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SURFICIAL GEOLOGY, BEAVER AND HELGA LAKE AREAS

SURFICIAL GEOLOGY
BEAVER AND HELGA LAKE AREAS
QUEBEC

NOVEMBER 1976

Prepared for

URANERZ EXPLORATION AND MINING LTD.
QUEBEC

by

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December 3, 1976

Mr. B. Starke,
Uranerz Exploration and Mining Ltd.,
6600 Trans Canada Highway,
Suite 210,
POINT CLAIRE, Quebec
H9R 4S2

Dear Mr. Starke:

Enclosed is our report entitled: "Surficial Geology Beaver and Helga Lake areas, Quebec". The report is divided into two parts dealing separately with Beaver Lake area and Helga Lake area. The Beaver Lake area report delineates the mineralization zone which is the source for the uraniferous erratics south of the lake.

The Helga Lake report is general in nature because of the brevity of fieldwork on our part and regional basis of exploration by Uranerz. Nevertheless, the excellent work performed by Uranerz in that area shows that a small region west of Helga Lake is most likely the source for the anomalies and the uraniferous erratics.

Yours very truly,

L. A. Bayrock

LAB/mp

L. A. Bayrock, Ph.D., P. Geol.
President

SURFICIAL GEOLOGY
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INTRODUCTION

Terms of Reference

The terms of reference were presented orally by Mr. B. Starke: (1) to investigate the surficial geology of Beaver Lake area in order to explain the occurrence of uraniferous erratics.

(2) to investigate on a reconaissance basis the radiometric anomalies in the Helga Lake region.

Fieldwork:

Fieldwork was carried out during the period of 25th to the 31st of August, 1976. Only one day was spent at Kervesa Lake camp (Helga Lake area). A typed copy of the field notes is forwarded separately to the Uranerz Mining and Exploration office in Montreal.

The short duration of the fieldwork for this study was made possible by the excellent work of Uranerz Mining and Exploration Company Ltd. in the Beaver and Helga Lake areas. Uranerz's results formed the basis for the surficial geology evaluation of the properties.

- BEAVER LAKE AREA -

SURFICIAL GEOLOGY:

Surficial geology of the Beaver Lake area has been mapped to a scale of 1:393.7 or 1 inch to 10 meters. The results of the survey are shown on Map 1, Surficial Geology of the Beaver Lake area. The mapping of the deposits and uraniferous erratics was performed by foot traverses.

Essentially two types of surficial deposits are present in the Beaver Lake area: ground moraine and hummocky moraine.

Ground moraine is a deposit of till of shallow depth and very small local relief. Generally the thickness of till in a ground moraine sheet varies from 1 to 3 meters. In the Beaver Lake area, the thickness of the ground moraine is between .5 to 2 meters. Shallow burial of the bedrock is evident by numerous outcrops in the ground moraine area.

Till is unsorted material deposited directly from the glacier. Ground moraine till is predominately of local origin. The bulk of ground moraine till is derived from glacial erosion of the bedrock from 1 to 3 kilometers in the glacial upstream direction (Kauranne 1967).

Hummocky moraine is a deposit of till of considerable thickness and high local relief. In the Beaver Lake area hummocky moraine till is over 3 meters in thickness. Patches of hummocky moraine are present on the ground moraine area and also surround it (Map 1).

Felsenmeer as defined here is an accumulation of boulders at the surface. In the Beaver Lake area felsenmeer forms a portion of the ground moraine.

Glacial advance directions in the Beaver Lake area have been determined by measurements of glacial striae on bedrock outcrops on hills in the area north and northeast of Beaver Lake. Figure 1 shows a prominent granite hill north of Beaver Lake where the majority of glacial advance directions have been measured. Table 1 gives the results of the measurements. Most of the measurements show a glacier advance from 20 to 35 degrees (N 20° to 35°E). Flutings developed on ground moraine in an area about 3 to 5 miles east and northeast of Beaver Lake show glacial advance direction of 27° (N 27° E) as determined directly from photograph #A-15588-8.

