MOUNTAINEER MINES LTD. - PAN OCEAN OIL LTD.

JOINT VENTURE

PRELIMINARY GEOLOGICAL REPORT

ON THE

RAD 1-24 MINERAL CLAIMS

N.T.S. 106-E-1
106-D-16

65°00'N 134°22'W

YUKON TERRITORY

November, 1977

by

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090287

This report has been examined by the Geological Evaluation Unit and is recommended to the Commissioner to be considered as representation work in the amount of

$2400.00

Resident Geologist or
Resident Mining Engineer

Considered as representation work under Section 53 (4) Yukon Quartz Mining Act

B. R. BAXTER
Supervising Mining Recorder

for Commissioner of Yukon Territory

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APPENDICES

1.0 INTRODUCTION

The RAD 1-24 mineral claims were staked on August 6, 1976 by Harman Management Ltd. to cover uranium showings discovered during a regional prospecting program carried out for Mountaineer Mines Ltd. A brief investigation of the property was conducted by Harman Management Ltd. subsequent to staking the ground.

Pan Ocean Oil Ltd. of Calgary acquired majority interest in the claims in the fall of 1976.

During the period August 18 to September 2, 1977 preliminary geologic mapping and additional prospecting were carried out in the claims area by Pamicon Developments Ltd.

