CANADIAN OCCIDENTAL PETROLEUM LTD.

MINERALS DIVISION

GEOLOGY AND GEOCHEMISTRY OF THE BIG OX CLAIM GROUP

Claim Sheet No. 105F/7
Lat.: 61°19'N
Long: 132°50'W

Claims:
BIG OX
Claims 1-72

Watson Lake Mining District
Yukon Territory

by:
Eric James Sacks, M.Sc.

Work Completed July 24 and 31, 1979

This report has been examined by the Geological [illegible] Unit and is recom- mended [illegible] to be consider- ed as [illegible] in the amount of

$ 7200

[illegible]

[illegible] or

[illegible] Engineer

Considered [illegible] representation work under Section [illegible] Quartz Mining Act.

Commissioner of Yukon Territory

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PLANS cont'd

SUMMARY

The BIG OX Claim Group, which comprises 72 individual claims, was staked on June 18th, 1979 to cover a multi-site G.S.C. stream sediment U-W-F anomaly released as part of O.F.R. 564 on June 15th, 1979. The claims are located at 61°19'N, 132°50'W within N.T.S. Sheet 105F/7, Watson Lake Mining District, Yukon Territory.

The claims are underlain by perthite-megacrystic, biotite quartz-monzonite, cut by intersecting, intense 040T and 160T fracture zones. Rocks within the zones have been highly limonitized, chloritized and cut by quartz-carbonate veining. Significant U and W contents occur in rocks within the fracture zones. Highly anomalous U, W, Ag and F occur in stream sediments, waters and heavy minerals derived from the fracture zones. Soil response is much more subtle. Secondary dispersion appears to be primarily mechanical in nature; however, significant chemical transport of U is occurring.

Potential for mineralization on the BIG OX Claims appears most favourable in the central and eastern portions, and would comprise hydrothermal, stockwork U-Mo-W mineralization within fracture zones. The possibility for primary or skarn U-Mo-W-F mineralization exists in the far northeastern corner of the claims.

The area immediately to the south and southeast of the claim group may be the source for U water anomalies in the southeast corner of the claim group and should be examined. Systematic mapping, soil geochemistry, lithogeochemistry, radiometric, VLF-EM

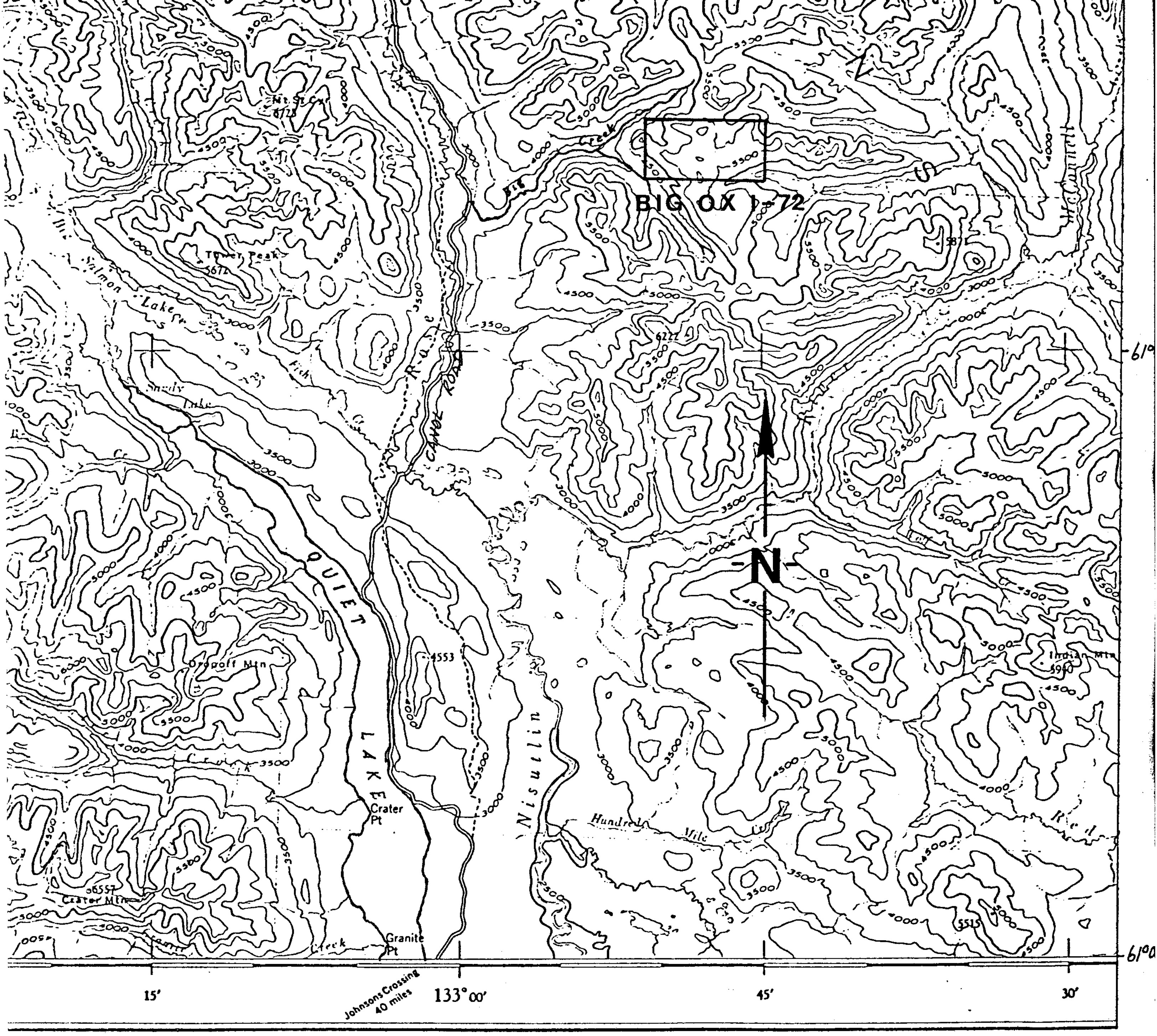

FIGURE I

LOCATION ACCESS OF BIG OX CLAIMS

NTS 105F/7

SCALE: 1:250,000

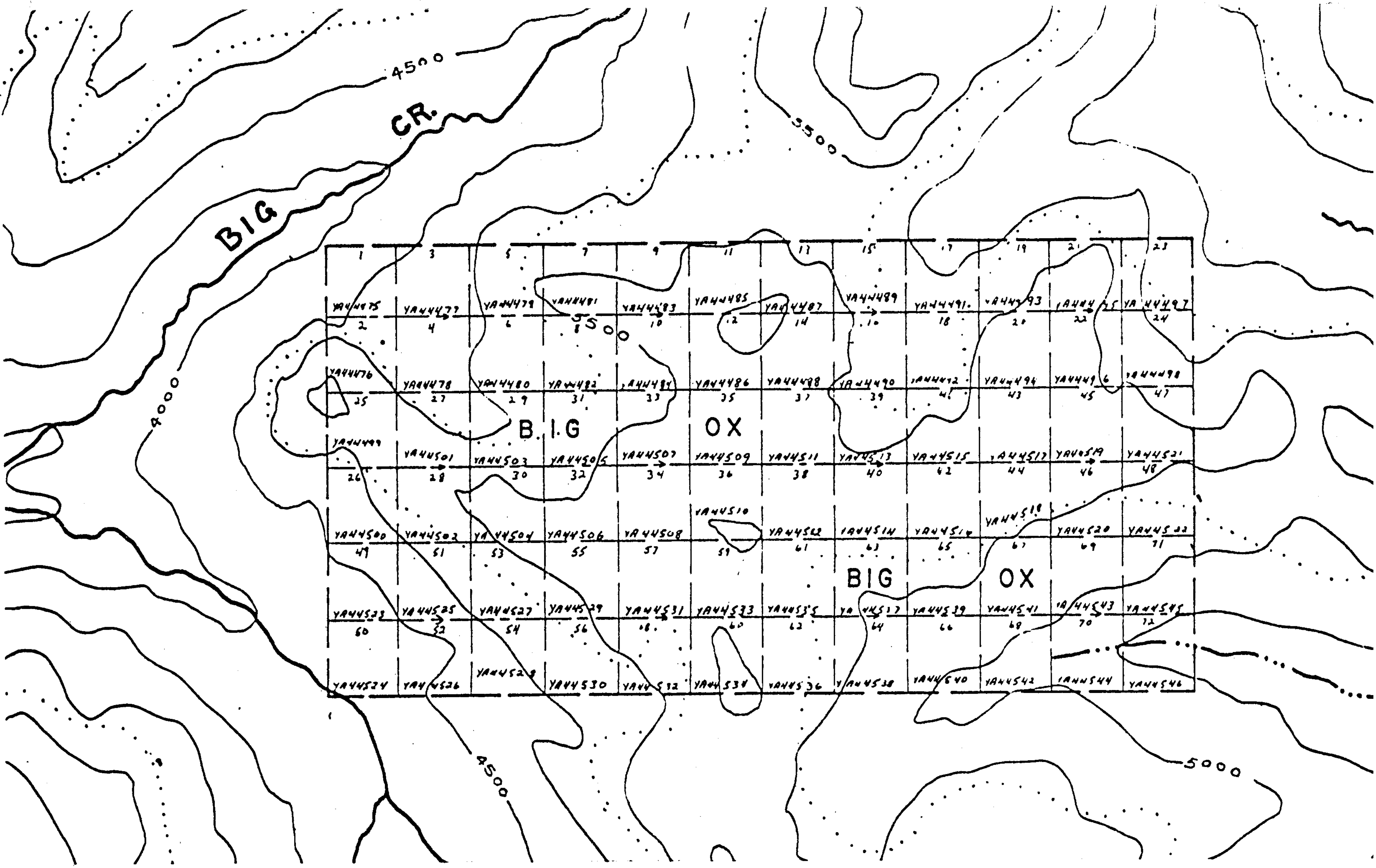

FIGURE 2

STAKING SKETCH SHOWING BIG OX 1-7 MINERAL CLAIMS

SCALE: 1"=2640'

and airphoto studies over the claim group are recommended.

I. INTRODUCTION

The BIG OX Mineral Claims were staked on June 18, 1979. On July 24, 1979, Canadian Oxy conducted reconaissance geology, prospecting, and geochemical surveys over the BIG OX Claims. This report presents the results of those surveys.

II. LOCATION AND ACCESS

The BIG OX Claim Group, which comprises 72 individual claims, is located at 61°19'N, 132°50'W, within N.T.S. map sheet 105F/7, Watson Lake Mining District, Yukon Territory. The Claim Group covers an area of approximately 5.8 $mi.^2$ (14.9km^2) along the south side of Upper Big Creek (Figure 1,2).

The claims lie approximately 5 miles (8km) due east of the Canol Road and 15 miles (25km) northeast of the north end of Quiet Lake. The Canol Road (Yukon Highway 8) is a summer-only, graded dirt and gravel road which was built during WWII to service construction of the oil pipeline which was to carry oil south from Norman Wells. The pipeline was never completed, however, its right-of-way is still visible from the roadway.

III. PHYSIOGRAPHY AND VEGETATION

Relief over the BIG OX Claims is 2500 ft. (760m) between elevations of 6500 ft. and 4000 ft. (1980m and 1220m) above sea level. The entire claim group lies above the treeline. Physiography consists of gentle slopes above small lakes in cirques grading upwards into steep talus slopes and broken, steep ridges. The cirques are numerous and face off in many directions resulting in a confused topography.

IV. PREVIOUS WORK

No evidence of previous work was found. The Quiet Lake (105F) map sheet was geologically mapped by numerous G.S.C. personnel over the last 25 years. (Wheeler, et.al, 1960, Templeman-Kluit, 1977) During the summer of 1978, the G.S.C. conducted a reconnaissance stream sediment and water sampling survey over the entire Quiet Lake sheet as part of the Uranium Reconnaissance Program (U.R.P.) coverage of the southern Yukon. Data was released in Whitehorse, Yukon Territory on June 15, 1979 as O.F.R. 564 and the BIG OX Claims were staked on June 18, 1979, to cover a two station U-F-W anomaly (66.3 and 54.5 ppm U, 130 and 170 ppb F, 210 and 30 ppm W respectively).

V. WORK COMPLETED - 1979

5.1. Staking

The BIG OX Claims were staked on June 18, 1979, by M.B.W. Surveys, Whitehorse, Yukon Territories for Canadian Oxy. Recording-anniversary date is June 20, 1979. A total of 72 claims covering an area of $5.8mi.^2$ ($14.9km.^2$) were staked.

5.2. Geological Mapping

Sacks and Hooper conducted reconnaissance geological mapping and prospecting over the BIG OX Claims on July 24, 1979. Wallis, Sacks and Hooper visited the claims on July 31, 1979. (See Appendix IV) A total of 2.6 man-days of work were performed.

5.3 Geochemistry

A total of 1 heavy mineral, 10 stream sediment, 10 stream water and 37 soil samples was collected over the claim group by Jermakowicz, Pelletier and Zayachivsky. In addition, 14 rock samples were collected during the mapping survey. All samples were sent to Chemex Labs Ltd., Vancouver, B.C., for geochemical analysis. In addition, one assay was performed. A total of 3 man-days of work was performed.

5.4 Summary of Work Completed

Type of Work	Man-Days	No. Samples	No. Analyses											
			Cu	Mo	Pb	Zn	Ag	U	Th	Sn	W	As	F	Total
Geological Mapping	2.6													
Geochemistry	3.0													
i) Rock		14	14	14	14	14	14	14	14	14	14	-	-	126
ii) Heavy Min.		1	1	1	1	1	1	1	1	1	1	-	-	9
iii) Sediment		10	10	10	10	10	10	10	10	-	10	-	-	80
iv) Water		10	-	-	-	-	-	10	-	-	-	10	10	30
v) Soil		37	37	37	37	37	37	37	37	-	37	-	-	296
Helicopter Bell 206-B)	3.0 hrs.													
TOTAL	5.6m/d	72												541

5.5 Names and Addresses of Personnel

Dr. R. H. Wallis Canadian Occidental Petroleum Ltd. Minerals Division, 311-215 Carlingview Drive, Rexdale, Ontario, M9W 5X8	Chief Geologist
E. J. Sacks, M. Sc. (Same address as above)	Project Geologist
J. Hooper (Same address as above)	Senior Assistant
E. Jermakowicz (Same address as above)	Junior Assistant
C. Pelletier (Same address as above)	Junior Assistant
B. Zayachivsky (Same address as above)	Junior Assistant
Dr. C. F. Gleeson C.F. Gleeson and Associates Ottawa, Ontario	Consulting Geochemist

VI. GEOLOGY

6.1 General Geology

Mapping and compilation by Templeman-Kluit (1977) show the entire BIG OX Claim Group to be underlain by Cretaceous, perthite negacrystic, biotite quartz-monzonite of the Nisutlin Batholith. Mapping by Canadian Oxy personnel has confirmed this lithology and has also revealed numerous 040T trending fracture zones containing limonite and chlorite and quartz-carbonate veining.

6.2 Table of Formations

Unit	Description
Di	Diabase dyke
bQM	Biotite quartz-monzonite; perthite megacrystic

6.3 Description of Rock Units

Descriptions of individual rock samples are listed in Appendix II along with their trace element contents. All granitic rocks were stained with sodium colbaltinitrate after immersion in concentrated HF in order to facilitate identification. The Colorado School of Mines Classification of Rocks system was used (Travis, 1955).

