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EXPLORATION OF THE SCHRYBURT CARBONATITE COMPLEX

G. Erdosh

March, 1977

International Minerals & Chemical
Corporation (Canada) Ltd.
Toronto, Ontario M5E 1J4

EXPLORATION OF THE SCHRYBURT CARBONATITE COMPLEX

G. Erdosh

International Minerals & Chemical Corporation (Canada) Ltd.

INTRODUCTION

A group of 155 claims were staked in October, 1975 to cover a possible carbonatite-alkalic igneous complex, the presence of which was predicted from an outstanding circular airborne magnetic anomaly of about 3½ miles in diameter (1-mile aeromagnetic series, map 938G, ODM-GSC). No record of drilling the complex appears in the Mining Recorder's assessment files but previous exploration conducted detailed ground magnetic survey and tested the complex by a number of shallow trenches.

The present program included an attempted geologic mapping, soil survey, and reverse circulation drilling.

LOCATION, ACCESS, TOPOGRAPHY

The claim group is located 75 air-miles north of Pickle Lake, Ontario where the nearest airbase is available. The complex adjoins Schryburt Lake to the east. The only access is by air from Pickle Lake by float- or ski-equipped aircrafts which can land on Schryburt Lake.

The topography is flat with occasional small sand-hills, consequently wet muskeg cover with black spruce

and tamarack is extensive. The slightly higher grounds are probably mainly sand and gravel, covered by spruce, in places birch, and less commonly poplar and pine. Glacial boulders are common throughout. There were no roads or trails on the property previous to this program.

CLAIMS

The 155 claims originally staked are listed in Appendix A. Since these were staked in the late fall of 1975 and geologic work was done during the summer of 1976, due to wet conditions on the property it was not easily possible to conduct drilling before assessment work was due in October 1976. Therefore, a 6-month extension was requested so drilling may be undertaken after freeze-up. The extension was requested for a reduced claim group of 82 claims listed in Apprendix A, also. Assessment work here is filed for 34 claims.

PERSONNEL

Geologic and soil surveys during July 1976 were conducted by the writer with the assistance of W. W. Ray. Drilling in January 1977 was done by Bradley Bros. Drilling Company of Noranda, Quebec; the work was supervised and geologic logging was done by the writer.

Analytical work for phosphate, x-ray and scintillation determinations and mineralogical examinations, was done in IMC's own laboratories in Libertyville, Illinois. Semi-quantitative spectrographic analyses were performed by American Spectrographic Laboratories, San Francisco, California.

GEOLOGY

Geologic field examination and a cursory soil and trench sampling were done during July 1976 by the writer and his assistant. Most trenches of the previous exploration program were visited, examined and sampled, and most of the higher ground was traversed to locate rock exposure.

There was only one definite rock exposure found over the carbonatite-alkalic complex near the east boundary of the property along the river bank just north of the Schryburt Lake outlet (see map in pocket). This exposure confirmed the existence of a carbonatite complex and is an unweathered medium-grained, sugary textured, nearly white, heterogeneous calcite carbonatite with 5-10% acicular green actinolite, few percent magnetite, minor pyrite/pyrrhotite and 10-15% apatite. The exposure is very small and made up of carbonatite slabs along the river bank and river bed over an area of 15-20 feet. The

carbonatite includes numerous irregular mafic xenoliths showing the explosive nature of the intrusion.

The series of old trenches in the northeast, northwest and west parts of the claim group were carefully examined and sampled (see map). Only in a few cases was it fairly certain that the trenches were in rock in place. In most instances this was indefinite; although the rocks in the trenches were all of local derivation, they appeared to have moved somewhat and could not be called exposures in place. All rocks in the trenches are highly weathered.

The rocks in the trenches are carbonatite, quite variable in composition from white calcite carbonatite through vermiculite-rich or magnetite-rich rocks to mafic-rich carbonatite. All rocks have been subjected to strong physical but little chemical weathering and now they are decomposed into semi-consolidated to unconsolidated sand-like material, still high in calcite.

Drilling further confirmed the existence of the carbonatite complex.

GEOCHEMICAL SURVEY

At the commencement of the exploration work it was known to us that rock exposures are rare over the complex; therefore it was decided to test by analytical techniques possible residual soils and all local rock that may not be far removed from its source. Phosphate

tests were considered one of the most important tests because phosphate values may give a clue of possible residual concentration by chemical weathering, which was one of the objectives of the program.