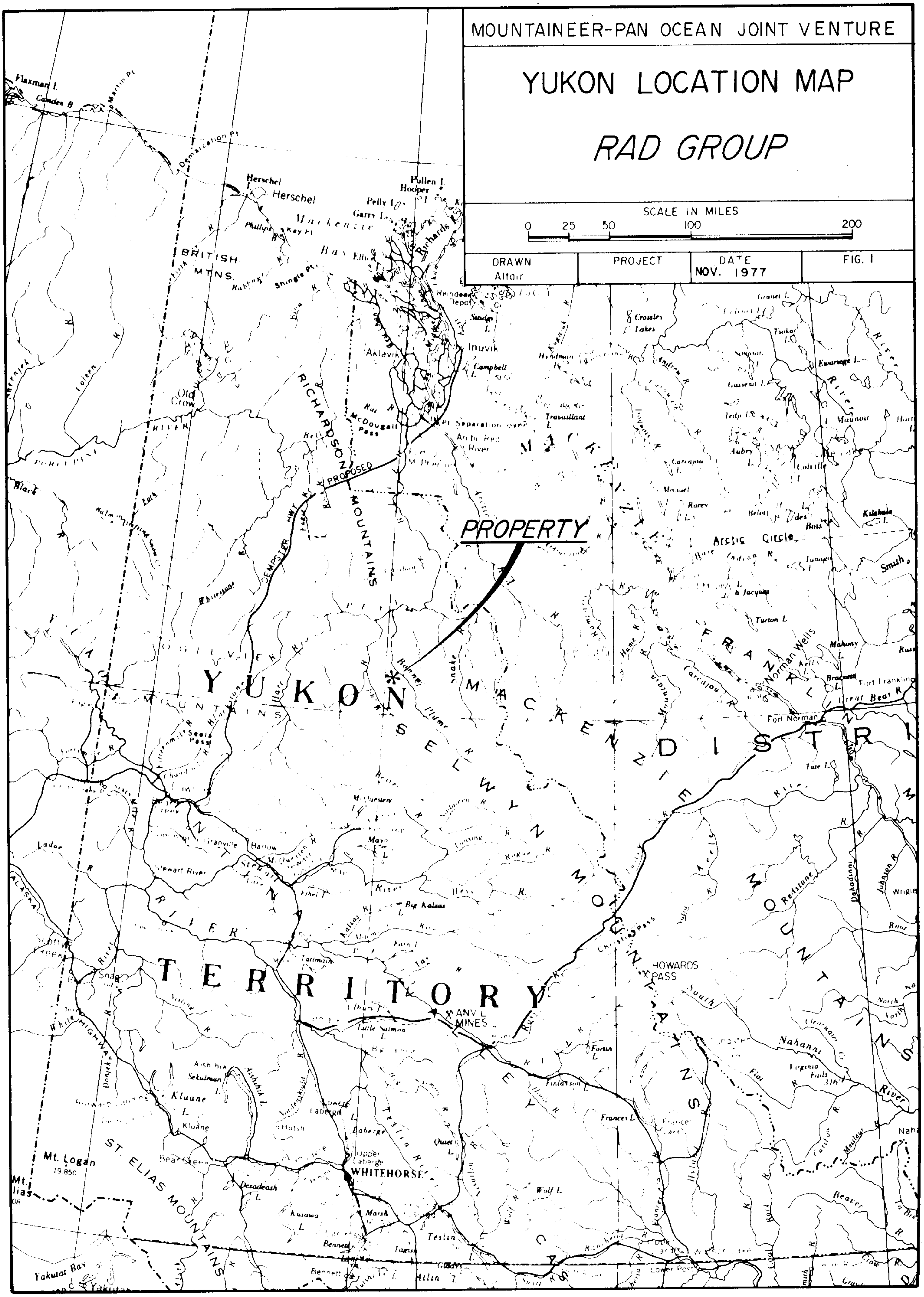
2.0 LIST OF CLAIMS

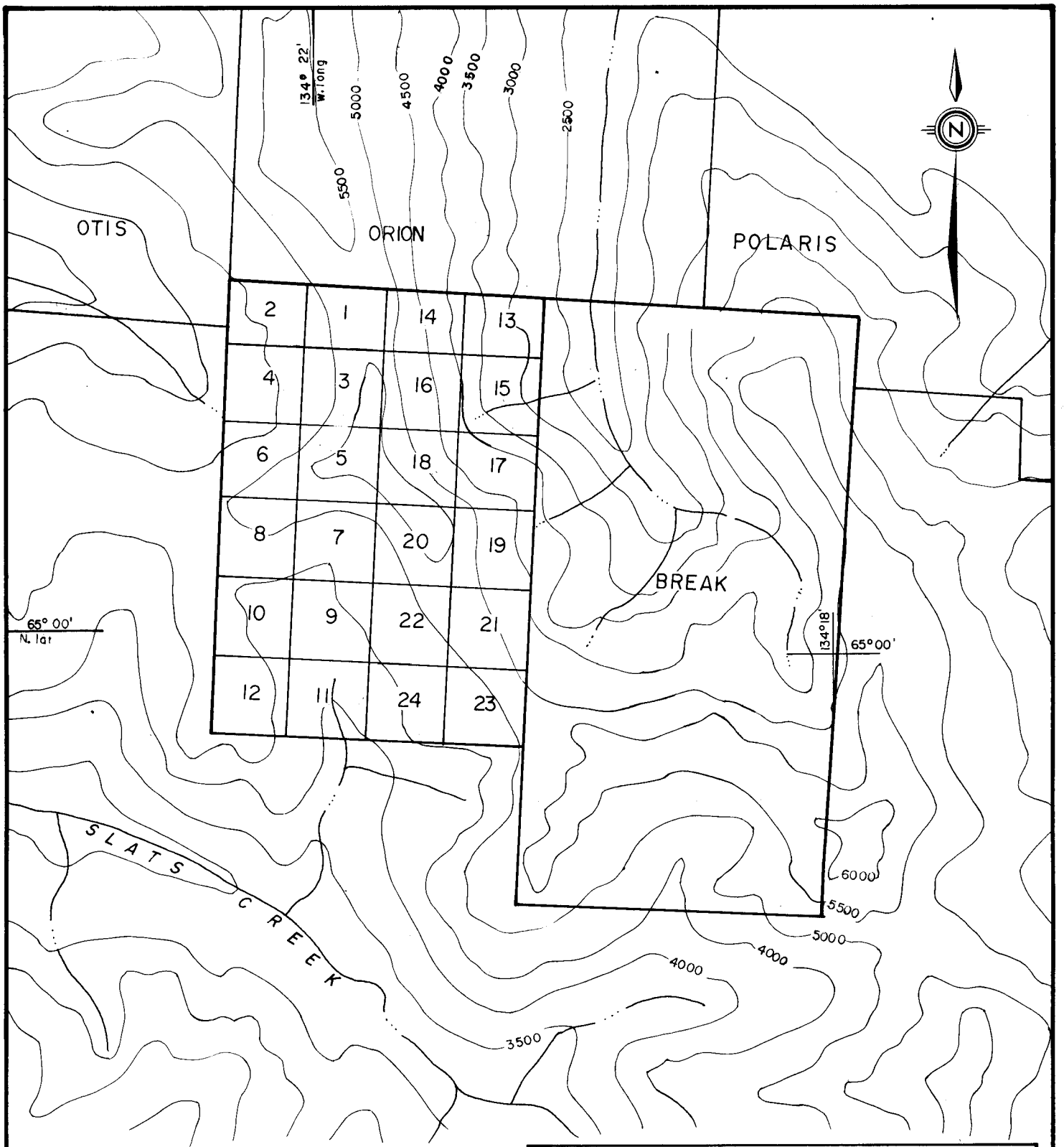
CLAIM NAME	STAKING DATE	RECORDING DATE	GRANT NO.
RAD 1-24	August 6, 1976	August 19, 1976	YA6443-YA6466 inclusive

