



Geoscience BC

Geoscience BC Report

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Logging SEDAR: a review of the contribution of NI 43-101 reports to public geoscience data

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Background

Public geoscience data is essential to mineral exploration. The goal of this project is to make an additional stream of primary public geoscience data in British Columbia, the National Instrument (NI) 43-101 technical reports, more readily accessible and integrated with other data.

In 2007, the Canadian Securities Administrators (CSA) and its provincial member organizations began to require technical reports conforming to NI 43-101, the *Standards of Disclosure for Mineral Projects*. NI 43-101 technical reports contain valuable geoscience and exploration data, prepared by 'qualified professionals' (QP) and filed by companies listed on a Canadian stock exchange regardless of where in the world the exploration occurs. Unfortunately, SEDAR (Figure 1), the website that hosts these reports, provides no interface to identify which reports contain geoscience information relating to British Columbia properties or to spatially locate associated projects, which makes them difficult to integrate with other public geoscience data. Geospatial indexing of these reports is not a priority for the CSA.

Assessment reports (available in the ARIS database; <https://aris.empr.gov.bc.ca/>) are also sources of primary data from the mineral exploration industry. To keep mineral titles in good standing, companies submit assessment reports to the BC Mineral Tenures Branch, which remain confidential for one year. These might include the same or similar information as NI 43-101 reports; however, some companies choose to pay cash in lieu of submitting assessment reports. Public companies are obliged to submit NI 43-101 reports (which are not subject to the one-year confidentiality), which might include information unavailable in assessment reports.

For a more detailed discussion of the importance of these reports, please see Barlow et al. (2020).



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Figure 1. Screenshot of SEDAR's search screen (<http://sedar.com>).

Phase 1

In 2016, Geoscience BC approved Phase 1 of this project. The goal of Phase 1 was to gain access to the NI 43-101 reports available on SEDAR for analysis and review, and to obtain permission to publish metadata derived from the reports. In 2018, Phase 1 was completed when the reports were released by the CSA to Geoscience BC for metadata capture and analysis to update the MINFILE database.

Phase 2

The purpose of Phase 2 of this project was to identify, from all NI 43-101 reports, which reports relate to BC (Barlow et al., 2020), create a metadata index and geospatial layer for these reports (which will be available on both Geoscience BC's Earth Science Viewer and the BC Geological Survey's MapPlace 2), and use the data to update the MINFILE database, thus, adding the corpus of information contained within NI 43-101 reports in BC to the public geoscience database. As the CSA tracks where companies are headquartered, but not where their projects are located (and a large number of mining companies are based in Vancouver or Toronto), we used a variety of methods to select BC-related reports; for further details, see Barlow et al. (2020).

Numbers and statistics

From the 12 790 NI 43-101 technical reports (1.9 million pages) provided in two instalments by the CSA, we determined 996 reports relate to BC properties, ranging from 2005 to 2019 (the last year provided by the CSA as of the time of writing). As expected, the reports were spatially distributed throughout the province and concentrated in areas of active exploration (Figure 2).

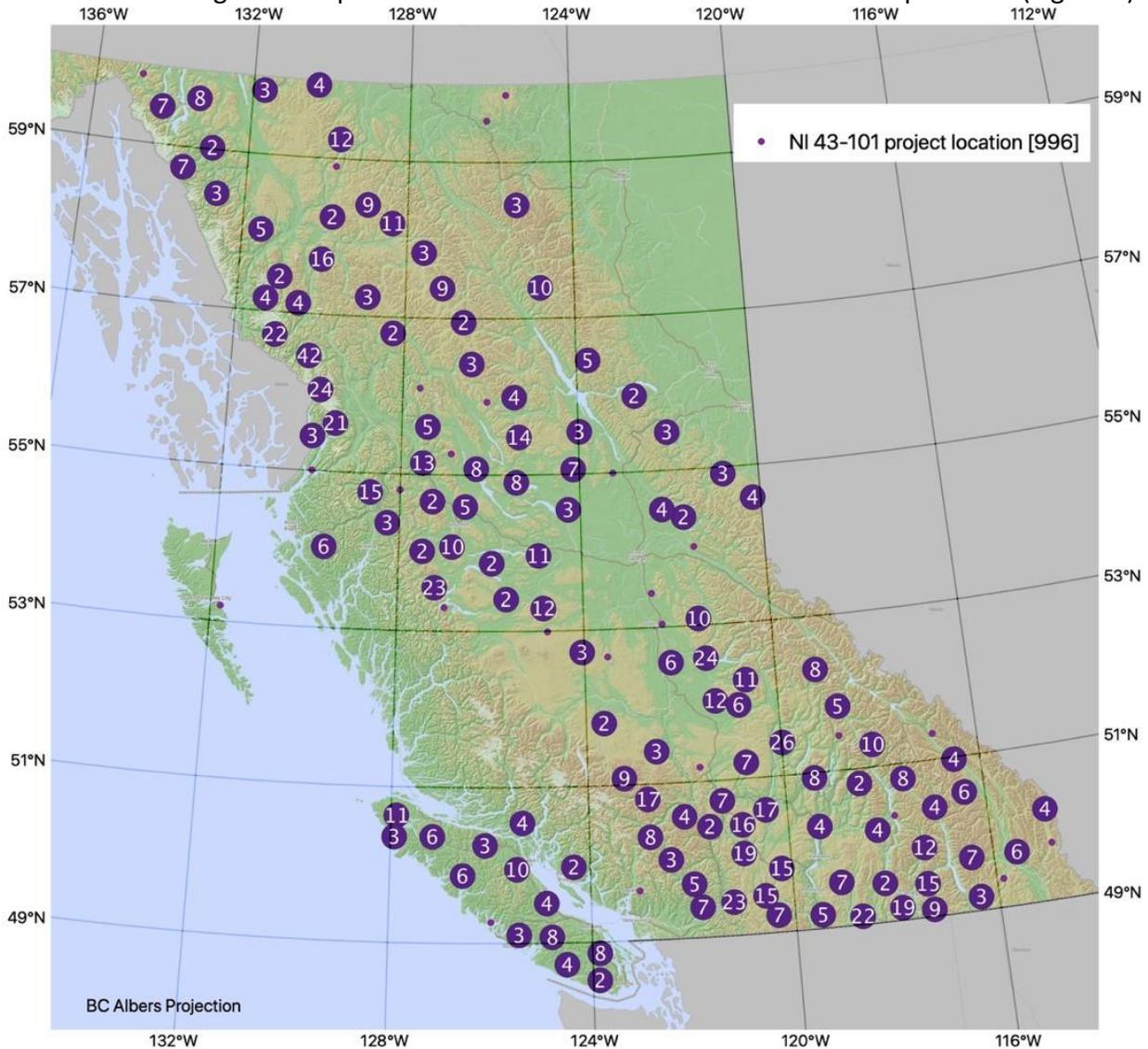


Figure 2. Geographic distribution of National Instrument 43-101 reports relating to properties in British Columbia. The numbers show the clusters of reports that would not resolve individually at this scale; dots without a number are a single report.

