Open File Envelope No. 3776

EL 578 AND EL 981

TUMBY BAY (WARUNDA)

PROGRESS AND ANNUAL REPORTS FOR THE PERIOD 16/1/80 TO 28/12/82

Submitted by

Afmeco Pty Ltd
1983

Enquiries: Customer Services
Ground Floor
101 Grenfell Street, Adelaide 5000

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

PRIMARY INDUSTRIES AND RESOURCES SA

CONTENTS ENVELOPE 3776

TENEMENT: E.L. 578 - Warunda - Eyre Peninsula South.

TENEMENT HOLDER: AFMECO Pty. Ltd.

Env. No. 3776
EL No. 578/981

Aerial Geophysical Surveys

~~Magnetic data tapes~~ covering:

✓ Magnetic -

✓ Radiometric -

~~VLF-EM -~~

~~EM -~~

~~INPUT -~~

~~Other -~~

(Delete as necessary)

Surveys conducted by ...Austirex...

in ...Nov, 1979...

are held by Geophysics Section, South Australian Department of Mines and Energy.

- Magnetometer and spectrometer data.
- Flight line films.

1 003

AFMECO PTY. LTD.
11-13 Lucknow Place, West Perth, Western Australia
P.O. Box 526, West Perth, Western Australia, 6005
Telephone: (09) 321 9618, 321 9681
Telex: AFMECO 92077 Perth

PA/aw 80-1363

20th May, 1980

Director-General,
Department of Mines and Energy,
P.O. Box 151,
EASTWOOD SA 5063

Dear Sir,

EXPLORATION LICENCE 578 - TUMBY BAY
QUARTERLY REPORT 16.1.80 to 15.4.80

Radiometry and magnetometry was flown over part of the area in late 1979 by Austirex Aerial Surveys Pty Ltd. Preliminary data from this survey was received and is being interpreted to provide the basis for field work to commence in the next quarter.

Colour aerial photography at 1:25 000 is in progress.

As the area is largely held as private land, Notices of Entry are being prepared.

Expenditure for the quarter was $42,736.60 as per the attached schedule.

Yours faithfully,
AFMECO PTY LTD

J.-P. POGGI,
Managing Director.

Enc. 1

RECEIVED
27 MAY 1980
DEPT. OF MINES AND ENERGY
SECURITY
3776

STATEMENT OF EXPENSES RELATING TO EXPLORATION
PROGRAMME ON E.L. 578, Quarter 16.1.80 to 15.4.80

PERSONNEL (FIELD WORK, EVALUATION, OFFICE WORK)	817.48
MATERIAL (DIRECT)	3.86
TRAVEL, ACCOMMODATION (DIRECT)	407.15
CONTRACTS, SUPPLIES	39,368.03
DRAFTING SERVICE, PREPARATION OF REPORTS & MISCELLANEOUS	105.00
MANAGEMENT/OVERHEADS	2,035.08
	$42,736.60

Mr

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AFMECO PTY. LTD.

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005

PA/aw 80-2241

31st July, 1980

Director-General,
Department of Mines and Energy,
P.O. Box 151,
EASTWOOD SA 5063

Dear Sir,

EXPLORATION LICENCE 578 - TUMBY BAY
QUARTERLY REPORT 16.4.80 to 15.7.80

First stage reconnaissance geological mapping, sampling, and radiometry of the area was completed, and an evaluation of aerial geophysical data is in progress. Radiometric anomalies were checked on the ground where possible.

A geochemical and petrographic study of the various rock units has been instigated, prior to the next stage of investigation.

Expenditure for the quarter was $25,389.98 as per the attached statement.

Yours faithfully,
AFMECO PTY LTD

J.-P. POGGI,
Managing Director.

Enc. 1

STATEMENT OF EXPENSES RELATING TO EXPLORATION PROGRAMME on E.L. 578, 16.4.80 to 15.7.80

PERSONNEL (FIELD WORK, EVALUATION, OFFICE WORK)	9,648.90
MATERIAL (DIRECT)	61.14
TRAVEL, ACCOMMODATION (DIRECT)	2,360.67
CONTRACTS, SUPPLIES	10,225.11
DRAFTING SERVICE, PREPARATION OF REPORTS & MISCELLANEOUS	1,885.11
MANAGEMENT/OVERHEADS	1,209.05
	$25,389.98

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P.O. Box 526, West Perth, Western Australia, 6005
Telephone: (09) 321 9618, 321 9681
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PA/aw 80-3294

31st October, 1980

Director-General,
Department of Mines and Energy,
P.O. Box 151,
EASTWOOD SA 5063

Dear Sir,

EXPLORATION LICENCE 578 - TUMBY BAY
QUARTERLY REPORT 16.7.80 to 15.10.80

Gridding began over a number of radiometric anomalies located during earlier work. This, together with geological mapping, sampling and radiometry, is currently in progress and will be reported when it is completed, in about December 1980.

Expenditure for the quarter was $22,920.91 as per the attached statement.

Yours faithfully,
AFMECO PTY LTD

J.-P. POGGI,
Managing Director.

Enc. 1

STATEMENT OF EXPENSES RELATING TO EXPLORATION PROGRAMME, Quarter 16.7.80 to 15.10.80

PERSONNEL (FIELD WORK, EVALUATION, OFFICE WORK)	11,209.46
MATERIAL (DIRECT)	68.55
TRAVEL, ACCOMMODATION (DIRECT)	4,460.70
CONTRACTS, SUPPLIES	4,612.61
DRAFTING SERVICE, PREPARATION OF REPORTS & MISCELLANEOUS	1,478.12
MANAGEMENT/OVERHEADS	1,091.47
	$22,920.91

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AFMECO PTY. LTD.

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Telephone: (09) 321 9618, 321 9681
Telex: AFMECO 92077 Perth

TL/tb 81-3109

13th May, 1981

The Director General
Department of Mines & Energy,
P.O. Box 151
EASTWOOD, S.A. 5063

Dear Sir,

Exploration Licence 578
Progress Report 16.10.80 to 15.4.81

During November, gridding and mapping took place to cover anomalies detected from the airborne radiometric survey.

Three grids were laid over areas with augen gneiss and two over areas with metasediments. All anomalies were mapped and checked for comparison with the airborne data. An auger drilling programme was conducted to check the geology by drilling through the overburden and sampling the bedrock, a total of 2014m for 121 holes. All holes were gamma logged and samples taken for geochemical analysis.

Eight Diamond drill holes were completed for a total of 1,160m. These were drilled to define the lithological succession and bed thickness within the Hutchinson Group.

Plans showing locations and geology will be reported in the July report.

Expenditure for the period is shown as per the attached schedule.

Yours faithfully,
AFMECO PTY. LTD.

pp D L Meyzant

J.-P. POGGI
Managing Director

encl. schedule

RECEIVED
20 MAY 1981
DEPT. OF MINES AND ENERGY
SECURITY
3776

STATEMENT OF EXPENSES RELATING TO EXPLORATION
PROGRAMME EL. 578. QUARTER 16-1-81 to 15-4-81

PERSONNEL (FIELD WORK, EVALUATION, OFFICE WORK)		11,492.94
MATERIAL (DIRECT)		357.68
TRAVEL, ACCOMMODATION (DIRECT)		5,069.41
CONTRACTS, SUPPLIES		49,567.04
DRAFTING SERVICE, PREP. OF REPORTS & MISCELLANEOUS		5,312.65
MANAGEMENT / OVERHEADS		3,589.99
	$	75,389.71

STATEMENT OF EXPENSES RELATING TO EXPLORATION
PROGRAMME EL. 578. QUARTER 16-10-80 to 15-1-81

PERSONNEL (FIELD WORK, EVALUATION, OFFICE WORK)	18,088.55
MATERIAL (DIRECT)	5,991.14
TRAVEL, ACCOMMODATION (DIRECT)	11,577.47
CONTRACTS, SUPPLIES	7,948.69
DRAFTING SERVICE PREP. OF REPORTS & MISCELLANEOUS	7,460.02
MANAGEMENT / OVERHEADS	2,553.29
	$ 53,619.16

EXPENDITURE COMMITMENT $60,000.00

TOTAL EXPENDITURE REPORTED TO DATE $144,666.65

PERMIT YEAR ENDS 15-1-81

F

012

AFMECO PTY LTD

WHYALLA BASE

ANNUAL REPORT FOR

TUMBY BAY E.L. (578)

Report No. WY.80.7

by

F.M. BARRETT

WHYALLA
FMB/pg 170/200

DECEMBER, 1980

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INTRODUCTION

LOCATION AND ACCESS

E.L. 578 is located entirely within the Lincoln 1:250 000 sheet area, SH 53-11, on the Southern Eyre Peninsula of South Australia. Port Lincoln, situated in the south eastern corner of the E.L. is the centre of a large and thriving fishing and farming community which offers a wide range of service industries. Good roads service most parts of the area. There are several flights daily between Port Lincoln and Adelaide, and the Lincoln Highway provides a good connection to Whyalla and Adelaide. All of the E.L. is private land, under cultivation or grazing.

The farmers have continuously been kept informed of our work on their properties and have generally been very co-operative.

CLIMATE AND VEGETATION

The area enjoys a pleasant climate which allows field work to be carried out all year round. Winters are moderately cold and wet and summers are mild. The weather is very changeable, rarely being the same for a whole day.

Climatic conditions at Port Lincoln:

	J	F	M	A	M	J	J	A	S	O	N	D
Rainfall (mm)	13.7	14.5	20.1	34.8	57.7	76.2	76.7	66.8	49.6	35.8	23.9	17.5

Most areas with fertile soil have now been cleared and only areas underlain by laterite or quartzites are still covered by mallee scrub and black boys.

REASONS FOR INVESTIGATION

The two main reasons for exploring the area are:

1. Small uranium occurrences have been known in the Lincoln Complex gneisses since 1954.

2. The area contains Lower Proterozoic metasediments of possible shallow marine origin overlying a reworked Archaean basement.

PREVIOUS WORK BY GOVERNMENT AND OTHER COMPANIES

Tilley in 1921, carried out detailed petrographic work on gneisses and metasediments from the Southern Eyre Peninsula. One inch to one mile maps were published in 1958 but the mapped units were very generalised. The economic potential of the banded iron formations was tested by the Mines Department in the early sixties with negative results.

After several small uranium occurrences were found in the Port Lincoln area in 1954, prospectors searched the area north of Port Lincoln without much success.

Exploration for radioactive minerals was carried out by Noranda in 1971. They flew a scintillometer survey down the east coast from just north of Tumby Bay to Port Lincoln covering the Lincoln Complex and Hutchison Group. About forty-five anomalies were detected, of which thirty-nine were investigated. Uranium was found to be restricted to augen gneisses of the Lincoln Complex, usually, lateritised. Concentration occurs on joint surfaces and foliation planes.

Endeavour/Le Nickel in 1972, and Uranerz in 1975/6 tested the lower Tertiary quartzose sediments, which contain pyritic and carbonaceous layers, of depths from 20 to 140 m. Their programmmes and results were almost identical. A series of poorly-sorted angular quartz sands with early diagenetic pyrite, garnet, and zircon is overlain by better-sorted sand with clay, peat, lignite beds, and rare pyrite. This unit is in turn covered by a fine sub-angular quartz sand with intercalated silt and clay. There are few impermeable horizons. Overlying these sediments is Quaternary limestone.

In the lower part of the upper unit, close to the boundary with the middle unit, the redox front occurs and minor uranium concentrations were found in carbonaceous layers below this front. Uranium values did not exceed 15 ppm, whilst thorium ranged from 5-95 ppm.

Anglo-American, CRA., Pickands-Mather, Pechiney and Pacminex prospected for base metals; all companies employed soil and stream sampling and Anglo-American also flew Input and aeromagnetics. No significant finds were made beyond the previously known small copper showings.

Coin (1976), mapped the area inland from Tumby Bay as part of a Ph.D thesis, but the mapping has been found to be very unreliable and of no help in the present programme.

WORK CARRIED OUT BY AFMECO

An airborne radiometric and magnetic survey was carried out in November, 1979.

Reconnaissance mapping was done by D. Bourke (southern part) and P. Walker (northern part), in May, 1980. Ground checking of airborne U-anomalies by two field assistants was begun in the latter half of the year, and was followed by more intensive ground work as follows: (Appendix I).

September: 3 days reconnaissance by F. Barrett;

October : 1 week gridding by F. Barrett and 2 field assistants;

November : 4 weeks gridding, radiometry, magnetometry and soil sampling by B. Harvey, F. Barrett and 2 field assistants.

4 days mapping of Lincoln-Hutchison contact by B. Harvey and F. Barrett.

December : 1 week reconnaissance mapping by F. Barrett.

1 week detailed radiometry and magnetometry by F. Barrett and 1 field assistant.

MINING IN E.L. 578

Only very limited mining has taken place inside the E.L.

Copper

Minor copper carbonates, chalcocite, and chalcopyrite were mined in open cut and shallow shafts prior to 1863 from the Mt.Liverpool Mines. There is no record of production. The ore occurs in a mylonitic gneiss with abundant quartz veining.

Silver-lead-gold

Galena, sphalerite, and pyrite with traces of silver and gold, were mined from the Lady Franklin and Moonlight Mines on the south eastern flank of the Marble Range prior to 1899. The host rocks were phyllites and low grade schists. The workings have now been filled in.

Graphite

Ninety-seven tons of graphite were produced from the Koppio Graphite Mine between 1917 and 1946. The graphite schists occur in a sequence of banded iron formations, mica schists, and biotite gneisses.

REGIONAL GEOLOGY

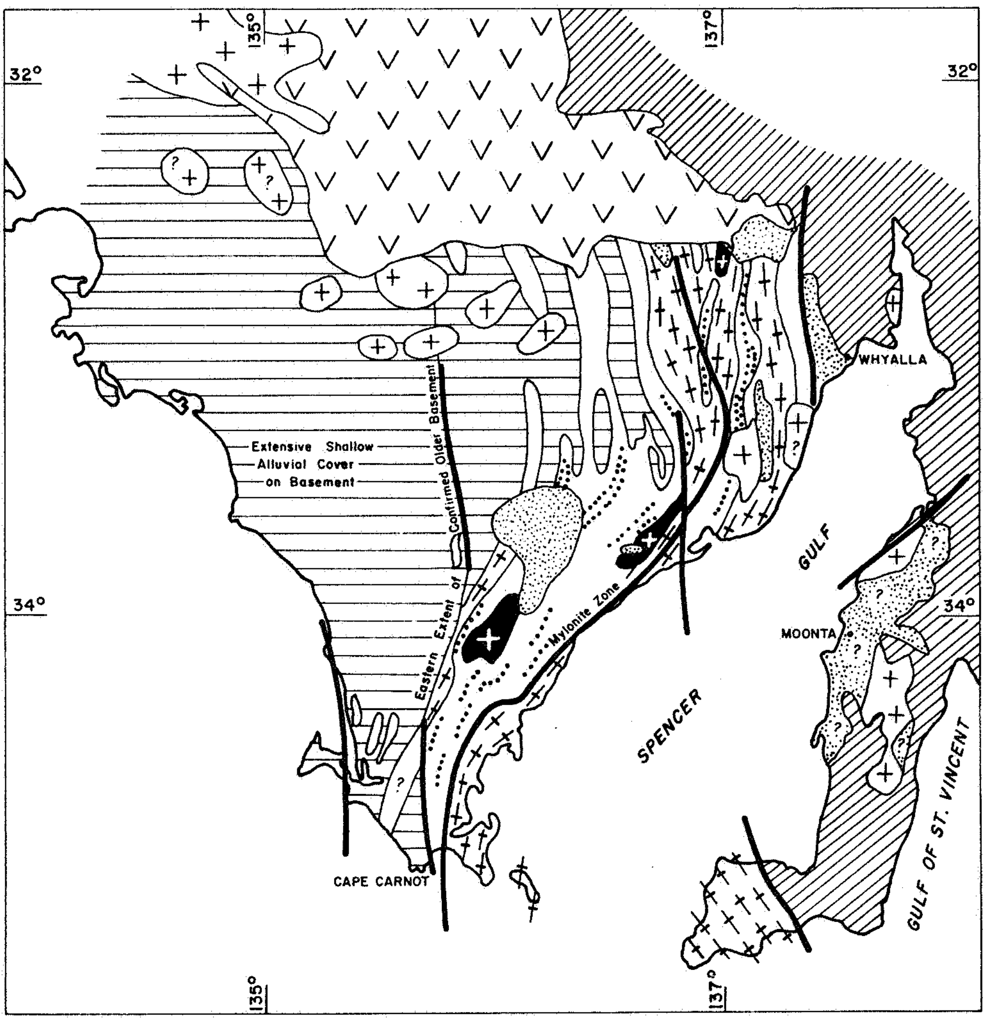
The E.L. is situated on the southern part of the Archaean to Lower Proterozoic Gawler Craton (Fig.1). The ages of rocks in the area range from at least Lower Proterozoic to Recent and Archaean rocks could be present. Most workers on the southern Eyre Peninsula subdivide the Lower Precambrian rocks into three groups; the Sleaford Complex, the Lincoln Complex and the Hutchison Group.

The oldest rocks in the area belong to the Archaean-Lower Proterozoic Sleaford Complex with Rb-Sr ages of 2.3-2.5 b.y. The complex has been dated at Cape Carnot south of the E.L. where a steeply dipping N-S striking sequence of granulite facies, highly aluminous metasediments, basic granulites and augen gneisses outcrop. The abundance of siliceous metasediments suggests that older Archaean rocks were present forming basement and source rocks for the Carnot metasediments. No other record of these older rocks is known at the moment.

The western part of the Sleaford Complex, consisting of greenschist to lower amphibolite facies, biotite-muscovite gneisses of possible igneous origin and more massive granites, give ages between 2400 and 2300 MA. The N-S striking steeply dipping rocks mainly outcrop in coastal exposures in the Marble Range. The Sleaford gneisses mainly outcrop where they are protected by a capping of Lower Proterozoic Warrow Quartzite. The low metamorphic grade is due to retrograde metamorphism during the Kimban Orogeny. How the Sleaford gneisses could be retrograded without a resetting of the Rb-Sr ages is a problem.

The Lincoln Complex is exposed in two N-S or NE-SW trending zones, one between Spencer Gulf and the Hutchison Group in the east and one between the Hutchison Group and the Sleaford Complex on the western part of ~~the~~ Eyre Peninsula. The exposed rocks are augen gneisses, basic granulites, amphibolites, migmatitic banded gneisses and minor intrusive biotite-hornblende granites. The metamorphic grade is high with granulite facies to the east and high amphibolite facies to the west. The dominant rock type, an augen gneiss, that can be followed from Port Lincoln to north of Cowell, has been dated at 1816 $\pm$ 10 m.y. The date is interpreted as the age of the main metamorphism and the initial ratio 0.7043 $\pm$ 0.0008 (Cooper et al 1976), suggests that only 10 m.y. could have elapsed between intrusion and metamorphism. Some of the migmatitic banded gneisses are considered to be reworked Archaean gneisses on the basis of lithological and structural similarities but no radiometric ages are as yet available to confirm this. Dips of all Lincoln gneisses are normally steep and the strike varies from N-S in the south of the area to ENE-WSW in the north of the area. Four phases of deformation have been recognised with the high grade metamorphism taking place during the first two phases. The third and fourth phases are related to the formation of the mylonite zone and locally to retrograde metamorphism.

The regional mylonite zone that can be followed from Sleaford Bay in the south to where it disappears under the Gawler Volcanics to the north, forms the contact between the Lincoln Complex and the Hutchison Group in the northern part of the E.L. In the southern part of the E.L. the main branch of the mylonite zone is approximately 2km E of the Lincoln-Huchison contact and the nature of the contact here is unknown. The contacts between the western belt of the Lincoln Complex and the Hutchison Group on one side, and the Sleaford Complex on the other side are not exposed. The Lincoln-Sleaford contact is marked by a noticeable change in magnetic intensity on the aeromagnetic map.



LEGEND

- Major Faults
- Adelaidean & Palaeozoic sediments
- Post-tectonic granites
- Gawler Range Volcanics
- Middle Proterozoic sediments
- BANDED IRON FORMATION — Hutchison Group
- Syntectonic granites
- Lincoln Complex
- Sleaford Complex

To Accompany Report WY. 80.7. *Figure : 1*

DRAWN A.E.M.	**AFMECO PTY. LTD.**
DATE JUNE '81	SCALE 0 50 100 KILOMETRES
GEOLOGY P.W.	TUMBY BAY PROJECT
APPROVED	REGIONAL GEOLOGY of the SOUTHERN PART of the GAWLER DOMAIN on EYRE PENINSULA
DWG. NO. AFMAP 3487	
REV. NO.	

A sequence of lower proterozoic metasediments designating the Hutchison Group can be followed from the Port Lincoln area to Cowell and the Middleback Range in the north of the Eyre Peninsula. Metaquartzites (Warrow Quartzite) and low grade micaschists overlying the Sleaford Complex in the Marble Range-Coffin Bay area have also been included in the Hutchison Group. Parker (1979) has established the stratigraphy in the Cowell area with 3 main sequences; a basal quartzite sequence equated with the Warrow Quartzite; a mixed chemical and clastic sequence with cherts, BIFs, carbonates, graphite schists, metapsammites and metapelites, (the Mangalo Schist or Middleback Sub-group), and an upper pelitic unit, the Yadnarie Schist. The total thickness has been estimated at 2000-3000 metres, but the original thickness could have been considerably greater. The Warrow Quartzite appears to be missing from the Tumby Bay E.L. outside the Coffin Bay-Marble Range area (Fig.2). Metamorphic grades are mid to high amphibolite facies and whole rock Rb-Sr ages yielded 1800-1700 MA in the Cowell and Coffin Bay areas. Three phases of deformation have been recognised by previous workers, with the main metamorphism related to the second phase. The third phase is related to the formation of the mylonite zone.

Both the Hutchison Group and the Lincoln Complex were metamorphosed during the Kimban Orogeny (17-1800 m.y.) but their prior relationship is still open to debate, (see later discussion).

Post orogenic granites and minor gabbros and pyroxenites intruded the Hutchison Group but they are poorly exposed in the E.L.

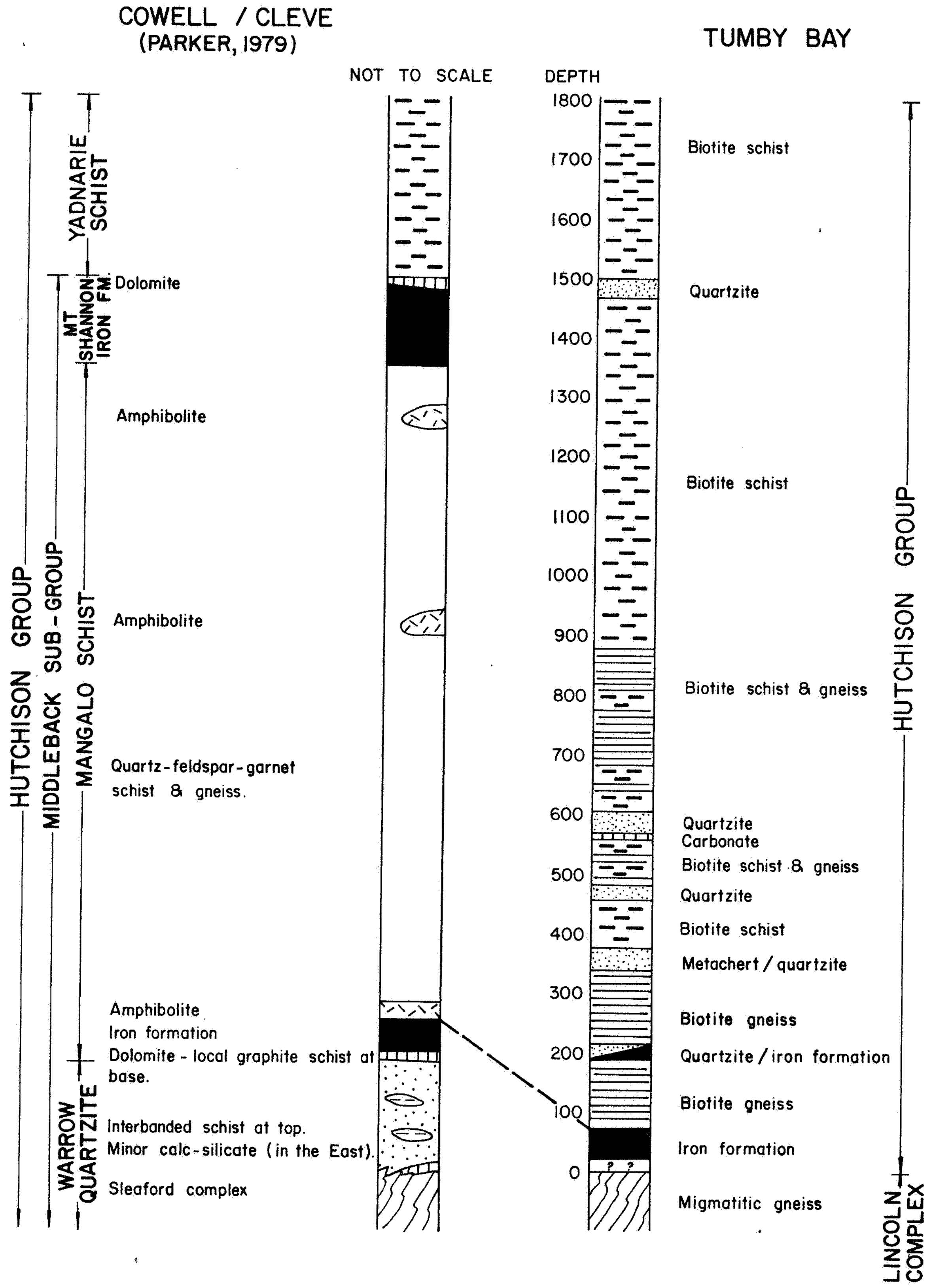
There is no record of any geological activity between the Mid-Proterozoic and the Lower Tertiary, when deep weathering with laterite development took place. During the Tertiary, carbonaceous sands were deposited on the eroded Sleaford Complex (Wanilla Formation). Associated with the deposition was the uplift of the area covered by the Hutchison Group and part of the Lincoln Complex. The fault scarps, probably following ancient lineaments, now form the edge of the coastal plain. During the Tertiary and the Quaternary, large parts of ~~the~~ Southern Eyre Peninsula were covered by eolian calcareous sandstones.

