Report of Investigation on Recovery of Graphite from Ore Sample

for

Baxter Lake Resources
4142 Sunflower Drive
Mississauga, Ontario
L5L 2L5

Attention: Mr. J. Atkinson

Submitted by:

J. Melnbardis
G.M. Freeman
C.A. Booth

Mineral Resources

ORF Account No. 40-31075

June 20, 1988

ONTARIO RESEARCH FOUNDATION
SHERIDAN PARK RESEARCH COMMUNITY
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Report of Investigation on Graphite [illegible]
for Baxter Lake Resources

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1. INTRODUCTION

Two sets of graphite ore samples delivered by Mr. J. Atkinson on behalf of Baxter Lake Resources were received at ORF pilot plant in April and May 1988.

The objective was to carry out analyses and graphite recovery tests as requested by Mr. Atkinson in a letter of authorization dated April 29, 1988. The requirememnts were further discussed then and on June 2, 1988.

A program report of test work conducted on the first set of samples prior to June 2, 1988 was issued on May 24, 1988.

2. SUMMARY

The graphite ore samples received and tested on behalf of Baxter Lake Resources included two sets of samples as follows:

1- the first set of 5 samples identified as No. 9001 to 9005 totalled 4.6 kg and the individual head samples assayed from 2.6 to 3.8 of graphitic carbon. The test feed composite was prepared by combining the 5 samples in the weight ratio received. The test feed was assayed to contain 3.33% graphitic carbon.

2- the second set of 3 samples indetified as No. 5, 6 and 7 totalled 6.5 kg. A test feed composite was prepared by combining the 3 samples on equal weight proportion. The test feed was assayed to contain 2.53 % graphitic carbon. The three individual samples were not assayed for graphitic carbon content.

Apart from graphitic carbon and XRD analyses obtained on the individual head samples of the first set, the composite prepared of each set were processed to recover graphite concentrates by means of froth flotation, screening and heavy liquid sink/float separation.

The results as summarized in Table 2 are encouraging since they indicate that more than 63% of the overall graphitic carbon content of the first composite is recoverable as crystalline graphite flake product in the +150 mesh size range at better than 90% grade (product No. 14 in Table 2).

In the case of the second sample set, the graphitic carbon flake product recovered in the +150 mesh size range assayed 94% grade, but at a correspondingly lower recovery of over 52%.

Generally, the occurance of the graphitic mineralization in the two sample sets appears to be similar. In both cases the graphite contained in the -150 mesh size fractions appears to be finely disseminated within the lost rock. This fraction, together with the unliberated middling fraction separated from the coarse +150 mesh graphite concentrates, would require further grinding and upgrading stages. The amounts to be re-treated however would be of relatively low volume, since the tests indicate that up to 96% of graphite mineralization is recoverable in the initial rougher flotation concentrates; amounting to less than 10% of the original feed ground to about -20 mesh size.

Due to the low volume of the lower grade intermediate products generated in these tests, it was not feasible to carry out the necessary regrind and further upgrading stages; in order to establish a secondary graphite product and overall grade and recovery. This would require a larger sample for testing purposes.

In general, the two sample sets indicate that large graphite flake is present in a relatively high ratio; compared to the total graphite content. This observation coupled with the fact that the samples were "grab samples" from the surface warrants further exploration and test work to be conducted on the property. Possible higher graphite content and a larger flake ratio may be encountered from a drilling program.

3. TEST PROCEDURES AND RESULTS

Ore sample receipts and preparation

The following samples were delivered at the ORF pilot plant by Mr. Atkinson of Baxter Lake Resources:

First sample set (April)

Identification No.	Weight kg	Graphitic carbon Assay %
9001	0.72	2.99
9002	1.15	3.76
9003	1.27	3.21
9004	0.95	3.66
9005	0.58	2.62
Total	4.67	3.33

Second sample set (May)

Identification No.	Weight kg	Graphitic carbon Assay %
5	1.6	-
6	1.9	-
7	3.0	-
Total	6.5	2.53*

* Composite combining 0.333 kg of the individual No. 5, 6 & 7 samples.

In addition to the graphitic carbon assays, XRD analyses were also done on the individual samples of the first sample set. The results are shown in Table 3.

All samples were first prepared individually to -6 mesh size using jaw and rolls crushers. Apart from obtaining individual head samples, two 1 kg composite batches were prepared of the first sample set combining the individual samples in the weight ratio received and a 1 kg test batch was prepared of the second sample set combining 0.33 kg of each sample received.

4. GRAPHITE RECOVERY TESTS

In the case of the first feed composite the two test batches prepared at -6 mesh were processed under comparative test conditions; except that the ball mill grinding time was extended for the second batch by 50% (from 10 min to 15 min). This was done to determine the effect of grind size on grade and recovery of the graphite flake product. Also, soda ash was introduced as a pH regulator and pulp conditioner in the second test. Based on those results, the grinding time of 10 min and soda ash was used in the testing of the second sample set. Following grinding, the processing stages for the recovery of graphite flake product included flotation, size separation and heavy liquid, sink/float separation.

