GEOLOGY AND GEOCHEMISTRY

OF THE

NEED CLAIMS

Claim Sheet 104P/4

Lat.: 59°10'N

Long.: 129°45'W

Claims:

NEED 1:	Units 1-18
NEED 2:	Units 1-18
NEED 3:	Units 1-18

LIARD MINING DIVISION

British Columbia

by:

Eric James Sacks, M.Sc.

Work Completed June 18, 1979

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PLANS ACCOMPANYING REPORT

SUMMARY

The NEED Claims, which comprise 54 claim units, are located at 59°10'N, 129°45'W, within N.T.S. sheet 104P/4, British Columbia. The claims were staked over the period of June 11th to July 4th, 1979 to cover a Geological Survey of Canada F-W-Zn-Mo-Ag-Pb-Cu anomaly released in Open File Report 562 on June 8th, 1979. On June 18th, 1979 Canadian Oxy conducted geological and geochemical surveys over the claims.

The claims are underlain by a series of Proterozoic to Devono-Mississippian meta-cherts, schists, meta-dolomites, phyllites and greenstones which have been intruded and thermally metamorphosed by Cretaceous biotite quartz-monzonite of the Cassiar stock. Known Pb-Zn-Ag, Be-W skarn and Mo showings occur on or near the claims. The quartz-monzonite is cut by 090T and 020T fracture zones in which clay, limonite and chlorite alteration is extensive. Visible pyrite, galena and molybdenite occur in these altered zones and pyrite and galena stringers occur within hornfelsed metasediments.

Anomalous U and Mo occur both within fresh quartz-monzonite and particularly within altered equivalents. Strong, heavy mineral and stream sediment Pb-Zn-Ag-Cu-Mo-W and U anomalies occur over the claims and are particularly anomalous in south-central NEED 1 and NEED 2. Stream water U, F and S.C. contents reflect lithology. Canadian Oxy sampling has replicated both Geological Survey of Canada and Pantaleyev's results; however, anomalous stream sediment Sn values discovered by Pantaleyev have not been replicated.

Potential for mineralization is excellent. Mineralization may include Pb-Zn-Ag veins within faulted, calcareous meta-sediments, W-Be-Mo skarns within calcareous metasediments, W-Mo mineralization associated with porphyry dykes within the intrusive and Pb-Zn-Ag-Mo veins within altered and fractured quartz-monzonite.

I. INTRODUCTION

The NEED 1 and 2 claims were staked on June 11th, 1979 to cover a Geological Survey of Canada stream sediment F-W-Zn-Mo-Ag-Pb-Cu anomaly. On June 18th, 1979 Canadian Oxy conducted follow-up geological and geochemical surveys over the claims. The NEED 3 claim was subsequently staked on July 4th, 1979. This report presents the results of the Canadian Oxy surveys.

II. LOCATION AND ACCESS

The NEED 1, 2 and 3 claims, which constitute 54 units, are located at approximately 59°10'N, 129°45'W, within N.T.S. sheet 104P/4, Liard Mining Division, British Columbia. (Figure 1, 2)

The claims are situated on and adjacent to Needlepoint Mountain and approximately 2 miles (3.2 km) from the Cassiar - Stewart Road (B.C. Hwy. 37). Access to the claims is via helicopter or via a hard climb up any of several stream channels leading from the claims down to the road.

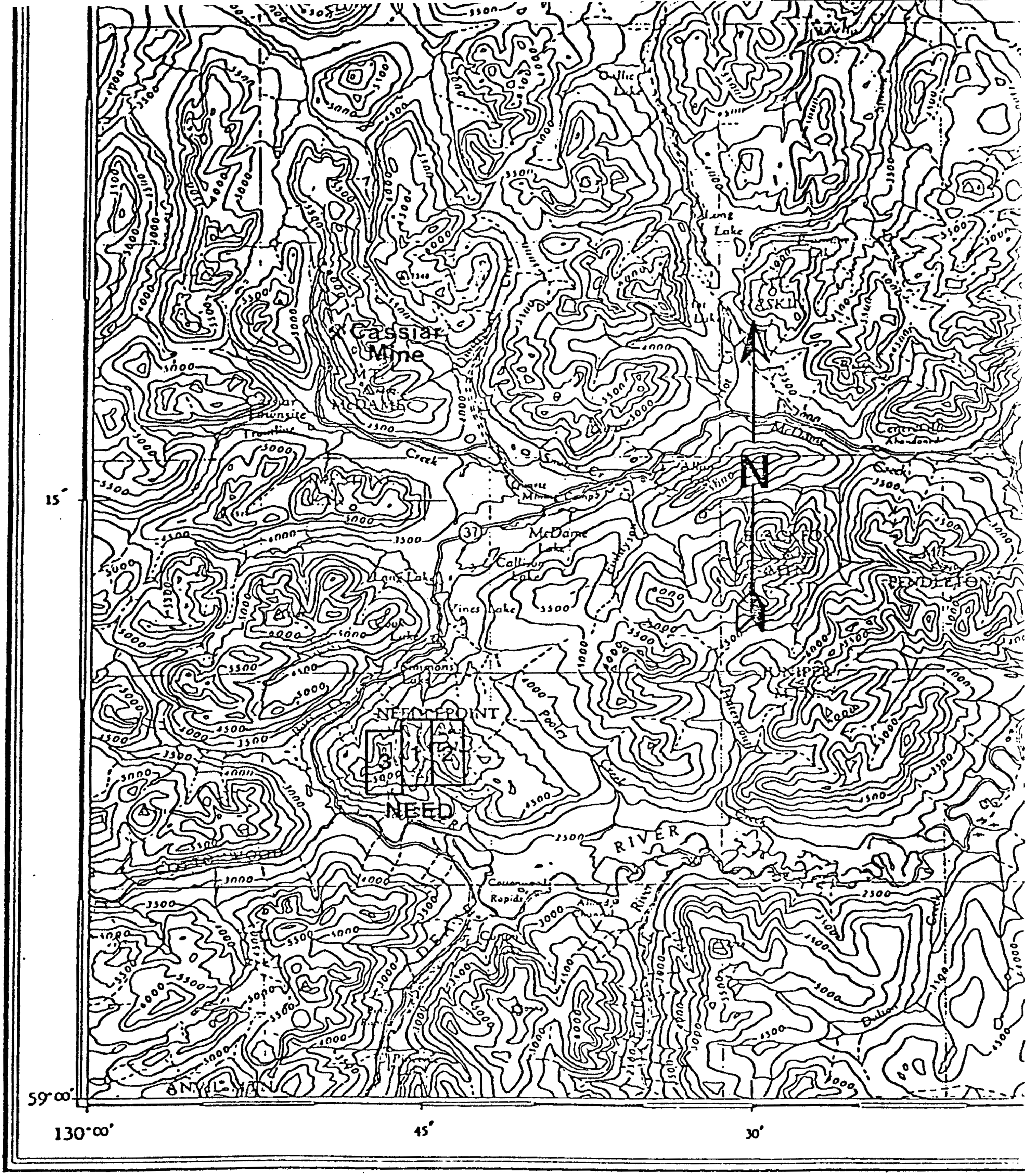

Figure 1

Location and Access of NEED Claims

NTS 104P/4
Scale: 1:250,000

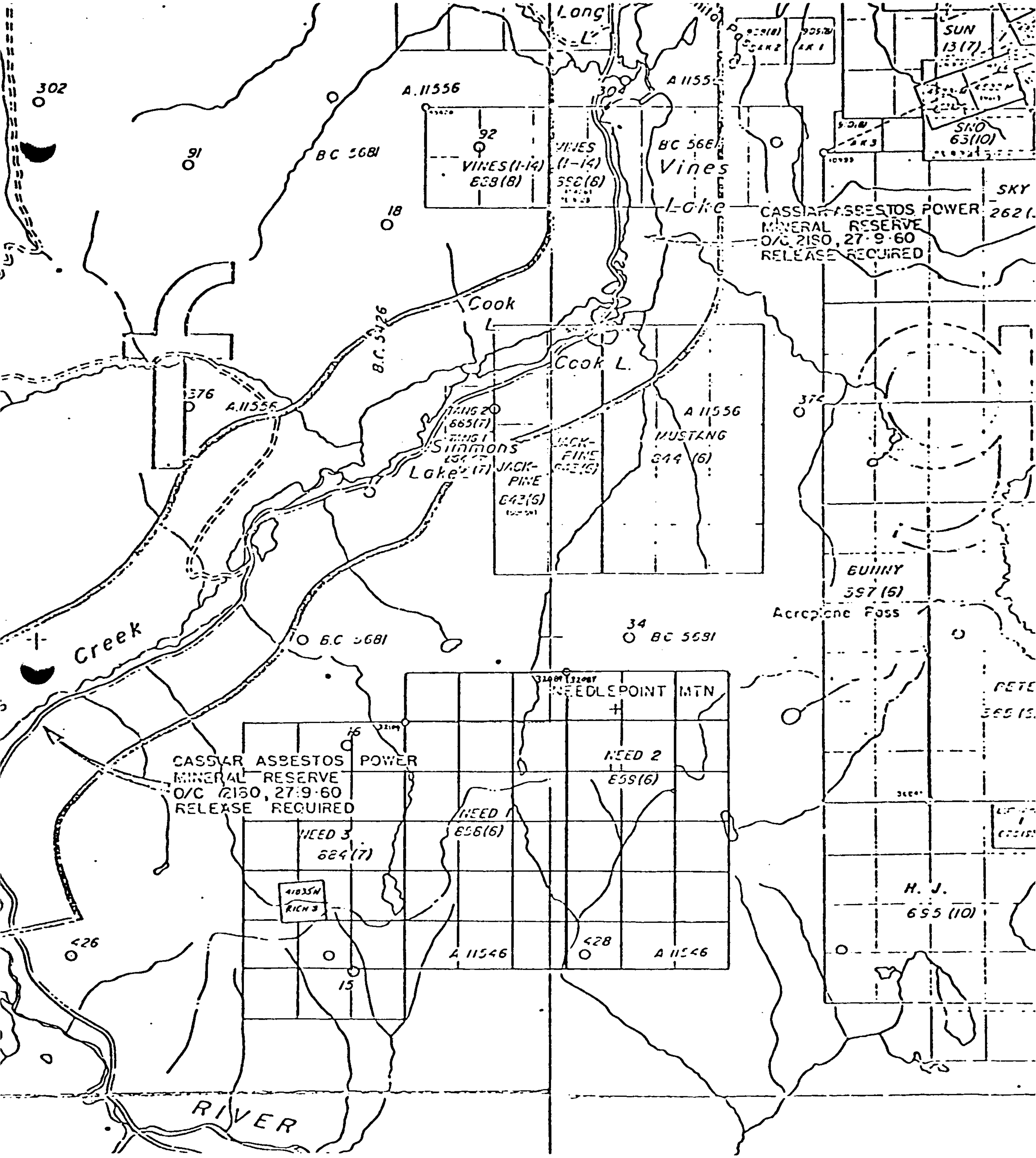

Figure 2

Staking Sketch Showing NEED Claims

Scale: 1:50,000

III. PHYSIOGRAPHY AND VEGETATION

Relief over the claims is approximately 3070 ft. (935 m) between elevations of 6571 ft. (Needlepoint Mountain) and 3500 ft. (2000 and 1065 m) above sea level. Topography consists of a relatively gentle upper plateau with rocky mounts, such as Needlepoint Mountain, dropping steeply into cliffs and scree-filled stream channels. Treeline is at the 5000 ft. (1525 m) level. Above the treeline, vegetation comprises grass and scrub-bush. Below the treeline, and especially within the stream channels, thick mature, conifer growth predominates. The bulk of the claims; however, lies above the treeline.

IV. PREVIOUS WORK

Pantaleyev (1978) reports the presence of several mineral showings on or about the NEED Claims, including a Mo occurrence in southwestern NEED 1, Ag, Zn, Pb veins in southeastern NEED 3, and a Be-W skarn occurrence just south of NEED 1. (See Appendix IV.) The RICH Claims were staked prior to NEED 3 and lie within those claims (Figure 2). These claims apparently cover an Ag-Pb-Zn showing; however, details are unavailable.

The McDame (104P) map-area was geologically mapped over the period 1949 to 1954, by the Geological Survey of Canada (Gabrielse, 1963). Pantaleyev (1978) conducted detailed geological and geochemical surveys in the Cassiar area, including Needlepoint Mountain, and the results are presented in Appendix IV. In 1978 the G.S.C. conducted reconnaissance stream sediment and water sampling over the entire McDame (104P) map sheet. Results of that survey were released on June 8th, 1978 as Open File 562. The NEED 1 and 2 claims were staked on June 11th, 1979 to cover a stream sediment W-Zn-Mo-Pb-Ag-Cu-F anomaly (8 ppm W, 410 ppm Zn, 23 ppm Mo, 50 ppm Pb, 0.8 ppm Ag, 78 ppm Cu, 420 ppb F), and the known Mo and Be-W skarn showings. The NEED 3 claims were staked on July 4, 1979 to cover a stream sediment F-W anomaly (640 ppb F, 28 ppm W), and the known Ag-Pb-Zn vein showing. (See PLAN 10)

V. WORK COMPLETED - 1979

5.1 Staking

The NEED 1, 2 and 3 Claims were staked by MBW Surveys of Whitehorse, Y.T., for Canadian Oxy. The NEED 1 and 2 claims were staked on June 11th, 1979 and comprise 36 units, covering an area of 2225 acres or 3.5 mi^2 (10.2 km^2). Anniversary date is June 19th. The NEED 3 claims were staked on July 4th, 1979 and comprise 18 units, covering an area of 1112 acres or 1.7 mi^2 (4.5 km^2). Anniversary date is July 16th.

5.2 Geological Mapping

Sacks and Hooper conducted geological mapping and prospecting on NEED 1 and 2 on June 18th, 1979. A total of 2 man-days of work were performed.

5.3 Geochemistry

A total of 6 heavy mineral, 39 stream sediment and 39 stream water samples were collected by Jermakowicz, Pelletier and

Zayachivsky, all of Canadian Oxy, over the NEED 1 and 2 claims on June 18th, 1979. A total of 8 rock samples were collected during the mapping survey. All samples were sent to Chemex Labs Ltd., Vancouver, B.C., for geochemical analysis. Analytical results are listed in Appendix I. Three man-days of work were performed.

5.4 Summary of Work Completed

Type of Work	Man Days	No. Samples	No. Analyses Cu	Mo	Pb	Zn	Ag	Au	U	Th	Sn	W	F	As	Total
Geological Mapping	2.0														
Geochemistry	3.0														
i) Rock		8	-	8	-	-	8	-	8	-	-	-	-	-	32
ii) Heavy Min.		6	6	6	6	6	6	6	6	6	6	6	-	-	60
iii) Stream Sed.		39	39	39	39	39	39	-	39	39	39	39	-	-	351
iv) Water		39	-	-	-	-	-	-	39	-	-	-	39	39	117
Helicopter(hrs) (Bell 206-B)	2.7														
TOTAL:	5.0 (2.7 hrs)	92													560

5.5 Names and Addresses of Personnel

Dr. R.H. Wallis — Chief Geologist
Canadian Occidental Petroleum Ltd.,
311 - 215 Carlingview Drive,
Rexdale, Ontario
M9W 5X8

E.J. Sacks, M.Sc. — Project Geologist
Same address as above.

J. Hooper — Senior Assistant
Same address as above.

(cont'd.)

5.5 Names and Addresses of Personnel (cont'd.)

E. Jermakowicz Canadian Occidental Petroleum Ltd., 311 - 215 Carlingview Drive, Rexdale, Ontario M9W 5X8	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 by Panteleyev (1978) shows the NEED Claims to be underlain by a series of northeasterly striking hornfels, quartzites, phyllites, schists, dolomites, carbonaceous and calcareous shales, cherts and greenstones ranging in age from Proterozoic to Devono-Mississippian. These metasediments are intruded by Cretaceous and (?) Tertiary, porphyritic biotite quartz-monzonite known as the Cassiar stock. The Cassiar stock "appears to be a discrete intrusion that has been emplaced along the eastern margin of the Cassiar batholith" (Pantaleyev, 1978, p. 51 - see Appendix IV). Several mineral occurrences are noted including Ag-Pb-Zn veins, a Mo showing and a Be-W skarn showing.

Mapping by Canadian Oxy supports the above interpretation; however, failed to locate the Ag-Pb-Zn showing with any certainty.

6.2 Table of Formations (PLAN 1)

Unit	Description
A	Amphibolite
QM	Quartz-monzonite
mSed	Cherty hornfles, limestone, meta-siltstone.

