Uranium Resource Evaluation Section

Report on Uranium Discovery of

CAMRAY PROSPECTING SYNDICATE

District of Algoma, Ontario

by A. H. Lang

CANADA
DEPARTMENT
OF
MINES AND RESOURCES
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GEOLOGICAL SURVEY OF CANADA

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Summary and Conclusions

The recent uranium discovery at Theano Point, 70 miles north of Sault Ste. Marie, is probably a rediscovery of the first reported uranium occurrence in Canada. A description of material from the original locality was published in 1847 by J. L. LeConte, who classed it as a new mineral closely related to pitchblende, which he called "coracite". This record was quoted in several later publications, and considerable interest has been taken in attempts to relocate the deposit, because all subsequent uranium discoveries in Ontario consisted of uraninite and complex uranium minerals in pegmatite bodies, and an occurrence of uranium-bearing anthraxolite near Port Arthur (9). However, such attempts have in the past been unsuccessful, because of the vagueness of the original description of the locality.

The discovery made by Robert Campbell in September 1948 agrees so closely with the original description that it is considered to be the same occurrence or one very close to it. The Camray discovery, as it is called, is in the Precambrian Shield, at the contact of a diabase dyke that cuts pink granite of probable Algoman age. The granite immediately adjacent to the dyke contains stringers of a black mineral which preliminary tests indicate to be pitchblende, accompanied by quartz, carbonate, mica, and disintegration products of pitchblende.

The stringers are from 1/8 inch to 2 inches wide and most of them are exposed for lengths of 2 to 4 feet. At one place a lens containing pitchblende and other minerals has a maximum width of 6 inches. Most of the stringers are concentrated in two zones along the south side of the dyke, one 275 feet long and the other 100 feet, separated by an apparently barren zone 200 feet long.

As no work has been done to expose the showings, the distance that the stringers extend into granite away from the cliff faces cannot now be determined, nor is the deposit ready for systematic sampling. High G-M counter anomalies and laboratory tests on character samples show that the stringers have a high uranium content, but much barren granite would have to be mined with them. It seems hopeful, however, that, if the two zones mentioned are found to extend in depth, the whole zones or parts of them may prove to be mineable orebodies from which the stringer material can be sorted.

The amount of pitchblende in sight at the property is small compared with that developed at the Eldorado mine and at the Eldorado and Nicholson properties at Lake Athabaska, but it compares favourably with all other Canadian discoveries, especially since it is still in the earliest stage of development. Much work will be required to prove the merits of the property, but the discovery is of great importance because it corroborates the occurrence of pitchblende in the eastern part of the Precambrian Shield, at a time when the report of the "coracite" discovery had become almost legendary; because the deposit is structurally

favourable for further development; and because analogous geological conditions occur over a large part of the district, hence other and perhaps more important discoveries may be made.

The claims are favourably situated with respect to transportation, power, timber, camp-sites, water-supply, and settlements, but the actual discovery is, in a minor way, inaccessible for development. Because of the scattered occurrence of the stringers, diamond drilling would not be very suitable for preliminary development; instead, it might be better to slash out the walls of the canyon at the stringer zones, or to explore underground by prospect adits or shafts. This would provide bulk samples.

For prospecting the rest of the holdings, closely-gridded G-M counter surveys should be made, paying greatest attention to the vicinities of dykes, shear zones, or other favourable structures. Magnetometer surveys might be useful for tracing dykes where overburden is too deep for effective use of a G-M counter.

Location

The Camray discovery is at the shore of Theano Point of Lake Superior, about 70 miles north of Sault Ste. Marie (See Figures 1, 2, 3). It is in Township 29, Range XIV, District of Algoma. The showing is near Highway No. 17, and is reached by a rough trail about 2 miles long that leaves the highway at mileage 72,9 from Sault Ste. Marie. There are no towns of any size nearer than Sault Ste Marie.

Holdings

The property consists of a block of 30 claims, which extends 1¾ miles eastward from the discovery and is about 1 mile wide (See Figure 2). The block includes all of Theano Point and extends to the highway (See Figure 2). The claims were staked by Robert Campbell for the Camray Prospecting Syndicate, 184 Bay Street, Toronto. The claims are in what is called a "restricted area", where a bona fide discovery must be made in order to retain title. The syndicate understands that it will be permitted to stake water claims adjoining the discovery.

