

9471

GREAT WESTERN PETROLEUM CORPORATION

GEOLOGICAL AND GEOCHEMICAL REPORT

SAT 1-4 CLAIMS

OMINECA MINING DIVISION  
BRITISH COLUMBIA

NTS: 93L/16W  
54°53'N, 126°25W

OWNER: GREAT WESTERN PETROLEUM CORPORATION

AUTHOR: N.C. CARTER, PH.D., P.ENG.

*N.C. Carter Ph.D. P.Eng.*

DATE: SEPTEMBER 29, 1981

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## INTRODUCTION

### LOCATION and ACCESS

The SAT porphyry copper prospect is situated in the Babine Lake area of west-central British Columbia, 48 kilometers east-northeast of Smithers. Access to the claims is by 65 kilometers of gravel road from Smithers via the Smithers Landing road and the alternate route to the village of Granisle (Figure SAT 81-1). A winter cat road extends from the Granisle road to the central part of the property (Figure SAT 81-2).

### MINERAL CLAIMS

The SAT mineral claims, comprising 64 units (Figure SAT 81-2), are owned by Great Western Petroleum Corporation and consist of the following:

<u>Mineral Claim</u>	<u>Record Number</u>
SAT 1 (20 units)	2866
SAT 2 (12 units)	2867
SAT 3 (12 units)	2868
SAT 4 (20 units)	2869

### PREVIOUS WORK

Part of the present property was originally

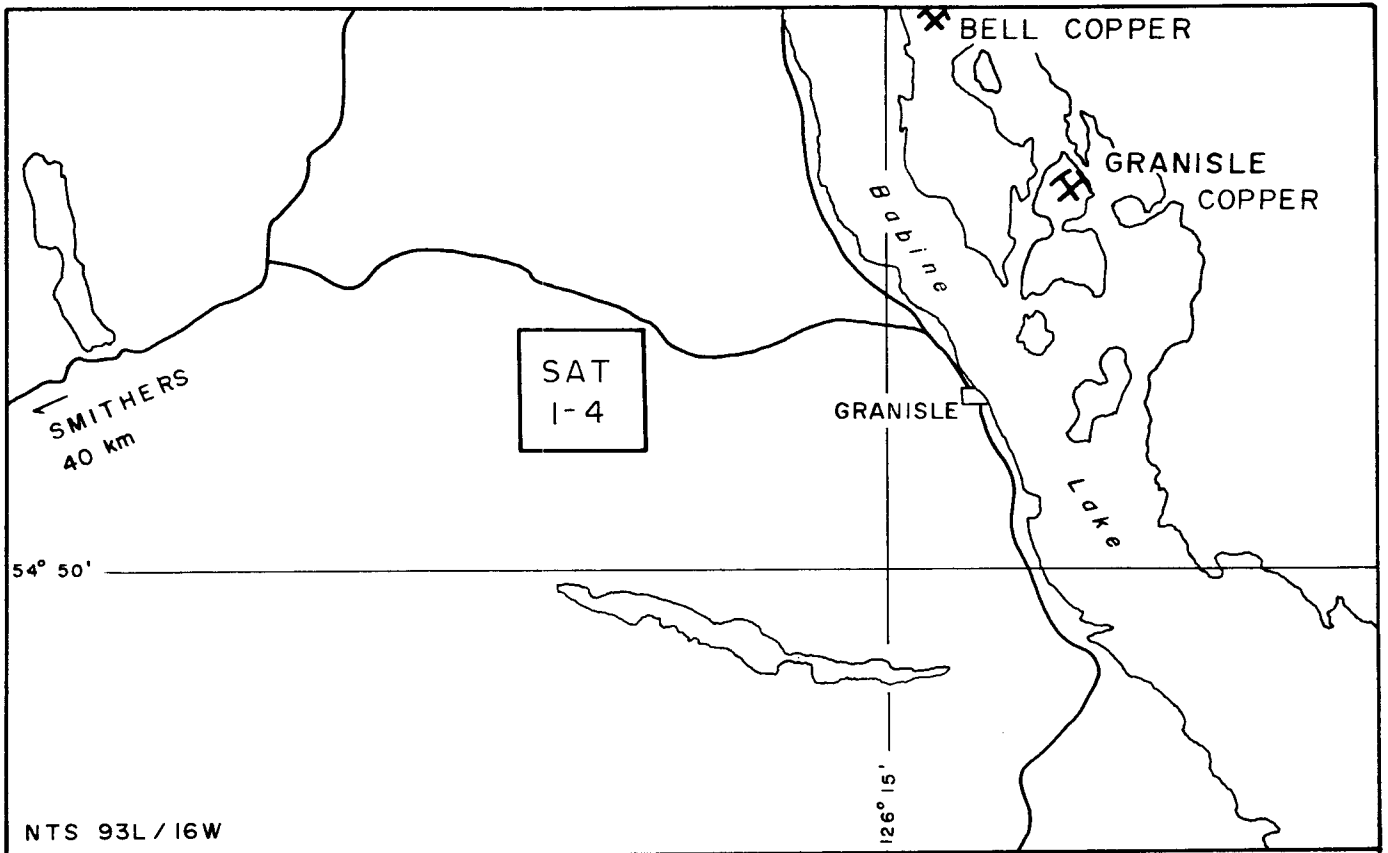
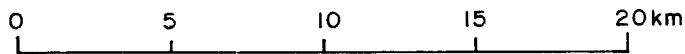


