Porphyry Districts of British Columbia Atlas Series

MOUNT POLLEY

A geo-exploration atlas of the Mount Polley porphyry copper-gold district

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In partnership with Imperial Metals Corporation

Geoscience BC

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Cover photo: Mount Polley mine, view southwest, August 2013; Credit: Norm Graham

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INTRODUCTION

The Mount Polley district in central British Columbia is associated with a Late Triassic alkalic intrusive complex, part of the Quesnel volcanic-arc terrane (Figure 1). Copper-gold (-silver) mineralization occurs within and around hydrothermal-breccia bodies, as well as within minor skarn development in coeval volcanic rocks surrounding the intrusive complex. In the first 15 years of mining by Imperial Metals Corporation, between 1997 and 2012, the district has produced 452 million pounds of copper, 695 000 ounces of gold, and 2.2 million ounces of silver from 80 million tonnes of ore milled (Rees, 2013).

The intrusive complex and the slightly older volcanic rocks that immediately surround it form a district measuring roughly 6 km long by 3 km wide. Production has been predominantly from the central Cariboo-Bell-Springer area, which has been mined through the development of three pits that will eventually expand into a single large pit by the time planned mining is completed. This main area is hosted within the intrusive complex; however, important mineralization has also been discovered in outlying zones within and immediately peripheral to the intrusive rocks.

After it was first staked in 1964, the main part of the district existed as a single property, then known as the Cariboo-Bell. Early exploration efforts generally had a district-scale approach, with a strong push in the early 1980s by E&B Explorations Inc. and then in 1988 when Imperial Metals took over exploration and generated important discoveries, which eventually led to the opening of the mill and initial mining in 1997 (Figure 2). Exploration has been ongoing throughout production, both in the immediate pit areas and in other parts of the district (Imperial Metals Corporation, 2013). It was through this continuing exploration that the high-grade Northeast zone (in 2003) and other peripheral deposits, up to 2 km from the core mineralization, were discovered and have added significantly to the resources at Mount Polley (Imperial Metals Corporation, 2013).

The landscape around Mount Polley is characterized by rolling topography and moderate relief with relatively continuous forest cover that has now been largely clear cut and subsequently regrown (Figure 2). Given the relatively high degree of initial vegetative and glacial cover, early exploration efforts used ground geophysical surveys and surface geochemical methods in addition to prospecting. In hindsight, most mineral zones were discovered by prospecting, geological mapping and surface trenching, whereas geophysics and geochemistry have played an important but secondary role (Rees, 2013).

With the highly successful exploration history at Mount Polley, and with the delineation of several orebodies through years of mining and drilling, there is an opportunity to look back to the early exploration data and see what worked, and what did not, in indicating the presence of buried mineralization in areas that now have defined resources. This atlas combines the most up-to-date geological mapping in the district (Rees et al., 2014) with available exploration datasets from historical geophysical and surface geochemical surveys. Maps are at scales of 1:250 000, 1:50 000 and 1:20 000, allowing comparison between the regional and the more specific district-scale features that characterize Mount Polley.

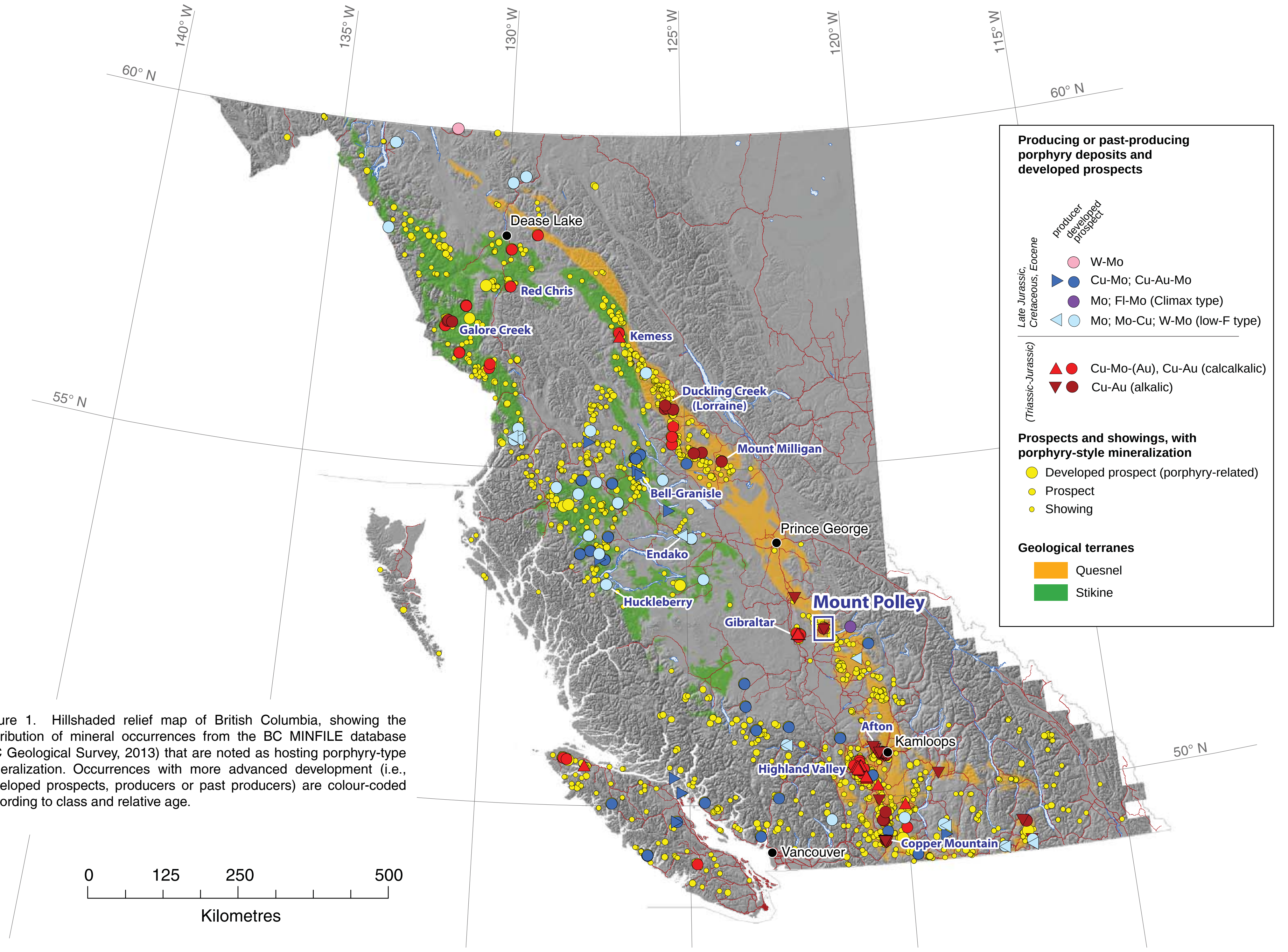

Figure 1. Hillshaded relief map of British Columbia, showing the distribution of mineral occurrences from the BC MINFILE database (BC Geological Survey, 2013) that are noted as hosting porphyry-type mineralization. Occurrences with more advanced development (i.e., developed prospects, producers or past producers) are colour-coded according to class and relative age.

Figure 2. View looking east over Trio Lake (foreground), Bootjack Lake and the Mount Polley mine, showing the well-vegetated landscape with poor bedrock exposure.

HISTORY OF EXPLORATION AND DEVELOPMENT

In 1963, the Mount Polley area was heavily timbered with sparse outcrop. A regional aeromagnetic survey from that year, released by the federal and provincial governments, showed a magnetic anomaly to the west of Mount Polley. Follow-up prospecting identified chalcopyrite, pyrite and magnetite associated with potassic alteration in limited exposure (Bacon, 1965; Rees, 2013). The area was staked by Mastodon-Highland Bell Mines Ltd. in partnership with Leitch Gold Mines Ltd. (Figure 3). A new company, Cariboo-Bell Copper Mines Ltd., was formed in 1966 following the initial promising results from surface trenching, soil geochemistry and ground-magnetic survey results.

Exploration work from 1966 to 1970 involved drilling and magnetic, seismic and IP surveys. Teck Corporation assumed control in 1969 and continued work on the property in the 1970s. Highland-Crow Resources Ltd., an affiliate of Teck, assumed control in 1977.

The Cariboo-Bell property, as it was known at that time, encompassed an area including the majority of what became known as the Mount Polley alkalic intrusive complex, which generally defines the Mount Polley district. In 1981, E&B Explorations Inc. optioned the property from Highland-Crow and acquired a 100% interest in 1982. With joint-venture partners Imperial Metals and Geomex Partnerships, they carried out six consecutive years of exploration until 1987, in part focused at the district scale and involving geological mapping, surface geochemistry, VLF-EM and IP surveys, and core and rotary drilling. This work included a soil survey comprising 4773 samples collected on a grid that covered a large part of the district.

Imperial Metals conducted the exploration programs from 1988 to 1990, which led to a positive feasibility study in 1990. Imperial purchased the remaining interest in the property in 1992 and continued exploration of known targets in 1995–1996.

The Mount Polley Mining Corporation was formed in April 1996, following a joint venture with SC Minerals Canada Ltd. Loan financing was arranged through Sumitomo Corporation of Japan to build the Mount Polley plant. Mining began in June 1997 on the Cariboo zone.

Exploration has carried on alongside mining through much of the early mining history at Mount Polley (Imperial Metals Corporation, 2013, 2014; Rees, 2013). Drilling near the Cariboo pit in 1998 discovered the C2 zone to the south, and exploration drilling continued through 2000 in the core zone at Mount Polley (the Cariboo-Bell-Springer-C2 area). Mining in the Bell pit started in 2000, and exploration expanded to several other parts of the district. In 2001, Imperial Metals acquired 100% interest in the Mount Polley mine. By fall 2001, the defined resource in the Cariboo pit was mined out and a period of low metal prices made further mining uneconomic. The mine was shut down.

Exploration activity continued through the mine shut-down period and led to the 2003 high-grade discovery in what became known as the Northeast zone. Also in 2003, Imperial drilled the first deep exploratory hole on the property into the area beneath the unmined Springer zone and intersected strong mineralization to a depth of 500 m (Rees, 2013). Following a 2004 feasibility study, which included an updated ore reserve and new mining plan, the mine was reopened in 2005. Mining in the Bell and Wight pits began in 2005, in the Southeast zone in 2008, and in the Pond and Springer zones in 2009. Continued exploration through mine development led to the discovery of the WX zone,

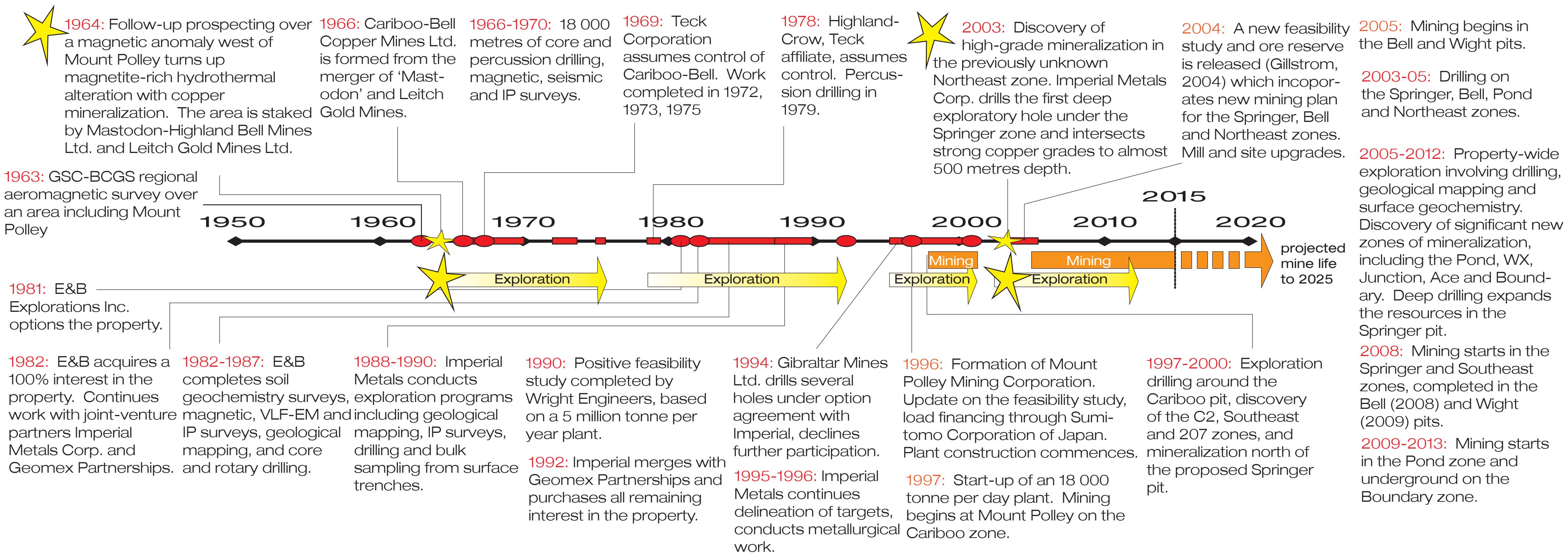

Figure 3. Timeline highlighting major exploration and development events in the Mount Polley district, from initial formal discovery through several cycles of exploration up to the present. Events are summarized from the 2012 and 2013 Annual Information Forms released by Imperial Metals Corporation (Imperial Metals Corporation, 2013, 2014) and from the summary by Rees (2013).

adjacent to the Springer and C2 zones. A Titan-24 deep-penetrating IP-magnetotelluric survey was conducted in 2009 to explore for blind sulphide targets (Imperial Metals Corporation, 2013). In 2010 underground-development exploration started on the Northeast zone beneath the Wight pit and on the Boundary zone; underground mining of the Boundary zone began in 2013.

Most recent exploration work at Mount Polley has included exploration beneath the Cariboo pit, continued underground drilling and exploration on the Boundary zone, and exploration of early-stage targets including the Junction and Quarry zones.

REGIONAL GEOLOGY

The Mount Polley porphyry copper-gold system occurs within the Quesnel accreted-arc terrane, in the Cariboo region of south-central British Columbia. The area is underlain by Late Paleozoic to Early Mesozoic arc-volcanic, plutonic and sedimentary rocks, the majority of which form the Late Triassic to Early Jurassic magmatic-arc complex that dominates the Quesnel terrane (Logan and Mihalynuk, 2005). Across faults to the west are accreted rocks of the Cache Creek terrane, the Paleozoic to Mesozoic remnants of the subduction-accretionary complex formed during development of the Quesnel arc. Across west-dipping thrust faults to the east of the Quesnel terrane are older rocks with pericratonic affinities.

In southern British Columbia, the Quesnel arc is an isotopically and geochemically primitive volcanic complex that is characterized by calcalkaline and alkaline stages of magmatism (Logan and Bath, 2006). In the area of Mount Polley, the arc is dominated by Late Triassic Na- and K-rich submarine to subaerial volcanic rocks, part of the Nicola Group, and cogenetic alkaline intrusions (Logan and Bath, 2006). In this region, the Quesnel belt is a 30–40 km wide northwest-trending belt with a simplified lithostratigraphic division of a lower fine-grained sedimentary succession and an upper volcanic succession of alkalic affinity. The lower sedimentary succession of fine-grained quartzose rocks grading upward into basal volcanic units is mapped on both the east and west sides of the central volcanic domain (Panteleyev et al., 1996), with opposing inward dips to the sedimentary units defining the Quesnel Trough (Roddick et al., 1967; Panteleyev et al., 1996). The central volcanic domain consists of augite-phyric basalt to basaltic andesite flows, breccia and volcaniclastic units with an estimated thickness of 5–6.5 km (Rees, 1987; Panteleyev et al., 1996).

The Mount Polley intrusive complex is a latest Triassic, alkalic intrusive centre that was emplaced into the Quesnel arc during the later stages of arc development. The porphyritic diorite to monzonite intrusions are chemically similar to the later stages of alkaline volcanism within the Quesnel arc and are interpreted to be cogenetic (Logan and Bath, 2006). They are dated at ca. 205 Ma (Mortensen et al., 1995), part of the latest Triassic pulse of alkalic magmatism and associated copper-gold mineralization that is seen in the southern Quesnel arc. Porphyry copper-gold mineralization within the Mount Polley intrusive complex is closely associated with magmatic-hydrothermal breccia bodies within the intrusive complex (Rees, 2013). The Bootjack stock, immediately south of the Mount Polley intrusive complex, is another Late Triassic alkalic intrusive body, but it is relatively unmineralized. It is a silica-undersaturated, layered nepheline syenite pluton (Fraser et al., 1995) that is slightly younger but within error (200–202 Ma; Mortensen et al., 1995) of the Mount Polley intrusions. Geochemical interpretation suggests that it is derived from a similar magmatic source (Bath and Logan, 2006).

A period of uplift and erosion marked the end of the prolific Late Triassic period of arc development and porphyry mineralization within the Quesnel arc. When arc building renewed in the Early Jurassic, the axis of arc magmatism and mainly calcalkaline volcanism had shifted eastward (Logan and Bath, 2006). In the Mount Polley region, the Triassic to Jurassic uplift is marked by an unconformity, exposed immediately north of the complex, that is overlain by conglomeratic rocks that include monzonite clasts interpreted to be derived from the Mount Polley intrusive complex (Logan and Mihalynuk, 2005; Rees, 2013). The conglomerate includes a latite tuff horizon that has been dated at 197 Ma (Logan and Mihalynuk, 2005), demonstrating that the Mount Polley complex was exposed at surface in the Early Jurassic. Other Early Jurassic sedimentary rocks overlying the Late Triassic stratigraphy are preserved sporadically within the Mount Polley region, most abundantly to the west and east of the volcanic succession.

The present-day regional map pattern shows that the area around the Mount Polley intrusive complex is a broad synform within the Quesnel arc Triassic and Jurassic volcanic strata that plunges 20° to the north-northwest (Logan and Mihalynuk, 2005). This is similar in structural theme to the more broad definition of the Quesnel Trough. Using the detail within the Mount Polley district, Wafforn (2013) also showed that the intrusive complex is tilted as much as 35° to the northwest. This regional deformation may be attributed to the accretion of the Quesnel arc in the Middle Jurassic. Other more recent deformation, including offsets along high-angle faults through the region, is attributed to extension in the Eocene (Wafforn, 2013).

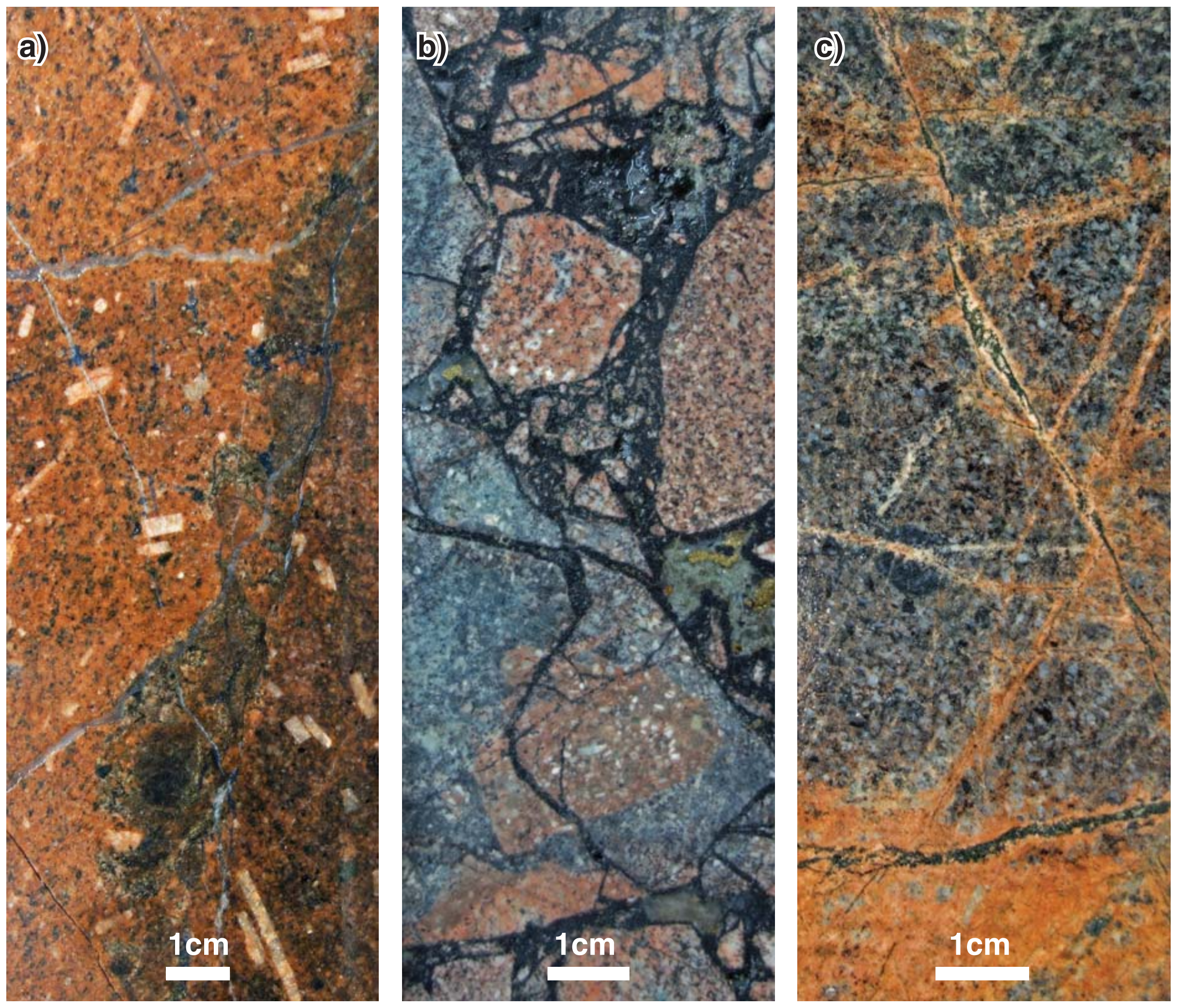

Figure 4. Mineralization and alteration from the Mount Polley porphyry copper-gold district: a) polymictic fragmental breccias with fluidal intrusive fragments (identified by Pass, 2010), Northeast zone; b) alteration and mineralization in the C2 zone similar to that of the Cariboo and Springer zones; a characteristic feature of C2 is magnetite-cemented breccias, including jigsaw-fit textures; c) biotite alteration ± albite and magnetite, and bornite and chalcopyrite in younger actinolite-magnetite veins with K-feldspar selvages, Springer zone.

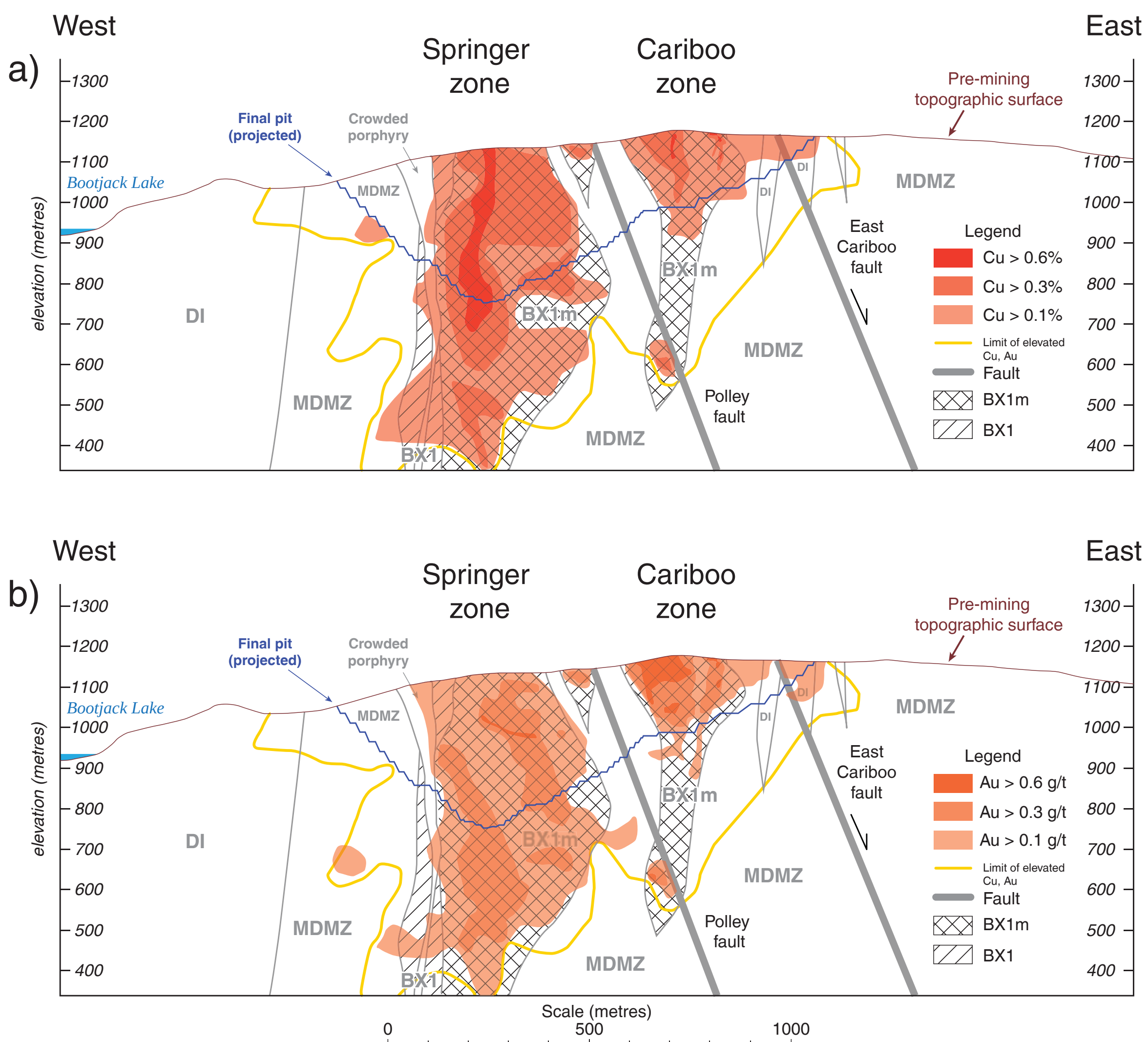

Figure 5. Cross-sections through the Mount Polley intrusive complex, showing the distribution of copper (a) and gold (b) mineralization (after Rees, 2013).

DISTRICT GEOLOGY

The Mount Polley intrusive complex (MPIC) is a Late Triassic suite of marginally silica-undersaturated alkalic intrusions and related hydrothermal breccias emplaced into slightly older (Late Triassic) arc-volcanic rocks of the Nicola Group; it hosts the Mount Polley copper-gold porphyry mineralization (Rees, 2013). The complex forms a northwesterly elongate body with dimensions of approximately 6 by 3 km.

Magmatic rocks that form the MPIC range from diorite to monzonite, with the older phases being more mafic and transitioning to more evolved monzonitic compositions with time (Rees, 2013; Rees et al., 2014). Similarly, the early phases are equigranular, with a progression to porphyritic intrusions over the course of emplacement. A plagioclase-phyric monzodiorite to monzonite composite unit forms the bulk of the complex and predates mineralization, while an important younger phase is a K-feldspar–megacrystic unit occurring as volumetrically minor dikes that are inferred to be most closely related to mineralization. Clasts of porphyritic intrusive phases in breccias, some with fluidal clast margins (Figure 4a; Pass, 2010), and breccias with porphyritic igneous cement demonstrate a close link between the later stages of magmatism, brecciation and mineralization.

Hydrothermal breccias are associated with the main zones of mineralization (Rees, 2013; Rees et al., 2014). Several breccia types are recognized; they are defined based on clast type, transportation and matrix material, and include highly transported igneous- and mineral-cemented breccias (Figure 4b) and locally developed 'crackle breccias'. Overprinting alteration is common and can be completely texture destructive. Alteration in the district is complex, including overprinting assemblages consisting of secondary biotite, K-feldspar, magnetite, albite, actinolite and garnet, as well as more peripheral epidote (Figure 4c; Fraser et al., 1995; Rees, 2013). The core of the system is dominated by potassic-sodic and calc-potassic assemblages, and local skarn alteration. Similar alteration is widespread throughout the MPIC but with lesser intensity. A distinctive 'reddening' is a notable feature of the potassic alteration zones (Figure 4a, c), caused by fine-grained inclusions of hematite in K-feldspar. Marginal propylitic alteration (epidote and pyrite) dominates along the southern fringe of the MPIC, near the contact with the Nicola Group hostrocks.

There are two main styles of economic mineralization in the district (Rees, 2013). Porphyry-style, disseminated and fracture-controlled chalcopyrite with minor bornite in the core of the MPIC is hosted in hydrothermal breccias and intrusions, and is associated with the most intense potassic- and calc-potassic alteration assemblages; copper and gold grades are low to moderate but have a similar distribution (Figure 5). The second style of mineralization occurs as high- to very high grade domains associated with magmatic-hydrothermal breccias, as bornite-chalcopyrite breccia cement and fine to coarse vein stockworks. This second style occurs in the northern part of the system, in the Northeast zone and associated areas, across the Green Giant fault; it is presumed to represent a structurally higher part of the system (Rees, 2013).

The MPIC and associated mineralization has been tilted as much as 35° to the northwest (Wafforn, 2013) and has also been dissected by several important, through-going faults. The north-trending faults through the main part of the system have a west-vergent reverse sense of displacement, while the younger west- and northwest-trending faults in the north have a north-side-down sense of displacement (Wafforn, 2013).

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DATA AVAILABILITY

This Publication

The data layers presented in this publication are available in digital form as a GIS package downloadable from the Geoscience BC website. Data for the Mount Polley district have been compiled from various public and company sources. In many cases, original files for imagery, base-map data and geological mapping have not been modified: linework is presented as originally published, although the presentation style of various features may be unique to this atlas. In other cases (e.g., geochemical and geophysical data), new data layers generated from the original data are presented, such as organized geochemical data files and maps, geophysical maps and inverted IP sections, and mapping of interpreted structural features from aeromagnetic data. All data layers presented herein are provided in the compiled GIS package, available for download from the Geoscience BC website (Report 2016-10).

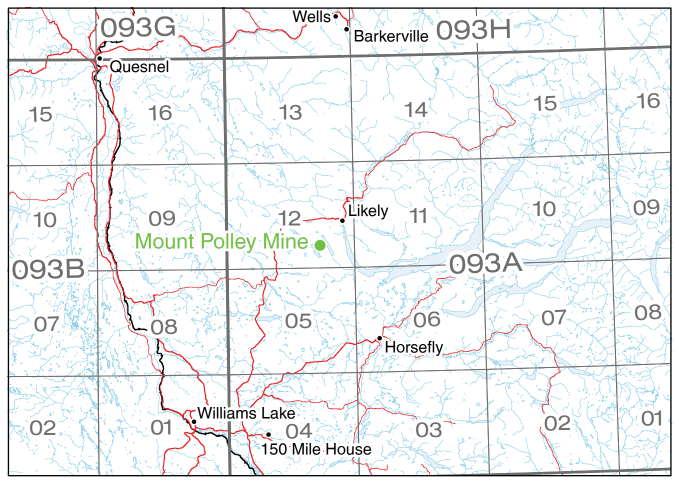


Figure 6. Central Cariboo region showing the location of the Mount Polley mine and the National Topographic System (NTS) tiles that cover the area.

Digital Elevation Data

Canadian Digital Elevation Data (CDED) at 1:50 000 scale are used in several maps within this atlas. The data are delivered in tiles that correspond to eastern and western halves of the NTS tiles (Figure 6), and are available through the GeoGratis portal (GeoBase®, 2015). The data are derived from hypsographic and hydrographic elements within the National Topographic Data Base, as well as other positional data. The grid spacing of the elevation data varies with latitude; in the Mount Polley region, the spacing is approximately 23 by 13 m, based on data points collected from existing topographic map sources.

GeoBase® (2015): Canadian digital elevation data; Natural Resources Canada, URL <http://geogratis.gc.ca/api/en/nrcan-rncan/ess-sst/3A537B2D-7058-FCED-8D0B-76452EC9D01F.html> [January 2016].

Mineral Occurrence Data

The BC Geological Survey maintains an inventory of geological, location and economic information on over 14 340 metallic, industrial mineral and coal mines, deposits, and occurrences in British Columbia. It is delivered publicly via the BC MINFILE database (BC Geological Survey, 2015). The database is active, with new occurrences being added through review of mineral assessment reports, recent publications, press releases and company websites.

BC Geological Survey (2015): MINFILE BC mineral deposits database; BC Ministry of Energy and Mines, URL <http://minfile.gov.bc.ca/> [January 2016].

Imagery

At Mount Polley, various image sources are available depending on the zoom factor, ranging from satellite imagery to aerial photographs. The detailed imagery is from airborne sources rather than satellite. The vintage, quality and availability of imagery will change depending on the area of BC being viewed. One source of satellite imagery used in this atlas is the SPOT satellite imagery database. It is available for viewing through the Google Earth™ viewer and for download using Google Earth Pro. Copyright restrictions apply to Google Earth images for many end-user applications.

Historical Airphotos

The 1985 airphoto mosaic, presented to accompany the 1:20 000 scale maps of the 1986 soil geochemistry survey, is compiled from 12 original airphotos acquired from the BC airphoto database. Original images were purchased from GeoBC (2013) and compiled into a single mosaic image by aerial triangulation of the individual scanned images, followed by orthorectification using Shuttle Radar Topography Mission (SRTM) digital terrain modelling data.

GeoBC (2013): British Columbia airphoto database; BC Ministry of Agriculture and Lands, Integrated Land Management Bureau, scale 1:15 000, flight lines BCC353 (photos 154–157 and 192–195) and BCC355 (photos 016–019).

Remote Sensing

Remote sensing data from the following sources and sensors were collected and analyzed for the Mount Polley district:

Landsat 8

Landsat 8 began operation on May 30, 2013, providing improved sensor capabilities over previous Landsat missions (e.g., increased sensitivity, adjusted band positions and decreased bandwidths). The imagery provides ten 30 m multispectral channels and one 15 m panchromatic band.
The Landsat 8 image used for the Mount Polly area was collected on July 1, 2013 at 19:08 GMT.

URL <http://landsat.gsfc.nasa.gov/?page_id=4071> [January 2016].

Imagery can be downloaded for free from <http://glovis.usgs.gov> [January 2016].

Hyperion

Hyperion, the only spaceborne hyperspectral-image sensor available, is onboard the NASA EO-1 satellite. The Hyperion instrument is capable of resolving 220 spectral bands (from 0.4 to 2.5 µm) with a 30 m resolution. It can capture a 7.5 by 100 km land area per image and provide detailed spectral mapping across all 220 channels with high radiometric accuracy.
Coverage was available for part of the Mount Polley area: the image was collected on September 2, 2002 at 18:43 GMT.

URL <http://eo1.usgs.gov/sensors> [January 2016].

Imagery can be downloaded for free from <http://glovis.usgs.gov> [January 2016].

ASTER

The Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) is an imaging instrument onboard Terra, a satellite launched in December 1999 as a collaborative effort between NASA, Japan's Ministry of Economy, Trade and Industry, and Japan Space Systems. ASTER captures high-spatial-resolution data in 14 bands, from the visible to the thermal infrared wavelengths, and provides stereo-viewing capability for creation of digital-elevation models.
The ASTER imagery available for the Mount Polley area was collected on July 25, 2004 at 19:17 GMT.
URL <http://asterweb.jpl.nasa.gov/index.asp> [January 2016].
Selected imagery for BC can be downloaded for free from MapPlace.
Imagery in or touching United States lands can be downloaded for free from <http://glovis.usgs.gov> [January 2016].
Imagery outside the United States can be purchased from Earth Remote Sensing Data Analysis Center (ERSDAC) at <http://gds.ersdac.jspacesystems.or.jp/?lang=en> [January 2016].

Topographic Data Layers

Topographic vector data from the National Topographic Data Base (NTDB) are available for download at no charge from Natural Resources Canada through the GeoGratis portal. The maps within the National Topographic System (NTS) are available in two standard scales: 1:250 000 and 1:50 000. The 1:50 000 series is available in a variety of raster and vector formats; the vector files are currently delivered as the CanVec product, which conforms to international geomatics standards. The map tiles applicable to the Mount Polley region are shown in Figure 6.

NTDB 1:250 000 scale

Natural Resources Canada (2015): National Topographic Data Base, tiles 093K, 093F; Natural Resources Canada, Earth Sciences Sector, Centre for Topographic Information, URL <http://www.geogratis.gc.ca> [January 2016].

CanVec 1:50 000 scale

Map tiles:

093A05 Beaver Creek	(published 2013)
093A06 Horsefly	(published 2013)
093A11 Spanish Lake	(published 2013)
093A12 Likely	(published 2013)

Natural Resources Canada (2013): CanVec, Canada, 093K01-08 and F09-16; Natural Resources Canada, Earth Sciences Sector, Mapping Information Branch, Centre for Topographic Information, URL <http://geogratis.gc.ca> [January, 2016]

Digital Road Atlas

Additional vector files for road data are from the BC Digital Road Atlas, which is a collection of detailed road data for the province. It is delivered through GeoBC.

GeoBC (2013): British Columbia Digital Road Atlas, URL < http://geobc.gov.bc.ca/base-mapping/atlas/dra/> [January 2016].

Bedrock Geological Mapping

Bedrock geological mapping is presented in this atlas at three different scales for the Mount Polley area, each map having been derived from a different source:

1:250 000 scale

The QUEST bedrock geology map (Logan et al, 2010) was published in 2010 as a highly collaborative map that provided an update to the BC digital geology map for the QUEST project area.

Logan, J.M., Schiarizza, P., Struik, L.C., Barnett, C., Nelson, J.L., Kowalczyk, P., Ferri, F., Mihalynuk, M.G., Thomas, M.D., Gammon, P., Lett, R., Jackaman, W., and Ferbey, T. (2010): Bedrock geology of the QUEST map area, central British Columbia; Geoscience BC, Report 2010-5, BC Geological Survey, Geoscience Map 2010-1 and Geological Survey of Canada, Open File 6476, scale 1:500 000, URL <http://www.geosciencebc.com/s/2010-005.asp> [January 2016].

1:50 000 scale

Logan et al. (2007) published a geology map for the Mount Polley area that included new mapping as well as a review and incorporation of historical data. A summary of previously published and new geochronology data is also included.

Logan, J.M., Bath, A.B., Mihalynuk, M.G., Rees, C.J., Ullrich, T.D., and Friedman, R.M. (2007): Regional geology of the Mount Polley area, central British Columbia; BC Ministry of Energy and Mines, Geoscience Map 2007-1, scale 1:50 000, URL <http://www.empr.gov.bc.ca/Mining/Geoscience/PublicationsCatalogue/Maps/GeoscienceMaps/Pages/2007-1.aspx> [January 2016].

1:20 000 scale

Rees et al. (2014) published a detailed, district-scale geology map of the Mount Polley area that includes lithology, alteration and mineralization information.

Rees, C., Gillstrom, G., Ferreira, L., Bjornson, L. and Taylor, C. (2014): Geology of the Mount Polley intrusive complex (final version); Geoscience BC, Report 2014-08, URL <http://www.geosciencebc.com/s/Report2014-08.asp> [January 2016].

Surficial Geological Mapping

Surficial geological mapping of the Mount Polley region presented herein is from the 2015 map of the Bootjack Mountain area (Hashmi et al., 2015). Additional mapping is available from the Imperial Metals Corporation data (provided in the digital compilation of this report) included in BC Ministry of Energy and Mines Assessment Report 28270 (McAndless and Taylor, 2006). They reported on a mapping and till sampling program by Imperial Metals conducted in 2005. The surficial geological mapping included in the report is by J. Blackwell and T. Stubley. An earlier 1:50 000 scale surficial geology map is also available for NTS map area 093A (Bichler and Bobrowsky, 2003). Measurements of features that indicate the ice-flow direction in this area have been compiled in a database by Ferbey and Arnold (2013).

Bichler, A.J. and Bobrowsky, P.T. (2003): Quaternary geology of the Hydraulic map sheet (NTS 093A/12), British Columbia; BC Ministry of Energy and Mines, Open File 2003-7, 1:50 000 scale, URL <http://www.empr.gov.bc.ca/Mining/Geoscience/PublicationsCatalogue/OpenFiles/2003/Pages/2003-7.aspx> [January 2016].

Ferbey, T. and Arnold, H. (2013): Compilation of micro- to macro-scale ice-flow indicators for the Interior Plateau, central British Columbia; BC Ministry of Energy and Mines, Open File 2013-3, scale 1:900 000 scale, URL <http://www.empr.gov.bc.ca/Mining/Geoscience/PublicationsCatalogue/OpenFiles/2013/Pages/2013-3.aspx> [January 2016].

Hashmi, S., Plouffe, A. and Ward, B.C. (2015): Surficial geology, Bootjack Mountain area, British Columbia,parts of NTS 93-A/5, NTS 93-A/6, NTS 93-A/11, and NTS 93-A/12; Geological Survey of Canada, Canadian Geoscience Map 209 (preliminary) and BC Geological Survey, Geoscience Map 2015-02, scale 1:50 000, URL <http://www.empr.gov.bc.ca/Mining/Geoscience/PublicationsCatalogue/Maps/Pages/GM2015-2.aspx> [January 2016].

McAndless, P. and Taylor, C. (2006): Surficial geology of the Mount Polley property: summary of 2005 exploration work; BC Ministry of Energy and Mines, Assessment Report 28270, 31 p., URL <http://aris.empr.gov.bc.ca/ArisReports/28270.PDF> [January 2016].

Till Geochemistry and Indicator Minerals

Till geochemistry data in the Mount Polley area were collected as part of a surficial geology program conducted by Imperial Metals Corporation in 2005. The data for copper, gold, silver and molybdenum are presented in McAndless and Taylor (2006). Additional till sampling in the area, including multi-element analyses and indicator-mineral tabulation for the same sample sites, is presented in an M.Sc. thesis (Hashmi, 2015) that was supported by the GSC and BCGS.

Hashmi, S. (2015): Quaternary geology and drift prospecting in the Mount Polley region (NTS 093A); M.Sc. thesis, Simon Fraser University. 165 p.

McAndless, P. and Taylor, C. (2006): Surficial geology of the Mount Polley property: summary of 2005 exploration work; BC Ministry of Energy and Mines, Assessment Report 28270, 31 p., URL <http://aris.empr.gov.bc.ca/ArisReports/28270.PDF> [January 2016].

Soil Geochemistry

Pre-mining soil geochemistry data are available for the Mount Polley district as a single contiguous survey that covers most of the known mineralization within the Mount Polley intrusive complex (McNaughton, 1987). In 1986, E&B Explorations Inc. cut a survey grid (for a VLF-EM and IP survey) and collected a B-horizon soil sample at most survey sites. The survey-line spacing is approximately 100 m, with sample sites at approximately 25 m intervals.

In total, 4773 samples were collected. An initial suite from even-numbered lines (at 200 m line spacing) was sent to Vangeochem Labs for analysis, with the remaining 285 samples from odd-numbered infill lines of interest sent to Acme Analytical Laboratories Ltd. for analysis later in the season. Samples were analyzed for gold by atomic absorption spectroscopy following an aqua-regia digestion; another 10 elements (copper, silver, arsenic, cobalt, chromium, iron, molybdenum, nickel, lead, and zinc) were analyzed by inductively coupled plasma–emission spectrometry following acid digestion (HCl-HNO3).

McNaughton, K. (1987): Cariboo-Bell project, 1986 geochemical, geophysical and drilling report on the BJ, Bootjack, CB and Polley mineral claims, Cariboo Mining Division; BC Ministry of Energy and Mines, Assessment Report 16040, 267 p., URL <http://aris.empr.gov.bc.ca/search.asp?mode=repsum&rep_no=16040> [January 2016].

Induced Polarization

Available digital induced polarization data for the Mount Polley area is from a survey in the Northeast zone area, conducted in 2004. The survey included 35 IP lines with 50 metre line spacing, comprising a total of 51.3 kilometres; it was arranged as a pole-dipole array with 50 m spacing and 'n' separations of 1 to 6. The digital data from these two surveys are made public by Imperial Metals Corporation in this publication and the associated digital data package.

Aeromagnetics and Radiometrics

The GSC datasets used were downloaded from the Canadian Aeromagnetic Database and the National Gamma-Ray Spectrometry Program Database (both accessed through http://gdr.agg.nrcan.gc.ca). The individual gridded data files were re-projected into UTM Zone 10N, NAD83 prior to being combined.
For the regional maps, the following surveys were combined to create the images presented: North Caribou Lake, Cottonwood and Wells, Likely, rtf_25301, Canada200m_August2010

In addition, several surveys provide data over the more immediate Mount Polley area:

Horsefly area survey (2003)

The GSC conducted a multisensor (gamma-ray spectrometric, magnetic total field) helicopter-borne geophysical survey in the Horsefly area (Shives et al., 2003). Flight lines were oriented northeast-southwest and spaced at 500 m intervals.

Shives, R.B.K., Carson, J.M., Ford, K.L., Holman, P.B. and Cathro, M. (2003): Helicopter-borne gamma ray spectrometric and magnetic total field geophysical survey, Horsefly area, British Columbia; BC Ministry of Energy and Mines, Open File 2004-09 and Geological Survey of Canada, Open Files 4615–4617, URL <http://www.empr.gov.bc.ca/MINING/GEOSCIENCE/PUBLICATIONSCATALOGUE/OPENFILES/2004/Pages/2004-9.aspx> [January 2016].

Mount Polley mine area survey, Imperial Metals Corporation (2004)

In 2003, Imperial Metals Corporation, with partial funding through the BC and Yukon Chamber of Mines 'Rocks to Riches' program, conducted a multisensor (gamma-ray spectrometric, magnetic total field) helicopter-borne geophysical survey over the area of the Mount Polley mine (Shives et al, 2004). Flight lines were oriented east-west and spaced at 100 m intervals.

Shives, R.B.K., Carson, J.M., Ford, K.L., Holman, P.B. and Cathro, M. (2004): Helicopter-borne gamma ray spectrometric and magnetic total field geophysical survey, Imperial Metals Corporation's Mount Polley mine area, British Columbia; BC Ministry of Energy and Mines, Open File 2004-10 and Geological Survey of Canada, Open File 4619, URL <http://www.empr.gov.bc.ca/Mining/Geoscience/PublicationsCatalogue/OpenFiles/2004/Pages/2004-10.aspx> [January 2016].

Tisdall Lake survey (2005)

In 2004 the Geological Survey of Canada, with funding provided by Amarc Resources Ltd., conducted a multisensor (gamma-ray spectrometric, magnetic total field) helicopter-borne geophysical survey in the Tisdall Lake Area, southeast of Mount Polley. Flight lines were oriented NE-SW, spaced at 250 m intervals.

