



Report on the Magnetometer and VLF-E
conducted by Northgate Exploration Limited on the Orofino
Property located in Silk & Horwood Townships, Timmins District,
Ontario

1.0 Introduction

The following report describes the magnetometer and VLF-electromagnetic surveys completed during the spring of 1980 on 80 claims comprising the Orofino joint venture in Silk & Horwood Townships, Porcupine Mining Division.

A grid comprising 102.6 miles of cut lines was completed by independent contractors. Lines were turned off every 120 metres and stations were measured every 30 metres. Supervision of line cutting and geophysics was by the author. The method utilized in numbering was to drop the last 0 at each station and on every line; for example, L12W is 120 metres west of 0+00. Three N on that line is 30 metres north of baseline, etc.

1.1 Property and Ownership (see Figure 1 and Schedule A appended)

The Orofino property in the joint venture agreement comprises 80 mining claims of which 27 are the original patents. These claims comprise a contiguous block, 5.5 miles east-west and 1 mile deep in a rectangular shape extending from the southeast corner of Silk Township to Horwood Lake on the east in Horwood Township. The group comprises three units (1) the original 27 patented claims of the former Orofino prospect; (2) two groups, one directly to the west and the second in the eastern extremity (27 claims) acquired by Orofino from L. Gauvreau et al, and (3) the third segment, 19 claims to the east of the original patents and 7 claims to the north (26 claims), staked by Northgate Exploration Limited.

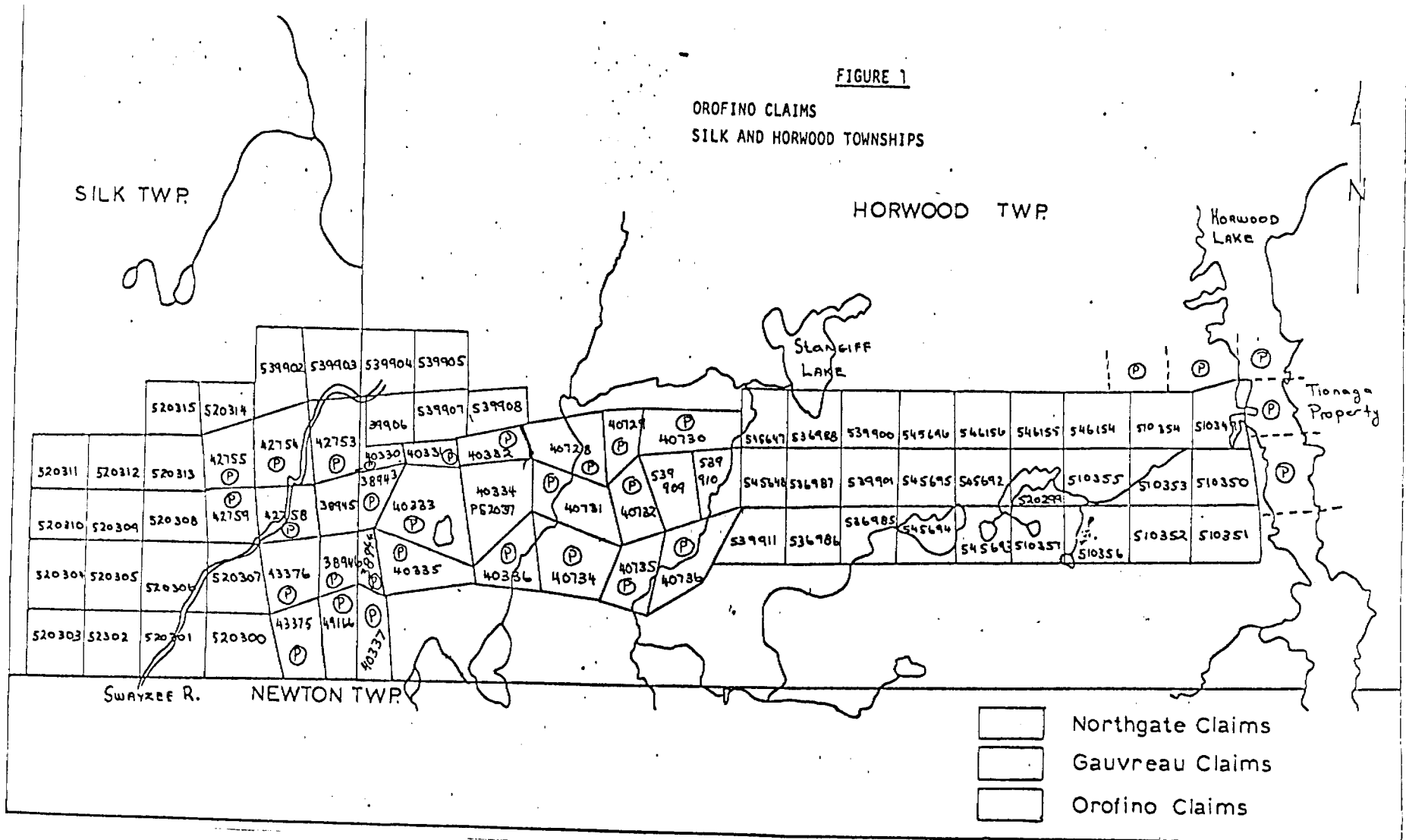
All of the above claims constitute the joint venture property. Further claims staked in the summer of 1980 have been added to the joint venture property but this report relates only to the patented and non-patented claims as appended; specifically for assessment purposes on the non-patented claims.

