenopyrite, 15% chalcopyrite, with traces of pyrite, bornite and orpiment, and yielded 11.8 g/t gold, >10 g/t silver, 2.24% copper and 1.63% arsenic.

• **Sample 170574** was a select outcrop grab taken from the south end of the North Pit and consisting of a 0.1 m. thick vuggy quartz-sulphide striking 270° and dipping 65° north, containing 10% arsenopyrite, 5% pyrite, 2% chalcopyrite, with traces of bornite, and yielded 0.28 g/t gold, >10 g/t silver, 3.49% copper and 0.16% arsenic.

**September 14, 2001**

The author visited the Mount Washington Property as Regional Geologist for the B.C. Ministry of Energy and Mines, accompanied by Prof. Steven Earle, PhD. of Malaspina University-College and two students. Visits were made to the former Mt. Washington Copper mill site within the Murex Breccia area where the author took 3 selected grab samples, and to other areas of the property area previously visited by the author. The samples were cut by the author, microscopically analyzed, but not sent for analyses, and with visual highlights as follows:
• **Sample 187597** was a select grab from the site of the coarse ore bin consisting of a 0.1 m. sulphide-quartz rock containing **50% chalcopyrite**, 20% pyrite, **5% bornite** and 5% magnetite.

• **Sample 187598** was another select grab from the site of the coarse ore bin consisting of a 0.1 m. quartz-sulphide rock containing 35% pyrite, **5% chalcopyrite**, and minor arsenopyrite and tetrahedrite.

• **Sample 187599** was a 0.1 m. select grab from a 10 m. square outcrop immediately northeast of the mill site consisting of chloritic and magnetic gabbro containing a **0.01 m. thick sulphide vein consisting mainly of chalcopyrite.**

**October 18, 2005**

The author visited the Lakeview-Domineer adit portal and Mt. Washington Copper North Pit in Mount Washington Property area as an independent mineral exploration consultant acting on behalf of SYMC Resources Ltd. who requested and paid for the visit, accompanied by Herb McMaster, President of SYMC and Cliff Rennie, P.Eng., President of Better Resources Ltd. Six samples were analyzed from the 12 taken and microscopically described confirmed results both visually and analytically from those taken and analyzed by the author in 2000. The six samples were sent by the author to Acme Analytical Laboratories where they were crushed, pulverized and analyzed for multi-elements using induced coupled plasma (ICP) methods, with highlights by sample number as follows:

• **Sample 201734** was a select float rock grab sample from the Lakeview-Domineer portal dump consisting of banded semi-massive sulphides containing 50% arsenopyrite, 15% pyrite, 15% chalcopyrite, 10% quartz, and 5% tetrahedrite, and yielded **55.7 g/t gold, 300 g/t silver, 4.4% copper and 8.47% arsenic.**

• **Sample 201735** was a select float rock grab sample from the Lakeview-Domineer portal dump consisting of banded massive sulphides consisting of 50% pyrite, 30% arsenopyrite, 15% chalcopyrite, 5% quartz and trace bornite, and yielded **95.6 g/t gold, 166 g/t silver, 3.05% copper and 21% arsenic.**

• **Sample 201736** was a select float rock grab sample from the Lakeview-Domineer portal dump consisting of a banded quartz-sulphide vein consisting of 50% quartz, 30% arsenopyrite, 10% chalcopyrite, 5% pyrite, 5% tetrahedrite and trace bornite, and yielded **31.2 g/t gold, 129 g/t silver, 1.77% copper and 26% arsenic.**
• **Sample 201741** was a select outcrop grab sample from the Mt. Washington Copper North Pit floor or wall consisting of a banded and brecciated quartz-sulphide vein containing 60% quartz, 15% arsenopyrite, 15% chalcopyrite, 9% pyrite and 1% bornite, and yielded **8.28 g/t gold, 95 g/t silver, 1.95% copper and 10.2% arsenic**.

• **Sample 201743** was a select outcrop grab sample from the Mt. Washington Copper North Pit floor or wall consisting of a quartz-sulphide vein containing 90% quartz, 9% chalcopyrite and 0.5% arsenopyrite, which yielded **1.89 g/t gold, 66 g/t silver, 3.21% copper and 2.34% arsenic**.

• **Sample 201744** was a select outcrop grab sample from the Mt. Washington Copper North Pit floor or wall consisting of a quartz-sulphide vein containing 50% quartz, 25% pyrite and 20% chalcopyrite, which yielded **6.94 g/t gold, 301 g/t silver, 6.69% copper, 0.53% arsenic and 0.39% bismuth**.

The three previous site visits by the author constitute verification of the nature and geochemistry of gold-silver-copper-arsenic mineralization occurring in the Lakeview-Domineer and Mt. Washington Copper Open Pit areas on or near the Mount Washington Property. Of particular interest is the vein orientation (135°/90°) of the outcrop source of sample 170572, suggesting that it may be a feeder vein or zone to the flat-lying vein or zone mined in the South Pit.

The 2013 field program undertaken by the author constitutes verification of the nature and geochemistry of the gold-silver-arsenic-copper-molybdenum-antimony-zinc mineralization in the Oyster Breccia area; the gold-silver-arsenic-bismuth-copper-tellurium-zinc mineralization in the Wolf Lake area; and the gold-silver-copper-molybdenum-tellurium-zinc mineralization in the Murex Breccia area.

None of the field verification by the author was of sufficient scope to verify dimensions and continuity of mineralized zones on or near the Mount Washington Property.

**Mineral Processing and Metallurgical Testing**
Since no mineral processing or metallurgical testing has been done since 2005 on mineral products from the Mount Washington Property area, relevant details of all such work have been included in the History section of this report. These testing programs are listed by dates as follows:

- 1941 – by the Canada Department of Mines and Resources – Mines and Geology Branch, for D.F. Kidd
- 1977-1981 – by B.C. Research for Imperial Oil Limited
- 1988 – by Bacon, Donaldson & Associates Ltd. for Imperial Metals Corp.
- 1990 – by Bacon, Donaldson & Associates Ltd. for Biomet Technology Inc.
- 1988-1990 – by G.W. Hawthorne for Better Resources Ltd.
- 2004-2005 – by Knelson Research & Technology for Pearl Asian Mining

The initial 1941 metallurgical test work and ore microscopy by the federal government identified the need to produce selective flotation to create multiple (3 or 4) concentrate products from the Domineer mineralization to effectively recover gold, silver and copper. This was probably considered too challenging for mine operators to develop at that time. Curiously, any metallurgical test work for its copper-rich deposits by Mt. Washington Copper Co. is absent in the public records. Although it is not known what if any metallurgical work was done by Mt. Washington Copper before starting production in 1961, the fact that they tried to produce a single (copper) flotation concentrate product suggests they were not concerned about recoveries of precious metals. They acquired, relocated and erected the former Woodgreen processing plant from the Motherlode Mine (MINFILE 082ESE034) near Greenwood, B.C. The plant processed copper-gold-silver mineralization from 1956 to 1959 primarily from local copper skarn deposits, in which all metals typically report to a single (copper) concentrate product. This plant may not have been appropriate for processing the more complex gold-silver rich Domineer mineralization, and not optimal for the copper rich Mt. Washington Copper Deposits from the South and North Pits. In the 1977-81, B.C. Research on behalf of Imperial Oil investigated copper heap leaching for processing mineralization at Mt. Washington, but without positive results.
As bio-leaching technology for processing complex ores began to evolve in the 1980’s, several companies looked at Mt. Washington as a potential candidate site. Veerman-Botel Ltd. investigated bio-leaching in the early 1980’s after acquiring the Mt. Washington property, as did metallurgical consultants Bacon, Donaldson & Associates for several mining companies in the late 1980’s. Better Resources solicited proposals from several metallurgical consultants and engaged G.W. Hawthorne, P.Eng. in 1988 to design a processing plant to optimize primarily gold recoveries from the Lakeview-Domineer Zone. By 1989, Mr. Hawthorne, supported by ore microscopy work by J.F. Harris, used bio-oxidation technology to design a 200 TPD mine-site plant producing two products: a copper-gold flotation concentrate and a gold bullion, with combined recoveries of 92% gold and 68% copper. The plant would send 99% of the arsenic to the tailings dam as ferric arsenate, but the recoveries and distribution of silver and other metals in the ore are not mentioned.

In 2004, Pearl Asian Mining Industries Inc. engaged Knelson Research & Technology to conduct gravity concentration test work for gold, silver and platinum from the Lake Zone of Wolf Lake Property, with poor recoveries results. In 2005, mineralogical work on samples from the Lake Zone by John Payne, Ph.D., P.Geol. of Vancouver Petrographics Ltd. for Pearl Asian Mining provided detailed descriptions of gangue and sulphide minerals, and native gold which occurs mainly with arsenopyrite. This is similar to the style of mineralization at Lakeview-Domineer.

**Mineral Resource Estimates**

Of the twenty four veins and zones identified in the Geological Setting and Mineralization section of this report, historical or other mineral resource estimates have been established on only four veins plus the tailings dam, none of which are to NI43-101 and CIM standards and therefore cannot be relied upon. None of the nine breccia zones has been subjected to sufficient and successful detailed work to date to establish mineral resources estimates. Of the four veins with mineral resource estimates, two were partially mined out by Mt. Washington Copper Co. Ltd. and have combined statistical data, and the other two may be contiguous and therefore one is included in the other. The four veins and tailings are summarized as follows:

**Domineer No.1 Vein (may be contiguous with Lakeview Zone to the west)**

Included in Lakeview-Domineer Resource by Better Resources (1989), shown below.
Mt. Washington Copper No.1 Zone (Tunnel Block, South Pit)

From 1965 to 1967, 342,600 tonnes of ore averaging 1.005% copper, 0.413 g/t gold, and 22.5 g/t silver were produced from the No.1 and No.2 Zones combined. In addition, mineral resources remaining adjacent to one or both pits were estimated at 305,720 tonnes @ 1.07% copper by W.G. Stevenson (1970). These zones are adjacent to and surrounded by the Mount Washington Property, shown schematically in Figures 2b, 3a and 3d.

Mt. Washington Copper No.2 Zone (Noranda Block, North Pit)

Included in Mt. Washington Copper No.1 Zone above.

Lakeview Zone (West Grid, Meadows; may be contiguous with Domineer No.1 Vein)

Combined Lakeview-Domineer mineral resource estimate by Better (1989) as follows:

<table>
<thead>
<tr>
<th>Area/Zone</th>
<th>Min. Grade</th>
<th>Min. Thickness</th>
<th>Tonnes</th>
<th>Gold</th>
<th>Silver</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lakeview-Domineer</td>
<td>3.4 g/t gold</td>
<td>2.0 metres</td>
<td>301,270</td>
<td>7.2 g/t</td>
<td>37.7 g/t</td>
</tr>
</tbody>
</table>

Drill-Indicated Open Pit:

<table>
<thead>
<tr>
<th>Area/Zone</th>
<th>Min. Grade</th>
<th>Min. Thickness</th>
<th>Tonnes</th>
<th>Gold</th>
<th>Silver</th>
</tr>
</thead>
<tbody>
<tr>
<td>West Grid</td>
<td>1.7 g/t</td>
<td>not specified</td>
<td>249,546</td>
<td>6.2 g/t</td>
<td>25.4 g/t</td>
</tr>
</tbody>
</table>

Based on the detailed observations from the Lakeview-Domineer adit driven by Better in 1987-88, as detailed in the History Section of this report, it appears that there are higher grade sections of the zone which may be defined by more detailed work. Only a portion of the Lakeview-Domineer historical mineral resources are located on the Mount Washington Property, shown schematically in Figures 2b and 3d.

Mt. Washington Copper Tailings Dam
Tonnage is calculated from production records in BC MINFILE as 342,600 tonnes milled less 17,200 tonnes concentrate produced for a net amount of 325,400 tonnes in the tailings dam. Grades are estimated based on the 2011 sampling program completed on a portion of the tailings dam as 0.124 g/t gold, 5.83 g/t silver, 0.102% copper and 8.54 g/t tellurium.

Adjacent Properties

There are two areas with significant mineral properties including a past producer and a developed prospect immediately adjacent to and surrounded by the Mount Washington Property, six significant prospects or developed prospects, and one producing mine in the Central Vancouver Island or nearby South Coast area. Refer to Figures 1a to 1g, 2b to 2h, 3c, and 3d for both regional and local significant mineral properties and other occurrences.

In the Wolf Lake Area of the Mount Washington Property, a one cell mineral claim 1017897 held 50% each by B.W. Scott and S.J. Scott covers Lupus 1 MINFILE 092F308, described both in the History Section and the Geological Setting and Mineralization Section of this report. The claim is surrounded by the Mount Washington Property, as shown if Figures 2a, 2b and 3c.

In the Domineer Area of the Mount Washington Property, 7 cell mineral claims covering a combined total of 14 cells are held by several individuals as follows:

- Claim 980266 – 1 cell held 100% by D.A. Zamida
- Claim 980267 - 4 cells held 100% by S.J. Scott
- Claim 980268 – 3 cells held 50% each by M. Martindale and B.W. Scott
- Claim 980270 – 1 cell held 100% by K.B. Funk
- Claim 980312 – 1 cell held 100% by D.A. Zamida
- Claim 980313 – 3 cells held 100% by D.A. Zamida
- Claim 1018605 – 1 cell held 100% by F.R. Laroche

These 7 claims are completely surrounded by the Mount Washington Property, as shown in Figures 2a, 2b and 3d. Cell claims 980266 and 980313 both held by Mr. Zamida cover approximately the northern half of the Lakeview-Domineer Resource Area, described both in the History Section and the Geological Setting and Mineralization Section of this report. Cell claim 966629 held by North Bay Resources Ltd. covers approximately the southern half of the
Lakeview-Domineer Resource Area, as well as the Domineer Veins 1-4, subject to the limitations of the underlying 4 Domineer crown granted mineral claims discussed below. Cell claims 980266, 980267, 980268, 980312 and 980313 combined cover the former Mt. Washington Copper Mine Open Pits. The Washington and Glacier Breccias are covered by cell claims 090266 and 980268. Cell claim 980313 covers the Float Area occurrence.

Also in the Domineer Area, 4 crown granted mineral claims (Domineer No. 1, 3, 4 and 6 Mining Claims) which include gold and silver mineral right only are held 100% by Clibetre Explorations Ltd. and are partially overlapped by cell mineral claims as follows:

- Claim 966629 – 8 cells held 100% by North Bay Resources Inc.
- Claim 980266 – 1 cell held 100% by D. A. Zamida
- Claim 980268 – 3 cells held 50% each by M. Martindale and B.W. Scott
- Claim 980271 – 12 cells held 100% by North Bay Resources Inc.

Not quite adjacent to the Property is the Forbidden Plateau area of Strathcona Provincial Park which begins 1 km. southwest of the Mount Washington Property, and is the site of several significant MINFILE prospects and showings discovered prior to and actively being explored up until the time of exclusion of the area from mineral exploration and mining by the B.C. government in 1990. Locations and selected highlights of these occurrences are as follows:

- The Gem Lake (MINFILE 092F239) prospect is located 5 km. southwest of the Mount Washington Property, and was explored extensively by Falconbridge Ltd. in the 1960’s-1980’s primarily for gold and silver, as the base metals were held by the crown. Five types of mineralization were discovered, including tectonic breccia bodies occurring along steeply-dipping, east trending fault structures, associated with Eocene quartz diorite intrusive stocks and dikes. Drilling in 1961 on the main showing yielded 18 metres @ 1% copper, and in 1963 another hole intersected 0.02% molybdenum over an unspecified width. Rock sample AF05320 taken in 1987 from a mineralized tectonic breccia measuring 15 m. by 30 m. and containing 5-20% chalcoprite yielded 3.0 g/t gold and 18 g/t silver.

- The Faith Lake (MINFILE 092F240) prospect is located 6 km. southwest of the Mount Washington Property, and was also explored extensively by Falconbridge Ltd. in the 1960’s-1980’s. At least 30 quartz-sulphide veins occurring in steeply-dipping, north and east-trending shears and faults and associated with Eocene quartz diorite intrusive stocks and dikes were discovered and explored. Drilling in 1963 yielded an intercept of 0.15 m. @ 25 g/t gold, 120 g/t silver and 3% copper.
• The Schev (MINFILE 092F241) prospect is located 5.5 km. southwest of the Mount Washington Property, and was explored by Falconbridge Ltd. as part of the Faith Lake property in the 1960’s-1980’s. A sericitic tectonic breccia containing arsenopyrite, chalcopyrite and pyrrhotite is exposed over an area of 20 m. by 3 m., associated with a Eocene felsic dike. Drilling in 1964 yielded an intercept of 1.5 m. @ 27 g/t gold and 43 g/t silver from a breccia zone with an interpreted orientation of 080° strike and 45° dip south.

• The Jo Anne (MINFILE 092F329) prospect is located 2.5 km. southwest of the Mount Washington Property, was explored by Iron River Resources Ltd., B.P.-Selco, and Noranda from 1984 to 1988. Drilling by Noranda in 1988 yielded multiple wide copper intercepts over an area 200 m. in diameter from quartz-sericite altered breccia associated with Eocene intrusives. This included hole NFP-88-5 which yielded 21.6 m. @ 0.43% copper from 48.4 to 70 m., and 12.4 m. @ 0.42% copper from 100.1 to 112.5 m., and two other holes, NFP-88-2 and NFP-88-3 which yielded wider zones of generally lower grade copper values.

The mineral occurrences on the Mount Washington Property and those of the Forbidden Plateau area establish a NE-SW trending belt of Eocene age intrusives with associated gold-silver-copper-arsenic bearing breccia bodies, shown if Figures 1a – 1g, and 2a – 2g. This trend may be projected to the southwest across Strathcona Provincial Park to the west coast of Vancouver Island, where Selkirk Metals Corp. holds the Catface Copper property, located 75 km. southwest of the Mount Washington Property. The Cliff Zone of the Catface Copper property contains an indicated mineral resource estimate of 56,863,000 tonnes @ 0.40% copper and inferred mineral resource estimate of 262,448,000 tonnes @ 0.38% copper (Selkirk Metals Corp., 2009). The Catface (MINFILE 092F120) and adjacent Irishman Creek (MINFILE 092F251) developed prospects are classified as porphyry copper-molybdenum-gold-rhenium deposits and are associated with multi-phase, Eocene intrusive stocks and dikes.

Near the centre of Strathcona Provincial Park along the southwest projection of the same trend lies Nyrstar’s Myra Falls Operation, which has been successfully producing and processing polymetallic sulphide deposits containing copper, zinc, lead, silver and gold since 1966. Myra Falls is located 30 km. southwest of the Mount Washington Property, and is hosted in the much older Devonian age Mount Sicker Volcanics which underlie portions of Vancouver Island.
Along the northeast projection of the same trend across Georgia Strait, 50 km. northeast of the Mount Washington Property, Eastfield Resources Ltd. and Prophecy Resource Corp. hold the OK Copper property. The North Lake Zone of the OK North developed prospect (MINFILE 092K008) contains an inferred mineral resource estimate of 86,800,000 tonnes @ 0.31% copper and 0.014% molybdenum (Prophecy Resource Corp., 2006). The OK North and adjacent OK South MINFILE 092F057 developed prospects are classified as copper-molybdenum-gold-rhenium deposits and are associated with multi-phase Cretaceous and possibly younger intrusive stocks, dikes and breccia bodies.

**Other Relevant Data and Information**

Technically, the Mount Washington Property and adjacent properties represent an attractive advanced exploration project, with many clustered polymetallic mineral occurrences in a geological setting similar to active and successful mining camps elsewhere. However, the social license to develop and operate a mine is not guaranteed to the mineral tenure holder anywhere, including on Vancouver Island. Only one metal mine (Myra Falls Operation) is currently operating on Vancouver Island, no new metal mine has been permitted since the 1960’s, and several active exploration properties were expropriated during expansion of local provincial parks in the early 1990’s, as was done with the former Falconbridge Ltd. properties, Gem Lake and Faith Lake, and the former Jo Anne property operated by Noranda Exploration Company Ltd. when Strathcona Provincial Park was expanded. It is possible that local surface tenure holders, recreation/conservation groups and/or communities will actively and successfully oppose future mine development in the Mt. Washington area. The treaty process between various First Nations and federal and provincial governments is still in progress on Vancouver Island with one final agreement completed (Maa-nulth), another final agreement in negotiation (K’omoks) in place, and several more at various stages. Co-operation agreements between local First Nations and a proponent is usually required to successfully develop a mineral property today in B.C. However, it is assumed under the B.C. government’s 2-Zone Model within its Sustainability in B.C. Mining Criteria that the Mount Washington Property is available for future exploration, development and mining, and that the B.C. Ministry of Energy and Mines will act as an effective advocate and permitting authority on behalf for any proponent who follows its laws and regulations required during all stages of any future work on the Mount Washington Property.

**Interpretations and Conclusions**
The various surveys, analyses, tests and excavations conducted on the Mount Washington Property area during the +50 year period mainly from 1940 to 1992 has identified at least 24 mineral occurrences containing varying combinations of gold, silver, copper, molybdenum and/or tellurium in clusters over an area of 10 km. by 4 km. Hundreds of ore-grade intercepts at current metal prices were achieved in natural and trenched outcrop samples or diamond drill holes by numerous operators on most of the 24 mineral occurrences on or adjacent to the Property. One attempt at mining and recovering only copper from a narrow vein deposit using open pit mining methods and producing a single flotation concentrate was not successful, and resulted in environmental damage that has since been mitigated. This may have been due in part to problems with mining narrow vein deposits by open pit methods, and in part due to the polymetallic nature of the mineral deposit and related analytical and metallurgical challenges.

