ROBERTSON RESEARCH (AUSTRALIA) PTY. LIMITED

REPORT NO. 551

PROJECT NO. 1052

EXPLORATION LICENCE NO. 1359

NOLTENIUS, NORTHERN TERRITORY

REPORT FOR YEAR ENDED 7TH AUGUST, 1979

by -

R.E. Cotton, B.Sc., M.Aus.I.M.M.

Prepared for:

Mobil Energy Minerals Australia Inc.,
2 City Road,
MELBOURNE, 3205.

August, 1979

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SUTTONS MOTORS MANAGEMENT

114 BOURKE STREET, EAST SYDNEY. 2011

AUSTRALIA

TELEPHONE
357 1777
TELEX AA22856

CABLES & TELEGRAMS
"SUTSYD" POTTS POINT

The Secretary,
Department of Mines and Energy,
Mines Division,
P.O. Box 2901,
DARWIN N.T. 5794

5th November, 1979

Dear Sir,

Yearly Reports

Enclosed please find review of activities during the year ended 7th August 1979 for the following Exploration Licenses:-

E. L. No.	Holder	Expenditure Undertaken	Actual Expenditure
1355	Suttons Motors (Darwin) Pty. Ltd.	20,000	22,000
1356	Suttons Motors (Arncliffe) Pty. Ltd.	20,000	86,000
1357	Sydney Motor Auctions Pty. Ltd.	20,000	22,000
1358	Autopool Pty. Ltd.	12,000	4,000
✓1359	Gilbert & Roach Pty. Ltd.	20,000	84,000
1597	Autopool Pty. Ltd.	6,000	8,000
1598	Autopool Pty. Ltd	3,000	3,000
1599	Suttons Motors (Arncliffe) Pty. Ltd.	12,000	9,000
		$113,000	$238,000

Yours faithfully,
SUTTONS MOTORS MANAGEMENT

F. P. Coyne
PROPERTY MANAGER

Exploration Licence No.1359 (Noltenius):

1979 Program

Hole	Standing Water Level
NPD.1	dry
NPD.2	dry
NPD.4	dry
NPD.5	3.0M
NPD.6	dry
NPD.7	dry
NPD.8	8.6M
NPD.9	14.5M
NPD.10	13.0M
NPD.11	dry
NCP.1	6.4M
NCP.2	8.3M
NP.1	drilled with water - SWL unknown
NP.2	12.5M
NP.3	20.0M
NP.4	23.0M
NP.5 to 21	dry

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SUMMARY

Following an airborne radiometric survey, 14 radiometric features were assessed geologically and radiometrically. Of these, anomalies 45/34A, 46/37A, 47/31B and 49/36 were selected for further work which has included gridding, geological mapping and percussion drilling. Soil geochemistry at 300 metre intervals has been carried out over the western part of the licence area, subject to the Suttons-MEMA joint venture. Ground magnetometry has detailed an aeromagnetic feature in the northwestern corner of the licence.

1. TITLE

Exploration Licence No. 1359 was granted by the Deputy of the Administrator to Gilbert and Roach Pty. Ltd. for one year from 8th August, 1977. The Minister for Mines and Energy granted renewal of the whole area for a further year from 8th August, 1978 to 7th August, 1979. Gilbert and Roach Pty. Ltd. is a member of the Suttons Group of Companies which signed a joint venture agreement with Mobil Energy Minerals Australia Inc. on 25th August, 1978. This report is compiled by Robertson Research (Australia) Pty. Ltd. for Mobil as operator of the joint venture. The licence area has a common boundary with E.L. 1356 on its west side (130°45'). The area in which Mobil has an interest is bounded by 13°30' south latitude, 130°50' east longitude and 13°46' south latitude. The total licence area is 460.96 square miles (1,193.9 square kilometres). In the normal course of events, the licence will expire on 7th August, 1982 after two more 50 percent reductions (refer Plate 1).

2. PREVIOUS WORK

The northern end of the exploration area was formerly part of Authority to Prospect 2604 (later E.L. 373) held by Keewanee Australia Pty. Ltd. They carried out trenching and sampling over a ridge of carbonaceous schist called Prospect C. Apparently the results were not encouraging.

3. PHYSIOGRAPHIC AND GEOLOGIC SETTING

That portion of the licence area subject to joint venture between Suttons and Mobil is dominated by topography transitional between the Wave Hill surface and the Koolpinyah surface. The substrata to the Wave Hill surface comprises quartzites of the Carpentarian Tolmer Group which show undulating topography around 200 metres above sea level. A marked sublinear scarp line trending NNE-SSW forms the west limit to the surface. Steeply dissected Lower Proterozoic rocks occupy a block 10 kilometres by 5 kilometres between the scarp and the Giants' Reef Fault. The Koolpinyah surface is developed at the north end of the block in the comparatively mature land forms close to the Reynolds River. This north end of the block is drained by the headwaters of Blackfellow Creek, a tributary of the Reynolds River, while the central and southern sectors of the block are drained by the headwaters of Survey Creek and Wheal Danks Creek, ultimately tributaries of the Daly River. The immature fairly rugged topography is drained by a network of consequent and subsequent streams, the latter having the greatest continuity north-south parallel to the prevailing foliation direction.

The Lower Proterozoic rocks are a complexly folded and faulted suite of meta-pelites and meta-arenites with some conglomeratic horizons. The maximum thickness of the succession is around 1,300 metres. The lower 900 metres of the local column corresponds to the Noltenius Formation. Quartz arenites and meta-quartzites predominate; these are frequently bimodal in quartz grain sizes, and granule and pebble beds occur which have a sand matrix. The arenites lack distinctive bedding features, although rarely graded bedding may be observed in the coarser rocks. The rocks are new quartz muscovite schists of various grain sizes. Numerous quartzite horizons occur at different levels in the arenite sequence.

Near the top of the formation is a distinctive pebble to boulder conglomerate marker unit. Individual beds are seldom more than one metre thick, but the number of beds may vary from one to ten, giving an overall lenticular distribution to the rudaceous rocks along strike. Weakly ferruginous purplish arenites are sometimes in stratigraphic proximity to the conglomerates. The arenite sequence resumes above the conglomerates, but is no more than 100 metres thick. Finer grained beds frequently show distinct bedding with cross-bedding and scour and fill structures.

Above this is an abrupt change in sedimentation to pelitic rocks, meta-siltstones and meta-shales, now essentially fine grained muscovite quartz schists. Although greenschist facies metamorphism prevails, local higher thermal effects have permitted the development of coarse andalusite porphyroblasts. In one locality on the Litchfield road, chiastolite has been noted. The thickness of the pelitic units varies, and in one locality in the centre of the block there is a local increase to about 300 metres. Normally pelitic units 30-50 metres thick alternate with fine to medium grained arenites. There are local developments of carbonaceous facies at this level, usually as lutite, occasionally as arenite (refer Anomaly 46/37A). In two localities there are interbeds of the distinctive 'tombstone greywackes' which characterise the Burrell Formation. For geological reference, we place the base of the Burrell Formation at the base of the first pelite above the conglomerate unit.

No volcanic units appear in the local Lower Proterozoic succession, although some units may have had a tuffaceous component. Igneous rocks are limited to rare pegmatite veins.

One igneous lithology does appear intercalated with the Carpentarian Depot Creek Sandstone Member which unconformably overlies the Lower Proterozoic. This has been described as an andesine micro-gabbro.

Cambrian limestone, the Tindall Limestone, is also unconformable on the Lower Proterozoic in the northwest corner of the licence area. No Cambrian is present overlying Lower Proterozoic east of the Giants Reef Fault. The inference is that the east block represents a high in Cambrian times. West of the Giants Reef Fault, Carpentarian rocks were either not deposited or were eroded prior to the Cambrian marine transgression.

The Lower Proterozoic has been complexly deformed. An initial compressive phase accompanied by the development of the regional schistosity has produced parallel antiforms and synforms. The stable mass of the Litchfield Complex may have acted as a buttress against pressure from the east.

Subsequent strike slip movement on the Giants Reef Fault has generated complementary NE and SW fault systems which have cross-cut and displaced the folds and local low angle plunge reversals. Tensional effects associated with the plunge reversals are demonstrated by east-west block faulting in the east of the area adjacent to the Carpentarian scarp. All three deformation phases can be observed at outcrop scale with SO bedding translated on S1 schistosity, S1 being locally subject to an S2 producing crenulation in meta-lutites and kinking in meta-arenites. An east-west vertical S_3 fracture set cuts S_0 S_1 and S_2.

The Carpentarian is effectively undeformed. At the scarp it shows dips less than ten degrees easterly. It is cut by one 350° fault through anomaly 49/36. The base of the Carpentarian is frequently topographically lower than the crests of the Lower Proterozoic ridges and in fact can be seen to occupy re-entrants in the Lower Proterozoic palaeo surface. This indicates that the present scarp line marks the local western limit of Carpentarian deposition.

4. SOIL SAMPLING

The ground follow-up of the Suttons airborne radiometrics showed that the higher background meta-pelitic sediments within the Noltenius and Burrell Formations appeared to hold the best potential for uranium mineralisation. Accordingly, the wedge-shaped belt of Lower Proterozoic meta-sediments in the extreme west of E.L. 1359 was selected for a more detailed exploration approach. This approach was designed:

(a) to fill in the 600 metre wide strips unscanned by the Suttons airborne survey and

(b) to check the narrow strike valleys in the strongly dissected terrain which could not be entered by the survey aircraft and

(c) to obviate the necessity for an intervening stream sediment survey.

Mobil decided on a minus 80 mesh residual/eluvial soil sampling programme, the sample spacing being 300 metres on a square photo-grid array. In view of natural obstacles such as incised sandy streams, thick vegetation and steep valleys, vehicles could not be used as primary access for most of the survey. The use of trail bikes was found quite effective for primary access, for as much as six and ten kilometres up two major strike valleys. From these access valleys, sampling traverses were run in loops of between ten and twenty sample points per day depending on the terrain. Samples were taken from the top of the 'B' horizon in each case. A scintillometer was carried by each field crew and Tc readings were recorded at regular intervals between sample points. At each sample point, the Tc level, and the relevant geologic and topographic data were recorded. Each sample was assayed for U, Cu, Pb, Zn and Bi. A total of samples were taken over an area of approximately 70 square kilometres. Field work was carried out between 14th April and 31st July, 1979 (refer Plates 4, 9, 10, 11).

5. RESULTS

The generally low order U assay and Tc results seem to preclude the presence of a significant uranium occurrence or geochemical halo in the area sampled. Some associations of interest may come out of statistical treatment of the results. From initial inspection, it seems that while the higher Tc values are associated with the meta-pelites, muscovite schists and andalusite muscovite schists, the higher uranium values are in the meta-arenite soils. In general, areas of stronger uranium background favour the eastern side of the area, away from the Giants Reef Fault closer to the angular unconformity with the shallowly east-dipping Tolmer Group quartzites, which form a prominent north-northeast trending scarp line.

6. NOLTENIUS PROSPECT (ANOMALY 45/34A)

This prospect lies near the intersection of the southeast corner of E.L. 1356 with E.L. 1359. The linear, four channel airborne anomaly coincides with a series of low knolls occupied by meta-sediments of Lower Proterozoic age. These are outcropping metamorphosed quartz arenites and pelites which show strong 350 degree vertical schistosity and marked transposition of bedding on this schistosity. The rocks are closely folded, virtually isoclinally, into a north-plunging antiform. Geological reconnaissance of the area found one small occurrence of uranium mineralisation at 755 metres south 162 metres east. This has been identified by powder diffraction as crandallite, a complex phosphate $(Ca, Sr, Pb)_2\ Al_7\ (PO_4)_3\ (OH)_{16}\ \ H_2O$ in which uranium has substituted for some Ca or Pb by supergene processes. Traces of yellow uranium secondary minerals have also been seen. The gangue is 20 percent very fine grained earthy hematite. This material assayed 0.45 percent uranium. Elsewhere in the zone are 'hot spots' with high U and Tc readings, but without identifiable uranium mineralisation. The area has been gridded on lines 100 metres apart and total count measurements taken (Plate 5). This work outlined two linear features with comparatively elevated Tc which became the targets for later percussion drilling.

Auger drilling was done between 16th November, 1978 and 12th December, 1978 to test an alluvial covered zone adjacent to the outcrop area of the prospect. The zone follows the west limb of the antiform, where pelitic beds overlie the more arenaceous lithologies.

Drilling was done on grid (magnetic) east-west lines, the vertical holes spaced five metres apart and where possible, the holes were carried at least 0.5 to 1 metre into bedrock. They proved to be generally shallow close to outcrop and progressed to depths of 15 metres at distances up to 250 metres west of the outcrop. Each hole

was sampled over one metre intervals from top to bottom, and at the bottom of each hole a sample was taken from the drill bit to provide:

(a) a clean geological sample and

(b) an uncontaminated bottom of hole (B.O.H.) sample for assay.

In each hole the last metre or part thereof also was assayed for U, Cu, Pb and Zn. As each hole was completed it was logged radiometrically for Tc and U + Th radioactivity with an integral down hole spectrometer.

Overall, 385 holes were drilled on eight lines for a total of 1,685.7 metres, of which 256 were drilled in E.L. 1359.

Geological logging of the B.O.H. samples enabled a structural interpretation of the interbedded meta-pelites and subordinate meta-arenites and granule beds which form the anticlinal west limb. This structure was reflected both in B.O.H. Tc radioactivity and B.O.H. assays (Plates 5, 6, 7, 8, 9), but no U values were obtained which could be interpreted as mineralisation or part of a geochemical halo.

A parallel zone to the west of the auger drilled panel was tested using a radon emanometer. Sufficient measurements were taken to establish background. A group of higher values was outlined which lay within a shallow drainage depression. Although it was recognised that the emission could be essentially surficial, it was considered advisable to check the anomaly with one percussion drill hole. This was subsequently drilled (P.D.H. LPD 3), refer Plate 5.

7. PERCUSSION DRILLING

Apart from LPD 3, five vertical percussion holes have been put down on the Noltenius Prospect. These are (east to west) NPD9, NPD1, NPD8, NPD4 and NPD2. All holes have been logged using a Mt. Sopris down hole logger to guide selection of samples for assay. Best assay results were:

NPD9:	1 m.	of 90 ppm	U_3O_8	between	52 and 53 m.
NPD1:	1 m.	of 505 ppm	U_3O_8	between	63 and 64 m.
	1 "	125	"		63 " 65 m.
	1 "	100	"		65 " 66 m.
NPD8:	1 m.	of 180 ppm	U_3O_8	between	53 and 54 m.
NPD4:	1 m.	of 435 ppm	U_3O_8	between	surface and 1 m.
	1 "	100	"	between	2 and 3 m.
	1 "	110	"	"	22 and 23 m.
	1 "	140	"	"	24 and 25 m.
	1 "	100	"	"	25 and 26 m.
	1 "	250	"	"	30 and 31 m.
	1 "	335	"	"	31 and 32 m.
NPD2:	1 m.	of 155 ppm	U_3O_8	between	6 and 7 m.

These results compare with 5-10 ppm U_3O_8 average background for the formation. All the above results were obtained above the base of oxidation. Reference to the plan and sections (Plate 13) shows that NPD9 and 1 have drilled the east limb of the anticline while NPD8 and 4 have drilled the west limb. The elevated U_3O_8 values quoted above were obtained very close to the same stratigraphic horizon. This statement also applied to the metatite-crandallite mineralisation close to the collar of NPD4. On the other hand, NPD2 is approximately 150 metres higher in sequence.

NPD3, mentioned earlier, is higher again in the sequence and has drilled distinctive quartz greywackes of the Burrell Formation. The boundary between the Burrell and the underlying Noltenius Formation (both of the Finniss River Group) is locally placed approximately 150 metres west of NPD2 (refer Appendices 1, 2, 3, 6 and 7).

8. ANOMALY 46/37A

This prospect is located at the axis of a fault-terminated syncline in the southern sector of the licence. Stratigraphically, it is placed close to the base of the Burrell Formation as defined in this report.

Local 'hot spots' of up to 20 times local background in total count occur in schistose meta-pelite close to the axis of the syncline. These are the highest Tc values obtained in the area east of the Giants Reef Fault, however no actual uranium mineralisation is observable.

The geology of the prospect is detailed on Plate 14. It is noteworthy that a strongly carbonaceous lithology is present, although it shows no unusual radioactivity. The plunge of the synclinal axis is sub-horizontal which means that the 'warm' lithology does not intersect the drill hole. Although P.D.H. NPD5 shows no indication of a secondary uranium dispersion, further testing with a more mobile drill is advisable. NPD5 showed traces of sulphide mineralisation, including chalcopyrite, associated with quartz veining. The best assay was 390 ppm Cu over one metre, 33-34 metres. Uranium did not exceed 5 ppm (refer Appendix 4).

9. ANOMALY 47/31B

This anomaly occupies a very similar stratigraphic position to that of 46/37A. Readings to 2.7 times background were obtained in the U channel. The elevated values relate to a carbonaceous siltstone, variously weathered to red and grey, close to the axis of a syncline with a sub-horizontal plunge (refer Plate 15). Again, the syncline plunges shallower than the slope of the ridge, so the prospective horizon does not intersect the drill hole NPD6. Again, no indication of a uranium secondary geochemical dispersion is in evidence, the uranium values not exceeding 5 ppm (refer Appendix 5).

