BEAUCAGE MINES PROPERTY,

MANITOU ISLANDS,

NORTH BAY,

ONTARIO

J. E. GILL

February 29, 1956.

BEAUCAGE MINES PROPERTY
Manitou Islands, Ontario

In 1952 radioactivity was noted on the Manitou Islands in Lake Nipissing, roughly six miles southwest of North Bay, Ontario. Mining rights were secured on 8, 153.22 acres, including the five islands of the Manitou group, and drilling was started by Inspiration Mining and Development Company in January 1953. Following this, 38,432 feet of diamond drilling, surface maping and magnetometer surveys served to locate and explore partially several areas containing concentrations of uranium and columbium (niobium).

In June 1953, investigation of material from the Newman zone was started for the purpose of working out an extraction process. In a report dated October 25, 1955 Battelle Memorial Institute of Columbus, Ohio provided a flow sheet, equipment drawings and layouts for a 25-ton pilot plant and estimates of capital costs and operating results for a 500-ton per day plant.

In 1954 a vertical shaft was sunk on Newman Island to 440 feet depth and lateral work was started at the 400 level early in 1955. 2377 feet of drifting and crosscutting and 23552 feet of underground diamond drilling have explored the zone systematically and fairly thoroughly for a length of 800 feet and through a vertical range of 400 to 500 feet. Several bodies were slashed out and backs were taken down to provide material for use in the pilot plant. A stock pile of 13,000 tons was built up for this purpose.

A flotation plant to up-grade the ore before chemical treatment is now in operation. The building for the chemical plant is complete and equipment is being installed under the supervision of Catalytic Construction Company.

SURFACE FEATURES

Lake Nipissing is up to 45 feet deep between North Bay and the Manitou Islands. In the vicinity of the Islands depths of up to 100 feet have been noted locally.

The Manitou Islands rise from the bed of the lake to elevations of 10 to 100 feet above lake level.

They form a ring about 1 1/4 miles across. Their areas are:

Newman Island	7.2 acres
Rankin Island	22.8 acres
Calder Island	26.5 acres
Little Manitou Island	69.5 acres
Big Manitou Island	203 acres

GENERAL GEOLOGY

The rocks exposed and encountered in the drill holes and underground workings are mainly closely folded gneisses, crystalline limestones, syenite and other intrusives forming a complex assemblage probably Precambrian in age. The deposits of economic interest are in breccia zones that have been subject to repeated structural adjustments and alterations. Acmite, apatite, fluorite, sulphides and pyrochlore are present in abundance in restricted zones and their manner of occurrence shows that sodium, phosphorous, fluorine, sulphur, columbium and uranium were introduced, presumably by solution rising from below.

The setting of these deposits is similar in some respects to those of certain occurrences in Africa in that they are associated with syenitic and carbonate-rich rocks and a ring structure, suggested by the distribution of the islands and the structures mapped on them.

Columbium and uranium occur in the mineral pyrochlore which has a variable composition, in this case probably $(Na,Ca,U)_2(Cb,Ti)_2O_6F$. There is no appreciable amount of tantalum. Titanium is present in only small amounts, probably Cb:Ti= about 14:1. The Uranium content is variable. Assays of ore with good columbium values range from very low to 0.24% U_3O_8. Only traces of thorium occur.

Scattered patches of Paleozoic conglomerate and limestone rest unconformably on the Precambrian rocks.

ORE ZONES

Noteworthy concentrations of columbium and uranium have been found on Newman, Calder and Big Manitou Islands. (See Map No 1 in pocket). Of these, the Newman zone is the best and most of the work done has been concentrated on it.

NEWMAN ZONE

A belt about 500 feet wide extending a little south of east from the east end of Newman Island contains a series of large sheets, pods and lenses enriched in columbium and uranium. The zone is notably irregular and complex in detail, but it is divisible roughly into four layers, based on the preponderance of certain rock types. Dips are southward at varying angles. The nature and relations of these layers can best be seen on the plan and cross sections in the folder accompanying this report.

To the south is a layer of crystalline limestone, partly silicated. North of this is a layer called "basic silicate rock", composed largely of acmite, feldspar, apatite, calcite, biotite, magnetite and sulphides in varying proportions. The best ore is in this rock. Farther north a pink "acidic sillicate rock" predominates. This consists mainly of feldspar with variable amounts of acmite, hematite, magnetite, pyrite and calcite. It contains some ore shoots. Northward it grades into a grey "acidic silicate rock" which is generally barren.

Some pegmatite and lamprophyre dykes occur. These are definitely intrusive.

At a late stage, fractures traversing the zone were filled by calcite and fluorite. Later still, a few faults occurred. These are marked by red earthy hematite, following the fractures.

Within the "basic silicate" and the "pink feldspar" layers, high columbium values occur in breccia zones that strike roughly parallel to the layers, but may dip more steeply. High values may occur anywhere through these two layers, though the biggest masses are in the basic silicate layers. Uranium, on the other hand is low on the south side of the ore zone and increases northward.

OTHER OCCURRENCES

Surface diamond drill holes cut interesting sections on Big Manitou and Calder Islands. None of these are large, but they may well yield substantial quantities of ore. A list of intersections is given in Appendix II.

ANALYSES

In the early stages results of analyses for columbium from different laboratories did not check. After some study it was found at McGill University that by setting up suitable standards it was possible to get consistent results by use of an X-ray spectrometer. All the early analyses were run at McGill and these have been used as a standard for plotting the assay plans. After two years of checking and development of analytical techniques it was found that the McGill results are consistently low. A commercial laboratory using the X-ray technique with revised curves came into operation in 1955 and most of the analyses since have been done by that laboratory, X-Ray Assay Laboratories, Ltd. of Toronto. Early checks indicated that X-Ray Assay Laboratories results were 15% higher than McGill, so all their assays have been cut 15% for plotting.

In Appendix I comparative analyses are given. It will be seen from these results that X-Ray Assay Laboratories results for the 27 samples listed are 21% higher than the McGill results. A comparison of results from 23 samples shows the U.S.G.S. chemicals average 24% higher than McGill.

In reporting the ore grades, averages have been calculated from the assay plans and the final results have been raised 15%. These figures should, therefore, be conservative.

Uranium results, checked against chemical determinations, appear to be a bit high (see Appendix I). The averages calculated from the assay plans have been cut by 6%.

ORE RESERVES

Estimates have been made using the outlines shown on the sections in the folder. Two calculations are shown in Appendix III, one for the higher grade areas shown on the first set of sections, the other for larger, lower grade areas, shown on the second set of sections, which also give the individual assays. In both calculations nothing was included within 200 feet of the surface. The results are:

	Tons	Tons/v.ft.(±)	$\%U_3O_8$	$\%Cb_2O_5$
High Grade	1,893,000	4500	.049	.86
or Lower Grade	2,962,000	7000	.041	.69

Actually there should be considerably more ore in this block because some of the sections are not thoroughly drilled. Also it should be noted that three sections with high Cb_2O_5 were cut in a surface drill hole southeast of the block estimated, toward Rankin Island. This may be a branch of the Newman zone. Magnetic anomalies indicate a possible continuation eastward along the main trend.

Submitted by,

J. E. Gill.

APPENDIX I

Analysis Checks

Columbium Oxide %

Sample	No.	McGill	X-Ray	USGS	Battelle	T.S.L.	Mines Branch Col.	X-Ray Fl.
78		.38		.47				
561	Ins.	.15		.16				
710	"	.96		1.15				
3017	"	.23		.27				
3024	"	.39		.50				
3038	"	.39		.51				
3043	"	.80		.96	.76			
3005	"	.60		.89				
3024	"	.39		.73	.53			
3196	"	.48		.74	.63			
5313	"	1.60		1.80				
3533	"	1.56		1.40				
3704	"	.52		.66				
4293	"	2.20		2.20				
3792	"	.48		.54	.52			
3814	"	.50		.76	.49			
3814	"	.78		1.00	.86			
3767	"	.62			.79			
3921	"	1.03		1.30	.93			
3969	"	.24		.36				
3984	"	.81		.83				
4017	"	.68		.63				
4094	"	.51		.70				
4109	"	5.21		5.00				
500		.64	.72					
659		.36	.43					
660		.29	.52					
661		.48	..58					
693		1.00	1.14					
695		.90	1.09					
696		.65	.74					
697		.82	.95					
698		.50	.62					
699		.14	.14					
701		.40	.48					
691		.44	.48					
692		.95	1.08					
693		1.00	1.11					
694		1.08	1.35					
1374		2.01	2.20					
3911	Ins.	1.24	1.57					
2645	"	.63	.85					
734	"	.84	.86					
1385		.76	.92					
3812	"	.25	.30					
3213	"	.50	.60					
3816	"	.26	.34					

Sample No.	McGill	X-Ray	USGS	Battelle	T.S.L.	Mines Branch Col.	Mines Branch X-Ray Fl.
16M	.60	.83			.62	.72	.75
2331	.72	.94			.85	.74	.80
77M	.72	.93			.88		
2344	1.43	1.86			1.60		
915		.58			.66	.62	.63
928		1.18			1.35	1.42	1.32
984		1.17			1.20	1.29	1.32
1392		2.25			2.30	2.35	2.55
1458		.67			.72	.78	.81
2567		.80			.75	.73	.73
2587		.74			.65	.70	.78
96M		.62			.55	.53	.52

McGill = McGill University X-ray laboratory.
X-Ray = X-Ray Laboratories, Ltd,, Toronto
USGS = United States Geological Survey.
Battelle = Battelle Memorial Institute, Columbus, Ohio.
T.S.L. = Technical Service Laboratories, Toronto.
Col. = Colorimetric method.
X-Ray Fl. = X-ray Fluorescence.