Topography

The region is typical of the rugged north shore of Lake Superior. Theano Point consists of steep rock cliffs indented by steep-walled, narrow canyons formed by wave and ice erosion. At least some of these gorges have been formed at the sites of dykes that were eroded more easily than the granitic wall-rock. Between the shore and the highway hills rise to heights up to about 600 feet above lake-level. Rock is very well exposed along the shore, and outcrops are fairly numerous elsewhere. The claims are well wooded with deciduous and evergreen trees.

Accessibility

The highway from Sault Ste. Marie is partly hard-surfaced but is chiefly a gravelled road in fair condition. Study of air photographs shows that a trail could be located from the highway to the discovery that would be somewhat shorter and less hilly than the present preliminary one. The shortest straight-line distance from the highway to the discovery is about 1½ miles. A road could be built easily from the highway to the vicinity of the showings, but a steep grade would be required to extend such a road into the canyon where the showing is actually situated.

The discovery can easily be reached on calm days by small boats from Alona Bay, but on many days large breakers not only prevent landing but also prevent examination of the shoreward part of the discovery. When I visited it, the extreme shoreward end could not be reached, and that part of Figure 4 is from information supplied by Mr. Campbell.

The nearest point on the Algoma Central Railway is 15 miles northeast of the property.

Power

A hydro-electric plant near the mouth of Montreal River, about 4 miles from the discovery, is one of four privately-owned plants serving the Sault Ste. Marie district.

History

The first recorded Canadian uranium discovery was the subject of an article published in 1847 by J. L. LeConte, a distinguished American geologist. LeConte states (1, p.173)[x]:

> "This mineral forms part of a collection made by Mr. B. A. Stanard on the north shore of Lake Superior.... This mineral as I am informed

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[x]Numbers such as these refer to the list of references at the end of this report.

> by Mr. Stanard, occurs on the north shore of Lake Superior, about 70 miles from the Sault St. Marie, at the junction of trap and sienite; the vein in which it is found is about two inches in width; but on account of its position, (on the face of an almost perpendicular cliff,) only a few specimens were obtained, and those with great difficulty."

The Mr. Stanard referred to was probably Benjamin Stanard, who was captain of a schooner operated on Lake Superior at that time by the American Fur Company (4, p.120).

LeConte considered that the mineral was closely related to pitchblende, but because of slight physical and chemical differences between it and the typical pitchblende of Joachimsthal in Bohemia, he classed it as a new mineral which he called "coracite". He probably derived that name from the Greek word for "raven", in allusion to the black colour of the mineral (6, p.65).

J. D. Whitney published a note on the mineral in 1849 (2, p.434). He believed that it contained uranium of a different valence from that of typical pitchblende, and that it was more readily soluble in acids than typical pitchblende.

In 1857 F. A. Genth published the following description of the Stanard specimen (3, p.421):

> "Dr. John L. LeConte kindly presented me with a specimen of the mineral from about 90 miles above Sault Ste. Marie on the north shore of Lake Superior, which he had described as coracite. Its great resemblance to pitchblende favoured the opinion that it was really nothing else ----- though it is interesting that it is so readily soluble in chlorhydric acid, this fact alone is not sufficient to separate it from pitchblende."

The first geological studies of the region were made by the Geological Survey and described by W. E. Logan in "The Geology of Canada", published by the

Geological Survey in 1863 (4). Under the heading "Uranium", the report states "An ore of this rare metal is said to occur at Maimanse", then continues with a condensation of the data published by LeConte and Whitney.

E. S. Moore made a geological map and report of the region in 1926 for the Ontario Department of Mines (7, 12). He did not mention the uranium discovery in his report.

The occurrence was summarized in later reports of the Geological Survey by Johnston (5) and Ellsworth (8). Officers of the Geological Survey made inquiries at various times in efforts to relocate the discovery, and answered numerous requests from prospectors for information on the occurrence. All efforts were unsuccessful, however, because of the conflicting locations given in the different reports. It now seems likely that LeConte's estimate of 70 miles from Sault Ste. Marie was nearly correct and that Genth's mention of 90 miles was unfortunate. It also appears likely that the use of the name Mamainse in "The Geology of Canada" followed an old custom of referring to the entire region as Mamainse, whereas more recent investigators have assumed that it referred to Mamainse Point which is considerably south of the Camray discovery.