GEOLOGY OF THE LICENCE AREA (PLATE 1)

The location of rock samples collected during the reconnaissance mapping is shown on Plate 2. The detailed petrographical description is given in Appendix II.

SLEAFORD COMPLEX

The exposed Sleaford Complex in the E.L. consists of a homogeneous biotite-muscovite-quartz-feldspar gneiss containing small (5-10mm) porphyroblasts of feldspar. Centimetre to decimetre size xenoliths of amphibolite and micaschist are common. The quartz-feldspar grains are commonly stressed, and minor retrograde effects are common. Albite is the dominant feldspar in several samples due to low Ca content. The rocks show moderately high background radio-activity (400-600 cps SPP2) over most of the outcrops. The analyses all give high thorium values, (Table 1), and thorite and/or brannerite has been identified in one sample. The airborne survey also showed high thorium in the Marble Range area. High thorium values are not characteristic for the Sleaford Complex in general as the Cape Carnot gneisses analysed by Fanning, contain thorium in amounts comparable to the average for quartz-feldspar gneiss.



To Accompany Report WY. 80.7. *Figure : 2*

DRAWN A.E.M.	**AFMECO PTY. LTD.**
DATE JUNE '81	TUMBY BAY PROJECT
GEOLOGY P.W.	GENERALISED STRATIGRAPHIC SEQUENCE in the COWELL & TUMBY BAY AREAS
APPROVED	
DWG. No. AFMAP 3488	
REV. No.	

LINCOLN COMPLEX

Augen gneiss

The dominant rock type is an augen gneiss with coarse (1-7 cm) microcline crystals. The shape of the augen varies from rectangular to almond shaped. The matrix consists of quartz, K-feldspar, biotite and hornblende. Accessory minerals are allanite, sphene, apatite, ? thorite, monazite, zircon and ? brannerite. Magnetite is present in amounts up to 2%. The chemical composition of the augen gneisses can be seen in Tables 1 and 2. The texture varies from massive to well banded to strongly crenulated, (Fig.3). In general the gneiss is steeply dipping with a constant trend parallel to the regional trend.

Xenoliths of amphibolites ranging from decimetric to metric size are abundant in the augen gneiss. Some amphibolites appear to have been emplaced late in the evolution of the gneiss, and can still be recognised as metadolerites (Fig. 4). Analyses of amphibolites in the augen gneiss can be seen in Tables 1 and 3.

The main anomalies in the area occur within the augen gneisses in leucocratic hornblende gneisses with a well-developed gneissic fabric. Most of these gneisses are rich in sodic plagioclase, and show diopside remnants. All the anomalous gneisses show a high concentration of accessory minerals such as zircon, monazite, brannerite, sphene, magnetite, allanite, and thorite. D. Bourke noted slight increases in gamma activity in shear zones due to the presence of allanite and brannerite. See Table 5a and 5b for a comparison between augen gneiss and anomalous hornblende gneiss.

To the west the augen gneiss is in contact with the mylonite zone. The change is gradual over several tens of metres and thin (cm to m) mylonite zones are present in the augen gneiss away from the main mylonite zone. Augen gneiss with smaller augen is present west of the mylonite zone where it shows an intrusive contact with the migmatitic banded gneisses.

The mylonite zone

The mylonites as defined in the field show a gradual change from strongly flattened and sheared banded gneiss, augen gneiss (Fig. 5) and amphibolite, to well-banded fine-grained gneiss where some of the finer bands consist of mylonites sensu stricto (e.g. in quarry at GR. 5767E; 61715N).

Some mylonites bear a superficial resemblance to the normal gneisses, e.g. Fig. 5, but the fine-grained nature of the matrix and the strongly deformed character readily distinguish the mylonites.

Outcrops in the mylonite zone are generally poor, and the zone is characterised by rounded soil-covered hills.

Banded migmatitic gneisses

This unit generally shows a well developed lithological banding with alternating leucocratic and melanocratic bands (Fig. 6). The melanocratic bands consist of hornblende and/or biotite, quartz, K-feldspar, and plagioclase. The leucocratic bands consist mainly of quartz and K-feldspar with minor plagioclase. Allanite, zircon, monazite and magnetite are present as accessory minerals (Table 1). Amphibolites are common in the migmatitic gneisses. A non-banded well-foliated fine-grained biotite gneiss is included in this map unit. Isoclinal folds on centimetric to metric scale are abundant in most outcrops.

Fig. 3 Crenulated augen gneiss TB1 area.

Fig. 4 Metadolerite in augen gneiss at Louth Bay. Note the strongly attenuated limbs and the thickened fringe zones.

Fig. 5 Mylonitic gneiss with strongly flattened feldspar augen. Notice the very fine grained nature of some layers.

Fig. 6 Banded migmatitic gneiss with alternating leucocratic coarse grained layers and medium-fine grained melanocratic layers.

The migmatitic gneisses show a gradual contact with the mylonite zone to the east. The nature of the western contact with the Hutchison Group is unknown in the south and is marked by a mylonite zone in the north of the E.L. A small occurrence of the migmatitic banded gneiss is present in the augen gneiss west of North Shields, where it is associated with a thin banded calc-silicate. The western belt of the Lincoln Complex consists mainly of migmatitic gneisses similar to those found immediately east of the Hutchison Group. The western belt is intruded by massive post-kinematic biotite granites ranging in size from a few tens of square metres to a few square kilometres. Generally, the granites are very poorly exposed. The contact between the migmatitic gneisses and the Hutchison Group is not exposed. Neither is the contact with the Sleaford gneisses to the west, but this contact is well defined on the aeromagnetic map.

Quartz veins

From North Shields to Tumby Bay there are three occurrences of massive quartz veins which are 10-15 m wide and from 200 m to 2 km long. They are massive and lack internal structures. Euhedral zoned quartz crystals have been found in all of them. The veins are parallel to both the regional foliation and the mylonite zone and have previously been mapped as quartzites.

Massena Bay gneisses

D. Bourke described a sequence of migmatitic banded gneisses from the coastal exposures around Massena Bay. They are in fault contact with the augen gneisses on Boston Island, but their relationship to other gneisses in the Lincoln Complex is not known.

<u>HUTCHISON GROUP</u>

In the western part of the E.L. the Hutchison Group is represented by the Warrow Quartzite and green-schist facies mica schist. These units are seen in coastal exposures along Coffin Bay, and as a capping on the Sleaford gneisses in Marble Range, North Block and South Block. In previous publications on the area the Warrow Quartzite is shown to be very thick in the stratigraphic columns but due to repetition in isoclinal folds, the real thickness is probably less than 50 metres. Low-angle cross-bedding in the quartzite has survived both the deformation and metamorphism. Arkosic layers are present near the base. The schists consist of quartz, muscovite, garnet and epidote. Chloritoid has been reported by Tilley (1925) confirming the grade as upper green-schist facies.

In the eastern belt the Hutchison Group is generally poorly exposed. The best exposed units are quartzites and metacherts, ferruginous quartzites, banded iron formations and amphibolites. Also present, but poorly outcropping, are biotite gneiss, carbonate calc-silicate, graphite schist and metapelites. The quartzites generally are fine-grained with no relict textures preserved. There is often a gradation both laterally and vertically over a few tens of metres from quartzite to ferruginous quartzite to banded iron formation. Due to poor exposure, it is not known whether all the mapped BIFs are separate units or whether there is a repetition due to isoclinal folding. From the schematic stratigraphy of Fig.2 it can be seen that a basal clastic quartzite equivalent to the Warrow Quartzite is missing from the eastern belt. The lowest part of the sequence is dominated by quartzites, banded iron formations, graphite schists, biotite gneisses and carbonates with biotite gneisses and metapelites increasing in abundance upwards. Apart from the mica schists and gneisses most of the other units in the E.L. are rather thin (<25 m). The metasediments have been intensely deformed during several episodes of deformation and the metamorphic grade has attained at least mid-amphibolite facies throughout the Hutchison Group in the eastern belt, judging from mineral assemblages in metapelites, amphibolites and carbonates. Analytical data on the Hutchison metasediments is found in Tables 1 and 4.

The stratigraphic column shown in Figure 3 assumes that there is no repetition of the sequence related to isoclinal folding. Due to limited outcrop it is not known whether this assumption is valid.

The metasediments are generally steeply dipping (within 5° of vertical) with constant N-NE trends, but in the central part of the belt, from west of Tod River Reservoir to Kappio, the dips are much shallower (15-20°) and the trends are more irregular.

Minor post-kinematic biotite granites similar to those found in the Lincoln Complex are found in the western part of the Hutchison Group.

GEOPHYSICS

A combined aeromagnetic and radiometric survey was flown over E.L. 578 by Austirex Aerial Surveys Pty. Ltd., in November, 1979. Details of the survey can be found in Appendix III.

AEROMAGNETOMETRY

Based on the shape of the contours and the magnetic intensity, the E.L. can be divided into 6 sub-areas that correspond well with major mapping units, (Plates 3 and 4), from east to west :

1. The zone adjacent to the Spencer Gulf shows non-linear patterns and moderately high to high intensities. The zone is generally poorly exposed but the magnetic highs correspond partly to migmatitic gneisses of the Lincoln Complex e.g. at Point Boston.

2. This medium intensity zone with well defined NNE linear trends corresponds to the mylonite zone and the augen gneisses in the Lincoln Complex.

3. This high intensity area shows a strong gradient in comparison to the previous zone. The linear trends follow the regional foliation. The zone correlates well with the mimatitic banded gneisses. An inlier of banded gneiss in the augen gneiss is well defined.

4. A zone with strong relief and partly linear trends, partly irregular trends. Magnetic highs north of Koppio and around Green Patch correspond to concentrations of BIFs and amphibolites. Extensive magnetic lows in the centre of the zone correspond to strongly lateritised micaschists. A magnetic high near the western margin is of unknown origin.

5. This zone is characterised by featureless magnetic lows. This very homogeneous zone corresponds to the Sleaford gneisses in the Marble Range-Coffin Bay area.

6. Just off the west coast of the Eyre Peninsula a strong N-S trend magnetic gradient marks the western limit of the massive Sleaford gneisses.

AERORADIOMETRY

U-channel: Most areas with counts higher than 50 cps are found in the Lincoln augen gneisses and in the Sleaford gneisses in the Marble Range area. Numerous areas with high backgrounds are located in the Hutchison Group and appear to cover soils, laterites and all rock types apart from BIFs. The mylonite zone generally gives low values on the uranium channel as does the banded migmatitic gneisses. All areas with backgrounds higher than 50 cps were selected for ground checking, (Plates 5 and 6).

K-channel: Highs on the K-channel correspond closely to areas of gneiss outcrops or where the gneisses are only covered by thin soils, (Plate 7).

Th-channel: The thorium values are strongly anomalous over the Marble Range. Analysed gneisses confirm the high thorium values. Thorium highs are erratically distributed over the Lincoln Complex and the Hutchison Group, with high values often corresponding to laterites, (Plate 8).

The maps and sections for U/Th, U/K and Th/K generally show erratic patterns without a close correlation to the geology, (Plates 9-11).

GROUND GEOPHYSICS

The geophysical and geochemical surveys were carried out on surveyed grids with 400 m linespacing. The spacing was reduced to 200 m and 100 m in areas of interest.

GROUND MAGNETOMETRY

The total magnetic field was measured at 10 m stations on all the gridded traverse lines, (Plates 12-18 and Fig.7). In addition to this, profiles were measured across the migmatitic banded gneisses of the Lincoln Complex from Mt.Gawler to the Lincoln-Hutchison contact, (Fig.9); one profile was measured across the mylonite zone south of Pillaworta Hill where it forms the contact between the Lincoln Complex and the Hutchison Group, (Fig.10); and three profiles were measured over outcropping and concealed banded iron formations north of Tod River Reservoir, (Fig.8).

The magnetic profiles over the metasediments in TB17 and TB29 correlate well with the known geology.

The magnetic profiles over the augen gneisses in TB1 and TB20 show rapid changes (300-1000 gammas) over 10-40 m intervals over rocks that appear to be identical. These changes are due to variations in the magnetite content. On the more detailed grids it can be seen that the magnetic contours closely follow the foliation. The magnetic profiles are smoother over areas covered by laterite, e.g. TB1 12400N; 10300E-10700E. Both the Mt.Gawler and the Pillaworta Hill profiles show a high magnetic background and a very irregular profile. The mylonites of Pillaworta Hill are mainly strongly deformed banded gneisses.

GROUND RADIOMETRY

The radiometric background was measured with an SPP2 scintillometer at 10 metre stations on all grid traverses. The radiometric profiles are shown in Plates 19-25 and Fig.11. As the highest radiometric background is found over outcrops, most of the outcrops within 50 m of the traverse lines were also checked as part of the systematic survey, leading to the discovery of the Tallala anomaly and the anomaly in TB20. The TB1-1 anomaly was known prior to the systematic survey.

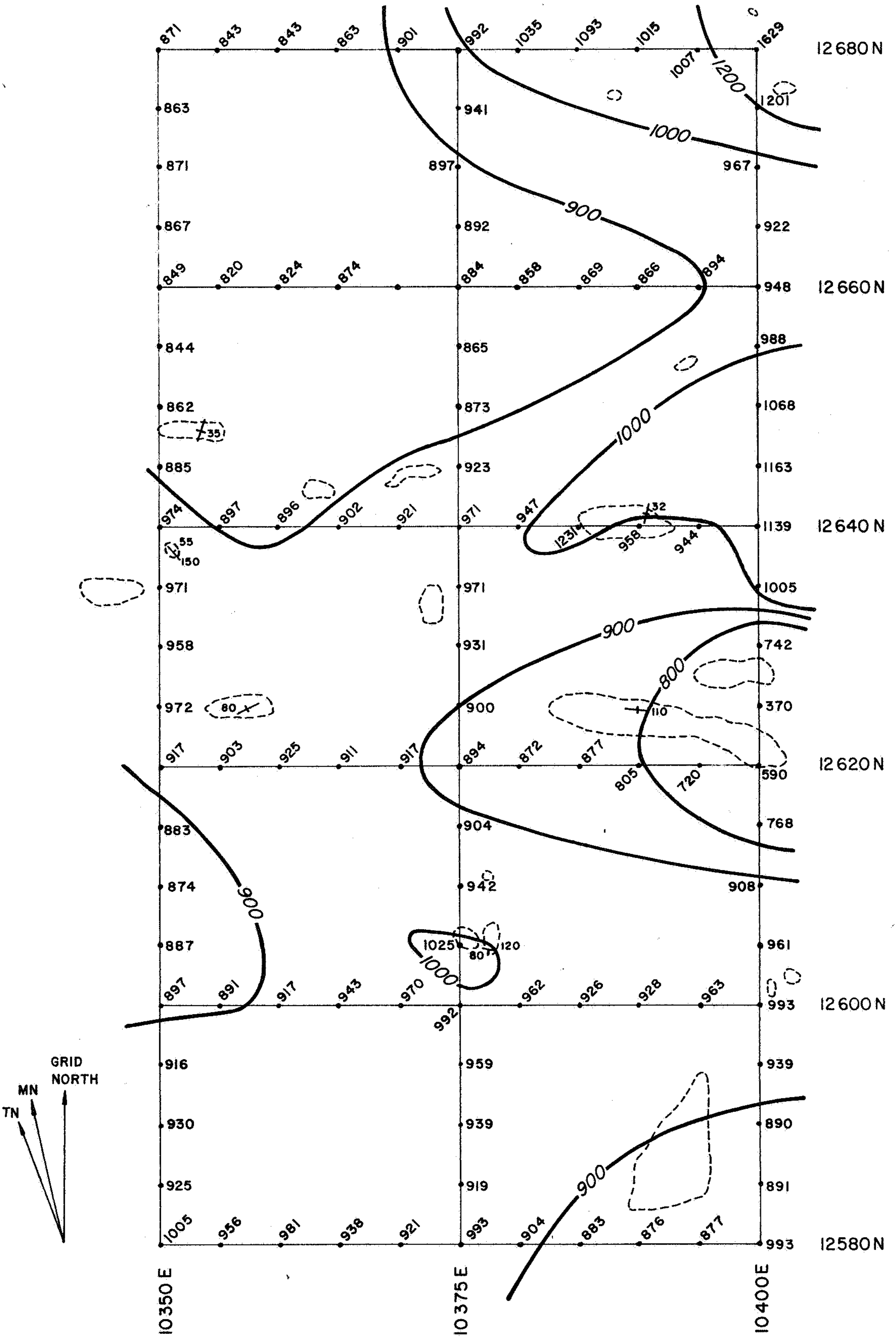
The main results of the survey were:

<u>TB1</u>: The average background over the augen gneisses is 125-150 cps SPP2. Higher backgrounds occur on lines 10800N and 11200N (200-250 cps) over thin laterites; on line 12400N (300-400 cps) over laterites and soil; and on line 12800N (200-350 cps) over lateritic soils.

Significant anomalies in fresh rock are: TB1-1 centered on 12600N 10375E where an anomaly of 5 x 30 metres with maximum count of 11000 cps has been delineated; and the Tallala anomaly (175 x 5 m maximum count 5500 cps), (Plates 19 and 20). Both occur in areas of average to below average radiometric background. The high counts in both anomalies are restricted to numerous areas of a few square centimetres to a few square decimetres. Spot counts between 500 and 1000 cps are common in the augen gneisses.

<u>TB13</u>: The average background is similar to TB1 (125-150 cps), (Plate 21). No significant anomalies were located during the systematic survey.

030

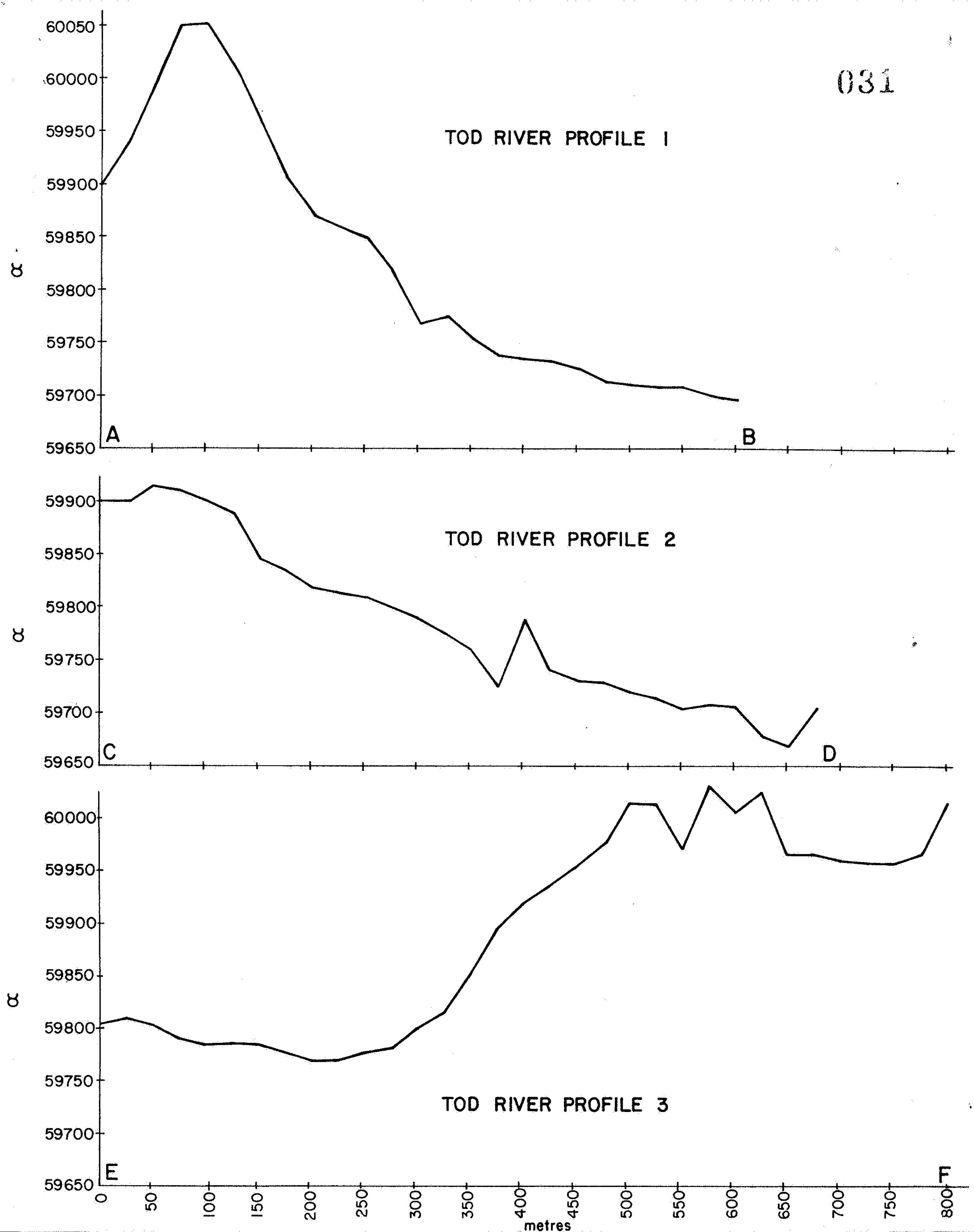


To Accompany Report WY. 80.7.

Figure : 7

Readings in gammas (total field).
All readings corrected for drift.
All readings are base line 59 000 gammas.