Shives, R.B.K., Carson, J.M., Dumont, R., Holman, P.B. and Yeager, D. (2005): Helicopter-borne gamma ray spectrometric and magnetic total field geophysical survey, Tisdall Lake area, British Columbia; BC Ministry of Energy and Mines, Open File 2005-16 and Geological Survey of Canada, Open Files 5292 and 5293, URL <http://www.empr.gov.bc.ca/Mining/Geoscience/PublicationsCatalogue/OpenFiles/2005/Pages/2005-16.aspx> [January 2016].

Ground Magnetics

Local ground-magnetic surveys were conducted over various parts of the Mount Polley property by Imperial Metals Corporation between 2007 and 2010. These data are released here by Imperial Metals. They have been combined into a single set of files and are presented as a combined image.

Gravity

A new gravity survey was flown in 2008 in the central BC region, as part of the Geoscience BC QUEST project (Sander Geophysics Ltd., 2008). The data for the survey are available from Geoscience BC.

Sander Geophysics Ltd. (2008): Airborne gravity survey, Quesnellia region, British Columbia; Geoscience BC, Report 2008-8, 121 p., URL <http://www.geosciencebc.com/s/2008-08.asp> [January 2016].

Electromagnetics (VTEM)

Time-domain helicopter-borne electromagnetic (VTEM) data were released by Geoscience BC for the Quest area in 2008 (Geotech Limited, 2008). One-dimensional (1-D) conductivity soundings were inverted along the flight lines and presented as conductivity-depth sections; 1-D inversion results were released in 2009 (Mira Geoscience Limited, 2009).

Geotech Ltd. (2008): Report on a helicopter-borne versatile time domain electromagnetic (VTEM) geophysical survey: QUEST project, central British Columbia (NTS 93A, B, G, H, J, K, N, O and 94C, D); Geoscience BC, Report 2008-4, URL <http://www.geosciencebc.com/s/2008-04.asp> [January 2016].

Mira Geoscience Ltd. (2009): QUEST project: 3D inversion modelling, integration, and visualization of airborne gravity, magnetic, and electromagnetic data, BC, Canada; Geoscience BC, Report 2009-15, URL <http://www.geosciencebc.com/s/2009-15.asp> [January 2016].

Porphyry Districts of British Columbia Atlas Series

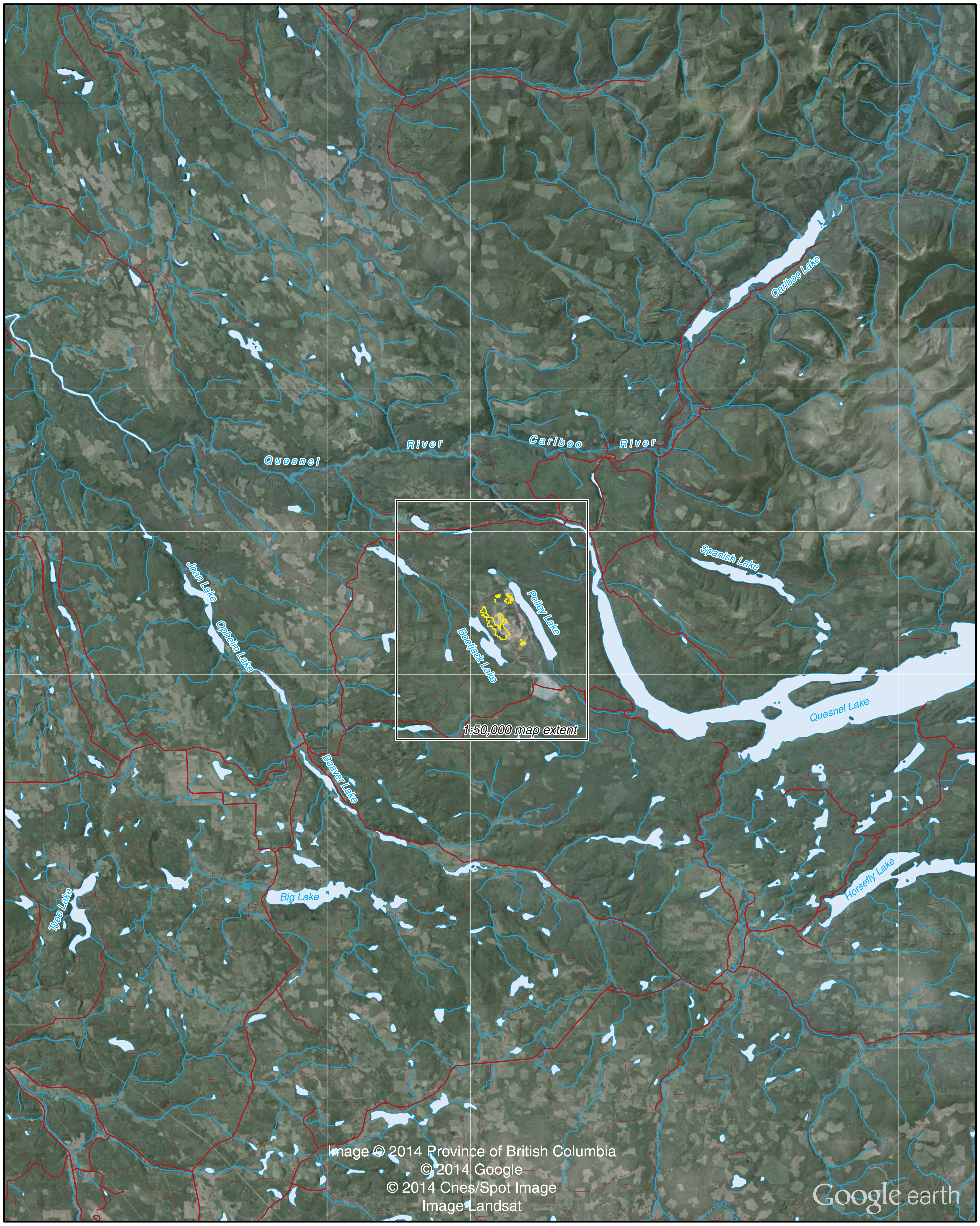
MOUNT POLLEY

A geo-exploration atlas of the Mount Polley porphyry copper-gold district

SATELLITE IMAGERY

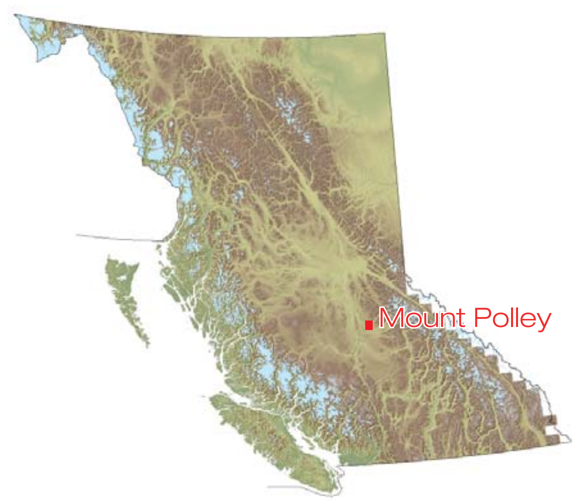
1:250 000

560000 570000 580000 590000 600000 610000 620000



560000 570000 580000 590000 600000 610000 620000

5860000 5850000 5840000 5830000 5820000 5810000 5800000 5790000



SCALE 1:250 000

0 5 10 20

kilometres

Universal Transverse Mercator Projection
NAD 83 Datum, Zone 10

Data Sources:

Google Earth
Imagery Date: December 12, 2004 (as listed on Google Earth)

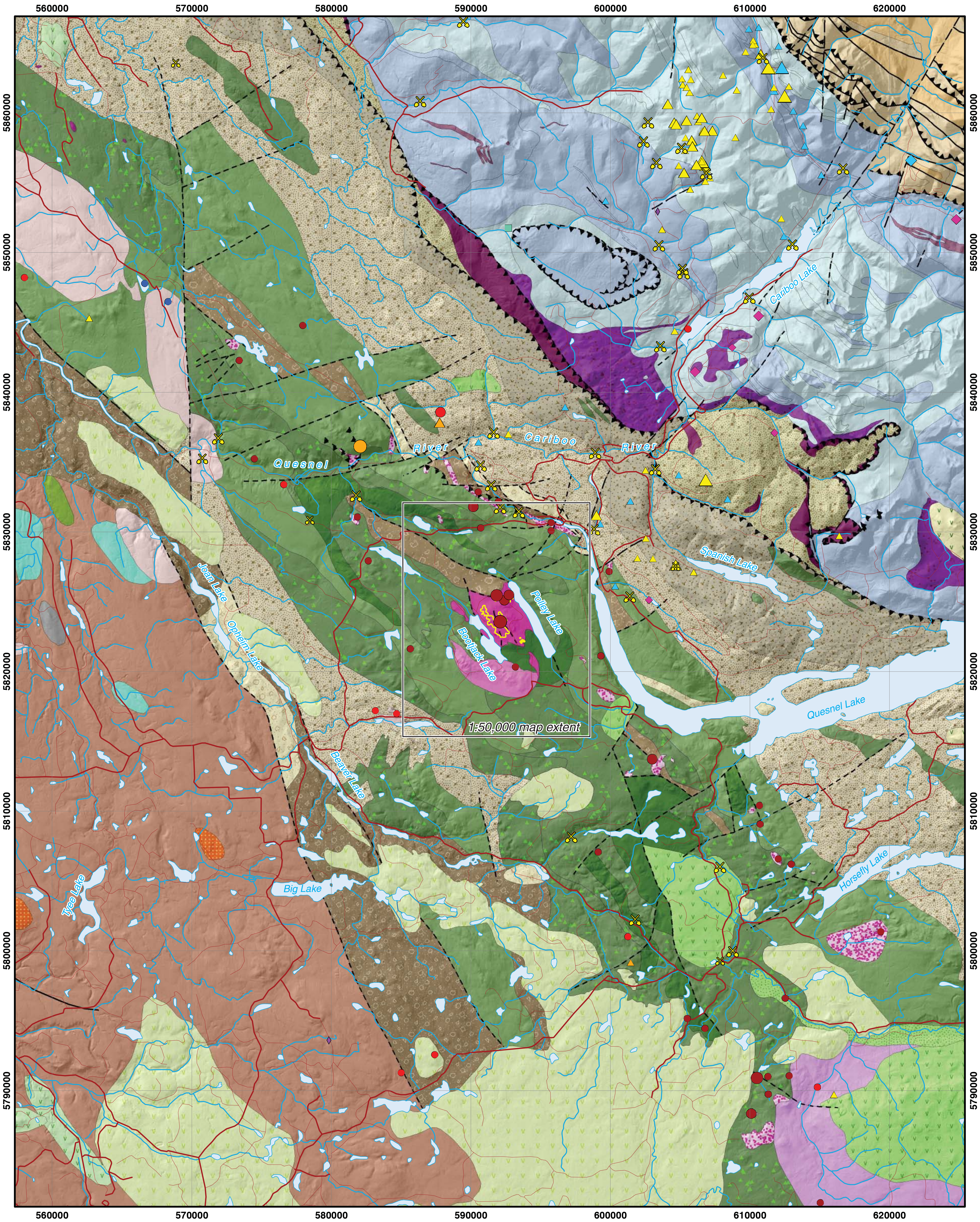
MOUNT POLLEY

A geo-exploration atlas of the Mount Polley porphyry copper-gold district

Geoscience BC

BEDROCK GEOLOGY

1:250 000



Overlap assemblages and postaccretionary intrusions

MIOCENE:

- MiPlCvb — Chilcotin Group: basalt

EOCENE to OLIGOCENE:

- EOv — Ootsa Lake Group rhyolite, Endako Group basalt, andesite
- EKaca — Kamloops Group high-K, calc-alkaline basalt, andesite, rhyolite
- EKasf — Kamloops Group - fine clastic sedimentary rocks

CRETACEOUS:

- Kg — Intrusive rocks, undivided
- KTcg — Sedimentary rocks, undivided

Triassic-Jurassic Quesnel terrane

Intrusive rocks

- EJmum — Ultramafic rocks (Polaris ultramafic suite)
- MJSMqm — Quartz monzonitic intrusive rocks (Ste. Marie Plutonic Suite)
- LTrJgd — Granodioritic intrusive rocks
- TJsy — Syenitic to monzonitic intrusive rocks (unnamed)
- LTsy — Syenitic intrusive rocks
- LTmz — Syenitic to monzonitic intrusive rocks (Mount Polley Intrusive Complex)

Layered rocks

- lmJs — Undivided sedimentary rocks
- lJst — Argillite, greywacke, conglomerate, turbidites

Nicola Group

- uTrNsv — Undivided sedimentary rocks
- muTrNcg — Polymictic conglomerate, sandstone
- muTrNvs — Mixed volcaniclastic rocks, siltstone, sandstone and minor limestone
- muTrNbb1 — Sandstone, siltstone, shale; bioclastic limestone; minor felsic tuff, tuffaceous argillite
- uTrTlm — Limestone
- uTrNvb — Basalt volcaniclastic rocks: Pyroxene and feldspar phyric basalt breccias; contains clasts of latite, trachyte and intrusive equivalents
- uTrNv — Basaltic volcanic rocks: Pyroxene and pyroxene-hornblende basalt flows, breccias and tuffs
- uTrNab — Basaltic volcanic rocks: Analcime, pyroxene+/-olivine phyric basalt breccias, tuffs and flows, fine-grained volcaniclastics

Oceanic rocks

PALEOZOIC - MESOZOIC

Cache Creek Group

- PTrClm — Limestone, marble, calcareous sedimentary rocks
- PTrCch — Chert, siliceous argillite, siliciclastic rocks
- PTrCsv — Marine sedimentary and volcanic rocks
- PTrCvb — Basaltic volcanic rocks

Slide Mountain

- uPzC — Crooked Amphibolite - serpentinite ultramafic rocks

Continental margin assemblages

LATE PALEOZOIC

- CmMB — Black Stuart Group - undivided sedimentary rocks
- MPA — Antler Formation - basaltic volcanic rocks
- Mdr — Unnamed dioritic intrusive rocks
- DMQ — Quesnel Lake Gneiss - orthogneiss metamorphic rocks

LATE PROTEROZOIC - PALEOZOIC

Snowshoe Group

- Paleozoic - metasedimentary rocks, minor greenstone
- Proterozoic to Paleozoic - metasedimentary rocks, minor greenstone

Cariboo Group

- Undivided sedimentary rocks

Symbols

- Roads (major, minor)
- Fault (defined, approximate, inferred)
- Thrust fault (defined, approximate, inferred)
- Geological contact

Mount Polley orebodies (Rees et al., 2014)

0.1% Cu grade contour

Data Sources:

Logan, J.M., Schiarizza, P., Struik, L.C., Barnett, C., Nelson, J.L., Kowalczyk, P., Ferri, F., Mihalynuk, M.G., Thomas, M.D., Gammon, P., Lett, R., Jackaman, W. and Ferbey, T., 2010: Bedrock Geology of the QUEST map area, central British Columbia; British Columbia Geological Survey Geoscience Map 2010-1, Geoscience BC Report 2010-5, and Geological Survey of Canada Open File 6476.

BC MINFILE

Recorded mineral occurrences: coloured by type, sized by status of development

1 Showing or anomaly
2 Prospect
3 Developed prospect
4 Producer or past producer

	1	2	3	4
Copper-Gold +/- Silver +/- Molybdenum (alkalic porphyry)			n/a	
Copper +/- Molybdenum +/- Gold (porphyry)				
Molybdenum +/- Copper, Zinc, Tungsten, Silver (porphyry Mo, low-F type)		n/a	n/a	
Gold +/- Silver, Antimony, Copper, Molybdenum (Au-quartz veins / polymetallic veins)			n/a	
Silver-Lead-Zinc +/- Gold, Copper (polymetallic veins / sedimentary exhalative)				
Gold-Silver +/- Copper (epithermal)			n/a	n/a
Lead-Zinc +/- Silver (carbonate hosted)	n/a			n/a
Copper-Lead-Zinc (massive sulphide)			n/a	n/a
Gold (placer)				

	1	4
Copper (skarn)		
Gold (skarn)		
Jade/Nephite		
Manganese		
Tungsten		
Nickel, Pt, Pd		
Barite-Fluorite		

SCALE 1:250 000

0 5 10 20

kilometres

Universal Transverse Mercator Projection
NAD 83 Datum, Zone 10

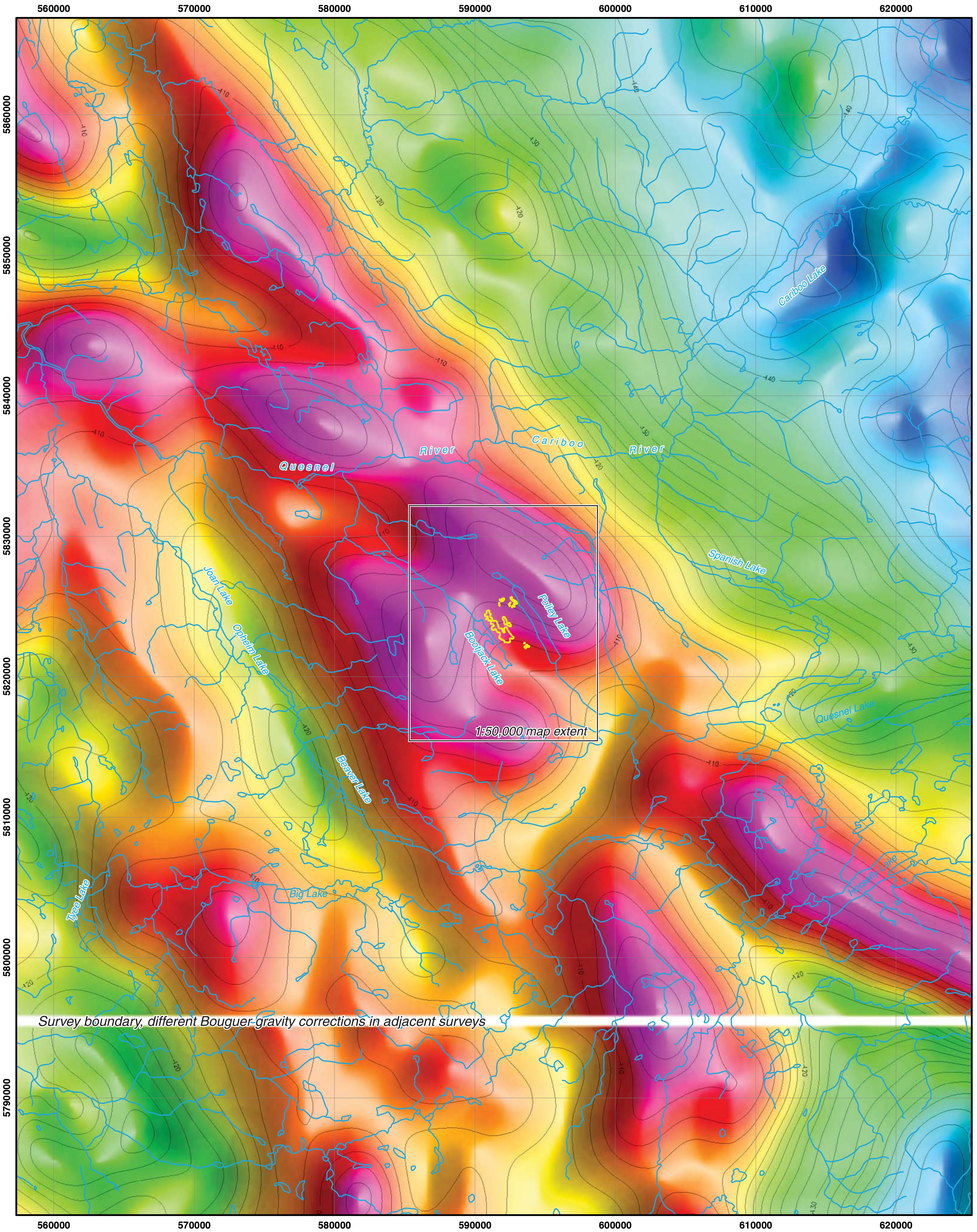
Porphyry Districts of British Columbia Atlas Series

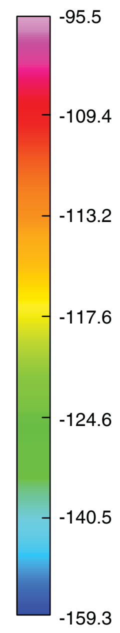
MOUNT POLLEY

A geo-exploration atlas of the Mount Polley porphyry copper-gold district

Geoscience BC

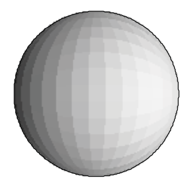
GRAVITY
Bouguer
1:250 000





Mount Polley orebodies
(Rees et al., 2014)

0.1% Cu
grade contour



SCALE 1:250 000

0 5 10 20
kilometres

Universal Transverse Mercator Projection
NAD 83 Datum, Zone 10

Data Sources:

Original survey data from the GeoscienceBC QUEST gravity data:

Sander Geophysics Limited (2008): Airborne gravity survey, Quesnellia Region, British Columbia; Geoscience BC, Report 2008-8, 121 p.

The image presented here was produced for this atlas.

Porphyry Districts of British Columbia Atlas Series

MOUNT POLLEY

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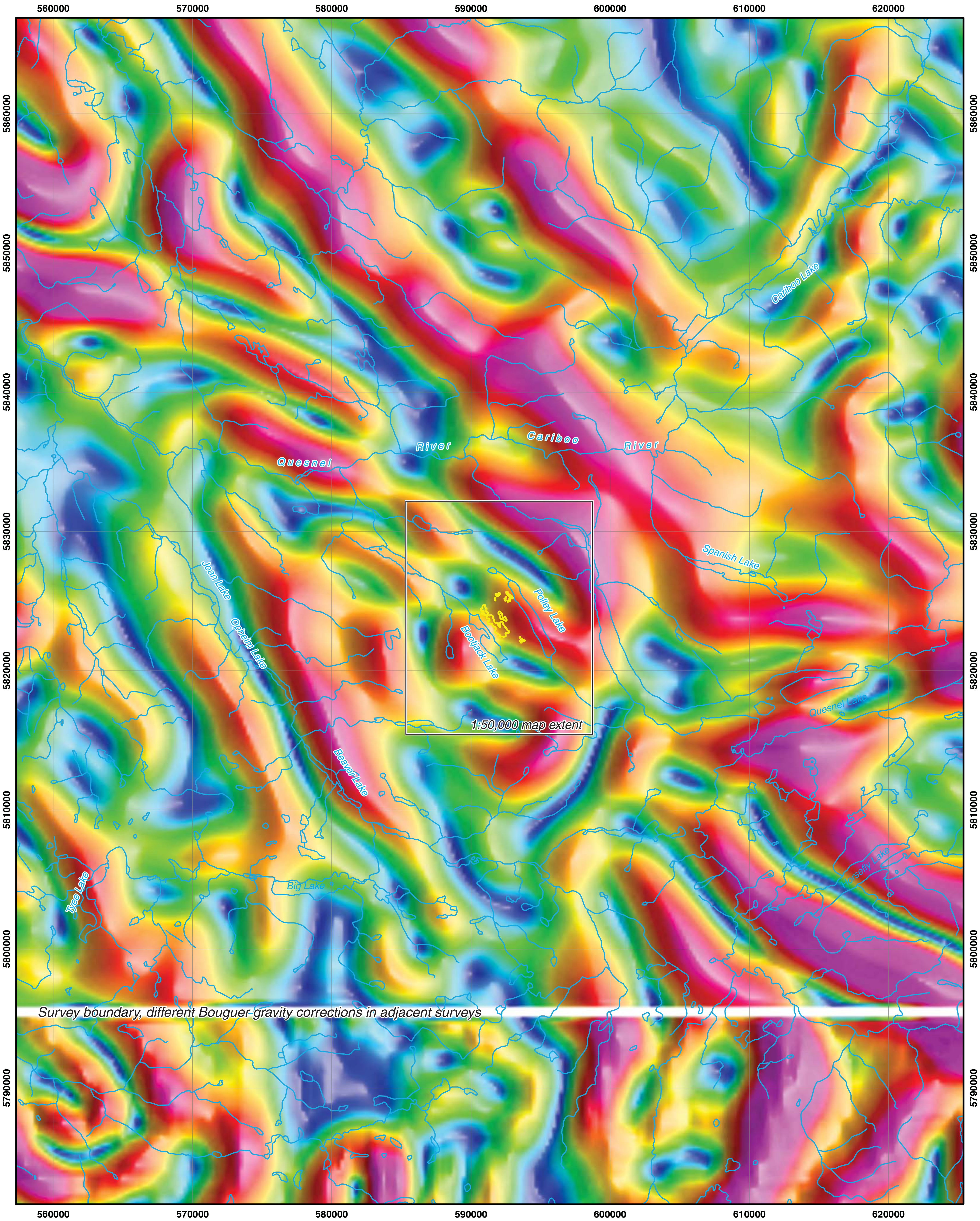
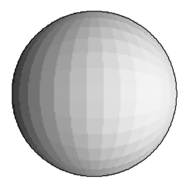
GRAVITY
Bouguer; Horizontal Gradient
1:250 000



mGal/km

Mount Polley orebodies
(Rees et al., 2014)

0.1% Cu
grade contour



Azimuth : 90
Inclination : 45

SCALE 1:250 000

0 5 10 20

kilometres

Universal Transverse Mercator Projection
NAD 83 Datum, Zone 10

Data Sources:

Original survey data from the GeoscienceBC QUEST gravity data:

Sander Geophysics Limited (2008): Airborne gravity survey, Quesnellia Region, British Columbia; Geoscience BC, Report 2008-8, 121 p.

The image presented here was produced for this atlas.

Porphyry Districts of British Columbia Atlas Series

MOUNT POLLEY

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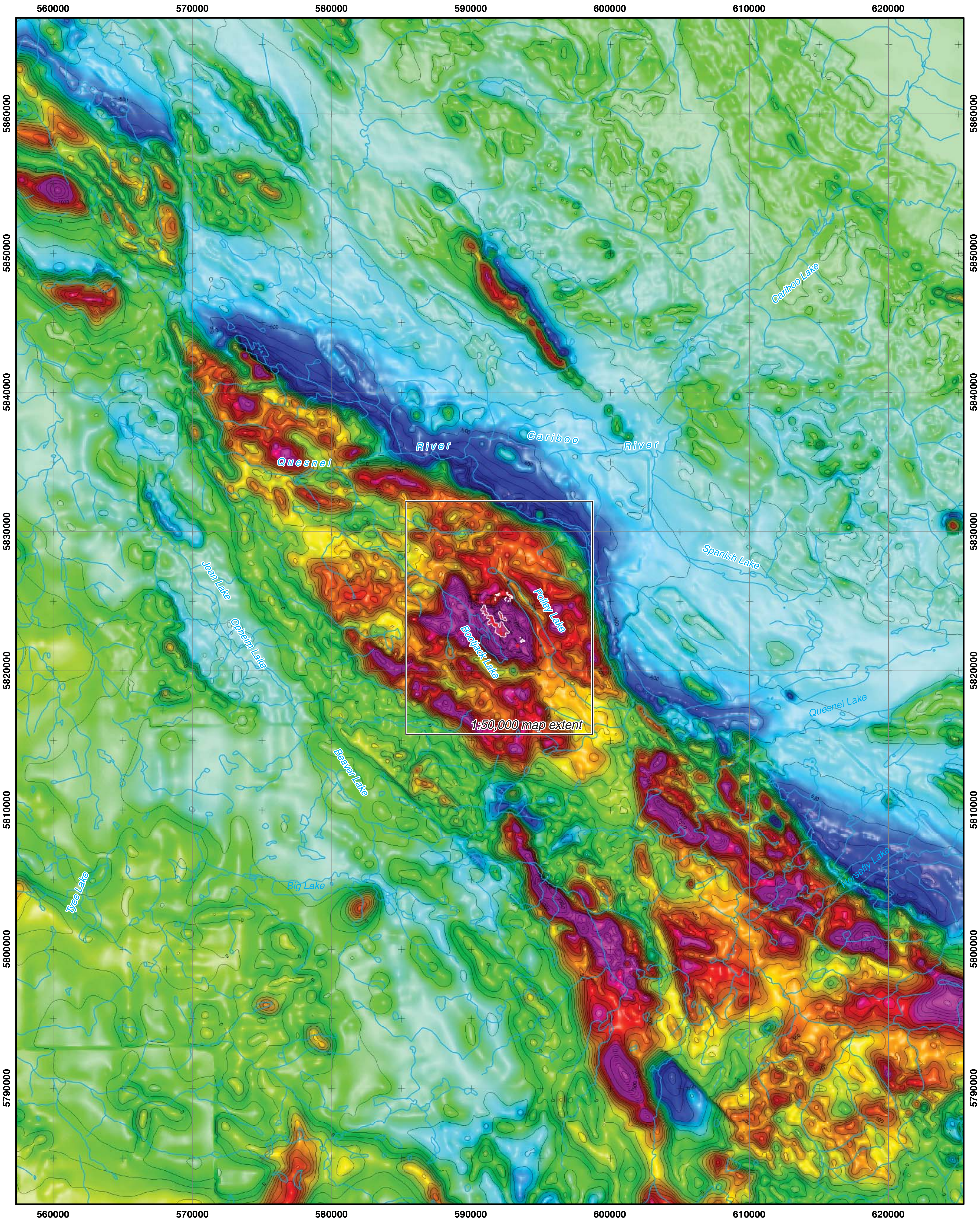
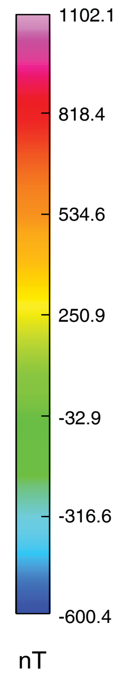
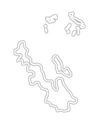
Geoscience BC

MAGNETICS
Residual Magnetic Intensity
1:250 000

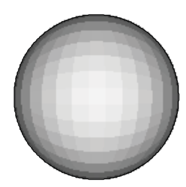




Mount Polley orebodies
(Rees et al., 2014)



0.1% Cu
grade contour



SCALE 1:250 000

0 5 10 20
kilometres

Universal Transverse Mercator Projection
NAD 83 Datum, Zone 10

Data Sources:

Geological Survey of Canada data sets used were downloaded from the Canadian Aeromagnetic database. The individual gridded data files were reprojected into NAD83 UTM Zone 10N prior to being combined together.

The data sets used in this image and their initial grid cell sizes are:
- Caribou Lake - 50m grid cells
- Cottonwood Wells - 40m grid cells
- Eagle Lake McKinley Creek - 50m grid cells
- Horsefly - 100m grid cells
- Likely - 100m grid cells
- rtf_25301 - 200m grid cells
- Canada200m_August2010 - 273m cells

Multiple GSC survey data sets have been combined to make this image. All downloaded grids were combined into a single grid with a 100m grid cell size. Each survey has been levelled to minimize the difference with adjoining surveys. Note that surveys flown at different altitudes and with different traverse line spacings show different amounts of detail. This produces some artifacts between surveys, which can be sometimes discerned as a shadowed line. All data has been upward continued 50m to reduce artifacts from the gridding algorithims used, this has the effect of slightly smoothing anomalies.

MOUNT POLLEY

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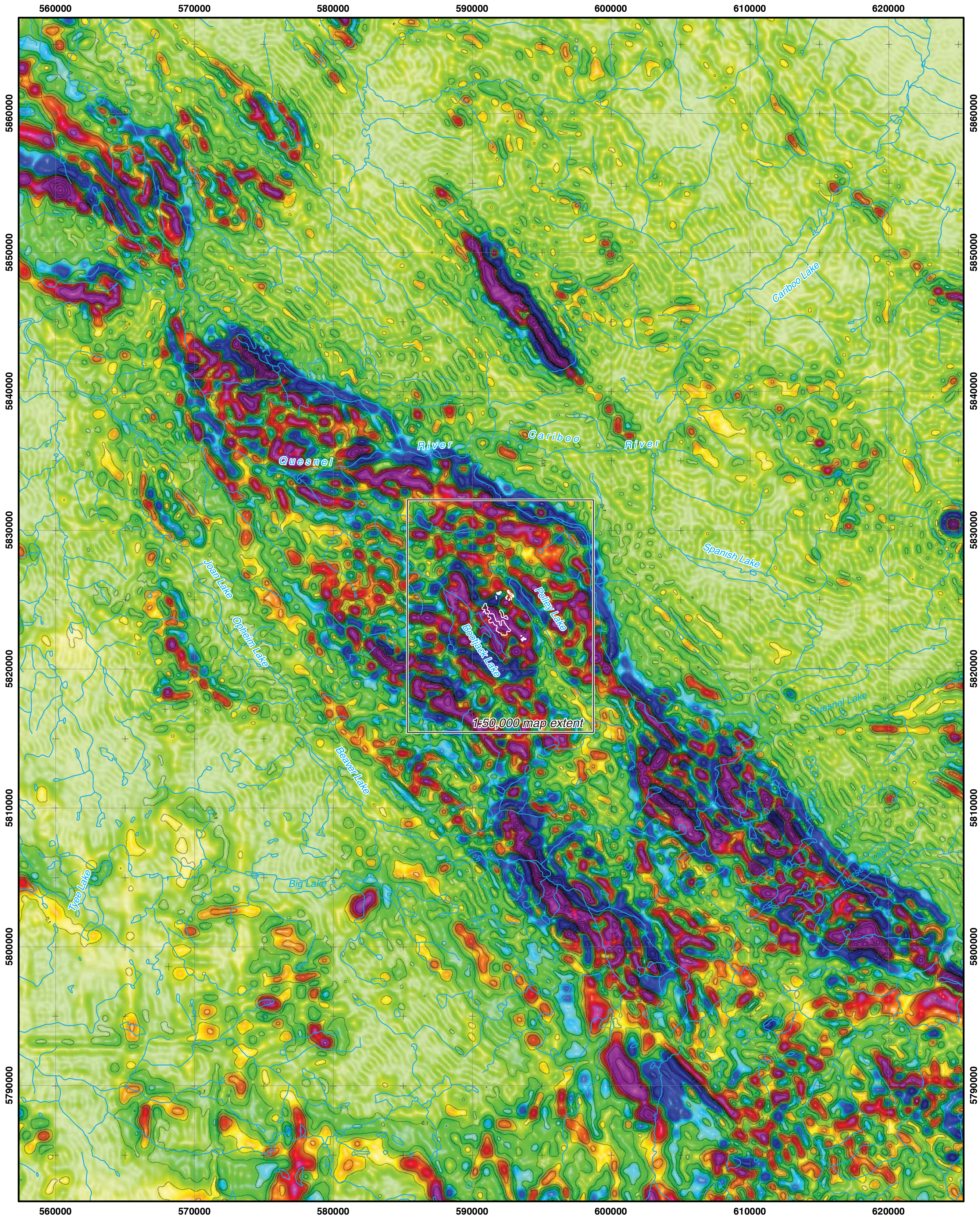
MAGNETICS
First Vertical Derivative

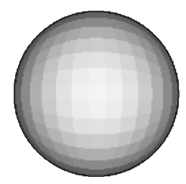
1:250 000



nT/metre

Mount Polley orebodies
(Rees et al., 2014)

0.1% Cu
grade contour



Azimuth : 90
Inclination : 90

SCALE 1:250 000

0 5 10 20

kilometres

Universal Transverse Mercator Projection
NAD 83 Datum, Zone 10

Data Sources:

Data from http://gdr.agg.nrcan.gc.ca
Geological Survey of Canada data sets used were downloaded from the Canadian Aeromagnetic database. The individual gridded data files were reprojected into NAD83 UTM Zone 10N prior to being combined together.
The data sets used in this image and their initial grid cell sizes are:

- Caribou Lake - 50m grid cells
- Cottonwood Wells - 40m grid cells
- Eagle Lake McKinley Creek - 50m grid cells
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- rtf_25301 - 200m grid cells
- Canada200m_August2010 - 273m cells

Multiple GSC survey data sets have been combined to make this image. All downloaded grids were combined into a single grid with a 100m grid cell size. Each survey has been levelled to minimize the difference with adjoining surveys. Note that surveys flown at different altitudes and with different traverse line spacings show different amounts of detail. This produces some artifacts between surveys, which can be sometimes discerned as a shadowed line. All data has been upward continued 50m to reduce artifacts from the gridding algorithims used, this has the effect of slightly smoothing anomalies.

The First Vertical Derivative grid of the data was computed from the final map using a Fourier frequency transform method. “Ripples” seen in areas of low relief in the final map, parallel to or around very strong anomalies, are artifacts of the original gridding process, and should be discounted by a user. The First Vertical Derivative map emphasizes the location of magnetic anomalies, it provides a sharper and more focused anomaly over the magnetic body, and allows an easier recognition of the boundaries of magnetic bodies, and the interpretation of the location of bounding faults. The limits of geologic bodies are indicated by linear features occuring at the transition from positive 1VD anomalies over magnetic bodies to a negative low surrounding them.

Porphyry Districts of British Columbia Atlas Series

MOUNT POLLEY

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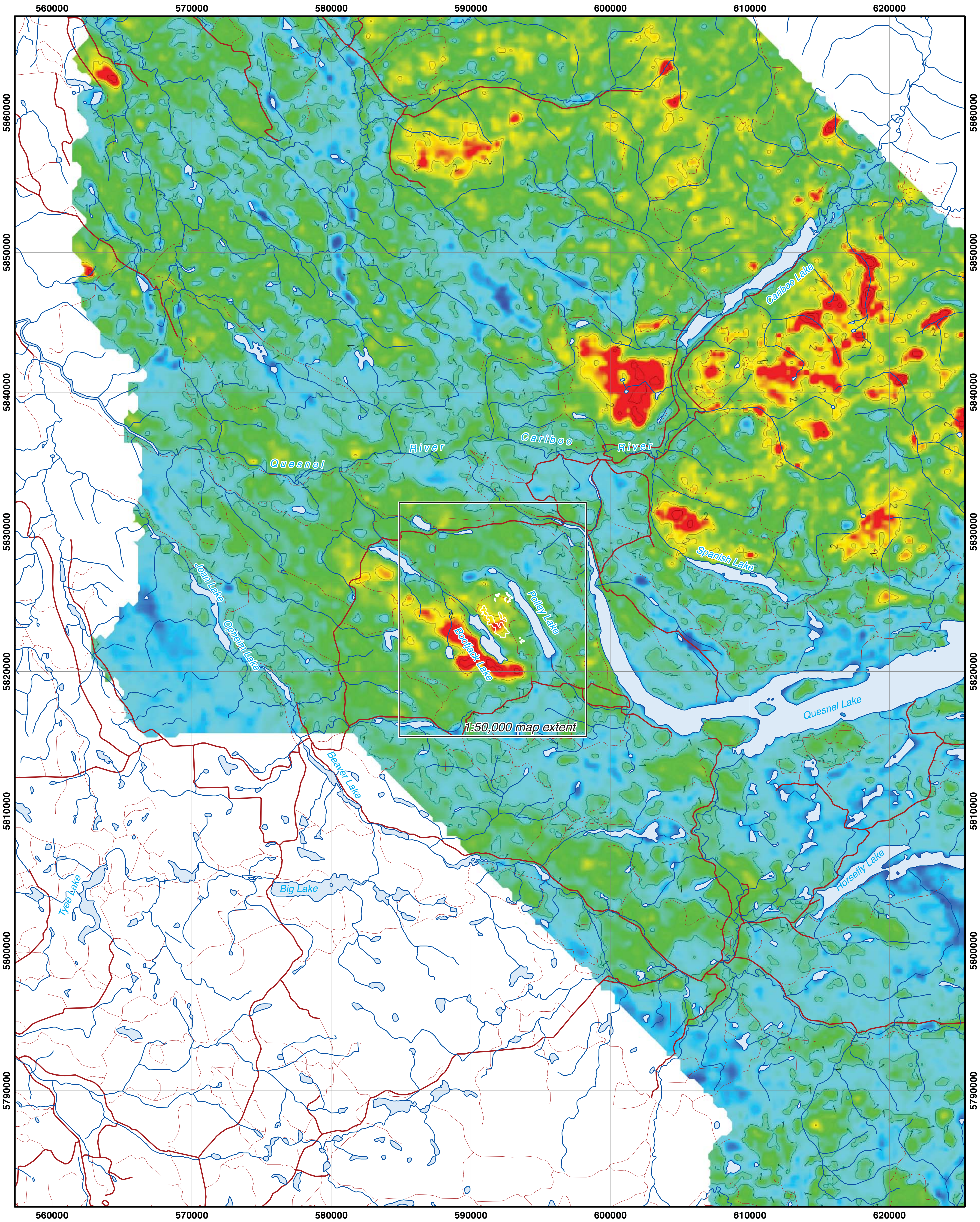
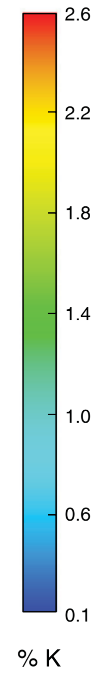
Geoscience BC

RADIOMETRICS
% Potassium
1:250 000





Mount Polley orebodies
(Rees et al., 2014)

0.1% Cu
grade contour

SCALE 1:250 000

0 5 10 20
kilometres

Universal Transverse Mercator Projection
NAD 83 Datum, Zone 10

Data Sources:

Data from http://gdr.agg.nrcan.gc.ca
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These terms and conditions remain with the data at all times.

