The following report briefly covers the following aspects of the property known as Beaucage Mines Limited:

1. Location and Area
2. History
3. Geology
4. Diamond Drilling
5. Estimate of Ore Tonnage and Grade
6. Conclusion and tentative Drilling Program

1. Location

The property of Beaucage Mines Limited held under License of Occupation No. 12082 originally consisted of 4,320 acres in a rectangular block 3 miles (N-S) by 2 1/4 miles (E-W) which enclosed all of the five islands of the group known as the Manitou Islands in Lake Nipissing. The centre of this rectangle is located at Latitude 46°-16′-12″; Longitude 79°-34′-46″. Subsequently with the purchase of an additional Concession the Greater Manitou Island and 6 square miles of water area was added on the North and West boundaries of the original concession bringing the total area to 8,000 acres of which 328.6 acres is occupied by islands.

2. History

Radio activity was first discovered on the Islands by a Mr. Strohl of Pennsylvania who has spent his holidays in the North Bay area for the past 15 years. Being acquainted with Martin Van Cleasaf, prospector, he persuaded the latter to examine the ground in August, 1952.

The various phases of transfer of interests in the property will not be dealt with here, but it was on one of the first trips to the islands that Van Cleasaf selected a grab sample from Newman Island which returned a value of 0.10% U3O8.

Dr. Thompson of the Ontario Department of Mines later visited the property and took a chip sample over a 40 foot width on this same location. This sample gave 0.12% U3O8 equivalent and 0.11% U3O8 by chemical analysis. Another sample (grab) taken by Dr. Thompson from the south end (carbonate zone) of Calder Island returned 0.11% U3O8.

These two samples were later combined by request of Mr. Kenney and assayed for tantalum, columbium and phosphorus. The results of this test showed 0.54% Cb (columbium oxide), less than 0.1% Ta (Tantalum oxide), and 4.46% P2O5 (phosphorus pentoxide).
The significance of the discovery was by now apparent, but these assays were not confirmed until February 3, 1953, when drilling had already gotten underway. The importance of the uranium soon became secondary and holes already sampled were gone over, and sections previously thought to be of too low a grade in \( \text{U}_3\text{O}_8 \) were split and assayed for columbium and tantalum. From these and subsequent core samples, it was found that a ratio of from 8 to 1 to as high as 20 to 1 existed between the columbium oxide value and that of the \( \text{U}_3\text{O}_8 \). With \( \text{CB}_2\text{O}_5 \) selling at $1.70 per lb. (base price) plus $1.70 bonus, widths of intersections were enlarged from 15 feet to twice or three times what was first thought to be commercial.

3. Geology

From what little is known of the geology to-date the following observations are presented:

The islands, which form a rough ellipse measuring about 2\( \frac{1}{2} \) miles on the longer, N-S, axis by 1\( \frac{1}{2} \) miles across, are more or less capped by flat-lying paleozoic limestones. Where this layer is lacking, probably removed by glaciation, there is exposed a steeply dipping, highly carbonated, and slightly laminated rock resembling a syenite. These laminations indicate an east-west strike in the vicinity of Newman Island, which occupies a position on the south to south-west rim of the ellipse, while on Great Manitou a mile to the north across the west quarter of the ellipse the formation strikes slightly east of north. One mile to the east, on Calder Island, the north south attitude is again apparent.

On the south end of Calder Island is exposed a band of carbonates, recrystallized limestones, 150 to 200 feet wide standing on edge and bounded both to the east and west by syenite. This material is slightly radioactive throughout and contains erratic higher grade material. This zone disappears beneath overburden to the north so that its extent is not known. About 800 feet to the north, and 300 westerly across the structure is to be seen a highly radio active pinkish syenite containing dark ferro-magnesium minerals and calcite crystals.

In the Newman Zone, on and extending eastward from the shore of Newman Island, diamond drilling has indicated similar rocks to those described on Calder Island. Here, however, considerable quantities of magnetite in grain form and in massive 8 inch sections were found. Where the greatest radio activity was noted there is present fine disseminated pyrite with pink to reddish felspars contained in a dark green basic phase of the syenite.

