6468

# GEOCHEMICAL REPORT ON THE MIR 5, MIR 6 AND MIR 7 MINERAL CLAIMS TROUT LAKE, B.C.

ATLIN MINING DIVISION

LAT. 59°40' N; LONG. 132°45' W
N.T.S. MAP-SHEET 104N/10

for

Union Oil Company of Canada Limited

by

R.R. Culbert, P.Eng., PhD

D.G. Leighton & Associates Ltd.
Vancouver, B. C.

30 September, 1977

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GEOLOGICAL CONSULTANTS

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VANCOUVER, B.C.
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# GEOCHEMICAL REPORT ON THE MIR 5, MIR 6 AND MIR 7 MINERAL CLAIMS TROUT LAKE, B.C.

## INTRODUCTION

This report describes the results of a geochemical survey completed over parts of the MIR 5 - 7 mineral claims. Work was part of a larger program of uranium exploration covering the MIR property (MIR 1 - 13 claims) and surrounding area. Field work was done at intervals in the Fall of 1976 and Summer of 1977.

Conclusions set forth in this report are based on geochemical results combined with geological and prospecting data, including ground based radiometric measurements.

## SUMMARY AND CONCLUSIONS

1. The MIR 5 - 7 mineral claims (comprised of 20 units each) held by Union Oil Company of Canada Limited are situated approximately 30 miles east of Atlin, British Columbia.

2. Granitic rocks of Upper Cretaceous or possibly Tertiary age underlie the claims.

3. Work carried out to date has consisted mainly of geochemical sampling and prospecting with hand-held scintillometers.

4. Geochemical results indicate areas with highly anomalous values in lead, silver, arsenic as well as uranium.

5. Potential exists for chemically complex types of primary uranium mineralization and also for secondary deposits.

Respectfully submitted,

R.R. Culbert, P.Eng., PhD

PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA R. R. CULBERT

30 September, 1977

## GENERAL DESCRIPTIONS

### Location and Access

The MIR property is located in the northwestern portion of British Columbia 30 miles east of Atlin. The MIR 5 - 7 claims are situated at the southeast corner of the group near Trout Lake. Geodetic coordinates are $59^{o}40'$ N, $132^{o}$~~45~~' W.
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The area is presently accessible from Atlin by helicopter or float plane which can land on Trout Lake.

The MIR 5 - 7 claims are situated mainly within the Trout Lake valley, a marshy area with limited rock exposure and scrub timber (see index map following page 3).

### Background

The original MIR claims (MIR 1 - 4) were staked during the Spring of 1976 to cover geochemical anomalies and radioactive areas centering on the "Radon Cirque" and near timberline on the west flank of the Trout Lake valley. Later it was discovered that important geochemical anomalies also occurred along the adjacent western margin of Trout Lake valley (graben), especially the marginal fault lineament. MIR claims 5 to 7 inclusive were staked in August of 1976 to cover much of the lineament. Hosford, Impy and Welter Ltd. were employed for this staking. Immediately following, most of the remaining graben area was staked by Cordilleran Engineering Ltd. for the "Bath 1976 Uranium Partnership". Placer Development Ltd. carried out exploration work on the BATH syndicate claims this season.