Systematic, multi-year exploration programs completed by junior and senior companies have been successful both on the Mount Washington Property and in the surrounding mineral area. However, a portion of the mineral area to the southwest of the Mount Washington Property was alienated from exploration and development in 1990 when it was being actively explored by major companies. At that time, the Lakeview-Domineer project was in the B.C. Mine Development Review process, and included a viable metallurgical process to recover both gold and copper. Funding to develop the project could not be obtained by owner Better Resources, due in part to the mining industry’s negative perception of political environment for mining in B.C. at that time, including Vancouver Island, and due to low metal prices. The project ceased, and very limited exploration activity has occurred in the Mt. Washington area since 1992.

The Subvolcanic Cu-Au-Ag (As-Sb) - (L01) mineral deposit profile category created by the BC Geological Survey in 1995 to capture the Equity Silver Past Producer (MINFILE 093L001) in central B.C. appropriately describes all the metallic mineral occurrences in the Mount Washington Property area. This target exploration model was not published or well known at the time most of the exploration work was done in the area, and so is a new model to test. The older and more common Epithermal and Porphyry mineral deposit profiles and their sub-types can be genetically and spatially related to sub-volcanic types within a district, and are also appropriate and have been successfully used in the Mount Washington Property area.

With current metal prices, the Mount Washington Property warrants modern data compilation, and systematic multi-year exploration programs. Such programs would be more effective in both the Lakeview-Domineer area and in the Wolf Lake area, if the fragmented tenure status in
those areas of the property were consolidated through agreements on various mineral tenures. The Murex Breccia and Oyster Breccia areas are well covered by North Bay’s mineral tenures.

**Recommendations**

The Mt. Washington property should first be re-evaluated based on its regional geological setting compared to other similar settings worldwide which host past or currently producing mines, with consideration to mineral deposit types and models. Today’s geological literature is much more extensive than it was at the times when the Mt. Washington area was being actively explored. In the author’s opinion, some of the key points to consider in such a comparison would be:

- Eocene age intrusive associated deposits and mineral districts
- Breccias – tectonic, intrusive and hydrothermal
- Fault structures – low angle detachment faults, steep faults
- Polymetallic – gold, silver, copper, molybdenum and/or tellurium
- Epithermal, porphyry and sub-volcanic mineral deposit types

Using today’s and projected future estimates of metal prices for gold, silver, copper, molybdenum and tellurium, reasonable exploration target models should be established for the Mount Washington Property. An investigation should be made of current mining and processing techniques and costs at operations exploiting similar deposits worldwide, including both open pit and underground operations. In the author’s opinion, the following combined exploration target models could be used as a starting point:

- Underground, flat-dipping, discontinuous but clustered narrow vein deposits totaling 1 million tonnes @ 10 g/t gold, 100 g/t silver, 0.50% copper, 10 g/t tellurium and 5% arsenic, requiring complex processing for optimal recovery of gold, silver, copper and tellurium while suppressing arsenic
- Underground, steeply-dipping, bulk mineable, clustered, breccia deposits totaling 100 million tonnes @ 1 g/t gold, 5 g/t silver, 0.50% copper, 0.01% molybdenum, 5 g/t tellurium and 0.5% arsenic, with similar processing requirements as above plus molybdenum recovery
The extensive data record available for the Mount Washington Property needs to be assembled into a single G.I.S.-based, 3-D model, and all rock units used by different operators need to be integrated into single, coherent geological legend. Because of the size and variable integrity of the data record, this process will take considerable time, effort and cost. At the end of the process, both property wide and detailed plan and sections views should be available for any selected portions of the property showing any and all combinations of historic geology, geochemistry, geophysics (by type), trenching, drilling, and excavations. Using this geo-referenced database, well-conceived exploration programs should be initiated.

A phased, systematic exploration program is warranted on the property to achieve the following primary exploration objectives, in the author’s opinion:

- Discover new economic mineral deposits of any type on the property through systematic, phased exploration probably commencing with airborne geophysics
- Establish new, bulk-mineable indicated resources of sufficient grades to be mined by underground methods in one or more of the breccia zones by diamond drilling
- Establish measured resources in the Lakeview-Domineer Zone by re-opening the portal, re-mapping the adit, definition drilling and detailed interpretation
- Further evaluate the metal resources in and metallurgical characteristics of the existing tailings pond from the historic mining operations at Mt. Washington

Also, the author recommends the following environmental and socio-economic programs be initiated to complement the exploration and environmental objectives:

- Establish baseline environmental database using historic and modern data
- Identify, negotiate and establish contract, employment and other co-operation agreements with local First Nations bands
- Negotiate and establish access road use and other co-operation agreements with local surface rights holders TimberWest and the Mount Washington Alpine Resort
- Negotiate and establish work progress update protocols with local recreation and conservation groups and communities
The following Phase 1 combined compilation, planning, exploration, environmental and socio-economic programs and budgets are proposed for the first year at the Mt. Washington property:

**Table 3 – Proposed Work Program and Budget Summary**

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Units/Timing</th>
<th>Unit Cost</th>
<th>Item Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Re-evaluation</td>
<td>Mining Geol./Eng.</td>
<td>1 month</td>
<td>$10,000 / month</td>
<td>$10,000</td>
</tr>
<tr>
<td>GIS Compilation</td>
<td>2 GIS Technicians</td>
<td>3 months</td>
<td>$15,000 / month</td>
<td>$45,000</td>
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<tr>
<td>Geological Legend</td>
<td>Project Geologist</td>
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<td>$10,000 / month</td>
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</tr>
<tr>
<td>Plan Exploration</td>
<td>Project Geologist</td>
<td>2 months</td>
<td>$10,000 / month</td>
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<tr>
<td><strong>Subtotal</strong></td>
<td>Compilation &amp; Planning</td>
<td>Months 1-3</td>
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<tr>
<td>New Discoveries</td>
<td>1000 km. Airborne</td>
<td>1 month</td>
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<tr>
<td>Explore Breccias</td>
<td>2000 m. Drilling</td>
<td>2 months</td>
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<tr>
<td>Lakeview-Domineer</td>
<td>Underground Work</td>
<td>2 months</td>
<td>$100,000 / month</td>
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</tr>
<tr>
<td>Tailings Pond</td>
<td>250 m. Drilling</td>
<td>1 month</td>
<td>$100 / metre</td>
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</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td>Exploration</td>
<td>Months 4-5</td>
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</tr>
<tr>
<td>Environmental Baseline Program</td>
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<td>10 months</td>
<td>$2,500 / month</td>
<td>$25,000</td>
</tr>
<tr>
<td>Road Use, Surface Agreements</td>
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<td>3 month</td>
<td>$5,000 / month</td>
<td>$15,000</td>
</tr>
<tr>
<td>First Nations Agreements &amp; Meetings</td>
<td></td>
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<td>$5,000 / month</td>
<td>$50,000</td>
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<tr>
<td>Local Communities Meetings</td>
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<tr>
<td><strong>Subtotal</strong></td>
<td>Environmental &amp; Socio-Economic</td>
<td>Months 3-12</td>
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<tr>
<td><strong>TOTALS</strong></td>
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<td>12 Months</td>
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<td>$1,000,000</td>
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</tbody>
</table>

Phase 2 and subsequent programs and budgets would follow depending on the success of the Phase 1 programs, with the exploration program probably escalating annually in size and cost.
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I, Jacques Houle, P.Eng. Do hereby certify that:

1. I am currently employed as a consulting geologist by Jacques Houle, P.Eng. Mineral Exploration Consulting 6552 Peregrine Road, Nanaimo, British Columbia, Canada V9V 1P8.
2. I graduated with a Bachelor’s of Applied Science degree in Geological Engineering with specialization in Mineral Exploration from the University of Toronto in 1978.
3. I am a member in good standing with the Association of Professional Engineers and Geoscientists of British Columbia, the Society of Economic Geologists, the Association for Mineral Exploration British Columbia, and the Vancouver Island Exploration Group; I am also a member of the Technical Advisory Committee for Geoscience B.C.
4. I have worked as a geologist for 35 years since graduating from university, including 5 years as a mine geologist in underground gold and silver mines, 15 years as an exploration manager, 3 years as a government geologist and 10 years as a mineral exploration consultant.
5. I have read the definition of “qualified person” set out in National Instrument 43-101 (“NI 43-101”) and certify that by reason of my education, membership in a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a “qualified person” for the purposes of NI 43-101.
7. I have had prior involvement with the properties that are the subject of the Technical Report, both as a government geologist and as a consultant.
8. I am not aware of any material fact or material change with respect to the subject matter of the Technical Report that is not reflected in the Technical Report, the omission to disclose which makes the Technical Report misleading.
9. I am independent of the issuer applying all the tests in NI 43-101.

Dated this 2\textsuperscript{nd} Day of August, 2013.

Signature of Qualified Person

Jacques Houle, P.Eng.

Print name of Qualified Person

Seal of Qualified Person
Figure 1b
Central Vancouver Island Infrastructure
Figure 1f
Central Vancouver Island
Gold Geochemistry
Figure 1g
Central Vancouver Island Molybdenum Geochemistry
This map is a user generated static output from an Internet mapping site and is for general reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable. THIS MAP IS NOT TO BE USED FOR NAVIGATION.
Figure 2f
Mount Washington
Gold Geochemistry
Figure 2h
North Bay Resources Inc.
Mount Washington Property
2013 Rock Sample Locations

- ▼ 2013 Rock Samples
- ● 2011 Tailings Samples
- □ 2009 Bulk Sample
Figure 3a

North Bay Resources Inc.
Mount Washington Oyster Breccia Area
2013 Rock Sample Locations
Figure 3b

North Bay Resources Inc.
Mount Washington Murex Breccia Area
2013 Rock Sample Locations

- 2013 Rock Samples
- 2011 Tailings Samples
- 2009 Bulk Sample
Figure 3c

North Bay Resources Inc.
Mount Washington Wolf Lake Area
2013 Rock Sample Locations

- 2013 Rock Samples
- 2011 Tailings Samples
- 2009 Bulk Sample
Figure 3d

North Bay Resources Inc.
Mount Washington Domineer Area
2009 Bulk Sample Location

- 2013 Rock Samples
- 2011 Tailings Samples
- 2009 Bulk Sample
Figure 3e
North Bay Resources Inc.
Mount Washington MWC Tailings Area
2011 Tailings Sample Locations

- 2013 Rock Samples
- 2011 Tailings Samples
- 2009 Bulk Sample
Figure 4a

North Bay Resources Inc.
Mount Washington Oyster Breccia Area
2013 Rock Sample Geochemistry
Figure 4b

North Bay Resources Inc.
Mount Washington Murex Breccia Area
2013 Rock Sample Geochemistry
Figure 4c

North Bay Resources Inc.
Mount Washington Wolf Lake Area
2013 Rock Sample Geochemistry
Gold ppm in Rocks

- 1.5
- 1
- 0.5

Figure 5a

North Bay Resources Inc.
Mount Washington Oyster Breccia Area
2013 Rock Sample Geochemistry
Figure 5b

North Bay Resources Inc.
Mount Washington Murex Breccia Area
2013 Rock Sample Geochemistry
Figure 5c

North Bay Resources Inc.
Mount Washington Wolf Lake Area
2013 Rock Sample Geochemistry
Figure 6a

North Bay Resources Inc.
Mount Washington Oyster Breccia Area
2013 Rock Sample Geochemistry
Figure 6b

North Bay Resources Inc.
Mount Washington Murex Breccia Area
2013 Rock Sample Geochemistry
Figure 7a

North Bay Resources Inc.
Mount Washington Oyster Breccia Area
2013 Rock Sample Geochemistry
Figure 7b

North Bay Resources Inc.
Mount Washington Murex Breccia Area
2013 Rock Sample Geochemistry
Appendix 1

2013 Rock Sample Data
<table>
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<tr>
<th>Sample #</th>
<th>Date</th>
<th>Sampler</th>
<th>Property</th>
<th>Location</th>
<th>Details</th>
<th>UTM Zone</th>
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<th>Elevation</th>
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<td>24-Jun-13</td>
<td>Houle</td>
<td>Mt.Wash.</td>
<td>Oyster Brecia Site #3 near mouth of E. tributary of Pyrrhotite Ck - site of BP-P-6 in ARIS 17193</td>
<td>Set QC grab of 2.5 m. exposure of heterolithic breccia with foliation, veins @ 040/40, 105/90</td>
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<td>Oyster Brecia Site #2 along Pyrrhotite Ck - site of BP-P-3 in ARIS 17193</td>
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<td>Murex Brecia Site #3 along Pyrrhotite Ck - site of 87-P-2 or 87-P-1 in ARIS 17193</td>
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<td>Murex Brecia Site #4 - Murex Zone D/E - Old Mill Crusher Rockcut NW. Side - ARIS 18391 site</td>
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<td>Murex Brecia Site #3 - Murex Zone A in Murex Creek E. bank at confluence of stream E. side</td>
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<td>Murex Brecia New Logging Road Rockcut #2 - across Murex Zone D</td>
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<td>Murex Brecia Site #1 - Murex Zone U/E - Old Mill Crusher Rockcut NW. Side - ARIS 18391 site</td>
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<td>Connie Hill</td>
<td>Wolf #3 Road Zone Gold - along NW side logging cut - sample results in ARIS 16405</td>
<td>Set QC grab of 0.15 m. exposure of quartz-sulphide vein @ 315/25 in mafic volcanics</td>
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<td>Connie Hill</td>
<td>Wolf #4 Bluff Zone Gold - along SW side bluff - at sample site 6629 from ARIS 26405</td>
<td>Set QC grab of 0.05 m. exposure of quartz-sulphide vein @ 355/30 in mafic volcanics</td>
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<td>Murex Creek Site #5 - E. side of Murex Ck 10 m. S. of E. tributary - site of sample #129 in ARIS 1839</td>
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<td>Murex Brecia Old MWC Mine-Mill Road Rockcut #3 - Murex Zone D</td>
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<td>Beige, white &amp; green, fine-grained, rusty, vuggy, calcite-quartz-feldspar-sulphide vein containing 0.5% aggregates and clusters of fine grained sulphides including pyrite, chalcopyrite, arsenopyrite, sphalerite</td>
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<td>Buff, brown, white &amp; bronze, clast-supported, monolithic hydrothermal breccia containing 80% coarse to fine, angular to subangular clasts, 15% fine, vuggy, quartz-carbonate-sulphide matrix, 5% sulphide aggregates including pyrite, arsenopyrite, chalcopyrite</td>
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<td>E5123129</td>
<td>Buff, white, black &amp; bronze, highly brecciated, channel sandstone containing 50% banded, textural, quartz-carbonate-sulphide stockwork stringers containing 10% fine, bandied and rounded aggregates and clusters including arsenopyrite, pyrite, chalcopyrite</td>
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<td>E5123130</td>
<td>Dark green, brown and bronze, weakly magnetic, clast-supported, monolithic hydrothermal breccia containing 95% mafic volcanic clasts &amp; 5% fine quartz-sulphide-epidote stockwork stringers and matrix containing 2% to medium aggregates of sulphides including chalcopyrite and pyrrhotite</td>
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<td>Dark grey-green, brown and bronze, magmatic, chloritic, polymictic hydrothermal breccia containing 50% mafic volcanics &amp; 10% sandstone clasts &amp; 10% vuggy, brecciated quartz-sulphide-sulphide matrix and stringers containing 5% aggregates of sulphides including chalcopyrite, pyrite, sphalerite</td>
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<td>E5123132</td>
<td>Dark grey-green and bronze, magmatic, chloritic, polymictic hydrothermal breccia containing 60% mafic volcanics &amp; 10% felsic intrusive clasts &amp; 25% brecciated quartz-chlorite-epidote-sulphide matrix containing 5% aggregates and disseminations of sulphides including pyrite, chalcopyrite, pyrite, arsenopyrite</td>
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<td>Dark, Buff and bronze, vuggy, rusty, chloritic, polymictic, matrix-supported hydrothermal breccia containing 20% mafic volcanic clasts, 25% felsic intrusive clasts, 10% brecciated quartz-sulphide-epidote matrix containing 10% coarse sulphides including pyrite, pyrrhotite, chalcopyrite, arsenopyrite</td>
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<td>E5123134</td>
<td>Brown &amp; bronze, aluminous, polymictic, matrix-supported intrusive breccia containing 20% mafic volcanic clasts, 20% sandstone clasts, 10% pyrrhotite blebs, 5% brecciated intrusive matrix, 15% clustered and disseminated sulphides including pyrite, chalcopyrite, pyrite, bornite</td>
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<td>Dark green, grey, chloritic, polymictic intrusive breccia containing 50% mafic volcanic clasts, 40% porphyritic matrix, 10% quartz-sulphide-chlorite-limonite-sulphide stringers, 5% clustered and disseminated sulphides including pyrite, chalcopyrite, pyrite, sphalerite</td>
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<td>Dark grey, magnetic, massive mafic volcanics with 10% fine grained sulphides as fracture fillings, elongate blebs, clasts and disseminations, including pyrrhotite, chalcopyrite, pyrite</td>
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<td>Dark grey, magnetic, massive mafic volcanics with 10% fine grained sulphides as fracture fillings, elongate blebs, clasts and disseminations, including pyrite, pyrrhotite, chalcopyrite, sphalerite</td>
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<td>Rusty, vuggy, weakly banded, coarse quartz-sulphide vein; 50% fine to coarse sulphides as zoned clusters and oxide hands, including pyrite, arsenopyrite, chalcopyrite, sphalerite</td>
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<td>E5123139</td>
<td>Pale grey and dark grey, 10% shattered silicate welded by 10% fine, fine-grained to crystalline, locally brecciated, quartz-calcite-sulphide stockwork containing trace very fine grained sulphides</td>
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<td>Dark grey-green, weakly magnetic, silicified, chloritic, massive to brecciated mafic volcanic containing 10% quartz-sulphide-stockwork stringers, 5% fine sulphides as elongate blebs and vugs in stringers and as clusters in crystallized breccia clasts, including pyrite, pyrrhotite, chalcopyrite</td>
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<td>Dark grey-green, highly silicified, matrix-supported, cryptocrystalline hydrothermal breccia containing 50% coarse volcanics &amp; pyrrhotite clasts, 40% medium porphyritic matrix, 10% quartz-sulphide stringers, 5% disseminations &amp; clustered sulphides over pyrrhotite, chalcopyrite, pyrite</td>
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<td>E5123142</td>
<td>Dark brown, green and bronze, weakly magnetic, felsic, brecciated mafic volcanics intruded by 10% epilastic felsic pyrophyllite dikes, 10% sulphides as elongated blebs, clasts and disseminations containing pyrite, chalcopyrite, pyrite, bornite</td>
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<td>Dark grey, light grey and green, magnetic, epidotic, matrix-supported intrusive/sedimentary breccia containing 10% fine sulphides as stockwork and net-textured veiners and clusters, including pyrite, pyrrhotite, chalcopyrite</td>
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2013 Rock Sample Descriptions for Mt. Washington Project
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Comments RDL - Reported Detection Limit

Acid Digest - Metals Package, ICP-OES finish (201070)

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Comments RDL - Reported Detection Limit
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**Chain of Custody Record - Mining**

**Report To**
- Company: Jacques Houle P.Eng. Mineral Exploration Cons
- Contact: Jacques Houle
- Address: 6552 Peregrine Road
- Phone: 250-390-3930
- AGAT Quote #: 21909KB

**Invoice To**
- Same Yes □ / No □

**Sample Sequence Number**

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**Analysis Authorization**
- Name: Jacques Houle
- Email: jhoule06@shaw.ca

**Sample Preparation**
- AGAT Sample Prep Code (specify below)
  - 226-001

**Sample Storage**
- Return to Client
- Discard Material

**Special Instruction**
- Include disposal fee with invoice.

**Courier**

**Special Instructions**
- Date: June 28, 2013

**Print Name**

---

**Laboratory Use Only**

**Arrival Condition:**
- Good □
- Poor (complete notes)

**AGAT WO#:** 13V731930

**Received:** 07/02/2013

**Notes:**
- Turnaround Time Required (TAT):
  - □ Regular TAT
  - □ Rush TAT
  - Rush surcharge may apply

**Material Matter**
- □ Drill Core
- □ Pulp
- □ Rock
- □ Water
- □ Till/Soil/Silt
- □ Other (specify below)
CLIENT NAME: JACQUES HOULE MINERAL EXPLORATION  
6552 PEREGRINE ROAD  
NANAIMO, BC V9V1P8  
(250) 390-3930  

ATTENTION TO: JACQUES HOULE  

PROJECT NO:  
AGAT WORK ORDER: 13V731930  
SOLID ANALYSIS REVIEWED BY: Yufei Chen, Analyst  
DATE REPORTED: Jul 17, 2013  
PAGES (INCLUDING COVER): 11  

Should you require any information regarding this analysis please contact your client services representative at (905) 501-9998  

*NOTES  

All samples are stored at no charge for 90 days. Please contact the lab if you require additional sample storage time.  