In total, 82 new MINFILE occurrences were recorded, 5 occurrences were rewritten, and 2676 occurrences were updated (Figure 3). As of August 2020, many of these occurrences are still being reviewed by the BC Geological Survey and our changes will be part of the public database within the next several months. Only 728 MINFILE occurrences documented a NI 43-101 report to the extent that no further changes were necessary.

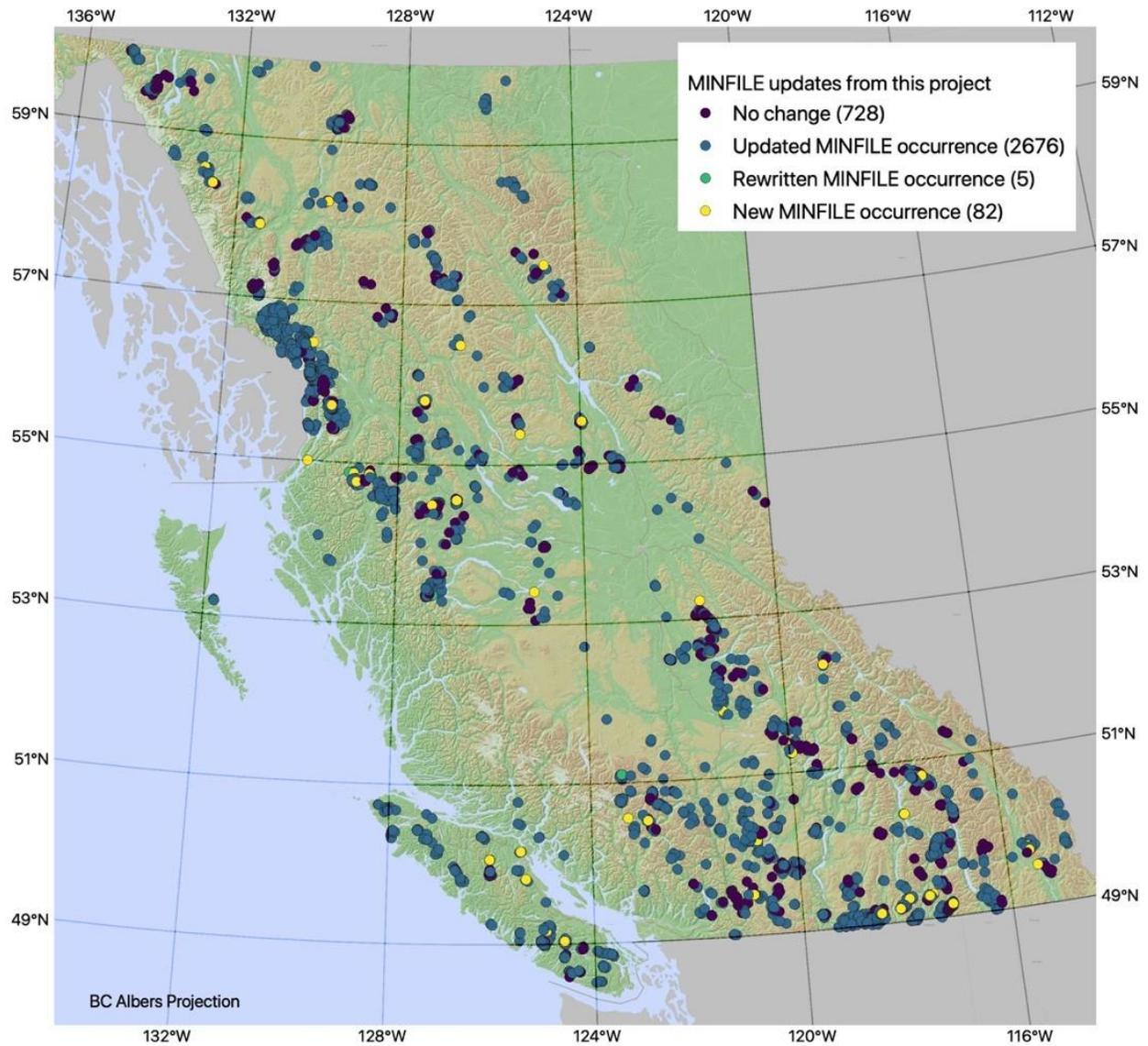


Figure 3. Geographic distribution of MINFILE occurrences correlated with National Instrument 43-101 reports, classified by the extent of changes made to the MINFILE occurrence.

Approximately 7900 'links' between NI 43-101 reports and new or existing MINFILE occurrences were identified, where a 'link' means a connection between a MINFILE occurrence and a NI 43-101 report, as some MINFILE occurrences refer to multiple NI 43-101 reports, and vice versa. Figure 4 shows a visualization of these links at the scale of mineral exploration project.