Robert Campbell, discoverer of the Camray deposit, told me that during the winter of 1947-48 he studied in Toronto libraries all the references to the old coracite occurrence. He formed the Camray[x] Prospecting Syndicate with a capital of $4,000

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[x] The name was coined from parts of the words "Campbell" and "gamma ray".

subscribed by Toronto backers and spent the season of 1948 prospecting by boat and on foot along the shore of Lake Superior in the general region of the old discovery. During the earlier part of the season he had two assistants, but when they left he continued his search alone. He was equipped with a Geiger-Mueller counter. On September 8 he obtained a strong reaction on his counter, near the south wall of a gorge on Theano Point, close to the water's edge, and on close inspection he found that the reaction came from a stringer of black mineral. Other stringers, some of which contained uranium stain, were then found at intervals along the wall, over a total distance of about 600 feet. He staked 30 claims and recorded them on October 16. After publication of news of the discovery early in November a staking rush developed and several hundred claims were recorded. The claim groups nearest to the discovery are shown in Figure 2.

Because the discovery was made at the end of the season, no trenching or blasting has been done to expose the showings.

J. Satterly and D. F. Hewitt examined the showing for the Ontario Department of Mines on November 7. A press release giving the results of their examination was issued on November 24.(11)

The writer examined the discovery on November 11, guided by Mr. Campbell. Snow conditions did not impede study of the actual showings because they occur on the face of a cliff, but snow prevented as complete a study of the neighborhood as would have been desirable.

All considerations of location, geological setting, and mineralogy suggest strongly that the recent "find" is a rediscovery of the occurrence found by Stanard many years ago.

General Geology

The region is in the southern part of the Canadian Precambrian Shield. The claims are underlain by pink granite and granite-gneiss which Moore (7, 12) and Collins (13) classed as probably Algoman in age. The rock is porphyritic in places, and the quartz in some specimens is so fine grained that the rock resembles syenite to the unaided eye, a fact that probably explains LeConte's mention of syenite. The granite contains dykes and irregular masses of pegmatite.

The granite is intruded by diabase dykes, only one of which was studied by me. It consists of fine grained, considerably altered diabase, which is much jointed and which tends to weather in blocks 2 to 6 inches in size. The diabase dykes of the region are classed as Keweenawan in age and are of two ages: an older, olivine-free type, and a younger, olivine-bearing type (7, 13). Study of two thin-sections of specimens from this dyke, by myself and by S. C. Robinson, failed to show the presence of olivine; therefore the dyke is classed tentatively with the older group.

Mineralization

The material forming the stringers is dark brown to black in general appearance, and consists of quartz, pitchblende, carbonate, mica, and disintegration products of pitchblende. H. V. Ellsworth kindly checked the preliminary determination of these minerals. The radioactive mineral is tentatively classed as pitchblende since it shows no evidence of crystal form.

A sample representative of the 6-inch lens mentioned below, when tested in the radiation laboratory of the Geological Survey, indicated a content equivalent to 8.72 per cent U_3O_8. Satterly and Hewitt (11, p.3) quote

a radiation assay of 56.3 per cent from a sample from the same locality, and assays of 61.6 and 63.8 per cent from samples from two of the stringers; presumably these samples were either of selected material or they happened to contain more pitchblende.

Coracite. This mineral is listed in early editions of Dana's "System of Mineralogy" as a variety of uraninite showing partial alteration to gummite. The seventh edition lists coracite as synonomous with gummite, and states that the name gummite is used in that edition as a generic or field term for substances essentially oxides of uranium.

Satterly reports (11, p.3) that three specimens from the recent discovery were examined by E. W. Nuffield of the University of Toronto, who obtained X-ray diffraction patterns identical with those obtained from pitchblende from Great Bear Lake. Nuffield and Satterly, therefore, class the Camray material as pitchblende. However, H. V. Ellsworth states that it has been found that an X-ray powder diffraction pattern does not distinguish between uraninite, pitchblende and UO_2 (synthetic uranous oxide); all give the same pattern.

Unless further mineralogical or analytical studies indicate that the name pitchblende is not applicable, it will probably be best to use that term and to discontinue use of the name coracite. The mineral is called pitchblende provisionally in the present report.