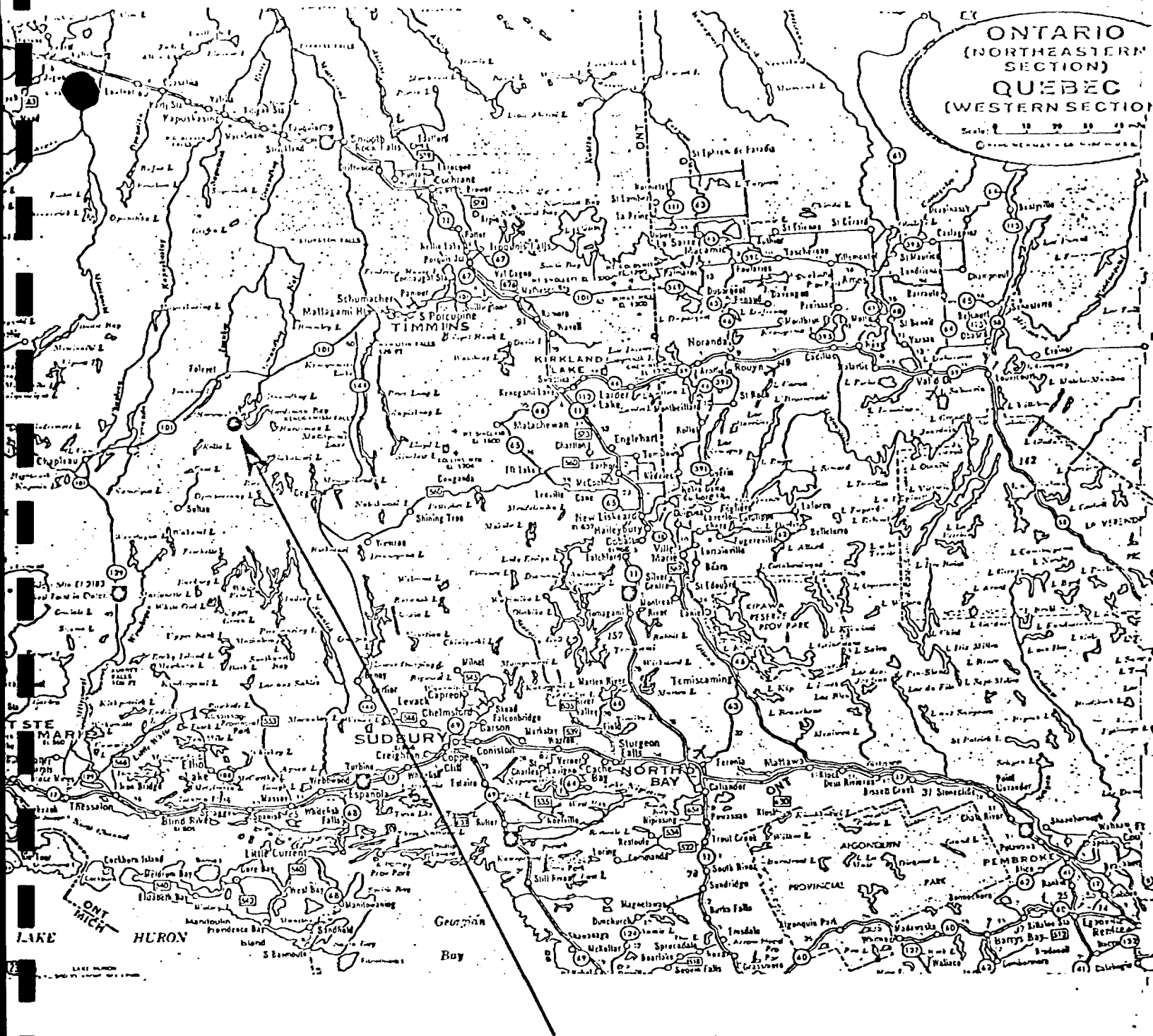
1.2 Location and Accessibility (see Figure 2)

