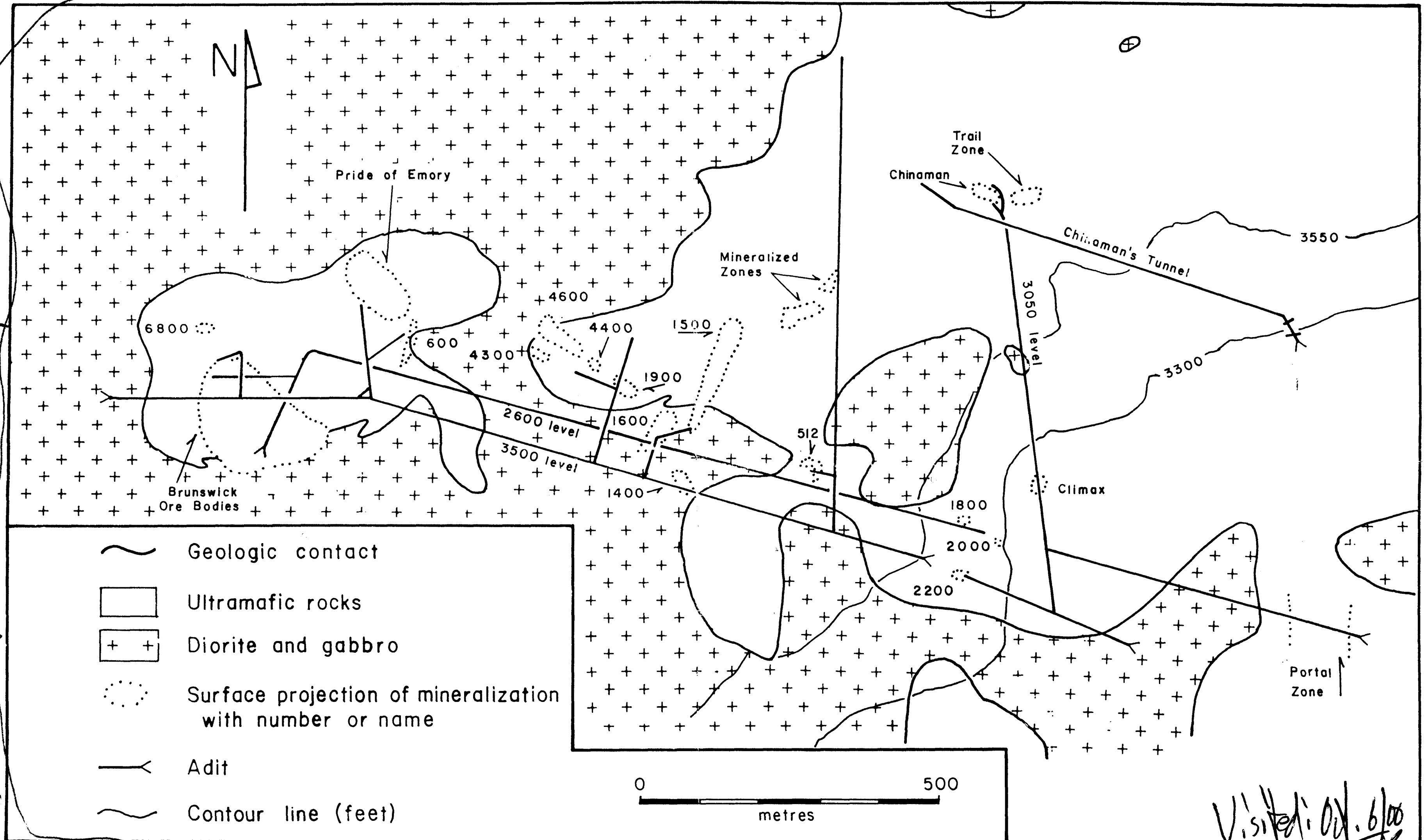

Figure 17. Map showing surface geology and surface projections of ore bodies and underground workings of the Pacific Nickel (Giant Mascot) nickel-copper mine (after Anonymous, 1965).

Visited Oct. 6/00

Giant Mascot
83356

secondary after pentlandite. No platinum minerals were found but it is probably associated with the nickel or copper sulphides and possibly with the merenskyite (LeCouteur, 1985).

