

CARDIFF TOWNSHIP, HALIBURTON COUNTY
ONTARIO.

Extent, Location and Accessibility

This property composed of 35 contiguous claims, situated toward the northeast corner of Cardiff Township, in Haliburton County of Ontario, embraces Lots 6 and 7, concession XV, Lots 5, 6 and 8, concession XVI, the s. $\frac{1}{2}$ of Lot 2, and Lots 3, 4, 5, 6, 7, 8 and 9, concession XVIII, and lots 4, 5, 6, 7 and 8, concession XVIII

This Holding is accessible from the village of Wilberforce on the C.N.R. railway, by highway to the McLean Property adjoining to the north, and thence by a newly constructed bush road which runs completely down the length of the property to the Cheddar Trail, which again connects by highway to Wilberforce from the south.

The distance from Wilberforce to the Hogan Property via the McLean Holdings is approximately four miles, i.e. to the centre of the group, and seven miles via the Cheddar Trail. The company's camp is centrally located and served by this bush road.

The whole region is of medium relief with moderately steep hills rising to about 200 feet above the intervening terrain, which is occupied by farm clearings, lakes, creeks and swamp lands. The ridges are heavily timbered mainly with second growth hardwoods.

General Geology

The Haliburton-Bancroft area is generally underlain by a pink to grey granite to syenite mass that is exposed by erosion as tongues and large outcroppings, all part of which is known as the Cardiff Batholith. This carbonate rich intrusive and related pegmatites invaded, it is believed, once thick beds of limestones and related sediments classed as the Hastings-Grenville series. Now only infolded remnants of these former thick beds remain. Magmatic differentiation is almost complete within the map area, with rock types varying from highly acid granites, to syenites, to gabbro to highly basic peridotites. The sediments too, grade from rather fresh bedded slightly altered limestone and sandstone to highly altered granitized paragneisses and highly pyroxenic crystalline limestone. The calcium carbonate rich pegmatites and the uranium-thorium allanite solutions which impregnate the pyroxenic limestone and parag-

neisses represent the residual and phase of magmatic differentiation. The Hogan property embraces a comparatively narrow infolded band of paragneisses and highly altered pyroxenic limestone within the granite orsyenites. The pegmatites and the altered sediments are hosts for the uranium and rare earth bearing solutions here, while the Centre Lake deposit near the east side of Cardiff Township a series of parallel basic felsitized dykes make up the host rock.

Geology of the Hogan Property

The most striking and obvious geological feature of the Hogan Group is a roughly north-south trending band of highly pyroxenized formation in contact with, and flanked both east and west by pegmatite dykes varying in width from 70 to 80 feet. The width of the pyroxenized formation, thought now to be highly altered crystalline limestone of the Hastings-Grenville series, varies from 400 near north end of the property, to an assumed 1400 to the south. The pyroxenic limestone is bounded in places by interbedded highly metamorphosed sediments or pragneiss, also of the Hastings-Grenville series. In fact both the pyroxenites and the paragneisses are doubtless infolded remnants of antichnal structure existent in Precambrian granites which underly most of the property both east and west of the sedimentary band. Highly sheared and biotitized zones occur in the pyroxenized sediments, parallelling the long axis of the zone, suggesting that faulting took place contemporaneous to folding followed by later movement and injection of the pegmatites along the resultant zones of weakness, at the same time pegmatitic uranium bearing solutions infiltrated the shattered pyroxenized limestone host. Thus contrary to the general belief, the two more or less parallel dykes are not limbs of the same infolded dyke, but separate in their indentivity and are therefore post folding. The pegmatites and the pyroxenites are both uranium bearing with the richer values in, and adjacent to the pegmatites.

The intrusive pegmatites have good depth possibilities, but only by probing can the depth of the infolded sediments be determined. The writer is enclined to think that the zone will be comparatively shallow.

Another wide band of proxenic sediments infolded in the granites and trenching northeasterly crosses the south half of Lot 2 and the north half of Lot 3, concession XVII and onward. This zone is syclinal in structure. This second body of pyroxenite is known to be radio active in places, but has only been to date casually explored or developed.

On Lots 6 and 7, Range XV near the southern extremity of the holdings, occurs another pegmatic zone, rich in calcite or carbonate, and soda feldspar with an apparent width of some 1600 feet, also striking in a north easterly direction. This zone is mainly heavily overburdened. A series of small exploratory pits here disclosed extraordinarily large brown variety of Ellsworthite crystals, known to contain up to 20% U_3O_8 .