The 80 patents and claims are located in the southeast corner of Silk Township and the southwest corner of Horwood Township. The patented claims straddle the mutual boundary of the townships. The main camp on the Swayze River is 64 air miles south & west from Timmins. It is accessible by 20 miles of good gravel road south from Ivanhoe Lake and thence by 7 miles of passable road to the Swayze River. The road is all-weather from Ivanhoe Lake to Eddy Forest Products bush operation about 7 miles to the south. Total distance by road from Timmins is 101 miles.

FIGURE 1

OROFINO CLAIMS
SILK AND HORWOOD TOWNSHIPS





OROFINO

FIGURE 2

LOCATION OF OROFINO PROPERTY

The property is 5 miles west of the southern portion of Horwood Lake and is accessible by road from the west shore of Horwood Lake.

1.3 Topography and Drainage

The area is generally flat with some low hills. The western portion was burned about 30 years ago and is covered by small, thick, second growth poplar and birch. Much of the east part of the area is covered by mature poplar in the higher sections and spruce in the flatter portions.

Drainage is via the Swayze River and its tributaries to Horwood Lake.

1.4 Previous Work

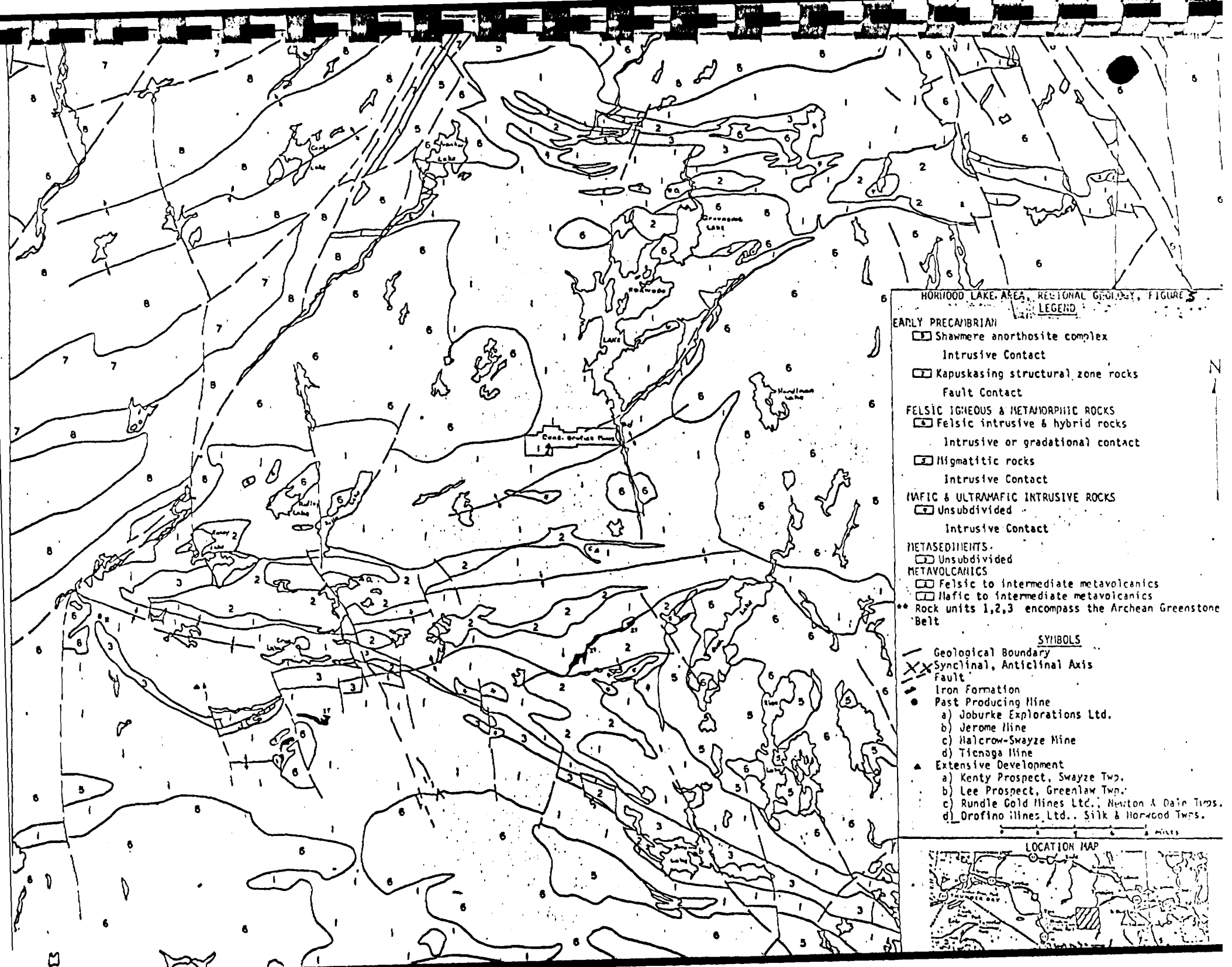
The main portion of the property, the original patented claims, were worked sporadically over a period of 50 years. The claims were staked originally in the early 1930's by G. A. Thorne, prospector, who optioned them to Hollinger Mines. After surface trenching and diamond drilling the claims were allowed to come open. Ferland and Doyon, prospectors, optioned the property to Orofino Mines after acquisition. S. C. Brown managed the mine from 1945 to 1951, the year of closure. After an initial 20,000 ft. of diamond drilling a three-compartment shaft was sunk with levels at 150 ft. and 275 ft. A fire in 1952 destroyed the head frame. The property was idle until 1962 when an additional 20,000 ft. of diamond drilling was completed. In 1973-74 Camflo optioned the property from Orofino and 11,000 ft. of drilling was done around the shaft area and additionally some holes were completed 1,500 to 2,800 ft. away, mainly northeast of the shaft. The property remained idle until 1979 when the present program commenced under a joint venture agreement between Consolidated Orofino Mines and Northgate Exploration Limited.