A magnetometer survey carried out over this area confirmed the east-west structure indicated by diamond drilling and further showed the formation to be curving northward at both ends of the zone.
On the west and beyond the limits explored by drilling the magnetometer survey indicates an offset, probably due to faulting, which has displaced the extension of the zone west of No. 1 hole to the north a distance of about 800 feet.

In addition to the radio activity on Calder and Newman Islands there are areas of slight activity on Rankin Island on the extreme south-east of the ellipse; on Little Manitou Island north-west of Newman Island, and on the most easterly tip of Great Manitou, north of Calder Island. Of prime interest and one which demands immediate examination, however, is a zone or anomaly which was picked up by an aerial scintillometer reconnaissance flight over the main arm of Great Manitou. This band has been described to the writer as being twelve to fifteen hundred feet long showing on the ground as two converging drawe. At the intersection of the latter the scintillometer is said to have given the greatest reading obtained anywhere over the concession.

In interpreting such readings it must be born in mind that heavy overburden and water will mask a deposit, while a deposit of well exposed low grade material will give high readings.

4. Diamond Drilling

Drilling was commenced on Newman Island January 16th, with a vertical hole set-up over the active outcrop sampled by Dr. Thompson. Since the ground was covered by ice and snow, and since no previous diagnosis had been made as to the attitude of the ore, this was considered to be the approach thought most likely to produce information. This hole, which was stopped at a depth of 178 feet gave continuous values down to 147 feet.

Hole 2 drilled south at 45° from the same set-up showed only a short 6 foot section of active material, and it was then assumed that the zone was dipping flatly north. To test this hypothesis Hole 3 was spotted 90 feet north and 90 feet east of Hole 1. This was unsuccessful proving that if there was a dip to the north it must be very steep.

An inclined hole, No. 4, was drilled from the location of Hole 3 and showed a broader mineralized zone than expected starting at 29 feet where it entered bedrock and continuing to a depth of 173 ft.

When Hole 5 was completed, drilled north from a point 200 feet south of Hole 4, it was immediately evident that the zone dipped south at about 60° and was striking slightly south of east.

From here on drilling was carried eastward initially at 100 foot intervals and then at 200 foot intervals until soft ice made it necessary to discontinue drilling.
These holes are numbered from 1-11 inclusive, and from 13 to 20 inclusive and represent a total footage drilled of 7,492 covering a strike length of 1,153 feet. Since Hole 19 on the extreme east end failed to show values, and no time remained to further explore the zone, it must be concluded for the present that the zone pinches out just beyond Hole 17 which is located 935 feet east of Hole 1. However, the magnetometer survey previously referred to in this report shows a second lens overlapping the main lens to the north which, though picked up in Holes 15, 18 and 20; and partially in Hole 17, was too far south to have been cut by Hole 19.

5. Estimate of Grade and Tonnage

As many assays are as yet incomplete the best that can be done is to make a rough estimate leaving some allowances for possible high assays, and where only one of the two values have been determined to assume the other on the basis of usual ratio.

In general the method of calculating tonnages has been based on the cross-sectional area on each section and multiplying this area by half the distance to each adjoining section; a tonnage factor of 10 cu. ft. has been used in these calculations. Depth used in determining cross-sectional area has in no case exceeded the maximum depth at which ore was cut in the lowest hole in that section, and was usually taken at about 60% of this maximum figure.

Tonnage on this basis has been computed to be 2,848,000 tons grading 0.77% (CuTa)₂O₅ and 0.053% U₃O₈. This represents a gross value of $60.05 per ton at current prices, which we feel, from our studies of supply, demand, and market conditions, is a sound basis of evaluation.

6. Conclusions

From the foregoing estimates it should be evident that sufficient tonnage has been indicated in the Newman zone to warrant underground development providing a satisfactory metallurgical process for concentration and recovery has been worked out. However during the period that the metallurgical tests are being carried out, the other zones should be examined and diamond drilled. The results of this work may provide areas where it would be preferable to start underground operations both from a cost and speed standpoint. The present and proposed drill programs are designed with this thought in mind.