Unit Di - Diabase dyke

This unit occurs as a 170T/30^{O}E trending dyke cutting biotite quartz-monzonite in the western part of the claim group. The rock consists of acicular plagioclase crystals in an anhedral, very fine-grained mafic groundmass. Contacts with the enclosing quartz-monzonite are sharp.

Unit bQM - Biotite quartz monzonite

This unit underlies the entire BIG OX Claim Group and comprises a medium to coarse-grained, perthite megacrystic rock containing K-feldspar (30 to 50%, much in the megacrysts), plagioclase (20 to 35%), quartz (10 to 30%), biotite (<5 to 10%) and trace magnetite. Megacrysts range in size from 1/8" to 1" (2.5cm) and are invariably present. The rock is generally fresh except within fracture zones where it becomes limonitized and kaolinized and crumbly and contains vuggy quartz-carbonate veins. The unit is characterized by a scintillometer response of 150 to 400 cps (Scintrex BGS-ISL).

6.4 Structure (PLAN I)

Numerous 040T/90^{o} fracture zones cut the quartz monzonite. Individual zones are up to 100 ft. (30m) wide and 3000 ft. (915m) long and cluster to form much broader zones. Strong 160T/90^{o} cross fracturing occurs, and in the center of the claims, strong 160T and 040T fracture zones intersect resulting in an extremely broken area.

Rock within the fracture zones is cut by numerous parallel fractures and is limonitized, chloritized and kaolinized. 040T fractures are often filled by resistant weathering vuggy quartz-carbonate veins. As a result, the normally competent quartz-monzonite falls apart and forms gulleys floored by very fine, crumbly and loose limonitic material and sinuous, upstanding quartz veins. The borders of individual fracture zones are razor sharp.

6.5 Metamorphism

Metamorphism is confined to the cataclastic fracturing occuring within the fracture zones.

6.6 Alteration

Kaolinization of feldspar and chloritization of biotite is ubiquitous within the fracture zones. Abundant limonite coats grain boundaries and fracture surfaces and occass-ionally selectively stains perthite megacrysts. Alteration outside of fracture zones is confined to surfical weathering.

6.7 Economic Geology

Mineralization was not observed. Potential mineralization could include stockwork U-W-Mo mineralization within the intersecting and limonitized fracture zones containing quartz-carbonate veins. The intrusive is not well differentiated and thus is not inherently favourable to primary U-W mineralization.

VII. GEOCHEMISTRY

Mean, possibly anomalous and probably anomalous levels for each element in heavy mineral, stream sediment and stream water samples were determined at the 50th, 84th and 97th percentiles of cumulative frequency distributions constructed from the combined Project WATSU regional follow-up data. In the case of soil samples, the combined data from all claim groups examined during Project WATSU were used. In the case of rock samples, probably anomalous levels were determined from data published by Levinson (1974, Table 2-1). Mean, possibly anomalous and probably anomalous levels are presented in Table I. Sampling and laboratory procedures are presented in Appendix III.

7.1 Rock Geochemistry (PLAN 2,3)

A total of 14 rock samples were collected and analyzed for Cu, Mo, Pb, Zn, Ag, U, Th, Sn and W.

1. 3.5 to 25.5 ppm U, 17 to 54 ppm Th and 2 to 200 ppm W occur in samples of limonitic quartz-monzonite and quartz vein material from the center of the claims encompassing an area of approximately 6000 ft. x 4000 ft. (1830m x 1220m) U/Th ratios are invariably less than unity. (Samples ES-BIG OX-1,2a,2b,2c,3,4, 4a, and JH-BIG OX-3,4,5)
2. 7.5 ppm U and 43 ppm occur in biotite quartz-monzonite from a fracture zone in the north-central part of the

TABLE 1

Mean, Possibly Anomalous and Probably Anomalous Levels - Soils, Sediments, Waters, Heavies.

Note: levels chosen from cumulative frequency curves at 50th, 84th and 97th percentiles, respectively.

A. Heavy Minerals

	ppm Cu	ppm Pb	ppm Zn	ppm Ag	ppm Mo	ppb Au	ppm Sn	ppm W	ppm U	ppm Th
Mean	24	17	75	.05	1.5	<10	2.3	15	3.8	44
Poss. Anom.	63	89	200	.38	3.5	19	38	60	26	330
Prob. Anom.	165	280	440	.95	8.5	3150	300	160	120	1200

B. Stream Sediments

	ppm Cu	ppm Pb	ppm Zn	ppm Ag	ppm Mo	ppm Sn	ppm W	ppm U	ppm Th
Mean	11	5	58	<.1	<1	<1	<1	2.5	13
Poss. Anom.	28	21	115	<.1	3	2	5	17	29
Prob. Anom.	54	59	320	1	11	5	16	38	50

C. Soils

	ppm Cu	ppm Pb	ppm Zn	ppm Ag	ppm Mo	ppm Sn	ppm W	ppm U	ppm Th
Mean	8	8	48	<.1	<1	<1	<1	2	14
Poss. Anom.	22	32	115	.1	2.5	1	7.5	7	36
Prob. Anom.	120	150	270	.8	5	2	40	30	75

D. Stream Waters

	ppb U	ppb F	m.mhos/cm S.C.
Mean	.25	19	18
Poss. Anom.	.85	100	46
Prob. Anom.	2.5	210	100

claim group (ES-Big Ox-6).

3. Samples of biotite quartz-monzonite from unfractured and unaltered areas contain from 1.5 to 3 ppm U and 1 ppm W.

In summary, anomalous contents of U and W in rocks are associated with limonitized fracture zones containing quartz-carbonate veining.

7.2 Heavy Mineral Geochemistry (PLAN 4,5,6)

One heavy mineral sample was collected from the southeast corner of the claim group and analysed for Cu, Mo, Pb, Zn, Ag, U, Th, Sn, and W. The sample contains 437 ppm U, 1720 ppm Th, 400 ppm W, 11 ppm Mo, 122 ppm Pb, and 0.6 ppm Ag. The stream drains quartz-monzonite, possibly from a fracture zone.

7.3 Stream Sediment Geochemistry (PLAN 4,7,8)

A total of 10 stream sediment samples were collected at 500 ft. (150m) intervals from streams in the eastern portion of the Claim Group. All samples were analysed for Cu, Mo, Pb, Zn, Ag, U and Th and one sample was subsequently assayed for U (79-WT-1025).

1. >400 ppm U (0.109% U_3O_8, 4.4 ppm Ag, 3 ppm Mo and 6 ppm W occur in a single station anomaly in the NE corner of the claims. The stream drains limonitic, sheared, quartz-monzonite. U/Th = 20.

2. 13.5 and 63 ppm U, 0.2 and 0.8 ppm Ag, 3 and 5 ppm Mo and 7 and 2 ppm W occur in two samples approximately

1000 ft. (350m) apart in the far NE corner of the claims. The area is underlain by bQM.

3. 20 to 120 ppm U, 52 to 120 ppm Th and 5 to 25 ppm W occur over 2500 ft. (760m) in the SE corner of the claims. 8 to 9 ppm Mo occur in 3 samples near the headwater. The stream drains altered bQM and may in part contain material derived from outside the SE corner of the claims.
4. 32 ppm U, 51 ppm Th and 14 ppm Mo occur in one sample draining intersecting altered bQM fracture zones in the center of the claims.
5. 31 ppm U, 68 ppm Th and 14 ppm W occur in one sample draining fractured bQM in the eastern portion of the claims.

In summary, highly anomalous contents of U, Mo, Ag, and W in stream sediments are derived from limonitized fracture zones within the biotite quartz-monzonite unit. Sources for U and W may be seen in the high U and W rock values within the fracture zones.

7.4. <u>Stream Water Geochemistry (PLAN 4,9)</u>

Stream water samples were collected at each stream sediment site and analysed in the field for pH and specific conductivity (S.C.) and in the laboratory for U, F, and As.

1. 1.4 to 3.2 ppb U occur in waters from the far SE corner of the claims. Accompanying stream sediments contain anomalous U, pH is very low (7.0 to 7.1) reflecting drainage from quartz monzonite and suggesting that little quartz-carbonate alteration occurs in this immediate area.

2. 6.4 ppb U (highest on BIG OX Claims) occurs in one sample from the east-central part of the claims draining bQM.

3. 1.2 ppb U and 150 ppb F occur in water accompanying the >400 ppm U stream sediment in the NE corner of the claims. A pH of 8.4 is the highest on the claim group.

4. 250 ppb F occurs in one sample from the far NE corner accompanying 63 ppm U in sediment.

5. pH and S.C. are very low over the entire claim group with the exception of the NE corner, thus it appears that fracture zone material is transported mechanically rather than chemically. U content in water is, however; extremely high indicating that U mineralization is itself susceptible to chemical weathering.

7.5 Soil Geochemistry (PLAN 4,10, 11)

Soil samples were collected from both talus and frost soil material over the entire claim group. All samples were analysed for Cu, Mo, Pb, Zn, Ag, U and Th.

1. 9 to 14.5 ppm U, 63 to 80 ppm Th (U/Th <1) and 17 to 25 ppm W occur over a traverse length of 1500 ft. (460m) in the NE corner of the claims. Sediments derived from this source contain highly anomalous U and Mo. Scattered single station and low level Mo anomalies (3-4 ppm Mo) occur in this area.

2. 18.5 and 29 ppm U and 4 and 9 ppm Mo occur in two samples from the north-central area of the Claims.

One sample contains 10 ppm W. This area is underlain by relatively unaltered bQM

3. 7 to 11 ppm U single station anomalies occur scattered over the western portions of the claims. The bQM in this area appears to be relatively unaltered.

VIII. CONCLUSIONS

1. The BIG OX Claims are underlain by perthite-megacrystic, biotite quartz-monzonite. In the central and eastern portions of the claims bQM is extremely well fractured at 040T and 160T forming fracture zones several thousands of feet in length. Within these zones, which are sharply defined, the rock has been extensively limonitized and chloritized together with quartz-carbonate veining.

2. Rocks within the altered fracture zones contain anomalous amounts of U and W; however, it appears that no increase in radioactivity marks these zones.

3. Stream sediments, waters and heavy minerals derived from the fracture zones contain anomalous contents of U and W (plus Mo and Ag).

U response in soils appears to be of low level; however, U-W soil anomalies do occur overlying the source area for at least one stream sediment anomaly.

4. Trace element dispersion on the BIG OX Claims appears to be primarily mechanical. This is reflected by high Th contents in soils and sediments as well as by low pH-S.C. in an environment which contains abundant alteration. Th occurs primarily

within very resistant minerals and its presence within the -80 mesh fraction of soils and stream sediments suggests extreme mechanical weathering. There does not, however, appear to be much inhibition of the solution and transport of U as the U content of stream waters on the BIG OX Claims is some of the highest seen in the entire Project WATSU.

5. Mineralization on the BIG OX Claims appears to favour the central and eastern areas. The presence of extensive and intersecting fracture zones containing quartz-carbonate veining and high W and U contents suggest potential for W-U-Mo stockwork mineralization. The presence of high F and pH in waters in the NE corner suggest additional hydrothermal alteration in this area, the presence of a high volatile phase of the intrusive or even skarnified xenolithic material.

IX. RECOMMENDATIONS

1. Systematic geological mapping and prospecting with a scintillometer should be carried out. Due to the complex topography the establishment of a single grid will not be feasible; airphoto-based traversing will be necessary.

2. Systematic soil and rock geochemical and radiometric surveys at maximum 800'x200' centers should accompany mapping.

3. 1"=400' airphoto blow-ups should be used as bases for all future work.

4. VLF-EM surveys should be considered as an aid to defining structures. Airphoto interpretation should be carried out in order to define lineaments which may be related

to fracture zones.

5. Detailed lithogeochemistry should be conducted across the fracture zones to determine just where within them the U and W are concentrated and thin-polished section examination should be conducted in order to define the nature of mineralization. All samples should be analysed for U, Th, W, Mo, Ag, Cu, Pb and Zn.

6. Since secondary dispersion appears to have a very large mechanical component, heavy mineral samples should be obtained from all streams and analysed for Cu, Mo, Pb, Zn, Ag, U, Th, Sn and W.

7. The area adjacent to the SE corner of the claims should be examined as it may be the source area for stream water and sediment U anomalies in the SE corner of the claims.

8. Sediments, waters and heavy minerals should be collected at maximum 500 ft. (150m) intervals from all streams and tributaries not previously sampled.

Respectfully submitted

E.J. Sacks

Eric James Sacks, M.Sc.

TORONTO, Ontario

December, 1979

APPENDIX I

ANALYTICAL RESULTS

CHEMEX LABS LTD.

212 BROOKSBANK AVE.
NORTH VANCOUVER, B.C.
CANADA V7J 2C1
TELEPHONE: [redacted] 984-0221
AREA CODE: 604
TELEX: 043-52597

• ANALYTICAL CHEMISTS • GEOCHEMISTS • REGISTERED ASSAYERS

CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 49357
INVOICE NO. 31746
RECEIVED August 3, 1979
ANALYSED August 10, 1979

TO: Canadian Occidental Petroleum Ltd.,
Minerals Division
311 - 215 Carlingview Dr.,
Rexdale, Ont.,
M9W 5X8

ATTN:

WATSU-BIG-OX-WATERS
c.c. Penticton

SAMPLE NO. :	PPB U	PPB F	PPB As
79 WT 1025	1.2	150	<2
1027	<0.2	20	<2
1033	6.4	90	<2
1038	0.4	45	<2
1168	0.6	250	<2
1169	1.4	70	<2
1170	3.2	100	<2
1171	2.0	60	<2
1172	2.8	65	<2
79 WT 1173	2.6	75	<2

CTA MEMBER CANADIAN TESTING ASSOCIATION

CERTIFIED BY:

CHEMEX LABS LTD.

212 BROOKSBANK AVE.
NORTH VANCOUVER, B.C.
CANADA V7J 2C1
TELEPHONE: [redacted] 984-0221
AREA CODE: 604
TELEX: 043-52597

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CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 49346

INVOICE NO. 32463
Th - 32606

RECEIVED Aug. 3/79

ANALYSED Sept. 7/79

TO: Canadian Occidental Petroleum Ltd.,
Minerals Division,
Ste. 311 - 215 Carlingview Dr.,
Rexdale, Ont.

ATTN: WATSU-Big Ox - Heavy Minerals CC. E. Sacks

SAMPLE NO. :	PPM Cu	PPM Mo	PPM Pb	PPM Zn	PPM Ag	PPM Sn	PPM W	PPM U	PPM Th (N.A.)
79 WT 1171	10	11	122	94	0.6	32	400	437	1720

	Total	-10 fraction	-10 magnetic	-10 Non mag.
79 WT 1171	483	468	1.42	3.31

CTA MEMBER CANADIAN TESTING ASSOCIATION

CERTIFIED BY: Hart Bichle

CHEMEX LABS LTD.