10. ANOMALY 49/36

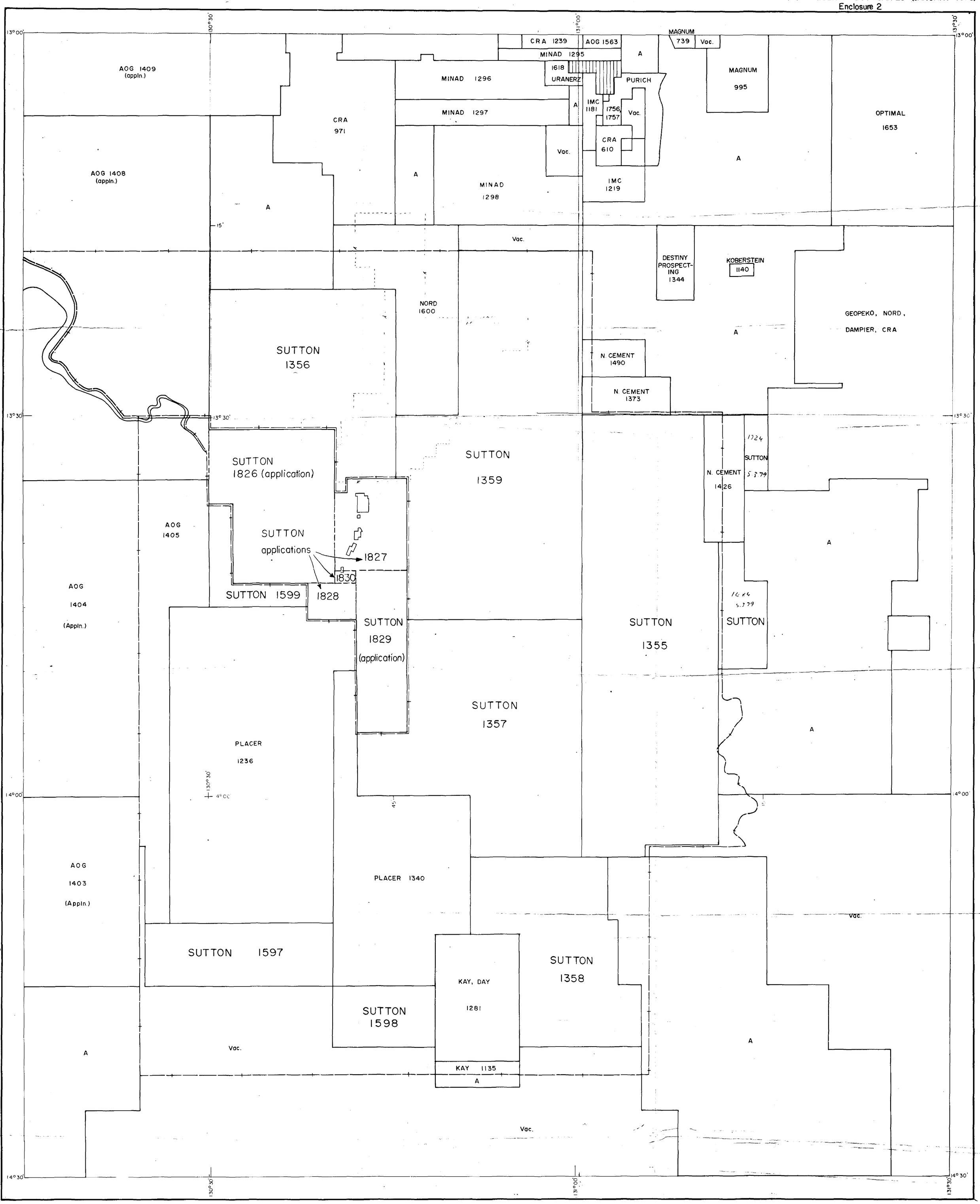
This anomaly relates to a perennial spring which flows from a fault line within Carpentarian quartzites towards the eastern boundary of the licence. Our projection of the basal Carpentarian unconformity suggests that it could occur at around 130 metres below the anomaly position. P.D.H. NPD7 was sited to provide a test of the unconformity, but reached its drilling limit at 60 metres due to the extreme resistance of the quartzite. Work on the prospect is temporarily suspended (refer Plate ~~16~~ 17).

11. MAGNETICS

Aeromagnetics carried out by Keewanee and later by Suttons show a possible 'thumbprint' type magnetic feature in the northwestern corner of the licence. The intensity is not so strong as those detected by the B.M.R. detailed aeromagnetic survey in the Daly River area, which proved in one case to represent steeply plunging chlorite-magnetic pyrrhotite pipes containing some massive subvolcanic chalcopyrite-sphalerite mineralisation. However in this case it is covered by the Cambrian Tindall Limestone, of which the thickness approximates 50-60 metres, as indicated by previous drilling in the vicinity.

Reconnaissance total magnetic intensity traverses have been run, readings taken at 25 metre intervals and the results reduced to a common datum. The profiles suggest a fairly deep source.

EXPLORATION LICENCE BOUNDARIES (JANUARY 1978)
Enclosure 2



EXPLORATION LICENCE AREAS (BOTH GRANTED AND UNDER APPLICATION) AND SUTTONS GROUP PASTORAL LEASE BOUNDARY
Enclosure 2

SCALE 1:250,000

NOTE: OVELAY TO ENCLOSURE 1

Plan prepared
by
ROBERTSON RESEARCH(AUST) PTY LTD.
Moss Vale Rd
Bowral, 2576, NSW.

Date: 12·3·78 — Drwg. No. 663

LEGEND

SUTTON 1599 — EXPLORATION LICENCE HOLDER (ABBREVIATED) & TITLE NUMBER

A — AREA APPLIED FOR — APPLICANT UNKNOWN

Vac. — AREA VACANT

GOVERNMENT RESERVE

TIPPERARY PASTORAL LEASE BOUNDARY

#505

PLATE 1

CR79/168

E.L 1356

E.L 1359

DALY RIVER AGRICULTURAL RESERVE

Daly River

Giants Reef

Fergusson River

13° 30' S

13° 35' S

130° 45' E

130° 50' E

LEGEND

QUATERNARY	Qa		sand, soil, clay, alluvium
CAMBRIAN	€	?JINDUCKIN FORMATION / TINDALL LIMESTONE	calcareous siltstone, limestone, basal arkose
		Unconformity	
MID–PROTEROZOIC (CARPENTARIAN)			fine to medium grained orthoquartzite and quartz arenite
		Unconformity	
LOWER PROTEROZOIC	bp, bc, ba, bg, bn	BURRELL CREEK FORMATION (Plb)	bp: muscovite quartz schist – metapelites, occasional current bedding and penecontemporaneous slump structures preserved bc: carbonaceous schist – ex black shale ba: quartz muscovite schist–fine to coarse meta-arenites, granule beds bg: greywacke, distinctive dark outcrops bn: andalusite muscovite quartz schist
	naa, nq, nb	NOLTENIUS FORMATION (Pln)	naa: quartz muscovite schist – medium to coarse meta – arenites, nq: granule beds, frequent quartzite horizons. Rare graded bedded. nb: conglomerate marker: quartz and quartzite pebbles to cobbles, some boulders.

- Geological boundary
- Geological boundary inferred from drilling
- Anticline
- Syncline, showing plunge
- Fault
- Strike and dip of strata
- Vertical strata
- Trend lines
- Vein q–quartz
- E.L. boundary
- Major road
- Tracks

GEOLOGY OF PART EL 1356 AND EL1359

Daly River District

NORTHERN TERRITORY, AUSTRALIA

MOBIL ENERGY MINERALS AUSTRALIA INC.

SUTTONS PROJECT 1052

SCALE 1:25 000

metres 500 0 0·5 1 1·5 2 2·5 3 kilometres

Dwg No. | Plan prepared by Robertson Research Australia | Oct. 1979

PLATE 2

SUTTONS PROJECT

1979 SOIL AND STREAM SEDIMENT GEOCHEMICAL SURVEY.

E.L. 1356
LITCHFIELD

E.L. 1359
NOLTENIUS

13°30'

13°30'45"

13°30'30"

13°35'

13°50'

Reynolds River

Blackfellow Creek

Nolteniius Billabong

Kilpayle Creek

MT THOMAS

47/31 B

45/34

46/37A

49/36

DDH 12 89m

DDH 11 89m

DDH 13 198m

3000 ft E

3200 ft S

800 ft W

800 ft E

3000 ft E

400 ft S

100 W
00
100 E
200
300
400
500
600 E
700 E
300 N
200 N
100 N
00 N
200 S
400 S
600 S
700 S

- Soil sample site
- × Stream sediment sample site
- ○ 49/36 Prospect selected from 1977 airborne radiometric survey results.
- ----- Four wheel drive vehicle access
- ..... Motorbike access.

SUTTONS PROJECT

1979 SOIL AND STREAM SEDIMENT GEOCHEMICAL SURVEY.

SAMPLE LOCATIONS

Base	6 July '79	L.DeL.
Compiled.	9 July '79	R.B.K.
Additions		

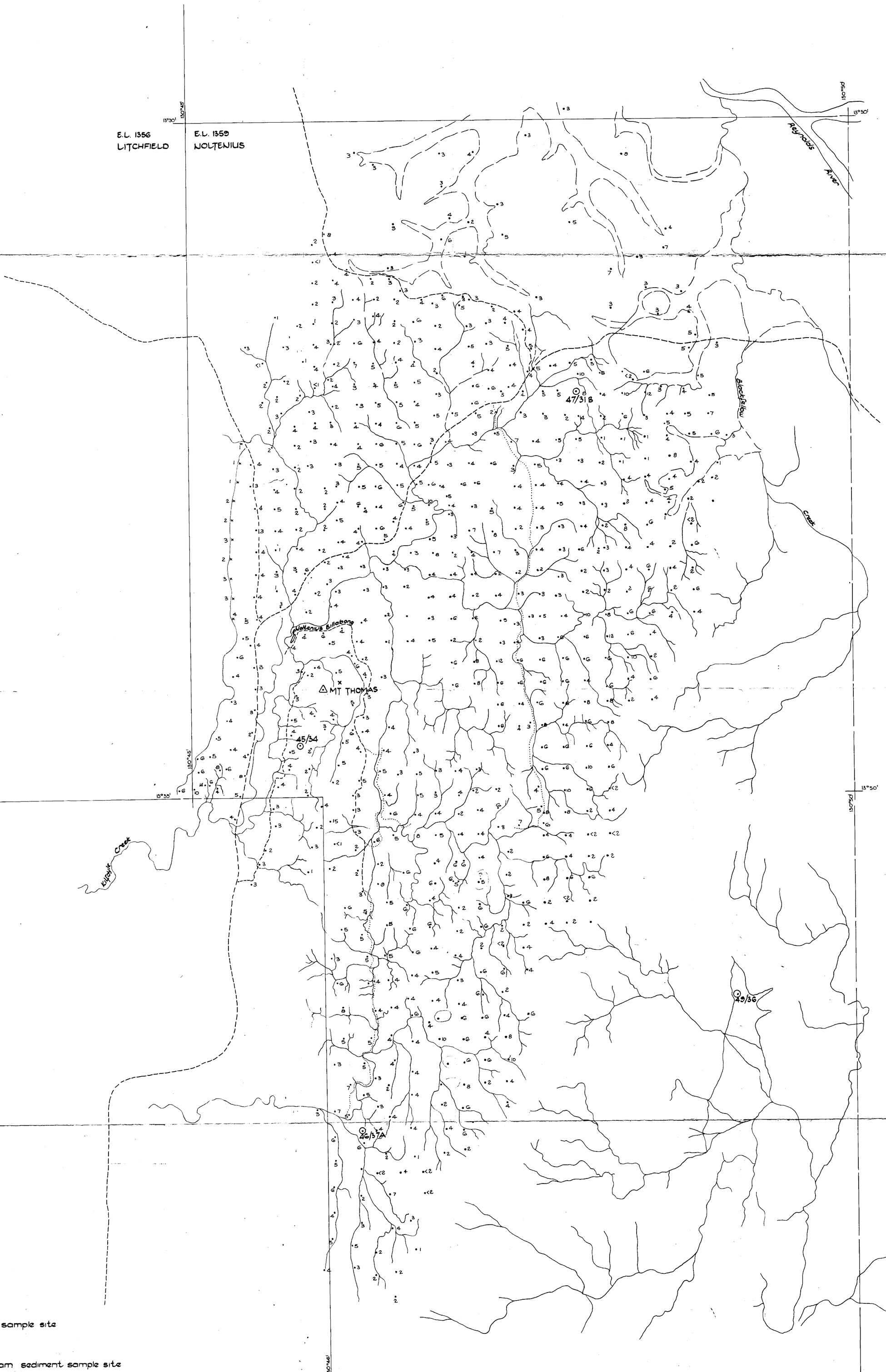
0 1 2 KILOMETERS.
1:22,200

PLATE 3

CR79/168 # 1502

SUTTONS PROJECT

1979 SOIL AND STREAM SEDIMENT GEOCHEMICAL SURVEY.



- Soil sample site
- × Stream sediment sample site
- ○ 49/36 Prospect selected from 1977 airborne radiometric survey results.
- ----- Four wheel drive vehicle access
- ..... Motorbike access.

SUTTONS PROJECT

1979 SOIL AND STREAM SEDIMENT GEOCHEMICAL SURVEY.

URANIUM

Base 6 July '79 L.DeL.
Compiled 9 July '79 R.B.K.
Additions

0 1 2 KILOMETERS.
1:22,200

PLATE 4

CR79/168 #1503

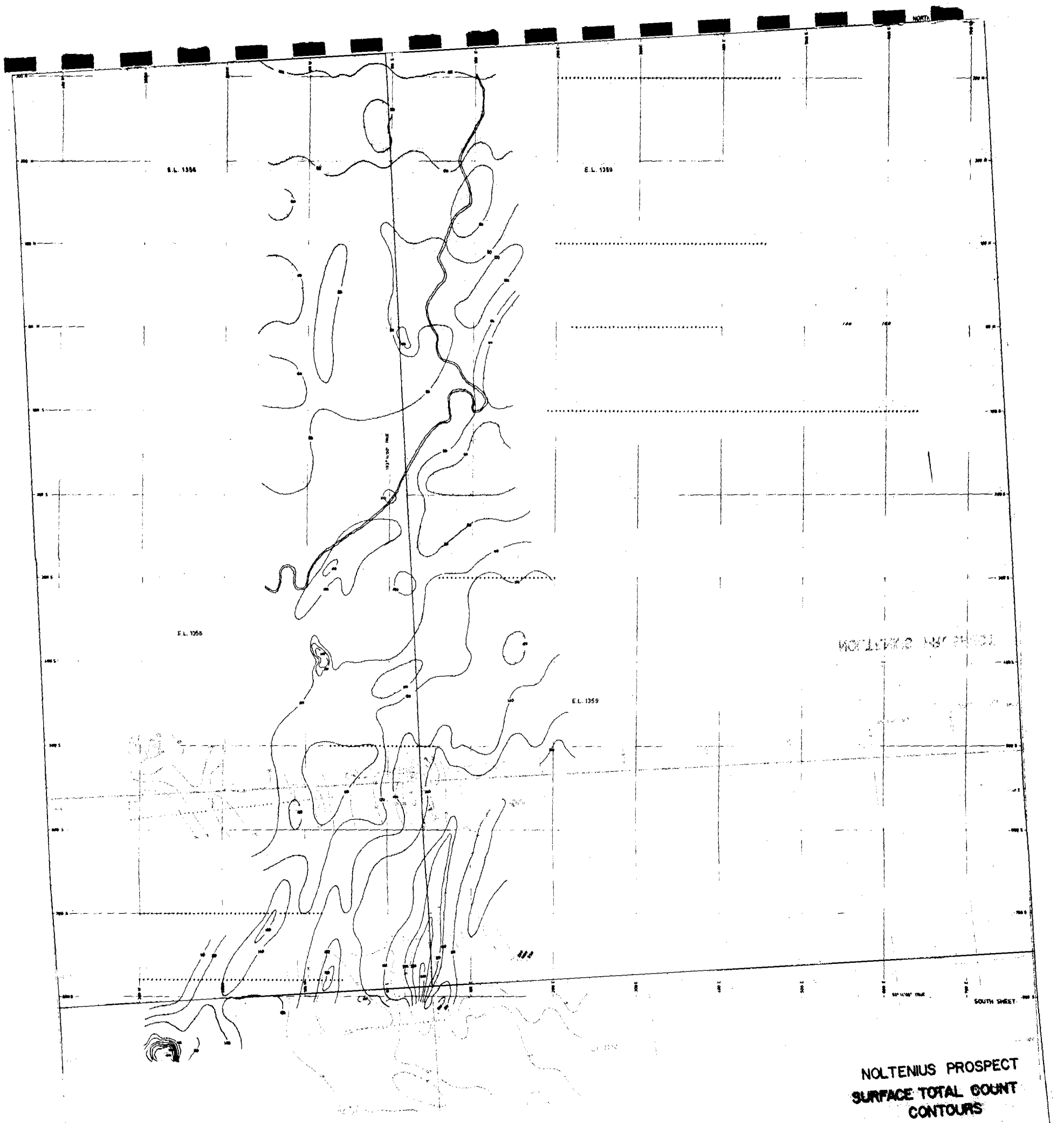

NORTH
E.L. 1356
E.L. 1359
E.L. 1358
E.L. 1359
SOUTH SHEET
NOLTENIUS PROSPECT
SURFACE TOTAL COUNT CONTOURS
AUSTRALIA
SUTTONS PROJECT
NORTHERN TERRITORY
0 20 40 60 80 100 METRES