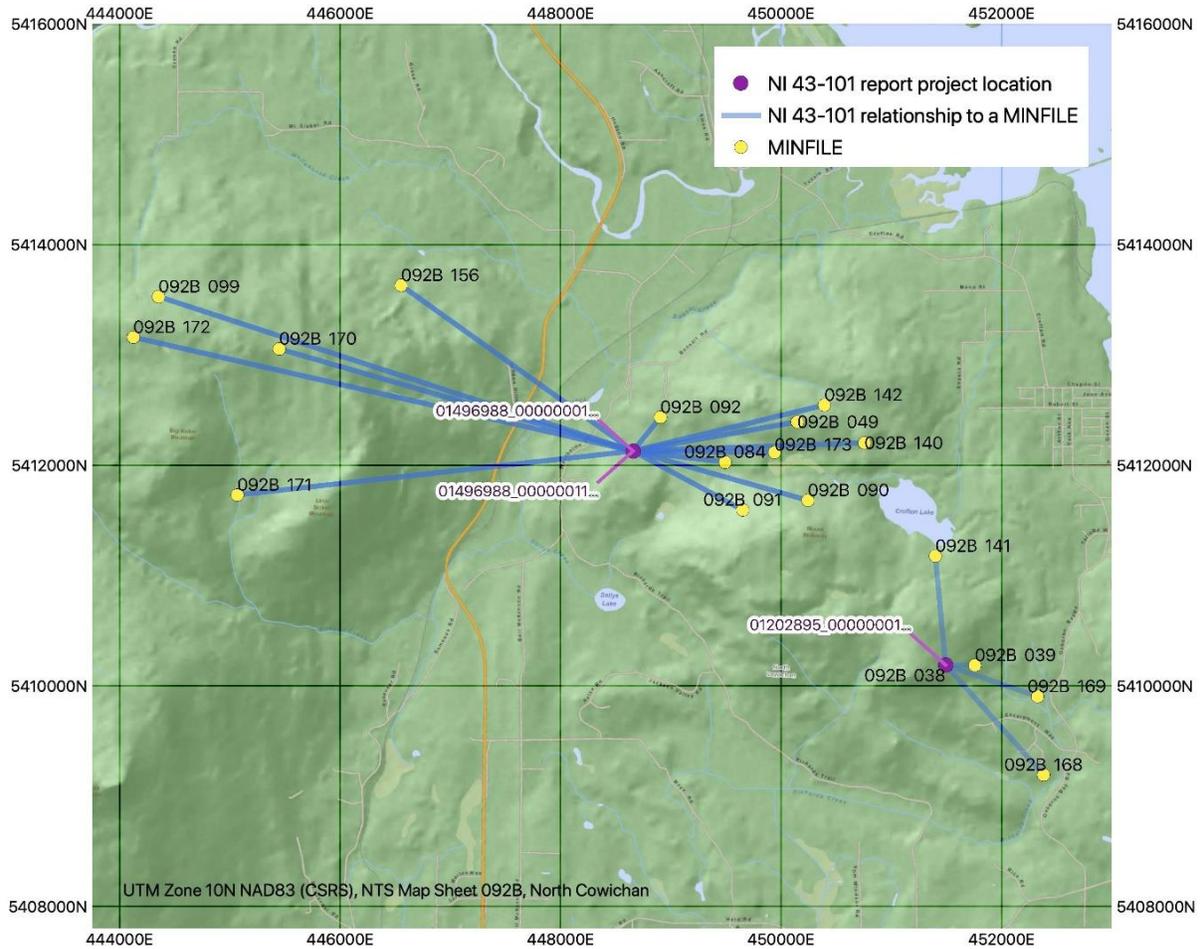


Figure 4. Example of connections between the locations of MINFILE occurrences and the associated NI 43-101 reports in an area near North Cowichan, Vancouver Island. Highlighted text labels are the names of NI 43-101 reports from SEDAR, truncated for this presentation, with purple callout lines. Purple dots are the central location given in the NI 43-101 reports; here, the two reports in the centre with the prefix 01496988 have the same location, one being an updated version of the other, and the third report beginning with prefix 01202895 coincides with MINFILE 092B 038. Blue lines indicate related nearby MINFILE occurrences, whose locations are marked with yellow circles *add text about the text indicating the MINFILE*.

Highlights

The NI 43-101 reports were used to update the work history and exploration results on almost 2800 occurrences extending across the province, providing information on historical and new exploration programs, including prospecting, geochemical (rock, silt, soil, stream sediment and vegetation) sampling, ground and airborne geophysical surveys, surface and underground development and drilling (diamond, reverse-circulation and percussion) programs. These exploration programs generally targeted base and precious metals and to a lesser degree coal resources, rare-earth elements (REEs), fluorite, barite, clay/zeolite and aggregate/dimension stone.

Numerous MINFILE occurrences were updated or rewritten to provide in-depth exploration histories and included significant sampling (rock, chip, channel and drill hole) results along

with geophysical and geochemical anomalies, new or revised zones of mineralization, physical workings including underground development and new or updated mineral resources and/or reserves. A number of highlighted capsule geological descriptions are available in the Appendix.

Many NI 43-101 reports describe a large number of MINFILE occurrences and thus can be useful for regional studies (Figure 4). For example, a report amended April 2, 2011 entitled “Technical Report on the Cu-Au-Mo properties, southwestern British Columbia, Canada” describes 282 claims in 10 groups in the area. A total of 32 MINFILE occurrences were updated based on this report.

New MINFILE occurrences

In total, 82 new MINFILE occurrences were recorded, 5 occurrences were rewritten, and 2676 occurrences were updated. Below are a several examples of the new occurrences identified.

Five new MINFILE occurrences identified using NI 43-101 reports (Cornice Mountain Breccia, Adrian (A zone), Rapp Creek, High Grade and GL2 EP) are higher grade, precious-metal-bearing (gold and/or silver) vein/breccia-style occurrences.

The Cornice Mountain Breccia occurrence is based on a report about the Bear River—Surprise Creek property, which was worked between 2005 and 2010. It includes a 15 to 20 m wide breccia zone with a strike length of 50 m exposed along a cliff face for at least 70 m of vertical extent. Promising sample results include 6.78 g/t Au and 2.24% Zn over 14.5 m and 11.1 g/t Au over 6 m (BC Geological Survey, 2020e).

The Adrian (A Zone) occurrence contains three zones of sulphide-rich quartz veining that host gold. Chip samples from the ‘A’ zone yielded from 9.06 to 54.20 g/t Au over intervals of 1 m, collected every 5 m, along a strike length of 30 m. Samples from the ‘C’ and ‘D’ zones returned 0.413 and 1.050 g/t Au, and grab samples from the 1134 zone assayed between 5.90 and 63.10 g/t Au and between 0.13 and 4.21% Cu (BC Geological Survey, 2020f).

The Rapp Creek occurrence is on Vancouver Island. According to a NI 43-101 report from 2010, it comprises both pyrite- and pyrrhotite-bearing quartz veins in a volcanic host (with chip samples that assayed 18.3 and 23.6 g/t Au and 5.2 and 5.6 g/t Ag over 2 and 3 m, respectively) as well as a limestone bed with sulphide-rich horizons approximately 200 m away (with samples that assayed 20.6 g/t Au and 4.3 g/t Ag; British Columbia Geological Survey, 2020g).

