CARMI–BEAVERDELL AREA
(82E/6, 11)

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A programme of regional mapping and property examinations was initiated to define the geological setting of mineral deposits in the Carmi-Beaverdell area. This area includes a variety of interesting silver, gold, molybdenum, copper, and uranium prospects as well as the Beaverdell (Highland Bell) silver-lead-zinc-(gold) mine of Teck Corporation Ltd. The last comprehensive study of the geology and mineral deposits was conducted by Reinecke (1915).

The map-area straddles the Westkettle River valley in south-central British Columbia and is situated within the southern part of the Interior Plateau. Access is provided by Highway 33 from Kelowna (88 kilometres) and Rock Creek (48 kilometres), and freight service is provided by the Kettle River Railway. Penticton, about 40 kilometres west of Carmi, is connected to Carmi by a rough forestry access road that is passable during summer months. Locally mining and logging roads provide excellent access to most of the area.

Mapping covered an 8 by 15-kilometre area extending from south of Tuzo Creek to Wilkinson Creek and including parts of Mount Wallace, Cranberry Ridge, and King Solomon Mountain. The area is dissected by the Wilkinson Creek, Beaverdell Creek, Tuzo Creek, and Westkettle River valleys. Elevations range from 1 733 metres at Goat Peak to 744 metres in the Westkettle River valley.

GENERAL GEOLOGY

The map-area (Fig. 7) is mainly underlain by the Westkettle batholith (Nelson granodiorite) and Beaverdell stock (Valhalla ? quartz monzonite) with contained pendants of Paleozoic or Early Mesozoic metamorphosed rocks of the Wallace Formation (Anarchist Group). Tuffaceous rocks and conglomerates of the Oligocene Curry Creek series and basic Miocene flows of the Nipple Mountain series occupy the eastern part of the map-area. A complex of dykes and sills of quartz monzonite and granite composition occur near Tuzo Creek in the southern part of the map-area and mark the position of an Eocene volcanic centre (Leary, 1967) with associated molybdenum mineralization. Hypabyssal rocks of granite to basalt composition occur throughout the area and are temporally and probably genetically related to mineralization at the Beaverdell mine, Tuzo Creek molybdenum prospect and Carmi molybdenum prospect.