Claim posts examined by the author appear to conform with the Yukon Quartz Mining Act regulations.

3.0 LOCATION AND ACCESS

The RAD claims are located on N.T.S. sheets 106-E-1 and 106-D-16, approximately eight miles south-southeast of Quartet Lakes in the northeastern Yukon Territory. Approximate


MOUNTAINEER-PAN OCEAN JOINT VENTURE
YUKON LOCATION MAP
RAD GROUP
SCALE IN MILES
0 25 50 100 200
DRAWN
Altair
PROJECT
DATE
NOV. 1977
FIG. I
PROPERTY
YUKON
TERRITORY
MACKENZIE DISTRICT
SELWYN MOUNTAINS
MACKENZIE MOUNTAINS
FRANKLIN MOUNTAINS
RICHARDSON MOUNTAINS
OGILVIE MOUNTAINS
BRITISH MTNS.
ST. ELIAS MOUNTAINS
DEMPSTER HWY
PROPOSED
Arctic Circle
WHITEHORSE
ANVIL MINES
HOWARDS PASS
Inuvik
Aklavik
Old Crow
Herschel
Norman Wells
Fort Norman
Mt. Logan
19,850
ALASKA



MOUNTAINEER-PAN OCEAN JOINT VENTURE

RAD CLAIMS

CLAIM MAP

106-E-1

QUARTET LAKES AREA

YUKON TERRITORY

SCALE IN MILES

1/2 1/4 0 1/2 1

DRAWN	PROJECT	DATE	FIG.
Altair			

co-ordinates of the claim group are 65°00'N latitude, 134°22'W longitude.

Access to the property is by fixed wing aircraft from Mayo to Quartet Lakes, a distance of 120 miles, then by helicopter to the property. Both helicopter and fixed wing aircraft as well as full expediting services are available in Mayo.

4.0 TOPOGRAPHY AND VEGETATION

Elevations on the property range from 2,500 feet to 5,500 feet A.S.L. and topography is rugged over the entire property. Exposure is good on most of the ground although large areas are obscured by talus cover.

The entire group lies above tree line so vegetation consists entirely of lichens, low grasses and moss.

Snow cover is extreme on the higher levels; often staying into July and usually falling in late August. This factor should be considered in planning any work programs.

5.0 REGIONAL GEOLOGY

The Quartet-Fairchild region lies in the Wernecke Mountains of the north eastern Yukon Territory. In the general area, the Werneckes consist of local ranges which include the Rackla Range, Bonnet Plume Range and Knorr Range. Topography is normally moderate to rugged with

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elevations ranging from 2,000 to 6,500 feet. The major river valleys are broad, timbered and extensively overburden covered, while most mountain slopes present greater than 60% outcrop above the 4,000 foot level.

The entire area has been mapped by the Geological Survey of Canada and three separate publications are presented. The following memoir and open file reports give 1" = 4 miles geological coverage of the Nash Creek, Nadaleen River, Wind River and Snake River map areas.

(1) Geology of Nash Creek, Larsen Creek and Dawson Map-Area, Yukon Territory by L.H. Green 1972 (Memoir 364).

(2) Open File 205 (Geology of Nadaleen River and Bonnet Plume Lake Map sheets by S. Blusson) 1975.

(3) Open File 279 (Geology of Snake River and Wind River sheets by D.K. Norris) 1975.