A bedrock ridge of foliated gneiss about 1 mile northeast of Beaver Lake shows 2 different glacial advance directions. The first from N 30° E and the second from N 310° E. The latter direction is considered to represent a glacial advance prior to the last or the dominant direction.

In the Beaver Lake area as shown on Map 1 glacial advance direction from N 27° E is considered to have been the direction which caused the distribution of uraniferous erratics. No noticeable effects of the former glacial advance direction has been observed on the pattern of distribution of uraniferous erratics.

Boulder counts were performed at numerous locations in the Beaver Lake and surrounding area. The results of the counts in percentages of major rock types is shown in Table 2. At each location approximately 100 boulders were determined in regards to composition. The locations of boulder counts in the Beaver Lake area are shown on the map of surficial deposits. The boulder counts in the surrounding area are not shown. (Map 1).

FIGURE 1: Granite hill north of Beaver Lake where most of glacial advance directions were measured.

TABLE 1

BEAVER LAKE - ADVANCE DIRECTIONS

	ADVANCE DIRECTION FROM	LOCATION OF MEASUREMENT	TYPE
1)	N 35° E	Top of hill 1.5 miles north of Beaver Lake	Striae on out-crop - granite
2)	N 10° E?	1.5 miles north of Beaver Lake	Indefinite scratches on polished granite
3)	N 29° E	Top of hill 1 mile North of Beaver Lake	Polished surface on granite with small grooves.
4)	N 34° E	Top of hill 1 mile North of Beaver Lake	Polished surface on granite with small grooves.
5)	N 25° E(DOMINANT)	3/4 mile north of Beaver Lake	Granite, polished striae
	N 20° E(MINOR)		
6)	N 20° E	3/4 mile North of Beaver Lake top of hill.	Striae on stoss side of hill.
7)	N 30° E	Direction of polished ridge 1 mile northeast of Beaver Lake	Direction of ridge.
8)	N 310° E	Above ridge	Striations, old advance.
9)	N 27° E	From photograph A-15588-8	Direction of glacial flut-ings.

TABLE 2

BEAVER LAKE - BOULDER COUNTS

(In Percent)

COUNT NO.	GRANITE	GNEISS	PEGMATITE	OTHERS	TOTAL
4-2	13	84	3		100
5-1	12	84	4		100
5-2	23	75	2		100
5-3	23	37	40		100
6-1	82	18	-		100
51-1	51	38	11		100
52-1	78	16	6		100
55-1	80	14	4	2	100
56-1	48	49	3		100
57-1	58	35	7		100
63-1	52	18	30		100

The distributions of compositions of the boulder counts are shown in Figure 2. The boulder counts from ground moraine in the Beaver Lake area (51, 56, 57) are positioned close together near the centre of the diagram. The counts from hummocky moraine in the Beaver Lake area (52, 55) are positioned near the top of the diagram. The two groupings show that the composition of the hummocky moraine and ground moraine is significantly different in the Beaver Lake area. The Beaver Lake area is underlain by gneiss and consequently the ground moraine shows a high percentage of that rock type. Hummocky moraine represents material of relatively distant origin and consequently in the Beaver Lake area it has only minor gneiss. A grouping of boulder counts with a high percentage of gneiss comes from an area to the northeast of Beaver Lake which is underlain by that rock type.

The boulder counts show that in the Beaver Lake area ground moraine reflects local bedrock and hummocky moraine does not.

Uraniferous Erratics

All uraniferous erratics, locations of high radioactivity, radioactive outcrops, and non radioactive outcrops in the Beaver Lake area are shown by consecutive numbers on the accompanying map of Surficial Deposits (Map 1). The outcrops are shown on the map as squares. 58 separate uraniferous erratics and high count locations are shown on the map (Map 1). Of these, 52 are erratics with significant radiometric counts. Table 3 gives the descriptions, size, and scintillometer counts per second of the boulders and the "hot spots". For detailed descriptions the reader is referred to the transcript of the field notes.