DRAWN A.E.M.	AFMECO PTY. LTD.
DATE JUNE '81	SCALE 1 : 500 — 4 0 4 8 12 16 20 metres
GEOLOGY P.W.	TUMBY BAY PROJECT
APPROVED	TB1 GRID
DWG. No. S153-11.126.3489.	TB1-1 ANOMALY
REV. No.	GROUND MAGNETICS & OUTCROP GEOLOGY

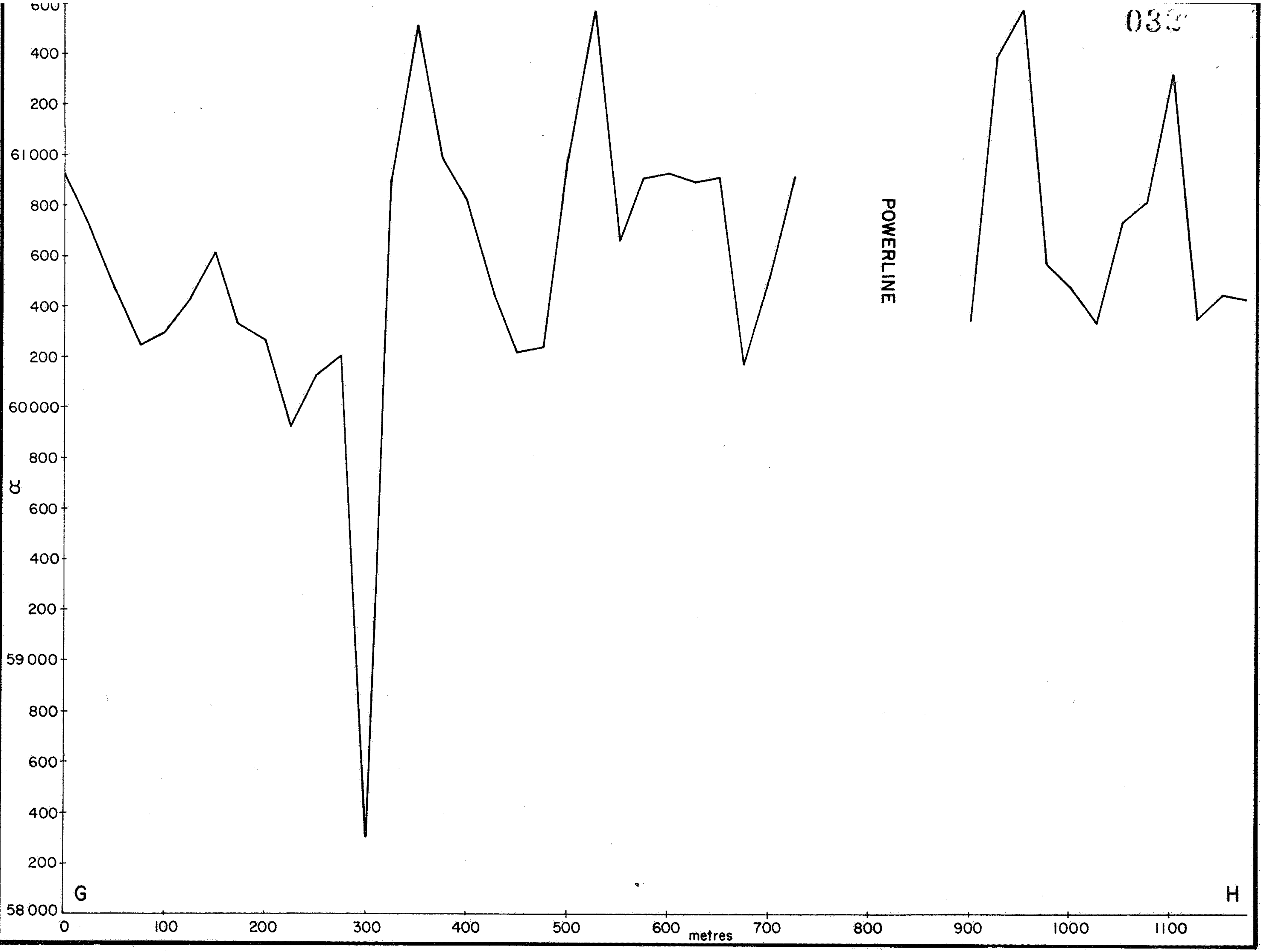


All readings in gammas.

To Accompany Report WY. 80. 7

DRAWN A.E.M.	AFMECO PTY. LTD.
DATE JUNE '81	SCALE 1:500 (4 0 4 8 12 16 20 m)
GEOLOGY P.W.	TUMBY BAY PROJECT
APPROVED	GROUND MAGNETIC PROFILES
DWG. NO. SI53-11.126.3490	A-B, C-D, E-F.
REV. NO.	TOD RIVER

Figure : 8



All readings in gammas.

TUMBY BAY PROJECT

GROUND MAGNETIC PROFILE G-H

MT. GAWLER

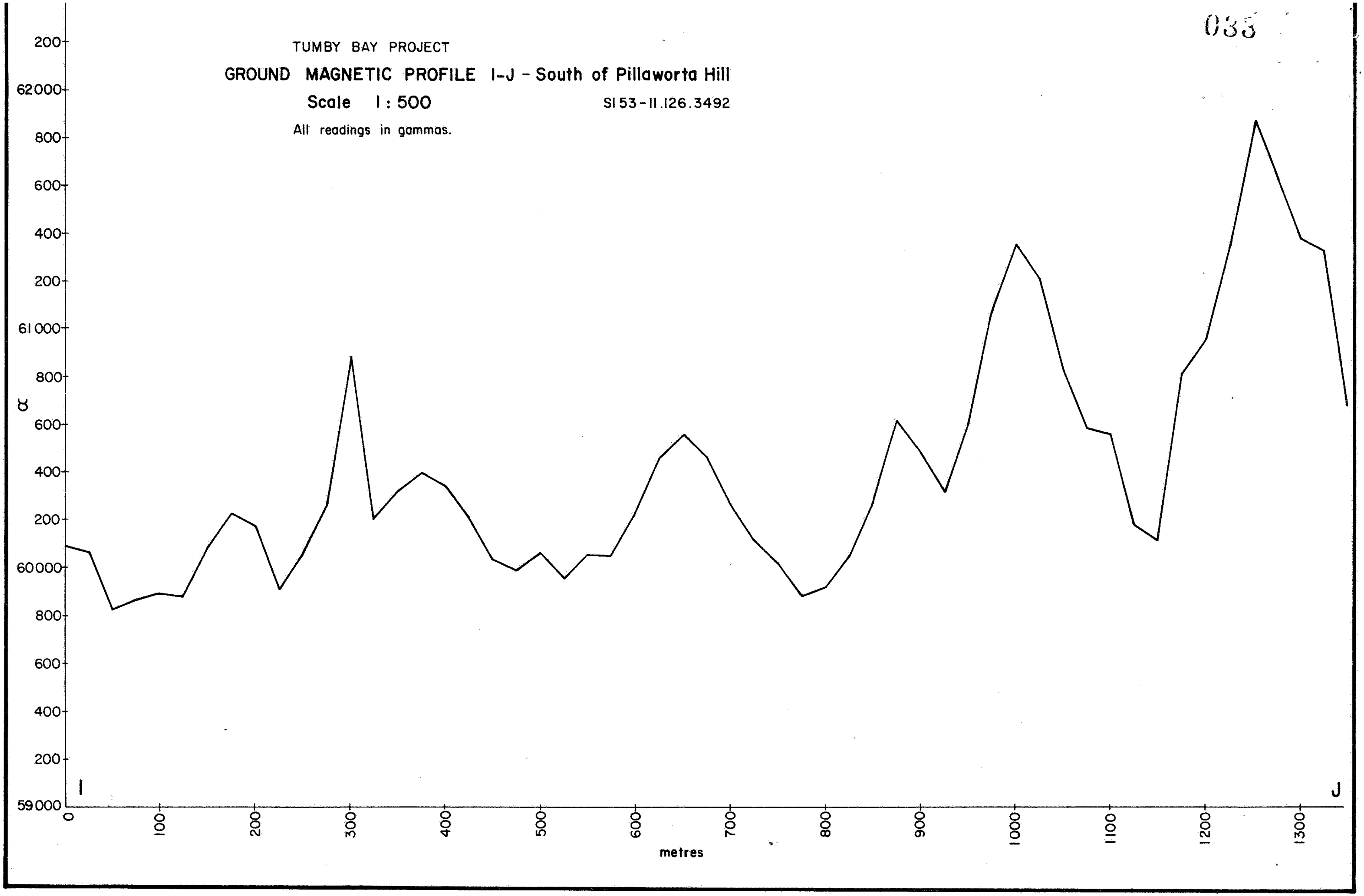
To Accompany Report WY. 80.7

Scale 1 : 500

S153-11.126.3491

Figure : 9

To Accompany Report WY. 80.7.



TUMBY BAY PROJECT

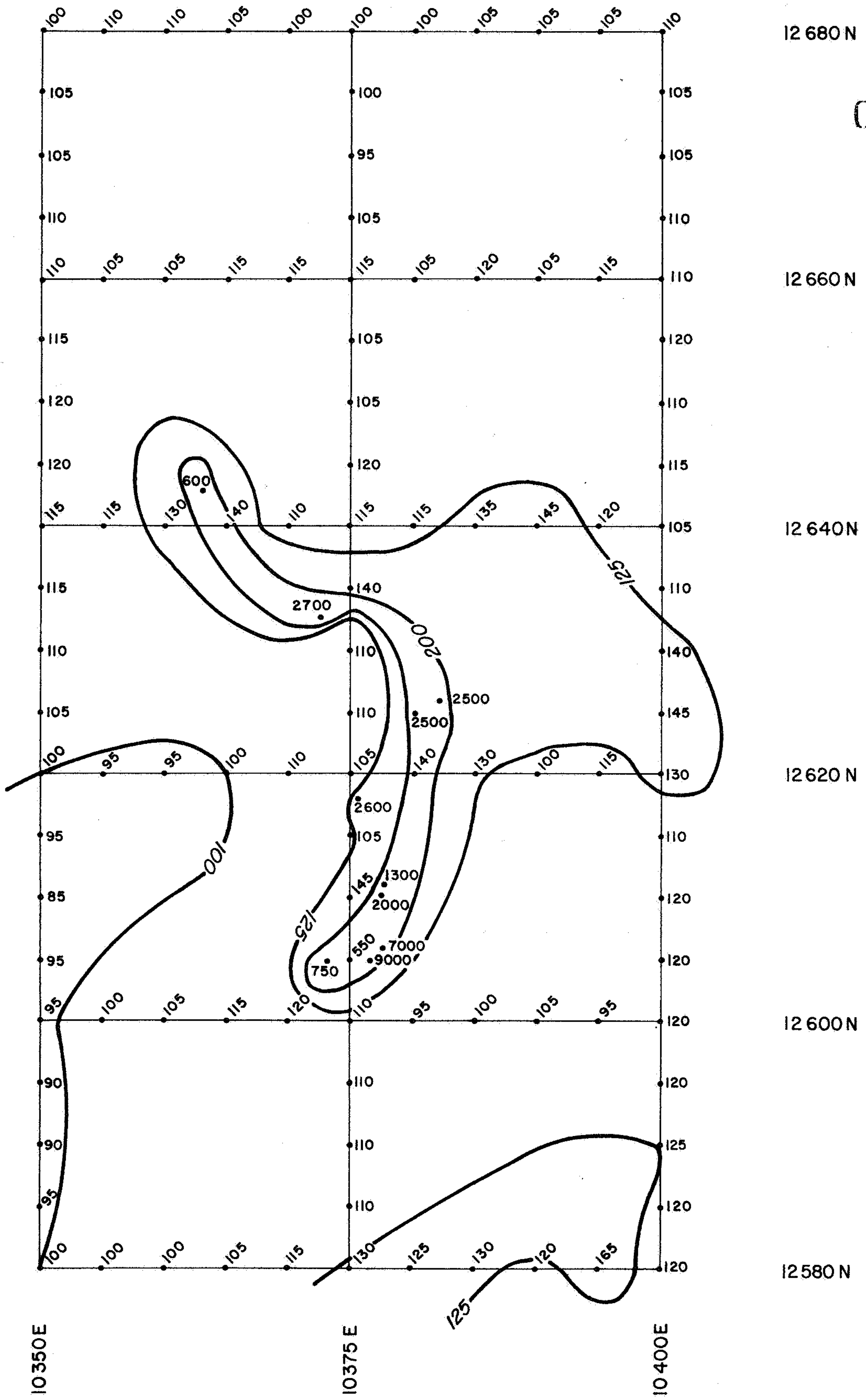
GROUND MAGNETIC PROFILE I-J - South of Pillaworta Hill

Scale 1 : 500 SI 53-11.126.3492

All readings in gammas.

Figure : 10

034



To Accompany Report WY. 80. 7. *Figure : 11*

All readings in cps SPP2.

DRAWN A.E.M.	**AFMECO PTY. LTD.**
DATE JUNE '81	SCALE 1 : 500 (4 0 4 8 12 16 20 m)
GEOLOGY P.W.	TUMBY BAY PROJECT
APPROVED	TB 1 GRID
DWG. NO. SI53-11.1263493.	TB 1-1 ANOMALY
REV. NO.	GROUND RADIOMETRY

<u>TB17</u>: The average background is low (< 100 cps) and no anomalous areas were located, (Plate 22). The previously recorded count of 1200 cps is restricted to a small laterite-covered hilltop.

<u>TB20</u>: The background is similar to TB1 (125-150 cps), (Plate 23). One anomalous area TB20-1 (125 x 10 m maximum count 3500 cps) was located, (Plate 24). This anomaly is very similar to the TB1 Tallala anomaly.

<u>TB29</u>: There are no outcrops on the traverse lines. Background over the quartzite is 50-70 cps and over the biotite gneisses 100-250 cps, (Plate 25).

See Table 6 for analyses of high background samples.

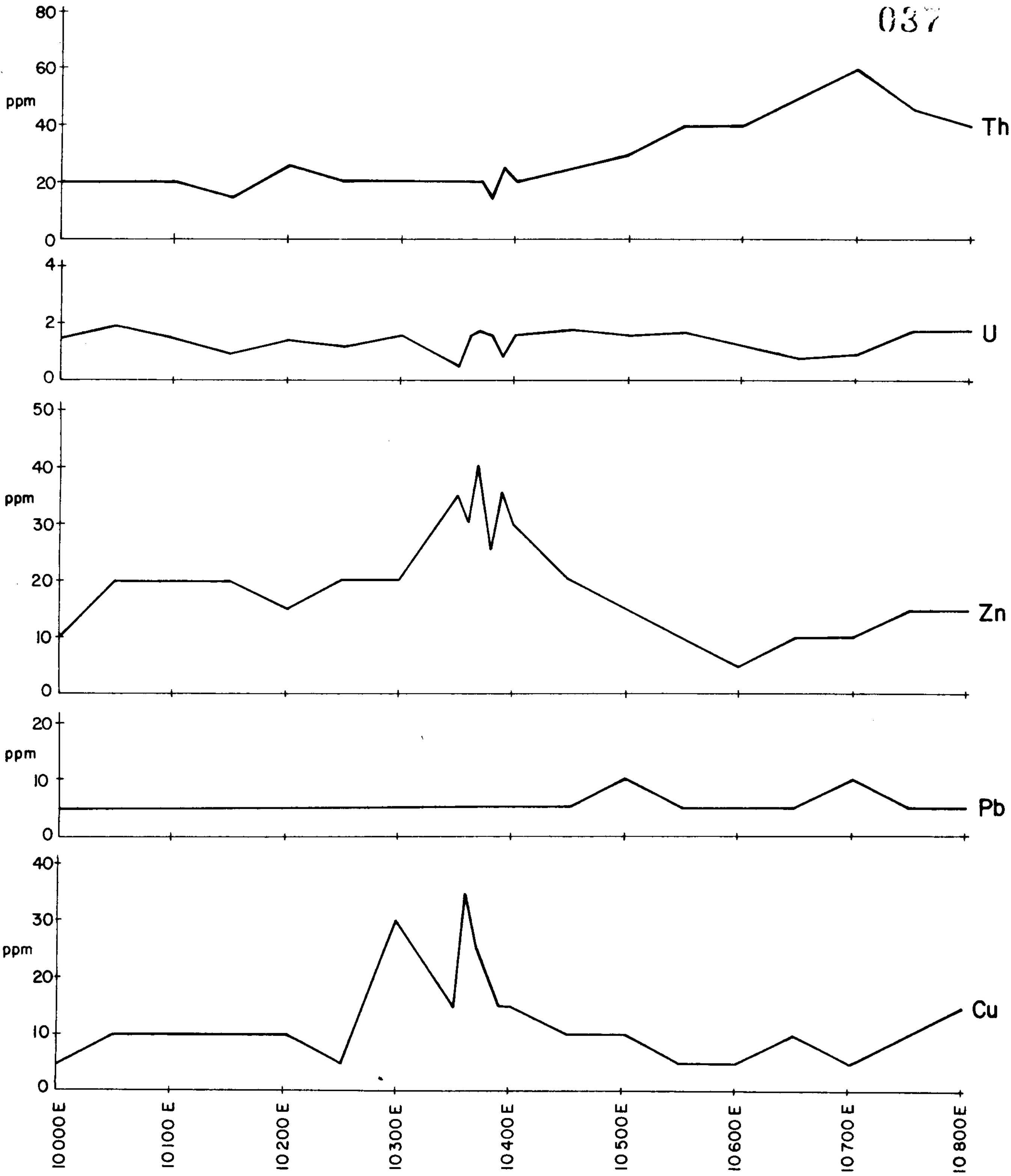
GEOCHEMISTRY

SOIL SAMPLING

As a pilot survey to determine the usefulness of soil sampling in general mapping and the nature of radiometric anomalies, 128 samples were collected from the A-horizon using a hand auger. Sample depth generally was 50 cm. The -20 +40 mesh and the -80 mesh fractions were analysed for U, Th, Cu, Pb, Zn, Ni, Ca, Ag, Mo, Sn. (cf Appendices IV and V).

Samples were collected at 50 m intervals on four grids; two over augen gneisses (TB1 and TB20) and two over metasediments (TB17 and TB29). Analytical results for the -80 mesh fraction are plotted in Figs. 12-14 and Plates 26-28. Most values for U, Th and base metals are very low except the Th values on the TB29 10400N traverse. The Th profile on this line correlates well with the radiometric profile, (Plate 25).

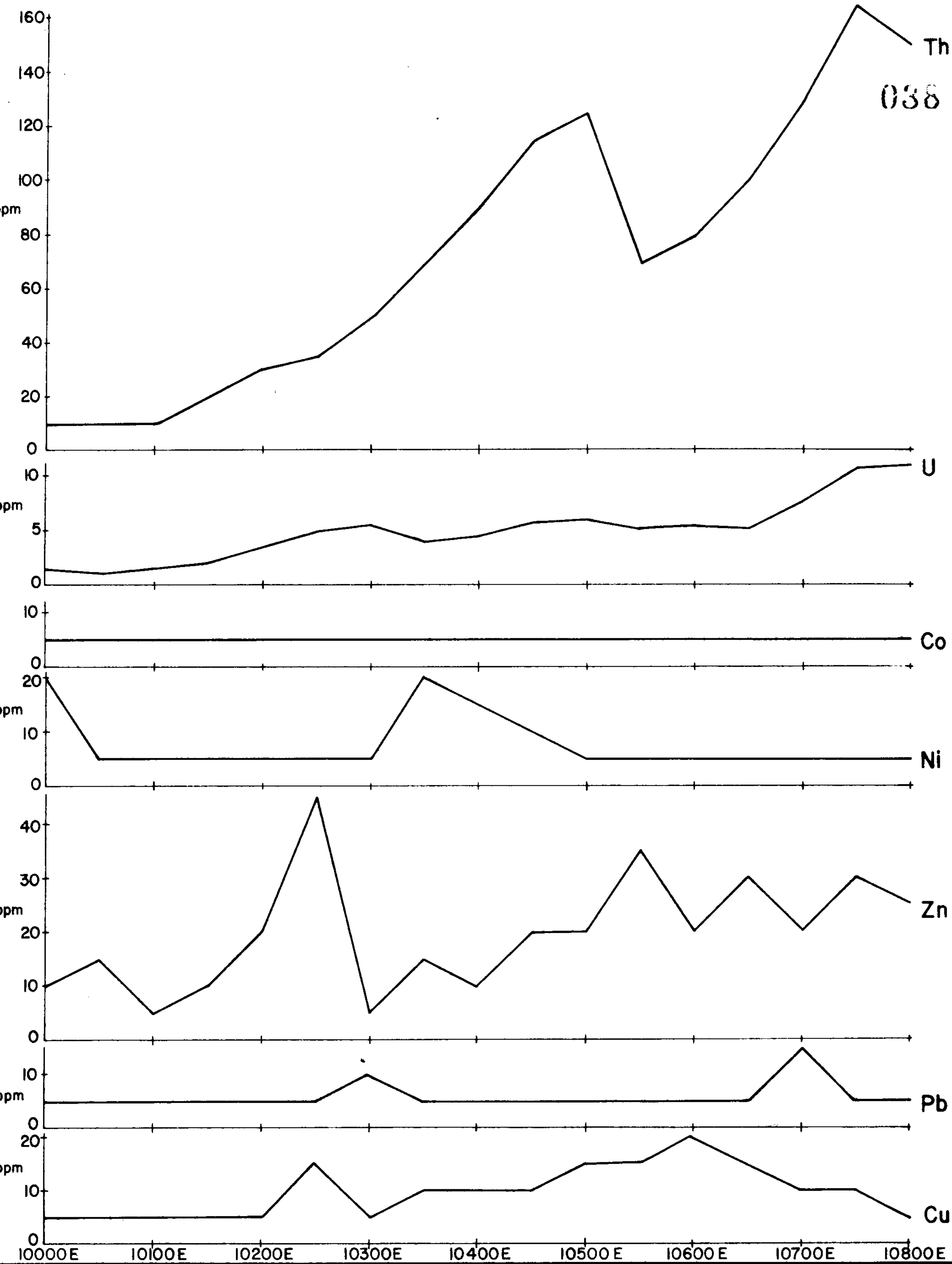
The samples from the TB17 grid were also analysed for Ca, Mg, P and Ti in an attempt to identify the lithologies underneath the soil cover, (Plates 26 and 27).



To Accompany Report WY. 80.7. *Figure : 12*

A Horizon 30 - 50 cm depth.
-80 mesh fraction.
HCl / HNO_3 / 3NHCl digestion.
All values in ppm.

DRAWN A.E.M.	AFMECO PTY. LTD.
DATE JUNE '81	SCALE 1:500 (4 0 4 8 12 16 20 m)
GEOLOGY P.W.	TUMBY BAY PROJECT
APPROVED	TB1 GRID - 12600 N TRAVERSE
DWG. No S153-11.126.3494	SOIL SAMPLING
REV. No	PILOT SURVEY



A Horizon 30-50cm depth.

-80 mesh fraction.

HCl / HNO_3 / 3NHCl digestion.

All values in ppm.

To Accompany Report WY.80.7.

DRAWN	A.E.M.
DATE	JUNE '81
GEOLOGY	P.W.
APPROVED	
DWG. No	S153-11.126.3495
REV. No	

AFMECO PTY. LTD.