In the Quartet-Fairchild-Gillespie Lakes region Helikian rocks are exposed over an area of some 1,500 sq. miles in a roughly circular fashion centered near longitude 134°00'W and latitude 65°00'N.

These rocks have been described as Units 1 & 2 by L. Green on the Nash Creek Sheet.

Recent G.S.C. stratigraphic work by Bell and Delaney (1976) has redesignated Units 1a, 1 and 2 (Green 1972) as Units A, B, and C respectively. The unit designations as established by Bell and Delaney will be used in this report.

Unit A whose base is not exposed, is composed of a thick succession of moderately metamorphosed fine grained clastic sediments with interbedded carbonates. The overlying Unit B consists of thinly interbedded slates and argillites with occasional quartzite beds.

Unit C, which conformably overlies the uppermost slate-quartzite section of Unit B, consists mainly of thickly bedded orange weathering dolomites. The base of the unit is marked by a series of transitional beds of alternating buff weathering dolomites and interbedded slates and quartzites.

Erractically distributed throughout the Proterozoic metasediments are irregularly shaped breccia bodies. The breccia zones vary from tens of feet to several thousand feet in size and appear as cross cutting pipe-like features at all levels in the stratigraphic column. Several varieties exist, but all exhibit an assortment of angular clasts derived from rock types common to the area. Hornfels margins observed at several localities indicate an intrusive origin.

A common association with many of the breccia bodies are zones of veining or locally pervasive feldspar alteration seen as internal features within the breccias or in host rocks adjacent to them.

The alteration zones are pink in colour due to either K-spar or strong hematization and in some instances contain varying amounts of specularite, chalcopyrite and minor uranium mineralization.

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5.1 Structure

Two major periods of deformation have taken place within the Wernecke Mountain region. During the first period or Racklan Orogeny, the Proterozoic rocks of Units A, B, and C underwent intense folding and faulting. Folds are tight to isoclinal with the development of strong axial plane cleavage and commonly an almost vertical foliation.

A major unconformity of Lower Hadrynian age forms the upper contact of Unit C. In many localities, erosion beneath this unconformity has resulted in the complete removal of Unit C and the strong angular relationship between the relatively flat lying Cambrian and younger rocks directly overlying Units A and B is apparent.

Further unconformities near the Upper Hadrynian, Lower Cambrian and Upper Cambrian margins leave Devonian carbonates directly over the Helikian section.

The second period of deformation, which involves both Paleozoic and Proterozoic strata, is weak compared to the first. This is particularly evident in the younger Carbonate sections to the west and southwest where deformation consists mainly of broad open folding and minor overthrusting.

6.0 GEOLOGY

6.1 Introduction

Preliminary mapping of the RAD claims was carried out at a scale of 1 inch to 1/2 mile (see Figure 3, this report). The