2.0 General Geology

The Orofino Joint Venture property lies within the Archean, meta-volcanic-metagabbroic-metasedimentary belt known as the Swayze greenstone belt (Breaks, 1978). Pillowed and fine-grained meta-volcanics dominate the rock types of the claim area (Breaks, 1978). Metagabbroic, and "dioritic" stocks, which are cut by feldspar porphyry and lamprophyre dykes, also occur. The dykes are mainly within the diorite intrusives. Quartz veins with associated pyrite, chalcopyrite, arsenopyrite and gold intrude the stock, either passively along fractures and foliation, or forcefully across the foliation. A Middle to Late Precambrian olivine diabase dyke of the Abitibi type crosses the northwestern corner of the claims (Breaks, 1978).

The metavolcanic rocks are of two main types. The first type is massive, displays pillow and amygdaloidal structures and relict volcanic textures. The second type is probably largely tuffaceous, moderately to intensely sheared and carbonatized (Breaks, 1978).

Occurring as stocks, the metagabbro or "diorite" bodies intrude the surrounding metavolcanics. They rarely exhibit relict gabbroic textures with interlocking subhedral plagioclase laths which have been saussuritized (Breaks, 1978).



HORWOOD LAKE AREA, REGIONAL GEOLOGY, FIGURE 5

LEGEND

- EARLY PRECAMBRIAN**
- Shawmere anorthosite complex
 - Intrusive Contact
 - Kapuskasing structural zone rocks
 - Fault Contact
- FELSIC IGNEOUS & METAMORPHIC ROCKS**
- Felsic intrusive & hybrid rocks
 - Intrusive or gradational contact
 - Migmatitic rocks
 - Intrusive Contact
- MAFIC & ULTRAMAFIC INTRUSIVE ROCKS**
- Unsubdivided
 - Intrusive Contact
- METASEDIMENTS**
- Unsubdivided
- METAVOLCANICS**
- Felsic to intermediate metavolcanics
 - Mafic to intermediate metavolcanics
- ** Rock units 1,2,3 encompass the Archean Greenstone Belt
- SYMBOLS**
- Geological Boundary
 - Synclinal, Anticlinal Axis
 - Fault
 - Iron Formation
 - Past Producing Mine
 - a) Joburke Explorations Ltd.
 - b) Jerome Mine
 - c) Halcrow-Swayze Mine
 - d) Ticnaga Mine
 - Extensive Development
 - a) Kenty Prospect, Swayze Twp.
 - b) Lee Prospect, Greenlaw Twp.
 - c) Rundle Gold Mines Ltd., Newton & Dain Twp.
 - d) Drofino Mines Ltd., Silk & Horwood Twp.
- 0 1 2 3 4 5 6 Miles

LOCATION MAP



The feldspar and quartz porphyries and lamprophyre dykes in the area post-date all rock types except the diabase dykes. Two theories for the origin of these dykes have been proposed. They may have originated as hypabyssal phases of granitic batholithic activity during the Archean. Another possibility is that some of these dykes originated from early felsic volcanism as sheets, plugs and conduits (Breaks, 1978). The lamprophyre dykes generally cut the porphyry dykes and are believed to be the last stage of differentiation in the intrusive.