SCALE 1:500

4 0 4 8 12 16 20 m

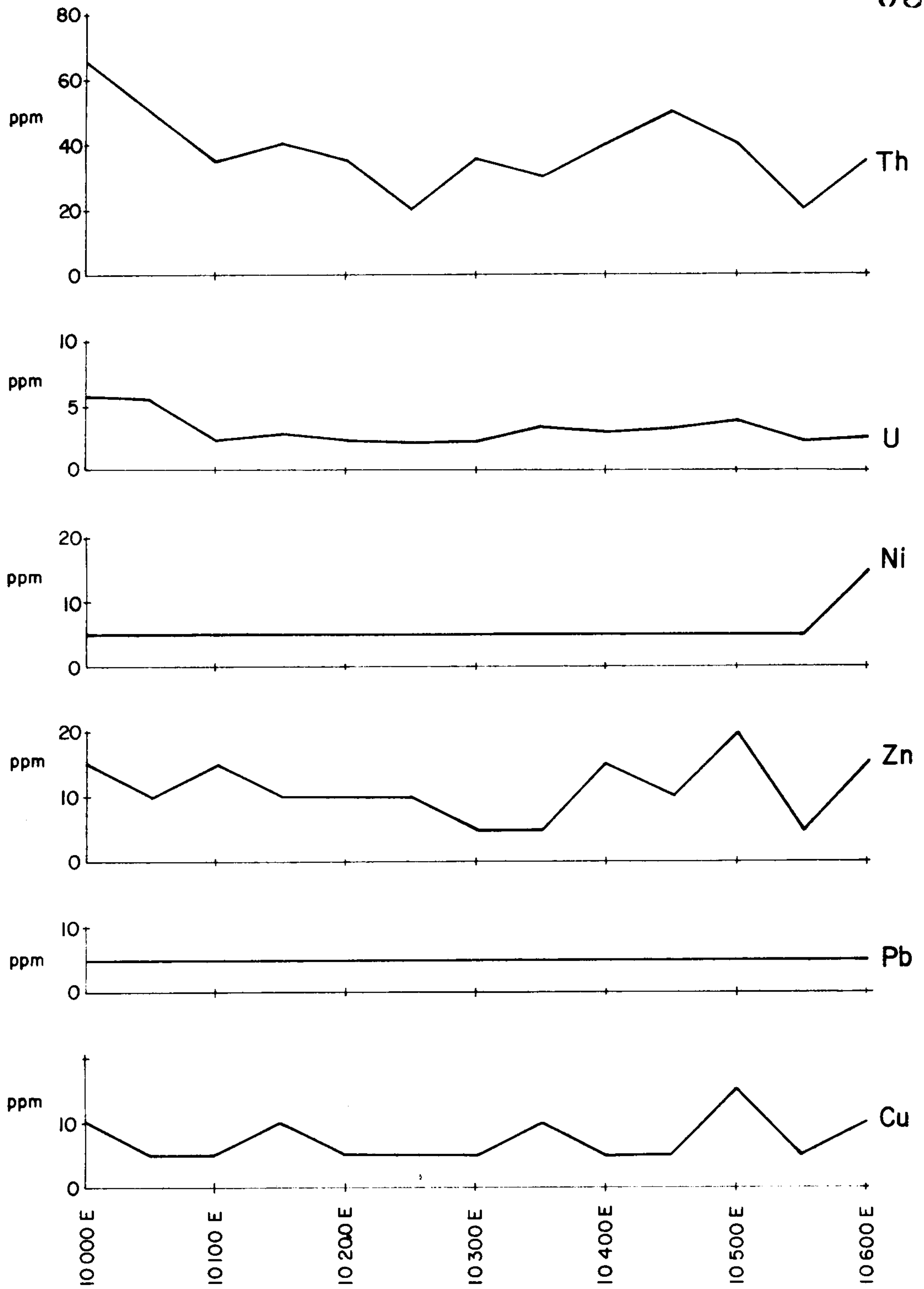
TUMBY BAY PROJECT

TB 29 GRID - 10400 N TRAVERSE

SOIL SAMPLING

PILOT SURVEY

Figure : 13



To Accompany Report WY. 80.7. *Figure : 14*

A Horizon 30 - 50cm depth.
- 80 mesh fraction.
$HCl / HNO_3 / 3NHCl$ digestion
All values in ppm.

DRAWN A.E.M.	AFMECO PTY. LTD.
DATE JUNE '81	SCALE 1 : 500 (4 0 4 8 12 16 20 m)
GEOLOGY P.W.	TUMBY BAY PROJECT
APPROVED	TB 29 GRID - 11200 N TRAVERSE
DWG. No S153-11.126.3496.	SOIL SAMPLING PILOT SURVEY
REV. No	

DISCUSSION

GEOLOGY

The key to the understanding of the geology of the southern Eyre Peninsula is the Lincoln Complex and its relationship to the Hutchison Group. Due to the lack of outcrops of the Lincoln-Hutchison contact, the lack of detailed maps, and the very limited number of radiometric dates, previous workers have drawn rather opposing conclusions on the relationship of the Lincoln Complex to the Hutchison Group. The 3 main hypotheses are:

1. The Lincoln Complex forms the basement for the Hutchison Group. The origin of the Lincoln Complex is unknown but it could be reworked Sleaford Complex.

2. The Lincoln Complex is intrusive into the Hutchison Group. Basement to the Hutchison Group is not specified, but is presumably the Sleaford Complex.

3. The Lincoln Complex is a highly metamorphosed part of the Hutchison Group.

Part of the confusion is probably due to the fact that the mylonite zone is considered to be the contact between the Lincoln Complex and the Hutchison Group. The AFMECO mapping has shown that this is not the case in the southern part of the E.L. where the banded migmatitic gneisses are found between the mylonite zone and the Hutchison Group.

The slight difference in metamorphic grade (mid to high amphibolite facies) and the marked differences in lithology makes it extremely unlikely that the Lincoln Complex is highly metamorphosed and migmatitised Hutchison Group. The slightly greater ages of the Lincoln Complex compared to the Hutchison Group also make hypothesis 3 unlikely.

As far as an intrusive relationship is concerned, the lack of intrusive contacts, slightly greater ages for the Lincoln Complex, the lack of Hutchison xenoliths in the Lincoln Complex and a longer tectonic history for the banded gneisses compared to the Hutchison group, all argue against an intrusive relationship.

The quartz veins in the Lincoln Complex have been interpreted as xenoliths of Hutchison quartzites but this is unlikely as the "veins" show no internal sedimentary structures and many crystals show well developed facies and a distinct zoning. The "veins" are all close to and parallel to the mylonite zone, and are most likely silicified sheer zones.

From the available data, it appears most likely that the Lincoln Complex consists of migmatitic banded gneisses equivalent to the Archaean Cape Carnot gneisses and intrusive granitoids like the Donnington Granitoid Suite, (Mortimer et al 1979), and the augen gneisses, both intruded about 1820 m.y. ago. All the rocks were deformed and metamorphosed to high grade, (granulite-high amphibolite facies), together with the Hutchison Group during the Kimban Orogeny (1800-1700 m.y.). The evidence for this interpretation is the great structural and lithological similarity (e.g. leucocratic garnet rich gneisses) between the Cape Carnot gneisses and the migmatitic banded gneisses in the Lincoln Complex. The Rb-Sr age and initial ratio for augen gneisses at Kirton Point, Port Lincoln is in agreement with, but does not prove, the above interpretation.

If Sleaford gneisses do form the basement for the Hutchison Group sediments, the potential for uranium mineralisation on or near the contact to the Hutchison Group appears low, as most mobile uranium would have been remobilised from the banded gneisses during the Archean high grade metamorphism. It is not known whether the augen gneisses could have been a source of uranium for the Hutchison sediments, as the relative ages of intrusion and sedimentation are unknown.

As more analytical data comes to hand, the suggestion that the thorium content could be used to differentiate between Sleaford, Lincoln and Hutchison rocks appears untenable. There is now an overlap of ranges for all three groups and the high Th in the Sleaford Complex is only characteristic for the homogeneous gneisses in the Marble Range-Coffin Bay area, (already described as Th rich by Johns, 1961). The only valid way of distinguishing the three groups appears to be by detailed structural studies combined with radiometric dating.

ORIGIN OF TB1 and TB20 ANOMALIES

The two main problems are the relationship of the anomalous hornblende gneisses to the surrounding augen gneisses, and the controls of the uranium mineralisation. A comparison of the two types of gneisses is given in Table 5a and 5b.

The contact between the hornblende gneiss and the augen gneiss has not been observed. The trend but not the foliation of the hornblende gneiss appears to be discordant to the trend of the foliation in the augen gneisses and to the magnetic trends in TB1-1 but the hornblende gneiss is concordant with both the foliation in the augen gneisses and the magnetic trends in the TB20-1 and Tallala anomalies. The hornblende gneisses are distinguished by a better developed gneissic fabric than the augen gneisses and by their more sodic character. Both the augen gneisses and the hornblende gneisses contain an unusually large number of accessory minerals but with higher concentration in the hornblende gneiss where the accessories are associated with ferro-magnesian minerals, (mainly hornblende). The uranium-bearing minerals, zircon, monazite, allanite, and brannerite are all considered to be primary metamorphic minerals. A detailed discussion of the anomalous gneisses should be left until the TB20-1 and the TB1-1 anomalies have been diamond drilled in February, 1981.

The fact that the uranium bearing accessories are associated with magnetite and ilmenite suggests a genetic relationship and, more important, that magnetometer surveys might be useful in locating soil covered anomalies. The TB20-1 and the Tallala anomaly are in fact associated with magnetic highs.

GEOCHEMISTRY

The soil sampling programme proved only moderately successful. There is a close correlation between the U and Th values in the -80 mesh soil fraction and the radiometric response as measured on the SPP2. No significant increase in any of the analysed elements apart from Cu was noted on TB1 line 12600N which passes only 5 m south of the TB1-1 anomaly. Another pilot survey with 5-6 soil samples collected over the TB1-1, TB1 Tallala, and TB20-1 anomalies and 5-6 reference samples collected from adjacent augen gneisses on each anomaly, should be carried out, with the samples analysed for as many elements as possible using the ICP method. Pb and Zr appear likely indicator elements for the anomalous hornblende gneisses.

The attempt to use soil geochemistry as a lithological guide might be better evaluated when the results from the drilling in January, 1981 are available.

While the -80 mesh fraction in general gives better results than the coarser (-20+40 mesh) fraction (Fig.15), the slightly high Th and Pb values in the -20+40 mesh fraction from TB1 12600N; 10750-10800E requires investigation, as higher background Th and Pb are associated with U in the TB1 and TB20 anomalies. The thorium might be present in resistant minerals that survived the weathering. The 10750-10800E interval is over lateritic soils in an area with subdued magnetic relief.

The frequency diagrams in Figures 16-19 show very low concentrations of all analysed elements except thorium.

GEOPHYSICS

Aeromagnetometry

In the Lincoln Complex there is generally a good correlation between the geological mapping units and magnetic features. Though the field evidence is lacking, the magnetic patterns suggest that the augen gneisses cut the banded gneisses in the area north of Winter Hill and west of North Shields. It is likely that the augen gneisses here extend underneath the meta-sediments of the Hutchison Group.

In the Hutchison Group the correlation between geology and magnetics is not so obvious, except N and NE of Koppio where zones with high magnetic intensity correspond to concentrations of BIFs and amphibolites. Most of the mapped BIFs do not show up on the aeromagnetic map, due to their thinness or the low magnetite content of some of the BIF's. The north-south trend of the Green Patch BIFs is not reflected in the magnetic pattern, which suggests an east-west trend.

While the eastern contact of the Hutchison Group is clearly displayed on the aeromagnetic map, the location of the western contact is not well defined. In general, the regional trends of the magnetic features follow the geological trends but on a smaller scale most of the magnetic features show a discordant N-S trend, which is probably due to the contouring, as there is no geological evidence for these trends.

From the magnetic patterns several E-W trending faults are suggested (Plate 3).

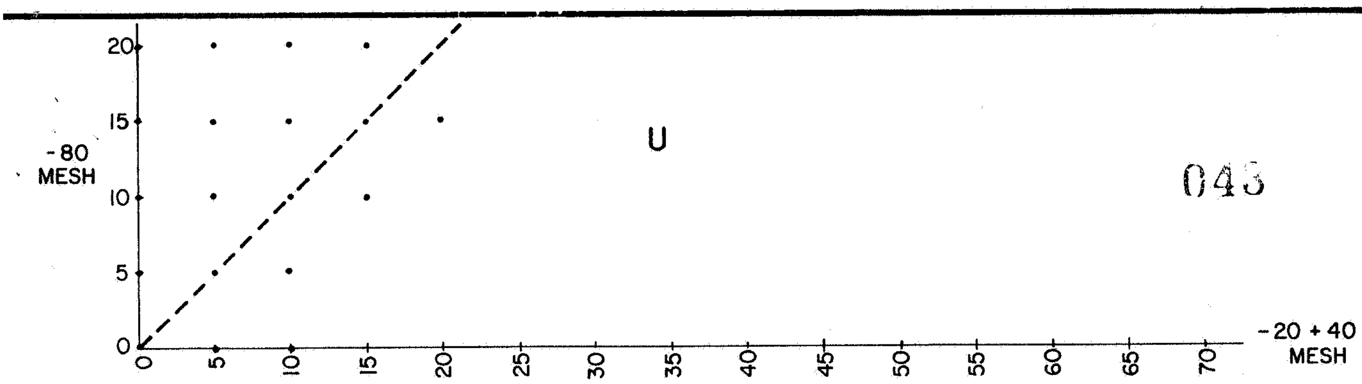
Aerial Radiometry

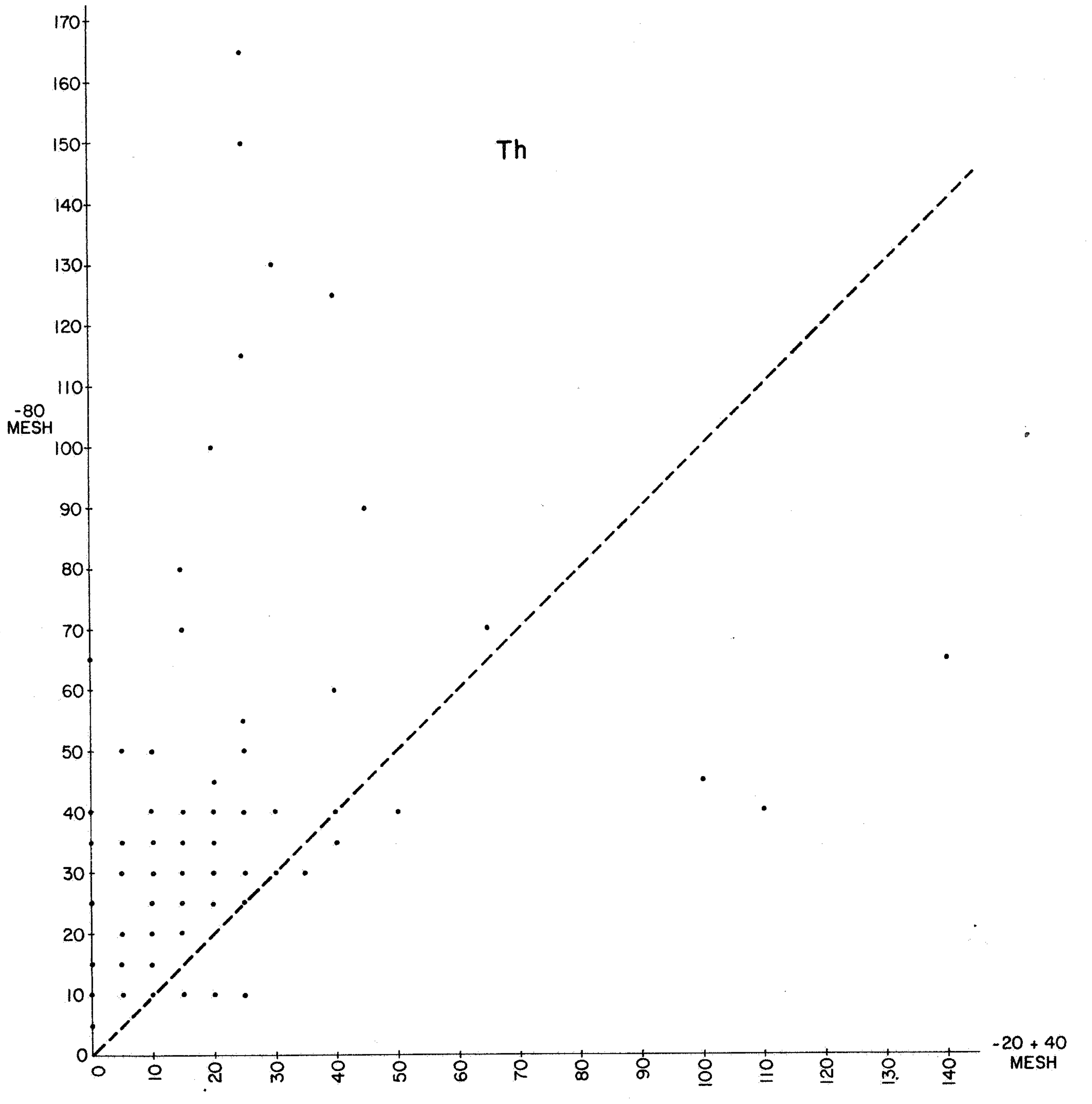
Following the airborne survey two field assistants ground-checked areas with more than 50 cps on the uranium channel (Table 7 and Plate 2). The areas with the highest counts on the SPP2 were sampled for analysis (Table 5). The results of this survey were used to select areas for gridding and more systematic work. The TB1-1 anomaly and other lesser anomalies were located by the field assistants.

The use of field assistants allowed the area to be quickly checked at a time when no geologists were available but the lack of lithological information from the anomalous areas necessitates further field checking, as areas with 300-400 cps over soil could be more significant than outcrops with 1000-2000 cps SPP2.

From the detailed groundwork it appears that not all the anomalies in the U-channel of the airborne surveys correspond to areas with high radiometric background; e.g. TB3 where the ground check gave only one spot reading of 1000 cps in a general background of 180-300 cps.

043





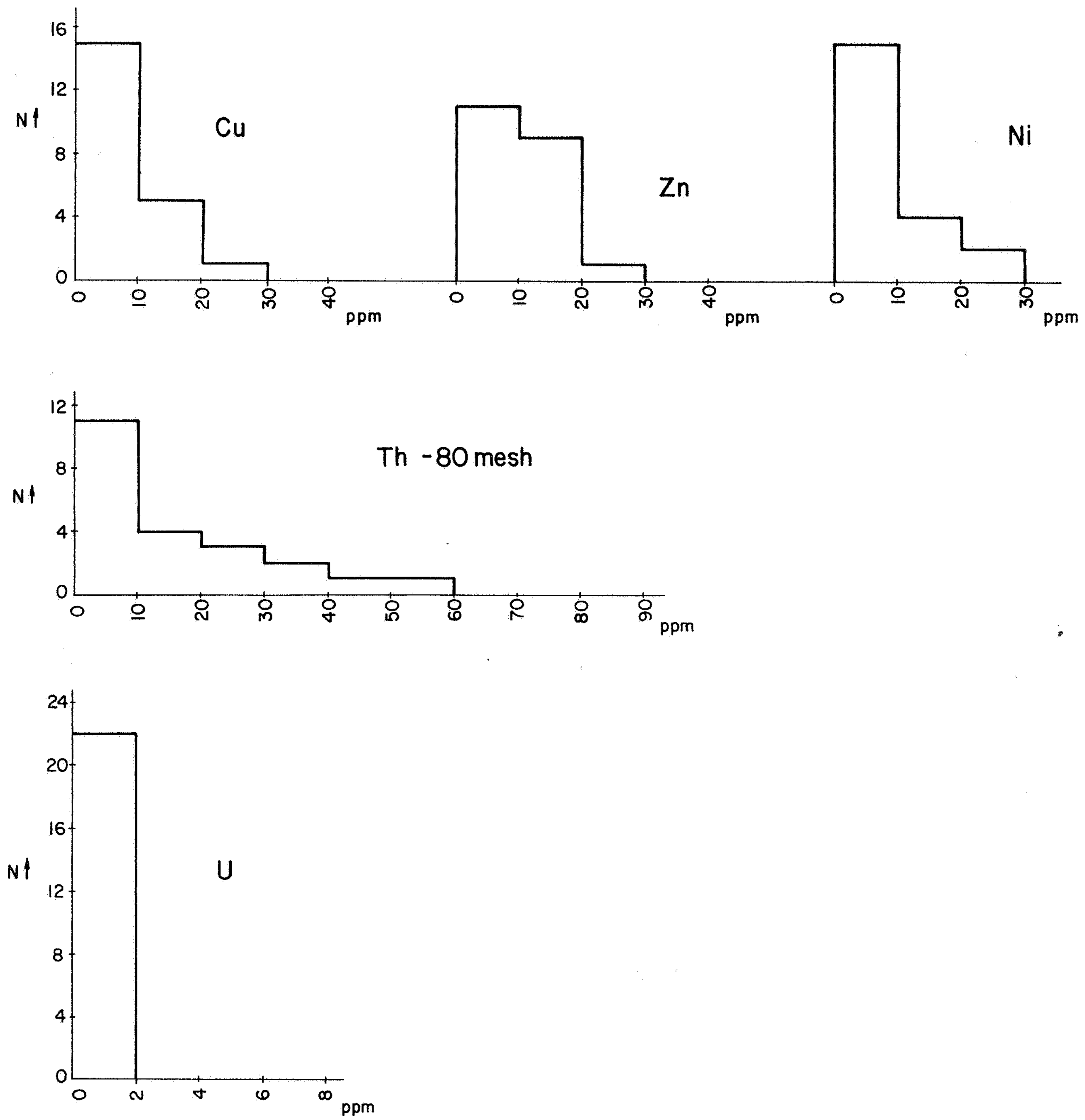
Comparison of -20+40 and -80 mesh fractions.
All figures in ppm.
Analyses by XRF.

To Accompany Report WY.80.7.

DRAWN A.E.M.	AFMECO PTY. LTD.
DATE JUNE '81	SCALE 1:500 (4 0 4 8 12 16 20 metres)
GEOLOGY P.W.	TUMBY BAY PROJECT
APPROVED	
DWG. No. S153-11.126.3497.	SOIL SAMPLING
REV. No.	Comparison of -80# and -20+40# fractions

Figure : 15

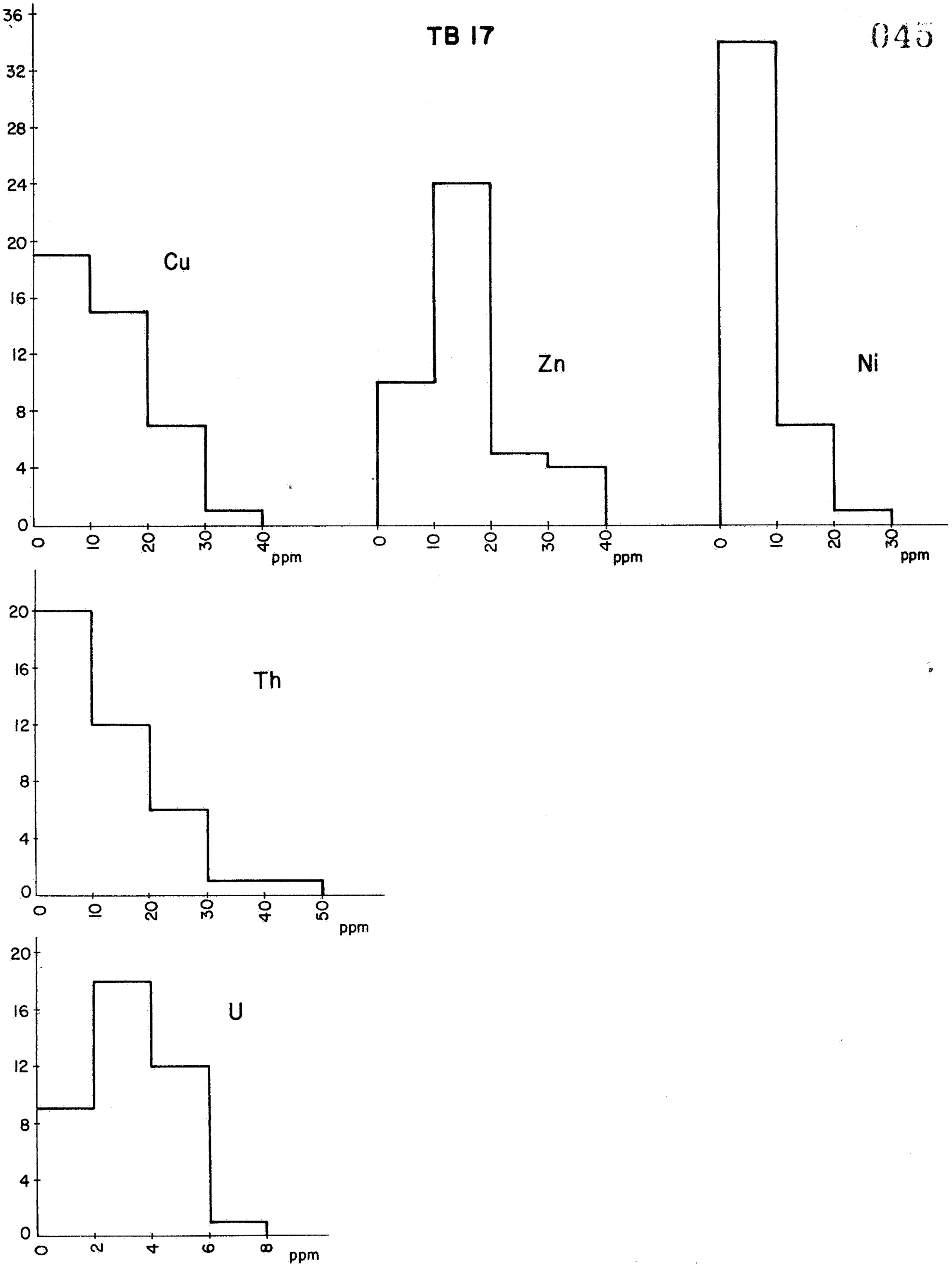
TB1



To Accompany Report WY. 80.7.

