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SML 481

MOUNT BURR

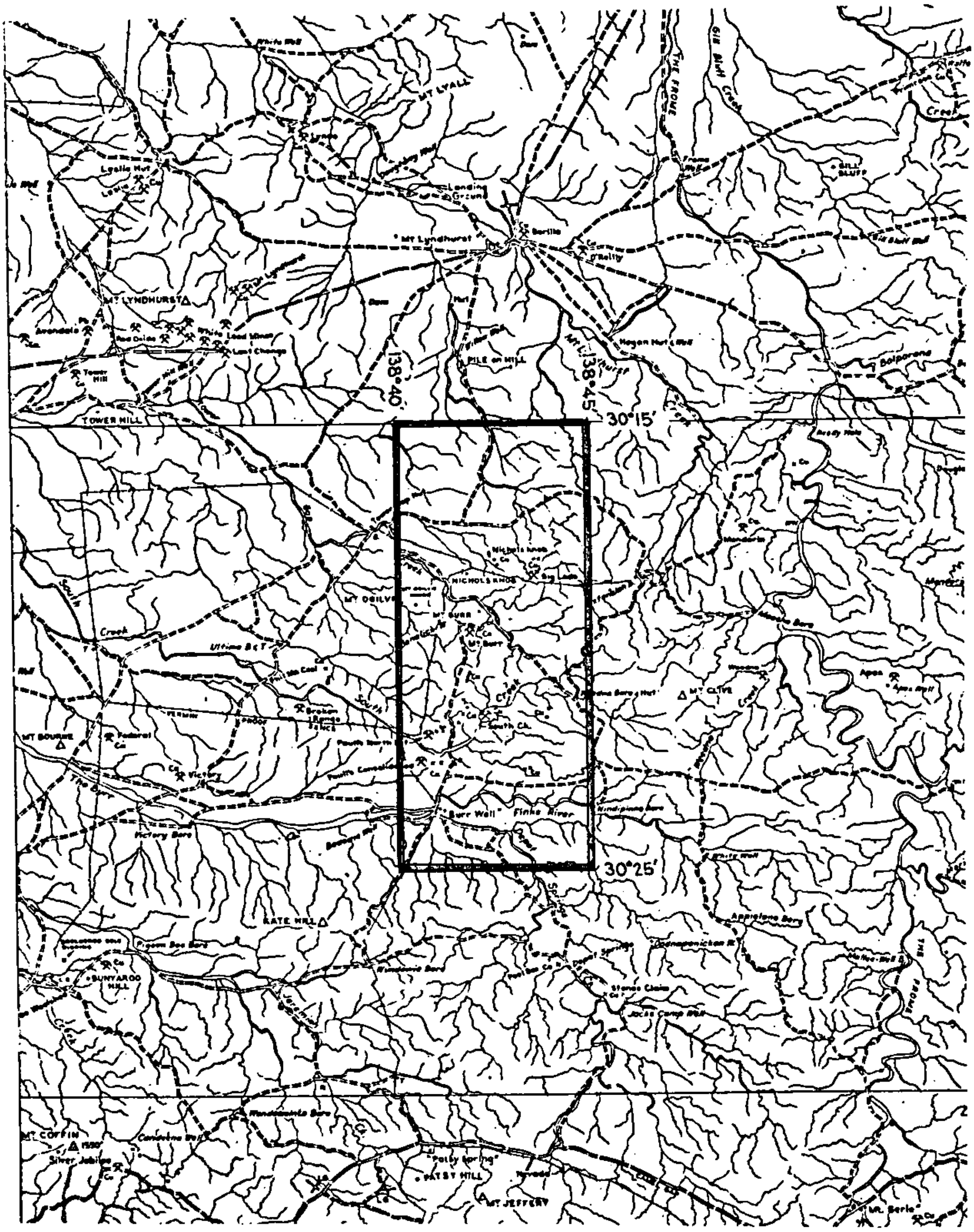
PROGRESS AND FINAL REPORTS TO LICENCE SURRENDER, FOR THE PERIOD 15/10/1970 TO 14/7/1971

Submitted by
Australian Aquitaine Petroleum Pty Ltd
1971

Enquiries: Customer Services Branch
Minerals and Energy Resources
7th Floor
101 Grenfell Street, Adelaide 5000

Telephone: (08) 8463 3000
Facsimile: (08) 8204 1880

Government of South Australia
Department for Manufacturing, Innovation, Trade, Resources and Energy



SCALE 1:250000

AUSTRALIAN AQUITAINE PETROLEUM PTY. LTD.

DOCKET D.M. 850/70 AREA 57 SQ MILES

1:250000 PLANS . COPLEY

LOCALITY

S.M.L. No. 481 EXPIRY DATE 14-4-71

CONTENTS ENVELOPE 1509 DM 850/70

TENEMENT: S.M.L. 481

TENEMENT HOLDER: AUSTRALIAN AQUITAINE PETROLEUM PTY. LTD

REPORTS:

OGNAR, S., 1971

Field Mission Report S.M.L. 481
3th November 1970 to 8th December 1970 (pgs. 4-7)

Plans:

Map 1 Photogeologic Interpretation map of the Mt. Burr area North Flinders Range S.A. (1509-2)

Map 2 Distribution of Copper values greater than 200 ppm with approximate relation to geology. (1509-4)

REPORTS:

OGNAR, S. (1971)

S.M.L. 481 Final report 1971
As annexe 3&4 Geophoto Resources Consultants, 1971. Photogeological evaluation of the Burr area, North Flinders Range, S.A. (pgs. 8-136)

Plans:

ANNEXE 1:

Drilling campaign 1971 and distribution of Copper values greater than 200ppm with approx. relation to geology and profiles of drill holes. (1509-3)

MTB 1: WATER LOG. (1509-5)
MTB 2: WATER LOG. (1509-6)
MTB 3: WATER LOG (1509-7)
MTB 4: Water Log (1509-8)
MTB 5: WATER LOG (1509-9)
MTB 6: WATER LOG. (1509-10)

Photogeologic interpretation map of the Burr area, North Flinders Ranges S.A. (1509-1)

CONTENTS ENVELOPE 1509 Cont

REPORTS:

BLANGY, B. 1971

Final report S.M.L. 481 Mt. Burr area
Period April 1971 to July 1971 (pgs. 137-143)

Plans:

Sample locations - plotted on Photogeologic interpretation map of the Burr area, North Flinders Range (1509-12)

Sample locations plotted an plan showing geology and drill holes (Scale 19600) (1509-11)

AUSTRALIAN AQUITAINE PETROLEUM PTY. LTD. 004

FIELD MISSION REPORT

SML 481

(3rd November 1970 - 8th December 1970)

S. Ognar January 1971

FIELD MISSION REPORT

SML 481

3/11/70 - 8/12/70

15th January, 1971.

PROGRAMME

Geology and Prospecting

In L.C. Barne's report, (of Plates 68 - 800 Cc and 68 - 92) concerning the graphic interpretation of the geochemical analysis results of soil sampling, it is noted that the strongest values (notably for Cu.) appear to relate to underlying strata of the same horizon, the Yudnamutana Sub-Group.

The mission has been carried out to determine whether this horizon is in fact metallogenically favorable. Following reconnaissance geological examination a number of chip sampling profiles (were laid down) oriented so to traverse the strongest anomalies.

Magnetometry

Several magnetometer profiles were run, traversing the dome structure of Nichols Nob, and a further number were made over an aeromagnetic anomaly on the Copley 1:250,000 sheet.

WORK CARRIED OUT

Photogeology

A 1:50,000 scale photogeological map of the SML and environs has been prepared by "Geophoto". (see Map No. 1).

Geology and Prospecting

Apart from a number of malachite bearing calcite veinlets, copper mineralisation is in general, not visible in the strata which correspond to the geochemical anomalies.

By contrast stratiform pyrite was constantly apparent, usually limonitised and often completely leached, rarely fresh. (Pyrite ghosts were frequently abundant in the troughs of ripple marks).

In the region between Mt. Burr and the Paulls Consolidated area, the old surface workings and more importantly the two Paulls Consolidated Mines, are always restricted to the same stratigraphic horizon. (Yudnamutana Sub-Group).

There were three Proterozoic formations considered to be interesting which have been examined in the field.

These were the SKILLOGALEE DOLOMITE (top of the Burra Group), unconformably overlain by the YUDNAMUTANA SUB-GROUP, which is itself in turn conformably overlain by the TINDELPINA SHALE. (These last two units belong to the base of Umberatana Group).

These formations are well described in Barnes (pp. 14-18). The main interest now lies in the complex nature of the Yudnamutana Sub-Group. Laboratory investigations are in progress on thirty samples to determine the origin and composition of the unit. A second series of samples will be selected for confirmation and further studies when the first investigations have been completed.

Outcrop conditions have been adequate to take chip samples along profiles on a 2 yard spacing with only a small number of soil samples being required in non-outcrop areas. For 20 profiles, of a total distance of 2090 yards 1100 rock samples and 280 soil samples have been collected and analysed chiefly for copper.

Two trenches have been made by bulldozers and sampled. One of the trenches (TII) failed to stay continuously at bedrock level due to the lightness of the bulldozer.

RESULTS OBTAINED

Laboratory analysis

The geochemical analyses are shown graphically on Map 2, in relation to the geology. The results show that the interesting values range between 200 ppm to 900 ppm and that the most favorable geographic zone is between Mt. Burr proper and profile No. 3 (see Map 2). The zone is approximately 14,000' long with an average width (determined from the chip sampling analyses) of 100'.

Magnetometry

The profiles traversing Nichols Nob and a number made over an aeromagnetic anomaly on the Copley 1:250,000 sheet are currently at the interpretation stage. The interpretation will be the subject of a later note.

General

The geochemical analyses have been sufficiently encouraging to indicate the necessity for further work and a programme for subsurface investigation by percussion drilling is currently planned.

EXPENDITURE

Expenditure recorded in our books for the period 15th October 1970 to 14th January 1971 amounts to a total of $21,348.91.

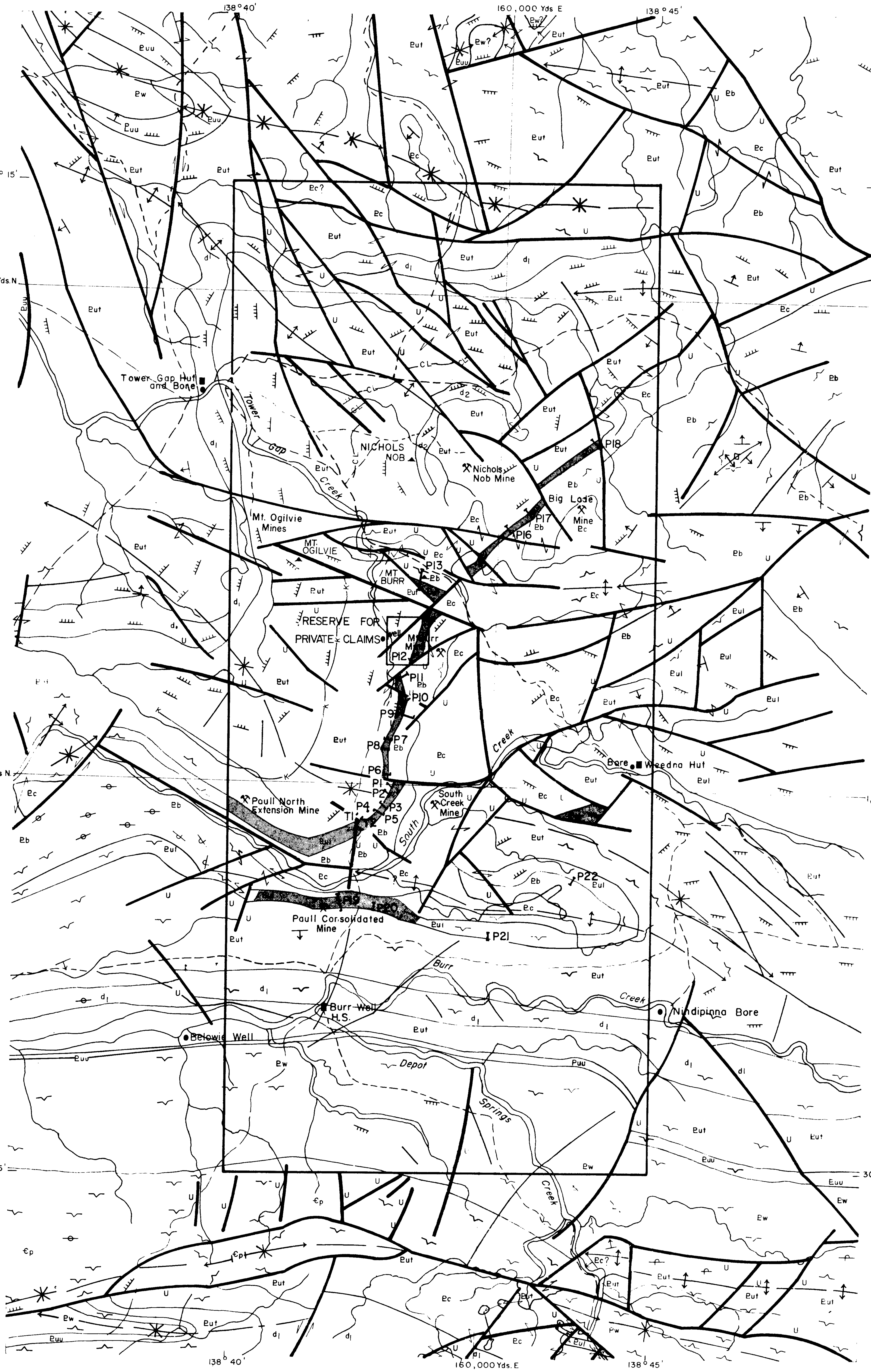
REFERENCE

Barnes L.C., - Geological investigation of the Burr complex crush zone. Copley - Serle. Rep. South Australia Department of Mines Pub.

ANNEXES

Map 1 Photogeologic map SML 481 and environs showing location of chip sampling profiles. Scale 1:50,000.

Map 2 Distribution of Cu. anomalies (related to surface geology) Scale 1:9,600 (after Barnes plan 69 -368 Sth. Aust. Mines Dep.).



PHOTOGEOLOGIC INTERPRETATION MAP OF THE BURR AREA, NORTH FLINDERS RANGE SOUTH AUSTRALIA

PREPARED BY GEOPHOTO RESOURCES CONSULTANTS
BRISBANE

FOR

AUSTRALIAN AQUITAINE PETROLEUM PTY. LTD.

Scale: 1:50,000

0 ½ 1 2 3 4 5 Miles

0 0·5 1 2 3 4 5 Kilometers

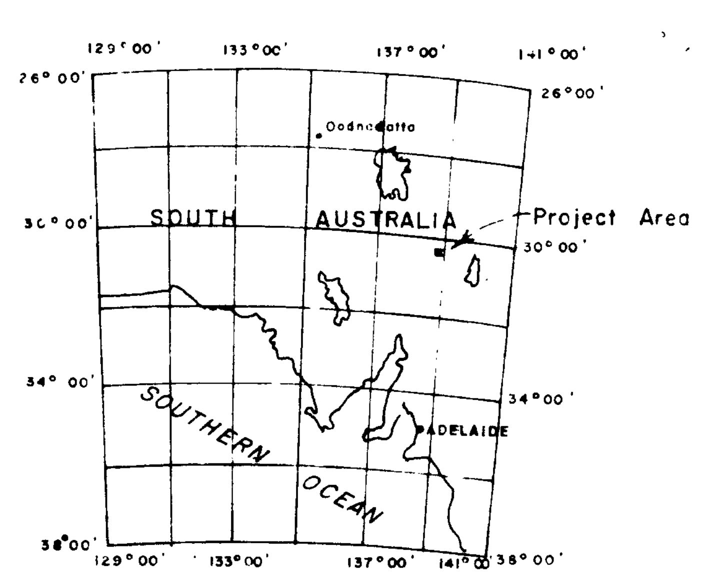
TRANSVERSE MERCATOR PROJECTION
DECEMBER 1970

LEGEND

Era		Group/Stage	Symbol	Unit	
Palaeozoic	Cambrian		€p	Pound quartzite	
Proterozoic	Adelaidian	Marinoan	Ew	Wilpena Group	
		Sturtian	Euu	Upper Tillite	Umberatana Group
			d1 d2 Eut	Tapley Hill Formation with massive dolomite horizons	
			Eul	Lower Tillite, containing some copper	
		Torrensian	Eb	Burra Group	
		Willouran	Ec	Callanna Beds (exposed only as diapiric breccia)	

GEOLOGIC SYMBOLS

- Dip group 1, less than 3°
- Dip group 2, 3° to 10°
- Dip group 3, 10° to 25°
- Dip group 4, 25° to 45°
- Dip group 5, 45° to nearly vertical
- Bedding appears vertical on photographs
- Overturned bedding
- Dip and strike. Amount of dip cannot be determined on photographs.
- Fault, normal or reverse
- Fault, position indefinite
- Transcurrent fault
- Distinctive lineation
- Change in Lithology
- Anticline. Arrow denotes plunge, diamond denotes apex; dashed where indefinite, questioned where inferred.
- Syncline. Arrow denotes plunge, ⊣⊢ denotes high point; dashed where indefinite, questioned where inferred.
- Contact, dashed where indefinite.
- Key Bed
- Identifies isolated or faulted segment with labelled area



REGIONAL INDEX MAP

Map No 1

6305

1509

AUSTRALIAN AQUITAINE PETROLEUM PTY LTD.

SML 481.
SOUTH AUSTRALIA

DISTRIBUTION OF COPPER VALUES GREATER THAN 200ppm. WITH APPROX. RELATION TO THE GEOLOGY

SCALE

HORIZONTAL 1" = 800'

VERTICAL 1cm = 1,000 p p m. Cu.

Profile. P.1. 1cm. = 1,000 ppm

1" = 800'

Basemap after Sth. Australia Dept. of Mines Drg. No 69-968.