It may be again noted at this point that not only are the pegmatitic bodies here very rich in calcite and other carbonates, but so also are the granites, the latter in many places containing large pink calcite inclusions and veinlike bodies. This leads to the theory that the granites and younger pegmatites invaded once thick overlying limestone beds and were able to only partially digest or chemically combine at high temperature the calcium carbonates. The uranium bearing solutions representing the residual end phase of magmatic differentiation penetrated the lime rich pyrenic limestones later, but as previously stated, contemporaneous with the pegmatitic invasion.

Development

During the summer and fall months of 1953 the property was completely gridded in an east-west pattern, at 300 feet intervals. This was followed by a geological as well as a geiger-scintillometer survey, the former under the direction of the writer, the latter under P. Presunka, the company's geophysist.

Time prevented completion of a detailed, and therefore strictly accurate, geological map of the property, but sufficient data was gathered to outline the main structural features thereon. (See attached Map). The pyroxenite-pegmatite contacts outlined and projected geologically were corroborated roughly by the profiles of the geiger survey, and apparently cross the entire length of the property.

Actual development of the uranium bearing zones other than the geological and geiger surveys has been confined, to date, to stripping and rock trenching a zone of high geiger intensity on the west flank of the pegmatite pyroxenite band, on the northerly portion of Lot 6, concession XVIII. Here Mr. Presunka discovered an area of high scintillometer readings persistent for a thousand feet in length, before dipping under heavy overburden. This zone has an apparent width of 60 feet in width and some 4 feet in length with their long axes trending N.W. These pods seem consistent in their distribution over the length and width of the zone so far opened up by a series of 16 trenches spaced roughly 50 feet apart, and blankets the

pyroxenite-pegmatite contact. The trenches have been channelled and bulk sampled. The results are not yet in hand. It may be stated here that grab samples, not entirely representative but rather selected, ran from 0.10% up to 6.8% U_3O_8 . Other associated or gangue minerals noted are biotite, magnetite, molybdenite, fluorite, some apatite, and carnotite. Pitch blende, the amorphous form of uraninite has also been found but not in quantity.

Summary Recommendations & Conclusion

The work accomplished to date, both geologically and geophysically, plus the limited amount of trenching, indicates an extremely favourable and encouraging set of conditions on this Hogan property. The pyroxenite-pegmatite zone which appears to cross the entire property for a length of over two and one half miles, is radio active almost wherever exposed with apparently high uranium content in or near the contact with the pegmatites. The trenched zone shows the same high consistency of geiger readings and visible uraninite for a length of one thousand feet and open at both ends. The favourable host rock, though an infolded remnant of sedimentary origin may therefore not have great depth. However long length would compensate for depth if the zone proved to be comparatively shallow.

To the writer, the economic possibilities, to repeat, are highly encouraging and now warrant much further development and resultant expenditure. The Ellsworthite showings to the south also deserve further investigation. It is recommended therefor that:

1. With the advent of Spring, a close and detailed geological survey be made of the entire holdings, with emphasis on the favourable areas outlined by the initial survey.
2. That a more closely gridded scintillometer survey be instituted with readings taken at closer intervals, and depth of overburden be recorded at each station by means of a sounding bar. Only if depth of overburden is known, can accurate interpretation of scintillometer readings be made.
3. That trenching be continued immediately to add length, if possible, to the known zone of high intensity between lines 48N. and 60N. Lot 6, concession XVIII. Also all zones where favourable scintillometer profile peaks were obtained, should be stripped and rock trenched as well as the zone to the south, where Ellsworthite crystals occur in such numbers. This latter discovery may have much merit.
4. The nature of the uraninite distribution on the main showing

suggests that large bulks up to 300 lbs. would perhaps prove up to be the proper means of determining the value of the rock rather than channel or chip samples.

5. The main zone be diamond drilled only subsequent to completion of both the geological and scintillometer survey, and only after accurate evaluation of sample results has been determined.

Respectfully submitted,

J.J. Harris, Msc. P.Eng.

February 16, 1954.