Initial exploration in the area was for copper-iron skarns along Tofino Creek, beginning in 1898. The work led to the staking of the Hetty Green, White and Foremost showings and prospecting has continued through to the present. Sun West Minerals Limited staked the Foremost claims in 1962 and subsequent work resulted in the discovery of the nickel showings in 1963 on the northwest shore of Deer Bay. Most of the exploration work, however, was directed at the skarn mineralization. In 1983, until 1987, Cominco Limited held the claims covering the nickel showings under option and did extensive geological mapping, rock and soil geochemical and geophysical surveys, trenching and detailed petrographic analysis. Most recently, Stag Explorations Ltd. has continued the geochemical, geological and geophysical exploration and evaluation of the nickel and platinum group element potential.

HOPE AREA

PACIFIC NICKEL MINE

(Giant Mascot)
Pride of Emory (L. 739)
B.C. Nickel mine
Western Nickel
MINFILE: 092HSW004 NMI: 92H/5 Ni1
LAT: 49°28′42″ LONG: 121°30′54″

The Pride of Emory - Pacific Nickel mine is located at the head of Texas Creek, approximately 12 kilometres north of Hope on the west side of the Fraser River. Access is by good mine road from the TransCanada Highway. The mine operated during the period 1958 to 1974 and is presently undergoing re-evaluation by Corona Corporation. The mine produced nickel and some associated copper.

The Pride of Emory mine developed sulphide mineralization in a Middle Cretaceous ultramafic intrusion hosted by metasediments (Figure 17). The metasedimentary package consists of amphibolites with a protolith of marine cherts and pelagic sediments of the Triassic Hozameen Group. Immediately north, east and south, the ultramafite is truncated by diorite of the Late Cretaceous Spuzzum intrusions. Potassium-argon dating has placed the ultramafite at 119 to 95 Ma and the adjacent Spuzzum intrusions at 79 to 89 Ma (McLeod *et al.*, 1976).

The host to mineralization is a multiphase ultramafic intrusion and has been classed as a layered intrusion. The major intrusive phases include a core of peridotite, harzburgite/dunite, and a rim of olivine-pyroxenite, separated by a bronzite which grades outward to hornblende-pyroxenite, with minor phases of gabbro. Alteration, seen as orthopyroxene and olivine grains with hornblende rims or total replacement, occurs in an annulus 100 metres wide around the ultramafite. This appears to be the result of a late-stage magmatic process, probably associated with the Spuzzum intrusions. The principal alteration type is uralitization, alteration of pyroxene to actinolitic hornblende, in pegmatitic zones along the contact with the Spuzzum intrusions. Locally peridotite has been pervasively altered to serpentinite, up to 50 per cent by volume, but serpentine is generally much less abundant. Some serpentine-talc-magnetite-carbonate-anthophyllite alteration is present along shear zones and joints and is often referred to as 'crumbly alteration'. Much of this is attributed to late-stage near-surface low-temperature alteration by meteoric water (Aho, 1956).

The ultramafite is extensively fractured and faulted with displacements generally small, commonly a few metres but occasionally several tens of metres (Aho, 1957). Detailed mapping has defined three sets of fractures at the following orientations:

Set	Orientation
X	350°/40°E
Y	035°/80°NW
Z	318°/55°W

The fracture sets appear to be genetically related; at any specific location, one fracture set is well developed and the other sets are poorly developed. The diorite dikes follow the 350° fractures and hornblendite dikes follow the 318° fractures (Aho, 1956).

Three types of sulphide mineralization are present within the intrusion; massive sulphides, zoned sulphides and vein sulphide. Massive sulphide mineralization is restricted to dunitic pipes which generally follow a trend of 285° and plunge steeply to the northeast. The pipes are irregular in shape, varying from crescentic to ellipsoidal in cross-section, 15 to 40 metres across with a vertical extent of five to ten times the diameter. There are few surface exposures of the pipes and they are not connected. Exploration and development required detailed drilling as most of the known mineralized zones are blind. This has made resource evaluation difficult as there are no obvious clues to the location of mineralized pipes.

Zoned sulphide mineralization is also restricted to pipelike bodies. Silicate zonation within these pipes usually consists of a dunitic core with bronzite rims. These pipes are generally regular in cross-section and similar in diameter to the massive pipes and may extend up to 400 metres vertically. Sulphides form concentric rings and the zoning pattern is complex. Occasionally, veinlike sulphide bodies, up to 0.5 metre wide, are found with pyroxenite or hornblendite borders, suggesting either late-stage magmatic injection or secondary remobilization of the sulphides.