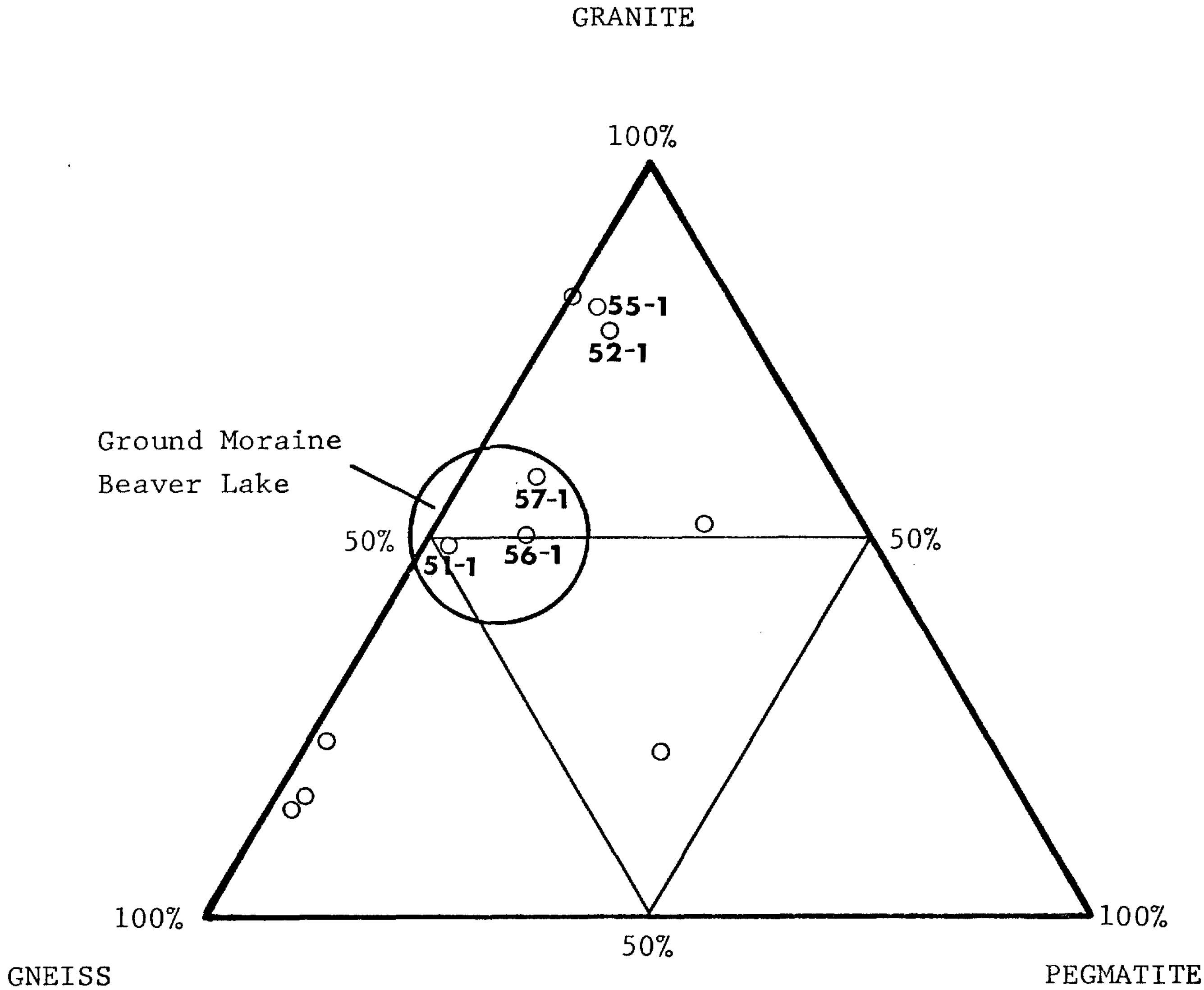

FIGURE 2: Boulder Counts, Lithologic Distribution.