URANIUM ANALYSIS CHECKS

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Uranium Oxide %

Sample No.	INSP	Mines Branch, Ottawa Chem.	Calc.	Eq gamma	Eg Beta	T.S.L.	Prob. ThO_2
2969	.081	.077	.074	.076	.075	.051	
3742	.028	.023	.028	.030	.029	Tr	
3766	.069	.059	.064	.067	.066	.031	
3815	.136	.12	.12	.141	.135		
3909	.186	.18	.17	.164	.168		
4072	.10	.094	.10	.094	.097		
4163	.033	.029	.034	.029	.031		
3151	.102					.098	
3194	.08					.072	
3533	.01					nil	
3610	.005					nil	
3737	.015					Tr	
781		.044					
782		.026					
783		.062					
784		.029					
Bulk Sample		.15	.15				
53	.10		.06	.06	.06		
62	.10		.086	.090	.088		
996	.05		.060	.063	.062		
1106	nil		.032	.034	.033		
1751	.042		.037	.044	.041		
1921	.046		.050	.042	.046		
926	.062		.070	.075	.072		
2873	.138		.11	.124	.117		
2874	.049		.047	.045	.046		
2888	.08		.072	.081	.077		
2889	.136		.11	.129	.121		
1967	.08		.077	.086	.082		
2230	.16					.19	
815	.015	.012	.016	.016	.016	.019	
865	.083	.083	.083	.074	.078	.082	
882	.046	.041	.045	.045	.045	.043	
889	.065	.058	.059	.073	.067	.059	.036
915	.072	.072	.068	.079	.074	.061	.03
928	.07	.070	.073	.073	.073	.064	
984	.111	.12	.12	.12	.12	.12	
1392	.106	.11	.10	.108	.105	.080	
1458	.059	.054	.054	.063	.059	.042	
2557	.041	.035	.037	.039	.038	.043	
2587	.068	.063	.065	.067	.066	.066	
96M	.062	.055	.059	.061	.060	.065	
3163	.075	.070	.069	.074	.072	.074	
3164	.08					.085	
3165	.043	.037	.043	.045	.044	.037	
3166	.047					.052	

APPENDIX II

CALDER ISLAND

ORE INTERSECTIONS

Hole #	Angle Hole	Hole Length	from	To	Core Length	% U_3O_8	% Cb_2O_5
C-2	Vert.	203	150	160	10		.29
C-3	Vert.	405	147	157	10		.27
C-6	-30°	428	176	178.5	2.5	.07	.62
			299	304	5	.03	.31
C-7	-52°	604	175	180	5	.06	.35
C-8	-35°	643	124.5	125.8	1.3	.10	.63
C-9	-33°	457	18	23	5		.33
C-10	-35°	327	54.5	60	5.5	.03	.34
C-11	-55°	341					
C-12	-30°	359	113	118	5	.04	.26
C-13	-30°	430	116	126	10	.03	.48
C-14	-40°	294	18	26	8		.41
C-18	-34°	520.5	89	91	2	.03	.43
			126	131	5	.03	.30
			347.5	352.5	5	.03	.48
			377.5	387.5	10	.04	.40

BIG MANITOU

Hole #	Angle Hole	Hole Length	from	To	Core Length	% U_3O_8	% Cb_2O_5
M-1	-33°40'	405	98	108	10	.055	.31
			265.2	266.3	1.1	.07	.30
M-2	-55°	212	106	110	4	.05	.32
			127	132	5	.04	.36
M-4	-30°	397	85	92	7	.03	.58
			229	234	5	.05	.40
M-5	Vert.	326	64.5	84	19.5	.06	.21
M-6	-45°	256	180	185	5	.02	.56
M-7	-30°	299	99	109	10	.085	.18
M-8	-60°	459	30	45	15	.04	.37
M-9	-45°	304	255	260	5	.11	.19
M-11	-30°	441	72	80	8	.06	.69
M-12	-57°	221	148	153	5	.13	.68
			168	173	5	.14	.15
M-13	-40°	347	7	53	46	.1	.3
			246	259.5	13.5	.09	.33
M-14	-40°	368	16	31	15	.046	.35
			36	41	5	.03	.38
M-15	-30°	302	10	15	5	.02	.88
			30	35	5	.03	.37
			263	266	2.5	.09	.80
M-17	-30°	312	96	111.5	14.5	.14	.52
M-20	90°	79	4	52	48	.157	.29
M-25	90°	180	22	68	46	.087	.28
			130	140	10	.10	.22
M-26	90°	189	6	30	24	.15	.32
M-27	90°	79	8	39	31	.06	.38
M-28	90°	65	22	37	15	.03	.57
M-29	90°	154	87	105	18	.21	.48
M-36	90°	104	42	48	6	.10	.22

APPENDIX III

High Grade

	Area sq. ft.	Length ft.	Tons	$\%U_3O_8$	$\%Cb_2O_5$		
Section 5190E							
Body C	10,320	50	46,909	.015	.74	703.635	34,712.66
Section 5240E							
Body A	2,496	50	11,345	.062	.76	703.390	8,622.20
Body C	22,528	50	102,400	.025	.65	2,560.000	66,560.00
" D	2,896	50	13,163	.011	.77	144.793	10,135.51
Section 5290E							
Body A	21,120	50	96,000	.065	.69	6,240.000	66,240.00
" B	11,024	50	50,109	.060	.81	3,006.540	40,588.29
" C	2,992	50	13,600	.034	.99	462.400	13,464.00
Section 5342E							
Body A	63,984	50	290,836	.058	.68	16,868.488	197,768.48
" B	2,560	50	11,636	.071	1.19	826.150	13,846.84
" C	32,048	50	145,673	.045	.62	6,555.285	90,217.26
" L	1,680	50	7,636	.064	.63	488.704	4,810.68
Section 5390E							
Body A	32,144	50	146,109	.089	1.02	13,003.701	149,031.18
" C	2,928	50	13,309	.057	.80	758.613	10,647.20
Section 5440E							
Body A	27,776	50	126,254	.066	.60	8,332.764	75,752.40
" C	7,904	50	35,927	.045	.61	1,616.715	21,915.47
" E	688	50	3,127	.056	.63	18.762	1,970.01
" F	2,032	50	9,236	.089	.62	822.004	5,726.32
" G	7,872	50	35, 781	.064	.79	2,289.984	28,266.99
Section 5490E							
Body A	7,632	50	34,691	.100	1.03	3,469.100	35, 731.73
" C	9,184	50	41,745	.034	.73	1,419.330	30,473.85
" E	1,840	50	8,363	.071	.77	593.773	6,439.51
" H	4,016	50	18,254	.021	.82	383.334	14,968.28
" I	2,960	50	13,454	.010	.63	134.454	8,476.02