Results relate only to the items tested and to all the items tested.
### Certificate of Analysis

**AGAT WORK ORDER: 13V731930**

**CLIENT NAME:** JACQUES HOULE MINERAL EXPLORATION  
**PROJECT NO.:**

**ATTENTION TO:** JACQUES HOULE

---

**4 Acid Digest - Metals Package, ICP-OES finish (201070)**

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**DATE RECEIVED:** Jul 02, 2013  
**DATE REPORTED:** Jul 17, 2013  
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Results relate only to the items tested and to all the items tested

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CERTIFICATE OF ANALYSIS (V1)

Page 2 of 11

5623 McADAM ROAD  
MISSISSAUGA, ONTARIO  
CANADA L4Z 1N8  
TEL (905)501-9998  
FAX (905)501-0589  
http://www.agatlabs.com
## Certificate of Analysis

**AGAT WORK ORDER:** 13V731930  
**CLIENT NAME:** JACQUES HOULE MINERAL EXPLORATION  
**PROJECT NO:**  
**ATTENTION TO:** JACQUES HOULE

### 4 Acid Digest - Metals Package, ICP-OES finish (201070)

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**DATE RECEIVED:** Jul 02, 2013  
**DATE REPORTED:** Jul 17, 2013  
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Results relate only to the items tested and to all the items tested.
# Certificate of Analysis

**AGAT WORK ORDER:** 13V731930  
**PROJECT NO:**

**CLIENT NAME:** JACQUES HOULE MINERAL EXPLORATION  
**ATTENTION TO:** JACQUES HOULE

## Certificate of Analysis Details

**AGAT WORK ORDER:** 13V731930

**DATE RECEIVED:** Jul 02, 2013  
**DATE SAMPLED:** Jul 02, 2013  
**DATE REPORTED:** Jul 17, 2013  
**SAMPLE TYPE:** Rock

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**Comments:** RDL - Reported Detection Limit  
4511455-4511471 As, Sb values may be low due to digestion losses.

**Certified By:**

**RESULTS RELATE ONLY TO THE ITEMS TESTED AND TO ALL THE ITEMS TESTED**
### Certificate of Analysis

**AGAT WORK ORDER: 13V731930**

**CLIENT NAME:** JACQUES HOULE MINERAL EXPLORATION  
**PROJECT NO:**

**ATTENTION TO:** JACQUES HOULE

**DATE SAMPLED:** Jul 02, 2013  
**DATE RECEIVED:** Jul 02, 2013  
**DATE REPORTED:** Jul 17, 2013  
**SAMPLE TYPE:** Rock

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**Comments:** RDL - Reported Detection Limit

**Results relate only to the items tested and to all the items tested**

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**Certified By:**

---

**AGAT CERTIFICATE OF ANALYSIS (V1)**

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<td>Sn</td>
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<td>&lt; 5</td>
<td>&lt; 5</td>
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Results relate only to the items tested and to all the items tested.
## Fire Assay - Au, Pt, Pd Trace Levels, ICP-OES finish (202055)

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</table>

Results relate only to the items tested and to all the items tested.
### 4 Acid Digest - Metals Package, ICP-OES finish (201070)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Expect</th>
<th>Actual</th>
<th>Recovery</th>
<th>Limits</th>
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<th>Actual</th>
<th>Recovery</th>
<th>Limits</th>
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<tbody>
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<td>Ag</td>
<td>14</td>
<td>13</td>
<td>96%</td>
<td>90% - 110%</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Al</td>
<td>6.96</td>
<td>6.91</td>
<td>99%</td>
<td>90% - 110%</td>
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<td></td>
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<tr>
<td>As</td>
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<td>Ba</td>
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<td>188</td>
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<td>Ca</td>
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<td>90% - 110%</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Co</td>
<td>22.1</td>
<td>21</td>
<td>95%</td>
<td>90% - 110%</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Cu</td>
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<td>5963</td>
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<td>Fe</td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>P</td>
<td>892</td>
<td>990</td>
<td>111%</td>
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<tr>
<td>S</td>
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<td></td>
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<td>90% - 110%</td>
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### Fire Assay - Au, Pt, Pd Trace Levels, ICP-OES finish (202055)

<table>
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<tr>
<th>Parameter</th>
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Results relate only to the items tested and to all the items tested.
## Method Summary

### CLIENT NAME: JACQUES HOULE MINERAL EXPLORATION  
### PROJECT NO:  
### AGAT WORK ORDER: 13V731930  
### ATTENTION TO: JACQUES HOULE

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# Method Summary

**CLIENT NAME:** JACQUES HOULE MINERAL EXPLORATION  
**PROJECT NO:**  
**AGAT WORK ORDER:** 13V731930  
**ATTENTION TO:** JACQUES HOULE

<table>
<thead>
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*Results relate only to the items tested and to all the items tested*
Canadian Association for Laboratory Accreditation Inc.
Certificate of Accreditation

AGAT Laboratories - Burnaby
AGAT Laboratories Ltd.
120 - 8600 Glenlyon Parkway
Burnaby, British Columbia

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communiqué dated 8 January 2009).

Accreditation No.: A3788
Issued On: November 14, 2011
Accreditation Date: November 14, 2011
Expiry Date: May 14, 2014

President & CEO

This certificate is the property of the Canadian Association for Laboratory Accreditation Inc. and must be returned on request; reproduction must follow policy in place at date of issue. For the specific tests to which this accreditation applies, please refer to the laboratory's scope of accreditation at www.cala.ca.
CERTIFICATE OF ACCREDITATION

AGAT LABORATORIES LTD.
5623 McAdam Road, Mississauga, ON L4Z 1N9

having been assessed by the Standards Council of Canada (SCC) and found to conform with the requirements of ISO/IEC 17025:2005 (CAN-P-4E) and the conditions for accreditation established by SCC is hereby recognized as an

ACCREDITED TESTING LABORATORY

for the specific tests or types of tests listed in the scope of accreditation approved by SCC and found on the SCC website at www.scc.ca.

CERTIFICAT D'ACCÉDITATION

AGAT LABORATORIES LTD.
5623 McAdam Road, Mississauga, ON L4Z 1N9

ayant fait l'objet d'une évaluation réalisée par le Conseil canadien des normes (CCN) et être jugé conforme aux exigences énoncées dans ISO/IEC 17025:2005 (CAN-P-4E) et aux conditions liées à l'accréditation établies par le CCN, est, en vertu du présent certificat, reconnu comme étant un

LABORATOIRE D'ESSAIS ACCRÉDITÉ

pour les essais ou types d'essais énumérés dans la portée d'accréditation approuvée par le CCN et figurant dans le site Web du CCN à www.ccn.ca.

Accredited laboratory number: / Numéro de laboratoire accrédité: 665

Accreditation date: / Date d'accréditation: 2010-02-17

Issued on: / Délivré le: 2010-02-17

Expiry date: / Date d'expiration: 2014-02-17

Chairman (SCC) / Président (CCN)

This accreditation is the formal recognition of the technical competence of the laboratory for the approved scope. In addition, this laboratory has demonstrated that they operate a quality management system (refer to the SCC website for the joint ISO-ILAC-IAF Communiqué dated January 2009).

Cette accréditation est la reconnaissance officielle de la compétence technique du laboratoire pour la portée d'accréditation approuvée. Ce laboratoire a également prouvé qu'il gère un système de management de la qualité (voir le site Web du CCN pour le communiqué commun ISO-ILAC-IAF daté de janvier 2009).
SCOPE OF ACCREDITATION

AGAT LABORATORIES LTD.
5623 McAdam Road
Mississauga, ON
L4Z 1N9

Accredited Laboratory No. 665
(Conforms with requirements of CAN-P-1579)

CONTACT: Mr. Nick Boulton
TEL: (905) 712-5075
FAX: (905) 712-5120
EMAIL: boulton@agatlabs.com
URL: www.agatlabs.com

CLIENTS SERVED: All interested clients

FIELDS OF TESTING: Chemical/Physical

PROGRAM SPECIALTY AREA: Mineral Analysis

ISSUED ON: 2011-11-07

VALID TO: 2014-02-17

The physical sample preparation involving accredited test methods as listed on the scope of accreditation may be performed at AGAT Laboratories Ltd. laboratory or at off-site sample preparation locations that are monitored regularly for quality control and quality assurance practices.

METALLIC ORES AND PRODUCTS

Mineral Analysis Testing

Mineral Assaying
Geotechnical Testing
CRUSHING OF MINERAL TESTING SAMPLES USING ROCKLABS BOYD CRUSHER MARK III - MINING BRANCHES

SAMPLE SIZE REDUCTION OF MINERAL TESTING SAMPLES - MINING BRANCHES

Determination of Total Carbon and Sulphur in Geological Samples Using Infrared Combustion

Determination of Sixteen (16) Metals in Geological Samples employing Peroxide Fusion with Inductively Coupled Plasma - Optical Emission Spectroscopy (ICP-OES) finish [Ni, Co, Fe, S, Mg, Pb, Si, Ca, Al, Mn, Zn, Cr, Sn, As, Mo; ICP-OES]

Determination of Gold and Silver in Mineralogical Samples by Lead Fusion Fire Assay with Gravimetric Finish

Determination of Gold, Platinum and Palladium in Geological Samples by Lead Fusion Fire Assay with Inductively Coupled Plasma Optical Emission Spectroscopy (ICP-OES) finish [Au, Pt, Pd; ICP-OES]

Screen Analysis and Particle Size Distribution of Mineralogical Samples

Determination of Total Nitrogen in Mineralogical Samples by Inert Gas Fusion - Thermal Conductivity Detection

Determination of Oxides in Mineralogical Samples Using Lithium Metaborate Fusion and Inductively Coupled Plasma - Optical Emission Spectroscopy (ICP-OES) [SiO₂, Al₂O₃, Fe₂O₃, CaO, MgO, Na₂O, K₂O, Cr₂O₃, TiO₂, MnO, P₂O₅, SrO, BaO]

Determination of Rare Earth Elements in Mineralogical Samples Using Lithium Borate Fusion and Inductively Coupled Plasma - Mass Spectroscopy (ICP-MS) [Ce, La, Y, Dy, Er, Eu, Gd, Ho, Lu, Tb, Tm, Yb, Nd, Pr, Sm, Th, U]

Determination of Metals in Mineralogical Samples Using Aqua Regia (Nitric and Hydrochloric Acid) Digestion and a Combination of Inductively Coupled Plasma - Optical Emission Spectroscopy (ICP-OES) and Inductively Coupled Plasma - Mass Spectroscopy (ICP-MS) [Ag, As, Au, Ba, Be, Bi, Ca, Cd, Ce, Co, Cr, Cs, Cu, Ga, Ge, Hf, Hg, In, La, Li, Mn, Mo, Ni, Nb, P, Pb, Re, Rb, Sb, Sc, Se, Sn, Sr, Ta, Te, Th, Ti, U, V, W, Y, Zn, Zr]

Determination of Metals in Mineralogical Samples Using Aqua Regia (Nitric and Hydrochloric Acid) Digestion and Inductively Coupled Plasma - Optical Emission Spectrometry (ICP-OES) [Ag, Al, As, B, Ba, Be, Bi, Fe, Ga, Hg, In, K, La, Li, Mg, Mn, Mo, Na, Ni, P, Pb, Rb, S, Sb, Sc, Se, Sn, Sr, Ta, Te, Th, Ti, U,
V, W, Y, Zr, Zn]

MIN-200-12021 Determination of Loss on Ignition in Mineralogical Samples

MIN-200-12022 Determination of Mercury in Mineralogical Samples using Aqua Regia (Nitric and Hydrochloric Acid) Digestion and Flow Injection - Cold Vapour Atomic Absorption Spectrometry

MIN-200-12023 Determination of Gold, Platinum and Palladium in Mineralogical Samples by Lead Fusion Fire Assay with Inductively Coupled Plasma - Mass Spectroscopy (ICP-MS) Finish

MIN-200-12024 Determination of Specific Gravity in Mineralogical Samples by a Gas Pycnometer

MIN-200-12025 Determination of Acid-Base Accounting Procedure

MIN-200-12034 Determination of Metals in Mineralogical Samples Using Inductively Coupled Plasma - Optical Emission Spectroscopy (ICP-OES) Following Four Acid Digestion [Ag, Al, As, Ba, Be, Bi, Ca, Cd, Ce, Co, Cr, Cs, Cu, Fe, Ga, In, K, La, Li, Mg, Mn, Mo, Na, Ni, P, Pb, Rb, S, Sb, Sc, Se, Sn, Sr, Ta, Te, Th, Ti, U, V, W, Y, Zr, Zn]

MIN-200-12035 Determination of Metals in Mineralogical Samples using Four Acid Digestion and a Combination of Inductively Coupled Plasma - Optical Emission Spectroscopy (ICP-OES) and Inductively Coupled Plasma - Mass Spectroscopy (ICP-MS) [Ag, As, Au, Ba, Be, Bi, Ca, Cd, Ce, Co, Cr, Cs, Cu, Ga, Ge, Hf, Hg, In, La, Li, Mn, Mo, Ni, Nb, P, Pb, Re, Rb, Sb, Sc, Se, Sn, Sr, Ta, Te, Th, Ti, U, V, W, Y, Zn, Zr]

Notes:

CAN-P-1579: Requirements for the Accreditation of Mineral Analysis Testing Laboratories

S. Cross, Director, Conformity Assessment

Date: 2011-11-07

Number of Scope Listings: 19
SCC 1003-15/833
Partner File #0
Partner:
Appendix 2

2013 Access Agreement
July 8, 2013

Jacques Houle, Consultant
c/o North Bay Resources
PO Box 162
Skippack, PA
19474 USA

Dear Mr. Houle:

Re: NOTICE TO PRIVATE LAND OWNER
SECTION 19 OF THE MINERAL TENURE ACT

TimberWest Forest Company ("TimberWest") has received your notification (the "Notice"), dated June 7, 2013 as required under section 19 of the Mineral Tenure Act (British Columbia) (the "Act"), describing your exploration activities (the "Work") on certain mineral claims (the "Claims") for which you require access to, or over, lands beneficially owned by TimberWest (the "Lands") from August 15, 2013 to October 15, 2013.

Due to the nature of TimberWest's activities on the Lands, TimberWest has a significant interest in ensuring that both access to the Lands and the Work conducted are in accordance with the Act. Nevertheless, TimberWest will not necessarily oppose the Work provided that you make the acknowledgements and agree as provided in Schedule A to this letter. Notwithstanding the foregoing and anything to the contrary contained herein, this letter, including its schedules, does not constitute a license and TimberWest is under no obligation to facilitate or otherwise assist you in accessing the Lands to conduct the Work. TimberWest reserves all of its rights, both under the Act and otherwise, in respect of the Lands.

Please review and confirm that you are in agreement with this letter by signing a copy in the area provided at the end of Schedule A and returning to my attention at your earliest convenience and, in any event, prior to commencing the Work.

Yours truly,

TIMBERWEST FOREST COMPANY
by its Managing Partner,
TimberWest Forest Corp.

Per: Dianna Lau
Paralegal, Real Estate Group

08.07.2013
SCHEDULE A
ACKNOWLEDGEMENT AND AGREEMENT

This is Schedule A to a letter dated July 8, 2013. In the event that the person signing this Schedule A is a corporation or other entity that is not a natural person, this Schedule A shall be interpreted accordingly. Capitalized terms not otherwise defined herein shall have the meanings ascribed to them in such letter.

I, Jacques Houle, on behalf of North Bay Resources, HEREBY ACKNOWLEDGE AND AGREE THAT:

1. My intention is to access the Claims and I require access to or over the Lands for such purpose.

2. Before I use any roads located on the Lands, commence exploration for any minerals on or in the Lands or enter on the Lands, I must provide to TimberWest:
   (a) a current Free Miner Certificate in good standing issued in my name; and
   (b) my plans for exploration of the Lands, such plans to be in a form acceptable to TimberWest and to include my intended exploration methods of and access routes to the Lands.

3. I will be liable to TimberWest (as surface owner) for any damage or loss incurred as a result of the Work and exploration activities on the Lands.

4. I WILL BE REQUIRED TO ENTER INTO A FORMAL AGREEMENT WITH TIMBERWEST PRIOR TO PRODUCTION AND HAULING OVER THE LANDS.

5. If there are substantial changes to the activity described in the Notice, or if the dates in which the Work will occur change by more than seven days, I will provide TimberWest with an amended notice.

6. Prior to the commencement of any mechanical work which may disturb the surface of the mineral claims, I am required to serve a Notice of Work to TimberWest and file that Notice of Work with the Chief Gold Commissioner and the District Inspector of Mines, and I must also obtain a permit under the Mines Act (British Columbia). The Act and the Mines Act stipulate that a Notice of Work must be filed with the District Inspector of Mines before exploration and development can commence.

7. TimberWest has not made, and will not make, any representation or warranty to me as to any matter, including, without limitation, the existence, quality or condition of any minerals on or in the Lands, the suitability of any minerals for any purpose, the condition

08.07.2013
of the Lands or any roads, gates or locks located on the Lands, or any other matter in any way related to or connected to any of the foregoing or my intended use thereof.

8. Under no circumstances do mineral rights allow for the construction of a cabin, the right to use the surface for domestic use, or the right to cut timber for any reason. A MINERAL CLAIM MAY ONLY BE USED FOR THE BUSINESS OF MINING. Any such construction or use of TimberWest’s private lands, without TimberWest’s express written permission, will result in TimberWest filing a complaint to the Chief Gold Commissioner in accordance with Section 40 of the Act.

9. TimberWest’s authorized representative for the purpose of the subject matter of this letter is Gary Lawson ((250) 286-7307 email: lawson@g@timberwest.com) (the “Authorized Representative”).

10. TimberWest will be actively logging in this area throughout the year, and will be hauling logs on the roads. Due to this activity it may be necessary to restrict my access during certain periods of the term. I MUST ADVISE THE AUTHORIZED REPRESENTATIVE OF THE DATES AND TIMES I PLAN TO ACCESS THE LANDS AT LEAST TWO (2) DAYS PRIOR TO SUCH ACCESS OR AT THE DISCRETION OF THE AUTHORIZED REPRESENTATIVE. BY SIGNING THIS LETTER I AGREE TO ABIDE BY THE DIRECTIONS OF THE AUTHORIZED REPRESENTATIVE WITH RESPECT TO RESTRICTED ACCESS PERIODS.

11. PRIOR TO ENTRY OF THE LANDS I MUST ACCESS WWW.TIMBERWEST.COM/COMMUNITY/ACCESS.ASPX TO OBTAIN INFORMATION CONCERNING POSSIBLE HAZARDOUS WEATHER CONDITIONS AND/OR TEMPORARY CLOSURES OF THE LANDS.

12. TimberWest may at any time and from time to time prohibit or restrict access to the Lands for such period or periods of time as TimberWest may in its absolute discretion determine should TimberWest consider such prohibition or restriction justified on account of hazardous weather conditions or unreasonable interference with TimberWest operations or for any other reason, and I will at all times observe and conform with such prohibitions or restrictions.

13. I am not permitted to camp on the Lands without the express written consent of the TimberWest, at its sole discretion. Camping is defined as erecting a shelter, or parking a recreation vehicle or other vehicle for the purpose of remaining overnight.

14. I am not permitted to bring on to or operate any single-operator four wheel all-terrain vehicles, dune buggies or other home-built or modified 4x4 vehicles on the Lands.

15. Any individuals travelling within my vehicle shall be entitled to enter the Lands with me provided that I assume all responsibility for the actions of said individual(s).

16. If required, I will attend at TimberWest’s Campbell River Office at 4475 NI Highway, Campbell River, British Columbia, and provide all requested information, sign the Key Control Form (attached to this letter as Schedule B) and provide a $500 refundable
deposit per key, in order to obtain keys for TimberWest gates. I must return the gate key to TimberWest within ten (10) days after the expiry of my access date, which is October 25, 2013, failing which the deposit for the use of the gate key(s) will be forfeited to TimberWest.

17. I MUST KEEP THIS LETTER WITH ME AT ALL TIMES WHEN ON TIMBERWEST LANDS TO CONFIRM THAT I HAVE PROVIDED ADEQUATE NOTIFICATION TO TIMBERWEST AS PER SECTION 19(1) OF THE ACT.

18. Forest industry vehicles and equipment will have priority of use on the Lands.

19. I agree that I will use the Lands at my own risk and I freely assume all dangers and risks associated with such use, and that TimberWest will not be liable for, and I hereby waive, any claim, action, damage, liability, cost or expense which I may suffer, incur or be put to in connection with any occurrence on the Lands or with the use and occupation of the Lands by myself or by TimberWest, including, without limitation, personal injury, including death, and/or property damage or loss. TimberWest will not be liable to me in connection with access to the Lands, whether based on contract, tort (including negligence and strict liability), under warning or otherwise, for any special, indirect, incidental or consequential loss or damage whatsoever, including loss of use of equipment or facilities and loss of profits or revenues. TIMBERWEST RESTRICTS, MODIFIES AND EXCLUDES ALL OF ITS DUTIES AS AN OCCUPIER IN RESPECT OF THE LANDS EXCEPT THE DUTIES SET OUT IN SECTION 3(3) OF THE OCCUPIERS LIABILITY ACT (BRITISH COLUMBIA), INCLUDING ALL AMENDMENTS THERETO, AND I ACKNOWLEDGE AND ASSUME ALL RISKS ASSOCIATED WITH SUCH RESTRICTION, MODIFICATION AND EXCLUSION. The waiver set out above will be effective and binding upon my heirs, executors and administrators in the event of my death.

20. Nothing contained in this letter (including this Schedule A) constitutes a license and TimberWest is under no obligation to facilitate or otherwise assist me in accessing the Lands to conduct the Work. I understand that TimberWest reserves all of its rights, both under the Act and otherwise, in respect of the Lands.