212 BROOKSBANK AVE.
NORTH VANCOUVER, B.C.
CANADA V7J 2C1
TELEPHONE: [redacted] 984-0221
AREA CODE: 604
TELEX: 043-52597

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CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 49330
INVOICE NO. 31900
RECEIVED Th-32440 Aug. 3/79
ANALYSED Aug. 15/79

TO: Canadian Occidental Petroleum Ltd.
Minerals Division
Ste. 311 - 215 Carlingview Dr.
Rexdale, Ont. M9W 5X8

ATTN: PROJECT: Watsu-Big-Ox-Soil CC: E. Sacks

SAMPLE NO. :	PPM Cu	PPM Mo	PPM Pb	PPM Zn	PPM Ag	PPM U	PPM Th
79WT1232	4	5	6	30	0.1	4.5	47
1233	4	1	2	12	0.1	2.0	29
1234	2	2	14	48	0.1	8.0	54
1235	6	1	1	22	0.1	1.5	18
1236	4	1	1	8	0.1	1.5	6
1237	6	2	4	30	0.1	1.5	10
1238	14	1	4	58	0.1	1.5	12
1239	4	2	10	56	0.1	2.5	70
1240	8	1	6	28	0.1	2.0	10
1241	6	2	34	54	0.1	11.5	44
1242	6	1	2	12	0.1	2.0	16
1243	6	2	4	32	0.1	2.5	Spilled
1244	6	2	6	28	0.1	2.0	"
1245	4	2	6	32	0.1	7.0	44
1246	4	3	6	46	0.1	4.0	62
1024	4	3	10	22	0.1	5.5	36
1026	10	1	10	42	0.1	4.0	36
1028	10	4	26	44	0.1	5.0	55
1029	8	4	32	38	0.1	11.0	71
1030	8	2	104	50	0.4	14.5	75
1031	6	2	26	46	0.1	12.0	80
1032	4	3	24	28	0.1	9.0	63
1034	4	1	14	32	0.1	3.5	75
1035	2	2	18	36	0.2	13.0	93
1036	4	1	14	28	0.1	5.0	84
1037	4	2	8	20	0.1	1.5	Spilled
1039	4	4	8	6	0.1	18.5	21
1040	12	9	26	64	0.1	29	Spilled
1174	10	1	8	42	0.1	4.5	9
1175	12	1	6	44	0.1	5.5	Spilled
1176	2	1	1	2	0.1	0.5	"
1177	14	1	6	52	0.1	6.0	47
1178	12	1	8	34	0.1	5.5	34
1179	8	2	2	24	0.1	3.0	16
1180	4	1	1	8	0.1	1.0	11
1181	6	2	6	20	0.1	4.0	30
79WT1182	4	1	1	14	0.1	1.5	16

CTA MEMBER CANADIAN TESTING ASSOCIATION

CERTIFIED BY: Hart Bichle

CHEMEX LABS LTD.

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NORTH VANCOUVER, B.C.
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AREA CODE: 604
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CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 49337
INVOICE NO. 31900
Th-32440
RECEIVED Aug. 3/79
ANALYSED Aug. 15/79

TO: Canadian Occidental Petroleum Ltd.
Minerals Division
Ste. 311 - 215 Carlingview Dr.
Rexdale, Ont. M9W 5X8

ATTN:
PROJECT: Watsu-Big-Ox-Stream Silts CC: E. Sacks

SAMPLE NO. :	PPM Cu	PPM Mo	PPM Pb	PPM Zn	PPM Ag	PPM U	PPM Th
79WT1025	8	3	16	28	4.4	>400	20
1027	10	3	16	44	0.2	13.5	40
1033	2	1	10	22	0.1	31	68
1038	2	14	6	18	0.2	32	51
1168	6	5	14	62	0.8	63	15
1169	4	9	12	44	0.1	120	52
1170	4	9	6	18	0.1	55	57
1171	2	8	6	28	0.1	65	64
1172	2	2	4	20	0.1	20.0	120
79WT1173	2	1	6	28	0.1	35	78

CERTIFIED BY: Hart Bichle

CERTIFICATE OF ANALYSIS

CHEMEX LABS LTD.
212 BROOKSBANK AVENUE
NORTH VANCOUVER B.C. CANADA

CLIENT : CAN-OXY

ATTN. : E. SACKS

SAMPLES RECEIVED : 07-SEP-79
ANALYSIS COMPLETED : 16-SEP-79
NOVATRACK CERT. NO. : B90074.
CHEMEX CERT. NO. : ASSAY 66171
INVOICE NO. : 32701

SAMPLE ID	U3O8 PERCENT
79 WT 207	0.063
79 WT 1025	0.109
79 WT 1045	0.045
79 WT 1068	0.105
79 WT 1261	0.082
79 WT 1262	0.087
79 WT 1263	0.086
79 WT 1279	0.047
HM 712	0.322
HM 713	0.322

CHEMEX LABS LTD.

212 BROOKSBANK AVE.
NORTH VANCOUVER, B.C.
CANADA V7J 2C1
TELEPHONE: [redacted] 984-0221
AREA CODE: 604
TELEX: 043-52597

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CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 51812
INVOICE NO. 34384
RECEIVED Dec. 13/79
ANALYSED Dec. 19/79

TO: Canadian Occidental Petroleum Ltd.
Minerals Division
Ste. 311 - 215 Carlingview Dr.
Rexdale, Ont. M9W 5X8

ATTN: E. Sacks

PROJECT: Watsu-~~Wox~~- Big Ox
Soils
PULPS

SAMPLE NO. :	PPM W
79WT1232	2
1233	1
1234	1
1235	1
1236	1
1237	1
1238	1
1239	7
1240	1
1241	6
1242	1
1243	1
1244	6
1245	5
79WT1246	4
79WT1024	12
1026	5
1028	1
1029	10
1030	17
1031	25
1032	20
1034	20
1035	8
1036	14
1037	5
1039	2
79WT1040	10
79WT1174	1
1175	2
1176	1
1177	7
1178	5
1179	1
1180	1
1181	12
79WT1182	2

CERTIFIED BY: D.G. Madson.

CHEMEX LABS LTD.

212 BROOKSBANK AVE.
NORTH VANCOUVER, B.C.
CANADA V7J 2C1
TELEPHONE: [redacted] 984-0221
AREA CODE: 604
TELEX: 043-52597

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CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 51811
INVOICE NO. 34384
RECEIVED Dec. 13/79
ANALYSED Dec. 19/79

TO: Canadian Occidental Petroleum Ltd.
Minerals Division
Ste. 311 - 215 Carlingview Dr.
Rexdale, Ont. M9W 5X8

ATTN:
PROJECT: Watsu-Big Ox-Stream Silts

PULPS

SAMPLE NO. :	PPM W
79WT1025	6
1027	7
1033	14
1038	2
1168	2
1169	5
1170	6
1171	10
1172	25
79WT1173	1

CTA MEMBER CANADIAN TESTING ASSOCIATION

CERTIFIED BY: [signature]

CHEMEX LABS LTD.

212 BROOKSBANK AVE.
NORTH VANCOUVER, B.C.
CANADA V7J 2C1
TELEPHONE: [redacted] 984-0221
AREA CODE: 604
TELEX: 043-52597

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CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 49361
INVOICE NO. 31943
Th-32440
RECEIVED Aug. 3/79
ANALYSED Aug. 16/79

TO: Canadian Occidental Petroleum Ltd.,
Minerals Division,
Ste. 311 - 215 Carlingview Dr.,
Rexdale, Ont.
ATTN: WATSU-Rock

CC. E. Sacks

SAMPLE NO. :	PPM Cu	PPM Mo	PPM Pb	PPM Zn	PPM Ag	PPM U	PPM Th	PPM Sn	PPM W
JH-OXY-1	52	1	1	16	0.2	1.0	< 1	1	1
2	8	2	4	22	0.2	1.0	< 1	1	1
3	6	1	1	52	0.4	< 0.5	< 1	1	3
4	2	1	2	16	0.1	< 0.5	< 1	1	1
5	46	2	2	28	0.1	23.0	6	1	1
6	4	1	4	40	0.1	4.5	51	3	1
7	26	1	4	62	0.1	6.5	6	1	3
8	8	1	10	10	0.1	14.0	39	1	3
9	62	1	2	28	0.1	< 0.5	3	1	1
9a	28	1	4	52	0.1	< 0.5	4	2	1
JH-OXY-10	8	1	16	40	0.1	9.0	40	1	1
ES-CLO-1a	4	2	4	8	0.1	< 0.5	31	1	1
1b	4	3	12	8	0.1	0.5	30	1	1
2	12	1	16	4	0.1	< 0.5	21	1	1
3	10	2	10	8	0.4	1.0	35	1	1
4	98	2	2	50	0.2	0.5	4	1	1
5	16	1	120	8	2.0	1.0	14	1	1
6a	52	1	4	22	0.1	0.5	2	1	1
ES-CLO-6b	8	1	2	50	0.1	0.5	5	1	1
JH-Tier-1	2	3	16	2	0.2	0.5	16	1	2
2	102	1	4	88	0.1	0.5	4	1	1
3	82	2	2	46	0.2	1.0	4	1	1
4	6	2	10	74	0.2	6.5	77	1	4
5	4	2	14	8	0.1	1.5	35	1	2
6a	6	2	26	14	0.4	0.5	11	1	2
6b	4	1	2	24	0.1	1.5	2	1	1
7	2	1	1	6	0.1	1.5	< 1	1	1
8	4	1	8	6	0.2	0.5	4	1	1
9	40	1	10	50	1.0	0.5	6	1	1
10	4	1	2	2	0.2	< 0.5	2	1	1
JH-Tier-11	4	4	48	6	1.2	1.5	9	1	1
JH-Bigox-1	6	1	2	60	0.2	2.0	21	1	1
2	4	1	1	90	0.1	1.5	19	1	1
3	2	1	8	28	0.2	3.5	54	2	200
4	2	1	4	28	0.2	7.5	38	2	2
5	2	1	6	14	0.1	10.0	30	1	1
~~JH-Bigox-6~~	~~Missing~~ next page				–	–	< 1	–	–
Bigox-1	4	1	4	20	0.1	1.5	33	1	8
2a	2	1	8	10	0.1	9.0	39	1	20
ES-Bigox-2b	6	2	14	22	0.6	25.5	40	1	20

CTA
MEMBER CANADIAN TESTING ASSOCIATION

CERTIFIED BY: Hart Bichle

CHEMEX LABS LTD.

212 BROOKSBANK AVE.
NORTH VANCOUVER, B.C.
CANADA V7J 2C1
TELEPHONE: [redacted] 984-0221
AREA CODE: 604
TELEX: 043-52597

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CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 49362

INVOICE NO. 31943

RECEIVED Th-32440 Aug. 3/79

ANALYSED Aug. 16/79

TO: Canadian Occidental Petroleum Ltd.,
Minerals Division,
Ste. 311 - 215 Carlingview Dr.,
Rexdale, Ont.

ATTN: Watsu-Rock CC. E. Sacks

SAMPLE NO. :	PPM Cu	PPM Mo	PPM Pb	PPM Zn	PPM Ag	PPM U	PPM Th	PPM Sn	PPM W
ES-Bigox-2c	2	2	8	16	0.1	7.5	9	1	12
3	2	2	18	2	0.1	4.5	43	1	4
4	2	1	12	2	0.1	4.0	41	1	15
4a	4	6	6	10	0.2	5.5	17	1	1
5	2	3	2	8	0.2	3.0	6	1	1
ES-Bigox-6	4	1	6	24	0.2	7.5	43	2	1
JH-Wox-1	12	47	16	6	0.4	23.5	29	1	12
2	6	1	6	18	0.2	3.5	32	2	6
JH-Wox-3	2	1	4	10	0.1	22.0	44	1	10
ES-Wox-1	10	2	4	8	0.2	1.5	15	1	1
2a	12	1	2	26	0.4	1.5	15	1	1
2b	32	7	2	8	0.4	1.5	17	2	1
3	4	15	8	14	0.1	9.5	21	1	10
4	90	3	2	10	0.2	5.0	10	1	1
5	2	1	6	12	0.1	12.5	43	1	3
ES-Wox-6	40	1	1	72	0.1	< 0.5	1	1	1
ES-Sal-1	2	1	4	42	0.1	4.5	10	1	1
2	2	1	4	48	0.1	3.5	14	2	1
3	26	2	4	76	0.2	1.0	5	2	1
4	4	1	6	44	0.1	2.5	13	1	1
5a	8	1	10	24	0.1	15.5	4	1	20
5b	2	1	10	40	0.1	3.0	6	1	10
ES-Sal-6	8	1	6	56	0.1	3.5	20	1	2
JH-Pisa-1	8	1	4	44	0.1	1.5	16	1	2
2	4	1	4	104	0.1	1.0	7	1	1
3	8	1	2	58	0.1	2.5	15	1	1
4a	16	1	2	54	0.2	3.5	13	1	2
4b	2	1	4	4	0.1	2.0	3	1	8
5	6	1	22	16	0.1	23.0	2	1	1
6	6	1	74	290	0.1	7.5	34	1	5
JH-Pisa-7	2	1	6	50	0.1	6.5	22	1	3
ES-Mox-1	4	1	10	52	0.4	4.0	25	1	2
2	6	1	38	14	0.1	1.0	4	1	2
3	16	1	18	270	0.2	2.0	20	1	1
4	12	2	4	98	0.4	0.5	15	1	3
5	4	1	12	22	0.2	2.0	23	1	2
6	12	1	14	48	0.1	1.0	16	1	3
7a	4	1	12	42	0.1	0.5	21	1	1
7b	24	1	8	82	0.1	2.0	26	1	1
ES-Mox-7c	38	2	6	90	0.4	0.5	14	1	3

CTA MEMBER CANADIAN TESTING ASSOCIATION

CERTIFIED BY: Hart Bichler

APPENDIX II - ROCK DESCRIPTIONS AND ELEMENT CONTENTS

Sample No. (Scint BGS-ISL cps)	Name	Description	Analyses (ppm) Cu	Mo	Pb	Zn	Ag	U	Th	Sn	W	U/Th
ES-BIG OX-1 (300)	Megacrystic biotite quartz-monzonite	Medium grained with perthitic megacrysts-K-fsp. (35%) plag (35%), quartz (20%); biotite (10%), trace magnetite.	4	1	4	20	0.1	1.5	33	1	8	.05
-2A (280 - 300)	Altered biotite quartz-monzonite	Medium grained with perthitic megacrysts-composition similar to ES-BIG OX-1; feldspar kaolinized, biotite largely chloritized, limonite staining pervasive especially adjacent to fracture surfaces.	2	1	8	10	0.1	9	39	1	20	.23
-2B	Altered biotite quartz-monzonite	As ES-BIG OX-2A, but more highly altered; limonite abundant now forming earthy-massed material; rock somewhat crumbly.	6	2	14	22	0.6	25.5	40	1	20	.63
-2C	Altered biotite quartz-monzonite with quartz veining	As ES-BIG OX-2B to cut by vuggy, limonitic quartz vein	2	2	8	16	0.1	7.5	9	1	12	.83
-3 (290)	Altered biotite quartz-monzonite cut by quartz veining	As ES-BIG OX-2C; numerous parallel fractures	2	2	18	2	0.1	4.5	43	1	4	.10