Figure  
SAT-81-1

LOCATION OF SAT COPPER PROSPECT



Scale 1: 250 000

*N. Clatter P.H.D. Penq.*

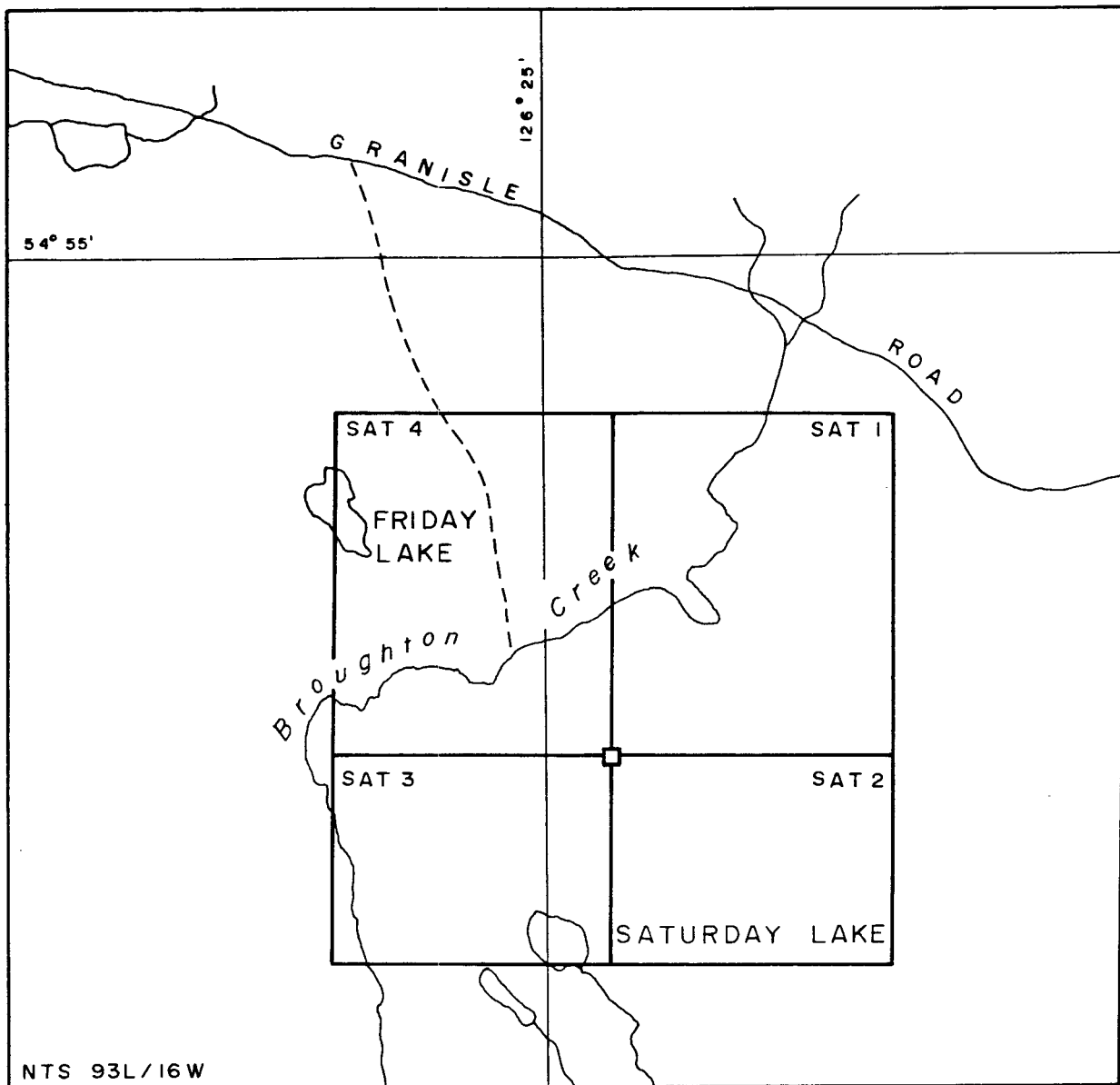


investigated by Amoco Canada Petroleum Company Ltd. in 1972 and 1973. Work done included 67 line-kilometers of I.P., magnetometer and EM surveys, collection and analysis of 1,435 soil, silt and rock samples and diamond drilling of 19 holes totalling 2,000 meters. Three of these holes were drilled north of the present SAT property.

The Amoco claims lapsed in 1974 and the property was relocated by Cities Service Minerals Corporation, who essentially duplicated the previous geophysical and geochemical surveys, and confirmed the presence of an extensive IP anomaly centred on Broughton Creek. Assessment work was filed and further drilling recommended prior to the closure of the Cities Service Vancouver office in 1977.

#### PRESENT STATUS

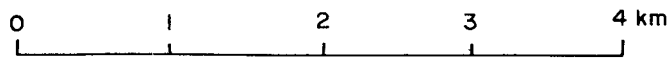
The SAT mineral claims were located in July of 1980 to cover a potential zone of porphyry copper mineralization. Intrusive rocks on the property are typical Babine intrusions and are similar to those hosting copper mineralization at the nearby Granisle and Bell mines (Figure SAT 81-1).