PLATE 5

NORTH SHEET

E.L. 1358

E.L. 1359

E.L. 1358

E.L. 1359

SOUTH SHEET

THRESHOLD - 32 COUNTS PER SECOND

NOLTENIUS PROSPECT

AUGER B.O.H. TOTAL COUNT RADIOMETRICS

BUREAU MINERALS DIVISION
AUSTRALIA

SUTTONS PROJECT
NORTHERN TERRITORY

T.N

0 20 40 60 80 100 METRES

PLATE 6

NOTE: U THRESHOLD = 9 ppm

U

NOLTENIUS PROSPECT
AUGER B.O.H. U GEOCHEMISTRY

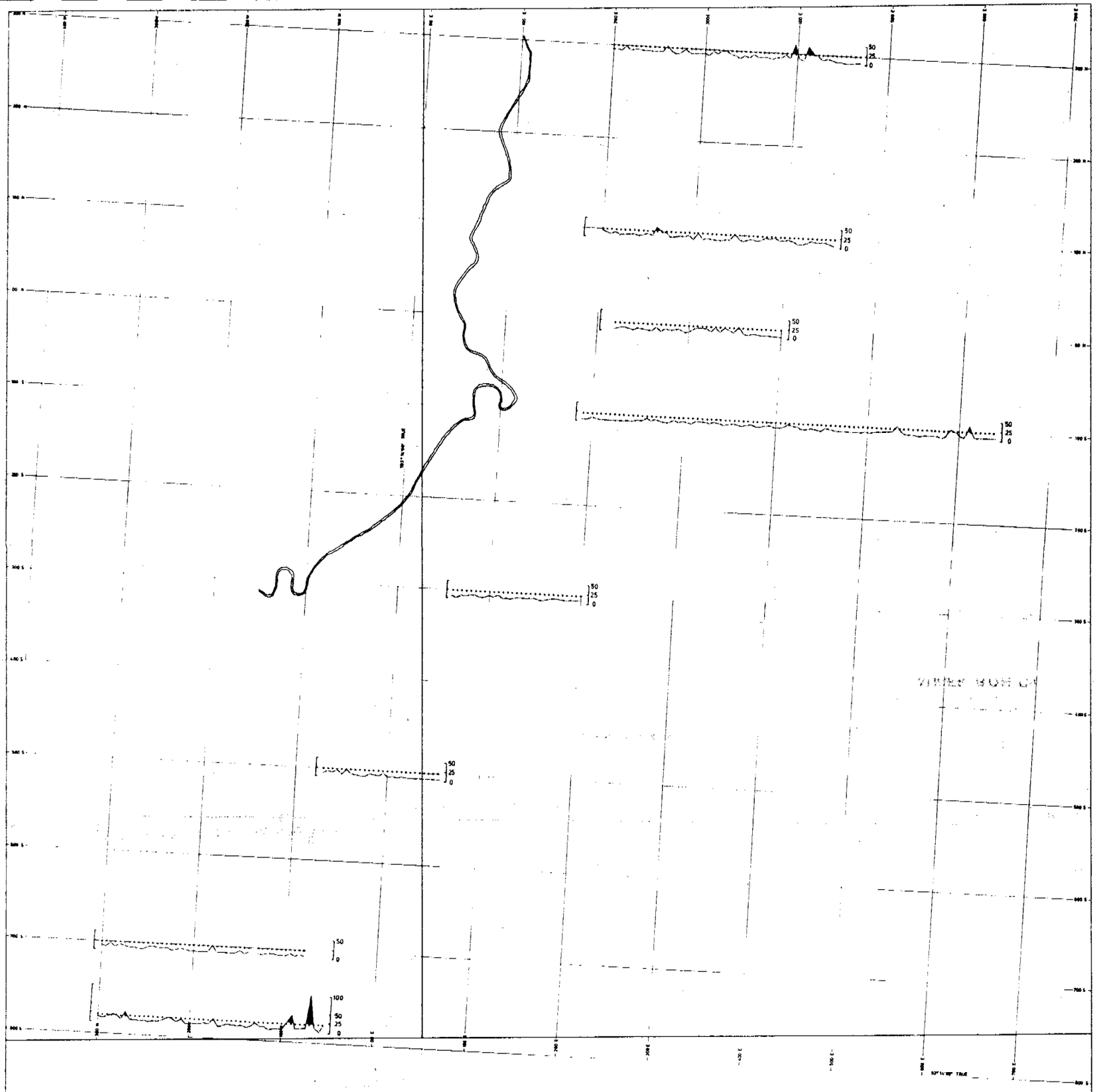
ENERGY MINERALS DIVISION
AUSTRALIA

SUTTONS PROJECT
NORTHERN TERRITORY

T.N.

0 20 40 60 80 100 METRES

PLATE 7



Cu THRESHOLD - 25 ppm

Cu

NOLTENIUS PROSPECT
AUGER B.O.H. Cu
GEOCHEMISTRY

ENERGY MINERALS DIVISION
AUSTRALIA

SUTTONS PROJECT
NORTHERN TERRITORY

T.N

0 20 40 60 80 100 METRES

DWG No. 1436

Pb

NOLTENIUS PROSPECT

AUGER BOH. Pb GEOCHEMISTRY

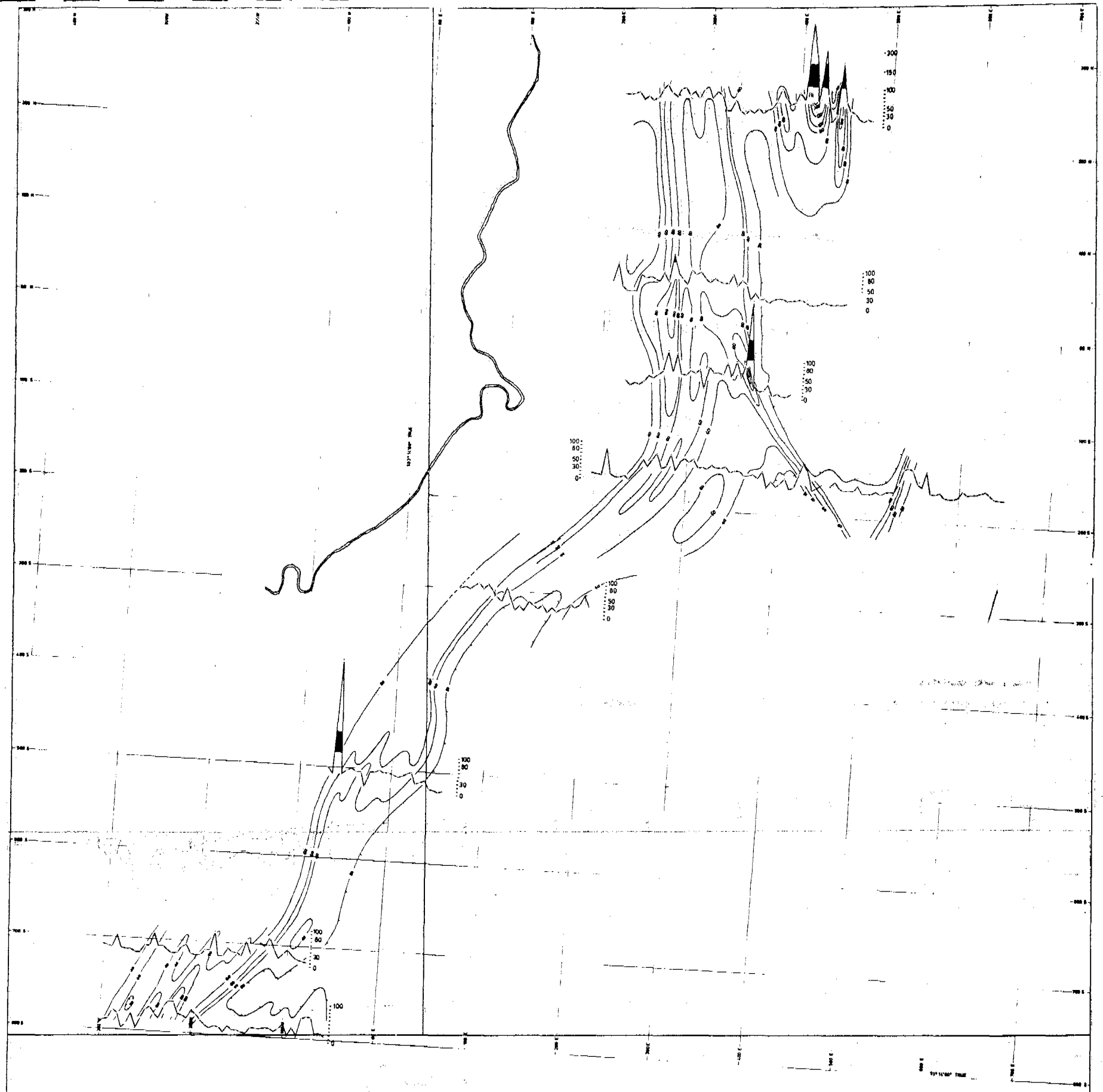
ENERGY / MINERALS DIVISION AUSTRALIA

SUTTONS PROJECT
NORTHERN TERRITORY

Pb THRESHOLD - 27 ppm

0 20 40 60 80 100 METRES

PLATE 9



Zn THRESHOLD - 99 ppm

Zn

NOLTENIUS PROSPECT

AUGER B.O.H. Zn GEOCHEMISTRY

ENERGY MINERALS DIVISION
AUSTRALIA

SUTTONS PROJECT
NORTHERN TERRITORY

TN

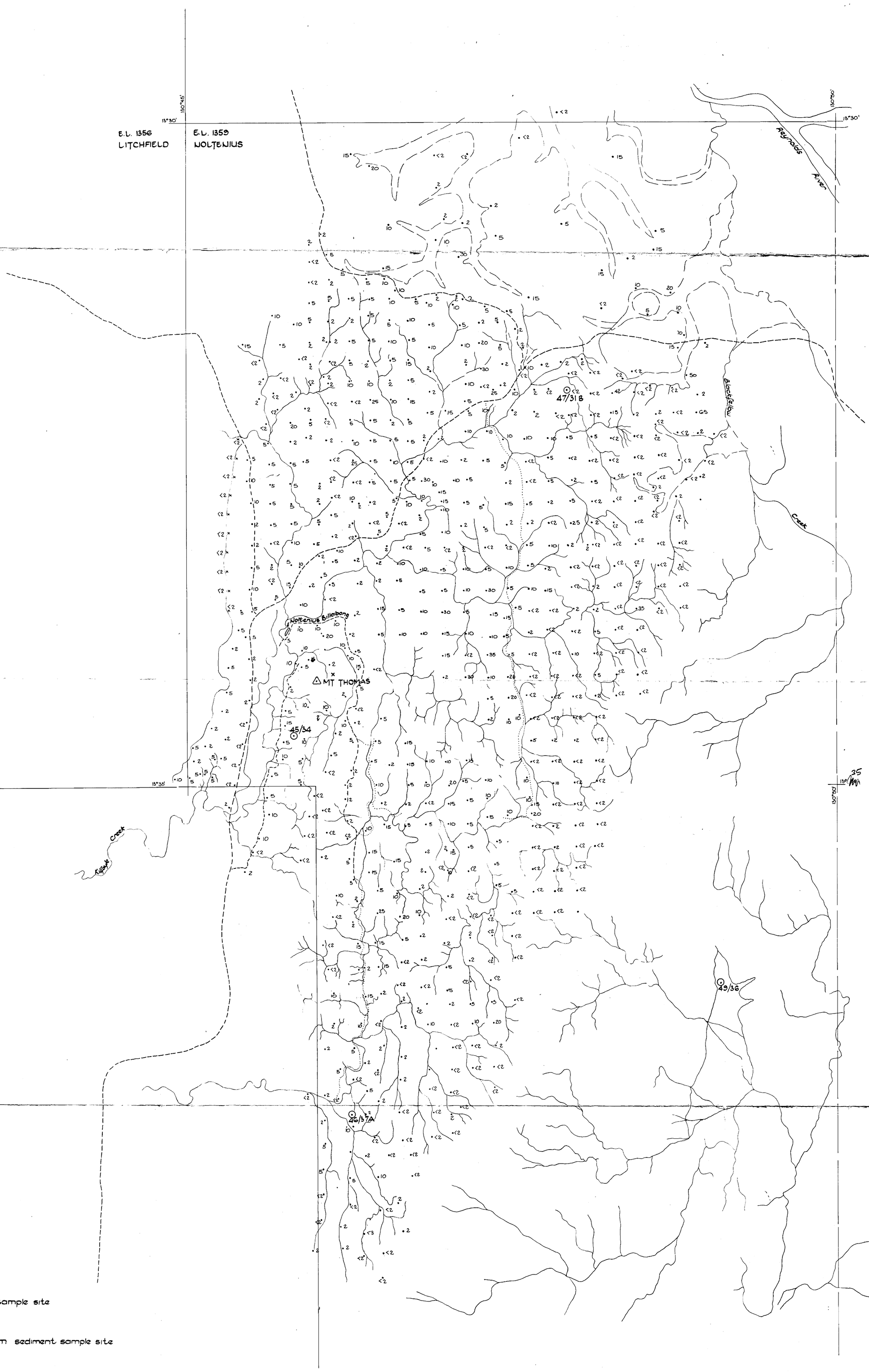
0 20 40 60 80 100 METRES

PLATE 10

1438

SUTTONS PROJECT

1979 SOIL AND STREAM SEDIMENT GEOCHEMICAL SURVEY.



- Soil sample site
- Stream sediment sample site
- 49/36 Prospect selected from 1977 airborne radiometric survey results.
- ----- Four wheel drive vehicle access
- ..... Motorbike access.

SUTTONS PROJECT

1979 SOIL AND STREAM SEDIMENT GEOCHEMICAL SURVEY.

COPPER

Base	6 July '79	L.DeL.
Compiled	9 July '79	R.S.K.
Additions		

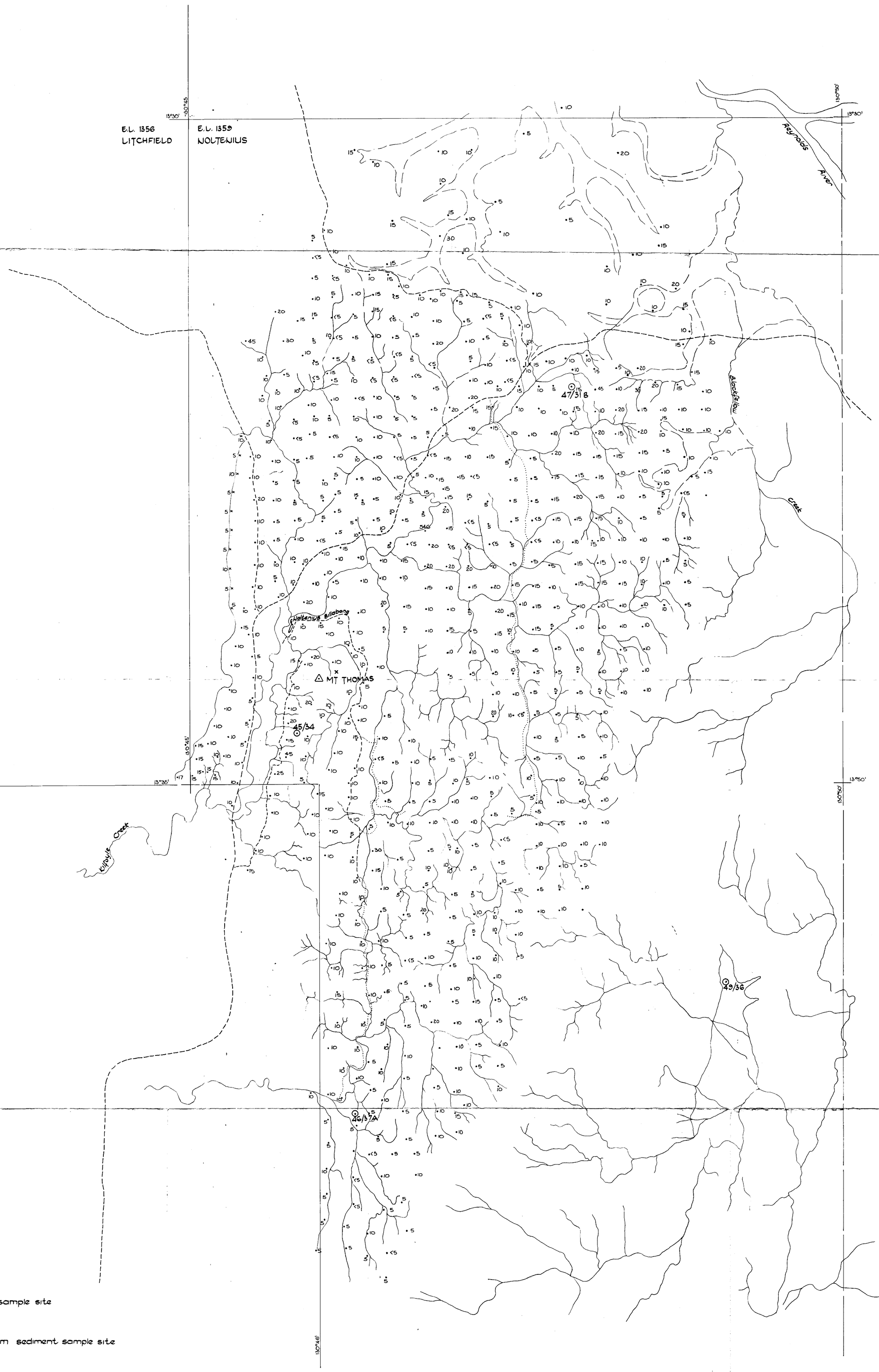
0 1 2 KILOMETERS.
1:22,200

PLATE 11

GR79/168 #1504

SUTTONS PROJECT

1979 SOIL AND STREAM SEDIMENT GEOCHEMICAL SURVEY.



- Soil sample site
- x Stream sediment sample site
- ○ 49/36 Prospect selected from 1977 airborne radiometric survey results.
- ----- Four wheel drive vehicle access
- ..... Motorbike access.

SUTTONS PROJECT

1979 SOIL AND STREAM SEDIMENT GEOCHEMICAL SURVEY.

LEAD

Base	6 July '79	L.DeL.
Compiled	9 July '79	R.B.K.
Additions		

0 1 2 KILOMETERS.