6.3 Description of Rock Units

All rock samples were stained with Sodium Cobaltinitrate after immersion in concentrated HF in order to distinguish K-feldspar from plagioclase. The rock was subsequently named using the Classification of Rocks of the Colorado School of Mines (Travis, 1955).

a) Unit mSed - Cherty hornfels, limestone, meta-siltstone

The unit underlies southern NEED 3 and eastern NEED 1, and corresponds to Pantaleyev's (1978) Proterozoic to Devono-Mississippian metasedimentary sequence. These rocks comprise fine-grained, dense cherty hornfels in southern NEED 3 and banded, meta-siltstones and limestone in NEED 1. Venlets of galena and pyrite were noted in southern NEED 3 both cross-cutting and paralleling banding. Banding varies from distinct to almost non-existent over distances of as little as a few feet.

b) Unit QM - Quartz-monzonite.

This unit underlies western NEED 1 and NEED 3. The rock contains K-felsdspar (50 - 70%), plagioclase (20 - 30%), quartz (10 - 15%) and biotite (1 - 2%). Texture is hypidiomorphic granular, non-porphyritic and medium to coarse-grained. The rock is fresh except in the vicinity of strong fracturing where chlorite alteration of biotite, clay alteration of feldspars and limonitization are pervasive.

Unit A - Amphibolite

This rock, probably forming a sill, consists of massive, knotted, green to black amphibole. Fractures are coated with muscovite.

6.4 Structure

The QM unit is occasionally foliated due to mica alignment. A 010T/90^{o} foliation is persistent.

Within the QM unit very strong 090T/90^{o} fracturing accompanies distinct, limonitized shear or fault zones (e.g. ES-NEED-3). Strong 020T/90^{o} fracturing occurs in southeastern NEED 1 near the intrusive metasediment contact. The zone is extremely limonitized and kaolinized and hosts the Mo showing.

Banding within the hornfels parallels the intrusive contact. The contact is sharp and wisps or screens of metasediment are included within the quartz-monzonite near the contact.

6.5 Metamorphism

The QM unit is unmetamorphosed. The metasediments have been thermally metamorphosed by the intrusive, resulting in dense, cherty rock. The thermal effect probably overprints regional amphibolite facies metamorphism within the metasedimentary pile.

6.6 Alteration

Alteration is confined to fracture zones. Where these zones have cut the QM unit, the rock becomes extremely crumbly due to the introduction of limonite (often massive), conversion of feldspar to clay and of biotite to chlorite. In southwestern NEED 1 one such 020T zone hosting the Mo showing consists almost totally of whitish-yellow kaolin with remnant quartz grains.

6.7 Economic Geology

a) Galena occurs as fine-grained material disseminated in limonitized quartz-monzonite within a 090T fault in southeastern NEED 3.

b) Pyrite and galena occur as fine stringers both cross-cutting and paralleling banding in cherty hornfels in southeastern NEED 3. This may represent the Pb-Zn-Ag vein showing, mentioned by Pantaleyev (1978 - Appendix IV, PLAN 10).

c) Molybdenite occurs as extremely fine-grained, disseminated flakes within pervasively kaolinized quartz-monzonite within a 020T/80°SE fracture zone in southwestern NEED 1. This zone is adjacent to the intrusive contact with limy metasediment. The degree of clay (+ limonite) alteration decreases away from the center of the shear. Adjacent sediments contain massive chlorite. The shear is 250 ft. long, by up to 100 feet wide and strikes northwards into a cliff face and southwards under snow cover, thus its total extent is unknown.

d) Potential mineralization is well described by Pantaleyev (1978- see Appendix IV) and includes Mo within porphyry dike swarms, Mo-Be skarns within limy metasediments and hornfels and Pb-Zn-Ag veins associated with faulting in lower Cambrian limy metasediments.

VII. GEOCHEMISTRY

Mean, possibly anomalous and probably anomalous levels for each element in stream sediment, stream water and heavy mineral samples were determined at the 50th, 84th and 97th percentile levels of cumulative frequency distributions constructed from the combined Project WATSU regional follow-up data. In the case of rock samples, data pertaining to trace element contents for various rock types published by Levinson (1974 - Table 2-1) was used. Analytical results are listed in Appendix I. Sampling and laboratory procedures are listed in Appendix III.

7.1 Rock Geochemistry (PLAN 2)

A total of 8 rock samples were collected and analysed for U, Mo and Ag.

a) Samples of unaltered quartz-monzonite contain from 6 to 14.5 ppm U (fluorimetric) and one such sample contains 8 ppm Mo (ES-NEED-7).

b) Samples of limonitic quartz-monzonite from fracture zones (ES-NEED-2, 3) contain 5 and 20 ppm U (fluorimetric) and 3 ppm Mo.

c) Samples of metasediment and hornfels from southern NEED 3 contain non-anomalous U, Mo and Ag.

7.2 Heavy Mineral Geochemistry (PLAN 3, 4, 5)

Heavy mineral samples were analysed for Cu, Mo, Pb, Zn, Ag, U, Th, Sn, W and Au.

a) 120 ppm U, 1690 ppm Th (U/Th = .07) and 65 ppm W occur in the stream draining east-central NEED 3.

b) 140 ppm Pb, 1 ppm Ag, 40 ppb Au, 225 ppm U and 2510 ppm Th (U/Th = .09) occur in the stream draining the NEED 1 - NEED 3 boundary.

c) 12 ppm Mo, 210 ppm U and 325 ppm W occur in the stream draining northwestern NEED 1. 620 ppm U and 2630 ppm Th (U/Th = .24) and 150 ppm W occur approximately 2000 feet (610 m) downstream.

d) 4 ppm Mo, 210 ppm Zn and 200 ppm W occur in the stream draining southward from the NEED 1 and 2 boundary.

7.3 Stream Sediment Geochemistry (PLAN 3, 6, 7, 8)

The -80 mesh fractions of stream sediments were analysed for Cu, Mo, Pb, Zn, Ag, U, Th, Sn and W.

a) Stream draining northward from the NEED 1-3 boundary : 1 to 30 ppm W, 6 to 14 ppm Mo, 14 to 28 ppm Pb, 82 to

142 ppm Zn, 11.5 to 36 ppm U and 92 to 150 ppm Th (U/Th 1) occur. The high Th content reflects the quartz-monzonite provenance and a high degree of mechanical weathering.

b) Stream draining northward from northwestern NEED 1: 2 to 14 ppm Mo, 84 to 245 ppm Zn, 8.5 to 30 ppm U, 67 to 160 ppm Th (U/Th 1), 1 to 3 ppm Sn and a spot 20 ppm W high occurs. Again, the very high Th content is derived from the quartz-monzonite and reflects mechanical weathering.

c) Stream draining southward from NEED 1 and 2: 32 to 58 ppm Cu, 1 to 17 ppm Mo, 2 to 17 ppm W, 16 to 68 ppm Pb, 250 to 500 ppm Zn, 0.1 to 1.2 ppm Ag, very low U and very low Th occur. Strongest Cu, Mo, Pb, Zn and Ag values appear to originate in NEED 2, while highest W originates in NEED 1. The low U and Th values reflect the metasedimentary lithology.

d) Stream draining west-central NEED 3; one sample from this stream contains 27 ppm U and 10 ppm W. The provenance of the sample material is quartz-monzonite.

e) Canadian Oxy sampling replicates stream sediment data obtained by Pantaleyev (1978 - see Appendix IV - PLAN 10), except that Pantaleyev obtained significant Sn values (7 - 9 ppm) which Canadian Oxy did not. Canadian Oxy sampling also revealed significantly higher W values, particularly in the vicinity of the known Be-W skarn occurrence (south of NEED 1).

Canadian Oxy sampling replicates Geological Survey of Canada stream sediment data quite well for all common elements. (see PLAN 10 for G.S.C. results).

7.4 Stream Water Geochemistry (PLAN 3, 9)

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

a) S.C. is non-anomalous in streams draining north from the quartz-monzonite (16 - 38 m. mohs/cm). S.C. is anomalous in streams draining south from the metasediments (57 to 200 m. mohs/cm).

b) 120 to 390 ppb F occurs in the north-draining streams which drain quartz-monzonite. F in the south-draining stream, which drains metasediments is non-anomalous.

c) pH is high over the entire claim group (8.5 - 9.1).

d) 0.2 to 2.2 ppb U occurs in waters draining the quartz-monzonite. 0.2 to 1.2 ppb U occurs in waters draining metasediments; particularly anomalous values originate in NEED 2.

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

VIII. CONCLUSIONS

1. The NEED Claims are underlain by Proterozoic to Devono-Mississippian chert, slate, phyllite, dolomite and greenstone which have been intruded by Cretaceous quartz-monzonite of the Cassiar Stock. Metasediments in the vicinity of the intrusive have been thermally metamorphosed.

2. The quartz-monzonite has been strongly fractured at 090T and 020T. Fracture zones have undergone extensive kaolinization, chloritization and limonitization. Anomalous U and Mo contents occur in these fracture zones, but also occur in unaltered quartz-monzonite.

3. Known mineral occurrences on the claims include Mo within a 020T shear zone, Pb-Zn-Ag sulphide veins within calcareous hornfels and a W-Be skarn in limy metasediments. Visible galena and pyrite were also found in one 090T fault zone cutting quartz-monzonite in southeastern NEED 3.

4. Strong heavy mineral and stream sediment Cu, Mo, Pb, Zn, Ag, U, Th and W anomalies occur over the claims. Particularly anomalous values appear to originate in central and southern NEED 1, and in NEED 2. Elements of most interest are Pb, Zn, Ag and W.

5. U and F contents in stream waters are anomalous over quartz-monzonite and lesser anomalous to non-anomalous over metasediments.

S.C. is non-anomalous over quartz-monzonite and anomalous over carbonate-bearing metasediments.

6. Pantaleyev (1978) obtained anomalous Sn in stream sediments over the claims which was not replicated by Canadian Oxy. Canadian Oxy has replicated the original Geological Survey of Canada anomaly, on which basis the NEED Claims were staked.

7. The potential for mineralization on the NEED Claims is proven by the several occurrences noted above. Possible types of mineralization include Pb-Zn-Ag veins in faulted, carbonate metasediment, W-Mo-U skarn in carbonate metasediment, and Mo mineralization within porphyry dykes (Pantaleyev, 1978).

IX. RECOMMENDATIONS

1. Systematic, 1" = 400 ft. geological mapping and prospecting should be conducted. Particular attention should be placed upon delineation of contacts, alteration zones and structure. The establishment of a simple grid is unfeasible due to topography and airphoto blow-up bases will be required.

2. Systematic soil, scintillometer and rock geochemistry surveys should be conducted.

3. Airphoto interpretation should be carried out prior to fieldwork, in order to assist in delineation of structure.

Respectfully submitted,

Eric James Sacks

Eric James Sacks, M.Sc.

Toronto, Ontario

January, 1980

APPENDIX I

ANALYTICAL RESULTS

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

CHEMEX LABS LTD.

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CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 48613
INVOICE NO. 31461
RECEIVED July 16, 1979
ANALYSED July 30, 1979

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

ATTN:

c.c. Penticton

ROCKS

SAMPLE NO. :	PPM Mo	PPM Ag	PPM U
ES - NEED - 1	1	0.1	6.0
2	3	0.1	5.0
3	3	0.1	20.0
4	2	0.1	2.0
5A	2	0.1	1.5
5B	2	0.1	6.5
6	1	0.1	0.5
ES - NEED - 7	8	0.1	14.5

CTA MEMBER CANADIAN TESTING ASSOCIATION

CERTIFIED BY: Hart Bichler

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. 47865

INVOICE NO. 31180

RECEIVED June 25/79

ANALYSED July 18/79

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

CC. E. Sacks

ATTN:

WATSU - HEAVY MINERAL SEPARATION

SAMPLE NO. :	PPM Cu	PPM Mo	PPM Pb	PPM Zn	PPM Ag	PPM U	PPM Sn
79 WT 0014	24	2	34	106	0.1	4.0	7
0016	110	4	94	164	0.1	4.0	7
0017	550	12	370	500	0.6	6.0	16
0018	255	19	130	490	0.4	23.0	10
0019	86	5	172	290	0.6	5.5	18
0020	14	4	28	44	0.1	21.5	20
0021	190	2	280	855	1.0	100	14
0022	18	2	50	80	0.1	77	27
0023	26	21	184	140	0.2	155	21
0024	30	6	186	305	0.2	340	53
0025	32	4	130	114	0.1	55	11
0026	20	3	58	92	0.1	36	31
0027	42	5	150	172	0.6	42	118
0028	30	4	54	84	0.1	165	50
0258	8	2	68	74	0.2	620	20
0259	14	2	172	180	7.8	470	16 NEED
0260	14	3	32	112	0.1	120	6
0261	18	1	1	104	0.1	32	2
0262	16	4	14	88	0.1	125	3
0263	8	4	8	62	0.1	270	5
0264	14	4	18	42	0.1	19.0	3
0265	20	3	4	52	0.1	13.0	2
0266	8	3	8	58	0.1	29	2
0267	14	3	18	56	0.1	25	3
0268	22	3	12	52	0.1	15.0	1
0269	14	3	80	72	0.1	5.0	1
0270	12	1	42	58	0.1	28	2
0271	24	4	34	78	0.1	12.0	4
0272	16	2	158	78	0.1	12.0	2
0273	18	2	12	74	0.1	16.5	2
0274	16	2	26	48	0.1	12.5	1
0275	38	3	2	46	0.1	1.5	1
79 WT 0290	48	4	34	210	0.1	9.5	5 NEED

CTA MEMBER CANADIAN TESTING ASSOCIATION

CERTIFIED BY: Hart Bichler

212 BROOKSBANK AVE.
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TELEPHONE: [redacted] 984-0221
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TELEX: 043-52597

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INVOICE NO. 31180
RECEIVED June 25/79
ANALYSED July 18/79

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

CC. E. Sacks

WATSU - HEAVY MINERAL SEPARATION

SAMPLE NO. :	PPM W	PPB Au	Total (g)	-10 mesh (g)	MAG HM	NON MAG HM	
79 WT 0014	2	4750	886	510	7.71	68.65	
0016	20	N.D.	410	358	1.25	6.72	
0017	90	N.D.	708	533	0.76	12.31	
0018	95	< 10	421	352	1.67	9.99	
0019	18	N.D.	871	670	1.14	9.05	
0020	65	< 10	698	587	11.68	24.35	
0021	35	NSS	521	495	1.52	3.99	
0022	200	< 10	485	363	9.41	7.78	
0023	20	< 10	456	405	7.47	9.76	
0024	40	N.D.	451	430	5.03	6.28	
0025	18	N.D.	392	362	2.56	5.19	
0026	175	N.D.	501	458	2.01	7.67	
0027	35	N.D.	496	428	1.35	4.19	
0028	32	< 10	470	407	1.69	10.12	
0258	150	< 10	571	476	84.84	58.13	
0259	60	40	615	478	24.18	17.02	NEED
0260	65	< 10	496	418	10.33	18.59	
0261	35	600	520	449	45.68	185.35	
0262	18	< 10	488	422	1.70	9.97	
0263	35	< 10	802	569	0.58	10.55	
0264	24	220	547	381	4.07	24.93	
0265	70	< 10	627	532	49.20	74.24	
0266	60	< 10	531	520	10.21	23.01	
0267	60	< 10	995	775	1.68	38.22	
0268	220	30	507	356	11.73	65.87	
0269	160	< 10	451	423	4.62	24.27	
0270	30	N.D.	146	132	10.27	3.74	
0271	115	< 10	575	505	31.46	27.53	
0272	120	40	567	468	8.81	17.16	
0273	45	< 10	506	416	2.74	30.90	
0274	55	< 10	485	410	9.12	43.66	
0275	1	< 10	748	635	14.62	194.05	
79 WT 0290	200	< 10	1048	776	4.32	79.12	NEED

NOTE: NSS = Not sufficient sample
N.D. = Not detected - low sample wt.

CTA MEMBER CANADIAN TESTING ASSOCIATION

CERTIFIED BY: Hart Bichler

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. 50837
INVOICE NO. 33574
RECEIVED Sept. 27/79
ANALYSED Oct. 31/79

TO: Canadian Occidental Petroleum Ltd.,
Minerals Division,
STe. 311 - 215 Carlingview Dr.,
Rexdale, Ont.
ATTN: E. Sacks

Gold Belt - Heavies

From #47865

SAMPLE NO. :	PPM Th	
79 WT 0014 SH	64	
0016	NSS	
0017	NSS	
0018	110	
0019	NSS	
0020	310	
0021	NSS	
0022	NSS	
0023	NSS	
0024	NSS	
0025	NSS	
0026	NSS	
0027	NSS	
0028	NSS	
0258	2630	NEED
0259	2510	
0260	1690	
0261	220	
0262	NSS	
0263	NSS	
0264	200	
0265	230	
0266	410	
0267	290	
0268	180	
0269	150	
0270	NSS	
0271	640	
0272	NSS	
0273	590	
0274	650	
0275	47	
79 WT 0290 SH	64	NEED

MEMBER CANADIAN TESTING ASSOCIATION

CERTIFIED BY: Hart Bichler

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

CHEMEX LABS LTD.

