## GEOLOGICAL, GEOCHEMICAL AND

 GEOPHYSICAL ASSESSMENT REPORTon the

Ni CLAIM GROUPS
HARRISON LAKE AREA
( $49^{\circ}$ N., $121^{\circ}$ W.)
$92+/ 12$ by

Department of
Mines and Petroleum Resources ASSESSMENT REPORT No. $36 \subset 5$ MAP
N.W. BERG, B.Sc. (Physics)
endorsed by
W.E. CLARKE, B.SC., P.Eng.
for

GIANT EXPLORATIONS LIMITED (N.P.L.)
1131 Melville Street
Vancouver 5, B.C.

March 20, 1972


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of $1-E$
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$127-\mathrm{B}$
$137-2 B$
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Area l-Claims and Sample Locations

- Geology
- Geochemistry P.P.M. Nickel
- Geochemistry P.P.M. Copper
- Magnetometer Stations
- Magnetometer Survey

Area 2- Claims and Grid Lines

- Rock Chip Sample Location
- Rock Chip Nickel
- Rock Chip Copper

Area 5-Grid Lines and Claims
Area 7- Geology

- Geology
- Channel Samples and Magnetic Profiles

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## INTRODUCTION

Giant Explorations Limited (N.P.L.) is carrying out a comprehensive exploration program in the area lying between Harrison Lake on the west, Bear Creek on the south, Cogburn creek on the north and the fraser River on the east. In the summer of 1969, 242 mineral claims were staked. During 1970 an additional 322 claims were added, bringing the total held by Giant Explorations to 564.

As a result of exploration work carried out in 1970, six target areas were chosen for detailed investigation in the 1971 season. Surveyed grids were established and this was followed by geological mapping, together with geochemical and geophysical surveys.

This report describes that portion of the 1971 detailed work program completed on each target area between September 11, 1971 and November 5, 1971.

## INTRODUCTION (Continued)

AREA 1

Geological mapping
Geochemical sampling
Geophysical surveying

## AREA 2

Iine cutting
Channel sampling
AREA 5
Line cutting
AREA 7

Geological mapping
Channel sampling

See Map No. 1-B
See Map Nos. $1-C, D, E$ See Map No. 1-F

See Map No. $2-2 A$
See Map Nos. 2-2C, 2D

See Map No. 5-2A

See Map Nos. $7-$ B, 2B See Map Nos. $7-\mathrm{C}, \mathrm{D}$

PROPERTY (on which work has been done)

AREA 1

Ox 1-12 (By agreement with A.E. Morgan of 3185 East 20 th Avenue Vancouver, owner of the $O x$ Claims)
Ni 594-599
Ni 608-610
Ni 611-618
$\qquad$
Record Number
$19809-19811$, inclusive 20712-20719

| $24646-24651$ | $"$ |
| :--- | :--- |
| $24660-24662$ | $"$ |
| $24663-24668$ | $"$ |
| $24489-24490$ | $"$ |

AREA 2

Ni $1-8$
Ni 23
Ni 25
Ni 27
21771-21778
"
21791
21793
21795

## AREA 5

Ni $376-381$
Ni 630-631
Ni 632-637

## Ni 316-317 <br> Ni $412-415$ <br> MAP AND GRID CO-ORDINATE SYSTEMS

$24457-24458$, inclusive
$24692-24695$
$25006-25008$

The co-ordinate system used on the maps which accompany this report are north and west extrapolations of the Giant Nickel Mine co-ordinates. The numbers on the map represent the distance in feet north (N) and west (W) of the zero point established at the mine site.

The surveyed line grids use a five digit computer format for each station location. The first digit represents the target area number, the second two digits represent the line number and the last two digits represent the station number. For example, 3-04-05 represents station No. 5 on line 4 in grid area No. 3 .

