GIANT MASCOT MINE
(92H/6)

By P. A. Christopher

INTRODUCTION

The Giant Mascot mine (latitude 49° 25′-30′, longitude 121° 12′-18′, New Westminster Mining Division) represents the only significant nickel producer in British Columbia. With the depletion of ore reserves and closure of the mine imminent, a study of the deposit was undertaken to consolidate geological data for future reference in exploring ultramafic rocks in this and other parts of the Canadian Cordillera. The study has included underground mapping, core logging, surface mapping, examination of showings, sampling for petrographic and geochemical studies, and a review of mine plans and engineering reports.

This report incorporates data compiled by the geological and engineering staff of Giant Mascot Mines Limited. The assistance and information provided by F. W. Holland (mine manager), L. DeRoux (mine geologist), and R. Gonzalez (exploration geologist) are acknowledged.

HISTORY

The initial discovery on the Giant Mascot mine property (also called: Pride of Emory mine, B.C. Nickel, Pacific Nickel, Western Nickel, and Giant Nickel mine) was made in 1923 when Carl Zofka, a trapper, located outcrops of the Pride of Emory orebody on Emory Mountain. B.C. Nickel Company was reorganized as B.C. Nickel Mines, Ltd. by the Smith, Sloan, Spencer Syndicate. Refinancing permitted underground development on the 3550 (No. 1 tunnel) and 3275 (No. 2 or Chinaman tunnel) levels. By 1937 the Syndicate had spent $1,300,000 to develop 1.2 million tons of ore at 1.38 per cent nickel and 0.50 per cent copper. Four ore shipments, totalling 2,134 short tons at 5 per cent nickel were made to Japan for test purposes and gross returns of $63,600 were obtained.

In 1938 B.C. Nickel Mines, Ltd. was reorganized as Pacific Nickel Mines Limited, but poor market conditions caused the property to remain idle till 1942. In 1952, Western Nickel Mines Limited was formed as an operating company of Newmont Mining Corporation of Canada Limited and Pacific Nickel Mines Limited. The property was further explored by establishing the 2600 (main haulage), 2950, and 3250 levels and connecting the levels with an internal inclined shaft. A favourable sales contract was arranged by Western Nickel and from January to July of 1958, under the management of The Granby Mining and Smelting Company Limited, 181,133 tons of ore was treated before market conditions again forced closure.

In 1959 Newmont's interest in the property was sold to Giant Mascot Mines Limited and Giant Nickel Mines Limited was formed as an operating company. In March of 1961,