APPENDIX II - ROCK DESCRIPTIONS AND ELEMENT CONTENTS

Sample No. (Scint BGS-ISL cps)	Name	Description	Analyses (ppm) Cu	Mo	Pb	Zn	Ag	U	Th	Sn	W	U/T
ES-BIG OX-4 (290)	Altered biotite quartz - monzonite	Perthite megacrysts in med. to c. gr. gdmass; intense lt stain on megacrysts, plag. largely converted to Kaolin along grain surfaces, biotite chloritized	2	1	12	2	0.1	4	41	1	15	.10
-4A	Quartz carbonate vein material	Zoned vein material - carbonate core with vuggy quartz and agate periphery cutting med. gr. biotite quartz monzonite.	4	6	6	10	0.2	5.5	17	1	1	.32
-5 (300)	Quartz vein	Vuggy quartz vein; euhedral quartz crystals growing into central open core	2	2	2	8	0.2	3	6	1	1	.50
-6 (280)	Megacrystic biotite quartz - monzonite	As ES-BIG OX-1	4	1	6	24	0.2	7.5	43	2	1	.17
JH-BIG OX-1 (150)	Megacrystic biotite quartz- monzonite	Perthite megacrysts in fine to med. gr. gdmass -K-fsp (30% mainly in megacrysts) plag(30%), quartz (10%), biotite (10%).	6	1	2	60	0.2	2	21	1	1	.10
-2 (190)	Megacrystic biotite quartz- monzonite cut by diabase	As above JH-BIG OX-1 but fine grained and less biotite; cut by fine grained diabase	4	1	1	90	0.1	1.5	19	1	1	.08

APPENDIX II - ROCK DESCRIPTIONS AND ELEMENT CONTENTS

Sample No. (Scint BGS-ISL cps)	Name	Description	Cu	Mo	Pb	Zn	Ag	U	Th	Sn	W	U/Th
			Analyses (ppm)									
JH-BIG OX-3 (400)	Altered biotite quartz-monzonite	Pinkish perthite mega-crysts unaltered in altered plag-bi-quartz gdmass; plag weathers to kaolin-limonite	2	1	8	28	0.2	3.5	54	2	200	.06
-4	Limonitic megacrystic bi-quartz-monzonite	As above JH-BIG OX-2, limonite stain on grain boundaries	2	1	4	28	0.2	7.5	38	2	2	.19
-5 (420)	Leucocratic megacrystic bi-quartz-monzonite	Fresh, med. to coarse gr. Ksp(40%), plag(30%), quartz (25%), biotite (< 5%)	2	1	6	14	0.1	10	30	1	1	.33

Appendix III - Sampling and Laboratory Procedures

I. SAMPLING PROCEDURES

A) Heavy Minerals

1. A sample site is selcted which exhibits maximum sorting of stream, bed material. Active (below water) or previously active (dry now but previously below water) sites may be chosen. Leading edges or sides of gravel bars with large boulders are most attractive. In practice, the ideal case is rare and one chooses the best possible site.

2. Gravel and cobble material is shoveled into a large (18" to 24") gold pan into which 1/4" holes have been drilled. The material is vigourously shaken in still water so that - 1/4 in. material passes the screen into a second, matching pan. Enough -1/4 in. material is collected to fill an 18" x 24" poly bag (usually one large pan or two smaller ones). The -1/4" material is returned to camp.

3. The - 1/4 in. material is panned to achieve a concentrate of heavy minerals and aggregates containing heavy minerals. Approximately 80% of the original material (20 - 25 lbs) is discarded while a 1 - 2 lb. concentrate is obtained. The concentrate is sealed in a plastic or cloth bag (cloth is preferred as it allows

the sample to dry, thus reducing shipping weight)and then sent to the laboratory for geochemical analysis.

B) Stream Sediment

1. A presently or previously active stream site is selected which exhibits minimum sorting ie. quiet water, and accumulation of fine sandy and silty material. If the stream is too active, material can be obtained from bank-moss which acts as a trap, or by digging out the lee of large boulders.

2. Three to four handfuls of material is collected and after squeezing to remove excess water is placed in high wet-strength, heavy duty, prenumbered kraft envelopes. The samples are dried in the field and then sent to the laboratory for geochemical analysis.

C) Stream Water

1. A 4 oz. poly bottle is rinsed with the sample site water at least three times then filled fully and tightly capped. The sample is tested in the field for pH and specific conductivity, then sent to the laboratory for geochemical analysis.

2. Care should be taken to avoid contamination by always collecting waters up-stream from a heavy mineral or sediment sample site.

D) Soil

1. 'B' horizon or talus fine material is sampled.

2. Three to four handfuls of material are collected into heavy duty, high wet-strength kraft envelopes which are dried in the field and then sent to the laboratory for analysis.

E) Sample Site Information Card

1. At each soil or stream sample site, an 80 column field data card is completed. The sampler records such information as sample number, location and type, depth of stream, sample composition, vegetation, drainage, etc. Separate cards are used for stream and soil samples in order to record pertinent information.

II. Laboratory Procedures

A. Sample Preparation

i) Heavy Minerals

1. Samples dried and weighed.

2. Screen - 10 mesh material from sample and weigh; weigh and retain +10 mesh material left on screen.

3. Use -10 mesh fraction for heavy liquid separation.

4. Transfer -10 mesh (fine) fraction into a 1000 ml. separatory funnel containing 200 mls. of tetrabromoethane (S.G. 2.96).

5. Shake sample gently in heavy liquid. Particles of fines adhering to sides of the separatory funnel can be washed into the heavy liquid by slowly rotating the funnel at an oblique angle. The "heavies" (S.G. $>$2.96) will slowly settle to the bottom of the heavy liquid.

6. Drain the "heavies" into a small filter funnel. Drain excess heavy liquid and light materials into a separate filter funnel. Collect all heavy liquid into a waste receiving bottle.

7. Save light minerals (S.G. $<$2.96). Wash "heavies" fraction with methanol to remove residual tetrabromoethane. Use the same procedure on light minerals fraction. Dry both fractions and weigh. Retain the "lights" in a suitable sealed container. Save 0.5 gm of "heavies" in a plastic vial for visual examination.

8. Pulverize the remaining "heavies" in an agate mortar and pestle and homogenize before weighing for analyses.

9. Analyse the "heavies" powder for appropriate elements. The number of elements analysed for is determined by the amount of "heavy" material obtained in separation.

ii) Stream Sediments

1. Samples are sorted and dried at 50°c for 12 to 16 hours.

2. Dried material is then screened to obtain the -80 mesh (177 micron) fraction. The rest of the material is discarded.

3. -80 mesh fraction material is weighed and analysed for appropriate elements.

iii) Soils

Same procedure as for stream sediments.

iv) Rocks

1. Entire sample is crushed.

2. If necessary (>250 gms.). The sample is split on a Jones splitter, the reject is retained for a short period.

3. The split fraction is pulverized in a ring grinder such that 90% passes a 200 mesh (74 micron) sieve.

4. The -200 mesh material is weighed and analysed for the appropriate elements.

v) Waters

See individual element descriptions for U and F.

B. Elemental Analyses

i) ppm Copper, Lead, Zinc, Silver, Molybdenum (Atomic Absorption)

1. A 1.0 gm portion of -80 mesh soil or stream sediment or -200 mesh rock flour or pulverized "heavies" is digested in concentrated, hot, perchloric - nitric acid ($HClO_4$-HNO_3) for 2 hours.

2. Digested sample is cooled and made up to 25 mls. with distilled water.

3. Solution is mixed and solids allowed to settle.

4. Cu, Pb, Zn Ag and Mo are determined by atomic absorption, using background correction for Pb and Ag analyses.

Element	Bkgd. Corr.	Flame Type	Wave Length hm	Detection Limit	Chemex Standard	± 1 Std. Deviation
Cu	No	A	324.7	1 ppm	71 ppm	± 3
Pb	Yes	A	217.0	1 ppm	59 ppm	± 1
Zn	No	A	213.8	1 ppm	52 ppm	± 3
Ag	Yes	A	328.1	0.2 ppm	8.5 ppm	± 0.5
Mo	No	N	313.3	1 ppm	25 ppm	± 1

A = Air acetylene flame.

N = Nitrous oxide - acetylene flame.

ii) ppm Tin (Sn) (Atomic Absorption)

1. A 1.0 gm sample of -80 mesh soil or stream sediment, -200 mesh rock flour or pulverized "heavies" is scintered with ammonium iodide.

2. The resulting tin-iodide is leached with a dilute HCl - ascorbic acid solution.

3. The TOPO complex is then extracted into MIBIC (Methyl isobutyl ketone) and anaylsed via atomic absorption.

4. Detection limit: <u>1 ppm Sn</u>

iii) <u>ppm Tungsten (W) (Colourimetric)</u>

1. 0.5 gm of -80 mesh soil or stream sediment, -200 mesh rock flour or pulverized "heavies" is fused with potassium bisulfate and leached with HCl.

2. The reduced form of W is complexed with toluene 3, 4 dithiol and extracted into an organic phase.

3. The resulting colour is visually compared to similarly prepared standards. <u>(Colourimetric method)</u>

4. Detection limit: <u>2 ppm W</u>

iv) <u>ppb Gold (Au) (Atomic Absorption)</u>

1. A 5 gm sample of -200 mesh rock flour or pulverized "heavies" is ashed at 800^{o}c for 1 hour.

2. Ashed material is digested with aqua regia twice to dryness.

3. Digested material is taken up in 25% HCl.

4. Au is extracted as the bromide into MIBK and analysed via atomic absorption.

5. Detection limit: <u>10 ppb Au</u>

v) <u>ppm Thorium (Th) (Neutron Activation)</u>

1. 1 gm of -80 mesh soil or stream sediment, -200 mesh rock flour or pulverized "heavies" is weighed into a polyethelene vial and heat sealed.

2. Samples, along with standards, are then irradiated

for sufficient periods to receive a neutron dose of 1-3 X 10^{10} to $10^{15}/cm^2$.

3. Following irradiation, samples are cooled for at least one week and thorium determined by the measurement of its characteristic gamma ray, using a semiconductor (Ge (Li)) detector.

4. Detection limit: 1 ppm Th

vi) Uranium (U) (Fluorimetry)

A) Uranium in soils, stream sediments, "heavies", rocks.

1. 1 gm of -80 mesh soil or stream sediment, -200 mesh rock flour or pulverized "heavies" is digested with hot, $HClO_4$-HNO_3 to strong fumes of $HClO_4$ for approximately 2 hours.

2. The digest is diluted to volume and mixed.

3. An aliquot is extracted into MIBK with the acid of an aluminum nitrate-tetrapropyl ammonium hydroxide salting solution. (TPAN)

4. Uranium in the MIBK is determined by evaporating a portion of the MIBK in a platinum dish and fusing with a mixture of Na_2CO_3-K_2CO_3-NaF.

5. The fluorescence of the fused flux is measured to determine the uranium content.

6. Detection limit: 0.5 ppm U

B) Uranium in Water

1. A portion of the sample is filtered to remove sediment (if necessary), is acidified and then evaporated to dryness.

2. Residue is leached with a small volume of HCO_3.

3. Uranium in the leachate is extracted into MIBK, with the aid of TPAN salting solution.

4. Uranium is determined as for solid materials, above by fluorimetry.

5. Detection limit: 0.2 ppb U

vii) Fluorine (F) (Specific Ion Electrode)

A) F in soils, stream sediments, rocks, "heavies".

1. 0.25 gm of -80 mesh soil or stream sediment, -200 mesh rock flour or pulverized "heavies" is fused with a 2:1 $NaCO_3$-KNO_3 mixture.

2. The melt is leached with water and citric acid, adjusted to pH 5.5 and the activity measured with a fluoride specific ion electrode.

3. Detection limit: 10 ppm F

B) F in Waters (Potentiometric)

1. An aliquot of the sample is filtered and treated with an equal volume of Total Ionic Strength Adjustment Buffer (TISAB) consisting of glacial acetic acid, sodium chloride and cyclohexanediamine tetraacetic acid.

2. The resulting solution is stirred for 3 minutes to allow the fluoride electrode to stabilize.

3. The F concentration is read from a specific ion meter which is calibrated frequently with freshly prepared standard fluoride solutions.

4. Detection limit: 0.02 ppb F

viii) <u>ppb Arsenic (As) (Atomic Absorption)</u>

a) <u>As in waters</u>

1. An aliquot of water is acidified with HCl and then reduced with potassium iodine to reduce As (V) to As (III).

2. A portion of this solution is further reduced with sodium borohydride to arsine, AsH_3.

3. The volatile arsine is swept into a heated cell in an atomic absorption spectrophotometer and decomposed to free arsenic to determine the arsenic concentration.

4. Detection limit: <u>2 ppb As</u>

ix) <u>pH</u>

1. pH in waters was determined in the field, using a portable pH meter.

2. The meter was standardized by means of buffer solutions, every 10th sample to minimize meter drift.

x) <u>Specific Conducitvity (S.C.)</u>

1. S.C. in waters was determined in the field, using a portable S.C. meter.

2. The electrode was washed in a standard water, after each determination, to minimize and standardize contamination.

APPENDIX IV - Comments of R.H. Wallis
- Examination of BIG OX Claims

BIG OX Claims (1-72) 105F 7W½ July 31st, 1979

Commodity (U-W-Mo-F) RHW, EJS, JH

All above the tree line, but confused topography with numerous cirques facing off in many different directions, need good photo blow-up map, as no 1:50,000 map and the 1:250,000 map is ridiculously simplified to the point of being of no help. The physiography consists of gentle slopes above small lakes in cirques grading upwards into steep talus slopes and broken, steep cliffs of "granite". Not an easy claim group on which to lay out a simple grid, 2000+ feet relief.

Geology - the Nisutlin batholith at its simplest; a perthite megacrystic,biotite quartz-monzonite (700 cps) cut by endless sets of limonite zones in which the quartz-monzonite "falls apart", biotite altered to chlorite and limonite, and carbonate-quartz-pyrite veins occur, but cps still 700 cps even in these fracture zones.

The Nisultin batholith is Kpqm of Tempelman-Kluit (1977) "moderately resistant, light grey weathering, homogeneous, porphyritic (pinkish K-feldspar) medium-grained, biotite quartz-monzonite.