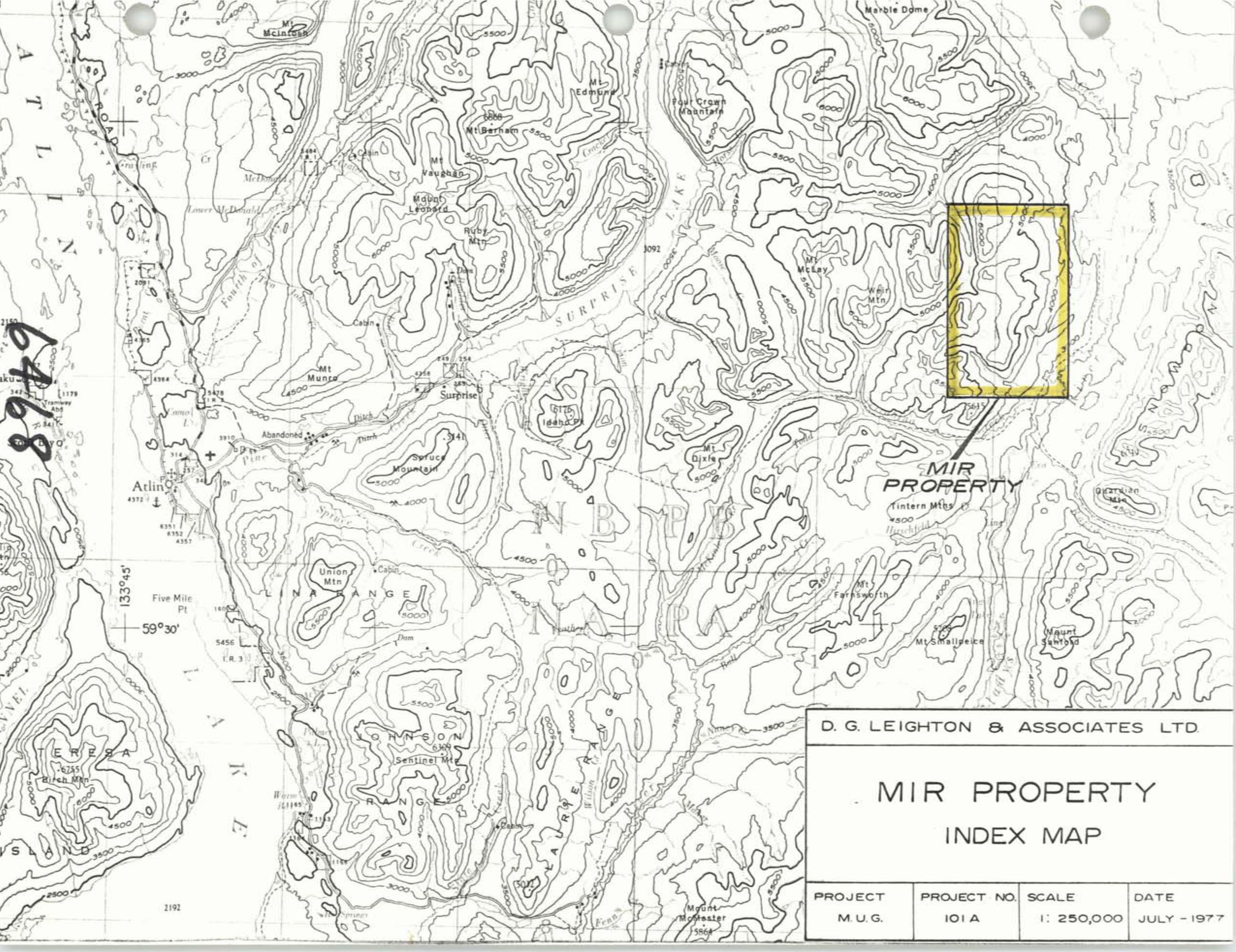
### Glacial Features

Glacial features of the MIR property and surrounding area were determined mainly from a study of airphotos. Results are shown on an accompanying map entitled MIR Property - Glacial Features (in pocket).

### Claims

The MIR property consists of 13 claims held by Union Oil Company of Canada Limited. This report describes work done on the east side of the MIR property on the following claims:

| Mineral Claims | Units | Record No. | Record Date | Expiry Date |
|---|---|---|---|---|
| MIR 5 | 20 | 125 | Sept. 17, 1976 | Sept. 17, 1978 |
| MIR 6 | 20 | 126 | Sept. 17, 1976 | Sept. 17, 1978 |
| MIR 7 | 20 | 127 | Sept. 17, 1976 | Sept. 17, 1977 |

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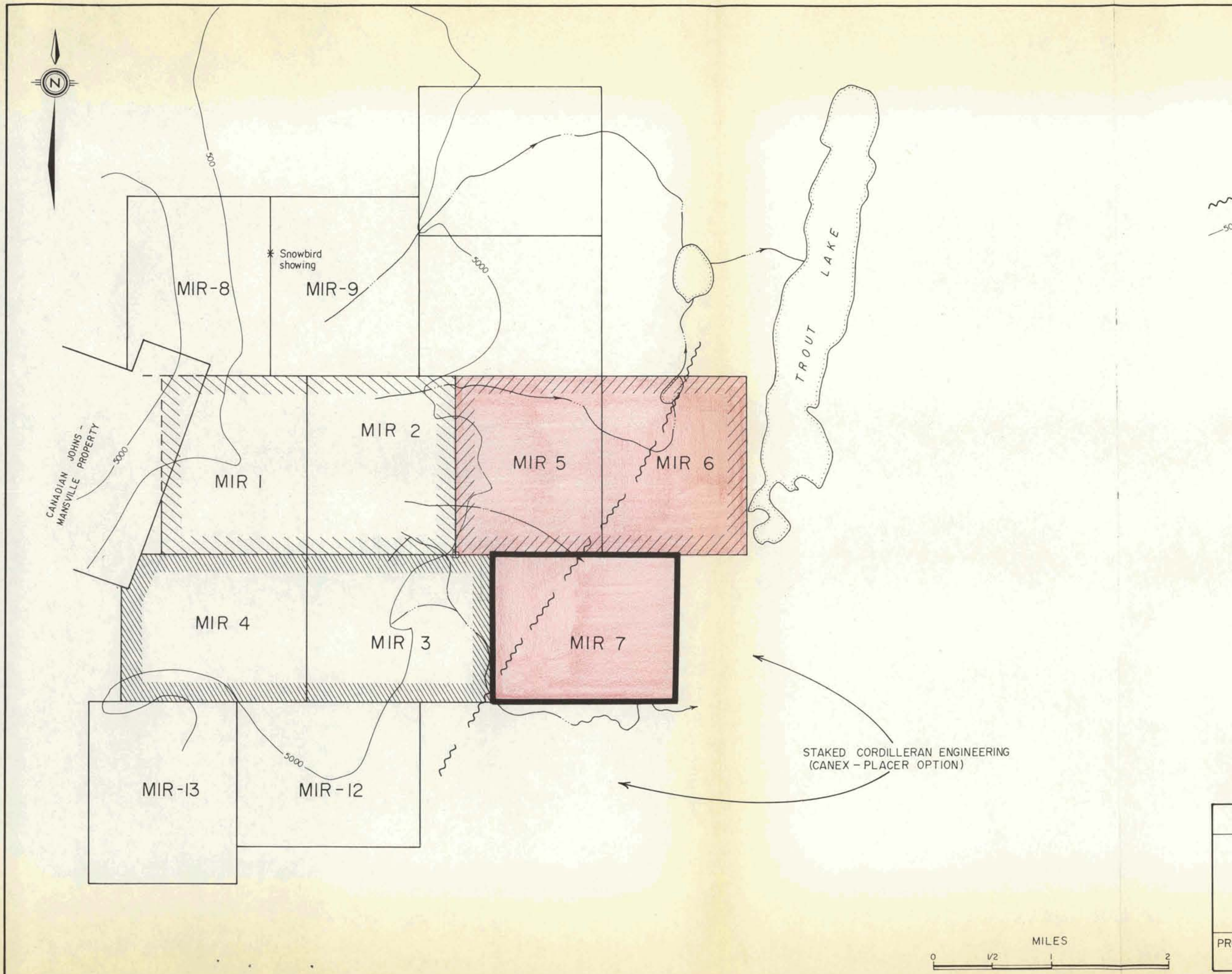
# MIR PROPERTY