Radioactivity Data
Citation 2013:
National Gamma-Ray Spectrometry Program Data Base
Airborne Geophysics Section, GSC - Central Canada Division
Geological Survey of Canada, Earth Sciences Sector
Natural Resources Canada

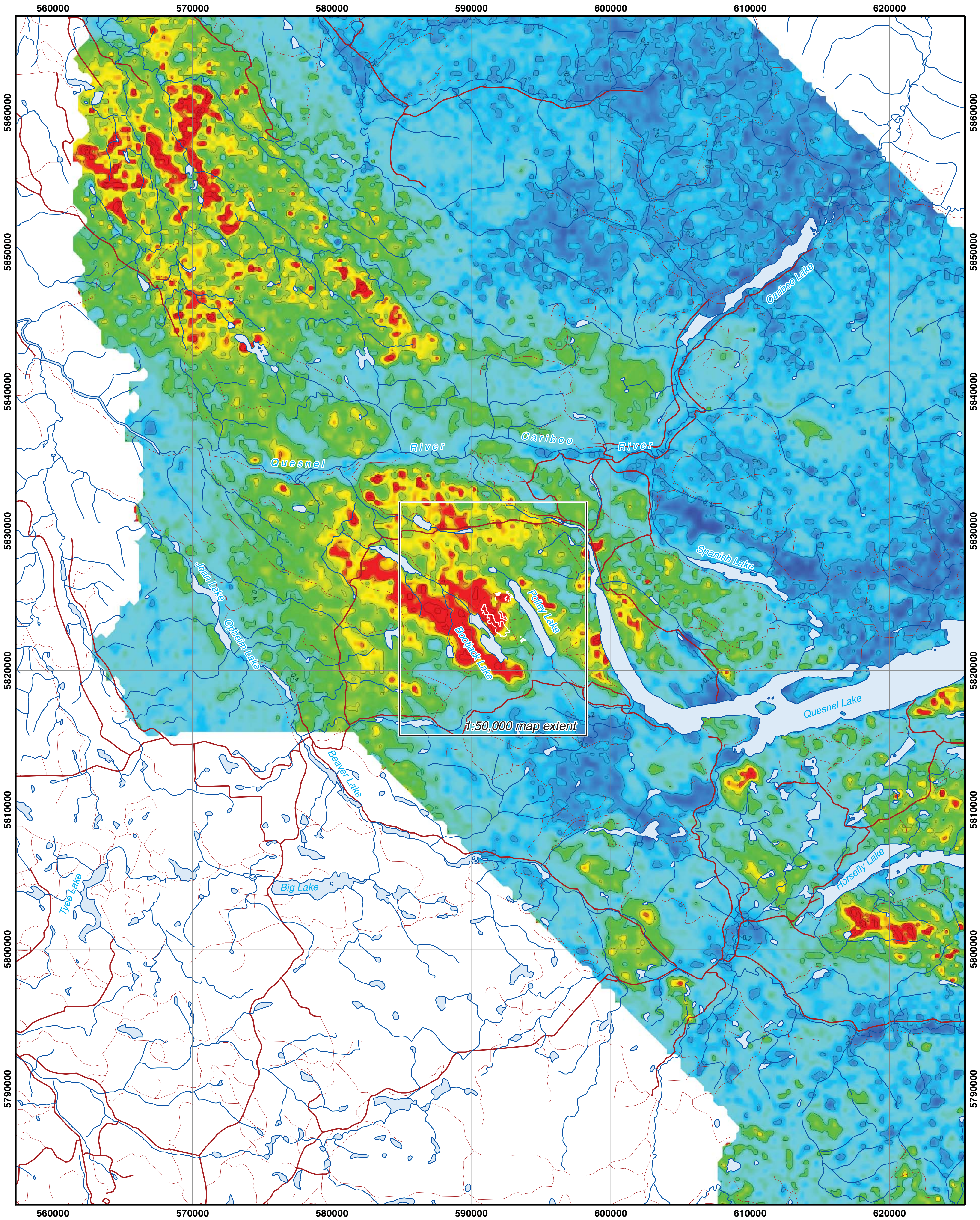
Porphyry Districts of British Columbia Atlas Series

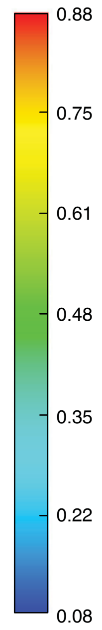
MOUNT POLLEY

A geo-exploration atlas of the Mount Polley porphyry copper-gold district

Geoscience BC

RADIOMETRICS
K / eTh
1:250 000





Mount Polley orebodies
(Rees et al., 2014)

0.1% Cu
grade contour

SCALE 1:250 000

0 5 10 20

kilometres

Universal Transverse Mercator Projection
NAD 83 Datum, Zone 10

Data Sources:

Data from http://gdr.agg.nrcan.gc.ca
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Natural Resources Canada

Porphyry Districts of British Columbia Atlas Series

MOUNT POLLEY

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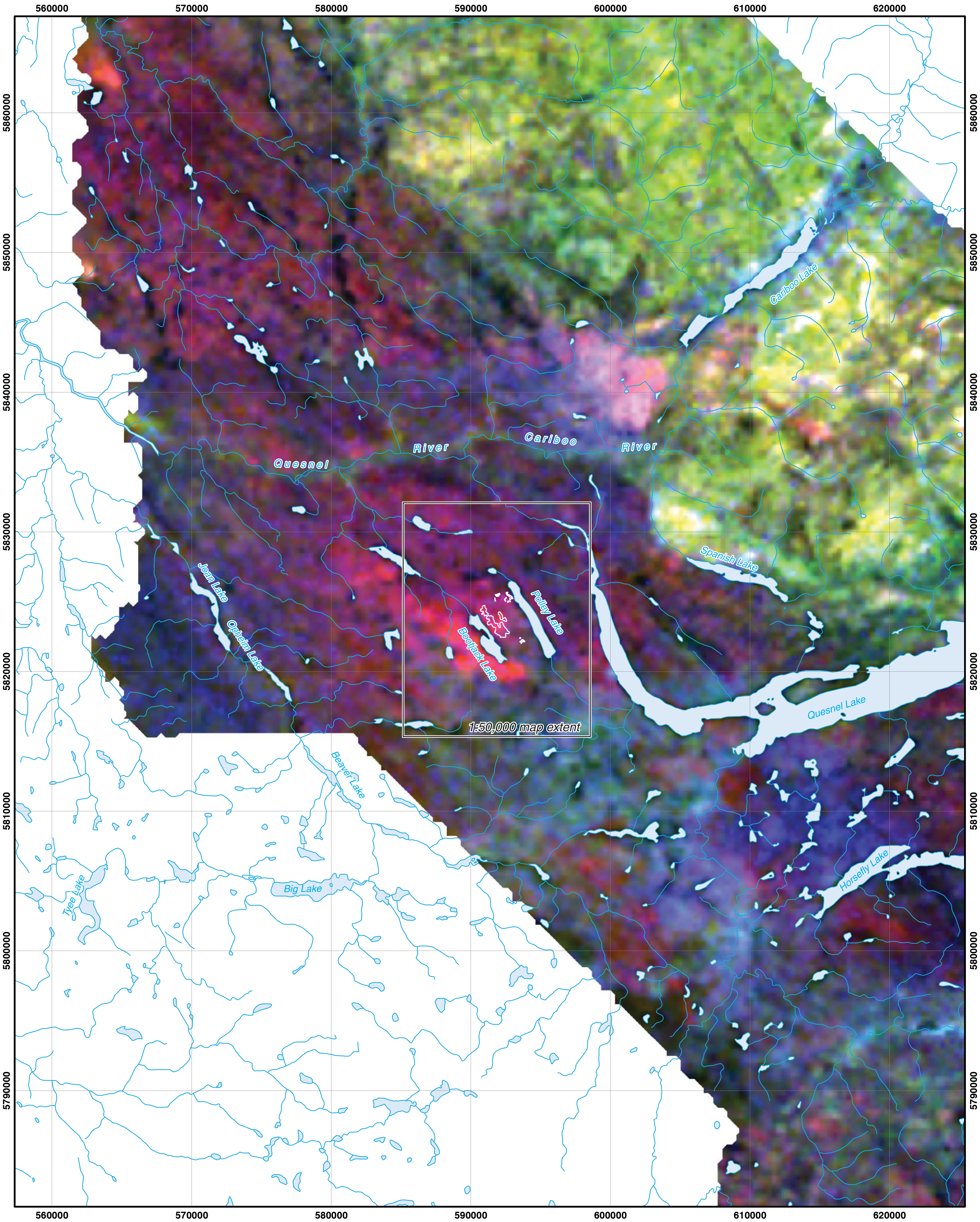
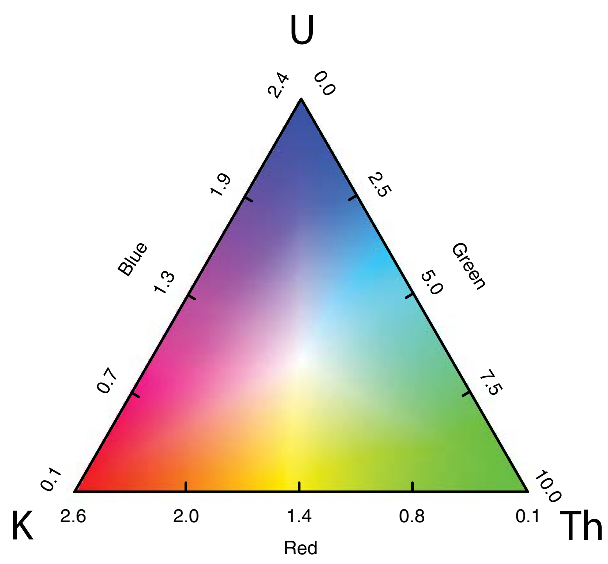
Geoscience BC

RADIOMETRICS
KTU/RGB
1:250 000





Red : Combined Percent Potassium
Green : Combined Equivalent Thorium
Blue : Combined Equivalent Uranium

Mount Polley orebodies
(Rees et al., 2014)

0.1% Cu
grade contour

SCALE 1:250 000

0 5 10 20
kilometres

Universal Transverse Mercator Projection
NAD 83 Datum, Zone 10

Data Sources:

Data from http://gdr.agg.nrcan.gc.ca
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Geological Survey of Canada, Earth Sciences Sector
Natural Resources Canada

Porphyry Districts of British Columbia Atlas Series

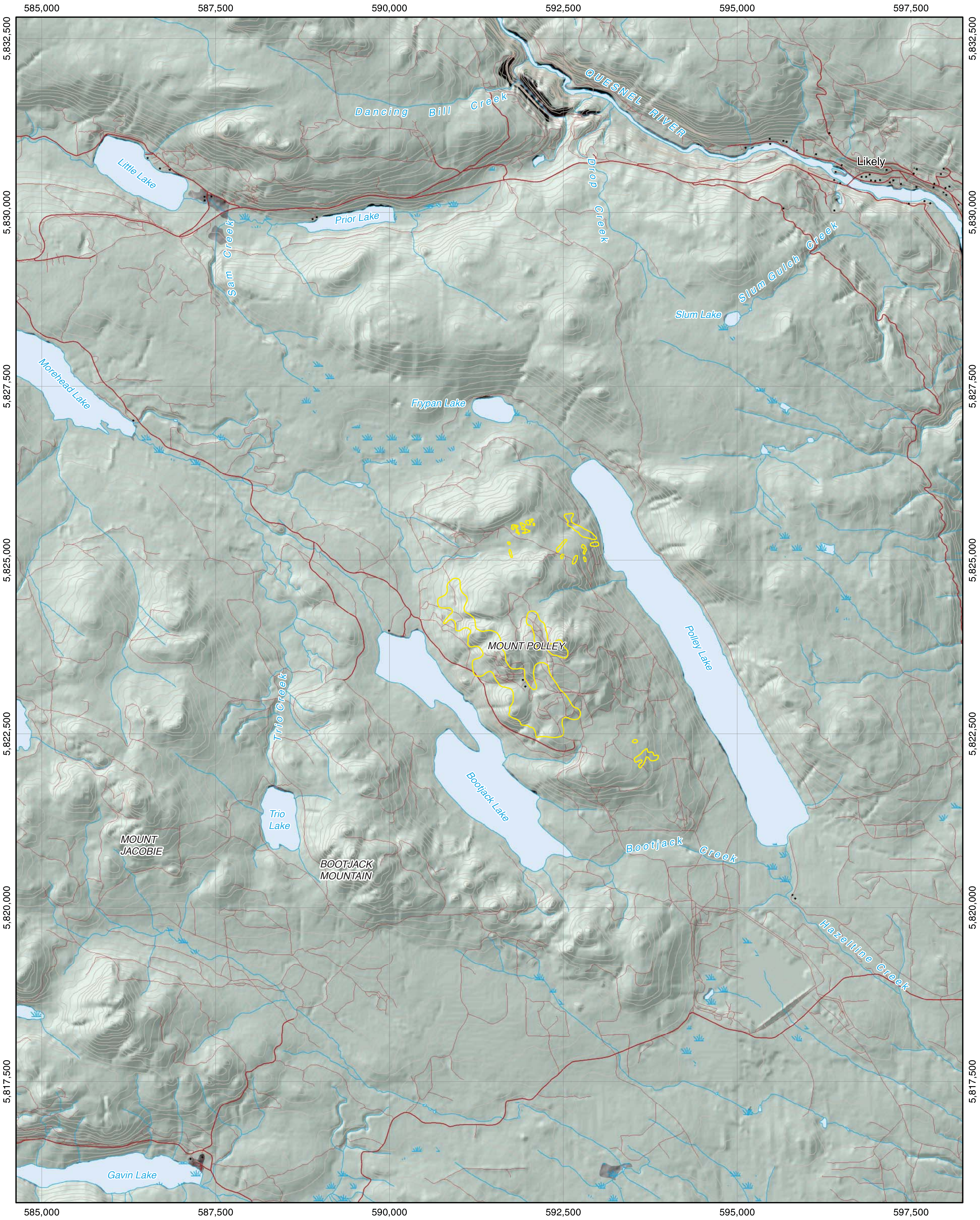
MOUNT POLLEY

A geo-exploration atlas of the Mount Polley porphyry copper-gold district

Geoscience BC

TOPOGRAPHY

1:50 000

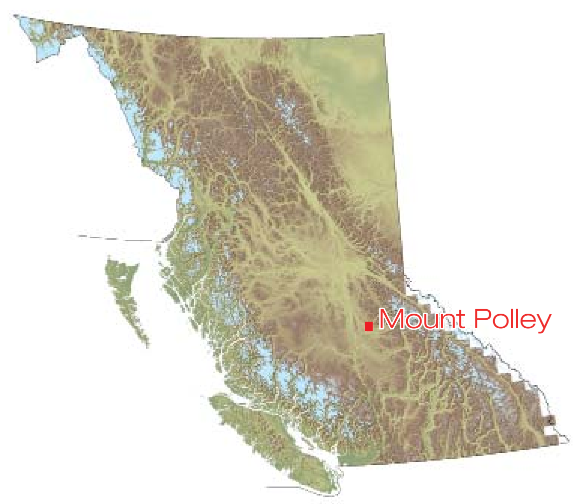


LEGEND

- industrial buildings
- tanks
- chimney (burner)
- buildings
- campground
- picnic site
- transformer station
- tower
- wetland
- major road
- minor road
- wooded area

Mount Polley orebodies
(Rees et al., 2013)

0.1% Cu grade contour



SCALE 1:50,000

0 2.5 5

kilometres

Universal Transverse Mercator Projection
NAD 83 Datum, Zone 10

Data Sources:

Natural Resources Canada (2013): CanVec, Canada, 093A05, 06, 11, and 12; Natural Resources Canada, Earth Sciences Sector, Mapping Information Branch, Centre for Topographic Information, URL <http://geogratis.gc.ca> [July, 2013]

GeoBC, 2013: Digital Road Atlas; Crown Registry and Geographic Base, Province of British Columbia, URL < http://archive.ilmb.gov.bc.ca/crgb/products/mapdata/digital_road_atlas_products.htm> [July, 2013]

Canadian Council on Geomatics (2007): Canadian digital elevation data; Natural Resources Canada, GeoBase®, URL <http://www.geobase.ca/geobase/en/data/cded/description.html> [July, 2013].

MOUNT POLLEY

A geo-exploration atlas of the Mount Polley porphyry copper-gold district

Geoscience BC

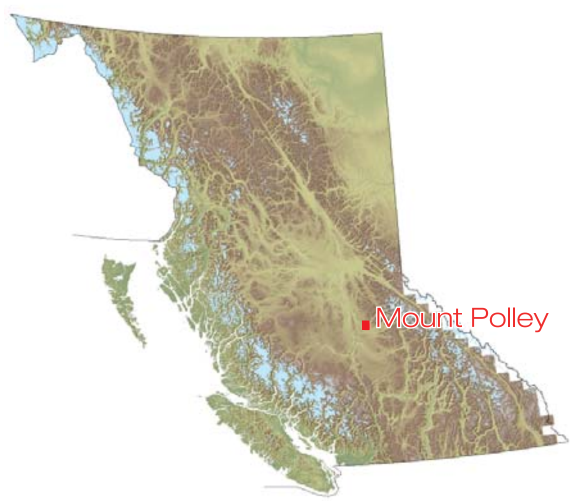
SATELLITE IMAGERY
Google Earth - SPOT
1:50 000

585000 587500 590000 592500 595000 597500

585000 587500 590000 592500 595000 597500

Mount Polley orebodies
(Rees et al., 2013)

0.1% Cu
grade contour



SCALE 1:50,000

0 2.5 5

kilometres

Universal Transverse Mercator Projection
NAD 83 Datum, Zone 10

Data Sources:

Google Earth
Imagery Date: December 31, 2004 (as listed on Google Earth)

Porphyry Districts of British Columbia Atlas Series

MOUNT POLLEY

A geo-exploration atlas of the Mount Polley porphyry copper-gold district

SATELLITE IMAGERY
Landsat8 - Natural Colour
1:50 000

July 1, 2013 @ 19:08 GMT

Mount Polley orebodies
(Rees et al., 2013)

0.1% Cu
grade contour

SCALE 1:50,000

0 2.5 5
kilometres

Universal Transverse Mercator Projection
NAD 83 Datum, Zone 10

Data Sources:

URL < http://landsat.usgs.gov/index.php > [December, 2013]

Landsat 8, 2013: July 1, 2013, 19:08GMT; WRS Path 48 Row 23

Standard Geometrically Corrected, Pansharpened, DRA-off. Cal Data Ltd.

This natural colour image was made by assigning the red, green and blue image channels to Landsat 8 bands (4, 3 and 2) with 30 metre pixel resolution. The image was then pansharpened using HSV sharpening using the 15 metre panchromatic band 8.

The good temporal nature of the medium resolution Landsat 8 sensor provides an excellent recent low cost view of an area of interest. This new sensor provides several new band, improved band placement and sensitivity while maintaining compatibility with the traditional Landsat bands.

Porphyry Districts of British Columbia Atlas Series

MOUNT POLLEY

A geo-exploration atlas of the Mount Polley porphyry copper-gold district

Geoscience BC

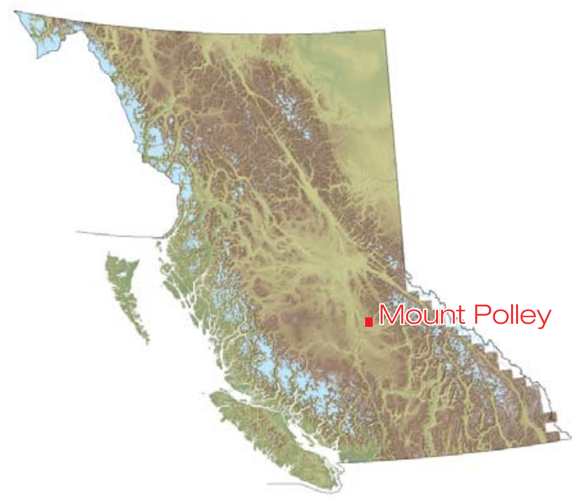
SATELLITE IMAGERY
ASTER - Pseudo Natural Colour
1:50 000

585000 587500 590000 592500 595000 597500

585000 587500 590000 592500 595000 597500

Mount Polley orebodies
(Rees et al., 2013)

0.1% Cu
grade contour



SCALE 1:50,000

0 2.5 5

kilometres

Universal Transverse Mercator Projection
NAD 83 Datum, Zone 10

Data Sources:

http://gds.aster.ersdac.jspacesystems.or.jp
http://asterweb.jpl.nasa.gov/

ASTER July 25, 2004, 19:17:32 GMT
AST_L1A.003:2025157165

ASTER does not sample the blue portion of the electromagnetic spectrum so a combination of bands is required to generate a pseudo-natural colour image from ASTER data. The pseudo-natural colour image is of moderate resolution (15 metres) and is often several years old. It is of critical value when analyzing an ASTER image as it provides the best possible display of what existed at each pixel location when the data was collected.

MOUNT POLLEY

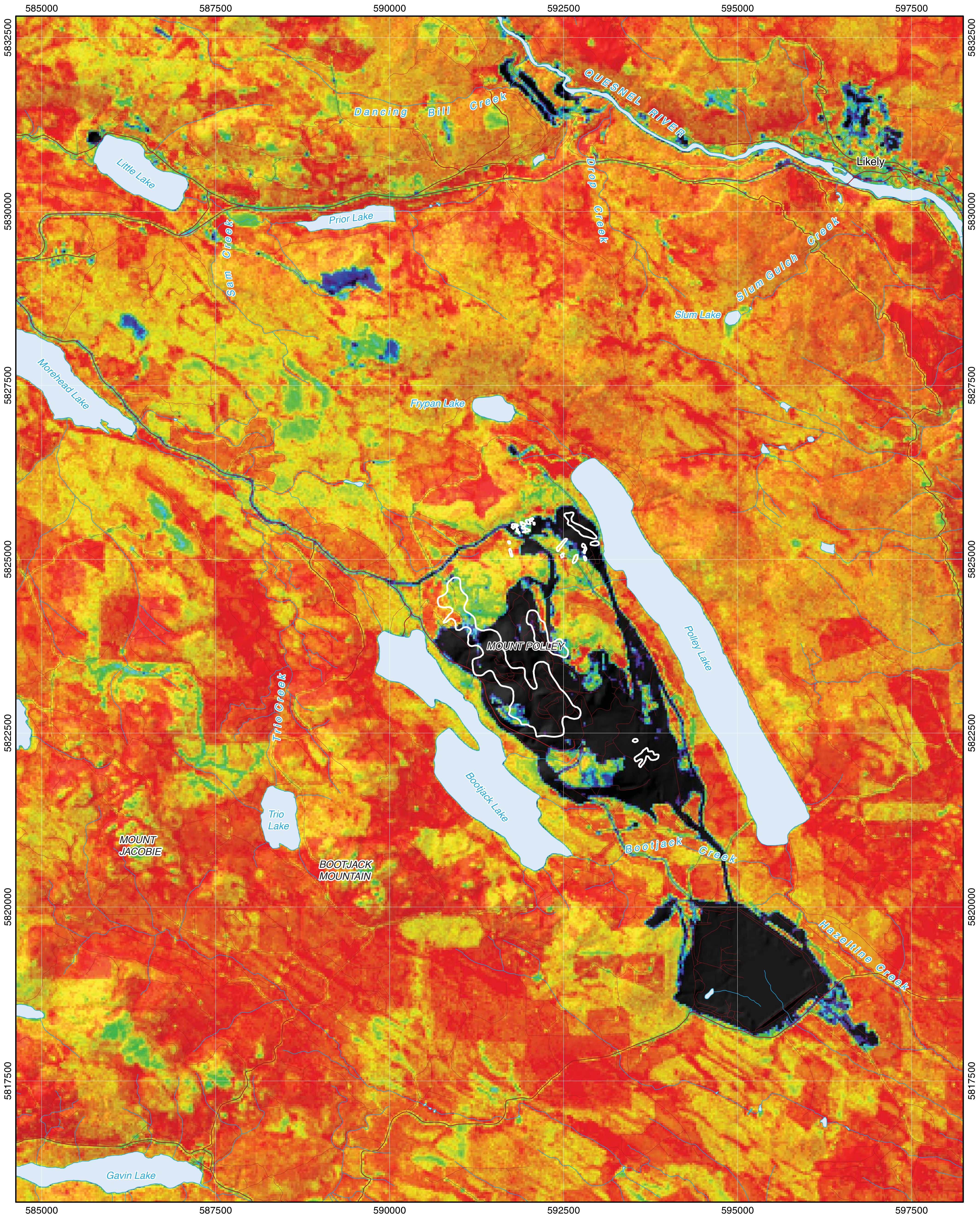
A geo-exploration atlas of the Mount Polley porphyry copper-gold district

Geoscience BC

SATELLITE IMAGERY

Landsat8 - Normalized Difference Vegetation Index

1:50 000



July 1, 2013 @ 19:08 GMT

Landsat 8 bands 4 and 5 are used to calculate the NDVI using:

NDVI = (Band 5 - Band 4) / (Band 5 + Band 4)

NDVI

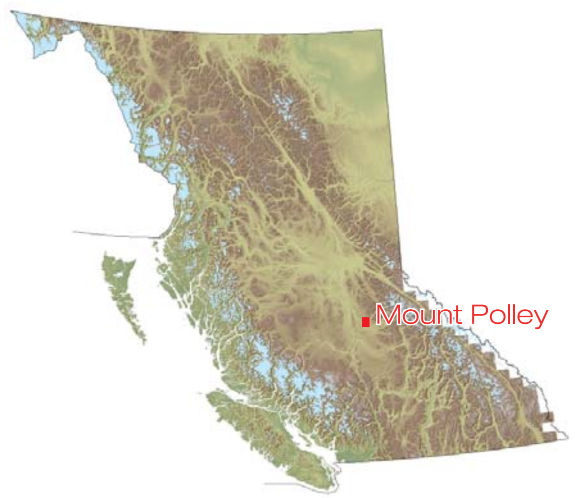
Chlorophyll Activity

highest

lowest

Mount Polley orebodies
(Rees et al., 2013)

0.1% Cu
grade contour



SCALE 1:50,000

0 2.5 5
kilometres

Universal Transverse Mercator Projection
NAD 83 Datum, Zone 10

Data Sources:

URL < http://landsat.usgs.gov/index.php > [December, 2013]

Landsat 8, 2013: July 1, 2013, 19:08GMT; WRS Path 48 Row 23

Standard Geometrically Corrected, Pansharpened, DRA-off. Cal Data Ltd.

Normalized Difference Vegetation Index (NDVI) is a traditional index that measures chlorophyll. Green vegetation absorbs electromagnetic radiation in the range of 0.4 - 0.7 µm and reflects EMS radiation in the 0.7 -1.1µm range.

This simple analysis is a powerful tool to quickly identify areas of no vegetation such as rock exposures, snow and water bodies. The relative amount of vegetation covering an area can be delineated and once calibrated with some ground verification can potentially be used to map vegetation differences related to the underlying geology.

Porphyry Districts of British Columbia Atlas Series

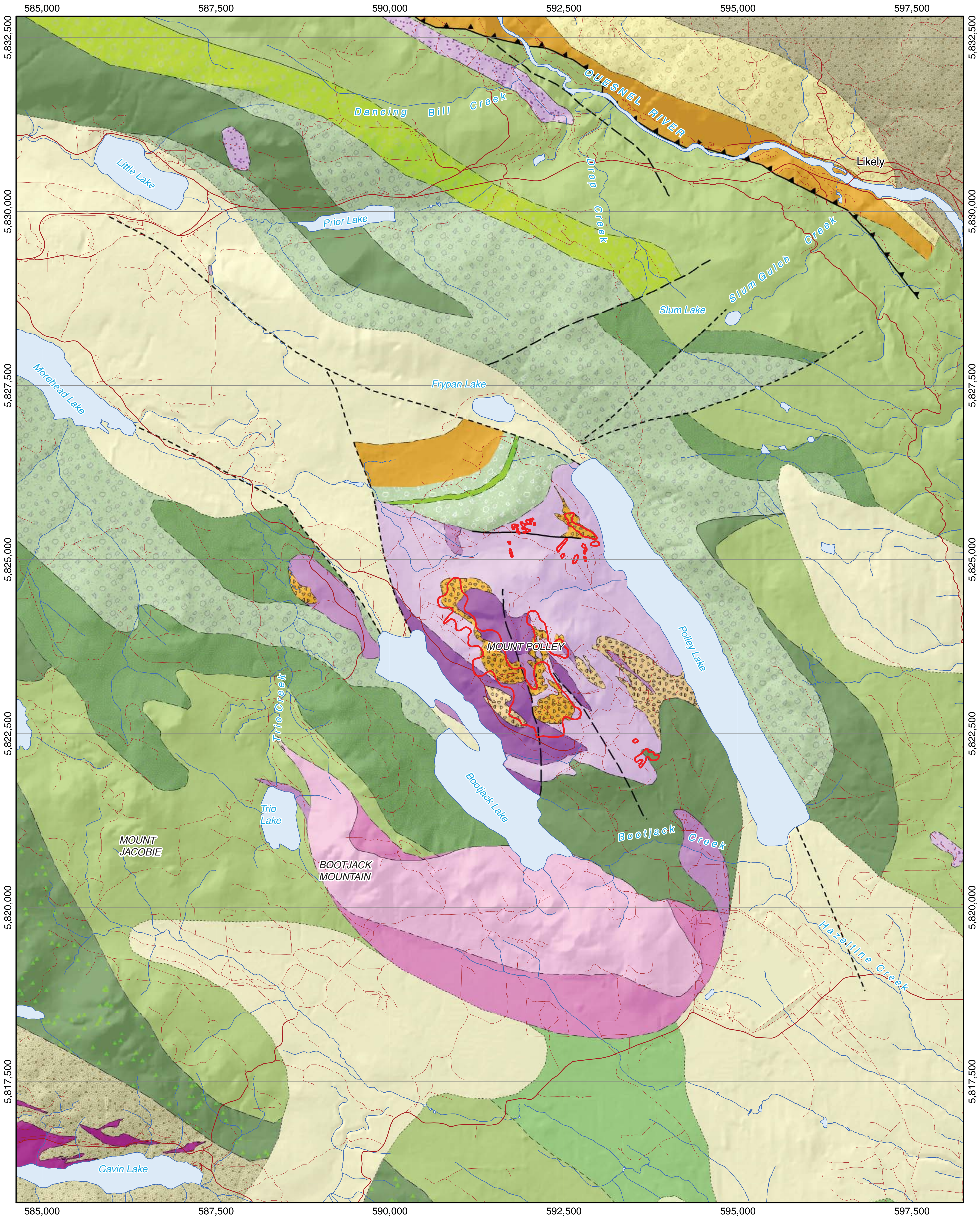
MOUNT POLLEY

A geo-exploration atlas of the Mount Polley porphyry copper-gold district

Geoscience BC

BEDROCK GEOLOGY

1:50 000



After Logan et al., BCGS Geoscience Map 2007-1

LEGEND

INTRUSIVE ROCKS

MIDDLE JURASSIC

MJqm	Hornblende-biotite quartz monzonite

LATE TRIASSIC TO EARLY JURASSIC

TJmz	Pyroxene-hornblende monzodiorite, hornblende-biotite monzonite and potassium feldspar megacrystic syenite

LATE TRIASSIC

LTbx	Hydrothermal breccias: potassic-albitic-calcic altered, metric to clast-supported, polymict intrusive-dominated pipes
LTMPd	Biotite-pyroxene diorite
LTMPmz	Pyroxene/hornblende-biotite monzonite
LTBJmsy	Melanocratic (pyroxene + hornblende) pseudoleucite syenite
LTBJosy	Orbicular pseudoleucite nepheline syenite
LTMPic	Hydrothermal altered intrusive carapace holocrystalline monzonitic intrusions and colcaniclastic wall rock (undivided)
LTNubx	Undivided polylithic breccias

LAYERED ROCKS

QUATERNARY

Qal	Thick alluvium cover

CRETACEOUS

Kcg	Polymictic clast-supported cobble conglomerate, includes gneiss, marble, chert, granitoid and volcanic clasts

LOWER JURASSIC

EJsn	Brown-grey siltstone, sandstone, and calcareous conglomerate
EJt	Quartz-phyric latite tuff

UPPER TRIASSIC TO LOWER JURASSIC

TJvcg	Well-bedded and sorted, polymict volcanic conglomerate, monzonite to K-spar megacrystic syenite clasts

UPPER TRIASSIC NICOLA GROUP

LTNvl	heterolithic lahar
LTNvl	Red-brown, massice, polymictc breccia, feldspar and hornblende crystal tuff
LTNpt	Plagioclase phyric, pyroxene lapilli tuff, breccia and minor flows
LTNav	Pink-white analcime pyroxene +/- olivine basalt breccia, flows and tuffs
LTNpv	Green and maroon pyroxene porphyry breccias, pyroxene-olivine basalt flows and crystal-rich sediments
LTNvb	Massive, coarse polymictic volcanic breccias, graded sandstones, siltstone and rare limestone breccia horizons
LTNs	Grey silstone, normal graded sandstone and certy shale with pyroxene and plagioclase-rich crystal sandstones
LTNu	Undivided mafic volcanic and volcaniclastic rocks

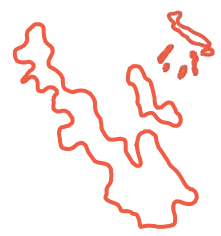
MIDDLE TO UPPER TRIASSIC

MuTNv	Pyroxene/hornblende metabasalt, greenstone and plagioclase crystal tuff
MuTNs	Graphitic and quartzose phyllite, shale, siltstone and sandstone

Mount Polley orebodies

(Rees et al., 2013)

0.1% Cu grade contour



SCALE 1:50,000

0 2.5 5

kilometres

Universal Transverse Mercator Projection

NAD 83 Datum, Zone 10

Data Sources:

Logan, J.M., Bath, A.B., Mihalynuk, M.G., Rees, C.J., Ullrich, T.D., Friedman, R., 2007: Regional Geology of the Mount Polley Area, central British Columbia (parts of NTS 093A/05, 06, 11 and 12); British Columbia Ministry of Energy, Mines and Petroleum Resources, Geoscience Map 2007-1.

MOUNT POLLEY

A geo-exploration atlas of the Mount Polley porphyry copper-gold district

Geoscience BC

SURFICIAL GEOLOGY

1:50 000

LEGEND

QUATERNARY

Non-glacial environment

- H — **Anthropogenic (Mine tailings)**
- O — **Organic deposits**

Colluvial and mass wasting deposits

- Cv — **colluvial veneer:** thin and discontinuous cover of slumped material, more than 2 m thick, dominantly overlies bedrock or till; occurs on moderate to steep slopes.

Alluvial sediments

- At — **Alluvial terraced sediments**: sorted gravel, sand, and minor silt; more than 2 m thick; forming inactive terraces above modern floodplain; represents a potential aggregate source.
- Af — **Alluvial fan sediments**: poorly sorted gravel, sand, and diamicton; more than 2 m thick; occur where a stream issues from a narrow valley onto a plain or valley floor.

Lacustrine sediments

- L — **Lacustrine sediments**, undifferentiated. Sand, silt, and minor clay intermixed with variable amount of organic material, deposited in a lake; more than 1 m thick; exposed following lowering of lake levels; includes organic deposits too small to be mapped separately.

Proglacial and glacial environment

Glaciolacustrine sediments: deposited in glacier-dammed lakes in valleys and along the margin of retreating glaciers

- GLv — **Glaciolacustrine veneer**: fine sand, silt, and clay; dominantly laminated and bedded; 1 to 2 m thick on average; thin and discontinuous.

Glaciofluvial sediments: deposited behind, at, or in front of the ice margin by glacial metlwater.

- GFt — **Glaciofluvial terraced sediments**: sand and gravel; 1 to 10 m thick; forming gently sloping flat surfaces perched above modern streams.
- GFh — **Hummocky glaciofluvial sediments**: poorly-sorted sand and gravel with minor diamicton; bedded to massive; 1 to more than 20 m thick; deposited in contact with a retreating glacier; forms hummocky topography.
- GFc — **Ice-contact glaciofluvial sediments**: poorly-sorted coarse sand and gravel deposits with pockets of diamict and fine sand and silt lenses; grater than 1 m and up to 10 m thick.
- GFk — **Kame terraced sediments**: poorly sorted sand and gravel with minor diamicton; bedded to massive; 1 to more than 20 m thick; deposited in contact with a retreating glacier; forms terraces on valley walls; perched above the modern valley floor.
- GFv — **Glaciofluvial veneer**: sand and gravel; 1 to 2 m thick; occurs near the margins and at the mouth of meltwater channels follows underlying topography.

Till: deposited directly by glaciers.

- Ts — **Streamlined and fluted till**: more than 2 m thick on average, till surface marked by streamlined landforms including flutings, drumlins, and crag and tails.
- Tv — **Till veneer**: more than 2 m thick on average, till surface marked by streamlined landforms including flutings, drumlins, and crag and tails.
- Tb — **Till blanket**: more than 2 m thick, continuous till cover forming undulating topography.

PRE-QUATERNARY

- R — Bedrock

Ice Flow Indicators & Geological Features

Uni-directional	Bi-directional
crag and tail ridge	drumlinoid or fluting
drumlinoid ridge	fluted bedrock
fluted bedrock	striation or groove
striation	

- esker ridge (direction known)
- esker ridge (direction unknown)
- minor meltwater channel (direction known)
- minor meltwater channel (direction unknown)
- major meltwater channel scarp
- landslide escarpment

SCALE 1:50,000

0 2.5 5

kilometres

Universal Transverse Mercator Projection
NAD 83 Datum, Zone 10

Data Sources:

Hashmi, S. (2015): Quaternary geology and drift prospecting in the Mount Polley region (NTS 093A). M.Sc. thesis, Simon Fraser University. 165 pages and digital data.

Hashmi, S., Plouffe, A., and Ward, B.C., 2015. Surficial geology, Bootjack Mountain area, British Columbia, Parts of NTS 93-A/5, NTS 93-A/6, NTS 93-A/11, and NTS 93-A/12; Geological Survey of Canada, Canadian Geoscience Map 209 (preliminary); British Columbia Geological Survey, Geoscience Map 2015-02, scale 1:50 000.

Ferbey, T. and Arnold, H. (2013): Compilation of Micro to Macro-scale ice-flow indicators for the Interior Plateau , Central British Columbia; British Columbia Geological Survey, Open File 2013-03.

Additional surficial geological mapping (not presented here but provided in the digital database) is from:

McAndless, P. and Taylor, C., 2006: Surficial Geology of the Mount Polley property: Summary of 2005 exploration work; British Columbia Ministry of Energy, Mines and Petroleum Resources Assessment Report 28270, 31 pages.
which includes the surficial geological mapping by Blackwell, J. and Stubley, T. (2005), internal report for Imperial Metals Corporation.
Digital data provided by Imperial Metals Corporation.

Mount Polley orebodies
grade contours
(Rees et al., 2014)

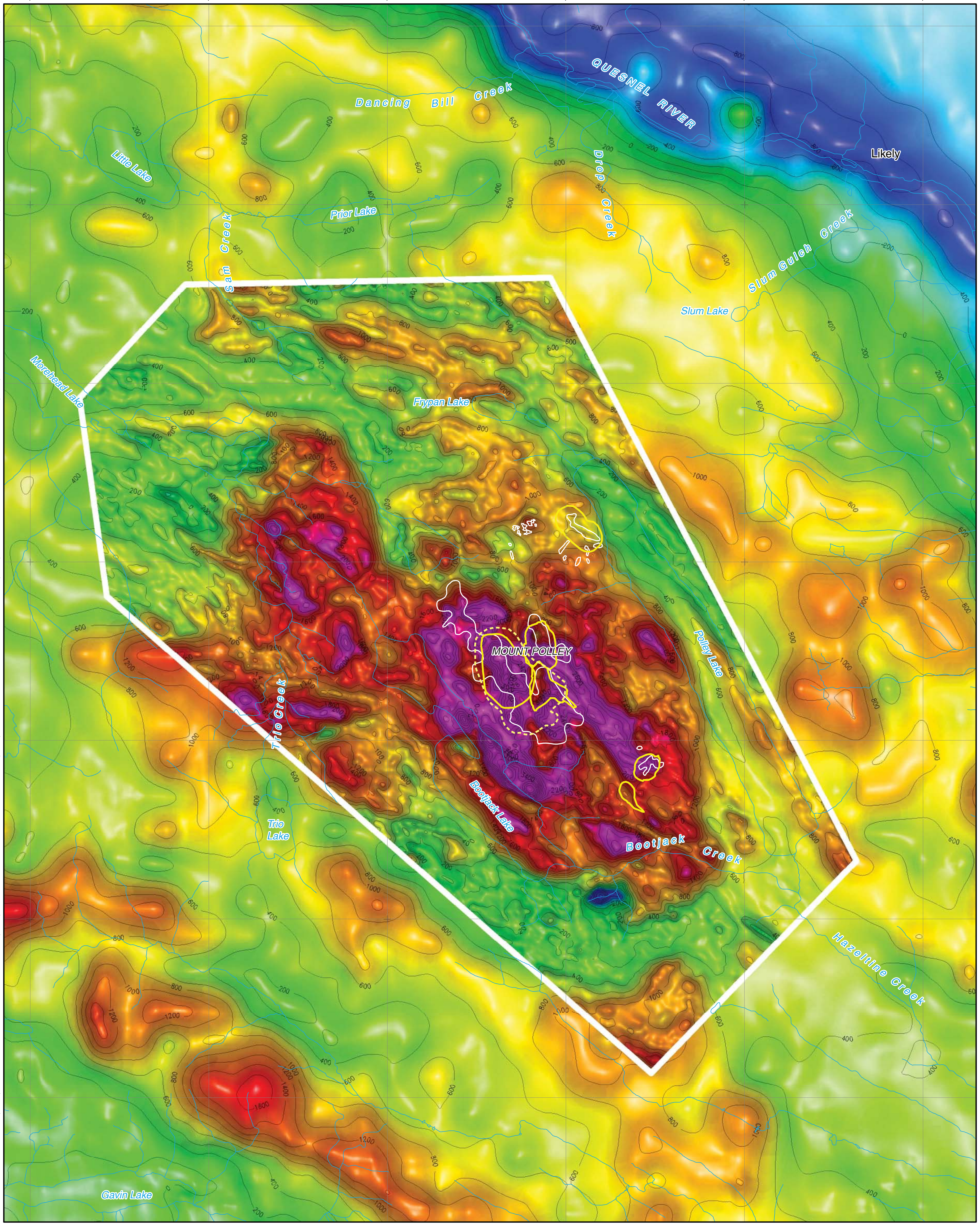
- 0.6% Cu
- 0.3% Cu
- 0.1% Cu

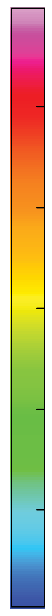
MOUNT POLLEY

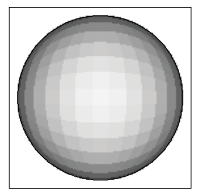
A geo-exploration atlas of the Mount Polley porphyry copper-gold district

Geoscience BC

MAGNETICS
Total Magnetic Intensity
1:50 000

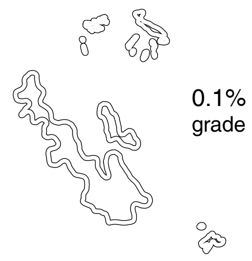






Azimuth : 90
Inclination : 90

Mount Polley orebodies
(Rees et al., 2013)



0.1% Cu
grade contour

Mount Polley pits

Current Limits

Planned limits

SCALE 1:50,000

0 2.5 5
kilometres

Universal Transverse Mercator Projection
NAD 83 Datum, Zone 10

Data Sources:

The background image is the same as presented in the 1:250,000 scale maps in this atlas; refer to those maps for references.

The more detailed survey is the Imperial Metals Corporation Mount Polley Mine survey. It is available thorough the Canadian Aeromagnetic Database <http://gdr.agg.nrcan.gc.ca >

Shives, R.B.K., Carson, J.M., Ford, K.L., Holman, P.B., and Cathro, M., 2004, Helicopter-borne gamma ray spectrometric and magnetic total field geophysical survey, Imperial Metals Corporation's Mount Polley Mine area, British Columbia: British Columbia Ministry of Energy Mines and Petroleum Resources Open File 2004-10 / Geolocial Survey of Canada Open File 4619.

MOUNT POLLEY

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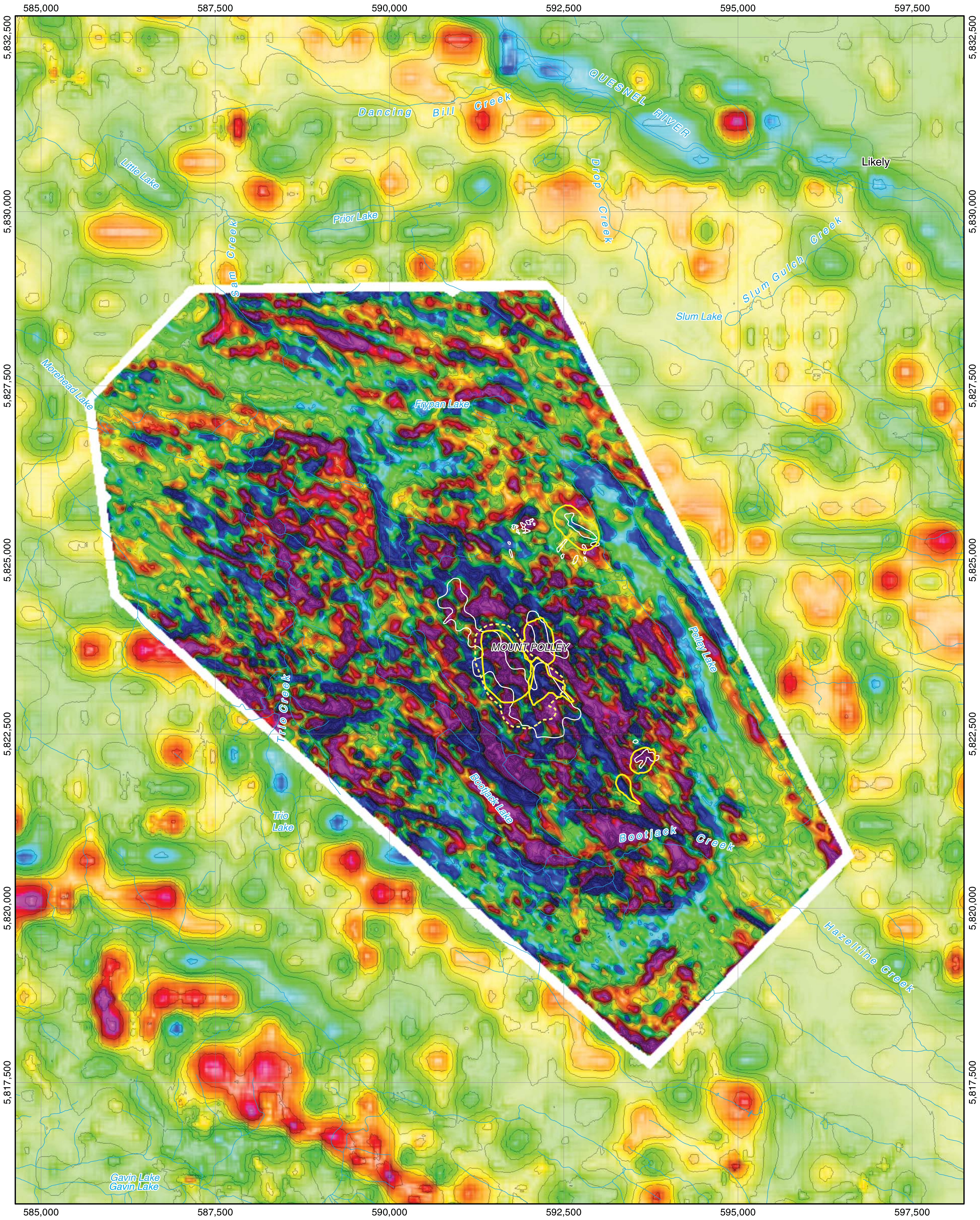
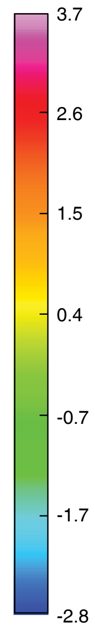
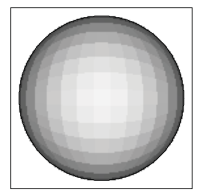
Geoscience BC

MAGNETICS
First Vertical Derivative
1:50 000



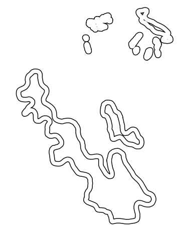


nT/m



Azimuth : 90
Inclination : 90

Mount Polley orebodies
(Rees et al., 2013)



0.1% Cu
grade contour

Mount Polley pits

Current Limits

Planned limits

SCALE 1:50,000

0 2.5 5

kilometres

Universal Transverse Mercator Projection
NAD 83 Datum, Zone 10

Data Sources:

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Shives, R.B.K., Carson, J.M., Ford, K.L., Holman, P.B., and Cathro, M., 2004, Helicopter-borne gamma ray spectrometric and magnetic total field geophysical survey, Imperial Metals Corporation's Mount Polley Mine area, British Columbia: British Columbia Ministry of Energy Mines and Petroleum Resources Open File 2004-10 / Geolocial Survey of Canada Open File 4619.