• ANALYTICAL CHEMISTS • GEOCHEMISTS • REGISTERED ASSAYERS

CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 47835
INVOICE NO. 31180
RECEIVED June 24/79
ANALYSED July 18/79

TO: Canadian Occidental Petroleum Ltd.,
Minerals Dept.
Ste. 311 - 215 Carlingview Dr., CC. E. Sacks
Rexdale, Ont.
ATTN:

WATSU - Stream HEAVY MINERAL SEP.

SAMPLE NO. :	PPM Cu	PPM Pb	PPM Zn	PPM Ag	PPM Mo	PPM U	PPM Sn	
79 WT 0507	62	140	112	0.1	4	2.5	1	
0508	62	84	90	0.1	4	2.5	1	
0509	58	98	138	0.1	2	3.5	1	
0510	54	48	80	0.1	3	2.5	1	
0511	46	38	94	0.1	5	2.5	1	
0512	54	10	66	0.1	2	1.0	1	
0513	66	28	60	0.1	3	0.5	1	
0514	36	2	52	0.1	1	<0.5	1	
0515	24	4	56	0.1	1	2.0	1	
0516	52	2	76	0.1	2	0.5	1	
0517	52	60	94	0.2	1	8.0	9	
0518	58	2	96	0.1	2	0.5	1	
0519	22	2	66	0.1	2	5.0	1	
0520	58	12	78	0.1	3	2.5	1	
0529	8	78	162	0.2	12	210	12	NEED
0758	16	8	78	0.1	2	4.5	46	
0759	16	4	58	0.1	3	1.0	12	
0760	12	10	74	0.1	1	1.5	1	
0761	26	6	136	0.1	1	5.0	3	
0762	24	4	68	0.1	1	4.5	2	
0763	28	26	108	0.1	2	1.5	2	
0764	18	6	54	0.1	1	2.0	1	
0765	28	8	72	0.1	4	1.0	3	
0766	30	6	66	0.1	2	1.0	1	
0767	NSS					NSS		
0768	24	22	96	0.1	3	1.0	1	
0769	40	1	38	0.1	2	1.0	1	
0770	36	2	42	0.1	1	1.0	4	
0771	24	14	78	1.8	1	5.0	13	
0773	585	32	220	0.2	10	50	14	
79 WT 0785	12	140	186	1.0	1	225	11	NEED

NOTE: NSS = Not sufficient sample

MEMBER CANADIAN TESTING ASSOCIATION

CERTIFIED BY: Hart Bichler

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

CHEMEX LABS LTD.

TICAL CHEMISTS • GEOCHEMISTS • REGISTERED ASSAYERS

CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 47835

INVOICE NO. 31180

RECEIVED June 24/79

ANALYSED July 18/79

: Canadian Occidental Petroleum Ltd.,
Minerals Dept.
215 Carlingview Dr., Ste. 311
Rexdale, Ont.

CC. E. Sacks

TTN:

WATSU - Stream HEAVY MINERAL SEP.

SAMPLE NO. :	PPM W	PPB Au	Total (g)	-10 mesh (g)	MAG HM	NON MAG HM	
79 WT 0507	5	N.D.	1030	769	0.60	9.18	
0508	8	N.D.	991	788	2.36	13.94	
0509	12	N.D.	935	690	1.15	10.94	
0510	8	N.D.	1035	719	0.62	10.92	
0511	32	10	698	573	1.25	17.33	
0512	8	10	985	750	6.79	84.43	
0513	2	10	723	632	0.95	123.00	
0514	1	10	480	421	0.11	133.49	
0515	12	10	485	311	0.74	61.03	
0516	3	10	671	593	0.23	51.26	
0517	110	10	635	506	5.54	98.53	
0518	13	10	535	342	2.83	32.54	
0519	1	10	578	504	0.56	80.36	
0520	12	10	486	355	2.59	34.88	
0529	325	N.D.	429	367	24.11	19.00	
0758	22	N.D.	1025	722	2.35	42.85	
0759	1	10	1091	871	2.99	122.73	
0760	1	10	1093	762	1.79	39.84	
0761	1	10	1071	798	21.05	116.92	
0762	8	N.D.	1201	840	5.64	65.19	
0763	8	8800	1089	812	2.47	30.28	
0764	2	10	1160	833	1.72	48.76	
0765	45	10	337	281	0.51	15.51	
0766	2	N.D.	641	535	0.56	14.54	
0767	2	NSS	908	665	0.06	2.43	
0768	700	10	576	438	1.65	64.11	
0769	22	20	477	367	7.13	178.61	
0770	3	20	654	528	8.98	302.04	
0771	14	10	503	340	3.34	57.91	
0773	125	N.D.	623	224	3.01	21.40	
79 WT 0785	~~45~~	~~N.D.~~	~~397~~	~~122~~	6.32	6.85	NEED

NOTE: NSS = Not sufficient sample
N.D. = Not detected - low sample wt.

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

YTICAL CHEMISTS • GEOCHEMISTS • REGISTERED ASSAYERS

CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 50838
INVOICE NO. 33574
RECEIVED Sept. 27/79
ANALYSED Oct. 31/79

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

Gold Belt - Heaved

From Geo. #47835

SAMPLE NO. :	PPM Th	
79 WT 0507 SH	NSS	
0508	NSS	
0509	NSS	
0510	NSS	
0511	NSS	
0512	33	
0513	9	
0514	3	
0515	31	
0516	1	
0517	21	
0518	7	
0519	16	
0520	72	
0529	NSS	← NEED CLAIMS
0758	NSS	
0759	22	
0760	29	
0761	40	
0762	NSS	
0763	16	
0764	17	
0765	16	
0766	NSS	
0767	NSS	
0768	10	
0769	4	
0770	1	
0771	70	
0773	NSS	
79 WT 0785 SH	NSS	← NEED CLAIMS

CTA MEMBER CANADIAN TESTING ASSOCIATION

CERTIFIED BY: Hart Bichler

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. 47832
INVOICE NO. 30751
RECEIVED June 24/79
ANALYSED June 27/79

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

ATTN: WATSU-Stream Sediment CC: E. Sacks

SAMPLE NO. :	PPM Cu	PPM Pb	PPM Zn	PPM Ag	PPM Mo	PPM Sn	PPM W	PPM U
PREFIX 79WT								
774	10	12	88	0.2	14			
775	6	20	106	0.1	12			
776	56	365	930	1.4	2			
777	6	28	134	0.1	6			
778	4	18	118	0.1	7			
779	6	12	118	0.1	15			
780	4	12	84	0.1	8			
781	4	14	92	0.1	14			
782	6	32	116	0.1	11			
783	6	28	112	0.1	11			
784	6	38	142	0.4	9			
[illegible]5	6	28	90	0.4	7			

CTA MEMBER CANADIAN TESTING ASSOCIATION

CERTIFIED BY: Hart Bichle

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

CHEMEX LABS LTD.

• ANALYTICAL CHEMISTS • GEOCHEMISTS • REGISTERED ASSAYERS

CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 47832

INVOICE NO. 30801

RECEIVED June 24/79

ANALYSED June 29/79

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

CC. E. Sacks

ATTN:

WATSU - Stream Sediment

SAMPLE NO.	PPM Sn	PPM W	PPM U
PREFIX 79 WT			
774	1	1	33
775	1	1	26
776	6	75	2.0
777	2	30	11.5
778	3	1	24.0
779	2	2	36
780	3	4	15.0
781	2	10	17.0
782	2	3	20.5
783	1	2	11.5
784	1	1	21.0
785	2	1	11.5

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

• ANALYTICAL CHEMISTS • GEOCHEMISTS • REGISTERED ASSAYERS

CERTIFICATE OF ANALYSIS

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

ATTN: WATSU-Stream Sediment

CC: E. Sacks

CERTIFICATE NO. 47833
INVOICE NO. 30751
RECEIVED June 24/79
ANALYSED June 25/79

SAMPLE NO. :	ppm Cu	PPM Pb	PPM Zn	PPM Ag	PPM Mo	PPM Sn	PPM W	PPM U
PREFIX 79WT								
0521	8	14	126	0.1	4			
0522	8	16	112	0.1	14			
0523	10	12	84	0.1	2			
0524	8	14	148	0.1	4			
0525	8	16	184	0.1	4			
0526	8	18	245	0.1	7			
0527	8	14	156	0.1	4			
0528	6	14	138	0.1	4			
0529	8	14	154	0.1	5			
0530	8	16	156	0.1	5			
0531	6	14	118	0.1	5			
0532	6	14	110	0.1	5			

CHEMEX LABS LTD.

212 BROOKSBANK AVE.
NORTH VANCOUVER, B.C.
CANADA V7J 2C1
TELEPHONE ~~985-0648~~ 984-0221
AREA CODE: 604
TELEX: 043-52597

• ANALYTICAL CHEMISTS • GEOCHEMISTS • REGISTERED ASSAYERS

CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 47833

TO: Canadian Occidental Petroleum Ltd.,
Minerals Division
Ste. 31 - 215 Carlingview Dr.
Rexdale, Ont.

ATTN:

CC. E. Sacks

INVOICE NO. 30801

RECEIVED June 24/79

ANALYSED June 29/79

WATSU - Stream Sediment

SAMPLE NO.	PPM Sn	PPM W	PPM U
PREFIX 79 WT			
0521	2	1	6.5
0522	3	1	17.0
0523	1	1	8.5
0524	1	2	11.0
0525	1	1	18.5
0526	2	1	23.0
0527	1	1	12.0
0528	2	1	15.5
0529	3	1	13.5
0530	2	1	19.5
0531	1	1	11.0
0532	2	1	19.5

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. 47831
INVOICE NO. 30751
RECEIVED June 24/79
ANALYSED June 27/79

TO: Canadian Occidental PetroleumLtd.
General Division
Ste. 311 - 215 Carlingview Dr.
Rexdale, Ont. M9W 5X8

ATTN: WATSU-Stream Sediment CC: E. Sacks

SAMPLE NO. :	PPM Cu	PPM Pb	PPM Zn	PPM Ag	PPM Mo	PPM Sn	PPM W	PPM U
PREFIX 79WT								
0283	52	68	250	0.2	1			
0284	54	38	345	0.8	15			
0285	54	36	350	0.8	13			
0286	54	36	330	0.6	12			
0287	48	32	330	0.6	12			
0288	46	16	375	0.2	6			
0289	44	28	305	0.4	8			
0290	46	28	300	0.6	10			
0276	32	36	460	0.1	5			
0277	58	56	280	0.1	2			
0278	34	34	320	0.1	3			
0279	62	44	410	1.0	17			
0280	56	375	980	1.8	2			
0281	58	68	500	1.2	14			
0282	56	40	375	1.0	14			

CTA MEMBER CANADIAN TESTING ASSOCIATION

CERTIFIED BY: ....

CTA MEMBER CANADIAN TESTING ASSOCIATION

CERTIFIED BY: ....

CHEMEX LABS LTD.

212 BROOKSBANK AVE.
NORTH VANCOUVER, B.C.
CANADA V7J 2C1
TELEPHONE [redacted] 984-022
AREA CODE: 604
TELEX: 043-52597

• ANALYTICAL CHEMISTS • GEOCHEMISTS • REGISTERED ASSAYERS

CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 47831
INVOICE NO. 30801
RECEIVED June 24/7
ANALYSED June 29/7

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

CC. E. Sacks

ATTN:

WATSU - Stream Sediment

SAMPLE NO. :	PPM Sn	PPM W	PPM U
PREFIX 9XXX 79 WT			
0276	1	14	17.0
0277	1	12	6.0
0278	1	17	9.5
0279	1	4	3.0
0280	6	100	1.0
0281	1	14	3.5
0282	1	7	2.5
0283	1	12	1.0
0284	1	7	2.5
0285	1	14	3.0
0286	1	2	3.0
0287	1	17	3.0
0288	1	1	2.0
0289	1	5	3.0
0290	1	5	3.0

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. 47831
INVOICE NO. 33215
RECEIVED June 24, 197
ANALYSED October 15,

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

Watsu - Stream Sediment. CC 1 Sacks

SAMPLE NO. :	PPM Th
9WT - 0283	13
284	9
285	11
286	11
287	11
288	11
289	11
9WT - 0290	10

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

• ANALYTICAL CHEMISTS • GEOCHEMISTS • REGISTERED ASSAYERS

CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 47830
INVOICE NO. 33215
RECEIVED June 24, 1979
ANALYSED October 15, 1979

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

C.C 1 Sacks

SAMPLE NO. :	PPM Th
WT - 0014	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
WT - 0028	
WT - 0258	
259	
260	
261	
262	
263	
264	
265	
266	
267	
268	
269	
270	
271	
272	
273	
274	
275	
276	60
277	18
278	49
279	12
280	15
281	12
WT - 0282	10

NEED

SD—

CERTIFIED BY: Hart Bichler

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. 47833
INVOICE NO. 33215
RECEIVED June 24, 1979
ANALYSED October 15, 19

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

Watsu - Stream Sediment C.C 1 Sacks

SAMPLE NO. :	PPM Th
WT - 0507	
508	
509	
510	
511	
512	
513	
514	
515	
516	
517	
518	
519	
520	
521	150
522	130
523	67
524	83
525	97
NEED 526	100
527	91
528	160
529	140
530	110
531	110
532	120
533	
534	
535	
536	
537	
538	
539	
540	
541	
542	
543	
544	
WT - 0545	

CTA MEMBER CANADIAN TESTING ASSOCIATION

CERTIFIED BY: Hart Bichler

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. 47832
INVOICE NO. 33215
RECEIVED June 24, 1979
ANALYSED October 14, 197

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

Watsu - Stream Sediment C.C Sacks

SAMPLE NO. :	PPM Th
9WT - 758	
759	
760	
761	
762	
763	
764	
765	
766	
767	
768	
769	
770	
771	
772	
773	
774	92
775	97
STD 776	12
777	150
778	140
779	100
780	150
781	140
782	120
783	110
784	120
9WT - 785	180

NEED

CTA
MEMBER CANADIAN TESTING ASSOCIATION

CERTIFIED BY:

CHEMEX LABS LTD.

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

• ANALYTICAL CHEMISTS • GEOCHEMISTS • REGISTERED ASSAYERS

CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 47857
INVOICE NO. 30746
RECEIVED June 25/79
ANALYSED June 27/79

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

WATERS

ATTN: PROJECT: WATSU - WATER CC: E. Sacks

SAMPLE NO. :	PPB U	PPB F
79WT 0272	1.0	40
0273	1.2	45
0274	0.8	10
0275	0.4	10
0276	0.4	135
0277	0.6	105
0278	0.8	100
0279	1.0	25
0281	1.0	25
0282	1.2	55
0283	0.4	20
0284	0.2	60
0285	0.2	55
0286	0.6	50
0287	1.2	45
79WT 0288	0.4	10
79WT 0502	5.6	25
0503	0.6	20
0505	<0.2	10
0506	0.6	10
0507	0.6	20
0508	0.6	10
0509	1.6	20
0510	0.2	10
0511	<0.2	10
0512	0.8	10
0513	0.2	10
0514	<0.2	10
0515	0.2	10
0516	0.6	10
0517	<0.2	10
0518	0.6	10
0519	0.2	10
0520	1.2	10
0521	0.2	160
0522	1.2	170
0523	0.2	160
0524	1.2	165
0525	0.4	165
79WT 0526	0.4	190

NEED
claims

NEED

CERTIFIED BY: Hart Bichle

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

CHEMEX LABS LTD.