## INDEX MAP

| PROJECT | PROJECT NO. | SCALE | DATE |
| --- | --- | --- | --- |
| M.U.G. | 101 A | 1: 250,000 | JULY - 1977 |




MINERAL RESOURCES BRANCH
ASSESSMENT REPORT
NO. 6468

| D. G. LEIGHTON & ASSOCIATES LTD. | | |
|---|---|---|
| MIR PROPERTY CLAIMS | | |
| PROJECT M. U. G. | SCALE 1:50,000 | DATE OCT., 1977 |

## REGIONAL GEOLOGY

The Atlin granite (or Surprise Lake Alaskite) body is a major intrusion of muscovite - biotite granite measuring approximately 10 km. by 30 km., elongated in an east - west direction. It is intruded almost entirely into metamorphic rocks of the Cache Creek group, largely greenstones, dirty cherts and silicous argillites, with minor limestone. The Trout Lake graben bisects the pluton, and along its eastern side, Cache Creek roof rocks are exposed on the floor of Trout Lake valley. On the western side of the graben, in the region concerned in this report, only intrusive rocks have been found in outcrop. North of Radon Creek, however, Cache Creek rock appears to form the majority of the float on the valley floor.

Heterogenity in the granite is due more to changes in crystal size than to variations in minerology. The two most common phases of granite in the graben area (as elsewhere) are of coarse grain and aplitic natures, with the aplitic phase being of higher background radioactivity. These phases are co-magmatic.

## GEOCHEMISTRY

### General

The average uranium content of the Atlin granite is close to 17 ppm, and the mode for reconnaissance stream silts for this region is close to the same. Soils in excess of 2000 ppm uranium have been encountered in a few places on the MIR 7 claim, and soils or silts from many parts of the graben margin area have been found to contain at least a few hundred ppm.

The geochemical analyses for uranium quoted in this report are designed for routine tests where expected values lie in the 0 - 50 ppm range (see Appendix for analytical procedures). For values in the 1000 plus range, accuracy of this procedure deteriorates in such a way that real values tend to be significantly higher. For geochemical exploration work it is relative rather than absolute values which are important, and the techniques followed are sufficiently informative.

Due to complex and variable soil development in the graben area, it was not always possible to collect soil samples from a characteristic horizon. In some cases material was taken from near surface using grub-hoes, and in others from more than one meter depth with augers. Where possible, organic material was avoided and "B" zone soil was sampled. In all cases weight per volume measurements were made on the sample pulps, which gives an indication of organic content, and this parameter was used in the interpretation of results.

Geochemical work on the graben flank in 1977 was of a "follow-up" nature, as opposed to detailed grid work done to define drill targets in the adjacent Radon Cirque area. Answers were specifically sought to the following questions:

1. Distribution and extent of anomalies
2. Relation of anomalies to structure
3. Relation of geochemistry to radioactivity
4. Relation of uranium anomalies to those of other elements
5. Extent of environmental control, particularly the effect of organic materials on spring waters
6. Possibility of economic uranium concentrations as secondary deposits.

Results

The above points will now be discussed in order.

1. Distribution

Silt and wet soil anomalies were found through the entire length of the graben margin examined (approximately 5 km.) and apparently extend beyond in both directions. In addition, substantial anomalies were encountered on the valley flank to west of the margin lineament, both in streams descending from Radon Cirque and from sediments or soils of apparent local derivation. Little work has been carried out to date east of the main lineament, but one radioactive and uraniferous area was discovered - the Delta Pool. Also, a major creek sampled in the northeast corner of the study area had high values in both uranium and arsenic.

In summary, a substantial portion of the water course sediments and water-affected soils in this area are highly anomalous in uranium.

2. Lineament control

In the graben margin study (as at Radon Cirque itself), there is a strong correlation between geochemical (and radioactive) anomalies and prominent lineaments or lineament intersections. It is by no means clear, however, whether this relationship is due to fault controlled mineralization (the usual site for uranium deposits in granite), or whether it is due to lineament control of water routes, swampy ground and springs. Both relationships may well be involved.

