P.A. Christopher

Highland Bell Mine (Beaverdell Mine)

Location Lat. 49°26' Long. 119°04' (82E/6E)

Greenwood M.D. Approximately 1 mile (1.6 km) east of the village of Beaverdell, at the head of Wallace Creek, on the west slope of Mount Wallace. The mine is accessible by 60 miles (96 km) of road from Kelowna, B.C. via highway 33 and serviced by several private mining roads from Beaverdell.

History

Records indicate that prospecting and exploration in the Beaverdell Mine area was in progress in the year 1889 with continuous production of silver since 1913 and intermittent production between 1900 and 1913. Several companies started production when the Kettle Valley Railway reached the village of Beaverdell in 1913. In 1936, the Bell and Highland Lass mines amalgamated to form the Highland Bell Mine and in 1938 obtained control of the Beaver Mine. In 1946 Leitch Gold Mines, Limited obtained control of Highland Bell, Limited, and of the Sally Mine property. In 1950 a 50 ton per day mill was constructed and the first concentrate shipments made. Discovery of the faulted extension of the Lass vein system (Lower Lass) in 1954 led to the expansion of the mill capacity to the present rate of 120 tons per day.

In 1970 Teck Corporation acquired the Highland Bell Mine and conducted an extensive exploration program with limited success. Faulted segments of known vein systems were outlined but no significant new reserves were located. At present the mining operation consists of reworking old stopes to recover remnants of low grade sections.

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, 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.

Geological Setting

Detailed geology of the Highland Bell Mine property has been reported by Reinecke (1915), White (1949), Kidd and Perry (1957) and Verzosa and Goetting (1972). The mine area is mainly underlain by the Westkettle batholith (Nelson) and Beaverdell stock (Valhalla ? with contained pendants of Paleozoic or Early Mesozoic metamorphosed rocks of the Wallace Formation (Anarchist Group) (Fig. 1). Hypabyssal rocks occur in E-W and NE fracture zones that are also occupied by the mineralized vein systems.

Vein systems of the Beaverdell Mine occur mainly within quartz diorite or granodiorite of the Westkettle batholith. Five separate vein systems (Figure 2) 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. Table 1 gives chemical analyses for the four main intrusive rock types.

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 (Figure 2). 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.

Mineralization

Sulphide mineralization consists mainly of pyrite, galena, and sphalerite with lesser chalcopyrite, pyrrhotitte, and arsenopyrite, 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.

Zoning is suggested by a change in the silver and gold content of the veins in the Lass system. Gold values increase and silver values decrease in the eastern part of the Lower Lass mine. Chalcopyrite and pyrrhotite are found in the Wellington and in the eastern part of the Lower Lass but are not generally found in other parts of the mine. Pyrargyrite is especially common in the Bell and Lass mines (Verzosa and Goetting, 1972).

Structural Setting

Faulting dominates the structural pattern at the Beaverdell Mine and plays a major role in mining and exploration procedures. Vein systems appear to have been continuous features that have been disrupted by at least five main fault systems (White, 1949; Kidd and Perry, 1954): with northerly striking, steeply east-dipping normal faults (Terminal Faults) and northeasterly-striking, moderately west-dipping normal faults causing the main disruptions. The East Terminal Fault has been shown to have displaced the Lass vein by 700 feet (Kidd and Perry, 1954) but the extent of movement on the West Terminal Fault has not been determined.

References

Kidd, D.F. and Perry. O., 1957: Beaverdell Camp, B.C.; in Structural Geology of Canadian Ore Deposits, C.I.M. Congress Vol. II, pp. 136-141.

Reinecke, L., 1915: Ore deposits of the Beaverdell Map area, Geological Survey of Canada, Mem. 79.

Staples, A.B. and Warren, H.V., 1946: Minerals from the Highland Bell Silver Mine, British Columbia; Western Miner, May and June.

Verzosa, R.S. and Goetting, B., 1972: Geology and history of the Highland Bell Mine, Beaverdell, B.C., paper presented at fall C.I.M. meeting in Prince George.

White, W.H., 1949: The Beaverdell Silver Camp, Minister of Mines, B.C., Ann. Rept., 1949, pp. 138-148.

Table 1. Chemical analyses of the main intrusive rock types in the Beaverdell Mine Area.