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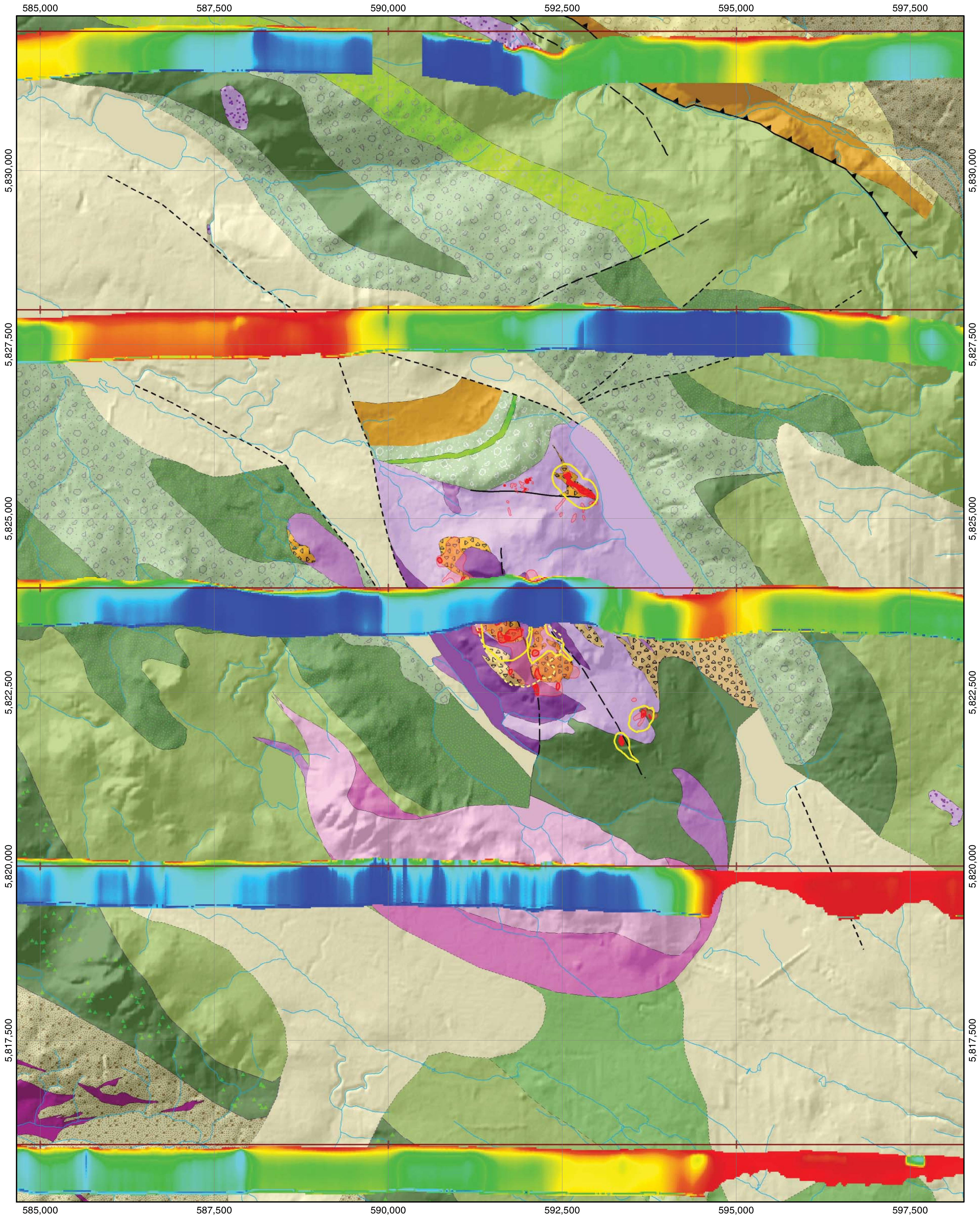
VTEM
1D Conductivity Depth Sections
1:50 000



INTRUSIVE ROCKS

MIDDLE JURASSIC

- MJqm — Hornblende-biotite quartz monzonite

LATE TRIASSIC TO EARLY JURASSIC

- TJmz — Pyroxene-hornblende monzodiorite, hornblende-biotite monzonite and potassium feldspar megacrystic syenite

LATE TRIASSIC

- LTbx — Hydrothermal breccias: potassic-albitic-calcic altered, metric to clast-supported, polymict intrusive-dominated pipes
- LTMPd — Biotite-pyroxene diorite
- LTMPmz — Pyroxene/hornblende-biotite monzonite
- LTBJmsy — Melanocratic (pyroxene + hornblende) pseudoleucite syenite
- LTBJosy — Orbicular pseudoleucite nepheline syenite
- LTMPic — Hydrothermal altered intrusive carapace holocrystalline monzonitic intrusions and colcaniclastic wall rock (undivided)
- LTNubx — Undivided polylithic breccias

LAYERED ROCKS

QUATERNARY

- Qal — Thick alluvium cover

CRETACEOUS

- Kcg — Polymictic clast-supported cobble conglomerate, includes gneiss, marble, chert, granitoid and volcanic clasts

LOWER JURASSIC

- EJsn — Brown-grey siltstone, sandstone, and calcareous conglomerate
- EJt — Quartz-phyric latite tuff

UPPER TRIASSIC TO LOWER JURASSIC

- TJvcg — Well-bedded and sorted, polymict volcanic conglomerate, monzonite to K-spar megacrystic syenite clasts

UPPER TRIASSIC NICOLA GROUP

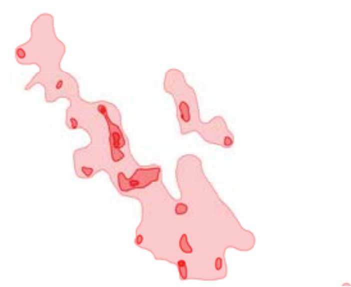
- LTNvl — heterolithic lahar
- LTNvl — Red-brown, massice, polymictc breccia, feldspar and hornblende crystal tuff
- LTNpt — Plagioclase phyric, pyroxene lapilli tuff, breccia and minor flows
- LTNav — Pink-white analcime pyroxene +/- olivine basalt breccia, flows and tuffs
- LTNpv — Green and maroon pyroxene porphyry breccias, pyroxene-olivine basalt flows and crystal-rich sediments
- LTNvb — Massive, coarse polymictic volcanic breccias, graded sandstones, siltstone and rare limestone breccia horizons
- LTNs — Grey silstone, normal graded sandstone and certy shale with pyroxene and plagioclase-rich crystal sandstones
- LTNu — Undivided mafic volcanic and volcaniclastic rocks

MIDDLE TO UPPER TRIASSIC

- MuTNv — Pyroxene/hornblende metabasalt, greenstone and plagioclase crystal tuff
- MuTNs — Graphitic and quartzose phyllite, shale, silstone and sandstone

Mount Polley orebodies

grade contours
(Rees et al., 2014)



- 0.6% Cu
- 0.3% Cu
- 0.1% Cu

SCALE 1:50,000

0 2.5 5

kilometres

Universal Transverse Mercator Projection
NAD 83 Datum, Zone 10

Data Sources:

Geotech Limited, 2008: Report on a helicopter-borne versatile time domain electromagnetic (VTEM) geophysical survey: QUEST Project, central British Columbia (NTS 93A, B, G, H, J, K, N, O & 94C, D); Geosience BC Report 2008-4, report and data.

Mira Geoscience Ltd., 2009: QUEST Project: 3D inversion modelling, integration, and visualization of airborne gravity, magnetic, and electromagnetic data, BC, Canada; Geoscience BC Report 2009-15, report and data.

Logan, J.M., Bath, A.B., Mihalynuk, M.G., Rees, C.J., Ullrich, T.D., Friedman, R., 2007: Regional Geology of the Mount Polley Area, central British Columbia (parts of NTS 093A/05, 06, 11 and 12); British Columbia Ministry of Energy, Mines and Petroleum Resources, Geoscience Map 2007-1.

VTEM conductivity depth sections are presented here. They have been plotted aligned along notional straight EW flight lines without vertical exaggeration. The 1000m elevation on the the section corresponds with the flight line. Depths on the sections can be scaled from the top of the section.

The VTEM survey was flown to map geology, rock types, faults, and the depth of overburden in the QUEST survey area. Massive sulfide conductors were not expected to be numerous, and the principal response comes from the depth of cover and the rock types below. The bulk resistivity of rocks is controlled mainly by porosity and fracturing, and the amount and salinity of the water in these openings. Faults with gouge or fracture zones may produce conductivity anomalies. Clays are normally more conductive, and gravels may report as resistors. Graphitic horizons are usually conductive.

Note that blue colours represent resistors and red colours more conductive zones. Flat lying regions of distinct resistivities, usually more conductive at the top of the section, are usually caused by overburden. When these are thickened, overburden may be thicker.

Blue regions on the bottom of the section may be interpreted as more electrically resistive rocks, with reduced porosity and fracturing. These may be intrusives.

The EM signal does not penetrate deeply into the more conductive parts of the geologic section. A review of the data indicates that when the total conductance of the section reaches 6 Siemens, little signal penetrates beyond this conductance. The conductivity depth sections have been trimmed at 6 Siemens total conductance. No signal is expected to come from the deeper parts of the section in these parts.

Porphyry Districts of British Columbia Atlas Series

MOUNT POLLEY

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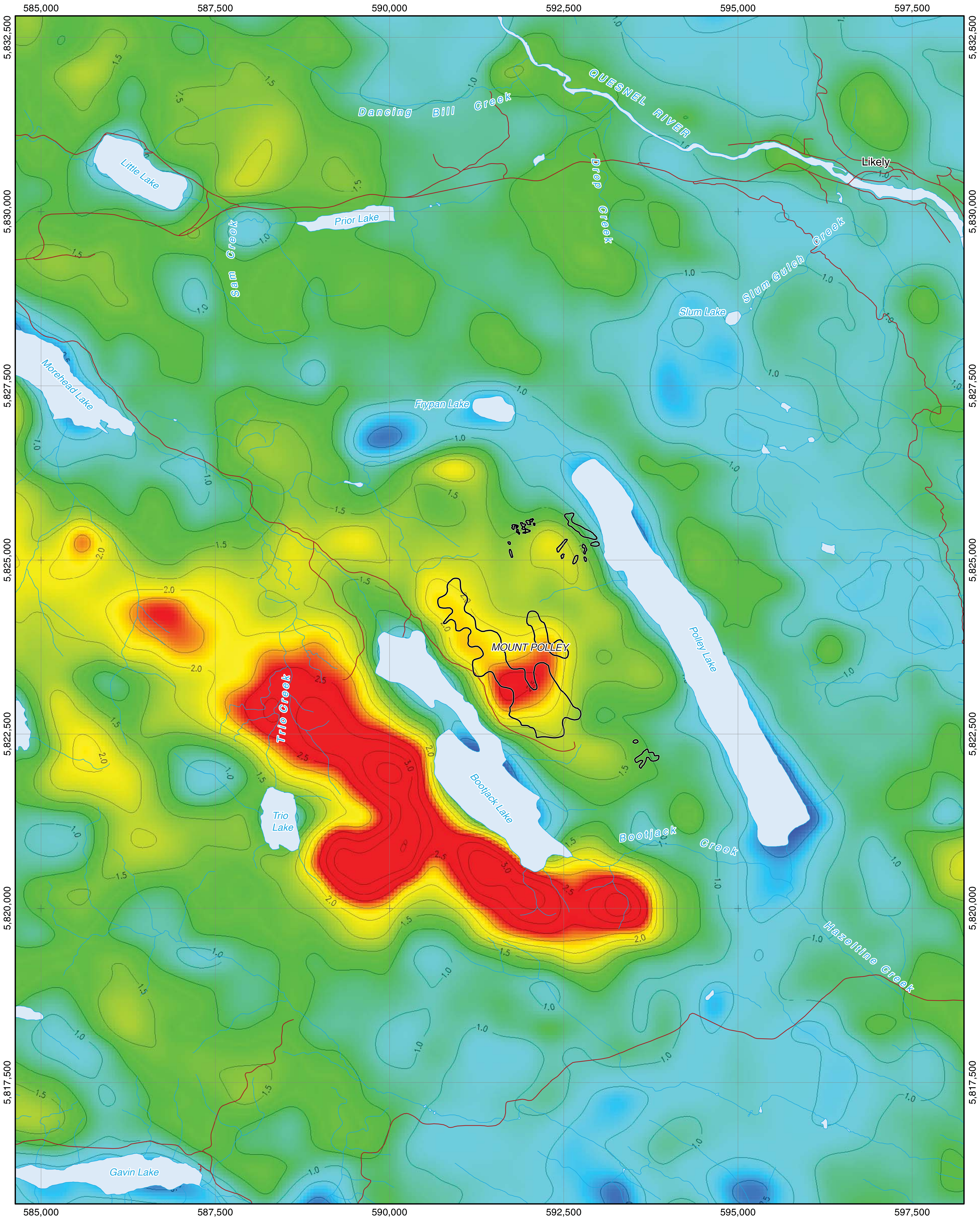
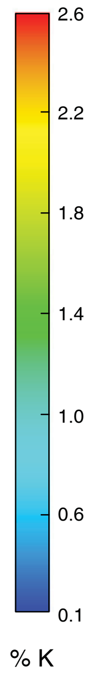
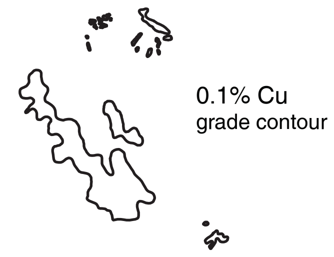
RADIOMETRICS
% Potassium
1:50 000





Mount Polley orebodies
(Rees et al., 2013)



SCALE 1:50,000

0 2.5 5

kilometres

Universal Transverse Mercator Projection
NAD 83 Datum, Zone 10

Data Sources:

Data from http://gdr.agg.nrcan.gc.ca
These data may be readily used for commercial, personal and public use and may be reproduced, in part or in whole and by any means, without charge for further permission from Natural Resources Canada.

These terms and conditions remain with the data at all times.

Radioactivity Data
Citation 2013:
National Gamma-Ray Spectrometry Program Data Base
Airborne Geophysics Section, GSC - Central Canada Division
Geological Survey of Canada, Earth Sciences Sector
Natural Resources Canada

MOUNT POLLEY

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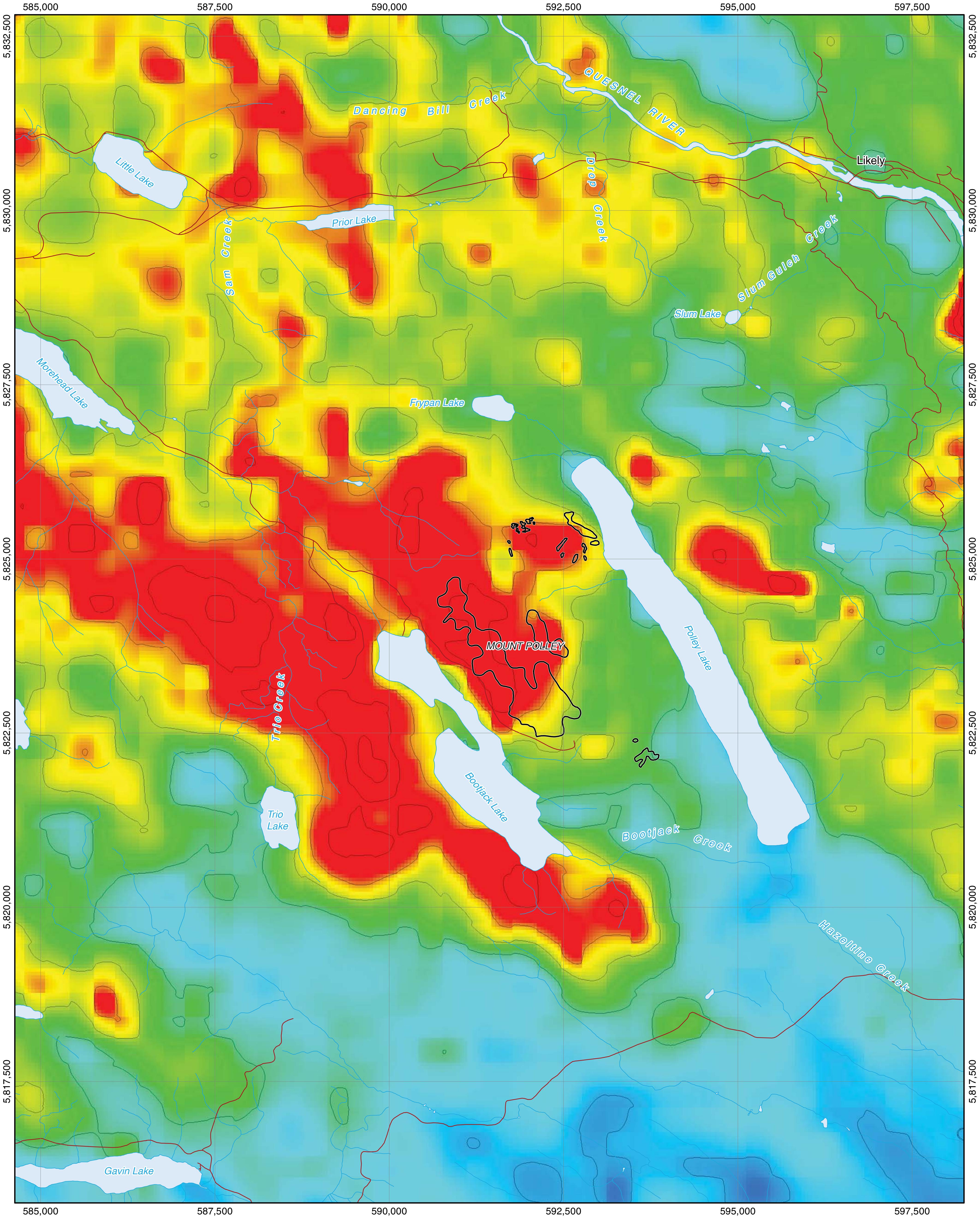
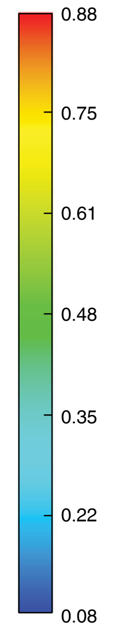
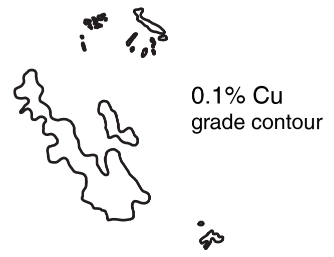
Geoscience BC

RADIOMETRICS
K/eTh
1:50 000





Mount Polley orebodies
(Rees et al., 2013)



SCALE 1:50,000

0 2.5 5

kilometres

Universal Transverse Mercator Projection
NAD 83 Datum, Zone 10

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Geological Survey of Canada, Earth Sciences Sector
Natural Resources Canada

Porphyry Districts of British Columbia Atlas Series

MOUNT POLLEY

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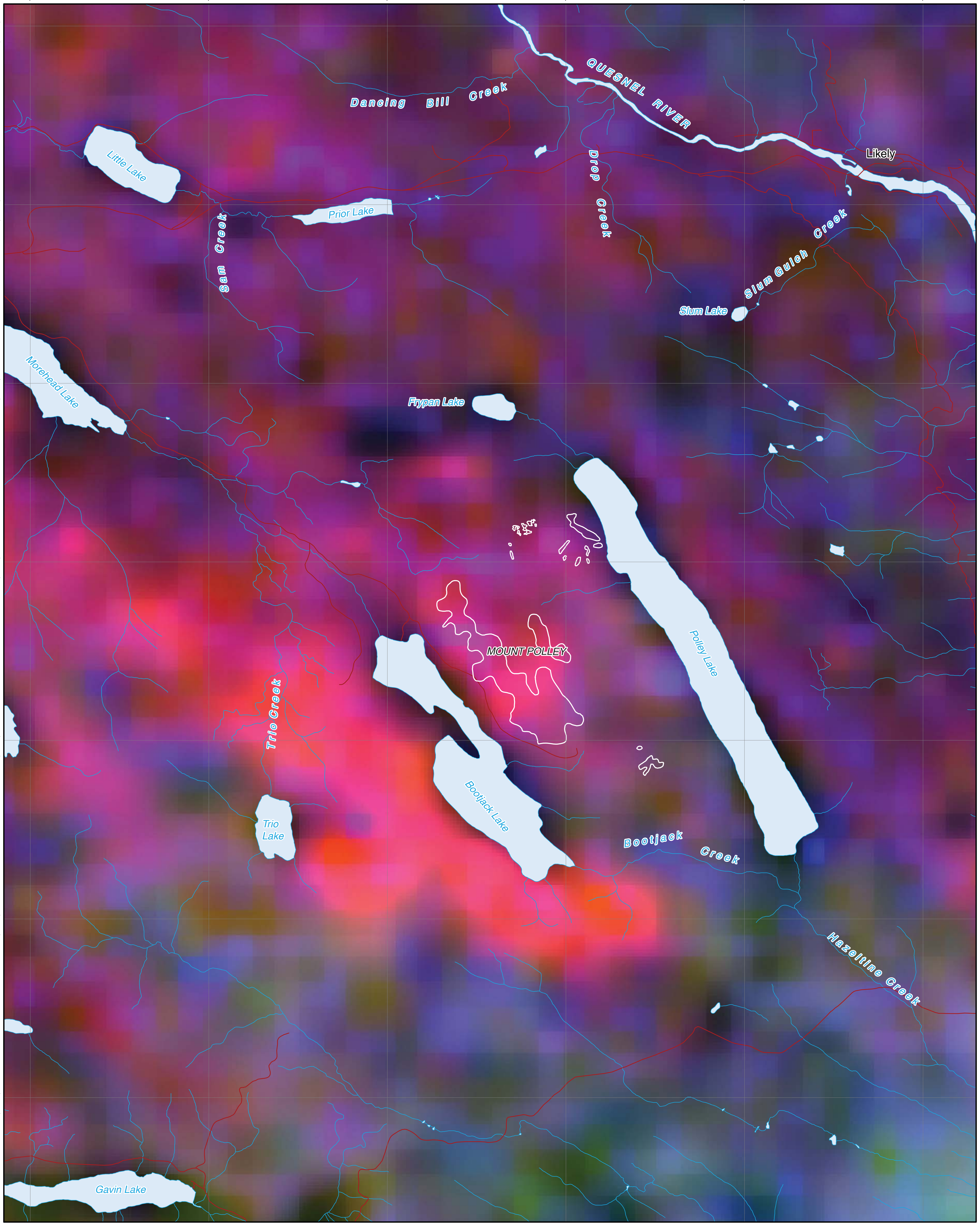
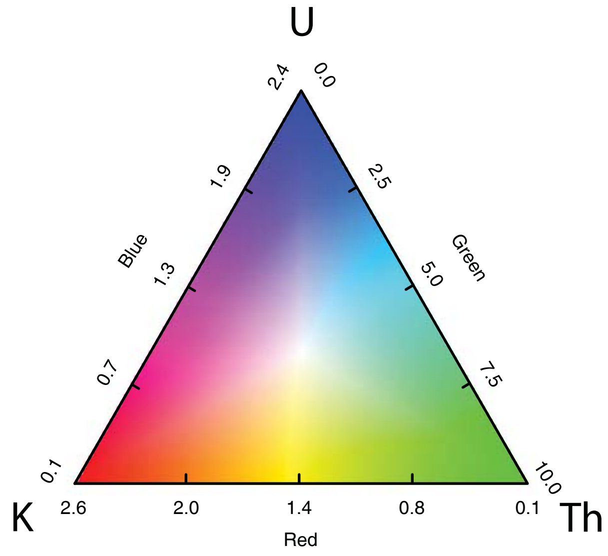
Geoscience BC

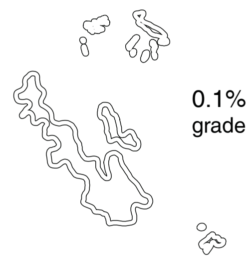
RADIOMETRICS
KTU/RGB
1:50 000





Red : Combined Percent Potassium
Green : Combined Equivalent Thorium
Blue : Combined Equivalent Uranium

Mount Polley orebodies
(Rees et al., 2013)



0.1% Cu
grade contour

SCALE 1:50,000

0 2.5 5
kilometres

Universal Transverse Mercator Projection
NAD 83 Datum, Zone 10

Data Sources:

Data from http://gdr.agg.nrcan.gc.ca
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Geological Survey of Canada, Earth Sciences Sector
Natural Resources Canada

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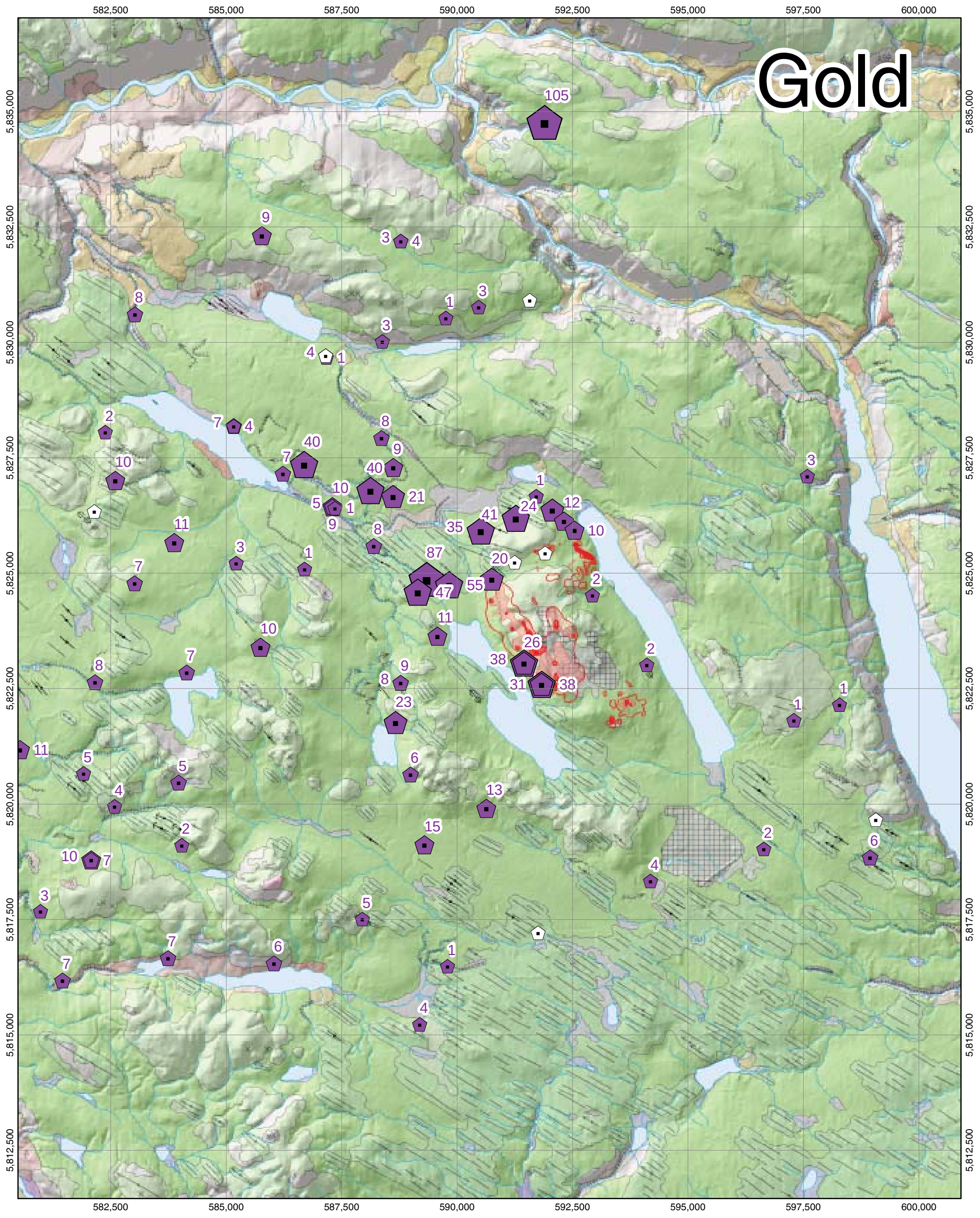
INDICATOR MINERALS

1:150 000

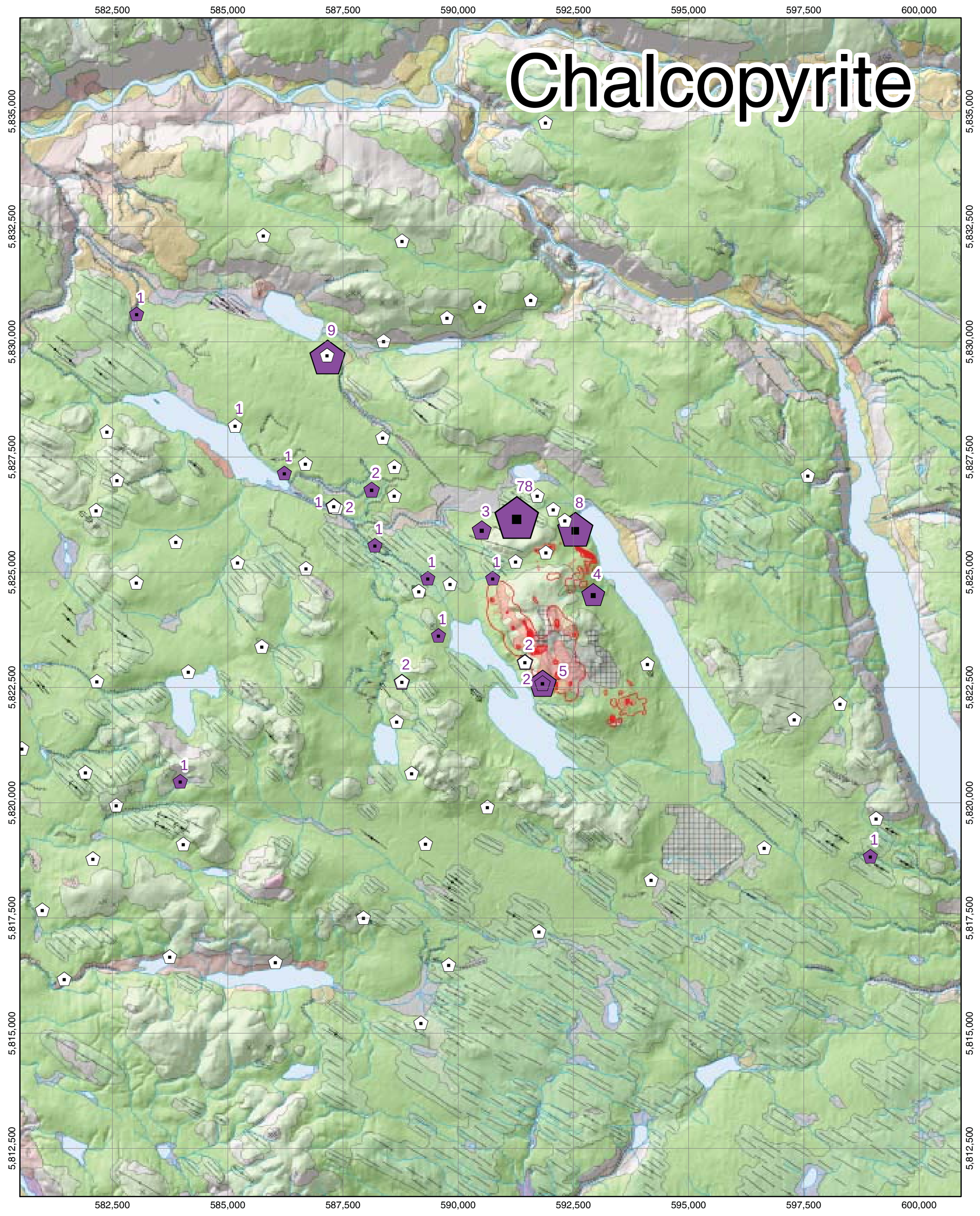


Gold

Grain count
(normalized to 10 kg bulk sample)

0.25 - 0.5 mm grains

- 0
- 0.01 - 5.00
- 5.01 - 8.64
- 8.65 - 15.19
- 15.20 - 30.86
- 30.87 - 66.22
- 66.23 - 104.69



Chalcopyrite

Grain count
(normalized to 10 kg bulk sample)

0.25 - 0.5 mm grains

- 0
- 0.01 - 1.00
- 1.01 - 2.00
- 2.01 - 3.00
- 3.01 - 4.00
- 4.01 - 5.00
- 5.01- 9.00
- 9.01 - 78.00

LEGEND (Surficial Geology background)
for more detail see Map 3.2

QUATERNARY
Non-glacial environment

- Anthropogenic (Mine tailings)
- Organic deposits
- Colluvial and mass wasting deposits

Proglacial and glacial environment

- Glaciofluvial sediments
- Till blanket
- Till veneer
- Till, streamlined and fluted

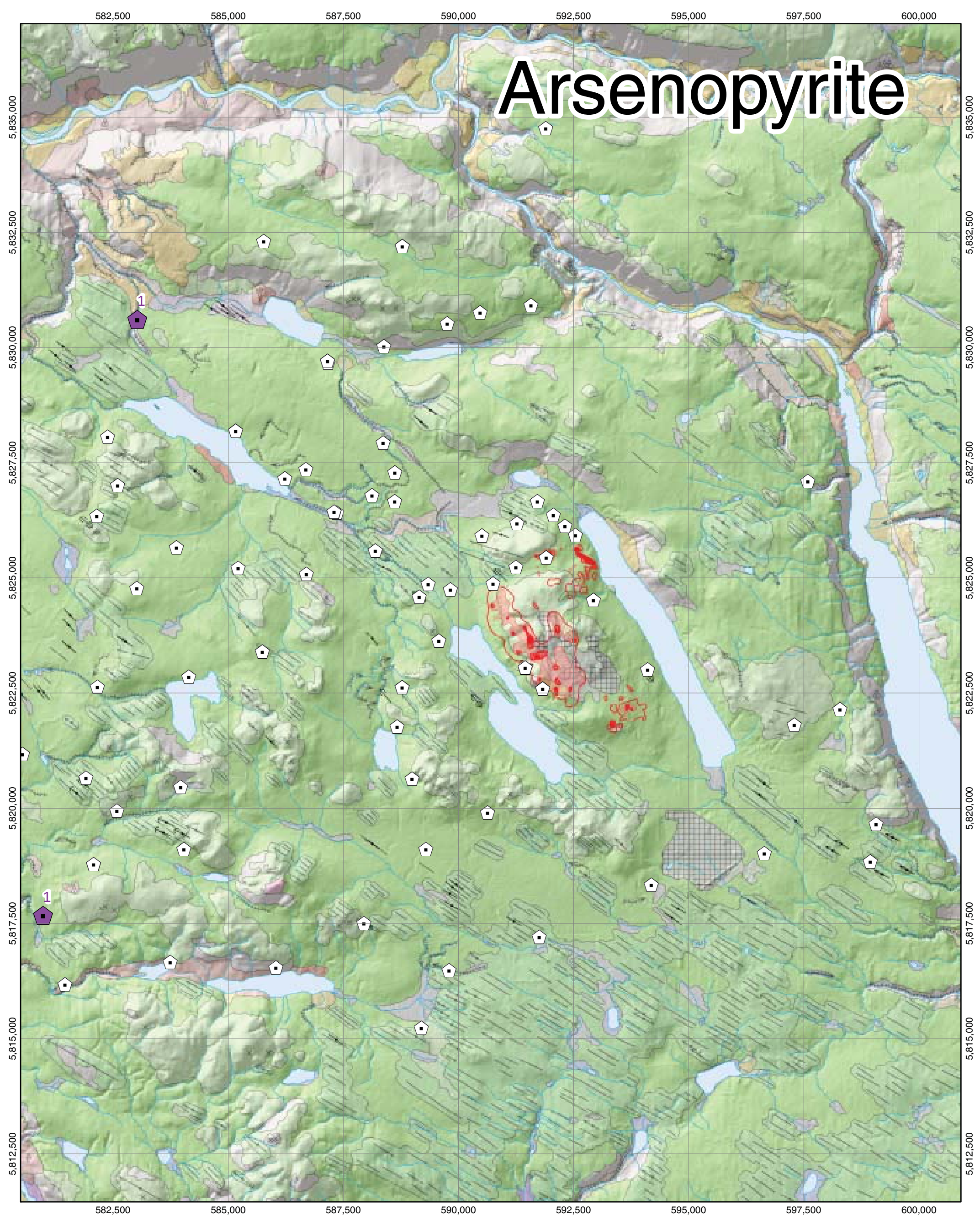
PRE-QUATERNARY

- Bedrock

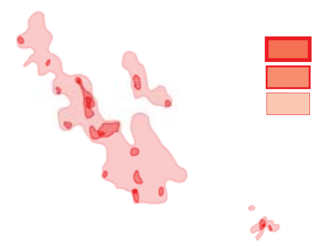
Ice Flow Indicators & Geological Features

Uni-directional	Bi-directional
crag and tail ridge	drumlinoid or fluting
drumlinoid ridge	fluted bedrock
fluted bedrock	striation or groove
striation	

- esker ridge (direction known)
- esker ridge (direction unknown)
- minor meltwater channel (direction known)
- minor meltwater channel (direction unknown)
- major meltwater channel scarp
- landslide escarpment



Mount Polley orebodies
grade contours
(Rees et al., 2014)



- 0.6% Cu
- 0.3% Cu
- 0.1% Cu

Pyrite

Grain count
(normalized to 10 kg bulk sample)

0.25 - 0.5 mm grains

- 0
- 0.01 - 1.00
- 1.01 - 2.00
- 2.01 - 3.00
- 3.01 - 5.00
- 5.01 - 10.00
- 10.01 - 15.00

Arsenopyrite

Grain count
(normalized to 10 kg bulk sample)

0.25 - 0.5 mm grains

- 0
- 0.01 - 1.00

Data Sources:

Hashmi, S. (2015): Quaternary geology and drift prospecting in the Mount Polley region (NTS 093A). M.Sc. thesis, Simon Fraser University. 165 pages and digital data.

Hashmi, S., Plouffe, A., and Ward, B.C., 2015. Surficial geology, Bootjack Mountain area, British Columbia, Parts of NTS 93-A/5, NTS 93-A/6, NTS 93-A/11, and NTS 93-A/12; Geological Survey of Canada, Canadian Geoscience Map 209 (preliminary); British Columbia Geological Survey, Geoscience Map 2015-02, scale 1:50 000.

Ferbey, T. and Arnold, H. (2013): Compilation of Micro to Macro-scale ice-flow indicators for the Interior Plateau , Central British Columbia; British Columbia Geological Survey, Open File 2013-03.

SCALE 1:150,000

0 5 10
kilometres

Universal Transverse Mercator Projection
NAD 83 Datum, Zone 10

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INDICATOR MINERALS

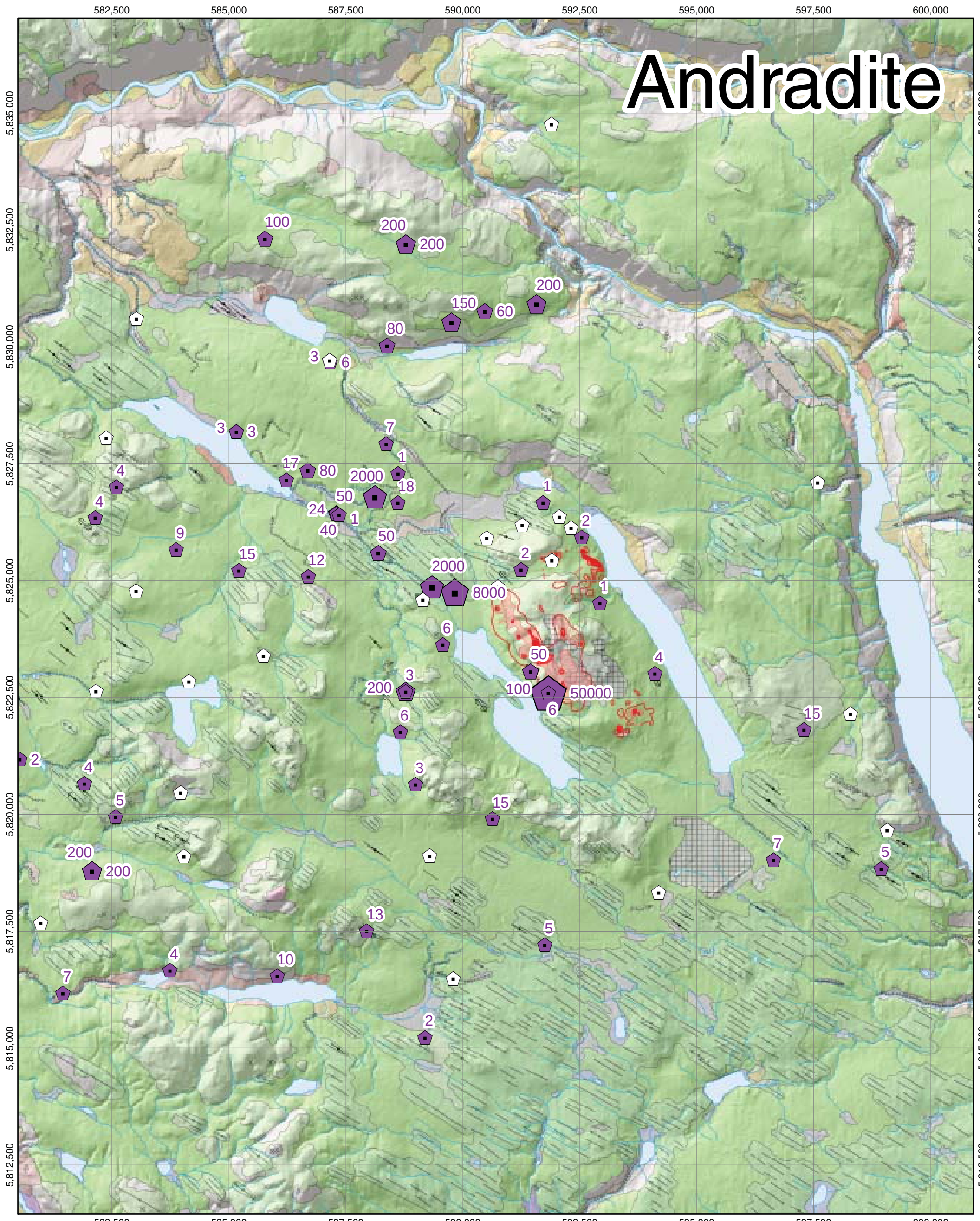
1:150 000

Jarosite

Grain count
(normalized to 10 kg bulk sample)

0.25 - 0.5 mm grains

- 0
- 0.01 - 1.00
- 1.01 - 15.00
- 15.01 - 60.00



Andradite garnet

Grain count
(normalized to 10 kg bulk sample)

0.25 - 0.5 mm grains

- 0
- 1 - 40
- 41 - 100
- 101 - 200
- 201 - 2,000
- 2,001 - 8,000
- 8,001 - 50,000

LEGEND (Surficial Geology background)
for more detail see Map 3.2

QUATERNARY
Non-glacial environment

- Anthropogenic (Mine tailings)
- Organic deposits
- Colluvial and mass wasting deposits

Proglacial and glacial environment

- Glaciofluvial sediments
- Till blanket
- Till veneer
- Till, streamlined and fluted

PRE-QUATERNARY

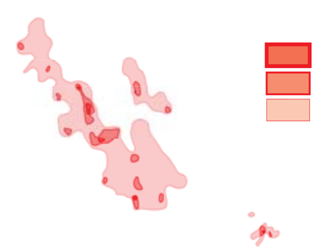
- Bedrock

Ice Flow Indicators & Geological Features

Uni-directional	Bi-directional
crag and tail ridge	drumlinoid or fluting
drumlinoid ridge	fluted bedrock
fluted bedrock	striation or groove
striation	

- esker ridge (direction known)
- esker ridge (direction unknown)
- minor meltwater channel (direction known)
- minor meltwater channel (direction unknown)
- major meltwater channel scarp
- landslide escarpment

Mount Polley orebodies
grade contours
(Rees et al., 2014)



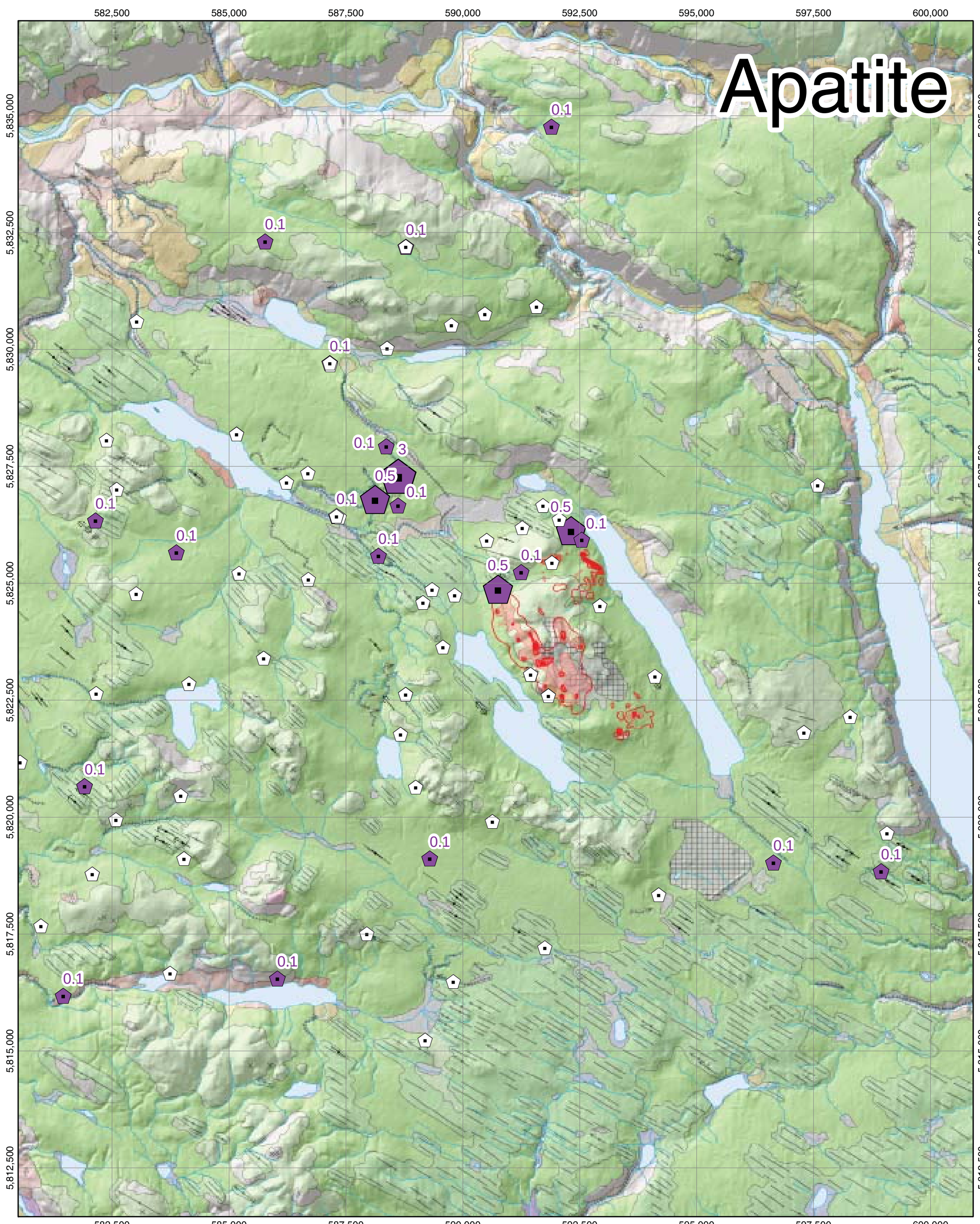
- 0.6% Cu
- 0.3% Cu
- 0.1% Cu

Epidote

Percentage

0.25 - 0.5 mm grains

- 0 - 0.1
- 0.2 - 3.0
- 3.0 - 6.0
- 7.0 - 20.0
- 21.0 - 40.0
- 41.0 - 70.0
- 71.0 - 90.0



Apatite

Percent

0.25 - 0.5 mm grains

- 0
- 0.10
- 0.50
- 3.0

Data Sources:

Hashmi, S. (2015): Quaternary geology and drift prospecting in the Mount Polley region (NTS 093A). M.Sc. thesis, Simon Fraser University. 165 pages and digital data.

Hashmi, S., Plouffe, A., and Ward, B.C., 2015. Surficial geology, Bootjack Mountain area, British Columbia, Parts of NTS 93-A/5, NTS 93-A/6, NTS 93-A/11, and NTS 93-A/12; Geological Survey of Canada, Canadian Geoscience Map 209 (preliminary); British Columbia Geological Survey, Geoscience Map 2015-02, scale 1:50 000.

Ferbey, T. and Arnold, H. (2013): Compilation of Micro to Macro-scale ice-flow indicators for the Interior Plateau , Central British Columbia; British Columbia Geological Survey, Open File 2013-03.