The High Grade occurrence shows a consistent work history between 1998 and 2018, which included prospecting, rock sampling, soil sampling, mapping, an airborne magnetic-AeroTEM-radiometric survey, trenching, ground geophysics and diamond drilling. A sample described in the NI 43-101 report assayed 708 g/t Au in 1999, which was followed up by two samples reported in an assessment report as assaying 380 and 53.9 g/t Au with 27.8 and 72.6 g/t Ag, respectively (British Columbia Geological Survey, 2020h).

The GL2 EP occurrence is in a geological setting rife with faulting, forming variably rotated and tilted blocks of monoclinical strata, which are intruded by granodiorite and quartz monzonite. Quartz-carbonate veining in the area hosts the mineralization, with variable amounts of galena, chalcopyrite and pyrite with malachite staining. A 2019 NI 43-101 report recorded grab samples from epithermal-style veins yielded up to 18.4 g/t Au, 3180 g/t Ag and 0.118% Pb and grab samples from porphyry-style veins yielded up to 2.1% Cu and 12.7 g/t Ag (BC Geological Survey, 2020i).

One new occurrence (G1) likely shows copper skarn style mineralization. According to a NI 43-101 report from 2018, a 641 line-kilometre airborne high-resolution gravimetric and magnetic gradient survey was conducted on the area identified eight anomalous zones. G1 was one such zone that was then drilled in 2017 and 2018, with one vertical drill hole intersecting a true width of 26.6 m grading 1.76% Cu, 10.29 g/t Ag, 0.27 g/t Au, and 35.8% Fe. The G17-16 drill hole averaged 1.31% Cu, 0.20 g/t Au, 4.06 g/t Ag, 31.14% Fe over 43.45 m (BC Geological Survey, 2020j).

The Granby, Chataway, Regal and Rapp Creek occurrences comprise generally historical occurrences (pre-1990) that were not previously reported or incorrectly reported, whereas other new occurrences are more recently identified zones of mineralization (post-2000). The Granby and Chataway occurrences show copper±gold porphyry-style mineralization.

The Granby occurrence has been explored since 1965 and has undergone programs of bulldozer and excavator trenching as well as percussion and diamond drilling. At least three NI 43-101 reports contain information relating to this occurrence. Drilling has intercepted a large zone of gypsum-pyrite-albite-clay brecciation/veining at depth, and historical drilling has also indicated more mineralization and strong hydrothermal alteration both 300 m to the southwest and 200 m to the south of the known mineralization. The most recent diamond drilling (in 2012; hole MM12-21) averaged 0.95% Cu, 0.55 g/t Au and 3.47 g/t Ag over 100.39 m and 0.34% Cu and 0.30 g/t Au over 128.02 m, including 2.46% Cu, 1.357 g/t Au and 8.90 g/t Ag over 35.05 m in hole MM12-24 (BC Geological Survey, 2020k).

The Chataway occurrence is described in a 2009 NI 43-101 report and refers to a 1967 article from the George Cross News Letter, which describes the copper mineralization at Chataway to be intersected by four diamond drill holes with an (non-NI 43-101 compliant) inferred resource of 544 320 tonnes grading 1.58% Cu (BC Geological Survey, 2020l).

[Updated/rewritten MINFILE occurrences](#)

In total, 5 occurrences were rewritten and 2676 occurrences were updated, including the addition of exploration histories and the addition of specific sample results.

The Bur (porphyry-style) occurrence is an interesting rewritten example that has been significantly rewritten. The original capsule geology consisted of one sentence and was explored in conjunction with the nearby Taseko (MINFILE 0920 033) and Buzzer (MINFILE

0920 038) occurrences. Drilling was completed in the Breccia zone (which shows minor chalcopyrite and molybdenite mineralization with pyrite as disseminations and stockworks within rusty and weathered granodiorite) of the Bur occurrence in 1969, 1970, 1976, 1986, 1991 and 1993 and the Central zone of the Bur occurrence was drilled in 2008, and all of these were described in a NI 43-101 report from 2011. Anomalous copper and gold results were recorded for these drillholes (BC Geological Survey, 2020m).

Using the data from this project

There are now a number of methods to access information about NI 43-101 reports that relate to BC occurrences:

- Through Geoscience BC's website, data, including spatial data showing the locations, and metadata of the NI 43-101 reports can be obtained.
- After our data is integrated, through the Geoscience BC Earth Science Viewer, one will be able to view the locations and metadata of the NI 43-101 reports.
- After our data is integrated, through MapPlace 2, one will be able to view the locations and metadata of the NI 43-101 reports.
- Through MINFILE, one can view the additions to the occurrence report and see the related NI 43-101 report(s) listed in the bibliography.

To obtain NI 43-101 reports themselves, go to <http://sedar.com> and input the search criteria (as described in the associated file 'README – using this data.pdf') to search for and download original reports.

Conclusions

A total of 996 NI 43-101 reports pertaining to BC were identified, mapped, and the information in them was used to generate updates for 2676 MINFILE occurrences. Geospatial datasets that make it easier to find NI 43-101 reports related to a particular region have also been generated.

This project demonstrated that NI 43-101 reports contain important information but are not well tracked with more commonly used and available public geoscience datasets. Through this project we were able to capture and update many MINFILE occurrences and provide spatial information that is readily accessible for NI 43-101 reports, making them quicker to find and more useful for mineral exploration.

Despite the overlap between information contained within NI 43-101 reports and assessment reports, this project shows that there is still a significant amount of data that was added to the public geoscience datasets. The NI 43-101 reports also fill in some of exploration history and older sampling results that provide a more robust understanding of the occurrence in question.

Future Work

Given that NI 43-101 reports are not incorporated into commonly used public geoscience datasets and contain useful data and histories for mineral exploration projects, an annual

update is recommended to maintain the existing dataset and add newly released reports.

Acknowledgments

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- BC Geological Survey (2020f): MINFILE Adrian (A Zone) record summary, MINFILE BC mineral deposits database; BC Ministry of Energy, Mines and Petroleum Resources, BC Geological Survey, in review.
- BC Geological Survey (2020g): MINFILE Rapp Creek record summary, MINFILE BC mineral deposits database; BC Ministry of Energy, Mines and Petroleum Resources, BC Geological Survey, in review.
- BC Geological Survey (2020h): MINFILE High Grade record summary, MINFILE BC mineral deposits database; BC Ministry of Energy, Mines and Petroleum Resources, BC Geological Survey, in review.
- BC Geological Survey (2020i): MINFILE GL2 EP record summary, MINFILE BC mineral deposits database; BC Ministry of Energy, Mines and Petroleum Resources, BC Geological Survey, in review.
- BC Geological Survey (2020j): MINFILE G1 record summary, MINFILE BC mineral deposits database; BC Ministry of Energy, Mines and Petroleum Resources, BC Geological Survey, in review.
- BC Geological Survey (2020k): MINFILE Granby record summary, MINFILE BC mineral deposits database;

BC Ministry of Energy, Mines and Petroleum Resources, BC Geological Survey, in review.