NTS 93L/16W

Figure  
SAT-81-2

LOCATION OF MINERAL CLAIMS  
SAT COPPER PROSPECT



Scale = 1 : 50,000



*N. C. Carter Ph.D. P.Eng.*

This report describes work done on the claims in June of 1981 which included geological mapping at a scale of 1:10,000 and geochemical analysis of 73 rock and 17 soil samples.

Much of this work was concentrated on SAT 3 and 4 mineral claims. Control for both the geological and geochemical survey was by pace and compass traversing tied into a pre-existing grid, the boundaries of which are shown on Figure SAT 81-3.

#### GEOLOGY

The SAT claims are situated in an area of low relief west of Babine Lake. Elevations are in the order of 900 to 1,000 meters. Much of the claims area is overburden covered and well treed broken only by a number of swamps. The few bedrock exposures are restricted to low ridges and along one section of Broughton Creek (Figure SAT 81-3). The following geological description is based on a number of pace and compass traverses, and on examination of available drill cores stored on the property at the old camp. Figure SAT 81-3 shows outcrop and drill hole locations and geological interpretation.



TABLE OF FORMATIONS

TERTIARY

Oligocene (?) - Amygdaloidal basalt, andesite

Eocene - Hornblende Feldspar porphyry (extrusive  
equivalent of Babine intrusions)

(Babine Intrusions)

Biotite Feldspar Porphyry

Jurassic (Hazelton Group)

Lower Jurassic

Siltstone, shale

Andesite pyroclastic rocks

The SAT claims are underlain principally by a sequence of Lower Jurassic (Hazelton Group) volcanic and sedimentary rocks which are intruded in the central part of the claim group by Tertiary porphyritic rocks of the Babine intrusions. Remnants of extrusive equivalents of the Babine intrusions and younger basalts and andesites are found on and adjacent to SAT 1 and 4 mineral claims. Lithologic descriptions, from oldest to youngest, are as follows:

Lower Jurassic (Hazelton Group)

Intercalated volcanic and sedimentary rocks underlie most of the property. Massive, fragmental maroon to green andesites comprise the oldest unit. These are overlain by siltstones and shales which are poorly exposed along the west boundary of the property. In Broughton Creek, these rocks strike northwesterly and dip gently west. Graphitic varieties were noted in diamond drill cores, most notably in drill hole 14.

Both the volcanic and sedimentary rocks are variably fractured and hornfelsed marginal to the younger intrusive rocks.

Eocene (Babine intrusions and extrusive equivalents)

Fine-to medium-grained crowded biotite-feldspar-porphyrries of granodiorite composition occur as dykes

intruding the older layered rocks. These porphyries, previously dated at 50-53 million years, are typical of the Babine Lake area and are the principal host rock for copper mineralization at the two mines and numerous porphyry prospects.

The largest intrusive mass is a large (up to 1,000 meters wide) northeast trending dyke-like body between Saturday Lake and Broughton Creek (Figure SAT 81-3). Lateral extent of this body is not known.

Two to four-millimeter euhedral phenocrysts of plagioclase (oligoclase-andesine) and biotite books are contained in a very fine-grained matrix of quartz and feldspar. Hornblende needles are common; many of these are variably altered to biotite.

Smaller dykes of biotite-feldspar porphyry were noted south of Friday Lake and are numerous in the previously drilled area where at least three porphyry phases, including an intrusive breccia, are recognized.

Hornblende-feldspar-porphyries, commonly displaying a flow or trachytic texture, are high level or extrusive equivalents of the intrusive porphyries. Remnants of these are found along Broughton Creek northeast of the old camp and west of Friday Lake where a 100 meter thick sheet displays good columnar jointing.

Oligocene (?) Amygdaloidal Basalt and Andesite

Two areas of these younger volcanic rocks occur in the northern half of the property, where they are believed to be unconformable over Jurassic layered rocks. Several hundred feet of similar volcanic rocks were encountered in drill hole 6, overlying biotite-feldspar-porphyry.

These rocks are essentially fresh and are characterized by four to six millimeter amygdules of calcite and lesser zeolite

MINERALIZATION and ALTERATION

All rocks within the previously drilled area (marginal to the north contact of the main intrusive body) are variably altered and mineralized.

Sedimentary and volcanic rocks in this area are hornfelsed and display some bleaching to a fine mixture of quartz and sericite marginal to numerous hairline fractures and quartz veinlets. Sulfide content, principally as pyrite and pyrrhotite, ranges from 2-10% by volume.

Chalcopyrite with pyrite occurs on hairline fractures in biotite-feldspar porphyry in several drill

holes and in outcrop adjacent to drill hole 13. Porphyries in the western part of the drilled area exhibit some chlorite-carbonate-epidote alteration which is transitional to a typical K-feldspar alteration as secondary biotite further east.

Malachite and chalcocite were noted in Hazelton Group volcanic rocks south of Friday Lake and minor molybdenite, galena and sphalerite occurs in some drill holes.

#### GEOCHEMISTRY

##### Sample Collection and Preparation

73 rock samples were collected from bedrock exposures and from diamond drill core stored on the property. 17 soil samples were collected from a small area north of the Broughton Creek. Sample locations are illustrated on Figure SAT-81-4. Rock and drill core samples were collected in plastic bags and soil samples were placed in wet-strength Kraft gusseted envelopes.

All samples were shipped to Vangeochem Lab. Ltd. in North Vancouver for geochemical analysis of molybdenum, copper, lead, zinc and silver. Analysis was by atomic absorption following a three hour digestion in a 2 ml. solution of 85% perchloric acid/15% nitric acid.