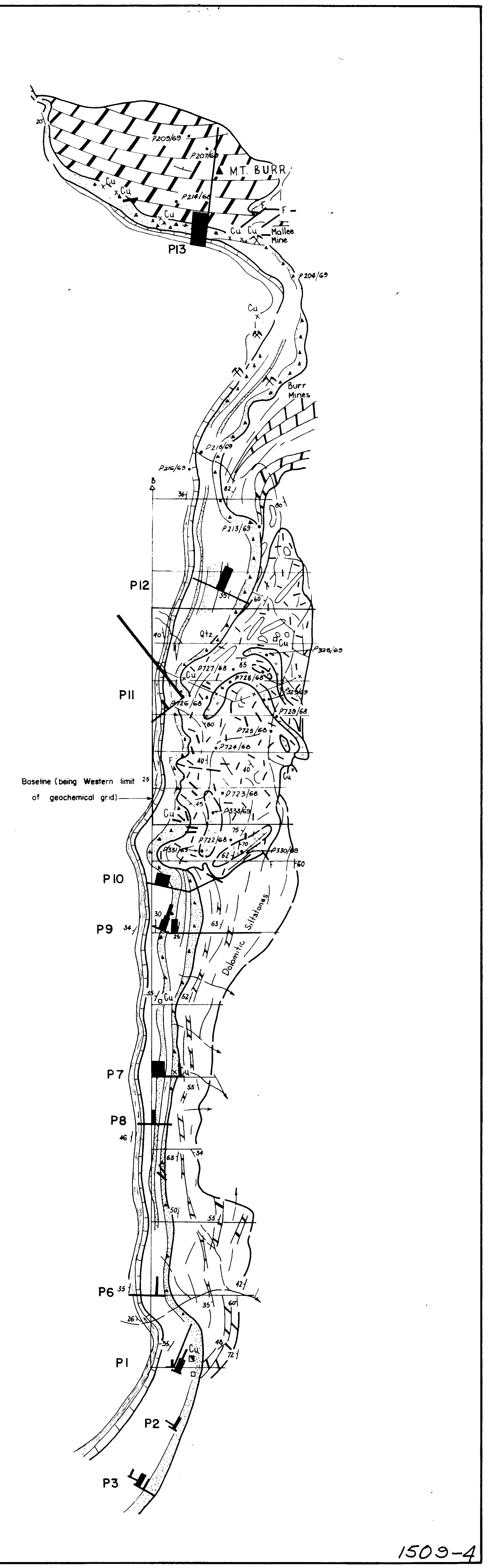
Map No 2.

Compiled by. S.OGNAR

Date: JAN 1971

LEGEND

- TINDELPINA SHALE MEMBER: Black fissile pyritic shale with basal buff-brown dolomite.
- YUDNAMUTANA SUB-GROUP: Pebbly siltstones, arkoses and gritty quartzites. Lenticular conglomerates. Basal conglomerate and quartzite.
- SKILLOGALEE DOLOMITE: Massive grey and brown dolomitic marbles, dolomites and dolomitic siltstones. Micaceous sandstones, grey pitted siltstones and black shales.
- Zone of contact metamorphism: Biotite quartz hornfels and schists, quartz amphibole hornfels and calc. silicate rocks.
- Microdiorites and microdolerites. Altered to plagioclase, epidote, biotite, chlorite amphibole rocks.



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SO/mj

SPECIAL MINING LEASE 481

SOUTH AUSTRALIA

FINAL REPORT 1971

S. OGNAR

9th March, 1971

CONTENTS

ANNEXES

I. OBJECTIVE

The first laboratory analysis results obtained at the end of the last year were sufficiently encouraging to justify this drilling campaign. (See Field Mission Report, January 1971).

The main objectives were as follows:

1) To try to locate, below the water table, the geochemical anomalies found on the surface.

2) To investigate the Tindelpina Shale Member in depth.

II. LOCATION

Six holes were spudded a little to the west of the centre of SML 481, along the contact between the Tindelpina Shale Member and the Yudnamutana Sub group, (east of the track between Burr well and Mount Burr). See annex 1, Location Map. MTB No. 1 was located about 3 miles north from Burr well and the subsequent holes emplaced successively north with an approximate 2000' spacing.

III. DRILLING CONTRACTOR

1. Equipment

- Rig = T64 HB Schramm Rotadrill (250 psi air)
  Myers pump and Gardner-Denver FGAG mud pump.
- Compressor = Gardner-Denver W.E.K. (350 psi 650 cubic feet).
- Tricone = Walker Mar. 7 3/8" and 5"
- Hammer Bit = Mission - D.C. Button 5"
- Casing = 20' X 6"
- Drill pipe = 20' X @ 3¼"
- Water truck = F700 Ford
- Four wheel drive = Toyota landcruiser

011

- Caravan = -

2. Personnel

1st shift	-	Mr. G. Reynolds	Drill Foreman
	-	Mr. M. Lee	Offsider
	-	Mr. McPhilips	Offsider
2nd shift	-	Mr. P.J. Seaman	Drill Foreman
	-	Mr. M. McPhilips	Offsider
	-	Mr. R. Mudge	Offsider

First shift worked from 31st January to 18th February 1971 and 1st to 2nd March 1971.

Second shift worked from 18th February to 2nd March 1971. (1st shift's = holiday period)

IV. BULLDOZER CONTRACTOR

Because of some technical difficulties with MTB No. 1, the drill foreman decided to use a complementary air compressor (Gardner-Denvers WEK 350 Psi and 650 cubic feet) from IRON KNOB near Port Augusta.

A private contractor was engaged locally with a bulldozer (D6) to lay out access tracks, pull the compressor and prepare some drilling sites.

V. DRILLING OPERATION

1) Operation Summary

Mr. Ognar (Geologist - A.A.P.) and A. Ferry (Technical assistant - Geoservices) arrived in the Mt. Burr Well area on 27th January 1971, and marked the drilling sites MTB 1-6 inclusive in the 3 day period 28th-30th January 1971.

The drillers arrived 31st of January and started MTB No.1 immediately. The last hole was completed 1st March 1971.

For each hole the daily progress was as shown below: 012

MTB 1	31st January	13th February	= 14	days for 510'
MTB 3	14th February	17th "	= 4	days for 330'
MTB 2	18th "	21st "	= 4	days for 410'
MTB 4	22nd "	24th "	= 3	days for 450'
MTB 5	25th "	28th "	= 3½	days for 380'
MTB 6	28th February	1st March	= 1½	days for 250'

The relatively lengthy period required to drill MTB 1 was due in part to poor downhole conditions and to inadequacies in the drillers equipment. The hole was abandoned at 510' without reaching the anticipated zone of the geochemical anomaly.

2) Sampling

Representative samples for petrographic and geochemical analysis were taken over 5 feet intervals and reduced by standard quartering procedure to approximately ½ lb weight.

VI RESULTS

1) Lithologic Analysis and Petrographic and Descriptions

The summary lithologic analyses and petrographic descriptions are plotted in the Master Logs (Annex 2).

Thirty rock samples have been sent to the Centre de Recherche de Pau in France for detailed analyses and the report on the studies carried out by the laboratories will be available in a few weeks. A copy will be despatched as soon as possible to the South Australian Department of Mines.

2) Analysis

Some analyses for vanadium were made, but low results do not justify any complementary studies.

The main analyses were made for copper and results can best be presented in tabular form as follows:

Hole No.	Depth	PPm of Cu		Thickness of the anomaly zone	Geological observations
		Average results	Max. results		
MTB 1	510'	740	1,200	370' - 410' 40'	Yudnamutana-Sub group Quartzitic sandstone with desseminated pyrite (White grey).
MTB 2	410'	275	510	175' - 215' 40'	Yudnamutana-Sub group Quartzitic sandstone with desseminated pyrite (green grey).
MTB 3	330'	845	1,655	120' - 140' 20'	Yudnamutana-Sub group Quartzitic sandstone with desseminated pyrite (green grey and white).
MTB 4	450'	1,660	2,525	205' - 225' 20'	Yudnamutana-Sub group Quartzitic sandstone with desseminated pyrite (white grey)
MTB 5	380'	1,000	2,250	190' - 230' 40'	Yudnamutana-Sub group Quartzitic sandstone with desseminated pyrite (green grey and white).
MTB 6	250'	1,215	1,450	90' - 110' 20'	Yudnamutana-Sub group Quartzite sandstone with desseminated pyrite and sometimes malachite in diaclases (white - grey).

It can be seen in this tabulation that the anomalies concentrations of copper are localised at the top of Yudnamutana sub-group, directly below the Tindelpina Shale Member.

VII. CONCLUSIONS

The stratigraphic control of the anomalies is evidenced by the fact that the larger anomalies are localised in the same stratigraphical position and in the same petrographic rock type (Tillitic porous white-grey sandstone with fine desseminated yellow pyrite).

Due to the relatively low copper values obtained further testing of the area now investigated by drilling is not warranted. However, the importance and numerous prospects which exist in an around the MT. BURR diapiric structure must be examined.

In particular these are (1) Big lode deposit, (2) Mt. OGILVIE Area, (3) diapiric structure in general, (possibilities of Mercury?) (4) the basal stratigraphic unit of the Copley Quartzite and (5) the structural dome of Nichols Nob.

ANNEX 3

LABORATORY ASSAYS.

RESULTS

1970 CHIP SAMPLING CAMPAIGN

GEOSERVICES BOX NO. 3 (DECEMBER 197[illegible]) [illegible] 48 [illegible] 36 K S[illegible]PLE[illegible], REC[illegible]

SAMPLE No.	Cu
P.XIX 1	108
2	62
3	110
4	845
5	670
6	227
7	238
8	237
9	226
10	1015
11	1210
12	252
13	177
14	365
15	255
16	302
17	570
18	208
19	342

016

all results in parts per million

GEOSERVICES BOX NO. 3 DECEMBER 1970 SML 86 CK PL RECEIVED 14.12.70

SAMPLE No.	Cu
P.XIX 20	97
21	145
22	218
23	285
24	122
25	58
26	70
27	78
28	275
29	137
30	165
31	375
32	216
33	310
34	142
35	158
36	175
37	425
38	325

all results in parts per million

SAMPLE No.	Cu
P.XIX 39	267
40	304
41	29
42	172
43	144
44	478
45	71
46	163
47	134
48	71
49	132
50	30
51	52
52	253
53	93
54	23
55	47
56	38
57	85

all results in parts per million

GEOSERVICES BOX NO. 3 (DECEMBER 1970) SML 481 86 ROCK SAMPLES RECEIVED 14.12.70

SAMPLE No.	Cu
P.XIX 58	170
59	58
60	134
61	80
62	73
63	58
64	46
65	45
66	138
67	44
68	94
69	20
70	148
71	42
72	104
73	280
74	165
75	69
76	500

019

all results in parts per million

[redacted] GEOSERVICES [redacted] BOX NO. 3 [redacted] (DE[redacted]MBER 1970) [redacted] SM[redacted]81 [redacted] 8[redacted]OCK[redacted]MP[redacted], R[redacted]IV[redacted]

SAMPLE No.	Cu
P.XIX 77	1415
78	395
79	64
80	222
81	560
82	160
83	1275
84	835
85	97
86	775

020

all results in parts per million

GEOSERVICES BOX NO. 4 (DECEMBER 1970) SMI 481 1[redacted] ROC[redacted]SAM[redacted]S, [redacted]EI[redacted] 14[redacted].7

SAMPLE No.	Cu
P.XII 4	44
6	95
7	10
8	209
9	70
35	485
36	404
37	1285
38	178
39	92
40	310
41	580
42	260
43	184
44	1450
45	4650
46	40
47	715
48	48

all results in parts per million

021

GEOSERVICES BOX NO 4 (DECEMBER 1970) SML 481 1[illegible] ROCK SAMPLES, [illegible]

SAMPLE No.	Cu
P.XII 53	37
50	15
52	25
54	18
55	18
56	36
57	50
58	25
60	9
61	25
63	12
64	90
65	34
66	22
67	10
68	12
69	310
70	29
71	177

all results in parts per million

SAMPLE No.		Cu
P.XII	72	32
	73	66
	74	this sample is missing
	75	43
	76	this sample is missing
	77	90
	78	46
	82	10
	84	920
P.XXI	1	27
	2	18
	3	12
	4	17
	5	106
	6	12
	7	15
	8	67
	9	11
	10	66

all results in parts per million

GEOSERVICES BOX NO. 4 (DECEMBER 1970) [redacted] 31 [redacted] K [redacted] PLES, RECD. 14.12.70

SAMPLE No.	Cu
P.XXI 11	200
12	170
13	21
14	15
15	54
16	14
17	39
18	575
19	11
20	25
21	17
22	105
23	27
24	179
25	69
26	48
27	24
28	37
29	23

all results in parts per million

GEOSERVICES BOX NO. 4 (DECEMBER 1970) 48 RC SA ES, RECD. 14

SAMPLE No.	Cu
P.XXI 30	68
31	25
32	21
33	53
34	19
35	21
36	35
37	15
38	8
39	54
40	168
41	11
42	152
43	106
44	220
45	124
46	8
47	13
48	85

025

all results in parts per million

GEOSERVICES BOX NO. 4 (DECEMB[illegible] 19[illegible]) SML[illegible]1 131 ROCK SAMPLES, RECD. 14.12.70

SAMPLE No.	Cu
P.XXI 49	71
50	73
51	33
52	15
53	32
54	15
55	22
56	19
57	this sample is missing
58	170
P.XIX 87	950
88	270
89	439
90	227
91	560
92	930
93	283
94	795
95	338

all results in parts per million

GEOSERVICES BOX NO. 4 SML 481 131 ROCK SAMPLES RECEIVED 14.12.70

SAMPLE No.	Cu
P.XIX 96	450
97	510
98	325
99	490
100	232
101	315
102	590
103	368
104	725
105	319
106	181
107	176
108	142
109	415
110	450
111	311
112	236

all results in parts per million

SAMPLE No.	Cu
P.XVIII 1	23
2	176
3	72
4	72
5	60
6	73
7	31
8	33
9	28
10	68
11	465
12	105
13	1750
14	88
15	91
16	48
17	60
18	48
19	57

all results in parts per million

G[redacted]ERV[redacted]S [redacted] B[redacted]NO.[redacted]2 [redacted] SM[redacted]481[redacted] 8[redacted]OCK[redacted]AMP[redacted], R[redacted]IV[redacted]14.[redacted]. [redacted]

SAMPLE No.	Cu
P.XVIII 20	26
21	88
22	62
23	38
24	19
25	57
26	27
27	87
28	60
29	19
30	33
31	23
32	56
33	73
34	109
35	75
36	55
37	38
38	30

029

all results in parts per million

SAMPLE No.	Cu
P.XVIII 39	38
40	38
41	48
42	25
43	55
44	31
45	57
46	13
47	27
48	116
49	48
50	75
51	82
52	26
53	53
54	53
55	50
56	28
57	22

030

all results in parts per million

SAMPLE No.	Cu
P.XVIII 58	19
59	12
60	58
61	20
62	44
63	29
64	480
65	600
66	80
67	68
68	78
P.XX 25	285
26	550
27	298
28	41
29	375
30	265
31	23
32	485

all results in parts per million

[redacted]GEO[redacted]VIC[redacted]BO[redacted]O. [redacted]SML[redacted]1 [redacted] 85[redacted]OCK[redacted]MPI[redacted], R[redacted]IVE[redacted]4.[redacted]. 7[redacted]

SAMPLE No.	Cu
P.XX 33	385
34	675
35	202
36	125
37	27
38	21
39	210
40	51
41	340

032

all results in parts per million

GEOSERVICES BOX NO. 1 (DECEMBER 1970) SML 481 52 SOIL SAMPLES, RECEIVED 10 December

SAMPLE No.	Cu
P.IX 53	590
54	1162
55	325
63	168
65	320
90	40
91	27
92	28
93	25
94	31
96	27
97	25
98	26
99	26
100	22
107	22
111	21
112	23
113	21

033

all results in parts per million

SAMPLE No.	Cu
PIX 114	23
115	19
116	17
117	20
P.X. 10	137
11	132
13	233
79	14
82	635
83	17
84	17
89	17
90	13
91	13
92	19
93	16
94	16
100	16
103	107

034

all results in parts per million

SAMPLE No.	Cu
PX 104	192
PXI 9	98
10	67
17	55
28	133
PXII 1	70
2	67
3	62
5	67
10	66
11	127
12	83
13	63
14	59

all results in parts per million

GEOSERVICES BOX NO. 2 (DECEMBER 1970) SML 481 32 SOIL SAMPLES RECEIVED 10 ...

SAMPLE No.	Cu
PXII 15	60
16	59
17	50
18	59
19	93
20	104
21	61
22	56
23	66
24	118
25	75
26	92
27	88
28	102
29	120
30	166
31	198
32	210
33	262

all results in parts per million

[redacted]SE[redacted]CES[redacted] [redacted]BOX[redacted]. [redacted] (D[redacted]MBE[redacted]97[redacted] [redacted]L [redacted] SOI[redacted]AM[redacted]S, [redacted]EIV[redacted]

SAMPLE No.	Cu
PXII 34	328
59	90
62	42
79	126
80	514
81	435
83	76
85	78
86	79
87	58
88	53
51	42
53	42

037

all results in parts per million

[redacted]EOS[redacted]IC[redacted] [redacted]BO[redacted]. [redacted]DE[redacted]ER[redacted]70)[redacted], SM[redacted]81 [redacted] ROC[redacted]SAM[redacted]S, [redacted]CEI[redacted] 10.12.