SCALE 1:150,000

0 5 10
kilometres

Universal Transverse Mercator Projection
NAD 83 Datum, Zone 10

Porphyry Districts of British Columbia Atlas Series

MOUNT POLLEY

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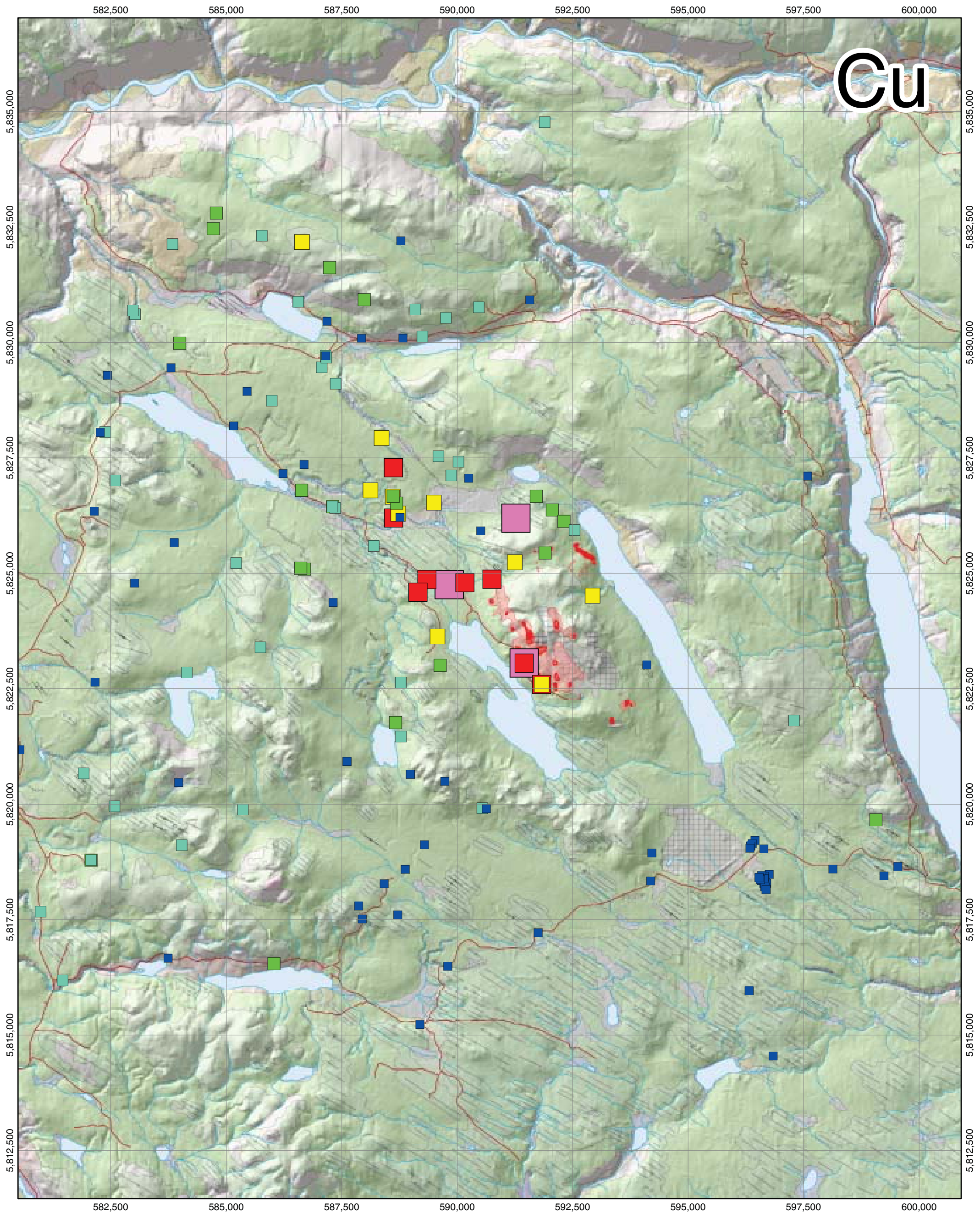
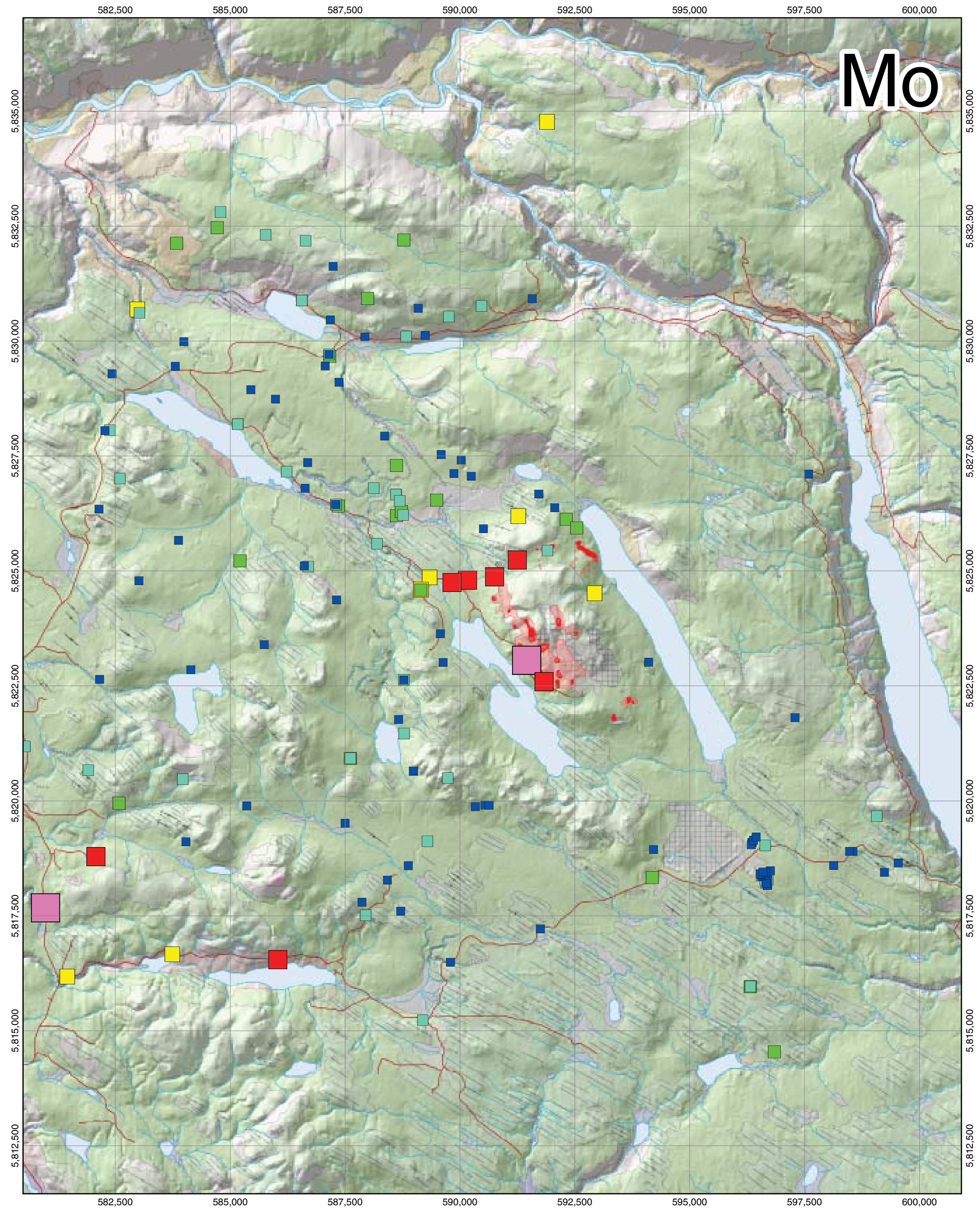
Geoscience BC

TILL GEOCHEMISTRY
Commodity Elements
1:150 000



Cu

percentile	ppm
0 - 50	34.53 - 88.62
50 - 75	88.63 - 114.73
75 - 90	114.74 - 146.98
90 - 95	146.99 - 286.20
95 - 98	286.21 - 553.00
98 - 100	553.01 - 739.38



Mo

percentile	ppm
0 - 50	0.31 - 0.70
50 - 75	0.71 - 1.01
75 - 90	1.02 - 1.36
90 - 95	1.37 - 2.82
95 - 98	2.83 - 4.75
98 - 100	4.76 - 7.28

LEGEND (Surficial Geology background)
for more detail see Map 3.2

QUATERNARY
Non-glacial environment
- Anthropogenic (Mine tailings)
- Organic deposits
- Colluvial and mass wasting deposits

Proglacial and glacial environment
- Glaciofluvial sediments
- Till blanket
- Till veneer
- Till, streamlined and fluted

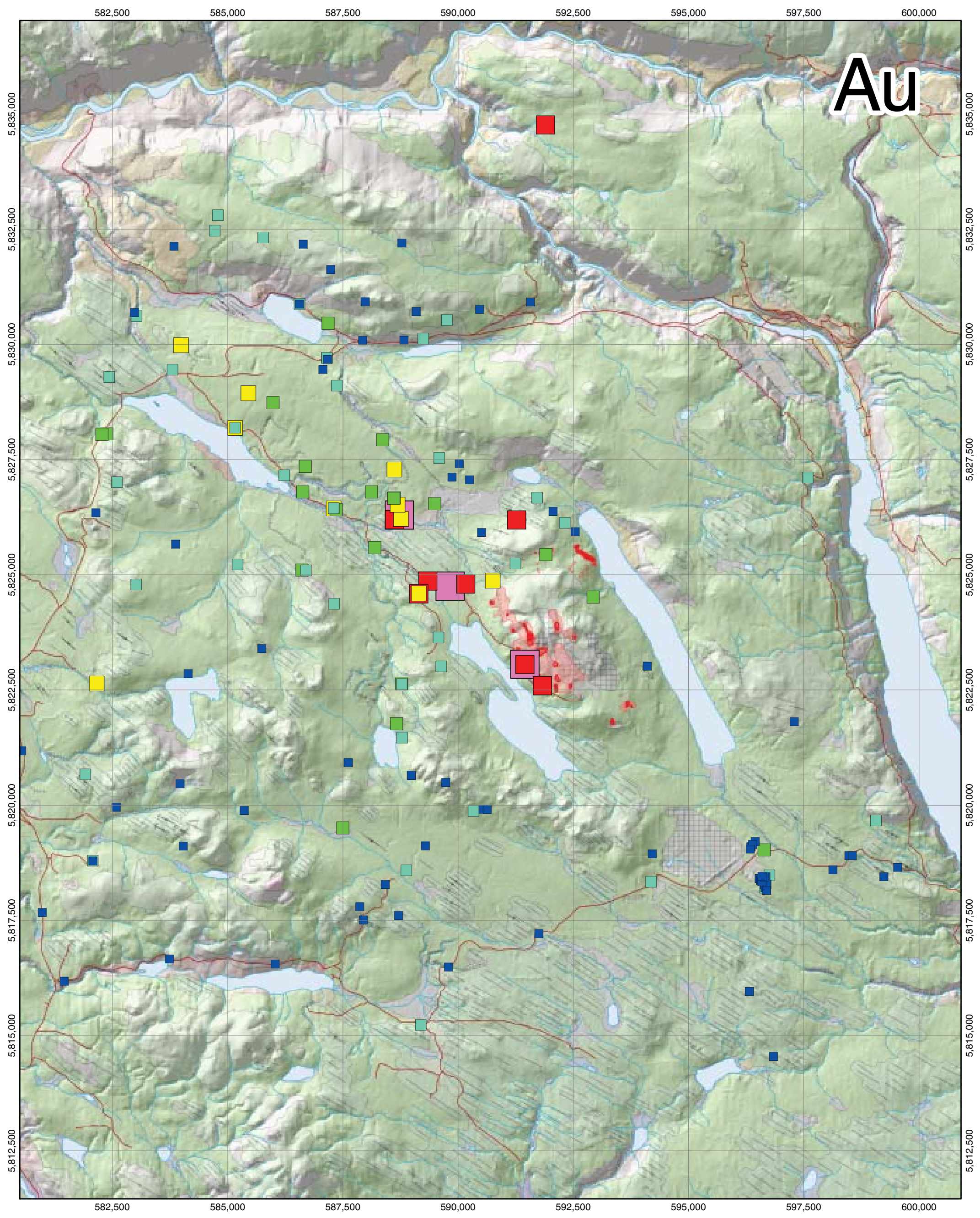
PRE-QUATERNARY
- Bedrock

Ice Flow Indicators & Geological Features

Uni-directional
- crag and tail ridge
- drumlinoid ridge
- fluted bedrock
- striation

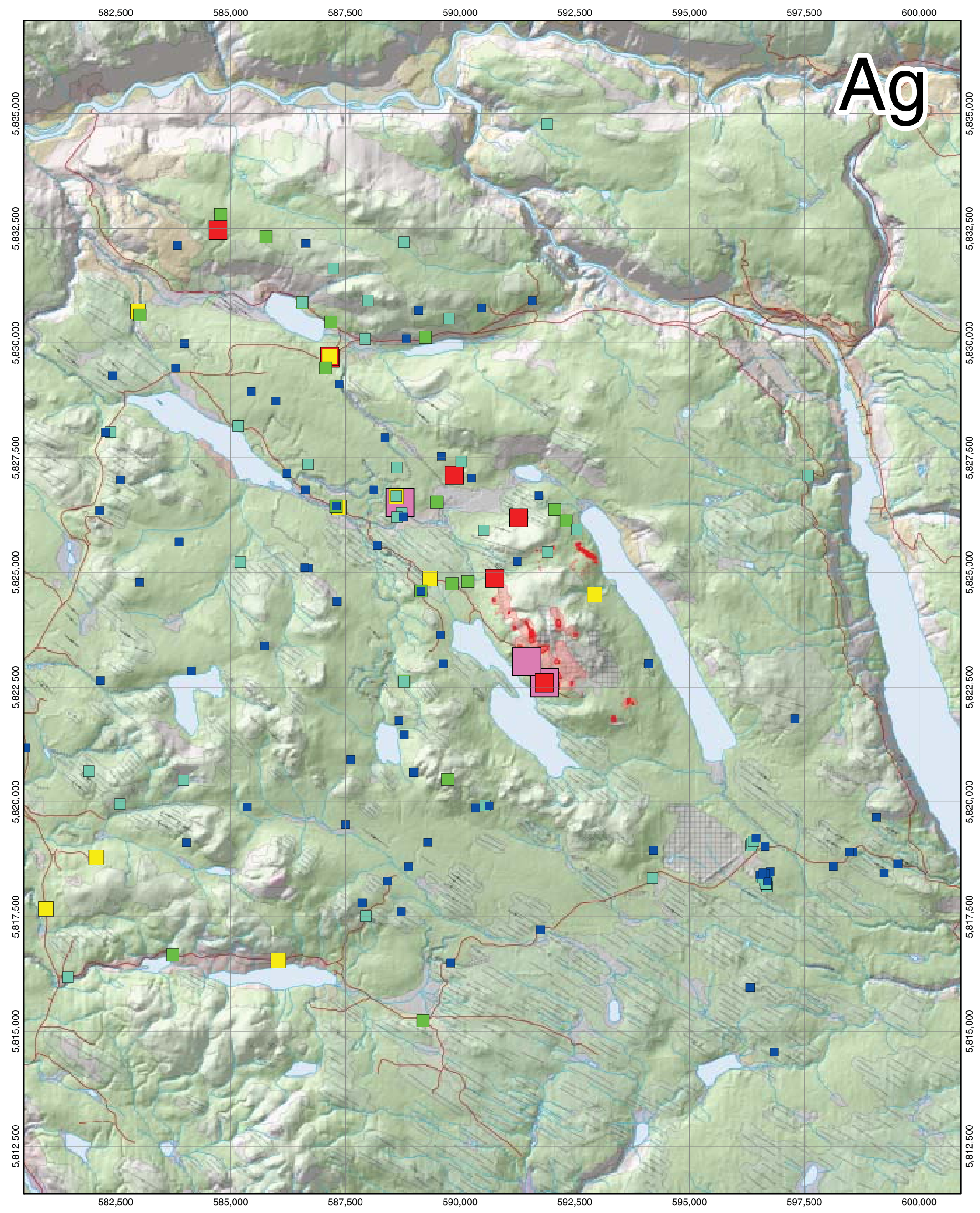
Bi-directional
- drumlinoid or fluting
- fluted bedrock
- striation or groove

- esker ridge (direction known)
- esker ridge (direction unknown)
- minor meltwater channel (direction known)
- minor meltwater channel (direction unknown)
- major meltwater channel scarp
- landslide escarpment

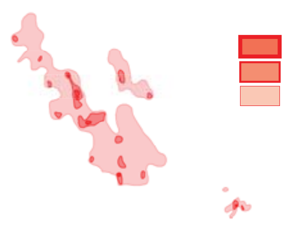


Au

percentile	ppb
0 - 50	0.4 - 5.7
50 - 75	5.8 - 10.7
75 - 90	10.8 - 17.6
90 - 95	17.7 - 26.7
95 - 98	26.8 - 76.3
98 - 100	76.4 - 90.2



Mount Polley orebodies
grade contours
(Rees et al., 2014)



- 0.6% Cu
- 0.3% Cu
- 0.1% Cu

Ag

percentile	ppb
0 - 50	19.0 - 67.0
50 - 75	67.1 - 97.0
75 - 90	97.1 - 134.0
90 - 95	134.1 - 198.0
95 - 98	198.1 - 293.0
98 - 100	293.1 - 353.0

Data Sources:

Hashmi, S. (2015): Quaternary geology and drift prospecting in the Mount Polley region (NTS 093A). M.Sc. thesis, Simon Fraser University. 165 pages and digital data.

McAndless, P. and Taylor, C., 2006: Surficial Geology of the Mount Polley property: Summary of 2005 exploration work; British Columbia Ministry of Energy, Mines and Petroleum Resources Assessment Report 28270, 31 pages.
Includes till geochemistry data for Cu, Au, Ag, Mo; digital data provided by Imperial Metals Corporation.

Hashmi, S., Plouffe, A., and Ward, B.C., 2015. Surficial geology, Bootjack Mountain area, British Columbia, Parts of NTS 93-A/5, NTS 93-A/6, NTS 93-A/11, and NTS 93-A/12; Geological Survey of Canada, Canadian Geoscience Map 209 (preliminary); British Columbia Geological Survey, Geoscience Map 2015-02, scale 1:50 000.

SCALE 1:150,000

0 5 10
kilometres

Universal Transverse Mercator Projection
NAD 83 Datum, Zone 10

MOUNT POLLEY

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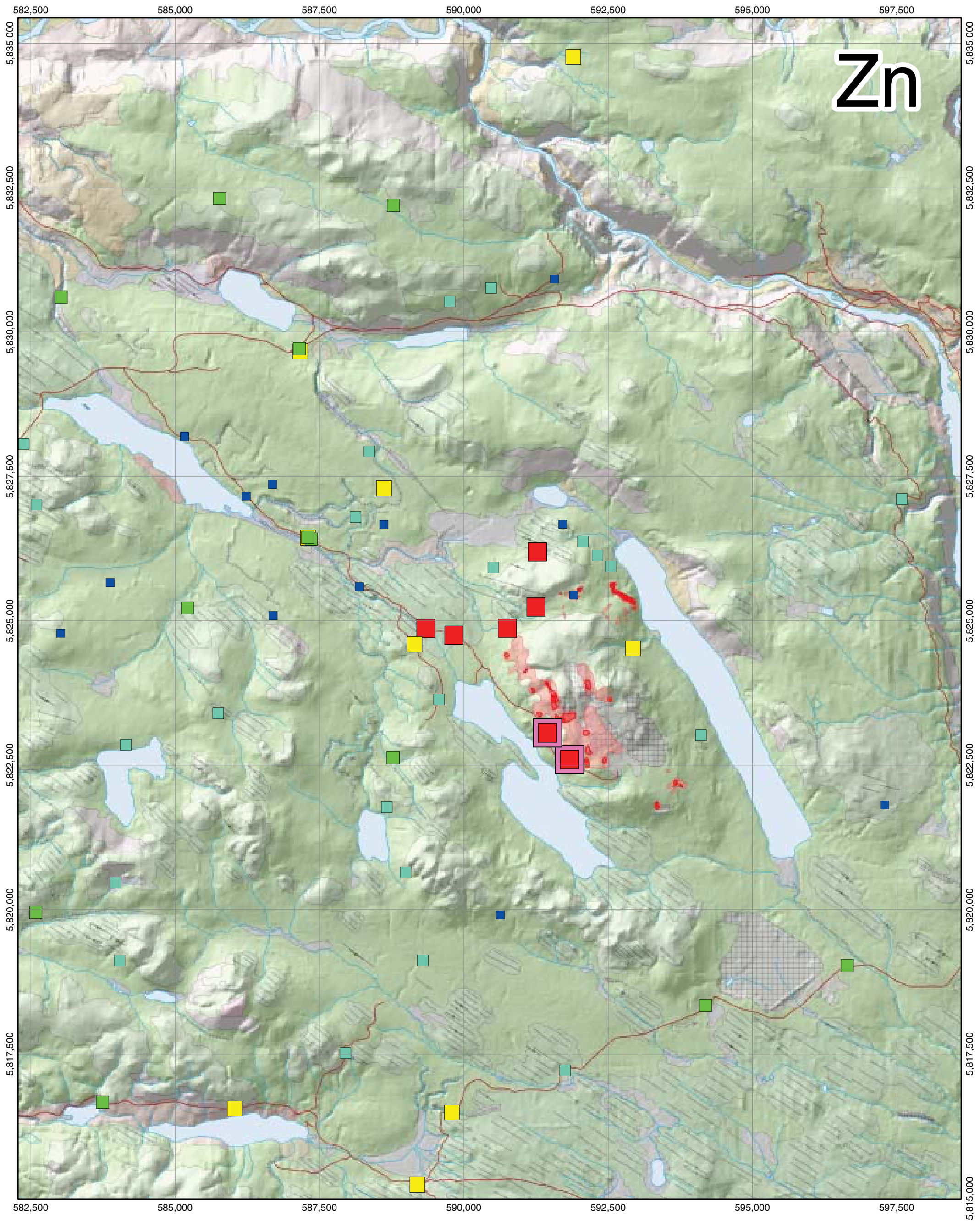
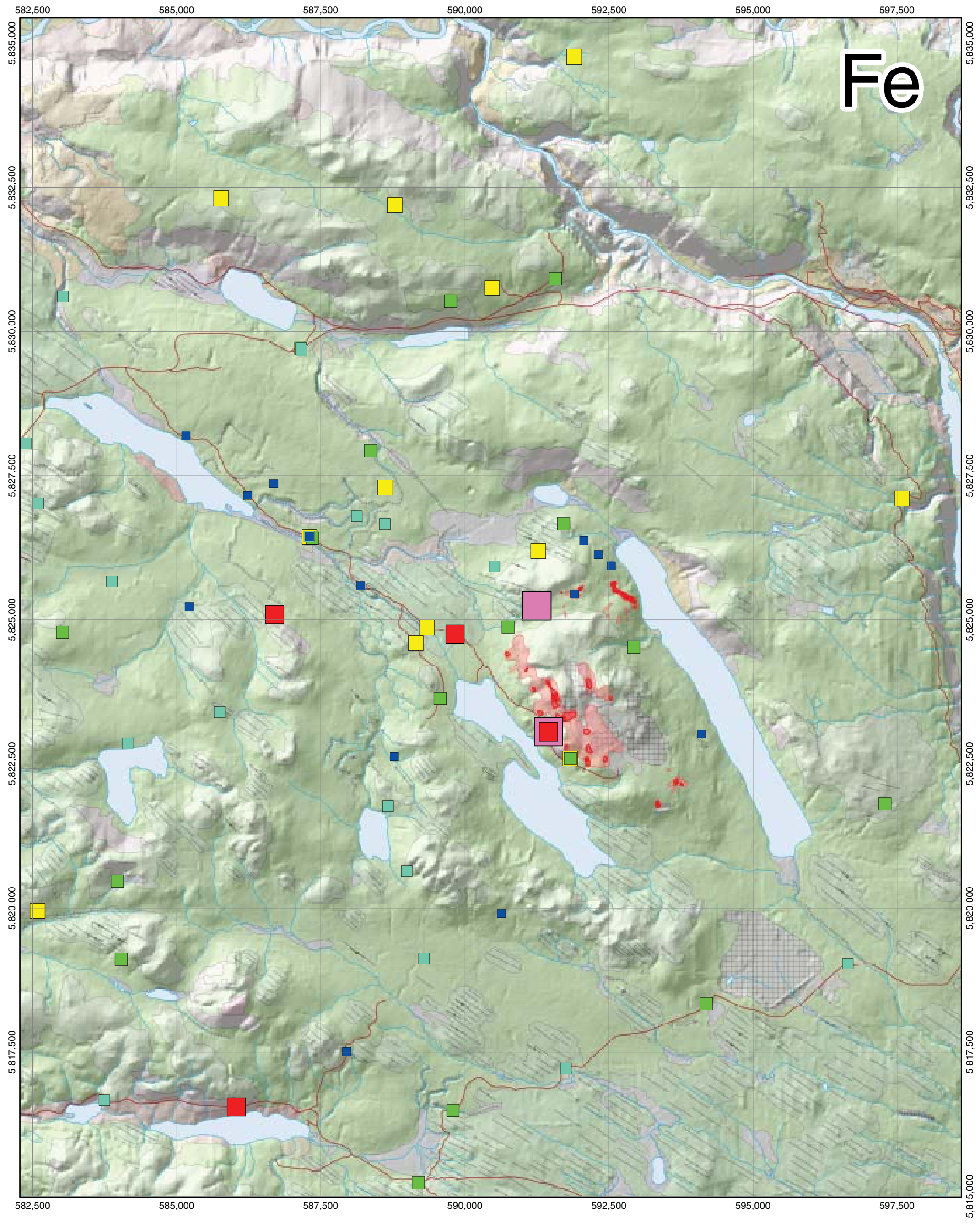
Geoscience BC

TILL GEOCHEMISTRY
Commodity Elements
1:150 000



Zn

percentile	ppm
0 - 50	0.0 - 55.2
50 - 75	55.3 - 65.1
75 - 90	65.2 - 73.8
90 - 95	73.9 - 85.9
95 - 98	86.0 - 110.8
98 - 100	110.9 - 118.1



Fe

percentile	%
0 - 50	0.00 - 3.47
50 - 75	3.48 - 3.87
75 - 90	3.88 - 4.27
90 - 95	4.28 - 4.59
95 - 98	4.60 - 5.22
98 - 100	5.23 - 5.64

LEGEND (Surficial Geology background)
for more detail see Map 3.2

QUATERNARY
Non-glacial environment
- Anthropogenic (Mine tailings)
- Organic deposits
- Colluvial and mass wasting deposits

Proglacial and glacial environment
- Glaciofluvial sediments
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- Till veneer
- Till, streamlined and fluted

PRE-QUATERNARY
- Bedrock

Ice Flow Indicators & Geological Features

Uni-directional	Bi-directional
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fluted bedrock	striation or groove
striation	

- esker ridge (direction known)
- esker ridge (direction unknown)
- minor meltwater channel (direction known)
- minor meltwater channel (direction unknown)
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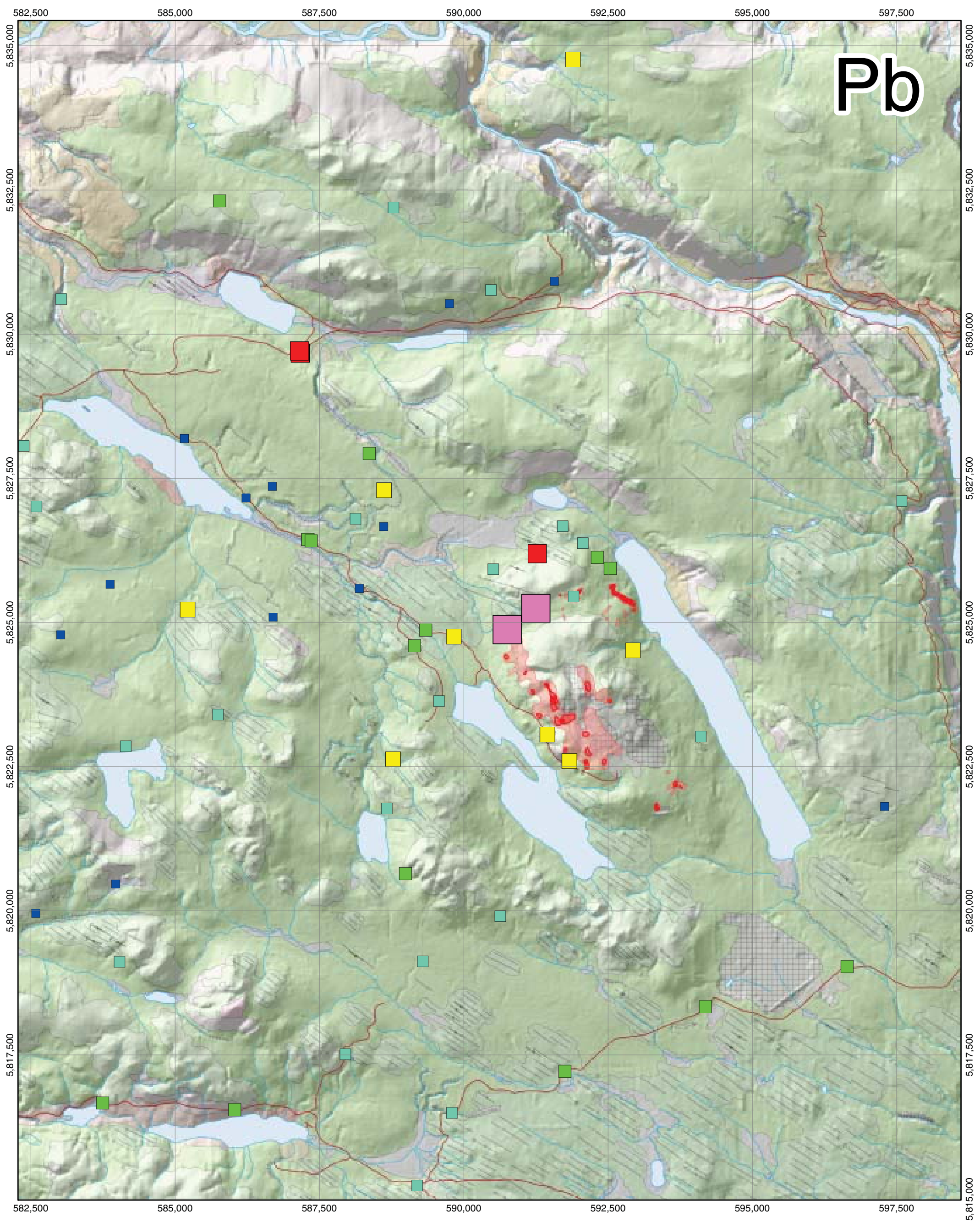
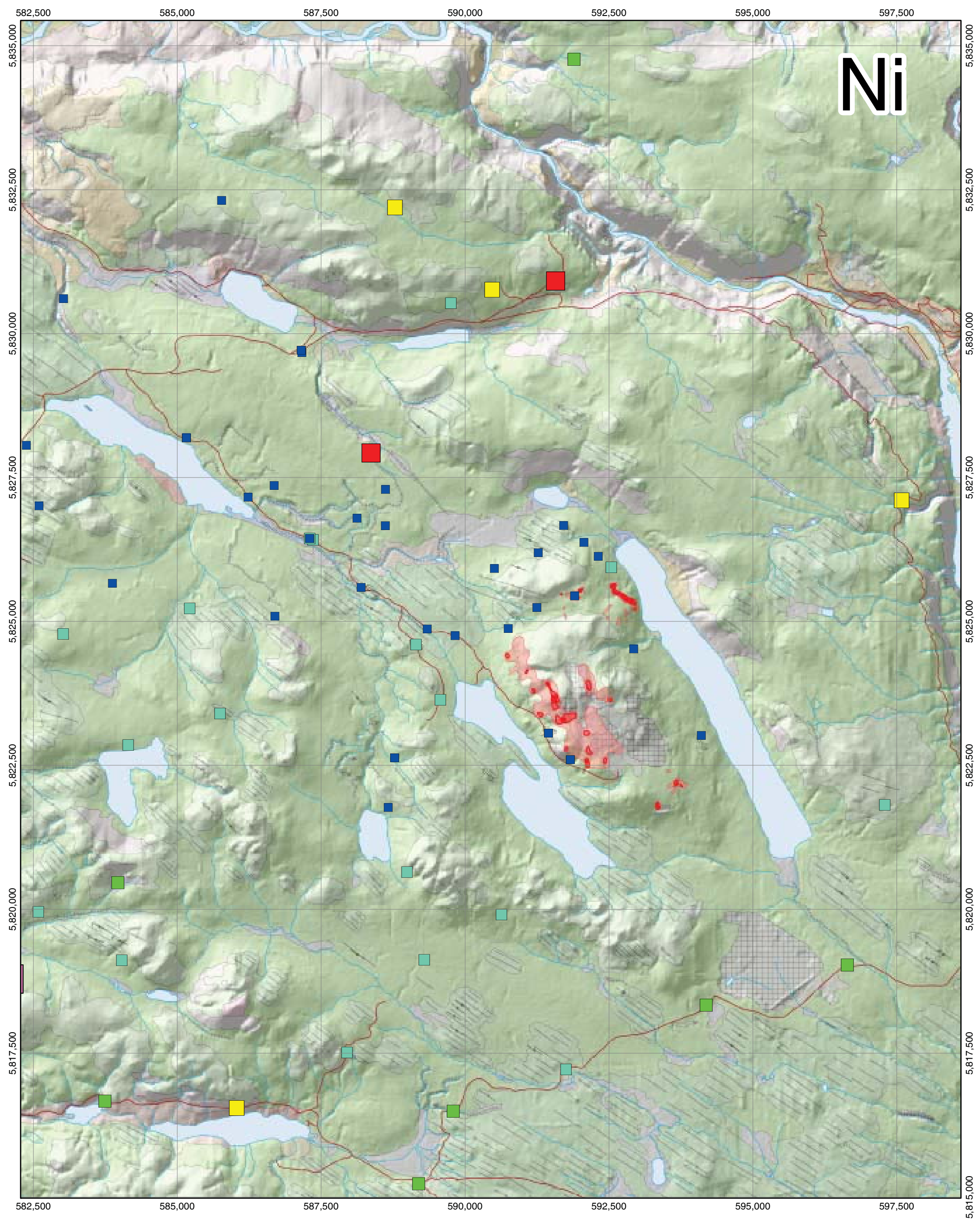
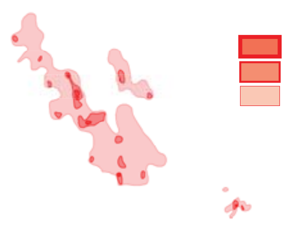


Pb

percentile	ppm
0 - 50	0.00 - 6.46
50 - 75	6.47 - 8.18
75 - 90	8.19 - 10.88
90 - 95	10.89 - 14.74
95 - 98	14.75 - 19.26
98 - 100	19.27 - 27.62



Mount Polley orebodies
grade contours
(Rees et al., 2014)



- 0.6% Cu
- 0.3% Cu
- 0.1% Cu

Ni

percentile	ppm
0 - 50	16.8 - 33.9
50 - 75	34.0 - 44.4
75 - 90	44.5 - 55.2
90 - 95	55.3 - 67.0
95 - 98	67.1 - 90.3
98 - 100	90.4 - 163.1

Data Sources:

Hashmi, S. (2015): Quaternary geology and drift prospecting in the Mount Polley region (NTS 093A). M.Sc. thesis, Simon Fraser University. 165 pages and digital data.

McAndless, P. and Taylor, C., 2006: Surficial Geology of the Mount Polley property: Summary of 2005 exploration work; British Columbia Ministry of Energy, Mines and Petroleum Resources Assessment Report 28270, 31 pages.
Includes till geochemistry data for Cu, Au, Ag, Mo; digital data provided by Imperial Metals Corporation.

Hashmi, S., Plouffe, A., and Ward, B.C., 2015. Surficial geology, Bootjack Mountain area, British Columbia, Parts of NTS 93-A/5, NTS 93-A/6, NTS 93-A/11, and NTS 93-A/12; Geological Survey of Canada, Canadian Geoscience Map 209 (preliminary); British Columbia Geological Survey, Geoscience Map 2015-02, scale 1:50 000.

SCALE 1:150,000

0 5 10
kilometres

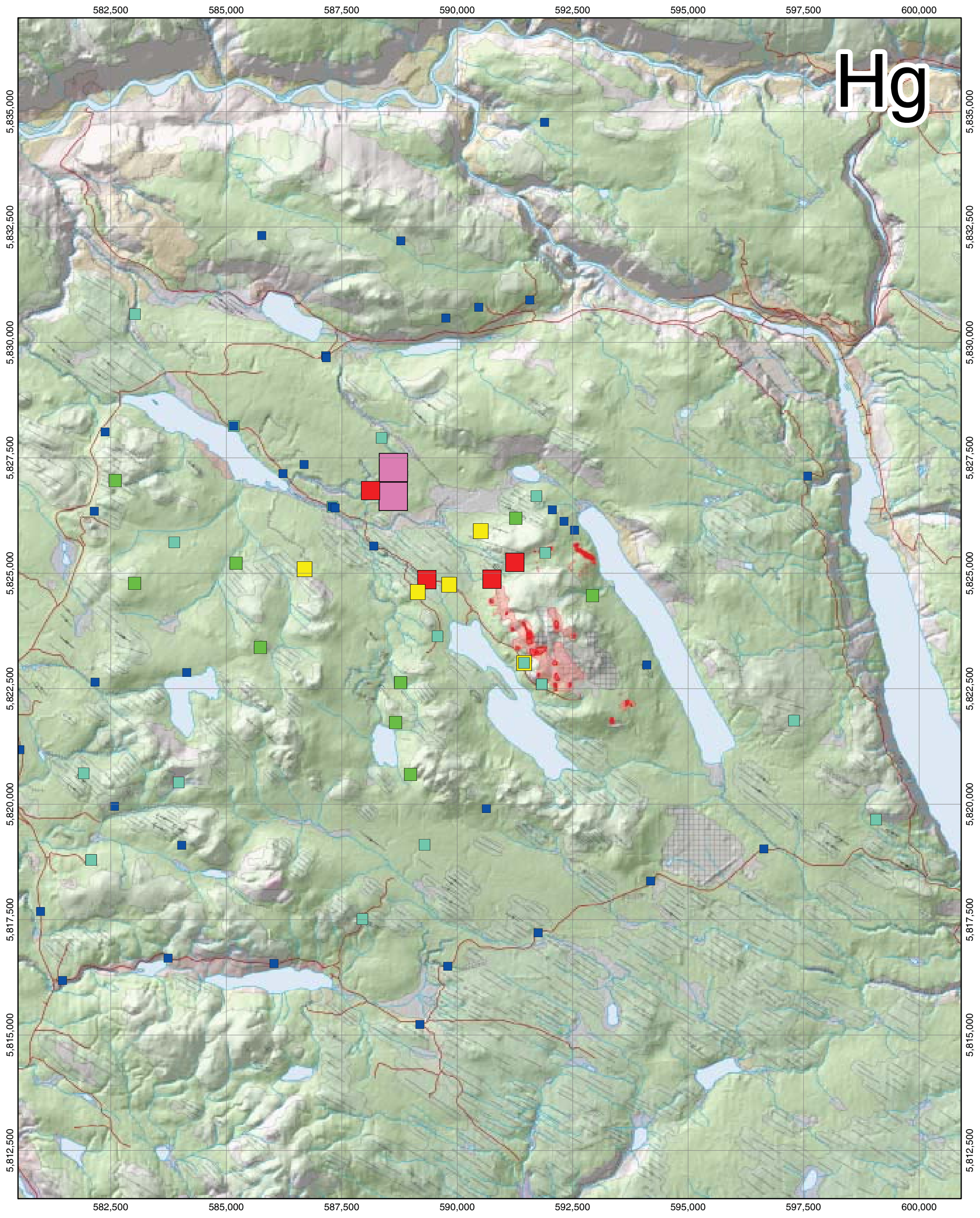
Universal Transverse Mercator Projection
NAD 83 Datum, Zone 10

MOUNT POLLEY

A geo-exploration atlas of the Mount Polley porphyry copper-gold district

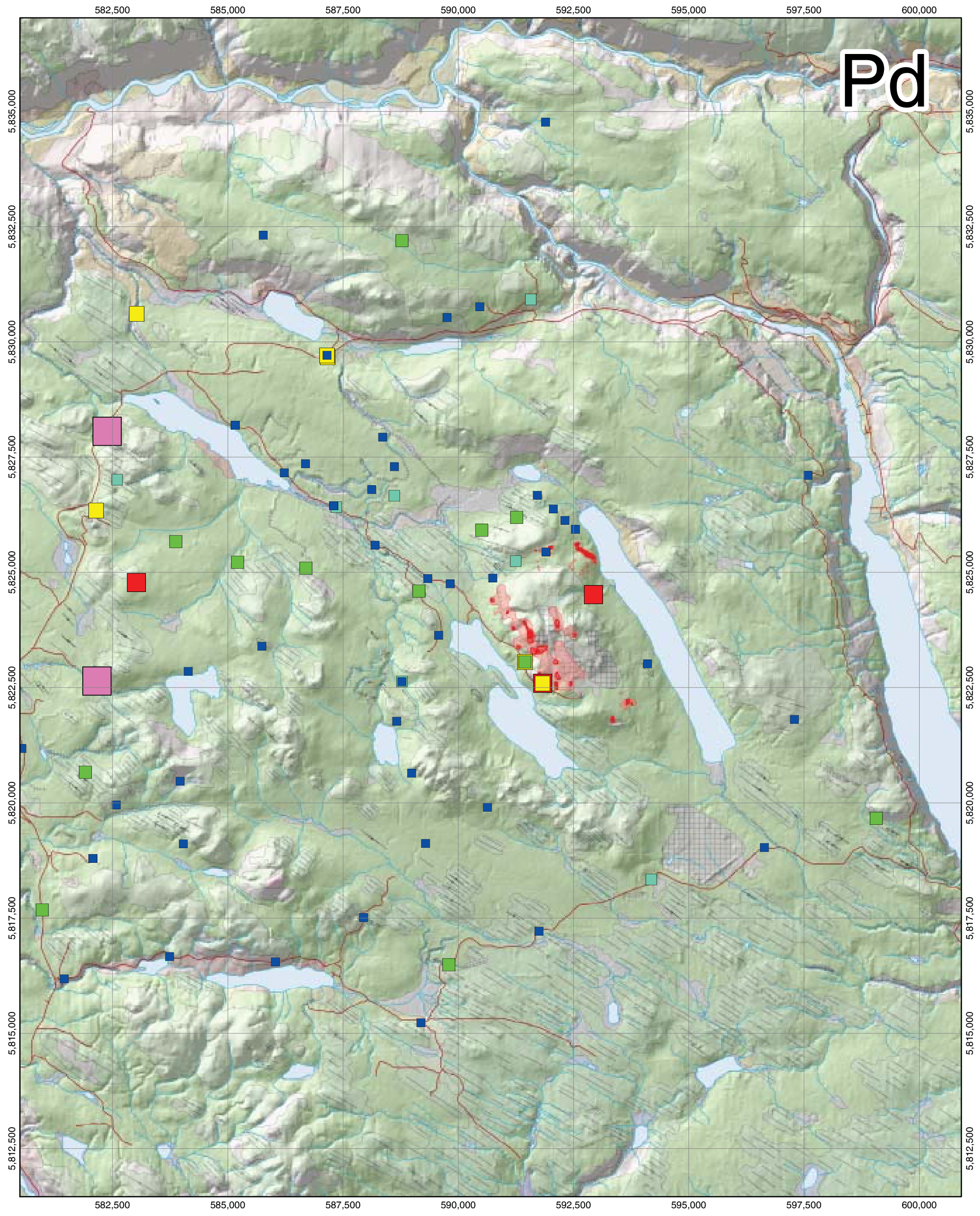
Geoscience BC

TILL GEOCHEMISTRY
Commodity Elements
1:150 000



Hg

percentile	ppb
0 - 50	37.00 - 106.00
50 - 75	106.01 - 144.00
75 - 90	144.01 - 176.00
90 - 95	176.01 - 221.00
95 - 98	221.01 - 288.00
98 - 100	288.01 - 670.00



Pd

percentile	ppb
0 - 50	5
50 - 75	6 - 12
75 - 90	13 - 17
90 - 95	18 - 20
95 - 98	21 - 23
98 - 100	24 - 28

LEGEND (Surficial Geology background)
for more detail see Map 3.2

QUATERNARY
Non-glacial environment
- Anthropogenic (Mine tailings)
- Organic deposits
- Colluvial and mass wasting deposits

Proglacial and glacial environment
- Glaciofluvial sediments
- Till blanket
- Till veneer
- Till, streamlined and fluted

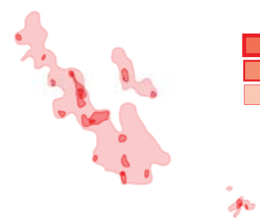
PRE-QUATERNARY
- Bedrock

Ice Flow Indicators & Geological Features

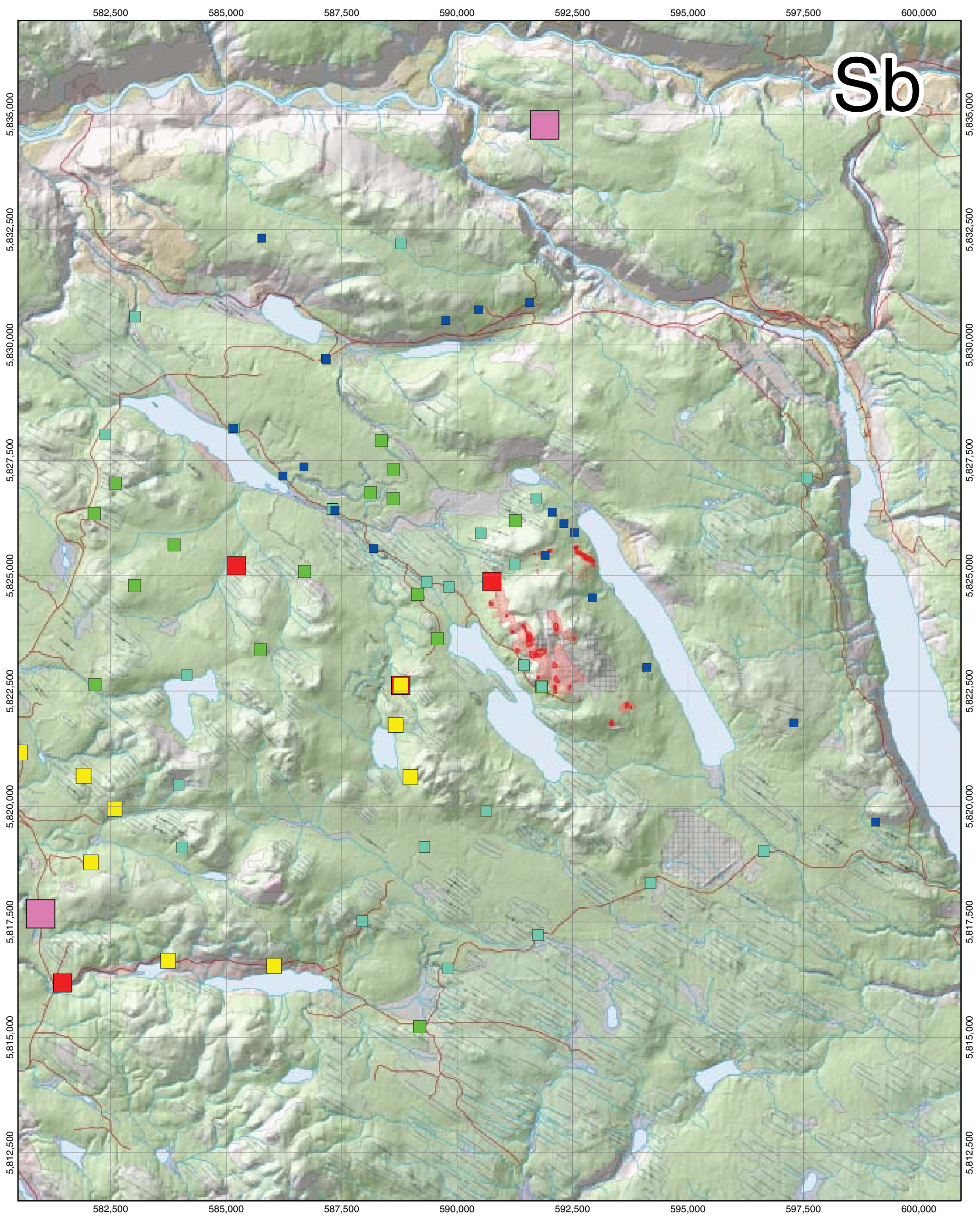
Uni-directional	Bi-directional
crag and tail ridge	drumlinoid or fluting
drumlinoid ridge	fluted bedrock
fluted bedrock	striation or groove
striation	

- esker ridge (direction known)
- esker ridge (direction unknown)
- minor meltwater channel (direction known)
- minor meltwater channel (direction unknown)
- major meltwater channel scarp
- landslide escarpment

Mount Polley orebodies
grade contours
(Rees et al., 2014)

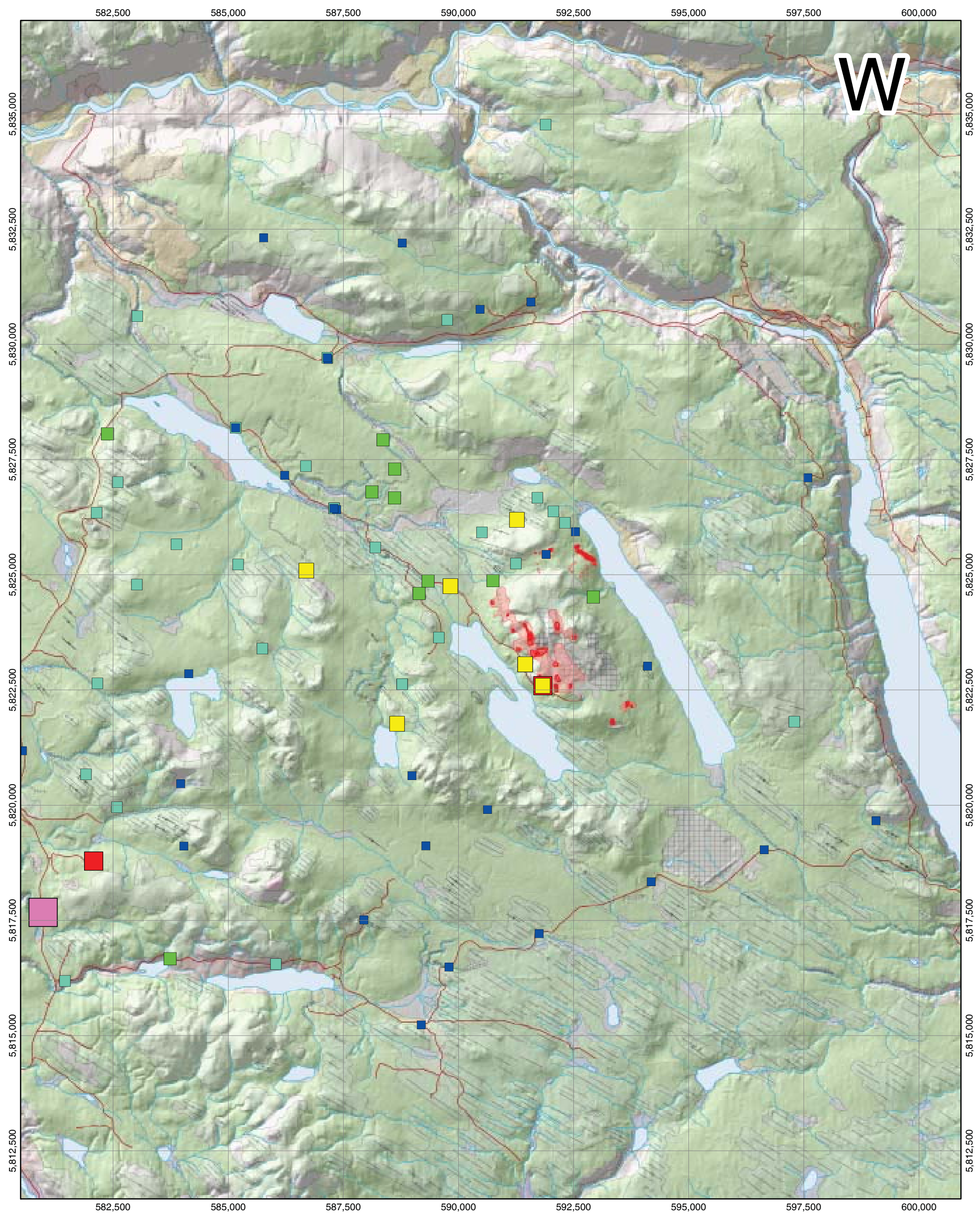


- 0.6% Cu
- 0.3% Cu
- 0.1% Cu



Sb

percentile	ppm
0 - 50	0.00 - 0.32
50 - 75	0.33 - 0.49
75 - 90	0.50 - 0.73
90 - 95	0.74 - 1.05
95 - 98	1.06 - 1.34
98 - 100	1.35 - 2.01



W

percentile	ppm
0 - 50	0.1
50 - 75	0.2
75 - 90	0.3
90 - 95	0.4
95 - 98	0.5 - 0.6
98 - 100	0.7 - 1.7

Data Sources:

Hashmi, S. (2015): Quaternary geology and drift prospecting in the Mount Polley region (NTS 093A). M.Sc. thesis, Simon Fraser University. 165 pages and digital data.