ANALYTICAL CHEMISTS • GEOCHEMISTS • REGISTERED ASSAYERS

CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 49023
INVOICE NO. 31406
RECEIVED June 25/79
ANALYSED July 27/79

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

ATTN: WATSU-WATER CC: E. Sacks

SAMPLE NO. :	PPB As
79WT0272	< 2
0273	< 2
0274	< 2
0275	< 2
0276	< 2
0277	2
0278	< 2
0279	2
0281	< 2
0282	2
0283	3
0284	< 3
0285	< 2
0286	< 2
0287	< 2
79WT0288	2
79WT0502	< 3
0503	< 2
0505	< 2
0506	< 2
0507	< 2
0508	< 2
0509	< 2
0510	< 2
0511	< 2
0512	< 2
0513	< 2
0514	< 2
0515	< 2
0516	< 2
0517	< 2
0518	< 2
0519	< 2
0520	< 2
0521	< 2
0522	< 2
0523	< 2
0524	< 2
0525	< 2
79WT0526	< 2

NEED

NEED

CTA MEMBER CANADIAN TESTING ASSOCIATION

CERTIFIED BY: Hart Bichle

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CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 47858
INVOICE NO. 30746
RECEIVED June 25/79
ANALYSED June 27/79

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

WATERS

TTN: PROJECT: WATSU-WATER CC: E. Sacks

SAMPLE NO. :	PPB U	PPB F
9WT 0527	1.8	200
0528	2.8	205
0529	0.2	200
0530	0.4	220
0531	0.2	230
0532	0.6	370

NEED

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AREA CODE: 604
TELEX: 043-52597

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CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 47859

INVOICE NO. 30746

RECEIVED June 25/79

ANALYSED June 27/79

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

WATER

ATTN: PROJECT: WATSU-WATER

CC: E. Sacks

SAMPLE NO. :	PPB U	PPB F
79WT 0755	0.2	10
0756	1.0	20
0757	0.2	20
0758	0.4	30
0759	0.2	30
0760	0.2	35
0761	0.6	20
0762	1.6	50
0763	0.4	20
0764	0.4	20
0765	0.4	20
0766	0.4	10
0767	1.0	20
0768	0.8	20
0769	0.6	10
0770	3.4	10
0771	0.6	10
0773	0.6	20
0774	0.2	120
0775	0.4	165
0777	<0.2	190
0778	1.4	230
0779	0.4	180
0780	0.8	220
0781	2.2	220
0782	2.2	220
0783	0.4	220
0784	0.4	220
79WT 0785	1.2	210

NEED

CERTIFIED BY: Hart Bichle

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CANADA V7J 2C1
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AREA CODE: 604
TELEX: 043-52597

ANALYTICAL CHEMISTS • GEOCHEMISTS • REGISTERED ASSAYERS

CERTIFICATE OF ANALYSIS

CERTIFICATE NO. 49021
INVOICE NO. 31406
RECEIVED June 25/79
ANALYSED July 27/79

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

ATTN: WATSU-WATER

CC: E. Sacks

SAMPLE NO. :	PPB As	
79WT0755	< 2	
0756	< 2	
0757	3	
0758	< 2	
0759	< 2	
0760	3	
0761	< 2	
0762	< 2	
0763	< 2	
0764	< 2	
0765	< 2	
0766	< 2	
0767	2	
0768	2	
0769	< 2	
0770	2	
0771	2	
0773	< 2	
0774	< 2	
0775	< 2	
0777	< 2	
0778	< 2	
0779	< 2	NEED
0780	< 2	
0781	2	
0782	< 2	
0783	< 2	
0784	< 2	
79WT0785	2	

CTA MEMBER CANADIAN TESTING ASSOCIATION

CERTIFIED BY: Hart Bichler

APPENDIX II - DESCRIPTIONS OF ROCK SAMPLES, TRACE ELEMENT CONTENTS

ROCK NUMBER	NAME	DESCRIPTION	ANALYSIS		
			ppm Mo	ppm Ag	ppm U
ES-NEED-1	Biotite quartz-monzonite	Coarse-grained, non-megacrystic; hypidiomorphic granular; K-feldspar (70%); Plag. (20%), Quartz (10%), Biotite (1 - 2%).	1	0.1	6
ES-NEED-2	Altered biotite quartz-monzonite	As ES-1, but kaolinized feldspar and abundant limonite, limonitized pods with fine-grained GALENA; in vicinity of strong E-W fracturing.	3	0.1	5
ES-NEED-3	Altered biotite quartz-monzonite	Feldspar limonitized leaving only quartz unaltered; abundant limonite; from 090^{o} shear zone.	3	0.1	20
ES-NEED-4	Limonitic cherty hornfels	Fine-grained cherty hornfels; abundant earthy limonite fracture coatings; adjacent to intrusive contact.	2	0.1	2
ES-NEED-5A	Meta-siltstone	Fine-grained, pyrite epidote veining.	2	0.1	1.5
ES-NEED-6	Amphibolite	Sill; spotted amphibolitic hornfels; muscovite along fracture planes.	1	0.1	0.5

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 $Na2CO_3$-K_zCO_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) ppb Arsenic (As) (Atomic Absorption)

a) As in waters

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: 2 ppb As

ix) pH

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) Specific Conductivity (S.C.)

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

<u>Pantaleyev (1978): Geological Fieldwork - 1978;</u>

<u>B.C. Min. Pet. + Nat. Res., Victoria, B.C.,</u>

<u>pp. 51 - 60</u>

CASSIAR MAP–AREA (104/P)

By A. Panteleyev

INTRODUCTION

A mapping project was initiated in the Cassiar area in response to heightened interest in molybdenum, tungsten, tin, and uranium in the general area and as a result of the discovery of the Logtung tungsten-molybdenum deposit and concentrated exploration for tin-tungsten in the vicinity of Swift River.

An area of 260 square kilometres (100 square miles) was mapped at a scale of 1:15 840. The map-area covers part of the southwest corner of McDame map sheet (NTS 104P) and includes the area between Cassiar mine on the north and Cottonwood River to the south. One hundred and sixty-five rock specimens were collected, 12 assay samples were gathered from mineralized zones, and 76 stream silt samples were taken for analysis.

The intent of the mapping program was to delineate and describe the various intrusive units that make up this portion of the Cassiar batholith. This project will serve as a basis for further studies on the nature of the Cassiar batholith and related mineral deposits.

Detailed mapping and sampling were done around known mineral deposits. Rock suites were collected for analysis to determine the concentration levels of various elements of interest in mineralized environments and the immediately surrounding host terrains. Six samples were taken for K/Ar radiometric dating of intrusive and hydrothermal events.

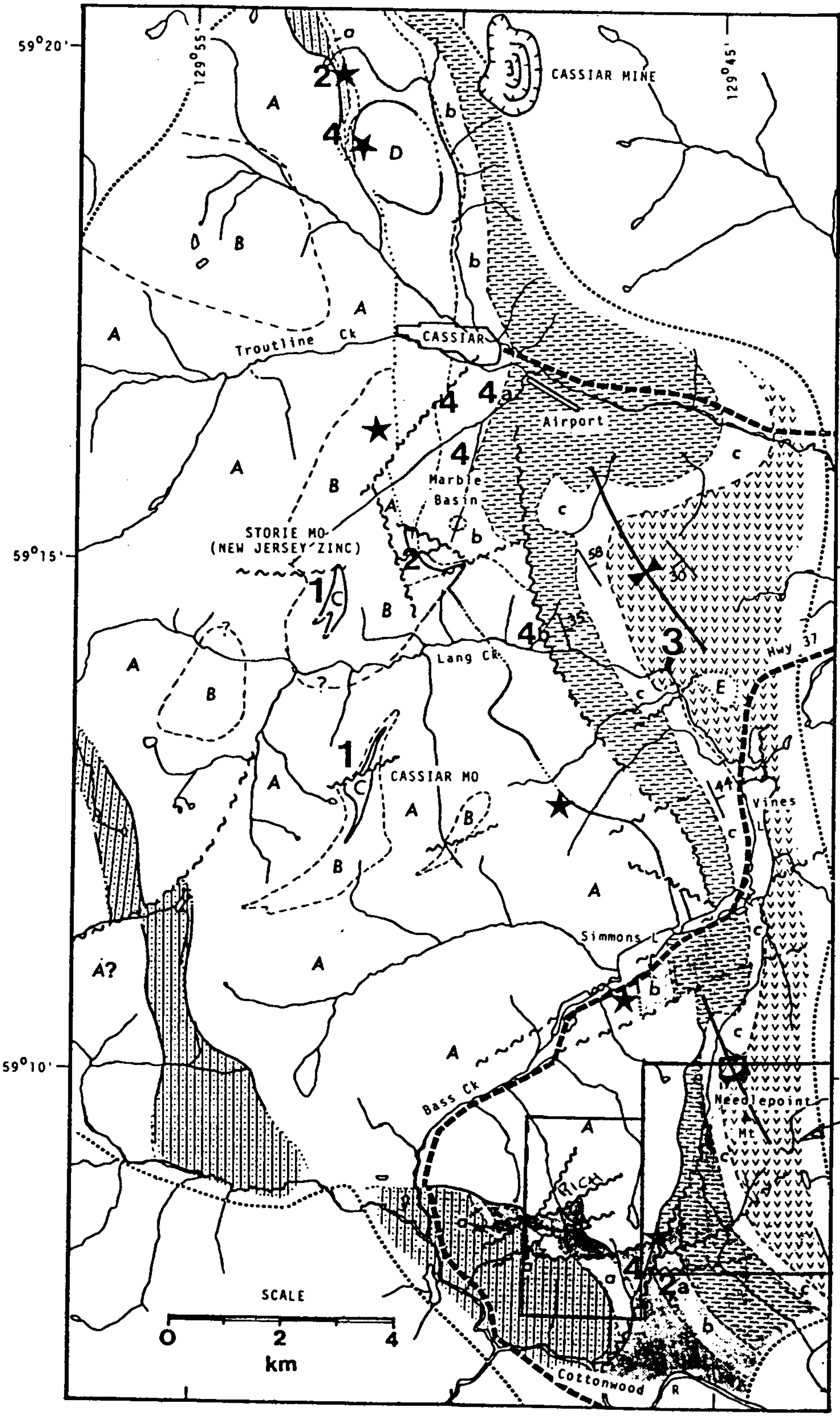
A detailed silt sampling program was undertaken (one sample per 3.4 square kilometres) to demonstrate the dispersion of ore and related elements around areas of known mineralization. This study is intended to provide an orientation suite that can be used to assist interpretation of results from the 1978 Uranium Reconnaissance Program (URP) in McDame (104P), Jennings River (104O), and Wolf Lake (105B) map-areas where a sampling density of one sample per 12.5 square kilometres was achieved.

Preliminary results are shown on Figures 16 and 17 and in the accompanying table.

GEOLOGY

Intrusive Rocks

The main intrusive mass in the map-area, hereafter referred to informally as the 'Cassiar stock,' appears to be a discrete intrusion that has been emplaced along the eastern margin of the Cassiar batholith. In 1972 the possibility of a separate intrusion in the Cassiar area was indicated by 68.3±2.7 and 71.7±2.6 Ma dates in contrast to a mean 102±3 Ma age for the Cassiar batholith (Christopher, 1972).



NEED CLAIMS

Figure 16. Geology of the Cassiar map-area.

LEGEND

INTRUSIVE ROCKS

CRETACEOUS AND (?) TERTIARY

A COARSE-GRAINED, PORPHYRITIC BIOTITE QUARTZ MONZONITE, CONTAINS RARE HORNBLENDE

B PORPHYRITIC BIOTITE QUARTZ MONZONITE WITH MANTLED K-FELDSPAR, GRADATIONAL WITH MAP UNIT A; IN PART PORPHYRITIC TO EQUIGRANULAR BIOTITE QUARTZ MONZONITE, LOCALLY CONTAINS MUSCOVITE

C QUARTZ PORPHYRY, QUARTZ FELDSPAR PORPHYRY, QUARTZ MONZONITE

D MEDIUM-GRAINED, PORPHYRITIC BIOTITE QUARTZ MONZONITE

PALEOZOIC (?)

E DIORITE

BEDDED ROCKS (AGE AND GROUP NAME AFTER GABRIELSE, 1963)

DEVONIAN AND MISSISSIPPIAN

SYLVESTER GROUP

SILTSTONE, SLATE, BLACK CHERT, GREENSTONE

ORDOVICIAN AND DEVONIAN

SANDPILE AND McDAME GROUPS (UNDIVIDED)

c McDAME: BLACK FETID DOLOMITE AND LIMESTONE, LIMESTONE
SANDPILE: GREY AND BUFF DOLOMITE, SANDY DOLOMITE, GREY AND PURPLE QUARTZITE

CAMBRIAN AND ORDOVICIAN

KECHIKA GROUP

SHALE, SLATE, CARBONACEOUS AND CALCAREOUS SHALE, PYRITIC AND PYRRHOTITIC BLACK SHALE AND SLATE

LOWER CAMBRIAN

ATAN GROUP

b RUSTY WEATHERING HORNFELS, SPOTTED HORNFELS, SILTSTONE, ARGILLITE, QUARTZITE; UPPER UNIT 'b': GREY, PINK, AND BUFF DOLOMITE, GREY AND BLACK CRYSTALLINE LIMESTONE, SKARN, SCAPOLITE MARBLE, MINOR SLATE

PROTEROZOIC

GOOD HOPE GROUP (INGENIKA GROUP)

a LAYERED HORNFELS, MICACEOUS QUARTZITE, PHYLLITE, SKARN, MICA SCHIST; UPPER UNIT 'a': MARBLE, COARSE-GRAINED GREY LIMESTONE

SYMBOLS

MINERAL DEPOSITS

1 Mo DEPOSITS ★ Mo OCCURRENCES

2 W IN SKARN AND CUPRIFEROUS PYRRHOTITE REPLACEMENTS

2a SKARN WITH SOME Be AND W

3 LANG CREEK Cu - MASSIVE SULPHIDE

4 VEINS - Ag, Pb, Zn WITH MANGANIFEROUS MAGNETITE

4a PYRITIC Ag, Pb, Zn, Au, Sn

4b AURIFEROUS PYRRHOTITE, ARSENOPYRITE

LIMIT OF MAPPING

MAJOR ROADS

FAULTS

MAP UNIT BOUNDARY (DISCONFORMITY)

INTRUSIVE CONTACT, DEFINITE, GRADATIONAL, INDEFINITE

FOLD AXIS

30 BEDDING ATTITUDE

This mapping project has shown that the 'Cassiar stock' is separated at least locally from the Cassiar batholith on the west by a screen of metamorphic rocks generally 1 kilometre or less in width that has been mapped from Cottonwood River near Bass Creek (Fig. 16), approximately 8 kilometres to the north and has been observed to extend at least an additional 8 kilometres northward. The full extent of the 'Cassiar stock' to the north of the area mapped is uncertain but a dimension of 33 by 7 kilometres from the Cottonwood River northward to the Blue River is possible. The southern two-thirds of the proposed 'Cassiar stock' is shown on Figure 16.

The 'Cassiar stock' is composed mainly of coarse-grained quartz monzonite and porphyritic quartz monzonite in which aplite dykes are common and pegmatite pods are present but are rare overall. The main quartz monzonite megacrystic phase (map unit A) contains both biotite and hornblende with biotite in excess of hornblende in a coarse granular fabric of quartz and feldspar with K-feldspar phenocrysts ranging from 2 to 4 centimetres in size.

Within map unit A are zones of finer grained porphyritic quartz monzonite and equigranular quartz monzonite. These rocks are shown as map unit B and have gradational contacts with map unit A. Rocks of map unit B (textural variants of map unit A) are present as either mantled porphyries in which oliogoclase commonly forms rims on K-feldspar phenocrysts or as medium-grained equigranular quartz monzonite. The mantled porphyritic quartz monzonite is compositionally equivalent to map unit A and is present in the areas of the two main molybdenum deposits (Storie molybdenum and Cassiar molybdenum). Equigranular medium-grained quartz monzonite contains some muscovite in addition to biotite and is present in two areas: one west of the head of Lang Creek; the other northwest of Cassiar and north of Troutline Creek. Similar equigranular quartz monzonite forms along the margin of the stock in a chilled border zone up to 300 metres in width. In some parts of the border zone gneissic inclusions are common and where these are common the quartz monzonite is usually leucocratic and contains minute spessartine garnets.

Map unit C occupies a small area relative to map units A and B but is nevertheless the most important rock unit in the map-area as the main molybdenum deposits are associated with it. Map unit C consists of quartz feldspar porphyry and quartz porphyry which have chilled contacts with equigranular to porphyritic quartz monzonite and mantled porphyry of map unit B. A small amount of equigranular, fine-grained, grey to pink quartz monzonite that is similar to quartz monzonite of map unit B is found on the flanks of the quartz porphyry and quartz feldspar porphyry intrusions. It is included in map unit C because it shows an intrusive rather than gradational relationship to mantled quartz monzonite porphyry of map unit B.

Intrusive rocks of map unit D are similar to the finer grained and mantled quartz monzonite porphyries of map unit B but because they form a separate small stock have been designated a separate map unit.

Map unit E consists of a small body of fine to medium-grained diorite that intrudes Sylvester rocks between Lang Creek and Highway 37. It is suggested here that this might be a Paleozoic intrusion that is synchronous with other small diorite and hornblendite dykes or sills that make up part of the Sylvester Group.

Bedded Rocks

Bedded rocks are readily subdivided into six lithologically distinct but structurally conformable map units. These have been described by Gabrielse (1963) as the Good Hope (now Ingenika), Atan, Kechika, Sandpile, McDame, and Sylvester Groups which range in age from Proterozoic to Devono/Mississippian. Except for Sylvester rocks which appear to be an allochthonous volcanic terrane (Monger, Souther, and Gabrielse, 1972), the other rocks are a shelf assemblage of fine-grained quartzite, shale, and carbonates.

Good Hope (Ingenika) rocks are mainly impure quartzite and are extensively metamorphosed to cordierite hornfels or micaceous schists. The upper part of the Good Hope map unit consists of a transitional zone of thinly interbedded siltstone and limestone which is now extensively recrystallized to a banded calc-silicate rock. This is overlain by an uppermost unit of coarsely crystalline limestone. Atan rocks in the map-area consist of a lower unit of rusty weathering biotite and spotted hornfels and an upper unit of dolomite and marmorized limestone. Near the intrusive contact these rocks form skarn and banded epidote-rich tactite zones. Further from the intrusive contact needles of scapolite are common in marble. Kechika rocks are black shale and slate; Sandpile rocks are mainly sandy dolomite; and McDame rocks are platy dolomite, dolomite breccia, and limestone. In the single locality observed where McDame limestone was intruded, a tremolite-epidote tactite zone generally less than 3 metres wide was formed.