SAMPLE. No.	Cu
PXVI 1	145
2	995
3	53
4	128
5	133
6	186
7	96
8	23
9	18
10	48
11	164
12	40
13	212
14	165
15	46
16	350
17	186
18	20
19	38

038

all results in parts per million

SAMPLE No.	Cu
PXVI 20	25
21	50
22	68
23	53
24	18
25	579
26	296
27	18
28	37
29	29
30	675
31	25
32	21
33	23
34	72
35	40
36	39
37	40
38	56

all results in parts per million

GEOSERVICES BOX NO. 5 (DECEMBER 1970) SML 481 41 ROCK SAMPLES RECEIVED .1[illegible])

SAMPLE No.	Cu
PXVI 39	85
40	70
41	16

040

all results in parts per million

SAMPLE No.	Cu
P.VII. 1	350
2	1650
11	112
13	475
14	625
16	1225
17	468
18	155
19	118
20	600
21	153
22	78
23	3800
24	55
25	50
27	56
31	47
34	80
35	79

all results in parts per million

041

GEOSERVICES BOX NO. 6 112 ROCK SAMPLES RECEIVED [illegible]12.70 SMI 481

SAMPLE No.	Cu
PVII. 37	1125
38	1015
39	1075
40	74
41	58
42	63
43	62
44	25
46	285
47	925
48	77
51	22
PVIII. 1	50
2	30
3	48
4	18
5	21
6	42
7	43

042

all results in parts per million

SAMPLE No.	Cu
PVIII. 8	95
9	53
10	60
14	87
15	65
17	47
22	111
23	137
24	227
25	515
26	441
27	200
29	350
30	107
31	93
32	32
33	15
35	41
40	317

all results in parts per million

SAMPLE No.	Cu
PVIII 41	126
43	27
45	28
46	153
47	260
50	80
52	489
56	35
PIX 1	missing
2	377
3	56
4	142
5	27
6	293
7	50
PXIII. 1	27
2	42
3	67
4	73

044

all results in parts per million

[redacted] G[redacted]ERV[redacted]S [redacted] B[redacted]NO[redacted] [redacted]IL [redacted]2 I[redacted]K S[redacted]LES[redacted]REC[redacted]ED [redacted]2.[redacted]

SAMPLE No.	Cu
P.XIII 5	217
6	49
7	166
8	350
9	300
10	435
11	498
12	23
13	585
14	225
15	278
16	1460
17	455
18	735
19	134
20	239
21	182
22	132
23	277

045

all results in parts per million

SAMPLE No.	Cu
PXIII 24	227
25	292
26	400
27	380
28	860
29	1960
30	890
31	1045
32	351
33	595
34	235
35	164
36	369
37	400
38	185
39	117
40	146

046

all results in parts per million

GEOSERVICES BOX NO. 7 44 SOIL SAMPLES SMI 481
received 8.12.70

SAMPLE No.	Cu
P.VII 3	155
4	237
5	250
6	264
7	310
8	218
9	170
10	384
12	301
15	350
26	65
28	76
29	85
30	69
32	112
33	105
36	165
45	270
49	167

047

all results in parts per million

DSE CES B NO S 48 44 SOIL SAMPLES. REC. 8.12.7

SAMPLE No.	Cu
P.VII 50	160
52	93
53	98
VIII 11	57
12	60
13	67
16	80
18	110
19	53
20	148
21	178
28	512
34	115
36	162
37	115
38	113
39	157
42	142
44	57

048

all results in parts per million

SAMPLE No.		Cu
PVIII	48	86
	49	87
	51	67
	53	61
	54	60
	55	40

049

all resultsin parts per million

[redacted] EOS [redacted] ICI [redacted] OX [redacted]. 1 [redacted] - [redacted] L [redacted] 8 [redacted] K S [redacted] LES [redacted]

SAMPLE No.	Cu	Mo	V
P.I 6	31		180
7	48		160
8	50		80
11	37		225
12	57		140
13	208		180
14	67		160
15	80		160
16	293		100
17	126		80
18	238		40
19	530		40
P I 20 2nd line	223		80
22	82		80
23	92		115
24	44		100
26	2850		80
28	162		100
29	178		70

050

all results in parts per million

SAMPLE No.	Cu.	Mo	V
P.I.30	74		80
31	113		80
33	162		140
34	167		80
35	118		120
37	665		80
38	530		100
39	475		70
40	850		150
41	1120		190
42	1950		170
43	470		210
44	425		190
P.II.1	36		150
2	212		200
3	69		180
4	32		120
5	112		150
7	27		170

051

all results in parts per million

GEOSERVICES BOX NO. 1 - SML 4[illegible] - 7 ROCK SAMPLES

SAMPLE No.	Cu		V
P.II 8	55		140
10	58		170
11	250		130
12	68		170
13	49		80
14	88		90
15	72		100
16	162		105
17	61		120
P.II.18 2nd line	215		60
19	27		105
20	400		160
21	51		150
22	30		40
23	645		140
24	79		155
25	85		180
26	161		165
27	106		165

052

all results in parts per million

GEOSERVICES BOX NO. 1 - SML 481 - 78 ROCK SAMPLES

SAMPLE No.	Cu		V
P.II. 28	7800		180
30	670		180
31	415		140
32	630		200
34	465		120
35	360		130
36	580		130
37	445		130
38	585		200
39	590		100
P.III 1	148		170
2	1825		220
3	105		180
4	310		150
5	123		180
6	368		180
7	42		100
8	28		160
9	38		70

all results in parts per million

SAMPLE No.	Cu	V
P.III 10	88	80
11	93	70

054

all results in parts per million

GEOSERVICES BOX NO. 2 - SML 481 - 63 ROCK SAMPLES

SAMPLE No.	Cu	V
P.III12 line 2	710	170
13	570	150
14	940	170
16	405	110
17	1250	110
18	450	190
19	202	60
20	109	100
21	52	150
22	52	110
23	83	130
24	460	190
25	510	60
26	198	200
27	340	240
28	119	200
29	124	150
30	100	130
31	63	150

all results in parts per million

SAMPLE No.	Cu		V
P. I 1	91		150
2	98		130
3	98		110
4	124		130
5	156		130
9	166		110
10	186		130
21	145		130
25	220		150
27	595		70
32	245		80
36	322		100
45	400		130
46	222		130
47	94		130
P.II 6	57		160
9	76		150
29	620		120
33	550		130

056

all results in parts per million

SAMPLE No.	Cu		V
P.III. 15	445		130
32	98		110
33	75		110
34	68		100
35	67		80
36	66		130
37	48		140
38	50		150
39	52		100
40	63		140
41	83		120
42	96		130
43	68		90
44	25		90
45	38		90
47	85		130
P.V. 13	114		200
14	142		150
15	146		160

all results in parts per million

GEOSERVICES BOX NO. 3 - SML 481 - 58 SOIL SAMPLES, RECEIVED ON 26.11.70

SAMPLE No.	Cu		V
P.V. 16	70		170
17	74		180
18	48		160
19	47		130
20	45		150
21	43		100
22	78		130
23	55		140
24	45		140
25	27		160
26	30		120
27	48		80
28	84		50
29	550		160
30	75		120
31	73		120
32	63		120
33	270		100
34	252		110

058

all results in parts per million

[redacted] GE[redacted]RV[redacted] BC[redacted]O.[redacted] 3[redacted] [redacted]SMI[redacted]1 [redacted] 58[redacted]IL [redacted]PL[redacted] RE[redacted]VE[redacted]N 2[redacted]1.[redacted]

SAMPLE No.	Cu		V													
P.V. 35	114		170													

059

all results in parts per million

[redacted]OS[redacted]ICE[redacted] NO[redacted] L 40[redacted] SOIL SA[redacted]ES, [redacted]CE[redacted]D 3[redacted]1.7[redacted]

SAMPLE No.	Cu
PVI 42	59
43	61
45	141
46	620
47	1775
48	1725
49	1260
51	420
52	490
57	180
58	156
59	130
60	125
61	96
62	123
63	145
64	132
65	131
66	111

all results in parts per million

SAMPLE No.	Cu
PV(67	167
68	106

[redacted] SER[redacted]CES [redacted] BOX [redacted]. 5[redacted] 4[redacted] R[redacted] SA[redacted]ES [redacted]CE[redacted]D 3[redacted]

SAMPLE No.	Cu
P.IV. 1	640
2	1240
3	335
4	570
5	880
6	55
7	67
P.V 1	166
2	227
3	265
4	268
5	182
6	13
7	38
8	71
9	16
10	80
11	62
12	205

062

all results in parts per million

[redacted]OSE[redacted]CE[redacted]OX[redacted] 5[redacted] SM[redacted]81[redacted] ROC[redacted] SAM[redacted]ES, [redacted]CEI[redacted] 30.11.70

SAMPLE No.	Cu
PV . 36	205
P.VI. 1	16
2	22
3	27
4	10
5	28
14	13
15	70
16	31
17	91
18	72
19	111
20	25
24	60
31	20
32	52
33	55
34	113
35	64

063

all results in parts per million

[redacted] GE[redacted]RV[redacted]S [redacted] BO[redacted]O. [redacted] SMI[redacted]1 [redacted]99 [redacted]K [redacted]PLE[redacted]REC[redacted]VED [redacted].11.[redacted]

SAMPLE No.	Cu
P.VI 36	81
37	208
38	48
39	100
44	54
50	177
53	450
54	132
55	78
56	63
P.XXII.1	99
2	160
3	48
4	49
5	31
6	55
7	30
8	23
9	25

064

all results in parts per million

eos ic BOX NO

SAMPLE No.	Cu
P.XX11. 10	26
11	20
12	49
13	22
14	25
15	23
16	21
17	25
18	20
19	21
20	30
21	38
22	91
23	39
24	30
25	20
26	15
27	32
28	31

065

all results in parts per million

GEO[redacted]VI[redacted] BO[redacted]O. [redacted] SM[redacted]81 [redacted] R[redacted] SA[redacted]ES, [redacted]ECE[redacted]D [redacted]30.[redacted].70

SAMPLE No.	Cu
P.XXII 29	32
30	40
31	28
32	17
33	16
34	33
35	38
36	33
37	61
38	40
39	41
40	37
41	24
42	40
43	20
44	14
45	24
46	29
47	30

066

all results in parts per million

GEOSERVICES BOX NO. 5 SML 481 99 ROCK SAMPLES, RECEIVED ON 30.11.70

SAMPLE No.	Cu
P.XXII.48	16
49	34
50	25
51	15

all results in parts per million

SAMPLE No.	Cu
P.XVII 1	9
2	6
3	8
4	5
5	5
6	4
7	15
8	18
9	5
10	15
11	152
12	6
13	27
14	10
15	6
16	71
17	10
18	10
19	44

all results in parts per million

068

EOSERVICES BOX NO (DECEMBER 1970) IL 86 ROCK SAMPLES, RECD. 14.12.70

SAMPLE No.	Cu															
P.XVII 20	19															
21	20															
22	27															
23	76															
24	18															
25	158															
26	21															
27	30															
28	122															
29	28															
30	112															
31	20															
32	22															
33	25															
34	12															
35	24															
36	11														069	
37	10															
38	260															

all results in parts per million

GEOSERVICES BOX NO. [illegible] (DECEMBER [illegible]) SML 1 8[illegible] ROCK SAMPLES, RECD. 1[illegible]

SAMPLE No.	Cu
P.XVII 39	33
40	11
41	26
42	10
43	27
44	17
45	15
46	9
47	94
48	122
49	66
50	23
51	152
52	625
53	29
54	60
55	205
56	28
57	975

070

all results in parts per million

[illegible]OSE[illegible]CES [illegible]OX . 6 (I[illegible] EMB 19[illegible], [illegible]L 4[illegible] [illegible] ROCK SAMPLES, RECD. 14

SAMPLE No.	Cu
P.XVII 58	5850
59	419
60	43
61	29
P.XX 42	73
43	41
44	46
45	66
46	34
47	96
48	85
49	52
50	132
51	34
52	2475
53	13
54	15
55	166
56	51

071

all results in parts per million

SAMPLE No.	Cu
P.XX 57	26
58	18
59	30
60	7
61	15
62	14
63	132
64	88
65	14
66	14

072

SAMPLE No.	Cu
P.IX 8	69
9	49
10	51
11	30
12	57
13	47
14	72
15	236
16	492
17	36
18	1725
19	1140
20	5500
21	3750
22	705
23	715
24	1040
25	635
26	625

073

all results in parts per million

SAMPLE No.	Cu
P.IX 27	42
28	153
29	196
30	188
31	68
32	50
33	268
34	198
35	96
36	202
37	365
38	215
39	77
40	73
41	86
42	65
43	123
44	1475
45	600

all results in parts per million

SAMPLE No.	Cu
P.IX 46	388
47	312
48	1325
49	537
50	384
51	1000
52	850
56	34
57	123
58	250
59	27
60	62
61	220
62	173
64	58
66	37
67	90
68	13
69	10

075

all results in parts per million

SAMPLE No.	Cu
P.IX 70	22
71	25
72	37
73	39
74	15
75	32
76	48
77	33
78	103
79	18
80	28
81	30
1	27

all results in parts per million

GEOSERVICES BOX NO. 9 (NOVEMBER 1970) SML 481 26 ROCK SAMPLES RECD 4.[illegible]70

SAMPLE No.	Cu
P.IX 82	30
83	10
84	20
85	9
86	117
87	52
88	17
89	40
95	83
101	10
102	10
103	20
104	13
105	15
106	8
108	8
109	8
110	12
PX 95	19

all results in parts per million

077

SAMPLE No.	Cu
PX. 96	4
97	5
98	8
99	5
101	16
102	48
105	34
106	13
107	12
108	28
109	56
110	missing
111	865
112	62
P.XI 1	64
2	93
3	97
4	104
5	123

078

all results in parts per million

[redacted] G[redacted]ERV[redacted]ES [redacted] BOX[redacted]. [redacted] (NOV[redacted]ER [redacted]70) [redacted] [redacted] 4[redacted] [redacted] [redacted] 86 [redacted]K [redacted]PLE[redacted], REC[redacted] 14.[redacted].70 [redacted]

SAMPLE No.	Cu
P.XI 6	18
7	55
8	395
11	99
12	105
13	159
14	100
15	63
16	116
~~17~~	
18	102
19	76
20	76
21	285
22	590
23	107
24	296
25	61
26	20

all results in parts per million

SAMPLE No.	Cu
P.XI. 27	12
29	386
30	18
31	136
32	52
33	44
34	17
35	20
36	15
37	13
38	188
39	118
40	55
41	30
42	20
43	43
44	123
45	30
46	54

all results in parts per million

080

GEOSERVICES BOX NO. 9 (NOVEMBER 1970) SML 481 36 ROCK SAMPLES REC 14 .70

SAMPLE No.	Cu
P.XI 47	166
48	40
49	14
50	1975
51	2925
52	6875
53	64
54	26
55	46
56	17
57	1975
58	19

SAMPLE No.	Cu
P.X 1	35
2	35
3	19
4	5
5	13
6	20
7	48
8	37
9	65
12	57
14	570
15	775
16	109
17	225
18	300
19	60
20	1575
21	230
22	109

all results in parts per million.

082

SAMPLE No.	Cu
P.X. 23	252
24	240
25	60
26	38
27	72
28	66
29	33
30	59
31	44
32	56
33	83
34	106
35	32
36	39
37	23
38	49
39	78
40	17
41	34

all results in parts per million

GEOSERVICES BOX NO. 10 (NOVEMBER 1970) CML 481 82 samples

SAMPLE No.	Cu
P.X. 42	115
43	112
44	345
45	160
46	38
47	315
48	730
49	22
50	32
51	28
52	27
53	27
54	30
55	20
56	23
57	3
58	38
59	25
60	53

084

all results in parts per million

G[illegible]ERV[illegible]S [illegible]OX [illegible] 10 ([illegible]NOV[illegible]ER [illegible]0) S[illegible] 481 82 samples,

SAMPLE No.	Cu
P.X. 61	32
62	30
63	14
64	45
65	25
66	19
67	27
68	13
69	12
70	9
71	6
72	12
73	7
74	58
75	8
76	8
77	18
78	6
79	this sample is missing (soil = 14)

all results in parts per million

085

[redacted] G[redacted]ERV[redacted]ES [redacted]BOX[redacted]. [redacted].(N[redacted]MB[redacted]197[redacted] [redacted] 48[redacted] [redacted] [redacted]82 [redacted]mples[redacted]

SAMPLE No.	Cu
P.X. 80	20
81	6
85	7
86	7
87	5
88	25

086

all results in parts per million

[redacted] SE[redacted]CES[redacted] [redacted]X [redacted] 1[redacted](NO[redacted]BER[redacted]70,[redacted] [redacted] 4[redacted] [redacted]ROC[redacted]SAM[redacted]S, [redacted]CD. [redacted]4.[redacted]70 [redacted]

SAMPLE No.	Cu
P. XIII 41	208
42	520
43	217
44	31
45	71
46	11
47	43
48	32
49	235
50	283
51	53
52	34
53	217
54	175
55	149
56	88
57	100
58	82
59	106

087

all results in parts per million

SAMPLE No.	Cu
P.XIII 60	12
61	78
62	104
63	98
64	299
65	21
66	33
67	22
68	318
69	1750
70	142
71	66
72	63
73	78
74	19
75	14
76	39
77	24
78	19

all results in parts per million

GEOSERVICES [redacted] BOX NO. [redacted] ([redacted]EMB[redacted] 19[redacted] SM[redacted]81 [redacted] ROCK SAMPLES, RECD. 14.12.70

SAMPLE No.	Cu
P.XIII 79	12
80	9
81	16
82	13
83	38
84	9
85	7
86	12
87	5
88	15
89	6
90	14
91	10
92	19
93	24
94	1075
95	22
P.XX 1	216
2	142

all results in parts per million

GEOSERVICES BOX NO. 11 (NOVEMBR 1970) SML 481 79 ROCK SAMPLES, RECD 14.10.70

SAMPLE No.	Cu
P.XX 3	268
4	345
5	640
6	216
7	106
8	156
9	112
10	148
11	183
12	805
13	110
14	570
15	450
16	255
17	455
18	445
19	265
20	315
21	188

030

all results in parts per million

SAMPLE No.	Cu
P.XX 22	162
23	240
24	177

091

all results in parts per million

SAMPLE No.	Cu	V
line P.III 46 2	1210	80
T.I.0-1M	43	220
1-2M	33	180
2-3M	128	180
3-4M	130	220
4-5M	195	170
5-6M	46	150
6-7M	36	240
7-8M	37	200
8-9M	84	140
9-10M	136	160
10-11M	179	120
11-12M	121	160
12-13M	249	140
13-14M	124	130
14-15M	60	110
15-16M	65	60
16-17M	50	100
17-18M	68	130

all results in parts per million

092

[redacted] GI[redacted]ERVI[redacted] BOX NO [redacted] - SMI 481 [redacted] RO[redacted]SAM[redacted]S [redacted]EIV[redacted] 26 [redacted].70 [redacted]

SAMPLE No.	Cu	V
T.1 18-19M	108	100
19-20M	350	170
20-21M	2050	150
21-22M	1175	170
22-23M	613	130
23-24M	1000	110
24-25M	850	130
25-26M	5500	150
26-27M	173000	130
27-28M	1150	110
T.II 0-1M	73	150
1-2M	187	150
2-3M	108	130
3-4M	22	170
4-5M	65	170
5-6M	82	200
6-7M	50	100
7-8M	210	80
8-9M	30	160

093

all results in parts per million

[redacted]EOS[redacted]IC[redacted] NO[redacted] SM[redacted]31 [redacted] 63[redacted]K S[redacted]LES[redacted]REC[redacted]ED [redacted].11.[redacted]

SAMPLE No.	Cu	V
T.II 9-10M	50	100
10-11M	196	80
11-12M	31	100
12-13M	22	80
13-14M	22	40
14-15M	27	100

094

all results in parts per million

ANNEX 4

LABORATORY ASSAYS.