Sporadic diamond drilling over the years has disclosed a profusion of smaller lamprophyre dykes of somewhat diverse composition, generally highly micaceous; which post-date all gabbroic rock types. One variety with a characteristically diagnostic composition may post-date all structural disturbances in the ore-bearing dioritic plug.

Generally, the regional metamorphism of the area is of green schist facies (Breaks, 1978).

2.1 Pleistocene & Recent Geology

Much of the area is covered by Pleistocene and recent deposits. There are glacial deposits in the form of a sandy-silty, undulating ground moraine which covers much of the area (Boissoneau, 1965). Glacio-fluvial deposits include eskers and kettle lakes. Glacio-lacustrine deposits in the interglacial Lake Barlow-Ojebway, occur as varied sequences sporadically distributed in the area (Boissoneau, 1965). The recent deposits consist of muskeg and peat swamps.

3.0 Structure (see Figure 4)

A major east-northeast to north-northeast trending fault zone known as the Hardiman Bay Fault cuts through the area. Movement in part on this structural feature is post-Abitibi diabase dykes (Breaks, 1978). The right-lateral offset on this fault is postulated as approximately 390 metres. Foliations become increasingly penetrative and schistose as one approaches this fault zone (Breaks, 1978).


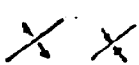

Additional work, both geophysical and diamond drilling, has shown much more faulting than was previously known. Presently, it is thought that there are two directions of rupture; a major north-east trending, strata conformable, series of parallel breaks and a near northerly direction, as postulated from diamond drill core some years ago. Faulting appears to have been recurrent; some zones of movement are significant gold ore depositories while others must post-date mineralization.