1:22,200

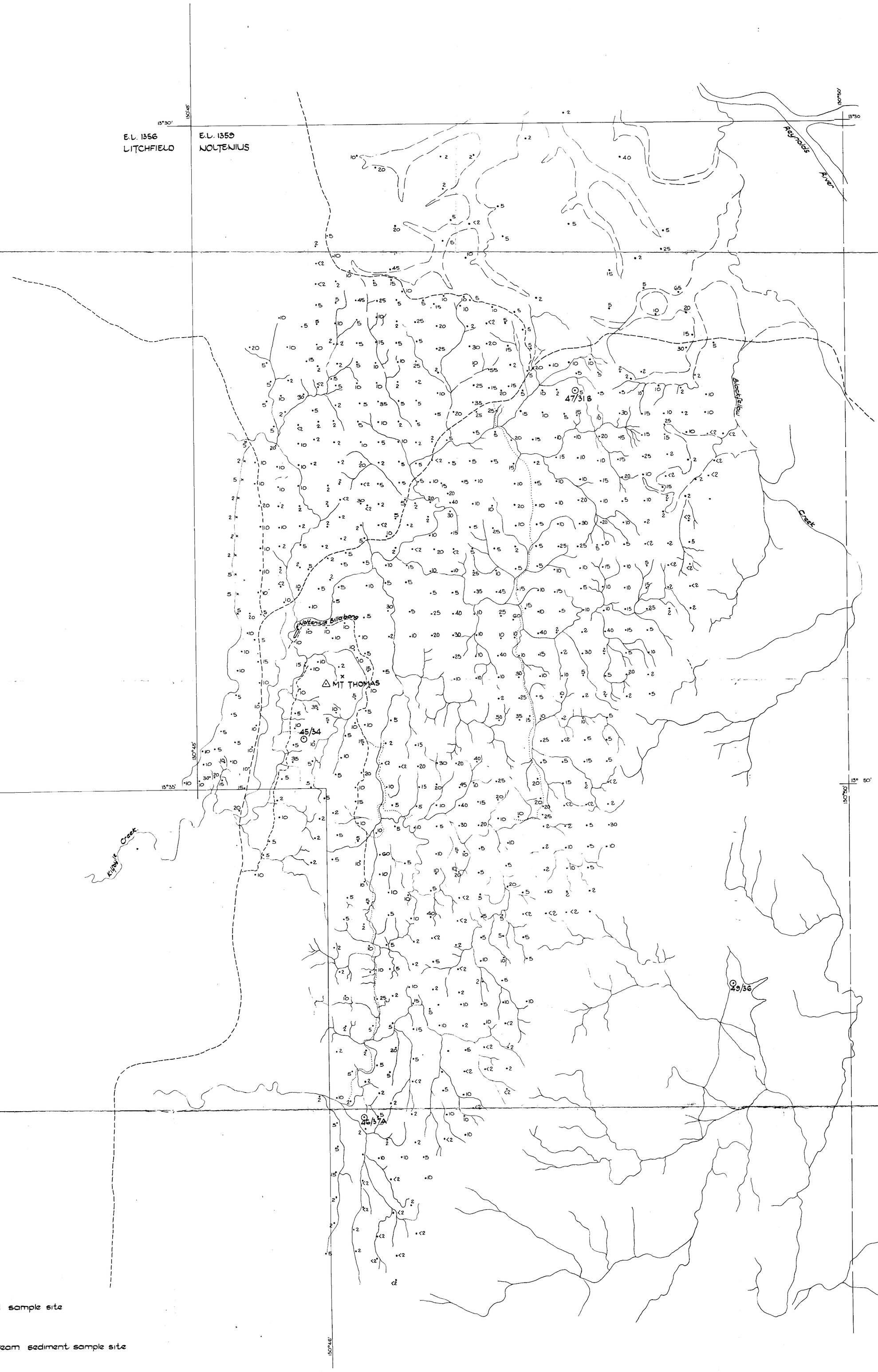
PLATE 12

CR79/166

#1505

SUTTONS PROJECT

1979 SOIL AND STREAM SEDIMENT GEOCHEMICAL SURVEY.



- Soil sample site
- × Stream sediment sample site
- ○ 49/36 Prospect selected from 1977 airborne radiometric survey results.
- ----- Four wheel drive vehicle access
- ..... Motorbike access.

SUTTONS PROJECT

1979 SOIL AND STREAM SEDIMENT GEOCHEMICAL SURVEY.

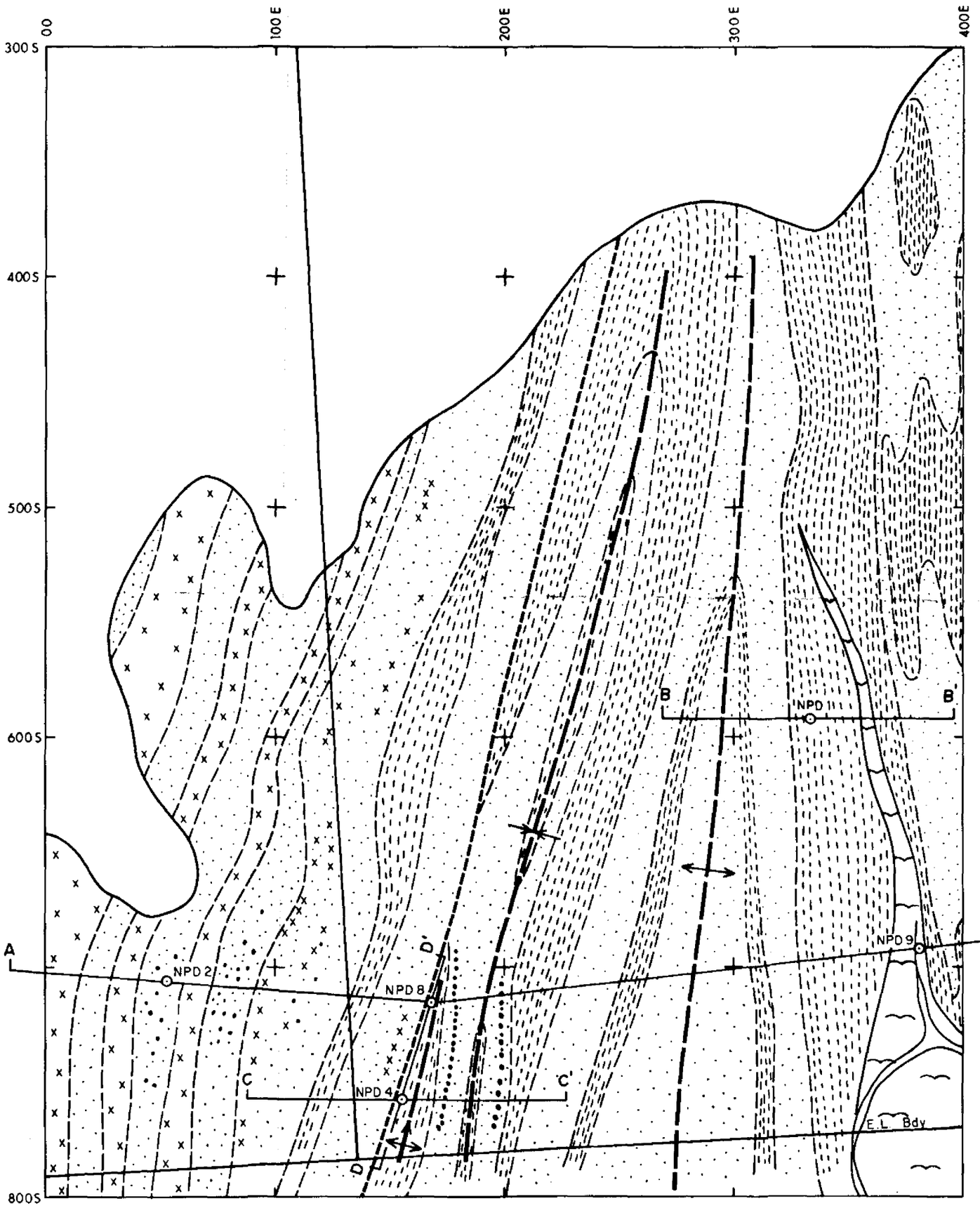
ZINC

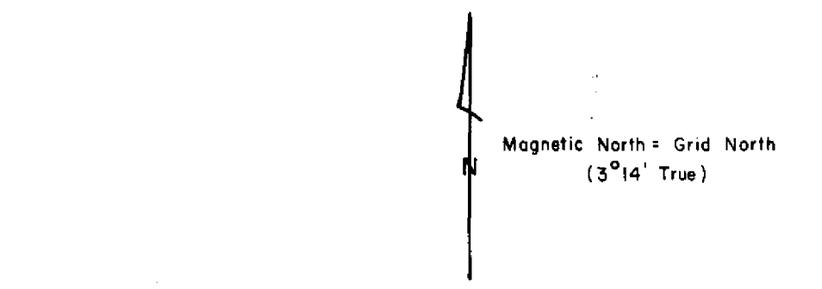
Base	6 July '79	L. DeL.
Compiled	9 July '79	R.B.K.
Additions.		

0 1 2 KILOMETERS.
1:22,200

PLATE 13

CR79/68 #1506

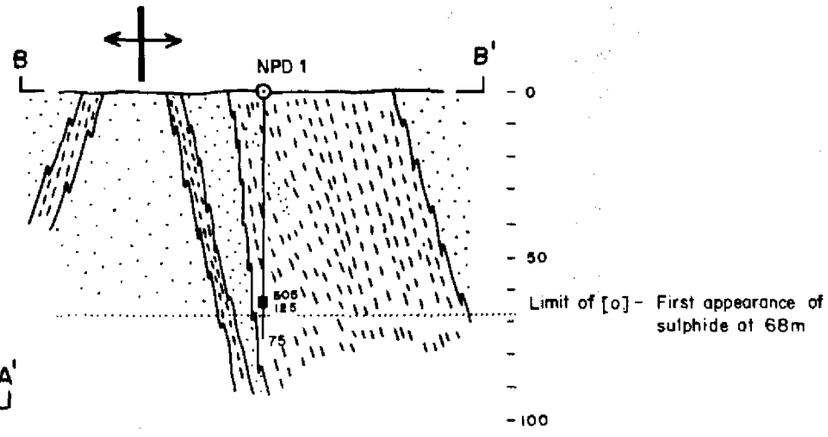


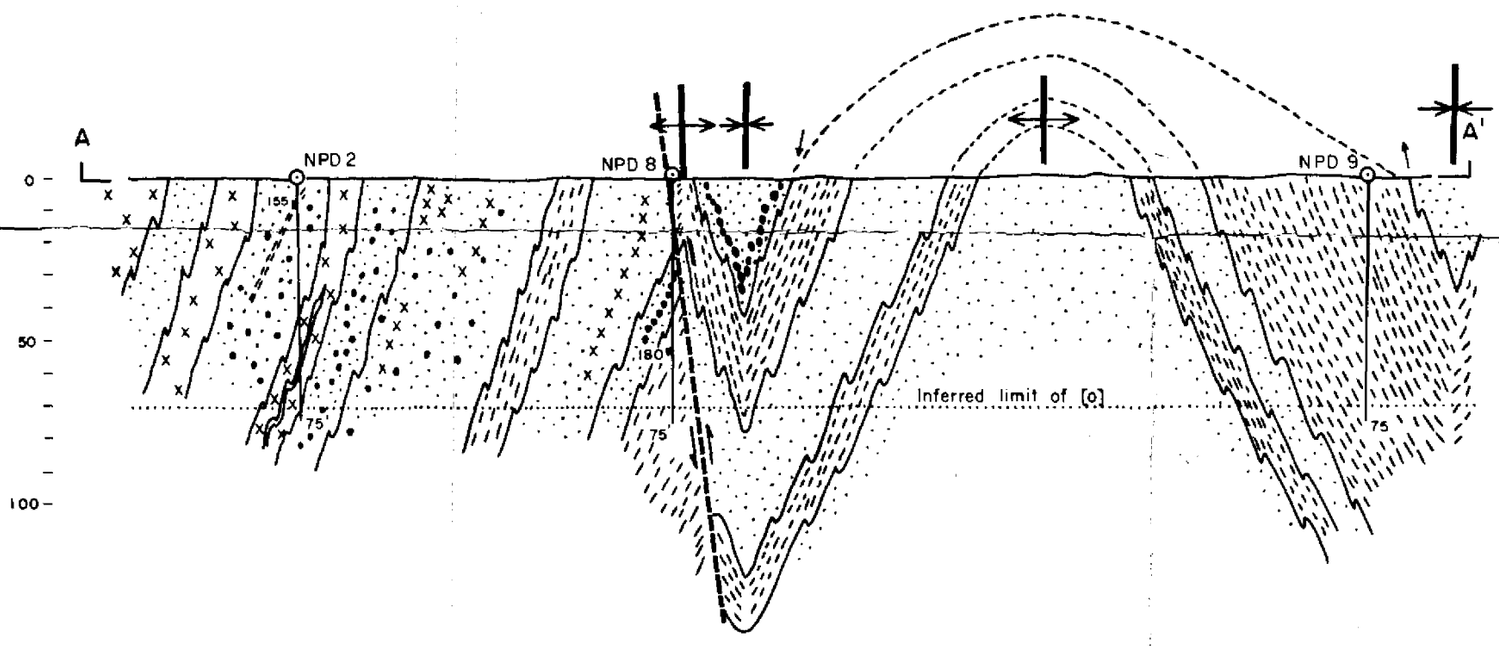


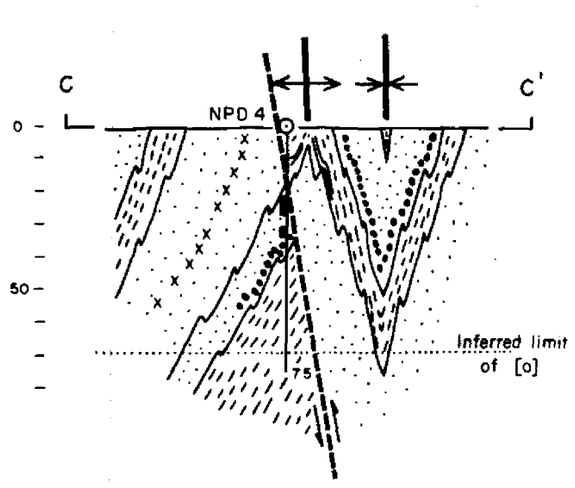
Scale
1:2000

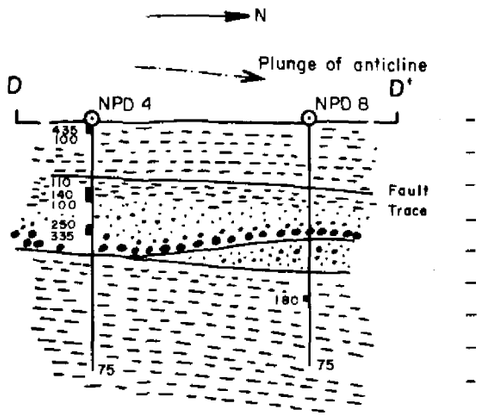
0 50 100 150m

Horizontal Scale = Vertical Scale









LOWER PROTEROZOIC

- Meta-pelite and fine meta-arenite (grey, brown and green : usually schistose)
- Meta-arenite (quartzose) with occasional granule and very coarse arenite bands
- Meta-quartzite & quartzite breccia

- Edge of outcrop
- Mapped lithological boundaries
- Inferred lithological boundaries
- Inferred fault and sense of movement
- Anticline with plunge
- Syncline
- NPD 4 — Site of percussion drill hole – profile showing concentration U_3O_8 > 100 ppm and depth of hole
- A A' — Location of cross-section
- Alluvium