Therefore, during the field work in July soil and rock samplings were also taken which were analyzed in IMC's laboratories for phosphate and acid residues. Due to the fact that few areas qualified as near bedrock or possible residual soil, only 10 samples were analyzed. The analytical results are given in Appendix B. Looking at the analytical results of carbonatitic soil and rocks it may be concluded that no concentration of non-weathering minerals occurred, such as apatite in the soil. The weathering producing the soil was entirely or dominantly physical weathering.

PURPOSE AND RESULTS OF DRILLING

The economic potential of the carbonatite complex was tested by drilling six widely-spaced holes. The purpose of this drilling was two-fold; (a) to test a possible residual accumulation over chemically weathered carbonate-rich rocks and (b) to test the bedrock itself.

Being well-acquainted with carbonatitic rocks from other similar complexes, it was advisable to forfeit the more trouble-free and less-expensive standard diamond

core-drilling technique for reverse circulation drilling using tricone bits. Furthermore, this drilling technique has the additional disadvantage of yielding tiny rock chips only, making field identification and geologic studies very difficult.

Nevertheless, to test unconsolidated or semi-consolidated residual deposits reverse circulation is still the best technique. Even for testing bedrock this is better than core drilling since carbonate-rich rocks in the cool moist northern Canadian climate are generally rotted and criss-crossed by solution channels and cavities near the surface, resulting in poor core recovery.

The criteria of selecting the drill sites were varies; for the first four holes topography in conjunction with magnetic values was used as a guide. Again from previous experience, low topography may, and probably is, an indicator of solution in the carbonate-rich rocks where present. And residual accumulation is expected in the deepest solution depressions, now of course buried by glacial overburden.

After drilling the first four holes it was found that chemical weathering over the carbonate-rich rocks is only present in hole SC-1. If ever it was present elsewhere, it has been scraped off by glaciation. A thin layer of physically weathered disintegrated carbonatite, now a

sand, may be the only weathering product over bedrock. This is a few feet thick.

The last two holes were designed strictly for testing bedrock. SC-5 was drilled on a high magnetic anomaly and SC-6, a last test on the outermost ring in the onion shell of the carbonatite complex.

The objectives of drilling were achieved but with disappointing results. The overburden was found to be shallow everywhere and chemically weathered residual accumulation on bedrock was only found in one drill hole, SC-1. Here the accumulation is about 30 feet and phosphate analysis of this section resulted in 17.5% P_2O_5. The bedrock under this residual is also higher in phosphate than elsewhere, in the 7% P_2O_5 range. Since drilling was not detailed enough, it is not known how extensive this residual accumulation is.

All six holes intersected calcite carbonatite of two major types: (a) white mafic-poor rock with predominant calcite and minor magnetite, apatite, phlogopite, pyrite-pyrrhotite and actinolite and (b) a similar rock but with significant mafic constituents (25-60%) of pyroxene or amphibole, high phlogopite and magnetite. Calcite still remains relatively high.

Due to the nature of drilling it is not possible to tell rock structures, but all carbonatite appears to be well-banded and, it is presumed that structures are near vertical.

ASSESSMENT CREDIT REQUESTED

The assessment work on the Schryburt property consists of drilling, geologic field work with some soil sampling, geologic office work, drilling supervision and core logging, assays, and laboratory studies.

The calculation of credits is as follows:

Drilling, 960 feet @ 1 day/ft.		960 days
Geologic field work, 2 men, 3 days @ 7 days/man-day		42 days
Office work, etc., 4 days @ 7 days/man-day		28 days
Drilling supervision, 12 days @ 7 days/man-day		84 days
		1,114 days
Analytical:		
10 P_2O_5 and insoluble analyses, 16 P_2O_5 analyses, = 26 @ $9.50/sample	$ 247.00	
12 SQS analyses @ $28.00/sample	336.00	
33 X-ray diffraction analysis of insoluble fraction @ $56.00/sample	1,848.00	
18 Scintillation analysis @ $8.00/sample	144.00	
	$2,575.00	
At $15.00/day credit requested =		171 days
Total credit requested =		1,285 days

REQUESTED DISTRIBUTION OF CREDITS

A credit of 20 days/claim is requested for the following 19 claims, for a total of 380 days:

Pa. 438144
Pa. 438145
Pa. 438158
Pa. 438159
Pa. 438172
Pa. 438173
Pa. 438331
Pa. 438332
Pa. 438333
Pa. 438334
Pa. 438340
Pa. 438341
Pa. 438342
Pa. 438343
Pa. 438347
Pa. 438354
Pa. 438361
Pa. 438368
Pa. 438375

A credit of 60 days/claim is requested for the following 15 claims, for a total of 900 days:

Pa. 438344
Pa. 438345
Pa. 438346
Pa. 438355
Pa. 438356
Pa. 438357
Pa. 438358
Pa. 438359
Pa. 438360
Pa. 438369
Pa. 438370
Pa. 438371
Pa. 438372
Pa. 438373
Pa. 438374

Total credit required for the above claims is 1280 days.