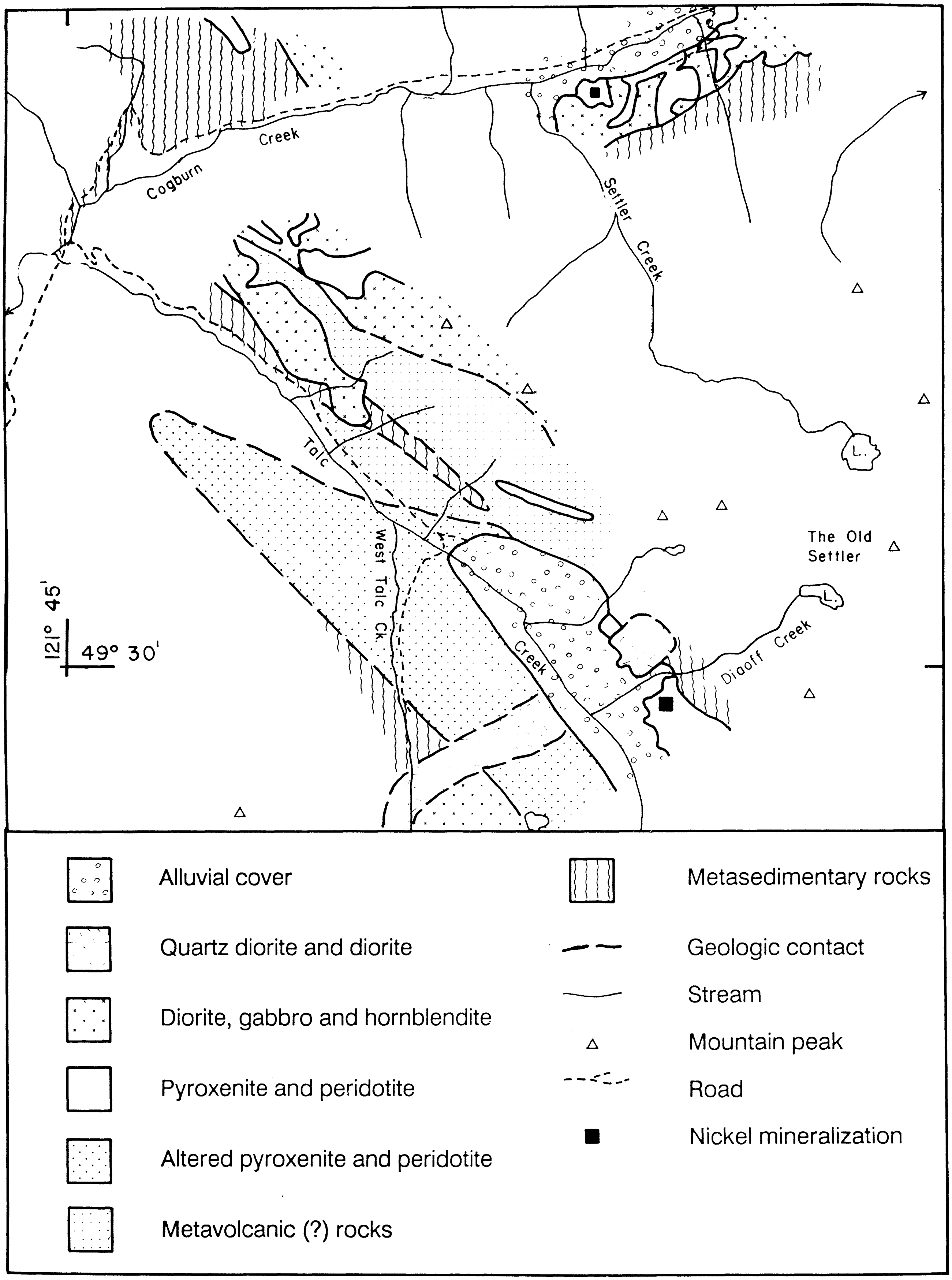

Figure 18. Geology of the Diaoff and Settler Creek area showing locations of nickel mineralization (after Eastwood, 1971).