	Area sq. ft.	Length ft.	Tons	$\%U_3O_8$	$\%Cb_2O_5$		
Section 5540E							
Body A	5,552	50	25,236	.114	1.096	2,876.904	27,658.65
Section 5590E							
Body C	5,056	50	22,981	.054	.52	1,240.974	11,950.12
Section 5644E							
Body C	2,464	50	11,200	.085	.42	952.000	4,704.00
" C'	4,928	50	22,400	.053	1.25	1,187.200	28,000.00
Section 5690E							
Body C	6,608	50	30,036	.050	.50	1,501.800	15,018.00
" C'	4,112	50	18,690	.050	.60	934.500	11,214.00
Section 5739E							
Body C	9,984	75	68,072	.046	.60	3,131.312	40,843.20
" C'	21,216	75	144,654	.058	.75	8,389.932	108,490.50
" J	2,688	75	18,327	.012	1.31	219.924	24,008.37
" K	10,128	75	69,054	.014	.54	966.756	37,289.16
Section 5840E							
Body C	6,992	100	63,562	.060	1.07	3,813.720	68,011.34
Section 5940E							
Body C	3,200	150	43,636	.040	.70	1,745.440	30,545.20
" K	2,100	150	28,636	.017	.77	486.812	22,049.72
Section 6140E							
Body C	2,592	150	35,344	.018	.86	636.192	30,395.84
" K	1,168	150	15,926	.008	1.58	127.400	25,163.08
			1,893,311			99,625.785	1421,706.06
Averages				.0526%	.75%		
Raise Cb_2O_5 15% (see note re analyses, p.4)					.86%		
Cut U_3O_8 6%				.049%			

APPENDIX III

Lower Grade

	Area sq. ft.	Length ft.	Tons	$\%U_3O_8$	$\%Cb_2O_5$		
Section 5190E							
Body C	20,800	50	94,545	.015	.56	1,418.175	52,945.20
Section 5240E							
Body A	11,520	50	52,363	.042	.45	2,199.246	23,563.35
" C	59,440	50	270,181	.019	.53	5,133.439	143,195.93
" E	13,120	50	59,636	.028	.34	1,669.808	20,276.24
Section 5290E							
Body A-C	63,840	50	290,182	.049	.58	14,218.918	168,305.56
Section 5342E							
Body A&E	101,232	50	460.146	.046	.59	21,166.670	271,485.55
Section 5390E							
Body ACE	67,840	50	308,363	.069	.79	21,277.047	243,606.77
Section 5440E							
Body A-E	68,480	50	311,273	.054	.56	16,808.742	174,312.88
" C	17,200	50	78,181	.040	.49	3,127.240	38,308.69
Section 5490E							
Body A	11,520	50	52,363	.071	.81	3,717.773	42,414.03
" C	10,960	50	49,818	.031	.63	1,544.358	31,385.34
" E	2,880	50	13,090	.062	.65	811.580	8,508.50
" I-H	14,080	50	64,000	.009	.46	576.000	29,440.00
Section 5540E							
Body A	7,280	50	33,090	.087	.86	2,878.830	28,457.40
" E	4,320	50	19,636	.039	.36	765.804	7,068.96
" M	3,000	50	13,636	.031	.50	422.716	6,818.00
" L	3,000	50	13,636	.023	.31	313.628	4,227.16

	Area sq. ft.	Length ft.	Tons	$\%U_3O_8$	$\%Cb_2O_5$		
Section 5590E							
Body C	11,728	50	53,309	.041	.52	2,185.669	27,720.68
Section 5644E							
Body C	13,360	50	60,727	.045	.59	2,732.715	37,828.93
Section 5690E							
Body C	12,288	50	55,854	.041	.48	2,290.014	26,809.92
" C	4,112	50	18,691	.050	.51	934.550	9,532.41
Section 5739E							
Body C	8,320	75	56,727	.037	.55	2,098.899	31,199.85
" C'	20,400	75	139,090	.056	.64	7,789.040	89,017.60
" K	10,880	75	74,181	.015	.53	1,112.715	39,315.93
Section 5840E							
Body C	6,928	100	62,980	.060	1.07	3,778.800	67,388.60
" C'	4,768	100	43,344	.040	.55	1,733.760	23,839.20
Section 5940E							
Body C	7,552	150	102,980	.015	.73	1,544.700	75,175.40
" K	2,400	150	32,726	.032	.51	1,047.232	16,690.26
Section 6140E							
Body C	4,240	150	57,810	.014	.60	809.340	34,686.00
" K	1,440	150	19,630	.008	.97	157.040	19,041.10
			2,962,187			126,264.448	1,792,565.44
Averages				.0426%	.60%		
Raise Cb_2O_5 15% (see note re analyses, p.4)					.69%		
Cut U_3O_8 6%				.041%			

Beaucage Feb. 28, 1956

ESTIMATED OPERATING RESULTS

Up-grading by flotation, followed by chemical extraction should yield a concentrate assaying 80% Cb_2O_5 with 70 to 75% recovery.

Using ore averaging 0.049% U_3O_8 and 0.80% Cb_2O_5, with a recovery of 70%, a price of $3.00 per lb. of Cb_2O_5 in 80% concentrates and $7.25/lb. for U_3O_8, annual profits from a 500 tons per day operation should be:

From Cb_2O_5	$1,037,500
From U_3O_8	320,250
	$1,357,750

The above estimate is based on figures provided by the Battelle Memorial Institute of Columbus, Ohio.

The costs used in the above estimates may be lowered somewhat through improvements accruing from operation of the pilot plant.

An important further development considered feasible is the production of about half the columbium as metal.

About 1,200,000 tons of the high grade ore averages 0.060% U_3O_8. By using this material, profits from uranium could be increased to $500,000 per year.

CAPITAL REQUIRED

To complete pilot plant and operate to April 30th,	$495,000
Operation for 1 year	500,000
Owed to Inspiration	437,000
	$1,432,000
Design and construction of flotation and chemical plant complete	3,259,000
Mine preparation and surface plant	1,921,000
	$ 6,612,000

Appendix 2

Ore estimated by O. E. Owens as of February 7th, 1956:

Total tonnage Newman Island Zone 2,536,110 at 0.53% $U^{3}O8$
0.77% $Cb^{2}O5$

(using all sections, projecting ore 25' each side of section except for 5740E project 50')

Tonnage between 300' level and 700' level
1,824,000 tons at 0.055% $U^{3}O5$ and 0.78% $Cb^{2}O5$ or
4,570 tons per vertical foot

Note by J. E. Gill

The above estimates include ore in the 200-foot surface pillar. Adjusting the grades as explained in my report, they become :

Total tonnage Newman Island Zone

- 2,536,110 at .05% $U^{3}O8$ and .88% $Cb^{2}O5$

Tonnages between 300' and 700' level

- 1,824,000 at .051% $U^{3}O8$ and $Cb^{2}O5$

Appendix 2

Ore estimates by O. E. Owens as of February 7th, 1956:

Total Tonnage Newman Island Zone 2,536,110 at .063% U_3O_8
.77% Cb_2O_5
(using all sections, projecting ore 25' each side of section except for 5740E project 50')

Tonnage between 300' level and 700' level
1,824,000 tons at .065% U_3O_8 and .78% Cb_2O_5 or
4,570 tons per vertical foot.

Note by J. E. Gill.

The above estimates include ore in the 200-foot surface pillar. Adjusting the grades as explained in my report, they become

Total tonnage Newman Island Zone
2,536,110 at .05% U_3O_8 and .88% Cb_2O_5

Tonnage between 300' level and 700' level
1,824,000 at .051% U_3O_8 and .90% Cb_2O_5

BEAUCAGE MINES LIMITED
(No Personal Liability)

North Bay, Ontario.

February 23, 1956.

Dr. J. E. Gill,
Physical Science Centre,
Geological Department,
McGill University,
Montreal, Quebec.

Dear Sir:

As requested I am forwarding you some estimates on placing Beaucage Mines into production on a 500 ton per day basis. These estimates are in some cases only fairly accurate as time does not permit getting quotes on all types of equipment etc. however, they are based on prices of similar equipment and material.

The plan would be to start the surface plant, mill etc. construction and at the same time sink the shaft to 825' with levels at the 550 and 700' horizons with a loading pocket about the 765' elevation. The 550 and 700' levels would be developed as cut and fill stoping levels with the 550 stopes going through the 400' level.

The change over from our present temporary installation to the permanent ones could be made in a matter of a few days. I would think that in 12 months we could accomplish the necessary underground development to furnish a 500 ton mill.

Power is a major factor that would require a decision; we have had two quotes on completing a power line and necessary installation to the island. These were by (a) H.E.P. Comm'n of Ontario $ 455,000.00 (b) Canada Wire & Cable $ 325,000.00. I am showing in the mine equipment one more 825KVA diesel generator this would be sufficient to handle the mining equipment. However, the mill if ran on diesel generators would require the installation of at least two more.

The building estimates are based on preliminary layouts by Mr. E. H. Bronson and are substantial permanent buildings similar to those being erected at most of the new mining operations.

I am enclosing Owens latest ore estimates plus the muck and face sample prints and also corrected logs for Hole #53 and 53A with proper co-ordinates shown on them.