The three major carbonate units: Upper Good Hope, Upper Atan, and combined Sandpile—McDame (map units a, b, c) form unmistakable, well-exposed, persistent exposures in the map-area that are useful marker units. These bedded units can be seen on Figure 16 to trend parallel to the Cassiar stock and therefore contact metamorphic effects are consistently more pronounced in the Good Hope and Atan rocks. All map units dip eastward although two broad synclines and closely folded Atan rocks near the intrusive contact were noted. All recognized faults had normal movement; some may have considerable lateral displacement. Repetition of Kechika, Sandpile, McDame, and basal Sylvester map units in the vicinity of Cassiar mine dictates that thrust faults are present but these were not studied.

Mineral Deposits

At least 15 mineral deposits and noteworthy occurrences of diverse types are known in Cassiar map-area.

The most important are two molybdenum deposits: Storie (New Jersey Zinc) deposit and the Cassiar molybdenum deposit. Both have been extensively explored; Storie deposit by 7 796 metres of diamond drilling and Cassiar molybdenum deposit by an 885-metre adit and 457 metres of drilling. The deposits have similar geological settings. They are both related to small dyke-like bodies. Cassiar molybdenum is associated with a northeasterly trending, steeply dipping, dyke-like body up to 360 metres wide and the Storie molybdenum deposit with a series of northerly to northeasterly, gently northwesterly dipping sheets. Three intrusive phases are recognized: a coarse-grained, porphyritic quartz monzonite (in part mantled porphyry) host rock, a fine-grained equigranular to medium-grained weakly porphyritic quartz monzonite, and small bodies of quartz porphyry or quartz feldspar porphyry.

Molybdenite is concentrated near intrusive contacts in fractures, rare quartz veinlets, and is disseminated as scattered flakes and rosettes in the weakly miarolitic youngest porphyry intrusions. Locally at Cassiar molybdenum deposit small high-grade zones with spectacular molybdenite crystals have formed in greisen pods developed along the borders of quartz porphyry dykes. Most commonly fractures with molybdenite contain some pyrite and quartz although 'dry' fractures with molybdenite and pyrite or molybdenite alone as rosettes are present. Rarely molybdenite forms coarse flaky vein selvages in vuggy quartz veinlets that also may contain K-feldspar or yellow fluorite.

At Storie molybdenum deposit molybdenite is present as disseminations throughout the youngest fine-granular porphyry dyke as well as in fractures and some quartz veins in the coarser grained quartz monzonites. Fractures commonly contain muscovite and have K-feldspar envelopes. Where muscovite is abundant and coarse grained, purple fluorite is commonly present. A K/Ar radiometric date of 71.4±2.5 Ma has recently been obtained from sericite from one such mineralized vein. Rare vuggy quartz veins with green beryl crystals are also present locally.

Both of these molybdenum deposits lack significant breccia zones and large-scale quartz stockworks or vein systems are absent. The environment of mineralization is one in which molybdenum is intimately associated with the small dyke-like intrusions that are the more highly differentiated phases of the surrounding quartz monzonite. Molybdenum mineralization appears to have taken place in a high-temperature vapour-dominated environment with low overall water content. Therefore, the relatively small amount of hydrothermal fluid that was evolved was restricted to fractures proximal to the youngest intrusions.

The other molybdenum occurrences shown by stars on Figure 16 are minor showings. In the intrusive rocks molybdenite occurs from south to north as rare flakes in weakly porphyritic quartz monzonite, with arsenopyrite in fractured coarsely porphyritic quartz monzonite, as flakes at the margin of a 1-metre-wide spherical pegmatite pod in porphyritic quartz monzonite, and in a quartz vein. In the other two occurrences molybdenite is present as minute grains on fractures in banded Atan calc-silicate rock and in the northern occurrence as rosettes with pyrrhotite in a skarn in Good Hope rocks.

Scheelite is common in small amounts in many garnet-pyroxene skarns that have formed at and near the main intrusive contact with Good Hope (Proterozoic) and Atan (Lower Cambrian) rocks. Nine check analyses show that concentration ranges in the range of 0.01 to 0.02 per cent WO_3 are widespread in these skarns. Scheelite is also present in massive pyrrhotite lenses that form replacement bodies in quartz monzonite adjacent to the intrusive contact (for example, 3 kilometres west of Cassiar mine) or form in tactite zones along the intrusive contact. The strongest scheelite concentration observed (not shown on Fig. 16) is in calc-silicate bands in Atan carbonates on Lamb Mountain approximately 8 kilometres northwest of Cassiar minesite. At Lamb Mountain one band of mineralized skarn was determined to contain 0.13 per cent WO_3 and 0.02 per cent copper and zinc across a width of 4.5 metres. The pyrrhotite-rich skarn band is near but separated from a small fine-grained porphyritic quartz monzonite intrusion by about 130 metres of crystalline limestone and a 10-metre-wide band of tremolite-rich barren skarn. Molybdenite is present in greisen veins at the intrusive contact. A number of other skarn bands further from the intrusion than the one sampled contain minor scheelite.

Another type of minor tungsten occurrence was discovered 1.5 kilometres east of Storie molybdenum deposit in which quartz veinlets in Atan hornfels contain scheelite near the intrusive contact with quartz monzonite. The quartz-veined hornfels is overlain by barren, thinly banded epidote-garnet skarn that was formed at the base of the Atan carbonate upper map unit. Along strike to the north and east the banded skarn contains lenses up to 8 metres in thickness of massive magnetite, pyrrhotite, and minor quartz, wollastonite, and tremolite. These contain generally 0.03 per cent or less WO_3 and base metal values (Cu, Pb, Zn, Sn, Bi). A similar magnetite-rich skarn lens southwest of Needlepoint Mountain (the Lowgrade deposit, shown as 2a on Fig. 16) was found by J. J. McDougall in 1954 to contain Be in helvite. Later, danalite was identified as the major beryllium-bearing mineral (Thompson, 1957). Tin content in the nine skarn samples tested for tungsten ranges from trace to a maximum of .04 per cent.

The Lang Creek copper deposit (occurrence 3 in Fig. 16) (Annual Report of the Minister of Mines and Petroleum Resources, 1961) is a small, shallow-dipping massive sulphide lens. It is up to 2 metres in thickness and is conformable with an argillite unit interbedded with greenstone near the base of the Sylvester assemblage. A sample across the exposed 1.0-metre sulphide layer assayed 1.7 ppm gold, 36 ppm silver, 1.84 per cent copper, 0.12 per cent lead, and 0.77 per cent zinc. Despite its small size this deposit is important in that it demonstrates the presence of massive sulphides in Sylvester rocks, an assemblage that might have been neglected during past exploration.

Veins are abundant in the map-area with silver-bearing lead-zinc veins being most prevalent. Quartz veins with free gold are restricted to Sylvester rocks to the east of the map-area and will be examined in detail during the 1979 field season. Silver-lead-zinc veins with manganiferous magnetite (shown as 4 on Fig. 16) are found at the Wiseman property southwest of Needlepoint Mountain, in the Marble Basin area, and in the Contact deposit west of Cassiar mine. These veins are associated with east-westerly trending faults and fracture zones in carbonate rocks of the Good Hope and Atan upper map units. Similar veins, but containing abundant pyrite instead of magnetite and having tin in the order of 0.15 per cent Sn, occur south of Cassiar. The pyrite-rich stanniferous lead-zinc-silver veins might be deeper equivalents to the magnetite-bearing veins as they occur in Atan hornfels or at the base of the Upper Atan carbonate unit.

A unique vein-type occurrence on the north bank of Lang Creek is shown as 4b. It consists of a 3 to 4-metre-wide replacement zone with pyrrhotite and arsenopyrite in a fault zone that separates Atan rocks from Kechika black shales. A sample from this mineralized fault zone across a 3.3-metre width contains 2 ppm gold, 22 ppm silver, 0.11 per cent copper, 0.03 per cent lead, 0.005 per cent zinc, 0.04 per cent bismuth, and 1.5 per cent tin.

Minor mineralization (not shown on Fig. 16) consists of widespread scattered fine grains of pyrrhotite and traces of chalcopyrite in Good Hope and Atan hornfels. Kechika rocks contain units with abundant very fine-grained pyrrhotite. One locality with traces of sphalerite is known in the road cut immediately east of Simmons Lake. Generally sulphide minerals in Kechika rocks are so fine grained that they cannot be seen by eye but they are accentuated where the rocks are recrystallized to hornfels.

GEOCHEMICAL DATA

Geochemical data for the 76 sample sites are shown on Figure 17 and listed on the accompanying table. Clearly the sample suite is highly anomalous in molybdenum, uranium, tungsten, lead, and zinc. However, the main source of molybdenum, uranium, tungsten (and also tin) can be identified and confined to the

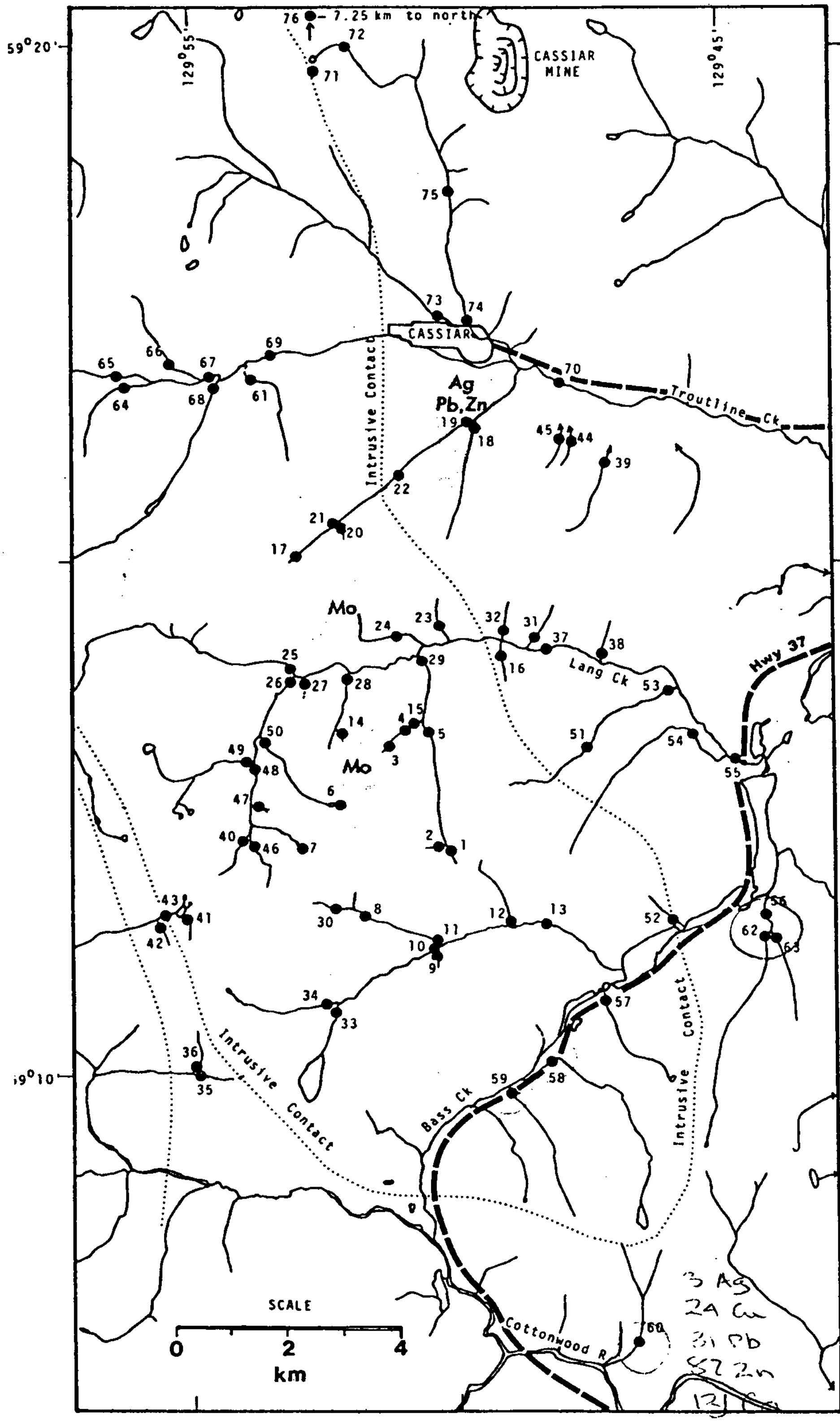


Figure 17. Silt sample location (1978), Cassiar map-area.

3 Ag
24 Cu
31 Pb
57 Zn
13 Co
44 Ni
5 U
6 W
7 Sn
1 Mo

ANALYTICAL DATA: CASSIAR SILTS, 1978

	Ag ppm	Cu ppm	Pb ppm	Zn ppm	Co ppm	Mn ppm	Ni ppm	U ppm	W ppm	Sn ppm	Mo ppm
8– 1	<0.3	8	13	51	7	550	8	60	2	5	14
2	0.3	13	6	24	5	313	3	21	2	5	14
3	0.3	12	14	53	8	640	6	34	16	6	50
4	0.3	14	17	66	8	591	7	42	26	5	103
5	0.3	11	18	41	7	394	6	36	12	7	39
6	<0.3	18	21	41	11	355	8	59	15	5	152
7	0.3	20	19	45	13	339	8	30	26	5	73
8	0.3	9	11	29	6	254	4	33	11	5	32
9	0.3	4	6	35	5	291	4	45	2	4	10
10	0.3	4	6	36	6	301	6	35	13	7	11
11	0.3	7	8	36	7	315	3	26	20	10	13
12	0.3	4	8	41	6	389	7	103	2	6	2
13	0.3	4	6	29	3	266	4	24	8	7	8
14	0.3	18	8	26	7	348	11	231	10	5	14
15	0.3	12	15	56	7	463	8	30	34	5	70
16	0.3	40	19	203	14	395	64	7	3	1	6
17	0.3	6	17	136	7	514	14	29	12	10	6
18	0.6	14	374	535	7	1 426	21	1	3	14	1
19	0.4	15	168	365	6	910	17	11	14	9	2
20	0.4	22	71	315	12	926	78	48	45	11	55
21	<0.3	6	21	315	6	404	21	37	87	10	15
22	0.3	19	83	273	6	823	14	9	22	3	4
23	0.3	38	87	146	6	933	12	12	66	14	14
24	0.6	29	119	273	7	1 280	14	61	74	15	58
25	<0.3	7	3	53	7	560	12	22	4	5	4
26	0.3	5	10	40	6	402	6	25	12	6	8
27	0.3	9	10	30	7	704	14	64	32	3	26
28	0.3	12	8	29	9	516	8	35	3	7	18
29	0.3	7	7	35	7	348	5	45	14	6	15
30	0.3	6	9	44	7	396	3	28	18	6	9
31	<0.3	45	18	355	12	346	82	7	2	1	15
32	0.3	11	9	38	6	250	12	10	18	5	1
33	0.3	6	7	41	4	659	9	34	2	5	7
34	0.3	8	12	48	5	427	10	N. A.	N. A.	N. A.	13
35	0.5	17	33	169	11	738	24	27	2	5	16
36	<0.3	25	15	90	11	564	32	14	6	1	1
37	0.3	5	12	31	4	212	5	15	2	6	5
38	0.4	26	15	2 580	6	297	172	5	2	2	2
39	0.5	33	31	355	9	293	57	6	5	3	7
40	<0.3	4	22	65	7	469	9	57	7	10	9
41	0.3	16	22	133	12	947	22	85	3	5	17
42	0.3	40	11	91	18	658	35	5	3	2	10
43	0.3	10	3	57	7	324	18	17	2	3	1
44	0.5	31	74	271	8	384	47	6	2	5	4
45	0.4	52	35	383	12	382	78	10	3	1	7
46	0.4	7	23	46	8	427	6	30	5	7	14
47	<0.3	6	8	37	6	371	9	34	16	4	26
48	0.3	4	13	33	4	249	5	31	12	6	8
49	0.4	4	13	37	4	398	5	18	2	5	1
50	0.3	6	3	35	6	348	9	13	2	5	17
51	<0.3	23	16	279	10	461	40	75	2	6	3
52	0.3	14	3	125	7	344	29	16	2	5	1
53	0.3	12	14	147	8	347	19	22	2	4	1
54	0.3	9	11	97	7	262	13	37	2	6	1
55	0.3	39	12	66	5	313	13	13	2	4	4
56	0.3	48	31	551	14	736	61	5	2	5	1
57	0.3	6	11	60	4	387	7	26	3	9	1
58	0.3	4	31	103	4	698	4	35	3	8	2
59	0.3	7	10	69	3	469	10	23	2	2	1
60	0.3	24	31	87	13	484	44	8	6	7	1
61	0.3	2	13	26	3	287	8	18	6	5	2
62	0.3	34	61	551	13	832	52	14	9	8	1
63	<0.3	53	51	1 905	17	1 018	137	9	6	1	1
64	0.3	5	4	41	3	320	18	18	2	5	1
65	0.3	7	14	55	6	361	10	62	2	6	1
66	0.3	7	6	59	4	419	14	31	2	4	1
67	0.3	4	3	31	4	249	12	19	2	3	1
68	0.3	7	4	49	6	684	18	20	2	4	3
69	0.3	5	10	43	4	503	22	21	2	4	1
70	0.5	25	28	179	10	461	91	8	2	2	4
71	0.3	352	24	195	29	682	77	8	14	6	10
72	0.3	34	54	205	13	400	42	24	3	6	10
73	<0.3	3	8	55	7	349	42	21	2	4	3
74	0.3	52	16	313	15	499	130	5	2	1	8
75	0.8	46	11	438	13	367	135	6	2	2	16
76	<0.3	26	7	53	14	417	29	5	2	5	1
$\bar{x}$ ARITH.	0.19	21.0	26.8	185	8.1	492	27.9	29.5	10.4	5.5	14.4
SD	0.16	40.7	48.4	368	4.2	237	34.8	30.7	16.0	2.9	24.5
MEDIAN	<D.L.	10.5	13.0	58	7.0	410	13.0	24.0	4.0	5.0	8.0

Analyses by Analytical Laboratory, Ministry of Energy, Mines and Petroleum Resources.
Ag, Cu, Pb, Zn, Co, Mn, Ni, by atomic absorption spectrometry; U, W, Sn, Mo, by X-ray fluorescence.
Sn checked colorimetrically; U checked by gamma-ray spectrometry.