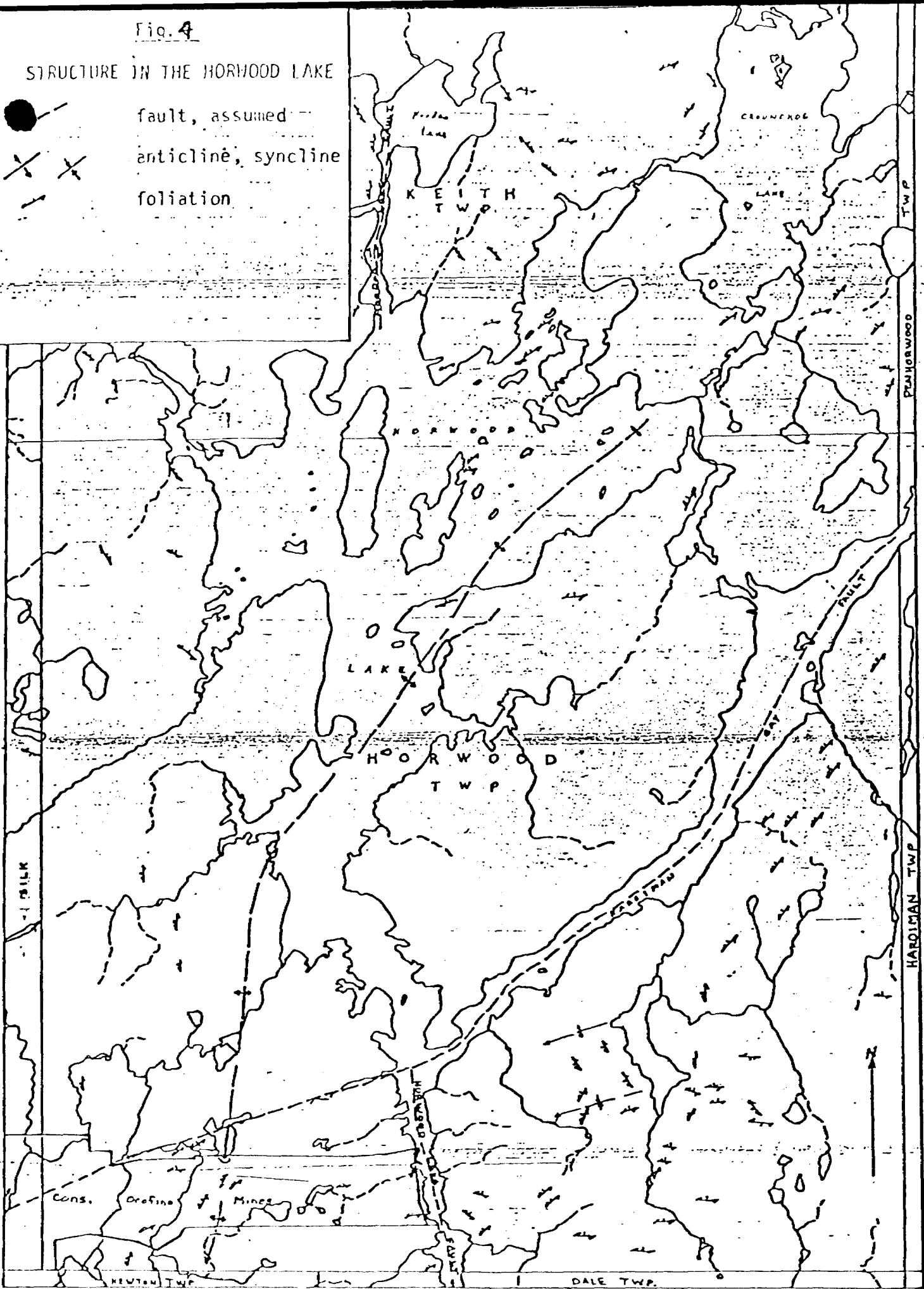
4.0 Line Cutting

A baseline was cut east and west from a 0+00 point on the township boundary between Horwood and Silk Townships. The baseline extends to the west boundary, a distance of 240 m. (720 ft.) and east, 8.52 (27,792 ft.) to the west shore of Horwood Lake.

Fig. 4

STRUCTURE IN THE HORWOOD LAKE

-  fault, assumed
-  anticline, syncline
-  foliation



Tie lines were cut and chained for control of the lines and amount to 20.7 km. (12.9 miles).

Picket lines were also cut and chained for a total distance of 135.7 km. (84.3 miles).

5.0 Magnetometer Survey (see Figure 5 Regional Magnetic Survey)

A magnetometer survey utilizing a McPhar model GP-70 proton magnetometer was carried out by Mr. K. Tyler, a Northgate employee. Readings were taken over the property from the latter part of January 1980 through April.

The recording unit measures absolute magnitude of total magnetic field. The instrument measures to 1 gamma sensitivity and 10 scale ranges read to a maximum of 100,000 gammas. Field intensity is readable directly in gammas from a contained display panel.

The traverses were done by a series of loops using base stations on the baseline from which corrections were made after completion of a looped traverse.

5.1 Interpretation

The interpretation of the magnetometer survey is based upon a study of contoured magnetic maps, bedrock geology and diamond drill logs. The line grid was used as the control for geological mapping at the same scale.

Very little structural information was resolved from the survey mainly because of the general similarity in magnetic values of various rock types so that any major or minor movements or dislocations remain undetected.

5.2 Summary of Results of Magnetometer Survey

The magnetometer survey was plotted on four sheets, starting from west to east.

The ground survey indicates a general formational trend of N60-70°E. On sheet #1 and 2, from line 0+00 to the north portion of the western boundary, a pronounced northeasterly trend averaging 1,500 gammas outlines an olivine diabase dyke approximately 500 ft. wide.

Areas underlain by volcanic assemblages on the west side of the property have surprisingly low magnetic response so that a detailed evaluation is impossible. This is abetted by the paucity of rock exposure. The general response is between 200 and 400 gammas with an abundance of intermediate values.

