REPORT ON
THE SUBSTANTIAL DEVELOPMENTS LIMITED PROPERTY
PALMERSTON, OLDEN, AND OSO TOWNSHIPS
FRONTENAC COUNTY, ONTARIO
FOR
THE URANIUM SYNDICATE
BY
GEOPHYSICAL ENGINEERING & SURVEYS LIMITED

Toronto, Ontario
June 25, 1970

L. O. Koskitalo
SUMMARY

Ground work was carried out over 6 claims in 1969 and 11 claims in 1970 to evaluate airborne radiometric anomalies that were outlined by an airborne survey of the Substantial Development 39 claim property.

Trenching of the most radioactive material within a white pegmatite body on claim EO-37989 returned at best an assay of 1.6 lbs/ton U₃O₈, representative of a 2' diameter area.

No further work is recommended on the property.
REPORT ON
THE SUBSTANTIAL DEVELOPMENTS LIMITED PROPERTY
PALMERSTON, OLDEN, AND OSO TOWNSHIPS
FRONTENAC COUNTY, ONTARIO

INTRODUCTION

The Property

The Substantial Developments Limited property consists of 39 claims as follows (Dwg. No. 3894-B):

(i) Bolton Lakes Group (13 Claims)

Claim Nos. EO-37986 to 89, Olden Township
EO-38350 to 58, Olden Township

(ii) Clarendon Group (2 claims)

Claim Nos. EO-218841 and 42, Oso Township

(iii) Cross Lake Group (24 Claims)

Claim Nos. EO-38340 and 41, Olden Township
EO-38346 to 49, Olden Township
EO-38535 to 48, Palmerston Township
EO-218843 to 46, Palmerston Township

Location and Access

The property is located in Frontenac County, about 40 miles north-northwest of Kingston, Ontario. The claims are accessible by local gravel roads running west from Highway No. 509 at distances of 1, 2 and 5 miles north of the junction of Highways No. 7 and No. 509 near Sharbot Lake (Figure 1). Further access to the Cross Lake group is provided by Cross Lake on the north and west sides, and by Rexdale property trails on the east side.
Airborne Radiometric Surveyed Area

CROSS LAKE GROUP

Ground-Prospecting 1970

CLARENDON GROUP

Ground Survey 1969

Granitic Gneiss

BOLTON LAKE GROUP

Ground Survey 1970

Granite

LEGEND

Report No. 646T

Report No. 659T

SUBSTANTIAL DEVELOPMENTS LTD.
PROPERTY LOCATION MAP
FRONTENAC COUNTY, ONT.
Scale: 1" = 1 mile  JUNE, 1970

FIGURE 1
Topography

The area is one of outcrop ridges and intervening swampy hollow terrain, trending north-easterly. The ridges and hollows average 200 to 500 feet in width and have an average local relief of 50 feet. Overall relief is relatively low; maximum and minimum elevations in the area are 950 and 700 feet. Forest cover is thin to moderate, and locally dense only in some swampy flats. Some small scale farming was once done in the general area; on the claims themselves, old clearings are found only on the west half of the Bolton Lakes group.

Outcrop exposure is extensive.

History

The 39 claims were part of a large block of claims staked by Substantial Developments Limited in 1968-69. A limited amount of trenching and linecutting was carried out during the summer of 1969.

The property was optioned by the Keevil Mining Group on October 22, 1969 following geological reconnaissance and detailed examination of trenches.

In the fall of 1969, detailed geological and ground radiometric surveys were carried out by G. E. S. L. on four claims of the Bolton Lakes group, and detailed airborne radiometric surveys (1/16 mile flight line spacing) were flown over the entire 39 claim area. The first and last of these surveys were previously reported (Koskitalo, 1969, G. E. S. L. Report No. 646T).

Exploration work on adjacent properties held by Rexdale Mines Limited consisted of trenching, radiometric surveys and diamond drilling.
Guardian Mines Limited also did radiometric surveying, trenching and diamond drilling on another adjacent property during 1968-69.

**General Geology**

The property lies within the Grenville province of the Canadian Shield, south of the Grenville geomagnetic fence. Geological mapping by the Ontario Department of Mines (Harding, 1947; Smith, 1956) indicates that the claims are underlain by marble, paragneiss, and amphibolite, which are cut by granitic gneiss, all trending generally 35°/45°SE and which occur immediately northwest (over a 0 to 4 mile span) of the southwest end of a large (5 x 30 miles), younger, intrusive diorite-gabbro and granite complex.

Uranium mineralization is associated with pegmatites and granite.
WORK DONE

Summary

1969:
1. Geological and Ground Radiometric Surveys
   - 4 claims, EO 37986 to 89, Bolton Lakes Group (part).
2. Geological and Ground Radiometric Surveys
   - 2 claims, EO-218841 & 42, Clarendon Group (all).
3. Airborne Radiometric Survey - Flight lines at 1/16 mile spacing over all 39 claims, for a 53.36 line mileage total, directly over the claims.