STRATMAT LIMITED - PROJECT O-9LOCATION AND ACCESS

The Hogan Group is strategically located in the Haliburton-Bancroft Uranium Area and consists of thirty-~~seven~~^{five} unpatented mining claims in the northwest quarter of Cardiff Township, County of Haliburton, Ontario. More specifically the property is located two miles south-east of the village of Wilberforce and twenty-three miles west of Bancroft, this latter point being 165 miles east of Toronto on highway No. 7.

Direct access to the north and south extremities of the property is by means of secondary roads at points a short distance from Wilberforce on both the Haliburton-Bancroft highway and the Cheddar Trail. A wood road has been bulldozed north-south the length of the property connecting these points.

The claims which embrace part of lots 2 to 10 in concessions 15, 16, 17 and 18, are registered in the Eastern Ontario Mining Division and are listed on the official claim map as follows:- E.O. 6194-6198, E.O. 6351-6359, E.O. 7306-7315, E.O. 7386-7391, E.O. 7464-7465, E.O. 12796-12800 inclusive.

FACILITIES

The Canadian National Railways has a spur line running through Wilberforce from Bancroft connecting with the main line at Lindsay.

Power is deemed adequate to supply only lighting and domestic facilities, thus mining properties would have to supply additional power needed from independent sources.

FORESTS

At present lumber is an important industry, and several small mills are operating in the area. Most of the lumber is small pine, spruce, balsam, cedar, hemlock, poplar, maple and yellow birch, being approximately 70% deciduous, 15% coniferous with the remainder burn and barren rock.

TOPOGRAPHY

The area is one of moderate relief with an abundance of low rolling hills imparting a northeast lineation to the topography. Frequent small lakes dot the area and form an important reserve water supply for the Trent Valley Canal System.

PRESENT DEVELOPMENT IN THE AREA

Cardiff Uranium Mines Limited which adjoins the Hogan group to the West is in the final stages of mine and mill construction, while a short distance to the south and east, Centre Lake, Dyno, Faraday and Croft are establishing sizable tonnages of commercial grade Uranium ore.

GEOLOGY

The Haliburton-Bancroft Area is a part of the Grenville sub-province of the Canadian Shield. In Precambrian times a thick mantle of sediments covered the area. Subsequent intrusion of a great granite to syenite mass uplifted and or enveloped this overlying series. Later erosion dispersed the uplifted remnants, so that now only relatively small areas of these sediments remain as highly altered and infolded bands. Numerous pegmatites of variable sizes and shapes representing end phases of the main magma intrude both the granite and included sediments. The Uranium-Thorium Allanite solutions are contemporaneous with the pegmatites and often impregnate the sediments for short distances.

The Hogan Group is well located with respect to structural conditions, lying within the western fringe of the "Cardiff" granite mass. This latter mass occupies a central position and appears to be a prime factor of structural control relative to major radio-active occurrences in the area. Several enveloped sedimentary belts lying within and fringing the "Cardiff" mass contain numerous differential intrusive pegmatitic rocks and these appear to be favourable loci for uranium and other rare metals.

The most striking geological feature on the Hogan group is the inclusion of two sedimentary belts striking northerly across the central and western parts of the property. These belts, containing numerous pegmatitic injections, vary from 500 to 2000 feet in width and have established lengths of 13,000 and 7000 feet. They offer very favourable prospecting areas of considerable extent.

DEVELOPMENT

During the summer and fall of 1953 the property was gridded with lines at 300 foot intervals and stations at 100 foot intervals. A scintillometer survey on this grid indicated several anomalous zones along the sedimentary belts. For convenience these zones were designated A, B, C and D.

ZONE A

Located on the southern extremity of the property embraces claims 12797 to 12800. Another more detailed scintillometer survey followed by geological mapping was carried out on a 100 x 100 grid system over a part of this zone. This survey indicated a potential area, some 1200 feet in length striking slightly north of west, between lines 54S and 60S. The potential ore rocks are granite and syenite pegmatites intruding a syenitized paragneiss. Identified minerals were Uraninite and Uranothorite.

The following are grab sample locations and results from this zone.

Sample No.	Location	U ₃ O ₈ %	Th O ₂ %
59	Line 57S 5+25E of B.L.	0.036	1.53
60	Line 54S 1+00W of B.L.	2.48	0.20

Eighty-one man days or approximately 8100 square feet of surface stripping was carried out along this zone, however work was halted pending readjustment of the option agreement before systematic sampling could be effected.