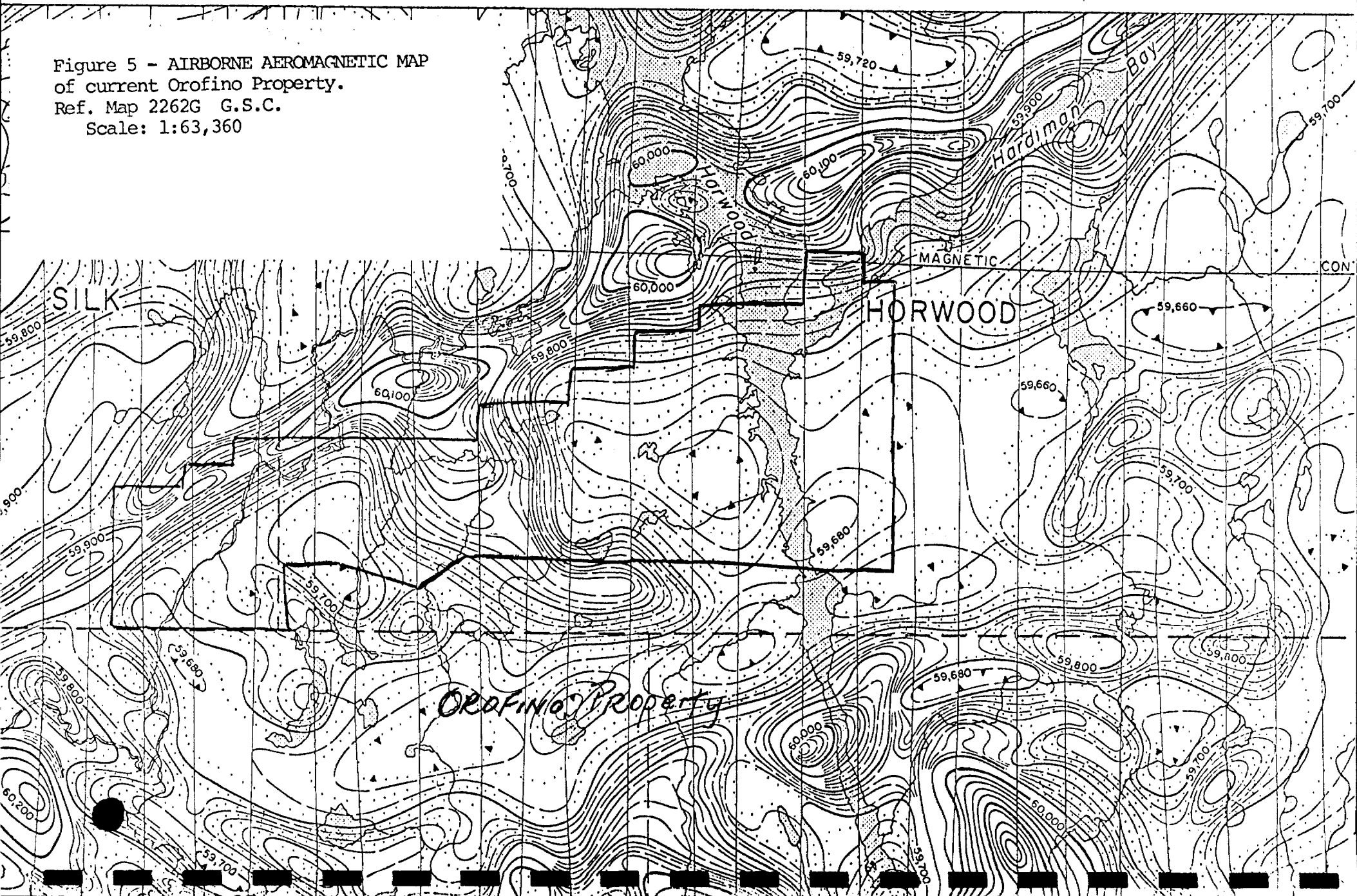
Several circular configurations of magnetic readings with a mean of 700 gammas were found by geological mapping to represent intrusive diorite plugs similar to the Orofino stock, the host rock for gold-bearing veins. Several of these appear on sheet #2 in the vicinity of the baseline between lines 60W and 96W.

25'

20'

Joins Map 2263G, "Groundhog Lake"

Figure 5 - AIRBORNE AEROMAGNETIC MAP
of current Orofino Property.
Ref. Map 2262G G.S.C.
Scale: 1:63,360



An ovoidal sequence of values in the range of 700 to 1,000 gammas completely enveloped in a sequence of 200 to 300 gammas as readings reflects the "shaft area" diorite with its intrusive character and its gold quartz veins contained within, in a sea of northeast-trending volcanic rocks. To the north of the shaft area, magnetometer values indicate a larger expanse of diorite intrusive than was previously surmised. There is no rock exposure so the postulation is based on the gamma intensity.

Within the central portion of the property a series of isolated magnetic highs remain unexplained, however, some of these, with a distinct northeast trend, represent volcanic rock mapped as mafic basalt.

In the extreme eastern part of the map area a repetitive series of andesitic volcanic flow rocks, as determined by mapping, show no appreciable magnetic contrast aside from a vague northeasterly trend to the magnetic values.