Description of the Deposit

The Camray discovery consists of zones of pitchblende-bearing stringers that fill fissures in the granite walls immediately adjoining the diabase dyke described above. The relationships are

illustrated in Figure 4. Because the erosion of the dyke has left a canyon, the stringers are exposed on almost vertical cliffs. The upper parts of the cliffs, which are about 50 feet high, cannot be examined at present, nor can the extent of the stringers into the walls be ascertained. The dyke and canyon strike N80°W and have an average width of 35 feet, but at one place the dyke narrows to 18 feet and the remaining width of the canyon is floored by granite. The dyke dips 70° to 80° northward.

Deepening of the canyon at the shore of the lake has caused the formation of a small cove, where the water normally extends inland about 140 feet from the general shoreline of Theano Point (See Figure 4). The high-water mark is about 200 feet farther inland. Eastward from the cove the floor of the canyon rises gradually for about 500 feet, at which point it is perhaps 50 feet above lake-level; beyond there the floor rises steeply. The dyke outcrops intermittently along the flatter part of the floor, and probably continues much farther inland but is covered by overburden.

The greatest amount of pitchblende is exposed in a lens up to 6 inches wide, which tapers to a thin stringer within a length of about 3 feet. The position of this lens is shown on Figure 4.

Elsewhere, the stringers range from 1/8 inch to 2 inches in width, most of them being ½ inch or less. Most of them are only exposed for lengths of 2, 3, and 4 feet. Many of them strike N70°E to N85°E, and dips range from 35°SE to vertical. Because the pitchblende is brittle and easily eroded, many of the fractures are now unfilled for a depth of ½ inch or more from

the face of the cliff; there pitchblende cannot be seen but high counter readings indicate the liklihood of its presence.

The stringers are grouped in two main zones along the footwall or south side of the canyon, the one nearer the shore having an over-all length of 275 feet, and the other 100 feet. These are separated by an apparently barren zone 200 feet long (See Figure 4). At the east end of the shoreward zone of stringers a small fault appears to displace the dyke about 2 feet. This fault may have some bearing on the narrowing of the dyke nearby, but the relationships are not yet well exposed. No pitchblende was seen in the fault, but high counter readings indicate that it may be present. This is the only indication that stringers may occur in the dyke.

About 400 feet farther east, beyond the limit of Figure 4, three high counter readings were obtained within a length of 80 feet along a granite cliff that appears to be the continuation of the footwall. No pitchblende was seen, but development work here might disclose another zone of stringers.

On the north or hanging-wall side of the canyon two stringers 1/8 to 1/4 inch wide and 4 feet long are exposed at a locality about 130 feet east of the head of the cove. One of these is perpendicular to the dyke and the other parallel with the contact between the dyke and the granite.

Mr. Campbell stated that a high count is obtainable in the bottom of another gorge that may represent the weathering of a dyke oblique to the direction of the one described above. The locality is about 1/3 mile east of Theano Point, beside the trail, and is shown

on Figure 3. It would be interesting to trace the continuation of the main dyke to its intersection with this gorge, on the chance that pitchblende might be concentrated there. Snow prevented me from checking the reading at this locality.

Figure 4, showing the details of the occurrence, is based on a diagram that appeared in the Northern Miner, with some modifications. All details and measurements were checked, except that of the stringer nearest the shore, which was inaccessible because of waves.

Grade

The deposit is not yet exposed in such a way as to permit sampling of a type that would give any indication of the grade of a ton of the stringer-containing granite. To cut samples along the cliff faces would not be practical for two reasons: because of the weathering of the stringers, and because such samples would be parallel with rather than across the probable direction of mining.

The field G-M counter cannot be used in an absolute, quantative way for estimating the grade of a deposit such as this, because the needle goes to the limit of the scale when held against the larger stringers, and because, when held against rock a foot or two away from a stringer, the reading represents rays coming from the stringer rather than from the area of contact.

Samples of the stringer material itself indicate the character of the mineralization, but not mineable grade, consequently the results of such samples are included in the mineralogical section of this report.

Samples of the granite near the stringers, when tested with a quantitative, laboratory G-M counter, indicated an average radiation equivalent to 0.006 per cent U_3O_8, and specimens of the dyke rock gave an average of less than 0.001 per cent U_3O_8. As counts of these orders are commonly obtained from rocks, it does not seem likely that the rock between the stringers will prove valuable. If the deposit proves to be mineable, it will probably be necessary to sort the stringer material from the country rock.