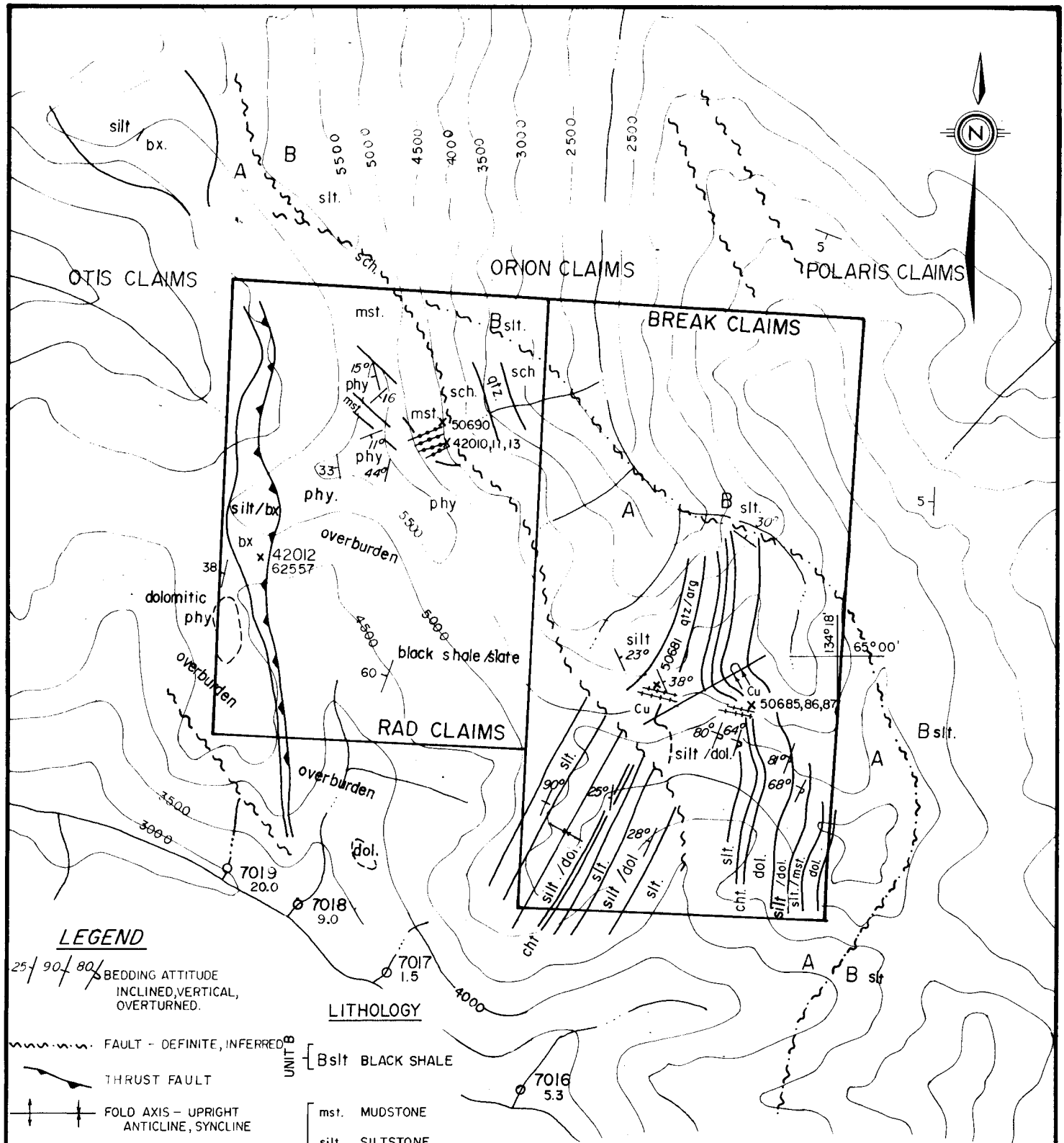
property is underlain by a variety of rock types, all assigned to map Unit A of the geologic column. Several intrusive phases were mapped as well as several major faults. Uranium and copper mineralization appear to be related to both the intrusive and structural events present.

6.2 Lithology

The northeast portion of the property is underlain by a light green chlorite biotite schist, presumably lying much lower in Unit A than the rest of the rocks on the property. The degree of metamorphism is high for the region with prophyroblasts of biotite, chlorite, and chloritoid(?) up to 3/16" in size noted. A several hundred foot thick band of light grey weathering, fine grained siliceous material lies partway through the schist section.

The unit overlying the metamorphic section, in the north central portion of the claims, is composed mainly of slatey to phyllitic dark green mudstones and siltstones. The rocks are heavily chloritized and become noticeably more phyllitic near the central portion of the claims. Where phyllitic, the metasediments have a crenulated texture and are a light green-grey colour.

Lying along the western boundary of the claims is a prominent, white weathering, bluff forming siltstone unit. Local brecciation has occurred within the light grey siltstone. Fragments in the breccias range from <1 m.m. to 1.5 ft. in size and are composed mainly of two rock types: a thinly laminated, partly silicified, light grey siltstone and an



LEGEND

25/ 90/ 80/ BEDDING ATTITUDE INCLINED, VERTICAL, OVERTURNED.