Yours very truly,

BEAUCAGE MINES LIMITED

(signed)

T. M. Kerr,
Manager.

TMK/CH

Appendix I

Installations required for mine:

(1) Buildings (permanent)

1 Steel head frame, ore bin & waste bin	106,350.
1 All Service Building, includes offices, dry. warehouse and machine shop at $1.00/cu. ft.	130,000.
1 Hoistroom and switchroom at .60/cu.ft.	88,930.
1 Compressor Room at .75/cu.ft.	17,350.
1 Generator-Boiler Room (already built)	

(2) Surface Mining Equipment

	(Cost in place)
1 Diesel Generator 825KVA	75,000.
1 2,000' Compressor	33,000.
1 5' Double drum hoist	54,000.
Electrical installation for above	15,000.
Machine Shop equipment	25,000.
1 Boiler 100H.P.	4,500.
Necessary Dry & Office Furniture	6,500.
Moving present 4' double drum hoist	5,000.
Ventilation Fan	6,000.

Underground Equipment

4 Hoisting Cables	4,500.
2 Skips 3 ton	4,500.
3 Mucking machines	16,000.
18 3 ton Cars	39,600.
2 Heavy Trolley Locomotives	32,000.
8 Stope Slushers (25H. P.)	24,000.
20 Rock Drills	16,400.
Hoses	6,000.
Pumps	11,000.
Underground electrical installations	10,000.

Underground Development

Shaft 400' at $350.00 includes electric cables	140,000.
Stations, loading pocket, spill pocket	52,500.
Sumps Electrical Stations & Changing Stations	21,000.
Loading Pocket Installations	10,000.
Drifts & Crosscuts 550' & 700' level 4,800' at $ 60.00	288,000.
Diamond Drilling on 550' & 700' level 25,000' at $ 3.00 (incl. assaying)	75,000.
Ore Pass Raises from loading pocket to 550' level 240' at $ 70.00	16,800.

Waste Pass System: 550' to surface 550' at $ 70.00			38,500.
Ventilation Raises: 400' to surface 400' at $ 70.00			28,000.
Stope Raises: fill & service assuming 4 stopes on 700' & 4 stopes on 550' 1,200' at $ 65.00			78,000.
Grizzlies & Dumping arrangements			12,000
Stope Preparation: Drift timbering and mill hole chutes only Note: Silling can be carried on when production starts			44,800.
Engineer Fees for above work, blue prints etc. $ 5,000.00 for 12 months			60,000.
Transportation of freight including water transportation			75,000.
			1,670.230
Total Mine			
Add contingency 15% for extras & smaller items			250,535.
TOTALS			1,920,765.
MILLING:			
Crushing, screening & conveying assuming mill on Newman Island	91,000.		91,000.
Flotation & Chemical Plant re: Battelle	2,886,400.	to	3,996,300.
Assaying Plant & Equipment	45,000.		45,000.
Tailings line to mainland 6" line recommended 36,000' long at $1.80/ft.	64,800.		64,800.
Tailings Pump assuming 200' head	7,000.		7,000.
Pipe Installation	15,000.		15,000.
Mill Totals	3,109,200.	to	4,219,100.
If Diesel Generators used for mill	150,000.		150,000.
	$ 3,259,200.	to	$ 4,369,100.
Total money required for production	$5,179,965.	to	$ 6,289,865.

BEAUCAGE MINES LIMITED

RESUME OF MINE DEVELOPMENT WORK

O. E. OWENS

NORTH BAY, Ontario.
December 17, 1956.

BEAUCAGE MINES LIMITED

LOCATION

The property is in Lake Nipissing 5 miles west of North Bay, Ontario. See Appendix Plate I.

PROPERTY

The property consists of 8,153.22 acres of which 328.62 acres comprise the Manitou Islands--as follows:

1. Great Manitou	203.	Acres
2. Little Manitou	69.22	Acres
3. Calder	26.5	Acres
4. Rankin	22.75	Acres
5. Newman	7.15	Acres

GEOLOGY

The rocks exposed on the islands, and observed in drill cores are mainly gneiss, crystaline limestone, various intrusives, and altered derivitaves; a complex assemblage typical of the Grenville province, but with local peculiarities, notably concentrations of sodium, phosphorous, fluorine, uranium and columbium.

These rocks are arranged in a roughly eilipitical ring about the Manitou Islands. The gneiss occurs on the outeredge of the ring and a diorite on the inner edge, while altered limestone and acid dykes and sills occur between.

East of Newman Island the limestone acidic sill group has been brecciated and partially replaced by basic material containing columbium and uranium. The zone is roughly 500 feet wide, and contains parallel lenticular masses with particularly high concentration of columbium and uranium. The general strike of this zone is east west, though with local deviations. The dip appears to vary between vertical, and 70° south.

BEAUCAGE MINES LIMITED

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BEAUCAGE MINES LIMITED

Resume of Mine Development Work:

Radioactive outcrops were discovered on Newman Island during August of 1952. Other radioactive areas were found on Calder and Big Manitou Islands during the fall of the same year.

Development rights to 7916.57 acres were acquired under Licenses of Occupation numbers 12082 and 12091, and an intensive diamond drill program was initiated, in January 1953, (in the area to the east of Newman Island). The following list outlines the surface diamond drill program carried out during 1953 (Ax core).

January - March 23, 1953	
Newman Zone (from ice)	7,510'
March - May 29, 1953	
Calder Island	6,610'
Newman Island	2,177'
May - October 31,1953	
Newman Island	3,186
Big Manitou Island	9,697'
Little Manitou Island	1,056'

After the completion of the winter drilling in the Newman zone, W.C.Martin, independent consulting geologist, estimated that the drilling indicated the presence of 4,037,685 tons of ore at a grade of .58% Cb_2O_5 and .04% U_3O_8 . In the early stages of the work Columbium analysis presented a difficult problem. Results were slow in being completed, they were costly, and in many cases later work showed them to be unreliable, so that early calculations were necessarily based on incomplete data. Also due to the limited drill season most of the holes

BEAUCAGE MINES LIMITED

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After the completion of the winter drilling in the Newman zone, W. C. Martin, independent consulting geologist, estimated that the drilling indicated the presence of 4,037,685 tons of ore at a grade of .38% Cb_2O_5 and .046% U_3O_8. In the early stages of the work Columbium analysis presented a difficult problem. Results were slow in being completed, they were costly, and in many cases later work showed them to be unreliable, so that early calculations were necessarily based on incomplete data. Also due to the limited drill season most of the holes were shallow and much of the above mentioned ore was what Martin termed "inaccessible"(above 300-foot vertical depth).

An X-Ray fluorescense method of columbium analysis was developed at McGill University during the spring of 1953. Results of this method (using an internal standard) were consisent and it was chosen as a standard for all future work up to the pilot plant stage. All analysis after May 8, 1953 were shipped to McGill for analysis and all earlier rejects of samples were re--assayed by them. All assay values on the logs and sections are McGill standard.

Diamond Drilling on Calder and Big Manitou Islands during the spring and summer of 1953 produced scattered intersections of rock containing in excess of .5% Cb_2O_5, but for the most part these do not line up and do not seem to represent part of a continous ore mass. An exception is a mass of 27,000 tons lying at the surface on Big Manitou Island which grades .38% Cb_2O_5, .10% U_3O_8 and about 10% P_2O. This zone has been opened up by a 10' long 8' deep 5' wide trench. Samples from this trench were shipped to several European and American firms, for metallurgical test work. (None was shipped to Battelle).

A magnetometer survey was completed from the ice over the Newman Zone during March 1953. The results showed weak magnetic anomalies over the ore outlined in the winter's drilling. Diamond drill core study shows a general relation of magnetite content of an area and grade, showing the value of magnetometer surveys in locating new ore areas. An airborne magnetometer survey was flown over the Manitou Island area in August 1953 and showed the presence of a large anomalous area north of Rankin Island.

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Battelle Memorial Institute, Columbus, Ohio was engaged to conduct metallurgical investigations on the Beaucage ore in the fall of 1953. Their initial work (sample A) was conducted on a channel sample 18" wide, 1' deep and 10' long, blasted from the discovery outcrop on the east shore of Newman Island.

The following list summarizes the surface diamond drilling during 1954.

January - March 19, 1954

Newman Zone (from ice)	7,069'
Big Manitou area (from ice)	1,441'

May - September, 1954

Little Manitou Island	904'
Newman Island	1,503'

The Newman Zone drilling included, one NX hole in section 5740-E to produce sufficient core for metallurgical tests at Battleel Memorial Institute, (Samples B & C).