BC Geological Survey (2020l): MINFILE Chataway record summary, MINFILE BC mineral deposits database; BC Ministry of Energy, Mines and Petroleum Resources, BC Geological Survey, in review.

BC Geological Survey (2020m): MINFILE Bur record summary, MINFILE BC mineral deposits database; BC Ministry of Energy, Mines and Petroleum Resources, BC Geological Survey, in review.

BC Ministry of Energy, Mines and Petroleum Resources (2020): Assessment Report Indexing System (ARIS); BC Ministry of Energy, Mines and Petroleum Resources, BC Geological Survey, URL <<https://aris.empr.gov.bc.ca/>> [August 2020].

Appendix: Examples of capsule geology descriptions for new and updated MINFILE occurrences created in this project

Please note that these MINFILE updates are currently awaiting approval with the BC Geological Survey and are not all publicly available at the time of writing.

Cornice Mountain Breccia (MINFILE “NEW 075”; 463000E, 6215000N, see location description of Cornice Mountain Breccia zone in report – Metcalfe, P. (2013-08-17): Technical Report – Bear River-Surprise Creek Property, pg. 77) – New (BC Geological Survey, 2020e)

The Cornice Mountain Breccia occurrence is located approximately 1 km north west of the summit of Cornice Mountain.

The area is underlain largely by north-striking near-vertical Early Jurassic Lower Hazelton intermediate volcanic and volcanogenic sedimentary rocks. This volcanic pile has been intruded by hypabyssal intrusions, some of which are of similar, and consist of feldspar porphyry and rhyolite domes. These intrusions are found at Cornice Peak and Yvonne Peak and are interpreted as volcanic centres. The rhyolitic domes, dykes and welded tuffs are believed to represent late-stage silicic volcanism in the evolving island arc.

Locally, a 15 to 20 metre wide breccia zone has been identified over a strike length of 50 metres and along a cliff face for at least 70 metres of vertical extent. The zone occurs at the intersection of two prominent structures, striking 090 and 140 degrees, respectively. The zone comprises clast-supported breccia and crackle breccia with silicified volcanic clasts occurring within a quartz-calcite-massive sulphide matrix. Sulphide mineralization comprises primarily sphalerite, pyrite and chalcopyrite with minor galena and arsenopyrite. Gossanous zones extend along a structure to the west for an additional 300 metres.

During 2005 to 2010, Auramex completed programs of prospecting, geological mapping, geochemical sampling and airborne geophysical surveys on the area as the Bear River-Surprise Creek property. In 2010, a chip sample assayed 6.78 grams per tonne gold and 2.24 per cent zinc over 14.5 metres, while another sample yielded 11.1 grams per tonne gold over 6 metres (Metcalfe, P. (2013-08-17): Technical Report – Bear River-Surprise Creek Property).

Adrian (A Zone), B, C, D, 1134 (MINFILE 104B 737; 6293900N, 380600E, see location map of the A zone in report - Von Einsiedel, C. (2012-10-23): Review of Technical Information and Proposed Exploration Program for the Adrian Project) – New (BC Geological Survey, 2020f)

The Adrian (A Zone) occurrence is located at an elevation of approximately 1300 metres on a generally north east facing slope, east of the Verrett River.

The area is underlain by Upper Paleozoic Stikine Assemblage rocks that host thin-bedded limestone and volcanic arc-like mafic to felsic volcanic flows, tuffs and volcanoclastics. Locally, these rocks have been intruded by Jurassic(?) stocks and plutons.

Locally, three zones of sulphide-quartz veining hosting gold values have been identified over an approximate 400 metre strike length and comprise the main (A-B) zone, the C-D zones to the north east and the 1134 zone to the southwest.

In 2012, chip samples taken from the “A” zone yielded from 9.06 to 54.20 grams per tonne gold over intervals of 1 metre, at 5 metre intervals, along a strike length of 30 metres (Von Einsiedel, C. (2012-05-14): Review of Technical Information and Proposed Exploration Program for the Adrian Project). Samples were also collected from areas of mineralization referred to as “C”, “D” and “1134” zones. Zones “C” and “D” may represent offset extensions or parallel zones related to the mineralization exposed at zone “A” and returned values ranging from 0.413 to 1.050 grams per tonne gold, while grab samples of poorly exposed, sulphide-rich mineralization, referred to as the 1134 zone and located approximately 200 meters to the south east of the “A” zone, returned values ranging from 5.90 to 63.10 grams per tonne gold and 0.13 to 4.21 per cent copper (Von Einsiedel, C. (2012-05-14): Review of Technical Information and Proposed Exploration Program for the Adrian Project).

The area has been explored in conjunction with the nearby Adrian (MINFILE 104B 350) occurrence and a completed property exploration history can be found there.

High Grade, Cobalt Hill (MINFILE 082FSW429; 49.2855, -117.5269, see location map of High Grade zone in report - Dandy, L. (2018-05-25): Technical Report on the Cobalt Hill Property, pg. 20) – New (Also ARIS *31929; BC Geological Survey, 2020h)

The High Grade occurrence is located at an elevation of approximately 1520 metres on a northwest-southeast trending ridge separating McPhee Creek to the north and Champion Creek to the south.

Regionally, the area is underlain by granite and granodiorite of the Late to Middle Jurassic Nelson Intrusions and small areas of volcanic rocks of the Lower Jurassic Elise Formation (Rosslund Group).

Locally, a 35 to 50 centimetre wide zone of alteration and narrow quartz vein trends approximately 330 degrees and dips vertically in a fresh intrusive.

In 1999, a sample is reported to have assayed 708 grams per tonne gold (Dandy, L. (2018-05-25): Technical Report on the Cobalt Hill Property).

In 2010, two samples (AG-009 and -010) assayed 380 and 53.9 grams per tonne gold with 27.8 and 72.6 grams per tonne silver, respectively (Assessment Report 31929).