## LINE CUTTING

The surveyed grids on each target area were established
in the following manner:
An initial base station point was chosen which could be located accurately on air photos and government topographic maps. From this base station, base lines were surveyed using a compass transit with tripod and a survey chain. The base lines were cut with axe and chain saw and cross lines established at 400
ft. horizontal intervals. Each cross line was run from the base line using a compass, a chain and a clinometer for slope corrections. The cross lines were blazed and flagged and undergrowth cut where necessary. Individual stations were established at 100 ft. intervals along the cross lines with pickets and colour coded ribbon. Elevations were taken at each station using Thommen altimeters. Claim posts adjacent to grid lines were tied into the grid.

## GEOCHEMICAL SURVEY

Geochemical soil samples were taken at 200 ft. intervals along the cross lines. In addition, silt samples were taken at streams which crossed the grid lines. The B soil horizon was sampled wherever possible. A mattock was used for trenching and the sample was placed in Kraft wet-strength envelopes using a trowel. All sample locations were flagged and marked with colour coded ribbon and numbered according to the grid co-ordinate system.

Fraser Laboratories Ltd., 1175 West 15 th street, North Vancouver, assayed the samples for total nickel and copper using the following procedure: One-half gram of the -80 mesh fraction was digested with nitric and perchloric acid. The samples were heated until the perchloric acid was consumed. This was followed by bulking the sample to standard volume. Values for nickel and copper were obtained with an atomic absorption spectrometer.

MAGNETOMETER SURVEY

The magnetometer surveys of the grid areas were carried out using a MacPhar M700 magnetometer as a field instrument and a "Sharpe" Model A2 vertical force magnetometer as a base station control instrument. The base station instrument was located at the base camp well away from any metallic objects and variable power sources. This instrument was read hourly. A reading was taken at each 100 ft . station on the grid lines with the field instrument. The time was noted for each reading in the field book. At the end of each survey day the field readings were corrected using the diurnal graph plotted from the base station data.

## GEOLOGICAL MAPPING

Geological mapping on the target areas was carried out by Mr. R. Gonzalez, B.Sc., M.Sc. (Geology) and Mr. R. Wehr, B.A. (Geology). A summary of their work on Area 1 and Area 7, as written by Mr. Gonzalez, follows.

## AREA 1

Geological mapping of Area 1 has been completed on a reconnaissance target-area basis using both loop and grid-line traverses. Because the topography is rugged, with abundant cliffs, the use of grid lines for mapping control was limited to the area west of $O x$ Lake. Daily loop traverses, using aerial photographs for control, were used to map approximately 80 percent of the area.

The southern half of the area is underlain by metamorphosed Chilliwack Group Rocks. North of this group is an east-west band of diorite/pyroxenite; this rock type makes up the bulk of the Old Settler Ridge. Peridotite is exposed west of Old Settler Lake and in a lopolith shaped intrusion on the southeastern side of the old settler. Diorite crops out north of Ox Lake and on the west side of the area.

Northwest and east-west trending faults are the most common; followed by northeast trends. The east-west faults, generally, appear to be the youngest.

Abundant massive and disseminated pyrite with minor pyrrhotite occur in the diorite/pyroxenite, and minor pyrrhotite with traces of chalcopyrite are found to occur in some of the pyroxenite bodies.

## AREA 1

## LOCATION AND ACCESS

Area l lies in the vicinity of Old Settler and Ox Lake. The intersection of Mine coordinates $27,400 \mathrm{~N}$ and $20,800 \mathrm{~W}$ are at the source of Old Settler Creek. The Old Settler Mountain (elev. 6994 feet) is the highest point on an east trending ridge which divides the area into north and south halves.

The area consists of very-steep hills and cliffs; relief varies from approximately 4500 to 7000 feet. The area mapped covers nearly four square miles.

Access is difficult; snow generally covers most of the area except during the summer months. Access to the southern half of the area is by a poorly defined foot trail up Daioff Creek, which drains Ox Lake; the trail begins at an elevation of 3000 feet; the walk in is not difficult, but it takes about three hours. Other than this trail, access is restricted to helicopters.

## ROCK TYPES

Relatively abundant outcrops have enabled a fairly detailed examination of the rocks and structures. Due to the map scale, some rock types and small scale structures have been deleted.

