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MINING LANDS SECTION

Geological Report on the Orofino Joint
Venture Property
Located in Silk and Horwood Townships
Timmins District, Ontario

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1.0 INTRODUCTION

Northgate Exploration Limited embarked on a program of acquisition of precious metal prospects several years ago. The Orofino property, dormant since 1947, save for a company drill program in 1962 and a Camflo Mines option-drilling program in 1973, was acquired under option late in 1979, together with adjoining claims acquired or staked to form part of a joint venture property.

1.1 Property and Ownership

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 listed below specifically for assessment purposes on the non-patented claims.

1.2 Claim Groups

(a) Patented Claims - Silk Township - 10 patents

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

Patented Claims - Horwood Township - 17 patents

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

- (b) Gauvrou Claims - 27 claims
P520317
P520300-315 incl.
P520299
P510349-57 incl.

- (c) Northgate Claims - 26 claims
P53900-911 incl.
P536985-88 incl.
P545692-96 incl.
P546154-56 incl.
P545647-48

(See Figure 1)

Although this report specifically relates (for assessment purposes) to the non-patented groups (b) and (c) above, the geological mapping covered the entire claim groups and for the sake of clarity, continuity and the proper overall perspective, references are made to geological data observed on the patented claims.

1.3 Location and Access (See Figure 2)

The Orofino property is approximately 338 miles north of Toronto and 63 miles southwest of Timmins. The town of Foleyet is 20 miles north of the property (See Figure 2).

Foleyet is situated on Highway 101 which is a paved and well maintained road connecting Timmins and Chapleau. From there a gravelled secondary road runs to the mine site. The first 24 miles is presently maintained by Ivanhoe Forest Products who are undertaking lumbering operations. The remaining six miles is in need of some repair and a new bridge will have to be constructed over the Swayze River (about 70 feet wide).

The eastern half of the property can be reached from bush roads leading from Highway 101 to Horwood Lake and thence by boat.

1.4 Auxiliary Services

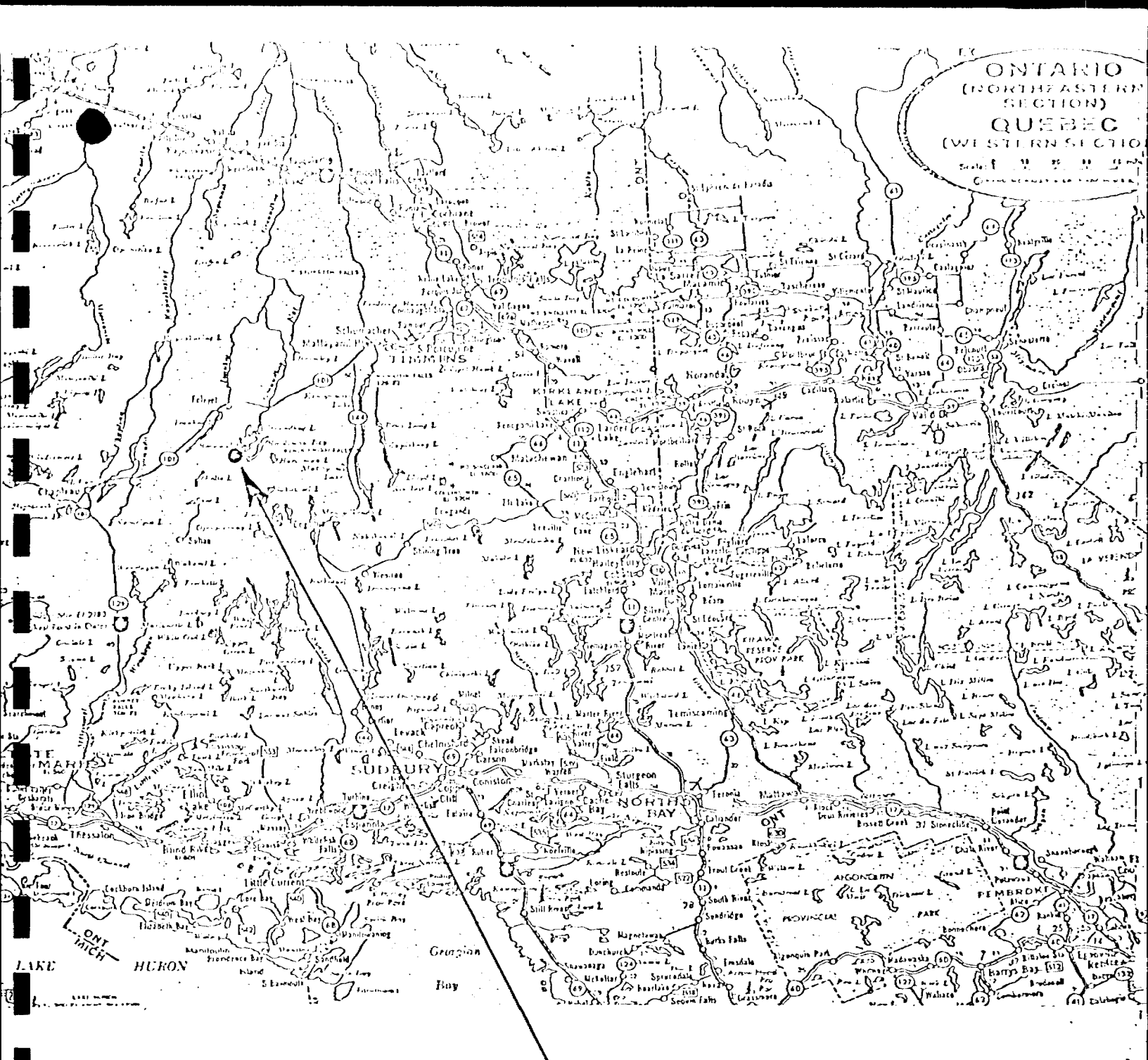
1.4.1 Water

The property is ideally situated in regards to water supplies. At the east end Horwood Lake provides an ample source while the Swayze River could service the western portion.

Numerous smaller lakes and streams transect the middle claims.

1.4.2 Timber

Stands of mature trees are not a frequent occurrence due to logging operations



OROFINO

FIGURE 2

LOCATION OF OROFINO PROPERTY

in the 1950's. However, aspens are plentiful in the southwestern corner of Horwood Township. (1) Any major requirements for lumber would have to be brought into the work site.

1.4.3 Electrical Power

There are no power stations in the area, therefore all future supplies will have to be provided by generator or a branch line would have to be extended from the nearest hydroline. Presently the nearest high tension power source is Foleyet.

1.4.4 Miscellaneous Supplies

All major equipment supplies are available at Timmins, a major mining centre. The town of Foleyet can provide some minor services and emergency food stuffs.

1.4.5 Transport

Once the gravel road to the mine site is upgraded there should be no difficulty in transporting any products or supplies into or out of the property.

The nearest rail facilities (CNR Transcontinental) pass through Foleyet.

The nearby Horwood Lake has ample length and depth for fixed wing float aircraft.

Helicopters are readily available (Huisson) at Timmins, a 35 minute ferry distance.

1.5 Topography

The entire Horwood Lake area lies within part of the glaciated Precambrian peneplain. Low ridges of rock and glacial debris are separated by small areas of level overburden. Mounds, low hills of sand and gravel, sink-holes and eskers are common within this region. Rock outcroppings throughout the area rarely attain heights of 200 feet. Swamps and areas of muskeg are not numerous in the immediate vicinity of the Orofino property but cover much of Keith Township to the north.

1.6 Climate

Horwood Township lies in a belt which experiences a continental climatic pattern.

This summer season which begins in May and continues to early September

(1) F.W. Breaks, "Geology of the Horwood Lake Area", OGS report 169, 1978

accompanied by warm temperatures which can be as high as 28°C to 30°C for short periods or time. Humidity varies considerably but is generally within an acceptable level.

Although most Summer seasons are quite pleasant, some can be marred with persistent overcast skies, abundant rainfall, and cool temperatures.

Both the Fall and Spring seasons are characterized by sunny, cool days and cold nights with frost.

The Winter season can start as early as mid-October and last into May but more frequently the snow does not usually stay until mid to late November and is gone by April.

Snow accumulations can be considerable, up to 3 feet in the bush and temperatures have been known to drop below -40°C.

1.7 Previous Work (2)

The following is a brief summary of the work completed on the property to date:

- 1933 - Visible gold was discovered east of the Swayze River in Silk Township by J. Burke and J. McIlroy who staked 12 claims for G.A. Thorne.
- 1935 - Hollinger Consolidated Gold Mines Ltd. optioned this property (Thorne-Dore option), drilled 25 diamond drill holes for a total of 4,800 feet; as well as trenching and channel sampling.
- 1938 - Hollinger drops option and claims come open.