1970:
4. Geological and Radiometric Prospecting
   - Cross Lake Group, with emphasis on 2 claims, EO-38547 and 48
5. Geological and Ground Radiometric Surveys
   - 9 claims, EO-38350 to 58, Bolton Lakes Group (remainder).
6. Trenching - 3 small pits, 1 claim, EO-37989, Bolton Lakes Group.

Results of Work

Items 1 and 3 above were reported previously (Koskitalo, 1969, Report No. 646T).


Claims EO-218841 and 42 which comprise this group were surveyed along cross-lines at 200 foot spacing, with further detailing at 100 foot intervals in the area of mildly radioactive pegmatites (Dwg. 3921-1).

Geologically, the area is characterized by granitic gneisses, containing variable amounts of pink to white, low mafic, conformable, lenticular pegmatites all striking about N20°E and dipping about 45°SE. The granitic gneisses are pink over most of the group, and red only in the extreme south eastern corner of the group. On the basis of O.D.M. mapping (Harding, 1947; Smith, 1956), the pink
granitic gneisses are identified as Cross Lake gneiss, and the red gneiss as the Lavant gneiss; the intervening swamp is inferred to be underlain by crystalline limestone, though no float or outcrops were noted within the claims. Pegmatite occurs throughout the gneisses, but significant concentrations (25% or more) are restricted to a 500 to 600-foot wide belt, on the southeast edge of the Cross Lake gneiss (marginal to the inferred marble band). Within this favourable pegmatitic belt, individual bodies of pegmatite do not appear to exceed 50 x 200 feet in dimension.

Radiometrically, the granitic gneisses average 4000 cmp T$_1$ (McPhar spectrometer, Model TV-1) at best, that is 2 x background. The pegmatites read to 5 x background on average, to 30 x background maximum. These maxima are spot maxima, restricted to 3' diameter areas, and show no significant concentration, grouping, or correlation. On T$_2$ and T$_3$ readings these "hot" spots were 3000 and 600 cpm, or 15 x and 10 x background, respectively. Trenches (5' x 5' x 1' deep) had been blasted by others previously at these locations.

It is to be noted that the detailed airborne radiometric survey gave only 40 ppm (eU)* values, barely above background, over these claims.

4. **Cross Lake Group - Prospecting**

The airborne radiometric survey indicated only two claims to be of any interest, (EO-38547 and 48, the northeastern most two claims of the group). It is to be particularly noted that the airborne survey was flown at 1/16 mile line spacing, that is, with flight lines of 330 foot average lateral separation. Hence, ground work required was well indicated as to specific location and probably extent.

* equivalent uranium.
LEGEND

Traverse Routes
April 26 & 29, 1970

Outcrop Hill; avg 3000-6000 Ti;
some pegmatite, largely conformable,
12000 Ti spot (2' dia) max.
(Ti Background = 2000)

SUBSTANTIAL DEVELOPMENTS LTD.
CROSS LAKE GROUP
GROUND INSPECTION

Scale: 1" = ½ mile JUNE, 1970
Two traverses were made on the group, with particular attention to the anomalous area (Dwg. No. 3921-2). Only country rock (paragneisses and granitic gneisses) and minor pegmatites of weak radioactivity were encountered.

The airborne anomaly, centred on claim EO-38548, correlates with extensive, elevated, outcrop exposures of granitic gneiss with minor pegmatite.

5. **Bolton Lakes Group - Geological & Ground Radiometric Surveys**

The 9 claims, EO-38350 to 58, were indicated as radioactively anomalous by the detailed airborne radiometric survey.

A baseline was cut for about 1 1/2 miles, southwest from the northeast corner post of the group, along the topographic ridge that correlated with the airborne anomaly. Concurrent prospecting, however, indicated that detailing on 1"=400' scale airphoto base would be adequate, the baseline to be utilized if and when an area of interest was identified.

Dwg. No. 3921-3 shows the results of the 1970 work. This mapping partially overlaps the 1969 work covering the adjacent 4 claims, EO-37986 to 89 (Map No. 2 of Report No. 646T).

Geologically, the 9 claims are dominated by an outcrop ridge of gneissic, red granite trending about N45°E. The granite is flanked largely by swamp and a lake on the southeast. In claims EO-38355 and 57, an outcrop of dark, fine grained greywacke (and possible metavolcanics?) occurs southeast of the granite. A small part of the group, immediately southeast of the Bolton Lakes, was not covered; airborne radiometric surveys indicated nothing of interest there. On the northeast side of the granite, as best demonstrated in claim EO38350, the succession is
marble, white pegmatite, and further northwestward, paragneiss, and granitic gneiss (Map No. 2, Report No. 646T). Generally, the structure across the entire group strikes N45°E, and dips 45°SE.