The most prominent lineaments in this area are those trending in a northeast direction, paralleling the main graben margin fault. These are cut by lineaments on a northwest trend. In the MIR - 6 area there is a chaotic pattern formed by intersections of three or more lineament sets, somewhat similar to that encountered in the Radon Cirque.

There is a disruption of the main graben margin fault in the vicinity of "Gamma Lake". This is also the area of the highest geochemistry, but unfortunately it also coincides with several large radioactive springs and with the main drainage from Radon Cirque. Hence, there is once again a question of whether structure or water transport are responsible.

### 3. Geochemistry vs. radioactivity - radon anomalies

A variety of radioactive springs, swamps and soils were encountered, and to a large extent this governed the geochemical sampling, except for stream silts. The results, however (see maps in pocket), showed a rather poor correlation between the radioactivity of soils and their uranium content. To some extent this is to be expected, due to separation of uranium from its daughter products, notably radium, during surface transport.

It would appear, however, that three radioactive zones with low uranium content, or those which are wet, involve the surfacing of radon, rather than accumulation of radium.

Samples of radioactive waters were taken from various points in the Atlin region in September of 1977 and sent to the Geological Survey of Canada in Ottawa for analyses. One of the samples from MIR - 7 (from Delta Pool) was, by a small margin, the richest of these in radon, 82,856 Picocuries per liter. This may be the highest radon measurement ever made for natural waters, according to Dr. W. Dyck, who performed the analysis. This is despite the fact that the samples were taken after a prolonged dry spell when the waters were of unusually low radioactivity. Furthermore, virtually all of the associated (but less soluble) helium had escaped from these waters, suggesting that a major portion of the original radon had de-gassed prior to collection.

Radioactivity in swampy areas is sometimes increased dramatically by a floating moss which accumulates both uranium and radon.

### 4. Other elements

Uranium is known to occur with lead in the mineral casolite on the MIR property, and to be associated closely with lead, zinc and silver mineralization at Radon Cirque. At other locations in the Atlin granite it is found with arsenic and copper as zeunerite. Extensive analysis of silt and soil samples for lead, silver, copper and arsenic (see maps in pocket) was carried out in search of evidence of these mineral associations in terms of elements less mobile than uranium in surface waters.

Lead, silver, and to a less extent copper, have high background throughout the area examined. With respect to these backgrounds, there are certain anomalous areas for each element.

a) Lead

The two "Radium" creeks descending from Radon Cirque area carry high lead values in their sediments, as do the swamps into which they drain. A similar effect is observed for a drainage system in the center of the MIR - 5 claim, and for those swamps (above the main lineament) into which it drains. Omega lineament soils farther north are also lead rich. Strangely, Radon Creek itself does not have (by comparison) high lead values in its sediments, and the intense uranium anomalies in Gamma Lake and Alpha Springs are not accompanied by lead.

b) Silver

Silver variation in these soils and sediments is not as great as with the other elements. To a major extent it seems to follow lead, but with a greater tendency to accumulate near springs. An exception is the Alpha-Beta area, where silver values are high with respect to lead.

c) Copper

Copper forms fairly well defined anomalous areas, including the Alpha-Gamma region and an area encompassing the Zeta and Theta radioactive zones and lineament samples to south thereof. The Omega zone is also copper rich.

d) Arsenic

Arsenic values in soils and sediments are more erratic than the other elements tested, and are more difficult to categorize. High values are clearly associated with the Alpha Springs area, and the Omega zone is very anomalous. In general, the northeastern part of the study area (MIR - 6) has a substantially higher arsenic background than the rest. Two single highs occur in the arsenic results, one from a swamp at base of "Radium A" creek, and the other from a large stream at the eastern edge of the MIR - 6 claim.

Special mention should be made of the Delta Pool area. Like the Omega lineament, this area was anomalous in all 5 elements analyzed. The area of radioactivity and of strong geochemical anomalies was largely determined by ground in which soils were influenced by water. However, one sample

(LIN-83) taken from a dry and only slightly radioactive lineament just above this pool had the following results: U = 1100 ppm, As = 480 ppm, Cu = 6200 ppm, Pb = 5400 ppm, Ag = 15.8 ppm. This sample very likely came from adjacent mineralization of a complex nature.

## 5. Environmental control

The most obvious control of uranium in the geochemistry of this area is by organic material. Although the regional correlation between uranium and organic material in silt samples is poor, in localities where uranium is anomalously high the greatest values are almost always associated with the more organic samples. This is presumably due to the well-known ability of organic materials to adsorb uranium from water, especially where they create reducing conditions. It is more surprising that lead, arsenic and even silver are also accumulated preferentially in some organic locations.

The underlying control in this pattern of distribution is the mobility of these elements in solution. This again is somewhat surprising, as neither lead nor silver are particularly mobile in waters of essentially neutral pH. Furthermore, tests run on the uranium content of these waters have shown them to be anomalous, but not highly so. Even the radioactive springs have seldom more than 10 ppb uranium.