21. BY SIGNING THIS DOCUMENT I WILL HAVE WAIVED CERTAIN LEGAL RIGHTS INCLUDING THE RIGHT TO SUE.

Acknowledged and agreed to by:

JACQUES HOULE, Consultant
for North Bay Resources

[Signature]

Authorized Signatory

Dated: July 8, 2013
SCHEDULE B
KEY CONTROL FORM

08.07.2013
You must complete each checkbox to confirm you have read each sentence below and agree to the terms and conditions of the Key Control Form.

- 1 key(s) as all identified below (the "Key") have been received;
- The attached Schedule "A" has been read and the Key Holder shall abide by all the terms and conditions stated therein;
- The Key(s) shall be used only for that purpose and use stated below under Authorized Use;
- The Key Holder will lock the gates at all time immediately after ingress or egress, and shall not allow any person or vehicle access through the gates.
- The TW contact shall be notified immediately of any emergency relating to its lands, roads, gates, etc.
- TimberWest shall be notified immediately if the Key is lost, stolen, or misplaced;
- If the Key is lost, stolen or misplaced, you will be required to pay TimberWest $500.00 per key or, at TimberWest's discretion, forfeit your key deposit held in trust, or may be held liable for the costs incurred as a result of replacing the current lock system.
- The Key Holder shall not assign or transfer the Key without TimberWest's express written approval;

Date Issued: _______________  Expiry Date: _______________  DATE RETURNED: _______________

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<th>Key Type</th>
<th>MULTILOCK</th>
<th>Key ID</th>
<th>Key #</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Key Type</td>
<td></td>
<td>Key ID</td>
<td>Key #</td>
</tr>
</tbody>
</table>

Authorized Use: ACCESS TO TIMBERWEST PROPERTY – FOR MINING PURPOSES ONLY – MT WASHINGTON AREA ONLY

TW Contact: GARY LAWSON

The "Key Holder":

User Type: Contractor, Agency, Third Party or Employee (circle one)  
Company: NORTH BAY RESOURCES  
Key Holder Name: JACQUES HOULE

Address

Phone

HOME:  
CELL:

Key Holder (Authorized Signatory): JACQUES HOULE  
TimberWest (Authorized Signatory)  

×
SCHEDULE A

RELEASE

1. The Key Holder will and does hereby accept all risks associated with its entry to and occupation of TimberWest's lands and of its use of the roads including, without limitation, all risks arising in respect of the use of the roads as private industrial roads for logging and logging-related activities and the passage thereon by oversized loaded and unloaded logging trucks and other forest industry vehicles, as its own risks and, without limiting the generality of anything contained herein, the Key Holder or itself and its directors, employees, agents, contractors, sub-contractors and invitees, and for their respective heirs, executors, administrators and assigns, as applicable, and for any persons acting in concert with any of the foregoing, hereby releases and discharges TimberWest, its related companies and its and their directors, employees, agents, contractors, sub-contractors, and invitees (collectively, the "Company's Representatives") from any and all responsibility and liability, whether arising in tort, contract or otherwise, in respect of all loss, damage, personal and property injury and death arising out of or attributable to the state, topography or condition of TimberWest's lands, to the design or layout or condition of the roads and trails thereon and the other lands upon which the roads are situated, or the conduct of TimberWest or the Company's Representatives on such lands or roads whether or not such loss, damage, personal or property injury, or death is attributable to the negligence of TimberWest or the Company's Representatives.

INDEMNITY

2. The Key Holder will indemnify, save harmless and defend TimberWest and the Company's Representatives from and against all loss, expense (including environmental investigation and remediation expenses), claims, demands, actions, suits, proceedings, judgments, damages, penalties, fines, costs and liability including, without limitation, damages for loss or restriction in use of TimberWest's lands, sums paid in settlement of claims, legal fees, consultants' fees and experts' fees which are in any manner based upon, arise out of or are connected with:

(a) any breach by the Key Holder of this terms of this Form;
(b) the Key Holder's occupation or use of TimberWest's lands or use of the roads; or
(c) the presence of any hazardous substance or contamination in, upon, above, under or in the vicinity of TimberWest's lands caused by, contributed to or aggravated by the Key Holder or its employees, agents, contractors, suppliers, customers, invitees or any other person for whom the Key Holder is responsible in law or who is on or about TimberWest's lands as a result of the Key Holder's use or occupation of TimberWest's lands. For greater certainty, costs incurred by TimberWest to remediate any such hazardous substances or contamination even though not required to be carried out by law or pursuant to an order of a governmental authority, are subject to this indemnity.

RIGHTS RESTRICTIONS

3. TimberWest may at any time and from time to time prohibit or restrict the Key Holder's right to make use of the Key for such period or periods of time as TimberWest may in its absolute discretion determine should TimberWest consider such prohibition or restriction justified on account of hazardous weather conditions or unreasonable interference with TimberWest operations or for any other reason and the Key Holder will at all times observe and conform with such prohibitions or restrictions.

RETURN OF KEY

4. TimberWest may require the Key Holder to return the Key at any time and for any reason without advance notice to the Key Holder and the Key Holder's rights under this Form will thereafter be terminated forthwith.

WAIVER

5. No waiver or neglect by TimberWest to enforce any right upon any breach of any covenant, condition or obligation herein will be deemed to be a waiver of such right upon any subsequent breach of the same or any other covenant, condition or obligation herein contained. Nothing contained herein is or should be construed as a waiver by TimberWest of any rights which TimberWest has or which may accrue to TimberWest at law, in equity, or by statute.
PRIME CONTRACTOR

We are currently harvesting in the area you will be accessing. You **must** contact the following Prime Contractors prior to accessing TimberWest private lands:

**Wolf Lake Logging** – Mr. Andrew Johnson (Safety Rep)
Cell: 250-714-4127 – Work 250-331-9690 - Email: a.kjohnson@shaw.ca
“TimberWest Safe Road Use Procedures”

The following procedures apply to all TimberWest resource roads. All users must be familiar with these procedures to ensure safe traveling conditions for all authorized industrial and recreational road users. In the event these procedures conflict with the user's own policies the TimberWest safe road use procedures will take priority. If a Prime Contractor has been designated to a specific road, they may have additional procedures that supplement Timberwest’s, which will be specified during prework discussions (where applicable).

All vehicles:

- All road users (industrial, authorized recreational) must be fully licensed with correct endorsements, adequately insured for the vehicles intended use and follow all applicable driving legislation.

- Check with the local TimberWest office to ensure you have contact information for the designated Prime Contractor, if your vehicle is equipped with a radio you must have the correct communication channel(s) and know the current status of log hauling and other industrial use on the desired roads of travel. Generally all South Island road traffic is on the South Island Road Channel 163.110 tx/rx, Tone 203.5 unless otherwise posted. Similarly, North Island traffic monitors the “Haul Channel” (158.430 tx/rx) and TFL 47 traffic is location specific (contact TimberWest for this information).

- Follow the posted speed limits (Maximum 60 km/hr or less if not posted) with headlights/tailights on at all times.

- Observe and obey all posted signage.

- All traffic must drive on the right-hand side of the road.

- Drive by the road conditions and visibility (sight lines, dust or weather relatec visibility). Roads are radio assisted not radio controlled. Drive accordingly and expect the unexpected.

- Deactivated roads may or may not be posted. It is suggested that you obtain information regarding road deactivation status from TimberWest before you begin your trip.

- Maintain safe distances when following other vehicles and use extra caution when driving in dusty conditions. Also use extreme caution when overtaking slower vehicles.

- Always give industrial traffic the right-of-way. (Pull over and stop).

- When passing logging trucks, low beds, graders, etc. make sure the operator is aware of your intentions and signals you verbally or visually before proceeding to pass; then pass only when road conditions are favourable.

- Watch out for “sweepers” which are very long logs hauled on logging trucks. They can hang over the back of the trailer up to 6 meters and on a tight corner could sweep a vehicle off the road.

- Do not block the road or stop on the running surface for any reason – logging trucks require a lot of room for safe travel and to safely stop. Do not impede their access at any time. It is essential that logging trucks be able to use the roads without delays. If you must stop, find a turnout or wide spot and park well off the road.
• Be aware that off highway trucks with wide bunks have very little opportunity to move off the center of the road grade, except on wide mainlines. Ensure you find a turnout that enables the logging truck adequate clearance for safe passage.

• Report vandalism or other suspicious activities to a TimberWest representative.

• Report all hazards immediately to Prime Contractor or TimberWest representative.

Industrial:

• All vehicles and drivers must comply with applicable rules and regulations (WorkSafeBC, Department of Transportation, MFLNRO statutes and legislation, National Safety Code, and Motor Vehicle Act, etc) that will ensure proper driving, loading, securing, inspection and maintenance.

• Down/Loaded vehicles have the right-of-way

• TimberWest typically maintains the bridge infrastructure to support L.165 tons. For active crossings that support less than L.165, TimberWest identifies the load rating with posted signage stating the load rating in the field (i.e. L100, L75, 5 tonnes/pickup, etc). In the event users have concerns, contact TimberWest representative for assistance.

Note: Notify TimberWest Contract Manager or designated TimberWest representative prior to walking (point loading) across structures with equipment 75 tonnes or greater so TimberWest can ensure structure can safely support the weight.

RADIO CALLING:

<table>
<thead>
<tr>
<th>Known Hazards</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Losing track of your location</td>
</tr>
<tr>
<td>2. Losing track of other vehicles location</td>
</tr>
<tr>
<td>3. Meeting oncoming vehicles without a radio</td>
</tr>
<tr>
<td>4. Not following calling procedures</td>
</tr>
<tr>
<td>5. Unnecessary radio chatter</td>
</tr>
<tr>
<td>6. Using the wrong frequency</td>
</tr>
<tr>
<td>7. “Walking over” other calls</td>
</tr>
<tr>
<td>8. Being distracted (i.e. phones, music, passengers)</td>
</tr>
</tbody>
</table>

Procedures:

1. The terms “UP” for increasing numbers and “DOWN” for decreasing numbers are the preferred methods for calling, although users may at times hear “EMPTY” for increasing and “LOADED” for decreasing. North Island’s practice is for logging truck traffic to use “LOADED / EMPTY”, and all other traffic to use “UP/DOWN” in order to identify direction of travel.

2. Preferred Radio Call: Road name followed by the kilometer position then Up or Down (e.g. “Northshore ... 2 km ... Up”).

3. All vehicles should call their location / direction of travel:
   • When entering or leaving a road system.
   • Whenever there is a road frequency/channel change.
   • Whenever you are stopping and parking on the road, and again when you resume.
   • When encounter a vehicle without a radio (Identify the vehicles position and direction of travel).
4. **Radio Calling protocol** - loaded vehicles:
   - Loaded vehicles (i.e. logging trucks, gravel trucks, lowbeds, and fuel trucks) must call at minimum every two km's, preferably every km when traffic is near, regardless of direction of travel.

5. **Radio Calling protocol** - all other vehicles, regardless of direction of travel:
   - Must call every km when within three km's of oncoming radio assisted traffic.
   - As a courtesy, should call every five km's.
   - As a courtesy, identify themselves: pick-up, low-bed, fuel truck, grader, etc. (i.e. "pick-up... Northshore ... 2 km... Up")

6. **Convoy calling**:
   - The lead vehicle is responsible for calling for all vehicles within the convoy. (i.e. "Convoy of 4 pickups... Northshore... 13km... UP")

*Remember, roads are radio assisted – not radio controlled, drive accordingly!*
Appendix 3

BC MINFILE and Mineral Deposit Profiles
<table>
<thead>
<tr>
<th>Name</th>
<th>DOMINEER (MOUNT WASHINGTON), MOUNT WASHINGTON (DOMINEER), DOMINEER, LAKEVIEW, MWC, DW, WEST GRID</th>
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<tbody>
<tr>
<td>Status</td>
<td>Developed Prospect</td>
</tr>
<tr>
<td>Latitude</td>
<td>49° 45' 30&quot; N</td>
</tr>
<tr>
<td>Longitude</td>
<td>125° 18' 00&quot; W</td>
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<tr>
<td>Commodities</td>
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</tr>
<tr>
<td>Tectonic Belt</td>
<td>Insular</td>
</tr>
<tr>
<td>Capsule Geology</td>
<td>The Dominer epithermal deposit comprises the Dominer, Lakeview and West Grid zones. The deposit lies 400 metres south of the Mount Washington Copper open pit (see 092F 117). The centre of the Lakeview zone is located 510 metres to the west of the Dominer zone, and the West Grid zone lies about 200 metres northwest of the Lakeview. The zones form a continuous shallow-dipping tabular body of argillie alteration containing discontinuous, en echelon or stacked lenses of mineralization. The mineralized zone occurs within a subhorizontal package of Tertiary pyroclastics and underlying clastic sediments of the Upper Cretaceous Nanaimo Group (Comox Formation), which unconformably overlie fmaic volcanic rocks of the Upper Triassic Vancouver Group (Karmutsen Formation). Intruding both formations is a Late Eocene to Early Oligocene quartz diorite stock of the Mount Washington Intrusive Suite (formerly Catface Intrusions – Nick Masssey, Personal Communication, May 1990), dated at 35 million years (+/- 6 million years) (Carson, 1960). Several later breccia events are imposed on all other rock types locally. The Karmutsen Formation comprises basaltic massive and pillow lavas that are commonly porphyritic. The lavas grade into pillow breccias and aquagene tuffs. The overlying Comox Formation comprises fine-grained sandstone and greywacke, with interbedded siltstone, carbonaceous shale and minor coal. A basalt conglomerate of rounded clasts separates the formations. The Tertiary quartz diorite stock is variably porphyritic and is centred on McKay Lake northeast of the summit of Mount Washington. Several sills and dykes of quartz diorite and quartz diorite porphyry are related to the stock. Late breccia events include the Washington, Murray, Glacier, Murex (092F 206) and Oyster (092F 365) breccias; others may also be present. Of these, the Washington breccia is the youngest and is located near the Dominer zone on a ridge north of Mount Washington. The Murex breccia, located east of the Dominer deposit, is the largest and most complicated of the breccias. Other breccias and diatremes are located 2 kilometres north and 2 kilometres east of Mount Washington. Contact relationships of the Washington breccia with the Murray breccia, the Glacier breccia and quartz diorite are crosscutting but gradational, and are often characterized by vertically oriented crackle breccia zones. Within the Washington breccia, large angular clasts dominate over a matrix of finely pulverized rock flour, which has locally been replaced by magnetite and actinolite. Slab-like fragments, with length to width ratios of 10:1 are common, and suggest that subvolcanic collapse may have been the operative process. Capping the west arm of Mount Washington is the tabular Murray breccia which generally contains a much higher matrix component than the other breccias, although considerable variability exists. Clasts are generally subrounded to subangular and range in size from 1 to 10 centimetres, averaging about 2 centimetres. The composition of clasts is mixed and consists of varieties of quartz diorite, sandstone, siltstone and mafic volcanics. Overlying, and in places adjacent to the Murray breccia, is a crackle breccia. The Murray breccia, which is bedded and locally displays shrinkage cracks and slump folds, has recently been identified as a coarse pyroclastic deposit with associated thinner beds of fine-grained tuff (Dahl, 1989). Mineralization at the Dominer deposit has a defined strike length of 1.5 kilometres and an average width of 61 metres. Diamond drilling indicates that mineralization extends from the Dominer zone to the Lakeview-West Grid area. Mineralization consists of a tabular zone of alteration containing a stockwork of auriferous quartz-rayite-arsenopyrite veins and lenses. The zone occurs within one of several subhorizontal fractures and breccias which post-date the Tertiary intrusions and volcanic activity, and may represent other thrust faults or decollements (Muller, 1989). Enveloping the quartz-sulphide veins and lenses, is a zone of pervasive kaolinite alteration. A 2 to 5 metre wide zone of hydrothermal breccia usually lies at the centre of the alteration zone. This breccia consists of angular clasts of altered wallrock in a matrix of quartz and sulphides. Locally, the sulphides envelop these clasts and exhibit a banded appearance. Away from the central alteration zone is a stockwork of smaller quartz-sulphide veins. With increasing distance these veins decrease in size and frequency, alteration becomes limited to vein selvages and chlorite becomes the dominant alteration mineral. The dominant sulphide minerals within the gold zone are pyrite and arsenopyrite. Chalcopyrite, covellite, sphalerite, galena, bornite, tennantite, wehrlite, hessite, chalcocite, realgar and orpiment are also present in varying amounts. Pyrrhotite, molybdenite and magnetite are present in the general vicinity but appear to be unrelated to the gold-bearing mineralization. Two high grade pods have been identified. A northern pod, centred on the Dominer showing, averaged 6.99 grams per tonne gold and 58.63 grams per tonne silver over an average thickness of 2.56 metres (Assessment Report 18472). Underground exploration and surface diamond drilling to August 1989 have established drill indicated reserves of 550,298 tonnes grading 6.75 grams per tonne gold and 32.23 grams per tonne silver (Open File 1992-1; George Cross News Letter - August 3, 1989).</td>
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<tr>
<td>Mining Division</td>
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<td>334248</td>
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<td>Deposit Types</td>
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<tr>
<td>Terrane</td>
<td>Wranell, Plutonic Rocks</td>
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</tbody>
</table>

### Bibliography
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- **EMPR FIELDWORK *1988, pp. 81-91**
EMPR GEM 1969-212; 1970-281; 1973-236; 1974-183
EMPR INF CIRC 1989-1, p. 32; 1990-1, p. 39; 1991-1, p. 74
EMPR MAP 65 (1989)
EMPR MER 1986, p. 70
EMPR OF 1992-1; 1994-6; 1998-10
EMPR P 1991-4, pp. 167,203
EMR MIN BULL MR 223 (1989) B.C. 98
EMR MP CORPFILE (Mount Washington Copper Company Limited; Noranda Exploration Company; Qualicum Mines Limited; Cumberland Mining Company Limited)
GSC BULL 172
GSC MAP 49-1959; 2-1965; 17-1968; 1386A
GSC OF 9: 61; 463
GSC P 66-1; 68-50, p. 39,42; 71-36; 72-44
CIM Transactions No.72, p. 116; Special Volume 15, 1976, Table I
CMJ Jan., 1965
GCNl Sept.17, Dec. 30, 1975; Sept.22, #210, 1976; May 25, Oct. 26, 1977; #7, 1978; #121, #206, 1979; #128, #155, 1984; #107, #129, #142, #150, #176, #178, #194, #196, #214, 1986, #14, #91, #107, #114, #135, #175, #176, #191, #195, #212, #225, 1987; #11, #114, #144, #177, #187, #222, 1988; #13, #149, #178, 1989; #5, #198(Oct.12), 1990
NW PROSP Oct.,Nov., 1988
PERS COMM N. Massey, May 1990
W MINER Nov. 1965, p. 35; Nov. 1967, pp.35-40
Better Resources Limited Annual Report 1987; Corporate Profile (not dated); 1989 Snapshot Review; Statement of Material Facts dated Aug.1, 1984
Vancouver Market Report February, 1987

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**MINFILE Record Summary**

**MINFILE No 092F 117**

XML Extract/Production Report/Inventory Report

**SUMMARY**

Name: MOUNT WASHINGTON COPPER, MWC 232, DOMINEER 22, DV, GOLD

Mining Division: Nanaimo

BCGS Map: 092F074

NTS Map: 092F14W

Easting: 5514861

NORTHING: 10 (NAD 83)

Deposit Types: LO4: Porphyry Cu +/- Mo +/- Au

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

Terrane: Wrangell, Plutonic Rocks

**Capsule**

The Mount Washington Copper deposit is located on a ridge on the north side of Mount Washington, 400 metres north of the Domineer/Lakeview occurrence (092F 116).

**Geology**

The area of the occurrence is underlain by sediments of the Upper Cretaceous Nanaimo Group, Comox Formation, which unconformably overlie mafic volcanic rocks of the Upper Triassic Vancouver Group, Karmutsen Formation. Intruding both formations is a quartz diorite stock of the Late Eocene to Early Oligocene Mount Washington Intrusive Suite (formerly Catface Intrusions - Massey, N. Personal Communication), dated at 35 million years (+/- 6 Ma) (Carson, 1960). Several later breccias have shattered all other rock types locally. The area is also cut by sub-horizontal thrust faults that control mineralization, and near-vertical faults with a lateral displacement of more than 1.0 kilometre. The Karmutsen Formation comprises basaltic massive and pillow lavas that are commonly porphyritic. The lavas grade into pillow breccias and aguagene tuffs. The overlying Comox Formation comprises fine-grained sandstone and greywacke, with interbedded siltstone. A basal conglomerate of rounded clasts of Karmutsen Formation rocks separates the formations.

The Tertiary quartz diorite stock is variably porphyritic and is centered on McKay Lake northeast of the summit of Mount Washington. Several sills and dykes of diorite, quartz diorite and quartz diorite porphyry are related to the stock.

The Mount Washington Copper deposit is considered to be a porphyry-type deposit with a later superimposed epithermal gold-copper-arsenic event (see EMPR ASS RPT 839).