Respectfully submitted,

Gerdosh

George Erdosh, Ph.D.
Senior Geologist

Qualifications: Not on record

APPENDIX A

CLAIMS

APPENDIX A

MINING CLAIMS originally staked in October, 1975:

PA-438118, 438119, 438120, 438121, 438122, 438123, 438124, 438125, 438126, 438127, 438128, 438129, 438130, 438131, 438132, 438133, 438134, 438135, 438136, 438137, 438138, 438139, 438140, 438141, 438142, 438143, 438144, 438145, 438146, 438147, 438148, 438149, 438150, 438151, 438152, 438153, 438154, 438155, 438156, 438157, 438158, 438159, 438160, 438161, 438162, 438163, 438164, 438165, 438166, 438167, 438168, 438169, 438170, 438171, 438172, 438173, 438174, 438175, 438176, 438177, 438178, 438179, 438180, 438181, 438182, 438183, 438184, 438185, 438186, 438187, 438188, 438189, 438190, 438191, 438192, 438193, 438194, 438318, 438319, 438320, 438321, 438322, 438323, 438324, 438325, 438326, 438327, 438328, 438329, 438330, 438331, 438332, 438333, 438334, 438335, 438336, 438337, 438338, 438339, 438340, 438341, 438342, 438343, 438344, 438345, 438346, 438347, 438348, 438349, 438350, 438351, 438352, 438353, 438354, 438355, 438356, 438357, 438358, 438359, 438360, 438361, 438362, 438363, 438364, 438365, 438366, 438367, 438368, 438369, 438370, 438371, 438372, 438373, 438374, 438375, 438376, 438377, 438378, 438379, 438380, 438381, 438382, 438383, 438384, 438385, 438386, 438387, 438388, 438389, 438390, 438391, 438392, 438393, 438394, 438395.

MINING CLAIMS for which extension was requested, July, 1976:

PA-438130, 438131, 438132, 438142, 438143, 438144, 438145, 438146, 438147, 438148, 438155, 438156, 438157, 438158, 438159, 438160, 438161, 438162, 438169, 438170, 438171, 438172, 438173, 438174, 438175, 438183, 438318, 438319, 438320, 438327, 438328, 438329, 438330, 438331, 438332, 438333, 438334, 438335, 438338, 438339, 438340, 438341, 438342, 438343, 438344, 438345, 438346, 438347, 438348, 438349, 438352, 438353, 438354, 438355, 438356, 438357, 438358, 438359, 438360, 438361, 438362, 438363, 438366, 438367, 438368, 438369, 438370, 438371, 438372, 438373, 438374, 438375, 438376, 438377, 438381, 438382, 438383, 438384, 438385, 438386, 438387, 438388.

COPIES TO: P. O. Sandvik
B. L. Murowchick

TO George Erdosh

FROM R. E. Whippo

DATE July 21, 1976

SUBJECT Phosphate, Canada

Proj. No: 06-3209

Assays of your samples from the Schryburt Lake carbonatite have been completed as follows:

Field No.	Min. No.	P_2O_5	Insol
SCH-2	FP-332	4.80	8.83
SCH-3	FP-333	3.00	67.4
SCH-5	FP-334	1.30	4.02
SCH-7	FP-335	3.48	23.4
SCH-8	FP-336	3.00	22.3
SCH-11	FP-337	1.80	36.5
SCH-12	FP-338	2.50	22.0
SCH-13	FP-339	4.30	20.7
SCH-14	FP-340	5.10	6.20
SCH-17	FP-341	0.28	49.4

R. E. Whippo

REW:kf

COPIES TO: D. L. Everhart
B. L. Murowchick

TO George Erdosh

FROM R. E. Whippo

DATE March 21, 1977

SUBJECT Schryburt Lake Carbonatite, Ontario

We have examined selected interval samples from the Schryburt Lake carbonatite.

Phosphorus analyses and semiquantitative spectrographic analyses of these intervals are shown in the attached Tables 1 and 2. Phosphorus values occur as apatite. The highest assay, 19.6% P_2O_5, indicates about 50% apatite.