PROVISIONAL GEOLOGY: CROSS - SECTIONS & SURFACE GEOLOGY

NOLTENIUS PROSPECT
SUTTONS PROJECT
E.L. 1359

July 1979

CR79/168

MAP 1

DWG No 1656

PLATE 14

MAP 2

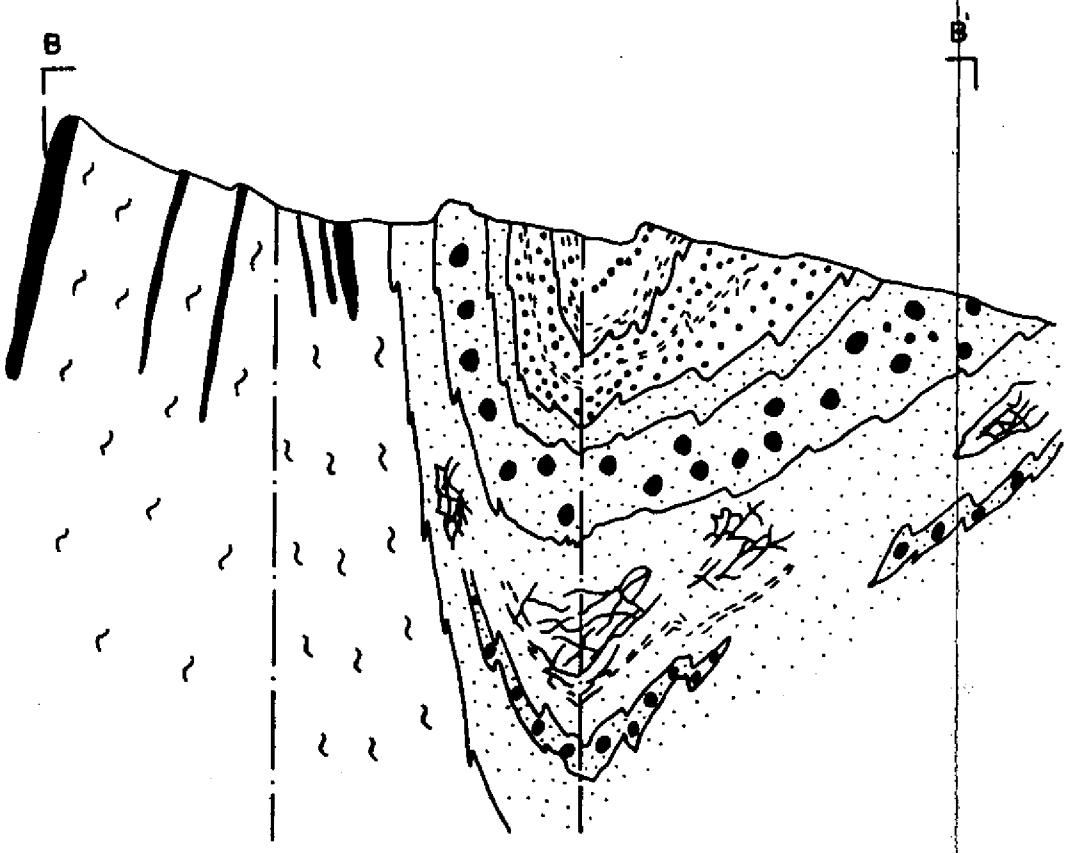
PROVISIONAL GEOLOGY N.P.D. 5

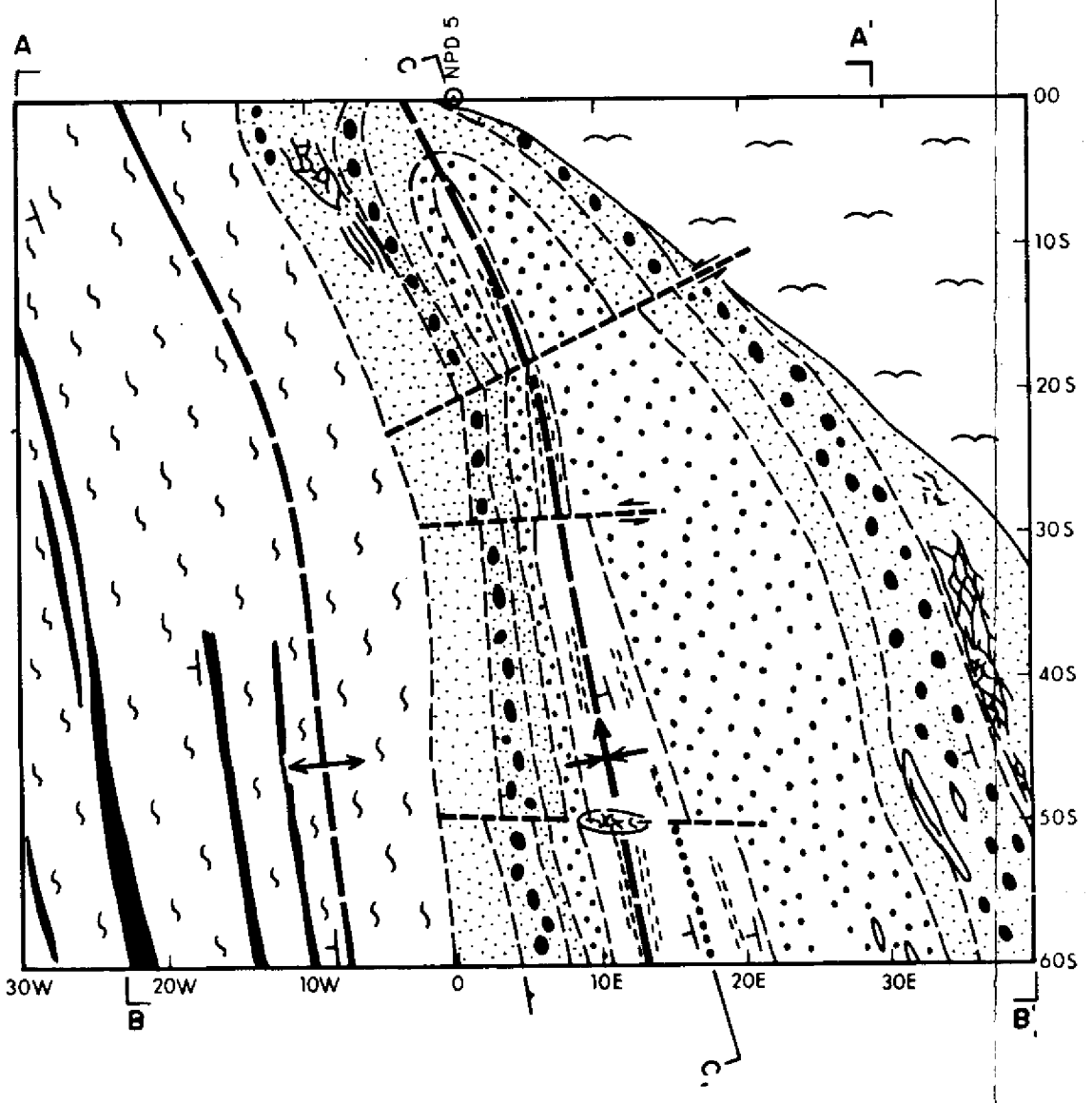
PROSPECT 46/37 A

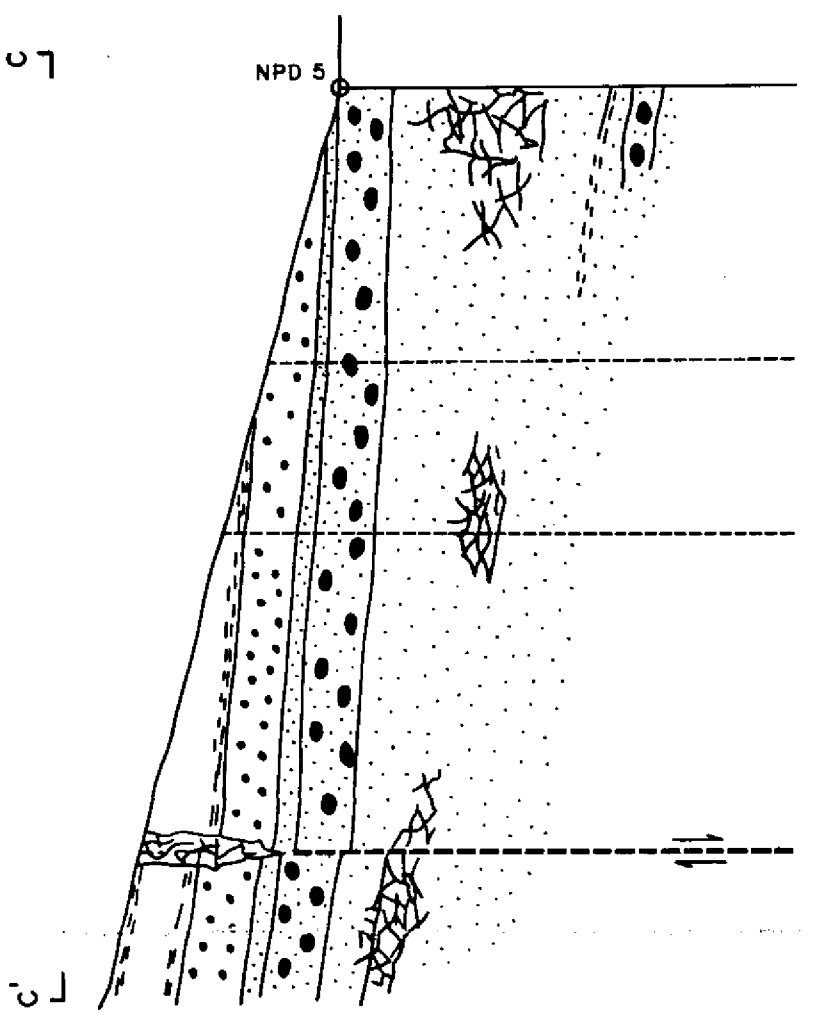
SUTTONS PROJECT

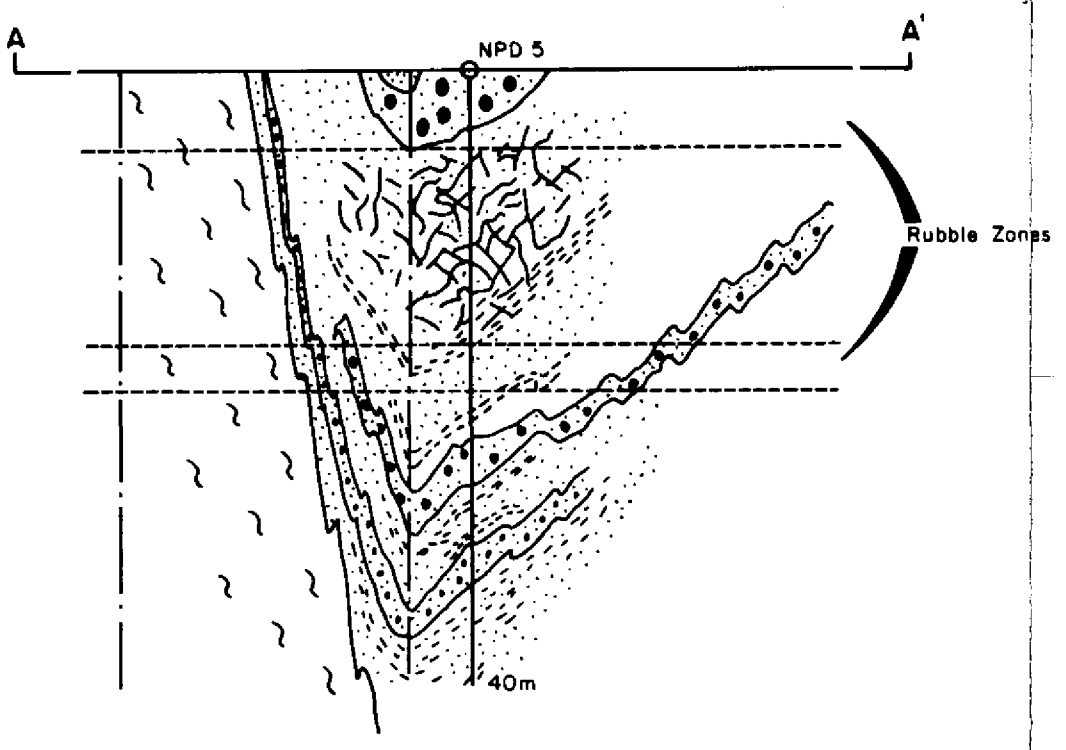
E.L. 1359

July 1979









Magnetic North = Grid North = 3°14' True North

SCALE: 1:500

0 10 20m

HORIZONTAL = VERTICAL SCALE

NOTE: Cross-section AA' and BB' viewed to north

Long-section CC' viewed to west

..... [o] limit >40m

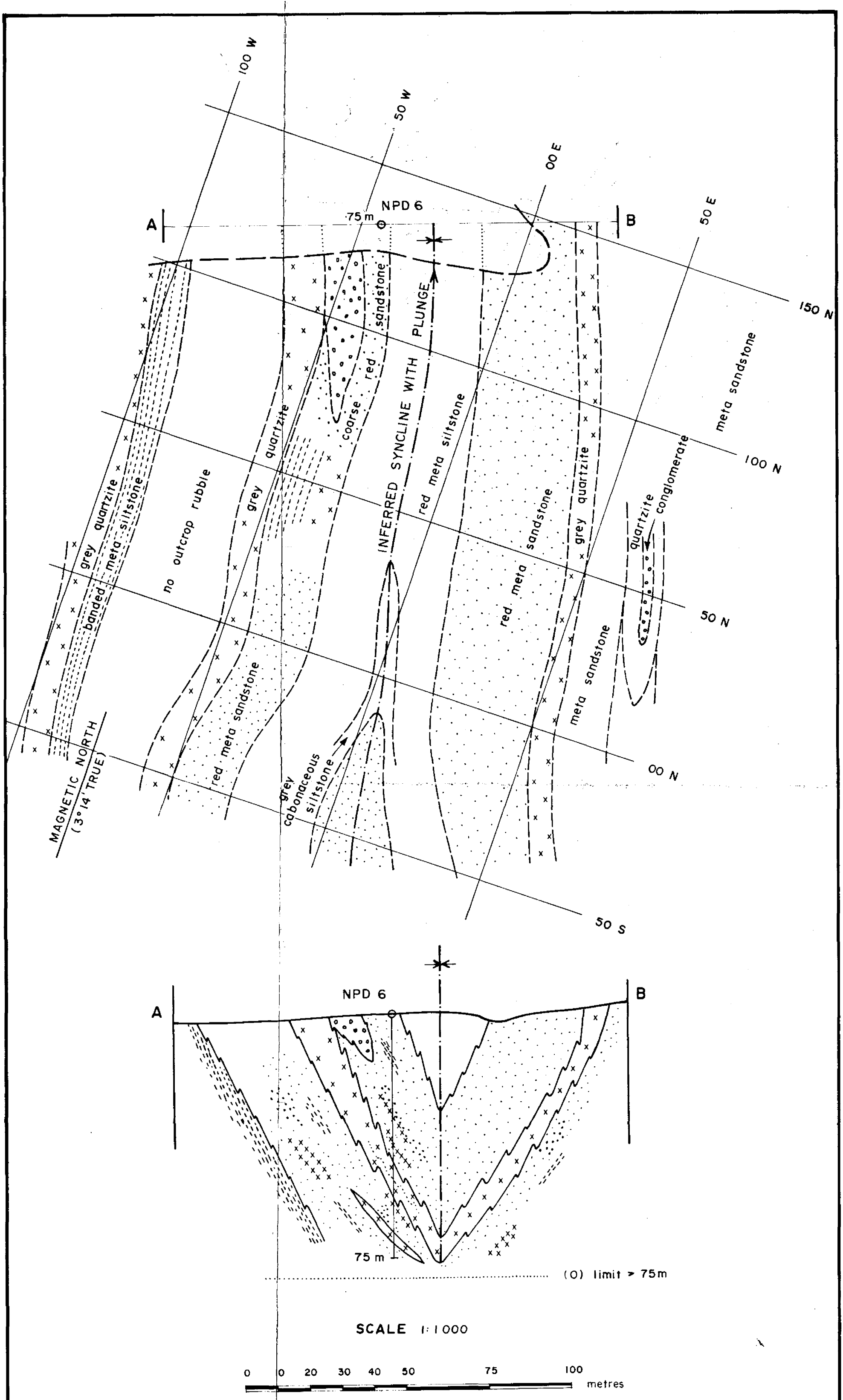
LEGEND

- Schistose meta-pelite: red/brown & brown/green metasiltstone & fine metasandstone
- Non-schistose fine red/brown metasandstone with intercalated breccia & veining-sulphide
- Red metasandstone: medium grain size
- Grey metasandstone: coarse quartz clasts up to coarse arenite-fine granule
- Carbonaceous meta sandstone with schistose bands
- Metaquartzite lens
- Alluvium
- Syncline with plunge
- Anticline
- Inferred fault
- Lithological boundaries
- Drill site with depth to bottom of hole (40)

PLATE 15

CR79/168

DWG No. 1657



SCALE 1:1000

0 0 20 30 40 50 75 100 metres

MAP 3. PROVISIONAL GEOLOGY 47/31 B

PROSPECT 47/31 B

SUTTONS PROJECT

E.L. 1359

Prepared by
ROBERTSON RESEARCH AUSTRALIA
July 1979

CR79/168

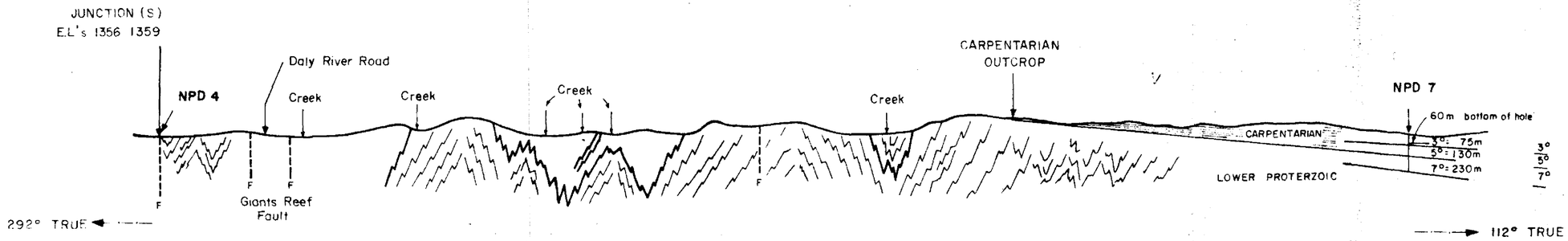
DWG No. 1658

PLATE 16

NPD 4
13°35S
130°45E

NPD 7

(LONGITUDINAL SECTION LOOKING NORTHERLY)



Average dip of Carpentarian Unconformity surface in corresponding depth to unconformity

MAP 4:

PROFILE FROM 35'S 130°45'E TO NPD 7
PROSPECT 49/36
SUTTONS PROJECT
E.L. 1359

SCALE
1:21800 (aprox)
0 500 1000 metres
No vertical exaggeration

Profile drawn from photo interpretation based on X4 enlargements of 1969 Government Photography. Topography reproduced from 1:100 000 sheets

PROVISIONAL DATA

PLATE 17

Produced by:
ROBERTSON RESEARCH AUSTRALIA
July 1979

CR79/68

DWG No. 1659

'CORNER ANOMALY'

N.W. CORNER E.L. 1359

TRUE NORTH
(356°46' MAGNETIC)

SCALE 1:5000

REFERENCE

——— Cleared lines

Plotted 6.7.79

Stacked profiles of Total Magnetic Intensity.
Values corrected for drift and diurnal.
Control values for this sector are :

A : 47211 γ
B : 47312 γ
C : 47265 γ

} relative to base control point for Keewanee grids "A" and "B"

Instrument : Scintrex MP-2 with fully extended staff in holster.