On March 5, 1954, Mr. C.F.Cookshutt, independent consulting engineer, submitted a report estimating the presence of 5,230,785 tons of material at a grade of .52% Cb_2O_5 and .035% Cb_3O_8, in the Newman Ore Zone. These figures include a re-calculation of material lying below the 300' level after partial completion of the 1954 winter's drilling but include Martin's figures for that material above the 300' level.

After all material had been assembled, after the winter diamond drill program, Dr.J.E.Gill, consulting geologist, estimated that the diamond drilling to date indicated the presence of 5,431,000 tons of material at an average grade of .53% Cb_2O_5 and .039% U_3O_8, and

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During the winter of 1954, interesting airborne magnetometer anomalies were surveyed with a ground magnatometer from the ice. This work outlined two anomalies in the favourable Newman-Rankin area, one to the north of the west end of Rankin Island the other to the north of the east end of the island and east of the Newman Zone.

A four compartment shaft was begun on September 17, 1954, and was completed to 427' on February 1, 1955. Stations were cut on the 275' & 400' levels. At the same time construction began on temporary, bunkhouses, cookhouse, staffhouse, dry, machine shop, hoistroom and compressor building. A permanent diesel generator and boiler room was also completed and materials are on the property for a permanent compressor building. Dock facilities (10' draft vessels) on Newman Island were completed in August 1954. Machanical equipment on Newman Island includes 1200 H.P. Ruston Parman(?) diesel with a 825 KVA English Electric generator, 1000 C.F.P.M. Broom & Wade compressor, and a 52" (lagged) double frum Ingersol Rand hoist. Transportation to and from Newman Island is provided by a 40 foot steel tug supplied by Russel Hipwell Limited. The bow is fitted with a "Amsterdam Plow" bow during the ice cover months, enabling the craft to break up to 8" of ice, and keep a channel open until vehicles can pass over the ice surface.

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Underground mine development in 1955, consisted of 19' of drifting on the 275' level, 2,372' of drifting and crosscutting on the 400' level, and 11,326 tons of slope silling also on the 400' level (10387 tons are 939 tons rock). The purpose of the stope silling was to supply ore material for pilot mill operation and also to establish grade & continuity of the ore.

Underground diamond drilling during 1955, consisted of 10,608' of Ex core to cross-section the ore zone at 50' intervals with horizontal holes, and to investigate the conditions at depth.

Beginning on April 26, 1955, samples for columbium analysis were shipped to X-ray Assay Laboratories, Woodbridg-, Ontario. These results were 15% higher than the McGill Standard and were reduced by 15% for uniformity in the records.

Construction of a pilot plant rated at 50 tons per day, began in June 1955. The flotation section of this plant commenced operation on November 15, 1955, (725 tons were treated during Nov. & Dec.). There is a dock and loading ramp at the pilot plant site.

During 1955, 7,300 tons of ore was moved to the pilot mill site from Newman Island, This material averaged .60% Cb_2O_5 and .05% U_3O_8.

Two surface diamond drill holes were drilled from the ice to the North of Rankin Island during 1956. These holes, along with an metallurgical testing at Battelle. This was carried out from the ice in January, in sections 5340E & 5740E, of the Newman Zone. At the same time 52 test holes were drilled to ledge to determine ledge profile.

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Under ground diamond drilling during 1956, consisted of 2,336 ft. (?)

Underground mine development during 1956 consisted of 57' of drifting and 3584 tons of stope drilling (2929 tons ore and 655 tons rock).

Mine operation for the periods for Feb. 15 to Oct. 1, and Nov. 30 to December 31, consisted of pumping and maintenance only.

A total of 8820 tons of ore were moved to the pilot plant site during 1956 at an average grade of .045% U_3O_8 and .71% Cb_2O_5.

The flotation section of the 50 ton per day pilot plant treated 1718 tons of ore at an average grade of .74% Cb_2O_5 and .038% U_3O_8 during 1956. The product was shipped to tails as the chemical section was not in continuous operation.

On February 29, 1956 Dr. J. E. Gill, consilting geologist submitted a report in which he estimated the ore reseves in the Newman Zone, below 200 feet of rock cover as follows:-

	Tons	Tons/Vft.	%U_3O_8	%Cb_2O_5
High Grade	1,893,000	4,500	.049	.86
Lower Grade	2,962,000	7,000	.041	.69

Continued columbium analyses checks have shown that McGill columbium analyses are lower than other laboratories. In the earlier hole in this area, indicate the presence of another ore zone in this area. The length of the ore intersection and extent of the magnetometer anomalies suggest that this zone is large and probably contains substantial reserves of columbium. The ore intersected in this area to date has contained a high percentage of calcite.

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As of February 15, 1956 the author calculated the indicated ore reserves, in the Newman Zone between sections 5190E and 6240E, on the basis of surface and underground diamond drilling, as follows:

	Tons	$\%U_3O$	$\%Cb_2O$
Total Ore Newman Zone	2,536,110	.053	.77
Below 300' level	1,821,290	.055	.81
Highest grade	740,350	.071	.94

These figures are based upon areas drawn on sections at 50 foot intervals. Commonly ore limite were not projected more than 100' above or below diamond drill holes unless structure, rock type and grade in a deeper hole suggested a continuation of values between the two. Ore was projected 25' to either side of the sections. Inasmuch as many sections are not completely drilled there should be considerably more ore in this block of rock. Calculations based on alternate more completely drilled sections at 100' intervals and projecting the ore 50 feet to either side of the sections are as follows:

	Tons	$\%U_3O$	$\%Cb_2O$
Total Ore Newman Zone	3,384,740	.053	.73
Below 300' Level	2,246,240	.053	.75

These figures do not allow for dilution and are based on the McGill standard of columbium analysis (?) (?)

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These figures do not allow for dilution and are based on the McGill standard of columbium analysis [illegible] 100' [illegible] that grade of rock removed in 16 - 28% below the grade calculated on diamond drill sections. At the same time later assay work indicates that the McGill standard is low by 15% so that actually the grade mined is only about 10% below expected grade. The author attributes this figure to geometric dilution difficulties in a breccia zone due to the fact that non ore breccia blocks of wallrock tend to be left out of diamond drill grade calculations; especially in narrow sections of ore. Probably this feature would not be so great in wider sections of ore (such as those below the 400' level between section 5240 and5540E where most of the higher grade material lies). In summary it is suggested that the following figures represent the tonnages of ore outlined in some detail by closely spaced surface and underground diamond drilling, and also the grade which may be expected on the basis of work on the 400' level.

	Tons	Tons/N ft.	$\%U_3O_8$	$\%Cb_2O_5$
Below 300' level	1,821,290	4,500	.053	.69
Highest grade 300' level	740,350	1,800	.067	.81

The columbium grade figures include an addition of 15% on account of the low standard originally chosen, and a subtraction of 25% on account of geometric dilution in narrow sections of ore in a breccia zone. The uranium assay figure has been reduced by 5.3% on account of chemical check assays. These figures are probably conservative.

that grade of rock removed in 16 - 28% below the grade calculated on diamond drill sections. At the same time later assay work indicates that the McGill standard is low by 15% so that actually the grade mined is only about 10% below expected grade. The author attributes this figure to geometric dilution difficulties in a breccia zone due to the fact that non ore breccia blocks of wallrock tend to be left out of diamond drill grade calculations; especially in narrow sections of ore. Probably this feature would not be so great in wider sections of ore (such as those below the 400' level between section 5240 and 5540E where most of the higher grade material lies). In summary it is suggested that the following figures represent the tonnages of ore outlined in some detail by closely spaced surface and underground diamond drilling, and also the grade which may be expected on the basis of work on the 400' level.