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- *12605, 14085, 14705, 15228, *15395, 15526, 15776, 15825, 15826, 15857, 15765, 16762, 17123, 17181
- EMPR BC METAL MM00175
- EMPR FIELDWORK *1988, pp. 81-91
- EMPR MER 1986, p. 70
- EMPR OF 1994-6; 1998-10
- EMPR MP CORFILE (Mount Washington Copper Company Limited; Noranda Exploration Company; Qualicum Mines Limited; Cumberland Mining Company Limited)
- GSC BULL 172
- GSC MAP 49-1959; 2-1965; 17-1968; 1386A
- GSC OF 9; 61; 463
- GSC P 60-1; 68-50, p. 39; 72-36; 72-44
- GSC SUM RPT 1924A, pp. 106-144; 1925A; 1930A-64
- CJM Transactions #72, p. 116
- CMJan., 1965
- GCNL #239(Dec.9), 1983; #107(June 4), #129(July 7), #142(July 24), #178(Sept.16), #194(Oct.8), #214(Nov.6), 1986; #14(Jan.21), #91(May 12), #135(July 15), #147(July 31), #176(Sept.14), #187(Sept.29), #191(Oct.5), #225(Nov.24), 1987; #12(Jan.19), #177(Sept.14), #187(Sept.28), 1988


6/11/2013
The Catface deposit lies at the contact between mafic volcanics (Sicker(?)) or Vancouver(?) groups rocks) and diorite of the Mesozoic and/or Paleozoic Westcoast Complex. The area of the contact has been intruded by the Early to Middle Jurassic Island Plutonic Suite and several phases of the Early to Middle Eocene Tofino Intrusive Suite (formerly Catface Intrusions, Personal Communication, N. Massey, May 1990). See also Irishman Creek (092F 251) and Hecate Bay (092F 231).

The mafic rocks consist of basalt and andesite flows, tuff breccia and agglomerate. It remains unclear as to whether these rocks belong to the Paleozoic Sicker Group or to the Upper Triassic Karmutsen Formation, Vancouver Group. The volcanic rocks have been weakly hornfelsed near the intrusions. Rocks of the Westcoast Complex are considered to be intrusive and/or dioritized pre-Jurassic rocks that include Sicker Group rocks (Canadian Institute of Mining and Metallurgy Special Volume 15, page 301).

Several phases of the Tertiary intrusions have intruded all other rocks. These include the Hecate Bay quartz diorite, dated at 48 million years, three porphyritic granodiorite phases and a late-stage porphyritic dacite. Their emplacement was, to some extent, controlled by pre-existing structures or contacts. Late (but pre-ore) adesite, dacite and quartz feldspar porphyry dykes trend north to northwest and dip 50 to 70 degrees east. Faults predate mineralization and strike northerly and easterly.

Jointing in the younger intrusive rock trends north to northeast, dipping 50 to 70 degree east. A less persistent joint set in these intrusions trends east to southeast and dips steeply north. Joints in the volcanic rocks trend 156 degrees and dip 51 degrees east.

Copper and molybdenum mineralization occur on dry fractures and in quartz veins. Molybdenite also occurs as rosettes in quartz veins, and disseminated copper mineralization is associated with mafic minerals.

Copper minerals include chalcopyrite, bornite and some chalcocite, with significant secondary carbonate and copper oxide minerals occurring on fractures. Other minerals recognized include pyrite, pyrrhotite, covellite, idalite, digenite, native copper, cuprite, valleniite, tenorite, limonite, goethite, magnete, hematite, cupriferrous chalcedony-opal and scheelite.

Mineralization shows distinct zoning, with a core of bornite- pyrite-pyrrhotite surrounded by a zone in which chalcopyrite predominates. The area of 0.2 per cent copper mineralization extends over 650 metres, to a depth of approximately 350 metres. The best mineralization is located in the volcanic rocks and in the younger porphyritic phases, but the grade is not consistent.

The earliest evidence of exploration at Catface is a caved adit driven about 5 metres into a highly fractured and oxidized shear; the main property was evidently not investigated between the turn of the century and 1960. In 1960, a local mine operator, John Jackson, and G. Davis, pilot prospector for Falconbridge Nickel Mines, made a brief visit to a cliff face displaying a conspicuous copper stain. Mineralized and high oxidized samples prompted a more thorough examination by Falconbridge geologist J. McDougall and company helicopter pilot R. Hepworth who then staked the property.

Falconbridge, through Catface Copper Mines Ltd., conducted exploration between 1961 and 1979. This included driving an 857-metre adit and drilling more than 19,000 metres in 127 surface and underground holes. Numerous metallurgical tests were conducted, and a bulk sample was shipped to Falconbridge's Tassu mine (103C 003) on the west coast of the Queen Charlotte Islands for processing. The geology of the property was mapped; soil and silt geochemical surveys were completed. Limited geophysical test surveys including I.P./resistivity, self-potential and magnetic surveys were conducted in selected areas. The claims were also surveyed at this time.

In 1989 and 1990, Falconbridge Limited re-activated the project to increase the resource and to determine gold content of the copper mineralization. The program included detailed adit sampling for copper and gold, geological mapping of selected areas, a 19 line-kilometre I.P./resistivity, VLF and magnetometer survey to cover accessible areas, 150 line-kilometre of combined airborne magnetometer and VLF (EM) surveys covering most of the claim block and metallurgical tests. An environmental base-line survey was also carried out. Four holes (1628 metres) were drilled to test chargeability anomalies.

Between 1960 and 1990, total expenditures by Falconbridge Limited on the Catface project amounted to nearly $10 million (constant $1990). In 1990, Falconbridge Limited planned to take the claims to mining lease status and a drilling program to test the large IP anomalies south of South Peak. Granting of required work permits was delayed by the Clayoquot Land Use dispute; consequently, the Catface project was abruptly cancelled and exploration funding was transferred to other projects. Catface lies within a General Integrated Management Zone designation (multiple use). In 1999, Doublestar Resources Ltd. acquired the property.

Unclassified reserves in 1971 were 181.4 million tonnes grading from 0.45 to 0.50 per cent copper (EMR Mineral Bulletin MR 223 B.C. 95). In 1990, Falconbridge calculated a drill indicated resource of 188 million tonnes of 0.42 per cent copper and 0.0084 per cent molybdenum (0.014 per cent Mo52) at a 0.30 per cent copper cutoff and 1:1:1 stripping ratio (CIM Special Volume 46, page 325). Other calculations are listed in Special Volume 46.

In 1999, Doublestar Resources Ltd. acquired the property from Falconbridge Limited. Doublestar has reported the following resources: 78.2 million tonnes of 0.53 per cent copper at 0.4 per cent cutoff or 158.4 million tonnes at 0.44 per cent copper with 0.31 per cent copper cutoff.

In 2007 Doublestar was bought by Selkirk Metals Corp. Selkirk completed a diamond drill program in 2008 comprised of 8 holes totalling 2383 metres of drilling. In 2009 the company released an updated resource estimate for the Cliff Zone based on the 2008 drilling.
In November 2009 Selkirk was bought by Imperial Metals Corporation. Imperial commenced a diamond drill program in 2010. Hole CF-10-56 intersected 275.5 metres grading 0.60 per cent Cu and 0.014 Mo within a 755.0 metre mineralized section grading 0.46 per cent Cu and 0.006 per cent Mo (News Release September 8, 2010 - www.imperialmetals.com)

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CIM Special Volume *15, 1976, pp. 299-310; *16, pp. 322-326
GCNL Sept. 29, 1971
STOCKWATCH Jan. 13, 2000
MINFILE Record Summary  
MINFILE No 092F 183

**SUMMARY**

**Name**
GOOD HOPE, WOLF LAKE, WOLF, LUPUS, CLIFF

**Mining Division**
Nanaimo

**BCGS Map**
092F074

**NTS Map**
092F14E

**UTM**
10 (NAD 83)

**Northing**
5515444

**Easting**
341550

**Easting**

**Commodities**
Arsenic, Copper

**Deposit Types**
Insular

**Tectonic Belt**
Wrangell

**Geology**

The Good Hope arsenic showing occurs about 800 metres northwest of the north end of Wolf Lake. The area is underlain primarily by basaltic lavas of the Upper Triassic Karmutsen Formation, Vancouver Group. These rocks are mostly massive flows and pillow lavas of partly amygdaloidal basalts, with minor tuffs, volcanic breccias and agglomerates. These are overlain by sediments of the Upper Cretaceous Nanaimo Group, Comox Formation.

The showing is exposed in a dry creekbed at an elevation of 260 metres. For about 75 metres the creek follows, and has exposed, a breccia zone in andesitic rocks. This zone varies from 0.6 to 3.6 metres in width, strikes 035 degrees and appears to dip steeply to the southeast. It contains lenses and veins of calcite up to 1.8 metres in width, in which numerous shattered and angular fragments of andesite are embedded. These bodies of calcite outcrop at intervals of about 45 metres along the creek bottom and contain occasional lenticular masses of realgar. The largest exposure of this arsenic sulphide measures 1.2 metres in length with a maximum width of 23 centimetres. Tiny veinlets of arsenopyrite occur locally within the andesitic wall rock. In some instances realgar has been replaced by native arsenic. Chalcopyrite has also been observed. The best assay from this zone was 4.9 grams per ton silver and 0.1 per cent copper over 2 metres (Assessment Report 14434).

The Cliff showing was discovered on the Lupus claims in the probable vicinity of the Good Hope arsenic showing. A 5 centimetre wide pyrite-arsenopyrite-quartz vein occurs in Nanaimo Group sediments. The vein has a vertical dip and a westerly trend. A grab sample assayed 15.77 grams per tonne silver, 0.10 grams per tonne gold, 0.52 per cent arsenic and 0.13 per cent copper (Assessment Report 15034).

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EMPR ASS RPT 12015, *14434, *15034  
EMPR EXPL 1983-208; 1986-C183,C184  
GSC EC GEOL *No.4, p. 36-38  
GSC MAP 2-1965; 17-1968; 1386A  
GSC OF 463  
GSC P 68-50; 72-44; 80-16
**SUMMARY**

**Name**  
LUPUS 6, CREEK SHOWING

**Status**  
Showing

**Latitude**  
49° 45' 58" N

**Longitude**  
123° 09' 16" W

**Commodities**  
Gold, Silver, Zinc, Lead, Copper, Arsenic

**Tectonic Belt**  
Insular

**Capsule**  
The Creek showing is a zone of mineralization, that extends for 200 metres, occurring in narrow breccia veins up to 10 centimetres wide and on fracture and shear surfaces. Breccia vein material consists of siltstone and sandstone fragments in a matrix of pyrite, arsenopyrite, clay, realgar, and coarse white calcite. Some breccia types and veins also contain black sphalerite. The mineralized veins are irregular in attitude, but trend approximately east-northeast and have steep northerly dips. Following the trend of the zone to the west an orange gossan is encountered adjacent Wolf Lake. Exposures of altered and shattered dacite containing disseminated pyrrhotite occur adjacent the gossan.

A 20 centimetre chip sample taken across the zone assayed 4.49 grams per tonne gold, 144.69 grams per tonne silver, 4.94 per cent zinc, 1.61 per cent lead, 2.10 per cent arsenic and 0.54 per cent copper (Assessment Report 15034).

**Deposit Types**  
Terrane

**Terrane**  
Wrangell

**NMI**  
Nanaimo

**Mining Division**  
Nanaimo

**BCGS Map**  
092F075

**NTS Map**  
092F14E

**UTM**  
10 (NAD 83)

**Northing**  
5514854

**Easting**  
344856

**Bibliography**  
EMPR ASS RPT *13426, *14442, *15034
EMPR EXPL 1984-168; 1986-C183,C184
GSC MAP 2-1965; 17-1968; 1386A
GSC OF 463
GSC P 68-50; 72-44; 80-16
SUMMARY

Name: MUREX, HKR, MWC, MINK

Status: Prospect

Latitude: 49° 45' 40" N
Longitude: 123° 15' 00" W

Commodities: Copper, Gold, Silver

Tectonic Belt: Insular

Capsule Geology:
The area is underlain primarily by basaltic lavas of the Upper Triassic Karmutsen Formation, Vancouver Group. These rocks are mostly massive flows and pillow lavas of partly amygdaloidal basalts, with minor tuffs, volcanic breccias and agglomerates. A major unconformity separates the Karmutsen Formation from the overlying Upper Cretaceous Nanaimo Group. Haslam and Comox Formations which consist of fine to coarse grained detrital sedimentary rocks. The Benson Member is a pebble-cobble-boulder conglomerate which marks the unconformity in some areas.

Diorite and granodiorite of the Late Eocene to Early Oligocene Mount Washington Intrusive Suite (formerly Catface Intrusions) have intruded the above rocks, forming stocks, sills and dykes. The two intrusive types, as well as xenoliths of intrusive found within diorite dykes, indicate that multiple stage intrusions have occurred.

These intrusives have, in some cases, caused the formation of breccias composed of various combinations of basalts, sediments, and diorite fragments in a fine to medium grained siliceous matrix, sometimes with accompanying sulphide mineralization. There are five breccia types recognized in the Murex breccia zone. Subdivided on the basis of their fragment lithology they are:

1. A Basaltic breccia composed of fragments of Karmutsen basalt, in a rusty, vuggy, fine to coarse grained quartz rich matrix. The fragments are sub-angular to rounded, and range in size from granules to large boulder sized blocks. The quartz rich matrix makes up from 20 to less than 5 per cent of the breccia. This matrix is mineralized with up to 10 per cent sulphides including chalcopyrite, pyrite and pyrrhotite.

2. The Comox breccia composed of fragments of Comox sandstones, siltstones and argillites in a siliceous matrix. The fragments ranging in size from pebbles to large cobbles, are generally angular to sub-angular and make up 85 per cent of the rock; the matrix makes up 15 per cent. In most cases the sulphide content makes up less than 1 per cent of the rock, chiefly in the form of blebs of pyrite, chalcopyrite and pyrrhotite.

3. The Intrusive breccia composed of fragments of diorite in a fine grained siliceous matrix containing up to 10 per cent biotite. The fragments are angular to sub-angular and range in size from pebbles to large cobbles. The fragment to matrix ratio is generally 90 per cent to 10 per cent, respectively. Pyrite with minor pyrrhotite and chalcopyrite occur within the matrix but rarely exceed 2 per cent of the whole rock.

4. The Mixed Lithology breccia consisting of fragments of basaltic, sedimentary and dioritic rocks, in varying proportions, in a
siliceous, often biotite bearing matrix. The fragments vary from
angular to sub-rounded and range in size from pebbles to large
cobbles. Fragment to matrix ratio averages 90 per cent to 10 per
cent, respectively.

(5) The Fluidized Milled breccia composed of 80 to 85 per cent
fragments consisting of basaltic, sedimentary and dioritic
fragments. The fragments are sub-angular to rounded and range
in size from granule to cobbles. The matrix makes up 15 to 20 per
cent of the breccia and is composed of quartz plus or minus minor
carbonate and varying amounts of chalcopyrite, pyrrhotite and
pyrite.

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5604, 5979, 5980, 6407, 6430, 6446, 7009, 11392, 11396, 11604,
12605, 14085, 14705, 15228, 15526, 15766, 15825, 15826,
15857, 15765, 16762, *17033, 17123, 17181, *1819, *18391
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C156-158; 1988-C92,C93
EMPR EXPL REVIEW 1986, p. 70
EMPR FIELDWORK *1988, pp. 81-91
EMPR GEM 1960-212; 1970-281; 1973-236; 1974-174
EMPR INF CIRC 1989-1, p.32; 1990-1, p.39
1:9600; Cumberland Mining Company Limited and Mount Washington
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Ownership
EMPR MP CORPFILE (Mount Washington Copper Company Limited; Noranda
Exploration Company; Qualicum Mines Limited; Cumberland Mining
Company Limited)
GSC BULL 172
GSC MAP 49-1959; 2-1965; 17-1968; 1386A
GSC OF 9; 6463
GSC P 66-1; 68-50, p. 39,42; 71-36; 72-44
GSC SUM RPT 1924A; 1925A; 1930A-64
GSC OF 9; 463
GSC P 66-1; 68-50, p. 39,42; 71-36; 72-44
GSC SUM RPT 1924A, pp. 106-144; 1925A; 1930A-64
CIM Special Volume #15, 1976, Table I
CIM Transactions #72, p. 116
CMJ Jan., 1965
GCNl Sept.17, Dec.30, 1975; Sept.22, #210, 1976; May 25, Oct.26,
1977; #7, 1978; #121,#206, 1979; #128,#155, 1984; #107,#129,
#142,#150,#176,#178,#194,#196,#214, 1986; #14,#91,#107,
#114,#135,#175,#176,#191,#195,#212,#225, 1987; #11,#114,
#144,#177,#187,#222, 1988; #13,145,#178, 1989; *#5, 1990
19, Nov.16, 1987; July 4, 1988;
NW PROSP Oct./Nov., 1988
PERS COMM: Paul Wilton, 1990 (with respect to genesis)
PERS COMM: Nick Massey, May 1990 (with respect to Tertiary intrusion
nomenclature)
V STOCKWATCH Sep.15, Jul.30, Sept.30, Oct.6, Oct.13, Nov.5, 9, 24,
W MINER Nov. 1965, p. 35; Nov.1967, pp.35-40
Project, Vancouver Island, Coreshack, Cordilleran Roundup

Epidote also occurs within the interstices, usually at the expense of the sulphides. Chlorite generally accompanies the epidote indicating a form of propylitic
alteration has taken place. Also exerting an influence on the amount of comminuted rock flour within the matrix. In addition,
where the rock flour content is low, the clasts tend to be angular and often elongate, suggesting little movement has taken place. In these areas the origin
of the Murex breccia is interpreted to be the result of collapse. Within blocks of brecciated mafic volcanic adjacent to the breccia a minor amount of
pyrrhotite veining is present. However, within the breccia the degree of veining is minimal. Magnetite is also reported to occur within the matrix.

The Murex zone represents an area of roughly 700 by 700 metres. The mineralization is thought to be the result of replacement but also has characteristics
in common with porphyry-type deposits.

The zone has been tested by a number of diamond-drill holes. One hole drilled in 1989 cut strong breccias with pyrrhotite-chalcopyrite mineralization about
30 metres below the surface. A 4 metre section of core assayed 4.08 per cent copper, 32.91 grams per tonne silver and 6.31 grams per tonne gold (George
Better Resources Limited, Annual Report 1987; Corporate Profile (not
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Carson, D.J.T., (1968): Metallogenic Study of Vancouver Island with
Emphasis on the Relationship of Plutonic Rocks and Mineral
Deposits, Ph.D. Thesis, Carleton University
Property, Vancouver Island, B.Sc. Thesis, University of British
Mount Washington Copper Company Limited, (1971): Statement of
Material Facts dated May 26, 1971
1988
Vancouver Market Report, February, 1987
MINFILE Record Summary
MINFILE No 092F 239
XML Extract/Inventory Report

SUMMARY

Name: GEM LAKE, MEG
Status: Prospect
Latitude: 49° 41' 04" N
Longitude: 125° 28' 39" W
Commodities: Copper, Gold, Silver, Molybdenum
Tectonic Belt: Insular

The area of the Gem Lake occurrence is underlain by basaltic and andesitic flows of the Upper Triassic Karmutsen Formation, Vancouver Group. These volcanics were intruded by stocks of quartz diorite of the Late Eocene to Early Oligocene Mount Washington Intrusive Suite (formerly Catface Intrusions), as well as several felsite dykes. The rock units were faulted and at about the same time mineralized with several generations of quartz veins. A polymeric intrusive breccia occurs consisting of 30 to 70 per cent clasts of volcanic material, quartz diorite and felsite. The matrix consists of hornblende, feldspar and quartz.

The mineralization at Gem Lake can be divided into 5 types (Assessment Report 17002): (1) Dilational quartz veins 0.1 to 10 centimetres in width with varying amounts of magnetite are common close to the intrusive breccia. The highest gold and silver assays obtained were 0.5 and 8 grams per tonne respectively. (2) Disseminations, filled amygdules and fracture coatings of pyrrhotite and chalcopyrite are common. Typical gold and silver values are 0.1 and 4 grams per tonne respectively. (3) Massive sulphide pods (several) with up to 5 per cent chalcopyrite are found. The largest of these pods outcrops over an area of 2 by 4 metres. Except for one sample assaying 1.1 grams per tonne gold most samples contained less than 0.2 grams per tonne. Silver was generally below 5 grams per tonne and always below 10 grams per tonne. (4) Quartz veins with 1 to 20 per cent pyrrhotite and chalcopyrite occur throughout the property. The veins are from 0.5 to 15 centimetres in width. The percentage of chalcopyrite is usually greater than that of pyrrhotite. The veins typically contain 0.3 and 10 grams per tonne gold and silver respectively. High values were 7.8 and 40 grams per tonne gold and silver respectively. (5) A tectonic breccia mineralized with chalcopyrite is exposed over and area of about 15 by 30 metres (Main showing). This breccia is associated with several parallel, steeply dipping, east trending faults. The host rock is mainly the intrusive breccia but a portion of the mineralization also occurs in basalt flows. The chalcopyrite is both disseminated throughout the tectonic breccia and occupies the open spaces between the fragments that resulted from faulting. The host rocks are not pervasively altered except in the areas of intense shearing where fault gouge has formed. Four samples were collected and assays showed that values range from 0.64 to 3.0 grams per tonne gold and from 9.8 to 49 grams per tonne silver.

A 1961 drill hole encountered 1 per cent copper over an interval of 18 metres (McDougall, 1964). Minor molybdenite (0.02 per cent) was found in the area of the deepest intrusive body intersected in 1963. One report also describes pyrite and molybdenite as occurring in fractures and veins. Carson describes the deposit as a porphyry copper type related to forcible intrusion of Tertiary stocks (Geological Survey of Canada Paper 68-50, page 45).