Except, therefore, in areas affected by major creeks, these multielement anomalies are likely transported indications of mineralization which is at no great distance. The exceptions will be where creeks or drainages of any size first encounter swamps. The forementioned example at Delta Pool strengthens this model of limited transport.

## 6. Springs and bog deposits

Some of the most intense geochemical anomalies occur near springs, where water-borne uranium first meets organic material (and reducing conditions). A somewhat similar condition may occur where rapidly descending creeks bearing some uranium abruptly encounter a swamp. On one hand, this causes interpretative problems, as such anomalies may have been transported considerable distance by creeks or from depth in the case of springs. On the other hand, in view of the intense accumulations of uranium in this area, it is conceivable that "bog-deposits" of economic size may be involved. This would be especially feasible where spring waters ascend below a marsh.

As a preliminary investigation of these uraniferous organic areas, a series of deep auger samples were taken along the main lineament. Results were mixed, with some sites increasing in uranium downwards, and some decreasing. The situation is hence likely to be complex, and exploration will be made more difficult by the fact that several of the highest geochemical results were returned from swamp of low radioactivity. On the other hand, augering showed that the organic material along much of the west marginal lineament was not very deep.

BREAKDOWN OF COSTS - FOR ASSESSMENT PURPOSES
(Applicable to portion of work on MIR-7 claim)

| | | |
|---|---|---|
| Wages and salaries | $713.00 | |
| Benefits | 237.00 | $ 950.00 |
| Meals and accommodation | | 490.00 |
| Mobilization - mainly helicopter | | 300.00 |
| Assay costs | | 400.00 |
| Miscellaneous; includes drafting, report preparation, etc. | | 500.00 |
| TOTAL | | $2,640.00 |

## CERTIFICATION

I, R.R. Culbert, do hereby certify that:

1. I am a practicing Professional Geological Engineer with offices at 3152 West 10th Ave., Vancouver, B.C.

2. I am a graduate of the University of British Columbia, BASc. (1964), PhD (1971).

3. I have practiced mining exploration for fifteen years, most of which were based in British Columbia.

4. I am a member in good standing of the Association of Professional Engineers of the Province of British Columbia.

5. I have personally visited the MIR property and supervised exploration work carried out there.

Respectfully submitted,

R.R. Culbert, PhD, P.Eng.

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
R. R. CULBERT

30 September, 1977

PHONE 980-5814



*MIN-EN Laboratories Ltd.*
*Specialists in Mineral Environments*
Corner 15th Street and Bewicke
705 WEST 15th STREET
NORTH VANCOUVER, B.C.
CANADA

# ANALYTICAL PROCEDURE REPORTS FOR ASSESSMENT WORK

## Procedure for Thorium Analysis:

Rocks, soils and silts are prepared in the same manner as for Uranium.

2.000 g. sample is weighed and digested for 6 hours with $HClO_4$ and $HNO_3$.

After dilution to suitable volumes a chemical separation is appled to separate thorium from the many interfering elements. Finally it is precipitated and a coloured complex is formed.

After taking into solution again samples are measured on a spectrophotometer.

Results are calculated from standard graphs.

## URANIUM IN WATER

A larger and suitable filtered aliquote water evaporated to dryness and digested with perchloric acid.

After a chemical separation of Uranium similar fluorescence discs are formed as for uranium in soil procedure to obtain measurement with the Jarrel Ash instrument.

Results are calculated accordingly to the original sample aliquote is taken.

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CANADA

# ANALYTICAL PROCEDURE REPORTS FOR ASSESSMENT WORK

## Procedure for Uranium Analysis:

Rock, soil and silt samples are dried at 110°C and then rocks are crushed and pulverized to -80 mesh.

Soils and silts are sieved and the minus 80 mesh fraction is retained for analysis.

1.000 g. sub-sample is weighed and digested for eight hours with $HNO_3$ and $HClO_4$.

Then the uranium is separated chemically from other possible interfering ions as Mn,Fe, etc.

After preparation a suitable aliquote is taken and fluxed to form a 1.5 inch diameter discs in platinum dishes.

These salt discs then are compared and measured along with suitable standard with a Jarrell Ash Fluorometer.

The results are calculated accordingly to the sample aliquotes used from standard graphs.

# GEOCHEMICAL ANALYSIS BY MIN-EN LABORATORIES LTD.

Samples are processed by Min-En Laboratories Ltd. at 705 W. 15th St., North Vancouver Laboratory employing the following procedures.

After drying the samples at 95°C soil and stream sediment samples are screened by 80 mesh sieve to obtain the minus 80 mesh fraction for analysis. The rock samples are crushed by jaw crusher and pulverized by ceramic plated pulverizer.