Origin of the Deposit

The pitchblende was probably deposited from hydrothermal solutions of magmatic origin. The relationship to the dyke seems to be entirely structural. The mineralization may have come from the same magma as the dyke, but the suggestion of pitchblende occurring in a fault displacing the dyke, as mentioned above, points to a younger age for the mineral deposit. It would be of much interest to have an age determination made on a sample of the pitchblende.

The relationship to the dyke makes the walls of this and other dykes in the vicinity the most obvious places for further prospecting but, presumably, any fractures, faults, or shear zones that were open at the time of mineralization could contain pitchblende, irrespective of the presence of dykes.

Other Staking in the Region

Interest in the Camray discovery has caused the greatest staking boom that has occurred in Ontario for several years. On November 12 the Mining Recorder at Sault Ste. Marie told me that claims recorded to that date formed a block extending about 6 miles south

from Montreal River and about 3 miles inland from Lake Superior. He believed that many more claims had been staked and not yet recorded.

Between Sault Ste. Marie and Montreal River, the area between Lake Superior and the highway, and a further area extending 1 mile east of the highway, are restricted from ordinary staking because of the tourist attraction of the region, but claims can be staked and held there subject to inspection and to the proof of a bona fide discovery. Certain areas north of Montreal River are similarly restricted, but a permit to stake can be obtained from the Department of Lands and Forests in the event of a bona fide discovery. The question of whether a G-M counter anomaly constitutes a discovery will doubtless arise.