TABLE 3

BEAVER LAKE - URANIFEROUS ERRATICS

No. of Uraniferous erratics	Size-vol. in decimeters	Rock type	Counts/second max.	Counts/second min.
1	6.75	Gneiss,biotite	3,500	not measured
2	76.0	Gneiss, biotite, barite veins	6,000	not measured
3	200.0	Gneiss, biotite, quartz vein, barite veins.	6,000	1,000
3a	not seen	not seen	2,000	not measured
3b	" "	" "	+1,000	" "
4	400.0	Breccia, barite veins	15,000	1,500
5	112.0	Breccia, Barite veins yellow stains	15,000	15,000+
6	160.0	Gneiss	2,500	400
7	4.5	Breccia, barite veins	1,600	500
8	672.0	Pegmatite	1,100	200
9	455.0	Breccia, barite veins yellow stains	15,000	10,000
10	36	Breccia	175	not measured
11a	12	Breccia	175	" "
11b	96	Breccia, barite veins, yellow stains	15,000	10,000

Table 3 - ii

No. of Uran-iferous erratics	Size-vol. in decimeters	Rock Type	Counts/second max.	min.
12	16.0	Gneiss	5,000	2,500
13	90.0	Gneiss	10,000	3,000
14	36.0	Breccia, barite veins	3,200	2,500
14a	180.0	Gneiss, bar-ite veins	800	300
16	72.0	Gneiss, yellow stains	3,000	900
16a	very small broken pieces	Gneiss	600	not meas-ured
17	2.0	Gneiss, yellow stains	8,000	" "
18	60.0?	Breccia, yellow stains barite	7,000	" "
19	576.0	Gneiss, yellow stains (brecciated one side)	4,000	1,000
21	24.0	Breccia, yellow stains	3,000	2,000
23	10.0?	Breccia, barite veins	3,000+	not meas-ured
28	----	hole in ground	6,000	" "
29	300.0	Breccia	10,000	2,500
30	80.0	Pegmatite	1,200	1,200
31	72.0	Gneiss, barite veins	15,000+	2,000

Table 3 - iii

No. of Uran-iferous erratics	Size-vol. in decimeters	Rock Type	Counts/second max.	min.
32a	8.0	Breccia, barite veins	2,000	not meas-ured
32b	1.0	Breccia, barite veins	1,250	" "
33	27.0	Gneiss, same breccia barite veins	2,000+ broken up	" "
34	60.0	Gneiss and pegmatite	2,000 on peg.	" "
35	480.0	Gneiss, yellow stains	3,00 0	3,000
36	72.0	Gneiss, with quart-zite, barite	3,000	500
37	45.0	Gneiss, with quartzite, barite	2,500	500
38	not measured	Gneiss, breccia, bar-ite veins	2,500	500
39	" "	Gneiss	750	not meas-ured
40	288.0	Gneiss	1,000	150
41	not seen	hole in ground	1,000	not meas-ured
42	" "	Gneiss	12,000	" "
43	288.0	Gneiss, barite veinlets brecciated on one side	2,500	" "

Table 3 - iv

No. of Uran-iferous erratics	Size-vol. in decimeters	Rock Type	Counts/second max.	min.
45	9.0	Breccia, barite veins	14,000	14,000
46	96.0	Gneiss, brecciated on side. barite veins.	13,000	not meas-ured
47	4.0	Breccia, barite veins	2,000	" "
48	16.0	Gneiss, barite veins yellow stains	10,000	" "
49	30.0	Gneiss	500	" "
50	87.0	Gneiss, barite veins	not meas.	" "
51	?	Hole in ground	1,100+	" "
52	?	Gneiss barite veins	3,500	" "
54	6.0	Gneiss, yellow stains	7,000	" "
55	12.0	Gneiss, barite veins	1,500	" "
56	2.5	Breccia, barite veins	5,000	" "
57	not seen	High count in stream	1,000+	" "
58	3.5	Gneiss, barite veins	3,800	" "
59	27.0	Gneiss, barite veins	3,200	450

Table 3 - v

No. of Uraniferous erratics	Size-vol. in decimeters	Rock Type	Counts/second max.	min.
60	60.0	Breccia, barite veins	6,000	not measured
61	1.5	Breccia, yellow stains barite veins	2,500	" "

Three types of lithologies are represented in the uraniferous erratics: gneiss, breccia, and pegmatite. Gneiss is dark biotite and hornblende gneiss, massive, with rare to numerous pegmatitic lenses. Where the pegmatite lenses are numerous, the gneiss may approach a migmatite in appearance.