INTERPRETATION

Rock Geochemistry

For purposes of discussion, background values (in parts per million) for the various elements are listed in the following table for each rock type identified on the SAT claims.

<u>Unit</u>	<u>Mo</u>	<u>Cu</u>	<u>Pb</u>	<u>Zn</u>	<u>Ag</u>
Hazelton Volcanic Rocks	1	28	18	60	0.3
" Sedimentary Rocks	7	41	23	91	0.6
Biotite Feldspar Porphyry	3	30	14	90	0.5
Hornblende " "	trace	10	5	53	0.2
Amygdaloidal Basalt	-	47	21	66	0.2

Anomalous values are ranked as follows:

Weak - 2 x background

Moderate - 4 x background

High - 8 x background

Copper values are shown on Figure SAT 81-5. Background values, as listed in the table, are variable and reflect the various lithologic units. As might be expected, values are lowest in the extrusive porphyries, while highest backgrounds are contained in Hazelton shales and the young amygdaloidal basalts.

Weak to moderately anomalous values occur in porphyries and Hazelton rocks in the previously drilled area and in isolated Hazelton outcrops south of Friday Lake and near Saturday Lake.

Molybdenum values (Figure SAT-81-6) are generally low, with weak anomalies in the area of previous drilling. Hazelton sedimentary rocks have higher background levels while both the extrusive porphyries and young basalts show only trace values.

Weak to moderately anomalous values in lead, zinc and silver were found principally in diamond drill core samples of both biotite feldspar porphyry and Hazelton volcanic and sedimentary rocks.

#### Soil Geochemistry

Background values for the few samples collected are as follows:

Mo - 1 - 2 ppm  
Cu - 15 ppm  
Pb - 10 ppm  
Zn - 53 ppm  
Ag - 0.2 ppm.

These values are generally low, particularly compared to rock background values and at least partially illustrate some of the problems inherent in attempting soil geochemistry in an area of transported overburden.

Only weakly anomalous copper values are present; values of other elements are only slightly above background levels.

#### CONCLUSIONS AND RECOMMENDATIONS

The SAT claims cover an area of potential porphyry copper mineralization. The geological environment is similar to that which is host to the nearby Granisle and Bell copper mines and numerous porphyry copper prospects in the Babine Lake area.

Rock geochemistry is obviously hampered by the few bedrock exposures in this predominantly overburden covered area. However, some anomalous copper values are present and it may be significant that anomalous Pb, Zn, and Ag values are concentrated in the area previously drilled. Coincident with this area is a major IP anomaly, partly explained by the presence of abundant pyrite, pyrrhotite and minor chalcopyrite seen in drill cores.

Using the classic porphyry copper zoning model, the previously drilled area may represent a pyrite halo with fringe Pb-Zn-Ag mineralization marginal to a zone of copper mineralization.



Accordingly, a program is recommended to test this hypothesis, consisting of further geophysical (IP) work on the SAT 1 and 2 claims, overburden drilling and sampling and limited diamond drilling.

COST STATEMENT - SAT 1-4 CLAIMS

1. Geological Mapping - Geochemical Surveys

Crew Time (including mobilization):

<u>Name</u>	<u>Per Diem Rate</u>	<u>Specific Dates</u>	<u>No. Days</u>	<u>Amount</u>
N.C. Carter (geologist)	\$200.00	June 2-4	3	\$600.00
L.K. Eccles (geologist)	\$116.58	May 31 June 2-5	5	\$582.90
D. Forster (geologist)	\$ 93.73	May 31 June 2-5	5	\$468.65
N. Cairn (geologist)	\$ 83.51	"	5	\$417.55
K. Hudson (sampler)	\$ 52.85	"	5	\$264.25
R. Reidel (sampler)	\$ 57.96	"	5	\$289.80
L. Tamaki (sampler)	\$ 52.85	"	5	\$264.25
				<u>\$2887.40</u>

2. Transportation

A1. Mobilization:

Vehicles (2)

a) Vancouver - Smithers: 2 days @ \$30.00/d	- 60.00
1152 km @ 0.17/km	195.84
Gasoline	82.28
b) Williams Lake - Smithers: 1 day @ 30.00	- 60.00
609 km @ 0.17/km	103.53
Gasoline	43.50
	<u>515.15</u>

2. B1. Vehicle Transport to Property

Smithers to SAT claims (June 2-5) 2 vehicles - 7 days @ 0.30	\$210.00
910 km @ 0.17/km	154.70
Gasoline	<u>89.50</u>
	454.20
 Total Transportation	 <u>969.35</u>

3. Food and Lodging

(including mobilization)

Motels - Hope (1 night)	37.10
Smithers (6 nights @ 135.68/night)	<u>814.08</u>
	\$851.18
 Meals - May 31-June 5	 754.09
	<u>1605.27</u>
 Total Food & Lodging	 <u>1605.27</u>

4. Geochemical Analysis

Sample Preparation:	
- 73 rocks @ \$2.25	164.25
- 17 soils @ 0.60	<u>10.20</u>
	\$174.35
 Trace analysis - Mo, Cu, Pb, Zn, Ag	
90 samples @ 4.75	\$427.50
Sample shipping	<u>31.40</u>
	<u>\$633.25</u>