Signed: T. M. Kerr, B. Sc.
Signed: H. D. Devlin, M. E.
BEAUCAGE MINES LIMITED

RECOMMENDATIONS FOR YEAR'S WORK 1954 - 1955
BEAUCAGE MINES LIMITED

RECOMMENDATIONS FOR YEAR'S WORK 1954 - 1955

(1) Metallurgical work should be pursued as speedily and efficiently as possible with work at Battelle Memorial Institute, Mines Branch, and other test laboratories being co-ordinated by one man.

(2) Clear and prepare Newman Island for a mining plant.

(3) Build suitable docking facilities on Newman and Little Manitou Islands.

(4) Build semi-permanent camps to accommodate 50 men on Little Manitou Island.

(5) Purchase and set up a Diesel Generator set and compressor of sufficient size that it will be of future value to the company.

(6) Contract
   (a) The sinking of a shaft preferably of a size to handle production up to 2,500 tons; on Newman Island to a depth of 1,000'. This would provide for layout of stopes down to the 850' level (See Sketch). Vertical diamond drill holes should be drilled and grouted at shaft site.
   (b) The driving of two exploration levels on the 400' and 700' Horizons.
   (c) The drilling of horizontal holes from the exploration levels to delineate the ore and provide information for stope layouts.
ESTIMATES ON COSTS OF YEAR'S WORK

1. Beaucage Staff
   (Engineer, Geologist, Assayer and Core Grabber) 20,000.00
2. Clearing and Levelling Newman Island 5,500.00
3. Clearing Little Manitou Island 2,500.00
4. Preparing Docks and unloading facilities 5,000.00
5. Building camps and cookery 35,000.00
6. Purchase and installation of Diesel Generator Unit and 1750 C.F.M. Compressor 105,000.00
7. Columbium Assaying 10,500.00 $183,500.00
8. Contract
   (a) Diamond Drilling and Grouting Shaft Site 8,000.00
   (b) Head frame and Bin 10,000.00
   (c) Shaft Collar 12,000.00
   (d) Shaft 1,000' @ $250.00 per ft. 250,000.00
   (e) Stations and Loading pocket 47,000 cu. ft. @ $1.00 per cu. ft. 47,000.00
   (f) Drifting 8' x 8' 2,000' @ $52.00 per ft. 104,000.00
   (g) Underground diamond drilling 15,000' @ $1.40 per ft. 21,000.00 $452,000.00

Total of above work $635,500.00

Metallurgical test work costs being practically impossible to estimate are not included in the above total.

- 150. balls complete
Proposed Development

BEAUCAGE MINES LTD.

1954

400' & 700' Levels To Be Driven First
Location:

The Beaucage Mine property is situated about the Manitou Islands five miles west of the city of North Bay.

Property:

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

- Great Manitou Island: 203 acres
- Little Manitou Island: 69.22 acres
- Calder Island: 26.5 acres
- Rankin Island: 22.75 acres
- Newman Island: 7.15 acres

General Geology:

The rocks exposed on the islands, observed in drill cores, and encountered in underground workings are mainly gneisses, crystalline limestone, various intrusives, and altered derivates; a complex assemblage typical of the Grenville province, but with an unusually high concentration of sodium, phosphorus, fluorine, iron, uranium and columbium.

Mineralogy:

The following minerals are present in columbium-bearing rocks: acmite, potash feldspar, apatite, calcite, biotite, magnetite, pyrite, hematite, pyrochlore, fluorite, monasite. They are listed in average decreasing order of abundance; however, there is local variation in proportion in different ore masses.

Pyrochlore is the only columbium-bearing mineral in the ore, and it also contains the majority if not all the uranium. The ratio of uranium to columbium is variable. It is about 1:30 in the southern section of the Newman zone, 1:15 in the central section; 1:10 along the northern part; and 1:4 on Big Manitou Island. The pyrochlore is tantalum free.

Diamond drilling:

Between January 1953 and December, 1955, 44,782' of surface diamond drilling, and 23,552' of underground diamond drilling has been completed.