Property re-staked by Ed Ferland and Paul Doyon for Mining Research Corporation. Thirteen new claims were added to the group.
- 1945 - Mining Research Corporation's new claims were sold to Orofino Mines Ltd., and Ontario incorporation formed that year.
- 1945-47 Stripping and trenching continued, 20,000 feet of diamond drilling using AX core established continuity of mineralization to a depth of 200 feet and over a strike length of 700 feet.

(2) J.B. Gordon, H.L. Lovell, Jan de Grijs and R.F. Davie,
"Gold Deposits of Ontario, Part 2", Ontario Geological Survey
Mineral Deposits Circular 18, 1979 p. 83-84

F.S. Breaks, "Geology of the Horwood Lake Area", Ontario Geological
Survey Report 169, 1978 p. 50

S.C. Brown, Report to Orofino Mines Ltd., April 1973

- 1948-49 - A 3-compartment shaft was sunk to a depth of 306 feet with levels established at 150 feet and 276 feet. Lateral work totalled 210 feet. Fifty-seven surface diamond drill holes totalling 15,000 feet were completed.
- 1950 - Lateral work continued resulting in a total to date of 2,058 feet of drifting, 1,134 feet of crosscutting and 21 feet of raising. Twenty-two underground diamond drill holes were completed for a total of 1,850 feet.
- 1951 - Total underground work increased to 3,381 feet of drifting, 1,299 feet of crosscutting and 78 feet of raising. Twenty-two holes, drilled from surface accumulated to 5,008 feet with an additional 54 holes (6,159 feet) being completed underground.
- 1962-63 - Orofino Mines completed 21,311 feet of AX core drilling on a grid pattern to test mineralization to the 1,000 feet level.
- 1973-74 - Camflo Mines Limited optioned the property and drilled 15 diamond drill holes totalling 8,200 feet.

In addition to the above relating to the patented Orofino claims, the following previous work (5) is recorded in the assessment files of the Ministry of Natural Resources, Ontario on parts of the present claim grouping.

1.7.1 Gifford Showing (Claim 510354)

Assessment Files Ref. T2116 - Donalda Mines Limited
T2127 - Proto Explorations Inc.

This prospect was originally found by G.S. Gifford in 1934. In 1937, Teck Hughes conducted limited drilling beneath the extensive surface trenches.

In 1965, Donalda Mines conducted magnetic and electromagnetic surveys over the prospect. The significant results of this work are summarized in Mineral Deposits Circular 18, Ontario Geological Survey "Gold Deposits of Ontario", Part 2, p. 65.

1.7.2 Landry Prospect (Claims 545648 - 536987)

Assessment Files Ref. T2118 Hardiman Bay Mines Limited

This occurrence which was discovered in 1934 lies to the south of Stangiff Lake in the central core of the present property. In 1963, Hardiman Bay Mines conducted a magnetometer survey and drilled 10 holes in their 18 claim group. No significant results were encountered. In 1965-66, further geological mapping and five additional drill holes comprised the work program.

Best assay recorded was 0.38 oz Au/ton over 4 inches.

2.0 SWAYZE GREENSTONE BELT

2.1 Regional Geology (3)

The Orofino property lies within the east-west trending Swayze-Deloro Metavolcanic-Metasedimentary belt which forms part of the Abitibi sub-province. All rocks are Archean in age with the exception of the middle to late Precambrian diabase dike swarms.

This belt contains two complete sequences of mafic and felsic metavolcanics with associated metasediments. The mafic metavolcanics predominate and consist of massive flows which in many exposures display pillow or amygdaloidal structures. Flows and pyroclastic rocks of rhyolitic, dacitic or trachytic composition form the felsic metavolcanic units with rhyolitic varieties being the most common.

Less than ten percent of the Swayze-Deloro Belt is composed of metasedimentary rocks. In decreasing order of abundance they include greywacke, arkose, conglomerate, quartzite and argillite.

Numerous Algonian granitic intrusives have deformed the belt's margin into an arcuate pattern typical of many Archean greenstone belts.

Mafic and ultramafic intrusions having dioritic, gabbroic and serpentized compositions occur throughout the belt. These bodies form as sills or stocks and pre-date the granitic intrusives.

A green schist facies regional metamorphism predominates over the entire area with epidote-almundine amphibolite grade being present in contact metamorphic aureoles.

2.2 Local Geology

2.2.1 Orofino Property

The geology of the property was mapped by R. Russell on a scale of 1:2500 during the 1980 field season, commencing on the 28th of May and completed on the 8th of August. K. Tyler, A. McParland, Debra Collins and Paul Jones ably assisted the party leader.

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- (3) P.C. Thruston, G.M. Siragusa and R.P. Sage, "Geology of the Chapleau Area, Districts of Algoma, Sudbury and Cochrane", Ontario Division of Mines, Geoscience Report 157, 1977.

F.W. Breaks, "Geology of the Horwood Lake Area".

2.2.2.1 Ultramafic and Basaltic Metavolcanics

The ultramafic metavolcanics are distinguished by their increased magnetic susceptibility and generally occur as relatively thin flow units. In general, there is an absence of thick flows or sills (?) representing a single phase of the volcanic cycle. It is not uncommon in outcrop to see in the space of several metres, ultramafic flows overlain by basic to intermediate flows and/or tuffs and siliceous and cherty end phases. In most instances, the cyclical intervals are short-lived.

North of the Swayze River, on a topographic high (L72W, 500N) there is a relatively thick (100 m) sequence of ultramafic pillowed lavas. In the south-east corner of the property near Horwood Lake, similar but less thick sequences also occur. Magnetic data indicates much of the ultramafic volcanics are drift covered.

Metavolcanics of probable basaltic or andesitic composition are more abundant probably because they are more weather resistant. These rocks are medium to dark green in colour and where finely foliated in texture, appear to be tuffaceous in origin. The medium grained varieties commonly exhibit pillow structures, and the medium to coarse grained varieties can easily be mistaken for gabbro.

2.2.2.2 Felsic Metavolcanics

These rock types are present in a number of varieties and with the exception of the pink porphyries are generally grey in colour and have a conchoidal fracture. Many of the felsic flows are accompanied by tuffaceous horizons, commonly with a chert phase. Both quartz-eye porphyry and feldspar porphyry occur. The latter closely resembles the intrusive variety at the mine site in both texture and composition. Their field relations however, clearly demonstrate that they are volcanic in origin. For example, on L144W south of the road, a medium grained quartz-eye, porphyry about 20 m thick is overlain by the unbroken chert horizon.

In the vicinity of the Gifford prospect, a quartz feldspar porphyry provides a distinguishing marker horizon.

Crystal tuffs are fairly frequent. North of the Swayze River bridge, a grey coloured crystal tuff is overlain by graphitic shale.

2.2.2.3 Meta sediments

Most of the sediments present are volcanic in origin, the most common being chert beds which are fairly ubiquitous, and on the western edge of the property frequently brecciated.

Graphitic shales were only observed in two localities, near the Swayze River bridge and on the mine dump although the E.M. data suggests that they probably occur more frequently.

2.2.3 Intrusive Rocks

2.2.3.1 Mafic Intrusives

Gabbro intrusives occur in a number of localities throughout the property. The most prominent being the Orofino "stock" which hosts the Orofino gold deposit and forms a topographic high in the west-central part of the property. It appears to be at least 900 m long on a N-S axis and 250 ~~miles~~ ^{ft.} wide at its widest point.

Contacts with the country rock of mixed volcanics appear to be both abrupt and transitional; that is to say there are both sharp intrusive contacts and other more gradational transitions where basic volcanics appear to grade into the gabbro, so that the gabbro may in part represent re-crystallized volcanics.

In fact, the relative abundance of felsic intrusives (porphyry dikes and quartz veining) within the stock suggest that it may be underlain by a buried granitic pluton which has provided a heat engine to re-crystallize the pre-existing volcanics into a rock of gabbroic composition. The relatively low magnetic relief (500 gammas) supports this hypothesis. Other smaller gabbro plugs outcrop west of the Swayze River and west and south of Stangiff Lake in the east-central portion of the property and again ground magnetic data indicate the likelihood of other plugs at shallow depth.

2.2.3.2 Felsic Intrusive

Feldspar porphyry dikes are frequent occurrences within the Orofino stock. These rocks post-date the gold mineralization. They occur elsewhere less frequently and none were found east of Stangiff Lake. They are both pink and grey in colour, medium grained, generally less than 10 m thickness and commonly oriented in a NW-SE direction.