Figure : 16

DRAWN A.E.M.	AFMECO PTY. LTD.
DATE JUNE '81	SCALE 1 : 500
GEOLOGY P.W.	TUMBY BAY PROJECT TB1 GRID SOIL SAMPLING FREQUENCY DISTRIBUTION
APPROVED	
DWG. No. S153-11.126.3498.	
REV. No.	

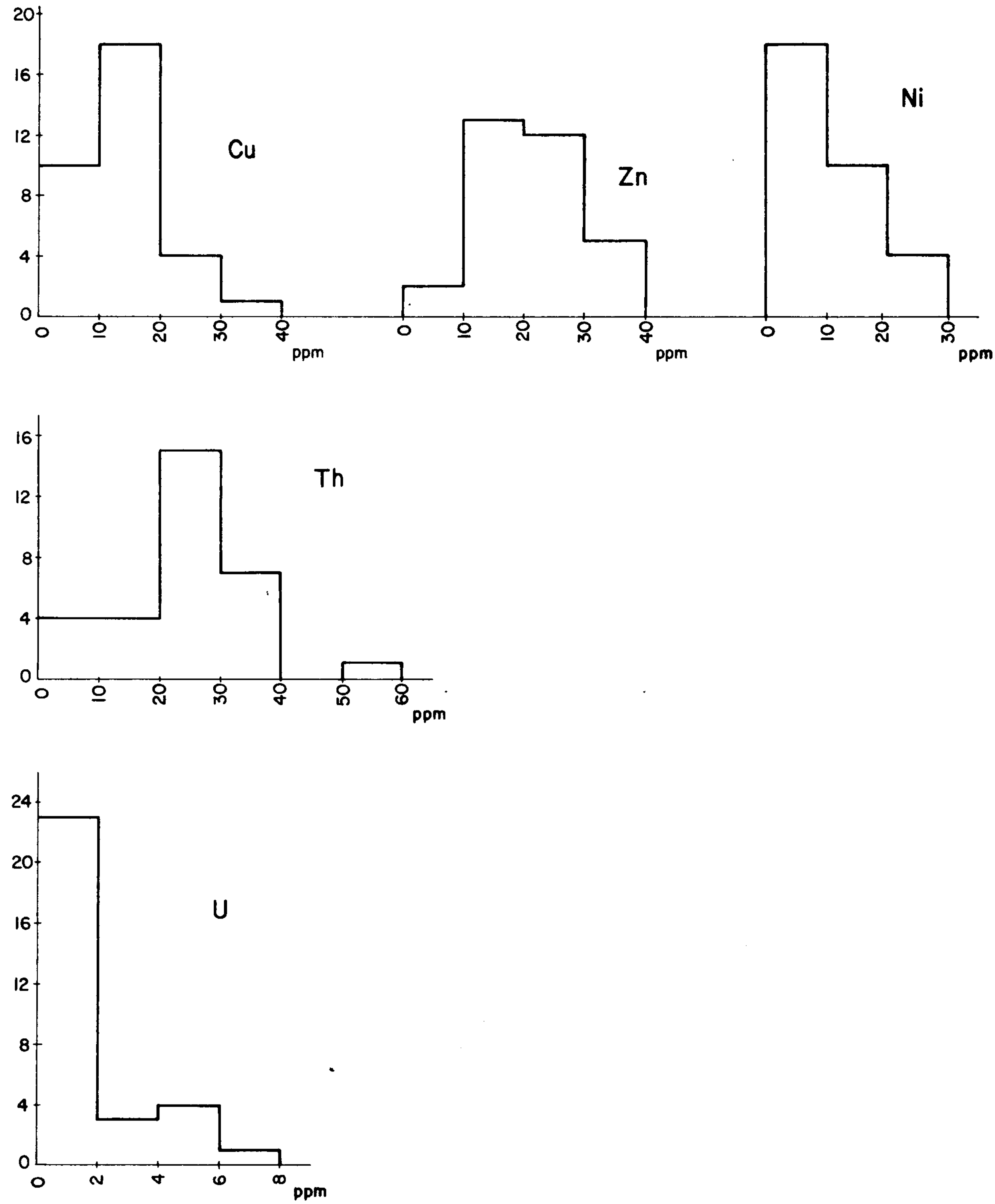


To Accompany Report WY. 80.7. *Figure : 17*

DRAWN A.E.M.	AFMECO PTY. LTD.
DATE JUNE '81	SCALE 1 : 500 (4 0 4 8 12 16 20 m)
GEOLOGY P.W.	TUMBY BAY PROJECT
APPROVED	TB 17 GRID
DWG. No. S153-11.126.3499.	SOIL SAMPLING
REV. No.	FREQUENCY DISTRIBUTION

046

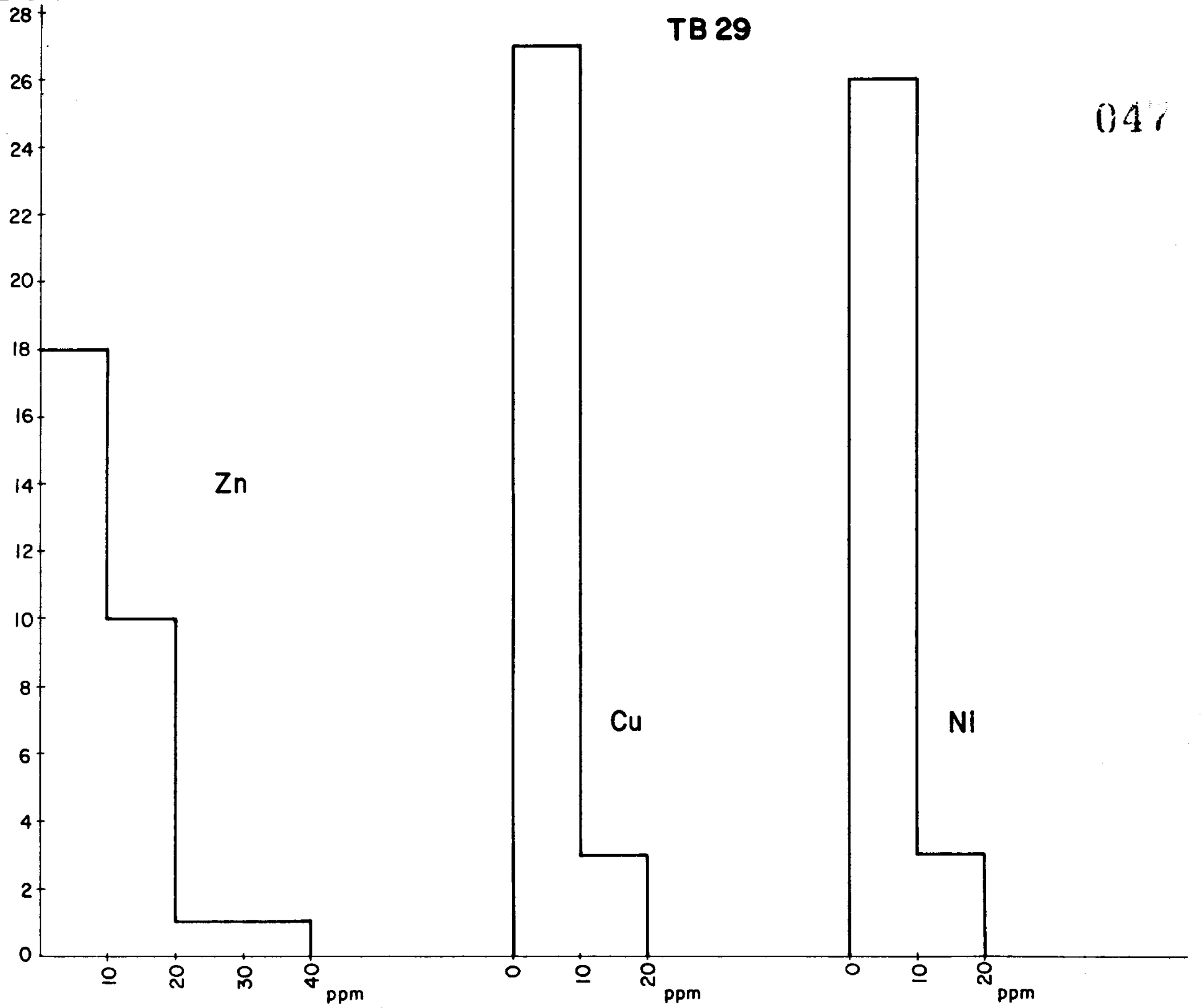
TB 20

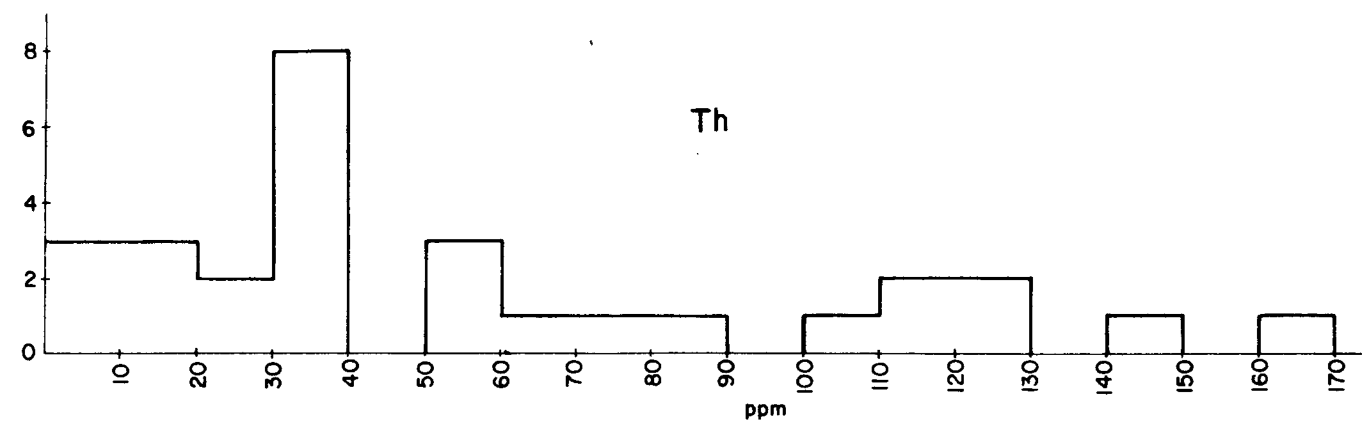


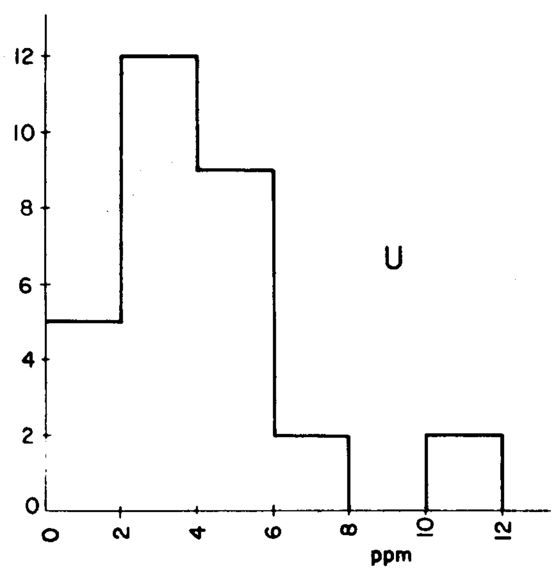
To Accompany Report WY. 80.7. *Figure : 18*

DRAWN A.E.M.	AFMECO PTY. LTD.
DATE JUNE '81	SCALE 1 : 500
GEOLOGY P.W.	TUMBY BAY PROJECT
APPROVED	TB 20 GRID
DWG. No. S153-11.126.3500	SOIL SAMPLING
REV. No.	FREQUENCY DISTRIBUTION

047



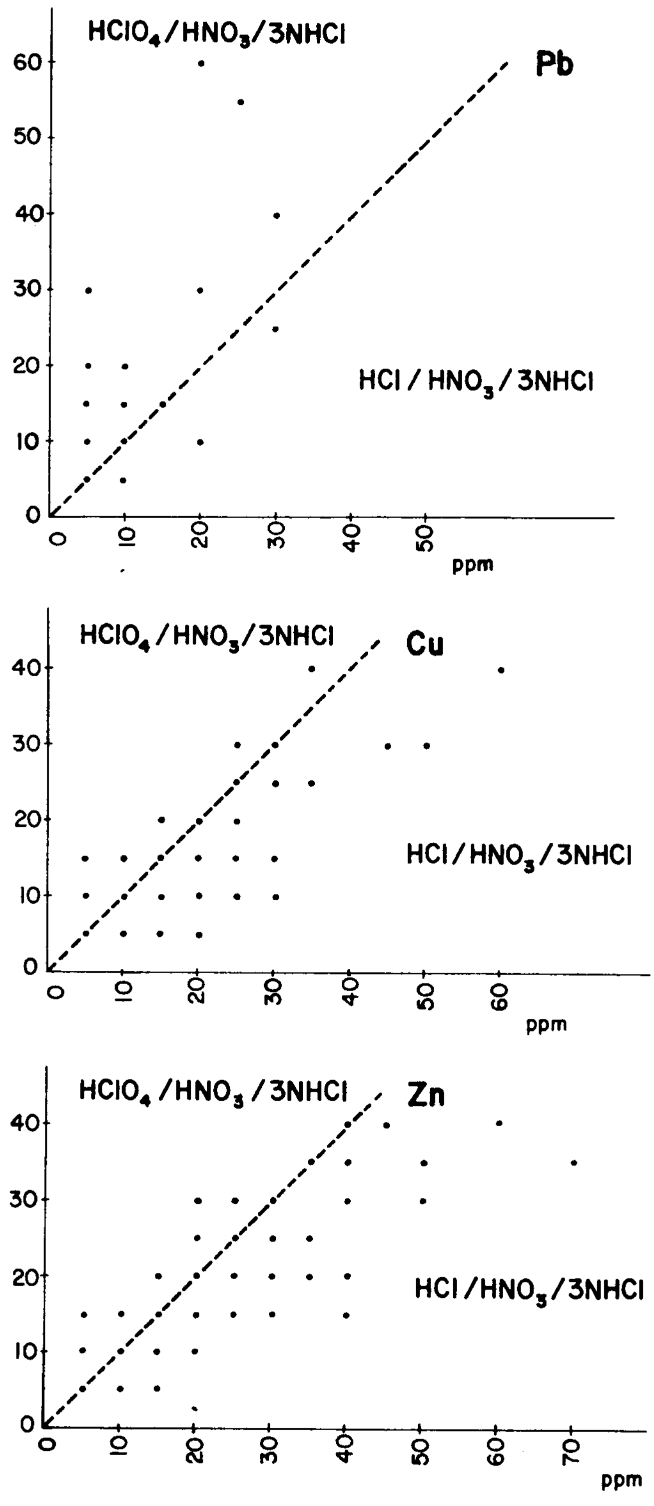




To Accompany Report WY. 80.7. *Figure : 19*

DRAWN A.E.M.	AFMECO PTY. LTD.
DATE JUNE '81	SCALE 1 : 500 — 4 0 4 8 12 16 20 m
GEOLOGY P.W.	TUMBY BAY PROJECT
APPROVED	TB 29 GRID
DWG. No. S153-11.126.3501.	SOIL SAMPLING
REV. No.	FREQUENCY DISTRIBUTION

048



To Accompany Report WY. 80.7.

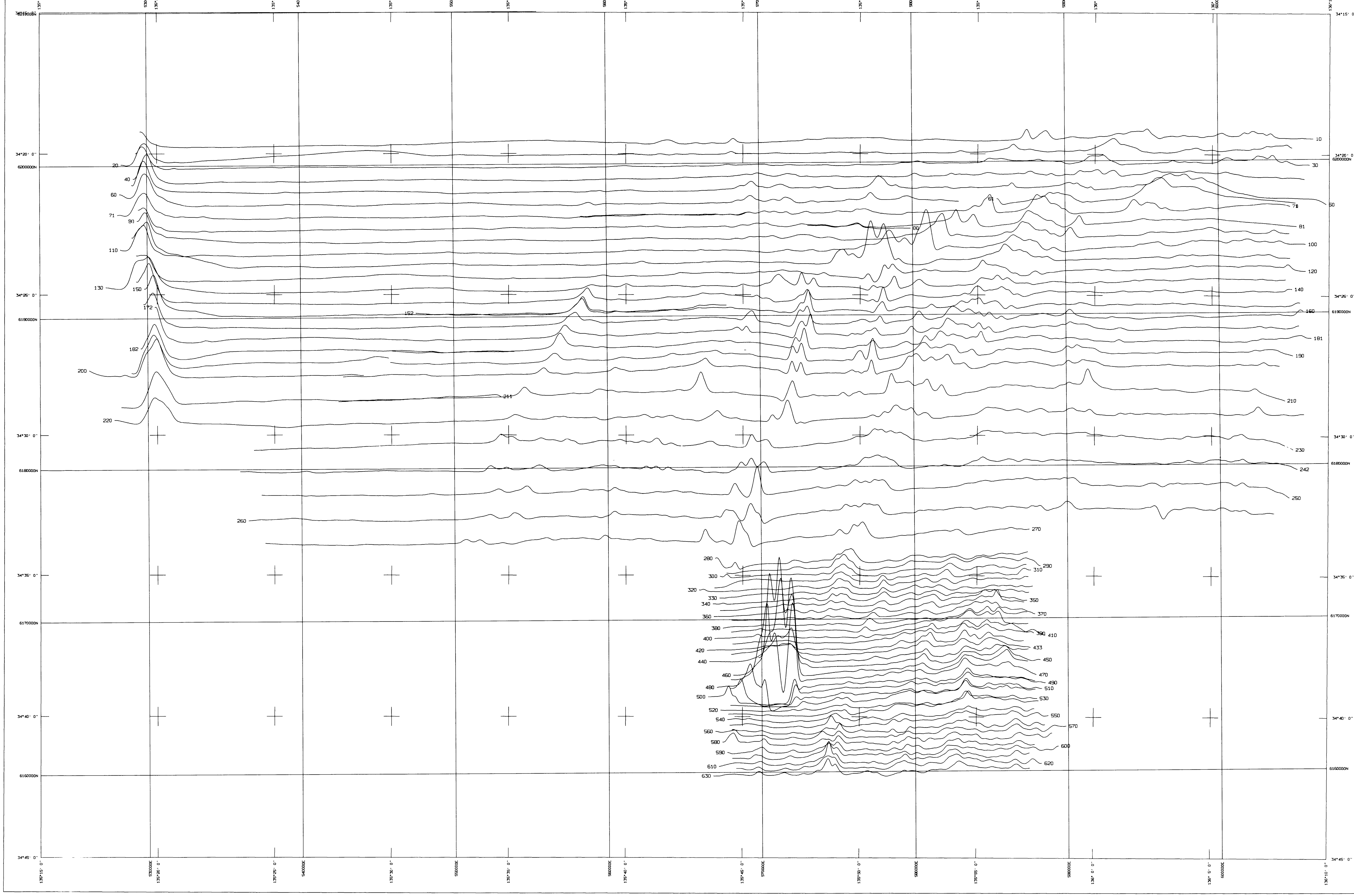
Figure : 20

DRAWN A.E.M.	AFMECO PTY. LTD.
DATE JUNE '81	SCALE 1 : 500
GEOLOGY P.W.	TUMBY BAY PROJECT
APPROVED	SOIL SAMPLING
DWG. No. S153-11.126.3502.	COMPARISON OF DIGESTION METHODS
REV. No.	FOR Cu, Pb AND Zn

TUMBY BAY
E.L. 578
GREAT AUSTRALIAN BIGHT
SPENCER GULF
TUMBY BAY
PORT DOUGLAS
KELLIDIE BAY
BOSTON BAY
LOUTH BAY
PEAKE BAY
PORT LINCOLN
Port Lincoln
Tumby Island
Boston Island
Louth Island
TN
LEGEND
PAST KINEMATIC INTRUSIVES
PB Pyroxenite
Pγ Granite
HUTCHISON GROUP
Pha Amphibolite
Phc Calc-silicate, marble
Phg Graphite schist
Phs Biotite schist
Phb Biotite gneiss
Phi Banded iron formation
Phq Quartzite, metachert
LINCOLN COMPLEX
Plq Quartzvein
Pl Undifferentiated gneiss
Plu Augengneiss
Plm Mylonite
Plb Banded migmatitic gneiss
SLEAFORD COMPLEX
Ps Muscovite, biotite gneiss
28 Dip and strike of foliation
Gelogical Boundary
E L Boundary
NOTE This map is a composite of portions of the 6 x 1:100 000 maps which make up the LINCOLN 1:250 000. (Portion of Coulta 5929, Cummings 6029, Tumby 6129, Wangary 5928, Lincoln 6028, Spilsby 6128)
To Accompany Report WY. 80.7
PLATE 1
REVISION
DATE
AFMECO PTY. LTD.
SCALE 1:100 000
2 0 2 4 Km
DRAWN Bernie
DATE June, 1981
GEOLOGY P.W., F.B., D.B.
APPROVED
DWG. No. S153-11.126.3450
TUMBY BAY PROJECT
OUTCROP GEOLOGY
3776(I)-1


TUMBY BAY
E.L. 578
SPENCER GULF
GREAT AUSTRALIAN BIGHT
LEGEND
Rock sample location
Uranium Anomalies from Airborne Survey Number
Grid location and Number
Auger drillhole location
NOTE This map is a composite of portions of the 6 x 1:100 000 maps which make up the LINCOLN 1:250 000. (Portion of Coulta 5929, Cummings 6029, Tumby 6129, Wangary 5928, Lincoln 6028, Spilsby 6128)
To Accompany Report WY. 80.7
PLATE 2
AFMECO PTY. LTD.
SCALE 1 100 000
DRAWN Bernie
DATE June, 1981
GEOLOGY PW, FB, DB
APPROVED
DWG. NO. S153-11.126.3465
TUMBY BAY PROJECT
LOCATION OF URANIUM CHANNEL AIRBORNE RADIOMETRIC ANOMALIES, ROCK SAMPLES, AUGER DRILLHOLES AND DETAILED GRIDS
3776(I)-2

530000E
540000E
550000E
560000E
570000E
580000E
600000E
610000E
34 15 00 S
34 20 00 S
6200000 N
34 25 00 S
6190000 N
34 30 00 S
6180000 N
34 35 00 S
6170000 N
34 40 00 S
6160000 N
34 45 00 S
135 20 00E
135 25 00E
135 30 00E
135 35 00E
135 40 00E
135 45 00E
135 50 00E
135 55 00E
136 00 00E
136 05 00E
136 10 00E
N
0 1 2 3 4 5 6 7 8 9 10 Km
SCALE 1:100000
FLOWN BY AUSTIREX : NOV 1979
COMPILED BY ENGINEERING COMPUTER SERVICES PTY LTD
This map is a combination of sheets : 5928, 5929, 6028, 6029, 6128, 6129
AFMECO (AUST) LTD
TUMBY BAY S.A.
TOTAL MAGNETIC FIELD
To Accompany Report N° WY 80.7
3776(I)-3
DWGNo SI53-11 126.3503
DATE: 12-FEB-80
PLATE 3



To Accompany Report WY.80.7.

Plate : 4

TUMBY BAY - MAGNETIC INTENSITY

BASE: 59000 NT - SCALE: 1000 NT/CM

1 : 100 000

2 0 2 4 6 8

AUSTIREX AERIAL SURVEYS PTY. LTD.