The breccia is composed of angular fragments of gneiss cemented by barite which is brown to red in color. The individual breccia fragments vary from 1 to over 10 centimeters in long diameter. Figure 3 shows uraniferous erratic #14 which is gneiss breccia cemented by barite. Figure 4 shows uraniferous erratic #9 which is a very coarse breccia cemented by barite. Erratics #8 and 30 are massive granite pegmatite with no barite. Out of the total of 52 uraniferous erratics examined in the Beaver Lake area, 31 are massive gneiss, 19 are breccia and only 2 are pegmatite. One of the pegmatite erratics (#8) is a small pegmatite lense attached to massive gneiss.

Uranium Mineralization in the Erratics:

Most of uranium mineralization in uraniferous erratics is associated with barite. Barite occurs as small to medium size reddish to brownish veinlets cementing the breccia or as separate veinlets in otherwise massive gneiss. Yellow uranium stains are present in cracks. Barite is fine to very fine grains but occasionally it may form crystals several centimeters across as in erratic #5. Vugs are present occasionally in the barite veins.

Not all of the barite mineralization is associated with uranium. Erratics #10 and 11a are examples of barite cemented breccia which is not radioactive. The largest breccia erratic is #9 (Figure 4) and it has a size of approximately 130 X 70 X 50 centimeters, and a volume of .455 cubic meters.

FIGURE 3: Uraniferous erratic #14, angular gneiss breccia with barite matrix, 3,200 cps.

Overall view

Close-up showing yellow staining.

FIGURE 4: Uraniferous erratic #9, gneiss breccia with barite matrix, 15,000+ cps.

Uraniferous erratic #39 (Figure 5) is massive gneiss with a reddish quartzite slab. The quartzite is mineralized specifically on the contact with the gneiss. A similar situation was observed in uraniferous erratic #43 where on one side of a very large gneiss boulder a lense of quartzite was adjacent and also slightly mineralized.

The above two erratics show that the gneiss is in fact the metasediment.

The numerous uraniferous erratics of breccia have in size no equivalent breccia observed in the outcrops. Specifically, uraniferous erratic #9, Figure 4, has the shortest dimension of 50 centimeters. In the outcrops similar breccia was always less than 10 centimeters in thickness. Thus it may be stated that large brecciated zones with corresponding barite and uranium mineralization as observed in the erratics has not been found as yet.

All of the outcrops examined were mainly massive gneiss with fractures and only minor breccia. Uraniferous erratics show that 40 percent of the erratics examined were breccia. Thus it may be said that breccia horizons form a substantial portion of the mineralized zone.

In the area north of the baseline up to Beaver Lake a very detailed prospecting did not reveal any uraniferous erratics north of the projected strikes of the joints and fractures. This fact is self-evident by examining the distribution of uraniferous erratics as shown on Map 1. Thus it may be stated that the origin of the uraniferous erratics in the Beaver Lake area is the set of mineralized fractures south of the Lake. #57 is a hot spot in stream, it may be outcrop or an erratic. If it is an erratic, it would point to additional mineralization north of projected strikes.

FIGURE 5: Uraniferous erratic #39, massive gneiss with quartzite layer.