McAndless, P. and Taylor, C., 2006: Surficial Geology of the Mount Polley property: Summary of 2005 exploration work; British Columbia Ministry of Energy, Mines and Petroleum Resources Assessment Report 28270, 31 pages.
Includes till geochemistry data for Cu, Au, Ag, Mo; digital data provided by Imperial Metals Corporation.

Hashmi, S., Plouffe, A., and Ward, B.C., 2015. Surficial geology, Bootjack Mountain area, British Columbia, Parts of NTS 93-A/5, NTS 93-A/6, NTS 93-A/11, and NTS 93-A/12; Geological Survey of Canada, Canadian Geoscience Map 209 (preliminary); British Columbia Geological Survey, Geoscience Map 2015-02, scale 1:50 000.

SCALE 1:150,000

0 5 10
kilometres

Universal Transverse Mercator Projection
NAD 83 Datum, Zone 10

MOUNT POLLEY

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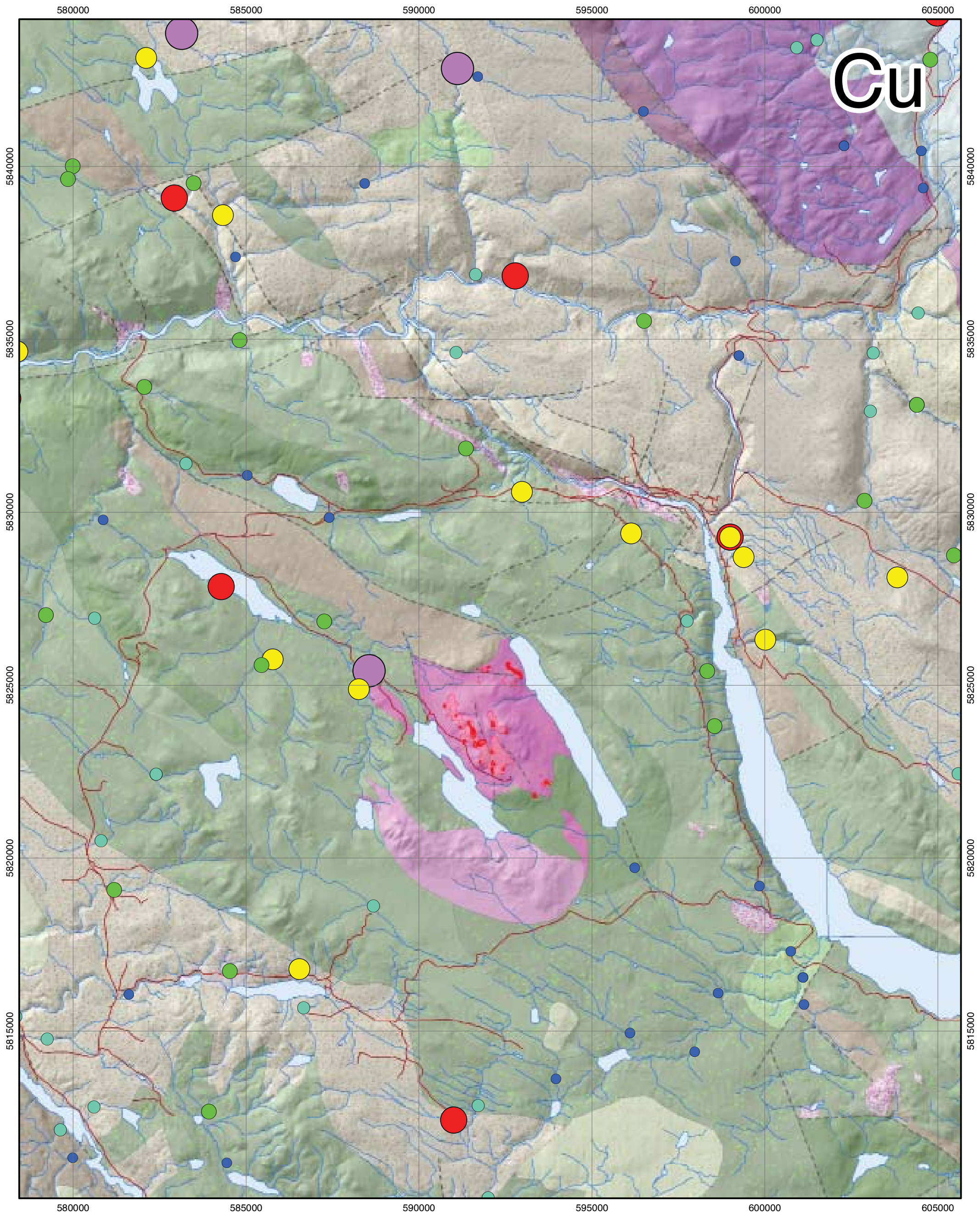
Geoscience BC

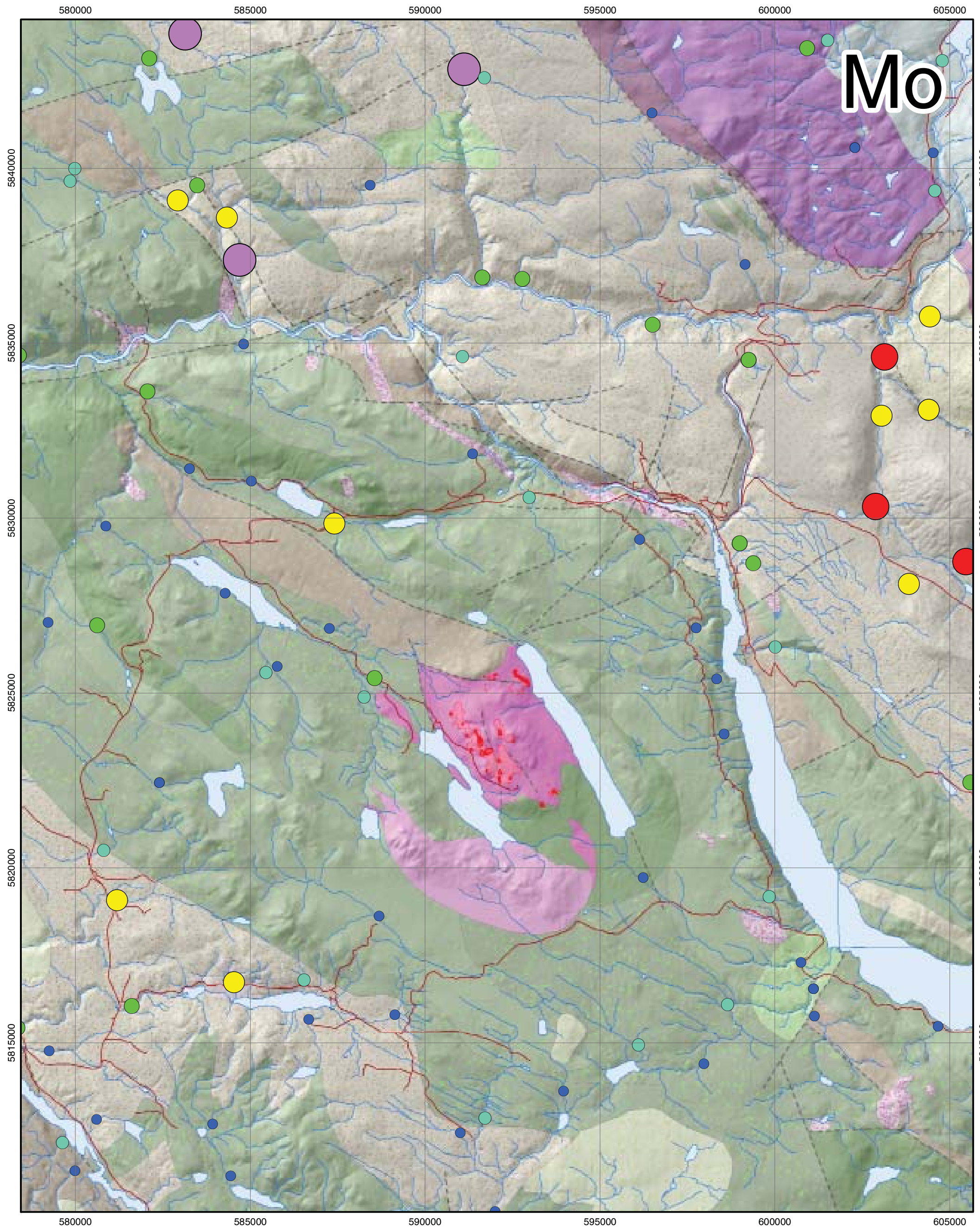
STREAM SEDIMENT GEOCHEMISTRY
Commodity Elements

1:200 000



Cu

percentile	ppm
0 - 50	4.51 - 43.36
50 - 75	43.37 - 60.87
75 - 90	60.88 - 74.39
90 - 95	74.40 - 99.95
95 - 98	99.96 - 777.15
98 - 100	777.16 - 779.36

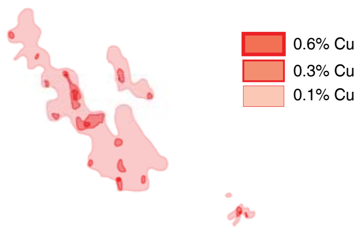


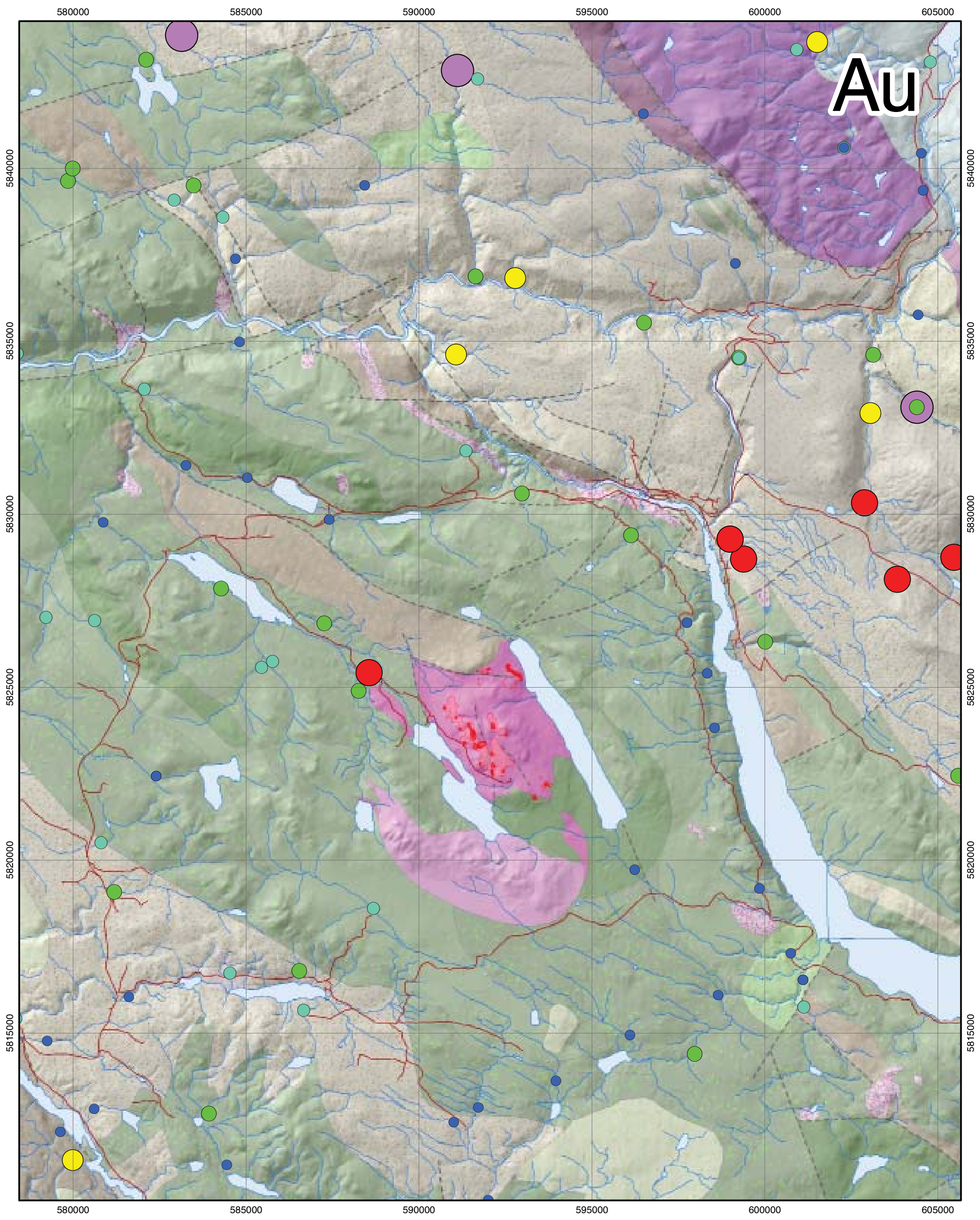
Mo

percentile	ppm
0 - 50	0.22 - 0.79
50 - 75	0.80 - 1.52
75 - 90	1.53 - 2.33
90 - 95	2.34 - 3.98
95 - 98	3.99 - 542.00
98 - 100	542.01 - 550.74

Bedrock Geology background
see map 1.2 for legend

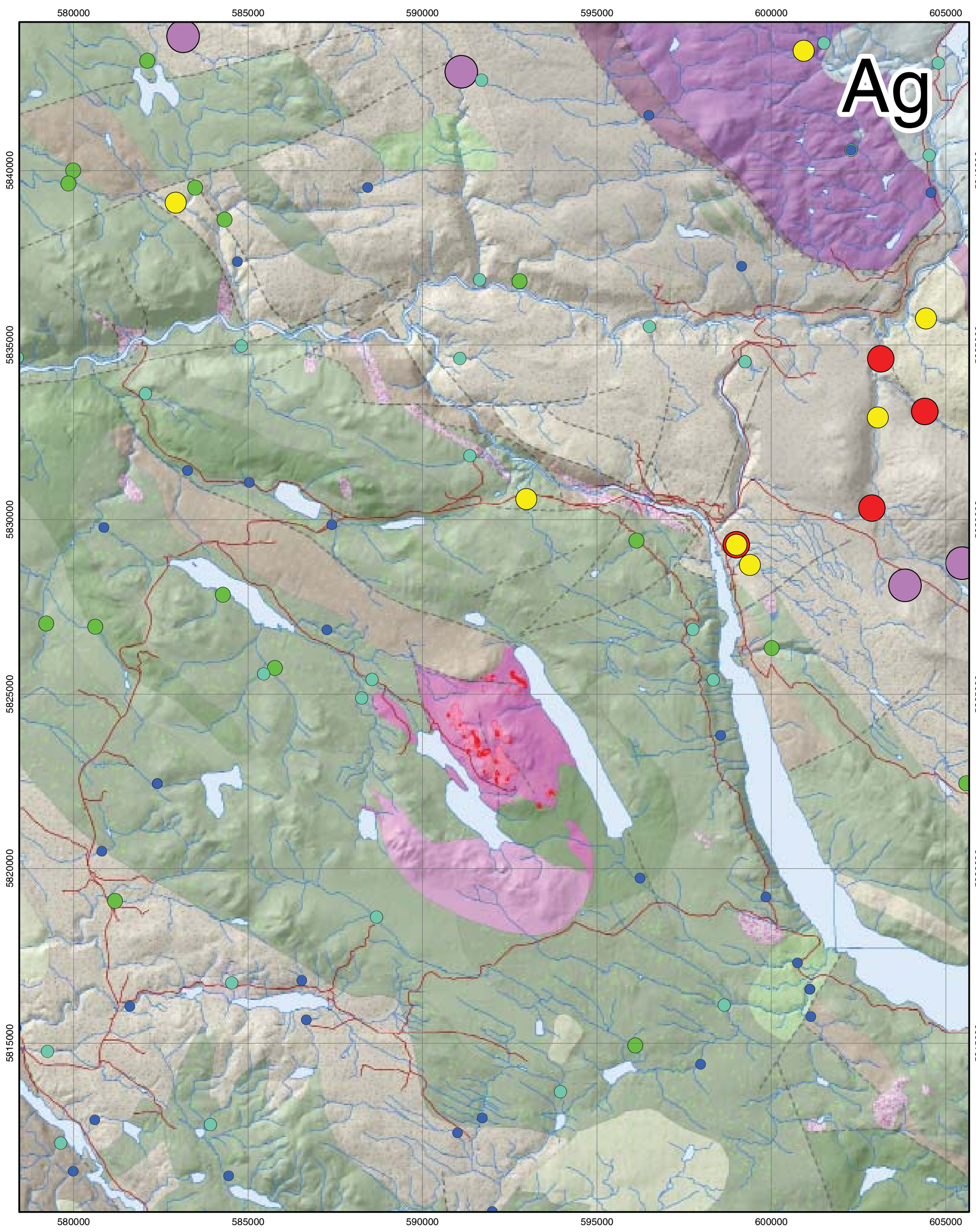
Mount Polley orebodies
grade contours
(Rees et al., 2014)





Au

percentile	ppb
0 - 50	0.3 - 2.1
50 - 75	2.2 - 3.1
75 - 90	3.2 - 5.7
90 - 95	5.8 - 10.7
95 - 98	10.8 - 339.6
98 - 100	339.7 - 514.0



Ag

percentile	ppb
0 - 50	12.0 - 105.0
50 - 75	105.1 - 161.0
75 - 90	161.1 - 262.0
90 - 95	262.1 - 364.0
95 - 98	364.1 - 3743.0
98 - 100	3743.1 - 3901.0

Data Sources:

Jackaman, W. (2008): QUEST Project sample reanalysis; Geoscience BC, Report 2008-3, 4 p.

Logan, J.M., Schiarizza, P., Struik, L.C., Barnett, C., Nelson, J.L., Kowalczyk, P., Ferri, F., Mihalynuk, M.G., Thomas, M.D., Gammon, P., Lett, R., Jackaman, W. and Ferbey, T., 2010: Bedrock Geology of the QUEST map area, central British Columbia; British Columbia Geological Survey Geoscience Map 2010-1, Geoscience BC Report 2010-5, and Geological Survey of Canada Open File 6476.

SCALE 1:200,000

0 5 10 15 20

kilometres

Universal Transverse Mercator Projection
NAD 83 Datum, Zone 10

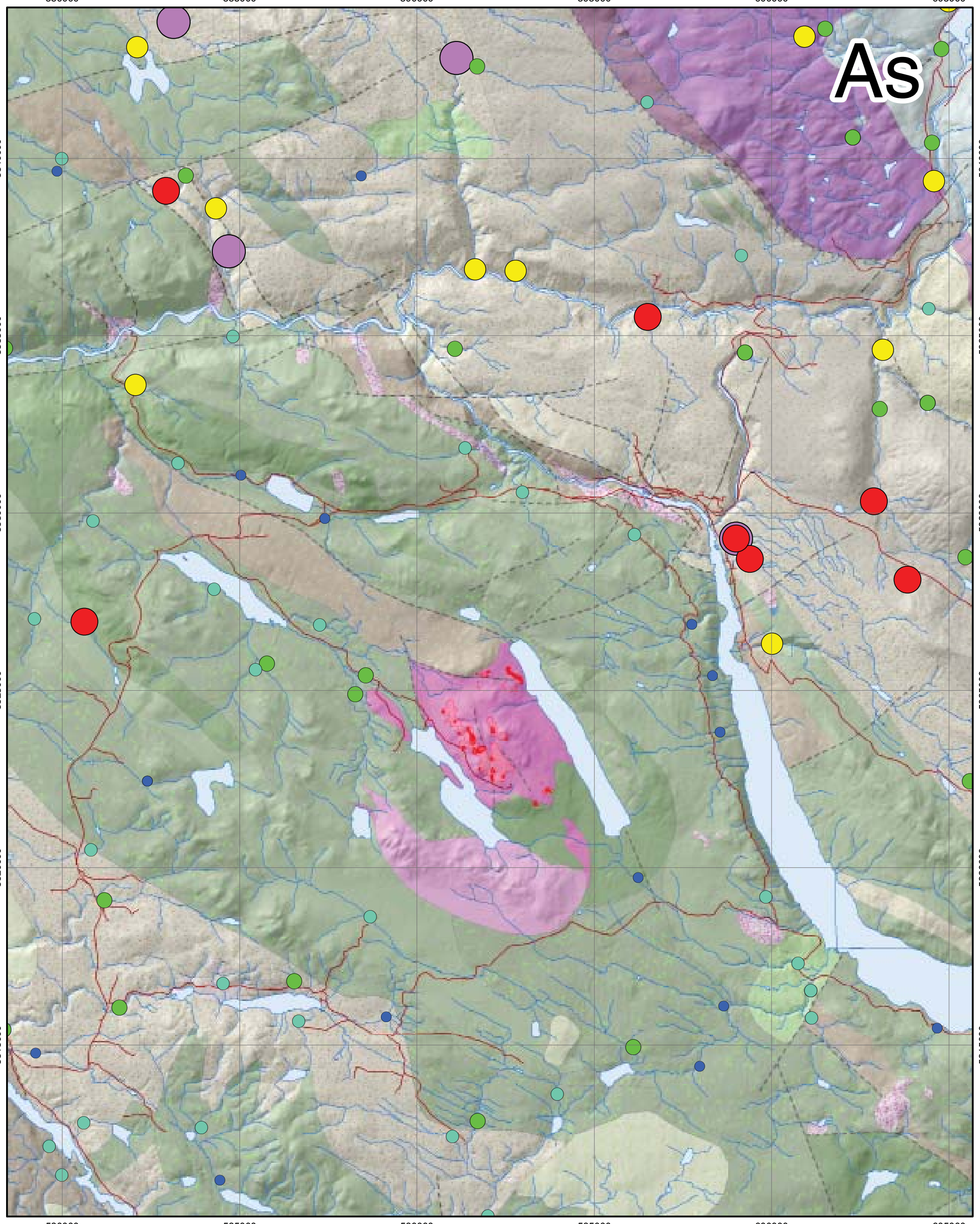
MOUNT POLLEY

A geo-exploration atlas of the Mount Polley porphyry copper-gold district

Geoscience BC

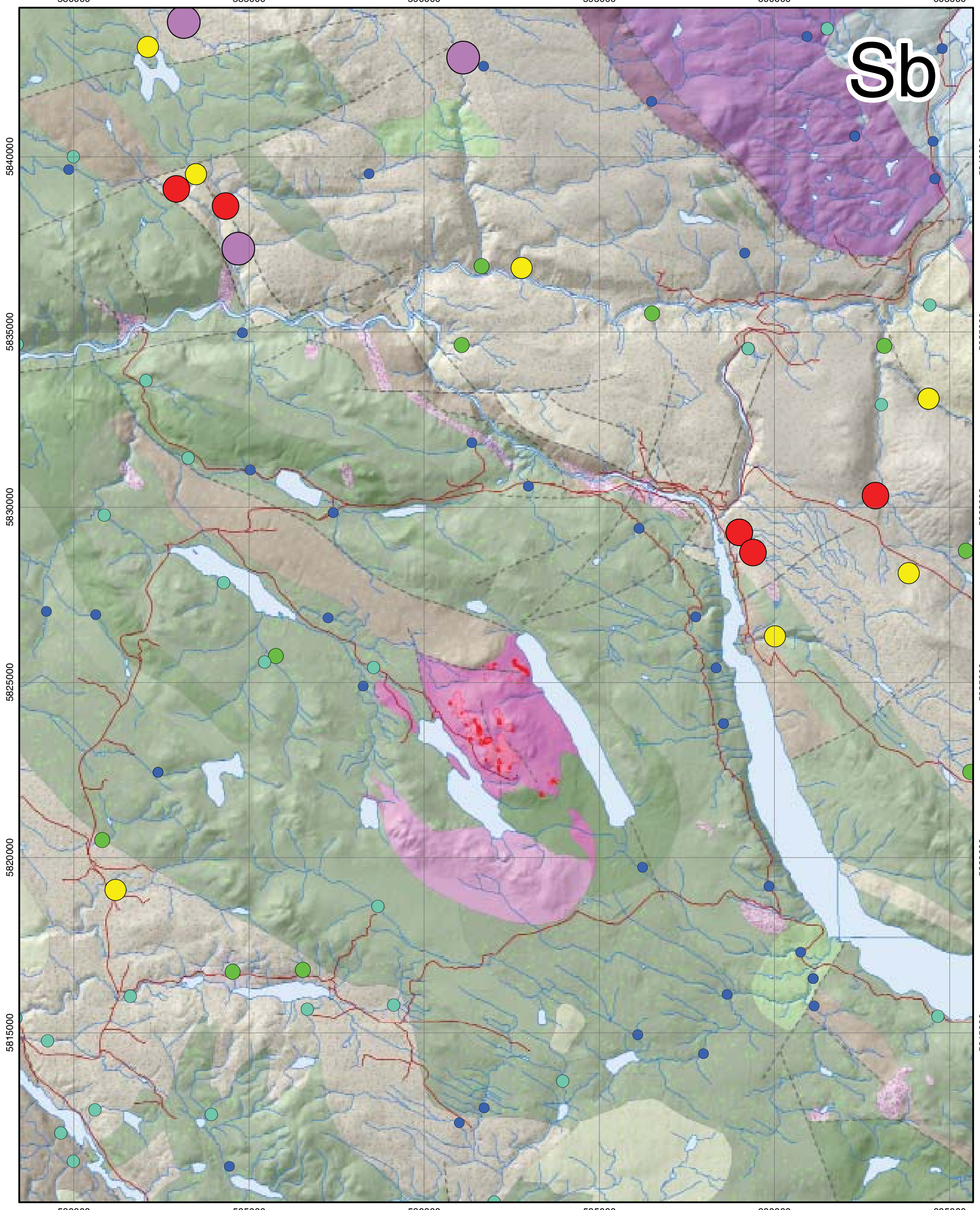
STREAM SEDIMENT GEOCHEMISTRY
Pathfinder Elements

1:200 000



As

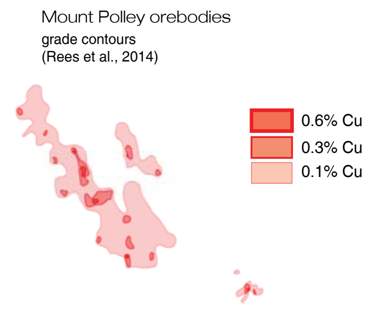
percentile	ppm
0 - 50	0.3 - 7.2
50 - 75	7.3 - 14.9
75 - 90	15.0 - 38.5
90 - 95	38.6 - 68.1
95 - 98	68.2 - 306.9
98 - 100	307.0 - 310.5

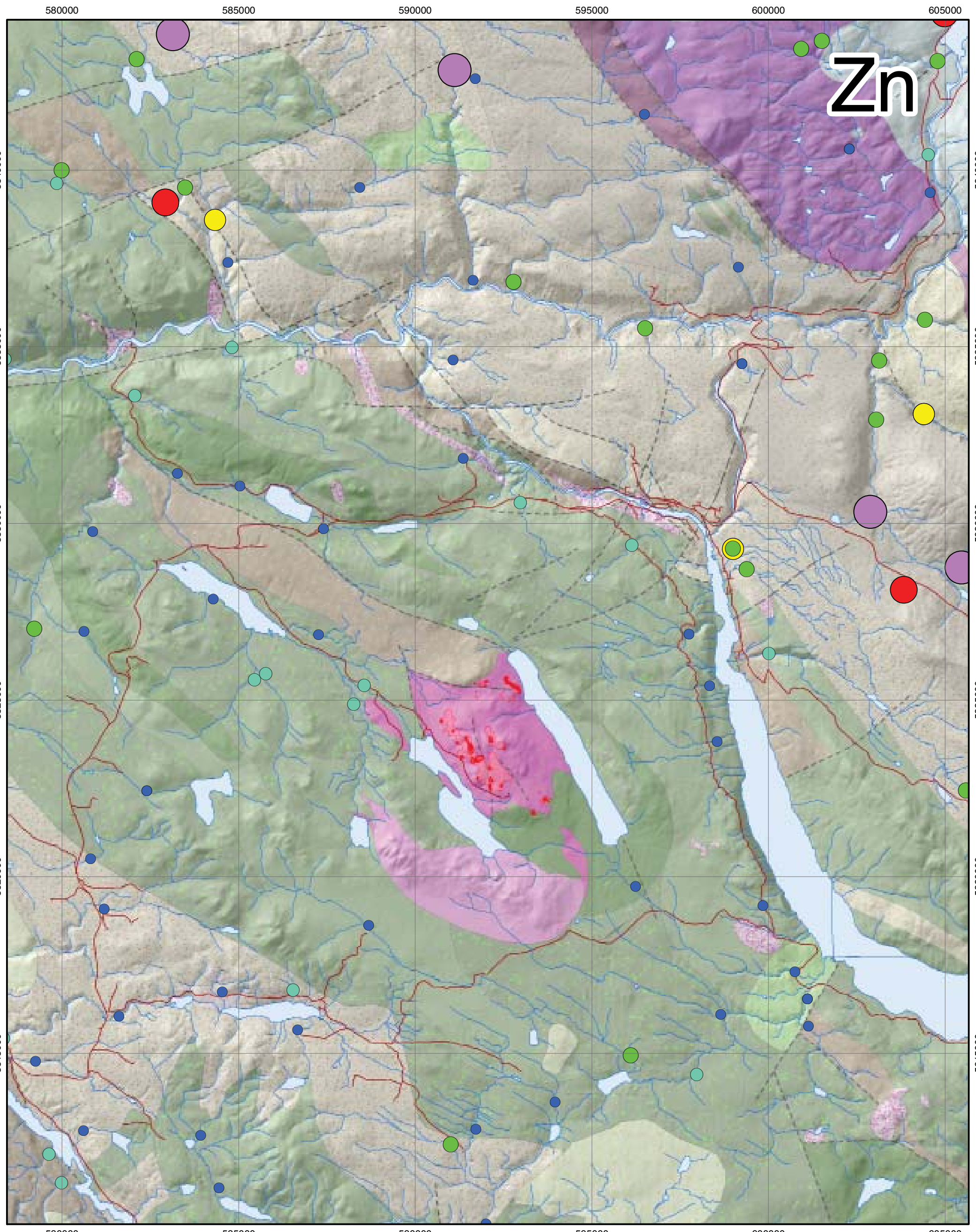


Sb

percentile	ppm
0 - 50	0.02 - 0.33
50 - 75	0.34 - 0.56
75 - 90	0.57 - 1.29
90 - 95	1.30 - 2.50
95 - 98	2.51 - 22.72
98 - 100	22.73 - 24.72

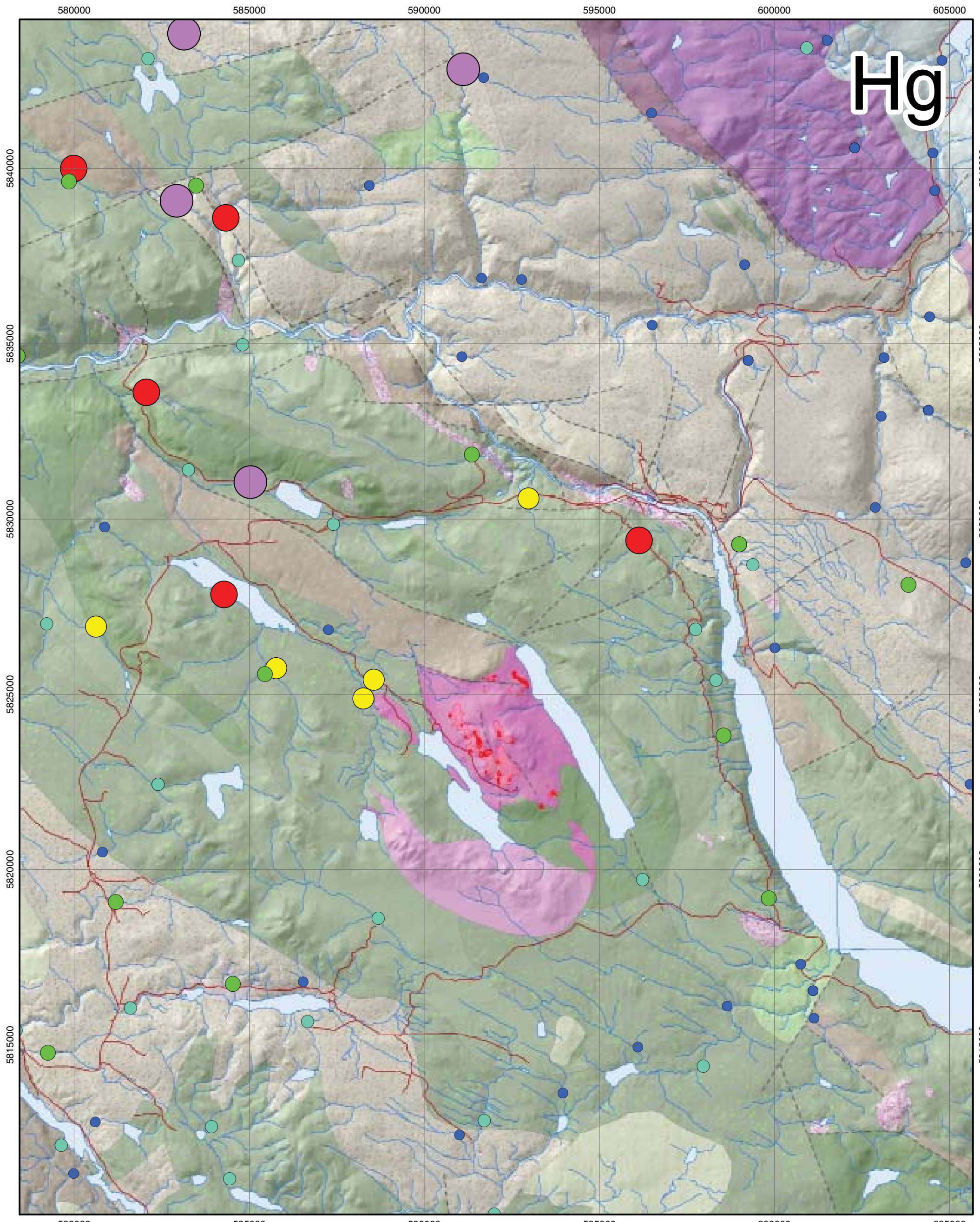
Bedrock geology background
see map 1.2 for legend





Zn

percentile	ppm
0 - 50	3.8 - 54.1
50 - 75	54.1 - 69.0
75 - 90	69.1 - 83.9
90 - 95	84.0 - 108.7
95 - 98	108.8 - 467.6
98 - 100	467.7 - 473.8



Hg

percentile	ppb
0 - 50	11 - 63
50 - 75	64 - 89
75 - 90	90 - 125
90 - 95	126 - 227
95 - 98	228 - 3232
98 - 100	3233 - 3240

Data Sources:

Jackaman, W. (2008): QUEST Project sample reanalysis; Geoscience BC, Report 2008-3, 4 p.

Logan, J.M., Schiarizza, P., Struik, L.C., Barnett, C., Nelson, J.L., Kowalczyk, P., Ferri, F., Mihalynuk, M.G., Thomas, M.D., Gammon, P., Lett, R., Jackaman, W. and Ferbey, T., 2010: Bedrock Geology of the QUEST map area, central British Columbia; British Columbia Geological Survey Geoscience Map 2010-1, Geoscience BC Report 2010-5, and Geological Survey of Canada Open File 6476.

SCALE 1:200,000

0 5 10 15 20

kilometres

Universal Transverse Mercator Projection
NAD 83 Datum, Zone 10

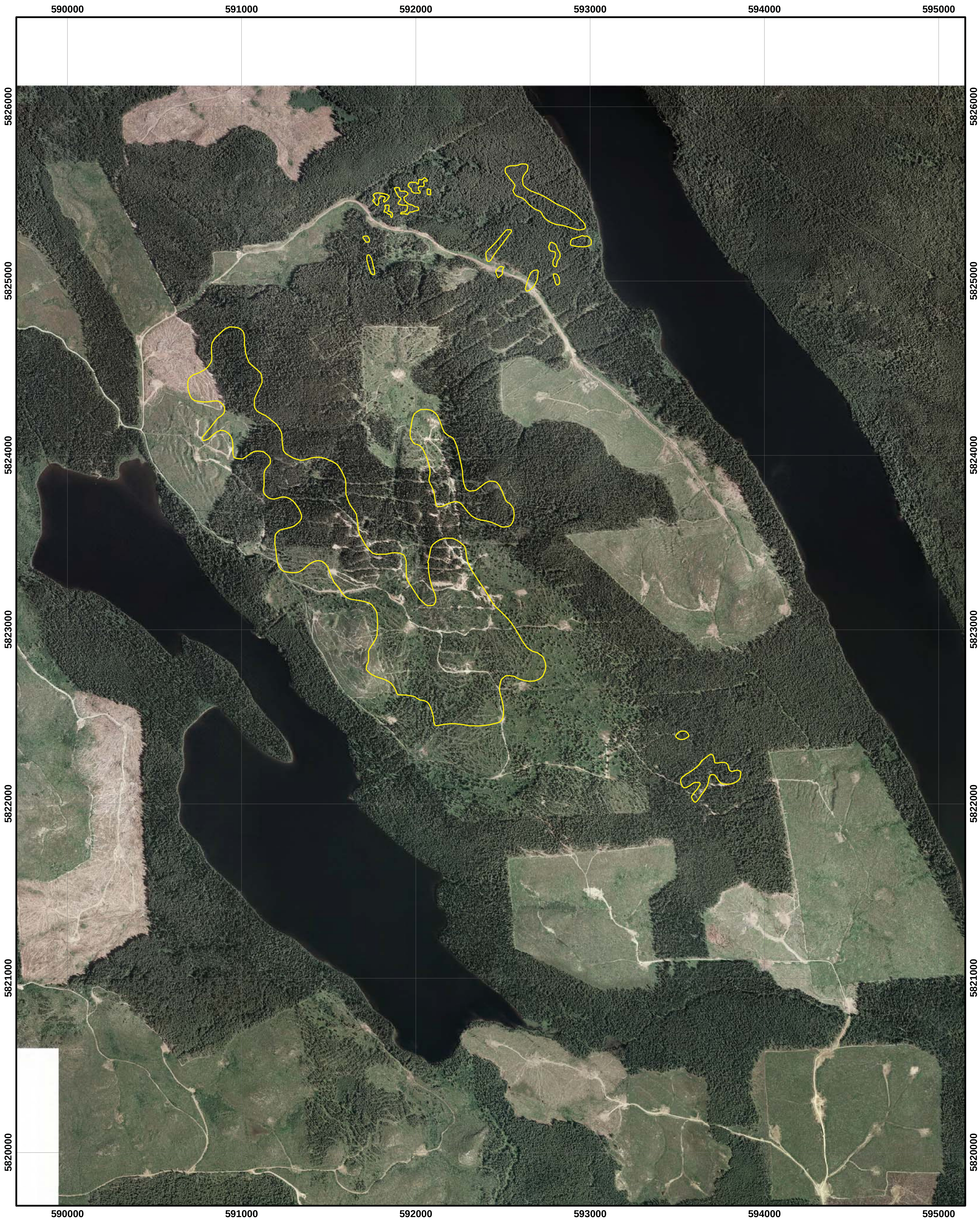
MOUNT POLLEY

A geo-exploration atlas of the Mount Polley porphyry copper-gold district

Geoscience BC

1985 ORTHOPHOTO MOSAIC

1:20 000



Mount Polley orebodies
(Rees et al., 2013)

0.1% Cu
grade contour

SCALE 1:20,000

0 1 2
kilometres

Universal Transverse Mercator Projection
NAD 83 Datum, Zone 10

Data Sources:

GeoBC, 2013: British Columbia Airphoto database; Integrated Land Management Bureau, Ministry of Agriculture and Lands, Scale 1:15,000, Flight lines BCC353 (photos 154-157 & 192 - 195) and BCC355 (photos 016 - 019). Victoria: Department of Land and Forests, 1985.

This image, created from air photos taken in 1985, is included to complement the 1986 soil geochemistry data presented in the following pages. It provides a view of the surface sampling terrain and cover near the time of the 1986 soil sampling program, prior to more recent mine development in the same area. Original images were scanned from the BC airphoto database and were compiled into a single mosaic image by aerial triangulation of the individual scanned images, followed by orthorectification using Satellite SRTM digital terrain modeling data.