Grinding was done at 50% pulp solids density using a rubber lined ball mill with 10 kg charge of 3.8 cm steel balls.

Flotation was carried out at about 33% pulp solids density using a Wemco 600 g (nominal) flotation cell. The graphite collector reagents used were mineral spirits and methyl isobutyl carbinol frother. Soda ash was used as a pulp conditioner and pH regulator.

Since no high grade graphite concentrates were obtained by flotation, the +48 and -48+150 mesh size fractions of the flotation concentrates produced by screening and elutriation were upgraded by sink/float separation; using a heavy liquid blend of Bromoform and perchloroethylene at about 2.4 specific gravity. This bench scale operation would be analogous to larger scale gravity table separation and screening.

The test sequence is shown in flowsheet of Fig. 1.

The flotation test conditions are shown in Table 1 and the test results, in terms of the graphitic carbon distribution, is shown in Table 2.

The results indicate that, depending on the initial grind and flotation selectivity, most of the graphite (up to 96% recovery) is recoverable in the rougher flotation concentrate. Since 20-30% of the graphite mineralization appears to be quite finely disseminated and remains unliberated after the initial grinding stage, a high grade product was not attained by cleaner flotation. The concentrates did contain some liberated graphite in the coarser size fractions, as indicated by the sink/float separation tests conducted on the +48 and -48+150 mesh size fractions of the flotation concentrate. In this respect, the composite of the second sample set appears to be more amenable to concentration, since a 94% graphitic grade product was attained in both the +48 and -48+150 mesh fractions while the -48+150 mesh graphite fraction produced from the first sample composite assayed below 90% grade. These graphite fractions would be upgraded by light reqrind, but that would result in some loss of recovery from the coarser flake product.

Due to the small amount of the intermediate middling products available from these tests, further testing to establish the grade and recovery of

an additional secondary graphite concentrate was not feasible at this time. A larger amount of test feed would be required, in order to produce a sufficient amount of the lower grade intermediate products for further stages of regrind and flotation concentration tests. Such secondary concentrate would necessarily be a finely ground product.

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Manager
Mineral Resources

TABLE 1

Summary of test conditions

	1st Composite TEST 1	1st Composite TEST 2	2nd Composite TEST 3
GRINDING -6M FEED			
Pulp % Solids	50	50	50
Time - Min	10	15	10
CONDITIONING STAGE			
Initial Pulp % Solids	32.9	37.8	33.0
Reagents - kg/mt Feed			
Soda Ash	-	0.92	1.0
MIBC frother and collector	0.27	0.052	0.11
Mineral Spirits (Varsol)	5.4	-	-
Time - min	3	3	3
Pulp pH	6.2	6.1-7.5	4.6-8.5
ROUGHER FLOTATION - MIN	12	12	15
Additional reagents kg/mt			
Mineral Spirits (Varsol)		0.90	0.80
MIBC frother and collector		0.052	0.06
CLEANER FLOTATION STAGES	2	2	1
Additional reagents kg/mt			
MIBC frother	0.13	0.052	0.06
Mineral Spirits	-	0.36	-

TABLE 2

Graphitic Carbon Balance

PRODUCT NO.		COMPOSITE OF 1ST SAMPLE SET TEST 1 WEIGHT (%)	GRAPHITIC C-% ASSAY	DIST.	COMPOSITE OF 1ST SAMPLE SET TEST 2 WEIGHT (%)	GRAPHITIC C-% ASSAY	DIST.	COMPOSITE OF 2ND SAMPLE SET TEST 3 WEIGHT %	GRAPHITIC C-% ASSAY	DIST.
	FLOTATION									
	Head (calculated)	100.0	3.09	100.0	100.0	2.78	100.0	100.0	2.53	100.0
2	Flotation Rougher Tailings	88.33	0.52	14.9	91.57	0.12	4.0	95.0	0.66	24.7
	Flotation Rougher Concentrate	11.67	22.5	85.1	8.43	31.7	96.0	5.00	38.1	75.3
	Flotation Cleaner Tailings	6.77	1.35	2.9	3.06	1.92	2.1	2.20	2.35	2.1
	Flotation Cleaner Concentrate	4.90	51.8	82.2	5.37	48.6	93.9	2.80	66.3	73.2
	SCREENING AND ELUTRIATION SEP.									
6A	-150 M Screen Fraction							0.80	39.4	12.4
nd	Elutriation Underflow (Middlings)									
6B	from the +150 M Fractions	2.23	19.3	13.9	2.61	20.8	19.5			
	SCREENED AND ELUTRIATED									
7	+150 M Flotation Conc. Fraction	2.67	78.9	68.3	2.76	74.9	74.4	2.00	77.0	60.8
8	-48+150 M Flotation Conc. Fraction	1.08	84.8	29.7	1.58	76.4	43.4	1.10	69.6	30.2
	+48 M	1.59	74.9	38.6	1.18	72.9	31.0	0.90	86.0	30.6
	H.L. SINK/FLOAT SEPARATION									
0	Sink from Product 8	0.16	61.3	3.2	0.35	42.6	5.3	0.42	30.2	5.0
11	Sink from Product 9	0.36	15.3	1.8	0.30	10.0	1.1	0.17	51.2	3.5
	Final Product									
12	-48+150 M Graphite Flake Float from 8	0.92	88.9	26.5	1.23	86.0	38.1	0.68	94.0	25.2
13	+48 M Graphite Flake Float from 9	1.23	92.4	36.8	0.88	94.5	29.9	0.73	94.1	27.1
4	TOTAL FINAL PRODUCT	2.15	90.9	63.3	2.11	89.5	67.9	1.41	94.0	52.3
	TOTAL LOW GRADE INTERMEDIATES TO BE FURTHER UPGRADED 4+6+10+11)	9.52	7.08	21.8	6.32	12.4	28.0	3.59	16.2	23.0