APPENDIX V

References

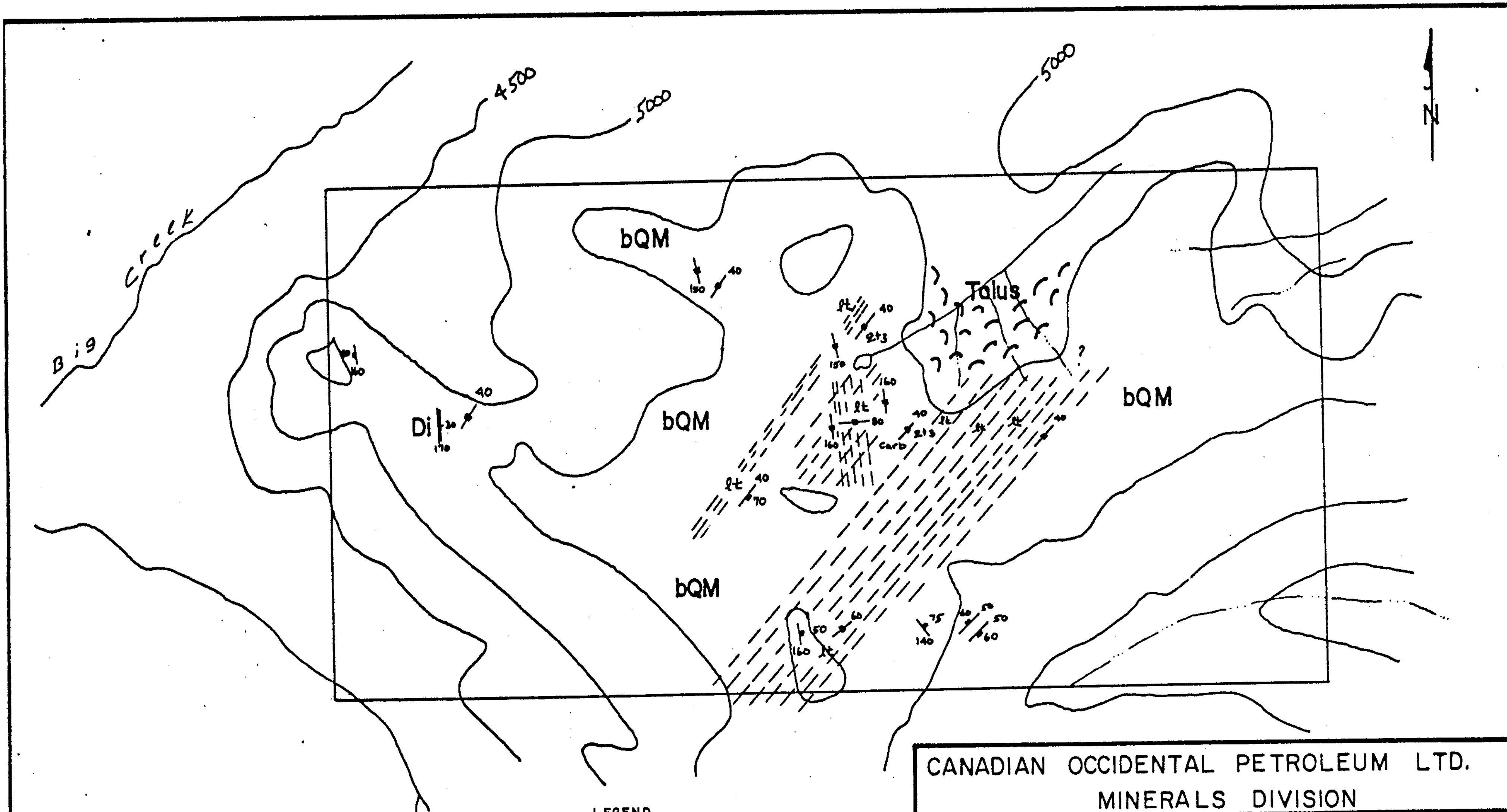
G.S.C. (1979): Stream Sediment and Water Reconnaissance Sampling Survey, Quiet Lake Sheet (105), Southern Yukon Territory: O.F.R. 56A.

Levinson, A. (1974): Introduction to Exploration Geochemistry; Applied Publishing, Calgary.

Tempelman-Kluit (1977): Quiet Lake (105F) and Finlayson Lake (105G) Map Areas; G.S.C. O.F.R. 486 (3 sheets)

Weeler, J.O., Green, L.H and Roddick, J.A.(1969): Geology - Quiet Lake, Yukon Territory; G.S.C. Map 7 - 1960, Prelininary Series Sheet 105F

Travis, R.B. (1955): Classification of Rocks; Quarterly of the Colorado School of Mines; V.50, No. 1, January, 1955.



LEGEND

Di : Diabase dyke

bQM : Biotite quartz monzonite

SYMBOLS

: Fracture Zone

: Jointing (vertical, inclined)

lt : limonite

qtz : quartz vein

carb : carbonate in vein

PLAN I

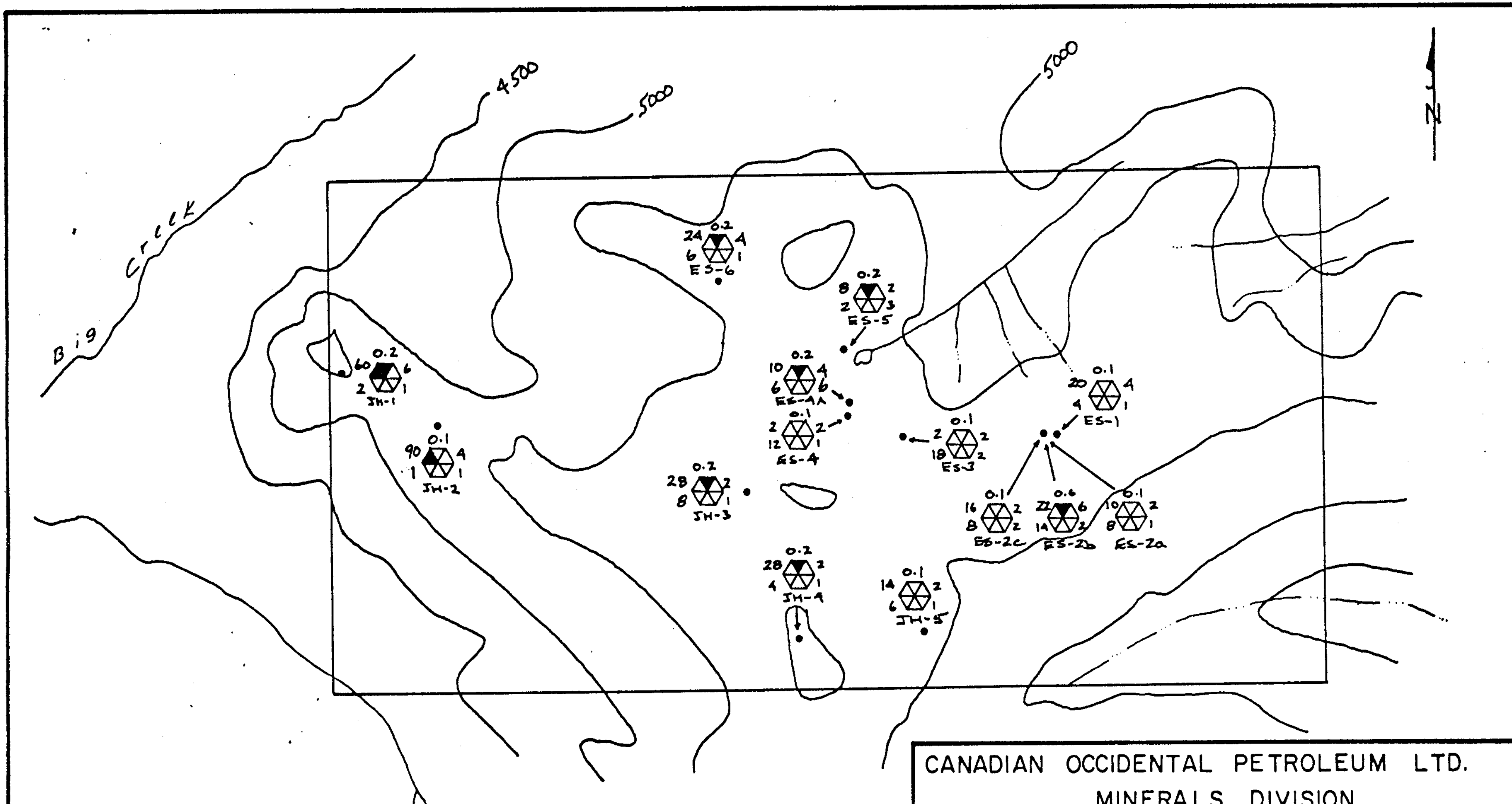
CANADIAN OCCIDENTAL PETROLEUM LTD.
MINERALS DIVISION

PROJECT WATSU
BIG OX CLAIMS
YUKON TERRITORY

GEOLOGY

Scale: 1" = 2640' (1/2 mile)

September, 1979



	Cu	Mo	Pb	Zn	Ag	
Poss. Anomalous	–	–	–	–	–	
Prob. Anomalous	30	2	20	60	.1	

PLAN 2

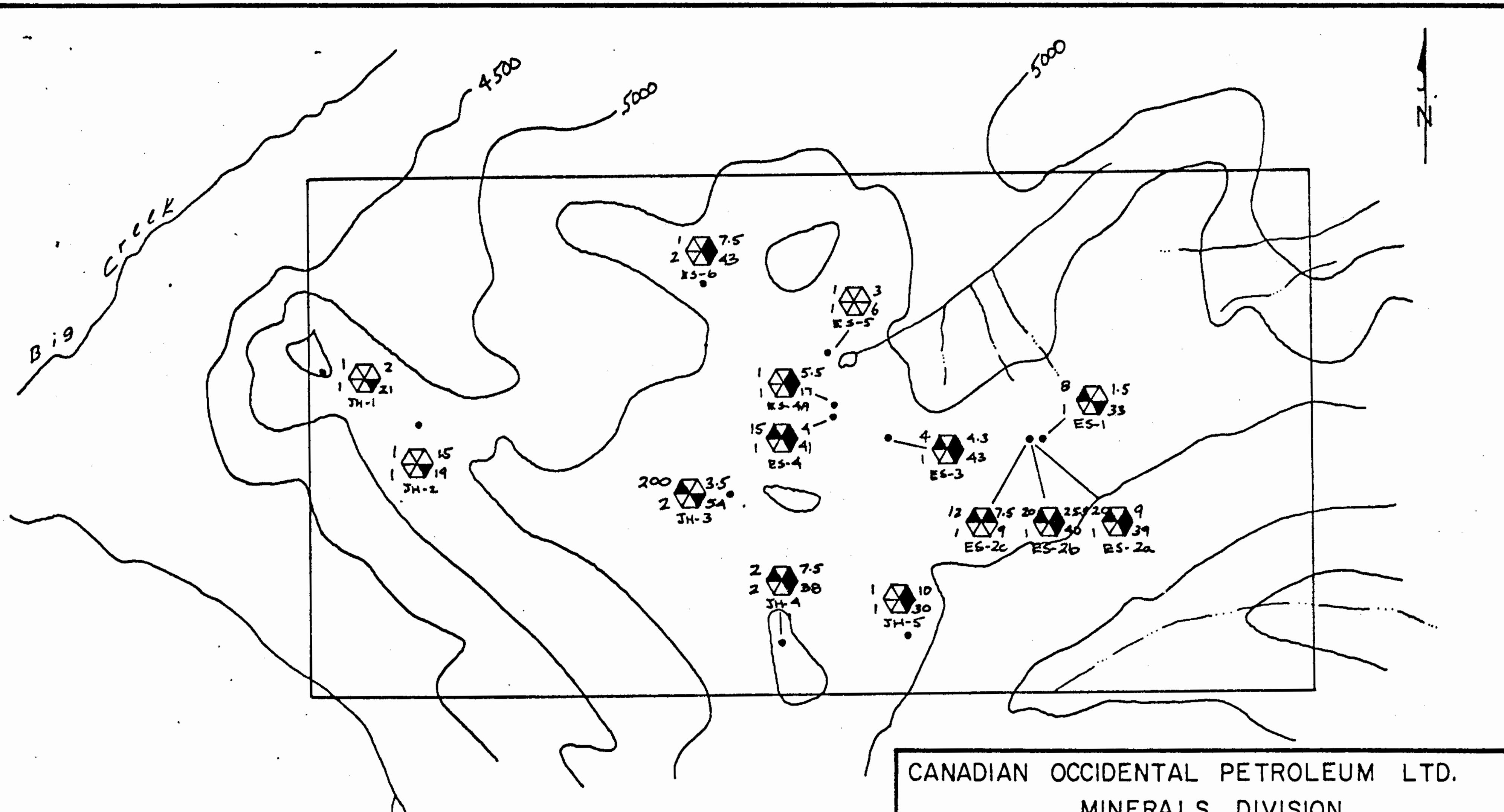
CANADIAN OCCIDENTAL PETROLEUM LTD.
MINERALS DIVISION

PROJECT WATSU
BIG OX CLAIMS
YUKON TERRITORY

ROCK GEOCHEMISTRY

Cu - Mo - Pb - Zn - Ag

Scale: 1" = 2640' (1/2 mile) September, 1979



	U	Th	Sn	W		
Poss. Anomalous	-	-	-	-		
Prob. Anomalous	4	17	3	2		

LEGEND

ppm W, ppm Sn, ppm U, ppm Th

Sample No.