5. Report Preparation

N.C. Carter - 1 day @ \$200.00/d	\$200.00
draughting, reproduction, air photos, base maps	<u>196.52</u>
	<u>396.52</u>
	<u><u>396.52</u></u>
TOTAL EXPENDITURE =	<u><u>\$6491.79</u></u>

SUMMARY OF COSTS

1. Wages	\$2887.40
2. Transportation	969.35
3. Food & Lodging	1605.27
4. Geochemical Analysis	633.25
5. Report Preparation	<u>396.52</u>
	<u><u>\$6491.79</u></u>

AUTHOR'S QUALIFICATIONS

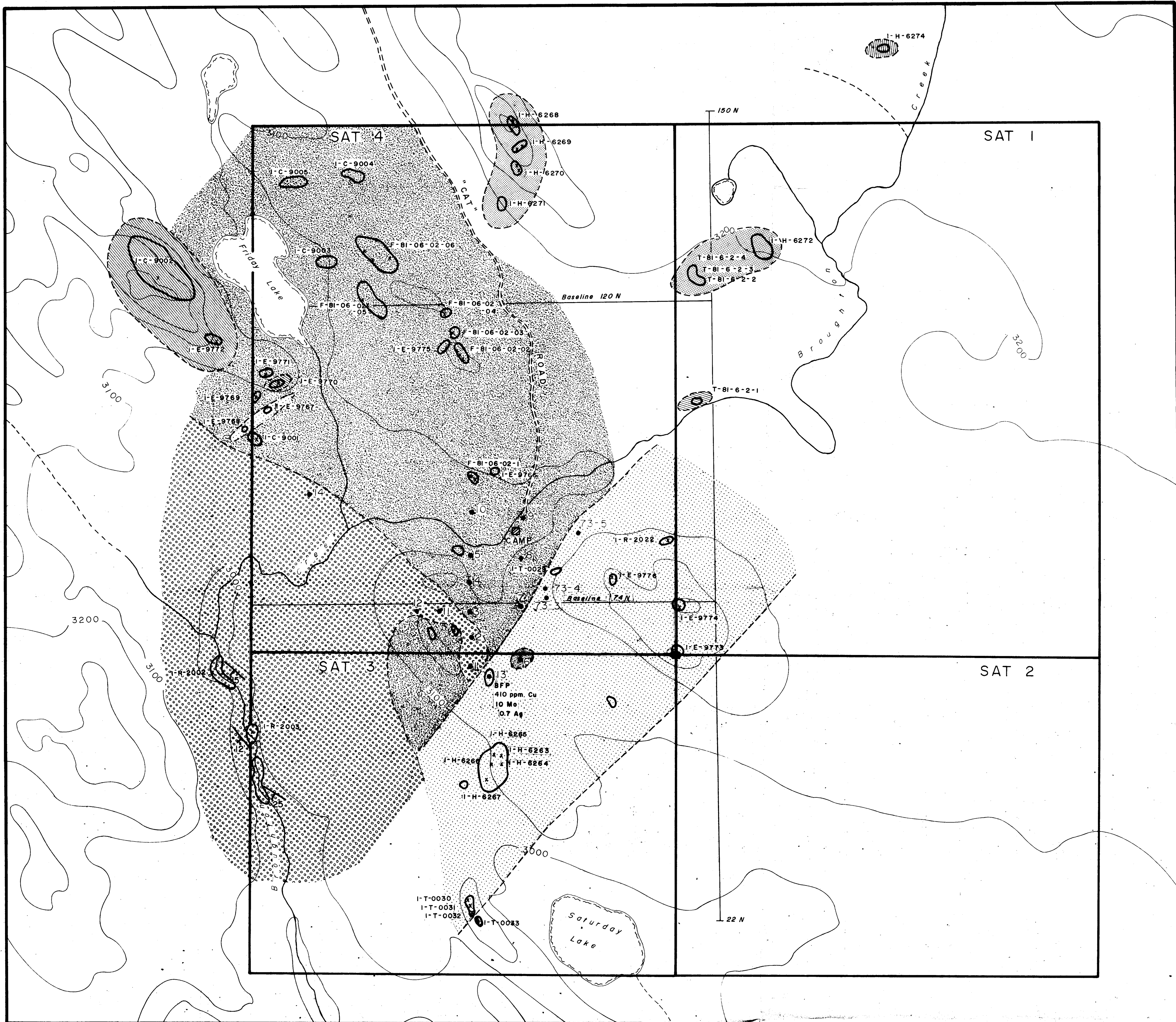
I, Nicholas C. Carter of Victoria, British Columbia, do hereby certify that:

1. I am a practising geologist, registered with the Association of Professional Engineers of British Columbia since 1966;
2. I am a graduate of the University of New Brunswick with B.Sc. (1960); Michigan Technological University with M.S. (1962) and the University of British Columbia with Ph.D. (1974).
3. I have practised my profession in British Columbia and Eastern Canada and the Western United States for the past 21 years.
4. Geological and geochemical work on the SAT 1-4 claims, described in this report, was carried out under my supervision in June of 1981.

*N.C. Carter Ph.D. P. Eng.*

N.C. Carter  
Ph.D., P. Eng.