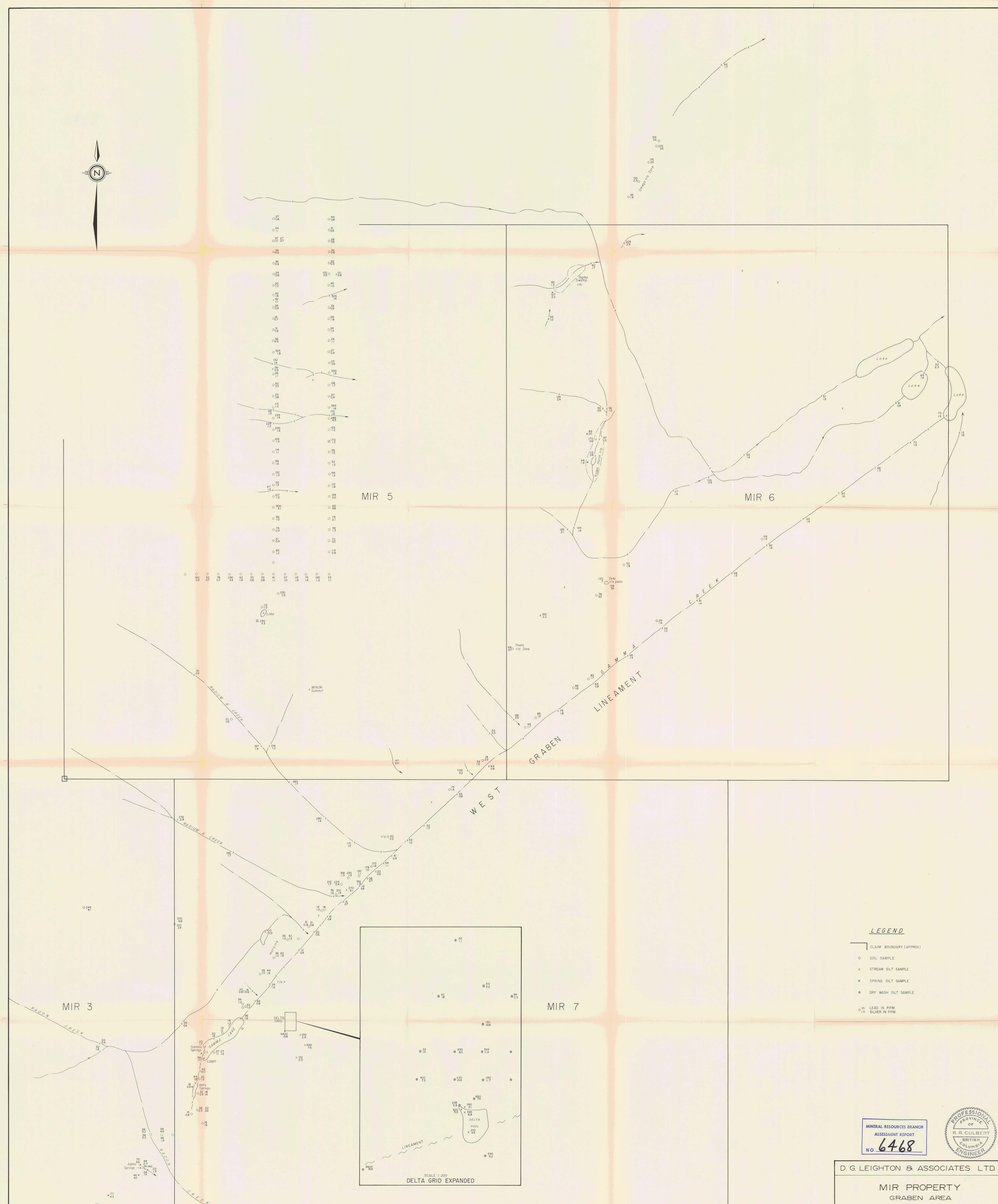
1.0 gram of the samples are digested for 6 hours with $HNO_3$ and $HClO_4$ mixture.

After cooling samples are diluted to standard volume. The solutions are analysed by Atomic Absorption Spectrophotometers.

Copper, lead, zinc, silver, cadmium, cobalt, nickel and manganese are analysed using the $CH_2H_2$-Air flame combination but the molybdenum determination is carried out by $C_2H_2$-$N_2O$ gas mixture directly or indirectly (depending on the sensitivity and detection limit required) on these sample solutions.

For Arsenic analysis a suitable aliquote is taken from the above 1 gram sample solution and the test is carried out by Gutzit method using Ag $CS_2$ N $(C_2H_5)_2$ as a reagent. The detection limit obtained is 1. ppm.

Fluorine analysis is carried out on a 200 miligram sample. After fusion and suitable dilutions the fluoride ion concentration in rocks or soils samples are measured quantitatively by using fluorine specific ion electrode. Detection limit of this test is 10 ppm F.