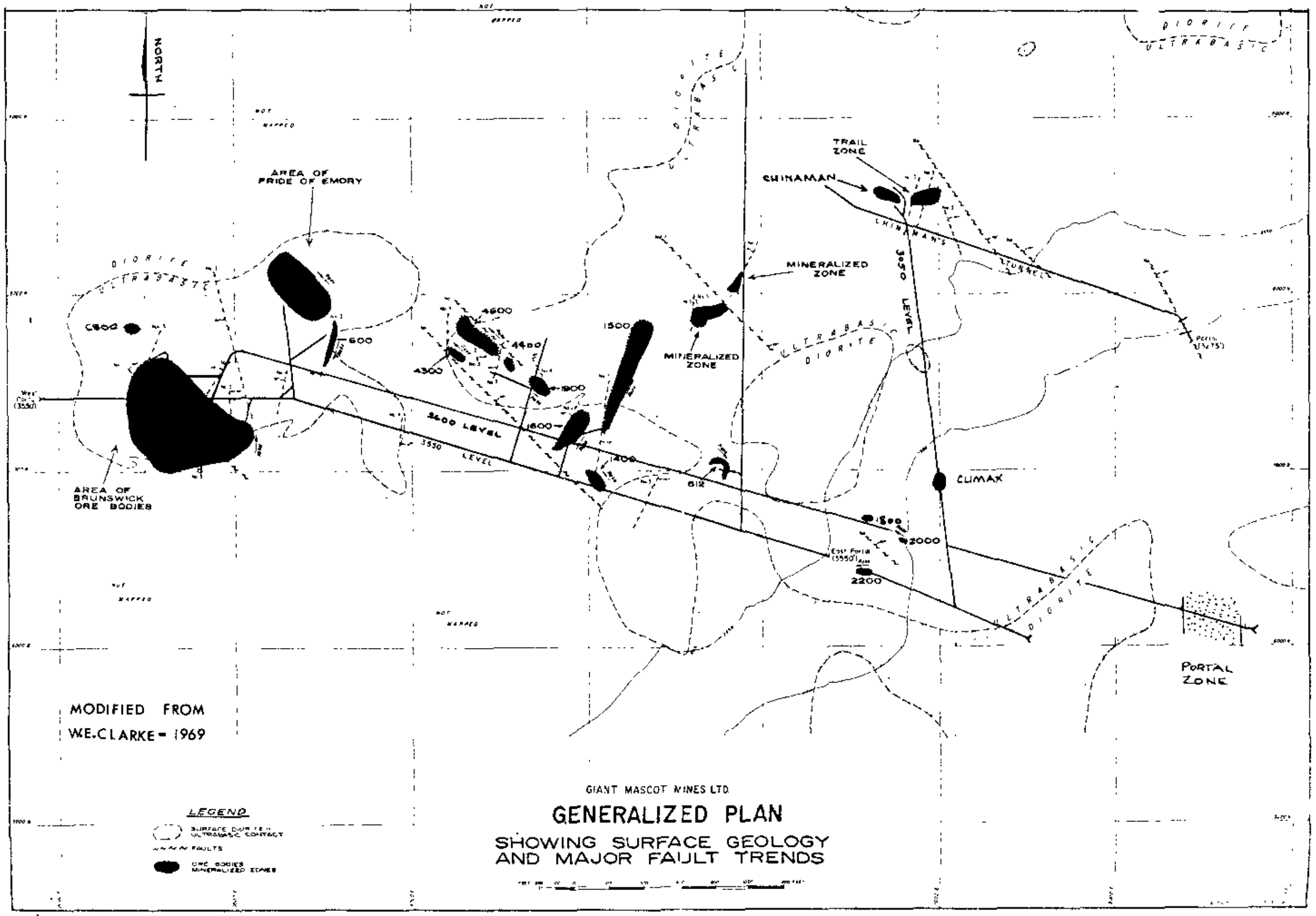

Figure 3. Generalized plan, Giant Mascot Mines Limited.

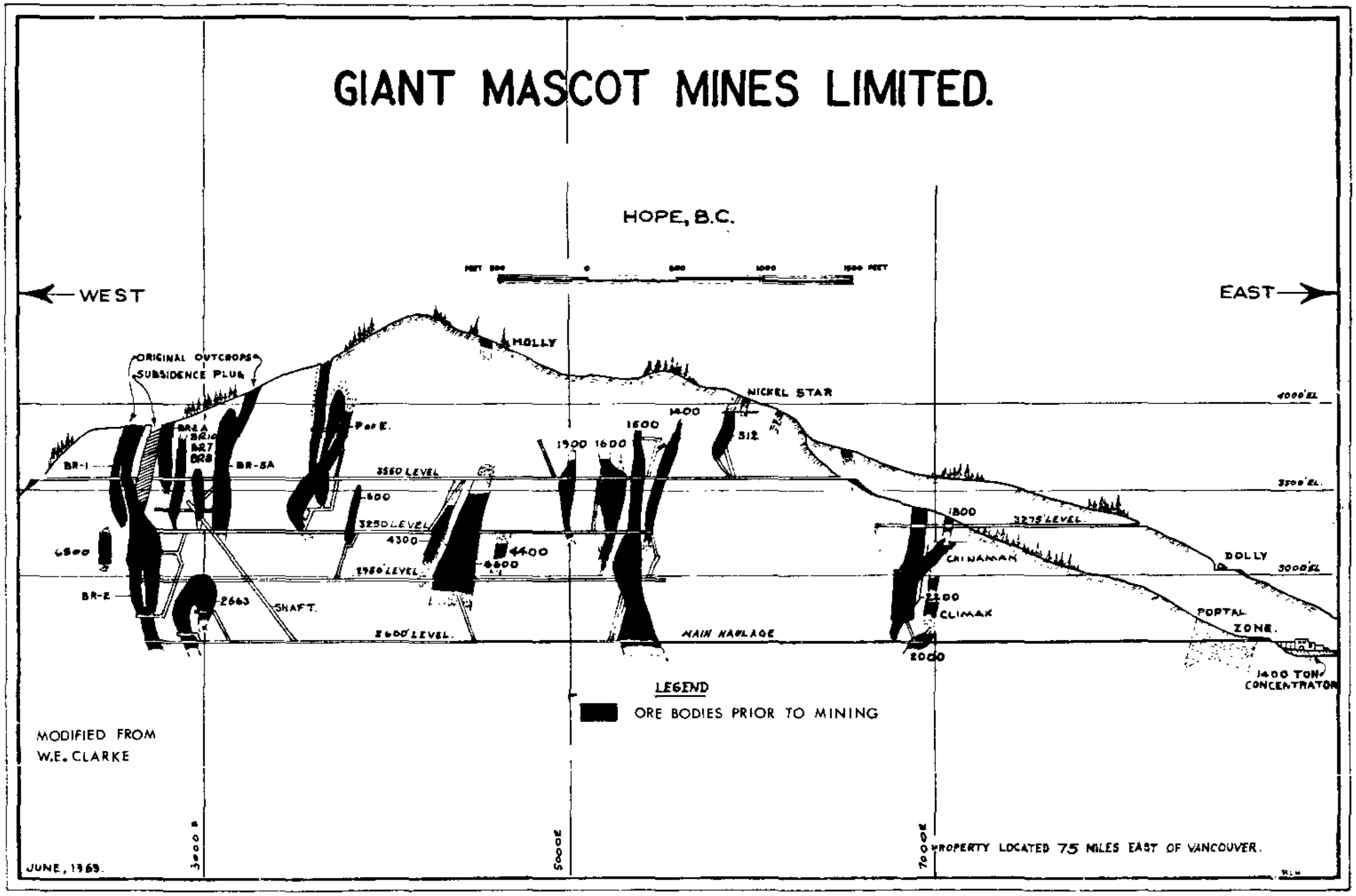

Figure 4. Longitudinal projection, Giant Mascot Mines Limited.