Lamprophyre dikes were only noted within the Orofino stock zone. They also post-date the gold mineralization.

2.2.4 Proterozoic

2.2.4.1 Mafic Intrusives

A regional intrusive, an Abitibi-type olivine diabase dike cuts through the NW corner of the claim group. It is 150 m in thickness and is characterized by brownish weathering rubble outcrop.

2.2.5 Pleistocene

A notable feature on the property is a series of N-NE trending eskers which mask the bedrock east of Stangiff Lake.

3.0 STRUCTURAL GEOLOGY

All of the volcanic and sedimentary rocks are isoclinally folded and trend fairly uniformly N-NE throughout the property. Drag folding is localized.

The ODM have interpreted a south plunging anticlinal axis oriented N-S in the vicinity of Stangiff lake. The writer found little evidence in support or dispute of this view. Faulting on the property appears to have economic importance and the writer has inferred most of the faults from air photo interpretation.

The Orofino deposit occurs at the locus of the junction of two regional fracture zones; the E-NE trending Hardiman Bay fault and a N-S fracture zone named the Orofino fault.

This same structural feature repeats itself at Stangiff lake and at the Horwood lake-Hardiman Bay junction. These latter areas deserve further attention for gold exploration.

4.0 ECONOMIC GEOLOGY AND RECOMMENDATIONS

Outside of the Orofino deposit itself, and the Gifford prospect, no other areas of economic gold mineralization were found during the course of this summer's mapping. However, the results of a humus sampling programme carried out by the writer has yielded some anomalous results which indicate the possibility that new gold mineralized zones do occur.

The writer favours the ground to the north of the present drilling activity as both gabbro, quartz and pyrite were found 400 metres north of the shaft area during the course of trenching a humus gold anomaly.

Anomalous gold in stream sediments also occur in this vicinity. The writer also feels that further humus sampling and lake bottom sediment sampling should be carried out around Stangiff Lake. In addition a similar programme of lake bottom sediment sampling should be carried out in the vicinity of the junction of the Horwood lake-Hardiman Bay faults.

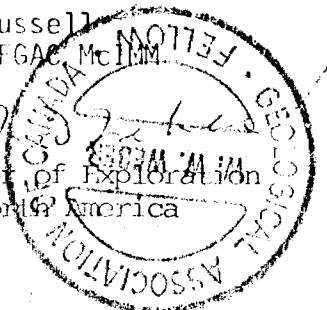
Respectfully,

R. E. Russell

R.E. Russell
B.Sc. FGAC, McIM

S.L.S.

Manager of Exploration
for North America



12.22.17

Toronto, October 3, 1980

TABLE OF FORMATIONS

QUATERNARY

Sand and gravel outwash, eskers, glacial drift, and recent muskeg, swamp and stream and lake deposits.

PRECAMBRIAN

Proterozoic:

7. Olivine diabase
6. Undifferentiated diabase dikes

Algoman:

5. Lamprophyric dikes
4. Undifferentiated felsic intrusives mainly feldspar porphyry. Lesser quartz porphyry and quartz-feldspar porphyry.
3. Gabbro, diorite, metagabbro

EARLY ARCHEAN

Temiskaming-type:

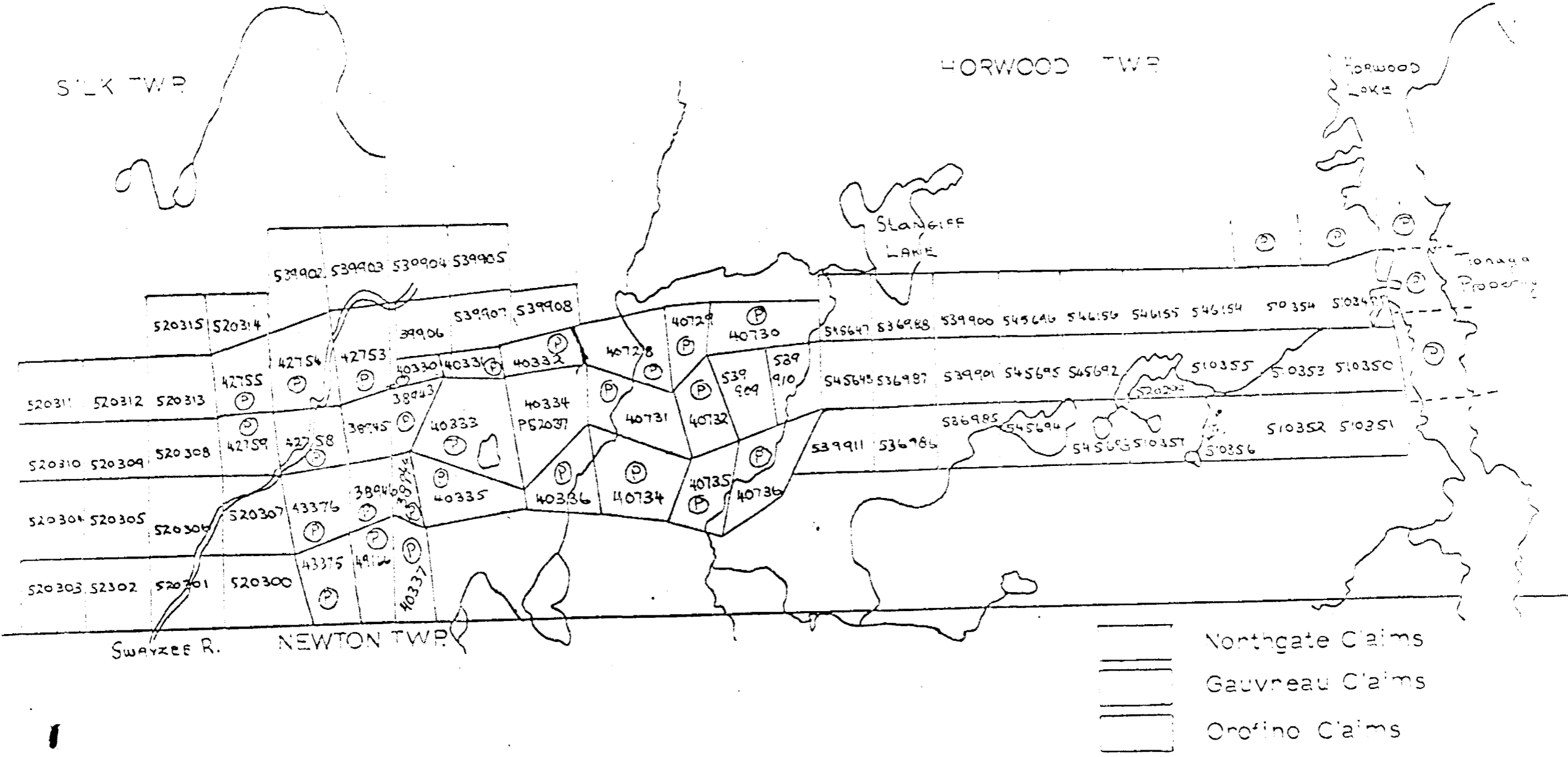
2. Metasediments
 - (a) argillites
 - (b) arkoses
 - (c) conglomerate
 - (d) greywacke
 - (e) chert and cherty breccia

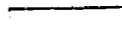
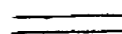

Keewatin-type:

1. Siliceous volcanic tuffs VAT.
 - (a) Quartz and feldspar porphyritic flows (?) possibly sills VAF
 - (b) Intermediate or dacitic volcanics VI
 - (c) Tuffs and flows VII, F
 - (d) Basic volcanics VB
 - (e) Ultramafic volcanics VUM

FIGURE 1

OROFINO CLAIMS
SILK AND HORWOOD TOWNSHIPS



-  Northgate Claims
-  Gauvneau Claims
-  Orofino Claims

900 N —
 800 N —
 700 N —
 600 N —
 500 N —
 400 N —
 300 N —
 200 N —
 100 N —
 Base Line
 100 S

P4-539902

Tie Line No. 5

P539902

P4-520315

P1-520315

P520315

P520314

P520312

P520313

S 42755

S 42754

P520311

P520312

P520313



LEGEND

PRECAMBRIAN INTRUSIVES

- Dia Diabase
- Diar Diorite
- Gabbro Gabbro, in some rocks, probably recrystallized volcanics
- Granite Unsubdivided granitoids
- QFP Quartz feldspar porphyry
- FQP Feldspar quartz porphyry
- FPF Felspar porphyry
- FELS Unsubdivided felsic dikes