RESULTS

1971 DRILLING CAMPAIGN

REFERENCE: EXPEDITION NO. 1, DATED 12 February 1971. CUTTINGS SAMPLES, RECEIVED ON 15.2.71

SAMPLE No.	Cu
MTB.1.0-10	38 (40
10-15	46
15-20	38
20-25	40
25-30	44
30-35	26
35-40	40
40-45	36
45-50	46
50-55	38
55-60	38
60-65	32
65-70	56
70-75	38
75-80	48
80-85	78
85-90	52
90-95	60
95-100	54

096

all results in parts per million

[redacted]FE[redacted]E:[redacted]XP[redacted]TIO[redacted]D. [redacted]DA[redacted] 12[redacted]b[redacted]y 1[redacted]. [redacted] [redacted]CUT[redacted]GS[redacted]MPL[redacted] R[redacted]D O[redacted]5.[redacted] [redacted]

SAMPLE No.	Cu
MTB.1.100-105	366
105-110	64
110-115	62
115-120	68
120-125	62
125-130	58
130-135	50
135-140	38
140-145	38
145-150	68
150-155	30
155-160	42
160-165	42
165-170	46
170-175	56
175-180	54
180-185	66
185-190	66
190-195	38

097

all results in parts per million

REFERENCE: EXPEDITION NO. 1, DATED 12TH FEBRUARY 1971. CUTTINGS SAMPLES, REC'D ON 15.2.71

SAMPLE No.	Cu
MTB.1.195-200	44
200-205	94
205-210	92
210-215	70
215-220	66
220-225	84
225-230	78
230-235	104
235-240	55
240-245	44
245-250	25
250-255	42
255-260	69
260-265	39
265-270	48
270-280	39
280-285	20
285-290	48
290-295	42

all results in parts per million

098

REFERENCE: EXPEDITION NO. 1, DATED 12TH FEBRUARY 1971. CUTTINGS SAMPLES REC'D ON 15.2.71

SAMPLE No.	Cu
MTB.1.295-300	28
300-305	22
305-310	23
310-315	25
315-320	24
320-325	29
325-330	35
330-335	40
335-340	102
340-345	103
345-350	30
350-355	46
355-360	70
360-365	105
365-370	96
370-375	510
375-380	675
380-385	515
385-390	1200

099

all results in partsper million

RE: EXPEDITION NO. 1, DATED 12TH FEBRUARY 1971. CUTTINGS SAMPLES REC'D ON 15.2.71

SAMPLE No.	Cu
MTB.1.390-395	870
395-400	875
400-405	735
405-410	560
410-415	475
415-420	380
420-425	212
425-430	237
430-435	193
435-440	133
440-445	93
445-450	102
450-455	72
455-460	59
460-465	56
465-470	62
470-475	56
475-480	55
480-485	83

all results in parts per million

REFERENCE: EXPEDITION NO. 1, DATED 12th FEBRUARY 1971. CUTTINGS SAMPLES RECD. ON 15.2.71

SAMPLE No.	Cu
MTB.1.485-490	73
490-495	60.

all results in partsper million

EF EXPEDITION No. 2, 17 February 1971. 3 CUTTINGS SAMPLES, RECEIVED 1

SAMPLE No.	Cu
MTB.1.495-500	55
500-505	64
505-510	74

102

all results in parts per million

[redacted] RE[redacted]ENC[redacted] C[redacted]ING[redacted]MPL[redacted] FR[redacted]EXP[redacted]TI[redacted]NO.[redacted] DA[redacted]D 2[redacted] FE[redacted]UAR[redacted]97[redacted]REC[redacted]ED[redacted]

PML

SAMPLE No.	Cu
MTB2. 0-5	30
5-10	34
10-15	41
15-20	38
20-25	50
25-30	
30-35	
35-40	
40-45	
45-50	57
50-55	60
55-60	48
60-65	67
65-70	63
70-75	67
75-80	89
80-85	46
85-90	21
90-95	28

all results in parts per million

103

[redacted]

SAMPLE No.	Cu
MTB2 95-100	24
100-105	21
105-110	28
110-115	50
115-120	37
120-125	35
125-130	48
130-135	183
135-140	52
140-145	48
145-150	48
150-155	43
155-160	33
160-165	83
165-170	166
170-175	
175-180	405
180-185	280
185-190	265

all results in parts per million

SAMPLE No.	Cu
MTB2 190-195	187
195-200	139
200-205	88
205-210	330
210-215	510
215-220	
220-225	285
225-230	255
230-235	108
235-240	106
240-245	83
245-250	43
250-255	39
255-260	19
260-265	18
265-270	39
270-275	73
275-280	9
280-285	15

all results in parts per million

SAMPLE No.	Cu
MTB2.285-290	114
290-295	113
295-300	73
300-305	94
305-310	21
310-315	47
315-320	24
320-325	26
325-330	14
330-335	22
335-340	27
340-345	41
345-350	51
350-355	93
355-360	96
360-365	60
365-370	46
370-375	63
375-380	28

all results in parts per million

106

SAMPLE No.	Cu
MTB2.380-385	32
385-390	29
390-395	31
395-400	
400-405	44
405-410	27

all results in parts per million

REF[redacted]NCE[redacted] E[redacted]DIT[redacted] N[redacted] 2 [redacted] 5[redacted]UT[redacted]GS [redacted]PL[redacted] RE[redacted]VE[redacted] F[redacted]uar[redacted]97[redacted]
17 FEBRUARY, 1971.

SHL

SAMPLE No.	Cu
MTB.3. 35-40	100
40-45	65
50-55	28
55-60	27
60-65	45
65-70	134
75-80	56
80-85	155
85-90	66
90-95	142
95-100	95
100-105	77
105-110	182
110-115	168
115-120	84
120-125	1655
125-130	485
130-135	830
135-140	415

all results in parts per million

REF: EXPEDITION NO. 2, 17 February1971.   57 CUTTINGS SAMPLES, RECD. 19.2.71

SAMPLE No.	Cu
MTB.3.140-145	103
145-150	102
150-155	24
155-160	28
160-165	18
165-170	295
170-175	48
175-180	27
180-185	37
185-190	24
190-195	25
195-200	34
200-205	28
205-210	16
210-215	21
215-220	43
220-225	43
225-230	43
230-235	48

109

all results in parts per million

SAMPLE No.	Cu
MTB.3.235-240	45
240-245	17
245-250	17
250-255	21
255-260	28
260-265	10
265-270	13
270-275	18
275-280	16
280-285	19
285-290	9
290-295	9
295-300	11
300-305	14
305-310	9
310-315	13
315-320	15
320-325	11
325-330	16

110

all results in parts per million

[redacted] . [redacted]OS[redacted]ICE[redacted] [redacted]90 [redacted]TI[redacted]SAM[redacted]S, [redacted].4[redacted]EF[redacted]EXP[redacted]TIO[redacted]No. [redacted] DA[redacted] 25[redacted] FEB[redacted]ARY[redacted]71[redacted] [redacted]

SAMPLE No.	Cu First Split	Check Anal. 1st Split	Cu 2nd Split	Cu Whole Sample Crushed
MTB.4.0-5	71	67	74	
5-10	65			
15-20	94			
20-25	88			
25-30	97			
30-35	80			
35-40	115			
40-45	82			
45-50	63			
50-55	115	112	103	
55-60	106			
60-65	161			
65-70	121			
70-75	101			
75-80	152			138
80-85	116			
85-90	93			
90-95	182			
95-100	98			

all results in parts per million

SAMPLE No.	Cu First Split			Check Anal. 1st.Split			Cu 2nd Split			Cu Whole Sample Crushed						
MTB.4.100-105	94						117									
105-110	117									115						
110-115	185															
115-120	105															
120-125	60															
125-130	92															
130-135	104															
135-140	75															
140-145	166															
145-150	135															
150-155	135			138			108									
155-160	45															
160-165	19															
165-170	31															
170-175	27															
175-180	128															
180-185	70															
185-190	33															
190-195	82															

all results in parts per million

[illegible]SERVICES [illegible] CUTTINGS SAMPLES, MTB. 4 [illegible] EDITION No. 4, DATE 25th February, [illegible]

SAMPLE No.	Cu First Split	Check Anal. 1st Split	Cu 2nd Split	Cu Whole Sample Crushed
MTB4.195-200	55			
200-205	123	120	97	
205-210	2525	2325		2375
210-215	1720	1650		
215-220	1100	960		
220-225	1300	1250		
225-230	510			
230-235	448			
235-240	270			
240-245	202			
245-250	307			
250-255	283			212
255-260	192			
260-265	161			
265-270	975	900	775	1115
270-275	515			485
275-280	152			
280-285	79			
285-290	59			79

all results in parts per million

SAMPLE No.	First Split	Check Anal. 1st Split	Cu 2nd Split	Cu Whole Sample Crushed
MTB4.290-295	40			
295-300	41			
300-305	156			
305-310	80			
310-315	28			
315-320	30	28	13	
320-325	18			
325-330	33			
330-335	20			
335-340	16			
340-345	10			
345-350	10			
350-355	8			
355-360	10			
360-365	14			
365-370	9	8	8	
370-375	16			
375-380	8			15
380-385	13			

all results in parts per million

SAMPLE No.	Cu First Split	Check Anal. 1st Split	Cu 2nd Split	Cu Whole Sample Crushed
MTB4.385-390	11			
390-395	12			
395-400	10			
400-405	13			13
405-410	10			
410-415	19			
415-420	10	7	11	
420-425	15			
425-430	26			
430-435	10			
435-440	11			
440-445	10			
445-450	10	10		

all results in parts per million

SAMPLE No.	Cu			Cu Control anal. 2nd Split												
MTB 5- 0-5	40															
10-15	55															
15-20	48															
20-25	82															
25-30	102															
30-35	76															
40-45	60															
45-50	43															
50-55	54															
55-60	13			12												
60-65	10															
65-70	14															
70-75	42															
75-80	50															
80-85	60															
85-90	72															
90-95	72															
95-100	78															
100-105	75															

All results in parts per million

GEOSERVICES MTB 5

SAMPLE No.	Cu			Cu Control anal. 2nd split
MTB 5 -105-110	53			49
110-115	60			
115-120	64			
120-125	25			
125-130	20			
130-135	21			
135-140	162			
140-145	35			
145-150	57			
150-155	108			
155-160	86			
160-165	65			
165-170	34			
170-175	49			
175-180	415			
180-185	192			
185-190	83			
190-195	665			
195-200	730			

117

All results in parts per million

SAMPLE No.	Cu			Cu Control Anal. 2nd split
MTB 5-200-205	835			
205-210				
210-215	1190			
215-220	2250			
220-225	860			
225-230	495			450
230-235	305			
235-240	204			
240-245	235			
245-250				
250-255				
255-260	590			
260-265	1170			940
265-270	810			
270-275	315			
275-280	400			
280-285	83			
285-290	190			
290-295	144			

All results in parts per million

SAMPLE No.	Cu			Cu Control Anal. 2nd split
MTB 5 -295-300	138			
300-305	145			
305-310	170			
310-315	103			117
315-320	102			
320-325	395			
325-330	95			
330-335	85			
335-340	84			
340-345	70			
345-350	90			
350-355	57			
355-360	113			
360-365	65			
365-370	35			
370-375	24			
375-380	27			24

All results in parts per million

50 CUTTING SAMPLES MTB 6 - RECEIVED ON 3rd March 1971 - EXPEDITION No. 5, 2.3.71

SAMPLE No.	Cu			Cu Control Anal. 2nd Split												
MTB 6- 0-5	103															
5-10	132															
10-15	62															
15-20	58															
20-25	80															
25-30	167															
30-35	128															
35-40	163															
40-45	112															
45-50	73			82												
50-55	64															
55-60	112															
60-65	116															
65-70	78															
70-75	95															
75-80	168															
80-85	207															
85-90	385															
90-95	1375															

All results in parts per million

SAMPLE No.	Cu			Cu Control Anal. 2nd split
MTB 6- 95-100	1450			1975
100-105	1000			
105-110	1035			
110-115	580			
115-120	455			
120-125	180			
125-130	127			
130-135	227			
135-140	172			
140-145	156			
145-150	140			144
150-155	95			
155-160	143			140
160-165	312			357
165-170	248			
170-175	111			
175-180	56			
180-185	49			
185-190	38			

121

All results in parts per million

SAMPLE No.	Cu			Cu Control Anal. 2nd split
MTB 6-190-195	29			
195-200	17			
200-2o5	25			
2o5-210	16			
210-215	11			10
215-220	11			
220-225	13			
225-230	8			
230-235	8			
235-240	6			
240-245	9			
245-250	20			21

All results in parts per million

PHOTOGEOLOGICAL EVALUATION

of the

BURR AREA, NORTH FLINDERS RANGE SOUTH AUSTRALIA

Prepared for

AUSTRALIAN AQUITAINE PETROLEUM PTY.LTD.

by

GEOPHOTO RESOURCES CONSULTANTS
BRISBANE, QUEENSLAND, AUSTRALIA

JANUARY, 1971

CONTENTS

INTRODUCTION

The photogeological evaluation of the Burr Area was undertaken by Geophoto Resources Consultants for Australian Aquitaine Petroleum Pty. Ltd., late in 1970. The total area consists of 156 square miles and lies in the north part of the Flinders Ranges of South Australia.

Differential relief in the area is not great and rarely exceeds a thousand feet, however, comparatively recent erosion has resulted in locally intricate dissection. Travel in the area is afforded by a number of unimproved earth roads which are negotiable in dry weather and are accessable from Leigh Creek approximately 15 miles to the south-west. This small community is on a railway as well as a sealed all weather road and has a landing strip for light air-craft.

The initial photo evaluation was conducted by Mr. L. DiScala while the final edit was undertaken by the author. The purpose of the evaluation was to supply as much geologic information as was possible from the air photographs to assist in later mineral exploration.

PHOTOGRAPHY AND MAP COMPILATION

Photographs

Air photographs covering the project area were furnished by the client. The photos, on a 9 inch by 9 inch format, are at an approximate scale of 1:80,000. Eight photos, comprising parts of two east-west flights, give complete stereoscopic coverage of the area. The photography was originally flown for the Department of Lands of South Australia.

The quality of the photography is excellent with respect to clarity and sharpness of detail. The virtual lack of vegetation cover results in excellent rock exposures. The only criticism of the photography from the standpoint of photogeologic interpretation is the small scale which limits the amount of detail that can be mapped.

BASE MAP

The base map was laid out on a Transverse Mercator Projection at a scale of 1:50,000. Control for the base map was taken from the 1:250,000 Copley planimetric sheet and the 1:63,360 Serle geologic sheet. Planimetric detail on the two above sheets was derived by photogrametric methods and appears to be quite accurate. The major portion of the planimetric detail on the 1:50,000 base map was derived directly from the published maps and was augmented to a lesser degree by detail from the photographs.

Compilation

The air photographs were stereoscopically examined by a photogeologist and his interpretation was annotated directly to the photos.

The photos were then placed in a Map-O-Graph opaque projector which was adjusted to project at a scale of 1:50,000 the image of the photo onto a print of the base map. Common planimetric detail of the projected image and the base were superimposed and the geological detail was traced directly onto the base map to construct the preliminary geologic map. A careful edit of the preliminary map was then undertaken by the geologist.

When the corrections were completed on the preliminary map the result was then ink drafted on a scale stable film. After a final edit of the drafted map prints were made and one copy was colored with permanent water proof inks.

GEOLOGY

The Burr area lies in the northern end of the Flinders Ranges. These Ranges with a general north-south orientation merge to the south with the Mt. Lofty-Olary area. This area, commencing with Kangaroo Island, extends northward through the Mt. Lofty Ranges and veers eastward through the Olary region into the Broken Hill area of New South Wales. The Flinders Ranges together with the Mt. Lofty-Olary arc and the Peake and Denison Ranges in north-central South Australia roughly define the surface exposures of a late Proterozoic to early Cambrian series of sediments laid down in the Adelaide Geosyncline. Early Paleozoic diastrophism of possibly more than one phase resulted in uplift and folding of the Adelaide Geosyncline into a series of mountain ranges. Associated with the sediments is a Late

Proterozoic granite suite and Early Paleozoic acid intrusives which have been termed collectively the younger granitic suite.

Throughout the remainder of Paleozoic and Mesozoic time the area was subjected to leveling erosion, periodic renewal of tectonic movements and deposition of continental sediments. By Tertiary time, peneplanation of the area was complete. Late Tertiary to Quaternary uplift of the area and recent rapid erosion has resulted in the present physiographic expression of the mountain ranges.

Rock Units

In the project area the major portion of the rock units exposed fall in the Proterozic Adelaidian system. The only exception is a unit in the southern part of the area of probable late Cambrian age. In the following discussion, the lithologic descriptions of the units mapped as well as their nomenclature have been taken from available literature.

Callanna Beds (Pc)

These beds consist predominantly of alternating sandstones and siltstones with significant amounts of interbedded dolomites, cherts, limestones and carbonaceous shales. Volcanics occur in the basal portion of the beds. The thickness of the unit has been variously estimated as between 12,000 and 20,000 feet. The Callanna Beds have been placed in the Willouran Series which is the oldest time unit in the Adelaide System of the Upper Proterozoic Era.

In the project area the beds occur out of normal sequence in complex brecciated crush zones which are now considered to represent the surface expression of diapiric structures. On the photographs these zones in general are readily distinguishable. Observable bedding is extremely contorted and unconformable with surrounding units. The texture and grain of the zones on the photos is likewise distinctly different.

<u>Burra Group</u> (<u>P</u>b)

This group in normal sequence overlies the Callanna Beds. It comprises the Torrensian Series of the Adelaide System. The Burra Group is composed of thick basal sandstone deposited in a shallow water to deltaic environment with the upper portion consisting of alternating shales, sands and dolomites with local cherts. The group has been estimated at between 10,000 to 13,000ft in thickness.

On the photographs the group is a distinct unit. In general it is very well bedded and at the photographic scale appears thin bedded in contrast to the other mapped units. It generally exhibits a dark tone.

<u>Lower Tillite</u> (<u>P</u>ul)

This unit is the basal member of the Umberatana Group. The group comprises the Sturtian Series of the Adelaide System. The Umberatana Group overlies the Burra Group in an unconformable relationship.

The Lower Tillite consists of a basal unit of coarse boulder conglomerate. This is overlain by a succession of laminated siltstones, varved beds and alternating quartzites and tillites. The unit is believed to have been laid down in an inland sea or large lake. The glacial deposits accumulated over a large span of time and in places reached a total thickness of 15,000 feet.

On the photographs the unit varies considerably in thickness. It is usually well bedded and generally light to medium toned.

Tapley Hill Formation (Put)

The unit is the middle member of the Umberatana Group as mapped in the area. It is composed of a thick sequence of laminated slates with several horizons of massive interbedded dolomites. Two of these dolomite horizons have been mapped in the area. The Tapley Hill Formation exceeds 10,000 feet in thickness and represents an interglacial stage in the Umberatana Group.

On the photographs the formation is moderately well bedded and varies between light to medium toned. The dolomite horizons are well expressed units.

Upper Tillite (Puu)

This unit forms the upper member of the Umberatana Group. It consists primarily of a coarse boulder tillite and resembles the boulder tillites of the Lower Tillite. It rarely exceeds a thickness of more than a 1000 feet. It represents the recurrence of a glacial cycle in late Sturtian time.

On the photographs it forms a distinct mappable unit. Bedding is moderately well expressed and it is generally light toned.

Wilpena Group (Pw)

This group comprises the Marinoan Series which is the youngest series of the Adelaide System. It consists of primarily of red shales and siltstones with minor amounts of sandstones, limestones, dolomites and carbonaceous shale. The thickness of the group exceeds 10,000 feet.

On the photographs the unit is moderately well bedded to poorly bedded. It is generally dark toned and is expressed topographically by low rounded hills.

Pound Quartzite (Ꞓp)

The Pound Quartzite consists primarily of a massive feldspathic sandstone sequence with minor interbedded shaly layers. It exceeds 9,000 feet in thickness. It is generally thought to be Cambrian in age. However, it rests conformably on the underlying Wilpena Group and as yet no diagnostic fossils have been found in it. For these reasons it is possible that it belongs to the Adelaide System and is Upper Proterozoic in age.

On the photographs it is a moderately well bedded unit and is generally dark tone. It is topographically expressed as a series of high well-pronounced ridges.

Structure

The major structural elements in the project area are those which resulted from the early Paleozoic orogeny which folded and faulted the Upper Proterozoic and Lower Paleozoic sediments of Adelaidian Geosyncline. Later tectonic movement appears to have only reactivated the same structural elements along the same structural trends.