**LEGEND**

**TERTIARY**  
Oligocene (?)

■ Amygdaloidal andesite, basalt

**Eocene**

■ Hornblende (biotite) Feldspar Porphyry

■ Babine Intrusions  
- Biotite (hornblende)  
Feldspar Porphyry

**LOWER JURASSIC (HAZELTON GP)**

■ Siltstone, minor pebble conglomerate

■ Andesite and basalt flows and pyroclastic rocks

~ Bedding

○ Outcrop area

● IO Diamond drill hole

- - - Inferred geological contact

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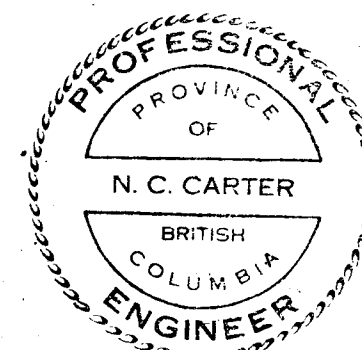
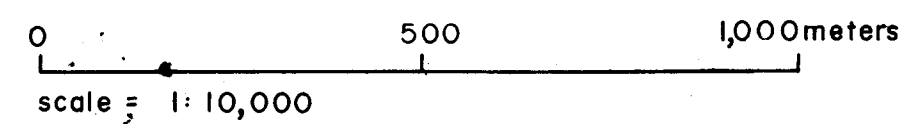
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MINERALS DIVISION

**SAT COPPER PROSPECT**

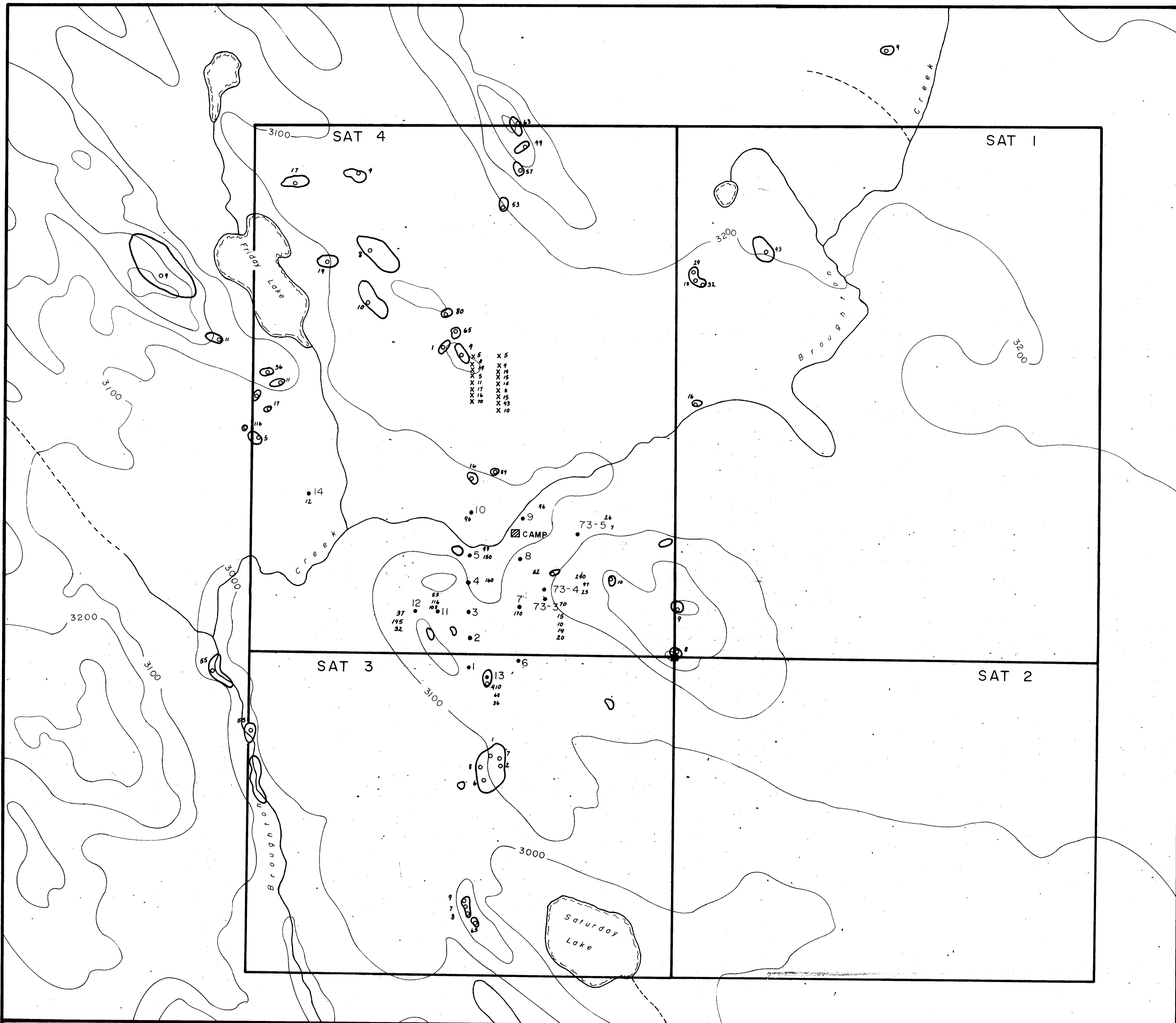
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Figure SAT-81-3