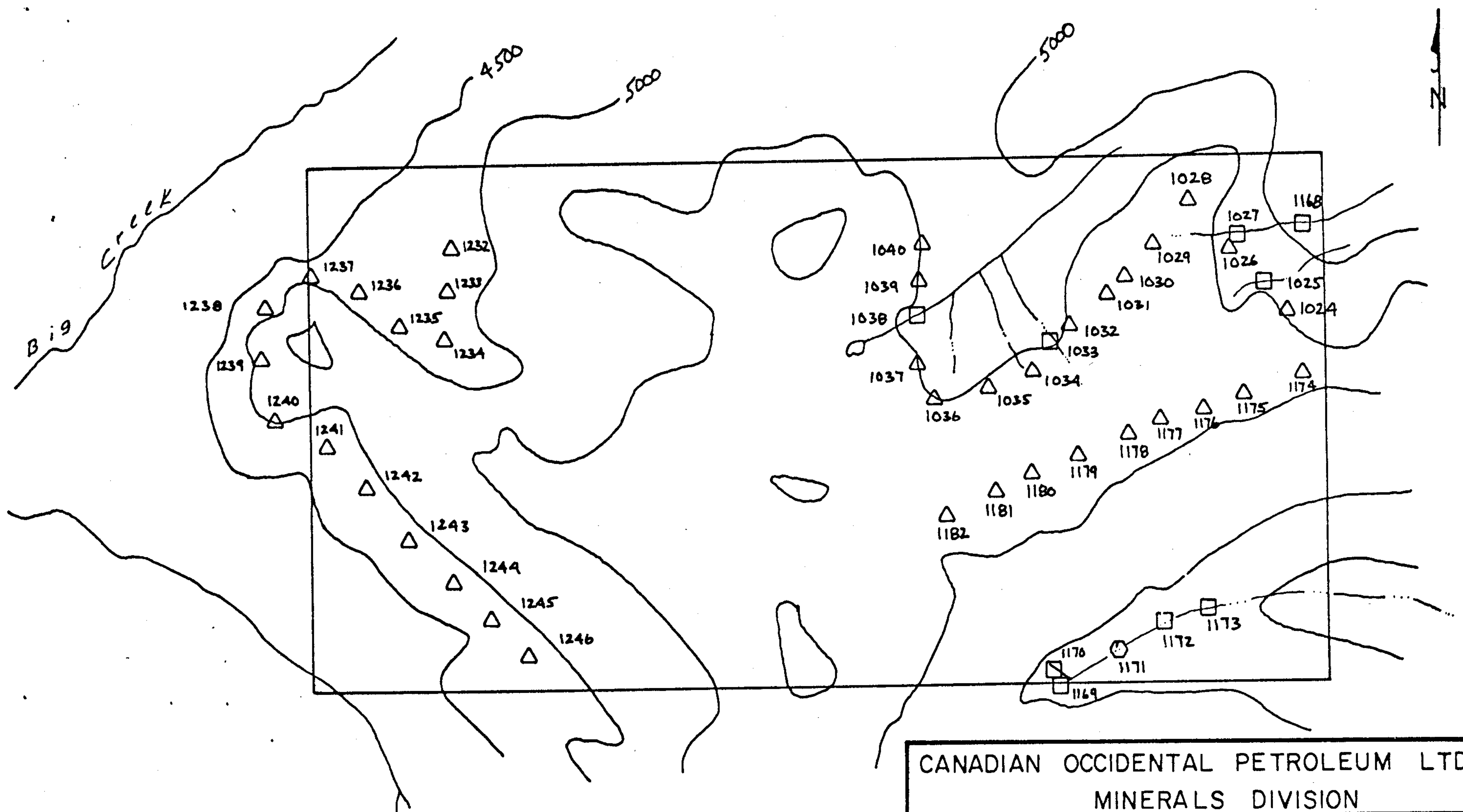
PLAN 3

CANADIAN OCCIDENTAL PETROLEUM LTD.
MINERALS DIVISION

PROJECT WATSU
BIG OX CLAIMS
YUKON TERRITORY

ROCK GEOCHEMISTRY
U - Th - Sn - W

Scale: 1" = 2640' (1/2 mile) September, 1979



LEGEND

△ SOIL

□ STREAM SEDIMENT & WATER

⬡ HEAVY MINERAL & SEDIMENT & WATER

PLAN 4

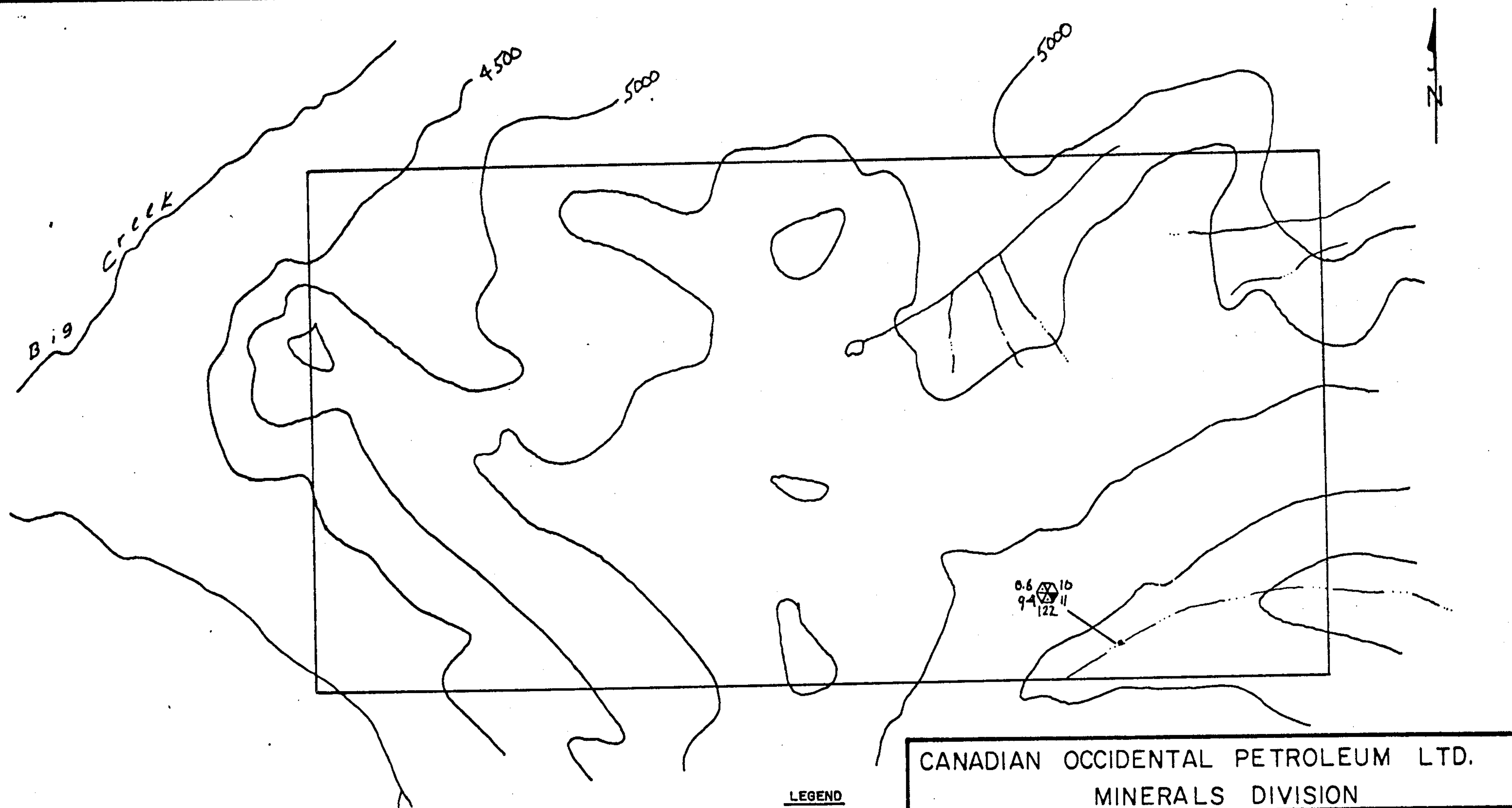
CANADIAN OCCIDENTAL PETROLEUM LTD.
MINERALS DIVISION

PROJECT WATSU
BIG OX CLAIMS
YUKON TERRITORY

SAMPLE LOCATIONS

Scale: 1" = 2640' (1/2 mile)

September, 1979



LEGEND

ppm Ag / ppm Cu / ppm Zn / ppm Mo / ppm Pb

	Cu	Mo	Pb	Zn	Ag
Poss. Anomalous	63	3.5	89	200	.38
Prob. Anomalous	165	8.5	280	440	.95

PLAN 5

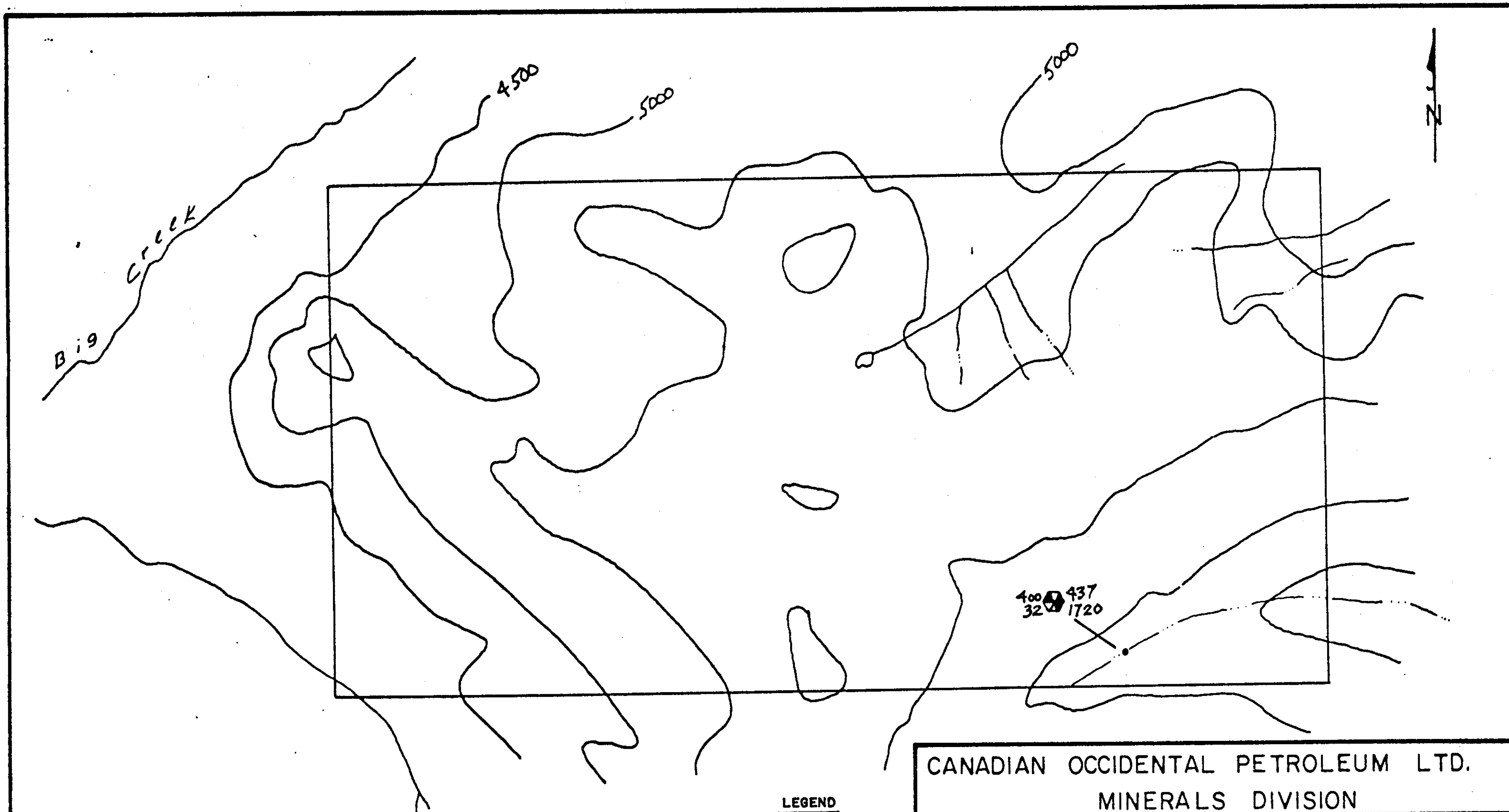
CANADIAN OCCIDENTAL PETROLEUM LTD.
MINERALS DIVISION

PROJECT WATSU
BIG OX CLAIMS
YUKON TERRITORY

HEAVY MINERAL GEOCHEMISTRY
Ag-Cu-Mo-Pb-Zn

Scale: 1" = 2640' (1/2 mile)

September, 1979



LEGEND

ppm W / ppm Sn ⬡ ppm U / ppm Th

		U	Th	Sn	W		
Poss. Anomalous	•	26	330	28	60		
Prob. Anomalous	◢	120	1200	300	160		

PLAN 6

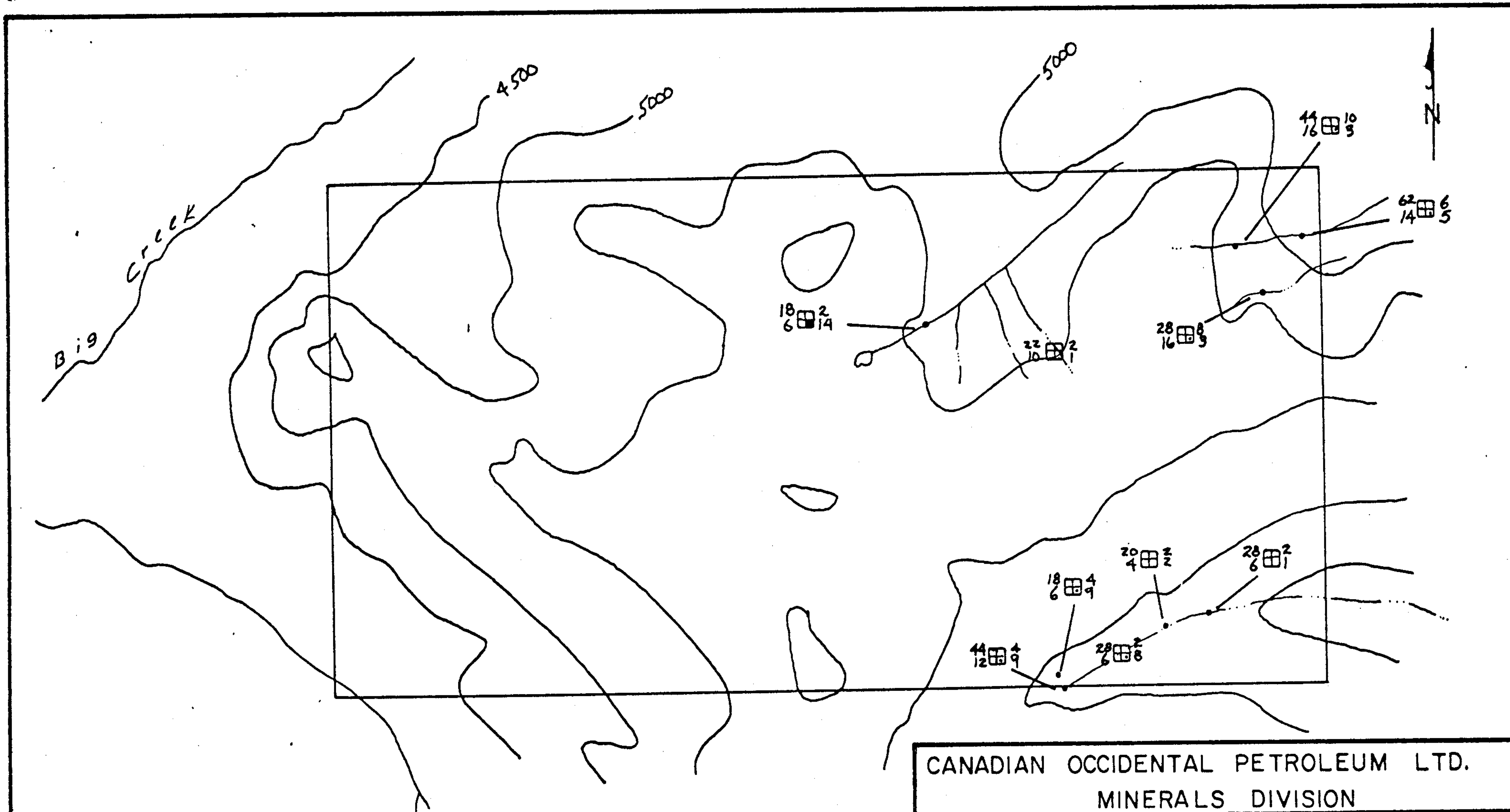
CANADIAN OCCIDENTAL PETROLEUM LTD.
MINERALS DIVISION

PROJECT WATSU
BIG OX CLAIMS
YUKON TERRITORY

HEAVY MINERAL GEOCHEMISTRY
U - Th - Sn - W

Scale: 1" = 2640' (1/2 mile)