Work History

Bruce Doyle acquired claims in the area in about 1995; these were optioned by Phelps Dodge Corporation of Canada in 1996. They carried out exploration, including soil geochemical sampling, mapping and prospecting on the south-central part of the property in 1997. The option was dropped in 1997. Interest in the property was acquired by Eagle Plains Resources Ltd., the next year. Cassidy Gold optioned the property in September 2000 and completed a small diamond drill program including five holes, totalling 607 metres. Three holes were completed on the High Grade occurrence. Firestone Ventures optioned the property in 2004 and in 2005 completed a program of prospecting, rock and soil sampling and geological mapping. In 2007 and 2008, Medallion Resources examined the property and completed a helicopter-borne magnetic-AeroTEM- radiometric survey and soil sampling. From 2009 to 2011, Cassidy Gold and Swift Minerals completed programs of prospecting, soil sampling, geological mapping, three diamond drill holes, totalling 147 metres, and 147 metres of trenching on the area. From 2012 to 2018, the area was prospected by B. Doyle. Later in 2018, Walcott Resources Ltd. completed a program of ground geophysical surveys on the area as the Cobalt Hill property.

GL2 EP, Golden Lion (6382200, 602900E; See location map of GL2 EP zone in report – Tupper, D.W. (2019-08-12): NI 43-101 Technical Report on the Golden Lion Property; MINFILE 094E 333; BC Geological Survey, 2020i) – New

The GL2 EP occurrence is located in an east-trending valley approximately 2.7 kilometres west-southwest of the south end of Moosehorn Lake.

The occurrence is situated within a Mesozoic volcanic arc assemblage, which lies along the eastern margin of the Intermontane Belt, a northwest-trending belt of Paleozoic to Paleogene sediments, volcanics and intrusions bounded to the east by the Omineca Belt and to the west and southwest by the Sustut and Bowser basins.

Permian Asitka Group crystalline limestones are the oldest rocks exposed in the region. They are commonly in thrust contact with Upper Triassic Stuhini Group andesite flows and pyroclastic rocks. Stuhini volcanics have been intruded by the granodiorite to quartz monzonite Black Lake Suite of Lower Jurassic age and are

in turn unconformably overlain by or faulted against Lower Jurassic calcalkaline volcanics of the Toodoggone Formation, Hazelton Group.

The dominant structures in the area are steeply dipping faults that define a prominent regional northwest structural fabric trending 140 to 170 degrees. In turn, high angle, northeast-striking faults (approximately 060 degrees) appear to truncate and displace northwest-striking faults. Collectively, these faults form a boundary for variably rotated and tilted blocks underlain by monoclinical strata.

Locally, granodiorite to quartz monzonite intrusives, primarily plagioclase porphyry, and epidotized mafic volcanics contain quartz-carbonate veins with variable amounts of galena, chalcopyrite and pyrite with malachite staining.

In 2018, grab samples (GLVB18-31R) of epithermal-style quartz-carbonate veins yielded up to 18.4 grams per tonne gold, 3180 grams per tonne silver and 0.118 per cent lead, and grab samples (GLLG18-003R) porphyry-style veins yielded up to 2.1 per cent copper and 12.7 grams per tonne silver (Tupper, D.W. (2019-08-12): NI 43-101 Technical Report on the Golden Lion Property).

The area has been historically explored in conjunction with the nearby Golden Lion (MINFILE 094E 077) and Har (MINFILE 094E 053) occurrences and a complete regional exploration history can be found there.

Rapp Creek (MINFILE 092C 261; 5421850N, 410100E; see location map of Rapp Creek trenches and samples in report - Harrington, E. (2010-10-22): Technical Report on the El Capitan Property, pg. 14 and 15) – New (BC Geological Survey, 2020g)

The Rapp Creek occurrence is located on a west facing slope in the north eastern head waters of Cottonwood Creek, approximately 1.5 kilometres south-southwest of Lomas Lake.

The area is underlain by chert and siliceous argillite of the Mississippian to Pennsylvanian Fourth Lake Formation (Buttle Lake Group), volcanoclastic rocks of the Middle to Upper Devonian Mclaughlin Ridge Formation (Sicker Group) and basaltic volcanic rocks of the Upper Triassic Karmutsen Formation (Vancouver Group). These have been intruded by quartz diorite and lesser granodiorite of Jurassic Island Plutonic Suite (Saanich Granodiorite).

Locally, a northwest trending shear zone contains pyrite- and pyrrhotite-bearing quartz veins, up to 0.10 metre wide, in a volcanic host. The veins strike 143 degrees with a dip of 35 degrees to the north east and have been exposed for over 7 metres.

Another zone of mineralization, located approximately 200 metres up slope to the south east, comprises a limestone bed hosting several undulatory sulphide-rich horizons, varying from 2 to 25 centimetres in width, containing up to 75 per cent sulphides including pyrite, pyrrhotite and arsenopyrite.

In 1988, two chip samples (9978 and 9979) of the mineralized veins yielded 18.3 and 23.6 grams per tonne gold, with 5.2 and 5.6 grams per tonne silver over 2 and 3 metres, respectively, while samples from the sulphide-rich horizons yielded up to 20.6 grams per tonne gold and 4.3 grams per tonne silver (Harrington, E. (2010-10-22): Technical Report on the El Capitan Property).

The area has been explored in conjunction with the nearby El Capitan (MINFILE 092C 019) occurrence and a completed regional and property work history can be found there.

G1, Spout Lake (MINFILE 092P 229; 51.975, -121.353, see location map of the G1 zone in report – Kirkham, G. (2018-03-05): NI 43-101 Technical Report Mineral Resource Estimate for the Aurizon South Deposit, Lac La Hache Project) – New (Prospect; BC Geological Survey, 2020j)

The G1 occurrence is located east of Eagle Creek and approximately 2 kilometres south of the eastern end of Spout Lake.

The Spout Lake area is underlain by andesites, basalts, calcareous tuffs and argillites of the Late Triassic Nicola Group. Nicola Group rocks are intruded by the Late Triassic to Early Jurassic Spout Lake intrusive complex, an alkalic intrusive suite ranging in composition from pyroxenite through monzonite to syenite, and from batholithic size to small intrusive plugs, dikes and breccia bodies. Granodioritic rocks of the Triassic to Jurassic Takomkane Batholith intrude Nicola rocks east of the property. Outliers of alkaline plateau basalts of the Miocene to Pleistocene Chilcotin Group are present in the general area.