- BEAVER LAKE AREA -

BEDROCK:

Mineralized and non-mineralized bedrock outcrops occur in the Beaver Lake area and are shown on the accompanying maps with consecutive numbers and a square outline. Outcrop #15 is composed of 3 segments #A, B, and C. The three outcrops are shallow excavations through the till. The outcrops are massive gneiss with fractures running through the centre. The fracture is mineralized and has barite veinlets. The strike of the fractures is 75°. Detailed descriptions of the outcrop are contained in the field notes. Figure #6 shows outcrop A. Figure #7 shows outcrop C : the fracture with barite veinlets are about 15 centimeters wide; a similar fracture is found only 15 centimeters south of the main fracture and is also mineralized with uranium and barite. The strike and dip of the massive gneiss foliation is N 75° E and 80° North. A small pocket of gneiss breccia is present in outcrop A. The pocket is about 5 centimeters wide with a barite matrix.

Outcrop #53 is a ledge of massive gneiss with numerous barite veinlets. The barite veinlets form up to 30 percent of the total rock on the east face. A high count of 1,500 cps was present only in one location of this outcrop. The rest of this outcrop had normal background and the barite veinlets did not have uranium mineralization associated with them. The strike and dip of the gneiss is similar to outcrop #15.

This group of small outcrops represents massive gneiss with small fractures parallel to the foliation and filled with barite which may or may not be mineralized.

Outcrop #20 was composed of 2 sections (20a and 20b). Figure #8 shows the outcrop before blasting. A trench was blasted

FIGURE 6: Outcrop 15a; gneiss with mineralized fracture containing barite and uranium; small product of breccia.

FIGURE 7: Outcrop 15c, gneiss with mineralized fracture containing barite and uranium.

Outcrop #20a

Outcrop #20b

FIGURE 8: Outcrop 20a and 20b, massive gneiss with mineralized fractures containing barite and uranium, before blasting.

to expose the bedrock. The trench was 17.5 meters long and is shown on Map 1. Detailed description of the bedrock encountered in the trench is given in the fieldnotes. The bedrock is massive gneiss with foliation at a strike of approximately 75^{o} and a dip which is variable being close to vertical or slightly to the north. Mineralized fractures with barite and uranium occur in the blasted outcrop. The dip and the strike of the mineralized zones is parallel to the foliation. 5 separate fractures 1 - 5 centimeters wide were encountered in the trench. The fractures had barite mineralization in them. At the baseline and at 9.6 meters north of the baseline, counts of over 1000 were associated with fractures. Before the blasting a high count of 1500 was observed on the fracture at the baseline. A minor zone of breccia was also present at the baseline before blasting.

This outcrop represents massive gneiss with fractures parallel to the foliation and striking more-or-less at 75^{o}, The fractures are mineralized with barite which may contain some uranium.

Outcrop #22 is made of two portions, A and B. These small excavated outcrops are massive gneiss with barite veinlets. A count of over 15,000 cps is associated with barite veinlets. The strike of the barite veins is 75^{o} and dip 70^{o} north or parallel to the foliation of the gneiss. This set of outcrops is massive gneiss with fractures parallel to the foliation which are mineralized with barite and uranium.

Outcrops #24, 24a and 25 are gneiss. The outcrops were not properly exposed. They are gneiss with foliation more-or-less striking at 75^{o} east. This set of outcrops probably represents again massive gneiss with one major fracture parallel to the previously discussed but not connected with it.

Outcrop #26 as described here to be composed of 4 separate units #A,B,C and D and may be considered at one outcrop. This set of outcrops is positioned 1 - 2 meters from the centre of the baseline and is 18 meters long. It is made of massive gneiss showing one major fracture with variable strike from 60 to 80°, and having a dip close to vertical. Figure 9 shows the overall view of the outcrop. Figure 10 shows a close-up of the fracture mineralized with barite and uranium. Figure 11 shows a close-up of the barite and uranium mineralized fracture. Outcrop #27 is a small pegmatite from 30 to 40 centimeters wide and placed in massive gneiss. The strike is 65° and the dip nearly vertical. Slight uranium mineralization is present at the pegmatite-gneiss contact.

Outcrops #44a,b,and c are non-mineralized outcrops of gneiss containing small and numerous pegmatites. These outcrops resemble migmatite.