Carbonates were removed by acid leaching. The numeral compositions of the insoluble residues are shown in Table 3. Pyrochlore is probably the main source of niobium. In addition the perovskite may also contain a minor amount of niobium as in the perovskite group member latrappite.

Relative counting rates were obtained from selected sample intervals. These rates are shown in Table 4. These rates are for alpha particles only. For comparison the following rates were determined under the same conditions:

blank planchet	7 cts/50 min.
agricultural limestone	10 cts/50 min.
Florida 72 BPL concentrate	251 cts/50 min.

Counting rates equivalent to Florida phosphate concentrates were obtained on intervals from holes SC-1 and SC-6.

REW

REW:kf

attachments

TABLE 1

CHEMICAL ANALYSES

SELECTED SAMPLES

SCHRYBURT LAKE, ONTARIO

Hole No.	Interval	Weight Percent P_2O_5
SC-1	45-50	19.6
	50-55	18.9
	75-80	14.0
	100-105	7.00
	120-125	8.60
	140-145	5.70
	155-160	8.90
	165-170	3.68
SC-2	35-40	2.90
	115-120	1.80
SC-3	10-15	1.70
	25-30	1.65
	50-55	0.70
	75-80	1.65
	105-110	2.85
	130-135	1.15
SC-4	50-55	1.30
	140-145	1.50
SC-5	50-55	2.25
	80-85	2.40
	110-115	4.70
SC-6	45-50	2.30
	145-150	2.65

Robert E. Buehrle

Robert E. Buehrle
Chemist

TABLE 2

SEMIQUANTITATIVE SPECTROGRAPHIC ANALYSES

SELECTED SAMPLES

SCHRYBURT LAKE, ONTARIO

	Weight Percent						
Oxide	SC-1 120-125	SC-2 115-120	SC-3 50-55	SC-3 75-80	SC-4 140-145	SC-5 110-115	SC-6 145-150
Ca	25.	40.	15.	20.	35.	30.	35.
Si	30.	12.5	25.	25.	4.	6.	3.
Fe	25.	3.	10.	12.5	7.5	12.5	10.
Mg	.6	6.	30.	20.	5.	7.5	6.
P	10.	-	-	-	-	3.	-
Al	1.	1.75	1.5	2.	.15	.1	.12
Mn	2.	.2	.5	.35	.25	.4	.35
Zr	.12	.05	.015	.05	.02	.1	.15
Nb	.03	.04	.06	<.02	-	-	.035
Ni	.025	.007	.08	.06	.01	-	.003
Ga	.005	-	.001	.002	-	.002	.001
Ti	1.	1.5	3.5	4.	.85	.85	.85
V	.04	.03	.025	.035	.02	.03	.035
Cu	.008	.008	.005	.015	.003	.01	.008
Na	-	1.	1.5	2.25	.5	.4	.6
Co	.01	.002	.01	.01	.002	.006	.006
K	-	2.	3.5	2.5	<.5	<.5	<.5
Sr	.05	.4	.1	.08	.4	.3	.4
Cr	.01	.01	.04	.04	.01	-	.001
Ba	.05	.08	.05	.1	.15	.04	.08
Sc	.003	<.001	<.001	.001	<.001	.004	.002
Be	-	-	-	.001	-	-	-
B	-	-	<.01	.01	-	-	-
Pb	-	-	.02	<.005	-	-	-
Sn	-	-	-	-	.002	.004	-
Zn	<.15	-	<.15	-	-	-	-
Y	.015	.003	-	.003	.002	.003	.004
Yb	<.001	<.001	-	-	-	-	<.001
Ce	.15	-	-	.1	-	-	-
La	.05	.02	<.02	.02	.04	.02	.03
Na	.05	.03	-	.03	.02	.02	.02

MINERAL COMPOSITION

SELECTED ACID INSOLUBLES

SCHRYBURT LAKE, ONTARIO

Hole	Interval	Phases Present				
		Major	Medium	Minor	Very Minor	Trace
SC-1	45-50		quartz magnetite	chlorite apatite	ilmenite goethite	perovskite
	120-125	goethite	quartz	magnetite	chlorite	mica ilmenite apatite
	155-160	mica		magnetite ilmenite quartz	serpentine amphibole	clinohumite pyrite
SC-2	35-40		mica magnetite	amphibole clinohumite olivine	ilmenite serpentine	pyrite pyrrhotite dolomite
	115-120	mica	amphibole	magnetite ilmenite	clinohumite pyrrhotite dolomite	olivine pyrite
SC-3	10-15	mica			pyrrhotite magnetite amphibole	dolomite, pyrite pyrochlore ilmenite
	25-30	mica	amphibole	magnetite ilmenite	clinohumite	olivine pyrrhotite
	50-55		mica amphibole	clinohumite ilmenite magnetite olivine	serpentine	pyrrhotite
	75-80		magnetite amphibole mica	olivine ilmenite	perovskite serpentine	clinohumite pyrrhotite
	105-110	mica		magnetite pyrrhotite clinohumite	ilmenite amphibole	pyrochlore olivine dolomite
	130-135		magnetite amphibole mica	serpentine ilmenite		clinohumite olivine

Anthony C. Gricius
Jr. Mineralogist

TABLE 3 contd.....