	1.	2.	3.	4.
SiO_2	72.93	64.90	56.75	58.86
TiO_2	0.286	0.441	0.861	0.554
Al_2O_3	14.11	15.60	15.24	17.96
Fe_2O_3	1.00	2.17	2.58	2.56
FeO	0.85	2.62	3.97	2.93
MnO	0.035	0.102	0.172	0.139
MgO	0.53	1.78	3.30	1.55
CaO	1.77	4.24	4.26	4.41
Na_2O	4.274	3.52	3.82	3.37
K_2O	3.40	2.55	4.37	3.73
H_2O+	0.35	1.27	2.03	1.67
H_2O-	0.26	0.42	0.39	0.53
CO_2	1.6	2.25	1.8	1.6
P_2O_5	0.15	0.16	0.25	0.25
S	0.01	0.02	0.08	0.07
TOTAL	101.5	101.8	99.42	99.87

1. Beaverdell Stock from railroad cut near Beaverdell Mine Mill.

2. Westkettle Batholith from road to 3800 portal at mine grid point 1850 E - 4600 N.

3. Idaho Dyke sample from 827 stope at station 3600 E - 200 N.

4. Wellington Dyke sample from Sally #2 vein portal at station 408 or 150 N - 650 W on Mine Grid.

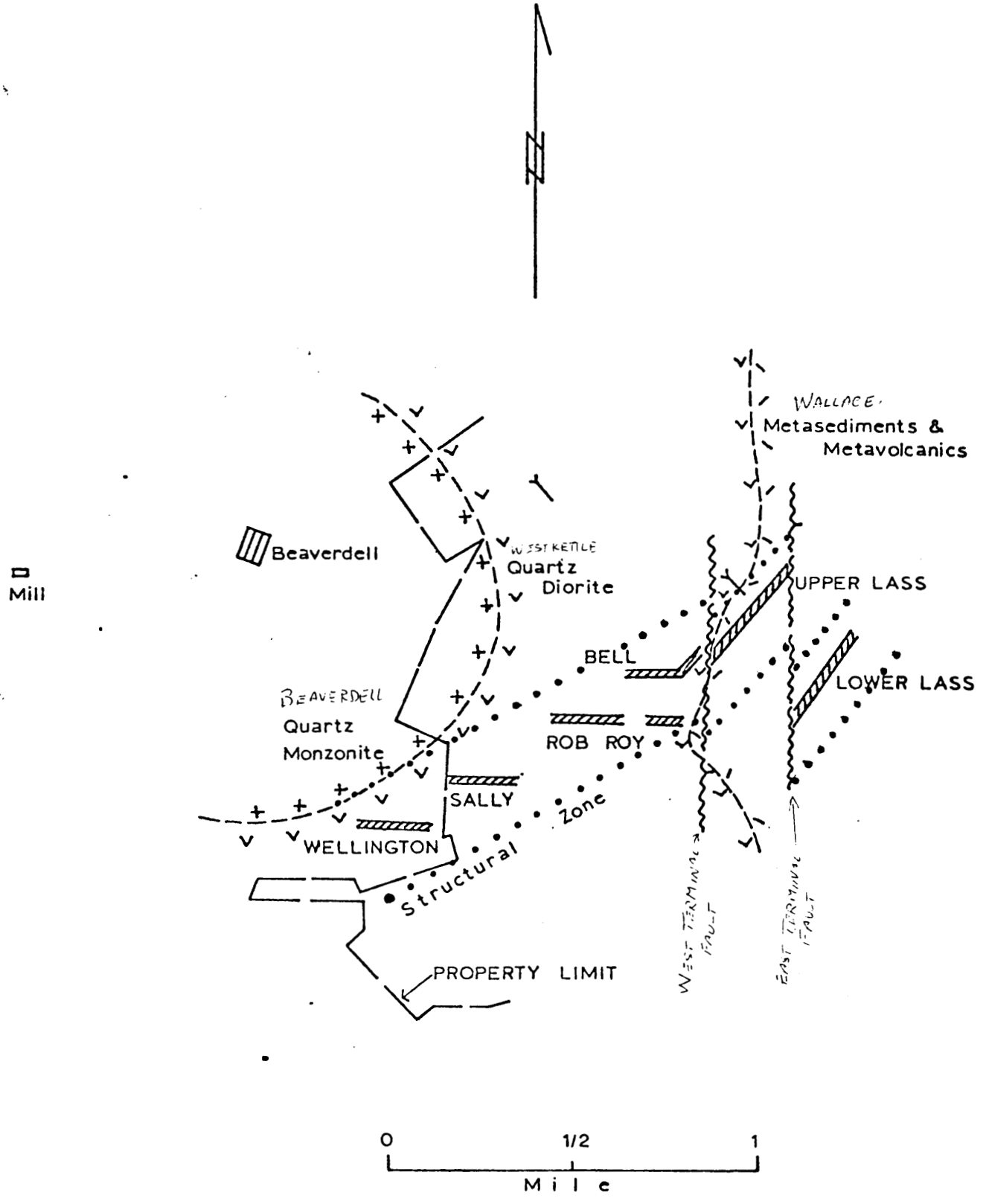

FIGURE 2. Generalized geology and schematic diagram of vein systems.

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