METAVOLCANICS AND METASEDIMENTS

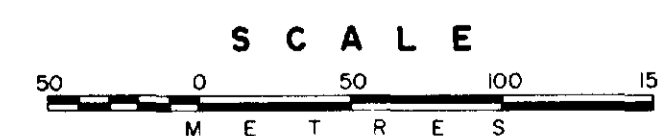
- CH Chert, in part rhyolite
- GH Shale, generally graphitic & pyritic
- ARG Argillite
- GWK Graywacke
- V Metavolcanics unsubdivided
- VA Acid Volcanics
- VI Intermediate volcanics
- (VA-1) Diacite + Andesite
- (VA-2) Basalt
- (VI-B) Andesite - Basalt
- Ultra basics - probably Olivine
- Ultra mafics - Basalt
- Accessory magnetite and epidote

SUFFIXES

- T Tuff
- F Flow
- QIP Quartz eye porphyry*
- QFP Quartz feldspar porphyry*
- FQP Feldspar quartz porphyry*
- Bx Breccia (Δ)
- D Dike
- NBS Northgate stream sediment sample
- These units considered to be extrusive or subvolcanic intrusives, and are conformable in nature.
- Qtz Quartz
- Au Gold
- Py Pyrite
- cp Chalcopyrite
- Gal Galena
- sp Sphalerite
- po Pyroclite

SYMBOLS

- Glacial striae
- Esker
- Outcrop - small
- Outcrop - large
- Outcrop area
- Bedding
- Schistosity
- Pillow
- Geological contact observed, inferred
- Fault, assumed
- DDH Diamond Drill Hole
- Quartz vein
- Jointing
- Swamp
- Creek
- Road



Northgate Exploration Limited

Sheet 1 - North

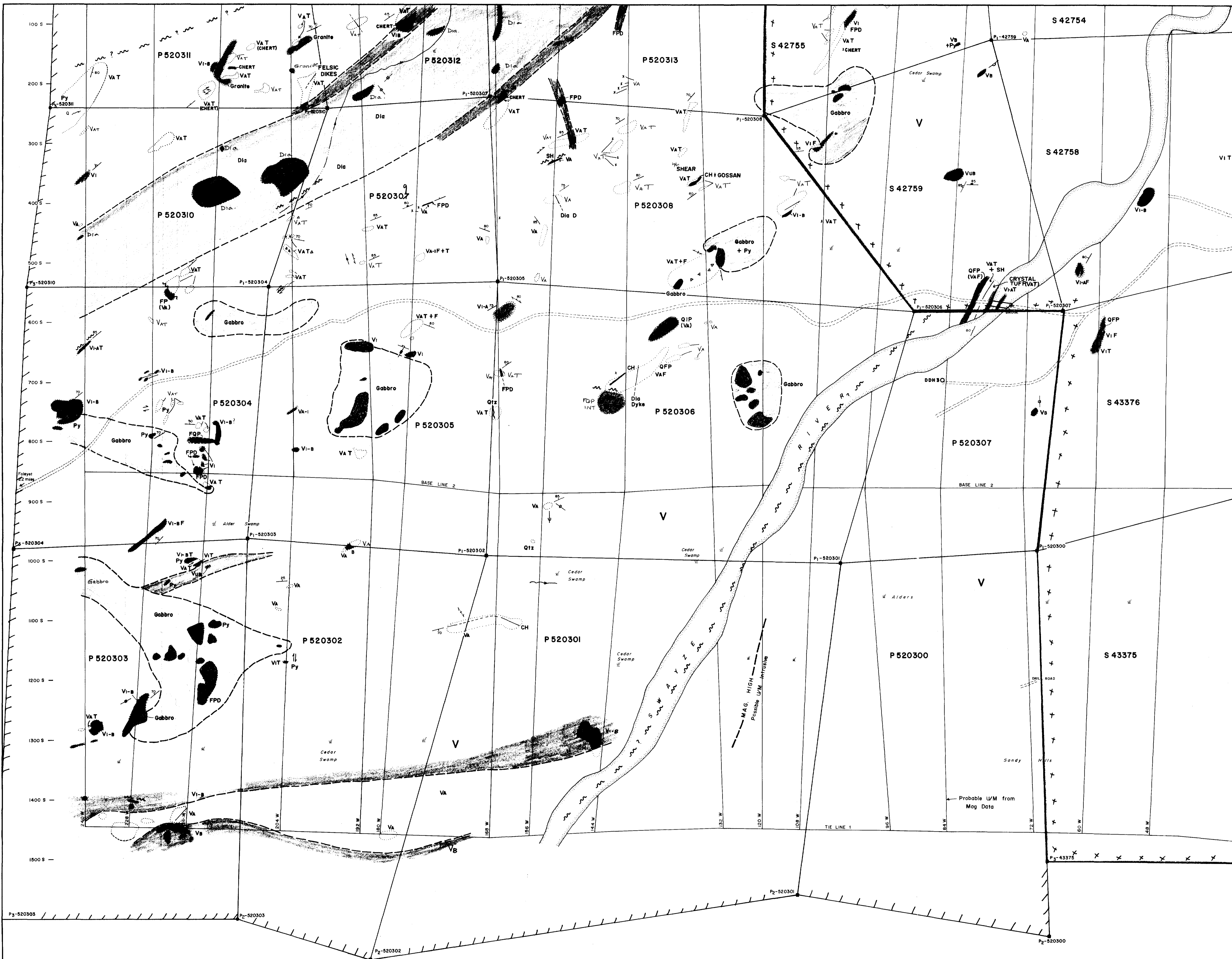
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**OROFINO MINE
 GEOLOGY**



Drawn: Carto-graphics
 Date: September 1980

Scale: 1cm=25M
 NTS: 41 0/16



LEGEND

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- Granite. Unsubdivided granitoids
- QFP. Quartz feldspar porphyry
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METAVOLCANICS AND METASEDIMENTS

- CH. Chert, in part rhyolite
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- ARG. Argillite
- GW. Graywacke
- DIKE. Dike
- V. Metavolcanics unsubdivided
- VA. Acid Volcanics
- VI. Intermediate Volcanics
- VA-I. (Discrete + Andesite) Acid Volcanics - Basalt
- VI-B. (Andesite - Basalt) Ultra basics - probably Omine
- U. Ultra mafics - Basalt
- AM. Accessory magnetite and apatite

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- T. Tuff
- F. Flow
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- FQP. Feldspar quartz porphyry
- Bx. Breccia (Δ)
- D. Dike
- NSB. Northgate stream sediment sample

SYMBOLS

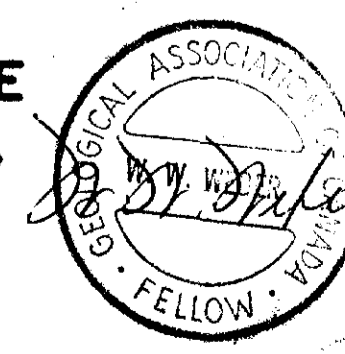
- Quartz
- Gold
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Northgate Exploration Limited