The entire eastern segment north of the baseline, for in excess of 1.5 miles, shows no contourable values and is magnetically flat. Existing magnetometer values and lack of exposure preclude interpretation within this volcanic sequence.

6.0 VLF-Electromagnetic Survey

6.1 Description of Method of Plotting

The method of plotting of preliminary profiles was as follows: On each of the sectional plans of the entire grid (Scale 1:5,000 or 1"=416.7 ft. or 1"=127 metres), profiles were drawn adjacent to each line of traverse with 1"=50% with both in-phase and quadrature profiles displayed. Positive readings were placed to the right of the line of traverse and negative readings to the left.

The data was then filtered by the Fraser correction method and curves were smoothed with the elimination of any erratic values. On a base map of identical scale the values obtained were then contoured for the in-phase readings. This map was then utilized as a guide for interpretation of anomalously responsive areas.

6.2 Description of Instrument & Procedure

6.2.1 The grid covered was identical to that noted in the previously described magnetometer survey. The instrument used was a Geonics EM-16 unit (VLF). Stations were read at 30 m. intervals on lines separated at 120 m.

The in-phase and quadrature components are read at right angles to the transmitter station. Readings were taken facing north, with the signal from Cutler, Maine. For a detailed explanation of the theory and of the manner of operation, the reader is referred to a standard manual on the unit manufactured by Geonics Limited, Thorncliffe Park, Toronto, Ontario.

6.3 Interpretation

Following the plotting of the results of the survey as noted above in section 6.1, the writer submitted his data to a geophysical consultant for review of the preliminary interpretation.

Plotted results (Scale 1:5,000) detailed a series of long, and near parallel, relatively weak anomalies which although sporadically broken or delimited, carry on over long distances. These lengthy anomalies represent the surface expression of major strike faults and seem to be weak or nearly obscured in local areas of excess overburden. The prevailing trend of these fractures is plus or minus 10° from N60° E True. In the absence of a detailed horizontal-loop survey, it appears that these features dip steeply south.

None of the profiled data suggests a shape coincidental with massive sulphides in any concentration.

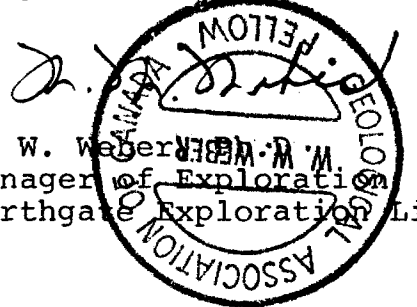
The small weak anomalies were examined in the field and were found to be due to accumulations of varied clays with a perched high water table which often causes erratic results. These would probably be eliminated with some selective horizontal loop traverses.

The purpose of the survey was accomplished in that the possibility of locating massive sulphides was eliminated and the delineation of the trend and approximate location of the surface expression of major dislocations was detailed. A scanning of the enclosed maps with interpreted anomalous conditions provides the details of the survey.

Timmins, Ontario
September 30, 1980

W. F. Gilman

W. F. Gilman, M.Sc.
Project Geologist



W. W. Weber
Manager of Exploration
Northgate Exploration Limited

63.A-567

Schedule A

Orofino Joint Venture

1. Patented Claims

(a) Silk Township - 10 Patents

S38945-46
S42753-55 incl.
S42758-59
S43375-76
S49166

(b) Horwood Township - 17 Patents

S40330-33 incl.
S40335-37 incl.
S40728-32 incl.
S40734-36 incl.
S38943-44 incl.

2. Unpatented Claims - Horwood Township

(a) Gauvreau Claims - 27 Claims

P520317
P520300-315 incl.
P520299
P510349-57 incl.

(b) Northgate Claims - 26 Claims

P539900-11 incl.
P536985-88 incl.
P545692-96 incl.
P546154-56 incl.
P545647-48

Schedule B

Details of Line Cutting
Orofino Property

BL-1 8.76 km. = 5.4 miles

BL-2 2.70 km. = 1.5 miles

TL-1 2.67 km. = 1.6 miles

TL-2 2.28 km. = 1.4 miles

TL-3 5.48 km. = 3.4 miles

TL-4 6.48 km. = 4.0 miles

TL-5 1.44 km. = 0.9 miles

Crosslines 135.69 km. = 84.3 miles

Total miles of baseline cut = 11.16 km. = 6.9 miles

Total tie lines cut = 20.72 km. = 12.9 miles

Total Line Cutting 167.57 line km. or 104.1 line miles