Table 3

Summary of X-Ray Diffraction (XRD) Results.

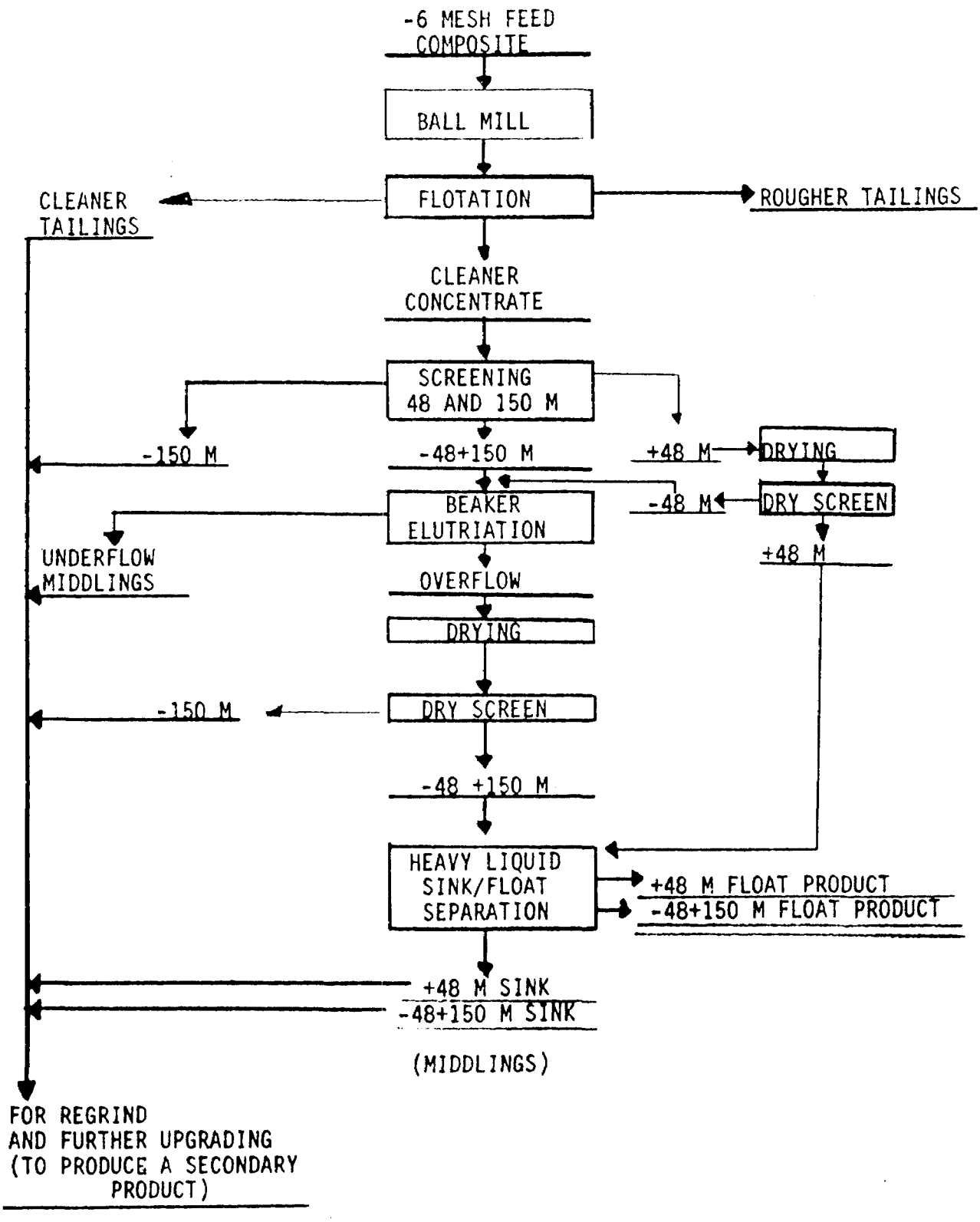
9001	Major quartz; major feldspar, plagioclase group & major feldspar, alkali group (possibly microcline).
9002	Major quartz; major feldspar, plagioclase group & major feldspar, alkali group (possibly microcline); trace mica.
9003	Major quartz; major feldspar, plagioclase group; major feldspar, alkali group (possibly microcline); minor mica.
9004	Major quartz; major feldspar, alkali group (possibly microclone); minor feldspar, plagioclase group.
9005	Major quartz; minor mica; major feldspar, plagioclase group; minor feldspar, alkali group (possibly microcline).