Giant Mascot Mines Limited gained full control of the property by purchasing Pacific Nickel's 49 per cent interest. The mine was reopened as a salvage operation in July of 1959 and continued production until August 31, 1973.

From 1958 to closure, total production from 26 orebodies was approximately 4,700,000 tons of ore, containing 59,000,000 pounds of nickel and 28,000,000 pounds of copper.

REGIONAL SETTING

Pyrrhotitic nickel-copper deposits are situated in an ultrabasic complex with chronologically and probably genetically related basic, dioritic, and noritic phases. The complex forms part of a 15-mile-wide, north-trending block of Late Paleozoic metamorphic rocks and Mesozoic intrusive rocks. The block is bounded on the east by the Fraser River fault zone and on the west by the Shuksan fault zone.

LOCAL GEOLOGY

Pipe-like mineral deposits occur within a segmented, crudely elliptical ultramafic complex about 1.5 miles in diameter. The stock-like mass contains pendants of metamorphosed Paleozoic rocks of the Chilliwack Group (?) and is in turn enclosed in younger granitic rocks considered to be part of the Spuzzum pluton. K-Ar ages from the ultramafic complex range from about 120 m.y. to 95 m.y. (J. McLeod, personal communication); the older ages were obtained from the hornblende pyroxenite phase with late hornblendite dykes having the youngest ages. All ages from the ultramafic complex are older than ages obtained from the Spuzzum pluton.

The complex contains a complete spectrum of ultramafic rocks with pyroxenite and peridotite (generally hornblendic) the most common rock types and dunitic phases rare. Hornblendite is often found adjacent to a granitic contact, prompting several workers to suggest a metamorphic or metasomatic origin for these bodies.

Clarke (1969) concluded that structure has played an important role in the control of orebodies and that the intersection of north 45 degrees west to north 50 degrees west striking faults and north 10 degrees west to north 30 degrees east striking faults exerts control over ore deposition. The four main fault trends recognized at the mine have the following strikes and dips:

(1) north 45 degrees west to north 50 degrees west; 50 to 75 degrees northeast

(2) north 15 degrees east to north 30 degrees east; 70 degrees southeast to 70 degrees northwest

(3) north 10 degrees west to north 10 degrees east; 55 degrees east to 55 degrees west

(4) north 30 degrees west to north 30 degrees east; 20 to 30 degrees east or west

The first three sets appear to provide ground preparation and access for ore while the fourth group appears to be post ore and often displaces ore zones. Tectonic and intrusive breccia zones and agmatite are found to be spatially related to several orebodies and breccia fragments are found in some massive ores. The genetic relationship between breccia zones and ore deposits is not clear, but remobilization is apparent in some of the breccia ore.

Alteration seems to be closely related to structure and intrusive contacts and, therefore, is often associated with orebodies. Four main types have been recognized: (1) crumbly alteration (also called pervasive shearing), (2) talc - amphibole ± magnetite, (3) uralitization, and (4) hornblendization. Crumbly alteration is a descriptive term applied to breakdown of olivine grains to micaceous minerals (phlogopite and chlorite) and to where intense serpentine is formed. Crumbly alteration is generally restricted to peridotite or dunite and is often present as a partial envelope around orebodies. Talc-amphibole alteration is generally associated with intensely faulted or fractured bodies of pyroxenite and is often found adjacent to the ore zones. Although alteration is generally present as a partial envelope around orebodies, there is no established pattern that can be relied upon as an ore indicator.

Twenty-eight mineral deposits have been outlined within the main ultramafic mass (Figs. 3 and 4). Of these deposits, production has been obtained from twenty-two, and five (4600, Pride of Emory, 1500, Brunswick 2, and Brunswick 5) accounted for over two-thirds of the production. Pipe-like orebodies range from a vertical continuity of 1,200 feet to 100 feet and have horizontal sections ranging from 250 by 120 feet to 20 by 40 feet. The orebodies can be divided into three types: (1) zoned, in which sulphides are disseminated through one or more rock types and show gradational change in tenor (for example, Brunswick Nos. 1, 5, 6 and 4600, 1900, and 512), (2) massive, generally confined to fault or contact zones and having sharp contacts (for example, Pride of Emory and Brunswick Nos. 2, 8, and 9), (3) vein, narrow tabular bodies that may enrich an ore zone but have limited tonnage potential.

SUMMARY

A geological study is presently being conducted at the Giant Mascot mie rear Hope, to consolidate geological information on this unique deposit. Chemical and petrographic examinations to be carried out should help define ore controls and consolidate genetic theories.

Since low-grade reserves are present within the ultramafic complex and less than a third of the known ultramafic complex has been explored by underground development, this deposit provides an intriguing exploration target.

REFERENCE

Clark, W. E. (1969): Giant Mascot Mines Ltd., Geology and Ore Control, *Western Miner*, No. 42, pp. 40-46.