Porphyry Districts of British Columbia Atlas Series

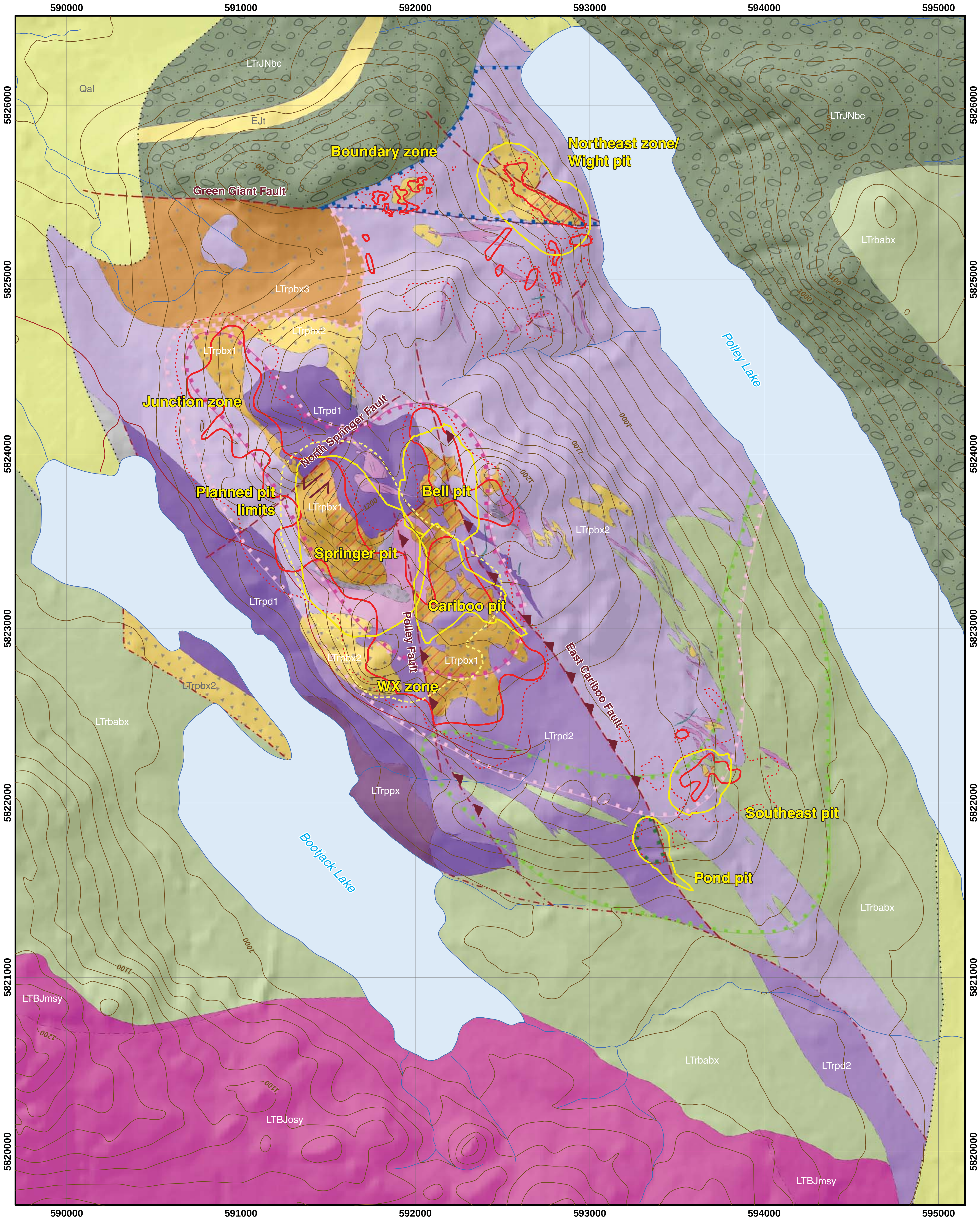
MOUNT POLLEY

A geo-exploration atlas of the Mount Polley porphyry copper-gold district

Geoscience BC

BEDROCK GEOLOGY

1:20 000



QUATERNARY

Qal	Thick alluvium cover

LATE TRIASSIC - EARLY JURASSIC

NICOLA GROUP (IN PART)

EJt	Trachyandesite tuff. Plagioclase-hornblende-biotite and minor (1%) quartz grains in aphanitic mauve-grey matrix. 196.7 ±1.3 Ma, U-Pb zircon (Logan et al. 2007b).
LTBJmsy	Melanocratic (pyroxene + hornblende) pseudoleucite syenite
LTBJosy	Orbicular pseudoleucite nepheline syenite
LTrJNbc	Breccia, conglomerate. Massive, coarse, matrix-supported polymictic breccia and minor cobble conglomerate, with clasts of intermediate intrusives, volcanics and microporphyries, in grey to maroon crystal-lithic matrix. Minor lithic sandstone-siltstone, and rare trachyte-latite. Strong hematite cement immediately north of and overlying MPIC.

LATE TRIASSIC - EARLY JURASSIC

MOUNT POLLEY INTRUSIVE COMPLEX (MPIC)

LTrpap	Augite porphyry dyke. Green-grey, fine grained, basaltic-andesitic dykes with subequant clinopyroxene phenocrysts, and lesser aphyric mafic-intermediate dikes.
LTrpbx1 LTrpbx1m	Intrusive complex with a significant amount of fragmental breccia (polymictic/oligomictic) or inclusion-rich intrusion, comprising (sub)rounded to subangular diorite to monzonite porphyry clasts in a cognate igneous 'cement' (igneous breccia), and/or a clastic matrix of fine to coarse rock flour. Clasts in igneous breccia may be partly resorbed. Contacts are gradational into variably brecciated (monomictic jigsaw-fit type) diorite to monzonite. Characteristic of bx1 (though not ubiquitous) is texture-destructive alteration due to moderate to strong secondary K-feldspar ± biotite ± albite ± magnetite ± actinolite/diopside ± garnet, replacing the igneous groundmass or breccia matrix, or permeating fractures. LTrpbx1m= mineralized to ore or near ore-grade with chalcopyrite ± bornite or pyrite.
LTrpbx2 LTrpbx2m	As bx1, but occurs outside central MPIC and is characterized by less texture-destructive alteration than bx1. Igneous cement is less common than rock flour matrix and/or mineral cement. bx2m = mineralized to ore or near ore-grade.
LTrpbx3	Fragmental breccia (polymictic) comprising mm- to cm-scale, rounded to angular, monzonitic porphyry clasts in a related rock flour matrix. Mostly matrix supported. Distinguished from LTrpbx1 and LTrpbx2 by a lack of (1) coherent rocks, (2) igneous breccia cement, (3) potassic alteration (except in transported clasts), and (4) mineralization (except pyrite). Local garnet alteration. Subtype bx3a has a finer rock flour matrix and a high matrix to clast ratio.
LTrpkm	Potassium feldspar-(plagioclase-)phyric monzonite. Pale to deep pink, fine to coarse grained groundmass, with sub-cm to megacrystic (2-3 cm) phenocrysts, with trachytoid alignment in some dikes and larger intrusions.
LTrppp	Plagioclase feldspar porphyry (monzodiorite). Grey to red-pink where strongly altered, typically crowded with phenocrysts up to 5 mm, locally aligned, in fine-grained groundmass.
LTrpmz	Monzonite to monzodiorite. Pale pink, medium-grained, even-textured, more homogenous than units LTrpd2, LTrpmdu, and lacking in inclusions.
LTrpmdu	Monzodiorite and monzonite, some diorite, undivided. General, heterogenous unit of intermediate intrusions with poorly defined internal contacts. Pink to grey, fine to medium grained, equigranular to plagioclase-phyric; mafic, lithic and other inclusions common, verging on igneous breccia locally. Includes small dykes and zones of bx1 and bx2 hydrothermal breccia note differentiated on map.
LTrpdb	Leucodiorite porphyry, banded. Minor unit. Pale green and pale grey, fine to medium grained, characterized by wispy laminations (possible flow banding) and fluidal (?) clasts; gradational with unit Pmdu.
LTrpd2	Diorite to monzodiorite, leucodiorite, and minor monzonite. Characterized by uneven textures and numerous small inclusions. Grey to green-grey, cream-grey 9pink where more altered), medium grained, usually inequigranular to subporphyritic (plagioclase and local augite phenocrysts).
LTrpd1	Even-textured augite(-biotite) diorite to monzodiorite. Speckled medium-grey, medium to coarse grained, mostly equigranular.
LTrppx	Pyroxenite, minor melagabbro. Dark green to black, medium to coarse grained.

NICOLA GROUP (NORIAN)

LTrbabx	Basalt to andesite, or intrusive-equivalent meladiorite, microdiorite. undivided volcanic and subvolcanic coherent rocks and fragmental breccias. Grey, dark mauve, dark green, finely plagioclase- or pyroxene-phyric, local analcite or pseudoleucite. Breccias are undifferentiated igneous-hydrothermal and volcaniclastics, characterized by a lack of felsic porphyry fragments. Local lenses of mafic or calcareous sediments, limestone. Gradational contacts with MPIC, where some breccias may be hydrothermal and coeval wtih MPIC intrusions.

Mount Polley orebodies (Rees et al., 2013)

0.1% Cu grade contour

limit of elevated copper

Mount Polley pits

Current Limits

Planned limits

SCALE 1:20,000

0 1 2

kilometres

Universal Transverse Mercator Projection
NAD 83 Datum, Zone 10

Data Sources:

Rees, C., Gillstrom, G., Ferreira, L., Bjornson, L. and Taylor, C. (2014): Geology of the Mount Polley Intrusive Complex (Final Version); Geoscience BC, Report 2014-08.

Logan, J.M., Bath, A.B., Mihalynuk, M.G., Rees, C.J., Ullrich, T.D., Friedman, R., 2007: Regional Geology of the Mount Polley Area, central British Columbia (parts of NTS 093A/05, 06, 11 and 12); British Columbia Ministry of Energy, Mines and Petroleum Resources, Geoscience Map 2007-1.

Wafforn, S. R. (2013): Structural Geology of the Mount Polley Cu-Au District, South-Central British Columbia; M.Sc. thesis, Oregon State University, 112 p.

ALTERATION

- Albite - epidote - pyrite
- Andradite garnet - epidote
- K-feldspar - biotite - albite - magnetite - diopside/actinolite
- K-feldspar - biotite - magnetite - albite
- K-feldspar - magnetite - biotite - chlorite - calcite - andradite garnet

Porphyry Districts of British Columbia Atlas Series

MOUNT POLLEY

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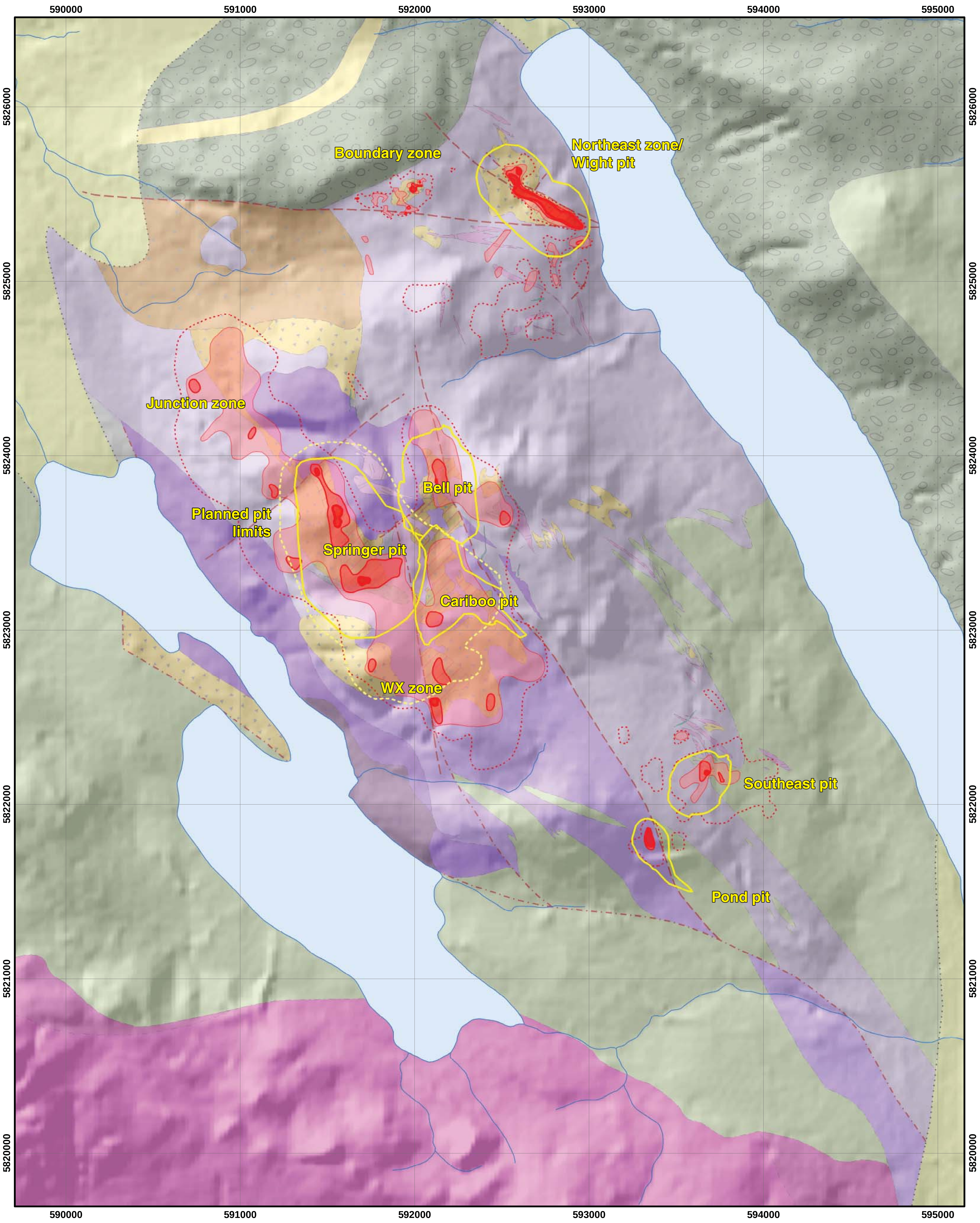
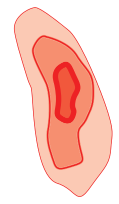
Geoscience BC

BEDROCK GEOLOGY
Mineralization - Copper Grade
1:20 000



Bedrock geology background, see map 7.1 for legend

Copper Grade Contours
(Rees et al., 2014)



- 0.6% Cu
- 0.3% Cu
- 0.1% Cu
- limit of elevated copper

The copper contours were generated from the 3D computerized block models used at the Mount Polley Mine for reserve estimation. The models include already mined ore as well as remaining resources (to December, 2012). The contours show the grade distribution at an elevation most representative of the ore zones. In the core of Mount Polley centred on the Springer zone, the contours are at an elevation of 1000 metres (a.s.l.). This is roughly equivalent to 100-200 metres below the pre-mining topography. Patterns of grade distribution at deeper levels may be different in detail but are generally conformable.

The 'limit of elevated copper' contour is less rigorously defined, based on assay results from exploration drilling, trenching and mapping.

SCALE 1:20,000

0 1 2
kilometres

Universal Transverse Mercator Projection
NAD 83 Datum, Zone 10

Data Sources:

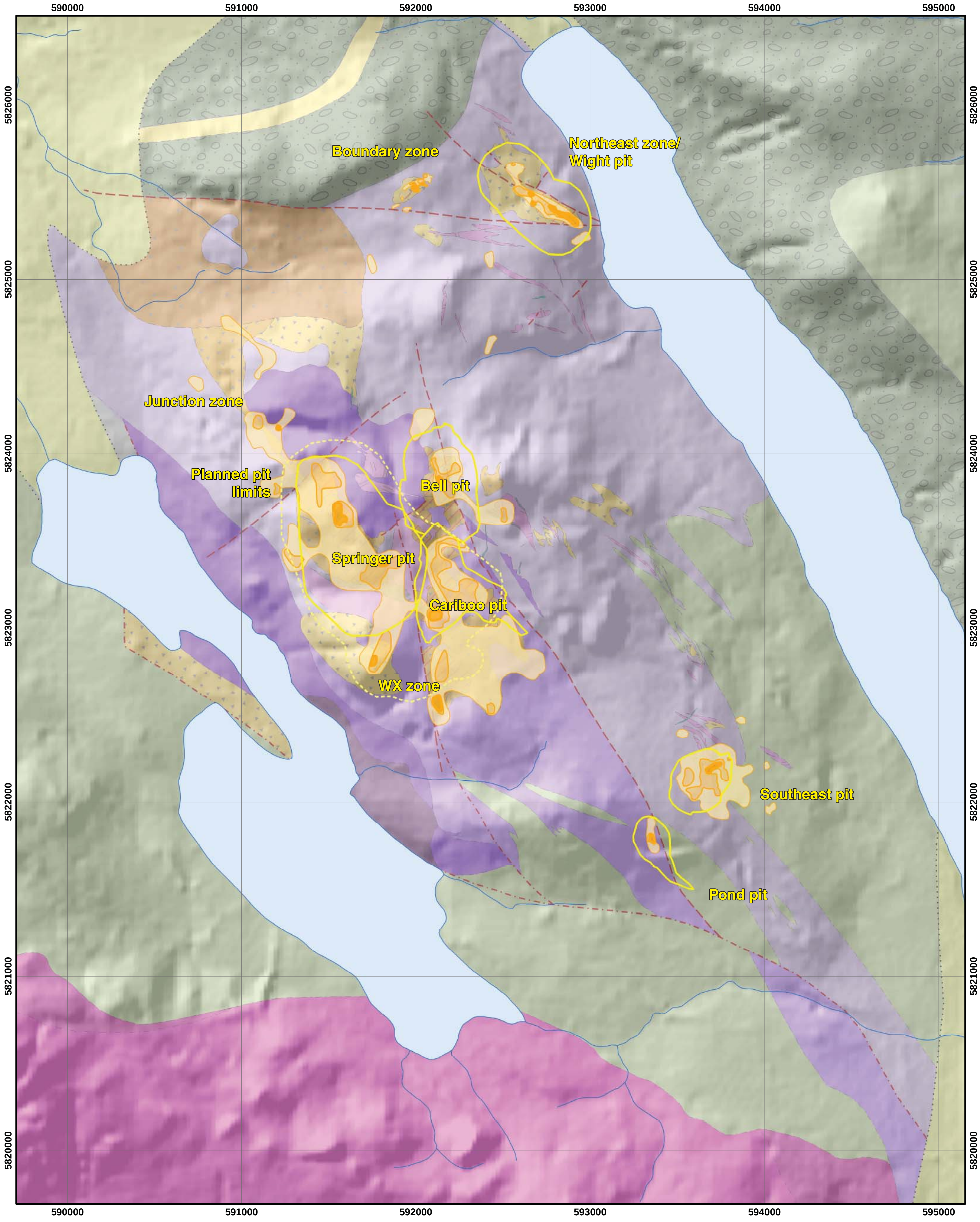
Rees, C., Gillstrom, G., Ferreira, L., Bjornson, L. and Taylor, C. (2014): Geology of the Mount Polley Intrusive Complex (Final Version); Geoscience BC, Report 2014-08.

MOUNT POLLEY

A geo-exploration atlas of the Mount Polley porphyry copper-gold district

Geoscience BC

BEDROCK GEOLOGY
Mineralization - Gold Grade
1:20 000



Bedrock geology background, see map 7.1 for legend

Gold Grade Contours
(Rees et al., 2014)

0.6 ppm Au
0.3 ppm Au
0.1 ppm Au

The gold contours were generated from the 3D computerized block models used at the Mount Polley Mine for reserve estimation. The models include already mined ore as well as remaining resources (to December, 2012). The contours show the grade distribution at an elevation most representative of the ore zones. In the core of Mount Polley centred on the Springer zone, the contours are at an elevation of 1000 metres (a.s.l.). This is roughly equivalent to 100-200 metres below the pre-mining topography. Patterns of grade distribution at deeper levels may be different in detail but are generally conformable.

SCALE 1:20,000

0 1 2
kilometres

Universal Transverse Mercator Projection
NAD 83 Datum, Zone 10

Data Sources:

Rees, C., Gillstrom, G., Ferreira, L., Bjornson, L. and Taylor, C. (2014): Geology of the Mount Polley Intrusive Complex (Final Version); Geoscience BC, Report 2014-08.

Porphyry Districts of British Columbia Atlas Series

MOUNT POLLEY

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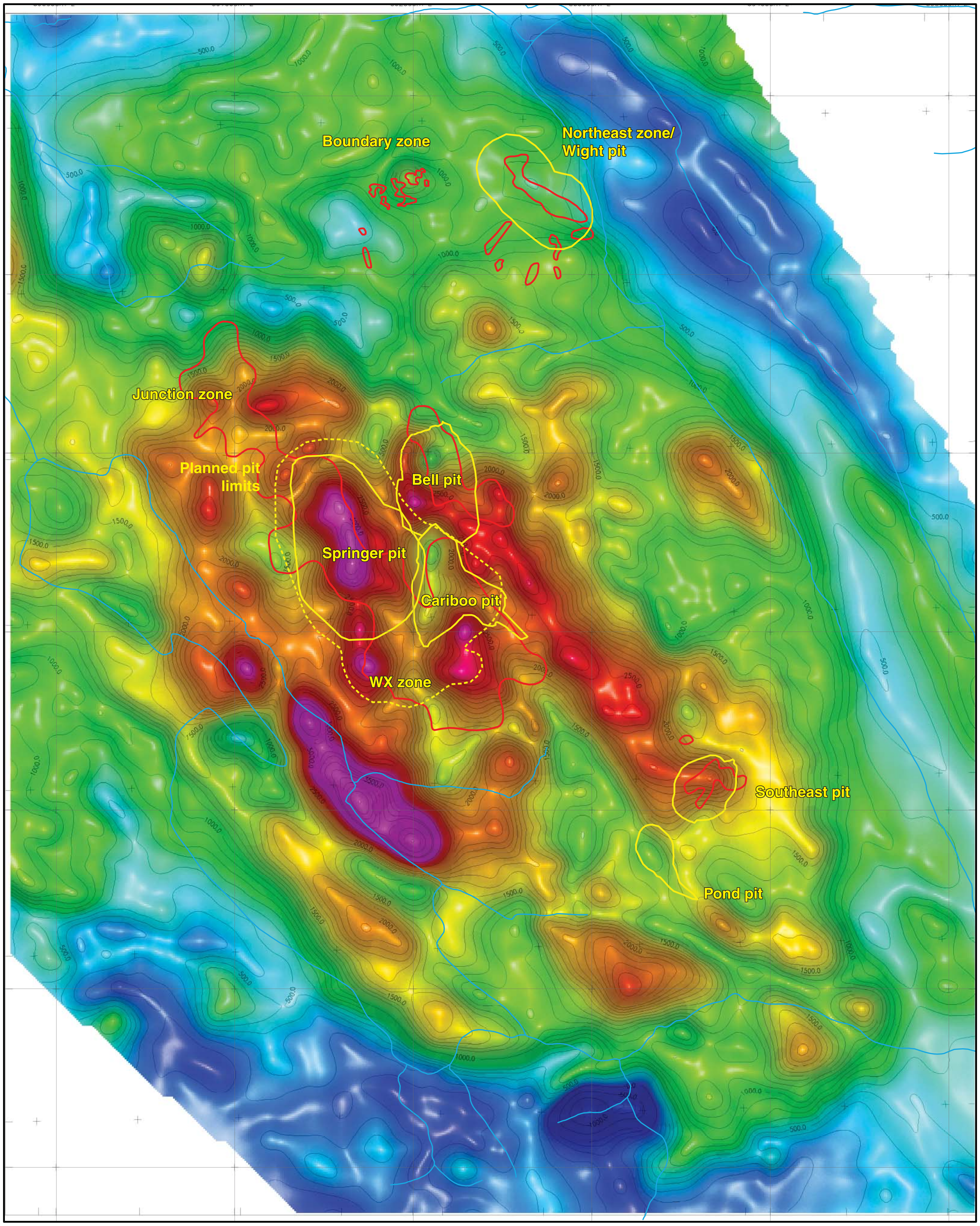
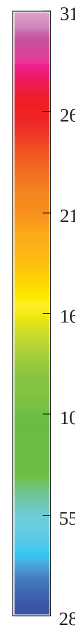
Geoscience BC

MAGNETICS - Airborne
Residual Magnetic Intensity
1:20 000





Mount Polley orebodies
(Rees et al., 2014)

0.1% Cu
grade contour

SCALE 1:20,000

0 1 2
kilometres

Universal Transverse Mercator Projection
NAD 83 Datum, Zone 10

Data Sources:

The Imperial Metals Corporation Mount Polley Mine survey data is available thorugh the Canadian Aeromagnetic Database <http://gdr.agg.nrcan.gc.ca >

Shives, R.B.K., Carson, J.M., Ford, K.L., Holman, P.B., and Cathro, M., 2004, Helicopter-borne gamma ray spectrometric and magnetic total field geophysical survey, Imperial Metals Corporation's Mount Polley Mine area, British Columbia: British Columbia Ministry of Energy Mines and Petroleum Resources Open File 2004-10 / Geolocial Survey of Canada Open File 4619.

Porphyry Districts of British Columbia Atlas Series

MOUNT POLLEY

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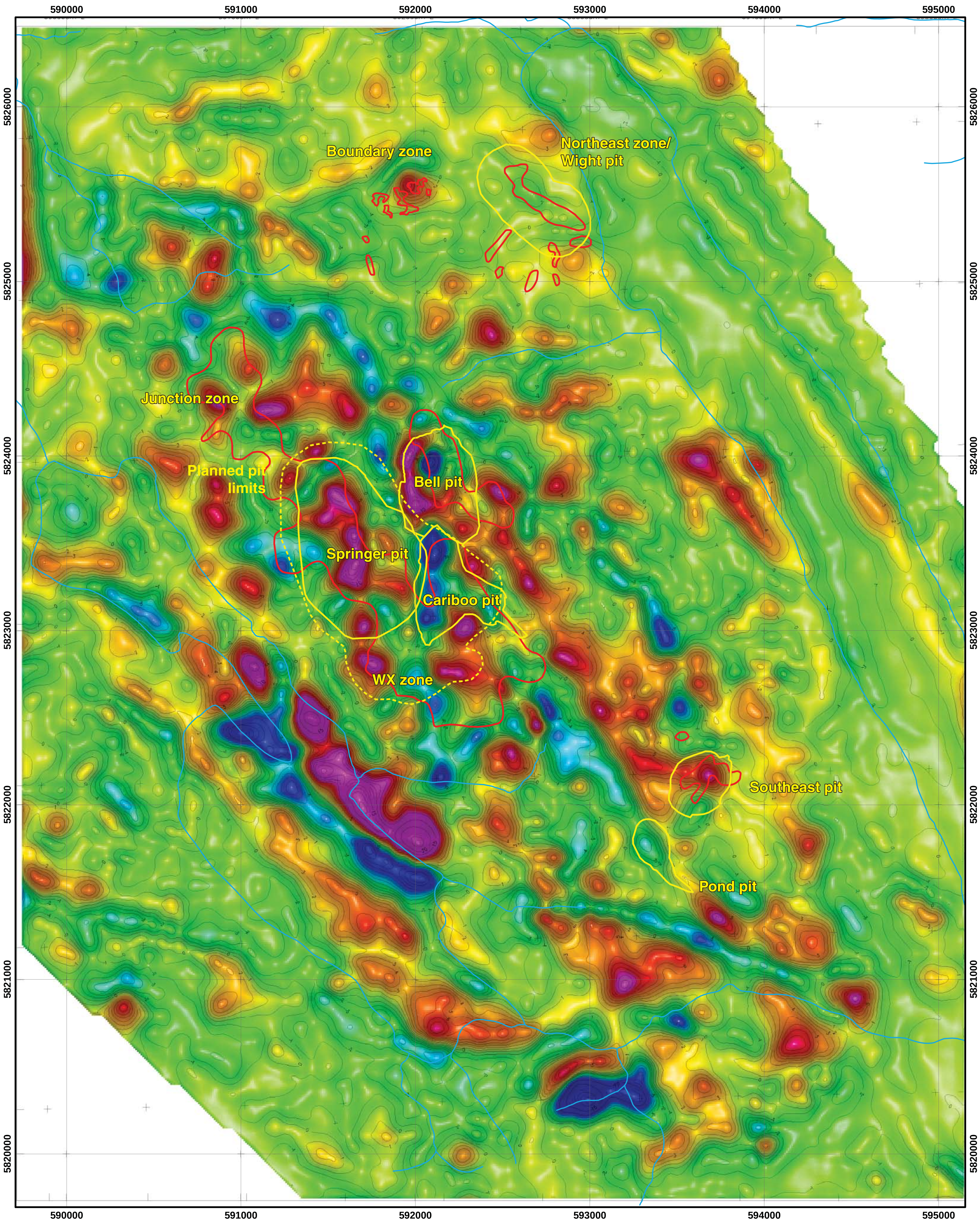
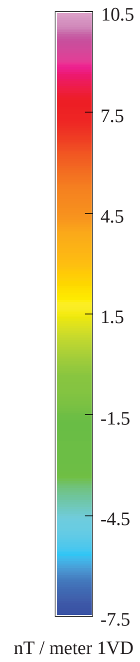
Geoscience BC

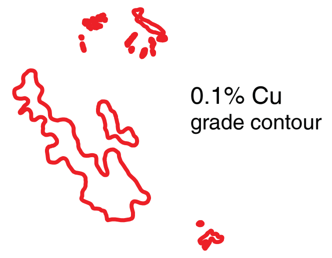
MAGNETICS - Airborne
First Vertical Derivative

1:20 000





Mount Polley orebodies
(Rees et al., 2014)



SCALE 1:20,000

0 1 2

kilometres

Universal Transverse Mercator Projection
NAD 83 Datum, Zone 10

Data Sources:

The Imperial Metals Corporation Mount Polley Mine survey data is available thorugh the Canadian Aeromagnetic Database <http://gdr.agg.nrcan.gc.ca >

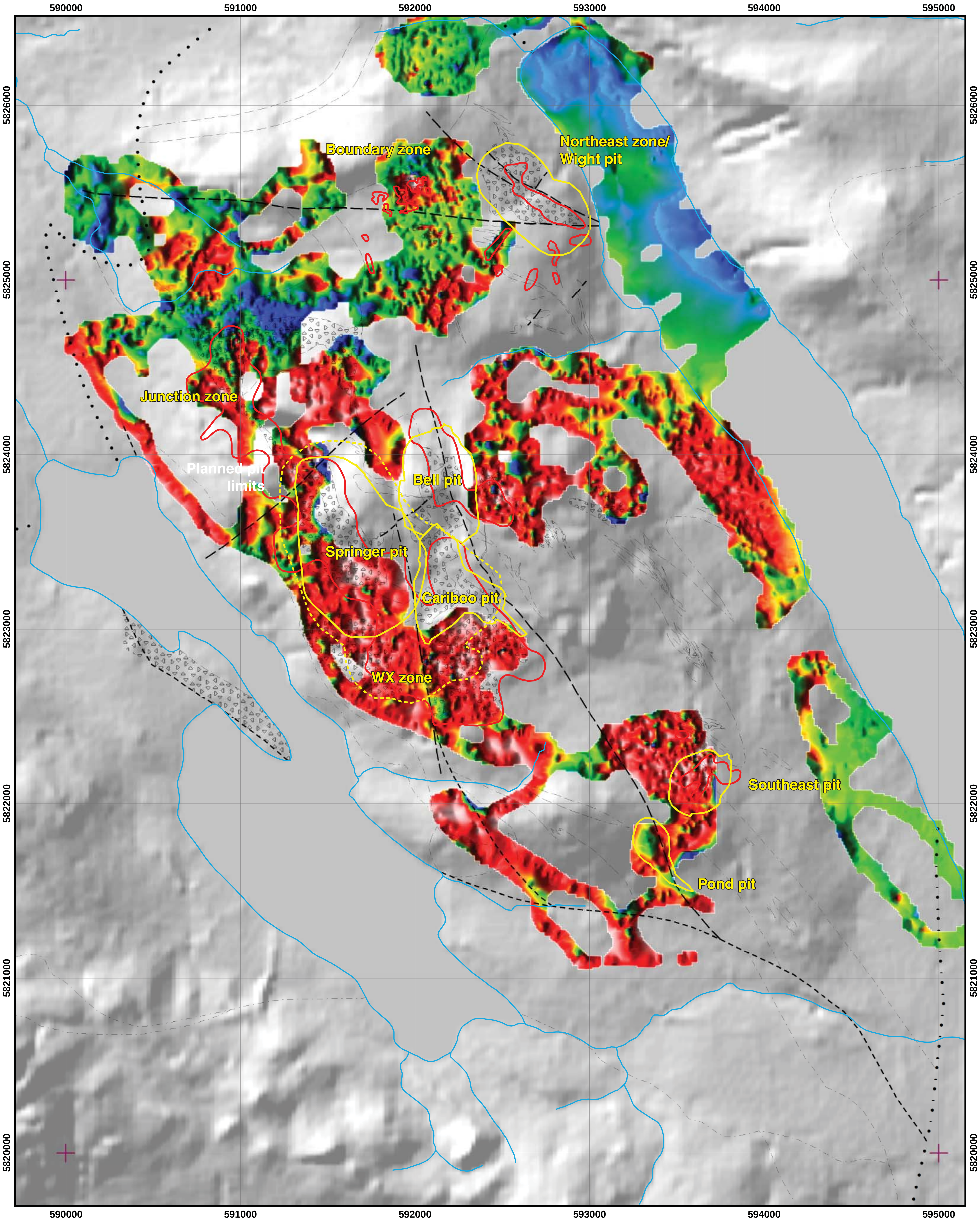
Shives, R.B.K., Carson, J.M., Ford, K.L., Holman, P.B., and Cathro, M., 2004, Helicopter-borne gamma ray spectrometric and magnetic total field geophysical survey, Imperial Metals Corporation's Mount Polley Mine area, British Columbia: British Columbia Ministry of Energy Mines and Petroleum Resources Open File 2004-10 / Geolocial Survey of Canada Open File 4619.

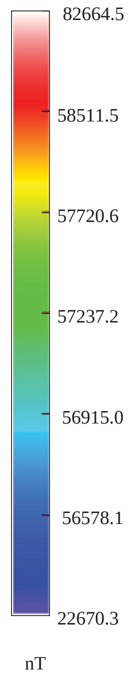
Porphyry Districts of British Columbia Atlas Series

MOUNT POLLEY

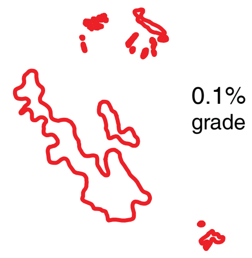
A geo-exploration atlas of the Mount Polley porphyry copper-gold district

MAGNETICS - Ground
Total Magnetic Intensity
1:20 000





Mount Polley orebodies
(Rees et al., 2014)



0.1% Cu
grade contour

SCALE 1:20,000

0 1 2
kilometres

Universal Transverse Mercator Projection
NAD 83 Datum, Zone 10

Data Sources:

Digital files for previously unpublished ground magnetic data provided by Imperial Metals Corporation.

This image is generated from ground magnetic survey data from various parts of the Mount Polley district. Surveys were conducted by Imperial Metals between 2007 and 2010.

The areas of mineralization, denoted on this map by the pit outlines, do generally coincide with the areas of high magnetic response.

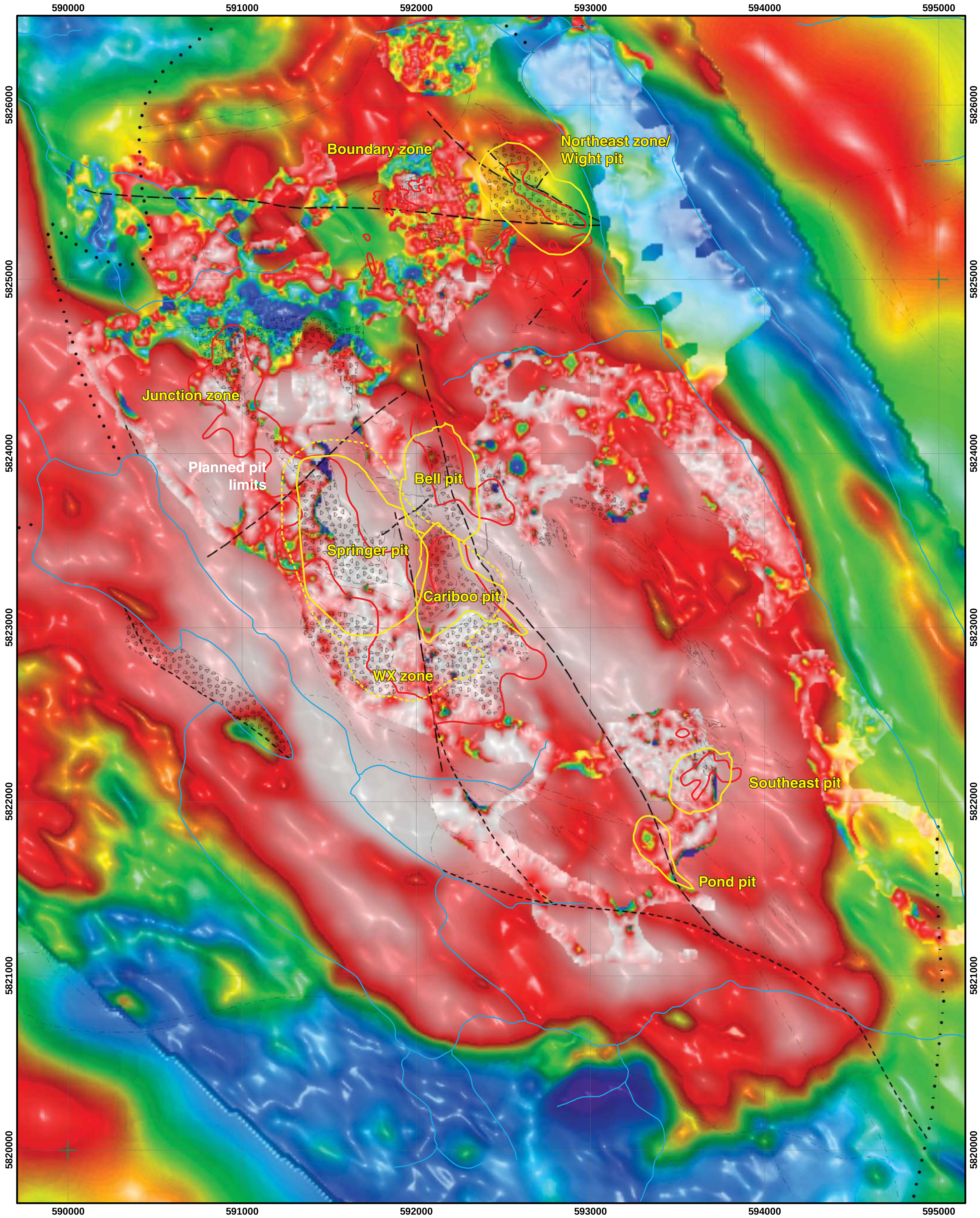
MOUNT POLLEY

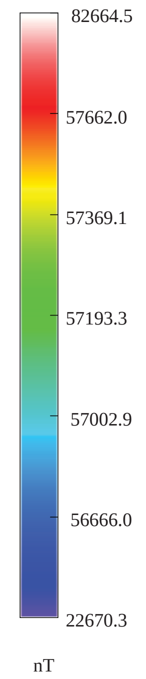
A geo-exploration atlas of the Mount Polley porphyry copper-gold district

Geoscience BC

MAGNETICS - Ground over Airborne
Total Magnetic Intensity

1:20 000





Mount Polley orebodies
(Rees et al., 2014)

0.1% Cu
grade contour

SCALE 1:20,000

0 1 2
kilometres

Universal Transverse Mercator Projection
NAD 83 Datum, Zone 10

Data Sources:

Digital files for previously unpublished ground magnetic data provided by Imperial Metals Corporation.

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This combined image is generated from the same ground magnetic survey data presented in the previous map, overlain and integrated with the aeromagnetic data. It is notable that the aeromagnetic high amplitude anomalies are made up of both high and low magnetic features in the ground magnetic data, which shows signitifcantly more detail in the anomalous areas.

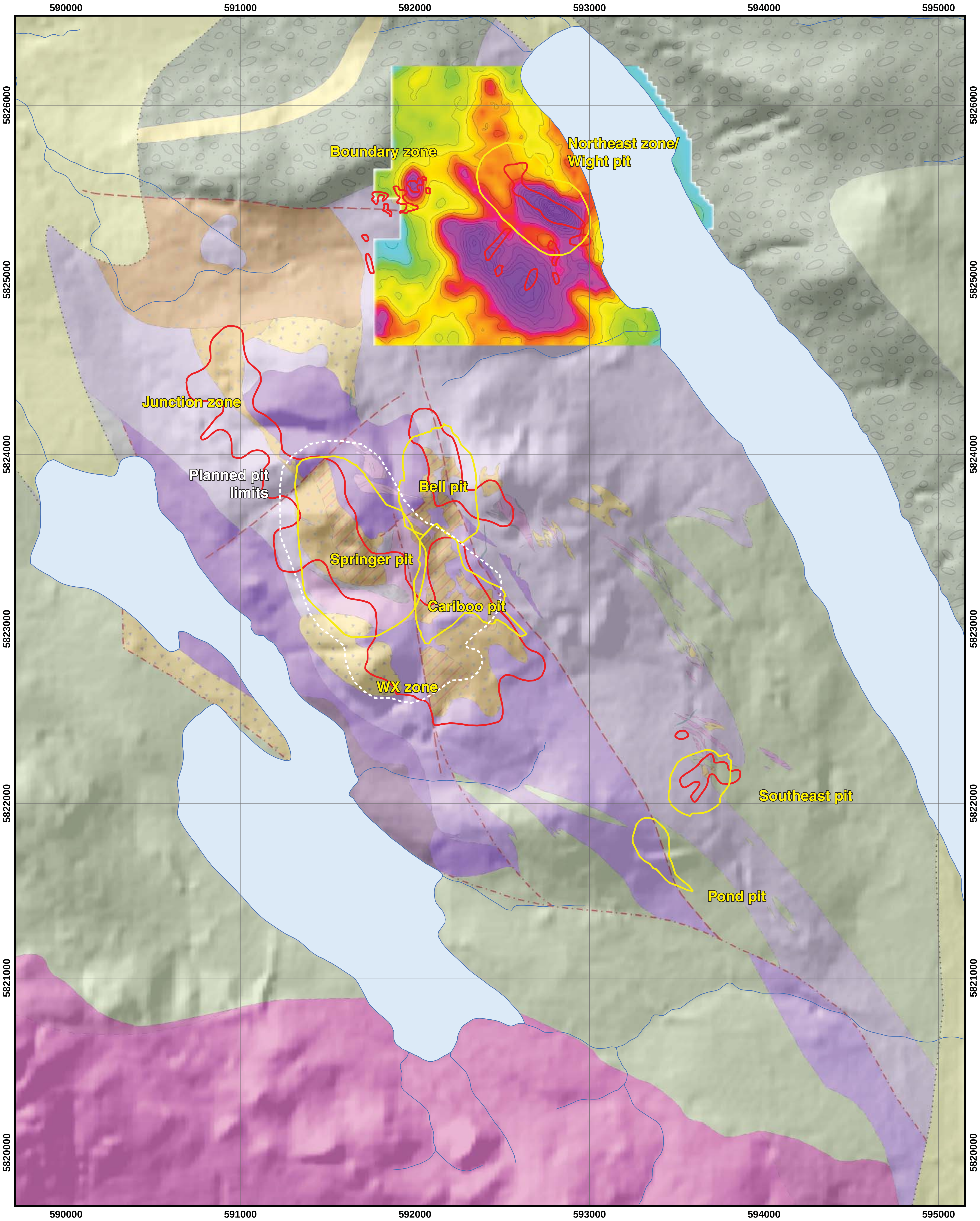
While the highest magnetic response in the central part of the intrusive complex generally coincides with the breccia-hosted mineralization in the original Cariboo-Bell area, the high-grade Northeast zone mineralization produces a low magnetic response.

Porphyry Districts of British Columbia Atlas Series

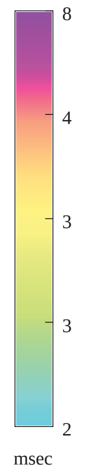
MOUNT POLLEY

A geo-exploration atlas of the Mount Polley porphyry copper-gold district

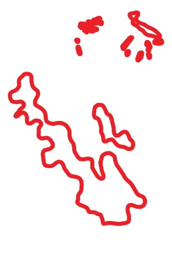
IP Chargeability 1:20 000



100 m depth slice of chargeability from an inversion model of all of the data.



Mount Polley orebodies
(Rees et al., 2014)



SCALE 1:20,000

0 1 2

kilometres

Universal Transverse Mercator Projection
NAD 83 Datum, Zone 10

Data Sources:

Associated Mining Consultants Ltd., 2005: Geophysical report on electromagnetic and induced polarization / resistivity surveys carried out at Mount Polley Mine property; British Columbia Ministry of Energy, Mines and Petroleum Resources, Assessment Report 27894, 77 pages.

Digital data provided by Imperial Metals Corporation.