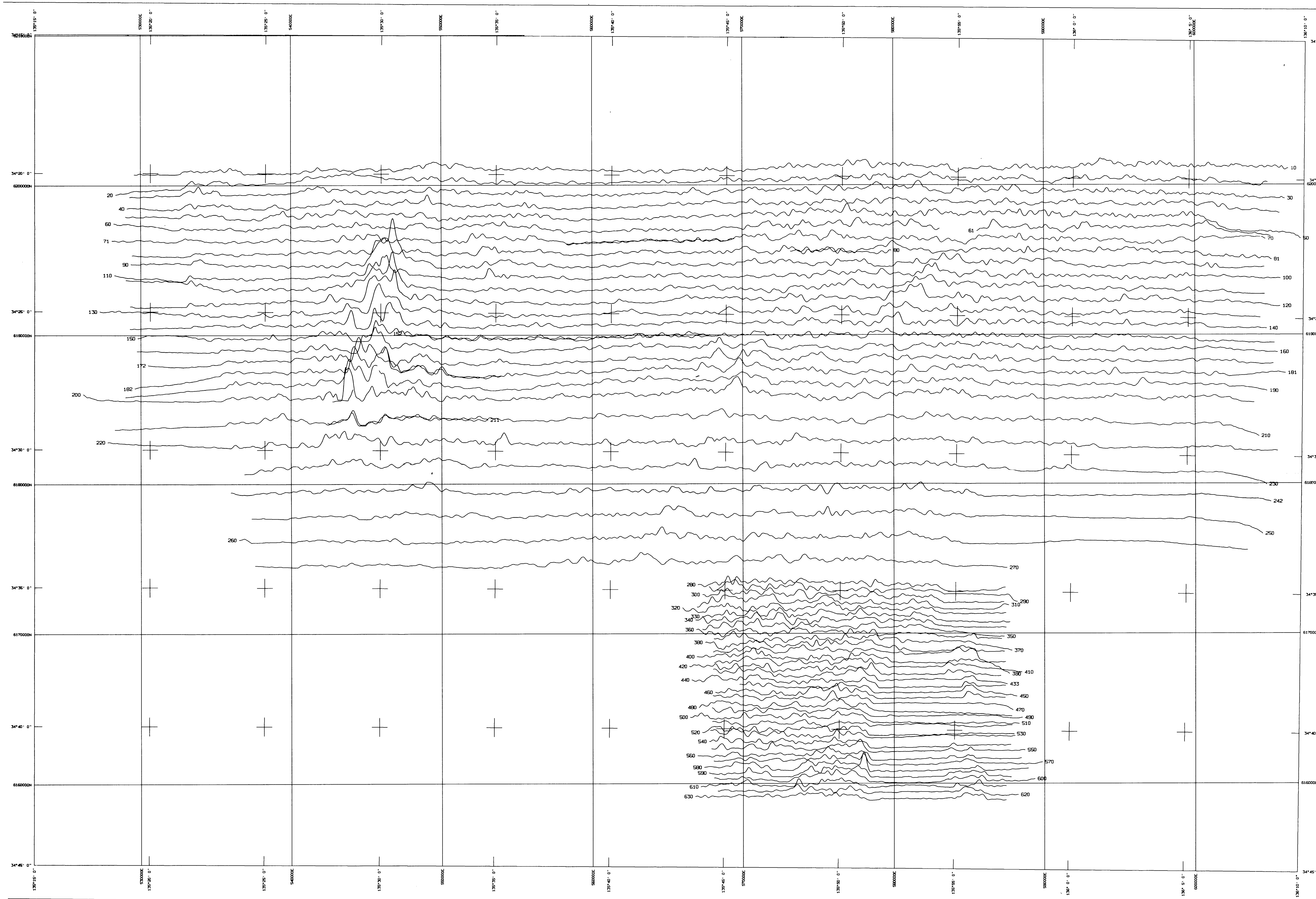
2/MAY/80

3776(I)-4

DWG. No.SI53-11.GPM 2422

3776(I)-5

PLATE 5



To Accompany Report WY.80.7.

Plate : 6

TUMBY BAY - URANIUM

BASE: 0 COUNTS - SCALE: 80 COUNTS/CM

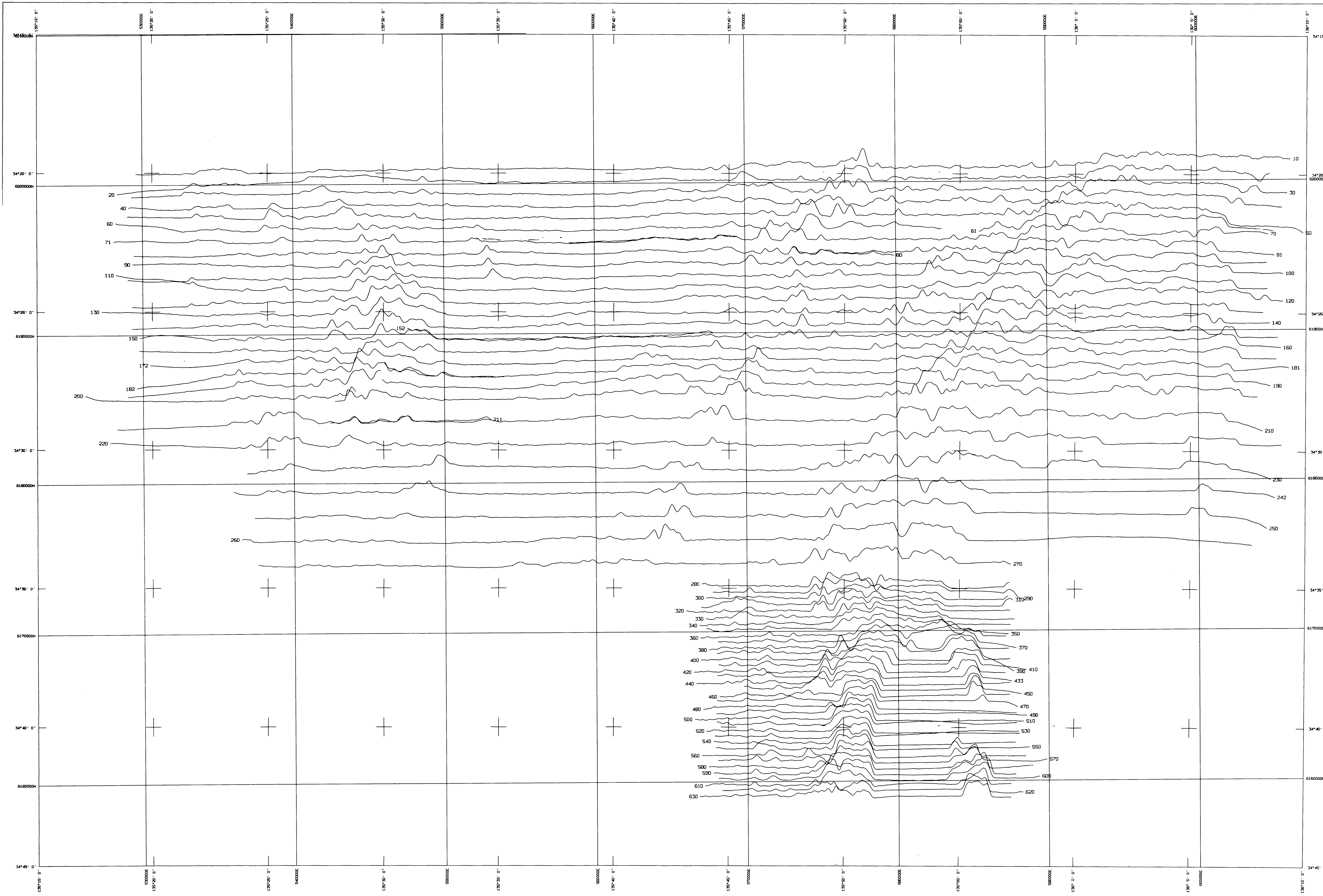
1 : 100 000

2 0 2 4 6 8

AUSTIREX AERIAL SURVEYS PTY. LTD. 2/MAY/80

3776(I)-6

DWG.No.SI53-11.GPR.2427



To Accompany Report WY.80.7. *Plate : 7*

TUMBY BAY - POTASSIUM

BASE: 0 COUNTS - SCALE: 400 COUNTS/CM

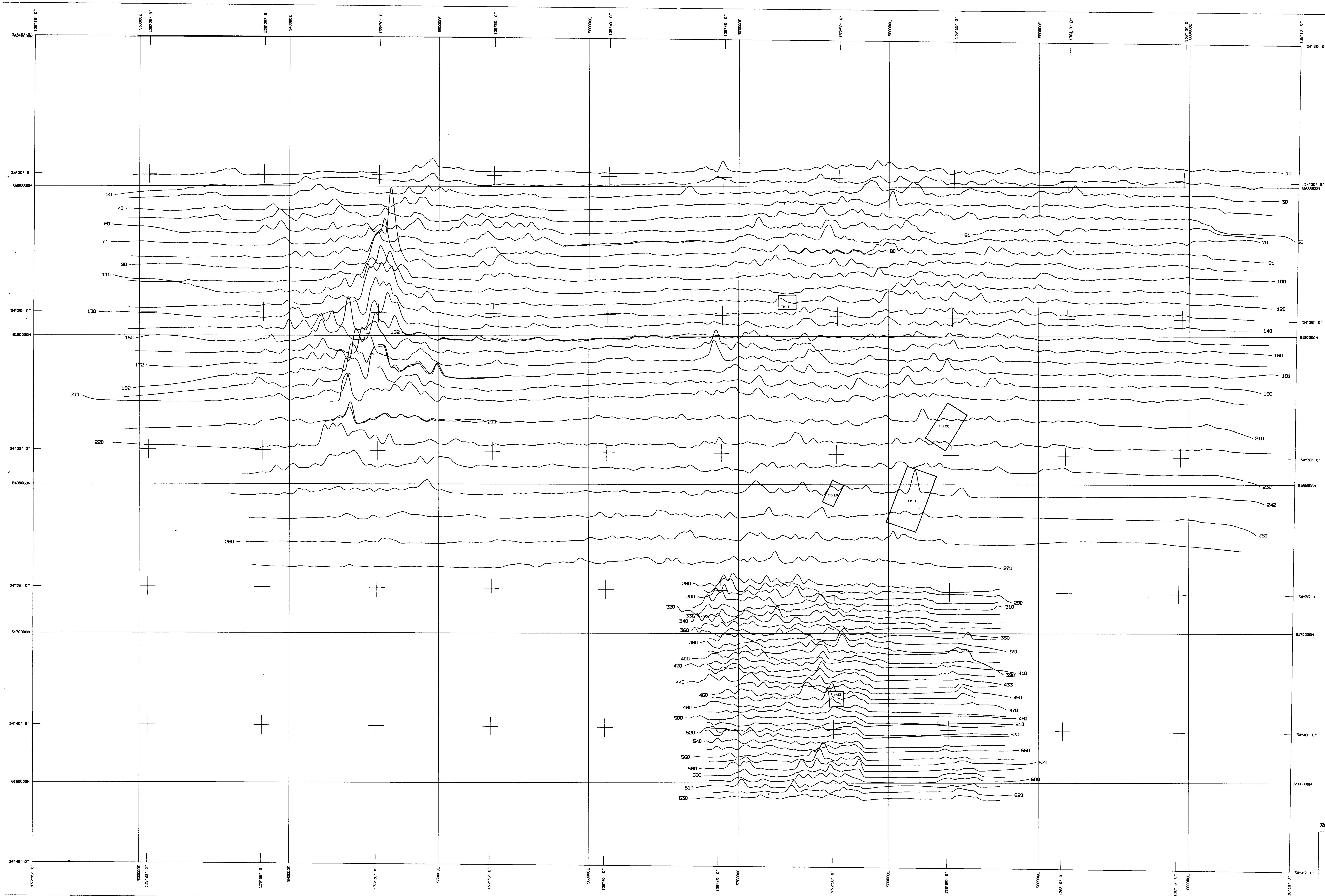
1 : 100 000

2 0 2 4 6 8

AUSTIREX AERIAL SURVEYS PTY. LTD. 2/MAY/80

3776(I)-7

DWG.No.SI53-11.GPR. 2428



To Accompany Report WY.80.7.

Plate : 8

TUMBY BAY - THORIUM

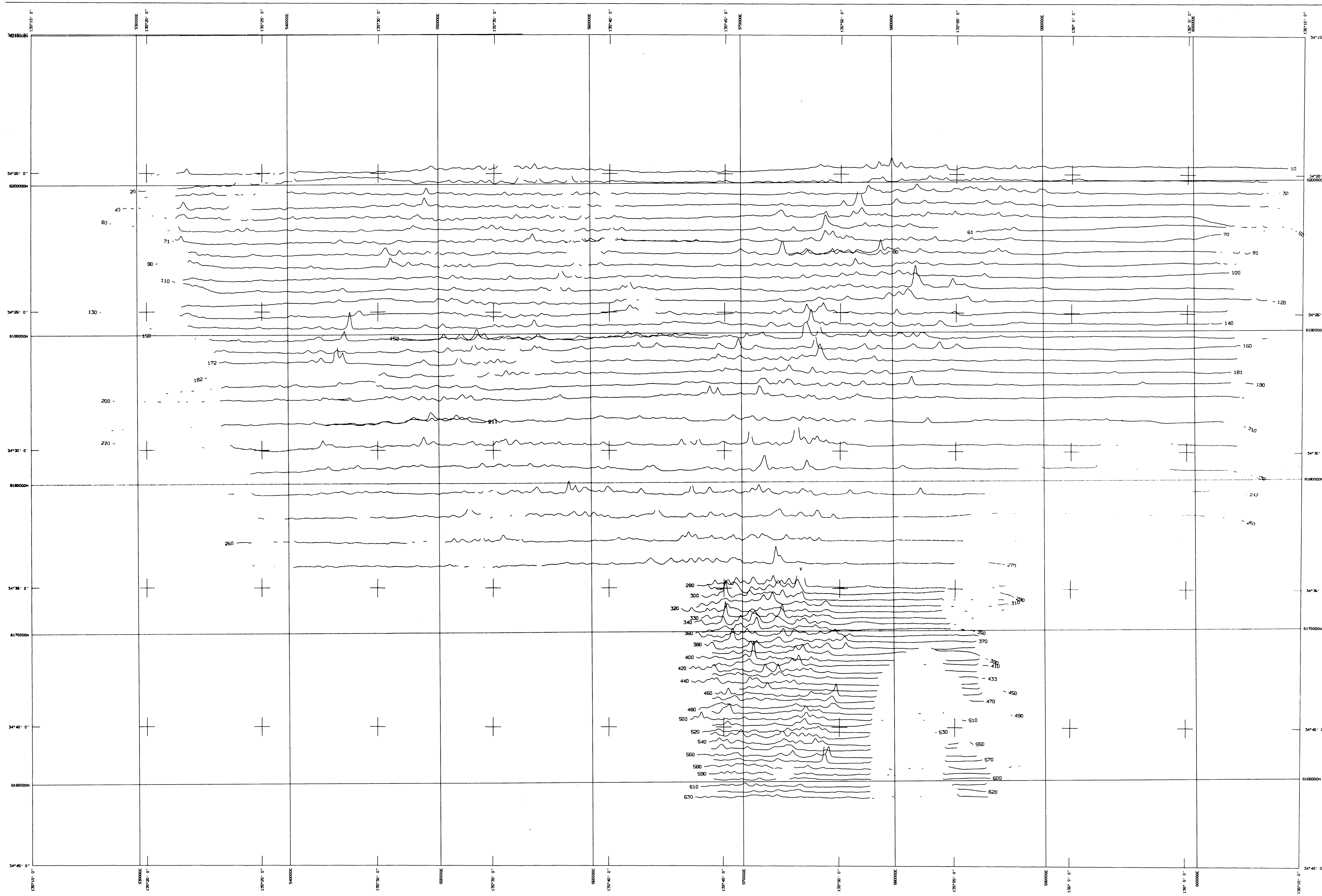
BASE: 0 COUNTS - SCALE: 400 COUNTS/CM

1 : 100 000

AUSTIREX AERIAL SURVEYS PTY. LTD. 2/MAY/80

3776(I)-8

DWG.No.S53-11.GPR.2426



To Accompany Report WY.80.7

Plate : 9

TUMBY BAY - U/K

BASE: 0 - SCALE: 4.0 /CM

1 : 100 000

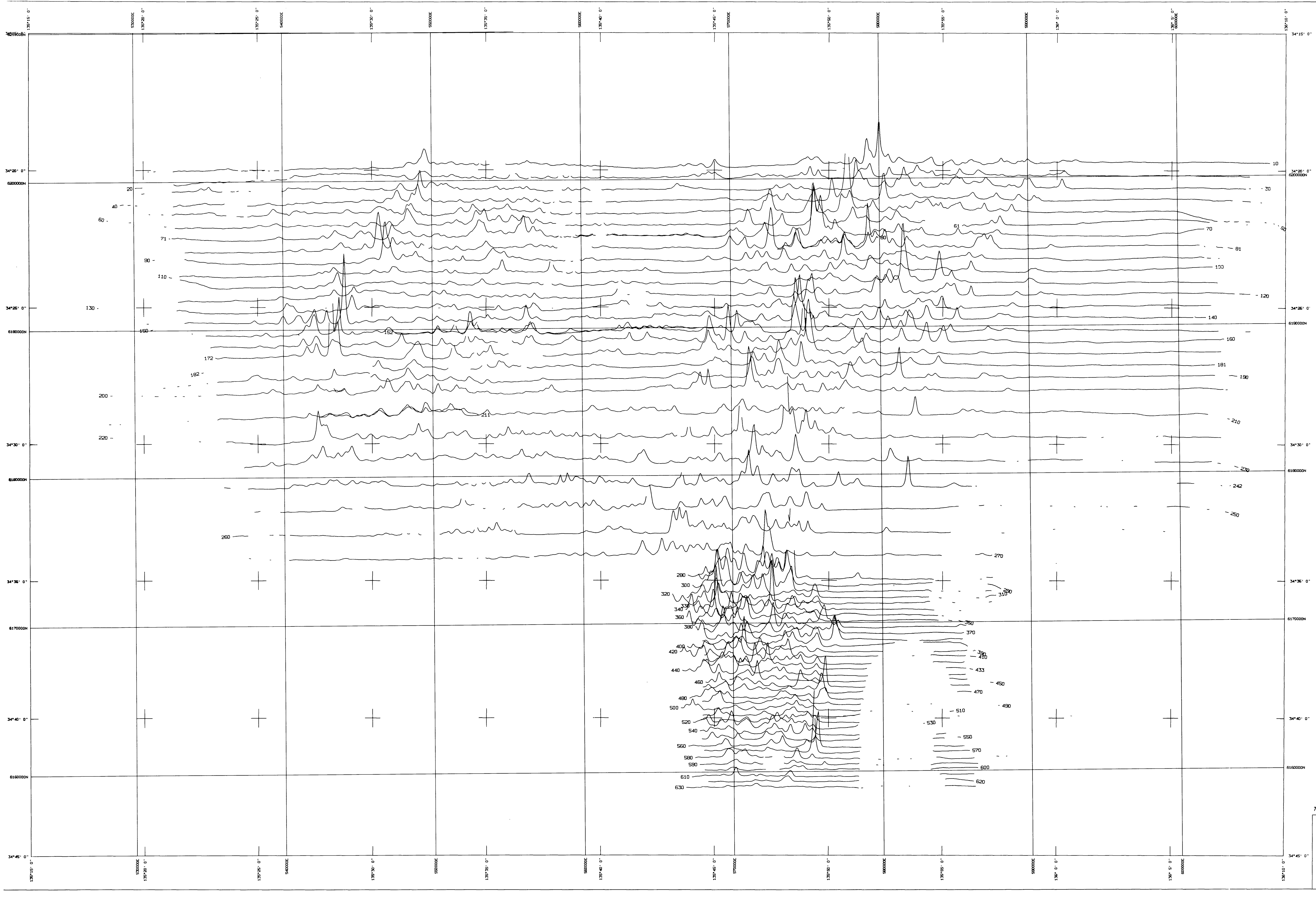
2 0 2 4 6 8

AUSTIREX AERIAL SURVEYS PTY. LTD.

3/MAY/80

3776 (I)-9

DWG No SI53-11 GPR 2425



To Accompany Report WY.80.7.

Plate : 10

TUMBY BAY - TH/K

BASE: 0 - SCALE: 8.0 /CM

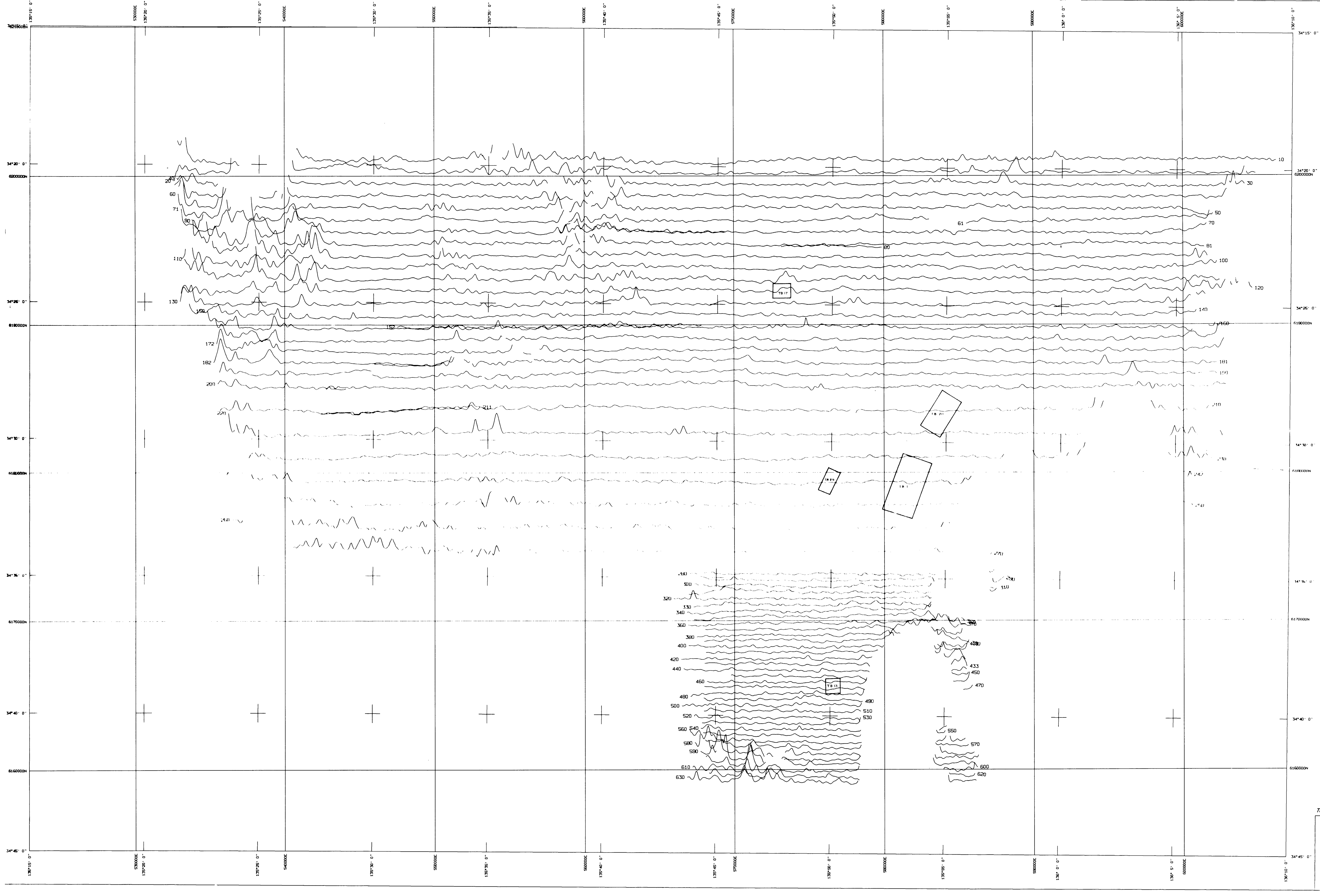
1 : 100 000

AUSTIREX AERIAL SURVEYS PTY. LTD.