FAULT - DEFINITE, INFERRED

THRUST FAULT

FOLD AXIS - UPRIGHT ANTICLINE, SYNCLINE

FOLD AXIS - OVERTURNED ANTICLINE, SYNCLINE

DYKELET SWARM

VEIN SWARM

Cu COPPER MINERALIZATION

U URANIUM MINERALIZATION

X 50685 ASSAY SAMPLE LOCATION

7019 / 20.0 WATER SAMPLE NO. / PPb URANIUM

LITHOLOGY

UNIT B

Bslt BLACK SHALE

UNIT A

mst.	MUDSTONE
silt.	SILTSTONE
dol.	DOLOMITE
cht.	CHERT
qtz.	QUARTZITE
arg.	ARGILLITE
slt.	SLATE
phy	PHYLLITE
sch	SCHIST
bx.	BRECCIA

mst/dol. INDICATES THAT FIRST ROCK TYPE IS INTERBEDDED WITH LESSER AMOUNTS OF SECOND ROCK TYPE.

MOUNTAINEER-PAN OCEAN JOINT VENTURE

RAD CLAIMS

GEOLOGY

106-E-1

QUARTET LAKES AREA

YUKON TERRITORY

SCALE IN MILES 1/2 1/4 0 1/2 1

DRAWN	PROJECT	DATE	FIG.
Altair			3

inter-laminated dolomite/mudstone, both of which are derived locally. The siltstone unit is relatively unbrecciated and becomes more calcareous near the contacts with adjoining units.

Also noted in the area were: a grey to black locally slatey shale in the south central portion of the property, a light grey to tan phyllite with dolomite lenses and segregations in the southwestern portion of the property, and an orange to brown weathering dolomite immediately south of the claims.

6.3 Structure and Stratigraphy

All the rocks seen on the property belong to map Unit A.

The metamorphic section in the northeast part of the property is apparently flat lying; although the idential appearance of the schists lying above and below the fine grained siliceous unit suggests the existence of a recumbent isoclinal fold cored by the siliceous material. Over 500 vertical feet of the metamorphic section is exposed.

The overlying phyllite/siltstone/mudstone unit is basically flat lying but the variety of bedding attitudes indicates extensive folding within the unit itself. The rest of the sedimentary rocks on the property generally strike north-south and dip moderately to steeply to the west.

Faulting appears to have been the most common structural feature. Two major faults occur on the property and alteration associated with them consists of chloritization,

bleaching and calcification; with slickensides and fracturing along fault traces.

The first fault, separating the schists from the mudstone/phyllite rocks in the northeastern part of the property, is a northwesterly trending, southwesterly dipping, high angle reverse fault. An intensely sheared and slickensided outcrop of chloritized mudstone lying near the fault trace at the northern edge of the claims exhibits well defined shear planes with attitude 145/57°SW. This is presumed to be approximately parallel to the fault plane. This fault appears to extend some eleven miles to the WNW of the property.

The second fault brings the light grey siltstone in fault contact with the underlying units, and within the RAD claims thrusts the siltstone over the mudstone/phyllite and the black shale. Fracturing is particularly intense in the siltstone and is commonly accompanied by small scale cross faulting trending generally east-west.

6.4 Mineralization

Several local uranium occurrences were discovered on the RAD claims. The mineralization appears to be structurally controlled by shearing within and/or adjacent to fault zones. These structures likely provide channelways for hydrothermal solutions and injections carrying and/or localizing the uranium minerals.

Uranium mineralization occurs within a portion of the dark green phyllitic mudstones lying above the fault in the

northeast part of the claims. In this area the mudstones are intruded by a felsic pegmatite dykelet swarm which hosts the radioactive material. The dykelets, which exhibit a common orientation of approximately 042/76°S, range in width from 2 inches to 2 feet and are spaced from 6 inches to several feet apart. The composition of the dykelets is mainly quartz and K-feldspar with inclusions of wallrock altered to chlorite and sericite. The dykelet swarm extends over a width of approximately 400 feet and is visible intruding some 150 to 200 feet in elevation into the cliffs above. Mineralization occurs as sporadic grains of brannerite ranging from 1 m.m. to 4 m.m. in size and occassionally as crystalline masses of a pinkish brown unidentified radioactive mineral. Mineralization was seen only within the dykelets. Due to the extreme nature of the cliffs in the showing area, the entire dykelet swarm was not inspected. However, it was possible to view the lower 50 feet of the showing from which it was evident that all the pegmatite dykelets are mineralized to some extent.