Note

Graphite is observed by the Quartz that is present.

FIG. 1

Test Flowsheet



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November 12, 1988

Location

The Baxter Lake Property is located in Baxter township approximately 4 kilometres east of Honey Harbour, Ontario at latitude 44° 53'N longitude 79° 46' W on NTS sheet 31D/13 (Fig 7).

The property includes four lcaims numbered SO 986038 to SO 986041 inclusive lying in lot 26 and 27 of Concession 12 of Baxter township adjacent to Provincial Highway 69 (Fig 2).

Geology (after Schwerdtner & Mawer (1982)

The area is under lain by foliated to gneissic metasedimentary and granitic units manifest as biolite gneiss, brolite-Lorneblende gneiss, felsis gneiss. Locally marble is present and may be useful as a marker horizon. Although detailed mapping of the property has not been undertaken, prospecting has located a graphitic horizon throughout the property (Fig 3) which varies up to 70 metres thick and dips gently to moderately in a possible synclinal structure with north-south axis.

Sampling

To evaluate, on a preliminary basis the grade and quality of the graphite present on the property, a series of 5 fairly large samples were collected in April 1988. The samples were forwarded to Ontario Research Foundation for analysis and testing. The results included as Appendix A, indicate that good grade, coarse flake graphite can be easily separated from the samples by conventional grinding and floatation and that further work is warranted.

Conclusion

A possible earily accessable source of good grade coarse grained crystalline flake graphite is indicated in Baxter Township.

Further testing including geological mapping, drilling and metallurgical evaluation is recommended.