3/MAY/80

3776 (I)-10

DWG.No.SI53-11.GPR.242



To Accompany Report WY 80.7

Plate : 11

TUMBY BAY - U/TH

BASE: 0 - SCALE: 1.0 /CM

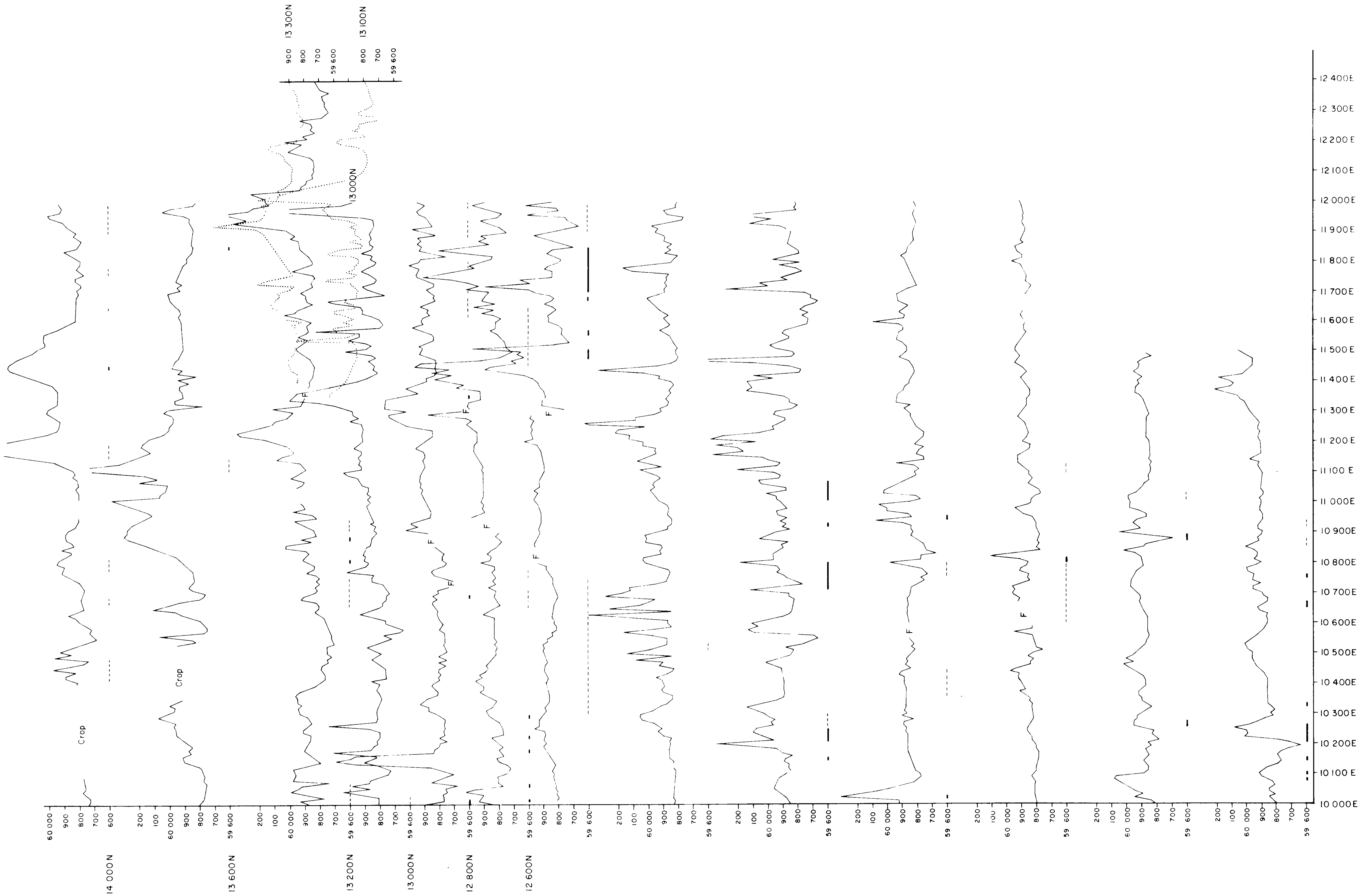
1 : 100 000

AUSTIREX AERIAL SURVEYS PTY. LTD.

3/MAY/80

3716(I)-11

DWG.No.S153-11.GPR 2424



LEGEND

Values in gammas (total field)

—— Solid outcrop } Augen gneiss
- - - - Scattered outcrop }

Blank: soil covered

F Fenceline

To Accompany Report WY 80.7.

Plate 12

REVISION	DATE		AFMECO PTY. LTD.
			SCALE 1:1000 — 0 20 40 60 m
		DRAWN S.L.C.	TUMBY BAY PROJECT
		DATE JULY '81	TB 1 GRID
		GEOLOGY FB & P.W.	GROUND MAGNETOMETRY
DWG No SI 53-11.126 3505		APPROVED	3776 (I) - 12

Two cases have been recorded where anomalies on the uranium channel correspond to thorium only in the samples analysed after the ground checking. In TB29 the radiometric anomaly is not due to uranium (5-10 ppm) but thorium (70-160 ppm). The airborne survey indicated low thorium on this locality.

In the Marble Range area where the airborne survey indicated very high thorium and high uranium concentrations (the highest in the E.L.) the analysed samples show high thorium but low uranium (Table 1). To check whether the analysed samples are representative of the Sleaford gneisses in the Marble Range area, two radiometric profiles with 25m stations should be measured across the Marble Range using the GAD-6 Spectrometer. The profiles should follow flightlines. If the profiles fail to indicate high U values, the validity of the airborne radiometric survey should be questioned. A new treatment of the flight data might be necessary to establish if the correct correction procedures have been followed. The size of the crystal makes it very unlikely that misleading results are due to poor counting statistics.

Another consequence of a negative search for uranium in the Marble Range should be the relinquishment of the area west of the Cummins - Port Lincoln road, as the potential of the massive Sleaford gneisses must be rated as low if no uranium is found associated with the airborne uranium anomaly.

Ground radiometry

From the radiometric traverses it is obvious that the anomalous areas located in TB1 and TB20 are not surrounded by a high background halo. On line 12600N there is no indication of the TB1-1 anomaly (max 11000 cps) 5m N of the traverse line (Plate 19 and Figure 11).The background on the traverse is only 100-110 cps and constant. A similar lack of high background haloes has been found round the TB1 Tallala and the TB20-1 anomalies. As traverse lines are 400m apart in general and 100-200m apart in areas where anomalies have been established, there is obviously plenty of scope for finding more anomalies between traverse lines. In areas with a higher (200-400 cps) general background, not a single count over 1000 cps has been recorded. This means that in order to detect all outcropping anomalies, all outcrops in augen gneiss would have to be surveyed with a 3-5m line spacing.

Such a big task should not be undertaken unless the core drilling in February 1981 indicates continuity of the high background areas in the TB1 and TB20 anomalies and a metallurgically more favourable mineralogy than the monazite, zircon, brannerite, sphene, allanite assemblages known from the surface samples.

As most of the uranium in the anomalous hornblende gneisses is located in refractory minerals and as the soils are residual, anomalies in the bedrock should be reflected in soil radiometric anomalies.

POTENTIAL OF THE HUTCHISON GROUP

Most of the work during the 1980 field season was concentrated on the grid surveys and on the augen gneisses in particular. To make an assessment of the potential of the Hutchison Group, a more detailed map is essential. In the area south of Tod River Reservoir, the outcrops are generally very poor but a few traverses along creeks in the Pillaworta and Yallunda Flat areas suggest that a greatly improved map could be produced by traverses along all major creeks in the Koppio-Yallunda, Flat-Pillaworta area. Detailed airphoto interpretation is not likely to be successful due to the extensive agriculture in the area. A more detailed map combined with the results from the geochemical drilling in January 1981 and the core drilling in February 1981, should allow a better assessment of the potential of the Hutchison Group.

The succession of chemical and detrital sediments grading upwards into a predominantly fine grained detrital sequence has been interpreted by Parker (1979) as originating in a shallow marine environment with water depth increasing after the initial deposition of BIFs, cherts, carbonates and coarser detrital sediments. A more specific reconstruction of the environment has not been attempted due to lack of original sedimentary structures, and a lack of detailed knowledge of the stratigraphy.

At the present stage, the Hutchison Group must still be rated favourably due to similarities in age and lithologies to the Pine Creek Geosyncline and due to the large number of radiometric features yet to be tested that occur in soil covered areas. Due to the line spacing (400-1600m) used in the airborne survey, only a small number of the total high background areas have been detected. Only two areas(TB17 and TB29) have been checked. As most of the area is covered by residual soils, a small number of thorium anomalies should be tested to see if uranium has been preferentially leached from the weathered crust.

As the first phase of ground checking involved field assistants using SPP2 scintillometers, the next phase should involve a geologist to gather lithological information and to collect data on U/Th ratios using the GAD-6 spectrometer.

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TABLE 1 : TUMBY BAY EL 578 - WHOLE ROCK ANALYSES, TRACE ELEMENTS APART FROM U AND TH, ARE ONLY SEMI QUANTITATIVE

Sample No.	3635	3636	3637	3638	3639	3641	3602	3604	3610	3619	3627	3631
Rock type	Musc-biot granite	Biotite gneiss	Biot-musc gneiss	Biot-musc gneiss	Biot-musc gneiss	Biot-musc gneiss	Banded gneiss	Banded gneiss	Banded gneiss	Banded gneiss	Banded gneiss	Banded gneiss
Complex	S.C.	S.C.	S.C.	S.C.	S.C.	S.C.	L.C.	L.C.	L.C.	L.C.	L.C.	L.C.
G.R.	903N 472E	926N 454E	957N 332E	926N 467E	857N 437E	908N 468E	978N 922E	978N 920E	823N 782E	981N 957E	921N 861E	953N 714E
SiO_2	70.5	67.8	67.9	71.1	71.8	69.8	69.3	70.8	65.0	69.4	68.5	70.5
TiO_2	0.58	0.67	0.49	0.55	0.63	0.69	0.39	0.47	0.93	0.50	0.59	0.62
Al_2O_3	14.2	14.2	16.5	14.9	14.8	14.6	14.55	12.4	13.7	11.9	13.1	12.7
Fe_2O_3	2.90	6.0	3.5	2.8	2.45	2.75	2.90	4.95	7.65	7.15	5.85	6.00
MnO	0.02	0.06	0.04	0.01	0.02	0.02	0.04	0.03	0.09	0.08	0.07	0.10
MgO	0.89	1.83	2.5	1.03	0.99	0.85	0.78	0.25	0.74	0.21	0.55	0.66
CaO	0.75	2.10	0.35	0.66	0.20	0.81	2.71	0.71	3.12	1.37	2.08	1.35
Na_2O	2.65	2.90	1.95	2.4	2.1	2.80	2.65	2.88	3.00	2.52	3.60	2.30
K_2O	5.70	2.87	4.3	5.2	5.4	5.80	5.24	5.89	5.19	6.00	4.95	4.50
P_2O_5	0.19	0.10	0.12	0.19	0.15	0.19	0.09	0.07	0.26	0.09	0.13	0.13
LO1	1.06	1.07	2.05	1.15	1.38	1.10	2.35	1.22	0.49	0.44	0.09	0.39
Tot	99.4	99.6	99.7	100.0	99.9	99.4	100.5	99.7	100.2	99.7	99.5	99.3
U	8	x	x	10	12	8	-	12	6	-	8	-
Th	150	26	15	150	150	180	22	34	14	44	24	22
As	-	-	50	30	-	-				-	-	-
Ba	600	1000	800	800	600	800	8000	2000	1500	1500	1000	3000
Co	x	50	20	x	x	x	x	-	25	-	20	x
Cr	x	100	150	60	60	x	-	-	-	-	-	-
La	200	x	x	x	250	200	x	250	x	150	x	200
Ni	-	80	80	x	x	x	x	-	20	-	-	-
Sr	x	x	x	x	x	x	200	x	200	x	x	x
V	80	200	150	60	60	40	100	20	60	40	60	40
Y	x	60	30	x	40	x	40	250	150	80	50	150
Yb	x	6	4	-	3	-	3	50	15	10	6	15
Zr	250	200	80	100	100	250	150	250	400	250	200	200
Cu	5	40	8	10	15	5	8	40	30	10	8	8
Pb	60	30	25	40	40	30	50	60	50	40	25	25
Sn	-	-	x	-	-	-	x	x	-	2	x	-
Zn	-	-	-	-	-	-	40	x	40	-	-	-

TABLE 1 (cont)

Sample No.	3613	3614	3603	3609	3643	3605	3617	3625	3622	3634	3624	3607	3633
Rock type	Amphib-olite	Amphib-olite	Amphib-olite	Amphib-olite	Amphib-olite	Amphib-olite	Meta-gabbro	Gabbro	Marble	Calc-silicate	Graphite-qtz rock	B.I.F.	B.I.F.
Complex	L.C.	L.C.	L.C.	L.C.	L.C.	H.G.	L.C.	H.G.	H.G.	H.G.	H.G.	H.G.	H.G.
G.R.	783N 579E	867N 859E	978N 920E	825N 784E	696N 854E	986N 873E	900N 021E	917N 848E	957N 866E	934N 757E	897N 831E	907N 780E	921N 776E
SiO_2	47.7	47.6	49.3	48.8	48.5	49.6	48.7	48.1	13.9	53.5	65.2	38.7	38.9
TiO_2	1.25	1.76	1.64	1.74	2.11	1.10	1.30	1.80	0.16	<0.02	0.69	0.06	0.07
Al_2O_3	14.0	14.4	13.6	13.9	13.0	13.6	14.4	14.5	3.85	0.70	0.10	1.8	2.55
Fe_2O_3	14.6	14.8	15.4	16.0	16.9	14.1	15.2	12.5	1.40	11.0	0.14	55.0	48.5
MnO	0.21	0.19	0.18	0.23	0.23	0.19	0.20	0.23	0.03	0.14	<0.01	0.07	0.02
MgO	6.34	6.95	5.65	5.40	5.53	7.05	6.60	6.38	2.38	13.0	0.35	0.08	0.04
CaO	8.47	10.0	7.45	10.2	10.6	10.7	9.40	7.60	42.0	21.0	6.64	0.13	0.05
Na_2O	2.55	2.44	3.00	1.95	2.02	3.00	2.20	2.00	0.65	0.40	0.20	<0.05	0.07
K_2O	1.51	0.97	1.85	1.20	0.64	0.35	0.80	1.70	1.20	0.11	0.10	<0.1	0.12
P_2O_5	0.16	0.19	0.09	0.21	0.26	0.10	0.13	0.23	0.07	<0.02	<0.02	0.24	0.74
LOI	3.54	1.42	2.35	1.20	0.27	1.04	0.61	2.41	34.6	0.31	26.25	4.61	6.70
Tot	100.3	100.7	100.5	100.8	100.24	100.8	99.5	97.5	100.2	100.2	99.7	100.7	99.4
U	-	-	12	-	< 5	-	x	-	-	-	-	6	4
Th	6	10	-	6	< 5	8	x	x	8	x	10	-	10
As					< 5		-	-	-	-	-		10
Ba	-	x	600	-	300	-	x	x	-	-	-	-	-
Co	50	40	80	80	< 10	40	80	100	-	x	-	40	5
Cr	150	150	250	300	45	200	200	150	x	-	60	60	40
La	x	x	300	x		-	-	x	-	-	-	-	-
Ni	150	100	60	100	50	60	80	200	-	-	-	60	25
Sr	x	x	x	x	< 30	x	x	200	x	-	-	-	-
V	200	300	400	400	100	300	500	700	50	x	100	200	60
Y	50	50	300	80	50	40	50	70	-	-	-	x	10
Yb	3	3	30	8	-	3	3	10	-	-	-	x	2
Zr	150	150	200	200	-	150	150	250	30	x	30	150	60
Cu	150	100	80	50	100	100	200	700	3	8	15	40	80
Pb	15	10	40	20	10	10	8	15	10	5	-	25	30
Sn	x	-	x	-	5	-	10	x	-	-	-	-	x
Zn	x	x	x	60	70	x	-	-	-	-	-	x	20

TABLE 1 (cont)

Sample No.	3646	3608	3611	3612	3615	3618	3601	3645	3630	3629	3642	3632	3621
Rock type	Banded gneiss	Banded gneiss	Biotite gneiss	Biotite gneiss	Augen gneiss	Augen gneiss	Augen gneiss	Biotite gneiss	Granite	Biotite granite	Moody granite	Biot-garnet hornfels	Hornfels
Complex	L.C.	L.C.	L.C. (Mylonite zone)	L.C.	L.C.	L.C.	L.C.	H.G.	L.C.	H.G.	H.G.	L.C.	L.C.
G.R.	721N 780E	827N 784E	787N 789E	783N 579E	867N 859E	981N 957E	972N 927E	940N 825E	953N 714E	011N 803E	193N 912E	953N 714E	010N 968E
SiO_2	69.0	81.3	74.9	72.8	67.1	74.3	73.6	74.4	71.3	63.4	72.6	71.2	68.5
TiO_2	0.62	0.20	0.19	0.35	0.83	0.15	0.28	0.45	0.05	1.27	0.15	0.64	0.58
Al_2O_3	13.1	8.8	13.15	12.5	13.7	13.2	12.9	12.0	15.1	14.2	14.0	12.9	13.5
Fe_2O_3	6.30	1.62	0.76	1.95	4.25	1.40	2.14	4.41	0.45	7.75	1.25	5.8	4.40
MnO	0.02	0.01	0.01	0.02	0.08	0.01	0.03	0.03	< 0.01	0.13	0.03	0.06	0.06
MgO	2.22	0.34	0.16	0.50	0.98	0.21	0.39	0.25	0.04	1.54	0.22	0.11	1.12
CaO	0.67	0.73	0.70	0.85	2.70	0.98	0.92	0.79	0.56	3.14	0.85	2.00	2.10
Na_2O	2.75	1.32	2.89	2.20	2.11	2.90	2.28	2.13	2.60	2.65	2.96	2.45	2.38
K_2O	4.57	4.32	5.94	6.8	6.80	5.45	6.68	4.77	8.70	4.60	6.30	3.80	5.62
P_2O_5	0.11	0.05	0.03	0.08	0.12	0.05	0.07	0.05	0.04	0.50	0.08	0.11	0.11
LOI	0.66	0.96	0.90	1.21	0.81	0.83	0.81	0.67	0.44	0.76	0.95	0.54	1.30
Tot.	100.02	99.6	99.6	99.3	99.5	99.5	100.1	99.96	99.3	99.9	99.4	99.6	99.7
U	< 5	-	-	4	-	10	6	< 5	-	6	150	-	8
Th	20	8	14	50	44	60	55	< 5	x	40	36	16	34
As	< 5		-		-	-		< 5	-	-	-	-	-
Ba	500	800	6000	1000	3000	x	800	500	1500	3000	600	3000	1000
Co	< 10	x	-	x	15	x	x	< 10	-	30	-	-	30
Cr	140	x	-	60	60	-	-	25	-	x	-	-	60
La		-	-	150	300	150	200		-	300	x	x	100
Ni	< 10	15	-	15	20	-	15	< 10	-	x	-	-	40
Sr	< 30	x	150	x	200	x	x	< 30	x	250	x	x	100
V	20	70	30	40	70	40	40	20	-	150	x	x	150
Y	10	x	x	80	80	40	60	10	x	70	x	60	60
Yb		x	x	10	8	x	5		x	5	x	8	5
Zr		100	100	200	200	80	150		50	300	100	200	200
Cu	40	20	10	40	40	20	8	30	3	10	x	3	25
Pb	10	40	60	50	60	30	80	< 10	30	40	30	25	50
Sn	3	-	-	x	-	-	x	< 1	-	-	-	-	x
Zn	50	-	x	x	x	-	x	45	-	-	-	-	-

.TABLE 2 : ANALYSES OF AUGENGNEISS, OBTAINED FROM ADELAIDE UNIVERSITY THESES

	1	2	3	4	5	6	7
iO_2	70.69	71.27	67.54	77.19	65.83	74.20	69.50
iO_2	0.10	0.09	0.07	0.17	0.04	0.31	0.56
l_2O_3	14.14	13.78	13.90	11.37	17.70	12.81	14.21
e_2O_3	0.48	1.34	5.73	1.68	1.34	0.49	0.88
eO	N.D	N.D	N.D	N.D	N.D	1.76	3.17
nO	-	-	-	-	-	0.03	0.06
gO	0.69	0.71	0.77	0.70	0.78	0.41	0.87
aO	0.27	0.40	0.07	0.38	0.66	1.36	2.43
a_2O	1.95	3.61	3.96	2.78	1.99	2.78	2.99
$_2O$	8.32	6.08	5.09	4.90	6.13	5.50	4.96
$_2O_5$	0.05	0.03	0.02	-	0.03	0.05	0.15
.O.I.	N.D	N.D	N.D	N.D	N.D	0.36	1.54
ot	96.99	97.31	97.15	99.17	94.50	99.68	99.78
r						89	138
b						305	237
						48	40
a						51	26
a						591	925

OCATION

- 5 Coin (1976) Locality unknown. Listed coordinates are for locality in Spencer Gulf.

- 7 Flook (1975) Kirton Point, Port Lincoln.

TABLE 3: ANALYSES OF LINCOLN COMPLEX AMPHIBOLITES OBTAINED FROM ADELAIDE UNIVERSITY THESES

	1	2	3	4	5	6	7	8
SiO_2	49.96	50.42	49.10	49.15	47.26	48.90	47.60	48.08
Al_2O_3	13.90	12.03	12.21	12.92	13.02	14.07	13.77	14.00
Fe_2O_3	3.09	3.20	13.60	15.32	12.89	14.20	14.94	7.79
FeO	11.13	11.53						
MgO	5.24	3.11	5.07	7.95	3.75	10.28	5.94	3.30
MnO	0.22	0.23	0.26	0.26	0.25	0.24	0.30	0.19
CaO	9.03	7.39	15.53	12.13	18.56	12.87	10.47	22.39
Na_2O	2.79	3.31	2.73	2.58	1.72	0.38	2.46	1.94
K_2O	1.04	2.12	0.25	0.39	0.15	0.54	1.05	0.40
TiO_2	2.21	3.04	1.13	1.90	1.09	2.70	1.53	0.82
P_2O_5	0.21	1.44	0.14	0.24	0.16	0.11	0.17	0.44
H_2O	0.09	0.12	0.54	0.56	0.75	1.07	1.33	0.43
Total	98.82	97.82	100.61	99.67	99.61	99.27	99.57	99.79
Sr	210	294						
Rb	37	98						
Y	31	64						
Th	3.5	6						
Ba	496	904						

Location

1-2 Flook (1975) Kirton Point, Port Lincoln

			S	E
3-8	Coin (1976)	3	34°21'04"S	135°56'54"E
		4	"	"
		5	"	"
		6	34°17'29"S	136°04'37"E
		7	34°17'13"S	136°04'08"E
		8	34°14'41"S	136°06'05"E

TABLE 4 : ANALYSES OF PELITIC SCHISTS FROM TUMBY BAY AREA.

(After Coin, 1976)

	1	2	3	4	5	6	7
iO_2	70.23	71.36	66.28	68.37	65.51	71.89	62.04
l_2O_3	13.34	12.40	16.02	15.19	15.74	12.15	17.13
e_2O_3	6.11	6.53	8.01	5.57	7.33	4.32	7.20
aO	0.87	1.53	0.43	1.15	0.88	0.20	0.56
gO	1.49	1.42	1.93	1.62	2.45	1.74	4.48
a_2O	1.97	2.11	1.02	2.51	3.10	1.37	1.17
$_2O$	5.38	2.94	4.43	4.49	5.14	6.09	4.89
iO_2	0.40	0.47	0.75	0.55	0.76	0.48	0.69
nO	0.07	0.35	0.13	0.16	0.36	-	0.37
$_2O_5$	0.17	0.09	0.17	0.12	0.16	0.13	0.06
$_2O$	-	0.58	1.58	0.99	0.94	-	-
ot	100.33	99.79	100.77	100.74	102.38	98.37	98.59

OCATION

S	E
34°16'14"	136°01'12"
34°17'42"	136°04'58"
34°18'35"	136°03'40"
34°17'24"	136°04'55"
34°13'56"	136°05'53"
34°18'42"	136°04'20"
34°19'07"	136°04'37"

TABLE 5a: COMPARISON OF AUGEN GNEISS AND ANOMALOUS HORNBLENDE GNEISS AT TB1 AND TB20

	Major minerals	Accessory Minerals	Chemistry	Texture
Augen gneiss	Hornblende, biotite, microcline porphyroblasts, quartz, oligoclase matrix.	Magnetite, sphene, zircon, monazite, allanite, ?thorite, brannerite.		Coarse gneissic fabric. Microcline porphyroblasts well developed.
TB1-1	Hornblende >> biotite. Oligoclase abundant. Quartz, microcline, albite matrix.	Magnetite-ilmenite, apatite, allanite, epidote, zircon, monazite, sphene, tourmaline, ?brannerite.	High Na, Pb, Zr	Well developed gneissic fabric.
TB1 Tallala	Leucogneiss. Hornblende >> relict diopside. Oligoclase in quartz-microcline matrix.	Sphene, apatite, zircon, brannerite.	High Na	Well developed gneissic fabric.
TB20-1	Hornblende >> relict diopside. Oligoclase in quartz microcline matrix.	Magnetite, sphene, apatite, zircon, brannerite.	High Na	Well developed gneissic fabric.