September, 1979



LEGEND

ppm Zn / ppm Pb ⊞ ppm Cu / ppm Mo

	Cu	Mo	Pb	Zn		
Poss. Anomalous	28	3	21	115		
Prob. Anomalous	54	11	59	320		

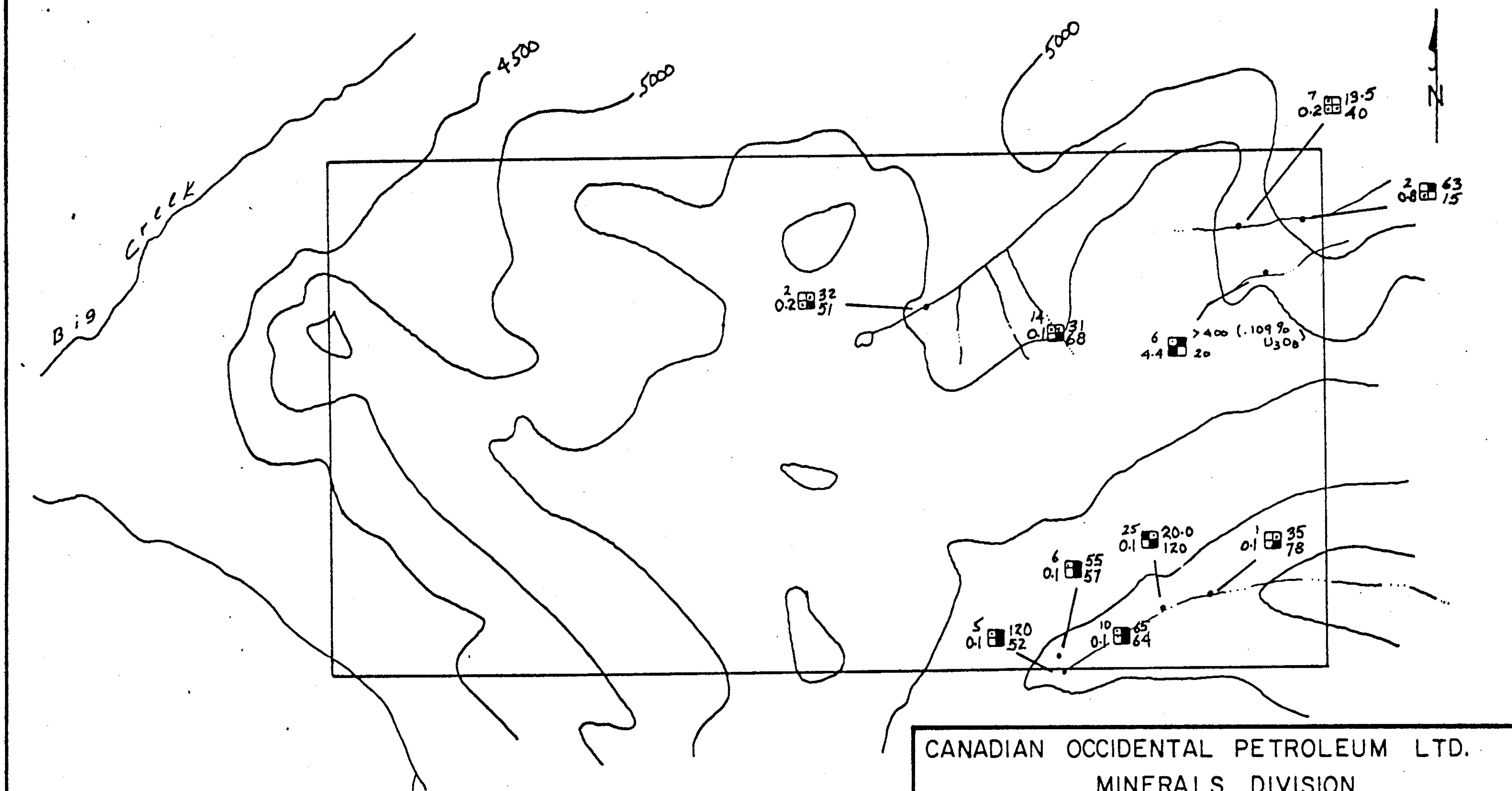
PLAN 7

CANADIAN OCCIDENTAL PETROLEUM LTD.
MINERALS DIVISION

PROJECT WATSU
BIG OX CLAIMS
YUKON TERRITORY

STREAM SEDIMENT GEOCHEMISTRY
Mo - Pb - Zn - Cu

Scale: 1" = 2640' (1/2 mile) September, 1979



		U	Th	Ag	W		
Poss. Anomalous	●	17	29	<.1	5		
Prob. Anomalous	◢	38	50	1	16		

LEGEND

ppm W ⊞ ppm U
ppm Ag ⊞ ppm Th

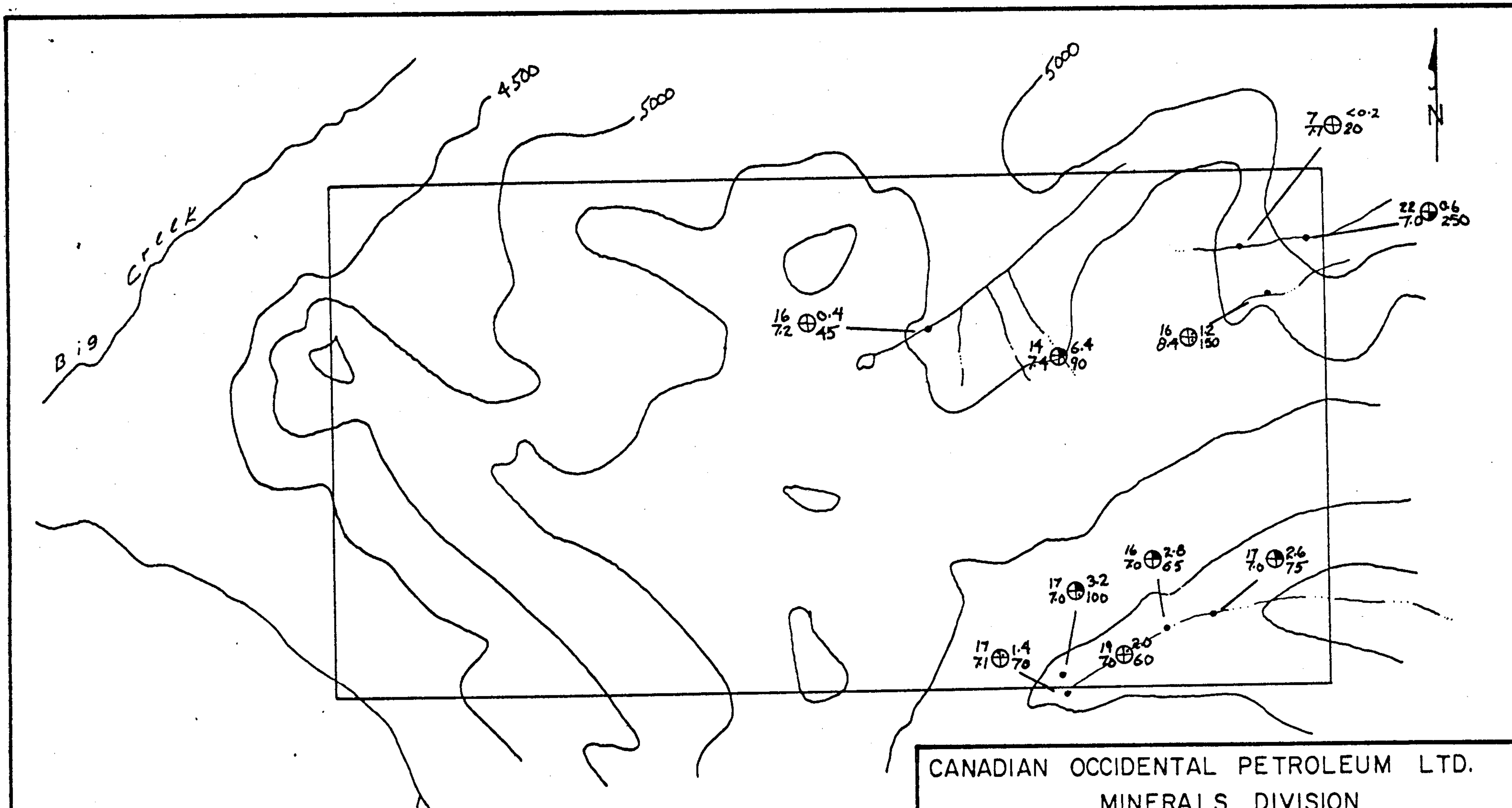
PLAN 8

CANADIAN OCCIDENTAL PETROLEUM LTD.
MINERALS DIVISION

PROJECT WATSU
BIG OX CLAIMS
YUKON TERRITORY

STREAM SEDIMENT GEOCHEMISTRY
W - U - Th - Ag

Scale: 1" = 2640' (1/2 mile) September, 1979



	U	F	S.C.			
Poss. Anomalous	·85	100	46			
Prob. Anomalous	2.5	210	100			

PLAN 9

LEGEND

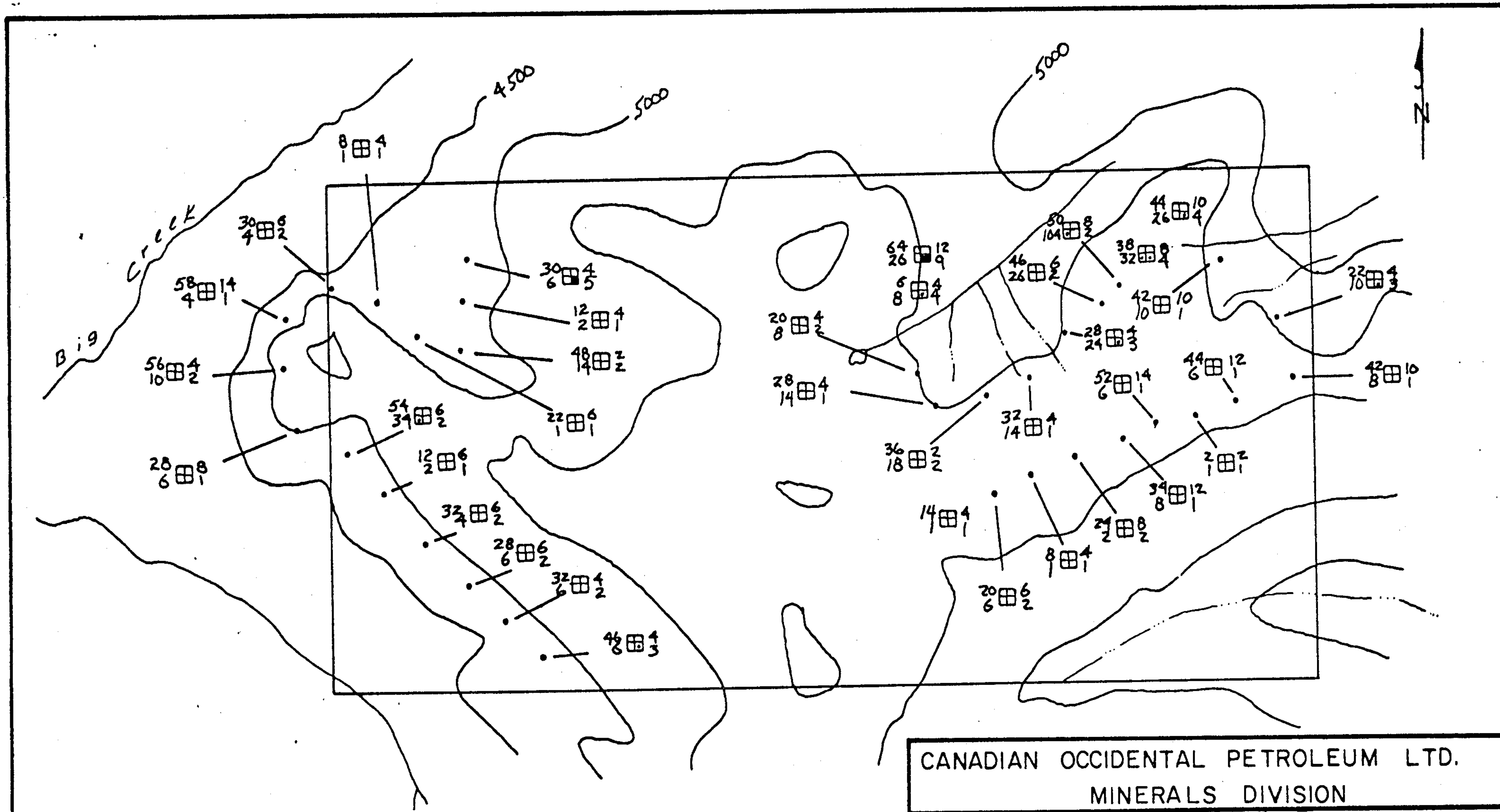
SC / pH ⊕ ppb U / ppb F   As < 2 ppb

CANADIAN OCCIDENTAL PETROLEUM LTD.
MINERALS DIVISION

PROJECT WATSU
BIG OX CLAIMS
YUKON TERRITORY

STREAM WATER GEOCHEMISTRY
U - F - As - pH - S.C.

Scale: 1" = 2640' (1/2 mile)   September, 1979



LEGEND

ppm Zn ⊞ ppm Cu
ppm Pb ⊞ ppm Mo

		Cu	Mo	Pb	Zn		
Poss. Anomalous		22	2.5	32	115		
Prob. Anomalous		120	5	150	270		

PLAN 10

CANADIAN OCCIDENTAL PETROLEUM LTD.
MINERALS DIVISION

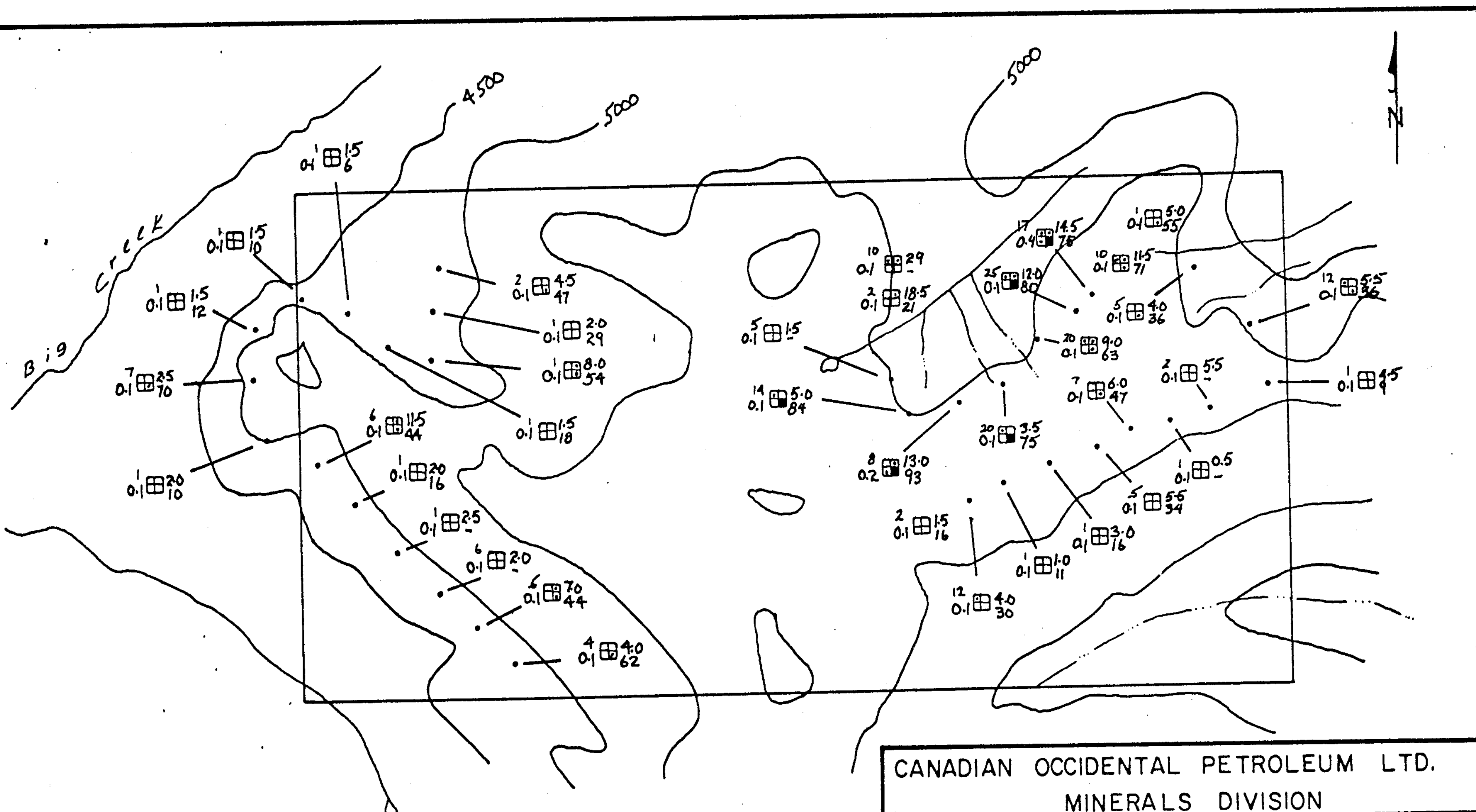
PROJECT WATSU
BIG OX CLAIMS
YUKON TERRITORY

SOIL GEOCHEMISTRY.