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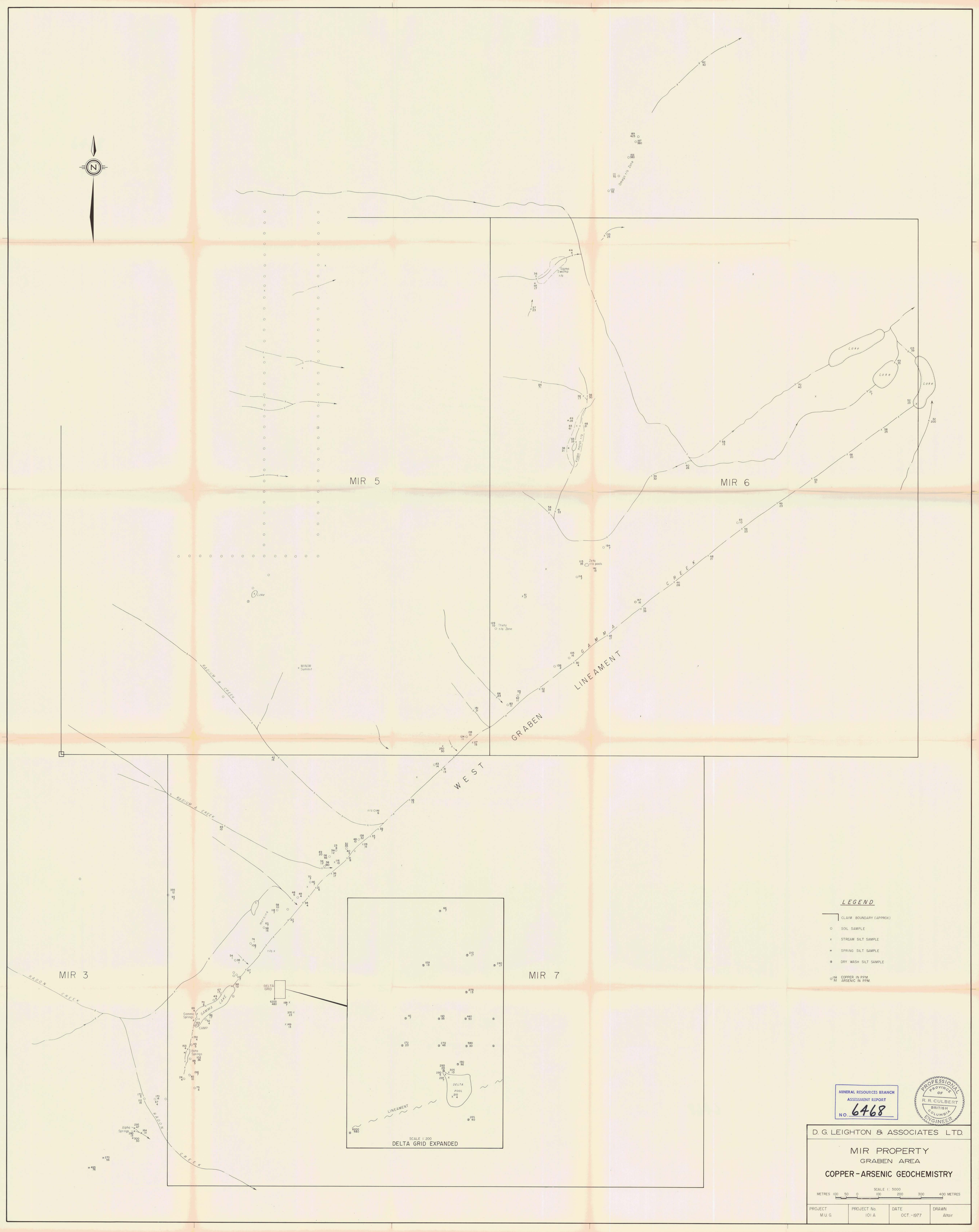
# MIR PROPERTY
## GRABEN AREA

# LEAD-SILVER GEOCHEMISTRY

SCALE 1: 5000
METRES 100 50 0 100 200 300 400 METRES

| PROJECT | PROJECT No. | DATE | DRAWN |
|---|---|---|---|
| M.U.G. | 101 A | OCT.-1977 | Altair |


MIR 5
MIR 6
MIR 3
MIR 7
WEST GRABEN LINEAMENT
GAMMA CREEK
RADIUM CREEK
RADON CREEK
MINOR Summit
DELTA GRID
SCALE 1:200
DELTA GRID EXPANDED
LINEAMENT
DELTA POOL
LEGEND
CLAIM BOUNDARY (APPROX.)
SOIL SAMPLE
STREAM SILT SAMPLE
SPRING SILT SAMPLE
DRY WASH SILT SAMPLE
158 COPPER IN P.P.M.
32 ARSENIC IN P.P.M.
MINERAL RESOURCES BRANCH
ASSESSMENT REPORT
NO. 6468
PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
R. R. CULBERT
D. G. LEIGHTON & ASSOCIATES LTD.
MIR PROPERTY
GRABEN AREA
COPPER - ARSENIC GEOCHEMISTRY
SCALE 1: 5000
METRES 100 50 0 100 200 300 400 METRES
PROJECT
M.U.G.
PROJECT No.
101 A
DATE
OCT.-1977
DRAWN
Altair