James R. Atkinson FGAC

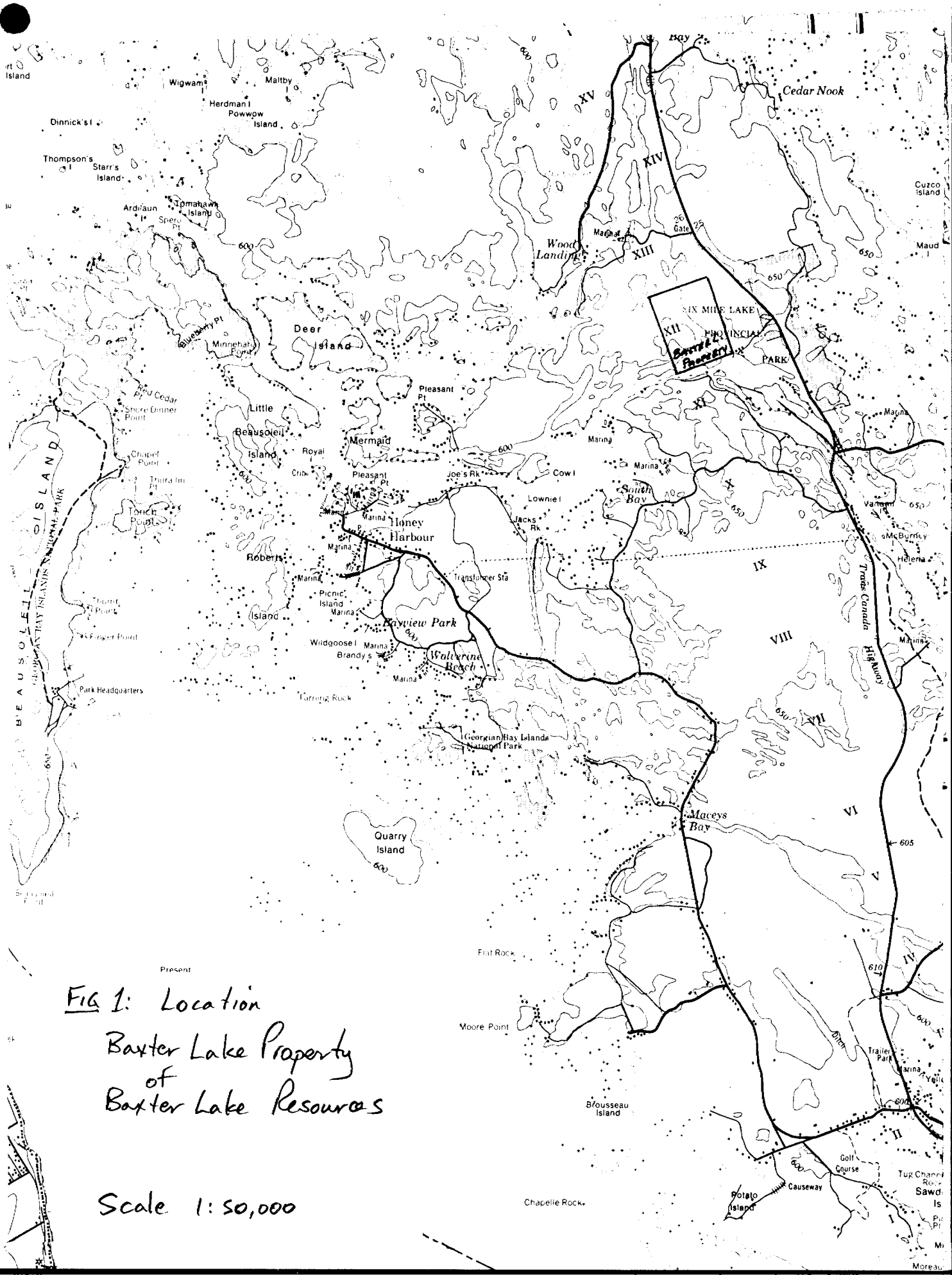


FIG 1: Location
Baxter Lake Property
of
Baxter Lake Resources

Scale 1:50,000

Gibson Twp.