The rock types are as follows:

## Metasediments

Late Paleozoic, Chilliwack Group, metamorphosed sediments and volcanic rocks are well exposed in the southern half of the area,
and metasediments underlie a small part of the northwest part of the map area.

At least five different rock types are represented, but due to map scale and the lack of any marker horizons the individual rock types are not differentiated on the map (see Figure 1).

Argillite is the most common clastic rock type. It is veryfine grained, usually massive but shows thin beds, dark gray to black, and often siliceous.

Quartzite is prominent, and it is medium-grained and occurs in massive beds; no original bedding is seen. The quartzite is typically tan in colour due to the cementing agent.

A ten foot thick bed of marblized limestone is exposed in and near a copper-skarn deposit (mapped by I. Rote, 1970) northwest of Ox Lake. The marble is a slightly recrystallized, poorly consolidated, coarse- to very-coarse grained, gray to blueishgray rock.

Two types of metamorphosed volcanic rocks are present; a weakly metamorphosed basalt and a volcanic rock which has been subjected to higher grade (probably dynamic) metamorphism and is now represented by a greenstone. The basalt is a very-fine grained, hard, black unit, which breaks easily along foliation planes. pyrite is abundant, and probably exceeds 3 percent. The greenstone is pale gray to green, locally olivine-green, quartz bearing volcanic
rock. This unit also breaks easily along planes of foliation. No sulfides were seen. This rock unit is confined to the highly faulted area south of Old Settler Peak.

## Diorite/pyroxenite

This unit is exposed in an east-west trending band which divides the area into north and south halves. The Old Settler Mountain and associated ridges are composed of this rock type. The typical rock is dark gray, medium- to fine-grained, hard, and composed mainly of amphiboles, lesser amounts of pyroxenes and up to 15 percent feldspar. Actinolitic alteration is usually present, though often very weakly developed. The rock is heterogeneous in its mineral make up, and within the same hand specimen both diorite and pyroxenite exist; this rock, taken as a whole, may closely resemble a gabbro or an amphibolite. It appears that anatexis may be the cause of the heterogeneity.

Rust coloured zones of iron oxide staining are common along both sides of old Settler Ridge; they form lenses and elliptical patches several tens of feet long. Alteration of mostly pyrite, and traces of pyrrhotite and possibly chalcopyrite are the cause of these zones. Grab samples from some of these patches have assayed $0.05 \% \mathrm{Cu}$ and minor nickel.

Dykes are rare, but east of Ox Lake several 2-5 foot wide vertical dykes are exposed on the cliff face. A chip sample examined was very-fine grained, dark-gray to black and appeared to be either andesitic or basaltic in composition. No sulfides were seen, and country rock-dyke contacts are sharp. The dykes appear to be
intruded along faults.

## Diorite

Diorite is found in several widely scattered areas, notably in the southwest, immediately north of $O x$ Lake, and in the northwest corner of the area.

This unit is similar to the diorite in Area's 3, 4, and 5 . It is medium-grained, light-gray, hornblendic diorite. Generally the diorite is fresh but there may be local chloritization of hornblende. Magnetite is usually absent.

The rocks north of $O x$ Lake are somewhat anomalous in their appearance to the typical diorite. This sequence more closely resembles Late Cretaceous, Coast Range Quartz Diorite; except that the total quartz content is probably less than ten percent. This diorite is light-gray, medium-to fine-grained, and very massive. Hornblende is more abundant than biotite by more than five to one; these mafics account for approximately 15-20 percent of the constituents. The hornblende is only slightly altered to chlorite; biotite is fresh. Magnetite is usually present, but its occurrence is fairly sporadic. Quartz varies greatly from sample to sample, and it may represent from 3 to 15 percent.

## Peridotite

This unit is confined to two areas, west of old Settler Lake and northeast of $0 x$ Lake. The rock weathers to a light brown to buff coloured clay-like material, and the weathering may extend as deep as one inch. The peridotite is fine-grained to aphanitic


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proxenite and nickel values have been on the order of 0.22 percent. No copper values are reported within the pyroxenites and as yet the fault zones have not been tested.