Orientation of folds in the area is somewhat at random but the predominant direction is east-west varying to north-west, south-east. In general the flexures are broad open structures and well expressed. Minor folds on the flanks of the large structures are fairly common. Dips in general are quite steep which is somewhat at varience to the openness of the folds.

Faulting in the area likewise displays a somewhat random nature.

However, a number are developed along the same trends as the folds with a pronounced additional orientation in a general north-east, south-west direction. The largest displacement appears to occur on several well developed strike faults. Several transcurrent faults have moderate displacement while the least displacement occurs on the number of short normal faults. A number of lineations have also been mapped in the project area and it is felt that many of these represent faults traces but their displacement is not apparent.

Of structural interest in the project area is the occurrence of several diapiric elements. These do not display typical domal structures. They likewise do not exhibit any preferred structural association. This would tend to indicate that diapiric development predates the main orongeny which deformed and uplifted the Adelaide Geosyncline.

CONCLUSIONS AND RECOMMENDATIONS

In the Flinders Ranges as well as within the actual project area a number of mineral occurrences have been noted. Some of these occurrences and prospects have been developed as economic mines but primarily on a small scale. The primary mineral occurrence is copper but uranium, gold, silver lead and zinc have also been found. Minor occurrences of barytes, magnesite, manganese and asbestos have also been noted. The metallic mineralization is thought to be associated with the emplacement of the younger granite suite.

The metallic mineral deposits do not appear to be confined to any specific stratigraphic horizon, however, in general they do appear more commonly in the tillitic beds of Umberatana Group and in the calcareous beds of the Burra Group and the Umberatana Group. In general the mineral deposits do not seem to indicate a specific structural control in their deposition.

In view of the general observations above it is difficult to present specific targets within the project area which warrant immediate investigation. Consequently the best recommendations that can be advanced are that more detailed surface mapping be undertaken in the calcareous zones and along the tillite contacts. It is also possible that local faulting exerts more control over mineralization than is apparant on the photogeologic map. If a stratigraphic or structural relationship can be established for the mineral occurrences then this can be used to guide later geochemical and geophysical prospecting.

Respectfully submitted,

GEOPHOTO RESOURCES CONSULTANTS

Robert Kopp
Senior Geologist

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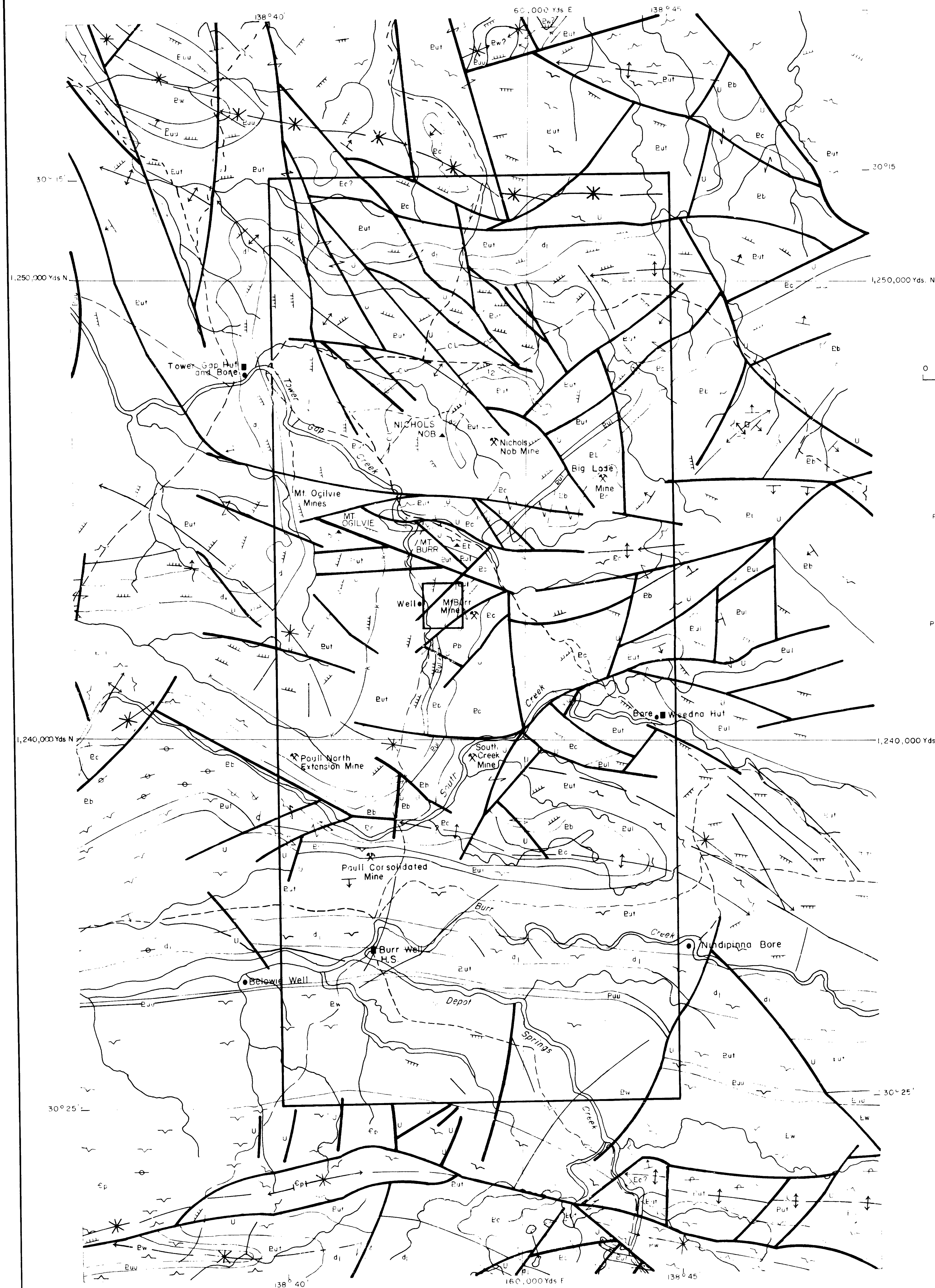
Journal of the Geological Society of Australia, 1966 Volume 13, Part 1.

Drg. No. 6340



GEOPHOTO

PHOTOGEOLOGIC INTERPRETATION MAP OF THE BURR AREA, NORTH FLINDERS RANGE SOUTH AUSTRALIA

PREPARED BY GEOPHOTO RESOURCES CONSULTANTS
BRISBANE

FOR

AUSTRALIAN AQUITAINE PETROLEUM PTY LTD.

Scale 1:50,000

0 ½ 1 2 3 4 5 Miles

0 0·5 1 2 3 4 5 Kilometers

TRANSVERSE MERCATOR PROJECTION

DECEMBER 1970

LEGEND

Palaeozoic – Cambrian		Єp	Pound quartzite	
Proterozoic – Adelaidian	Marinoan	Єw	Wilpena Group	
	Sturtian	Єuu	Upper Tillite	Umberatana Group
		d1 d2 Єut	Tapley Hill Formation with massive dolomite horizons	
		Єul	Lower Tillite	
	Torrensian	Єb	Burra Group	
	Willouran	Єc	Callanna Beds (exposed only as diapiric breccia)	

GEOLOGIC SYMBOLS

Dip group 1, less than 3°

Dip group 2, 3° to 10°

Dip group 3, 10° to 25°

Dip group 4, 25° to 45°

Dip group 5, 45° to nearly vertical

Bedding appears vertical on photographs

Overturned bedding

Dip and strike Amount of dip cannot be determined on photographs

U Fault, normal or reverse

Fault, position indefinite

Transcurrent fault

Distinctive lineation

CL Change in Lithology

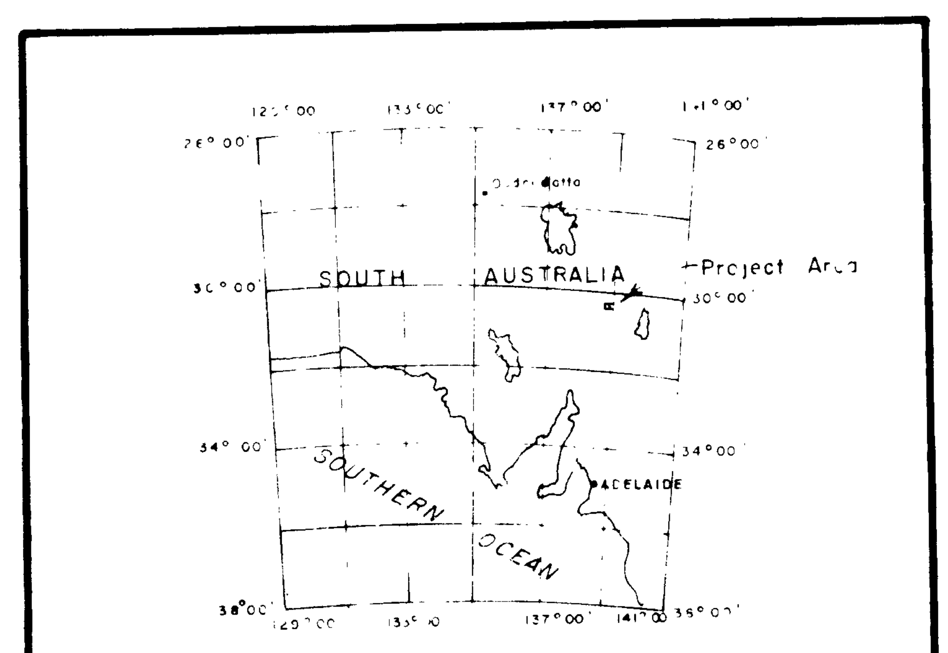
Anticline Arrow denotes plunge diamond denotes apex, dashed where indefinite, questioned where inferred

Syncline Arrow denotes plunge, ⊣⊢ denotes high point dashed where indefinite, questioned where inferred

Contact, dashed where indefinite.

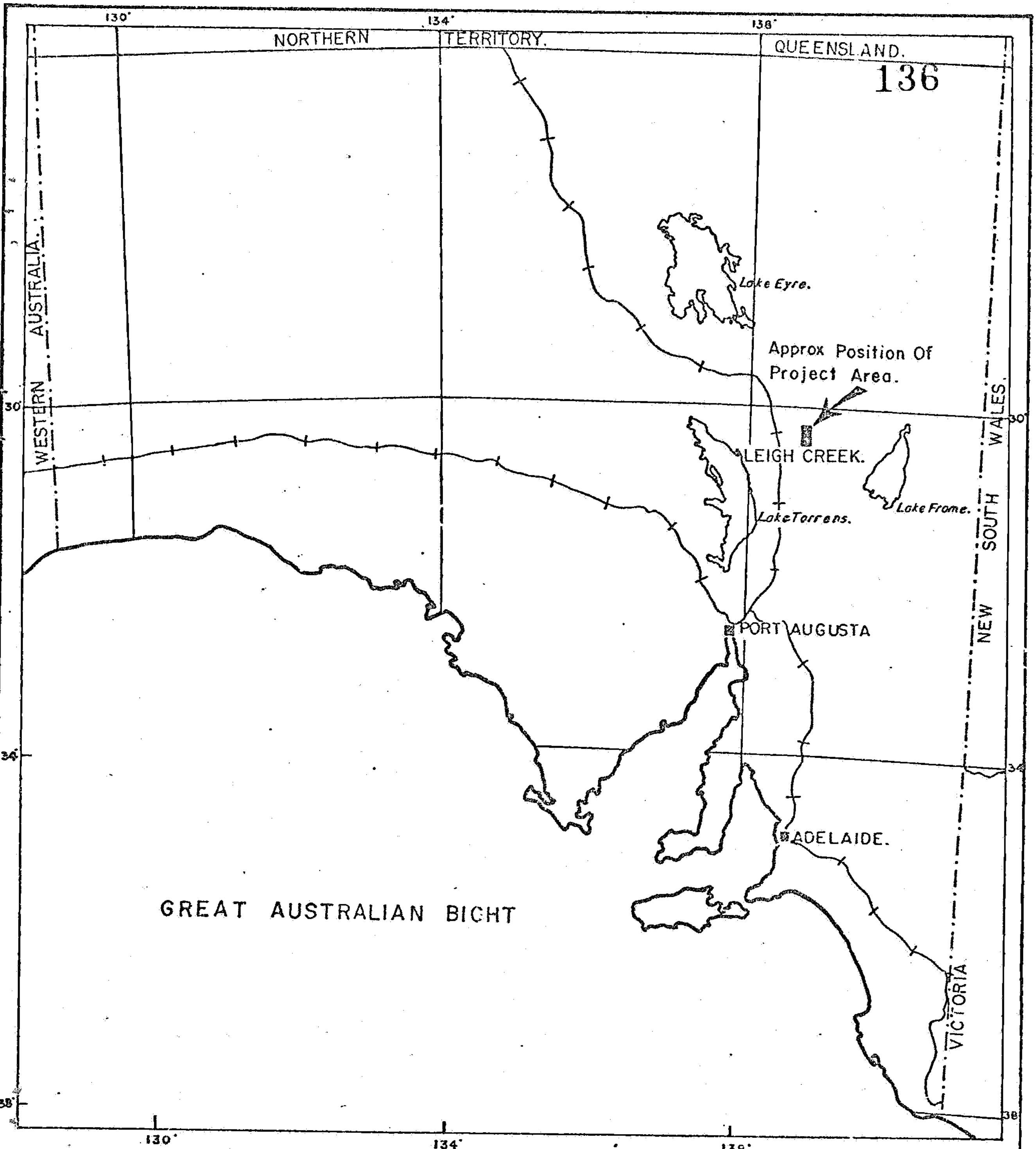
K Key Bed

Identifies isolated or faulted segment with labelled area



REGIONAL INDEX MAP

1509-1



AUSTRALIAN AQUITAINE PTY LTD.

BURR AREA NORTH FLINDERS RANGE.

SOUTH AUSTRALIA

REGIONAL LOCATION MAP.

SCALE. 1" = 120 MILES.

6679

ANNEX. I

AUSTRALIAN AQUITAINE PETROLEUM PTY LTD.

SML 481
SOUTH AUSTRALIA

DRILLING CAMPAIGN 1971 AND DISTRIBUTION OF COPPER VALUES GREATER THAN 200ppm. WITH APPROX. RELATION TO THE GEOLOGY

SCALE

HORIZONTAL 1" = 800'

VERTICAL 1cm = 1,000 p p m. Cu

Profile P.1 — 1cm. = 1,000 ppm — 1" = 800'

VERTICAL PROJECTION OF DRILL HOLES MTB 1–6

Cu VALUES – SURFACE

Cu VALUES – SUB SURFACE

CONTACT AREA

DIP ROCK

Basemap after Sth Australia Dept of Mines Drg No 69 968.

Compiled by S. OGNAR

Date: MAR. 1971

LEGEND

TINDELPINA SHALE MEMBER: Black fissile pyritic shale with basal buff - brown dolomite.

YUDNAMUTANA SUB-GROUP: Pebbly siltstones, arkoses and gritty quartzites. Lenticular conglomerates. Basal conglomerate and quartzite.

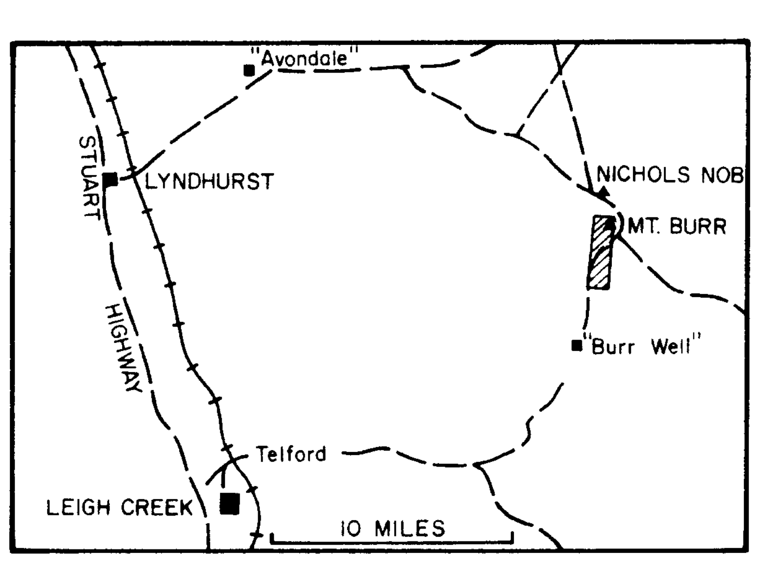
SKILLOGALEE DOLOMITE: Massive grey and brown dolomitic marbles, dolomites and dolomitic siltstones. Micaceous sandstones, grey pitted siltstones and black shales.

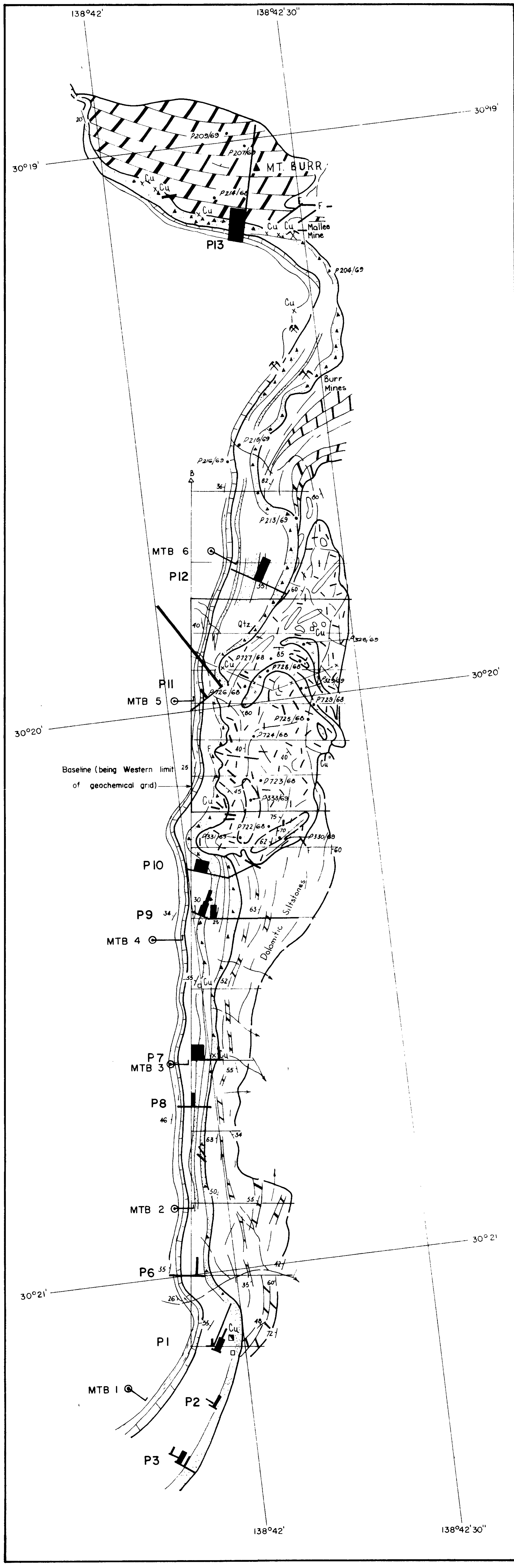
Zone of contact metamorphism: Biotite quartz hornfels and schists, quartz amphibole hornfels and calc. silicate rocks.