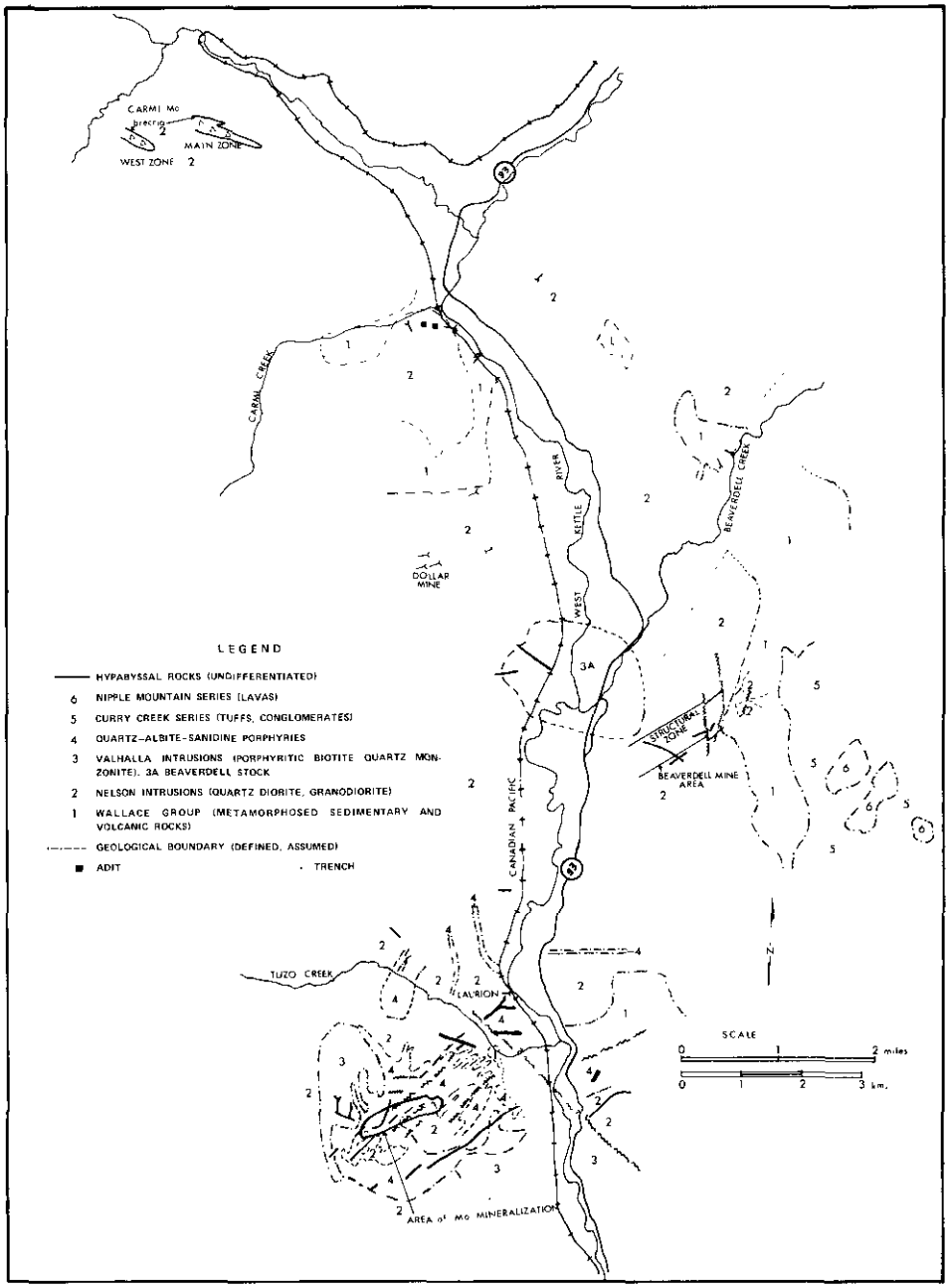

Figure 7. Carmi-Beaverdell area.

MINERAL PROPERTIES

Beaverdell (Highland Bell) Mine

Vein systems of the Beaverdell mine occur mainly within quartz diorite or granodiorite of the Westkettle batholith. Five separate vein systems are situated in a 3-kilometre, northeast-trending, complexly faulted zone on the west slope of Mount Wallace. At the eastern end of the mineralized zone, the Westkettle batholith is overlain by metamorphosed sedimentary and volcanic rocks of the Wallace Formation and at the western end of the mineralized zone, porphyritic quartz monzonite (Beaverdell stock) intruded the Westkettle batholith. Pre-mineral andesitic dykes (Wellington type) and syn or post-mineral quartz latite dykes (Idaho type) are spatially and temporally related to mineralization and often occupy the same structural zone. Veins are essentially mineralized fissures that formed along either easterly or northeasterly trending faults with mainly easterly trending veins in the western part of the mineralized zone (Wellington, Sally, and Rob Roy vein systems) and mainly northeasterly trending veins in the eastern part of the mineralized zone (Upper and Lower Lass systems). The Bell system in the central part of the mineralized zone has both easterly and northeasterly trending veins. Except for the mineralized 'black breccia' (probably a carbonaceous fault brecciated vein) that occurs in the Wallace Formation, mineralized lodes persist for only short distances into the Wallace Formation. The proximity of the Wallace Formation to mineral occurrences throughout the area suggests that the Wallace rocks acted as a dam to mineralizing solutions.