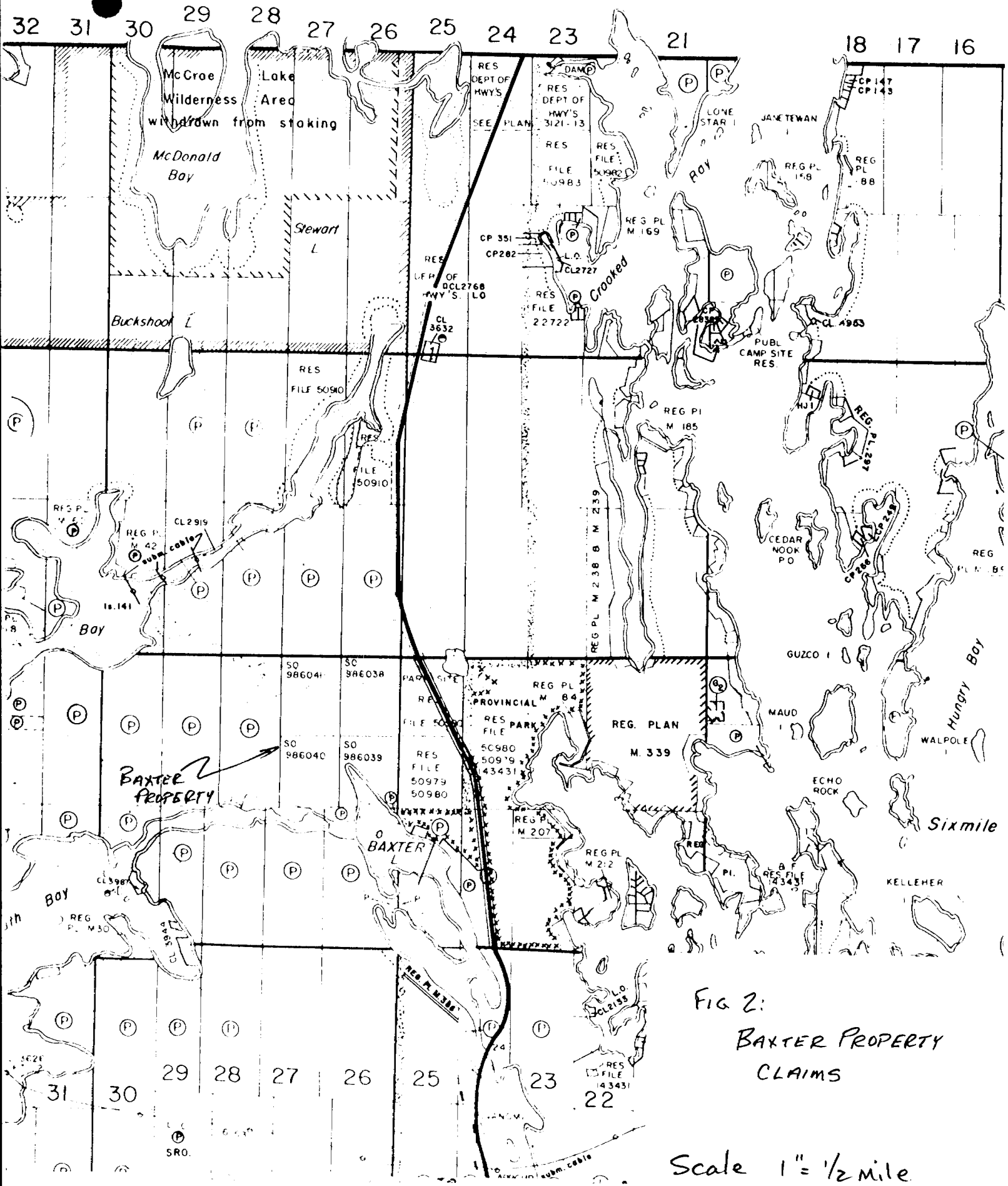


FIG 2:
BAXTER PROPERTY
CLAIMS

Scale 1" = 1/2 mile

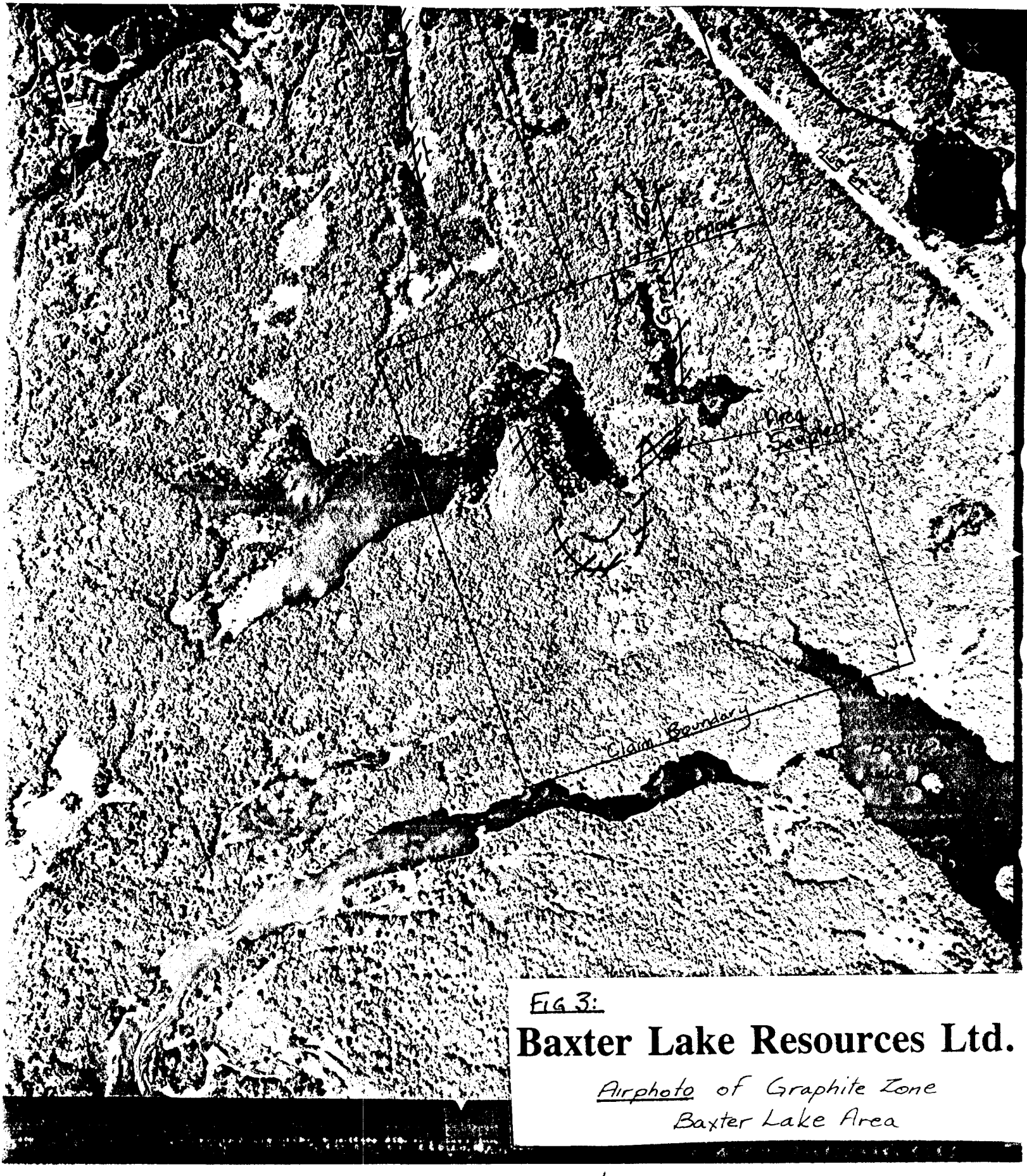


FIG 3:

Baxter Lake Resources Ltd.