Microdiorites and microdolerites. Altered to plagioclase, epidote, biotite, chlorite amphibole rocks.

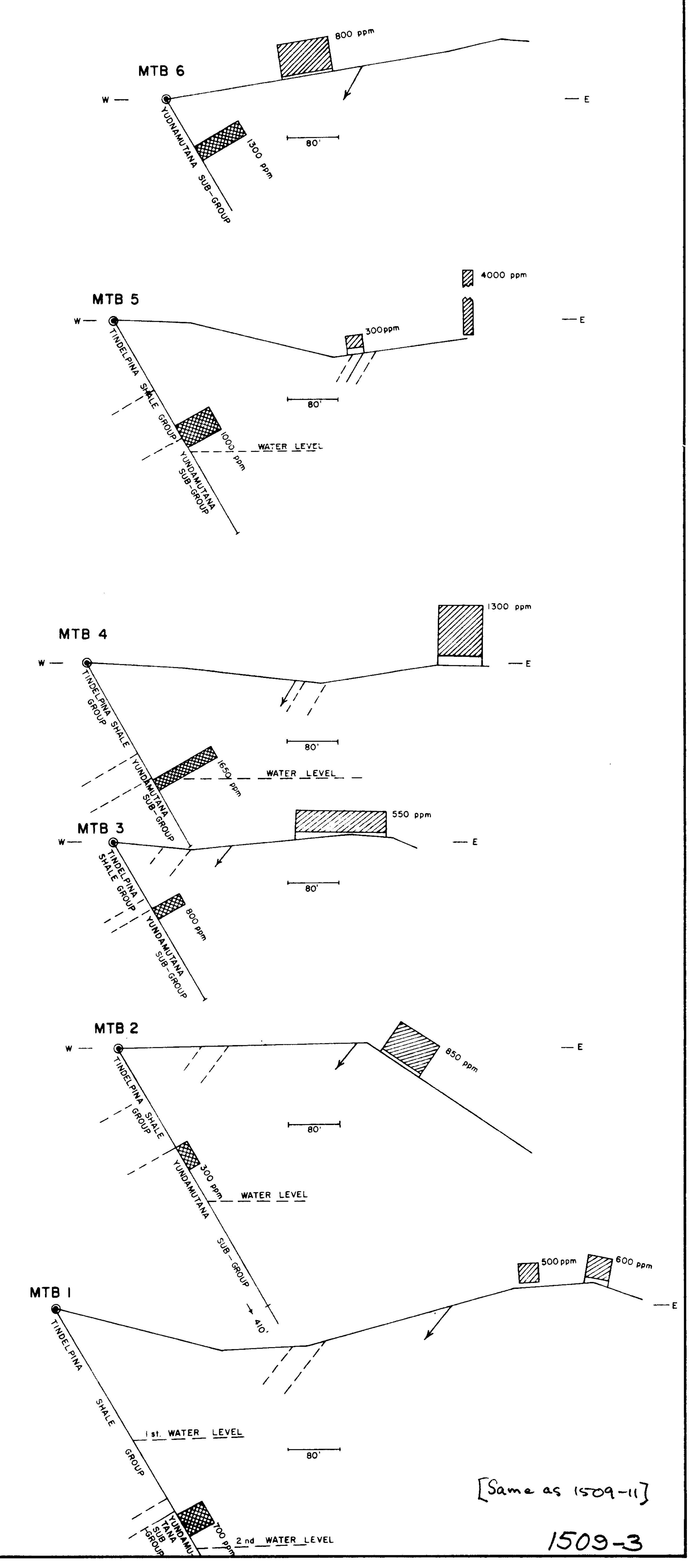
LATITUDES AND LONGITUDES ONLY APPROX.

LOCALITY PLAN





RESULTS OF COMPARISON BETWEEN SURFACE AND SUB-SURFACE



[Same as 1509-11]

1509-3

6652

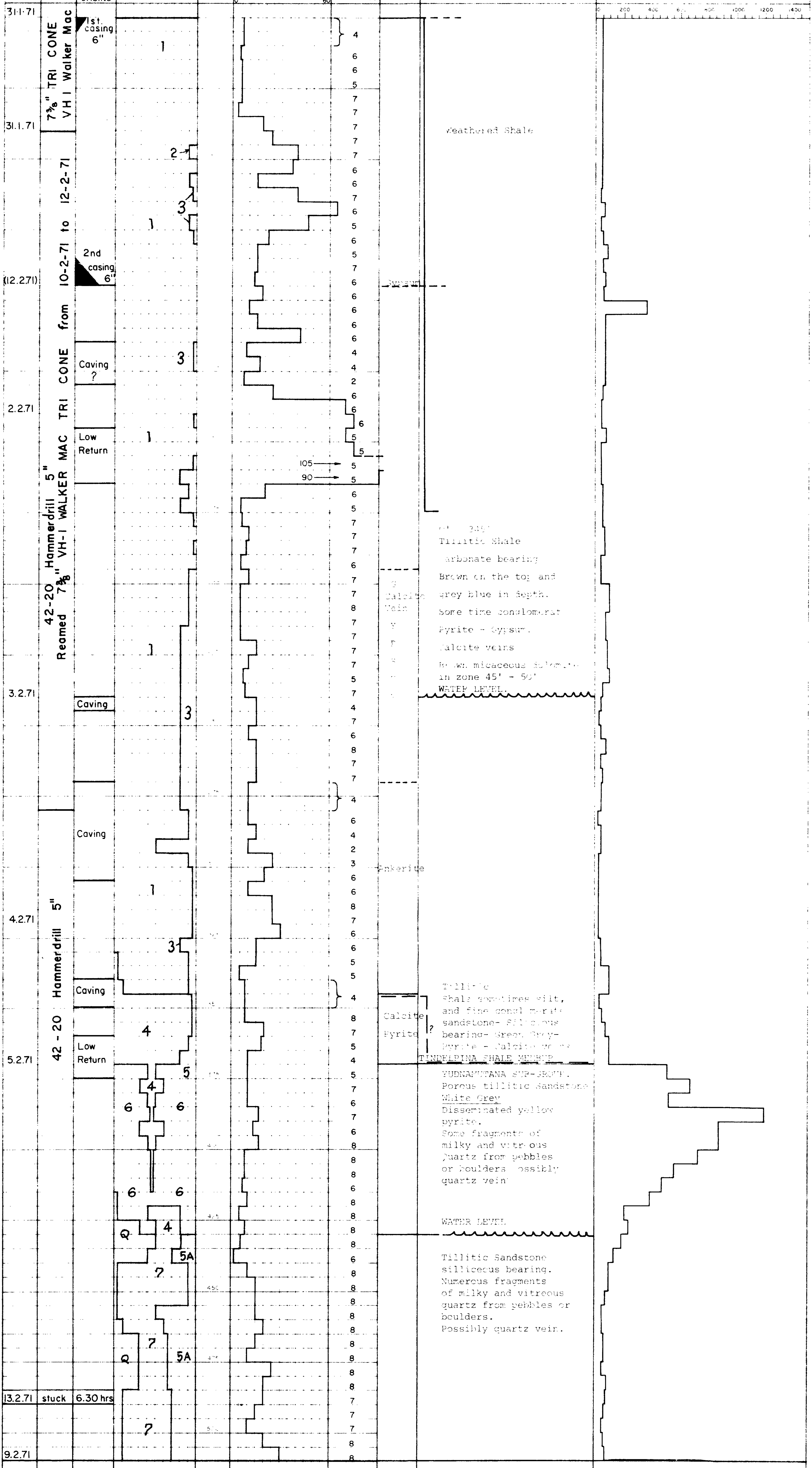
AUSTRALIAN AQUITAINE PETROLEUM PTY LTD

MASTER LOG

MINERAL GEOLOGY

WELL		LITHOLOGY	Hole Parameters
Rotary Hole **MTB No. 1**	Location X - Not fixed Y - Not fixed Refer to drilling report. Ground elevation: Unknown Origin of depths: Ground Level Date spudded 31-1-71 Date completed: 13-2-71	1 Shale 2 Dolomite 3 Pyritic and tillitic shale 4 Shale or siltst. in part conglomeratic 5 1 & 3 5A 3 & 4 6 Porous tillitic sandstone Q Milky and vitreous quartz 7 Tillitic sandstone (1) 4 = 1/16 8 = 1/256 of sample returned.	Azimuth N 130°E Depression 60° Diameter 7⅜" : 0'- 90'; 5" : 90'- 510' Outcrop Strike N 40° E Outcrop Dip 40° W Water Level 1 st. 240'; 2nd. 430'
PERMIT SML 481	STATE SOUTH AUSTRALIA		
SCALE 1 in. = 25 ft.	LOG COMPILED BY Name: S. OGNAR Date: MARCH, 1971		
AAP REPRESENTATIVE S. OGNAR	DRILLING CONTRACTOR INTAIRDRIL		

DATE	DRILLING BIT	DRILLING PARAMETERS CASING	CUTTINGS LOG	DEPTHS	DRILLING RATE (0–60)	SAMPLE SPLITTING FACTOR (1)	INTERPRET. LOG	DESCRIPTION	LABORATORY ASSAYS



After reaming and second casing = casing = stuck at 490' - Hole abandoned at 515' - Drill string sticking.

1509-5
~~1509~~

6653

MASTER LOG

1509

MTB No. 2

Rotary Hole

Not fixed — Not fixed
Refer to drilling report

18-2-71

21-2-71

SML 481

SOUTH AUSTRALIA

1 in = 25 ft

MARCH 97

1 Tillitic Shale
3 Pyritic and tillitic shale
4 Shale or siltst. in part conglomeratic
5 1 & 3 [5A] 3 & 4
6 Porous tillitic sandstone
8 Quartzitic siltst. [9] 6 & 8
Q Milky and vitreous quartz
10 Argillaceous sandstone

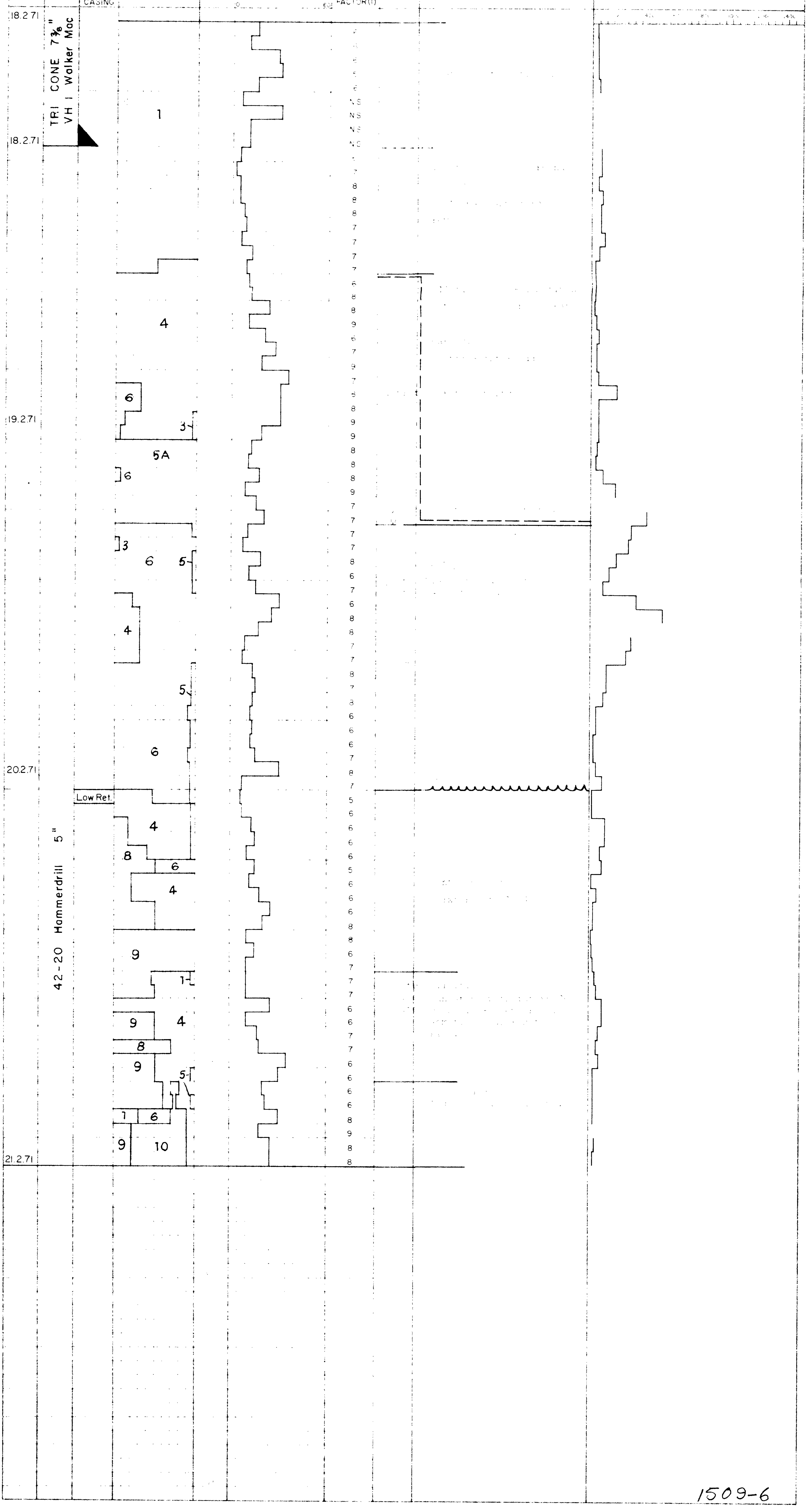
4 = 1/16 8 = 1/256 of sample returned.

Hole Parameters	
Azimuth	N 100° E
Depression	60°
Diameter	7⅞" : 0'-45' 5" : 45'-410'
Outcrop Strike	N 10° E
Dip	40° W
Water Level	275'

DRILLING PARAMETERS CASING

SAMPLE SPLITTING FACTOR (1)

LABORATORY ASSAYS



1509-6

6654

AUSTRALIAN AQUITAINE PETROLEUM PTY LTD

MASTER LOG

1509

WELL Rotary hole **MTB No. 3**	Location: Not fixed. Not fixed. Refer to drilling report. Ground elevation: Unknown. Depth from: Ground Level. Date spudded: 14-2-71. Date completed: 16-2-71	LITHOLOGY: 1 Shale; 3 Pyritic and tillitic shale; 4 Shale or siltst. in part conglomeratic; 5 1&3; 5A 3&4; 6 Porous tillitic sandstone; 8 Quartzitic siltst.; 9 6&8; 10 Argillaceous sandstone; Q Milky and vitreous quartz; 11 Grey dolomite	Hole Parameters: Azimuth N 90°E; Depression 60°; Diameter 7⅞" : 0'-40', 5" : 40'-330'; Outcrop Strike N. 0°; Outcrop Dip 40° W; Water Level Nil
PERMIT SML 481	STATE SOUTH AUSTRALIA		
SCALE 1 in = 25 ft	S. OGNAR MARCH, 1971		
S. OGNAR	INTAIRDRIL	(1) 4 = 1/16 8 = 1/256 of sample returned.	LABORATORY ASSAYS

DATE | DRILLING | DRILLING PARAMETERS CASING | SAMPLE SPLITTING FACTOR (1)

14.2.71 TRI CONE 7⅞" VH1 Walker Mac

14.2.71 42-20 Hammerdrill 5"

Lithology: 1; 4; 3; 5; Q; 6; 8; 10; 11; 10; 4; 5 5A 9; 4 10; 6

Sample splitting factor: 7, 7, 7, 7, 7, 7, 7, 7, 8, 8, 7, 7, 7, 10, 9, 8, 8, 7, 7, 7, 6, 7, 10, 9, 8, 7, 7, 6, 7, 10, 9, 8, 7, 7, 8, 7, 6, 8, 6, 7, 7, 7, 7, 7, 8, 7, 8, 7, 7, 8, 8, 8, 8, 8, 8, 8, 7, 8, 6

1655

16.2.71

1509-7

6730

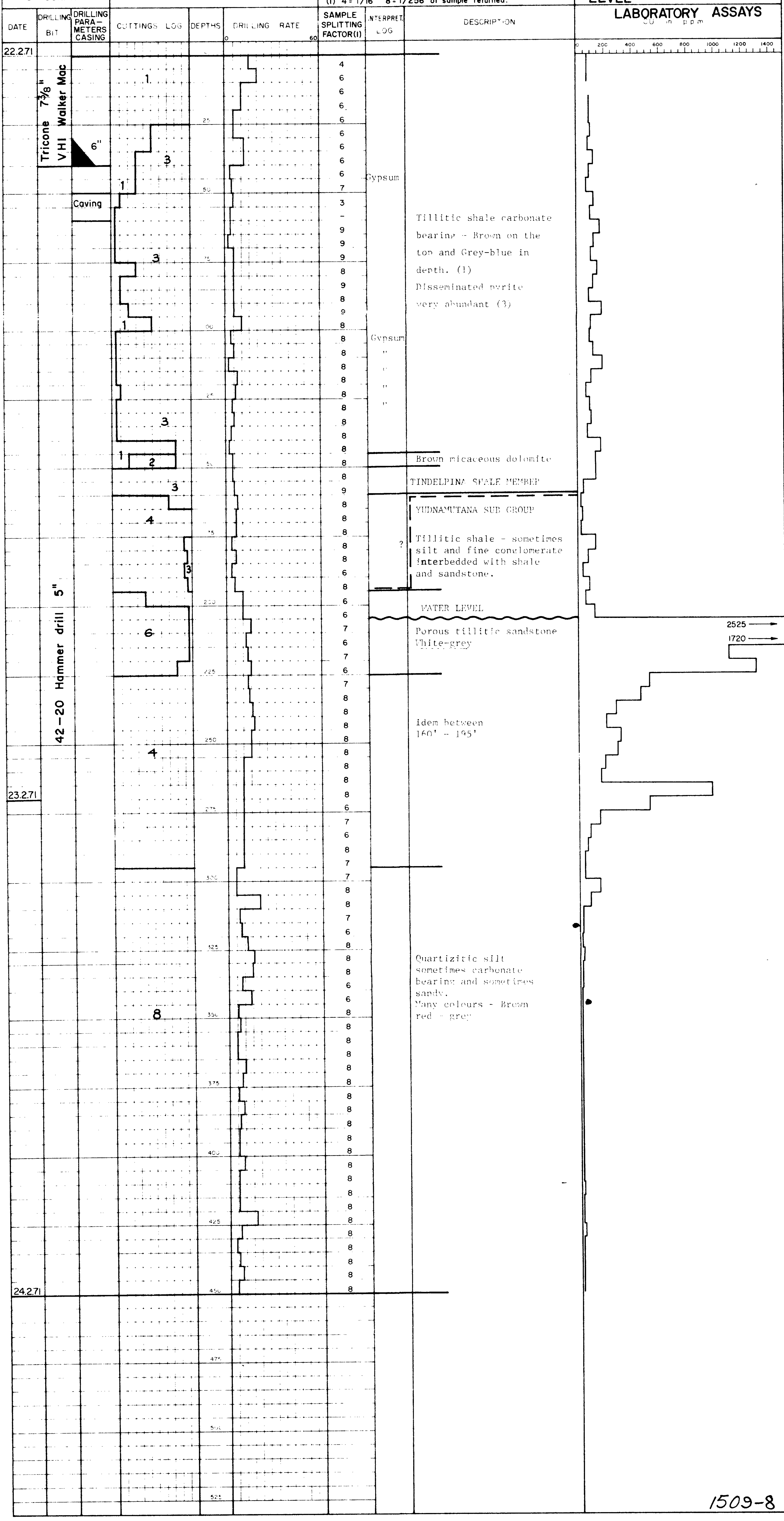
RECEIVED 15 APR 1971 DEPT. OF MINES SECURITY 1509

AUSTRALIAN AQUITAINE PETROLEUM PTY. LTD.