Potential uranium mineralization was confined to pegmatites within the granite (map unit 1) and to the white pegmatite (map unit 2). Within the granite, pegmatites were typically pink, lenticular, both conformable and discordant, and of limited amount (5%) and extent (less than 5 x 50 feet). The white pegmatite apparently underlies a 400 x possibly 1000 foot area; no additional outcrops were seen beyond those located in 1969.

Radiometrically also, the granite dominates the area. Average readings were 6000 cpm T_1 (3 x background), with maxima of 9000 cpm T_1 (4 1/2 x background) over pegmatitic portions. The most radioactive pegmatite found was a 6" x 10' cross-cutting, red dyke located in the centre of claim EO-38355. Scintillometer readings at rock surface were 20,000 T_1, 1200 T_2, 250 T_3 (10 x, 6 x and 5 x background, respectively).

The relative radioactivity of the granite, its large outcrop extent, and its elevated relief appear to be the only causes of the airborne anomalies along the ridge.

Re-examination of the white pegmatite on claim EO-37988, located two new "hot" spots, apparently unknow to the previous workers of the claims. Readings over trenches previously blasted averaged about 50,000 T_1 at ground; the two new locations were off-scale (that is, 100,000 T_1 or more).

Two very old trenches were found immediately west of claim EO-38352.
These likely represent a previously reported occurrence of molybdenum in crystalline limestone (Harding, 1947, p. 90 - Avery showing). No molybdenite was seen.

6. **Bolton Lakes Group - Trenching - Claim EO-37989**

One day was spent trenching the above mentioned two "hot" spots, and enlarging an older, nearby trench (Detail Map B, Map No. 4). Trenches averaged 5' x 5' x 1' deep in size.

Samples taken on the better two locations averaged 0.06% U₃O₈, 0.02% ThO₂ (1.2 lbs/ton U₃O₈), are highgraded samples and are representative of only 1' - 2' diameter areas. Rock surface scintillometer readings at these locations average off scale T₁, 1750 T₂, 250 T₃ (450 x, 9 x, 4 x background respectively).

**RECOMMENDATIONS**

No further work is recommended on the property.

Respectfully submitted,

Lloyd Koskitalo

Lloyd Koskitalo
A three channel radiation spectrometer for reconnaissance and general use.

Description

Model TV-1 is a three channel, integral type radiation spectrometer. Measurements are based on the spectral characteristics of gamma radiation from radioactive elements. Selection of the operating threshold is made by means of the threshold selector switch.

The instrument is designed primarily for reconnaissance. The wide open position provides for maximum sensitivity. Additional thresholds however, provide the capability to differentiate between gamma radiations emanating from uranium and thorium and provide quantitative information relating to each.

The meter is calibrated to display zero to 100 counts per minute. A four position scale multiplier switch provides four full scale ranges of 100, 1000, 10,000 and 100,000 counts per minute. A fifth position on this switch is employed to test the condition of the batteries.

The variable time constants are tied in with the threshold selector switch. In the wide open (maximum sensitivity) operation, a fast or slow time constant may be selected. In the upper thresholds (lower net count), the long time constant only, is in effect.

The detecting element is a 1-1/4 by 1 inch sodium iodide crystal coupled to a photomultiplier tube. These are hermetically sealed, magnetically shielded and mounted in the forward end of the scintillator housing.

A speaker provides a variable pitch output with changing radiation levels. A speaker control, mounted on the top of the instrument, can be used to adjust the pitch for any given level of radiation.
SPECIFICATIONS

Threshold Settings

$T_1$ at 0.2 Mev. — measures total count across the entire gamma energy spectrum for maximum sensitivity.

$T_2$ at 1.63 Mev. — measures characteristic uranium and thorium radiations.

$T_3$ at 2.5 Mev. — measures diagnostic thorium radiations only.

Temp. Range: $-35^\circ$ to $+55^\circ$ C. Detector Crystal: NaI (T) $1\,'' \times 1 - 1/4''$ and matched photomultiplier hermetically sealed.

Weight: 3 pounds.

Measurement Ranges:
Four switch positions provide full scale counts per minute of: 100; 1,000; 10,000 and 100,000.

Time Constants:
Threshold $T_1$: 1 and 10 seconds
Threshold $T_2$ and $T_3$: 10 seconds

Speaker: Variable pitch output governed by radiation intensity.

Battery Supply: Two "C" size flashlight cells located in handle. On-off control by either trigger or slide switch.

Voltage Regulation: Internally generated high and low voltages are highly regulated down to 1/2 initial battery voltage.

Accessories:
Leather belt holster, thorium calibrating source, spare batteries instruction manual, foam fitted attache case.
CLAIM LOCATION MAP

SUBSTANTIAL DEVELOPMENT LIMITED PROPERTY
PALMERSTON, OSO & OLDEN TWP
COUNTY OF FRONTENAC, ONTARIO
for
KEEVIL MINING GROUP LIMITED
by
GEOGRAPHICAL ENGINEERING & SURVEYS LIMITED

SCALE: 1" = 1320'

DRAWN by: S.F.
CHECKED by: S.J.

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