Schryburt Lake, Ontario

Hole	Interval	Phases Present				
		Major	Medium	Minor	Very Minor	Trace
SC-4	50-55	mica		magnetite amphibole clinohumite olivine	ilmenite serpentine	pyrrhotite
	140-145		mica clinohumite	magnetite amphibole clinohumite	pyrrhotite ilmenite olivine serpentine	
SC-5	50-55	mica		quartz magnetite	clinohumite feldspars	amphibole, ilmenite olivine, pyrrhotite
	80-85		mica magnetite	olivine clinohumite amphibole	ilmenite perovskite serpentine	pyrrhotite
	110-115		magnetite	olivine clinohumite	mica pyrrhotite serpentine amphibole	ilmenite
SC-6	45-50		magnetite amphibole mica	dolomite clinohumite	pyrrhotite	ilmenite pyrite pyrochlore
	145-150	magnetite	mica	amphibole pyrrhotite	ilmenite dolomite zircon	clinohumite pyrite

Anthony C. Gricius

Anthony C. Gricius
Jr. Mineralogist

TABLE 4

COUNTING RATES OF SELECTED SAMPLES

SCHRYBURT LAKE, ONTARIO

Hole No.	Interval	Counting Rate (cts/50 min.)
SC-1	45-50	178
	120-125	182
	155-160	349
SC-2	35-40	82
	113-120	43
SC-3	10-15	51
	25-30	57
	50-55	103
	75-80	100
	105-110	75
SC-3	130-135	44
SC-4	50-55	51
	140-145	69
SC-5	50-55	11
	80-85	16
	110-115	20
SC-6	45-50	317
	145-150	365

Anthony C. Gricius

Anthony C. Gricius
Jr. Mineralogist

American Spectrographic Laboratories, Inc.

Analysis • Research • Consultation

557 MINNA STREET • SAN FRANCISCO, CALIF. 94103

TELEPHONE: (415) 863-0190

March 9, 1977

ASL #5488

NAC
GROWTH SCIENCES CENTER
LIBERTYVILLE, IL 60048

Attn.: Harriet Ciszewski
111

RE: Semi-quantitative spectrographic analyses on your seven samples submitted on your P. O. #7LV-0011, Release #A-416.

The following are reported as oxides of the elements indicated.

	SC-1 120-125' 54419	SC-2 115-120 54422	SC-3 50-55 54425	SC-3 75-80 54426	SC-4 140-145' 54430	SC-5 110-115' 54433	SC-6 145-150 54435
Ca	25. %	40. %	15. %	20. %	35. %	30. %	35. %
Si	30.	12.5	25.	25.	4.	6.	3.
Fe	25.	3.	10.	12.5	7.5	12.5	10.
Mg	.6	6.	30.	20.	5.	7.5	6.
P	10.	—	—	—	—	3.	—
Al	1.	1.75	1.5	2.	.15	.1	.12
Mn	2.	.2	.5	.35	.25	.4	.35
Zr	.12	.05	.015	.05	.02	.1	.15
Nb	.03	.04	.06	< .02	—	—	.035
Ni	.025	.007	.08	.05	.01	—	.003
Ga	.005	—	.001	.002	—	.002	.001
Ti	1.	1.5	3.5	4.	.35	.85	.85
V	.04	.03	.025	.035	.02	.03	.035
Cu	.008	.008	.005	.015	.003	.01	.008
Na	—	1.	1.5	2.25	.5	.4	.6
Co	.01	.002	.01	.01	.002	.006	.006
K	—	2.	3.5	2.5	< .5	< .5	< .5
Sr	.05	.4	.1	.08	.4	.3	.4
Cr	.01	.01	.04	.04	.01	—	.001
Ba	.05	.08	.05	.1	.15	.04	.08
Sc	.003	< .001	< .001	.001	< .001	.004	.002
Be	—	—	—	.001	—	—	—
B	—	—	< .01	.01	—	—	—
Pb	—	—	.02	< .005	—	—	—
Sn	—	—	—	—	.002	.004	—
Zn	< .15	—	< .15	—	—	—	—
Y	.015	.003	—	.003	.002	.003	.004
Yb	< .001	< .001	—	—	—	—	< .001
Ce	.15	—	—	.1	—	—	—
La	.05	.02	< .02	.02	.04	.02	.03
Nd	.05	.03	—	.03	.02	.02	.02

AMERICAN SPECTROGRAPHIC LABORATORIES

B. H. Hinckley

American Spectrographic Laboratories, Inc.