Cu - Mo - Pb - Zn

Scale: 1" = 2640' (1/2 mile)

September, 1979



	U	Th	Ag	W		
Poss. Anomalous	7	36	·1	7.5		
Prob. Anomalous	30	75	·8	40		

PLAN 11

LEGEND

ppm W ⊞ ppm U
ppm Ag ⊞ ppm Th

CANADIAN OCCIDENTAL PETROLEUM LTD.
MINERALS DIVISION

PROJECT WATSU

BIG OX CLAIMS

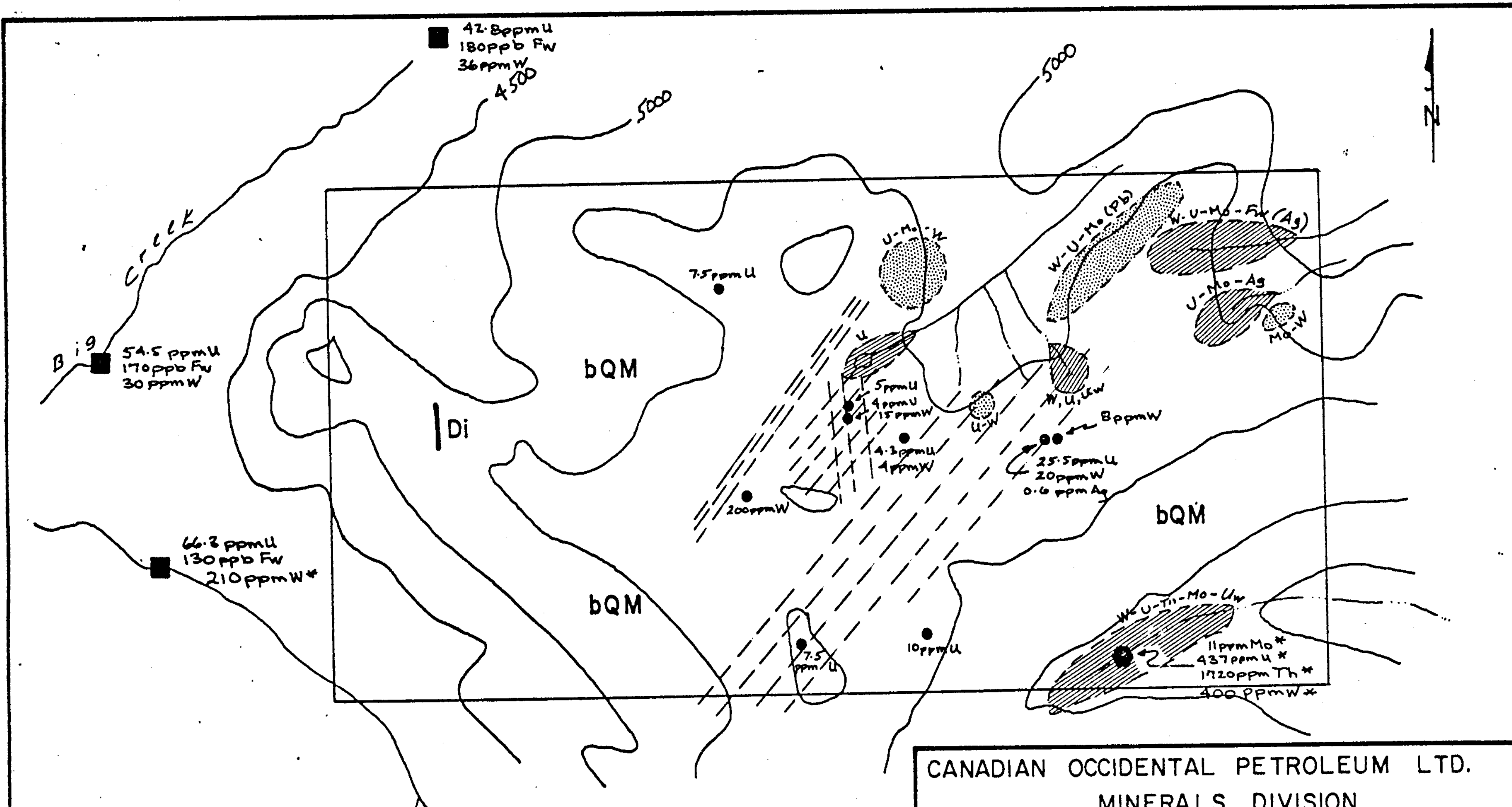
YUKON TERRITORY

SOIL GEOCHEMISTRY

W - Ag - Th - U

Scale: 1" = 2640' (1/2 mile)

September, 1979



CANADIAN OCCIDENTAL PETROLEUM LTD.
MINERALS DIVISION

PROJECT WATSU
BIG OX CLAIMS
YUKON TERRITORY

COMPILATION OF GEOLOGY & GEOCHEMISTRY

Scale: 1" = 2640' (1/2 mile) September, 1979

Legend

Di : Diabase dyke

bQM : Biotite quartz monzonite

Fracture zone

GEOCHEMISTRY

Sediment-Water Anomaly: U>17ppm; Mo>3ppm Ag>.1ppm Fw>100ppb

Soil Anomaly: U>7ppm Mo>2.5ppm Pb>32ppm

Rock geochemistry

Heavy Mineral

1978 G.S.C.-U.R.P. Sediment Site

PLAN 12

Author's Qualifications

Eric J. Sacks

Education - Graduated Queen's University, Kingston, Ontario
M.Sc. in Geology, 1978
- Graduated University of Toronto, Toronto, Ontario
B.Sc. in Geology, 1977

Work Experience - Employed as field exploration geolgist with Canadian Occidental Petroleum Ltd., Minerals Division, Toronto, Ontario since 1978. Carried out and supervised mineral exploration programs in B.C. and Yukon.

Statement of Expenditures

Claims BIG OX 1-72

Record Numbers YA 44475 - YA 44546

			Pro-rated[1] Costs
Salaries and Benefits			$1,650.21
Travel and Accommodation			1,005.87
Drafting and Reproduction			353.39
Consultant			495.86
Camp costs and Supplies			1,132.74
Rental of Equipment			188.78
Other Work			482.69
	Sub-total		$5,309.54
Helicopter 3.0 hr. at $340/hr.	$1,020.00	2	
Geochemical 541 analyses	879.76	3	$1,899.76
	Total		$7,209.30

Notes

[1] Pro-rated on basis of 5.6 man-days worked on claims conducting geological/geochemical/geophysical surveys out of a total of 115.6 man-days spent on these surveys during Project Watsu (see attached breakdown on following sheet).

[2] Helicopter flying completed by Associated Helicopters Ltd.

[3] Geochemical analyses completed by Chemex Labs, Vancouver, B.C. (see attached Cost Breakdown).

BC CLAIM GROUPS	TOTAL NO. OF MAN DAYS	PRO-RATED COSTS SALARIES & BENEFITS	TRAVEL & ACCOMMODATION	DRAFTING & REPRODUCTION	CONSULTANTS	CAMP COSTS & SUPPLIES	EQUIPMENT RENTAL	OTHER WORK	SUB-TOTAL "A"	REAL COSTS HELICOPTER at $310/hr	hrs.	GEOCHEMISTRY cost	# ana	SUB-TOTAL "B"	TOTAL "A" + "B"
ALLEN	4.3	1267.12	772.36	271.35	380.75	869.78	144.96	370.63	4076.95	620.00	2.0	617.80	385	1237.80	5314.75
ASP	5.0	1473.40	898.10	315.53	442.73	1011.38	168.56	430.97	4740.67	682.00	2.2	627.28	396	1309.28	6049.95
COT	3.0	884.04	538.86	189.32	265.64	606.83	101.13	258.58	2844.40	620.00	2.0	378.24	201	998.24	3842.64
KAZ	5.0	1473.40	898.10	315.53	442.73	1011.38	168.56	430.97	4740.67	527.00	1.7	854.64	454	1381.64	6122.31
MAR	1.0	294.68	179.62	63.11	88.55	202.28	33.71	86.20	948.15	310.00	1.0	62.40	18	372.40	1320.55
NEED	5.0	1473.40	898.10	315.53	442.73	1011.38	168.56	430.97	4740.67	837.00	2.7	966.36	560	1803.36	6544.03
PLATE	5.4	1591.27	969.94	340.77	478.15	1092.29	182.04	465.45	5119.91	961.00	3.1	793.24	464	1754.24	6874.15
RAN	5.4	1591.27	969.94	340.77	478.15	1092.29	182.04	465.45	5119.91	1209.00	3.9	775.28	524	1984.28	7104.19
SHAR 1&2	5.4	1591.27	969.94	340.77	478.15	1092.29	182.04	465.45	5119.91	1023.00	3.3	639.36	402	1662.36	6782.27
SHAR 3&4, 9	5.4	1591.27	969.94	340.77	478.15	1092.29	182.04	465.45	5119.91	1488.00	4.8	480.04	619	2268.04	7387.95
SHAR 5&6	5.4	1591.27	969.94	340.77	478.15	1092.29	182.04	465.45	5119.91	899.00	2.9	750.36	469	1649.36	6769.27
SHAR 7&8	5.4	1591.27	969.94	340.77	478.15	1092.29	182.04	465.45	5119.91	837.00	2.7	749.28	460	1586.28	6706.19
SUB-TOTAL (1)	55.7	16413.66	10004.78	3514.99	4932.03	11266.77	1877.72	4801.02	52810.97	10013.00	32.3	7994.28	4952	18007.28	70818.25
YUKON CLAIM GROUPS										at $340/hr					
BIG OX	5.6	1650.21	1005.87	353.39	495.86	1132.74	188.78	482.69	5309.54	1020.00	3.0	879.76	541	1899.76	7209.30
BORDER	1.1	324.15	197.58	69.42	97.40	222.50	37.08	94.81	1042.94	204.00	0.6	165.16	101	369.16	1412.10
CLO	3.9	1149.25	400.52	246.11	345.33	788.87	131.47	336.16	3697.71	1224.00	3.6	316.96	185	1540.96	5238.67
CO	2.2	648.30	395.16	138.83	194.80	445.01	74.16	189.63	2085.89	918.00	2.7	535.24	372	1453.24	3539.13
GOAT	5.5	1620.74	987.91	347.08	487.01	1112.51	185.41	474.07	5214.73	782.00	2.3	1266.48	807	2048.48	7263.21
ICE	4.2	1237.66	754.40	265.04	371.90	848.56	141.59	362.32	3982.47	782.00	2.3	798.64	351	1280.64	5263.11
LICK	5.2	1532.34	934.02	328.15	460.44	1051.83	175.30	448.21	4930.29	748.00	2.2	920.36	546	1668.36	6598.65
MOX	5.9	1738.61	1059.75	372.32	522.43	1193.42	198.90	508.54	5593.97	1292.00	3.8	1205.04	705	2497.04	8091.01
OXY	4.6	1355.53	826.25	290.29	407.31	930.47	155.07	396.49	4361.41	884.00	2.6	732.44	449	1616.44	5977.85
PISA	5.6	1650.21	1005.87	353.39	495.86	1132.74	188.78	482.68	5309.54	714.00	2.1	757.96	512	1471.96	6781.50
SAL	5.6	1650.21	1005.87	353.39	495.86	1132.74	188,78	482.78	5309.54	1190.00	3.5	497.12	411	1687.12	6996.66
TIER	4.9	1443.93	880.15	309.21	433.91	991.10	165.18	422.71	4645.46	1156.00	3.4	750.76	438	1906.76	6552.60
WOX	5.6	1650.21	1005.87	353.39	495.86	1132.74	188.78	482.69	5309.54	952.00	2.8	841.08	579	1793.08	7102.62
SUB-TOTAL (2)	59.9	17651.35	10759.22	3780.01	5303.97	12116.23	2019.28	5162.98	56793.41	11866.00	34.9	9367.00	5997	21233.00	78026.41
TOTALS (1+2)	115.6	34065.00	20764.00	7295.00	10236.00	23383.00	3897.00	9964.00	109604.00	21879.00	67.2	17361.28	10949	39240.28	148844.66

THE BIG OX CLAIM GROUP

GEOCHEMICAL COST BREAKDOWN

INVOICE #[1]	# OF SAMPLES	DESCRIPTION	COST[2]
31746	10	U, F, As	$ 92.50
32463	1	Cu, Mo, Pb, Zn, Ag, Sn, W, U,	25.60
32606	1	Th	5.00
31900	47	Cu, Mo, Pb, Zn, Ag, U	331.45
32440	61	Th	305.00
32701	1	$\%U_3O_8$ assay	10.00
34384	47	W	129.25
31943	14	Cu, Mo, Pb, Zn, Ag, U, Sn, W	200.90
		SUB-TOTAL	$1099.70 less 20%
		TOTAL	$ 879.76

1 - all invoices from Chemex Labs unless otherwise noted
2 - cost includes preparation of samples

Department of Indian Affairs and Northern Development

YUKON QUARTZ MINING ACT

FORM "C" - APPLICATION FOR A CERTIFICATE OF WORK

(This form required in duplicate with sketch showing location of work.)

RECEIVED
30 JUN 1980
MINING RECORDER
WATSON LAKE, Y.T.
I.A. & N.D.

OFFICE DATE STAMP

I (Name) Roger H. Wallis	Occupation Chief Geologist
(Postal Address) 311 - 215 Carlingview Dr., Rexdale, Ont. M9W5X8	

MAKE OATH AND SAY, THAT:-

1. I am the XXXXXX agent of the owner, of the mineral claim(s) to which reference is made herein.

2. I have done, or caused to be done, wotk on the following mineral claim(s):
(Here list claims on which work was actually done by number and name)

BIG OX 1-72

YA 44475-YA 44546

situated at 61°19'N 132°50'W Claim Sheet No. 105F/7
in the Watson Lake Mining District, to the value of at least 7,209.30
dollars, since the 24th day of July 1979.

to represent the following mineral claims under the authority of Grouping Certificate No. ________
(Here list claims to be renewed in numerical order, by grant number and claim name, showing renewal period requested).

YA 44475-YA 44546 BIG OX 1-72 Each claim to be renewed for a period of one year.

4 Jul 80

3. The following is a detailed statement of such work: (Set out full particulars of the work done indicating dates work commenced and ended in the twelve months in which such work is required to be done as shown by Section 53.)

Geological survey, geochemical surveys.

See report by E.J. Sacks referring to the claim group.

See accompanying Statement of Expenditures and cost breakdowns.

Sworn before me at Toronto
this 18 day of June 1980

R. J. Evans

Notary Public

ROBERT J. EVANS
Notary Public, Province of Ontario, for
Canadian Occidental Petroleum Ltd.
Expires February 7, 1981

R H Wallis

Applicant.