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SUMMARY

DIAMOND DRILLING

Surface:

January - March 1953	
Newman Island Zone (from ice)	7,510'
April - May 1953	
Newman Island	2,177'
Calder Island	6,610'
May - November 1953	
Newman Island	3,186'
Big Manitou Island	9,697'
Little Manitou Island	1,056'
January - March 1954	
Newman Zone (from ice)	7,069'
Big Manitou Zone (from ice)	1,441'
May - September 1954	
Little Manitou Island	904'
Newman Island	1,503'
January - March 1955	
Newman Zone	3,629'
52 test holes to lodge	
TOTAL	44,782'

Jnderground:

February - Dec. 31, 1955	
Newman Zone	10,608'
February - Jan. 1956	
Newman Zone	2,336'
TOTAL	12,944'
Total Diamond Drilling	57,726'

SUMMARY

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Newman Island	1,503'
January - March 1955	
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52 test holes to ledge	
TOTAL	44,782'

Underground:

February - Dec. 31, 1955	
Newman Zone	10,608'
February - Jan. 1956	
Newman Zone	2,336
TOTAL	12,944'
Total Diamond Drilling	57,726'

SUMMARY

MINE DEVELOPMENT:

September 17, 1954 - February 1, 1955

Shaft Sinking		427'
Stations		275' level
		400' level

February 1, 1955 - December 31,1956

Drifting & Crosscutting 8x8	275' level	19'
	400' level	2,362'
Stope Silling		11,326 tons
	(10,387 tons ore 939 tons rock)	

January 1- December 31, 1956

Drifting & Crosscutting 8x8	400' level	571'
Stope Silling		3,584 tons
	(2,929 tons ore 655 tons rock)	

Total Shaft Sinking	427'
Total Drifting & Crosscutting	2,448'
Total Stope Silling	14,809 tons

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ANALYSIS

Columbium Analysis

The Beaucage Mines Limited columbium deposit was the first pyrochlore-columbium deposit to be developed in North America which meant that there was no established columbium analytical procedure to follow. In the early stages this presented a difficult problem. Columbium assaying* was costly, results were slow in coming in, and in many cases later work showed them to be unreliable.

To alleviate this problem the geology Department of McGill University developed an X-ray fluorescence method of columbium analysis, during the spring of 1953. Results of this method, which used an internal standard, were consistent and it was chosen for all future work up to the pilot plant stage. After May 8, 1953, all samples were shipped to McGill for columbium analysis, and all earlier rejects of samples were re-assayed by them. Where rejects were missing the core was quartered and assayed. The dates on which assays were performed and name of the assayer are recorded, along with other data pertaining to the sample in the Assay Record Book.

Beginning on April 26, 1955 samples for columbium analysis were shipped to X-ray Assay Laboratories, Woodbridge, Ontario. McGill at this time were doing so much commercial work that they were swamped with samples and it was taking too long to receive their results. Before using the X-ray Assay Laboratories values 19 samples were shipped to them and to McGill

* Assayers - Milton Hersey
Harry Weller
Toronto Testing Laboratories
Union Carbide
Lakefield Laboratories

for comparitive checks (see appendix) and it was found that the X-ray Assay Laboratories results were highest by an average of 17.4%. After studying the rocks involved and the specific differences in the samples it was decided to reduce the X-Ray Assay Laboratories results by 15% for uniformity in the records.

During November 1955 Beaucage Mines Limited began doing their own columbium analyses at the pilot plant site. These are performed by a thiocyanate colorimetric method. Results of this method have been used in all pilot plant records, but were not used in mining records until after March 31, 1956. Thus all values recorded on the mine diamond drill sections, diamond drill logs, and plans are of the McGill standard except a very few muck and test samples in 4-7 stope, and the eastern part of 4-8 stope. Comparitive checks between X-Ray Assay Laboratories and Beaucage Laboratories indicate that the Beaucage results are 3.2% lower (results of 85 checks spread out over the period March 1 - August 7, 1956).

After two years of checking and development of analytical techniques it has been found that the McGill results are consistently low. For instance a comparison of results of 23 samples shows that the results of chemical determinations at the United States Geological Survey average 24% higher than the McGill results; that the results of 27 of X-Ray fluorescence determination at X-Ray Assay Laboratories average 21% higher than McGill; that the results of 7 chemical determination at Battelle Memorial Institute; Columbus, Ohio, average 7% higher; that the results of 4 chemical determination at the Mines Branch, Ottawa, average 27% higher; and that assays of the same 4 samples by X-Ray fluorescence also at the Mine Branch average 28% higher. Between November 1955 and February

1956 McGill modified their procedure so that now their results (as a result of 11 check analyses) average 2% higher than X-Ray Assay Laboratories; and 5% higher than Beaucage (11 checks).

The law of average suggests that the X-Ray Assay Laboratories results give values close to the absolute Cb_2O_5 content, and that the columbium grade figures on the mine plans should be raised by 15% and that possibly the mill results are 3% low. However, it is believed that a 50 pound pulvarized thoroughly mixed standard sample should be set up and after carefully determining the grade of this sample have regularly selected rejects of past mine and mill sample related to it by re-assaying. Then using the factor so produced change all values on mine plans, sections and logs so that they are all based upon a common standard. A great deal of work has been carried out on the problem of assaying pyrochlore (columbium mineral) bearing rocks during the last few years and it appears that the standard of this work has developed to the point where Beaucage should set up a standard and relate all future and past work to this standard.

Uranium Analysis

All samples obtained by Beaucage Mines Limited up until October 6, 1956, were assayed for uranium oxide by Milton Hersey Co. Ltd., Winnipeg, Manitoba. These were performed by a radiometric method. At this time chemical analyses were unsatisfactory as laboratories had considerable difficulty getting all the uranium into solution.

After October 6, 1956 all uranium analyses were performed at Beaucage by a beta radiometric method. These results were related to standard uranium samples obtained from the Mines Branch, Ottawa. Subsequent chemical checks (see appendix) with the Mines Branch indicates that the Beaucage results are 5.3% high. No changes in any reports or on any of the plans have been made on account of this figure.

BEAUCAGE MINES LIMITED

COLUMBIUM ANALYSIS CHECKS

% Columbium

Sample No.	McGill	X-Ray	USGS	Battelle	U.C.	T.S.L.
78 Ins.	.38		.47		.68	.77
500	.64	.72				
1197		.75				
1198		.70				
561 Ins.	.15		.16		.29	.25
637	.30					
638	.31					
639	.29					
644	.37					
645	.37					
649	.50					
651	.50					
662	.26					
663	.26					
667	.34					
668	.35					
666	Tr					
602	Tr					
648	.50					
651	.50					
659	.36	.43				
660	.29	.52				
661	.48	.58				
683	.48					
684	.50					
693	1.00	1.14				
1200		1.16				
695	.90	1.09				
696	.65	.74				
697	.82	.95				
698	.50	.62				
699	.14	.14				
701	.40	.48				
691	.44	.48				
692	.95	1.08				
693	1.00	1.11				
694	1.08	1.35				
4043 Ins.	1.64					
1374	2.01	2.20				
1376		2.21				
1377		2.41				
3911 Ins.	1.24	1.57				
1379		1.47				
2645 Ins.	.63	.85				

Sample No.	McGill	X-Ray	USGS	Battelle	U.C.	T.S.L.
1381		.83				
734 Ins.	.84	.86				
1383		.93				
1385	.76	.92				
1093		.98				
1558		.83				
1094		.31				
1559		.28				
1095		1.62				
1560		1.59				
1096		.15				
1561		.14				
2373		1.72				
2385		1.74				
2386		1.63				
2375		1.01				
2387		1.08				
2388		1.03				
710 Ins.	.96		1.15			1.86
3017 Ins.	.23		.27		.59	.39
3024 Ins.	.39		.50		1.10	1.05
3038 Ins.	.39		.51		.70	.73
3043 Ins.	.80		.96	.76	.92	
2421				.92		
2422				.77		
3005 Ins.	.60		.89		.77	
3024 Ins.	.39		.73	.53	1.10	
3196 Ins.	.48		.74	.63		
2423				.67		
2424				.54		
5313 Ins.	1.60		1.80			
3533 Ins.	1.56		1.40			
3704 Ins.	.52		.66			
4293 Ins.	2.20		2.2			
3792 Ins.	.48		.54	.52		
4711 Ins.				.54		
2418			.57			
3814 Ins.	.50		.76	.49		
2419			.80			
2420			.67			
3762 Ins.	.78		1.0	.86		
2415			1.0			
3767 Ins.	.62			.79		
3921 Ins.	1.03		1.3	.93		
2416			1.4			
3969 Ins.	.24		.36			
3984 Ins.	.81		.83			
4017 Ins.	.68		.63			
4094 Ins.	.51		.70			
2417			.77			
4109 Ins.	5.21		5.0			
3812 Ins.	.25	.30				
3813 Ins.	.50	.60				
3816 Ins.	.26	.34				
3111 Ins.						.58