Certain townships are covered by "Algoma Rights" granted for construction of the Algoma Central Railway. There a licence to stake must be obtained from the Algoma Steel Corporation. Staking is done under regulations similar to those of the Ontario Department of Mines, and a 1 per cent royalty must be paid to the Corporation on any production.

The Mining Recorder, and engineers and prospectors in the district, told me that they did not know of any additional discoveries other than counter anomalies. Prospectors said that they intended to return home as soon as they had finished staking, because of the lateness of the season, and did not expect to do prospecting or assessment work until next year.

A report of another discovery, at McGregor Cove about 10 miles north of Theano Point (See Figure 1), has since appeared in the press, and is said to have caused much additional staking.

It is too early to predict with certainty the formations that are favourable or unfavourable for prospecting. The granite near dykes or other favourable structures affords the greatest similarity to the Camray discovery, but pitchblende deposits may also be shown to occur in the formations mapped by Moore as Batchawana and Mamainse (12). Until more is known regarding the age of the pitchblende deposits, nothing can be said as to the potentialities of the areas underlain by Keweenawan sediments and lavas.

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Maps

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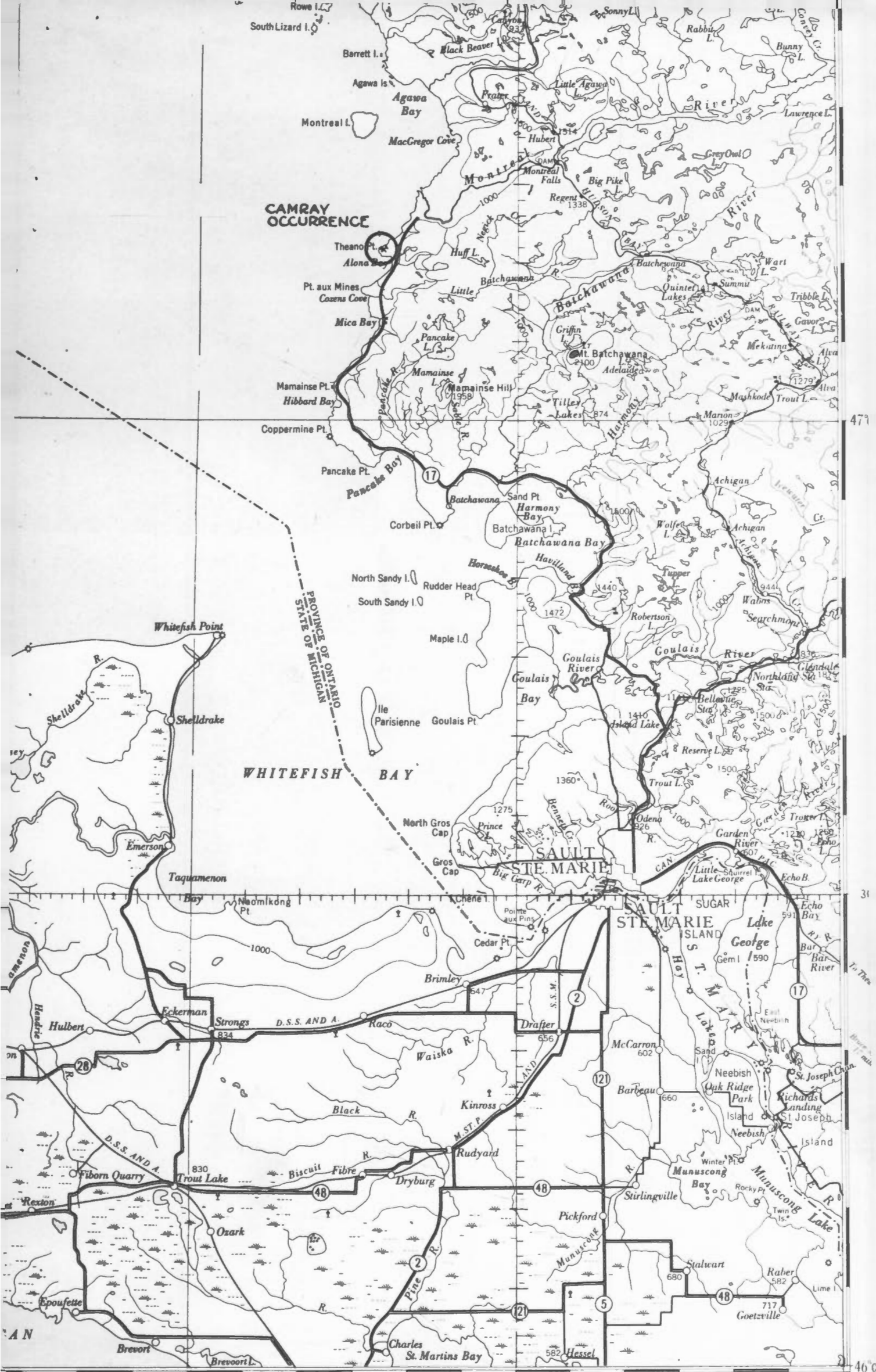