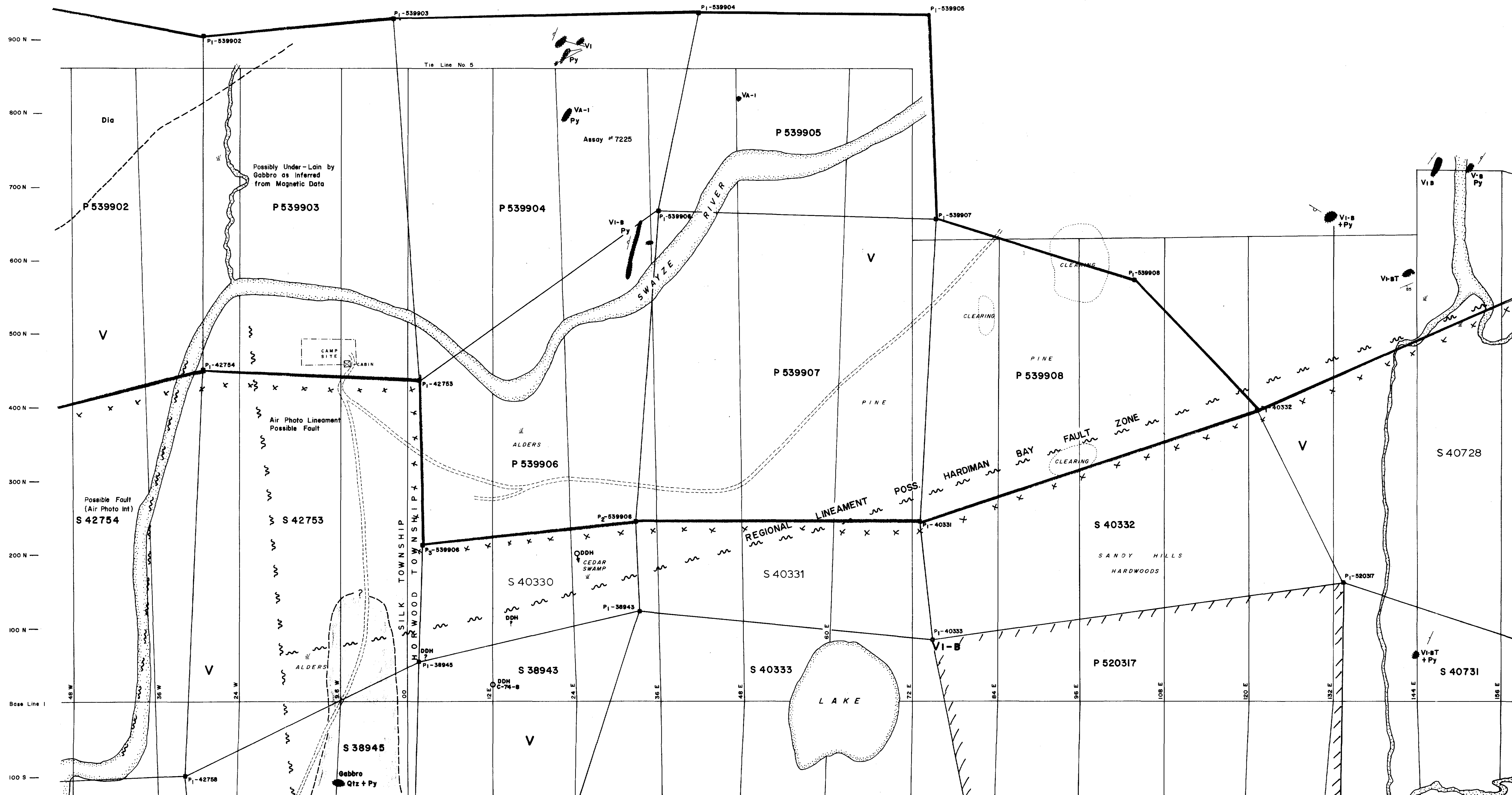
Sheet 1 - South No.

OROFINO MINE GEOLOGY



Drawn: Carto-graphics
Date: September 1980

Scale: 1cm=25M
NTS: 41 0/16



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METAVOLCANICS AND METASEDIMENTS

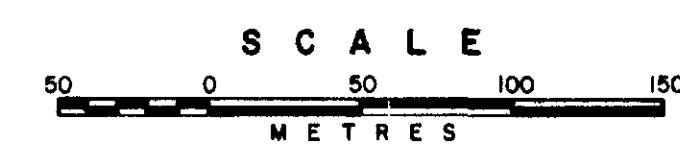
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- Road

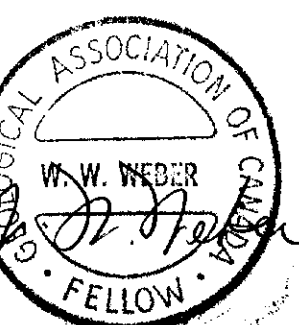


Northgate Exploration Limited

Sheet 2 - North

No.

**OROFINO MINE
GEOLOGY**



Drawn: Carto-graphics
Date: September 1980

Scale: 1 Cm = 25 M
NTS: 410/16





LEGEND

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- (Vv-b) Andesite - Basalt
- U/M Ultra basics - probably Olivine
- U/M Ultra mafics - Basalt
- U/M Accessory magnetite and epidote

SUFFIXES

- T Tuff
- F Flow
- QIP Quartz eye porphyry*
- QFP Quartz feldspar porphyry*
- FQP Feldspar quartz porphyry*
- Bx Breccia (Δ)
- D Dike
- NSB Northgate stream sediment sample
- * These units considered to be extrusive or subjacent intrusives, and are conformable in nature.
- Qtz Quartz
- Au Gold
- Py Pyrite
- cp Chalcopyrite
- gn Galena
- sp Sphalerite
- po Pyrrhotite

SYMBOLS

- Glacial stria
- Esker
- X Outcrop-small
- Outcrop-large
- Outcrop area
- 70 Bedding
- 75 Schistosity
- ~ Pillow
- Geological contact observed, inferred
- Fault, assumed
- ODDH Diamond Drill Hole
- Q Quartz vein
- Jointing
- Swamp
- Creek
- Road

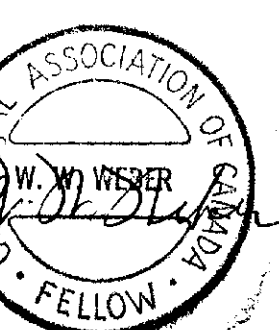


Northgate Exploration Limited

Sheet 2 - South

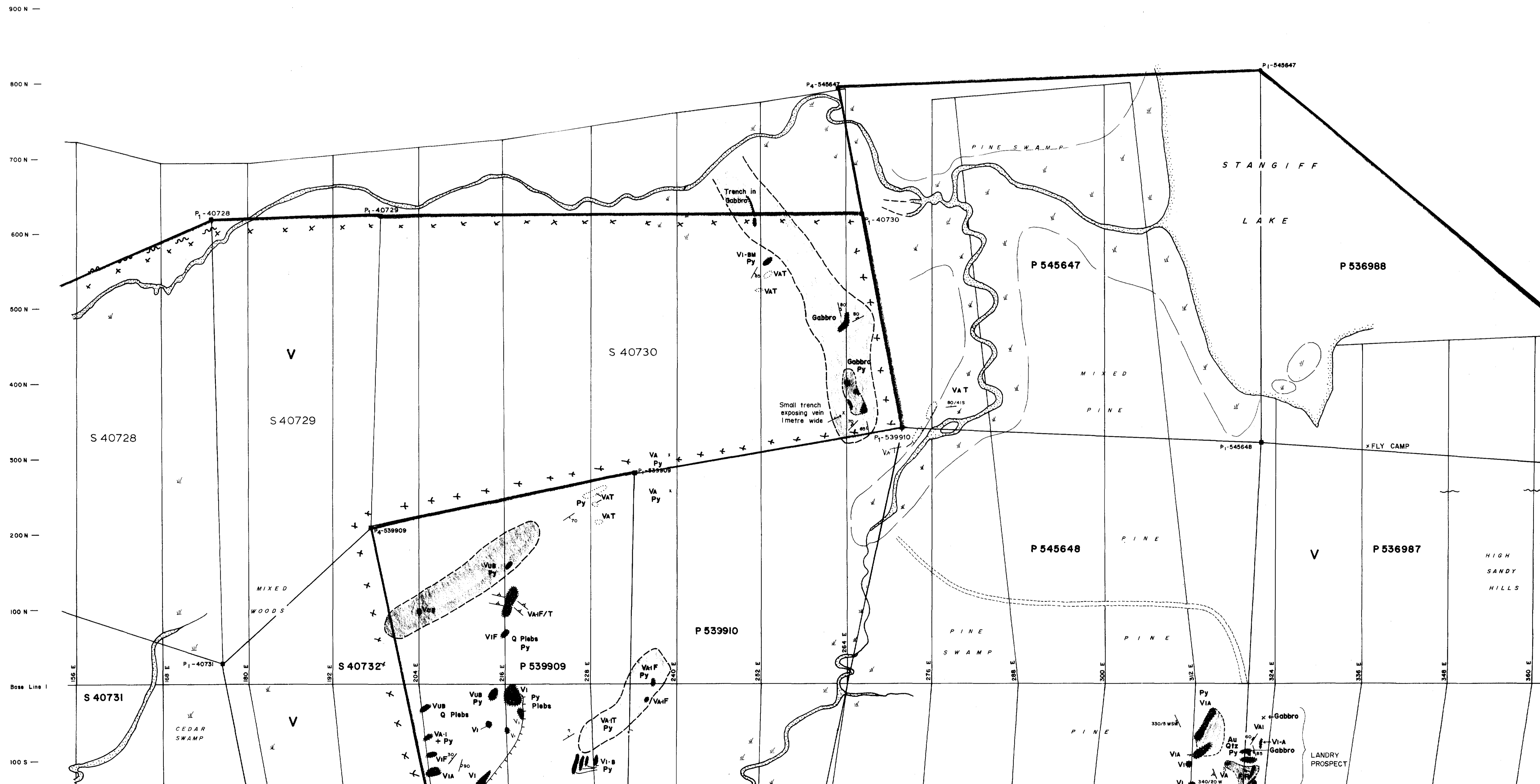
No.