The bedrock of the area of Beaver Lake as shown on Map 1 consists of massive gneiss having a foliation of strike 75° east and of nearly vertical dip. Numerous small fractures parallel to the foliation are present near Beaver Lake. The fractures are filled with barite and may have uranium mineralization. The uranium mineralization is not continuous along the fractures and is not always associated with barite.

The direction and projection of the mineralized fractures is shown by lines and dots on Map 1. It is evident that the mineralized fractures are covered by hummocky moraine in the eastern and western extension. The hummocky moraine covers effectively all traces of the mineralized fracture as it is over 3 meters in thickness.

FIGURE 9: Overall view of outcrop #26a.

FIGURE 10: Outcrop 26a, close-up view of mineralized fracture.

FIGURE 11: Close-up view of mineralized fracture of outcrop 26d.

- BEAVER LAKE AREA -

SUMMARY

The uraniferous erratics located in the Beaver Lake area are derived from a zone of parallel fractures. The fractures are mineralized with uranium and barite. The erratics show the same lithology as found in the outcrops. The size of the erratics shows that the mineralized fratures are much larger in size as seen in the available outcrops. Thus it may be said with certainty that large mineralized fractures have not been located as yet.

The mineralized fracture zone extends definitely under hummocky moraine to the east and west.

- HELGA LAKE AREA -

SOURCE OF INFORMATION:

The Helga Lake area surficial geology is evaluated on the basis of the following information received from Uranerz Mining and Exploration Company:

1. Airborne scintillation anomalies map.

2. Geochemical anomalies map.

3. Uraniferous erratics, faults and fractures, and EM anomalies.

4. Aerial photographs #A21579-12, 13, 14. The photographs show also faults and fractures outlined in colored ink.

5. A short field visit with 2 helicopter stops on August 29, 1976.

The base map for this area has been produced by an enlargement of photograph #A21579-13. The airborne anomalies map, the geochemical anomalies map, and the uraniferous erratics map have been reduced to the scale of the enlarged aerial photograph. The separate maps are shown as mylar overlays to the airphoto enlargement.

Fieldwork Results:

Two helicopter landings were performed in the Helga Lake area. The first on the west shore of the lake on line 2800 west and 500 south. At this location a count of the boulders at the lake shore was performed (39-1). A pebble and boulder count was also performed at line 2800 west and 300 south (40-1 and 40-2).

The second landing was at line 5000 west and 700 south. At this location a pebble and boulder count was also performed. (41-1 and 41-2). The results of the counts are given in Table 4.

At the first location, 39-1, on the shore of Helga Lake a boulder count was performed in an area resembling felsenmeer. All the boulders were at least .5 meters in diameter. The predominant lithology was granite followed by pegmatite and granite, and lastly pegmatite. At a location approximately 200 meters west of the shore of Helga Lake a pebble count was performed on small pebbles in till and on boulders in the surrounding area. These two counts have numbers 40-1 and 40-2 respectively. It is seen from the counts that sedimentary rocks such as sandstone, quartzite and siltstone predominate in the pebble fraction. Pegmatite pebbles are also present in a high proportion in the pebble fraction. These two counts show that sedimentary rocks and pegmatites are softer and have been ground up by the glacier faster than the granites.

At the second pebble and boulder count location, similar percentages of rocks have been encountered. In the pebble counts, sedimentary rocks and pegmatite predominate. Again, this shows that pegmatites and sedimentary rocks were less resistant to glacial grinding.

TABLE 4

HELGA LAKE AREA - PEBBLE AND BOULDER COUNTS
(In Percentage)

No. of Count	Granite	Pegmatite and Granite	Pegmatite	Sedimentary ss. qtzt. si.s.	Gneiss	Gabbro
39-1 Boulder	61	23	15	--	1	--
40-1 Pebble	3	--	36	59	--	2
40-2 Boulder	46	20	27	7	--	--
41-1 Pebble	18	--	41	37	1	3
41-2 Boulder	45	9	34	10	2	--

Note: 40-1 and 40-2 are from the same location and
41-1 and 41-2 are from the same location.