## GEOLOGY-STRUCTURE

The metasedimentary unit is highly deformed, and it has undergone several episodes of deformation. Since our interest in this rock type is limited the only structural feature noted was schistosity. The rocks have a well developed schistosity comparable to the overall regional trend: northwest with a steep dip to the northeast.

Several fault sets traverse the area. The most prominent occupies a belt in the centre of the area; they trend east-west and northwest. The east-west trend is common throughout the area. A moderate northeast trend is common west of old Settler Lake and near Ox Lake. A weakly developed north-northwest to north-northeast trend is also present. All faults appear to be high angle.

Age relationship of the faults are difficult to determine, but generally the east-west and northwest systems offset the others. It is interesting to note that the pyroxenite bodies are commonly associated with the east-west faults.

## INTERPRETPATIONS

The most interesting aspect of Area 1 is the widespread sulfide mineralization. Finely disseminated pyrrhotite is common in the pyro-
sulphides, mainly pyrite with traces of pyrrhotite and possibly chalcopyrite, are common throughout the old Settler Ridge as lenses and eliptical patches 20 to 50 feet wide; only a few of these patches have been chip sampled and assay results were generally not too encouraging, but not enough sampling has been done to fully evaluate the area.

The most favourable rock type is found in the northern half of the area and southeast of the old settler Peak. No geochemical or geophysical data has been collected in these areas. A control grid is needed in this area so additional data can be collected and evaluated. Access is by helicopter only.

From an air photo study conducted in the spring, abundant linears traverse the area (Figure 2). The strike of these linears are plotted on an orientation diagram (Figure 3). In an attempt to explain these linear figures additional diagrams have been plotted; Figure 4 is a plot of fault direction and Figure 5 is a plot of joint directions. Schistosity has not been plotted because with only one exception, all schistosity falls within a northwest direction.

It is apparent in Figure 3 that east-west linears seem to be the most important. Also prominent are west-southwest, northwest and west-northwest fractures; weak northwest and northerly linears are of lesser importance.

In figure 4 the east-west and west-northwest fault directions are the most prominent, followed by northerly irends and northeasterly and northwesterly trends. It appears that most of the
east-west, west-southwest, and west-northwest linears (Figure 3) are due to faults, although the west-southwest linears are not totally due to faulting.

It is interesting to note that there are prominent faults in a northwesterly direction. This is parallel to the regional schistosity, and most of the faults traverse metamorphic rocks isee Figure 1). Since schistosity is probably the oldest structural feature in the area, and faulting is much younger, the conclusion is that faults are either a-result of rejuvination along this regional zone of weakness or are superimposed on this zone.

If jointing is to be interpreted as the result of compression at the time of the implacement of local plutons, then the orientation of the compressional stress, at the time of plutonism was probably around $N 25^{\circ} \mathrm{E}$ and the long axis of the uplift was around $N 50^{\circ} \mathrm{W}$.

Following this interpretation, Figure 6 is a diagram showing the various features of this area.

From this interpretation it is concluded that the primary compressional stress was due to the implacement of the Upper Cretaceous Spuzzum Pluton (the centre of which lies approximately ten miles to the north-northeast).



Figure 3. Orientation diagram of the strike of air-photo linears.


Figure 4. Orientation diagram of the strike of faults.

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76 Measurements

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Figure 5. Orientation diagram of the strike of joints.


Figure 6. Structural Interpretation.

AREA 7

## INTRODUCTION

This area was discovered by one of the Syndicate geologists while doing regional prospecting. The most interesting discovery is on an old logging road west of area 4. Generally, the area is on a north facing steep slope; the lower portions have been logged making walking in these areas rather difficult.

No grid lines have been cut in this area, and mapping has been done with chain or rangefinder and compass.

## LOCATION AND ACCESS (see Figure 1)

Area 7 is located on the south side of Cogburn Creek just west of Area 4. Elevations vary from under 1000 feet to over 4000 feet.