**OROFINO MINE
GEOLOGY**



Drawn: Carto-graphics
Date: September 1980

Scale: 1 Cm = 25 M
NTS: 41 0/16



LEGEND

PRECAMBRIAN INTRUSIVES

- D_{1a} Diabase
- D_{1aF} Diorite
- Gabbro Gabbro, in some rocks, probably recrystallized volcanics
- G₁ Granitic
- QFP Quartz feldspar porphyry
- FQP Feldspar quartz porphyry
- FP Feldspar porphyry
- FELS Unsubdivided felsic dikes

METAVOLCANICS AND METASEDIMENTS

- CH Chert, in part rhyolite
- SH Shale, generally graphitic & pyritic
- ARG Argillite
- GWKE Greywacke
- METAVOLCANICS**
- V Metavolcanics unsubdivided
- VA Acid Volcanics
- VA₁ Intermediate volcanics
- VA₂ (Di)acite + Andesite
- VA₃ Basalt + Andesite
- VA₄ (Andesite - Basalt)
- VA₅ Ultra mafics - probably Olivine
- VA₆ Accessory magnetite and epidote

SUFFIXES

- T Tuff
- F Flow
- QIP Quartz eye porphyry*
- QFP Quartz feldspar porphyry*
- FQP Feldspar quartz porphyry*
- Bz Breccia (Δ)
- D Dike
- NBS Northgate stream sediment sample
- * These units considered to be extrusive or subvolcanic intrusives, and are conformable in nature.
- Qtz Quartz
- Au Gold
- Py Pyrite
- cp Chalcopyrite
- gn Gádena
- sp Sphalerite
- po Pyrrhotite

SYMBOLS

- Glacial striae
- Esker
- Outcrop - small
- Outcrop - large
- Outcrop area
- Bedding
- Schistosity
- Pillow
- Geological contact observed, inferred
- Fault, assumed
- Diamond Drill Hole
- Quartz vein
- Jointing
- Swamp
- Creek
- Road

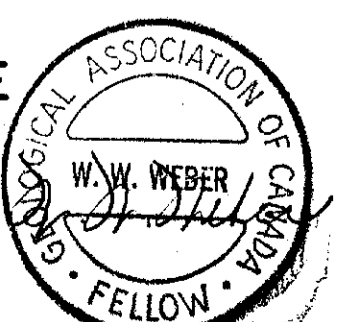


Northgate Exploration Limited

Sheet 3 - North

No.

**OROFINO MINE
GEOLOGY**



Drawn: Carto-graphics
Date: September 1980

Scale: 1 Cm = 25 M
NTS: 410/16



LEGEND

PRECAMBRIAN INTRUSIVES

- Dia Diabase
- Dior Diorite
- Gabbro Gabbro, in some rocks, probably recrystallized volcanics
- Granite Unsubdivided granitoids
- GFP Quartz feldspar porphyry
- FQP Feldspar quartz porphyry
- FP Feldspar porphyry
- FI Unsubdivided felsic dikes

METAVOLCANICS AND METASEDIMENTS

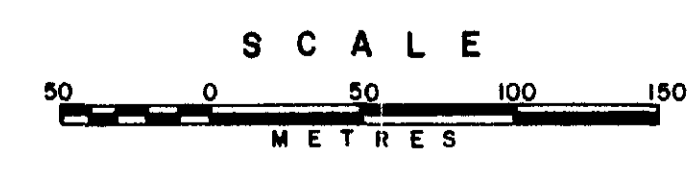
- METASEDIMENTS**
- Ch Chert, in part rhyolite
 - Sh Shale, generally graphitic & pyritic
 - Arg Argillite
 - Grw Greywacke
- METAVOLCANICS**
- V Metavolcanics unsubdivided
 - VA Acid Volcanics
 - VI Intermediate volcanics
 - VIa Diacite + Andesite
 - VIb Andesite + Basalt
 - VIc Andesite + Basalt
 - VIe Ultra basics - probably Olivine
 - VIe Ultra mafics - Basalt
 - VIe Accessory magnetite and epidote

SUFFIXES

- T Tuff
- F Flow
- QIP Quartz eye porphyry*
- QFP Quartz feldspar porphyry*
- FQP Feldspar quartz porphyry*
- Bx Breccia (Δ)
- D Dike
- NSS Northgate stream sediment sample
- * These units considered to be extrusive or subjunct intrusives, and are cartographically in grey.
- Qtz Quartz
- Au Gold
- Py Pyrite
- Cp Chalcopyrite
- Gn Galena
- Sp Sphalerite
- Po Pyrrhotite

SYMBOLS

- Glacial striae
- Esker
- Outcrop - small
- Outcrop - large
- Outcrop area
- Bedding
- Schistosity
- Pillow
- Geological contact - observed, inferred
- Fault, assumed
- ODDH Diamond Drill Hole
- Quartz vein
- Joining
- Swamp
- Creek
- Road



Northgate Exploration Limited

Sheet 3 - South No.

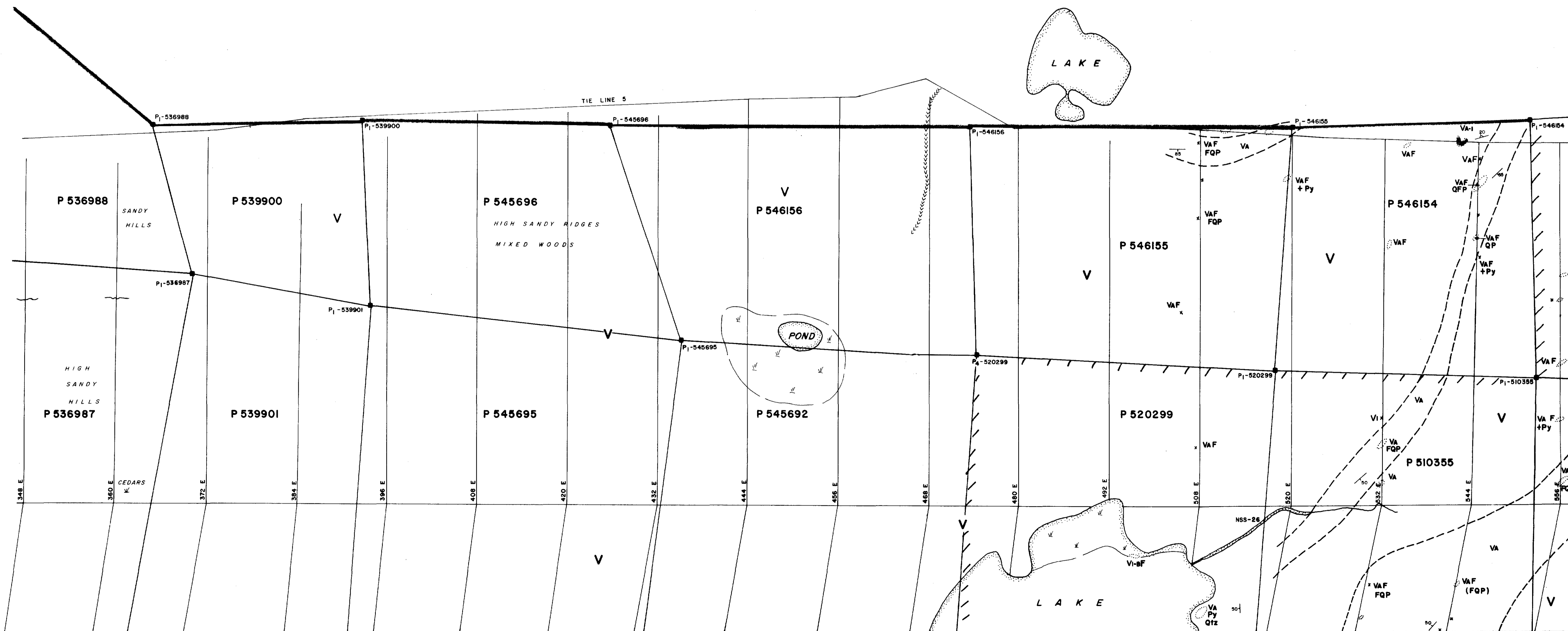
OROFINO MINE GEOLOGY

Scale: 1 Cm. = 25 M
NTS: 410/16

Drawn: Carto-graphics
Date: September 1980



900 N —
800 N —
700 N —
600 N —
500 N —
400 N —
300 N —
200 N —
100 N —
Base Line I
100 S —



LEGEND

- PRECAMBRIAN INTRUSIVES**
- Di Di Diabase
 - Dior Diorite
 - Gabbro Gabbro, in some rocks, probably recrystallized volcanics
 - Granite Unsubdivided granitoids
 - QFP Quartz feldspar porphyry
 - FQP Feldspar quartz porphyry
 - FP Feldspar porphyry
 - FELS Unsubdivided felsic dikes