Mine development:

Between September 17, 1954 and December 31, 1955, the following underground has been completed:
Shaft sinking: 427'
Station: 275' level, 400' level
Drifting & Crosscutting: 8 x 8
Stope silling: 11,326 Tons

Ore Reserves:
Important concentrations of columbium-uranium bearing rock have been found on Newman, Big Manitou and Calder Islands.
The Newman Zone contains the major portion of the ore outlined to date.

Newman Zone:
The area north of Rankin Island and east of Newman Island contains large, irregularly shaped masses of rock containing significant amounts of columbium and uranium. Surface diamond drilling and underground development has been restricted to the western section of this zone and has uncovered numerous large lenses of rock containing more than one half of one percent columbium. These lie within a zone about 500' wide and 1200' long striking east-west and dipping steeply to the south. This is referred to as the Newman Island.

The ore occurs in basic silicate rocks and is of two types: (a) that consisting of acmite, calcite, and apatite, (b) that made up predominately of acmite, and red feldspar. The uranium proportion is higher in the latter variety which occurs along the northern side of the zone. Within the zone, definable units have been outlined at a grade of .053% U'08 and .78% Cb'05 aggregating 4,570 tons per vertical foot.

Ore beneficitation and Metallurgy:
Battelle Memorial Institute have informed us that they have reached a feasible process for the reduction of the ore and obtaining a high grade Cb'05 concentrate.
This process as detailed is briefly: a leaching process, with a flotation step to remove calcite, apatite, and pyrite which are reagent consumers. The flotation underflow is reached by carbon tetrachloride producing a volatile columbium chloride which forms columbium pentoxide by hydrolysis.
Battelle designed a 40 ton pilot mill for us to perfect their laboratory procedures and by the end of the year the flotation section of this plant was built and in operation. The chemical section is being prepared and will be assembled by Catalytis Construction of Canada Ltd. This section should be in operation by May, 1956.
Battelle have informed us that we have expect upto 80% recovery of the Cb'05.

General Survey:
Sufficient underground work has been accomplished to substantiate the continuity and tonnages of ore obtained from surface drilling and plants to substantiate and improve the metallurgical processes are underway.

Sd/ - T. M. Kerr, General Manager
Sd/ - O. E. Owens, Geologist.
Beaucage Mines Limited
(No Personal Liability)
North Bay, Ontario

Engineering - Geological report

December 1955

Location:
The Beaucage Mine property is situated about the Manitou Islands, five miles west of the city of North Bay.

Property:
The property consists of 8,153.22 acres of which 326.62 acres comprise the Manitou Islands:
- Great Manitou Island: 203 acres
- Little Manitou Island: 69.22 acres
- Calder Island: 26.5 acres
- Hankin Island: 22.73 acres
- Newman Island: 7.13 acres

General Geology:
The rocks exposed on the islands, observed in drill cores, and encountered in underground workings are mainly gneisses, crystalline limestone, various intrusives, and altered derivatives; a complex assemblage typical of the Grenville province, but with an unusually high concentration of sodium, phosphorus, fluorine, iron, uranium, and columbium.

Mineralogy:
The following minerals are present in the columbium-bearing rocks: saclite, potash feldspar, apatite, calcite, biotite, magnetite, pyrite, hematite, pyrochlore, fluorite, monazite. They are listed in average decreasing order of abundance, however there is local variation in proportion in different ore masses.

Pyrochlore is the only columbium-bearing mineral in the ore, and it also contains the majority if not all the uranium. The ratio of uranium to columbium is variable. It is about 1:30 in the southern section of the Newman Zone, 1:15 in the central section, 1:10 along the northern part, and 1:4 on Big Manitou Island. The pyrochlore is tantalum free.
Diamond Drilling:
Between January 1953 and December 1955, 44,783' of surface diamond drilling, and 23,552' of underground diamond drilling has been completed.