TRAPPER CREEK
FLAT
TRAPPER LAKE
ZENAZIE CREEK
SNOW BIRD SHOWING
ice ?
RADON CIRQUE
RADON CREEK
APPROXIMATE BOUNDARY OF MIR PROPERTY
LEGEND
O Organic
R Bedrock
C Colluvium
F Fluvial (Recent)
F^G Fluvial Glacial
M Moraine
Ff Fluvial fan
Lineaments
Fault (position approximate) from Aitken
Cirque
Glacial channels
C/R Colluvium over bedrock
C:R Colluvium & bedrock at surface in equal amounts
C>R Colluvium greater
MINERAL RESOURCES BRANCH
ASSESSMENT REPORT
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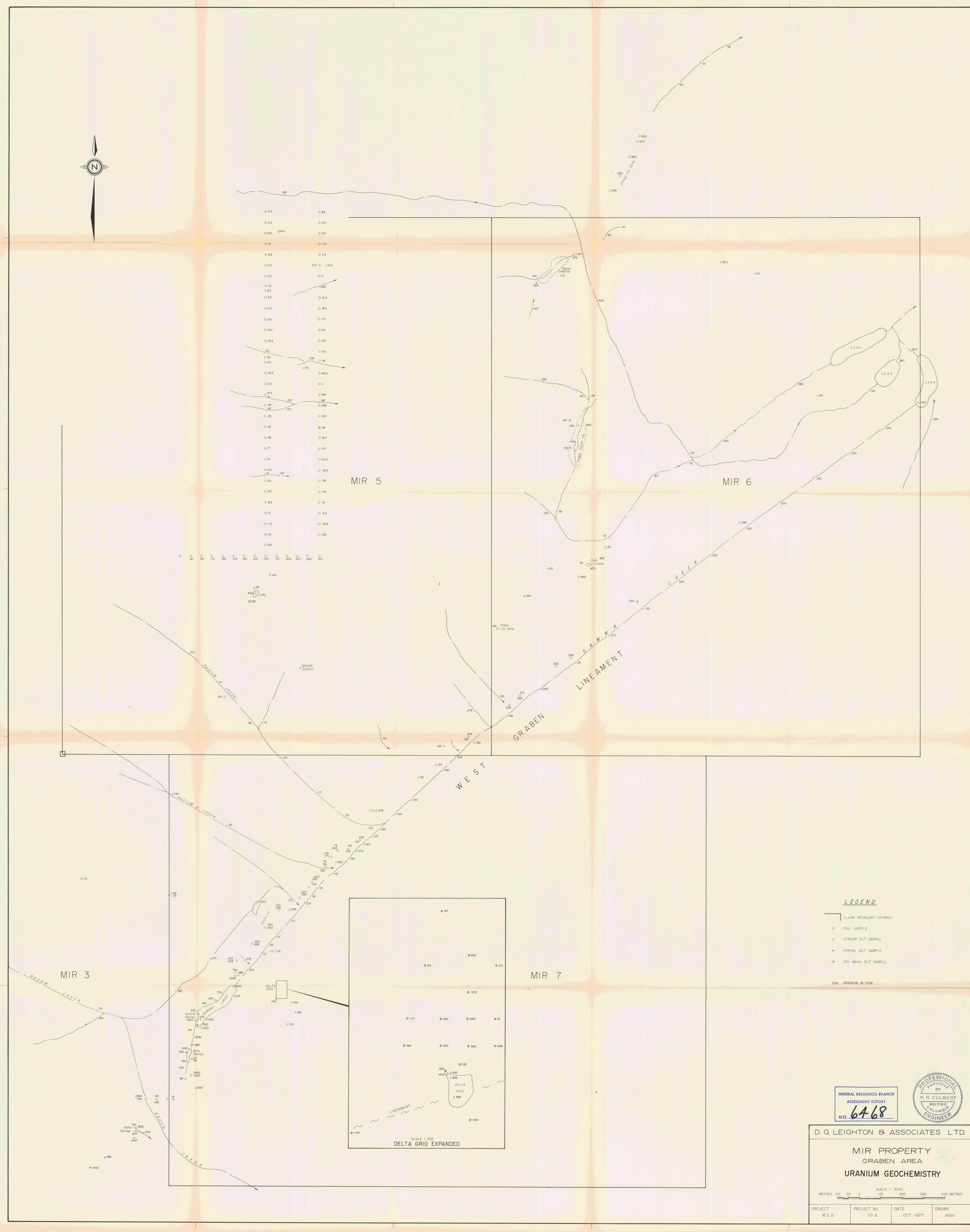
PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
R. R. CULBERT
D. G. LEIGHTON & ASSOCIATES LTD.
MIR PROPERTY
GLACIAL FEATURES (AND LINEATIONS)
SCALE
FEET 1000 500 0 1000 2000 FEET
PROJECT M.U.G.
PROJECT No. 101 A
DATE OCT. 1977
DRAWN Altair


MIR 3
MIR 5
MIR 6
MIR 7
WEST GRABEN LINEAMENT
GAMMA CREEK
RADIUM A CREEK
RADIUM B CREEK
RADON CREEK
DELTA GRID
SCALE 1:200
DELTA GRID EXPANDED
DELTA POOL
LINEAMENT
CAMP
MINOR Summit
LEGEND
CLAIM BOUNDARY (APPROX)
SOIL SAMPLE
STREAM SILT SAMPLE
SPRING SILT SAMPLE
DRY WASH SILT SAMPLE
53 URANIUM IN P.P.M.
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PROFESSIONAL PROVINCE OF R. R. CULBERT BRITISH COLUMBIA ENGINEER
D. G. LEIGHTON & ASSOCIATES LTD.
MIR PROPERTY
GRABEN AREA
URANIUM GEOCHEMISTRY
SCALE 1: 5000
METRES 100 50 0 100 200 300 400 METRES
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