Analysis • Research • Consultation

557 MINNA STREET • SAN FRANCISCO, CALIF. 94103

TELEPHONE: (415) 863-0190

March 18, 1977

ASL #5551

IMC---Growth Sciences Center
Libertyville, Illinois

Attention: Mary Eager - 111

RE: Semi-quantitative spectrographic analysis, as oxides, on your five samples submitted on your Release A-419.

	SC-1, 45-50' 54566	SC-1, 155-160' 54567	SC-3, 10-15' 54568	SC-6, 45-50' 54570	SC-3, 10-15' PYROCHLORE CONC. 54569
Ca	25. %	25. %	35. %	35. %	8.5 %
Nb	0.035	<0.02	0.04	0.07	Princ. Constit.
P	25.	6.	1.	1.25	—
Fe	20.	5.	4.	2.	2.
Si	25.	10.	1.75	1.75	1.25
Mg	1.5	7.5	2.5	4.	0.25
Al	1.5	.5	.2	.04	.15
B	.01	.01	—	—	.08
Mn	.4	.25	.15	.2	.08
Pb	< .005	.007	.015	.005	.15
Ga	.002	< .001	< .001	—	—
Mo	< .003	—	—	—	—
Ti	2.	1.	.12	.1	2.5
Cu	.03	.01	.008	.001	.002
Na	.2	.25	.2	.15	1.5(?)
Zn	.1	—	—	—	—
Ag	—	< .001	< .001	—	—
Zr	.07	.06	—	.05	2.
Ni	.035	.007	.006	< .001	.015
Co	.01	.001	.003	< .001	—
Sr	.12	.15	.35	.35	.6
Cr	.015	.008	.002	—	< .02
Ba	.015	.02	.08	.06	1.25
V	.035	.02	.002	.003	—
Sn	—	—	—	—	.06
La	.04	.035	.035	.02	.75
Nd	.12	.1	.03	.03	.75
Ce	.15	.12	.12	.1	4.
Y	.015	.02	.007	.008	< .03
Yb	< .001	< .001	< .001	< .001	< .001
Sm	.025	.02	—	—	.05
Pr	—	—	—	—	.1

AMERICAN SPECTROGRAPHIC LABORATORIES

B. H. Hinckley

NOTE: MATERIALS SUBMITTED FOR ANALYSIS ARE HELD FOR THIRTY DAYS AND THEN DISCARDED.

APPENDIX C

CORE LOGS

INTERNATIONAL MINERALS & CHEMICAL CORPORATION
GEOLOGICAL LOG

170 140 150 200 150 150/900

HOLE NO. SC-1 SHEET NO. 1 of 1 AZIMUTH Vertical COLLAR ELEVATION

COORDINATES 13+80W DATE STARTED Jan. 19, 1977 ACID TEST TOTAL FOOTAGE 170'

27+40N DATE COMPLETED Jan. 20, 1977 OVERALL CORE RECOVERY 98%

BIT SIZE Reverse Circulation LOGGED BY G. Erdosh

FROM	TO	FT. OF CORE	TYPE	ROCK DESCRIPTION, ALTERATION AND REMARKS	METALLIZATION	ANGLE TO CORE	SECTION	DEPTH
0	45	45	Sand, Gravel	Glacial, mixed composition and size, about equal of sand and gravel.				
45	50	5	Leached Carbon.	Sand-sized leached carbonatite, cannot say if consolidated or unconsolidated in place. Contains 35% apatite, 5% magnetite, 25% chloritized mica, much glacial material mixed in sample either in place or during drilling.				
50	149	99	Mafic Calcite Carbon.	Weathered, somewhat leached chocolate-brown broken-up gravel- and sand-size rock composed of heterogeneous fragments made up of calcite carbonatite, apatite-rich rock, chloritized mica-rich rock, coarse magnetite fragments, some possibly ankerite- or siderite-rich fragments and unidentified fine-grained mafic-rich fragments. Larger rock fragments are absent possibly because weathered rock is broken up by drilling. Sand-size fraction may be 70-80% apatite, but this fraction is only 20-25% of sample with further decrease downward. Magnetite fragments contain 15-20% apatite crystals. Total apatite in rock may average 20-25%. In place rock fragments include 10-15% extremely fine grained homogeneous light greenish gray cherty-looking calcite carbonatite. 138 - 146 Light brown phlogopite-rich carbonatite, minor calcite, possibly ankerite or siderite, 10% magnetite, 15-25% apatite				
149	170	21	Calcite Carbon.	White heterogeneous black-peppered unweathered carbonatite composed mainly of calcite but commonly fairly rich in mafic minerals, mica, magnetite, actinolite, occasional pyrite/pyrrhotite. Apatite 10-15% or lower. 149 - 160 ~~Black and white calcite carbonatite, rich~~ in magnetite. 170 - End of hole.				