ANALYSES OF DATA

Surficial deposits of the Helga Lake area have been interpreted from aerial photographs and the results are shown on Map 2. Three diffierent types of deposits are recognized: ground moraine, hummocky moraine, and glacial outwash. Ground moraine is a deposit of till of shallow depth and low local relief. The thickness of the till in the ground moraine area in Helga Lake region is from 1 to 3 meters. Most of the ground moraine materials are derived from local bedrock from 1 to 3 kilometers in the glacial upstream direction.

The hummocky moraine in the Helga Lake region is from 3 to 10 meters in thickness and has a local relief of over 3 meters. It is made of till of relatively farther derivation as compared to the ground moraine.

Glacial outwash is present on the eastern side of Helga Lake. It is made of gravel with sand matrix and in thickness it may exceed 10 meters. The materials composing the outwash plain have been derived from bedrock relatively farther positioned as compared to the ground moraine.

Glacial advance direction for the purpose of this study has been measured from glacial lineations and flutings in the area. Glacial advance directions as measured by Uranerz in an area a few kilometers north of Helga Lake are from 25^o to 40^o east. An old glacial advance direction at the same location has been measured as being 80^o east.

Airborne scintillation anomalies map, geochemical anomalies map, and uraniferous erratics (Map 3, 4 and 5 respectively) are shown as overlays to the enlargement of aerial photograph A21579-13. By superimposing Map 3, 4 and 5, it was possible to draw the outlines of an anomalies fan. The outlines of the fan are shown on Map 5.

Major concentration of anomalies is present near the apex of the fan or on the west side of Helga Lake. The anomalies gradually diminish in intensity towards the southwest. Uraniferous erratics are present in higher concentrations near the apex of the fan. No uraniferous erratics are present at the apex.

The centre line of the fan is the same as the glacial advance direction as determined from aerial photographs. This advance direction is similar to the latest glacial advance direction as measured by Uranerz. It is believed that the old glacial advance direction of 80° east has no bearing on the anomalies or uraniferous erratics.

Most of the fan is positioned on ground moraine. Ground moraine is of relatively local derivation and consequently the anomalies fan should reflect anomalies of the bedrock and the erratics mineralization near the apex of the fan. The northeastern border of the fan crosses the boundary of hummocky moraine. It would be desireable to accurately map the distribution of hummocky moraine in the field as the photographs are of poor quality.

The concentration and number of uraniferous erratics within the fan area is very low. In areas where economic uranium deposits are present the concentration of uraniferous erratics reaches a very high proportion. In the Beaver Lake area the concentration of erratics near the ore zone is approximately

30 uraniferous erratics per hectare. In the Lake Athabasca region, the concentration of uraniferous erratics is over 120 per hectare.

The reason for the low concentration of uraniferous erratics in the Helga Lake area may be many fold. Firstly, zones of uranium mineralization may not produce the uraniferous erratics. This situation is considered to be highly unlikely. Secondly, prospecting for uraniferous erratics has not been performed in sufficient detail to show high concentrations of uraniferous erratics.

An analyses of the aerial photographs by us in order to delineate new fault and fracture areas was unsuccessful. We did not find any joints, fractures or faults on the aerial photograph which had not been already mapped by Uranerz.

- HELGA LAKE AREA -

SUMMARY AND RECOMMENDATIONS

The distribution of radiometric anomalies and uraniferous erratics in the Helga Lake area can be delineated as a glacial fan. The fan has the direction in symmetry corresponding to the glacial advance direction.

The concentration of the anomalies is located near the western shore of Helga Lake. This area is considered to be the prime source of all of the anomalies in the fan. The survey of uraniferous erratics should be in sufficient detail to delineate high concentrations of uraniferous erratics, if present.

A survey of surficial deposits of the Helga Lake area should be conducted in order to delineate in detail regions of hummocky and ground moraine and to determined the origin of uraniferous erratics.

In our opinion, the apex of the glacial fan should be investigated in detail as there may be present economic uranium deposits.