Two microlite showings of note exist farther north on this zone which were mapped and are included with this report. However, as it was felt these showings represent deposits of limited extent, only a small amount of stripping was carried out.

ZONE B

Located on the north central part of the property includes parts of claims:- 6357, 6358, 7391, 7315. It straddles the north part of the central sedimentary belt previously mentioned as a favourable locus for ore.

The enveloped sedimentary belt is exposed over variable widths of up to 600 feet in this zone and includes paragneiss, pyroxenite and hornblende-biotite schists. The sediments which have a flat dip of about 20 degrees east, include frequent differentiated pegmatite dykes and are flanked both east and west by granitic rocks which are gneissitized along the contacts.

A central band of syenite injected pyroxenite, which has been exposed by trenching at 100 foot intervals for over 1000 feet, shows a persistence of radioactivity. The writer obtained an average of 800 C/P/S or 35 times background over this band in the ten trenches examined. Additional exposures 1000 feet south show similar radiation. Uraninite in small disseminated crystals was identified in several specimens of the pyroxenite.

Exposures of the pyroxenite, which vary from 15 to 25 feet in width were channel sampled in 1953, but these results proved to be a lot lower than anticipated with only a few commercial assays of note. The writer observed that the pyroxenite is quite friable as compared to the hard uraninite crystals, so it is quite possible that unless extreme care was taken many of the crystals would be lost in this sampling procedure. The writer feels therefore that additional check sampling is warranted on this zone in the form of bulks.

ZONE C

Located on the west central part of the property includes parts of claims 7306, 7307 and 7308. The sedimentary belt in this zone varies from 200 to 900 feet in width and has an estimated length of some 7000 feet extending into claims 7313 and 7314.

Only additional work performed on this zone to date was a magnetometer survey done during June 1954. This survey shows a magnetic anomaly striking through the central part of the belt. This anomaly may have some significance in view of some more recent discoveries which have up to 20% disseminated magnetite associated with radioactive minerals in dyke rocks.

ZONE D

Located on the south central part of the group includes claims 6195, 6196, 6197 and 8194. Supplement to the main survey more detailed scintillometer work was done on part of this zone and several anomalous areas were indicated. It was planned to follow this up with mapping and prospecting when work was discontinued.

C O N C L U S I O N

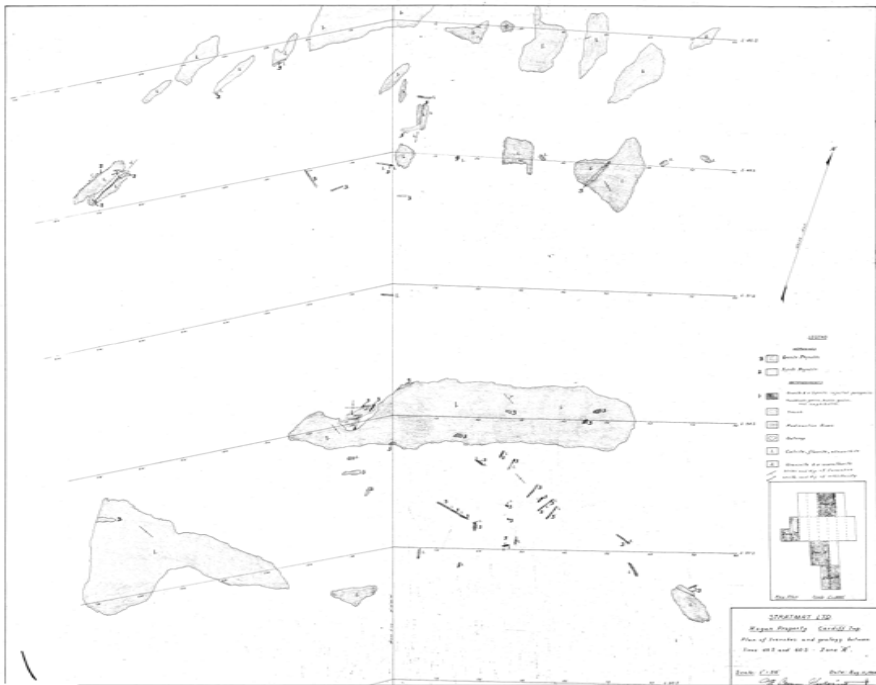
The Hogan property definitely warrants continued investigation of the above mentioned potential zones with a view to outlining significant sections for bore-hole exploration. Additional rock trenching, sampling and geological mapping should be performed immediately on some of the zones in order to design an effective programme of exploratory drilling for the winter months, where warranted. The writer feels the property justifies a minimum expenditure of about \$20,000 by way of continued surface exploration and preliminary bore-hole testing.