Cassiar and Storie molybdenum deposits. Mean uranium content in silts from intrusive sources is 39 ppm compared to about 12 ppm from bedded rocks. Zinc is concentrated in black shales of the Kechika Group. Lead correlates with zinc in black shale hosts but is also derived from major vein occurrences and probably numerous small veinlets peripheral to molybdenum deposits in granitic rocks. Tin is derived from the greisen-rich zones at Storie molybdenum deposit but is also related to lead-zinc veins. It is noteworthy that anomalous associations of tin-lead-zinc in Granite Creek (samples 17 to 22) indicate that more veins are present in this region than have been discovered to date.

likely?

Copper is low overall and notably depleted in the intrusive terrains. All samples with copper enrichment can be related to minor chalcopyrite occurrences in Good Hope and Atan hornfels, Sylvester greenstone, or chalcocite occurrences in McDame rocks as noted by Gabrielse (1963). Some malachite and azurite in McDame carbonate rocks is probably formed from copper leached out of overlying Sylvester greenstones.

ACKNOWLEDGMENTS

The cooperation and hospitality of Cassiar Asbestos Corporation Limited, especially the Engineering Department, are appreciated. Mr. W. J. Storie provided much valuable information about the region and its history. He generously gave access to his maps and reports and was an affable guide to the many showings and areas of interest. His interest is this project and stimulating discussions are deeply appreciated.

Greg Smith ably assisted the writer in the field.

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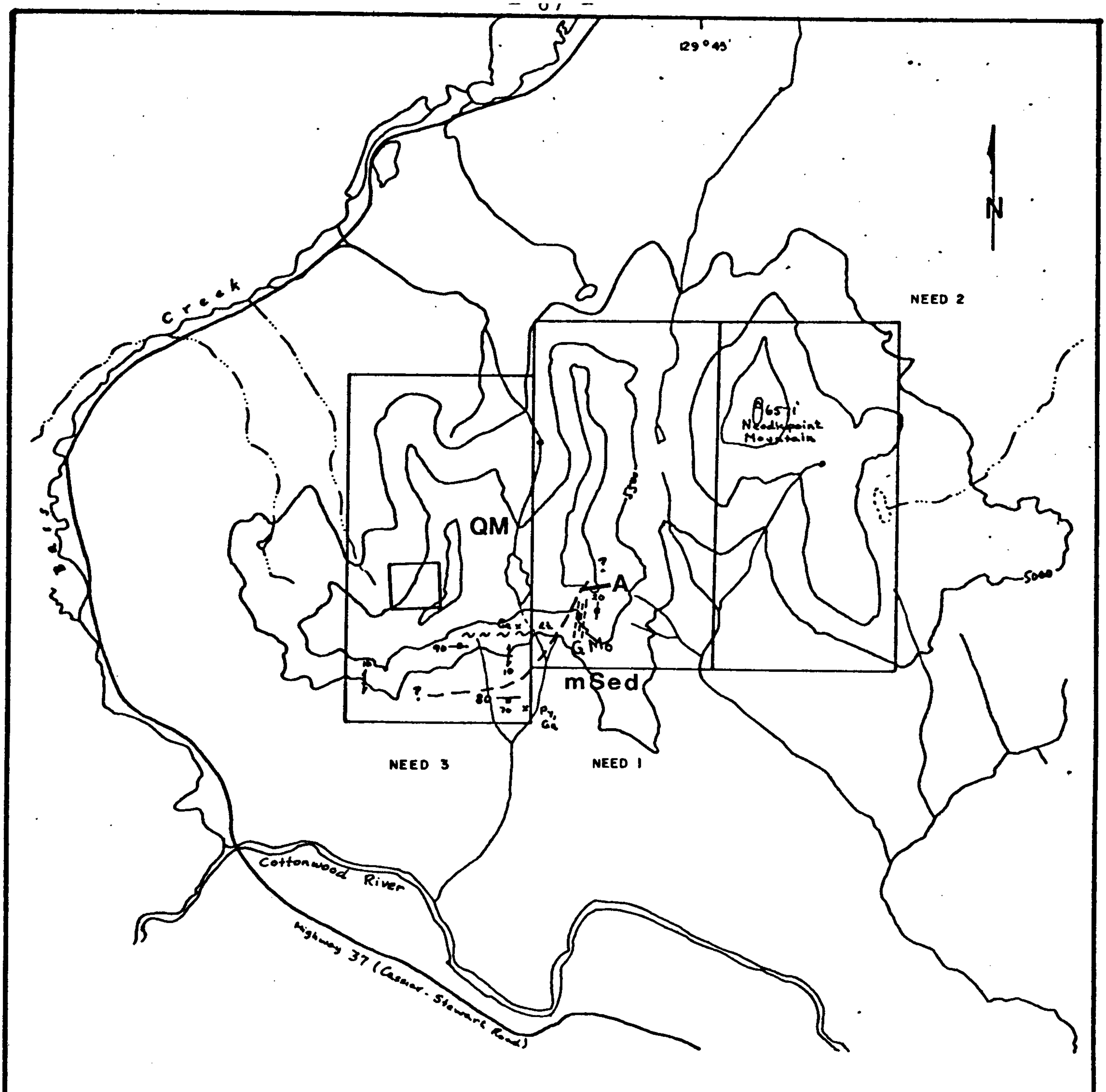


Legend

A	: Amphibolite
QM	: Quartz monzonite
mSed	: Cherty hornfels, limestone, meta siltstone
— — —	Geological contact (assumed)
	Foliation (vertical)
	Jointing (vertical, inclined)
~ ~ ~	Fault (assumed)
	Fracture Zone
G	Gossan
Ga	Galena
Py	Pyrite
Li	Limonite

CANADIAN OCCIDENTAL PETROLEUM LTD.
MINERALS DIVISION

PROJECT WATSU

NEED CLAIMS

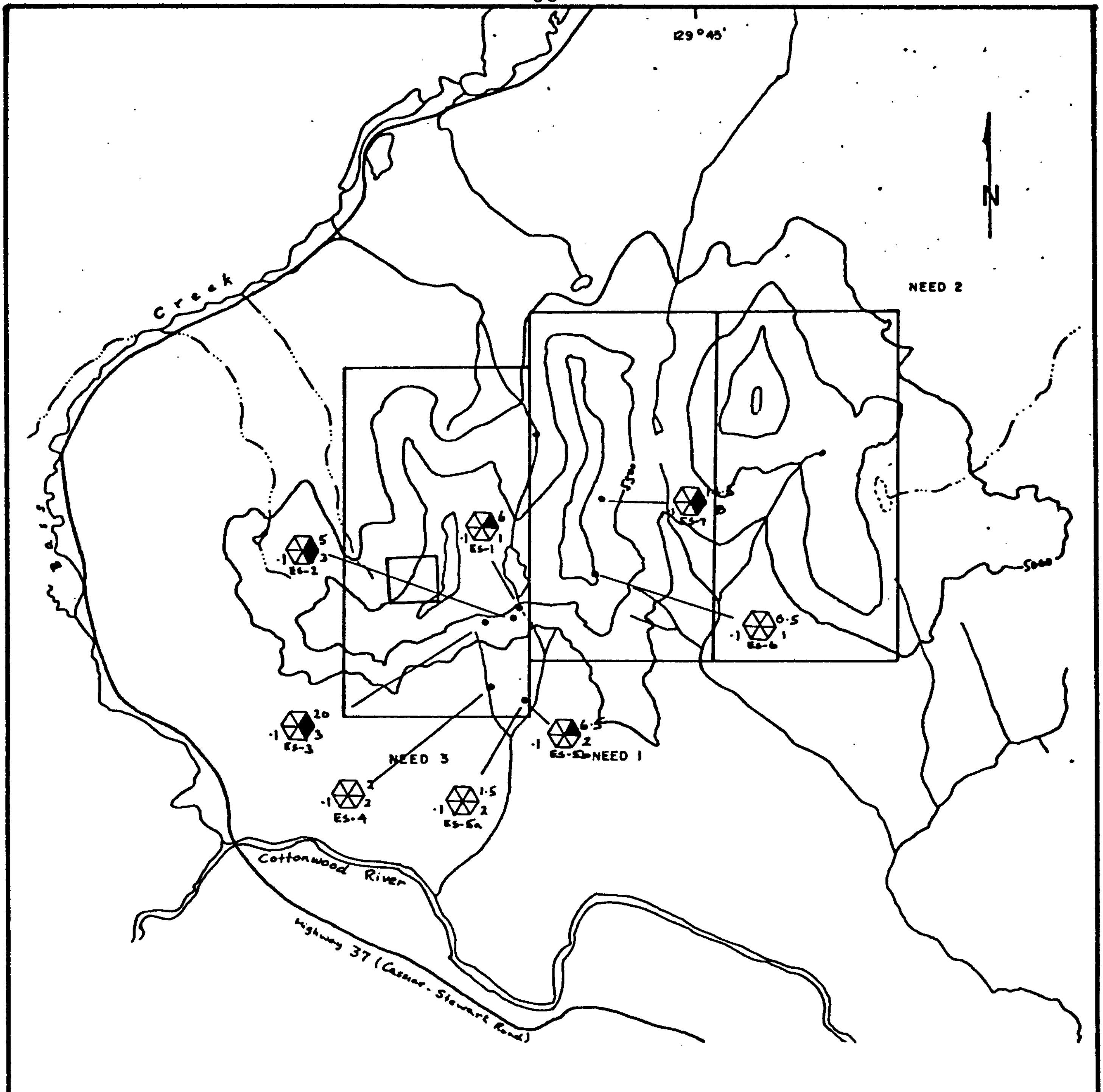
BRITISH COLUMBIA

GEOLOGY

Scale 1 50,000

PLAN 1

September, 1979



Legend

ppm U
ppm Ag
ppm Mo
Sample No.

	U	Mo	Ag
Poss. Anomalous	-	-	-
Prob. Anomalous	3·5	3	0·2

PLAN 2

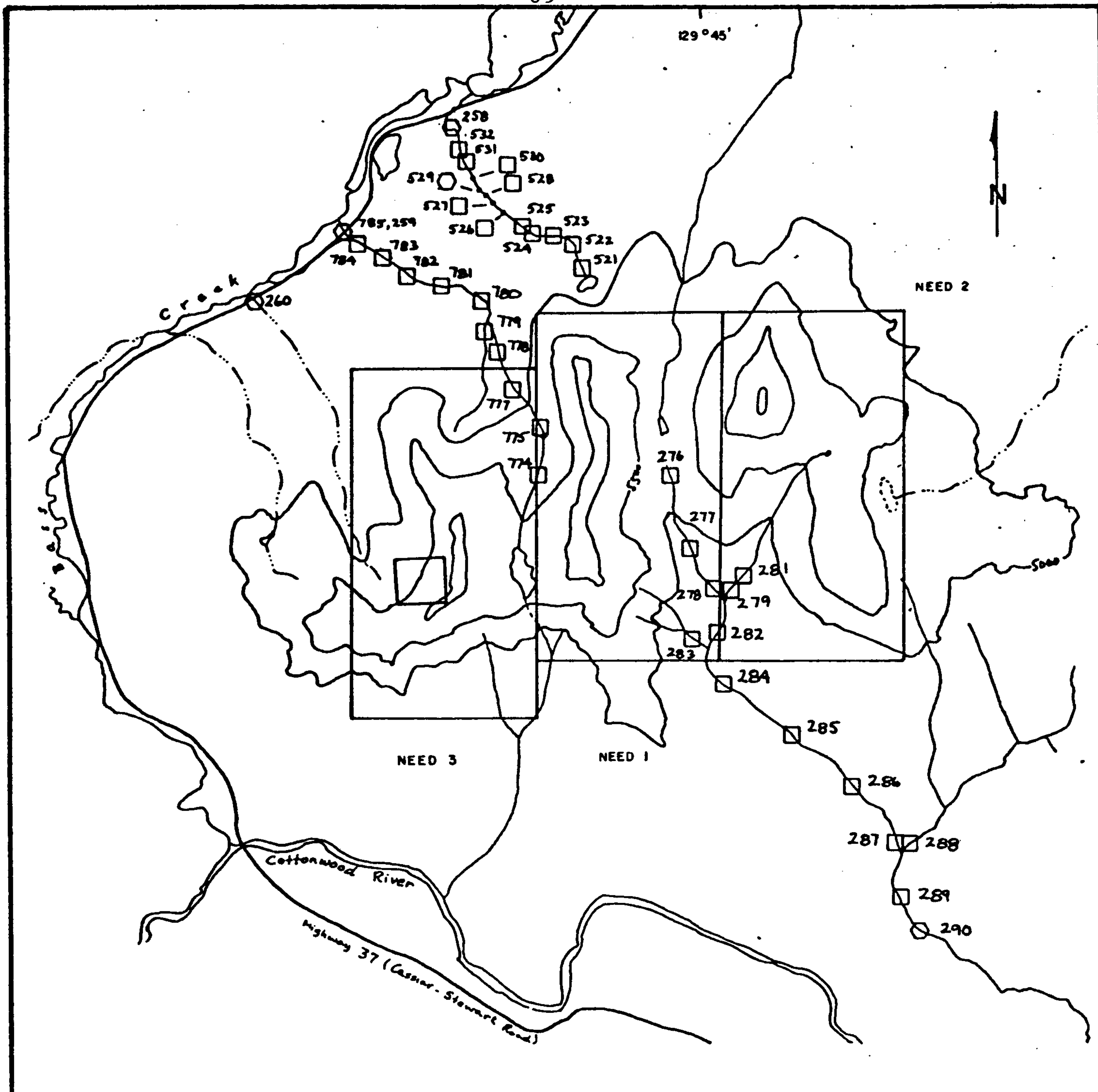
CANADIAN OCCIDENTAL PETROLEUM LTD.
MINERALS DIVISION