FIG. 1

SCALE: 1 inch = 8 miles

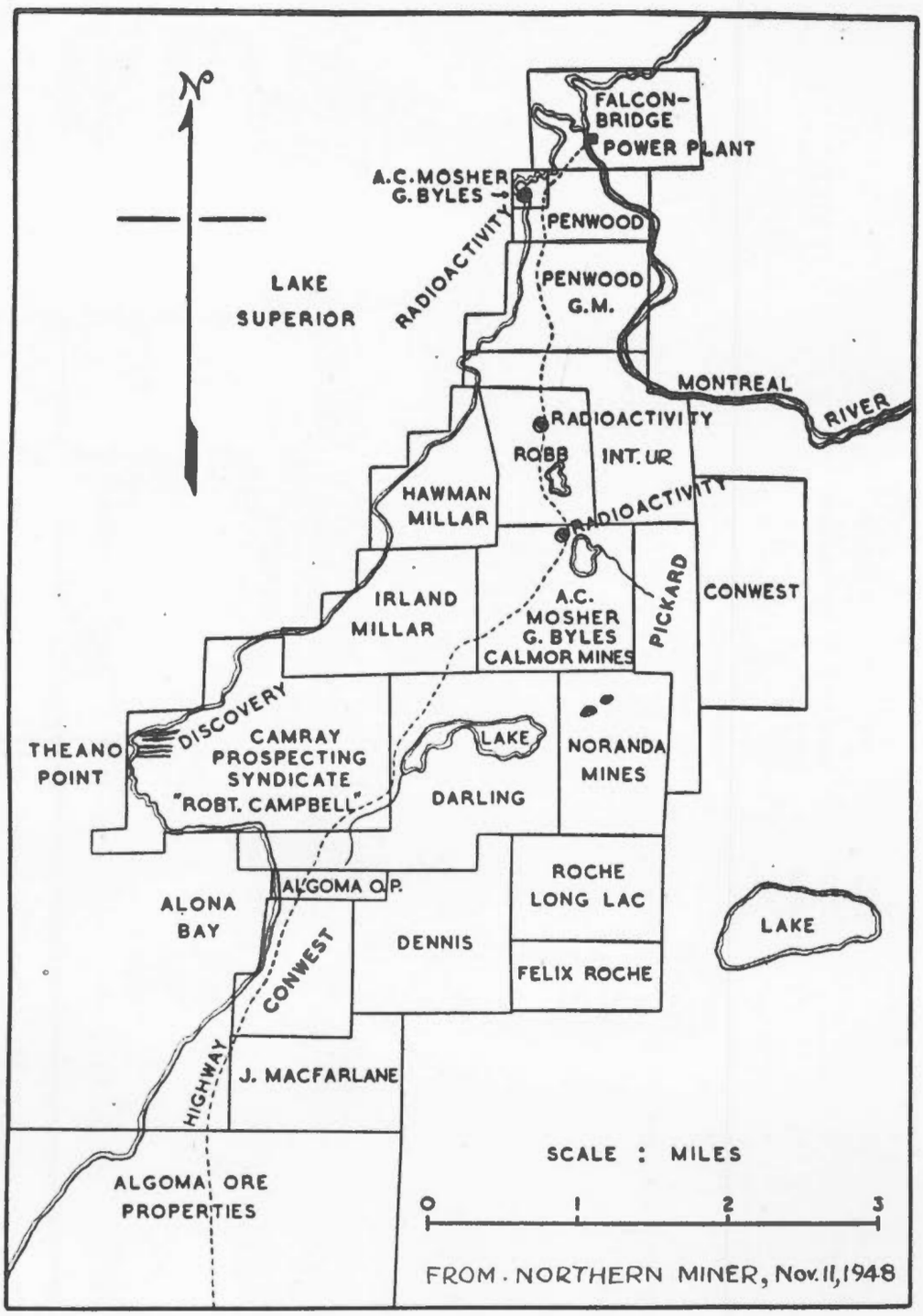

N
FALCON-
BRIDGE
POWER PLANT
A.C. MOSHER
G. BYLES
PENWOOD
RADIOACTIVITY
LAKE
SUPERIOR
PENWOOD
G.M.
MONTREAL
RIVER
RADIOACTIVITY
ROBB
INT. UR
HAWMAN
MILLAR
RADIOACTIVITY
PICKARD
CONWEST
IRLAND
MILLAR
A.C.
MOSHER
G. BYLES
CALMOR MINES
DISCOVERY
THEANO
POINT
CAMRAY
PROSPECTING
SYNDICATE
"ROBT. CAMPBELL"
LAKE
DARLING
NORANDA
MINES
ALGOMA O.P.
ROCHE
LONG LAC
ALONA
BAY
DENNIS
LAKE
CONWEST
FELIX ROCHE
HIGHWAY
J. MACFARLANE
ALGOMA ORE
PROPERTIES
SCALE : MILES
0
1
2
3
FROM. NORTHERN MINER, Nov. 11, 1948

FIG. 2

photo ordered but not yet received

Vertical Air Photograph of Theano Point, Lake Superior. The Camray Discovery is indicated by an arrow. North is at the top of the photograph, which is on the same scale as Figure 3. The photograph was provided by the Ontario Department of Lands and Forests.

View of south side of Theano Point, looking northwest across Alona Bay.

View of the canyon formed by erosion of diabase dyke. The more westerly stringers of the Camray discovery lie in the granite cliff at the left of the picture, where the wave is breaking. Photo. from Globe and Mail, November 23, 1948.