D. E. Cameron.

D. E. Cameron
Mining Geologist

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LEGEND

ROCKS

- Bare Rock
- Bare Rock

REEF

- Reef at low water stage
- Reef
- Submerged Reef
- Reef
- Rocks, Shoals, and Reefs
- Shoals at low water stage
- Shoals at low water stage

Other

- Shoals
- Shoals

Scale

0 10 Miles

STRAITS OF GIBRALTAR
 Hydrographic Survey for
 Plan of Straits and nearby waters
 from 1855 and 1856 - Scale 1:50,000

Edw. Clark Hydrographic Survey

HALO URANIUM MINES LTD.

Cardiff Township
Haldimand County
Eastern Ontario

Geological Map
GEOLOGICAL MAP

and
GEIGER COUNTER SURVEY

SCALE: 300' to 1"



GEOLOGY

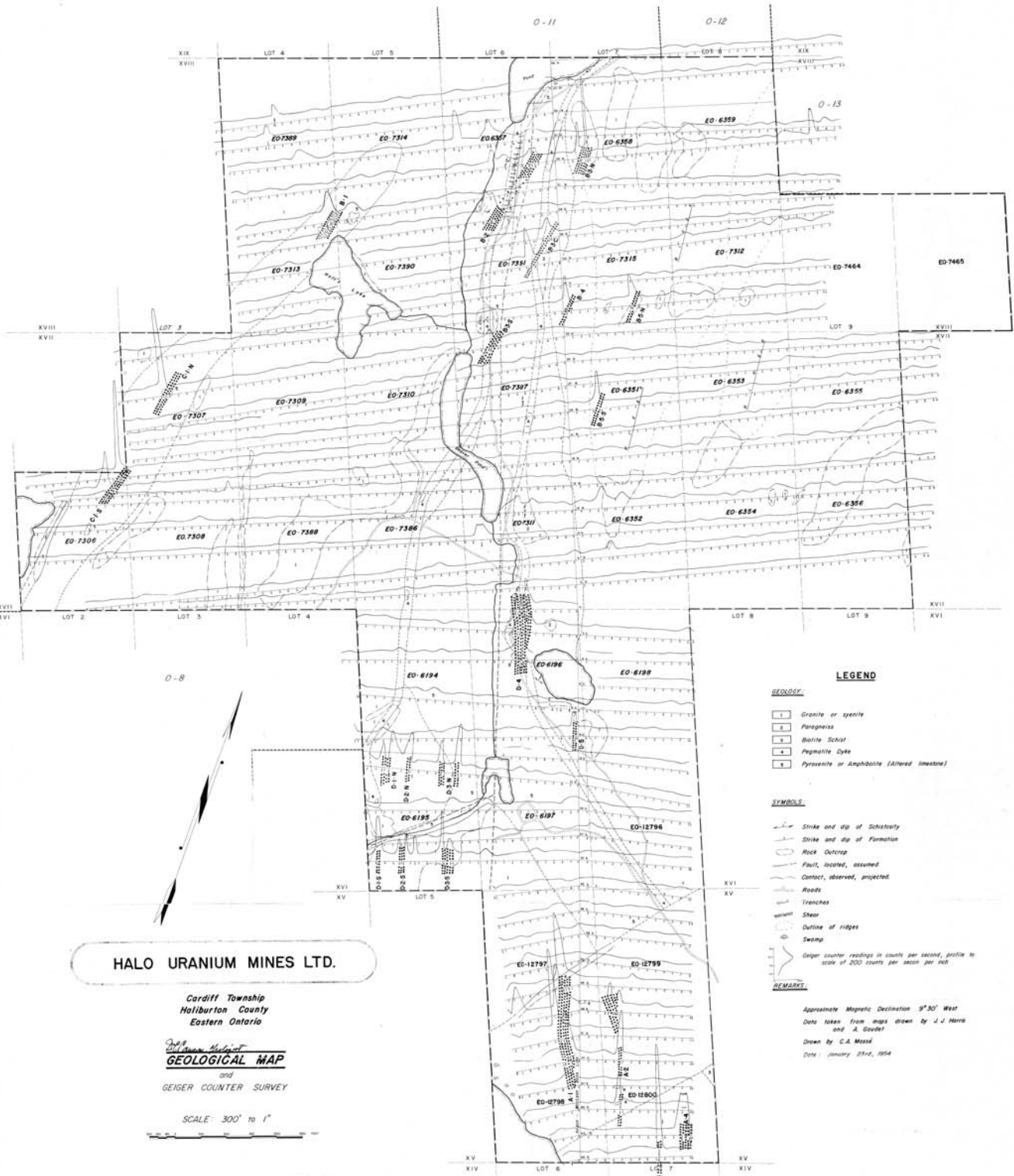
- Granite or syenite
- Gneiss
- Basaltic Schist
- Pegmatite Dyke
- Pyroxenite or Amphibolite (Altered limestone)