PROJECT WATSU
NEED CLAIMS
BRITISH COLUMBIA

ROCK GEOCHEMISTRY

Scale: 1:50,000

September, 1979



Legend

⬡ Heavy mineral + sediment + water

☐ Sediment + water

PLAN 3

CANADIAN OCCIDENTAL PETROLEUM LTD.
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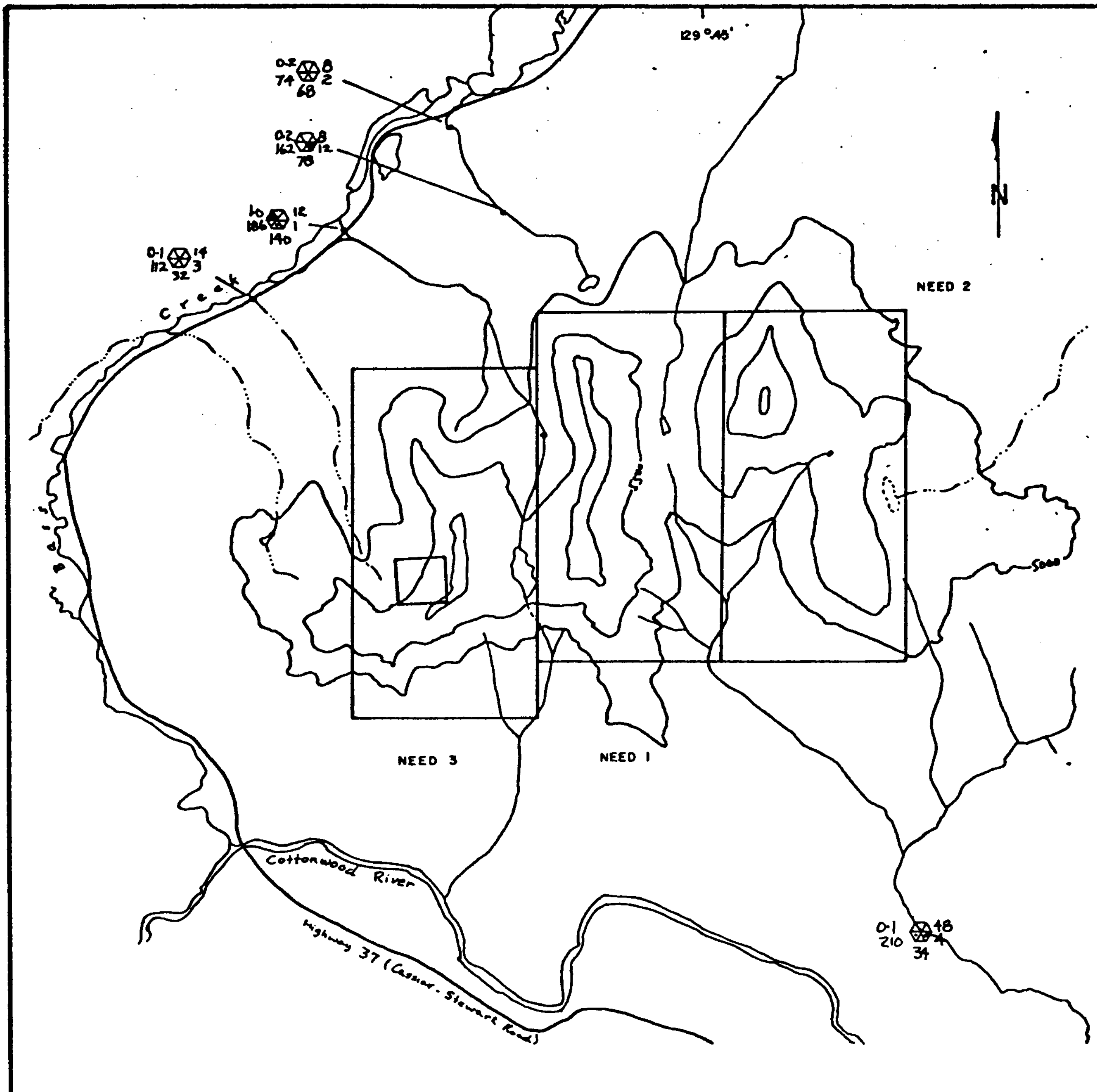
PROJECT WATSU
NEED CLAIMS
BRITISH COLUMBIA

SAMPLE LOCATIONS

Scale 1:50,000

September, 1979



CANADIAN OCCIDENTAL PETROLEUM LTD.
MINERALS DIVISION

PROJECT WATSU
NEED CLAIMS
BRITISH COLUMBIA

HEAVY MINERAL GEOCHEMISTRY

Cu - Mo - Pb - Zn - Ag

Scale 1 50,000

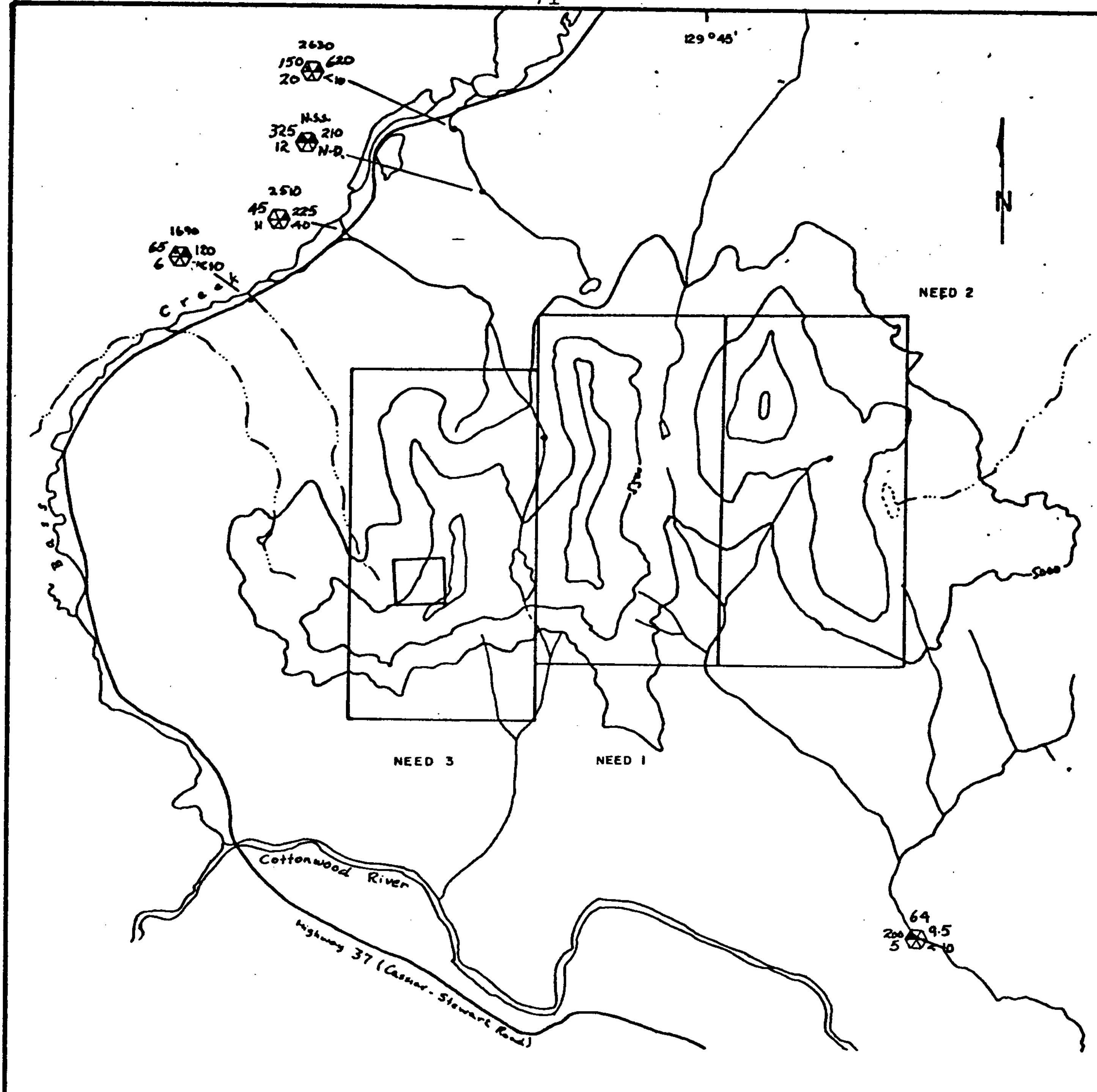
September, 1979

LEGEND

ppm Ag, ppm Zn, ppm Cu, 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 4



LEGEND

ppm Th
ppm W ppm U
ppm Sn ppb Au

		U	Sn	W	U
Poss. Anomalous		26	38	60	19
Prob. Anomalous		120	300	160	3150

N.D. = Not Detectable
N.S.S. = Not Sufficient Sample

PLAN 5

CANADIAN OCCIDENTAL PETROLEUM LTD.
MINERALS DIVISION

PROJECT WATSU

NEED CLAIMS

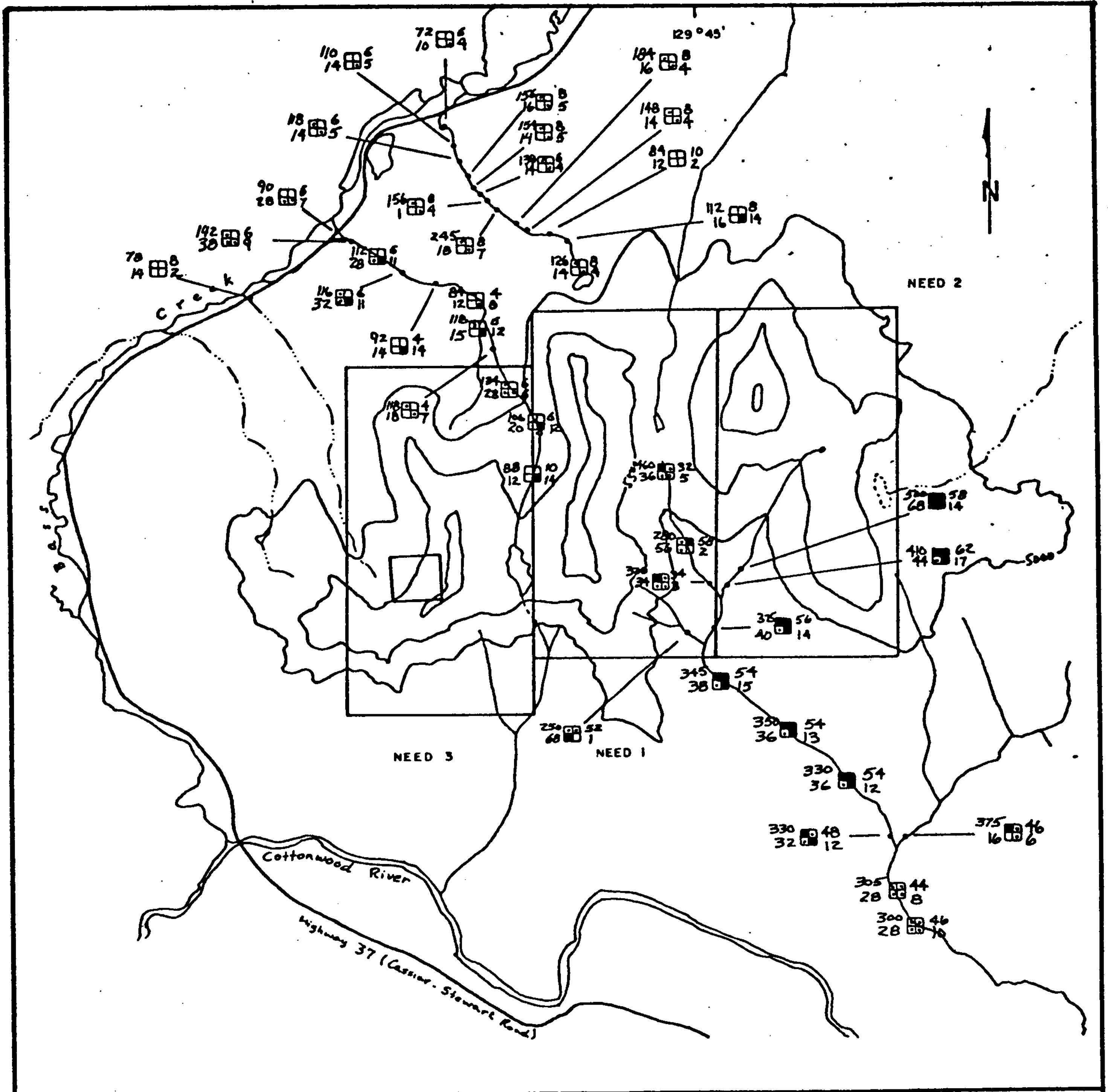
BRITISH COLUMBIA

HEAVY MINERAL GEOCHEMISTRY

U - Au - Sn - W - Th

Scale 1:50,000

September, 1979



LEGEND

ppm Zn ppm Cu
ppm Pb ppm Mo

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

PLAN 6

CANADIAN OCCIDENTAL PETROLEUM LTD.
MINERALS DIVISION

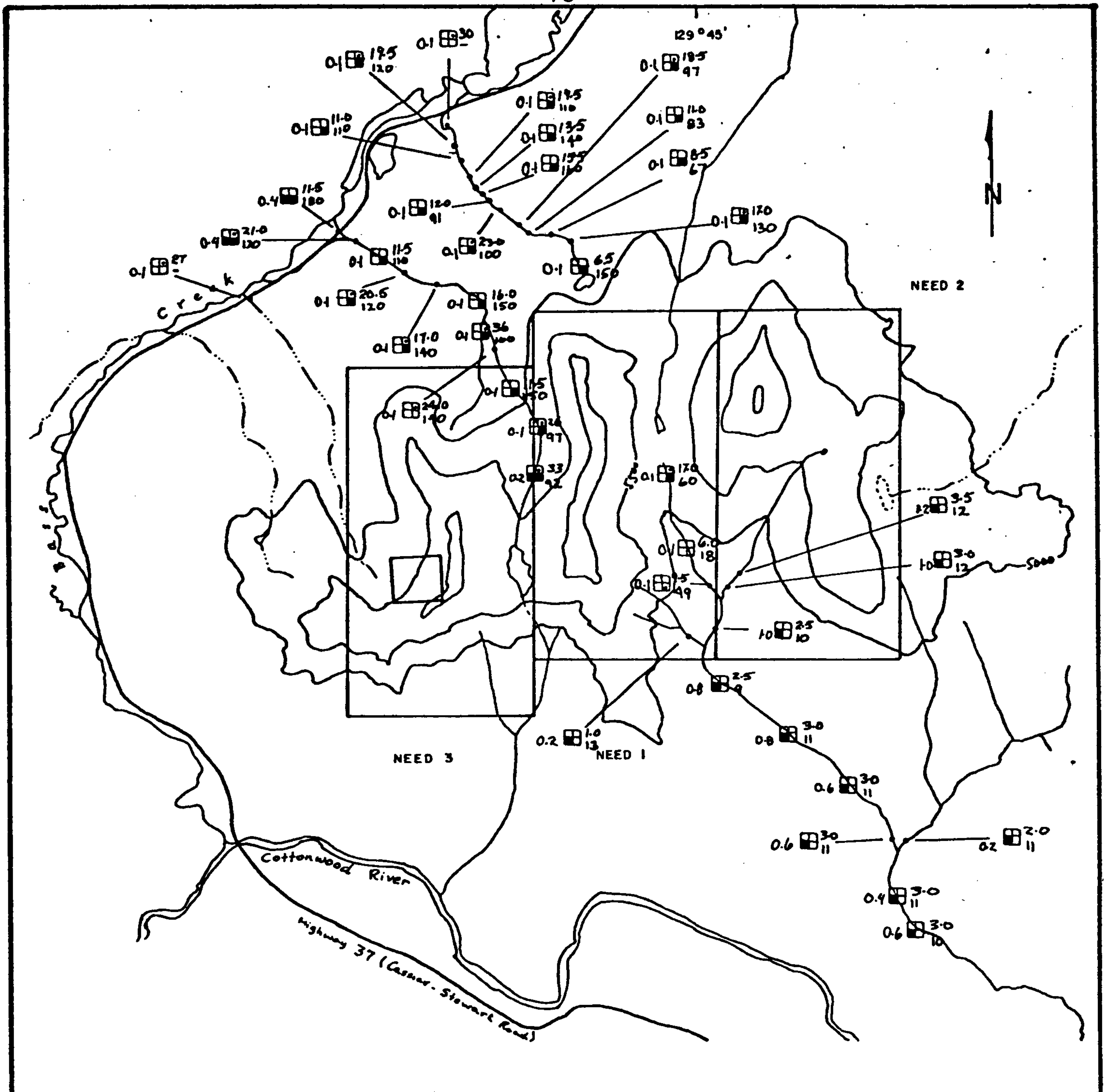
PROJECT WATSU
NEED CLAIMS
BRITISH COLUMBIA