The Spout Lake area is underlain by a generally moderately to steeply northeast-dipping sequence of Upper Triassic Nicola Group volcanic flows and volcanoclastic sedimentary rocks. A predominant set of north- to northeast-trending faults and a subordinate east- to west-trending fault set slightly complicates the geology. The Nicola volcanic flows comprise augite porphyry andesite, plagioclase porphyry andesite and fine-grained andesite. The volcanoclastic sedimentary rocks include limestone breccia, limy andesite breccia, polymictic volcanic breccia and conglomerate. Intrusive rocks consist of microdiorite and porphyritic monzonite dykes.

Locally, as identified by drilling in 2017, stratiform mineralization occurs within sub-horizontal, limey (calcitic), volcanoclastic rocks (siltstones, grits and conglomerates) as carbonate replacement by early magnetite and subsequent chalcopyrite, similar to the nearby Spout (MINFILE 092P 120) occurrence. The true vertical thickness of the zone, as indicated by drilling, appears largest along a crudely central axis with intersects of up to 44 metres.

In 2017, a vertical drill hole (G16-01) intersected a true width of 26.6 metres grading 1.76 per cent copper, 10.29 grams per tonne silver, 0.27 gram per tonne gold and 35.8 per cent iron, and subsequent holes yielded intercepts of up to 1.31 per cent copper, 0.20 gram per tonne gold, 4.06 grams per tonne silver and 31.14 per cent iron over 43.45 metres in hole G17-16 (Kirkham, G. (2018-03-05): NI 43-101 Technical Report Mineral Resource Estimate for the Aurizon South Deposit, Lac La Hache Project)

Work History

The area has been explored in conjunction with the nearby Spout Lake (MINFILE 092P 120) occurrence and a completed property exploration history can be found there.

In 2017, EnGold Mines Ltd. completed a 641 line-kilometre airborne high-resolution gravimetric and magnetic gradient survey on the area. This work identified eight anomalous zones, including the G1 zone, which was subsequently drilled. An additional ground gravity survey was completed on the G1 zone later in 2017. By March 2018, 30 drillholes had been completed on the G1 occurrence over an area of approximately 250 by 150 metres.

Granby, Regal, North, Cuba, Quintana (MINFILE 092HSE269; 49.485, -120.460, see location map of Miner zone in report – Preto, V.A. (2009-03-09): Review and Recommendations – Miner Mountain Project; pg. 11) – New (Prospect; BC Geological Survey, 2020k)

The Granby occurrence is located on a west facing slope, east of Allison Creek and approximately 2.5 kilometres north of the creek's junction with the Similkameen River.

This area in the vicinity of Mount Miner (Baldy Mountain, Allison Mountain) is underlain by the eastern facies of the Upper Triassic Nicola Group, consisting of mafic augite and hornblende porphyritic pyroclastics and flows. These rocks are intruded by small dioritic bodies that may be coeval with the volcanics. A fault striking northeast along Dear Valley Creek (Deer Valley fault) juxtaposes the volcanics against coal-bearing sandstones and shales of the Eocene Princeton Group to the northwest.

Locally, a zone of porphyry-style copper-gold mineralization, largely hosted by microdiorite but also by variably altered Nicola volcanics, has been identified. The northern half of the Granby Zone is underlain by a medium- grained magnetic, pyroxene diorite, which is most likely comagmatic with the Nicola volcanic rocks. The southern half of the zone is underlain largely by intensely fractured and altered Nicola volcanic rocks with subordinate amounts of microdiorite.

Two zones of crushed and deeply oxidized rock, 50 to at least 100 metres wide traverse the southern part of the Granby Zone in a northwesterly direction. These crush zones probably represent major faults and appear to be mostly in volcanic rocks. The main area of hypogene sulphide mineralization is found northeast of the two crush zones and consists of disseminations and fracture fillings of pyrite, bornite and chalcopyrite with rims of chalcocite and covellite in a saussuritized microdiorite. Nicola volcanic rocks are also variably mineralized but due to their generally more broken, altered and oxidized condition near surface, most commonly contain secondary copper minerals such as malachite, azurite and locally native copper.

The dominant alteration is propylitic (chlorite±epidote±actinolite±hematite±albite±pyrite), but large areas of albitization (Na-feldspar), sericite/illite±rutile, carbonate and potassic alteration (K-feldspar±magnetite) have also been encountered by drilling.

Drilling has intercepted a large zone of gypsum-pyrite-albite-clay brecciation/veining, which occurs at depth and appears to mark the lower boundary or outer boundary of the 'better' mineralization and metal grades.

In addition, historical drilling has indicated more mineralization and strong hydrothermal alteration at two other locations approximately 300 metres to the southwest and 200 metres south of the known zone of mineralization.

In 1965, copper mineralization, greater than 0.30 per cent copper, was reported to have been intersected

in three percussion drill holes, while five other holes intercepted from 0.10 to 0.30 per cent copper mineralization (Preto, V.A. (2009-03-09): Review and Recommendations – Miner Mountain Project).

In 1973, a diamond drill hole (73-4), located on the eastern margin of the Granby zone, yielded 0.27 per cent copper over 70.2 metres (Preto, V.A. (2009-03-09): Review and Recommendations – Miner Mountain Project).

In 1997, drilling yielded intercepts of 0.115 per cent copper over 40.5 metres in hole 97-1 and 0.18 per cent copper with some gold-palladium values over 52.5 metres in hole 97-2 (Assessment Report 26296; Preto, V.A. (2009-03-09): Review and Recommendations – Miner Mountain Project).

In 2000, drill hole 00-1 yielded 0.252 per cent copper over the final 39.0 metres of the hole (Assessment Report 26296; Preto, V.A. (2009-03-09): Review and Recommendations – Miner Mountain Project).

In 2008, diamond drilling yielded intercepts of 0.46 per cent copper, 0.14 gram per tonne gold and 2.58 grams per tonne silver over 64.24 metres in hole MM-08-04 and 0.41 per cent copper, 0.12 gram per tonne gold and 2.11 grams per tonne silver over 52.47 metres in hole MM-08-09 (Preto, V.A. (2009-03-09): Review and Recommendations – Miner Mountain Project). Both holes bottomed in mineralization.

In 2009, drill hole MM-09-11 yielded 0.355 per cent copper, 0.165 gram per tonne gold and 2.52 grams per tonne silver over 62.79 metres (Preto, V.A. (2011-06-17): Review and Recommendations – Miner Mountain Project).