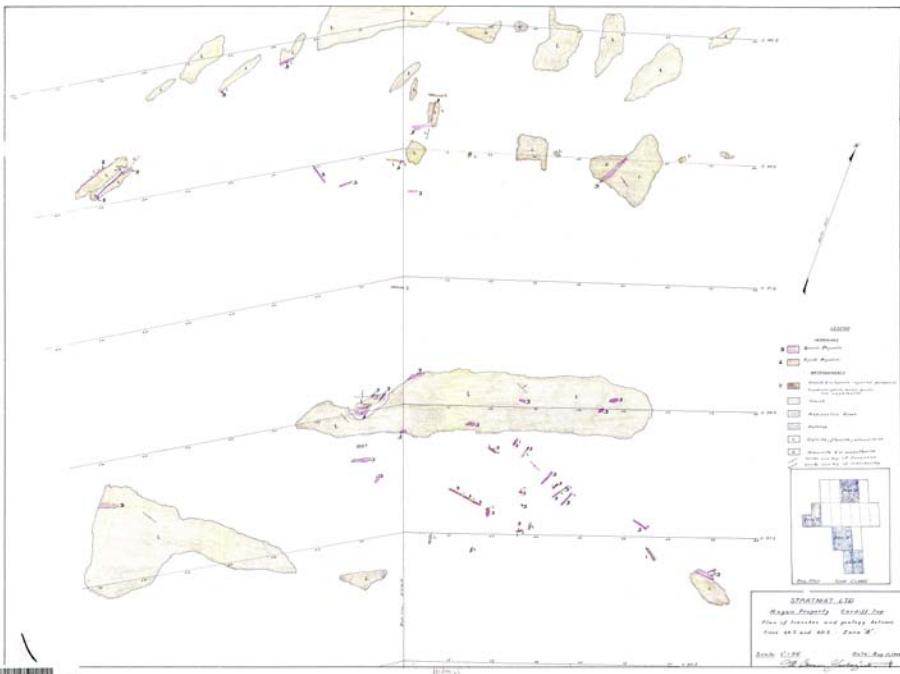
SYMBOLS

- Strike and dip of Schistosity
- Strike and dip of Formation
- Rock Outcrop
- Fault, located, assumed
- Contact, observed, projected
- Roads
- Trenches
- Shear
- Outline of ridges
- Swamp
- Geiger counter readings in counts per second, profile to scale of 200 counts per second per inch

REMARKS

Approximate Magnetic Declination 9°30' West
Data taken from maps drawn by J. J. Harris and A. Gredel
Drawn by C.A. Massé
Date: January 25th, 1954