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EMPR EXPL 1988-C91
EMPR FIELDWORK 1988, pp. 61-74
GSC MAP 2-1965; 17-1968; 1386A
GSC DF 463
GSC P 68-50, pp. 39,45; 72-44
Falconbridge File
**Name** | FAITH LAKE, RIM  
**Status** | Prospect  
**Latitude** | 49° 28' 53" N  
**Longitude** | 125° 24' 55" W  
**Commodities** | Gold, Silver, Copper, Molybdenum, Lead, Zinc  
**Deposit Type** | Terrane  
**Tectonic Belt** | Insular  
**Mineral Division** | Nanaimo  
**BCGS Map** | 092F063  
**NTS Map** | 092F11W  
**UTM** | 10 (NAD 83)  
**Northing** | 5502426  
**Easting** | 325656  
**Deposit Types** | Wrangell, Plutonic Rocks  

**Summary**  
The area of the Faith Lake occurrence is primarily underlain by basalt of the Upper Triassic Vancouver Group, Karmutsen Formation which consists of flows, pillow breccia, aquagene tuff, and some thin sedimentary layers. This unit was intruded by a hornblende quartz diorite stock of the Late Eocene to Early Oligocene Mount Washington Intrusive Suite (formerly Catface Intrusions), then cut by a felsite sill. The dominant structures are steeply dipping, intersecting north and east trending shears and faults. Bedding is gently warped, with an average strike of 230 degrees and dip of 15 degrees north.

At least 30 veins have been examined within a 1.2 kilometre radius of the intrusive. Within the volcanics the veins fill the north and east trending structures as well as sheared intraformational contacts. These veins vary in size from 5 to 10 centimetre wide lenses up to 0.6 to 1.2 metre wide veins fully exposed vertically through at least 600 metres. Undulating veins occupying intraformational contacts, although rarely more than 0.46 metres in width, can be traced for distances measurable in kilometres. Where seen in the plutonic rock the veins parallel a master joint or fracture system which strikes 060 degrees and dips 70 degrees to the south.

The banded veins are generally composed of comb quartz plus occasional ankeritic carbonates, and massive to coarsely crystalline sulphides. The sulphides typically include arsenopyrite, chalcopyrite, pyrite, pyrrhotite, molybdenite, minor secondary chalcocite and possible bornite. The Galena vein, a 30 centimetre thick and 20 metre long pod shaped vein emplaced along a shear between two basalt flows, was the only vein found that contained galena and sphalerite as well as chalcopyrite and arsenopyrite.

A 15 centimetre drill interval assayed 24.69 grams per tonne gold, 120.00 gram per tonne silver and 3 per cent copper (McDougall, 1964).

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GSC P 68-50, p.39; 72-44  
Falconbridge File
**SUMMARY**

**Name**  
Shev (Faith Lake), Faith Lake, Faith Copper, Rim

**Commodities**  
Copper, Gold, Silver

**Deposit Types**  
L04: Porphyry Cu +/- Mo +/- Au

**Status**  
Showing

**Latitude**  
49° 35' 28" N

**Longitude**  
125° 22' 39" W

**Easting**  
328413

**Northing**  
5503296

**UTM**  
10 (NAD 83)

**NTS Map**  
092F11W

**BCGS Map**  
092F064

**Mining Division**  
Nanaimo

**Terrane**  
Insular

**Tectonic Belt**  
Insular

The Shev occurrence area is primarily underlain by basalt of the Upper Triassic Vancouver Group, Karmutsen Formation which consists of flows, pillow breccia, aquagene tuff, and some thin sedimentary layers. This unit is intruded by a hornblende quartz diorite stock of the Late Eocene to Early Oligocene Mount Washington Intrusive Suite (formerly Catface Intrusions), then cut by a felsite sill. The dominant structures are steeply dipping, intersecting north and east trending shears and faults. Bedding is gently warped, with an average strike of 230 degrees and dip of 15 degrees north.

The Shev breccia showing consists of a poorly exposed 20 by 1 metre exposure of highly altered monolithic breccia with clasts of mafic volcanic rock up to 15 centimetres in size. The top of the showing is cut by a white felsic dyke, striking roughly east. Carson relates the brecciation of the host rocks to the forcible intrusion of the Tertiary intrusive complex and describes this showing as a porphyry copper type deposit (Geological Survey of Canada Paper 68-50, p. 45).

Pervasive sericitic alteration is characteristic of the zone, varying in intensity from moderate to strong. Silicic and clay alteration are also present but subordinate to the sericitization. The intensity of the mineralization is proportional to the intensity of the alteration. Arsenopyrite, chalcopyrite and pyrrhotite are the dominant sulphides. The percentage of chalcopyrite is never more than 3 per cent. Arsenopyrite can form up to 5 per cent but averages 1 to 2 per cent. Occasional samples have assayed as high as 12.34 grams per tonne gold and 61.71 grams per tonne silver but are generally much lower (McDougall, 1964).

**Bibliography**

EMPR ASS RPT 2053, *16866*

EMPR EXPL 1988-C91

EMPR FIELDFIELD 1988, pp. 61-74


GSC OF 463

GSC P *68-50, pp. 39,45; 72-44


Falconbridge File
**MINFILE Record Summary**

**MINFILE No 092F 251**

**XML Extract/Inventory Report**

### SUMMARY

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#### Geology

The Irishman Creek occurrence lies 0.9 kilometre north of the Catface copper-molybdenum developed prospect (092F 120). See also Hecate Bay (092F 231).

The area of the deposit is underlain by andesite and basalt flows, breccia and agglomerate in contact with diorite of the Mesozoic-Paleozoic Westcoast Complex. The age of the volcanics is in doubt and they are thought to belong to either the Upper Triassic Karmutsen Formation (Vancouver Group) or to the Paleozoic Sicker Group. Quartz monzonite of the Early to Middle Jurassic Tofino Intrusive Suite (formerly Catface Intrusions), (Personal Communication, Nick Massey, May 1990).

Mineralization at Irishman's Creek consists of disseminated chalcopyrite, pyrite and some pyrrhotite in volcanic rocks and in brecciated quartz monzonite, near Tofino Intrusive Suite quartz diorite. A zone with greater that 0.2 percent copper mineralization measures 100 metres wide and 350 metres long (CIM Special Volume 15, page 308). The best drill intercept was 0.63 percent copper over 155.4 metres, with silver up to 6.7 grams per tonne. A potential for 20 million tonnes of mineralized rock with unknown grade was estimated in 1970 (CIM Special Volume 46, pages 322-326).

Also present are sulphide-rich masses containing magnetite, chalcopyrite, pyrite and pyrrhotite that occur over a width of one metre in or near a pyroxenite dyke that follows an east trending fault along Irishman's Creek.

In 1999 Doublestar Resources Ltd. plans to acquire the property from Falconbridge Limited.

#### Bibliography

- EMPR ASS RPT 540, 541, 580
- EMPR GEM 1970-287; 1971-234-245; 1972-266
- EMR MP CORPFILE (Falconbridge Nickel Mines Limited; Catface Copper Mines Limited; 1971 Prospectus, Thunder Valley Mines Limited)
- GSC MAP 17-1968; 1386A
- GSC MEM 204
- GSC OF 9; 61; 463
- GSC P 66-1; 68-50, pp. 39-45; 72-44
- GSC SUM RPT 1920A
- CIM *Special Vol. 15, 1976, pp. 299-310; *46, pp. 322-326
- GCNL Sept. 29, 1971
- PERS COMM Massey, N., May 1990 (with respect to Tertiary intrusive nomenclature)

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**SUMMARY**

**Name**: LUPUS 1, LAKE, ROAD  
**Status**: Showing  
**Latitude**: 49°46'53"N  
**Longitude**: 123°12'11"W  
**Commodities**: Gold, Silver, Zinc, Copper, Lead  
**Tectonic Belt**: Insular  
**Geology**: The Lake showing occurs about 800 metres northwest of the north end of Wolf Lake. The area is underlain primarily by basaltic to andesitic lavas of the Upper Triassic Karmutsen Formation, Vancouver Group. These rocks are mostly massive flows and pillow lavas of partly amygdaloidal basalts, with minor tuffs, volcanic breccias and agglomerates. The showing was exposed in a rock quarry in 1983. The showing is made up of a vein, up to 9 centimetres wide, that plunges 30 degrees toward 080 degrees. The vein consists of a core of massive sulphides lined with quartz. Sulphides include pyrite, arsenopyrite, sphalerite, minor chalcopyrite and galena. The vein is enveloped by a narrow clay zone that contains broken sulphide-quartz material. This zone is enveloped by a dark grey alteration zone which grades into a more bleached zone which in turn grades into unaltered green Karmutsen volcanics. A sample of the zone material taken across 0.90 metres assayed 4.42 grams per tonne gold, 20.57 grams per tonne silver, 0.60 per cent zinc, 0.15 per cent copper, 1.59 per cent lead and 0.01 per cent arsenic (Assessment Report 15034). Various selected samples and samples taken across narrower widths contained significantly higher grades of all the above elements. At the Road showing, 750 metres west-southwest of the Lake showing, a 6 centimetre wide quartz vein contains chalcopyrite and pyrite. A grab sample assayed 21.94 grams per tonne gold, 30.86 grams per tonne silver, and 0.66 per cent copper (Assessment Report 15034).

**Deposit Types**: I06 : Cu+/-Ag quartz veins  
**Terrane**: Wrangell  

**Bibliography**  
EMPR ASS RPT *13426*, *14442*, *15034*  
EMPR EXPL 1984-168; 1986-C183,C184  
EMPR PF (C.J. Westerman, Lupus Gold Property Report, 1986; various maps)  
GSC MAP 2-1965; 17-1968; 1386A  
GSC OF 463  
GSC P 68-50; 72-44; 80-16  
GCNL #42(Mar.2),(Apr.10), #149(Aug.5), 1987
SUMMARY

Name: JO ANNE
Mining Division: Nanaimo
NGS Map: 092F074
UTM: 10 (NAD 83)
Northing: 5510595
Easting: 330247
Status: Showing

Commodities: Copper, Gold
Deposit Types: H04 : Epithermal Au-Ag-Cu: high sulphidation
Terrain: Plutonic Rocks, Overlap Assemblage
Tectonic Belt: Insular

Capsule Geology:
Upper Cretaceous Nanaimo Group, Comox Formation sediments unconformably overlie Upper Triassic Vancouver Group, Karmutsen Formation basalt. Diorites of the Late Eocene to Early Oligocene Mount Washington Intrusive Suite have intruded along this contact resulting in some hornfelsing of the sediments and the development of diatreme breccias.

Disseminated to massive pyrrhotite, pyrite and chalcopyrite occur in hornfelsed Comox sandstones and siltstones. Crackled quartz diorite locally contains pyrite, arsenopyrite and chalcopyrite disseminated within the porous matrix of the sill-breccia complex, in association with chlorite, quartz and calcite. This cavity filling mineralization is considered to be epithermal in origin and similar in nature to the gold-bearing mineralization at nearby Mt. Washington (See 092F 116).

A sample of siliceous breccia from the Cliff Breccia zone assayed 1.66 grams per tonne gold and greater than 1 per cent arsenic (Assessment Report 17096).

Bibliography:
EMPR ASS RPT 13952, 14595, *14889, 15116, 16542, *17096
EMPR EXPL 1985-C155; 1986-C181; 1987-C154; 1988-C91
EMPR FIELDWORK 1988, pp. 81-91
GSC MAP 2-1965; 17-1968; 1386A
GSC OF 463
GSC P 68-50; 72-44
PERS COMM Massey, Nick, Feb. 1990 (with respect to Tertiary intrusive nomenclature)
The Pyrrhotite Creek breccia zone is an epithermal-type structure that occurs along a creek near the southern perimeter of the Oyster breccia. The structure consists of a lenticular zone of partially silicified and kaolinized bleached and brecciated basalt, mineralized across a width of about 1 metre and dipping toward the Oyster zone. Sulphide minerals present in decreasing order of abundance are pyrite, arsenopyrite, chalcopyrite, orpiment and realgar. The chalcopyrite sections of drill core were coincident with quartz veining and visible arsenopyrite.

A grab sample of silicified fault breccia assayed 14.50 grams per tonne gold, 31.88 grams per tonne silver, 1.04 per cent lead and 0.05 per cent zinc (Assessment Report 17193). A 43 centimetre section of core assayed 2.78 grams per tonne gold, 6.86 grams per tonne silver, 0.07 per cent copper and 3.67 per cent arsenic (Assessment Report 17193).

### Bibliography

- EMPR ASS RPT 83; 112; 114; 115; 169; 447; 4505; 5146; 5267.
- *S604* [9799, 9808, 6407, 6395, 9445, 11946, 11995; 11996; 12604; 12605; 14985, 1765, 35228, 15295, 15526, 15776, 15825, 15826, 15857, 15765, 17612, 17123, 17181, *17193; *18473
- EMPR EXPL REVIEW 1986, p. 70
- EMPR FIELDWORK *1988, pp. 81-91
- EMPR MP CORPFILE (Mount Washington Copper Company Limited; Noranda Exploration Company; Qualicum Mines Limited; Cumberland Mining Company Limited)
- GSC BULL 172
- GSC MAP 49-1959; 2-1965; 17-1968; 1386A
- GSC OF 9; 61; 463
- GSC P 66-1; 68-50; 69-22; 71-36; 72-44
- GSC SUM RPT 1924A, pp. 106-144; 1925A; 1930A-64
- CIM Transactions #72, p. 116
- CIM Special Volume #1, 1976, Table 1
- CMJ Jan., 1965
- NW PROSP Oct./Nov., 1988
- PERS COMM *Paul Wilton (District Geologist), March 1990
- V STOCKWATCH Sep.15, Jul.30, Sept.30, Oct.6, Oct.13, Nov.5, 9, 24,
W MINER Nov. 1965, p. 35; Nov. 1967, pp.35-40
Better Resources Limited, Annual Report 1987; Corporate Profile (not dated); 1989 Snapshot Review; Statement of Material Facts dated Aug.1, 1984
Vancouver Market Report, February, 1987
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**Geology**

The Ideal 3 occurrence area is underlain primarily by basaltic lavas of the Upper Triassic Karmutsen Formation, Vancouver Group. These rocks are mostly massive flows and pillow lavas of partly amygdaloidal basalts, with minor tuffs, volcanic breccias and agglomerates. A major unconformity separates the Karmutsen Formation from the overlying Upper Cretaceous Nanaimo Group. The Nanaimo Group (Comox Formation) consists of fine to coarse-grained detrital sedimentary rocks. The Benson Member is a basaltic pebble-cobble-boulder conglomerate which marks the unconformity in some areas. Diorite and granodiorite of the Tertiary Mount Washington Intrusive Suite have intruded the above rocks, forming stocks, sills and dykes.

The main showing consists of a 1 to 8 centimetre wide, 230 degree striking shear zone, with 10 to 20 degree northwest dips. The zone is hosted within the Benson conglomerate, about 1 metre above the unconformity with the Karmutsen Formation. The shear zone contains quartz and calcite veins up to 1.5 centimetres in width and locally up to 4 centimetres in width. The veins and adjacent rocks contain pyrite, sphalerite, galena and chalcopyrite. The wallrock is moderately to strongly iron-carbonate altered.

A composite of grab samples of the veinlets (1 to 3 centimetres wide) assayed 9.87 grams per tonne gold, 24.6 grams per tonne silver, 0.05 per cent copper, 0.8 per cent lead, 0.4 per cent zinc and 0.4 per cent arsenic (Assessment Report 16412).

A quartz-pyrrhotite-chalcopyrite veinlet occurs in a shear zone in basalt, on the east wall of Murex Creek about 1.5 kilometres upstream from the above occurrence. A sample (Sample 49A) assayed 0.42 per cent copper and 2.43 per cent zinc (Assessment Report 16412).

Realgar and arsenopyrite occur as disseminations and lenses in calcite veins. This showing is located about 2 kilometres to the northwest of the main showing on a southern branch of McKay Creek.

**Bibliography**

- EMPR ASS RPT *16412, 17500*
- EMPR EXPL 1987-C154, 1988-C91
- GSC MAP 2-1965; 17-1968; 1386A
- GSC OF 463
- GSC P 68-50; 72-44; 80-16
- GCNL #186, 1988
- NW PROSP Oct/Nov 1988
- V STOCKWATCH Dec. 17, 1987
## MINFILE Record Summary

### MINFILE No 092F 512

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**Last Edit:** 01-Jan-01 by BC Geological Survey (BCGS)
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MINFILE No 092F 513

SUMMARY/Inventory Report

Name: IDEAL 4 WEST, DOVE
Status: Showing
Latitude: 49° 44' 59" N
Longitude: 123° 14' 11" W
Commodities: Copper
Tectonic Belt: Insular
Capsule

Geology

At the Ideal 4 West occurrence, two copper bearing quartz veins occur in basalt of the Upper Triassic Karmutsen Formation, Vancouver Group. One vein is 4 to 6 centimetres wide and contains 10 to 15 per cent pyrrhotite and up to 2 per cent chalcopyrite. The vein strikes 235 degrees and dips 80 degrees northwest. The second vein, with similar mineralogy, has only a few per cent pyrrhotite and is found a few hundred metres to the northwest of the first. The vein strikes 245 degrees and dips 50 degrees northwest. An assay of this vein material revealed a content of 0.85 per cent copper and 4.5 grams per tonne silver (Assessment Report 16412).

Twenty-nine metres north of the northerly vein is an exposure of quartz diorite of the Late Eocene to Early Oligocene Mount Washington Intrusive Suite (formerly Catface Intrusions). Pyrrhotite and chalcopyrite occur in patches on the numerous fractures and joints of the intrusive.

Bibliography

EMPR ASS RPT *16412, 17500
EMPR EXPL 1987-C154, 1988-C91
GSC MAP 2-1965; 17-1968; 1386A
GSC OF 463
GSC P 68-50; 72-44
PERS COMM Massey, N. (May 1990) (with respect to renaming of Tertiary intrusions)
The OK North deposit is located east of Okeover Inlet and south of Theodosia Inlet in the Bunster Hills. Powell River is located about 25 kilometres to the south. The North zone is located near a small lake known as North Lake. The South Breccia zone (092K 057), lies 2.3 kilometres to the south.

Since its discovery in 1965, the O.K. property has been explored by a number of geological, geochemical and geophysical surveys and by more than 14,000 metres of percussion and diamond drilling. This work outlined several copper-molybdenum mineralized zones over a northerly trend of five kilometres length. Between 1966 and 1985, several companies (Asrco Exploration Company of Canada Limited, Falconbridge, Granite Mountain Mines, Western Mines, Aquarius Resources Limited) carried out the exploration work. In 1994, CanQuest Resource Corporation optioned the property and conducted geological, geophysical and geochemical surveys and drilling.

Two phases of intrusions occur within the Jurassic to Cretaceous Coast Plutonic Complex. Granodiorite is intruded by an elliptical, 1.6-kilometre long quartz monzonite body, referred to as the O.K. intrusive complex and assumed to be Tertiary or younger in age. The leucocratic feldspar porphyry dike-like body is elongated north-northwest, varies from 30 to 60 metres in width, and has been inferred to be the core of the larger variably altered granodiorite body. At least six phases of intrusions have been noted on the property, characteristic of many porphyry deposits. Later phases include narrow quartz-eye porphyries and postmineral diorites, which occur as north-northeasterly dikes. They vary from 1 to 60 metres in width. Discontinuous andesite dikes represent the latest intrusive phase. Rocks in the vicinity of the O.K. South exhibit moderate to strong phyllic and argillic alteration. Elsewhere on the property, alteration is less intense and consists predominantly of propylitic alteration to chlorite and epidote. Post-mineralization, north-northwest trending faults cut both granitic rocks of the Coast Plutonic Complex and the younger O.K. intrusive complex.

Mineralization occurs in fractures, quartz stringers, irregular veinlets, blebs and some disseminations. Mineralization of economic significance is primarily peripheral to the leucocratic feldspar porphyry in the granodiorite. Sulphide minerals include chalcopyrite, molybdenite and pyrite with minor sphalerite and bornite. Minor magnetite is associated erratically with pyrite and chalcopyrite. Thin veneers of malachite, limonite and azurite are also noted.

In situ reserves/possible resources at a 0.3 per cent copper cutoff grade are 68 million tonnes grading 0.39 per cent copper and 0.02 per cent molybdenum (N.C. Carter, personal communication, 1991).

A geostatistical study in 1982 of all drill hole data that included seven mineralized zones (over a distance of 5 kilometres) for which sufficient data were available, estimated that drill indicated and geological potential resources combined were 408,000,000 tonnes of greater than 0.24 per cent copper and 0.009 per cent molybdenum (CanQuest website). An independent report prepared in 1989 for CanQuest further refined the 1982 geostatistical analysis to provide a "proven plus probable resource, recoverable by a selective open pit mining operation" as 104,900,000 tonnes of 0.46 per cent copper and 0.028 per cent molybdenum, at a 0.4 per cent copper equivalent cut-off (CanQuest website).

Eastfield Resources and Prophecy Resource Corp. released updated resource estimates for the North Lake Zone in 2006 of 86.80 million tonnes Inferred per cent molybdenum, at a 0.4 per cent copper equivalent cut-off (CanQuest website).

Since its discovery in 1965, the O.K. property has been explored by a number of geological, geochemical and geophysical surveys and by more than 14,000 metres of percussion and diamond drilling. This work outlined several copper-molybdenum mineralized zones over a northerly trend of five kilometres length. Between 1966 and 1985, several companies (Asrco Exploration Company of Canada Limited, Falconbridge, Granite Mountain Mines, Western Mines, Aquarius Resources Limited) carried out the exploration work. In 1994, CanQuest Resource Corporation optioned the property and conducted geological, geophysical and geochemical surveys and drilling.