**GEOLOGY**



*N.C. Carter Ph.D. P.Eng*

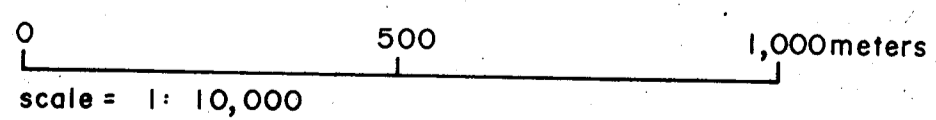


**LEGEND**

- Outcrop Area
- Rock Sample Site
- Soil Sample Site
- Diamond Drill Hole Sample

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Figure SAT-81-5

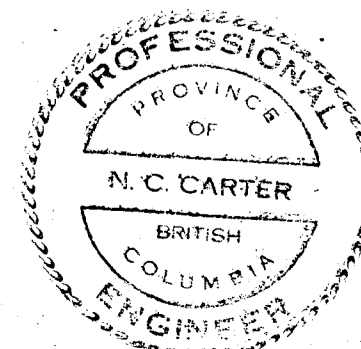


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**SAT COPPER PROSPECT**

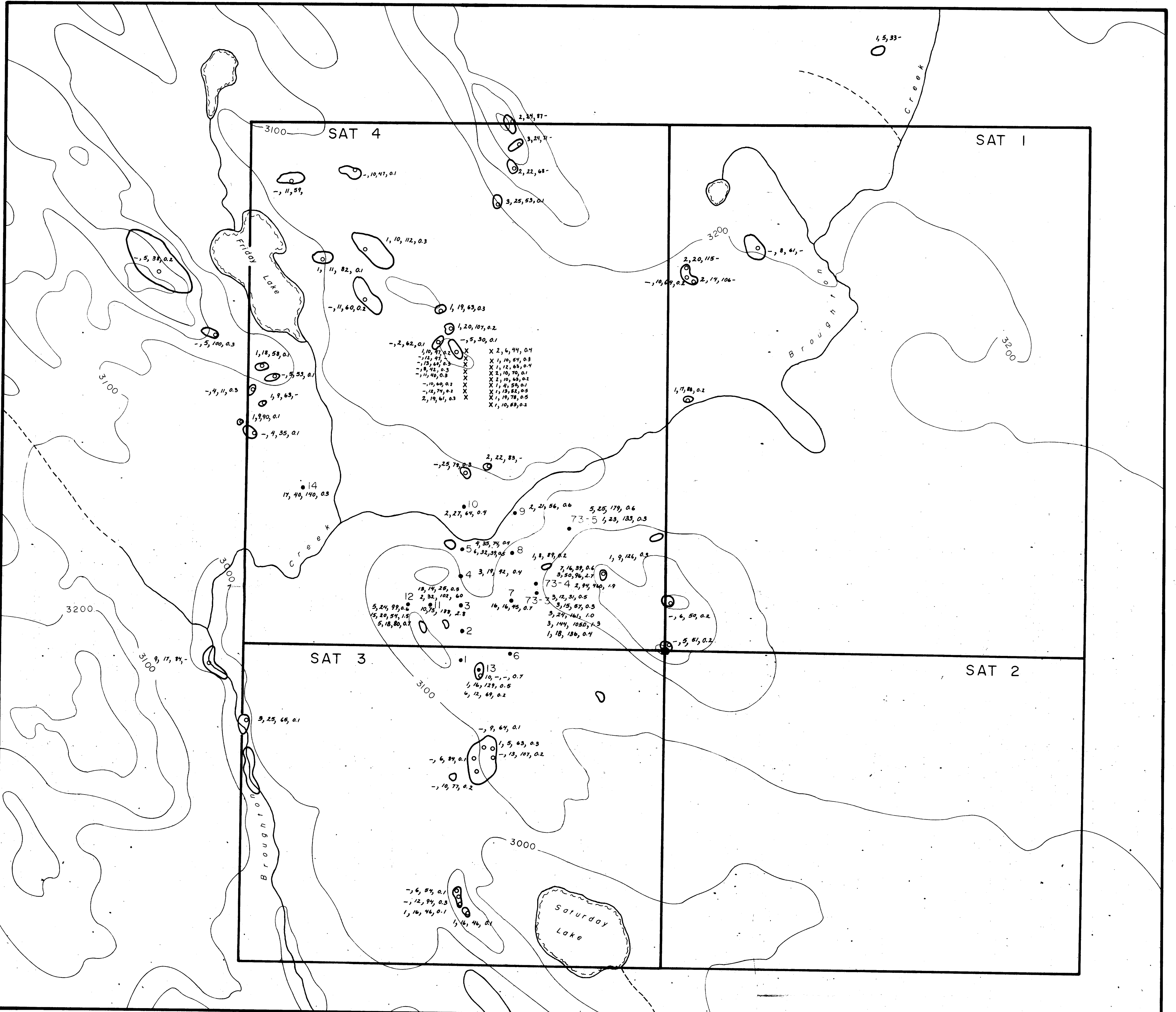
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**GEOCHEMISTRY - COPPER (Parts Per Million)**



*N.C. Carter P.Eng*





**LEGEND**

- Outcrop Area (for lithologies, see figure SAT-81-3)
- Rock Sample Site (Mo, Pb, Zn, Ag)
- x Soil Sample Site (Mo, Pb, Zn, Ag)
- Diamond Drill Hole Sample Location Site