- METAVOLCANICS AND METASEDIMENTS**
- METASEDIMENTS**
- CH Chert, in part rhyolite
 - SH Shale, generally graphitic & pyritic
 - ARG Argillite
 - GWK Greywacke
- METAVOLCANICS**
- V Metavolcanics unsubdivided
 - VA Acid Volcanics
 - VA-1 Intermediate volcanics
 - VA-2 Diorite & Andesite
 - VA-3 Basic Volcanics - Basalt
 - VA-4 Andesite - Basalt
 - VA-5 Ultra mafics - probably Olivine
 - VA-6 Ultra mafics - Basalt
 - VA-7 Accessory magnetite and apatite

SUFFIXES

- T Tuff
 - F Flow
 - QIP Quartz eye porphyry*
 - QFP Quartz feldspar porphyry*
 - FQP Feldspar quartz porphyry*
 - Bx Breccia (s)
 - D Dike
 - NSS Northgate stream sediment sample
- * These units considered to be extrusive or subvolcanic intrusives, and are conformable in nature.

SYMBOLS

- Glacial striae
- Esker
- Outcrop - small
- Outcrop - large
- Outcrop area
- Bedding
- Schistosity
- Pillow
- Geological contact: observed, inferred
- Fault, assumed
- Diamond Drill Hole
- Quartz vein
- Jointing
- Swamp
- Creek
- Road



Northgate Exploration Limited

Sheet 4 - North No.

OROFINO MINE GEOLOGY

Drawn: Carto-graphics Date: September 1980

Scale: 1 Cm = 25M
NTS: 410/16





LEGEND

PRECAMBRIAN INTRUSIVES

- Dia Diabase
- Dior Diorite
- Gabbro Gabbro, in some rocks, probably recrystallized volcanics
- Granite Unsubdivided granitoids
- QFP Quartz feldspar porphyry
- FQP Feldspar quartz porphyry
- FELS Feldspar porphyry
- Unsubdivided felsic dikes

METAVOLCANICS AND METASEDIMENTS

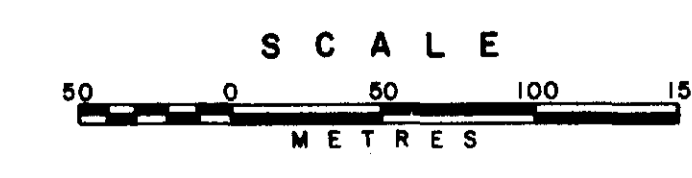
- METASEDIMENTS**
- CH Chert, in part rhyolite
 - SH Shale, generally graphic & pyritic
 - ARG Argillite
 - GNW Greywacke
- METAVOLCANICS**
- V Metavolcanics unsubdivided
 - VA Acid Volcanics
 - VA-1 Intermediate volcanics
 - VA-2 Basic Volcanics - Basalt
 - VA-3 (Vi-a) Andesite - Basalt
 - VA-4 Ultra basals - probably Olivine
 - VA-5 Ultra mafics - Basalt
 - VA-6 Accessory magnetite and epidote

SUFFIXES

- T Tuff
- F Flow
- QIP Quartz eye porphyry*
- QFP Quartz feldspar porphyry*
- FQP Feldspar quartz porphyry*
- Bx Breccia (A)
- D Dike
- NSS Northgate stream sediment sample
- * These units considered to be extrusive or subvolcanic intrusives, and are conformable in nature.

SYMBOLS

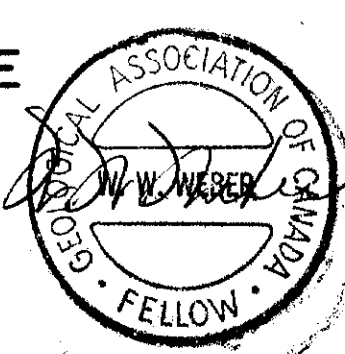
- Glacial striae
- Esker
- Outcrop - small
- Outcrop - large
- Outcrop area
- Bedding
- Schistosity
- Pillow
- Geological contact: observed, inferred
- Fault, assumed
- DDH Diamond Drill Hole
- Quartz vein
- Jointing
- Swamp
- Creek
- Road



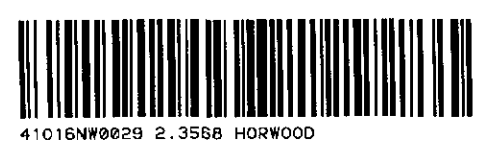
Northgate Exploration Limited

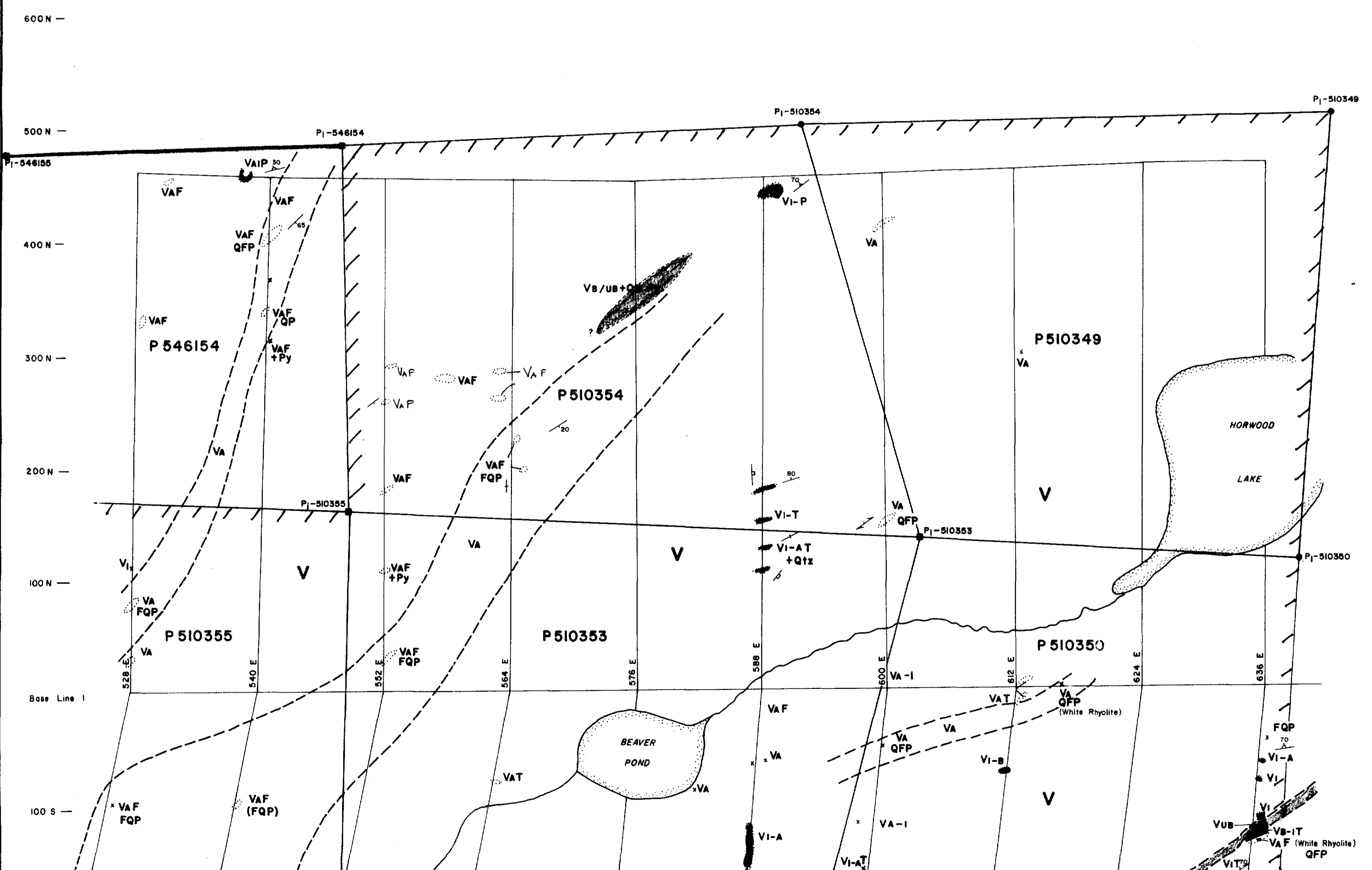
Sheet 4 - South No.