In 2010, a diamond drill hole (MM-10-19) located a new zone or extension of this mineralization to the south and west of the crush zones in similarly altered microdiorite, while trench 96 is reported to have successfully located 'excellent' grade mineralization above drill hole. Drilling highlights included intercepts of 0.31 per cent copper over 96.62 metres in hole MM-10-16 and 0.27 per cent copper with 0.16 gram per tonne gold over 60.41 metres in hole MM-10-19 (Preto, V.A. (2011-06-17): Review and Recommendations – Miner Mountain Project).

In 2011, percussion drilling yielded values of up to 1.264 per cent copper and 1.061 grams per tonne gold over 52 metres in hole PDH-09, 0.842 per cent copper and 0.834 gram per tonne gold over 26.0 metres in hole PDH-68 and 1.006 per cent copper with 0.576 gram per tonne gold over 82.0 metres in hole PDH-94 (Assessment Report 32369; Christopher, P.A. (2012-10-15): Technical Report on the Miner Mountain Property).

In 2012, diamond drilling yielded values of up to 0.95 per cent copper, 0.55 gram per tonne gold and 3.47 grams per tonne silver over 100.39 metres in hole MM12-21 and 0.34 per cent copper with 0.30 gram per tonne gold over 128.02 metres, including 2.46 per cent copper, 1.357 grams per tonne gold and 8.90 grams per tonne silver over 35.05 metres in hole MM12-24 (Christopher, P.A. (2012-10-15): Technical Report on the Miner Mountain Property).

Another zone of similar mineralization, referred to as the North zone, is reported to be located approximately 2 kilometres to the north-northeast. The North zone is underlain by a rusty white, intensely altered rock of uncertain origin with disseminated pyrite flanked to the north and south by sparse exposures of weakly altered and unmineralized volcanic rocks.

The area has been explored in conjunction with the nearby Regal (MINFILE 092HSE078) occurrence and a completed property exploration history can be found there. Exploration on the zone comprises programs of bulldozer and excavator trenching, and percussion and diamond drilling.

Chataway, Chataway (South), CVS-6 (MINFILE 092ISE215; 50.366, -120.912, see location map of Chataway zone in report – Bergey, W.R. (2009-09-25): Geological Report on the Highland Valley Property, pg. 40) – New (Prospect; BC Geological Survey, 2020I)

The Chataway (South) occurrence is located east of Chataway Creek and approximately 0.5 kilometre south of Chataway Lake.

The occurrence is in the southeastern part of the Lower Jurassic Guichon Creek batholith underlain primarily by coarse-grained granodiorite designated as the Chataway variety of the Highland Valley phase of the intrusion (Map 30). The Guichon Creek batholith is transected by north and west trending regional

faults.

Locally, copper mineralization is reported to have been intersected by at least four diamond drill holes. No further description of the mineralization is known.

A news release in the George Cross News Letter of February 8, 1967, stated that copper mineralization was intersected in four diamond drill holes and gave an inferred resource of 544,320 tonnes grading 1.58 per cent copper (Bergey, W.R. (2009-09-25): Geological Report on the Highland Valley Property).

Work History

In 1963 and 1964, Chataway Exploration Co. completed programs of geological mapping and geophysical (induced polarization and electromagnetic) surveys on the area. Subsequent drilling was performed on an anomaly south of Chataway Lake. Further programs of geological mapping and induced polarization surveys were completed on the area through 1968 by Chataway Exploration Co.

During the 1970s, numerous operators including Asarco, Canadian Superior Exploration, International Mogul Mines Ltd. and Aselo Minerals completed programs of ground geophysical surveys on the area.

From 1991 to 1993, Aucumo Resources and Hudson Bay Exploration completed programs of soil and stream sediment sampling, an induced polarization survey and minor drilling on the area as the CVS property.

In 2009, the area was examined by Highbank Resources Ltd. and Moag Copper-Gold Resources Inc.

BUR, Breccia, Central (MINFILE 0920 039; 5661900, 473300E, see location map of Breccia zone in report - Westphal, M.W. (2011-03-10): Technical Report – Taseko Mineral Property, pg. 24) – (Prospect) – Rewrite (BC Geological Survey, 2020m)

The Bur (Breccia) occurrence is located south of the Taseko River, approximately 1.5 kilometres east-southeast of the river's junction with Granite Creek.

The area is underlain by volcanic rocks of the Upper Cretaceous Powell Creek Formation and granodiorite of the Upper Cretaceous Coast Plutonic Complex.

Locally, at the Breccia zone minor chalcopyrite and molybdenite mineralization occurs with pyrite as disseminations and stockworks within rusty and weathered granodiorite.

Another anomalous zone, referred to as the Central zone, is located approximately 600 metres to the south. In 1969, a drill hole (A-6), located immediately north east of the Taseko River, is reported to have yielded 153.2 grams per tonne silver over 3.0 metres (Westphal, M.W. (2011-03-10): Technical Report – Taseko Mineral Property).

In 1970, a drill hole (S-1), located on the Breccia zone, yielded 0.20 per cent copper over 30 metres, including 0.45 per cent copper over 6 metres (Westphal, M.W. (2011-03-10): Technical Report – Taseko Mineral Property).

In 1976, drilling on the Breccia zone yielded intercepts of up to 0.32 per cent copper over 6.0 metres in hole Q-33 (Westphal, M.W. (2011-03-10): Technical Report – Taseko Mineral Property).

In 1989, a drill hole (89-13) located south west of the Breccia zone yielded 0.27 per cent copper and 0.2 gram per tonne gold over 0.9 metre (Westphal, M.W. (2011-03-10): Technical Report – Taseko Mineral Property).

In 1991, diamond drilling of the Breccia zone yielded intercepts of 0.14 per cent copper and 0.17 gram per tonne gold over 80.1 metres in hole 91-38, 0.61 and 0.72 per cent copper with 0.82 and 0.58 gram per tonne gold over 14.1 and 13.2 metres, respectively, in hole 91-39, 0.13 per cent copper over 43.5 metres in hole 91-40, 0.32 and 0.56 per cent copper with 0.28 and 0.17 gram per tonne gold over 59.7 and 19.8 metres in hole

91-54 and 0.26 per cent copper with 0.08 gram per tonne gold over 29.1 metres in hole 91-55 (Westphal, M.W. (2011-03-10): Technical Report – Taseko Mineral Property).

Work History

The area has been explored in conjunction with the nearby Taseko (MINFILE 0920 033) and Buzzer (MINFILE 0920 038) occurrences and a completed property exploration history can be found there. Drilling was performed on the Breccia zone in 1969, 1970, 1976, 1989, 1991 and 1993, while the Central zone was drilled in 2008.