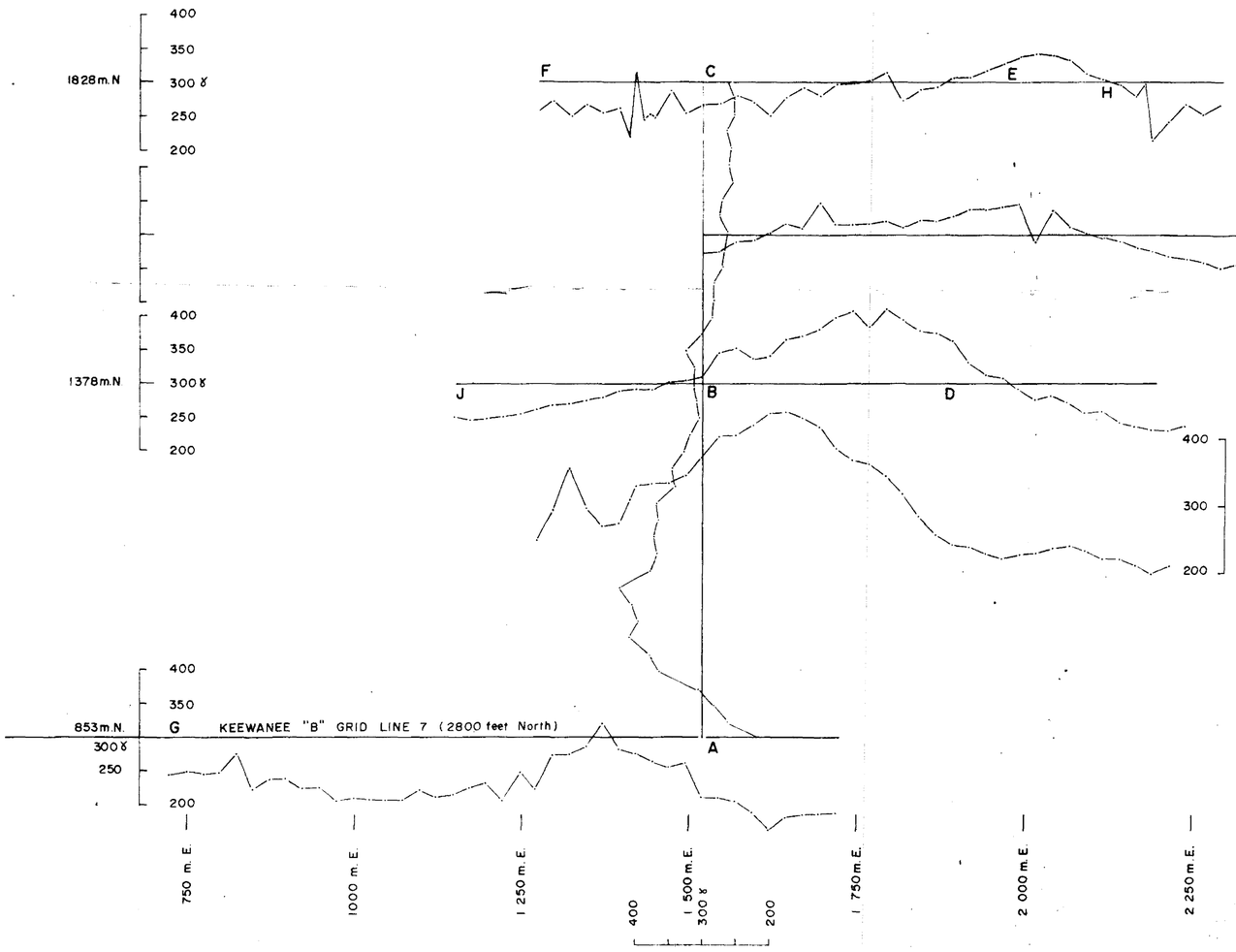


PLATE 18

Plan prepared by
ROBERTSON RESEARCH AUSTRALIA
October 1979

CR79/168

DWG No. 1660

GP9/168

DRILL HOLE COMPOSITE LOG

PLATE NO. 19

HOLE NO.: NPD1 N E

Project: SUTTONS E.L. No.: 1359 Prospect: NOLTENIUS

well foliated schistose metasiltstone

Fine grained metasandstone band in m-slst.

Dense black m-slst band in m-slst schists

M-slst schist with isolated arenite grade clasts

Veined strata

Geological Log	Grc. Log	m.	γ	Down-hole Logs S.P.	Res.	Assays (p.p.m.) Ag / Cu / Pb / Bi

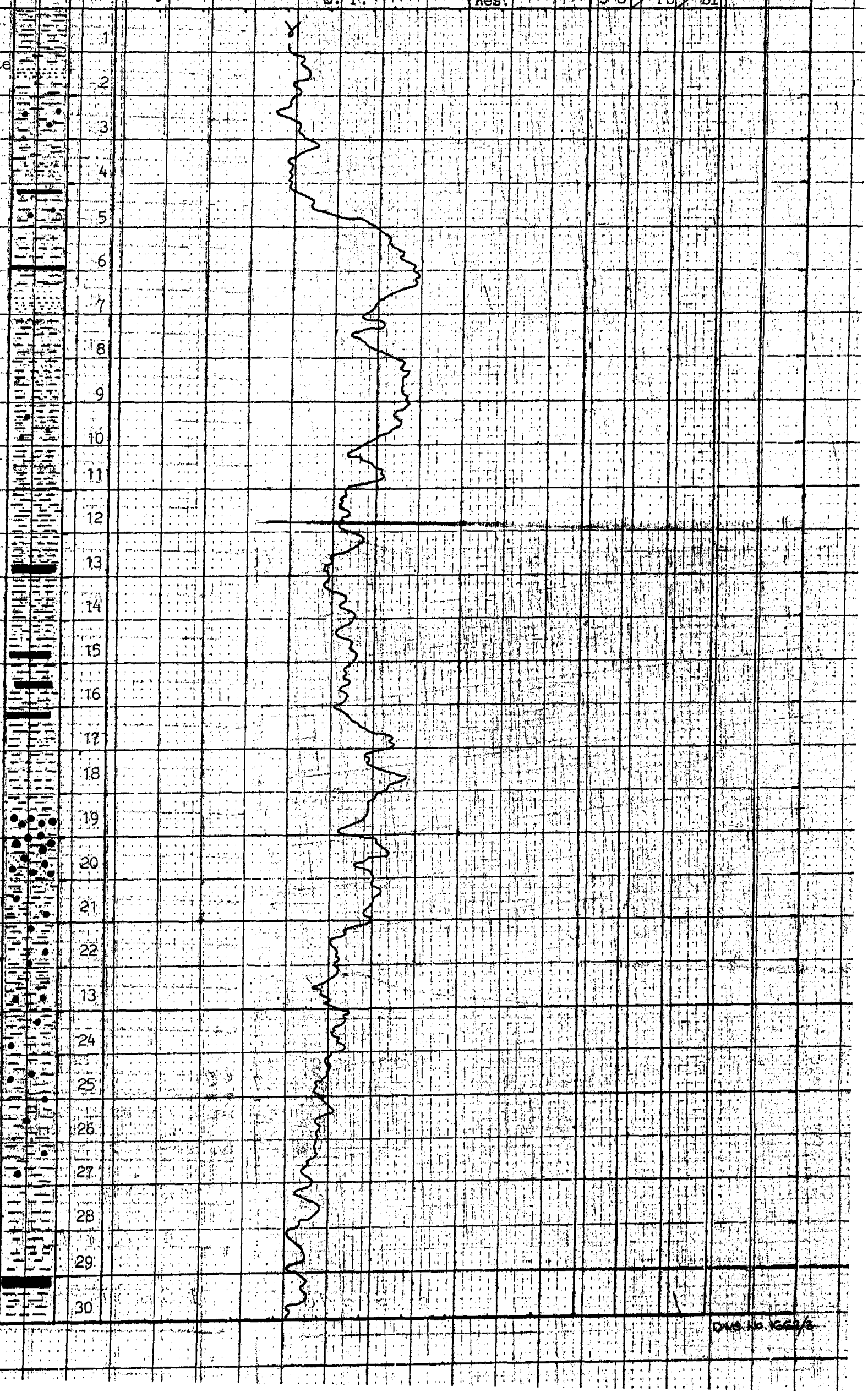
Surface [°] & near surface [°] indicated by red/brown/orange/yellow Fe oxide coatings (haemalite limonite, goethite) of earthing material pervade from 5m to 9m.

0 - 7m Silvery grey green qtz-white mica ± chlorite ± biotite m-slst schist and fine grained m-s/s (<0.5mm) with grained similar mineralogy. Thin bands of black non foliated well indurated qtzose coarser m-slst.

7 - 18.5m Greyish green chloritic and grey brown Hem m-slst schists with isolated coarser blue qtz clasts up to 1mm. Occasional thin bands of the black non-schistose coarser m-slst.

18.5 - 27m Grey green m-slst schists (qtz - white mica - chloritic ± Hem) & brownish bronze m-slst schists (qtz - white mica ± Hem - specular Hem - biotite ± chlorite) containing isolated qtz clasts (blue water clear) up to 1mm diameter.
Rare amounts of v. fine m-s/s with blue qtz clasts encased in qtz - Hem matrix (approx. 90% matrix).
Scattered veining - usually qtz but one instance of qtz vein with walls lined with Hem appear as 2° Hem after 1° sulphide. (approx. 24 - 25m). Some qtz veining ∥ cleavage.

27 - 30m Inc. amount of greenish chloritic m-slst schist (v. qtzose) and dec. brown Hem m-slst schists. Thin band of black non foliated well indurated speckled m-slst at 29m.



DWG NO 1668/2

DRILL HOLE COMPOSITE LOG

HOLE NO.: NPD4 N. E.

Project: SUTTONS E.L. No.: 1359 Prospect: NOLTENIUS

Geological Log	Grc Log	m.
30 - 31m Qtz granule Hem bimodal m-s/s with qtz-Hem matrix (approx. 8mm)		31
31 - 32m Thin band of fine g.s. chloritic m-s/s with coarse qtz granule bimodal Hem m-s/s		32
32 - 34m Continued inc. in coarseness of qtzose bimodal m-s/s - generally a greenish matrix with some bronzy Hem coatings on qtz clasts.		33
		34
34 - 40m Up to 50% free qtz. Coarse qtz - arenite to qtz - granule clasts (max qtz pebble grade approx 5mm) liberated by drilling from qtzose bimodal m-s/s - qtz / Hem matrix fine to medium arenite grade (0.5 to 1mm). Matrix varies from brown Hem type to green chloritic type. Some qtz granule m-qtzite in rocks with <15% matrix - some appears as m-qtzite breccia. Most free qtz contained in recovered samples is the remains of coarse qtz clasts & not vein qtz.		35
		36
		37
		38
		39
		40
40 - 46m Pale greenish grey v. qtz rich weakly foliated m-slst (qtz-white mica-chlorite-rare Hem) pale brownish grey Hem m-slst. Both types in equal abundance - often with Hem and chloritic types represented in 2 - 3mm.		41
		42
		43
46 - 49m Brownish well foliated qtz - Hem m-slst with thin band of black speckled well indurated non schistoic m-slst.		44
		45
49 - 50m Thin band of very weakly foliated Hem qtz-white mica m-s/s.		46
50 - 54m Brownish Hem and greenish grey chloritic qtzose m-slst as previously. Hem type has better developed cleavage. Thin non-foliated black speckled m-slst and weakly foliated qtz-white mica m-s/s at 53m to 54m.		47
		48
		49
		50
		51
		52
		53
54 - 60m Dominated by grey green qtz rich fine grained qtz - chlorite - white mica m-slst with a moderately well developed foliation (cleavage) forming semi-schists. Brownish bronze to reddish brown Hem coatings visible along some fractures and cleavage planes.		54
		55
		56
		57
		58
		59
		60

Down-hole Logs

S P. Res.

Assays (p.p.m.)

V	Cu	Pb	Zn	Bi
30	2	45	50	-5
250	2	25	70	-5
335	2	10	20	-5
60	2	5	30	-5
35	-2	5	15	-5
15	2	10	60	-5
10	10	5	60	-5
-5	2	10	55	-5
50	2	10	150	-5
15	-2	10	55	-5
10	3	10	50	-5

DWG. No. 1662/10

DRILL HOLE COMPOSITE LOG

CRP/166

HOLE NO.: NPD1 N. E.

Project: SUTTONS E.L. No.: 1359 Prospect: NOLTENIUS

Geological Log	Grc Log	m.	Down-hole Logs S.P.	Down-hole Logs Res.	Assays (p.p.m.) U_3O_8	Assays (p.p.m.) Cu / Pb	Assays (p.p.m.) Zn / Bi
60 - 75m Green to grey/green qtz - rich m-slst (qtz - white mica - chlorite - Hem ± biolite - specular Hem) schist - well foliated with pronounced cleavage. Inc. chlorite -> darker green schists. Inc. Hem -> brownish-bronze schists		61					
2° Hem as pinkish bronze coatings and disseminations along fractures and sometimes in cleavage.		62					
65 - 68m Greenish m-slst schist as detailed but with inc. in amount of disseminated pinkish bronze Hem - it is visible in approx 50% of chips without magnification.		63					
		64					
		65					
		66					
		67					
67 - 68m 40% briwbusg bribze qtz-Hem schist (m-slst)		68					
68 - 70m Greenish m-slst schist as detailed but containing 1° sulphide (Py?) as highly reflective brass yellow disseminations mixed with pinkish-bronze reflective to earthy coatings of 2° Hem in micro fractures veins and along cleavage i.e. 1° sulphide → 2° Hem oxide.		69					
		70					
		71					
		72					
		73					
		74					
		75					

NOTE : Deep oxidation profile indicated by first appearance of fresh sulphide at 72m.

Pinkish - bronze 2° Hem after 1° sulphide is pervasive at all levels.

Limit of surface and near surface oxidation marked by disappearance of hydrated Fe oxides (limonite and goethite) at approx 8m.

Depth to water table unkown. Dry hole to 75m.

"-" sign means less than

DWG.No.662/5

Cross Sect/Logs

PLATE NO 20

Page 1 of 3

DRILL HOLE COMPOSITE LOG

HOLE NO.: NPD2 N E

Project: SUTTONS E.L. NO.: 1359 Prospect: NOLTENIUS

Metasiltstone schist

Fine g.s. m-s/s - red-brown & grey green.

Bimodal m-s/s + coarser blue qtz clasts in fine arenite grade matrix.

Arenite grade m-qtzite with lens of slst grade m-qtzite.

Veined areas

Geological Log

GrC Log m.

Down-hole Logs γ S.P.

K FACTOR 4.5×10^{-6}

Assays (p.p.m)

U_3O_8 Cu/Pb Zn/Bi

35 10/15 10/+5

25 2/20 10/-5

30 -2/5 10/-5

40 2/10 20/-5

155 10/15 15/-5

95 2/10 10/-5

50 2/10 10/-5

40 -2/10 25/-5

0 - 2.8m Red/brown & yellowish red earthy Fe oxides & coatings on qtz med. g.s. (0.7-1m) non foliated greyish red m-s/s. Coarse qtz clasts & rare white mica plates in matrix of fine s/s grade (<0.5-0.7 mm) qtz + mica..

2.8 - 3.6m Moderately well foliated pale grey green qtz-white mica m-slst (± earthy Fe oxides)

3.6 - 4.4m m-s/s as in 0.2 but finer g.s. (<0.7mm)

4.4 - 5.2m grey green slst as in 2.8 - 3.6m.

5.2 - 6.2m grey brown to grey green qtzose m- s/s. Generally med. g.s.

6.2 - 9.4m Greyish green qtz rich m-slst. Well foliated qtz- white mica ± chlorite. Hem schist. Some v. fine arenite grade schist of similar mineralogy. Some qtz veining.

9.4 - 11.2m Reddish/bronze well foliated qtz-white mica. Hem. m- slst schist.

11.2 - 14.4m Med. g.s. (0.5-1mm) qtzose m-s/s. Clasts in finer qtz white mica - Hem matrix. Clasts are blue water clear type. Thin bands of grey green m-slst schist & finer qtzose m-s/s

14.4 - 30m Predominantly a med. to coarse grained (0.8-2mm) qtzose m-s/s, non-foliated, with coarser blue qtz clasts set in fine arenite grade qtz - Hem/or chorite ± white mica matrix. Chips are greyish brown or grey-green i.e. Hem or chlorite. Often the Hem- types are in the coarse arenite grades & frequently show a friable saccharoidal texture. This interval is essentially a bi-modal m-s/s with varying clast sizes in matrix components.

27 - 28m A murley brownish green, med. arenite grate m-qtzite.

DWG No 1562/G

20

DRILL HOLE COMPOSITE LOG

Page 2 of 3

HOLE NO.: NPD 2 N. E.

Project: SUTTONS E.L. NO.: 1359 Prospect: NOLTENIUS

Geological Log	Grc. Log	m.	Down-hole Logs S.P.	Res.	Assays p.p.m. U_3O_8	Cu/Rb	Zn/Bi
30 - 38.5m Bimodal qtzose m-s/s Brownish grey types with Hem-qtz matrix & greenish grey type with chloritic qtz matrix. Clastic blue qtz, clasts vary from med to coarse to qtz granule grade i.e. 0.7mm to 3mm. Thin Hem. veinlets common. Fine unimodal qtz-Hem m-s/s Veining common — latter qtz veins (~1mm) observed to intersect earlier qtz-chl veins Qtz granule m-s/s-Hem & coarse arenite grade m-s/s		31 32 33 34 35 36					
38.5 - 60m A medium arenite g.s. (approx. 1mm) m-qtzite. The qtzite is composed of the water clear well rounded blue qtz clasts that occurr in m-s/s. A grey colour generally pervades the qtzites but Hem in chlorite matrix components impart brownish grey & greenish grey colours respectively. Frequently a saccharoidal texture has developed due to production of qtz overgrowths during retrogressive met^{n} of qtzose s/s to m-qtzite. Thin bands of grey to greenish grey slst grade m-qtzite occur at 39m, 49m, & 55-57m. Med. g.s. m-s/s at 48m &51m due to inc. in matrix component - Hem, chlorite, white mica.		37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60					

DWG NO: 1662/7

DRILL HOLE COMPOSITE LOG

HOLE NO.: NPD 2 N. E.