Mine Development:
Between September 17, 1954 and December 31, 1955 the following underground work has been completed:

<table>
<thead>
<tr>
<th>Activity</th>
<th>Depth (in feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shaft Sinking</td>
<td>427'</td>
</tr>
<tr>
<td>Stations</td>
<td>275' level</td>
</tr>
<tr>
<td>Drifting &amp; Crosscutting 8 x 8</td>
<td>275' level 19'</td>
</tr>
<tr>
<td></td>
<td>400' level 237'</td>
</tr>
<tr>
<td>Stoping Silling</td>
<td>11,526 Tons</td>
</tr>
</tbody>
</table>

Ore Reserves:
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The ore occurs in basic silicate rocks and is of two types: (a) that consisting of acmite, calcite, and apatite, (b) that made up predominately of acmite, and red feldspar. The uranium proportion is higher in the latter variety which occurs along the northern side of the zone. Within the zone, definable units have been outlined at a grade of .653% U_3O_8 and .78% Cb_2O_5 aggregating 6,570 tons per vertical foot.
The beneficiation and Metallurgy

Battelle Memorial Institute have informed us that they have reached a feasible process for the reduction of the ore and obtaining a high grade \(\text{C}_2\text{O}_5\) concentrate.

This process as detailed is briefly: a leach-y process, with a flotation step to remove calcite, apatite, and pyrite which are reagent consumers. The flotation underflow is leached by carbon tetrachloride producing a volatile columbium chloride which forms columbium pentoxide by hydrolysis.

Battelle designed a 40 ton pilot mill for us to perfect their laboratory procedures and by the end of the year the flotation section of this plant was built and in operation. The chemical section is being prepared and will be assembled by Catalytic Construction of Canada Ltd. This section should be in operation by May 1956.

Battelle have informed us that we can expect up to 80% recovery of the \(\text{C}_2\text{O}_5\).

General Summary

Sufficient underground work has been accomplished to substantiate the continuity and tonnages of ore obtained from surface drilling and plants to substantiate and improve the metallurgical processes are underway.

Signed: T. K. Levy,
Mine Manager.

Signed: O. K. Owen,
Geologist.
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The Beaucage Mine property is situated about the Manitou Islands, five miles west of the city of North Bay, Ontario.

Property:
The property consists of 8,153.22 acres of which 328.62 comprise the Manitou Islands.

General Geology:
The rock exposed on the islands, observed in drill cores, and encountered in underground workings are gneisses, crystalline limestone, various intrusives, and altered derivatives. They are rocks typical of the Grenville province, but with an unusually high, acmite apatite, and pyrochlore content.

The mineral pyrochlore contains all the columbium and uranium present in the rocks. It is tantalum free.

The ore occurs in Basic Silicate Rock. This may be subdivided into two types:
(a) that consisting predominantly of acmite, calcite, and apatite;
(b) that consisting predominantly of acmite and red feldspar.

The first mentioned variety constitutes the major part of the indicated ore reserves; however the latter variety contains a higher proportion of uranium.

Ore Reserves:
Diamond drill exploration in the vicinity of the Manitou Islands has indicated a very large potential tonnage of columbium-uranium bearing rock.

Closely spaced surface diamond drilling, and underground development has been concentrated in the zone to the east of Newman Island.

Revised tonnage and grade estimates based on underground development within this zone are given below. Three estimates are obtained by placing the boundaries at different cut offs. Nothing has been included above the 300 ft level. It should be noted that the grade of these estimates is substantially higher than those calculated earlier from surface work.
<table>
<thead>
<tr>
<th>Tons</th>
<th>Tons / v. ft.</th>
<th>% U₃O₈</th>
<th>% C₆₂O₅</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,695,500</td>
<td>6,990</td>
<td>.64</td>
<td>.69</td>
</tr>
<tr>
<td>1,924,000</td>
<td>4,560</td>
<td>.65</td>
<td>.88</td>
</tr>
<tr>
<td>617,000</td>
<td>1,540</td>
<td>.975</td>
<td>1.06</td>
</tr>
</tbody>
</table>

It is probable that the ore continues to greater depth than those investigated to date; also it is reasonable to expect that substantial additional tonnages exist to the east of area included in the above figures, as the area is underlain by anomalies, and widely spaced diamond drill holes have indicated the presence of columbium and uranium.

O.E. Owens
Geologist.