Sulphide mineralization consists mainly of pyrite, galena, and sphalerite with lesser chalcopyrite, pyrrhotite, and arsenopyrite and silver minerals including tetrahedrite, pyrargyrite, polybasite, argentite, and native silver (*see* Staples and Warren, 1946). Quartz, calcite, and rare fluorite are the main gangue minerals. Veins generally have a prophylitic alteration halo that may be recognizable up to 10 metres from the main vein and may carry low-grade silver values.

Production from the Beaverdell mine area started in 1900 and since then has totalled about 32 million ounces of silver, 24 million pounds of lead, and 28 million pounds of zinc with minor production of gold, cadmium, and copper. Gold values appear to increase in the eastern part of the Lower Lass mine but further exploration is required to outline an economic gold-silver part of the deposit. Complex faulting makes estimation of proven ore reserves tenuous and with the present economics, the main requirement for continued production is to keep mill heads above about 10 ounces of silver per ton.

Tuzo Creek Molybdenum Prospect

The main altered and mineralized zone is on the ridge immediately south of Tuzo Creek about 1 kilometre west of the Westkettle River valley. The geology of the property is generalized after Leary (1967). A stock of porphyritic quartz monzonite (Valhalla ?) and

younger bodies of quartz-albite-sanidine porphyry (Late Valhalla ? differentiates) intruded Nelson granodiorite. Low-grade molybdenum mineralization occurs in a northeasterly trending altered and sheared zone about 300 metres and 1 000 metres long. Two hydrothermal phases of structurally controlled mineralization have been recognized by Leary (1967):

Phase I (main phase) with a metallic mineral assemblage including hematite, magnetite, pyrite, and molybdenite and gangue of quartz (stockwork veining), hydro-mica and K-feldspar, and

Phase II with a metallic mineral assemblage including pyrite, sphalerite, galena, chalcopyrite, and molybdenite and gangue of sericite, quartz, calcite, and fluorite.

Weathering has produced a gossan over the mineralized zone with molybdenite converted to ferrimolybdenite.

East of the Tuzo Creek property, phase II mineralization becomes more intense and represents the typical lead-zinc vein systems that are found peripheral to molybdenum deposits.

Carmi Molybdenum Property

The property is situated north of the Carmi-Penticton road about 6 kilometres northwest of Carmi. Molybdenite with pyrite, minor chalcopyrite and notable uraninite, occurs chiefly in two sheared and brecciated zones in gneissic granodiorite (Nelson). The main or eastern zone was discovered in 1960 when Kennco Explorations, (Western) Limited obtained anomalous molybdenum values from stream sediments. In 1974 Vestor Explorations Ltd. used soil geochemistry to locate the western zone. Granby Mining Corporation (1974-75) and International Minerals & Chemicals Corp. (1970) have also explored the property.

Grade of molybdenum appears to vary with intensity of alteration and brecciation. Where alteration within the breccia zone is intense, a greissen zone consisting of quartz, muscovite, fluorite, and molybdenite (ferrimolybdenite near surface) is formed. Molybdenite occurs mainly as rosettes that are disseminated within breccia fragments and quartz feldspar matrix material.

Drill holes have intersected a leucocratic monzonite porphyry that does not appear to be exposed at the surface. The presence of a buried porphyry body suggests that the showing is at a high level in the hydrothermal and intrusive system.

Uraninite is widespread in Nelson rocks and shows some concentration in pegmatites at the Carmi prospect. Further leaching and concentration of similar material provides a plausible source for secondary uranium mineralization that has accumulated below Miocene plateau basalts north and northwest of Carmi.

Secondary Uranium (Fuki and Donen)

The Fuki and Donen (82E/10W) claims are situated 25 kilometres northeast of Beaverdell. Secondary uranium minerals mainly (autunite) have accumulated in unconsolidated gravel and sand deposits that are preserved below a cap of Miocene plateau lavas. Exploration in the Kallis Creek and Hydraulic Lake areas has located deposits with similar settings. Oxidation and weathering of uranium-bearing veins or pegmatities or low-grade disseminated uraninite in basement rocks (for example, Carmi molybdenum prospect) may be the source of this secondary mineralization.

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