Minor brannerite was also seen within the light grey siltstone approximately 4,000 feet southwest of the pegmatite swarm. The mineralization in the siltstone is apparently associated with an east-west trending cross fault. Very little brannerite was seen and the occurrence is non-continuous on the surface. Other minerals present in the same area include

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minor chalcopyrite, pyrite, and hematite.

Table 6.4.1 - Assays

Sample No.	% U_3O_8	Description
42010	0.002	Grab sample of dykelet material showing disseminated alteration haloes; from south end of dykelet swarm.
42011	0.057	Grab sample of chlorite, sericite schist material from dykelet walls in southern portion of dykelet swarm.
42012	0.081	Grab sample from feldspar flooded breccia material in light grey siltstone unit in western portion of claims.
42013	0.016	Grab sample from dykelet material showing albite/hematite alteration and exhibiting moderate radio-activity. Sample from southern portion of pegmatite swarm.
50690	0.047	Grab sample of altered, radio-active dykelet material from northern portion of pegmatite swarm.
62557	0.256	Continous chip sample across 4 feet of outcrop taken from light grey metasiltstones in western portion of claims.

7.0 GEOCHEMISTRY

During prospecting in the claims area three water geochemistry samples were taken from active streams draining the southern portion of the property. Water was collected in

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numbered, acid cleansed plastic sample bottles. Samples were sent for analysis to Chemex Labs Ltd. in North Vancouver, B.C. and upon receipt were analysed for uranium using standard fluorometric procedures (see Appendix II for complete descriptions of procedures.)

Table 7.0.1 Water Geochemistry Results

Water Sample No.	ppb Uranium
7017	1.5
7018	9.0
7019	20.0

All three values are considered anomalous for the region.

8.0 DISCUSSION AND CONCLUSIONS

Uranium is present in two main areas on the property. In the pegmatite dyke swarm, brannerite was seen sporadically distributed in the dykelets, however, the intervening mudstones gave no scintillometer response and appeared essentially barren. The entire swarm has yet to be inspected in detail, but preliminary indications are that the underlying fault provided the controls for both the intrusive and the mineralizing phases.

Visible brannerite was also seen in small amounts within the grey siltstone. The mineralization appears to be controlled by cross-faulting and shearing. The siltstone generally is highly fractured, brecciated and cross faulted thus providing good traps for mineral emplacement. The unit

therefore appears to be a favourable host rock type. Although brannerite was seen only in trace amounts, several overburden covered areas of approximately 600 sq. ft. were found to have anomalous scintillometer readings. Results from water samples taken from streams draining the area of the siltstone unit were high and are considered very anomalous compared to sample results of the region. It is felt, therefore, that further work is required to evaluate the RAD claims.

9.0 RECOMMENDATIONS

1. Detailed geochemical sampling should be carried out both in streams draining the south end of the property and on overburden covered areas near the favourable siltstone unit.

2. Detailed geologic mapping and assay sampling should be undertaken on all mineralized showings.

3. Geologic mapping at 1,000 feet = 1 inch should be completed for the entire property.

4. Contingent on the results of the foregoing recommendations, hand trenching should be done on any showings requiring such additional work.

Respectfully submitted,

R. Yorston

R. Yorston - Geologist

David A Yeager

D. Yeager - Geologist

C. K. Ikona

C. Ikona - P.Eng.

URANIUM

Analytical methods for uranium presently in use at Chemex have been modified from procedures developed by the USGS and GSC. For uranium at PPB and PPM level, fluorometric methods of analyses are highly acceptable in terms of accuracy, cost and turn around time.

The following methods are used extensively to determine uranium potential in a variety of material.

(a) Water Samples - By Fluorescence Analysis

Clean 100 or 200 ml plastic bottles are provided for field use. If a portion of the water is to be stored we require a 200 ml sample.

A 75 ml aliquot is transferred to a clean 100 ml pyrex beaker. 3 ml of concentrated HNO_3 is added and the solution is evaporated to dryness at low uniform temperature. The dry residue after ashing is dissolved in 3 ml of warm 4M HNO_3. An aliquot of the dissolved residue is transferred to a small platinum dish, dried, and fused with an 0.50g tablet of carbonate-fluoride flux at 650° C. The fused disc is removed from the platinum dish and uranium fluorescence is determined using a G. K.Turner III Fluorometer or Jarrell-Ash 26-000 Fluorometer. Detection limit is 0.20 PPB U. Analytical capability approx. 200 samples per day including check samples and quality control standards.

