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dominated by grit, phyllite and quartzite (including Goose Peak, Eaglesnest and Agnes successions). These units, of suspected early Paleozoic age, are correlated with the Lardeau Group of the Kootenay Arc and with middle portions of the Eagle Bay assemblage (upper part of unit EBG and unit EBS).

Mineral occurrences within Barkerville Terrane include rich late Tertiary and Quaternary gold-bearing placers, Mesozoic gold-quartz veins and related pyritic replacement deposits, and local massive sulphide accumulations. The latter category includes the Frank Creek occurrence south of western Cariboo Lake, hosted by black carbonaceous metasedimentary rocks of the Harveys Ridge succession stratigraphically beneath mafic to intermediate metavolcanic rocks. The host stratigraphy and Beshi-style mineralization correlate with the past-producing Goldstream deposit, hosted by the lower Lardeau Group in the northern Selkirk Mountains. Lode gold deposits, including several past-producers and the newly-discovered Bonanza Ledge zone near Wells, formed in the Early Cretaceous during the latter stages of a protracted sequence of regional ductile deformation and metamorphic events that began in late Early Jurassic time.

11:10 Atlin TGI update and new massive sulphide discovery in Cache Creek rocks
Mitch Mihalyuk, BC Ministry of Energy and Mines; Bob Anderson, Carmel Lowe, Mike Villeneuve, Geological Survey of Canada; Stephen Johnston, Joseph English, University of Victoria; Fabrice Cordey, Université Claude Bernard Lyon 1, France

In 2002, a third and final season of geoscience field studies was completed under the aegis of the federal and provincially funded Targeted Geoscience Initiative (TGI) in the Atlin area (NTS 104N), northwestern BC. Most of the Atlin area is underlain by rocks of the Cache Creek complex, including: ultramafic and mafic volcanic rocks of predominantly juvenile arc origin, platformal carbonate, and pelagic and terrigenous rocks. Under-explored primitive arc rocks have demonstrated potential for volcanogenic mineralization. Cache Creek complex is also intruded by Mesozoic plutons with varied metallogenic potential, particularly for granite-hosted lode gold deposits. Early to Middle Jurassic sedimentary rocks of the Laberge Group flank Cache Creek complex to the southwest. Our preliminary hydrocarbon evaluation of these strata show that some units have good source rock potential, are gas prone, and lie partly within the oil window.

The Late Cretaceous Surprise Lake biotite granite batholith, newly dated at 79.7 +/- 0.2 Ma (U-Pb), hosts abundant granophile mineral occurrences, and also shows features such as miarolitic cavities and pegmatite segregations suggesting partition of liquid/vapour phases capable of transporting metals. Similar but less abundant features in the Middle Jurassic Mount McMaster granodioritic pluton (newly dated at 172.7 +/- 0.3 Ma, U-Pb) are in accord with enhanced RGS Au anomalies from streams draining its southern margin. Preserved metasedimentary pendants and finer grain size suggest preservation of the pluton roof, in contrast to deeper levels of exposure of the coeval Llangorse Mountain granodiorite batholith (newly dated at 171.7 +/- 0.3 Ma (U-Pb)) to the east. In addition to RGS Au anomalies, other indicators of lode gold potential of Middle Jurassic plutons include placer deposits that are concentrated where pluton aureoles are deeply exhumed and widest, and the age of mineralization in known lode gold occurrences which is coeval with plutonism.

Our discovery of magnetite exhalite (Thunder Alley occurrence), demonstrates the potential for further undiscovered volcanogenic mineralization. It comprises up to 50 % of layers as much as 5 m thick, that occur intermittently across a 25m interval and crop out for more than 700 m long strike. Or discovery of the Joss'alun occurrence,

demonstrates the potential for further discovery of significant accumulations of base metal sulphides. Mineralization at Joss'alun is of uncertain origin. It consists of lenses of semi-massive chalcopyrite and lesser pyrite up to 90 cm thick. These lenses are apparently concordant, and are stacked over an exposed interval of more than 10m. Discordant veins, typically less than 5 cm thick, are common. Grab samples assay more than 10% Cu and a 90cm chip assayed 3.35% Cu. Mineralized outcrops occur over a distance of 225 m and blebs of chalcopyrite were observed in volcanic breccia 1 km east-southeast of the main mineralized zone. Host rocks are submarine flow breccia and mafic tuff. Irregular interbeds of ferruginous chert contain radiolaria of Permian age. Structurally underlying rocks are tectonized mantle harzburgite. Rocks that unconformably overlie the mineralized volcanic rocks are very coarse, quartz-rich clastic sediments including very coarse granitoid boulder conglomerate, probably derived from the roots of an arc. Detrital zircons indicate that this arc was 240-250 Ma - coeval with the Kutcho arc volcanics

11:30 Use of Spinel in Mineral Exploration: Application to the Enigmatic Giant Mascot Ni-Cu-PGE Deposit and Metallogenic Implications

Graham Nixon, Geological Survey Branch, Ministry of Energy & Mines, 1810 Blanshard St., Victoria BC V8V 4X4

Spinel (chromites) are among the first common phases to crystallize in a variety of terrestrial igneous rocks and exhibit a wide range of compositions sensitive to the conditions of crystallization. Whereas modern techniques in diamond exploration routinely rely on a suite of important indicator minerals (*e.g.* garnet, pyroxene, ilmenite), spinel is a sorely under-utilized tool in the search for economic deposits of platinum-group elements (PGE) and Ni-Cu-PGE sulphides hosted by ultramafic and mafic rocks.

A compilation of spinel compositions recently published by Barnes and Roeder (2001) is a comprehensive database of spinel analyses (>26 000) representing a diverse assemblage of intrusive and extrusive mafic and ultramafic rocks formed in a wide variety of tectonic settings. The extremely large volume of spinel analyses are subdivided into various categories and subcategories based on magma type and geological environment, and include ophiolites, continental layered intrusions and flood basalts, island-arc tholeiites and oceanic basalts, boninites, alkalic and lamprophyric rocks, mantle xenoliths, Alaskan-type ultramafic intrusions and komatiites. Spinel populations in each category are represented by data density contour plots which allow for a quantitative comparison between spinel groupings in the global database and spinels from rocks whose magmatic affinity and tectonic setting are poorly characterized. The database also serves as a valuable tool in provenance studies where, for example, chromite is associated with platinum placers (*e.g.* Tulameen).

As an example of the use of spinel in mineral exploration, chromites occurring in ultramafic rocks which host Ni-Cu±PGE ores extracted from the former Giant Mascot mine (1958-74) are examined in the light of the global spinel database. The petrotectonic setting of the Giant Mascot ores currently remains enigmatic in that the ultramafic rocks which host the sulphides were once considered to be part of the calc-alkaline Spuzzum pluton yet the mineral deposits themselves appear more characteristic of a tholeiitic magmatic association. Plots of the available spinel analyses for Giant Mascot provide a rational framework in which to examine the magmatic and tectonic affiliation of the sulphide ores, as well as the implications for regional metallogeny.

11:50 - 12:00 Summary & Discussion