Two phases of intrusions occur within the Jurassic to Cretaceous Coast Plutonic Complex. Granodiorite is intruded by an elliptical, 1.6-kilometre long quartz monzonite body, referred to as the O.K. intrusive complex and assumed to be Tertiary or younger in age. The leucocratic feldspar porphyry dike-like body is elongated north-northwest, varies from 30 to 60 metres in width, and has been inferred to be the core of the larger variably altered granodiorite body. At least six phases of intrusions have been noted on the property, characteristic of many porphyry deposits. Later phases include narrow quartz-eye porphyries and postmineral diorites, which occur as north-northeasterly dikes. They vary from 1 to 60 metres in width. Discontinuous andesite dikes represent the latest intrusive phase. Rocks in the vicinity of the O.K. South exhibit moderate to strong phyllic and argillic alteration. Elsewhere on the property, alteration is less intense and consists predominantly of propylitic alteration to chlorite and epidote. Post-mineralization, north-northwest trending faults cut both granitic rocks of the Coast Plutonic Complex and the younger O.K. intrusive complex.

Mineralization occurs in fractures, quartz stringers, irregular veinlets, blebs and some disseminations. Mineralization of economic significance is primarily peripheral to the leucocratic feldspar porphyry in the granodiorite. Sulphide minerals include chalcopyrite, molybdenite and pyrite with minor sphalerite and bornite. Minor magnetite is associated erratically with pyrite and chalcopyrite. Thin veneers of malachite, limonite and azurite are also noted.
SUMMARY

OK SOUTH, O.K., IN, DEE, O.K. SOUTH, SOUTH BRECCIA, OK

Prospect

UTM 124E 38' 26" N 192W 3' 17" W

Copper, Molybdenum, Silver, Gold, Zinc, Rhenium

Terrane

Plutonic Rocks

Capsule

The OK South deposit is located east of Okeover Inlet and south of Theodosia Inlet in the Bunster Hills. Powell River is located about 25 kilometres to the south. The North zone (092K 008) is located 2.3 kilometres to the north, near a small lake known as North Lake.

Geology

Since its discovery in 1965, the O.K. property has been explored by a number of geological, geochemical and geophysical surveys and by more than 14,000 metres of percussion and diamond drilling. This work outlined several copper-molybdenum mineralized zones over a northerly trend of five kilometres length. Between 1966 and 1985, several companies (Asrco Exploration Company of Canada Limited, Falconbridge, Granite Mountain Mines, Western Mines, Aquarius Resources Limited) carried out the exploration work. In 1994, CanQuest Resource Corporation optioned the property and conducted geological, geophysical and geochemical surveys and drilling.

Two phases of intrusions occur within the Jurassic to Cretaceous Coast Plutonic Complex. Granodiorite is intruded by an elliptical, 1.6 kilometre long, leucocratic felsic porphyry, referred to as the O.K. intrusive complex and assumed to be Tertiary or younger in age. The leucocratic feldspar porphyry dike-like body is elongated north-northwest, varies from 30 to 600 metres in width, and has been inferred to be the core of the larger variably altered granodiorite body. At least six phases of intrusions have been noted on the property, characteristic of many porphyry deposits. Later phases include narrow quartz-eye porphyries and postmineral diorites, which occur as north-northeasterly dikes. They vary from 1 to 60 metres in width. Discontinuous andesite dikes represent the latest intrusive phase. Rocks in the vicinity of the O.K. South exhibit moderate to strong phyllic and argillic alteration. Elsewhere on the property, alteration is less intense and consists predominantly of propylitic alteration to chlorite and epidote. Post mineralization, north-northwest trending faults cut both granitic rocks of the Coast Plutonic Complex and the younger O.K. intrusive complex.

Mineralization occurs in fractures, as quartz stringers, irregular veinlets, blebs and some disseminations. Intrusive breccias peripheral to the granodiorite host the higher grade copper mineralization. Trenching and limited diamond drilling suggest a north-northwest trend to the breccia zone, which consists of rounded two to five centimetre clasts of varying lithologies within a fine-grained matrix containing a high percentage of sulphide minerals.

Sulphide minerals include chalcopyrite, molybdenite and pyrite with minor sphalerite and bornite. Minor magnetite is associated erratically with pyrite and chalcopyrite. Thin veneers of malachite, limonite and azurite are also present.

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EPITHERMAL Au-Ag-Cu: HIGH SULPHIDATION

H04
by A. Panteleyev
British Columbia Geological Survey


IDENTIFICATION

SYNONYMS: (Epithermal) acid-sulphate, quartz-alunite Au, alunite-kaolinite ± pyrophyllite, advanced argillic, Nansatsu-type, enargite gold. The deposits are commonly referred to as acid-sulphate type after the chemistry of the hydrothermal fluids, quartz-alunite or kaolinite-alunite type after their alteration mineralogy, or high-sulphidation type in reference to the oxidation state of the acid fluids responsible for alteration and mineralization.

COMMODITIES (BYPRODUCTS): Au, Ag, Cu (As, Sb).

EXAMPLES (British Columbia (MINFILE #) - International): Mt. McIntosh/Hushamu (EXPO, 092L 240), Taseko River deposits - Westpine (Empress) (092O 034), Taylor-Windfall (092O 028) and Battlement Creek (092O 005); Goldfield and Paradise Peak (Nevada, USA), Summitville (Colorado, USA); Nansatsu (Japan), El Indio (Chile); Temora (New South Wales, Australia), Pueblo Viejo (Dominica), Chinkuashih (Taiwan), Rodalquilar (Spain), Lepanto and Nalesbitan (Philippines).

GEOLOGICAL CHARACTERISTICS

CAPSULE DESCRIPTION: Veins, vuggy breccias and sulphide replacements ranging from pods to massive lenses occur in volcanic sequences associated with high level hydrothermal systems marked by acid-leached, advanced argillic, siliceous alteration.

TECTONIC SETTING: Extensional and transtensional settings, commonly in volcano-plutonic continent-margin and oceanic arcs and back-arcs. In zones with high-level magmatic emplacements where stratovolcanoes and other volcanic edifices are constructed above plutons.

DEPOSITIONAL ENVIRONMENT / GEOLOGICAL SETTING: Subvolcanic to volcanic in calderas, flow-dome complexes, rarely maars and other volcanic structures; often associated with subvolcanic stocks and dikes, breccias. Postulated to overlie, and be genetically related to, porphyry copper systems in deeper mineralized intrusions that underlie the stratovolcanoes.

AGE OF MINERALIZATION: Tertiary to Quaternary; less commonly Mesozoic and rarely Paleozoic volcanic belts. The rare preservation of older deposits reflects rapid rates of erosion before burial of subaerial volcanoes in tectonically active arcs.

HOST/ASSOCIATED ROCK TYPES: Volcanic pyroclastic and flow rocks, commonly subaerial andesite to dacite and rhyodacite, and their subvolcanic intrusive equivalents. Permeable sedimentary intervolcanic units can be sites of mineralization.

DEPOSIT FORM: Veins and massive sulphide replacement pods and lenses, stockworks and breccias. Commonly irregular deposit shapes are determined by hostrock permeability and the geometry of ore-controlling structures. Multiple, crosscutting composite veins are common.

TEXTURE/STRUCTURE: Vuggy ‘slaggy’ silica derived as a residual product of acid leaching is characteristic. Drusy cavities, banded veins, hydrothermal breccias, massive wallrock replacements with fine-grained quartz.

ORE MINERALOGY (Principal and subordinate): pyrite, enargite/luzonite, chalcocite, covellite, bornite, gold, electrum; chalcopyrite, sphalerite, tetrahedrite/tennantite, galena, marcasite, arsenopyrite, silver sulphosalts, tellurides including goldfieldite. Two types of ore are commonly present: massive enargite-pyrite and/or quartz-alunite-gold.

GANGUE MINERALOGY (Principal and subordinate): Pyrite and quartz predominate. Barite may also occur; carbonate minerals are absent.

ALTERATION MINERALOGY (Principal and subordinate): Quartz, kaolinite/dickite, alunite, barite, hematite; sericite/ilite, amorphous clays and silica, pyrophyllite, andalusite, diaspare, corundum, tourmaline, dumortierite, topaz, zenyite, jarosite, Al-P sulphates (hinsdalite, woodhouseite, crandalite, etc.) and native sulphur. Advanced argillic alteration is characteristic and can be areally extensive and visually prominent. Quartz occurs as fine-grained replacements and, characteristically, as vuggy, residual silica in acid-leached rocks.
WEATHERING: Weathered rocks may contain abundant limonite (jarosite-goethite-hematite), generally in a groundmass of kaolinite and quartz. Fine-grained supergene alunite veins and nodules are common.

ORE CONTROLS: In volcanic edifices - caldera ring and radial fractures; fracture sets in resurgent domes and flow-dome complexes, hydrothermal breccia pipes and diatremes. Faults and breccias in and around intrusive centres. Permeable lithologies, in some cases with less permeable cappings of hydrothermally altered or other cap rocks. The deposits occur over considerable depths, ranging from high-temperature solfataras at paleosurface down into cupolas of intrusive bodies at depth.

GENETIC MODEL: Recent research, mainly in the southwest Pacific and Andes, has shown that these deposits form in subaerial volcanic complexes or composite island arc volcanoes above degassing magma chambers. The deposits can commonly be genetically related to high-level intrusions. Multiple stages of mineralization are common, presumably related to periodic tectonism with associated intrusive activity and magmatic hydrothermal fluid generation.

ASSOCIATED DEPOSIT TYPES: Porphyry Cu-Mo-Au deposits (L04), subvolcanic Cu-Ag-Au (As-Sb) (L01), epithermal Au-Ag deposits: low sulphidation type (H05), silica-clay-pyrophyllite deposits (Roseki deposits) (H09), hotspring Au-Ag (H03), placer Au deposits (C01, C02).

COMMENTS: High-sulphidation epithermal Au-Ag deposits are much less common in the Canadian Cordillera than low-sulphidation epithermal veins. However, they are the dominant type of epithermal deposit in the Andes.

EXPLORATION GUIDES

GEOCHEMICAL SIGNATURE: Au, Cu, As dominate; also Ag, Zn, Pb, Sb, Mo, Bi, Sn, Te, W, B and Hg.

GEOPHYSICAL SIGNATURE: Magnetic lows in hydrothermally altered (acid-leached) rocks; gravity contrasts may mark boundaries of structural blocks.

OTHER EXPLORATION GUIDES: These deposits are found in second order structures adjacent to crustal-scale fault zones, both normal and strike-slip, as well as local structures associated with subvolcanic intrusions. The deposits tend to overlie and flank porphyry copper-gold deposits and underlie acid-leached siliceous, clay and alunite-bearing 'lithocaps'.

ECONOMIC FACTORS

TYPICAL GRADE AND TONNAGE: There is wide variation in deposit types ranging from bulk-mineable, low-grade to selectively mined, high-grade deposits. Underground mines range in size from 2 to 25 Mt with grades from 178 g/t Au, 109 g/t Ag and 3.87% Cu in direct smelting ores (El Indio) to 2.8 g/t Au and 11.3 g/t Ag and 1.8% Cu (Lepanto). Open pit mines with reserves of <100 Mt to >200 Mt range from Au-Ag mines with 3.8 g/t Au and 20 g/t Ag (Pueblo Viejo, Dominica) to orebodies such as the Nansatsu deposits, Japan that contain a few million tonnes ore grading between 3 and 6 g/t Au. Porphyry Au (Cu) deposits can be overprinted with late-stage acid sulphate alteration zones which can contain in the order of ~1.5 g/t Au with 0.05 to 0.1% Cu in stockworks (Marte and Lobo) or high-grade Cu-Ag-Au veins (La Grande veins, Collahausi). More typically these late stage alteration zones carry <0.4 to 0.9 g/t Au and >0.4 to 2% Cu (Butte, Montana; Dizon, Philippines).

ECONOMIC LIMITATIONS: Oxidation of primary ores is commonly neccessary for desireable metallurgy; primary ores may be refractory and can render low-grade mineralization noneconomic.

IMPORTANCE: This class of deposits has recently become a focus for exploration throughout the circum-Pacific region because of the very attractive Au and Cu grades in some deposits. Silica-rich gold ores (3-4 g/t Au) from the Nansatsu deposits in Japan are used as flux in copper smelters.

REFERENCES


EPITHERMAL Au-Ag: LOW SULPHIDATION

H05
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IDENTIFICATION

SYNONYMS: (Epithermal) adularia-sericite; quartz-adularia, Comstock, Sado-type; bonanza Au-Ag; alkali chloride (hydrothermal).

COMMODITIES (BYPRODUCTS): Au, Ag (Pb, Zn, Cu).

EXAMPLES (British Columbia (MINFILE #) - International): Toodoggone district deposits - Lawyers (094E 066), Baker (094E 026), Shas (094E 050); Blackdome (092O 050, 092O 051, 092O 052, 092O 053); Premier Gold (Silbak Premier), (104B 054); Cinola (103F 034); Comstock, Aurora (Nevada, USA), Bodie (California, USA), Creede (Colorado, USA), Republic (Washington, USA), El Bronce (Chile), Guanajuato (Mexico), Sado, Hishikari (Japan), Colqui (Peru), Baguio (Philippines) Laddolam (Lihir, Papua- New Guinea).

GEOLOGICAL CHARACTERISTICS

CAPSULE DESCRIPTION: Quartz veins, stockworks and breccias carrying gold, silver, electrum, argentite and pyrite with lesser and variable amounts of sphalerite, chalcopyrite, galena, rare tetrahedrite and sulphosalt minerals form in high-level (epizonal) to near-surface environments. The ore commonly exhibits open-space filling textures and is associated with volcanic-related hydrothermal to geothermal systems.

TECTONIC SETTING: Volcanic island and continent-margin magmatic arcs and continental volcanic fields with extensional structures.

DEPOSITIONAL ENVIRONMENT / GEOLOGICAL SETTING: High-level hydrothermal systems from depths of ~1 km to surficial hot spring settings. Regional-scale fracture systems related to grabens, (resurgent) calderas, flow-dome complexes and rarely, maar diatremes. Extensional structures in volcanic fields (normal faults, fault splays, ladder veins and cymoid loops, etc.) are common; locally graben or caldera-fill clastic rocks are present. High-level (subvolcanic) stocks and/or dikes and pebble breccia diatremes occur in some areas. Locally resurgent or domal structures are related to underlying intrusive bodies.

AGE OF MINERALIZATION: Any age. Tertiary deposits are most abundant; in B.C. Jurassic deposits are important. Deposits of Paleozoic age are described in Australia. Closely related to the host volcanic rocks but invariably slightly younger in age (0.5 to 1 Ma, more or less).

HOST/ASSOCIATED ROCK TYPES: Most types of volcanic rocks; calcalkaline andesitic compositions predominate. Some deposits occur in areas with bimodal volcanism and extensive subaerial ashflow deposits. A less common association is with alkalic intrusive rocks and shoshonitic volcanics. Clastic and epiclastic sediments in intra-volcanic basins and structural depressions.

DEPOSIT FORM: Ore zones are typically localized in structures, but may occur in permeable lithologies. Upward-flaring ore zones centred on structurally controlled hydrothermal conduits are typical. Large (> 1 m wide and hundreds of metres in strike length) to small veins and stockworks are common with lesser disseminations and replacements. Vein systems can be laterally extensive but ore shoots have relatively restricted vertical extent. High-grade ores are commonly found in dilational zones in faults at flexures, splays and in cymoid loops.

TEXTURE/STRUCTURE: Open-space filling, symmetrical and other layering, crustification, comb structure, colloform banding and multiple brecciation.

ORE MINERALOGY (Principal and subordinate): Pyrite, electrum, gold, silver, argentite; chalcopyrite, sphalerite, galena, tetrahedrite, silver sulphosalt and/or selenide minerals. Deposits can be strongly zoned along strike and vertically. Deposits are commonly zoned vertically over 250 to 350 m from a base metal poor, Au-Ag-rich top to a relatively Ag-rich base metal zone and an underlying base metal rich zone grading at depth into a sparse base metal, pyritic zone. From surface to depth, metal zones contain: Au-Ag-As-Sb-Hg, Au-Ag-Pb-Zn-Cu, Ag-Pb-Zn. In alkalic hostrocks tellurides, V mica (roscoelite) and fluorite may be abundant, with lesser molybdenite.

GANGUE MINERALOGY (Principal and subordinate): Quartz, amethyst, chalcedony, quartz pseudomorphs after calcite, calcite; adularia, sericite, barite, fluorite, Ca-Mg-Mn-Fe carbonate minerals such as rhodochrosite, hematite and
chlorite.

**ALTERATION MINERALOGY:** Silicification is extensive in ores as multiple generations of quartz and chalcedony are commonly accompanied by adularia and calcite. Pervasive silicification in vein envelopes is flanked by sericite-illite-kaolinite assemblages. Intermediate argillic alteration [kaolinite-illite-montmorillonite (smectite)] formed adjacent to some veins; advanced argillic alteration (kaolinite-alunite) may form along the tops of mineralized zones. Propylitic alteration dominates at depth and peripherally.

**WEATHERING:** Weathered outcrops are often characterized by resistant quartz ± alunite 'ledges' and extensive flanking bleached, clay-altered zones with supergene alunite, jarosite and other limonite minerals.

**ORE CONTROLS:** In some districts the epithermal mineralization is tied to a specific metallogenetic event, either structural, magmatic, or both. The veins are emplaced within a restricted stratigraphic interval generally within 1 km of the paleosurface. Mineralization near surface takes place in hotspring systems, or the deeper underlying hydrothermal conduits. At greater depth it can be postulated to occur above, or peripheral to, porphyry and possibly skarn mineralization. Normal faults, margins of grabens, coarse clastic caldera moat-fill units, radial and ring dike fracture sets and both hydrothermal and tectonic breccias are all ore fluid channeling structures. Through-going, branching, bifurcating, anastamosing and intersecting fracture systems are commonly mineralized. Ore shoots form where dilational openings and cymoid loops develop, typically where the strike or dip of veins change. Hangingwall fractures in mineralized structures are particularly favourable for high-grade ore.

**GENETIC MODEL:** These deposits form in both subaerial, predominantly felsic, volcanic fields in extensional and strike-slip structural regimes and island arc or continental andesitic stratovolcanoes above active subduction zones. Near-surface hydrothermal systems, ranging from hotspring at surface to deeper, structurally and permeability focused fluid flow zones are the sites of mineralization. The ore fluids are relatively dilute and cool solutions that are mixtures of magmatic and meteoric fluids. Mineral deposition takes place as the solutions undergo cooling and degassing by fluid mixing, boiling and decompression.

**ASSOCIATED DEPOSIT TYPES:** Epithermal Au-Ag: high sulphidation (H04); hotspring Au-Ag (H03); porphyry Cu±Mo±Au (L04) and related polymetallic veins (I05); placer gold (C01, C02).

**EXPLORATION GUIDES**

**GEOCHEMICAL SIGNATURE:** Elevated values in rocks of Au, Ag, Zn, Pb, Cu and As, Sb, Ba, F, Mn; locally Te, Se and Hg.

**GEOPHYSICAL SIGNATURE:** VLF has been used to trace structures; radiometric surveys may outline strong potassic alteration of wallrocks. Detailed gravity surveys may delineate boundaries of structural blocks with large density contrasts.

**OTHER EXPLORATION GUIDES:** Silver deposits generally have higher base metal contents than Au and Au-Ag deposits. Drilling feeder zones to hotsprings and siliceous sinters may lead to identification of buried deposits. Prospecting for mineralized siliceous and silica-carbonate float or vein material with diagnostic open-space textures is effective.

**ECONOMIC FACTORS**

**TYPICAL GRADE AND TONNAGE:** The following data describe the median deposits based on worldwide mines and U.S.A. models:

Au-Ag deposits (41 Comstock-type 'bonanza' deposits) - 0.77 Mt with 7.5 g/t Au, 110 g/t Ag and minor Cu, Zn and Pb. The highest base metal contents in the top decile of deposits all contain <0.1% Cu, Zn and 0.1% Pb

Au-Cu deposits (20 Sado-type deposits) - 0.3 Mt with 1.3% g/t Au, 38 g/t Ag and >0.3% Cu; 10 % of the deposits contain, on average, about 0.75% Cu with one having >3.2% Cu.

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SUBVOLCANIC Cu-Au-Ag (As-Sb)

by Andre Panteleyev
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IDENTIFICATION

SYNONYMS: Transitional, intrusion-related (polymetallic) stockwork and vein.

COMMODITIES (BYPRODUCTS): Cu, Au, Ag (As, Sb).

EXAMPLES (British Columbia - Canada/International): Equity Silver (091L 001); Thorn prospect (104K031, 116); Rochester District (Nevada, USA), Kori Kollo (Bolivia), the 'epithermal gold' zones at Lepanto (Philippines), parts of Recsk (Hungary) and Bor (Serbia).

GEOLOGICAL CHARACTERISTICS

CAPSULE DESCRIPTION: Pyritic veins, stockworks and breccias in subvolcanic intrusive bodies with stratabound to discordant massive pyritic replacements, veins, stockworks, disseminations and related hydrothermal breccias in country rocks. These deposits are located near or above porphyry Cu hydrothermal systems and commonly contain pyritic auriferous polymetallic mineralization with Ag sulphosalt and other As and Sb-bearing minerals.

TECTONIC SETTINGS: Volcano-plutonic belts in island arcs and continental margins; continental volcanic arcs. Subvolcanic intrusions are abundant. Extensional tectonic regimes allow high-level emplacement of the intrusions, but compressive regimes are also permissive.