BEAUCAGE MINES LIMITED

URANIUM ANALYSIS CHECKS

% Uranium Oxide

Sample No.	INSP	T.T.L.	Mines Branch Chem.	Mines Branch Calc.	Eq gamma	Eq beta	T.S.L.	Prob. ThO_2
2969	.081	Tr	.077	.074	.076	.075	.051	
3742	.028		.023	.028	.030	.029	Tr	
3766	.069	Tr	.059	.064	.067	.066	.031	
3815	0.136	.02	0.12	0.12	0.141	0.135		
3909	0.186	.02	0.18	0.17	0.164	0.168		
4072	0.10	.03	0.094	0.10	0.094	0.097		
4163	0.033	Tr	0.029	0.034	0.029	0.031		
3151	.102						.098	
3194	.08						.072	
3533	.01						nil	
3610	.005						nil	
3737	.015						Tr	
781			.044					
782			.026					
783			.062					
784			.029					
Bulk Sample			.15	.15				
53	.10			.06	.06	.06		
62	.10			.086	.090	.088		
996	.05			.060	.063	.062		
1106	nil			.032	.034	.033		
1751	.042			.037	.044	.04[illegible]		
1921	.046			.050	.042	.046		
1926	.068			.070	.075	.072		
2873	.138			.11	.124	.117		
2874	.049			.047	.045	.046		
2888	.08			.072	.081	.077		
2889	.136			.11	.129	.121		
1967	.08			.077	.086	.082		
2230	.16						.19	
815	.015		.012	0.016	0.016	0.016	.019	
865	.083		.083	0.083	0.074	0.078	.082	
882	.046		.041	0.045	0.045	0.045	.043	
889	.065		.058	0.059	0.073	0.067	.059	0.036
915	.072		.072	0.068	0.079	0.074	.061	0.03
928	.07		.070	0.073	0.073	0.073	.064	
984	.111		.12	0.12	0.12	0.12	.12	
1392	.106		.11	0.10	0.108	0.105	.080	
1458	.059		.054	0.054	0.063	0.059	.042	
2567	.041		.035	0.037	0.039	0.038	.043	
2587	.068		.063	0.065	0.067	0.066	.066	
96M	.062		.055	0.059	0.061	0.060	.065	
3163	.075		.070	0.069	0.074	0.072	.074	
3164	.08						.085	
3165	.043		.037	0.043	0.045	0.044	.037	
3166	.047						.052	

Sample No.	Beaucage	McGill	X-Ray	USGS	Battelle	U.C.	T.S.L.	Mines Branch Col.	Mines Branch X-R Fl
815		.85					1.24	1.08	1.02
865		.73					.88	.72	.82
882		.58					.68	.67	.69
889		.72					.92	1.18	1.17
915			.58				.66	.62	.63
928			1.18				1.35	1.42	1.32
984			1.17				1.20	1.29	1.32
1392			2.25				2.30	2.35	2.55
1458			.67				.72	.78	.81
2567			.80				.75	.73	.73
2587			.74				.65	.70	.78
96M			.62				.55	.53	.52
16M		.60	.83				.62	.72	.75
77M		.72	.93				.88		
2331		.72	.94				.85	.74	.80
2344		1.43	1.86				1.60		
3930	.59		0.64						
321M	.58		0.58						
322M	.72		0.68						
3931	.60		0.60						
3932	.58		0.67						
3933	.59		0.64						
323M	.55		0.64						
3934	.57		0.60						
3935	.58		0.63						
324M	.73		0.79						
325M	.60		0.68						
3936	.58		0.60						
376M	.74		0.79						
3937	.58		0.63						
3938	.63		0.62						
3939	.62		0.62						
3940	.62		0.61						
377M	.87		0.83						
378M	.78		0.74						
3942	.66		0.64						
3943	.67		0.64						
380M	.60		0.68						
381M	.69		0.67						
3944	.67		0.62						
382M	.64		0.66						
383M	.71		0.66						
3945	.63		0.64						
3946	.65		0.64						
3941	.63		0.66						
3947	.59		0.63						
3948	.62		0.64						
379M	.81		0.71						
384M	.61		0.63						
385M	.65		0.62						
386M	.64		0.65						
3949	.61		0.66						
3950	.60		0.66						
387M	.65		0.64						
388M	.62		0.66						

Sample No.	Beaucage	McGill	X-Ray	UGS	Battelle	U.C.	T.S.L.	Col.	X-R F
3951	.55		0.62						
3952	.64		0.66						
3953	.63		0.65						
389M	.71		0.68						
390M	.61		0.64						
391M	.61		0.63						
392M	.64		0.65						
3954	.62		0.62						
3955	.63		0.62						
3956	.63		0.65						
393M	.62		0.64						
394M	.72		0.68						
3957	.67		0.70						
395M	.69		0.67						
396M	.62		0.63						
3958	.63		0.69						
3959	.63		0.65						
397M	.64		0.65						
3960	.61		0.61						
400M	.60		0.61						
3963	.60		0.62						
404M	.55		0.55						
3964	.58		0.60						
3965	.62		0.65						
407M	.60		0.63						
411M	.58		0.60						
3966	.60		0.61						
414M	.59		0.60						
3967	.58		0.62						
416M	.55		0.58						
3968	.57		0.59						
417M	.61		0.61						
3969	.54		0.62						
398M	.62								
3962	.61								
399M	.64								
401M	.59								
402M	.60								
403M	.55								
405M	.58								
406M	.61								
408M	.60								
3970	.52		0.52						
418M	.53		0.51						
419M	.50		0.46						
3971	.50		0.45						
3972	.47		0.45						
420M	.44		0.45						
421M	.43		0.42						
3973	.48		0.48						
3974	.48		0.027						
3975	.58		0.030						
3976	.81		0.82						
3977	.68		0.64						
3978	.89		0.92						
3979	.66		0.67						

Sample No.	Beaucage	McGill	X-Ray	USGS	Battelle	U.C.	T.S.L.	Col.	X-R Fl
3980	.69		0.64						
3981	.81		0.76						
5216			0.01						
5217	TR								
3982	.72		0.65						
3983	.85		0.82						

		New McGill		
3691	.57	.63	.60	.60
3692	.53	.57	.53	.53
3693	.56	.62	.58	.58
3694	.57	.62	.60	.64
3695	.69	.70	.69	.71
3696		.75		.71
3697		.89		.80
3698	1.03	1.10		1.06
3700	.78	.84		.84
3801	.67	.67		.72
3822	.58	.59		.66

COLUMBIUM METALLURGY

FROM THE GEOLOGICAL POINT OF VIEW

O. E. Owens

North Bay, Ontario
August 15, 1956

INTRODUCTION

The geology of pyrochlore type columbium deposits is complicated. There are numerous such deposits spread through Norway, Canada and southern Africa. All of these bear some resemblances; in fact the similarities are striking if we consider the uncommon nature of this type of rock.

The African deposits are large and apparently contain less than .5% Cb_2O_5. They are composed mainly of high calcite rocks called Carbonatites. Grade and tonnage work has consisted mainly of test pitting with some diamond drilling. Most of the properties mention hundreds of million tons grading .3% Cb_2O_5, though some mention small sections grading 1%. From the widely spaced surface trenching type of investigation it is probable that the extent of narrow high grade intersections have not been investigated.

The Sove deposit of Norway, the only pyrochlore deposit presently undergoing production is also a calcite-rich type of ore. They are reported to be shipping a 50% Cb_2O_5 concentrate.

The Canadian deposits bear many similarities to the forementioned deposits, however in the case of the Beaucage and Molybdenum Corporation of America,deposits, the areas presently undergoing investigation are considerably higher in grade, and contain more iron silicate minerals. The Multi Mineral deposit is low in grade, but most of the ore contains a high proportion of silicate minerals. A small quantity of the Multi Mineral ore is the calcite type.

LIST OF PYROCHLORE COLUMBIUM DEPOSITS

NAME	LOCALITY	TYPE OF ORE *	GRADE	TONNAGE
Beaucage	Ontario	silicate	.77% Cb_2O_5	2.5×10^6
		calcite	.30%	large
Oka	Quebec	calcite-silicate	.65	65,000/V.ft.
Multi Minerals	Ontario	silicate	.17 - .35	50 x 10
		calcite	.25 - .35	small
Dominion Gulf	Ontario		.53	limited drilling
Kola Peninsula	Russia	silicate	.18 - 1.4%	large
Sove	Norway	calcite	.30	large (4 x 10⁶)
Chilwa	S.Nyasaland	calcite	.30	large
Sukulu	Uganda	red soil	.20	200×10^6
Loolekop	E. Transvaal	calcite		
Tundulu	Nyasaland	calcite		
Panda Hill	S. Tanganyka	calcite	.30	9×10^6
		soil	.60	1.5×10^6
			1.0	some
Mrima Hill	Kenya	rare earth	.75	30×10^6
Nkumbwa	N. Rhodesia	calcite	.20	large
Facupiranga	Brazil	calcite		large
	U.S.A.			