At present the area can be thought of as two parts, lower and upper. Because of access more information is known about the lower part.

Access to the lower part is by foot along an old logging road that is over-grown by $8-10$ year old alder trees. The old road lies below the present Cogburn Creek Road at mile 5; the discovery outcrop is approximately $1 \frac{1}{2}$ miles along this old road.

Access to the upper part is restricted to helicopter landing pads, two of which have been cut in the dense forest. The upper area is 1500 to 2500 feet above the lower area.

Although, examination of a portion of the lower part of Area 7 has indicated scattered outcrops, a fairly detailed mapping of the rocks and structures has been conducted. The rock types for the lower part are as follows:

## Diorite

This unit is the most abundant rock type mapped and is not unlike the diorite found in area's 1,3,4, and 5. It is generally gray, medium-grained, equigranular, horn-blende-diorite; the hornblende content varies from 40-80 percent. It is interesting to note that the diorite becomes more leucocratic away from the diorite-pyroxenite contacts; it is also suggested, by the presence of granitic dykes cutting the pyroxenite and the marked increase of hornblende near pyroxenite, that the diorite has intruded the pyroxenites or they are nutually intruding one another. Hornblendite

There are probably at least two types of hornblendite. The most common type is composed of large, $5 \mathrm{~mm} ., \mathrm{black}$ hornblende crystals with plagioclase feldspar filling the remaining spaces. This rock type appears to occupy a contact zone between the diorite and pyroxenite; it is usually slightly mineralized. Hornblendite dykes are found cutting the pyroxenites. The composition and textures of the dykes
varies from almost entirely of black hornblende to coarsegrained black hornblende with interstitial plagioclase. Normally the dykes are unmineralized.

## Pyroxenites

Except for a few local pyroxenite occurrences, this unit is made up of the hornblendic phase. It is coarsegrained and dark brownish-black hornblendic pyroxenite. The poikilitic texture is rarely seen, and gererally the hor nblende crystatls are unaltered, Sulfide mineralization is impressive, both pyrrhotite and chalcopyrite are present. Pyrrhotite occurs as lacy interstitial material and as clusters. Chalcopyrite is only associated with pyrrhotite. The upper part of Area 7 was very quickly examined on a reconnaissance basis. This area is located on a north facing ridge above the 3500 foot level (see map 3). The rock types are similar to those found in the lower area. The most abundant rock is a coarse-grained hornblende pyroxenite with locally abundant disseminated pyrrhotite and lesser amounts of chalcopyrite. Away from the target area, diorite is the most common rock type. The sulfides are sporadically distributed throughout the rock. Possibly grading into the hornblende pyroxenite is a mafic, mediumgrained, hornblende diorite. This diorite may contain up to 75 percent black hornblende. Small discontinuous zones of a medium-grained more leucocratic hornblende
diorite, containing 15-25 percent coarse grained hornblemde, are present within the mafic diorite. The diorite contains minor amounts of pyrite.

## GEOLOGY - STRUCTURE

As yet no major structural features have been seen, but several minor features are present. From the fracture pattern study (Figure 4) three surficial linear patterns were recognized. The strongest trend is a general east-west system followed by a northeast trend, and finally a poorly developed north-northwest trend. These linear patterns appear to correspond to mapped joint patterns.

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INTERPRETATION AND RECOMMENDATIONS
The most interesting aspect of Area 7 is the nume rous and widespread exposures of hornblendic pyroxenite, and the accompanying pyrrhotite and chalcopyrite mineralization. This rock type is found in both upper and lower areas, and disseminated and lacy pyrrhotite is generally present.

Based on the rock type and mineralization, this area represents one of the most exciting yet found, and it should be thoroughly examined.




Figure 4. FPACTURC, AND, IINEAR, TRACES IN AREA 7 .

## PERSONNEL

The author was Project Manager and carried out the program under the supervision of Mr. W.E. Clarke, P.Eng. The geological mapping was carried out by Mr. R. Gonzalez, B.Sc., M.Sc. (Geology) and Mr. R. Wehr, B.A. (Geology).