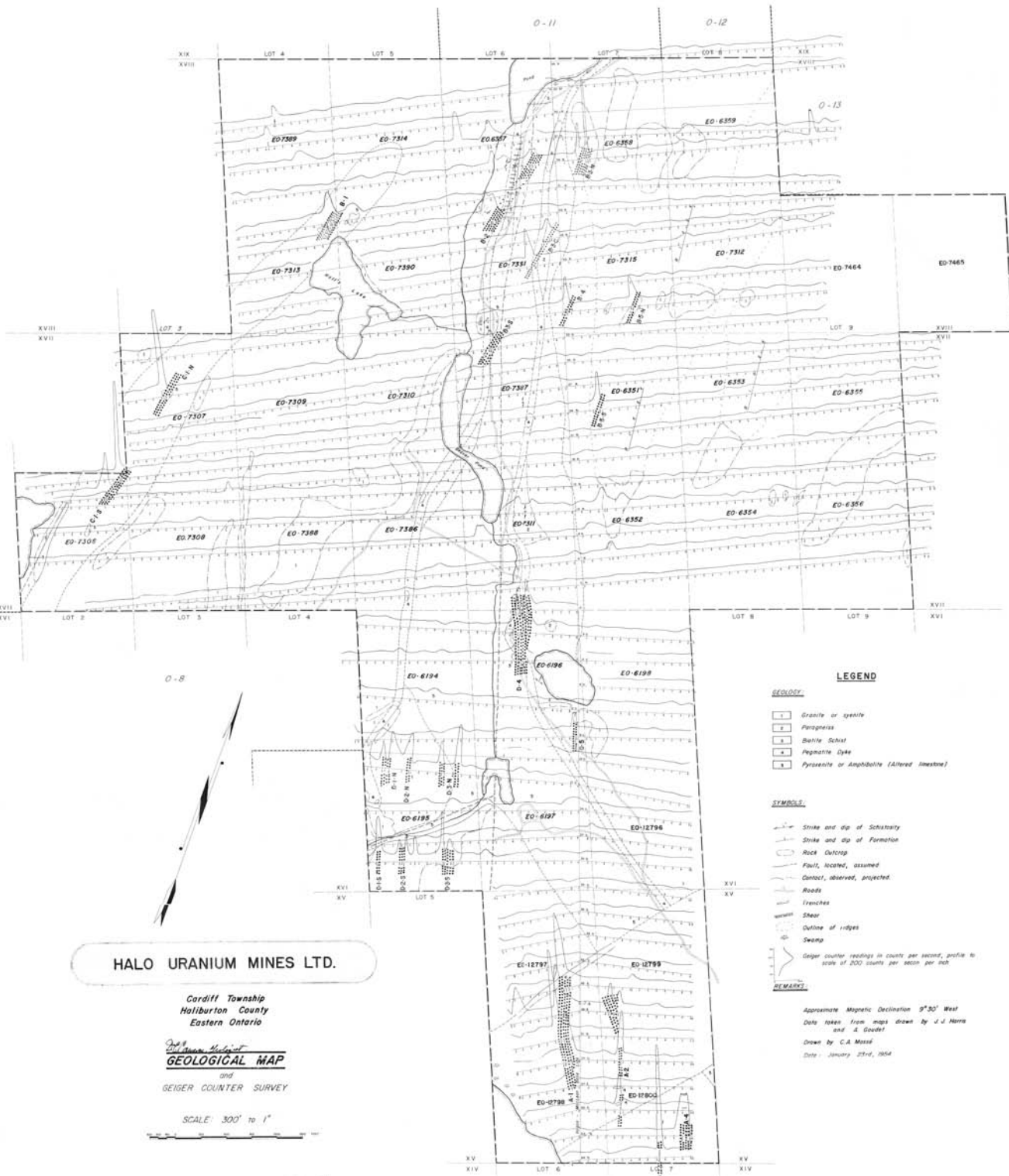


- LEGEND**
- Bathymetry
 - Basalt Dykes
 - Basalt Dykes
- HYDROGRAPHIC**
- Sand & Gravel (upper part)
 - Sand
 - Silty sand
 - Silt
 - Clay
 - Muddy water
 - Muddy water
 - Muddy water
 - Muddy water
 - Muddy water
 - Muddy water
 - Muddy water
 - Muddy water
 - Muddy water
 - Muddy water



STRAIT OF LÉDAR
 Magn. Sheet No. 111/12
 Plan of rocks and geology between
 lines 400 and 400 - Zone "B"

Scale: 1:50,000



HALO URANIUM MINES LTD.

Cardiff Township
Haliburton County
Eastern Ontario

John William McLean
GEOLOGICAL MAP

and
SEISER COUNTER SURVEY

SCALE: 300' to 1"

LEGEND

GEOLOGY

- 1 Granite or gneiss
- 2 Pegmatite
- 3 Barite Schist
- 4 Pegmatite Dyke
- 5 Pyroxenite or Amphibolite (Altered limestone)

SYMBOLS

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REMARKS:

Approximate Magnetic Declination 9°30' West
Data taken from maps drawn by J.J. Harris and J. Goodell
Drawn by C.A. Massé
Date: January 27th, 1964