MASTER LOG

MINERAL GEOLOGY

WELL Rotary Hole **MTB No. 4**	Location X= Not fixed Y= Not fixed Refer to drilling report. Ground elevation: Unknown Origin of depths: Ground Level Date spudded: 22-2-'71. Date completed: 24-2-'71.	LITHOLOGY 1 Tillitic shale. 2 Brown - Dolomite 3 Pyritic and tillitic shale 4 Shale or silt sometimes conglomeratic 6 Porous, tillitic sandstone 8 Quartzitic silt, sometimes conglomeratic. (1) 4 = 1/16 8 = 1/256 of sample returned.	HOLE PARAMETERS Azimuth N.110°E. Depression 60° Diameter 7 3/8" : 0'-40'; 5" : 40'-450' Outcrop Strike N. 20°E. Outcrop Dip 30° W. WATER LEVEL 205'
PERMIT SML 481	STATE SOUTH AUSTRALIA		
SCALE 1 in. = 25 ft	LOG COMPILED BY Name: S. OGNAR Date: MARCH, 1971		
AAP REPRESENTATIVE S. OGNAR	DRILLING CONTRACTOR INTAIRDRIL		



1509-8

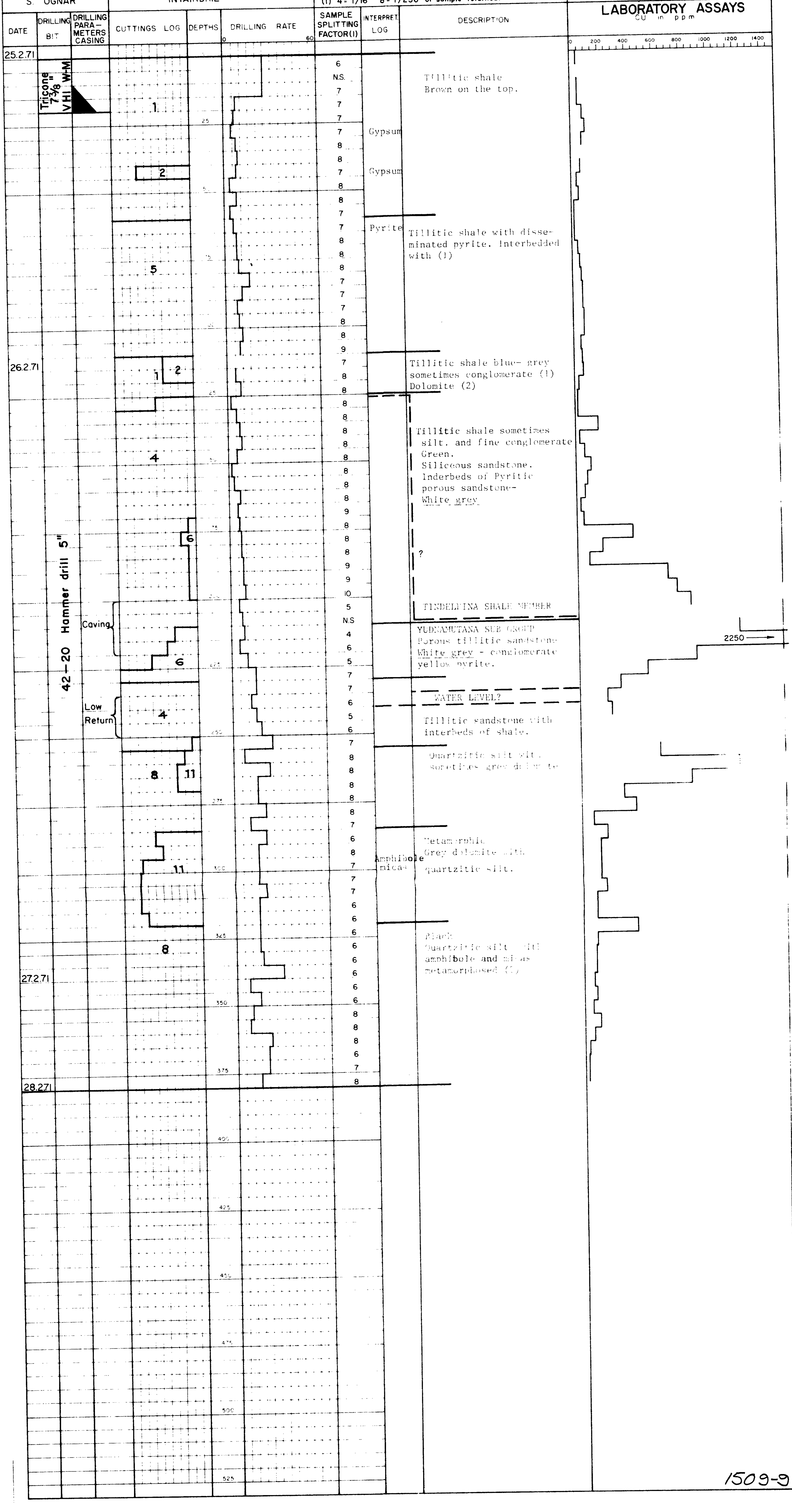
6731

AUSTRALIAN AQUITAINE PETROLEUM PTY. LTD.

MASTER LOG

MINERAL GEOLOGY

WELL		LITHOLOGY	HOLE PARAMETERS
Rotary Hole	Location X= Not fixed Y= Not fixed Refer to drilling report.	1 Tillitic shale.	Azimuth N. 100° E.
MTB No. 5	Ground elevation: Unknown	2 Brown micaceous dolomite.	Depression 60°
	Origin of depths: Ground Level	3 Pyritic and tillitic shale.	Diameter 7 3/8": 0'-20'
	Date spudded: 25-2-'71.	4 Shale or silt sometimes conglomerate.	Outcrop Strike N. 10° E.
	Date completed: 28-2-'71.	5 3 plus 1.	Outcrop Dip 30° W.
PERMIT SML 481	STATE SOUTH AUSTRALIA	6 Porous tillitic sandstone.	Water Level. Heavy with moisture below 240'.
SCALE 1 in. = 25 ft.	LOG COMPILED BY Name: S. OGNAR Date: MARCH, 1971	11 Grey dolomite.	
AAP REPRESENTATIVE S. OGNAR	DRILLING CONTRACTOR INTAIRDRIL	(1) 4 = 1/16 8 = 1/256 of sample returned.	



1509-9

6732

MINERAL GEOLOGY

AUSTRALIAN AQUITAINE PETROLEUM PTY. LTD.

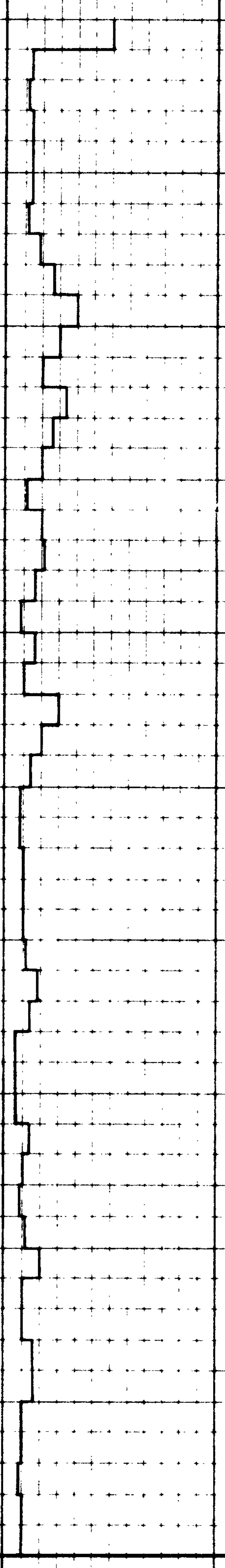
MASTER LOG

WELL	Location	LITHOLOGY	HOLE PARAMETERS
Rotary Hole **MTB No. 6**	Location X = Not fixed Y = Not fixed Refer to drilling report. Ground elevation: Unknown Origin of depths: Ground Level Date spudded: 28-2-'71. Date completed: 1-3-'71.	4 Tillitic sandstone. 8 Quartzitic silt. 10 Argillaceous sandstones.	Azimuth N. 100° E. Depression. 60° Diameter 7 3/8": 0'-5'; 5": 5'-250' Outcrop Strike N. 10° E. Outcrop Dip. 30° W. Water Level Nil.
PERMIT: SML 481	STATE: SOUTH AUSTRALIA		
SCALE: 1 in. = 25 ft.	LOG COMPILED BY: Name: S. OGNAR Date: MARCH, 1971		
AAP REPRESENTATIVE: S. OGNAR	DRILLING CONTRACTOR: INTAIRDRIL	(1) 4 = 1/16 8 = 1/256 of sample returned.	

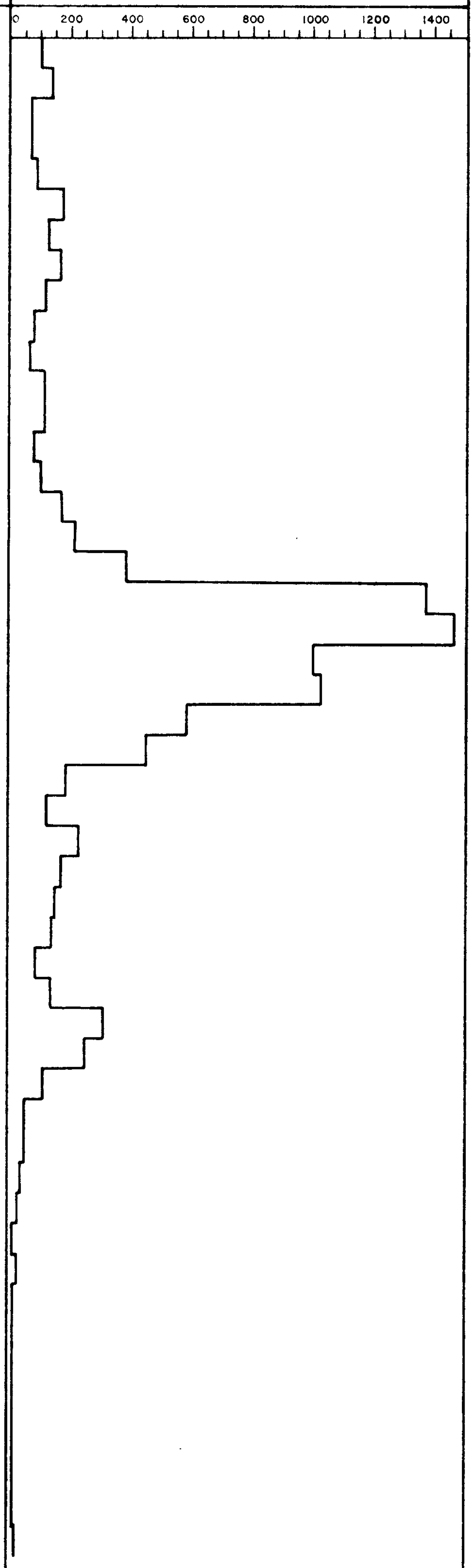
DATE	DRILLING BIT	DRILLING PARAMETERS CASING	CUTTINGS LOG	DEPTHS	SAMPLE SPLITTING FACTOR (1)	INTERPRET. LOG	DESCRIPTION
28.2.71	Tricone	7 3/8"	4	0–100	7, 8, 8, 7, 8, 8, 8, 8, 7, 7, 8, 8, 8, 8, 8, 9, 8, 8, 7, 8	Malachite	Tillitic green sandstone sometimes dolomitic and sometimes calcitic quartz veins. Malachite in joints. Sandy on the bottom.
28.2.71	42–20 Hammer drill 5"	Low Ret.	4	100–130	8, 6, 8, 7, 7	Quartz Calcite	
		Low Ret.	8 (4)	130–175	8, 6, 7, 8, 8, 10, 8, 8, 5		Quartzitic siltstone sometimes carbonate bearing.
		Caving	10	175–250	9, 9, 9, 10, 8, 8, 8, 8, 8, 9, 8, 10, 8, 9, 10, 10		Argillaceous sandstone of many colours. Sometimes sandy
1.3.71				250			

DEPTHS: 25, 50, 75, 100, 125, 150, 175, 200, 225, 250, 275, 300, 325, 350, 375, 400, 425, 450, 475, 500, 525

DRILLING RATE 0 60



LABORATORY ASSAYS Cu in p.p.m.



1509-10

A/DI/71/526
BB/dc

AUSTRALIAN AQUITAINE PETROLEUM PTY.LTD.

137

FINAL REPORT.

SML 481, MT.BURR AREA,

PERIOD APRIL 1971 to JULY, 1971.

B. BLANGY.

SEPTEMBER, 1971.

Distribution:

Department de Mines.	...	1
S.N.P.A.	...	1
A.A.P.	...	1
S.Ognar.	...	1

Final Report.

SML 481, MT.BURR AREA, PERIOD APRIL 1971 to JULY 1971.

This report is not related to a new exploration made in 1971 on SML 481. It is only a critical revision of results obtained in Mt.Burr area.

1. BASE METALS IN STURTIAN GLACIAL SEDIMENTS.

The area studied with some detail is limited to a North South portion of ground between Mt.Burr and Paull Consolidated Mine. The glacial nature of UMBERATANA sediments was already described. Nevertheless a new sampling was made (see location maps) and the samples were carefully studied in thin sections. The results are given in Annex

In conclusion we consider the UMBERATANA sediments of Mt.BURR area as fluvio-glacial facies deposited at a short distance (of 10 to 20 miles) from the main true glacial tillites widely outcropping to the East.

The chip sampling made by AAP during November 1970 proved that copper mineralisation was strictly limited to the upper sandstones of UMBERATANA Outcropping below the TINDELPINA SHALES. This mineralisation, after the chip sampling and the percussion drill holes (FEB.1971) is not economic. The paleoclimatic environment of Umberatana Sediments is not favorable to any kind of stratiform deposits. We come to the conclusion that Copper contained in these sandstones is partly detritic, coming from older rocks, or contained in thin Quartz veinlets. We think the only possible

.../...

case of dissemination exists with a drastic change of climatic conditions. It looks for example that in Paull Consolidated Mine, copper mineralisation is correlated with a "red beds" horizon.

If these hypotheses are valid, Umberatana beds have no chance to contain economic mineralisation.

2. BASE METALS IN TINDELPINA SHALE MEMBER.

We had some reasons to expect good results in Tindelpina shale exploration:

- the nature of the sediments, (possibly black shales)
- the result of B.M.R. geochemical sampling.
- existence of mineralisation in Tindelpina outside the SML 481 (example Southern Cross).

We consider now that these 3 arguments do not exist anymore.

After the observations made in the field and some thin sections studies, Tindelpina shale member is now considered as a varve post - glacial sedimentation and does not match with the definition of a true BLACK SHALE. In fact we understood rapidly in December 1970 that the mineralisation giving all B.M.R. geochemical answers was contained inside the Umberatana and not in Tindelpina shale (with very few exceptions). This observation was confirmed by A.A.P. percussion drilling. Tindelpina has, nevertheless, a high CLARKE in Cu and other metals.

During a visit to their prospect, kindly granted by Southern Cross, we understood that copper mineralisation was contained inside small quartz filling with hydrothermal paragnesis.

.../...

For these reasons we consider we should give up exploration of TINDELPINA shale member in Mt. Burr area.

3. BASE METALS IN WILLOURAN.

The presence of older formations in Mt.BURR anticlines is known but very poorly defined. The photogeological study made by GEOPHOTO shows CALLANNA beds widely distributed on western and northern flanks of Mt.BURR anticline. We had to visit the Willouran formations where they outcrop; in the Mt.PAINTER area. These visits were extremely usefull and allowed our geologist to recognise the same formations in the Mt.BURR area, mainly in two locations, BIG LODE and South Creek.

- The BIG LODE is now considered as being located in the UPPER CALLANNA beds.

- in South Creek area, we were lucky enough to recognise the CALLANNA and find a new extensive copper showing, South of Paull North Extension Mine.

CONCLUSIONS.

- We consider after a geological evaluation of all results obtained by B.M.R. and A.A.P. that Umberatana and Tindelpina, both of glacial origin are not a suitable target for copper exploration.
- Copper may eventually be present in these formations, but either in local red beds or in veins and fractures, of possibly in tillitic pebbles or diapiric floating blocks coming from lower units.

- A possible source to these mineralisations could be the WILLOURAN formations, not fully mapped, sometimes hidden by younger creeks, but sometimes outcropping.

.../...

- for these reasons we relinquish SML 481. On the claims pegged in the meantime we intend to explore the Willoura possibilities.

ANNEXES : Sample location map scale 1/50,000.

Sample location map scale 1" - 800'

SML 481

PETROGRAPHIC DESCRIPTIONS

SO 673 - silt. rare feldspar; some carbonates.

SO 674 - silt.

SO 675 - argillaceous sandstone, conglomeratic, coarse, in an argile/carbonate matrix.

SO 676 - silt.

SO 677 - argillaceous sandstone.

SO 678 - coarse, polymodel argillaceous sandstone. MICA. PYRITE. CHLORITE.

SO 679 - silt, varve.

SO 680 - shale. PYRITE.

SO 681 - silt.

SO 682 - feldspathic sandstone. conglomeratic. Quartz feldspar. Matrix of silt + silica + carbonates.

SO 684 - sandstone. fluvioglacial.

SO 685 - conglomeratic sandstone. Numerous pebbles of metamorphic and eruptive rocks. Numerous micas in the cement.

SO 686 - black varve. Pyrite. Chlorite.

SO 687 - black varve.

SO 688 - black shale with pebbles of sedimentary and metamorphic rocks.

SO 689 - argillaceous sandstone with pebbles.

SO 690 - silt close to a true varve.

SO 691 - quartzitic sandstone.

SO 692 - sandstone with numerous pebbles.

SO 693 - sandstone.

SO 694 - silt.