Personnel employed, together with wages paid which are applicable to this report, are summarized as follows:

Days Worked \& Wage Rates

Amount Paid
R. Gonzalez September 11

1621 st. Georges St. to North Vancouver, B.C. November $5 \quad 30$ @ $\$ 40 /$ day $\quad \$ 1,200.00$
R. Wehr September 11

81405 - 8th Ave. Federal Way, Wash.
B. Barker

2607 West 23rd Ave.
Vancouver, B.C.
G. Clarke

8090 Sussex Ave.
Burnaby, B.C.
F. Cannon

1180 West 57 th Ave.
Vancouver, B.C.
H. Bruce

4474 West 5 th Ave. Vancouver, B.C.
S. White

5312 Edward Street Burnaby, B.C.
to
November 5
30 @ $\$ 35 /$ day
$1,050.00$
September 11 to
September 29
10 @ $\$ 20 /$ day 200.00

September 11
to
September 29 10 @ $\$ 20 /$ day 200.00
September 11
to
September 29
11 @ $\$ 22 /$ day
242.00

September 11
to
September $29 \quad 11$ @ $\$ 22 /$ day $\quad 242.00$
September 11
to
September 2910 @ $\$ 22 /$ day 220.00

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## 4


B. Egerton

1670 West 8th Ave. Vancouver, B.C.
S. Meth

73 East Hastings st. Vancouver, B.C.
H. Chang

73 East Hastings St. Vancouver, B.C.

October 20
to
November $5 \quad 10$ @ $\$ 25 /$ day $\quad \$ 250.00$
September 11
to
November $5 \quad 35$ @ $\$ 30 /$ day $\quad 1,050,00$

September 11
to
November $5 \quad 32$ @ $\$ 30 /$ day
960.00
$\$ 5,614.00$
Total Amount Paid
5,614.00

## EXPENDITU RES

## Labour

$$
\$ 5,614.00
$$

Camp operation and accommodation 4,539.00
Assaying ( 280 geochemical and rock samples ( $\$ 1.00$ per sample)
280.00

Engineering supplies 734.00

Vehicle operation:
Helicopter charter $18 \mathrm{hrs}$. @ $\$ 150 / \mathrm{hr} . \$ 2,700$
Land transport 1,309
$4,009.00$
$\$ 15,176.00$

Percentage Applicable to each target area:
Area No. $1 \quad 50 \% \quad \$ 7,588.00$

Area No. 2 7.5\% $\quad 1,139.00$
Area No. 5 7.5\% $\quad 1,139.00$
Area No. 7 35\%

5,310.00



# Submitted on behalf of <br> GJANT EXPLORATIONS LIMITEL (N.P.L.) 

Roman Wu Bery
Nrjow. werg,
project Wanager

Endorsed by


W.E. Clarke, B.Sc., P.Eng.

## CERTIFICATE

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I, N.W. Berg, of the City of Langley, B.C.,
certify:

1. That I am engaged in work as a Project Manager and reside at 5359 - 202 nd Street, Langley, B.C.
2. That I am a graduate of the University of British Columbia with a Bachelor of Science degree in Physics.
3. That I have practiced as an Exploration Manager for two years.
4. That I have personally supervised work done on the claims mentioned in this report.
5. That $I$ am presently employed by Giant Mascot Mines Limited.

DATED March 20, 1972.

Signed,








Department of
Mines and Pefroleum Resources ASSESSMENT REPORT NO. $36 / 5$ MAP 416

| To accompany an assessment repont dated March 201972 by N. Berg B. Sc. (physics)on the Ni claim group, Harrison Lake |  |
| :---: | :---: |
| NICKEL SYNDICATE |  |
| GRID AREA No. 1 MAGNETOMETER SURVEY |  |
| SCALE $1^{\prime \prime}=500^{\prime}$ DRAWN N.B. DATE Mar. 72 | DWG NO. $1-F_{2}$ |





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