OROFINO MINE GEOLOGY



Drawn: Carto-graphics
Date: September 1980
Scale: 1 Cm = 25 M
NTS: 410 / 16





LEGEND

PRECAMBRIAN INTRUSIVES

- Dia. Diabase
- Dior. Diorite
- Gabbro. Gabbro, in some rocks, probably recrystallized volcanics
- Granite. Unsubdivided granitoids
- QFP. Quartz felspar porphyry
- FQP. Felspar quartz porphyry
- FELS. Unsubdivided felsic dikes

METAVOLCANICS AND METASEDIMENTS

- CH. Chert, in part rhyolite
- SH. Shale, generally graphitic & pyritic
- Arg. Argillite
- Greyw. Greywacke
- METAVOLCANICS**
- V. Metavolcanics unsubdivided
- Acid Vol. Acid Volcanics
- Int. med. Vol. Intermediate volcanics (VA-1) Diacite + Andesite
- Basic Vol. Basic Volcanics - Basalt (Va-a) Andesite - Basalt
- Ultra. bas. Ultra basics - probably Olivine
- Ultra. maf. Ultra mafics - Basalt
- Acc. mag. Accessory magnetite and epidote

SUFFIXES

- T. Tuff
- F. Flow
- QIP. Quartz eye porphyry #
- QFP. Quartz felspar porphyry #
- FQP. Felspar quartz porphyry #
- Bx. Breccia (A.)
- D. DIke
- NSS. Northgate stream sediment sample
- These units considered to be extrusive or subadjacent intrusives, and are conformable in nature.
- Qiz. Quartz
- Au. Gold
- Py. Pyrite
- cp. Chalcopyrite
- gn. Galena
- sp. Sphalerite
- po. Pyrochlore

SYMBOLS

- Glacial striae
- Esker
- Outcrop - small
- Outcrop - large
- Outcrop area
- Bedding
- Schistosity
- Pillow
- Geological contact: observed, inferred
- Faulty, assumed
- ODDH. Diamond Drill Hole
- Quartz vein
- Jointing
- Swamp
- Creek
- Road

Northgate Exploration Limited

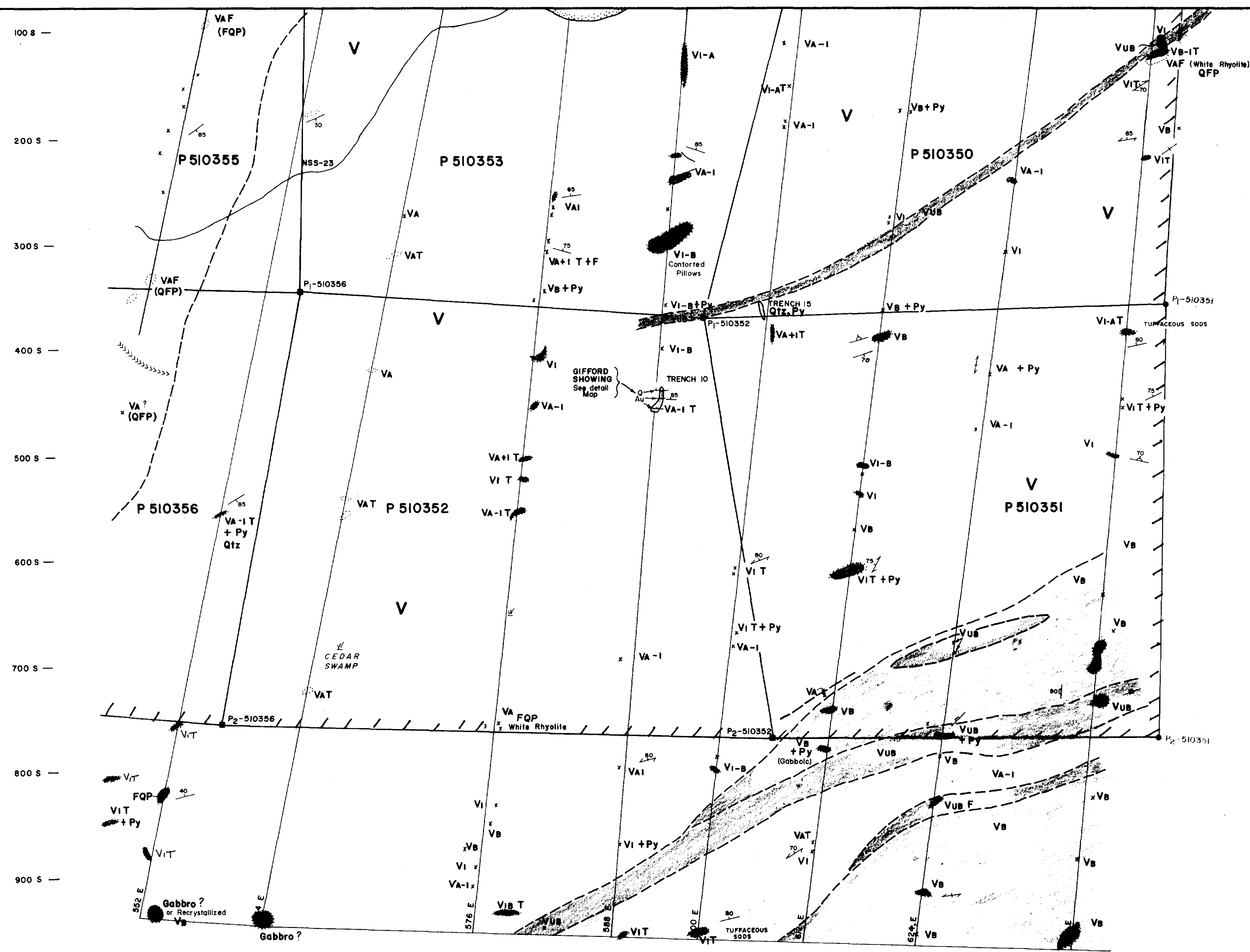
Sheet 5 - North No. _____

OROFINO MINE GEOLOGY

Drawn: Carto-graphics
Date: September 1980

SCALE
0 50 100 150
METRES

Scale: 1 Cm = 25 M
NTS: 410/16



LEGEND

PRECAMBRIAN INTRUSIVES

- Di Diabase
- Dior Diorite
- Gabbro Gabbro, in some rocks, probably recrystallized volcanics
- Granite Unsubdivided granitoids
- QFP Quartz feldspar porphyry
- FQP Feldspar quartz porphyry
- FP Feldspar porphyry
- FELS Unsubdivided felsic dikes

METAVOLCANICS AND METASEDIMENTS

METASEDIMENTS

- CH Chert, in part rhyolite
- SH Shale, generally graphitic & pyritic
- ARG Argillite
- GWKE Greywacke

METAVOLCANICS

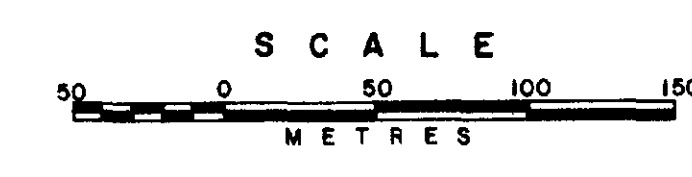
- V Metavolcanics unsubdivided
- VA Acid volcanics
- Vi Intermediate volcanics
- Vb Basic volcanics - Basalt
- Vus Ultra basalt - probably Olivine
- Vb-IT Ultra mafic - Basalt
- Vb-IT Accessory magnetite and epidote

SUFFIXES

- T Tuff
- F Flow
- QIP Quartz eye porphyry*
- QFP Quartz feldspar porphyry*
- FQP Feldspar quartz porphyry*
- Bx Breccia (Δ)
- D Dike
- NSS Northgate stream sediment sample
- * These units considered to be extrusive or subjunct intrusives, and are conformable in nature.
- Qtz Quartz
- Au Gold
- Py Pyrite
- cp Chalcopyrite
- gn Galena
- sp Sphalerite
- po Pyrrhotite

SYMBOLS

- Glacial striae
- Esker
- Outcrop-small
- Outcrop-large
- Outcrop area
- Bedding
- Schistosity
- Pillow
- Geological contact - observed, inferred
- Fault, assumed
- Diamond Drill Hole
- Quartz vein
- Jointing
- Swamp
- Creek
- Road



Northgate Exploration Limited

Sheet 5 - South No.

OROFINO MINE GEOLOGY

Drawn: Carto-graphics
Date: September 1980

Scale: 1 Cm = 25 M
NTS: 41 0/ 16