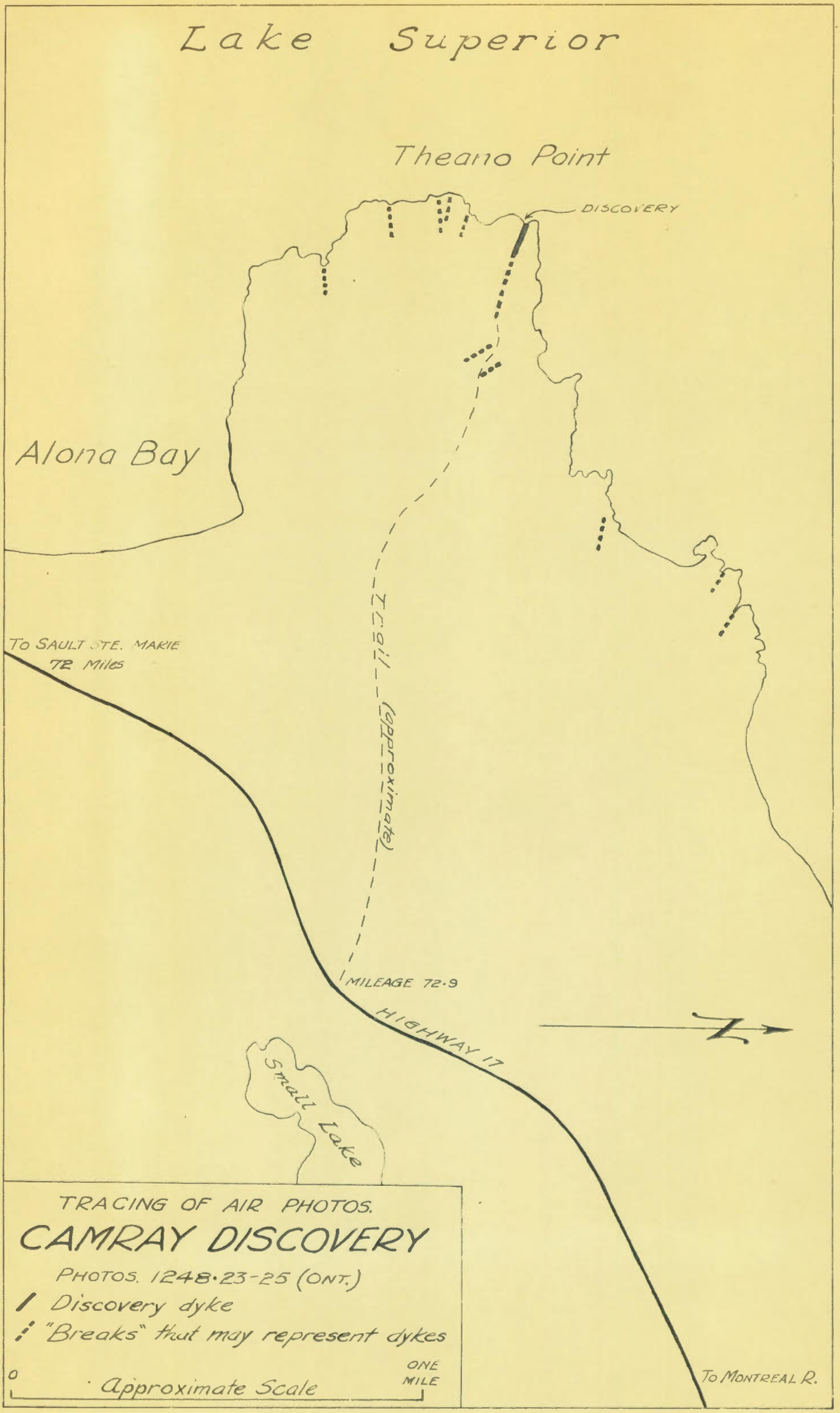
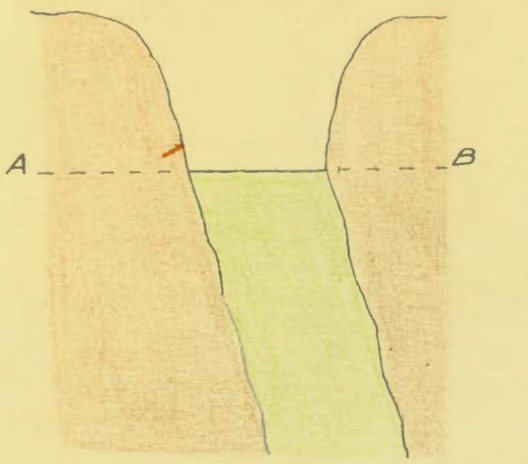

Lake Superior
Theano Point
DISCOVERY
Alona Bay
T.C.T.L. (approximate)
To Sault Ste. Marie
72 Miles
MILEAGE 72·9
HIGHWAY 17
Small Lake
To Montreal R.
TRACING OF AIR PHOTOS.
CAMRAY DISCOVERY
PHOTOS. 1248·23-25 (ONT.)
Discovery dyke
"Breaks" that may represent dykes
0
Approximate Scale
ONE MILE

FIG. 3



DIAGRAMMATIC SECTION
along line A-B

Lake Superior

ast.

Possible orebody 275' long

Cove

A

B

580 ft.

BASE LINE

Possible orebody 100' long

lens
6" wide

SCALE IN FEET

0 50 100

PLAN AND SECTION OF
CAMRAY DISCOVERY

Diabase dyke

Granite

Pitchblende stringer, observed

Pitchblende stringer, inferred

Fault

FIG. 4