G. Erdosh

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INTERNATIONAL MINERALS & CHEMICAL CORPORATION
GEOLOGICAL LOG

HOLE NO. SC-2
COORDINATES 24+00W 14+50N
BIT SIZE Reverse Circulation
SHEET NO. 1 of 1
DATE STARTED 1-22-77
DATE COMPLETED 1-23-77
AZIMUTH Vertical
ACID TEST
COLLAR ELEVATION
TOTAL FOOTAGE 140'
OVERALL CORE RECOVERY 98%
LOGGED BY G. Erdosh

FROM	TO	FT. OF CORE	TYPE	ROCK DESCRIPTION, ALTERATION AND REMARKS	METALLIZATION	ANGLE TO CORE	SECTION	DEPTH
0	35	35	Sand	Medium grained dirty quartz sand, minor gravel, all carbonate rich probably from carbonatite.				
35	140	105	Phlogopite Calcite Carbon.	Dark gray fine to medium grained magnetite- and mica-rich calcite carbonatite with probably much pyroxene or amphibole. Magnetite 5-10%, fine phlogopite 10-15%, apatite 5-10%, minor pyrite. Narrow white nearly pure calcite carbonatite sections with minor phlogopite magnetite, pyrite common (Sample 50-55 have much of this material). In many samples this rock makes up 50%, in some even more.				
				140 - End of Hole.				

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GEOLOGICAL LOG

HOLE NO. SC-3 | SHEET NO. 1 of 1 | AZIMUTH Vertical | COLLAR ELEVATION
COORDINATES 1+75W 37+00N | DATE STARTED 1-23-77 | ACID TEST | TOTAL FOOTAGE 150'
DATE COMPLETED 1-24-77 | OVERALL CORE RECOVERY 96%
BIT SIZE Reverse Circulation | LOGGED BY G. Erdosh

FROM	TO	FT. OF CORE	TYPE	ROCK DESCRIPTION, ALTERATION AND REMARKS	METALLIZATION	ANGLE TO CORE	SECTION	DEPTH
0	8	8	Overburden	Not recovered, probably mainly organic muck.				
8	15	7	Calcite Carbon.	White, medium grained banded calcite carbonatite with 3-5% pyrite, generally 4-6% fine phlogopite, except in occasional phlogopite-rich bands, very minor magnetite, trace apatite.				
15	70	55	Phlogopite Calcite Carbon.	Dark gray with a purplish tinge, fine to medium grained rock with 25-35% fine phlogopite flakes, 30-50% calcite, minor magnetite, few percent pyrite/pyrrhotite, trace to minor apatite, probably 20-25% fine mafic mineral (pyroxene or amphibole) which cannot be identified, 2-8% fine brown unusual equi-dimensional crystals of granular phlogopite. This rock crumbles easily under drill bit, most of the samples are sand. Occasional narrow interbanded white calcite carbonatite. 55 - 70 Half of sample is white calcite carbonatite.				
70	99	29	Mafic Calcite Carbon.	Similar rock to above but even darker and without purplish tinge given by phlogopite. In this unit biotite may be the dominant mica. Magnetite increased to 50-20%, mafic minerals to 25-35%, total mica probably decreased somewhat. White calcite carbonatite chips in some samples occur but not common.				
99	119	20	Calcite Carbon.	Same as first unit, occasional interbanded mafic carbonatite.				
119	137	18	Mafic Calcite Carbon.	As above.				
137	150	13	Calcite Carbon.	Similar to earlier white carbonatite but richer in phlogopite. Gradational with unit above. 150 - End of Hole.				