Project: SUTTONS E.L. No.: 1359 Prospect: NOLTENIUS

Geological Log	Grc Log	m.	Down-hole Logs γ	S.P.	Res.	Assays (p.p.m.) U_3O_8	Cu	Pb	Zn	Bi
60 - 62m Med. arenite grade to fine arenite Hem m-qtzite. Thin sist grade grey m-qtzite.		61								
62 - 66m Bimodal brwonish grey qtz rich m-s/s. Clasts grom fine arenite (approx. 0.7mm) to coarse arenite grade (approx. 2mm). Generally a qtz-Hem ± chlorite & white mica matrix..		62								
		63								
		64								
66 - 68m Coarse arenite to qtz granule m-qtzite. Clasts 2-3mm set in qtz-Hem matrix.		65								
68 - 70m Fine g.s. (0.7mm) m-s/s with isolated coarser blue qtz clasts 2-3mm set in qtz-Hem matrix.		66								
		67								
70 - 71.6m V. qtzose m-slst & fine - med. g.s. bimodal m-s/s Brownish grey & greenish grey.		68								
71.6 - 75m Greenish grey chloritic qtzose fine to med. g.s. bimodal m-s/s. Isolated coarse arenite clasts.		69								
		70								
		71								
		72								
		73								
		74								
		75	20 cps cm^{-1} Running Speed 4m min^{-1}				15	2 / 5	20 / 5	

"-" sign means less than

NOTE : NPD 2 is dominated by v. qtz rich meta sandstones & metaqtzites, hence differentiation is very subjective.

: Earthy Fe oxides pervade to 14 m where yellowish orange limonite & geothite cease

: Deep oxidation profile indicated by occurrence of reddish bronze Hem veinlets throughout the 75m.

: Depth to Water Table : 21 m.

DWG. No. K62/8

CR79/158

DRILL HOLE COMPOSITE LOG

PLATE NO. 21

HOLE NO.: NPD4 N. E.

Project: SUTTONS E.L. No.: 1359 Prospect: NOLTENIUS

Metasilstone schists

M-slst schists with bands of m-qtzite & non-foliated m-slst

Meta sandstone fine g.s. (<0.7mm).

Meta sandstone bands in meta siltstone

Metasandstone - coarse arenite to granule (1mm to 4mm) grade clasts in a fine matrix - a bimodal m-s/s

Geological Log

GnC Log m.

Down-hole Logs γ S.P. Res.

Assays (p.p.m.) U_3O_8 Cu Pb Zn Ba

0 - 1m Trace amounts of uraniferous Hem m-s/s with red Hem qtz-mica m-slst schist. Red brown earthy Hem & yellow limonite as near surface [O] products pervade to 10 - 13m. Generally reddish m-slst to 3m.

3 - 8m Silvery grey green & brownish bronze qtz - approx. corres. to chloritic & Hem types resp. Trace vein qtz. Minor qtz veining (0.5mm) // cleavage.

8 - 9m Fine g.s. non foliated dark green m-s/s - v. qtzose & chloritic with lesser m-slst.

8 - 15m Brownish red well foliated Hem qtz-white mica m-slst schists with thin bands of brown orange massive fine grained m-qtzite. Trace amounts of green chloritic m-qtzite. The m-slst sometimes show segregation into qtz rich and Hem/mica rich layers

15 - 20m V. fine grained well indurated, moderate to weak foliation, qtz rich m-slst. Dark green to black colour - some saccharoidal pale grey green variants. The dk. green qtz chlorite semi-schists are as for 20 - 22m but lack coarser blue qtz clasts. Thin Hem. brown m-slst schist bands occurr occasionally.

20 - 22m Qtz chlorite (& white mica) saccharoidal semi-schistose m-slst with isolated blue qtz clasts up to 1 - 2mm. Rare Hem variants.

22 - 23m As for 20 - 22 but with inc. % of fine arenite grade matrix

23 - 30m Generally qtz rich bimodal m-s/s with water clear blue qtz clasts, often well rounded, up to 1.5 - 2mm encased in qtz (fine arenite grade) Hem /or qtz-chlorite matrix giving brownish and greenish m-s/s respectively Inc. grain size down hole.

DWG. No. 1662/5

GC 9/66

DRILL HOLE COMPOSITE LOG

HOLE NO.: NPD 1 N. E.

Project: SUTTONS E.L. No.: 1359 Prospect: NOLTENIUS

Geological Log

30 - 33m Grey green and grey brown chloritic and Hem m-slst schists. Thin band of black non-foliated m-slst. Also a v. fine non-foliated Hem m-s/s at 32 - 33m. Intense veining 32 - 33 with qtz/chloritic/specular Hem approx. 2° Hem veins up to 3 - 4mm wide.

33 - 47.4m Dominated by greenish m-slst schist - qtz, white mica, chlorite ± biotite ± specular Hem well foliated as previously. Pinkish, bronze 2° Hem coats cleavage and fractures in some chips - 1° sulphide (Py) disseminations may occur with 2° Hem approx. 33 - 34m.

37 - 39m Greenish m-slst schists as detailed but with prominant veining - milky white qtz veins up to 2 - 3mm wide.

47.5 - 50m Brown Hem m-slst schists (Qtz - white mica - Hem) showing some veining by qtz. Hem in veins may be 2° after 1° sulphide.

50 - 60m Greenish m-slst schists as detailed with thin bands of brown Hem schist at 52 - 53m and 57 - 58m - Hem schists appear to contain minor increase in veining by qtz.

Pink - bronze 2° Hem after 1° sulphide coats fractures and cleavage.

Grc Log

m.

Down-hole Logs: γ, S.P., Res.

Assays (p.p.m.): U_3O_8, Cu, Pb, Zn, Bi

20 cps cm^{-1}

Running speed 4m min^{-1}

DWG No. 1662/4

DRILL HOLE COMPOSITE LOG

HOLE NO. NPD4 N. E

Project: SUTTONS E.L. No: 1359 Prospect: NOLTENIUS

Geological Log	Grc Log	m.	Down-hole Logs γ	S.P.	Res.	Assays (p.p.m.) U_3O_8	Cu	Pb	Zn	Bi
60 - 62m Green chloritic qtzose m-slst schist with good cleavage.		61								
62 - 63m Green chloritic qtzose m-slst schist with red/bronze Hem veinlets (0.3mm) [2° Hem after 1° Py?].		62								
63 - 71m Dark greenish qtzose m-slst with moderate to well developed foliation → qtz-chlorite ± white mica schists. Often they contain a bronze sheen on cleavage surfaces and in franctures. Bronze to bronze/black patches merge to more earthy pinkish bronze patches inferring 2° Hem after 1° sulphide.		63								
		64								
		65								
		66								
		67								
		68								
		69								
		70								
71 - 72m Green chloritic qtzose m-slst schist with finely disseminated 1° sulphide (Py) and 2° Hem in fractures		71								
		72								
73 - 75m		73								
		74								
		75								

γ 50 cps cm^{-1}

Running speed 4m min^{-1}

10 | 2 | 10 | 45 | -5

"-" sign means less than

NOTE: Occurrence of pinkish - bronze 2° Hem (as ferrous ions) along fractures and cleavage, plus reddish - bronze 2° Hem (ferric) in veinlets infers oxidation of 1° sulphides to 2° iron oxides. This indicates a deep oxidation profile to approximately 70m - the level at which unaltered 1° sulphide (Py) is first encountered.

Limit of surface and near surface oxidation approx. 5m - marked by the general decrease in abundance of hydrated 2° Fe oxides (limonite and geothite)

Depth to water table: unknown, although it would be expected before 80m, as damp sample was returned from 68m during drilling.

DWS No. 1662/11

DRILL HOLE COMPOSITE LOG

PLATE NO. 23

HOLE NO.: NPD5 N E

Project: SUTTONS E.L. NO.: 1359 Prospect: 46/37A

Soil in rubble zone

Metasiltstone schist

Metasandstone semi schist

Fine & Med. g.s.

Bimodal m-s/s. Blue qtz clasts set in finer arenite grade matrix.

Brecciated & veined lithologies ; % indicates sulphide abundance in total chip log.

Geological Log	Grc Log	m.	Down-hole Logs γ	S. P.	Res.	Assays (p.p.m.) U_3O_8 Cu / Pb Zn / Bi
0 - 5m Soil & rubble zone earthy Fe oxides (red, brown Hem, yellow-orange limonite & goethite) coat milky white qtz pebbles contained in rubble zone therefore these qtz pebbles are approx 75% of recovered sample. Rock chips include Fe stained red qtz-mica, fine grained m-s/s-non foliated. Vein qtz with green chlorite ± sulphides have a gossanous-vughy appearance. Saccharoidal qtz fragments common -- pale green.		1 2 3 4 5				
5m - coherent rock		6				
5 - 16m Heavily veined, brecciated fine to med. g.s. m-s/s - some bimodal but mainly a friable saccharoidal pale grey green qtz-chlorite white mica m-s/s (some semi-schists) G.s. - 0.4 to 0.3mm More[o]ed. m-s/s & red/brown similar to surface expression. Veins infilled to form a coarse qtz granule/qtz pebble m-qtzite breccia. Dk. green chlorite stringers & coarse patches of granular euhedral to anhedral microfractured sulphide (Py) infill the breccia. Add. sulphide are massive Po [also as inclusions in Py) Cp with marcasite & Asp? Trace Av? in 10-12m interval. Py is dominant but with only trace amount of other sulphides. S. min[n] appears in veins and as interstial fillings to qtzose m-s/s. Occasionally visible in cleavage of meta schists.	2% 2% 3% 5% 5% 6% 3% 3% 4%	7 8 9 10 11 12 13 14 15				
16 - 18m Fine g.s. saccharoidal qtz-white mica m-s/s schist with moderately well dev. foliation. Grey-green colour with minor chl. & only trace amts. of S. - aggregates, veinlets and perhaps along cl.	1%	16 17				
18 - 21m Rubble zone with boulders of Q qtz - chlorite - mica m-s/s giving pinkish Hem taint to chips - the s/s is very friable. Hem qtz-chl. - S. breccia abundant 19-19m.	2% 2%	18 19				
21 - 23m Fine qtz-white mica-chl. m-s/s schists as in 16 - 18m.		20				
23 - 24m Fine g.s. grey green non-foliated qtz-mica-chl. m-s/s.		21				
24 - 27m Med. g.s. qtz-chl-white mica non-foliated S bearing grey green m-s/s & qtzite breccia (minor) Bands of m-slst (dk. green black well indurated)schist & pale green m-s/s semi schist.	4% 3% 1%	22 23 24				
27 - 29m Fine g.s. friable pale green qtz-chl m-s/s. Veined → qtz-chl (dk. green) - Sulphides (Py mostly).	2% 3%	25 26				
29 - 30m V. fine saccharoidal pale green grey qtz-mica-chl m-slst schist.	2% 2% 2%	27 28 29				
	2%	30				

γ 20 cps cm^{-1}

Running Speed 4m min^{-1}

DWG. No. 1662/12

DRILL HOLE COMPOSITE LOG

HOLE NO.: NPD 5 N. E.

Project: SUTTONS E.L. No. 1359 Prospect: 46/37A

Geological Log	Grc Log m.	Down-hole Logs S. P.	Res.	Assays (p.p.m.) U_3O_8	Cu	Pb	Zn	Bi
30-31m As for 29-30m	31			-5	50	2	15	15
31-35.4m Mod to coarse (1-1.5mm) qtzose green/brown bimodal m-s/s with fine s/s matrix. Non-foliated -qtz-chl-Ht-S bearing.	32			-5	40	2	14	14
	33			-5	130	2	10	10
33.4-40m Fine grained qtz-white mica-chlorite pale grey green well foliated m-s/st schist with less well foliated saccoroidal qtz-chloride pale green m-s/s semi-schist. Disseminated sulphides (Py and Asp?) may coat cleavage and micro fractures of m-s/st schists.	34			-5	390	2	10	10
	35			-5	40	2	15	10
	36			-5	20	2	15	10
	37			5	40	2	20	10
	38			-5	25	2	15	15
	39			-5	35	3	10	10
	40			-5	40	2	10	10

"-" sign means less than

NOTE: Earthy Fe oxides (hydrated limonite / goethite) coat chips to 25 m. Bronze Ht present at 33 m. Deep oxidation inferred despite presence of 1% sulphide at high levels, i.e. localised [o] conditions pervade to at least 33 m.

Depth to Water Table: 11 m.
Standing Water Level rose to 3m.

Confirmatory ore microscopy detailed by H.W. Fander, Central Mineralogical Services.
Report No. C.M.S. 79/7/33
Ref. PDH 5
Examination material from 10-12m interval

DWG No 1662/13

DRILL HOLE COMPOSITE LOG

PLATE No. 23

Page 1 of 3

HOLE NO. NRD 6 N E

Project: SUTTONS E.L. No.: 359 Prospect: 4/135

Metasiltstone schists — Very fine g.s, m-s/s - friable

Bimodal m-s/s-coarser blue qtz clasts set in finer arenite grade matrix.

Coarse arenite in qtz. granule m-qtzite

Geological Log

G.C. Log

m.

Down-hole Logs: γ, S.P., Res.

Assays: U3O8, Cu, Pb, Zn, Bi

0-1m. Soil and rubble zone, free qtz in soil and rubble to 1m.

1-3m. Coherent rock -heavily O red m-s/s with red Ht and yellow-orange limonite coatings; m-s/s in bimodal qtz clasts in qtz-mica -Fe oxide matrix

3-13m. Qtzose bimodal m-s/s non-foliated as for previous. Blue water clear qtz clasts from 0.8-2mm, often well rounded encased in qtz-white mica and lesser Ht with chlorite; finer arenite grade matrix.
Chloritic types have pale grey green colour, Ht^{ic} types pass from rust red/brown colours to purplish bronze colours at below 5m.
Larger clasts of black, bronze somewhat vitreous platy mineral contained in most intervals - it is specular Ht plates and possibly rare biotite.
Limit of earthy hydrated Fe oxides (limonite) is 11m.
Minor amounts of qtz-chlorite in qtz-Ht veins (usually <1mm) occur at most intervals but not abundant.

13-30m. Dominated by fine m-s/s with g.s 0.5-0.8mm.
Generally a brown-bronze-mauve coloured Ht^{ic}-qtzose-white mica ± biotite ± specular Ht non-foliated m-s/s with some more greenish grey chloritic horizons.
Thin interbedded bands of bronze Ht m-s/st schist and green saccharoidal chloritic m-s/st schist occur throughout but are replaced by coarser bimodal m-s/s below 25m. i.e. possibly a broad graded bed.

Qtz-chlorite and qtz-specular Ht. veins occur sporadically.

Coarse bimodal Ht^{ic} qtzose m-s/s clasts 1-2mm.

DWS. No. 1662/14

DRILL HOLE COMPOSITE LOG

HOLE NO.: NPD.6 N. E.

Project: SUTTONS E.L. No.: 1359 Prospect: 4/7/13/13

Geological Log	Geo Log	m.	Down-hole Logs S.P.	Down-hole Logs Res.	Assays (ppm) U_3O_8	Assays (ppm) Cu / Pb	Assays (ppm) Zn / Bi
30-31.5 Coarse (1-2mm) Ht^{ic} qtzose bimodal mus/s ē blue qtz clasts in a brownish Ht-qtz ē white mica matrix (in 0.5-0.8mm)		31	0	1200	-5	5 / 10	30 / 10
31.5-32.5 Coarse qtz granule metaqtzite-blue qtz clasts up to 3mm ē v.little matrix(Ht^{ic})		32					
32.5-35m Fine to med. (max. 1mm) brownish (Ht^{ic}) in pale grey green (chloritic) qtzose bimodal m-s/s. ē interbedded qtz-white mica-Ht = chlorite m-s/st schists.		33					
		34			-5	5 / 10	40 / 10
35-41.8m Fine grained (<0.8mm) qtzose m-s/s (qtz-white mica) predominantly being pale greenish grey saccharoidal chloritic m-s/s. Occasionally a weak foliation is visible. Finer bands of grey-green m-s/st. are strongly foliated qtz-white mica-chlorite schists.		35					
		36					
		37					
		38					
		39			-5	10 / 10	30 / 15
		40					
41.8-42.6m. Qtz granule m-qtzite ē brouze Ht in green chl.coatings		41					
42.6-46m. Similar interval to 35-41.8m ē fine gs. chloritic m-s/s in interbedded m-slst schists.		42			10	2 / 10	10 / 10
		43					
		44			20	5 / 10	15 / 10
		45			65	2 / 10	20 / 10
46-51.5m. Qtz. granule metaqtzite. Qtz clasts up to 4mm. coated with bronze Ht disseminations and/or dark green chlorite stringers. Qtz is similar to that of bimodal m-s/s, i.e. it is not a qtz breccia.		46			10	5 / 10	15 / 10
		47					
		48			5	2 / 10	10 / 10
		49					
		50			-5	2 / 10	5 / 10
51.5-52.4m. Fine g.s. qtz-Ht brownish non foliated m-s/s.		51					
52.4-52.6m. V.soft bronze Ht^{ic} qtzose m-s/st. schist.		52			-5	2 / 10	5 / 10
52.6-56m. Qtz granule m-qtzite in coarse qtz granite m-qtzite as in 46-51.5m, but slightly finer grained. Fine m-s/s band at 55m.		53					
		54			10	5 / 10	10 / 10
		55			-5	10 / 15	5 / 5
56-58m. Very fine grained (<0.7mm) qtzose greenish chloritic m-s/s - friable saccharoidal type non foliated.		56					
		57					
58-59m. Coarse arenite grade m-qtzite-Ht^{ic} and/or chl.coatings.		58					
		59					
59-60m. As for 56-59m.		60					

DVS. No. 1662/15

DRILL HOLE COMPOSITE LOG

HOLE NO. NPD 6 N. E.