NON PYROCHLORE TYPE

NAME	LOCALITY	TYPE OF ORE	GRADE	TONNAGE
Granites	Nigeria	granite	.26	700,000/V.ft.
		placer	? .3-.5	low
		eluvia	1-2 lb/yd.	large
Bugaboo	B.C.	placer	"payable"	large
Mountain Pass	California	rare earth		low

* Grade and Tonnage information has been kindly offered in conversation with various individuals and is not official or public information; nor can its reliability be assured. It is presented here for information purposes. Its release or quotation would be embarrassing.

.3 500,000

METALLURGY

Apparently pyrochlore is not directly concentratable * and an indirect mode of concentration is necessary to produce a saleable columbium product. To this end there are numerous lines of approach open to the metallurgist and an understanding of the variable geology of pyrochlore columbium deposits may be helpful.

There are two broad types of pyrochlore deposits, the high calcite type, and the high silicate type. Pyrochlore is associated with the apatite concentrations in a high calcite gangue at the Sove deposit, parts of the Molybdenum Corporation Oka deposit, the Multi Mineral (calcite zone), and the Beaucage-Rankin Island deposit. While at the Beaucage Newman deposit and parts of the Molybdenum Corp, Oka deposit, the pyrochlore is associated with concentrations of silicate minerals in a feldspar calcite gangue.

The Sove mining company is currently producing a pyrochlore concentrate from the high calcite type of ore by crushing and tabling their ore. An apatite-pyrochlore fraction assaying 6% Cb_2O_5 and containing 60% of the Cb_2O_5 is separated on tables. This is shipped to Norak Hydro Chemical Company for phosphate removal. The end product of this process contains in excess of 50% Cb_2O_5 and is marketable to the U. S. Government.

Samples of the Multi Mineral ore have been treated by the same process to give the same degree of extration.

The other approach to the pyrochlore metallurgical problem is that of Beaucage Mines Limited, and probably Kennecott Copper (Oka

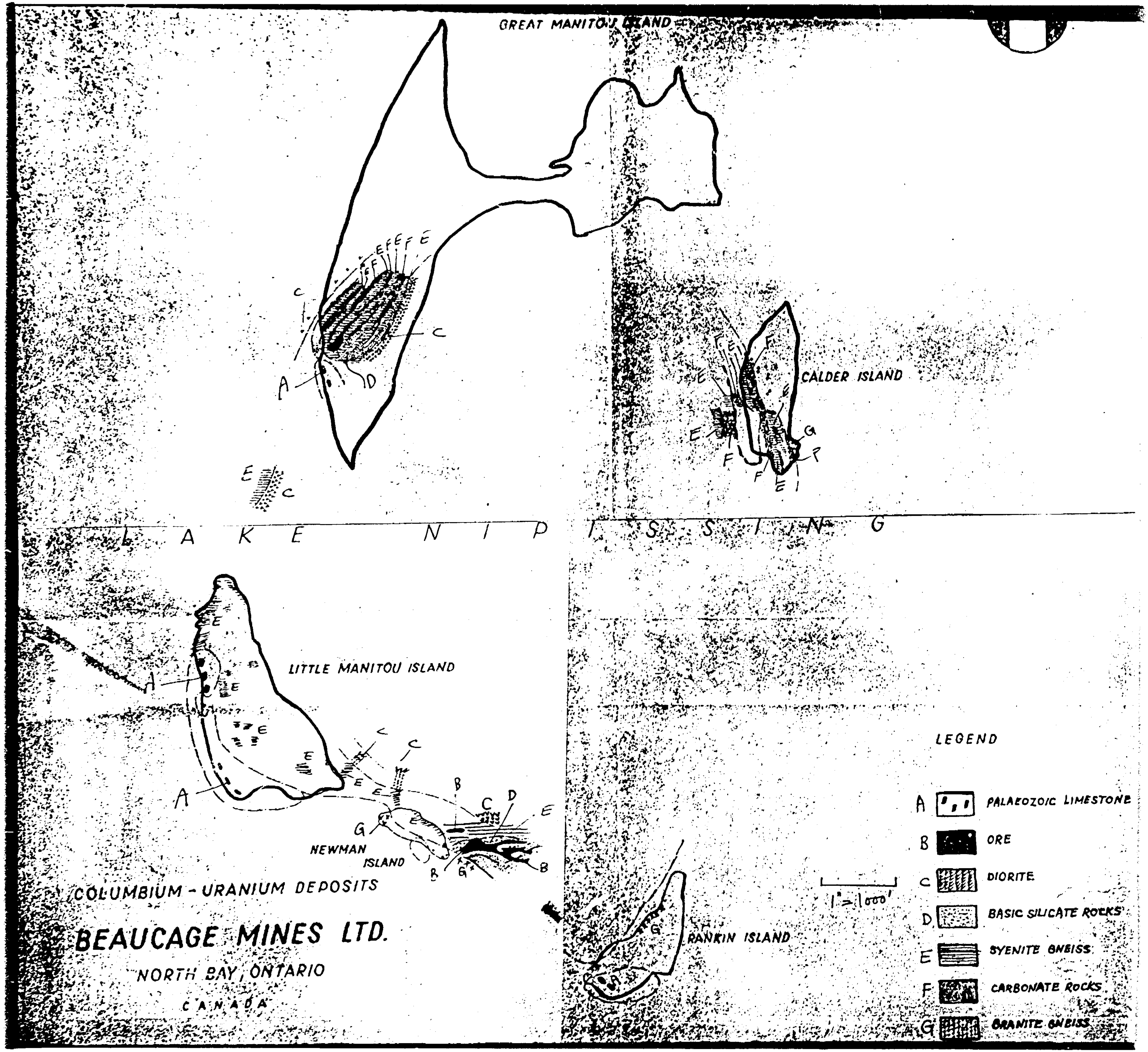
* On Account of its fine grain size and other features.

property of Molybdenum Corporation) on the high silicate type of ore. This entails and acid leach of a finely ground ore from which acid consumers have been removed by floation.

The last mentioned process removes a high percentage of the columbium, in a pure form, at a relatively high cost, while the Sove process removes 60% of the columbium as an impure concentrate at low cost. An interesting point about the Sove process is that their pre-concentrate assays 6% Cb_2O_5 while the Beaucage floation purified product runs about 1% Cb_2O_5.

These two extreme cases are mentioned to show the scope of approach available to the metallurgist because of the variable character of the different deposits and also the variable composition of ore from different places in a given deposit. In one case a small fraction of the rock (with only 60% of the Cb_2O_5) is removed for concentration; while in the other process a large fraction containing about 80% of the Cb_2O_5 is treated to produce a high purity product.

Since Beaucage Mines Limited possess the two types of pyrochlore ore, it is suggested that both types should be investigated seperately, and from different points of view. To this end, the Mines Branch, Ottawa are presently testing our high silicate type of ore, and also the high calcite type of ore from the Multi Mineral property. It would be advantageous to obtain a NX core, bulk sample, of the Rankin Island carbonate type of ore, and have the Mines Branch test it by the Sove method.


GREAT MANITOU ISLAND
CALDER ISLAND
LAKE NIPISSING
LITTLE MANITOU ISLAND
NEWMAN ISLAND
RANKIN ISLAND
1" = 1000'
LEGEND
A PALAEOZOIC LIMESTONE
B ORE
C DIORITE
D BASIC SILICATE ROCKS
E SYENITE GNEISS
F CARBONATE ROCKS
G GRANITE GNEISS
COLUMBIUM - URANIUM DEPOSITS
BEAUCAGE MINES LTD.
NORTH BAY, ONTARIO
CANADA

BEAUCAGE MINES LIMITED

170 Regina St.
North Bay, Ontario.

355 St. James Street West,
Montreal, Quebec,
22nd February, 1956.

Dr. J. E. Gill,
McGill University,
Sherbrooke St. West,
Montreal, Quebec.

Dear Jim:

The following details with respect to the Beaucage capital set-up should be sufficient for your needs, but if not, please don't hesitate to ask for further details:

Authorized Capitalization	3,000,000
Issued & Outstanding	2,560,005
Remaining in Treasury	439,995
Shares owned by Inspiration (escrow)	318,910
" " " " (free)	1,179,840
Total " "	1,498,750

Inspiration now owns 58.5% of the present outstanding stock of Beaucage.

The enclosed prospectus may help you further if any additional information is required.

Yours Sincerely,

(signed) (D.D. Thomson)
President.