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GEOLOGICAL LOG

HOLE NO. SC-4 | SHEET NO. 1 of 1 | AZIMUTH Vertical | COLLAR ELEVATION

COORDINATES 12+00E, 37+30N | DATE STARTED 1-25-77 | ACID TEST | TOTAL FOOTAGE 200'

DATE COMPLETED 1-26-77 | OVERALL CORE RECOVERY 95%

BIT SIZE Reverse Circulation | LOGGED BY G. Erdosh

FROM	TO	FT. OF CORE	TYPE	ROCK DESCRIPTION, ALTERATION AND REMARKS	METALLIZATION	ANGLE TO CORE	SECTION	DEPTH
0	17	17	Sand, Gravel	Glacial. No recovery to about 9 feet. (Water lost after a boulder at 2 feet.)				
17	37	20	Carbon. Sand	Gray medium sand made up mainly of calcite grains but with considerable amounts of biotite and chloritized biotite locally. Glacial sand mixed in especially in top part.				
37	60	23	Mafic Calcite Carbon.	Fine to medium grained heterogeneous nearly black mafic rock that may not strictly be carbonatite. However, it contains 25-35% calcite, about the same amount of unidentified mafic minerals, 5-25% phlogopite (half of which is granular as described in SC-3), 10% magnetite. Bands of white nearly pure calcite carbonatite occur, in some samples common.				
60	200	140	Phlogopite Calcite Carbon.	Similar to rock above but less mafics and more calcite. Magnetite down to trace, phlogopite remains 5-20%, pyrite trace. Rock is light gray in color. Occasional narrow phlogopite-rich bands, 20-25%.				
				200 - End of hole.				

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GEOLOGICAL LOG

HOLE NO. SC-5 | SHEET NO. 1 of 1 | AZIMUTH Vertical | COLLAR ELEVATION
COORDINATES 26+00E, 18+00N | DATE STARTED 1-28-77 | ACID TEST | TOTAL FOOTAGE 150'
DATE COMPLETED 1-29-77 | OVERALL CORE RECOVERY 50%
BIT SIZE Reverse Circulation | LOGGED BY G. Erdosh

FROM	TO	FT. OF CORE	TYPE	ROCK DESCRIPTION, ALTERATION AND REMARKS	METALLIZATION	ANGLE TO CORE	SECTION	DEPTH
0	32	32	Sand. Gravel	Glacial but high in carbonates. Either contamination from bedrock or naturally high. Very poor recovery.				
32	100	68	Calcite Carbon.	White fine to medium grained rock with only few percent each of magnetite, phlogopite, pyrite, apatite. Occasionally up to 5% in either of these constituents. Below 60' these constituents commonly 5% throughout. Recovery poor although rock appears competent. Slightly better below 70' but total sample still remains ½ a bag (7-10 lb.) 78 - 87 Black highly magnetic mafic phase, still high in calcite.				
100	140	40	Phlogopite Calcite Carbon.	Dark gray nearly black rather heterogeneous rock with 5-15% magnetite, some apatite, 15-20% phlogopite, few percent pyrite/pyrrhotite. 110 -115 5-6% yellow-brown clinohumite (identified by x-ray diffraction).				
140	150	10	Calcite Carbon	White medium grained, same as first unit.				
				150 - End of Hole.				

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GEOLOGICAL LOG

HOLE NO. SC-6 | SHEET NO. 1 of 1 | AZIMUTH Vertical | COLLAR ELEVATION
COORDINATES 2+50N, 29+60E | DATE STARTED 1-30-77 | ACID TEST | TOTAL FOOTAGE 150'
DATE COMPLETED 1-31-77 | OVERALL CORE RECOVERY 90%
BIT SIZE Reverse Circulation | LOGGED BY G. Erdosh

FROM	TO	FT. OF CORE	TYPE	ROCK DESCRIPTION, ALTERATION AND REMARKS	METALLIZATION	ANGLE TO CORE	SECTION	DEPTH
0	19	19	Clay	Soft gray lake clay.				
19	28	9	Gravel	Mixed glacial gravel.				
28	150	122	Calcite Carbon.	White, medium-grained rock with 2-8% small magnetite grains, 2-8% very fine brown hexagonal platy crystals of phlogopite, 2-10% of fine brown granular crystals of phlogopite, few % apatite, and occasionally few % pyrite, in bands high mafic minerals, otherwise rock mainly calcite. In places, not uncommonly a bottle green actinolite up to 3-6%. Rock very uniform all the way. Only occasional narrow bands of carbonatite with very high calcite, greater than 95%.				
				150 - End of Hole.				

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