STREAM SEDIMENT GEOCHEMISTRY

Cu - Mo - Pb - Zn

Scale 1: 50,000

September, 1979



LEGEND

ppm Ag ⊞ ppm U / ppm Th

		U	Th	Ag			
Poss. Anomalous		17	29	<·1			
Prob. Anomalous		38	50	·1			

PLAN 7

CANADIAN OCCIDENTAL PETROLEUM LTD.
MINERALS DIVISION

PROJECT WATSU

NEED CLAIMS

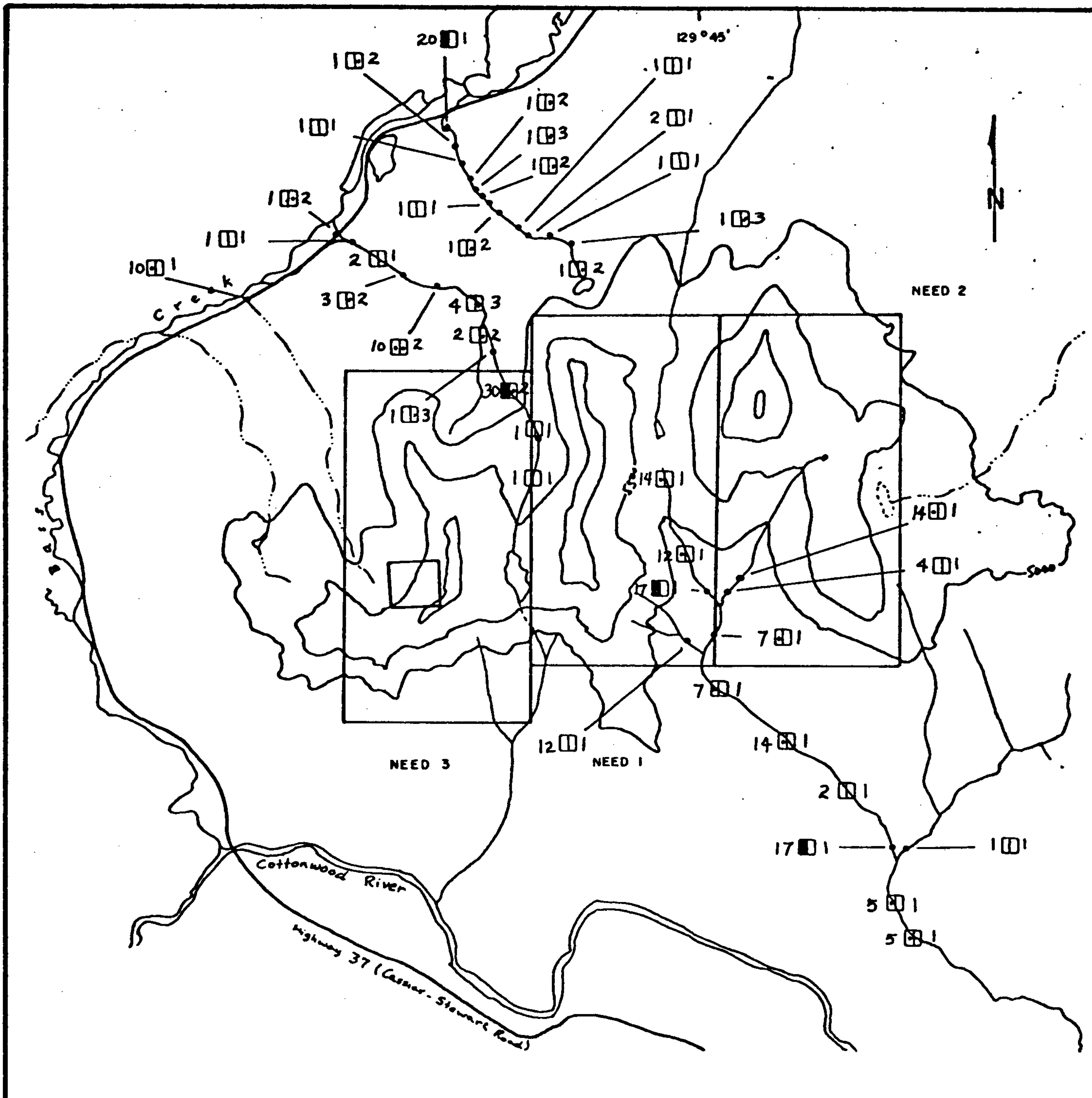
BRITISH COLUMBIA

STREAM SEDIMENT GEOCHEMISTRY

U - Th - Ag

Scale 1 50,000

September, 1979



LEGEND

ppm W ▯ ppm Sn

	Sn	W
Poss. Anomalous	2	5
Prob. Anomalous	5	16

PLAN 8

CANADIAN OCCIDENTAL PETROLEUM LTD.
MINERALS DIVISION

PROJECT WATSU

NEED CLAIMS

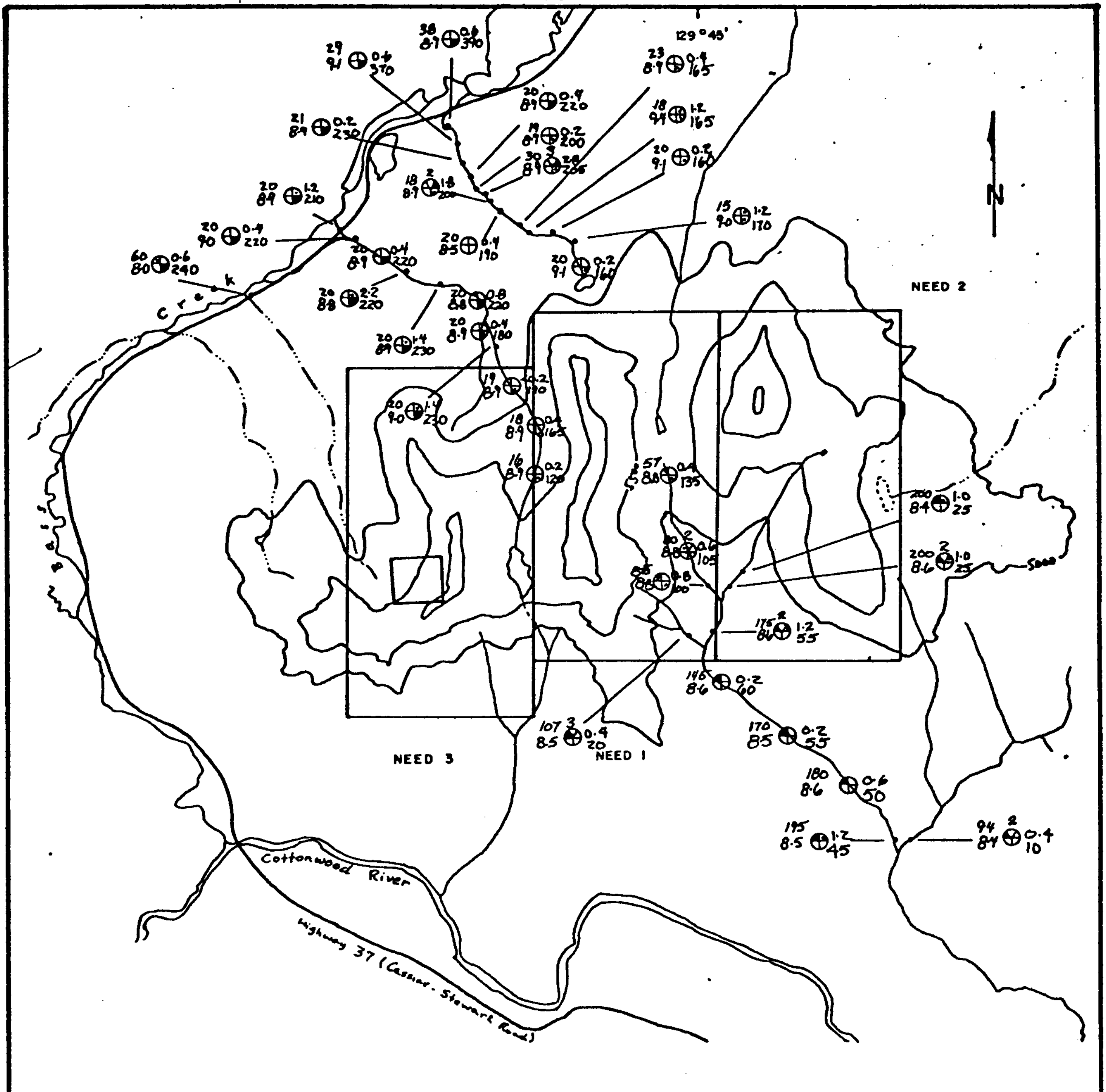
BRITISH COLUMBIA

STREAM SEDIMENT GEOCHEMISTRY

Sn - W

Scale 1:50,000

September, 1979



LEGEND

S.C. / pH ⊕ ppbU ; As<2 ppb / ppbF

ppb As / S.C. / pH ⊗ ppbU / ppbF

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

* S.C. units are µmohs/cm

. PLAN 9

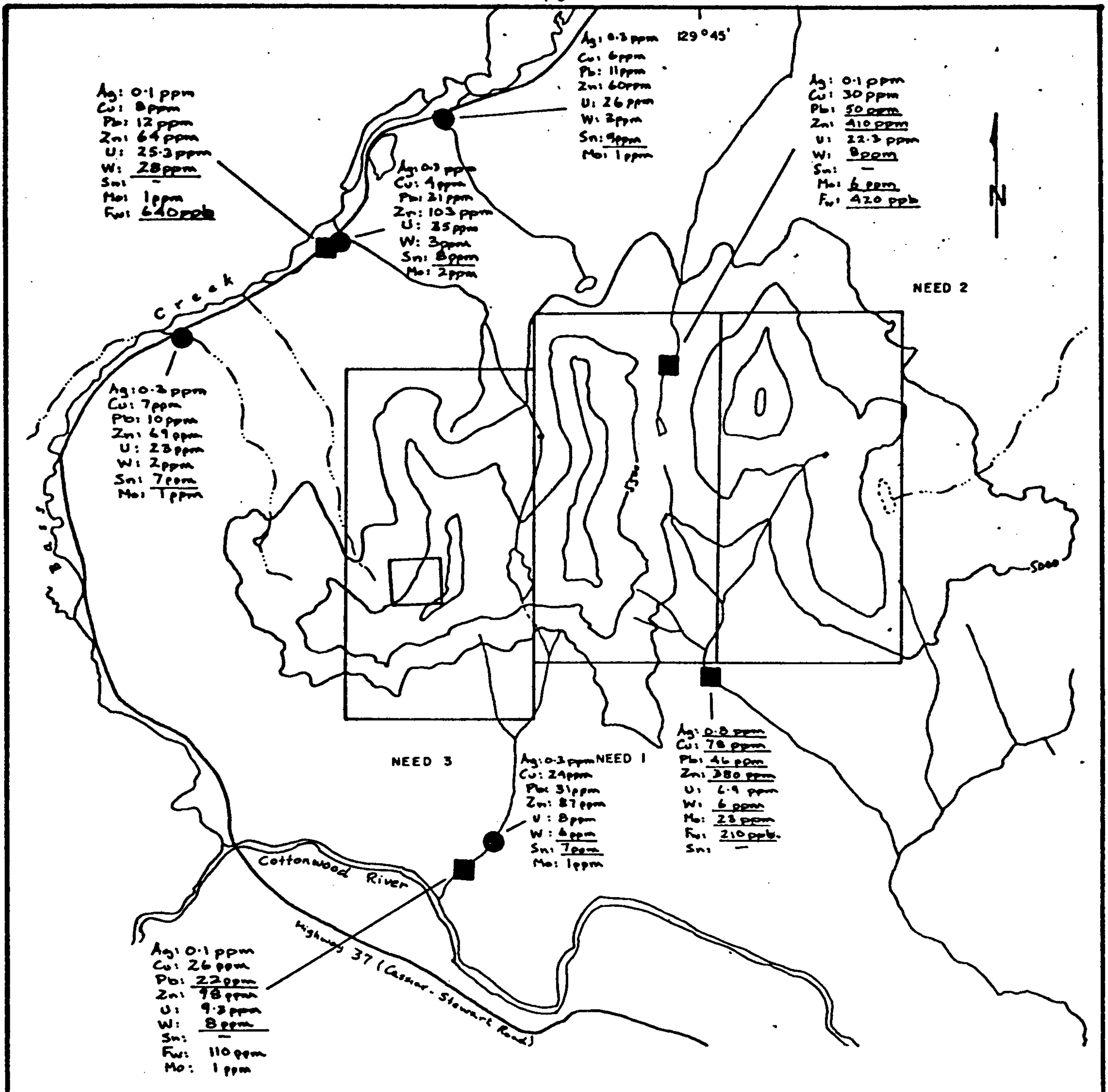
CANADIAN OCCIDENTAL PETROLEUM LTD.
MINERALS DIVISION

PROJECT WATSU
NEED CLAIMS
BRITISH COLUMBIA

STREAM WATER GEOCHEMISTRY

Scale 1 50,000

September, 1979



Legend

● 1978 Pantaleyev Sediment Site

■ 1978 G.S.C. - U.R.P. Sediment Site

Values underlined are anomalous.

References: Pantaleyev - see Appendix III
G.S.C. - O.F. 562

PLAN 10

CANADIAN OCCIDENTAL PETROLEUM LTD.
MINERALS DIVISION

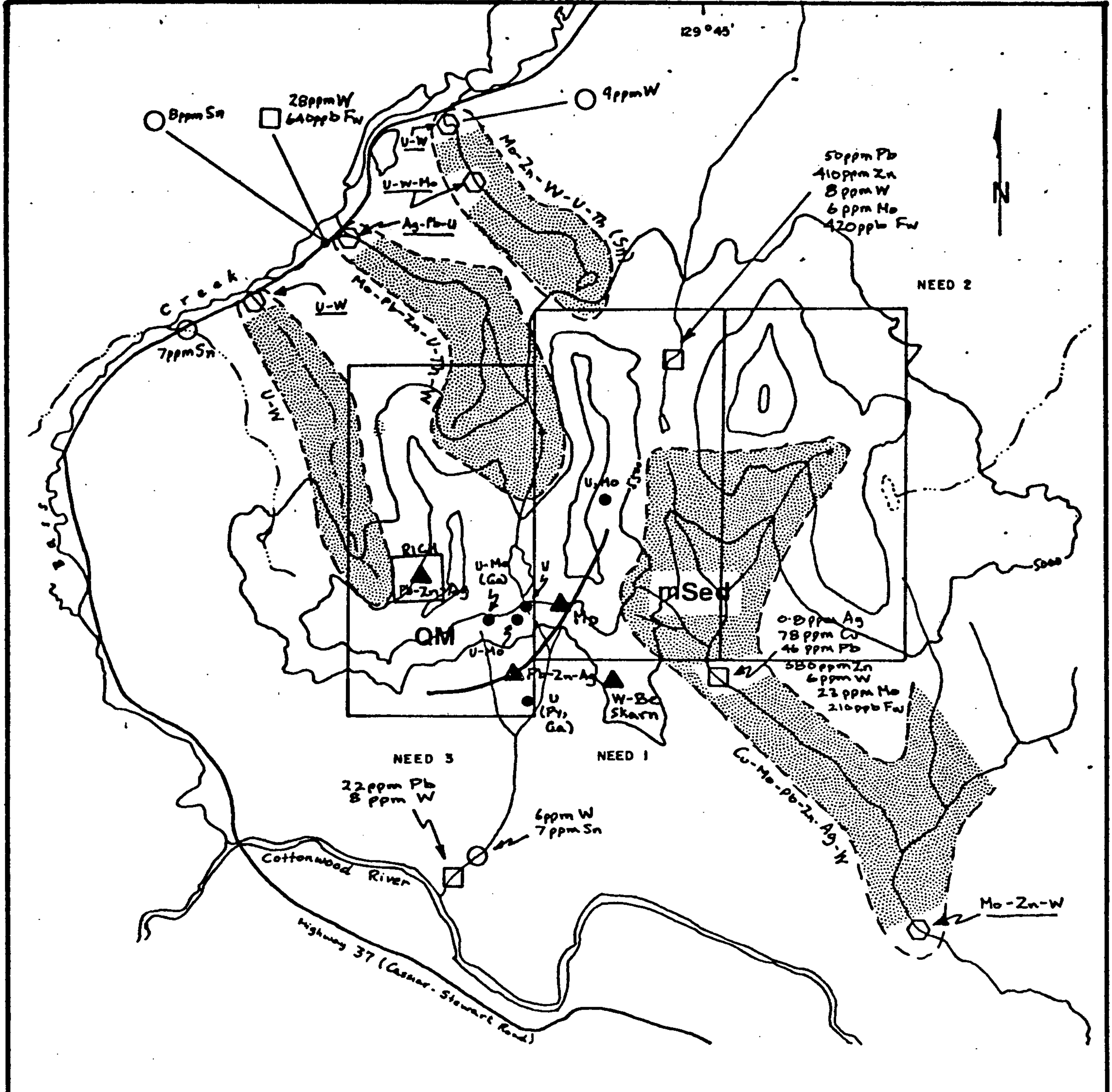
PROJECT WATSU

NEED CLAIMS
BRITISH COLUMBIA

1978 GSC-URP and PANTALEYEV-1978
STREAM SEDIMENT DATA

Scale 1:50,000

September, 1979



Legend

Geology

QM : Quartz monzonite

mSed : Meta sediments; hornfels, dolomite

Geological contact

Mineral Showing

Geochemistry

Can. Oxy 1979 Stream sediment anomaly

Can. Oxy. 1979 Rock anomaly

Can. Oxy. 1979 Heavy mineral anomaly

1978 G.S.C. Stream sediment anomaly

1978 Pantaleyev Stream sediment anomaly

CANADIAN OCCIDENTAL PETROLEUM LTD.
MINERALS DIVISION

PROJECT WATSU

NEED CLAIMS

BRITISH COLUMBIA

COMPILATION OF GEOLOGY, GEOCHEMISTRY, MINERAL SHOWINGS

Scale 1:50,000 | PLAN 11 | September, 1979

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 NEED 1-3

Record Numbers 858, 859, 884

			Pro-rated[1] Costs
Salaries and Benefits			$1,473.40
Travel and Accommodation			898.10
Drafting and Reproduction			315.53
Consultant			442.73
Camp costs and Supplies			1,011.38
Rental of Equipment			168.56
Other Work			430.97
	Sub-total		$4,740.67
Helicopter 2.7 hr. at $310/hr.	$ 837.00	2	
Geochemical 560 analyses	966.36	3	$1,803.36
	Total		$6,544.03

Notes

[1] Pro-rated on basis of 5.0 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.

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	165.16	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