Figure SAT-81-6

0 500 1,000 meters  
scale = 1:10,000

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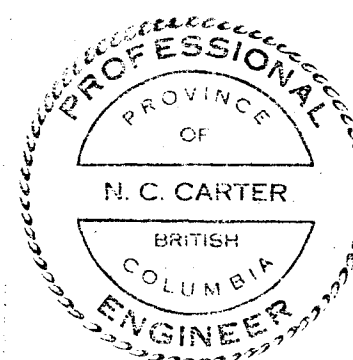


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**SAT COPPER PROSPECT**

NTS 93L / 16

**GEOCHEMISTRY - MOLYBDENUM, LEAD, ZINC, SILVER**  
(Parts Per Million)



*N.C. Carter Ph.D. P.Eng.*



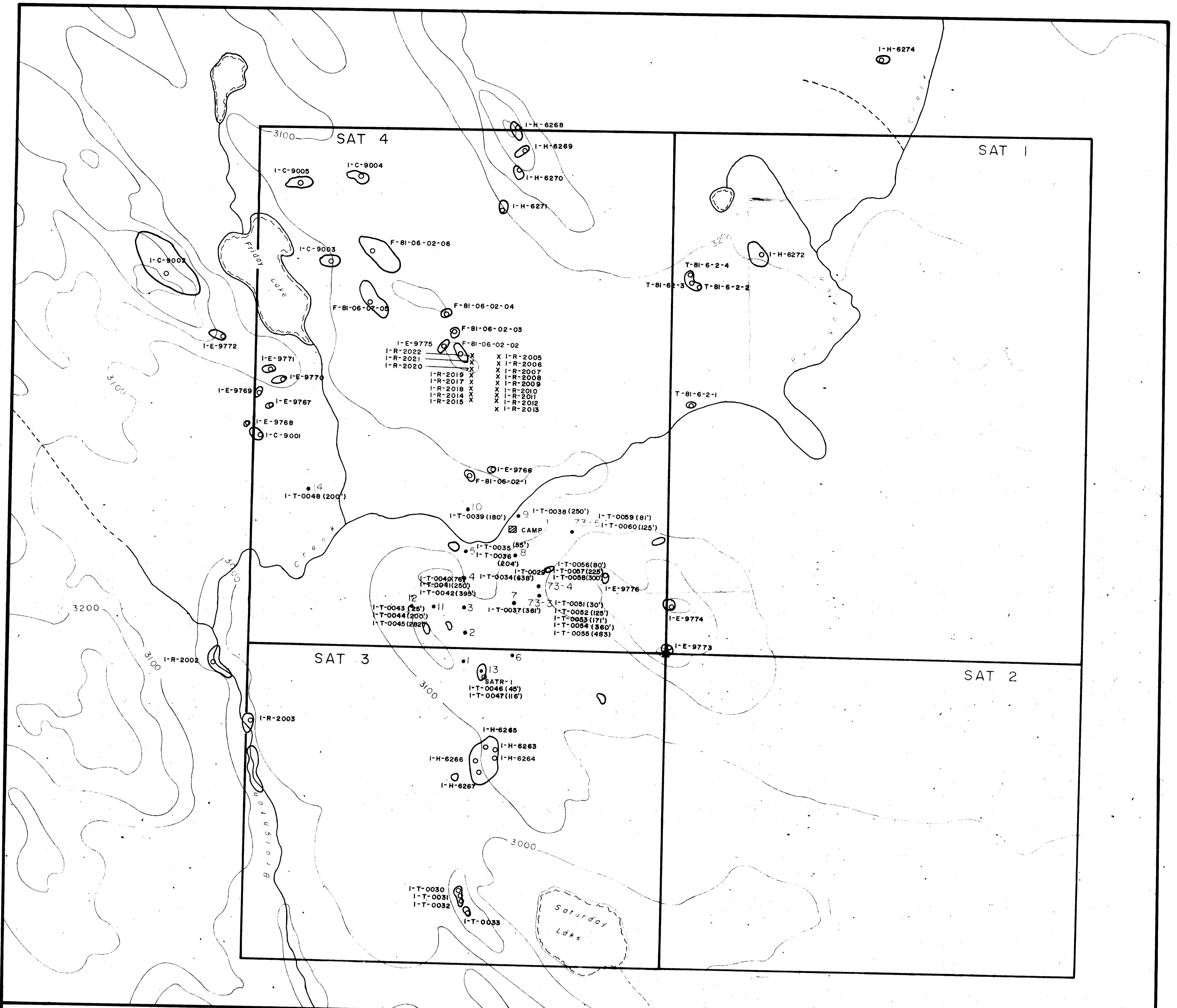


Figure SAT-81-4

**LEGEND**

- Outcrop Area (For Lithology, See Figure SAT-81-3)
- Rock Sample Site
- Soil Sample Site
- Diamond Drill Core Sample (depth in feet)

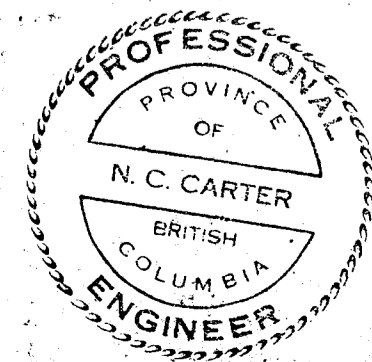
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MINERAL RESOURCES BRANCH  
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MINERALS DIVISION

**SAT COPPER PROSPECT**  
NTS 93L/16

**GEOCHEMICAL SAMPLE LOCATIONS**



*N.C. Carter P.E.D. P.Eng*