DEPOSITIONAL ENVIRONMENT / GEOLOGICAL SETTING: Uppermost levels of intrusive systems and their adjoining fractured and permeable country rocks, commonly in volcanic terrains with eroded stratovolcanoes. Subvolcanic domes and flow-dome complexes can also be mineralized; their uppermost parts are exposed without much erosion.

AGE OF MINERALIZATION: Mainly Tertiary, a number of older deposits have been identified.

HOST/ASSOCIATED ROCK TYPES: Subvolcanic (hypabyssal) stocks, rhyodacite and dacite flow-dome complexes with fine to coarse-grained quartz-phryic intrusions are common. Dike swarms and other small subvolcanic intrusions are likely to be present. Country rocks range widely in character and age. Where coeval volcanic rocks are present, they range from andesite to rhyolite in composition and occur as flows, breccias and pyroclastic rocks with related erosion products (epiclastic rocks).

DEPOSIT FORM: Stockworks and closely-spaced to sheeted sets of sulphide-bearing veins in zones within intrusions and as structurally controlled and stratabound or bedding plane replacements along permeable units and horizons in hostrocks. Veins and stockworks form in transgressive hydrothermal fluid conduits that can pass into pipe-like and planar breccias. Breccia bodies are commonly tens of metres and, rarely, a few hundred metres in size. Massive sulphide zones can pass outward into auriferous pyrite-quartz-sericite veins and replacements.

TEXTURE/STRUCTURE: Sulphide and sulphide-quartz veins and stockworks. Open space filling and replacement of matrix in breccia units. Bedding and lithic clast replacements by massive sulphide, disseminations and veins. Multiple generations of veins and hydrothermal breccias are common. Pyrite is dominant and quartz is minor to absent in veins.

ORE MINERALOGY (Principal and subordinate): Pyrite, commonly as auriferous pyrite, chalcopyrite, terahedrite/tennantite; enargite/luzonite, covellite, chalcocite, bornite, sphalerite, galena, arsenopyrite, argentite, sulphosalts, gold, stibnite, molybdenite, wolframite or scheelite, pyrrhotite, marcasite, realgar, hematite, tin and bismuth minerals. Depth zoning is commonly evident with pyrite-rich deposits containing enargite near surface, passing downwards into tetrahedrite/tennantite + chalcopyrite and then chalcopyrite in porphyry intrusions at depth.

GANGUE MINERALOGY (Principal and subordinate): Pyrite, sericite, quartz; kaolinite, alunite, jarosite (mainly in supergene zone).

ALTERATION MINERALOGY (Principal and subordinate): Pyrite, sericite, quartz; kaolinite, dickite, pyrophyllite, andalusite, diaspore, corundum, tourmaline, alunite, anhydrite, barite, chalcedony, dumortierite, lazulite (variety scorzalite), rutile and chlorite. Tourmaline as schorlite (a black Fe-rich variety) can be present locally; it is commonly present in breccias with quartz and variable amounts of clay minerals. Late quartz-alunite veins may occur.
WEATHERING: Weathering of pyritic zones can produce limonitic blankets containing abundant jarosite, goethite and, locally, alunite.

GENETIC MODEL: These deposits represent a transition from porphyry copper to epithermal conditions with a blending and blurring of porphyry and epithermal characteristics. Mineralization is related to robust, evolving hydrothermal systems derived from porphyritic, subvolcanic intrusions. Vertical zoning and superimposition of different types of ores is typical due, in large part, to overlapping stages of mineralizations. Ore fluids with varying amounts of magmatic-source fluids have temperatures generally greater than those of epithermal systems, commonly in the order of 300°C and higher. Fluid salinities are also relatively high, commonly more than 10 weight per cent NaCl-equivalent and rarely in the order of 50 %, and greater.

ORE CONTROLS: Strongly fractured to crackled zones in cupolas and internal parts of intrusions and flow-dome complexes; along faulted margins of high-level intrusive bodies. Permeable lithologies, both primary and secondary in origin, in the country rocks. Primary controls are structural features such as faults, shearz, fractured and crackled zones and breccias. Secondary controls are porous volcanic units, bedding plane contacts and unconformities. Breccia pipes provide channelways for hydrothermal fluids originating from porphyry Cu systems and commonly carry elevated values of Au and Ag. The vein and replacement style deposits can be separated from the deeper porphyry Cu mineralization by 200 to 700 m.

ASSOCIATED DEPOSIT TYPES: Porphyry Cu-Au±Mo (L04); epithermal Au-Ag commonly both high-sulphidation (H04) and low-sulphidation (H05) pyrite-sericite-bearing types; auriferous quartz-pyrite veins, enargite massive sulphide also known as enargite gold.

COMMENTS: This deposit type is poorly defined and overall, uncommon. It is in large part stockworks and a closely spaced to sheeted sulphide vein system with local massive to disseminated replacement sulphide zones. It forms as a high-temperature, pyrite-rich, commonly tetrahedrite, and rarely enargite-bearing, polymetallic affiliate of epithermal Au-Ag mineralization. Both low and high- sulphidation epithermal styles of mineralization can be present. As and Sb enrichments in ores are characteristic. If abundant gas and gas condensates evolve from the hydrothermal fluids there can be extensive acid leaching and widespread, high-level advanced argillic alteration. This type of alteration is rarely mineralized.

EXPLORATION GUIDES

GEOCHEMICAL SIGNATURE: Elevated values of Au, Cu, Ag, As, Sb, Zn, Cd, Pb, Fe and F; at deeper levels Mo, Bi, W and locally Sn. In some deposits there is local strong enrichment in B, Co, Ba, K and depletion of Na. Both depth zoning and lateral zoning are evident.

GEOPHYSICAL SIGNATURE: Induced polarization to delineate pyrite zones. Magnetic surveys are useful in some cases to outline lithologic units and delineate contacts. Electromagnetic surveys can be used effectively where massive sulphide bodies are present.

OTHER EXPLORATION GUIDES: Association with widespread sericite-pyrite and quartz-sericite-pyrite that might be high-level leakage from buried porphyry Cu ± Au ± Mo deposits. Extensive overprinting of sericite/ilite by kaolinite; rare alunite. In some deposits, high-temperature aluminous alteration minerals pyrophyllite and andalusite are present but are generally overprinted by abundant sericite and lesser kaolinite. Tourmaline and phosphate minerals can occur. There is commonly marked vertical mineralogical and geochemical depth-zoning.

ECONOMIC FACTORS

GRADE AND TONNAGE: The deposits have pyritic orebodies of various types; vertical stacking and pronounced metal zoning are prevalent. Small, high-grade replacement orebodies containing tetrahedrite/tennantite, and rarely enargite, can form within larger zones of pyritization. The massive sulphide replacement ores have associated smaller peripheral, structurally controlled zones of sericitic alteration that constitute pyritic orebodies grading ~ 4 g/t gold. Similar tetrahedrite-bearing ores with bulk mineable reserves at Equity Silver were in the order of 30 Mt with 0.25% Cu and ~86 g/t Ag and 1 g/t Au. At the Recsk deposit, Hungary, shallow breccia-hosted Cu-Au ores overlie a porphyry copper deposit containing ~1000 Mt with 0.8 % Cu. The closely spaced pyritic fracture and vein systems at Kori Kollo, La Joya district, Bolivia contained 10 Mt oxide ore with 1.62 g/t Au and 23.6 g/t Ag and had sulphide ore reserves of 64 Mt at 2.26 g/t Au and 13.8 g/t Ag.

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PORPHYRY Cu+/-Mo+/-Au

L04
by Andre Panteleyev
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IDENTIFICATION

SYNONYM: Calcalkaline porphyry Cu, Cu-Mo, Cu-Au.

COMMODITIES (BYPRODUCTS): Cu, Mo and Au are generally present but quantities range from insufficient for economic recovery to major ore constituents. Minor Ag in most deposits; rare recovery of Re from Island Copper mine.

EXAMPLES (British Columbia - Canada/International):
Volcanic type deposits (Cu + Au * Mo) - Fish Lake (092O 041), Kemess (094E 021 004), Hushamu (EXPO, 092L 240), Red Dog (092L 200), Poison Mountain (092O 046), Bell (093M 001), Morrison (093M 007), Island Copper (092L 158); Far Southeast (Lepanto/Mankayan), Dizon, Guianaong, Taysan and Santo Thomas II (Philippines), Frieda River and Panguna (Papua New Guinea).

Classic deposits (Cu + Mo * Au) - Brenda (092HNE047), Berg (093E 046), Huckleberry (093E 017), Schaft Creek (104G 015);
Casino (Yukon, Canada), Inspiration, Morenci, Ray, Sierrita-Experanza, Twin Buttes, Kalamazoo and Santa Rita (Arizona, USA), Bingham (Utah, USA), El Salvador, (Chile), Bajo de la Alumbrera (Argentina).

Plutonic deposits (Cu * Mo) - Highland Valley Copper (092ISE001,011,012,045), Gibraltar (093B 012,007), Catface (092F 120); Chuquicamata, La Escondida and Quebrada Blanca (Chile).

GEOLOGICAL CHARACTERISTICS

CAPSULE DESCRIPTION: Stockworks of quartz veinlets, quartz veins, closely spaced fractures and breccias containing pyrite and chalcopyrite with lesser molybdenite, bornite and magnetite occur in large zones of economically bulk-mineable mineralization in or adjoining porphyritic intrusions and related breccia bodies. Disseminated sulphide minerals are present, generally in subordinate amounts. The mineralization is spatially, temporally and genetically associated with hydrothermal alteration of the hostrock intrusions and wallrocks.

TECTONIC SETTINGS: In orogenic belts at convergent plate boundaries, commonly linked to subduction-related magmatism. Also in association with emplacement of high-level stocks during extensional tectonism related to strike-slip faulting and back-arc spreading following continent margin accretion.

DEPOSITIONAL ENVIRONMENT / GEOLOGICAL SETTING: High-level (epizonal) stock emplacement levels in volcano-plutonic arcs, commonly oceanic volcanic island and continent-margin arcs. Virtually any type of country rock can be mineralized, but commonly the high-level stocks and related dikes intrude their coeval and cogenetic volcanic piles.

AGE OF MINERALIZATION: Two main periods in the Canadian Cordillera: the Triassic/Jurassic (210-180 Ma) and Cretaceous/Tertiary (85-45 Ma). Elsewhere deposits are mainly Tertiary, but range from Archean to Quaternary.

HOST/ASSOCIATED ROCK TYPES: Intrusions range from coarse-grained phaneritic to porphyritic stocks, batholiths and dike swarms; rarely pegmatitic. Compositions range from calcalkaline quartz diorite to granodiorite and quartz monzonite. Commonly there is multiple emplacement of successive intrusive phases and a wide variety of breccias. Alkaline porphyry Cu-Au deposits are associated with syenitic and other alkaline rocks and are considered to be a a distinct deposit type (see model L03).

DEPOSIT FORM: Large zones of hydrothermally altered rock contain quartz veins and stockworks, sulphide-bearing
deposits, advanced argillic alteration (kaolinite-pyrophyllite).

* Plutonic deposits (e.g., the Highland Valley deposits) are found in large plutonic to batholithic intrusions immobilized at zones with potassic (commonly biotite-rich) or phyllic alteration contain molybdenite * chalcopyrite, then chalcopyrite and zoning of alteration and sulphide minerals from a weakly mineralized potassic/propylitic core is usual. Surrounding ore and then phyllic (quartz-sericite-pyrite) alteration, less commonly argillic, and rarely, in the uppermost parts of some ore older alteration assemblages in cupriferous zones can be partially to completely overprinted by later biotite and K-feldspar looking secondary mineral that is commonly referred to as an early developed biotite (EDB) or a 'biotite hornfels'. These * Volcanic type deposits (e.g. Island Copper) are associated with multiple intrusions in subvolcanic settings of small stocks, sills, dikes and diverse types of intrusive breccias. Reconstruction of volcanic landforms, structures, vent-proximal extrusive deposits and subvolcanic intrusive centres is possible in many cases, or can be inferred. Mineralization at depths of 1 km, or less, is mainly associated with breccia development or as lithologically controlled preferential replacement in hostrocks with high primary permeability. Propylitic alteration is widespread and generally flanks early, centrally located potassic alteration; the latter is commonly well mineralized. Younger mineralized phylic alteration commonly overprints the early mineralization. Barren advanced argillic alteration is rarely present as a late, high-level hydrothermal carapace.

* Classic deposits (e.g., Berg) are stock related with multiple emplacements at shallow depth (1 to 2 km) of generally equant, cylindrical porphyritic intrusions. Numerous dikes and breccias of pre, intra, and post-mineralization age modify the stock geometry. Orebodies occur along margins and adjacent to intrusions as annular ore shells. Lateral outward zoning of alteration and sulphide minerals from a weakly mineralized potassic/propylitic core is usual. Surrounding ore zones with potassic (commonly biotite-rich) or phylic alteration contain molybdenite * chalcopyrite, then chalcopyrite and a generally widespread propylitic, barren pyritic aureole or 'halo'.

* Plutonic deposits (e.g., the Highland Valley deposits) are found in large plutonic to bolitholithic intrusions immobilized at relatively deep levels, say 2 to 4 km. Related dikes and intrusive breccia bodies can be emplaced at shallower levels. Hostrocks are phaneritic coarse grained to porphyritic. The intrusions can display internal compositional differences as a result of differentiation with gradational to sharp boundaries between the different phases of magma emplacement. Local swarms of dikes, many with associated breccias, and fracture zones are sites of mineralization. Orebodies around silicified alteration zones tend to occur as diffuse vein stockworks carrying chalcopyrite, bornite and minor pyrite in intensely fractured rocks but, overall, sulphide minerals are sparse. Much of the early potassic and phyllic alteration in central parts of orebodies is restricted to the margins of mineralized fractures as selvages. Later phylic-argillic alteration forms envelopes on the veins and fractures and is more pervasive and widespread. Propylitic alteration is widespread but unobtrusive and is indicated by the presence of rare pyrite with chloritized mafic minerals, saussuritized plagioclase and small amounts of epidote.

**TEXTURE/STRUCTURE:** Quartz, quartz-sulphide and sulphide veins and stockworks; sulphide grains in fractures and fracture selvages. Minor disseminated sulphides commonly replacing primary mafic minerals. Quartz phenocrysts can be partially resorbed and overgrown by silica.

**ORE MINERALOGY (Principal and subordinate):** Pyrite is the predominant sulphide mineral; in some deposits the Fe oxide minerals magnetite, and rarely hematite, are abundant. Ore minerals are chalcopyrite; molybdenite, lesser bornite and rare (primary) chalcocite. Subordinate minerals are tetrahedrite/tennantite, enargite and minor gold , electrum and arsenopyrite. In many deposits late veins commonly contain galena and sphalerite in a gangue of quartz, calcite and barite.

**GANGUE MINERALOGY (Principal and subordinate):** Gangue minerals in mineralized veins are mainly quartz with lesser biotite, sericite, K-feldspar, magnetite, chlorite, calcite, epidote, anhydrite and tourmaline. Many of these minerals are also pervasive alteration products of primary igneous mineral grains.

**ALTERATION MINERALOGY:** Quartz, sericite, biotite, K-feldspar, albite, anhydrite/gypsum, magnetite, actinolite, chlorite, epidote, calcite, clay minerals, tourmaline. Early formed alteration can be overprinted by younger assemblages. Central and early formed potassic zones (K-feldspar and biotite) commonly coincide with ore. This alteration can be flanked in volcanic hostrocks by biotite-rich rocks that grade outward into propylitic rocks. The biotite is a fine-grained, ‘shreddy’ looking secondary mineral that is commonly referred to as an early developed biotite (EDB) or a ‘biotite hornfels’. These older alteration assemblages in cupriferous zones can be partially to completely overprinted by later biotite and K-feldspar and then phylic (quartz-sericite-pyrite) alteration, less commonly argillic, and rarely, in the uppermost parts of some ore deposits, advanced argillic alteration (kaolinite-pyrophyllite).

**WEATHERING:** Secondary (supergene) zones carry chalcocite, covellite and other Cu*2S minerals (digenite, djurleite, etc.), chrysocolla, native copper and copper oxide, carbonate and sulphate minerals. Oxidized and leached zones at surface are marked by ferruginous ‘cappings’ with supergene clay minerals, limonite (goethite, hematite and jarosite) and residual quartz.

**ORE CONTROLS:** Igneous contacts, both internal between intrusive phases and external with wallrocks; cupolas and the uppermost, bifurcating parts of stocks, dike swarms. Breccias, mainly early formed intrusive and hydrothermal types. Zones of most intensely developed fracturing give rise to ore-grade vein stockworks, notably where there are coincident or intersecting multiple mineralized fracture sets.

**ASSOCIATED DEPOSIT TYPES:** Skarn Cu (K01), porphyry Au (K02), epithermal Au-Ag in low sulphidation type (H01) or epithermal Cu-Au-Ag as high-sulphidation type enargite-bearing veins (L01), replacements and stockworks; auriferous and polymetallic base metal quartz and quartz-carbonate veins (I01, I05), Au-Ag and base metal sulphide mantos and replacements in carbonate and non- carbonate rocks (M01, M04), placer Au (C01, C02).

**COMMENTS:** Subdivision of porphyry copper deposits can be made on the basis of metal content, mainly ratios between....
Cu, Mo and Au. This is a purely arbitrary, economically based criterion, an artifact of mainly metal prices and metallurgy. There are few differences in the style of mineralization between deposits although the morphology of calcalkaline deposits does provide a basis for subdivision into three distinct subtypes - the 'volcanic, classic, and plutonic' types. A fundamental contrast can be made on the compositional differences between calcalkaline quartz-bearing porphyry copper deposits and the alkalic (silica undersaturated) class. The alkalic porphyry copper deposits are described in a separate model - L03.

EXPLORATION GUIDES

GEOCHEMICAL SIGNATURE: Calcalkalic systems can be zoned with a cupriferous (* Mo) ore zone having a 'barren', low-grade pyritic core and surrounded by a pyritic halo with peripheral base and precious metal-bearing veins. Central zones with Cu commonly have coincident Mo, Au and Ag with possibly Bi, W, B and Sr. Peripheral enrichment in Pb, Zn, Mn, V, Sb, As, Se, Te, Co, Ba, Rb and possibly Hg is documented. Overall the deposits are large-scale repositories of sulphur, mainly in the form of metal sulphides, chiefly pyrite.

GEOPHYSICAL SIGNATURE: Ore zones, particularly those with higher Au content, can be associated with magnetite-rich rocks and are indicated by magnetic surveys. Alternatively the more intensely hydrothermally altered rocks, particularly those with quartz-pyrite-sericite (phyllic) alteration produce magnetic and resistivity lows. Pyritic haloes surrounding cupriferous rocks respond well to induced polarization (I.P.) surveys but in sulphide-poor systems the ore itself provides the only significant IP response.

OTHER EXPLORATION GUIDES: Porphyry deposits are marked by large-scale, zoned metal and alteration assemblages. Ore zones can form within certain intrusive phases and breccias or are present as vertical 'shells' or mineralized cupolas around particular intrusive bodies. Weathering can produce a pronounced vertical zonation with an oxidized, limonitic leached zone at surface (leached capping), an underlying zone with copper enrichment (supergene zone with secondary copper minerals) and at a depth a zone of primary mineralization (the hypogene zone).

ECONOMIC FACTORS

TYPICAL GRADE AND TONNAGE:

Worldwide according Cox and Singer (1988) based on their subdivision of 55 deposits into subtypes according to metal ratios, typical porphyry Cu deposits contain (median values): Porphyry Cu-Au: 160 Mt with 0.55 % Cu, 0.003 % Mo, 0.38 g/t Au and 1.7 g/t Ag. Porphyry Cu-Mo: 390 Mt with 0.48 % Cu, 0.015 % Mo, 0.15 g/t Au and 1.6 g/t Ag. Porphyry Cu-Mo: 500 Mt with 0.41 % Cu, 0.016 % Mo, 0.012 g/t Au and 1.22 g/t Ag.

A similar subdivision by Cox (1986) using a larger data base results in: Porphyry Cu: 140 Mt with 0.54 %Cu, <0.002 % Mo, <0.02g/t Au and <1 g/t Ag. Porphyry Cu-Au: 100 Mt with 0.5 %Cu, <0.002 % Mo, 0.38g/t Au and 1g/t Ag. (This includes deposits from the British Columbia alkalic porphyry class, B.C. model L03.) Porphyry Cu-Mo: 500 Mt with 0.42 % Cu, 0.016 % Mo, 0.012 g/t Au and 1.2 g/t Ag.

British Columbia porphyry Cu * Mo ± Au deposits range from <50 to >900 Mt with commonly 0.2 to 0.5 % Cu, <0.1 to 0.6 g/t Au, and 1 to 3 g/t Ag. Mo contents are variable from negligible to 0.04 % Mo. Median values for 40 B.C. deposits with reported reserves are: 115 Mt with 0.37 % Cu, *0.01 % Mo, 0.3g /t Au and 1.3 g/t Ag.

ECONOMIC LIMITATIONS: Mine production in British Columbia is from primary (hypogene) ores. Rare exceptions are Afton mine where native copper was recovered from an oxide zone, and Gibraltar and Bell mines where incipient supergene enrichment has provided some economic benefits.

END USES: Porphyry copper deposits produce Cu and Mo concentrates, mainly for international export.

IMPORTANCE: Porphyry deposits contain the largest reserves of Cu, significant Mo resources and close to 50 % of Au reserves in British Columbia.

REFERENCES


Sutherland Brown, A., Editor, (1976): Porphyry Deposits of the Canadian Cordillera; Canadian Institute of Mining and Metallurgy, Special Volume 15, 510 pages.