Ore consists of nickeliferous pyrrhotite, pentlandite, violarite after pentlandite and minor amounts of pyrite and chalcopyrite. The most significant metal present is nickel with copper forming a minor constituent. Platinum and palladium are present in low concentrations but did provide a small production credit. Typical mineralization and ore grades are described below:

Mineral	Disseminated Ore Ore:Gangue 1:3	Massive Ore >60% of rock
Pyrrhotite (nickeliferous)	45%	55%
Pentlandite	25%	30%
Violarite	10%	---
Pyrite	10%	10%
Chalcopyrite	5%	5%

(Clarke, 1969)

Ore Grades:

	1.4% Ni	Ni/Cu = 2.7
	0.5% Cu	
	1.0% Cr	
	0.1% Co	
	0.68 g/t Au	
	0.34 g/t PGM	
for the 1500 body, 1966	2.05 g/t Pt	
	7.20 g/t Pd	
	0.90% Cu	
	2.6% Ni	

(Eastwood and Waterland, 1966)

Nickel primarily occurs substituting for iron in pyrrhotite ($Fe_{1-x}NiS$) with an average replacement of 2 per cent. In the 1600 orebody the nickel content in pyrrhotite was 13 per cent, the approximate limit of nickel solubility (Aho, 1956). The Ni:Cu ratio varies with the host silicates. In dunite the ratio was as high as 4 and as low as 2.5 in olivine pyroxenite and bronzite. Chalcopyrite tended to occur along the margins of orebodies, lowering the Ni:Cu ratio. Mineralization in the hornblendite is erratic and generally limited to disseminated sulphide grains and blebs with a very low Ni:Cu ratio. Chromite occurs as discrete, disseminated grains throughout the peridotite and pyroxenite with concentrations of usually less than one per cent (Aho, 1956).

The Pride of Emory deposit has had a long history. The original showings were staked and prospected in 1923 by Carl Zafka. In 1926 the B.C. Nickel Co. Ltd. staked more ground and began underground development. Development continued through to 1938 until poor market conditions forced the closure of the prospect. Developed reserves at that time consisted of 1.08 million tonnes containing 1.38 per cent nickel and 0.5 per cent copper. In 1952, Newmont Mining Company and Pacific Nickel Mines Ltd. formed Western Nickel Mines Ltd. to reopen the workings and drive the 2600 main haulage level and other adits. Mine and mill development proceeded to 1958 when commercial production began. Giant Mascot Mines Ltd. purchased Newmont's 51 per cent interest in 1959 and bought out the Pacific Nickel Mines Ltd. 49 per cent share in 1961. Production continued from 1959 to 1974 during which time 26 orebodies were mined to produce 26.8 million kilograms of nickel, 14 million kilograms of copper from 4.2 million tonnes of ore having a millhead grade of 0.77 per cent nickel and 0.33 per cent copper (Christopher, and Robinson, 1974). Mining was by long-hole stoping methods with a mix of tracked and trackless equipment. The economic limit of mining was reached in 1974. 'Reserves' in place at that time consisted of sixteen mineralized bodies totalling 2.72 million tonnes. The largest single body is the Portal zone containing 2.15 million tonnes with grades of 0.25 per cent nickel and 0.11 per cent copper. The total of the other bodies is 568 000 tonnes with an average grade of 0.92 per cent nickel and 0.37 per cent copper (Christopher, 1975). Corona Corporation presently owns the mine and has been re-evaluating its potential.

NI GROUP

Settler Creek
Diaoff Creek
MINFILE: 092HNW042, 045
LAT: 44°33'23" LONG: 121°40'12"

The Settler Creek and Diaoff Creek showings are hosted by extentions of ultramafic rocks northwest from the Pacific Nickel mine. The Settler Creek showing is immediately east of the confluence of Cogburn Creek and Settler Creek on the lower hill slope. The Diaoff Creek showing is on the southeast bank of Diaoff Creek on the southwest slope of the Old Settler. These prospects were discovered during regional exploration in the early 1970s in an attempt to extend the life of the Pacific Nickel mine. The two showings are the largest found in the area were too small to warrant development at that time.

Country rocks to the intrusions are metasediments, comprising Permo-Pennsylvanian quartz-muscovite-garnet schists, and metavolcanics consisting of hornblende and hornblende-feldspar schists (Monger, 1970). The regional foliation varies from 320°/45°NE to 290°/85°NE and is generally parallel to layering although some foliation across layering suggests isoclinal folding (Eastwood, 1971). These rocks are intruded by quartz diorite plugs and dikes associated with the Spuzzum intrusions and serpentinized pyroxenites and peridotites probably associated with the Pacific Nickel intrusion (Figure 18).

The felsic intrusive rocks are only seen in contact with the metamorphic rocks, although exposure is very poor. The ultramafic rocks intrude both the metasediments and metavolcanics. The largest body, composed of generally undeformed pyroxenite, extends southeasterly along the northern slope of Talc Creek. However, at its southeastern end the rock is more sheared and altered. The sheared zone consists of 85 per cent pyroxenite and