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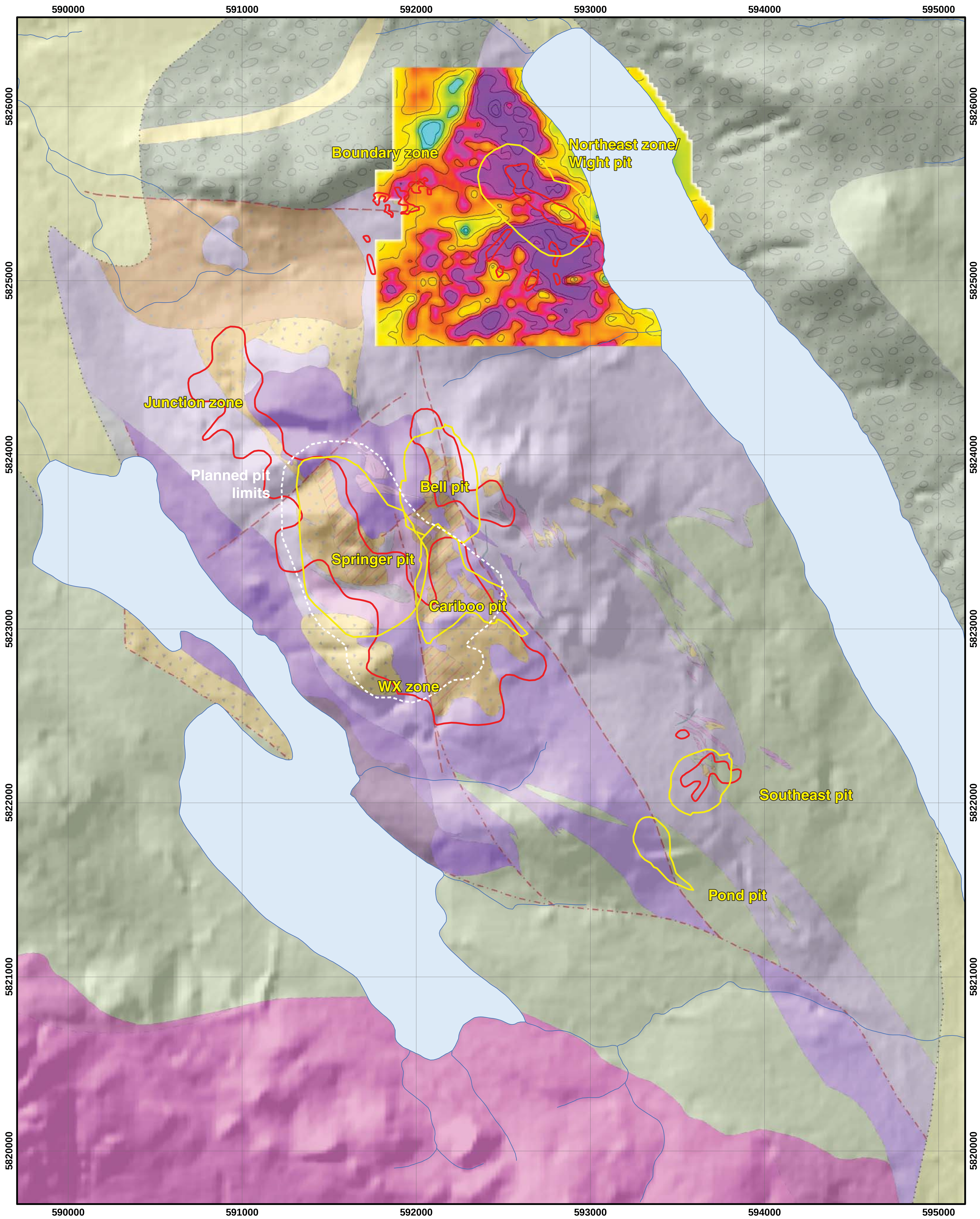
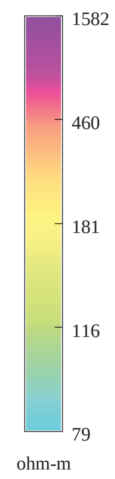
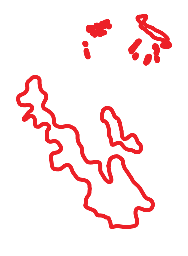
IP Resistivity 1:20 000



100 m depth slice of resistivity from an inversion model of all of the data.



Mount Polley orebodies
(Rees et al., 2014)



SCALE 1:20,000

0 1 2

kilometres

Universal Transverse Mercator Projection
NAD 83 Datum, Zone 10

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MOUNT POLLEY

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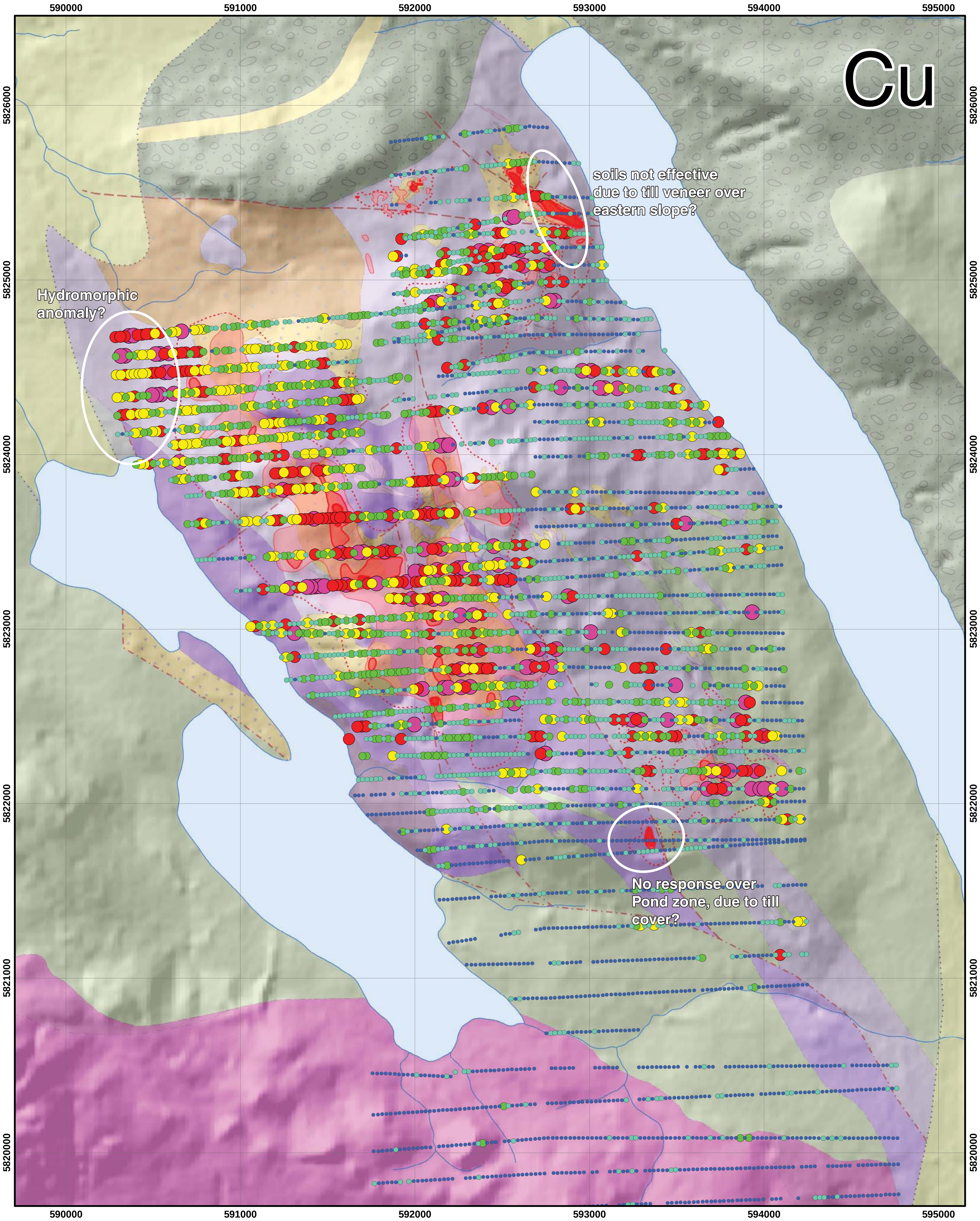
SOIL GEOCHEMISTRY

1:20 000



Cu

percentile	ppm
0 - 50	0 - 50
50 - 75	51 - 144
75 - 90	145 - 288
90 - 95	289 - 483
95 - 98	484 - 1 184
98 - 100	1 185 - 14 337

Copper Grade Contours
(Rees et al., 2014)

0.6% Cu
0.3% Cu
0.1% Cu
limit of elevated copper

SCALE 1:20,000

0 1 2
kilometres

Universal Transverse Mercator Projection
NAD 83 Datum, Zone 10

Data Sources:

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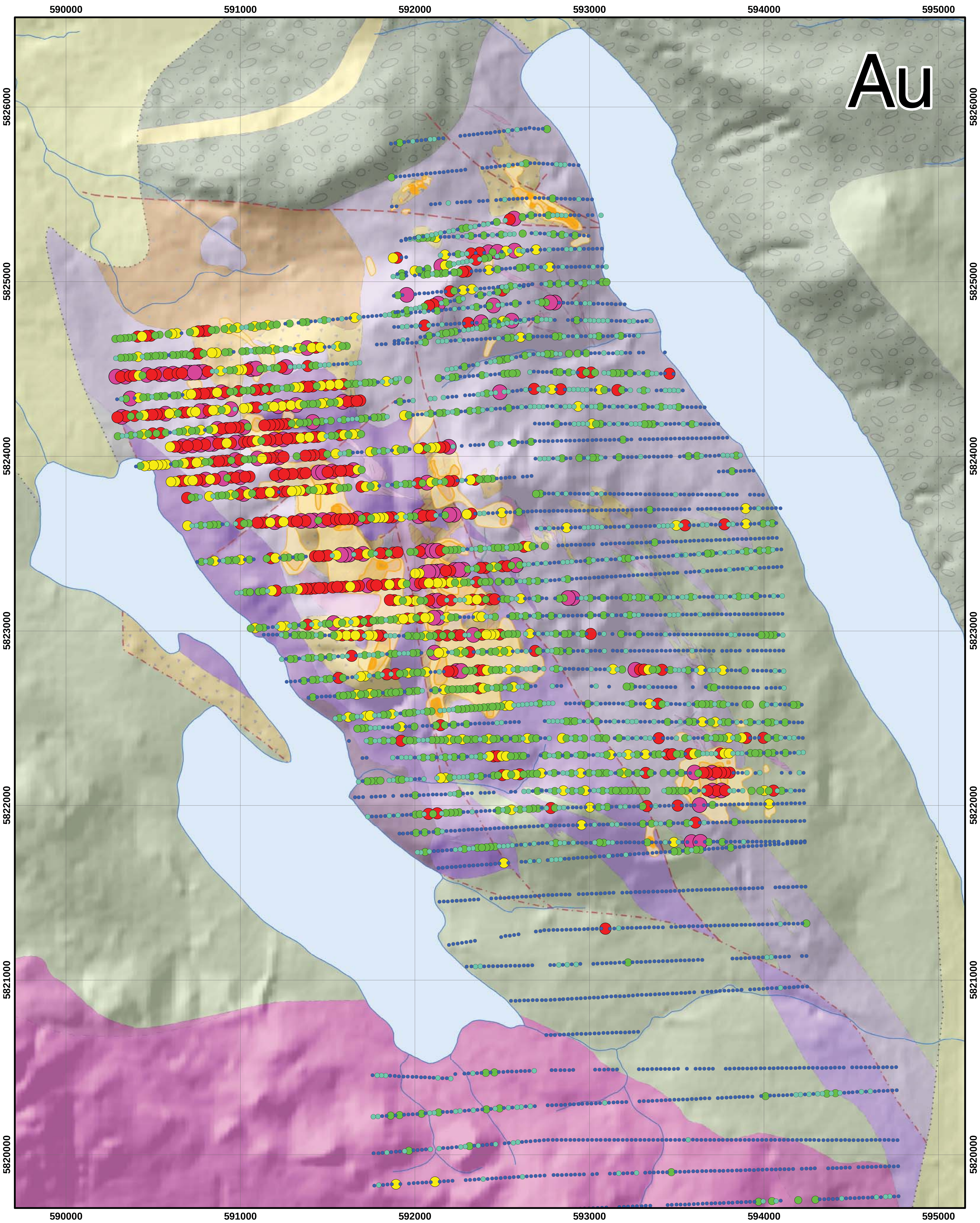
MOUNT POLLEY

A geo-exploration atlas of the Mount Polley porphyry copper-gold district

SOIL GEOCHEMISTRY

1:20 000



Au

percentile	ppb
0 - 50	0.0 - 5.0
50 - 75	5.1 - 14.8
75 - 90	14.9 - 25.0
90 - 95	25.1 - 39.0
95 - 98	39.1 - 87.0
98 - 100	87.1 - 1080.0

Gold Grade Contours
(Rees et al., 2014)

0.6 ppm Au
0.3 ppm Au
0.1 ppm Au

SCALE 1:20,000

0 1 2
kilometres

Universal Transverse Mercator Projection
NAD 83 Datum, Zone 10

Data Sources:

McNaughton, K., 1987: Cariboo-Bell Project, 1986 Geochemical, geophysical and drilling report on the BJ, Bootjack, CB and Polley mineral claims, Cariboo Mining Division, NTS 093A/12E; British Columbia Ministry of Energy and Mines Assessment Report No. 16,040, 267 pages.

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Porphyry Districts of British Columbia Atlas Series

MOUNT POLLEY

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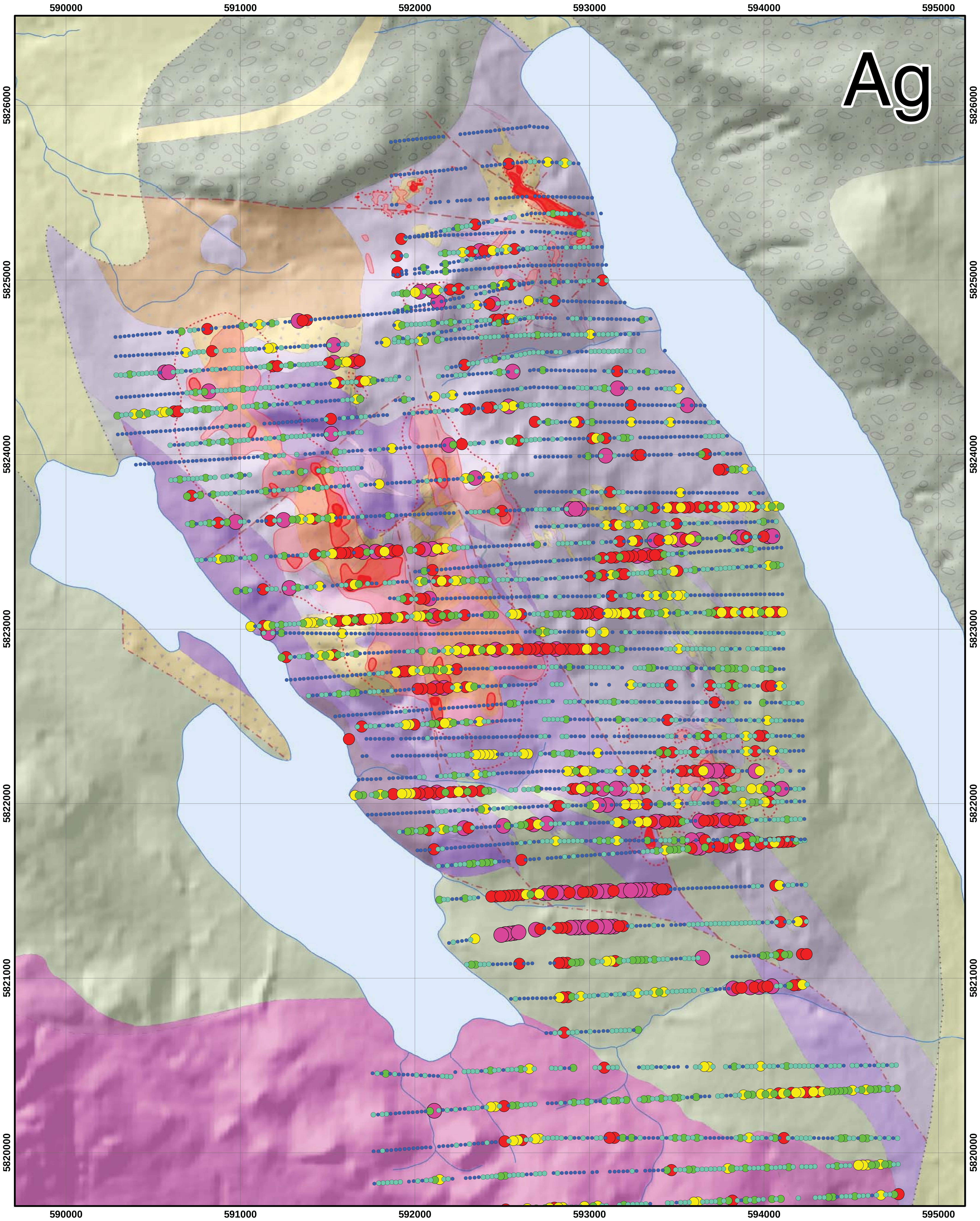
SOIL GEOCHEMISTRY

1:20 000



Ag

percentile	ppm
0 - 50	0.0 - 0.1
50 - 75	0.2 - 0.3
75 - 90	0.4
90 - 95	0.5
95 - 98	0.6 - 0.8
98 - 100	0.9 - 4.9

Copper Grade Contours
(Rees et al., 2014)

0.6% Cu
0.3% Cu
0.1% Cu
limit of elevated copper

SCALE 1:20,000

0 1 2
kilometres

Universal Transverse Mercator Projection
NAD 83 Datum, Zone 10

Data Sources:

McNaughton, K., 1987: Cariboo-Bell Project, 1986 Geochemical, geophysical and drilling report on the BJ, Bootjack, CB and Polley mineral claims, Cariboo Mining Division, NTS 093A/12E; British Columbia Ministry of Energy and Mines Assessment Report No. 16,040, 267 pages.

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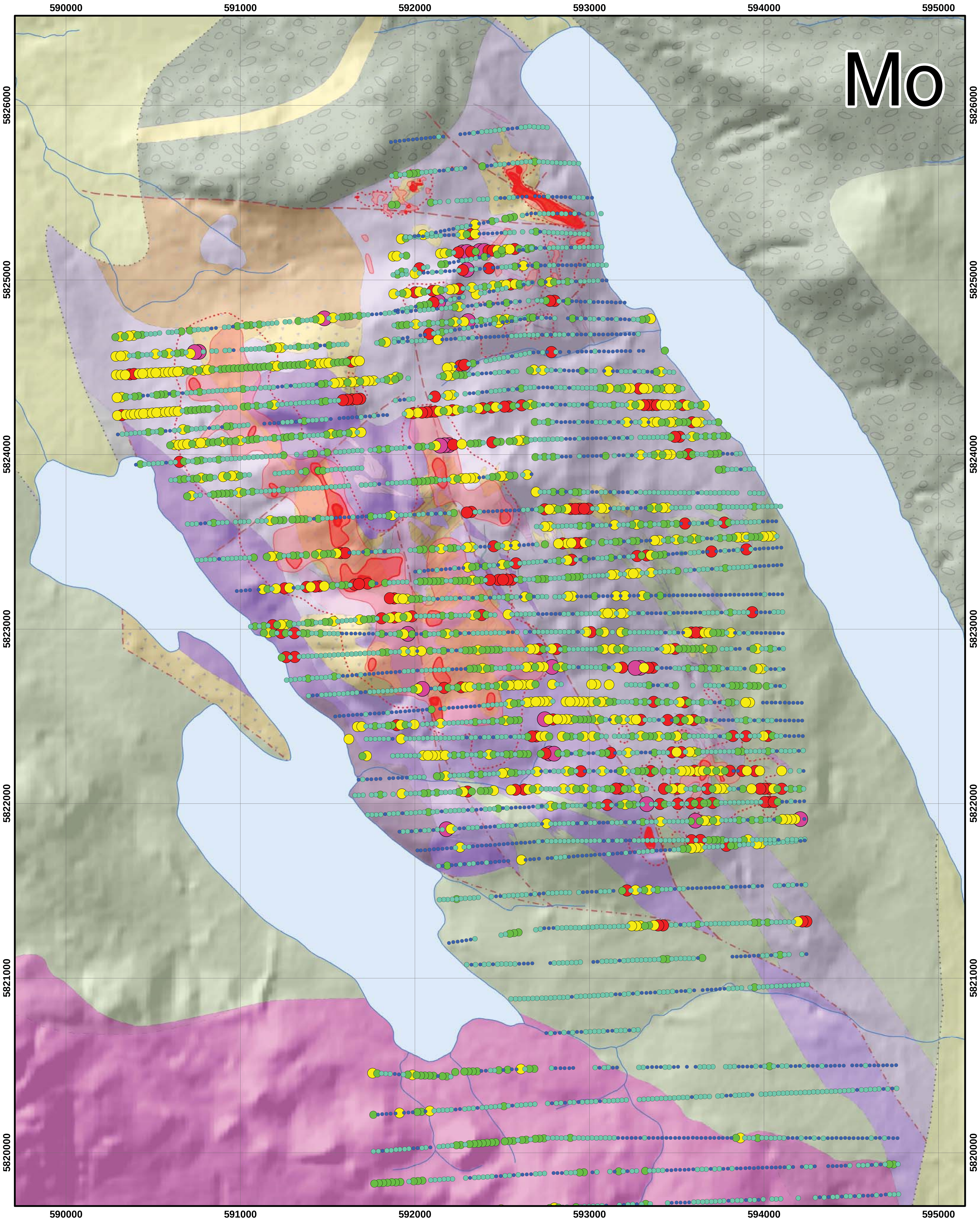
SOIL GEOCHEMISTRY

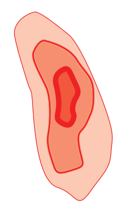
1:20 000



Mo

percentile	ppm
0 - 50	0.00 - 0.90
50 - 75	0.91 - 1.90
75 - 90	1.91 - 2.00
90 - 95	2.01 - 4.00
95 - 98	4.01 - 13.00
98 - 100	13.00 - 68.0

Copper Grade Contours
(Rees et al., 2014)



0.6% Cu
0.3% Cu
0.1% Cu
limit of elevated copper

SCALE 1:20,000

0 1 2
kilometres

Universal Transverse Mercator Projection
NAD 83 Datum, Zone 10

Data Sources:

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MOUNT POLLEY

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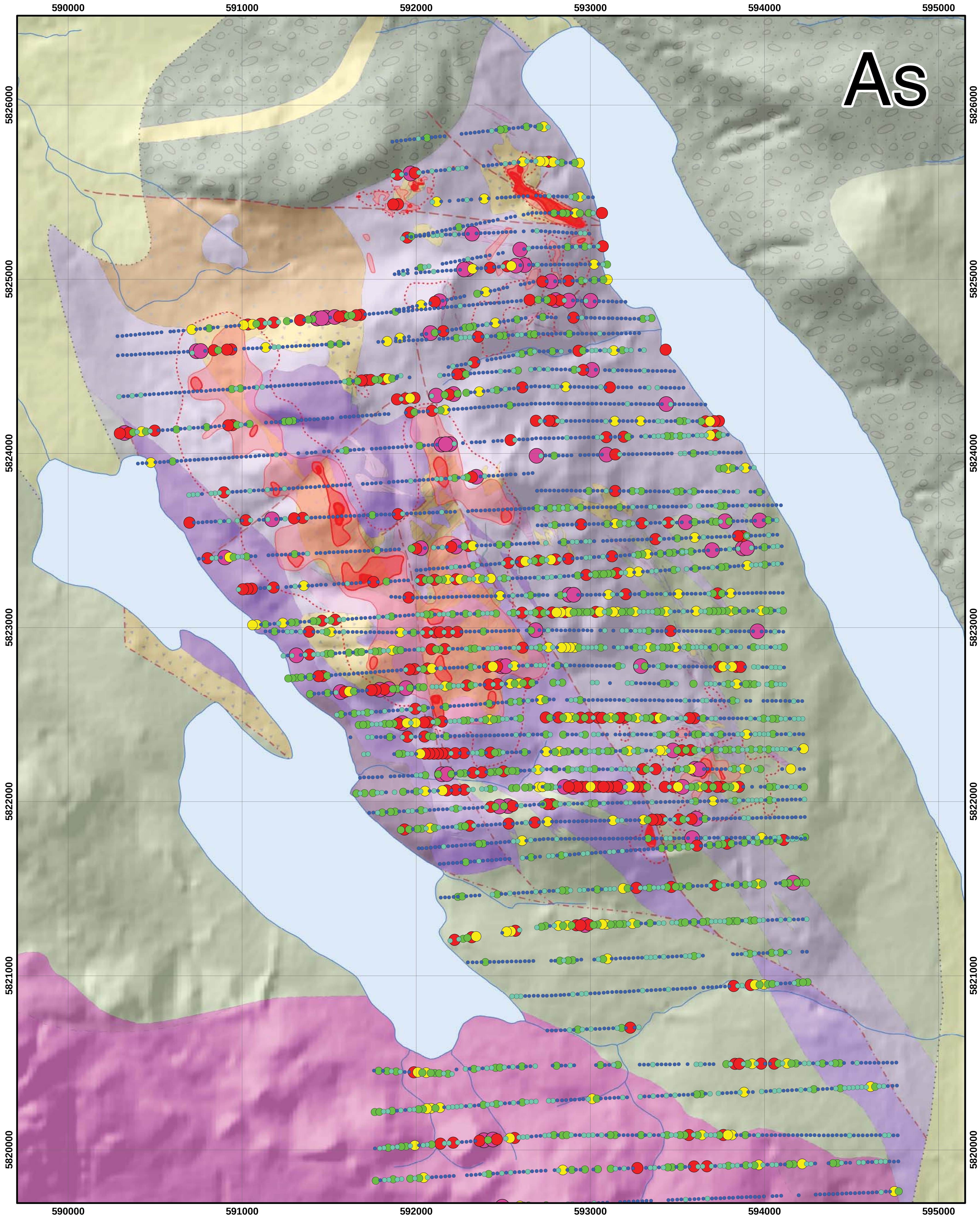
SOIL GEOCHEMISTRY

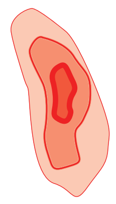
1:20 000



As

percentile	ppm
0 - 50	0.0 - 4.0
50 - 75	4.1 - 6.9
75 - 90	7.0 - 8.0
90 - 95	8.1 - 9.0
95 - 98	9.1 - 13.5
98 - 100	13.6 - 197.0

Copper Grade Contours
(Rees et al., 2014)



0.6% Cu
0.3% Cu
0.1% Cu
limit of elevated copper

SCALE 1:20,000

0 1 2
kilometres

Universal Transverse Mercator Projection
NAD 83 Datum, Zone 10

Data Sources:

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MOUNT POLLEY

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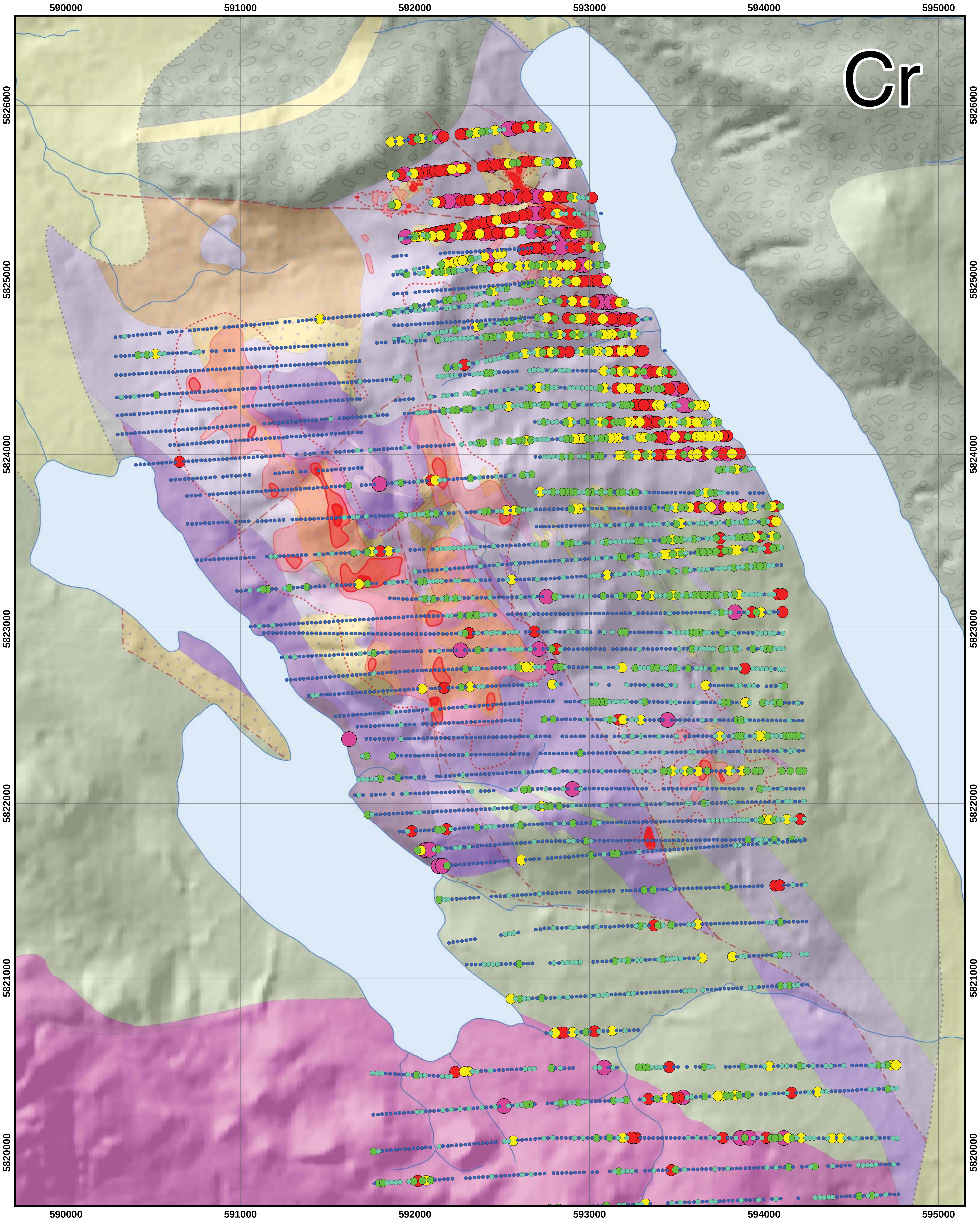
SOIL GEOCHEMISTRY

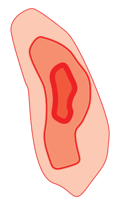
1:20 000



Cr

percentile	ppm
0 - 50	0 - 30
50 - 75	31 - 37
75 - 90	38 - 44
90 - 95	45 - 52
95 - 98	53 - 67
98 - 100	68 - 236

Copper Grade Contours
(Rees et al., 2014)



0.6% Cu
0.3% Cu
0.1% Cu
limit of elevated copper

SCALE 1:20,000

0 1 2
kilometres

Universal Transverse Mercator Projection
NAD 83 Datum, Zone 10

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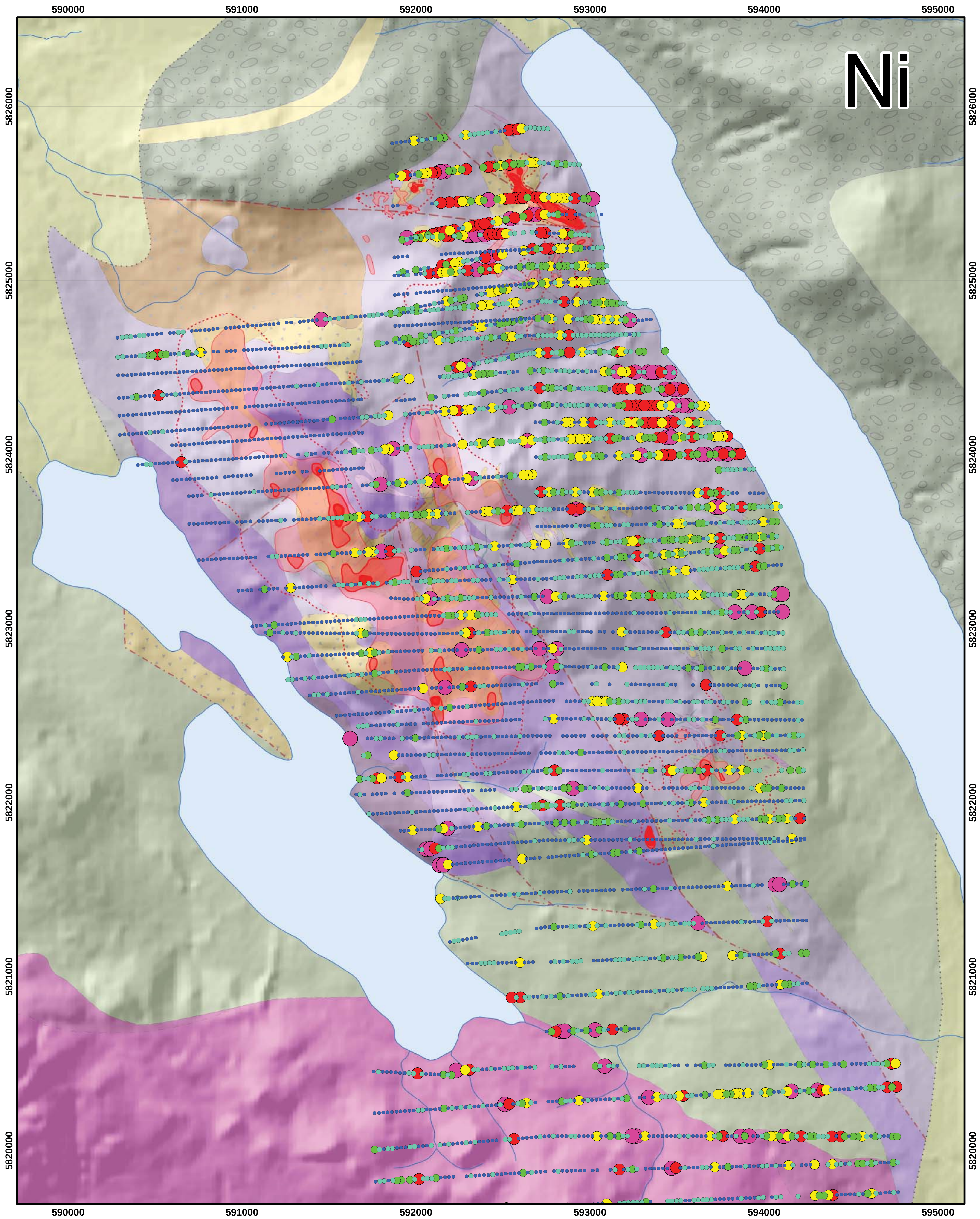
MOUNT POLLEY

A geo-exploration atlas of the Mount Polley porphyry copper-gold district

SOIL GEOCHEMISTRY

1:20 000



Ni

percentile	ppm
0 - 50	0.0 - 19.9
50 - 75	20.0 - 26.7
75 - 90	26.8 - 31.9
90 - 95	32.0 - 37.0
95 - 98	37.1 - 49.0
98 - 100	49.1 - 233.0

Copper Grade Contours
(Rees et al., 2014)

0.6% Cu
0.3% Cu
0.1% Cu
limit of elevated copper

SCALE 1:20,000

0 1 2
kilometres

Universal Transverse Mercator Projection
NAD 83 Datum, Zone 10

Data Sources:

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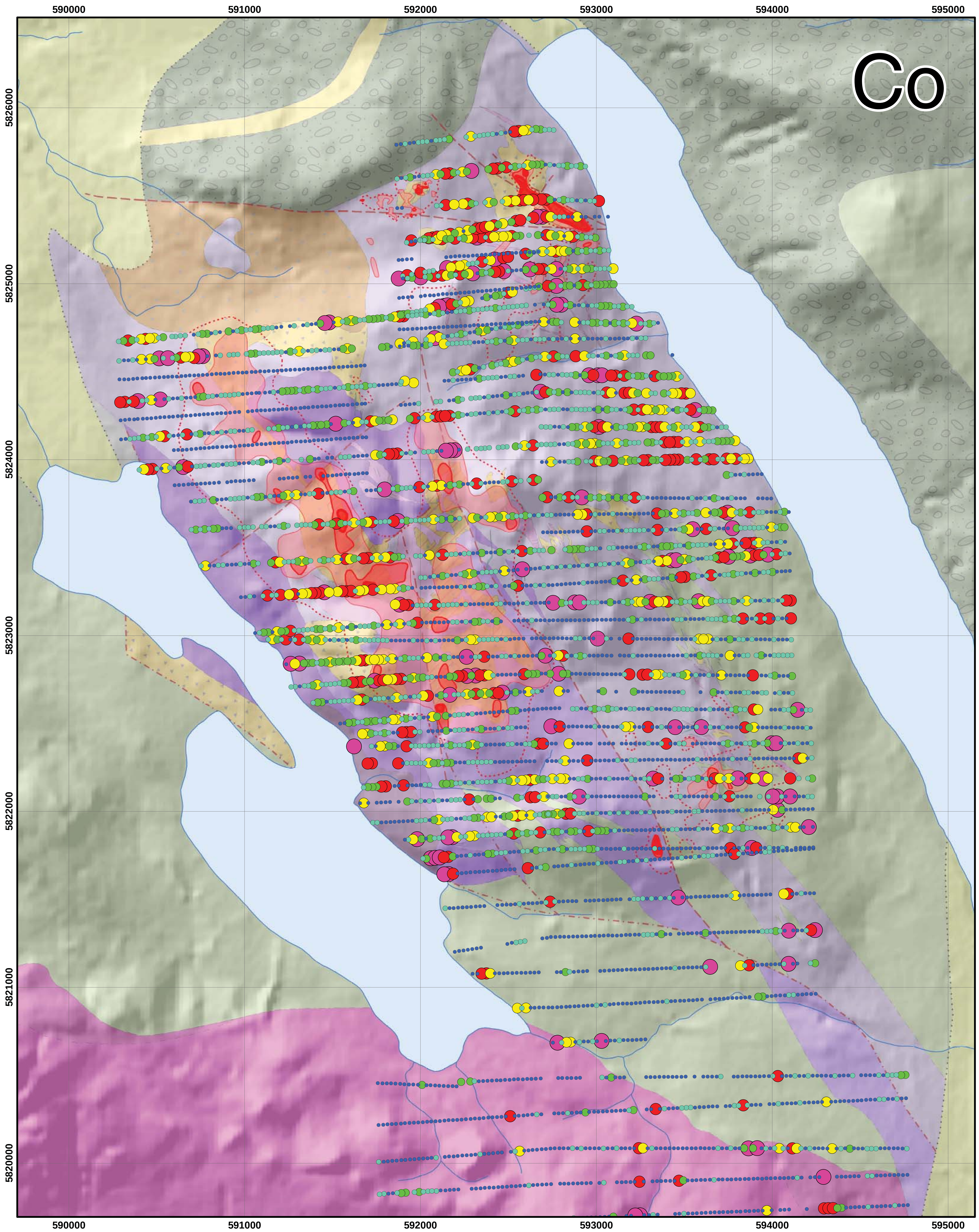
SOIL GEOCHEMISTRY

1:20 000



Co

percentile	ppm
0 - 50	0.0 - 10.9
50 - 75	11.0 - 13.0
75 - 90	13.1 - 15.9
90 - 95	16.0 - 17.9
95 - 98	18.0 - 22.7
98 - 100	22.8 - 68.1

Copper Grade Contours
(Rees et al., 2014)

0.6% Cu
0.3% Cu
0.1% Cu
limit of elevated copper

SCALE 1:20,000

0 1 2
kilometres

Universal Transverse Mercator Projection
NAD 83 Datum, Zone 10

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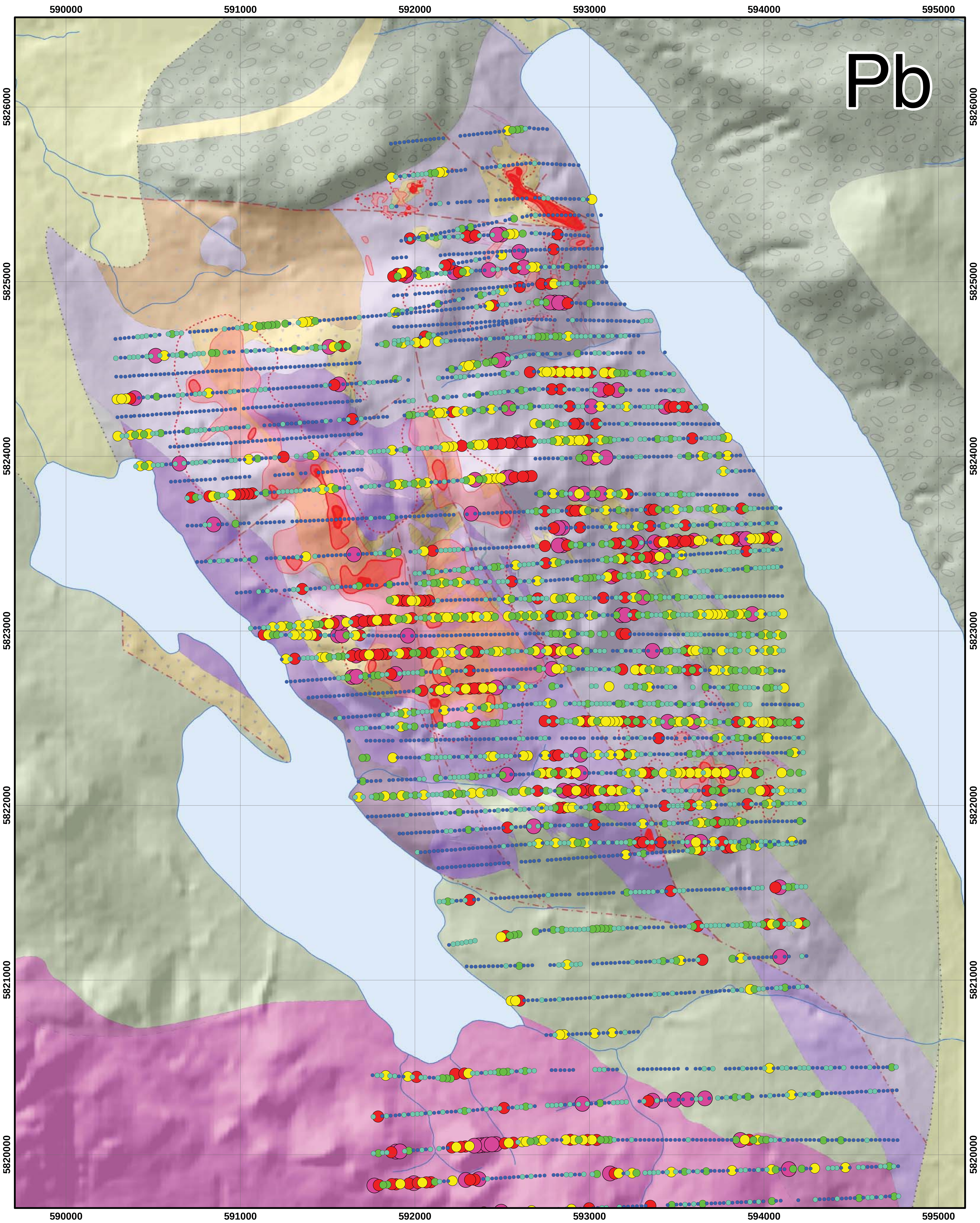
SOIL GEOCHEMISTRY

1:20 000



Pb

percentile	ppm
0 - 50	0.0 - 12.0
50 - 75	12.1 - 15.0
75 - 90	15.1 - 17.0
90 - 95	17.1 - 20.0
95 - 98	20.1 - 27.0
98 - 100	27.1 - 78.0

Copper Grade Contours
(Rees et al., 2014)

0.6% Cu
0.3% Cu
0.1% Cu
limit of elevated copper

SCALE 1:20,000

0 1 2
kilometres

Universal Transverse Mercator Projection
NAD 83 Datum, Zone 10

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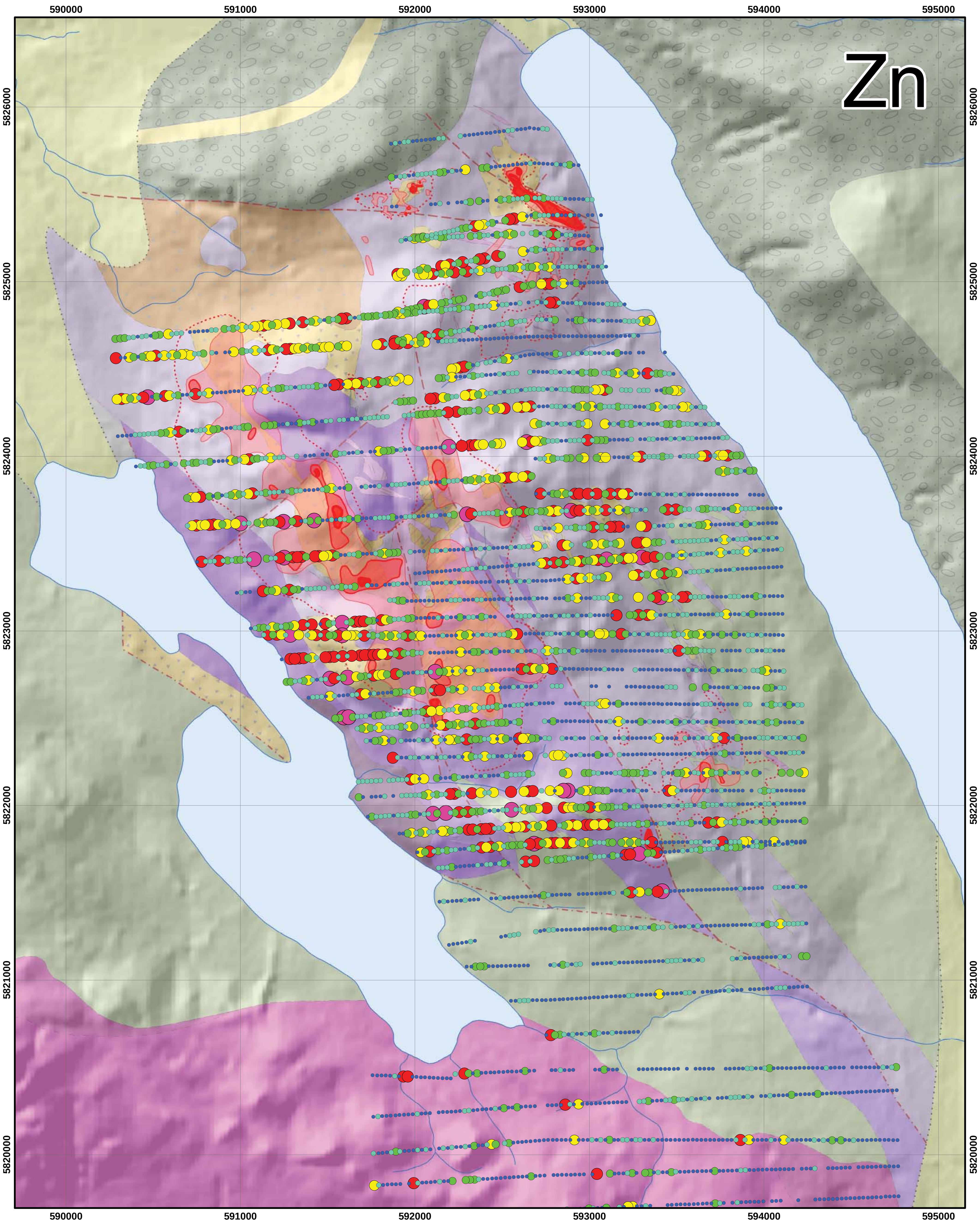
SOIL GEOCHEMISTRY

1:20 000



Zn

percentile	ppm
0 - 50	25 - 76
50 - 75	77 - 109
75 - 90	110 - 140
90 - 95	141 - 175
95 - 98	176 - 237
98 - 100	238 - 257

Copper Grade Contours
(Rees et al., 2014)

0.6% Cu
0.3% Cu
0.1% Cu
limit of elevated copper

SCALE 1:20,000

0 1 2
kilometres

Universal Transverse Mercator Projection
NAD 83 Datum, Zone 10

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