SO 695 - silt with pebbles (angulous). Chlorobiotites.

SO 696 - silt.

SO 697 - microbreccia. Chlorite. Illite. Muscivite.

SO 698 - feldspathic sandstone with carbonate cement. Pyrite quartz concrete by carbonates.

SO 699 - silt with dolomitic cement.

SO 828 - feldspathic sandstone. Cement of silt and carbonates.

SO 829 - argillaceous sandstone.

SO 830 - dolomitic silt.

SO 831 - conglomeratic sandstone. Cement of silt and carbonates. Molodite. Sulphides.

SO 683 - dolomicrite. silicified possible phlogopite.

ANNEX 2

QUANTOMETER RESULTS SML 481

N° TERRAIN	B	V	Mo	Pb	Zn	Cu	Cr	Ni	Co	Sr	Ba	Ga	Mn	Ag
SO 673	55	150	≤ 5	≤ 5	8	30	75	10	10	35	400	8	200	≤ 5
SO 675	30	110	≤ 5	≤ 5	7	290	40	15	9	15	340	7	120	≤ 5
SO 676	45	120	≤ 5	≤ 5	8	230	60	20	15	50	450	10	60	≤ 5
SO 680	45	180	11	8	50	≥ 1800	80	45	30	85	490	15	120	≤ 5
SO 682	20	65	≤ 5	≤ 5	≤ 5	75	30	≤ 5	15	60	50	≤ 5	830	≤ 5
SO 684	35	130	≤ 5	13	30	300	40	15	20	≤ 5	175	≤ 5	90	≤ 5
SO 687	75	220	≤ 5	≤ 5	8	40	100	30	12	25	330	11	130	≤ 5
SO 688	30	90	≤ 5	≤ 5	8	200	50	20	6	25	670	≤ 5	40	≤ 5
SO 690	35	150	≤ 5	≤ 5	6	40	80	≤ 5	15	40	270	12	210	≤ 5
SO 694	30	120	≤ 5	≤ 5	≤ 5	960	60	12	12	35	250	9	340	≤ 5
SO 697	160	170	≤ 5	9	≤ 5	170	80	20	20	8	290	7	20	≤ 5
SS 828	80	120	25	≤ 5	≤ 5	90	80	9	30	320	8000	9	4500	≤ 5
SS 829	85	130	≤ 5	≤ 5	≤ 5	140	80	30	30	20	1450	8	450	≤ 5
SS 830	50	90	7	≤ 5	6	40	70	15	40	140	300	8	2500	≤ 5
SS 831	420	130	15	8	20	≥ 1800	80	30	30	120	55	12	480	≤ 5

Drg. No. 7316

PHOTOGEOLOGIC INTERPRETATION MAP OF THE BURR AREA, NORTH FLINDERS RANGE SOUTH AUSTRALIA

PREPARED BY GEOPHOTO RESOURCES CONSULTANTS
BRISBANE

FOR

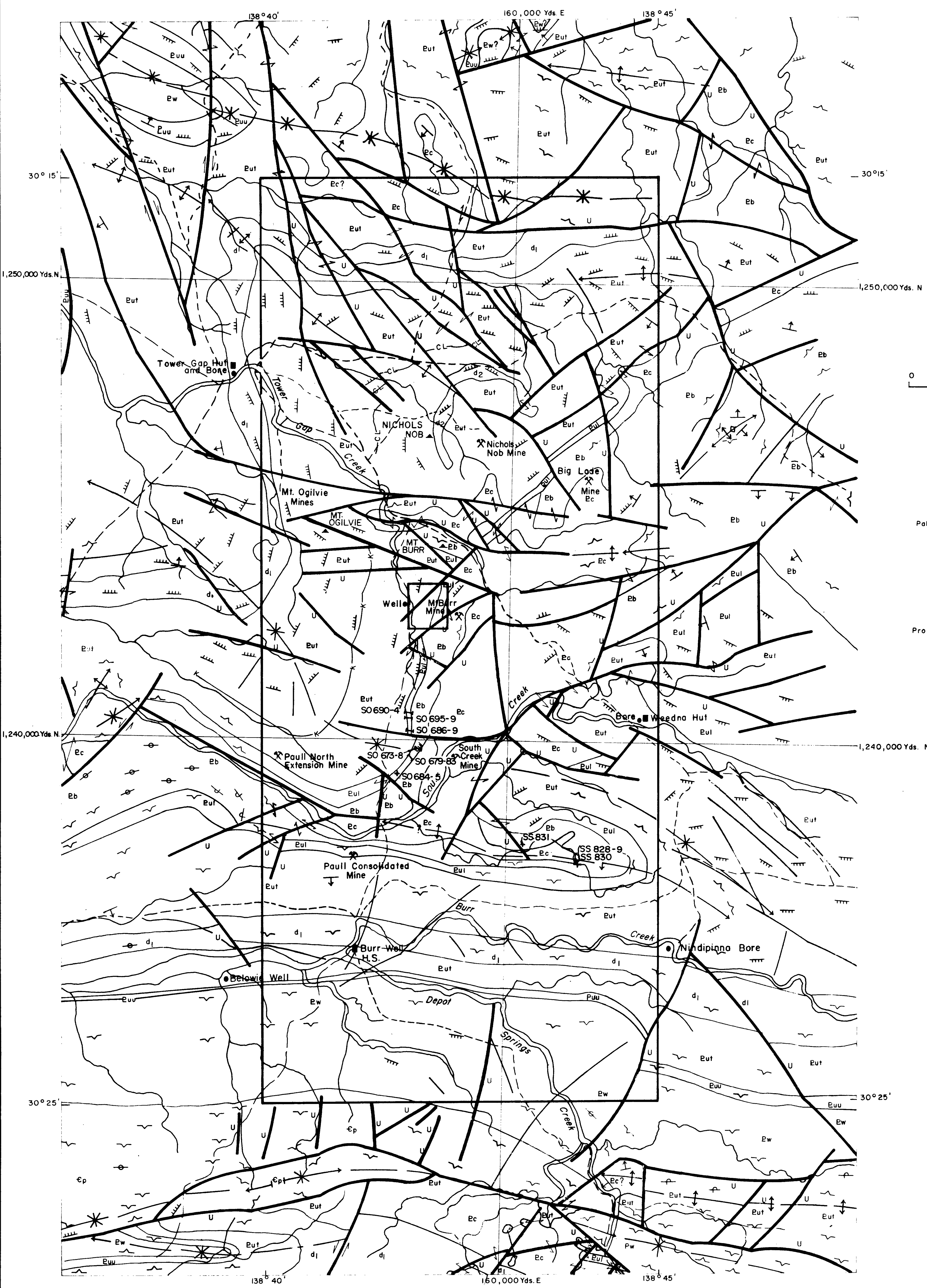
AUSTRALIAN AQUITAINE PETROLEUM PTY. LTD.

Scale: 1:50,000

0 ½ 1 2 3 4 5 Miles

0 0·5 1 2 3 4 5 Kilometers

TRANSVERSE MERCATOR PROJECTION
DECEMBER 1970

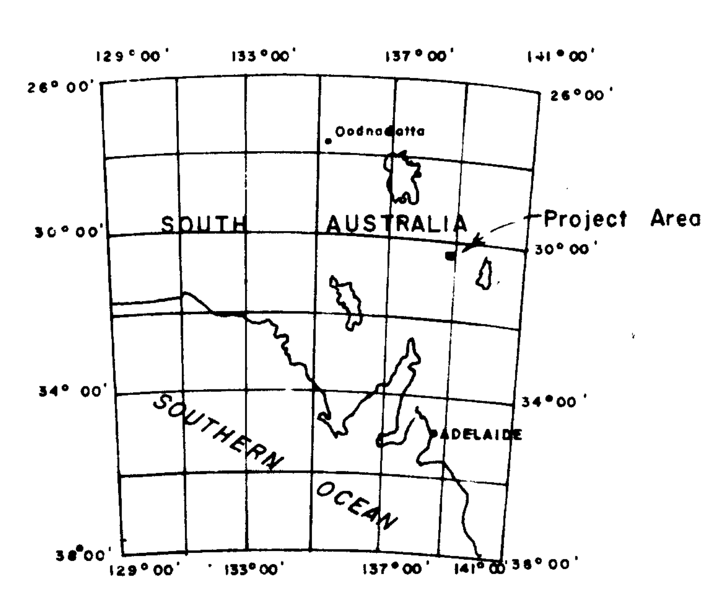


LEGEND

Palaeozoic	Cambrian		€p	Pound quartzite	
Proterozoic	Adeloidian	Marinoan	Ꝑw	Wilpena Group	
		Sturtian	Ꝑuu	Upper Tillite	Umberatana Group
			d1, d2 Ꝑut	Tapley Hill Formation with massive dolomite horizons	
			Ꝑul	Lower Tillite	
		Torrensian	Ꝑb	Burra Group	
		Willouran	Ꝑc	Callanna Beds (exposed only as diapiric breccia)	

GEOLOGIC SYMBOLS

Dip group 1, less than 3°
Dip group 2, 3° to 10°
Dip group 3, 10° to 25°
Dip group 4, 25° to 45°
Dip group 5, 45° to nearly vertical
Bedding appears vertical on photographs
Overturned bedding
Dip and strike. Amount of dip cannot be determined on photographs.
Fault, normal or reverse
Fault, position indefinite
Transcurrent fault
Distinctive lineation
Change in Lithology
Anticline. Arrow denotes plunge, diamond denotes apex; dashed where indefinite, questioned where inferred.
Syncline. Arrow denotes plunge, ⊣⊢ denotes high point; dashed where indefinite, questioned where inferred.
Contact, dashed where indefinite.
Key Bed
Identifies isolated or faulted segment with labelled area



REGIONAL INDEX MAP

1509-12

6679

ANNEX. I

AUSTRALIAN AQUITAINE PETROLEUM PTY. LTD.

SML 481
SOUTH AUSTRALIA

DRILLING CAMPAIGN 1971 AND DISTRIBUTION OF COPPER VALUES GREATER THAN 200ppm. WITH APPROX. RELATION TO THE GEOLOGY

SCALE

HORIZONTAL 1" = 800'

VERTICAL 1cm = 1,000 p p m. Cu

Profile. P.I. 1cm. = 1,000 p pm 1" = 800'

VERTICAL PROJECTION OF DRILL HOLES MTB 1–6

Cu VALUES – SURFACE

Cu VALUES – SUB SURFACE

CONTACT AREA

DIP ROCK

Basemap after Sth Australia Dept of Mines Drg. No 69·968.

Compiled by. S. OGNAR

Date: MAR. 1971

LEGEND

TINDELPINA SHALE MEMBER: Black fissile pyritic shale with basal buff - brown dolomite.

YUDNAMUTANA SUB-GROUP: Pebbly siltstones, arkoses and gritty quartzites. Lenticular conglomerates. Basal conglomerate and quartzite.

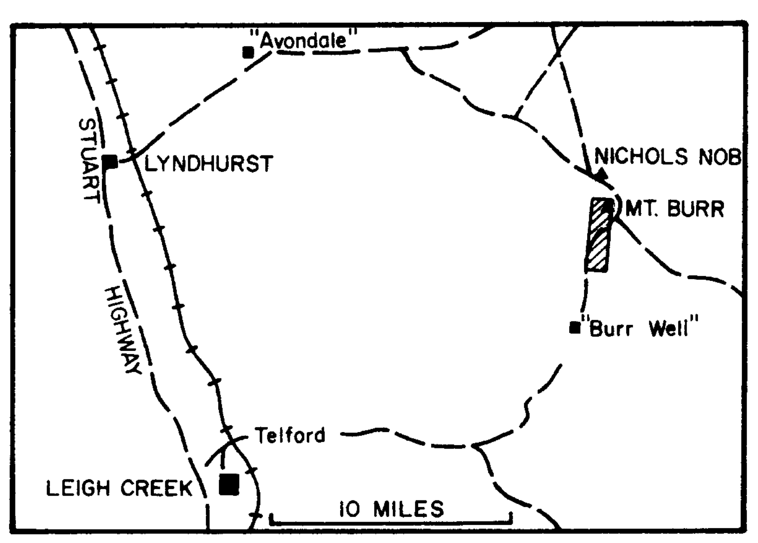
SKILLOGALEE DOLOMITE: Massive grey and brown dolomitic marbles, dolomites and dolomitic siltstones. Micaceous sandstones, grey pitted siltstones and black shales.

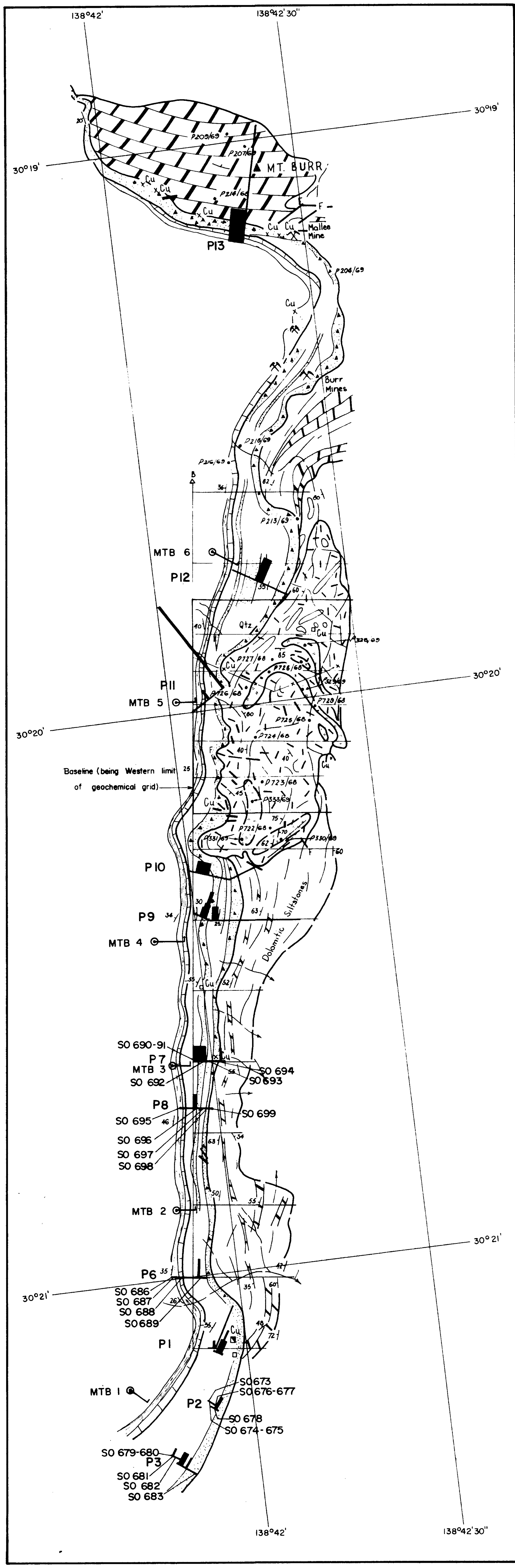
Zone of contact metamorphism: Biotite quartz hornfels and schists, quartz amphibole hornfels and calc. silicate rocks.

Microdiorites and microdolerites. Altered to plagioclase, epidote, biotite, chlorite amphibole rocks.

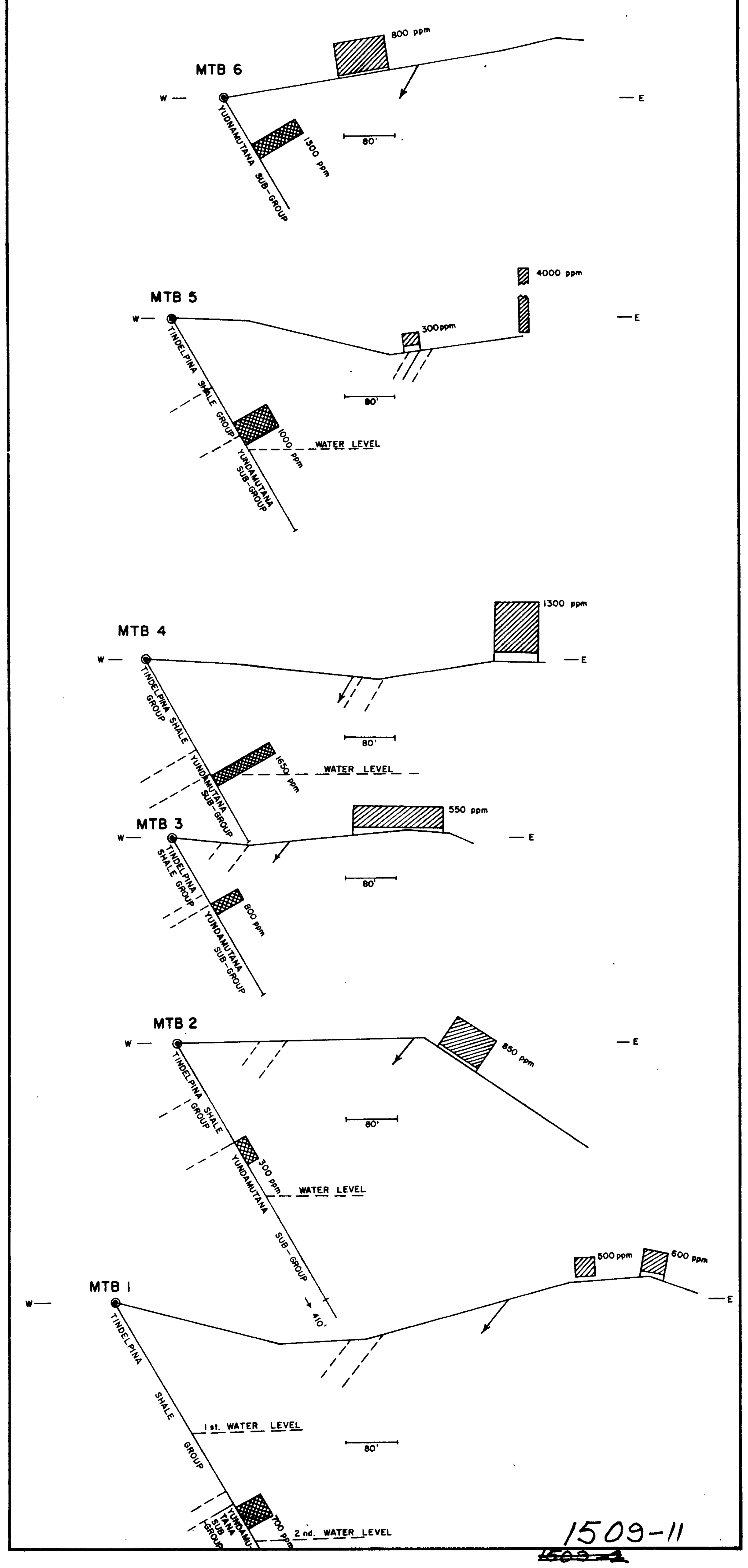
LATITUDES AND LONGITUDES ONLY APPROX.

LOCALITY PLAN





RESULTS OF COMPARISON BETWEEN SURFACE AND SUB-SURFACE



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