Project: SUTTONS E.L. No.: 1359 Prospect: Lyons

Geological Log

Grc Log m.

Down-hole Logs S. P. Res.

Assays (ppm) U_3O_8 Cu Pb Zn Bi

60-65m. As previous with a very fine grained saccharoidal ~~pale green chloritic qtzose~~, non-foliated m-s/s with thin coarse m-qtzite band of arenite grade clasts

65-66.5m. Brownish fine grained ~~qtzose Ht. m-s/s with some~~ semi-schistose m-s/s.

66.5-69m. Green and brown qtz. granule (3mm) chl. and/or ~~Ht^ic~~ m-qtzite

69 - 75m. Generally fine grained brownish ~~Ht^ic~~ m-s/s with max. up to med.grain (≤ 1mm) bimodal type (74-75m). Thin bands of coarse qtz arenite (.5-2mm) m-qtzite in ~~bronze Ht^ic~~ m-s/st. schist (70-71.5m).
~~Pale green chloritic~~ m-s/s generally absent.

61 62 63 64 65 66 67 68 69 70 71 72 73 74 75

0 1200

γ 20 cps cm.$^{-1}$

Running Speed 4m.min^{-1}

"-" sign means less than.

NOTE: Earthy hydrated Fe oxides extend to 11m. (limonite and goethite)

Deep oxidation profile inferred from presence of bronzy Ht. disseminations - possibly after 1° sulphide, i.e. at >75m.

Depth to Water Table: essentially a dry hole but recovered sample started balling at 74M.

DMS No. 1662/16

CC79/158

PLATE No 24

Page 1 of 3

DRILL HOLE COMPOSITE LOG

HOLE NO.: NPD 8 N. E.

Project: SUTTONS E.L. No.: 1359 Prospect: NOLTENIUS

Metasiltstone schists

M-slst schists with bands of m-qtzite & non foliated m-slst.

Fine g.s. m-s/s bands in m-slst schists.

Fine g.s. metasandst., (<0.7mm)

Metasandstone - coarse arenite to granule/ pebble grade (1-4mm+) clasts in finer arenite matrix - a bimodal m-s/s

V. coarse arenite to qtz granule/pebble m-qtzite

Veined areas

Geological Log

Grc. Log

m.

Down-hole Logs

S.P. Res.

Assays

U_3O_8 Cu Pb Zn Bi

0-2m Red-brown and orange - yellow oxides (H+, limonite, geothite) pervade &coal m-s/st schists & coarser, bimodal ,-s/s to Zm. Qtz-mica-specular H+ + earthy ovides in slat n s/s.

2-4m As for 0-2m but with fresher m-slst appearing as silvery grey green schists. Some m-s/s appears similar to uraniferous Hem s/s of Q-1m in NPD 1.

4-6m Strongly schistose m-slst. Brownish Hem - qtz-mica & silvery grey green qtz-white mica-chlorite types. ~ 4% milky white vein qtz in 4-5m, often with plates of black vitreous specular Ht. Some slst. show segregation into qtz rich in mica rich bands.

6-10m Reddish brown Hem - m-slst schists with thin non foliated bands of black m-s/s (fine gs) and some vein qtz.

Qtz and specular Ht vein ~ ll foliation.

10-12m Him m-s/st schist but with inc. amts. of weakly foliated m-s/s (V. fine arenite grade, qtz white mica), Hem). Qtz and/or spec. Hem veins up to 0.7 mm at 90° or ll to cleavage.

12-13m Red brown Hem m-s/st schist and silvery grey green m-s/st schists in equal amounts

13-14m Dominated by dk green to black qtz rich mon foliated m-s/st (qtz-chl-spec Ht).

14-21.6m M-s/st showing varying degrees of schistosity but generally weak to only moderately well developedped Pale grey green chloritic qtzose (+ minor white mica) type and pale brown Hem qtzose type. Thin bands of non-foliated dk green to black m-s/st as in 13-14m. Also bands of s/st to v. fine arenite grade (<0.5 mm) pale orange .brown m-qtzite and trace amts of pale green m-qtzite. Minor vein qtz.

21.6-23m First appearance of m-s/s with coarse arenite granite blve qtz clasts.

23-25m Grey green m-s/st schists containing isolated blue qtz clasts replaced by Hem m-s/s with qtz clasts up to 3 mm (granule) encased in fine arenite qtz-Hem matrix.

25-29m Coarse arenite to qtz granule and small pebble bimodal m-s/s (mdy clast ~5mm) with rounded blue water clear qtz clasts encased in fine arenite grade qtz-Hem matric. Black s/st lithic fragment observed in 27-28m. This interval of qtz rich m-s/s tend to m-qtzite.

29-30m Coarse arenite grade (1.5-2 mm) v. qtzose Him bimodal m-s/s tending to arenite grade m-qtzite

DWG. No. GG2/17

CR 9/106

DRILL HOLE COMPOSITE LOG

HOLE NO.: NPD 9 N. E.

Project: SUTTONS E.L. No.: 1359 Prospect: NOLTENIUS

Geological Log	Grc Log	m.	Down-hole Logs γ	S.P.	Res.	Assays (p.p.m.) U3O8	Cu / Pb	Zn / Bi
30-34m Pale green grey qtz - white mica - chlorite m-s/st. Well developed foliation < weak to moderate foliation.		31						
		32						
		33						
34-37m Strongly Hem qtz-white mica m-s/st. schist.		34						
		35						
	Strongly Hematitic	36						
37-46m Most recovered chips are pale greenish grey qtz-white mica - chlorite + Ht m-s/st schists and semi-schists - some massive non-foliated chips (< 10%). Pale brown dust colour within this interval indicates a probable larger Hem m-s/st component that has not been coherent enough to provide sufficiently large chips. 42-43m has a 0.3 mm vein of black vitreous plates of specular Ht.		37						
		38						
		39						
		40						
		41						
		42						
		43					% 5 / 15	30 / 20
		44						
		45						
46-47m As for 30-34m.		46	γ					
47-50m As for 37-46m		47						
		48						
		49						
50-51m As for 30-34m		50						
51-52m Strongly Hem brownish qtz-white mica m-s/st - well foliated.		51					5 / 20	35 / 20
52-55m Grey to pale green grey foliated m-s/st - qtz white mica ± rare chlorite. (There is no extensive veining, alteration, lithological or mineralogical variation to provide quick reasoning for γ log peak.)	Sl. Ht.	52				-5	5 / 20	40 / 20
		53				5	5 / 20	50 / 20
		54				90	5 / 30	40 / 20
55-57m Pale greenish grey qtz - white mica ± chlorite m-s/st.		55				50	2 / 20	40 / 20
		56				20	10 / 20	35 / 15
57-60m Strongly Hem qtz-white mica m-s/st schist interval with lesser grey green schist.		57						
		58						
		59						
	Strongly Hematitic	60						

DWG No. 1662/21

2c

GD79/108

DRILL HOLE COMPOSITE LOG

HOLE NO. NPD 9 N. E.

Project: SUTTONS E.L. No.: 1359 Prospect: NOLTENIUS

Geological Log	Grc Log	m.	Down-hole Logs γ	S.P.	Res.	Assays p.p.m. U_3O_8	Cu	Pb	Zn	Bi
60-61m Pale grey green m-s/st as in 37-46m		61				-5	35	30	35	20
		62								
62-63m Strongly Hem brown m-s/st as in 57-60m		63								
63-73m Pale green to grey green qtz-white mica-chlorite mOs/st as in 37-46m		64								
64-65m contains trace amts. of pinkish bronze Ht on fractures - possibly 2^o Ht after 1^o sulphide		65								
		66								
		67								
		68								
		69								
		70								
		71								
		72								
73-74.5m Thin band of grey s/st grade gs m-qtzite - sacogariodal texture.		73								
74.5-75m Pale grey-green qtz-white mica-chlorite m-s/st		74								
		75	γ 100 cps cm^{-1} Running Speed 4 m min^{-1}							

"-" sign means less than

NOTE: NPD 9 is essentially monolithological metasiltstone showing varying degrees of foliation and Ht content. Much of the non foliated Hem s/st contains Ht not as a surface veneer but rather as a constituent of the rock i.e. possibly 1^o Hem siltstones.

All the s/st variants frequently have dk black patches - where coarse enough for streaking they provide red powder 180% of time) and white powder, hence interring Ht and biotine respectively.

The s/st of NPD 9 appear more qtzose less chloritic and potentially less sulphide bearing c.f. NPD 4, 8, 1 although they all appear in the same s/st unit.

Limit of surface near surface oxidation : vague possibly as deep as 15 m.
Deep oxidation pervades beyond 75m.

Depth to Water Table is 10 m (first damp sample).

DWG. No. 1662/22

CR79/168

DRILL HOLE COMPOSITE LOG

PLATE NO. 25

HOLE NO.: NPD 9 N. E.

Project: SUTTONS E.L.No.: 1359 Prospect: NOLTENIUS

Well foliated grey-brown & grey green metasiltstone.
Non foliated grey-brown & grey green metasiltstone
Foliated & non-foliated metasiltstone
Metaqtzite

Geological Log

Geo Log m.

Down-hole Logs S.P. Res.

Assays (p.p.m.) U_3O_8 Cu/Pb Zn/Bi

0-2m Alluvial soil and rubble zone. Rubble consists of brown m-s/st with earthy Fe oxides of red/rust brown Ht, yellowish-orange limonite and/or geothite.

2-6m Coherent rock at 2m still brown m-s/st heavily coated with earthy Fe oxides. Fresher less [O] chips show grey brown colour, strong foliation (cleavage) with a silvery sheene on the cleavage surface. The dominant lithology is a qtz-white mica m-s/st schist.

6-8m Fresher chips show the brown grey m-s/st schist as previously with also a brown non-foliated coarse qtz-mica m-s/st.

8-9m Silvery grey/brown to brown qtz-mica m-s/st; 90% schistose and 20% massive. Coarse black vitreous plates of specular Ht and qtz veins with red Ht coatings in schists. Red Ht veins 9.5 mm dip.

9-12m Dominantly brownish massive non-foliated qtz-white mica-Ht m-s/st. Limonite pervades to 12m.

12-15m Grey brown and grey green m-s/st. Strongly foliated and weak to non foliated types in equal amts Both are qtz-white mica + Ht + chlorite (rare) m-s/st. Red Ht veinlets and coatings to cleavage are common.

15-22m Generally a grey brown micaceous m-s/st schist and grey green micaceous but more qtzose non-foliated m-s/st in equal amts. (schist > non-schist) Veining is visible in most intervals as
: deep red/black Hem veinlets 0.3mm
: qtz-Ht veins up to 1 mm
: black metallic Ht > 1 mm
: coarse qtz veins up to 2 mm (generally in non-foliated type)
All vein types cross cut or run ∥ to foliation.
18-20m - strong Hem.

22-27m A strongly Hem interval of well foliated to weakly (and non-) foliated qtz-mica m-s/st. Some more massive, well indurated darker coloured chips (almost black) give a red streak indicating probable 1° Ht as disseminations Red Ht still coats fractures and cleavage.

27-28m More micaceous greenish grey m-s/st schist - minor chlorite

28-29m Strongly Hem m-s/st as in 22-27 m.

29-30m More micaceous m-s/st as in 27-28m

Strongly Hematitic

5 2/10 10/15

0029/166

DRILL HOLE COMPOSITE LOG

HOLE NO. NPD 8 N. E.

Project: SUTTONS E.L. No.: 1359 Prospect: NOLTENIUS

Geological Log	Grc Log	m.	Down-hole Logs S. P.	Res.	Assays U3O8	Cu / Pb	Zn / Bi
30-32m Coarse m-qtzite with blue qtz clasts from 2-5mm forming > 95% of chips. Matrix component minor as Hem and qtz. Grey/brown (pale) colour		31					
		32					
32-33m As for 30-32 but only coarse arenite grade (2mm) qtz clasts. Matrix inc → s/s		33					
33-38m Him bimodal pale grey/brown m-s/s. Some clasts up to granule grade but usually med. to coarse arenite [(1-2mm) {~35m granule grade)] grades encased in finer arenite grade qtz-Ht matric. Some chlorite in matrix → pale green colour.		34					
		35					
		36					
		37					
38-39m Coarse arenite grade m-qtzite band in fine-med gs (0.5-1mm) Hem qtzose brown m-s/s		38					
39-40.2m Fine gs (0.5mm) qtz Ht m-s/s (unimodal) - pale grey saccharoidal type + dk green chloritic type.		39					
40.2-44m Moderately well foliated qtz-white mica m-s/st. Generally pale to dk green chloritic m-s/st. Minor amounts of brown Him s/st. Thin Hem m-s/s (fin gs) bands occur.		40					
		41					
		42					
		43					
44-45m Bimodal Hem m-s/s with med-coarse gs (102mm) blue qtz in finer qtz-Hem matrix-brown/grey colour.		44					
45-46m Green chloritic qtz-mica schist (m-s/st) » non foliated Hem brown qtz rich m-s/st.		45					
46-48m Pinkish bronze qtz-mica-Ht m-s/st schist and minor amounts of more qtzose non-foliated Hem m-s/st.		46					
		47					
48-52m Combination of pinkish bronze Hem and greenish grey chloritic qtzose micaceous m-s/st - both moderately well foliated and in equal abundance. Hem type appears similar to 2° Ht after 1° sulphide types. Sporadic qtz veining + Ht + chlorite.		48					
		49					
		50					
		51					
52-60m Well foliated green qtz-chlorite m-s/st schist. Pinkish bronze disseminations coat cleavage and fractures - 2° Ht. 1° sulphide present as disseminations of Py in fractures and on cleavage. Sporadic qtz veining 54-55m. 1° Py and 2° Ht observed in contact on some fractures.		52					
		53					
		54					
		55					
		56	200 cps cm				
		57					
		58					
		59					
		60					

			Nil return during drilling
10	2	60	10
15	2	65	15
5	2	60	15
40	2	70	15
85	5	80	20
180	5	80	20
80	5	70	20
45	2	65	15
35	2	65	15
30	2	60	20

DWG. No. 1662/18

CR79/166

DRILL HOLE COMPOSITE LOG

HOLE NO. NPD 8 N. E.

Project: SUTTONS E.L. No.: 1359 Prospect: NOLTENIUS

Geological Log	Grc Log	m.	Down-hole Logs γ	S.P.	Res.	Assays Ti_3O_8	Cu / Pb / Zn / Bi
60-72.8m Qtz-chlorite m-s/st as previous but marked dec. in amt. of pinkish-bronze Ht traces Ph also less abundant but observed in 62-63m and 67-69m. There appears to be a sympathetic decrease in intensity of foliation down hole. Qtz. veining is sporadic but increased at 72m (~2-3% cf. < 1% 60-72m)		61					
		62					
		63					
		64					
		65					
		66					
		67					
		68					
		69					
		70					
		71					
72.8-74.2m Intensely veined qtz-chl m-s/st schist. Milky white vein qtz with bronze Ht coatings ~12% of sample.		72					
		73					
74.2-75m Qtz-chl m-s/st schist with minor pale green saccharoidal m-qtzite.		74					
		75					

20 cps cm^{-1}
Running Speed 4 m min^{-1}

"-" sign means less than

NOTE: First appearance of 1° sulphide verified at 62m. Perhaps 1° sulphide at 60m.
Deep oxidation profile.

Surface and near surface oxidation forming earthy hydrated Fe oxides to max of 12 m.

Depth to Water Table ; damp sample at 46 m.

DWG. No. 1662/19

LEGEND

QUATERNARY	Qa		sand, soil, clay, alluvium
CAMBRIAN	€	?JINDUCKIN FORMATION TINDALL LIMESTONE	calcareous siltstone, limestone, basal arkose
		Unconformity	
MID-PROTEROZOIC (CARPENTARIAN)			fine to medium grained orthoquartzite and quartz arenite
		Unconformity	
LOWER PROTEROZOIC	bn bp bc ba bg	BURRELL CREEK FORMATION (Plb)	bp: muscovite quartz schist – metapelites, occasional current bedding and penecontemporaneous slump structures preserved bc: carbonaceous schist – ex black shale ba: quartz muscovite schist – fine to coarse meta-arenites, granule beds bg: greywacke. distinctive dark outcrops bn: andalusite muscovite quartz schist
	na2 na1	NOLTENIUS FORMATION (Pln)	na2 na1 quartz muscovite schist – medium to coarse meta – arenites, granule beds, frequent quartzite horizons. Rare graded bedded. conglomerate marker: quartz and quartzite pebbles to cobbles, some boulders.

Geological boundary

Geological boundary inferred from drilling

Anticline

Syncline, showing plunge

Fault

Strike and dip of strata

Vertical strata

Trend lines

Vein q-quartz

E.L. boundary

Major road

Tracks

GEOLOGY OF PART EL1356 AND EL1359
Daly River District
NORTHERN TERRITORY, AUSTRALIA

MOBIL ENERGY MINERALS AUSTRALIA INC.

SUTTONS PROJECT 1052

SCALE 1:25 000

metres 500 0 0·5 1 1·5 2 2·5 3 kilometres

Dwg Nº

Plan prepared by Robertson Research Australia

Oct. 1979

PLATE 2

DWG No 1661