(b). Soil, Silt, Lake Bottom Sediments & Rocks - By Fluorescence Analysis

These materials normally arrive unprepared. Preparation requires drying @ 60° C and screening to obtain the -80 mesh fraction. Coarse material is retained if the screened fraction is small. A 0.25 gm sample of -80 mesh material is weighed into a 100 ml pyrex beaker. The sample is ashed at 550° C to remove organics. The ashed residue is digested in 5 mls 4M HNO_3 and taken to dryness twice. The residue is leached in 50 mls 1% HNO_3. The solution is swirled and allowed to settle. A few microlitres of

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the clear solution is transferred by micropipette to a platinum dish. The sample is evaporated to dryness and an 0.50 gm tablet of carbonate - fluoride flux is added to the sample dish. Fusion and fluorometric determination of uranium is as described for water samples. Detection limit is 0.50 PPM U. Analytical volume approx. 400 samples per day including duplicates and quality control standards. Upper limit of analytical method - 400 PPM U.

(c). Assay Materials (% U_3O_8) By Colorimetric Methods

1 gram of homogenized sample pulp is weighed into a Teflon dish and digested with 10 mls 52% HF, 5 mls 70% $HClO_4$ and 5 mls conc. HNO_3 to dryness. The residue is dissolved in 25 mls 9M HCl. The uranium is separated from interfering elements by anion exchange procedures. The adsorbed uranium is eluted form the resin and a suitable portion of the uranium bearing solution is reduced, filtered and then complexed using Arsenazo III reagent. Absorbance is measured using "Spectronic 700" Spectrophotometer. The U_3O_8 concentration is evaluated by correlation with a standard reference curve. Analytical volume - 40 samples/day. Concentration range 0.001% U_3O_8 to 10.0% U_3O_8.

CHEMEX LABS LTD.

.12 BROOKSBANK AVE.
NORTH VANCOUVER, B.C.
CANADA V7J 2C1
TELEPHONE: 985-0648
AREA CODE: 604
TELEX: 043-52597

• ANALYTICAL CHEMISTS • GEOCHEMISTS • REGISTERED ASSAYERS

CERTIFICATE OF ASSAY

CERTIFICATE NO. 31610

TO: Mountaineer Mines
c/o Harman Management
907 675 W. Hastings
Vancouver, B. C.

INVOICE NO. 17767

RECEIVED Aug. 12/76

ATTN:

ANALYSED Aug. 17/76

SAMPLE NO. :	% U_3O_8	% WO_3
42010	0.002	< 0.01
42011	0.057	
42012	0.084	< 0.01
42013	0.016	
JC #1		< 0.01
JC #2		< 0.01

CTA MEMBER CANADIAN TESTING ASSOCIATION

REGISTERED ASSAYER, PROVINCE OF BRITISH COLUMBIA

CHEMEX LABS LTD.

212 BROOKSBANK AVE.
NORTH VANCOUVER, B.C.
CANADA V7J 2C1
TELEPHONE: 985-0648
AREA CODE: 604
TELEX: 043-52597

• ANALYTICAL CHEMISTS • GEOCHEMISTS • REGISTERED ASSAYERS

CERTIFICATE OF ASSAY

CERTIFICATE NO. 31806

INVOICE NO. 18452

RECEIVED Sept. 23/76

ANALYSED Oct. 1/76

TO: Harman Management
907 - 675 W. Hastings,
Vancouver, B. C.

ATTN:

SAMPLE NO. :	% Copper	% U_3O_8
50656		0.001
50657		<0.001
50658	0.14	0.002
50659	0.82	0.007
50660	0.10	0.006
50661		<0.001
50678	2.14	
50679	0.25	
50680		0.021
50681	0.90	
50682	10.4	
50683	4.50	
50684	0.65	
50685	1.48	
50686	1.80	
50687	1.22	
50688	3.85	0.005
50689	0.31	0.011
50690		0.047

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REGISTERED ASSAYER, PROVINCE OF BRITISH COLUMBIA