Airphoto of Graphite Zone
Baxter Lake Area

Scale 1: 10,000

Ministry of Northern Development and Mines
Ontario

Report of Work
(Geophysical, Geological, Geochemical and Expenditures)

DOCU W88

900

8809-106 (SECTION 11 (19)

Min

Type of Survey(s): METALLURGICAL TESTING ✓	Township or Area: BAXTER TWP (M1922) ✓
Claim Holder(s): BAXTER LAKE RESOURCES LTD. ✓	Prospector's Licence No.: T. 5162 ✓
Address: 58 SHAFTESBURY AVENUE, TORONTO, ONT. M4T 1A3 ✓	
Survey Company: ONTARIO RESEARCH FOUNDATION	Date of Survey (from & to): ~~20~~ Day / Mo. / Yr. — 20 Day 06 Mo. 88 Yr.
Total Miles of line Cut: — ✓	
Name and Address of Author (of Geo-Technical report): JAMES R ATKINSON 4142 Sunflower Dr Mississauga ✓	

Credits Requested per Each Claim in Columns at right

		Days per Claim
Special Provisions: For first survey: Enter 40 days. (This includes line cutting) For each additional survey: using the same grid: Enter 20 days (for each)	Geophysical	
	- Electromagnetic	
	- Magnetometer	
	- Radiometric	
	- Other	
	Geological	
	Geochemical	
Man Days: Complete reverse side and enter total(s) here	Geophysical	
	- Electromagnetic	
	- Magnetometer	
	- Radiometric	
	- Other	
	Geological	
	Geochemical	
Airborne Credits: Note: Special provisions credits do not apply to Airborne Surveys.	Electromagnetic	
	Magnetometer	
	Radiometric	

Mining Claims Traversed (List in numerical sequence)

Mining Claim Prefix	Mining Claim Number	Expend. Days Cr.
SO	986038	25.5 AB
	986039	25.5 AB
	986040	25.5 AB
	986041	25.5 AB

Mining Claim Prefix	Mining Claim Number	Expend. Days Cr.

ONTARIO GEOLOGICAL SURVEY
ASSESSMENT FILES
OFFICE
JAN 16 1989
RECEIVED

SOUTHERN ONTARIO MINING DIV
RECEIVED
DEC - 2 1988

WORK ASSIGNMENT
SO 986040 & 41
4,000 - 25.5 =
3974.5 days
balance

Expenditures (excludes power stripping)

Type of Work Performed: METALLURGICAL TESTING

Performed on Claim(s): SO 986041

SO 986040

Calculation of Expenditure Days Credits

Total Expenditures				Total Days Credits
$ 1541.00	÷	15	=	102 ✓

Instructions: Total Days Credits may be apportioned at the claim holder's choice. Enter number of days credits per claim selected in columns at right.

Total number of mining claims covered by this report of work: 4 ✓

For Office Use Only		
Total Days Cr. Recorded: 102	Date Recorded: Dec 2/88	Mining Recorder:
	Date Approved as Recorded: 3 Jan 89	Branch Director:

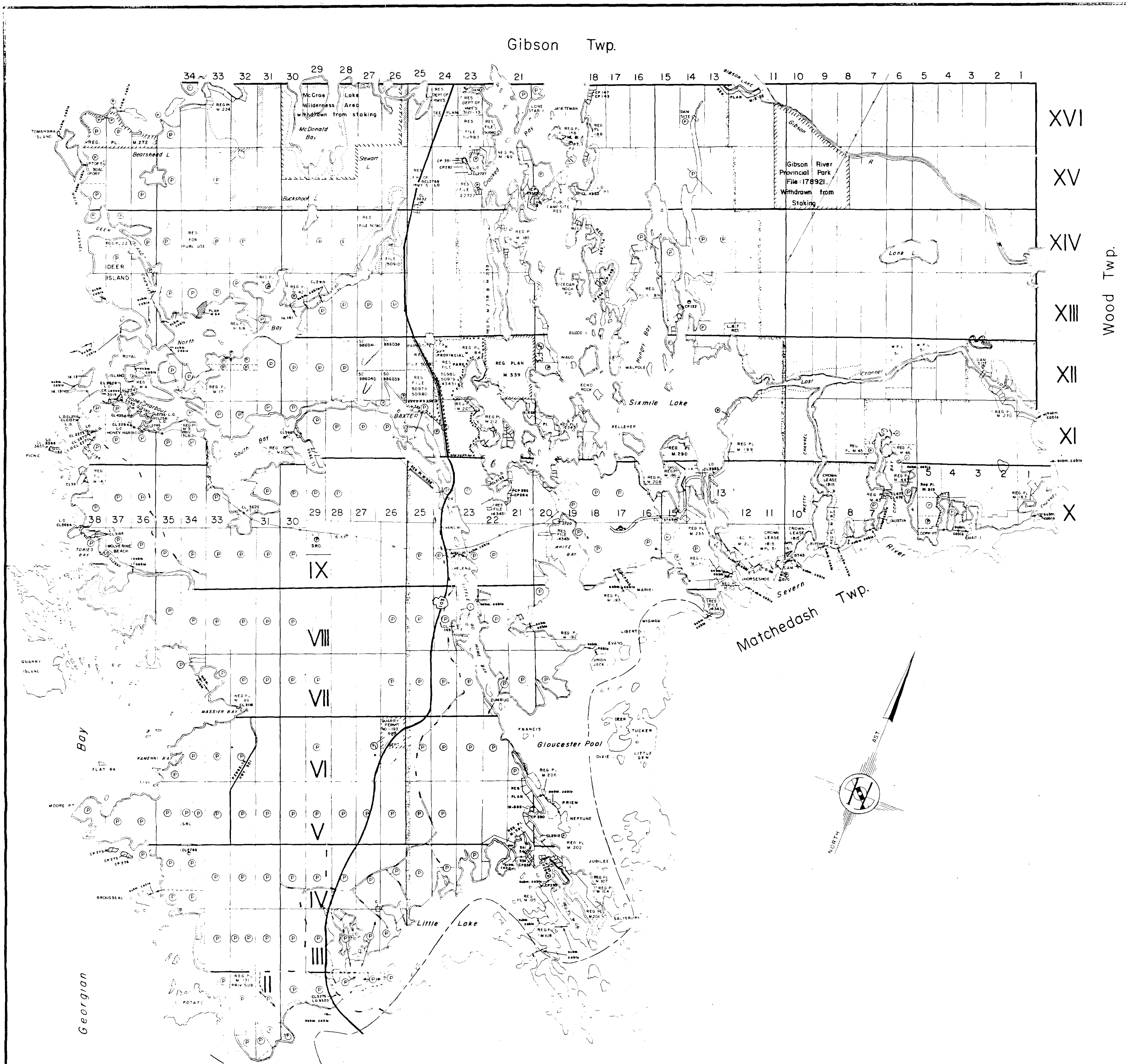
Date: Nov 12/88 | Recorded Holder or Agent (Signature): ✓

Certification Verifying Report of Work

I hereby certify that I have a personal and intimate knowledge of the facts set forth in the Report of Work annexed hereto, having performed the work or witnessed same during and/or after its completion and the annexed report is true.

Name and Postal Address of Person Certifying:
JAMES R ATKINSON FGAC
4142 Sunflower Dr. Mississauga

Date Certified: Nov 12/88 | Certified by (Signature): ✓



THE TOWNSHIP OF BAXTER

DISTRICT OF MUSKOKA

SOUTHERN ONTARIO

MINING DIVISION

SCALE: 1-INCH = 40 CHAINS

LEGEND

PATENTED LAND	(P)
CROWN LAND SALE	C.S
LEASES	(L)
LOCATED LAND	Loc
LICENSE OF OCCUPATION	L.O
MINING RIGHTS ONLY	M.R.O
SURFACE RIGHTS ONLY	S.R.O
ROADS	
IMPROVED ROADS	
KINGS HIGHWAYS	
RAILWAYS	
POWER LINES	
MARSH OR MUSKEG	
MINES	⚒
PATENTED for S.R.O	

NOTES

This Map Is Not To Be Used
— FOR SURVEY PURPOSES —

400' Surface Rights Reservation along the shores of all lakes and rivers.

For status of summer resort locations shown thus & Islands in Georgian Bay, Sixmile Lake, Severn River, Gloucester Pool & Little Lake Please contact Dept of Lands & Forests

Original shoreline shown thus

F.R.I. shoreline shown thus

New Survey of Sixmile Lake Area & Severn River Area shown thus

Mining claims staked on lots 26 to 33, Con XV & XVI are to be accepted for the mining rights only.

Public Reserve - Wilderness Area - File 12937 shown thus

Reserve Flooding Rights to elevation 596.0' Trent Canal Datum for all lots & islands on or in Gloucester Pool. File 130005

Land under water in Georgian Bay withdrawn from staking By Order in Council Dated April 30, 1912.

Area shown thus: xxxx Reserved For Six Mile Lake Provincial Park. Withdrawn From Staking Under Sec. 39 (d) of the Mg. Act. File: 22720.

DATE OF ISSUE

SAND & GRAVEL

Q QUARRY PERMIT No. 193		FILE 27322
G GRAVEL		FILE 50915

PLAN NO.- M. 1922

ONTARIO

MINISTRY OF NATURAL RESOURCES

SURVEYS AND MAPPING BRANCH

31D13NE0004 2.11900 BAXTER

200