TABLE 5b: COMPARISON OF AUGEN GNEISS AND ANOMALOUS HORNBLENDE GNEISS FROM TB20 ANOMALY

SAMPLE NO	1431	1433	1432	1434	1435
SiO_2	65. 4	62. 4	69. 4	58. 8	71. 0
TiO_2	0.85	0.67	0.63	0.86	0.51
Al_2O_3	18. 2	17. 7	13. 9	17. 7	13. 3
Fe_2O_3	5.04	5.09	5.46	7.56	4.52
MnO	0.06	0.07	0.03	0.07	0.01
MgO	0.45	0.73	0.58	0.81	0.55
CaO	0.92	2.89	1.71	3.03	1.58
Na_2O	7.88	5.59	2.43	4.38	2.37
K_2O	0.34	4.12	5.21	6.07	5.65
P_2O_5	0.20	0.15	0.13	0.19	0.11
L.O.I	0.67	0.53	0.72	0.47	0.40
	99.93	99.84	100.22	99.94	99.96
Cu	10	15	30	20	10
Pb	10	30	<10	<10	<10
Zn	110	80	150	80	70
U	320	750	10	30	20
Th	20	70	40	20	45
Zr	2130	1760	<5	120	<5
V	655	205	40	300	30

Location

1431 and 1433	Anomalous hornblende gneiss
1432	Augen gneiss 5m W of TB20 anomaly
1434	Augen gneiss 5m W of TB20 anomaly
1435	Augen gneiss 20m E of TB20 anomaly

TABLE 5b: COMPARISON OF AUGEN GNEISS AND ANOMALOUS HORNBLENDE GNEISS FROM TB20 ANOMALY

SAMPLE NO	1431	1433	1432	1434	1435
SiO_2	65.4	62.4	69.4	58.8	71.0
TiO_2	0.85	0.67	0.63	0.86	0.51
Al_2O_3	18.2	17.7	13.9	17.7	13.3
Fe_2O_3	5.04	5.09	5.46	7.56	4.52
MnO	0.06	0.07	0.03	0.07	0.01
MgO	0.45	0.73	0.58	0.81	0.55
CaO	0.92	2.89	1.71	3.03	1.58
Na_2O	7.88	5.59	2.43	4.38	2.37
K_2O	0.34	4.12	5.21	6.07	5.65
P_2O_5	0.20	0.15	0.13	0.19	0.11
L.O.I	0.67	0.53	0.72	0.47	0.40
	99.93	99.84	100.22	99.94	99.96
Cu	10	15	30	20	10
Pb	10	30	<10	<10	<10
Zn	110	80	150	80	70
U	320	750	10	30	20
Th	20	70	40	20	45
Zr	2130	1760	<5	120	<5
V	655	205	40	300	30

Location

1431 and 1433	Anomalous hornblende gneiss
1432	Augen gneiss 5m W of TB20 anomaly
1434	Augen gneiss 5m W of TB20 anomaly
1435	Augen gneiss 20m E of TB20 anomaly

TABLE 6 Analyses of high background samples

	1/A1	1/A1/2	A2	1/A1/3	1/A5	A/1/6	1/A7	A/1/8	13/1
R	808E 798N	808E 798N	819E 803N	808E 798N	806E 783N	801E 787N	806E 776N	?	766E 659N
	Hornblende gneiss	Hornblende gneiss	Hornblende gneiss	Hornblende gneiss	Augen-gneiss	Augen-gneiss	Augen-gneiss	Augen-gneiss	Augen-gneiss
P2	11000	4000	2000	3200	950	1200	1500		1300
	650	3310	190	1690	145	160	15	5	<5
h	135	125	25	60	235	100	170	35	85
u	30	20	50	10	55	25	10	30	25
b	540	1600	<10	600	180	10	40	<10	10
n	35	15	10	15	35	30	10	60	40
i	10	<10	<10	20	20	<10	30	35	20
o	<10	<10	<10	10	10	<10	30	<10	10
o	20	< 3	< 3	< 3	30	< 3	< 3	< 3	< 3
n	3	3	3	3	3	< 1	< 1	3	< 1
s	< 5	< 5	< 5	< 5	< 5	< 5	10	< 5	< 5
g	< 2	2	< 2	2	< 2	< 2	< 2	< 2	< 2
	TB1-1 anomaly	TB1-1 anomaly	TB1-2 anomaly	TB1-1 anomaly	TB1-5 anomaly	TB1-6 anomaly	TB1-7 anomaly	TB1-8 anomaly	TB13 anomaly

	13/2	13/3	17/1	20/1	20/2	1452	1457	1454
R	761E 655N	761E 655N	736E 924N	835E 835N	834E 835N	827E 797N	827E 797N	11025E 10325N (TB20GRID
	Augen-gneiss	Augen-gneiss	Laterite	Augen-gneiss	Augen-gneiss	Leucc-gneiss	Leucc-gneiss	Hornblende-gneiss
P2	1800	1700	1200	1000	1000	3000	5000	3000
	25	45	185	<5	<5	3340	490	950
h	60	90	<5	400	5	120	80	110
u	55	<10	170	25	20			
b	<10	130	140	30	40			
n	25	40	120	30	25			
i	<10	10	70	<10	<10			
o	15	10	80	10	15			
o	< 3	< 3	30	< 3	< 3			
n	5	< 1	< 1	< 1	< 1			
s	< 5	< 5	< 5	< 5	< 5			
g	< 2	< 2	2	< 2	< 2			
	TB13 anomaly	TB13 anomaly	TB17 anomaly	TB20 anomaly	TB2C anomaly	TB1 Tallala anomaly	TB1 Tallala anomaly	TB20 anomaly 25

TABLE 7: GROUNDCHECK OF AIRBORNE RADIOMETRIC ANOMALIES

Anomaly	GR	Max cps	Lithology	Comments
TB1	5810E 61780N	11000	Augen gneiss	Gridded
TB2	5650E 61660N	450	Laterite over micaschists	
TB3	5815E 61920N	1000	Quartzite and biotite gneiss	
TB4	5693E 61855N	1000	Soil & qtzite and gneiss	
TB5	5460E 61890N	990	Sleaford gneiss	Th anomaly
TB6	5665E 61805N	200	Laterite	
TB7	5713E 61795N	450	Lateritic soil	
TB8	5695E 61745N	120	Soil	
TB9	5723E 61743N	600	Soil	
TB10	5735E 61725N	250	Soil over gneiss?	
TB11	5755E 61715N	400	Banded gneiss, mylonite	
TB12	5775E 61670N	600	Augen gneiss	
TB13	5760E 61655N	1700	Augen gneiss	Gridded
TB14	5675E 61565N	200	Soil	
TB15	5756E 61615N	300	Augen gneiss	
TB16	5847E 61925N	450	Laterite.	
TB17	5735E 61920N	1200	Soil and laterite	Gridded

Anomaly	GR	Max cps	Lithology	Comments
TB18	5672E 61852N	200	?	
TB19	5798E 61845N	300	Banded gneisses	
TB20	5840E 61840N	3500	Augen gneiss	Gridded
TB21	5425E 61900N	420	Soil over Sleaford gneiss	
TB22	5700E 61695N	380	Soil	
TB23	5710E 61670N	750	Soil	
TB24	5760E 61600N	350	Augen gneiss	
TB25	5780E 61608N	200	Augen gneiss	Built-up area
TB26	5690E 61728N	850	?	
TB27	5720E 61710N	900	?	
TB28	5745E 61810N	900	Laterite over micaschist	RAB holes TUB 1&2
TB29	5763E 61790N	650	Qtzite and soil & biotite gneiss	Gridded. Thorium anomaly
TB30	5780E 61785N	400	Banded gneiss and soil	
TB31	5685E 61885N	300	Soil	
TB32	5866E 61970N	440	Soil and micaschist	
TB33	5392E 61840N	400	Sleaford gneiss	
TB34	5745E 61905N	580	Laterite over granite?	
TB35	5765E 61970N	1000	Granite and soil	

Anomaly	GR	Max cps	Lithology	Comments
TB36	5788E 61993N	420	Laterite	
TB37	5440E 61820N	830	Soil over Sleaford gneiss	
TB38	5840E 61910N	300	Laterite and soil and BIF	
TB39	5765E 61820N	280	Soil over biotite gneiss?	

APPENDIX I

TUMBY BAY STUDY
SOUTH AUSTRALIA
(EL 578)

This report was never edited and has been incorporated as a complement to the author's views.

D. Bourke

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CONTENTS

1. INTRODUCTION

1.1 Location and Access

E.L. 578 is located wholly within the Lincoln 1:250 000 sheet, SH 53/11, on the southern Eyre Peninsula of South Australia. Port Lincoln, situated in the south eastern corner of the E.L., is the centre of a large and thriving fishing and farming community which offers a wide range of service industries. Good roads service most parts of the area. Virtually all the E.L. is under cultivation or grazing. As a result, considerable time can be lost in liaising with property owners requesting permission to enter their land. To date no hostile reactions have been experienced from the local population.

1.2 Previous Work

Numerous earlier workers such as Mawson, Jack and Tilley published descriptive papers on parts of the Eyre Peninsula. Accounts of their work can be read in Johns (1961) who was the first geologist to deal with the geology of the whole of the peninsula.

The most recent work can be found in Parker (1979) and in the extended abstracts of the Geological Society of Australia's Symposium on the Gawler Craton.

A good account of previous company work on the Eyre Peninsula is given by Fairburn (1976).

1.3 Work carried out

This report is a summary of field work undertaken on E.L. 578 during May 1980. The field work consisted of numerous traverses by foot along the coast and down creeks which cut the regional foliation. This was backed up by traverses along roads and interpretation of aerial photographs.

Forty samples were collected and a petrological report made of the specimens.

A preliminary geology fact map was drawn and this was overlain on contour maps of the total magnetic field, plus the uranium channel and the uranium/potassium ratio computed from an airborne radiometric survey.

The stratigraphic nomenclature used on the Eyre Peninsula is very confusing Parker (1978) considers that this is due to a lack of detailed study and the redefinition of the nomenclature by each and every worker. In order not to compound this problem an informal nomenclature has been used. Use of formal names can be introduced in the future when the relationship between these informal units and the formal units, such as Lincoln Complex, is known.

2. GEOLOGY

2.1 Introduction

Two broad groups of rocks can be recognised in E.L. 578; precambrian metamorphic rocks and the overlying cainozoic sedimentary rocks and fossil soils. The precambrian metamorphic rocks in the field can be subdivided into two broad groups; crystalline rocks with a very well developed gneissosity and a sequence of metasedimentary rocks which include quartzites and appear to overlie the gneissic rocks. The metasedimentary rocks are known as the Hutchison Group (Thomson, 1980). The gneissic rocks are further subdivided into the Sleaford Complex and the Lincoln Complex on the basis of isotopic dating. This will be further discussed in Section 6 on metamorphism and geochronology.

Within E.L. 578 the Precambrian rocks can be readily subdivided, in the field, into at least five informal units which are described below.

2.2 Precambrian metamorphic rocks

2.2.1 "Unit 1"

a) DISTRIBUTION: "Unit 1" is well exposed on Boston Island and along the mainland coastline especially at Boston Point and south of Messena Bay. It is likely that "Unit 1" underlies much of the Quaternary soil cover east of the Eyre Highway north of Peake Bay.

b) GEOLOGY: "Unit 1" consists predominantly of light-coloured, very indurated, siliceous, quartz-feldspar-amphibole-magnetite gneiss interlayered with dark-coloured, fine-grained basic bodies. In general, the gneiss has a distinct gneissic banding which is parallel to the regional foliation. However in places, where the banding cuts across the foliation, it is kinked into tight, small-scale, "V"-shaped folds. Some almost massive phases of the gneiss also occur and these contain randomly distributed spherical porphyroblasts of orthoclase. In "Unit 1" the basic bodies tend to be massive and are often distinctly discordant with regional foliation and gneissosity in the gneiss. Petrological descriptions of samples from these bodies show that they are hornblende-pyroxene granulites of probable igneous origin. Some less common, foliated basic bodies were also noted. These foliated bodies are concordant with the gneissosity even where this cuts across the regional foliation. These concordant foliated bodies may represent an early generation of basic rock which has a sedimentary rather than igneous origin. Very coarse-grained veins of feldspar and quartz with minor large euhedral crystals of hornblende and rare small crystals of tourmaline also intrude the gneiss.

c) PETROLOGY: Thin sections cut from the gneissic units indicate that they are amphibolite facies metasediments containing up to 2% magnetite. Petrological descriptions of the basic bodies indicated that they are probably metaigneous and have reached granulite facies regional metamorphic grade. The apparent variation in grade between the gneisses and the basic granulites is probably due to compositional differences which allowed the basic bodies to react more readily to changes in temperature and pressure, thereby recrystallizing to granulite facies mineral assemblages earlier than the quartz rich gneisses.

d) RELATIONSHIPS: The contact between "Units 1 and 2" is well exposed on Boston Island at GR.840 598. Here the contact appears to be a fault. Mortimer et al (1979) suggest that rocks of the Donington Granitoid Suite intrude rocks of "Unit 1" at Point Bolingbroke.

e) NOMENCLATURE: This unit forms part of the Flinders Group on the Lincoln 1:250 000 geological sheet (Johns, 1961) and part of the Lincoln Complex on the South Australian state 1:1 000 000 geological map (Thompson, 1980).

2.2.2 "Unit 2"

a) DISTRIBUTION: "Unit 2" forms the eastern portion of the dissected plateau which rises up on the western side of the Lincoln Highway. Here the unit is well exposed along most roads and all the creeks. In addition, the unit is well exposed on the north-western coastline of Boston Island and at Kirton Point.

b) GEOLOGY: The unit is characterised by a sequence of porphyroblastic (augen) gneiss and amphibolite. The porphyroblasts in the gneiss range in size from 10 to 70 mm and in general are composed of albite-twinned microcline. Most commonly they are aligned parallel to the gneissosity which in places is contorted by small-scale assymetrical folding. In addition massive phases of the gneiss can also be found. The matrix surrounding the porphyroblasts is composed of fine-grained quartz, feldspar, amphibole and biotite. In places this matrix appears to have a very basic composition being composed mainly of mafic minerals. In general, the amphibolite layers are parallel to the gneissosity and range in thickness from a few centimetres to about two metres. Over much of the unit the gneissosity and amphibolite layers dip very steeply to the east or west and are parallel to the regional foliation which trends at about 030°N. However there are some quite large areas, for example along the Tod River and in much of "Unit 2" south of the Tod River, where the gneissosity and layering is almost flat lying and intersected by the regional foliation. In these areas the gneissosity and layering is contorted into folds which appear to have an axial plane parallel to the regional foliation.

c) PETROLOGY: The petrological descriptions show that this unit is mainly composed of amphibolite facies gneisses of definite sedimentary origin containing relict detrital heavy minerals. One specimen taken from Point Maria on Boston Island indicates that the eastern part of the unit, close to "Unit 1", may have reached granulite facies metamorphism. Many of the specimens exhibit two metamorphic events, the first regional and the second dynamic. Specimens showing the effects of the second event are distributed along the escarpment and at the contact between "Units 2 and 3" where a zone of shearing was noted in the field at several localities (GR.832 841, 790 780, 781 753, 774 683). A slight increase in gamma activity was sometimes noted in the sheared zones and this is reflected by the presence of metamict allanite and more rarely brannerite in thin sections. In addition traces of post-metamorphic sulphide mineralisation was found in one specimen collected from the quarry west of Port Lincoln owned by D.K. Quarries Pty Ltd. All the specimens of amphibolites were interpreted to be metaigneous. This is not considered to be true for all the amphibolites in "Unit 2" and probably reflects a sampling bias in the field.

d) RELATIONSHIPS: "Unit 2" appears to be bounded by faults or zones of shearing which separate it from both "Unit 1" and "Unit 3".

e) NOMENCLATURE: "Unit 2" forms part of the Flinders Group on the Lincoln 1:250 000 geological sheet (Johns, 1961) and part of the Lincoln Complex on the South Australian state 1:1 000 000 geological map (Thompson, 1980), Kirton Point being given as the type location of "granulite augen gneiss". Kirton Point is also the type locality for Lincoln Gneiss of Tilley (1921).

2.2.3 "Unit 3"

a) DISTRIBUTION: "Unit 3" is well exposed in all the creeks and along some roads which cross it on the dissected plateau west of the Lincoln Highway. Good exposure is restricted to a north-south trending belt of hills located west of the Koppio-Green Patch Road. The Tod River where it runs south-east through the hills provides the best section with excellent exposure.

b) GEOLOGY: "Unit 3" is composed dominantly of medium to fine-grained banded hornblende-quartz-feldspar-biotite gneiss and banded amphibolite. Lesser amounts of metaquartzite, banded calc-silicate gneiss and garnetiferous gneiss also occur in this unit. Isoclinal folding of the banding is very common. Thin, discordant, folded veins of pegmatite containing porphyroblastic hornblende also intrude much of the unit. A subunit, "Unit 3a", composed mainly of porphyroblastic gneiss, crops out along part of the western limit of the exposed portion of the unit. This porphyroblastic subunit appears to be unrelated to the porphyroblastic (augen) gneiss which characterises "Unit 2". In "Unit 3a" the porphyroblasts are small (10 mm - 25 mm in diameter), spherical and form a much lower proportion of the whole rock (about 10-15%). In "Unit 2" the porphyroblasts are large (up to 70 mm in diameter), ovoid and form a very large proportion of the whole rock (up to 65%).

c) PETROLOGY: Petrological examination of thin sections cut from samples of "Unit 3" indicate that all the unit including the amphibolites are metasediments with amphibolite facies mineral assemblages. One specimen (3717) had an upper greenschist facies mineral assemblage and was taken from a schistose unit which may have suffered retrograde metamorphism during the period of dynamic metamorphism. Samples which showed anomalous gamma responses contained allanite, zircon and monazite all of which are suggested to be detrital (samples 3707-3709). One specimen taken close to the shear zone which separates "Unit 2" from "Unit 3" contained veins of fluorite, epidote, adularia and chlorite. H.W. Fander (consultant petrologist) notes that these veins could have also introduced minerals such as allanite and brannerite.

d) RELATIONSHIP: "Unit 3" has a shear zone or faulted contact with "Unit 2". The relationship between "Unit 3" and "Unit 4" is unknown but photo interpretation in the northern part of the E.L. indicates that the quartzite unit of "Unit 4" may overlie "Unit 3" and even "Unit 2".

e) NOMENCLATURE: "Unit 3" forms part of the Hutchison Group on the Lincoln Complex 1:250 000 geological sheet (Johns, 1961) and part of Lincoln Complex on the South Australian state 1:1 000 000 geological sheet (Thompson, 1980).

2.2.4 "Unit 4"

a) DISTRIBUTION: "Unit 4" is poorly exposed. Most of the outcrops are very weathered and kaolinised occurring as sporadic exposures below a well developed laterite cover in road cuttings and along some creeks. The full geographic extent of the unit is not known. Its stratigraphic base is placed at the base of the Warrow Quartzite which is exposed in the Marble Range. The top of the unit is unknown but is placed at the youngest member of Lower Proterozoic metasedimentary sequence. An apparent intrusive granitic quartzo-feldspathic gneiss which is exposed along the western edge of the dissected plateau and always associated with thinly layered metaquartzites is also included in this unit but might better be placed in a separate unit when its relationship to "Unit 4" is better understood. A very coarse-grained quartz-feldspar-mica gneiss containing relict sillimanite (sample A 3741) probably also belongs to a separate unit. It is interesting to note here that Sleaford Complex at Cape Carnot includes sillimanite-cordierite gneiss containing up to 20% sillimanite (Cooper et al, 1976).

b) GEOLOGY: Very little is known about "Unit 4" in E.L. 578 because of its poor exposure. The unit seems to be a sequence of mostly quartzite, feldspathic-micaceous quartzite, hematitic-graphitic quartzite (bif) and very poorly exposed biotite and garnetiferous schists. The quartzites appear to be thickest and the most quartzose in the west, in the Marble Range area. In the eastern part of E.L. 578, "Unit 4" seems to be dominantly pelitic with only a few thin quartzite members which tend to be hematitic and/or graphitic.

c) PETROLOGY: Only three samples were submitted from "Unit 4". Two samples were of the same hematitic-graphitic quartzite horizon. The third sample came from the aluminous quartz-feldspar-mica gneiss mentioned above and may not belong to "Unit 4".

d) RELATIONSHIP: "Unit 4" can be readily observed unconformably overlying "Unit 5" in the Marble Range. Its relationship to "Unit 3" is unknown. However, a brief photo interpretation of Runs 1, 2 and 3 of the Kevron Aerial Survey of Tumby Bay indicates that "Unit 4" may overlie "Unit 3" and even "Unit 2". This boundary may be a simple angular unconformity. However, it may also be a faulted contact along which "Unit 4" was thrust to cover "Unit 3" and then later deformed to give the appearance of an unconformity. This relationship has not been checked in the field and it may be that "Unit 4" as interpretated on the aerial photographs is in fact a Tertiary laterite.

e) NOMENCLATURE: "Unit 4" corresponds to only part of the Hutchison Group on the Lincoln 1:250 000 geological sheet. It should be noted that Johns (1961) placed the Warrow Quartzite in his Flinders Group and considered some of the Lincoln Complex on the South Australian state 1:1 000 000 geological map (Thompson, 1980), near Port Lincoln to be part of his Hutchison Group. "Unit 4" as described in this report seems to correspond most closely to the Hutchison Group of Thompson (1980).

2.2.5 "Unit 5"

a) DISTRIBUTION: "Unit 5 is well exposed along the track which crosses over the Marble Range.

b) GEOLOGY: Only a small part of the Marble Range has been examined. The only rock observed was a quartz-feldspar-mica gneiss containing euhedral porphyroblastic laths of feldspar. The gneiss porphyroblasts exhibit a strong foliation.

c) PETROLOGY: Samples submitted by P. Walker from this unit were described as metasediments with mineral assemblages indicating upper greenschist facies to lower amphibolite facies regional metamorphism.

d) RELATIONSHIPS: "Unit 5" is overlain in the Marble Range by basal quartzites of "Unit 4".

e) NOMENCLATURE: "Unit 5" forms part of the Flinders Group on the Lincoln 1:250 000 geological sheet (Johns, 1961). It corresponds to part of the Kiana Granite, a member of the Sleaford Complex, on the South Australian state 1:1 000 000 geological map (Thompson, 1980).

2.3 Cainozoic sedimentary rocks

No systematic observations were made on the thin sedimentary rocks or lateritic horizons which cover the precambrian metamorphics. Fairburn (1976) gives a good summary of the geology of the Tertiary sediments in the Cummins-Lock Basin which covers much of the western half of E.L. 578. Further information on the whole range of cainozoic sediments including the laterites and fossil soils found on the southern Eyre Peninsula is given by Johns (1961).

3. STRUCTURAL GEOLOGY

Virtually no structural geology was undertaken as the field mapping was carried out on a rapid reconnaissance basis. An attempt was made to record the regional foliation and the orientation of the gneissosity and lithological layering. Over much of the area the three features are parallel. However, where the gneissosity and/or the lithological layering were discordant with the regional foliation, folding and crenulation of the gneissosity and the layering was noted.

Two faults were photo interpreted and both trend 070°N. In the field swarms of joints trending 070°-090° were regularly recorded and these structures appear to be related to the magnetic discontinuities observed on the total magnetic field contour map. These structures are late stage and cut across all other structures.

4. METAMORPHISM, GEOCHRONOLOGY AND THE LINCOLN COMPLEX CONTROVERSY

Geochronological investigations by Webb (1978) have clearly defined the existence of two major periods of orogenesis and magmatism. The early period spanned from 2500 MA to 2300 MA and the second period from 1800 MA to 1400 MA. The first period is known as the Sleafordian Orogeny and is known to have affected rocks of the Sleaford Complex. There is a striking hiatus of 500 million years between the end of the Sleafordian Orogeny and the beginning of the Kimban Orogeny. The second orogeny is known to have affected the Hutchison Group and Lincoln Complex, the Lincoln Complex being all the gneisses and migmatites which yield a Rb-Sr isotope age of 1800-1530 MA.

Fanning et al (1979) have shown that the Carnot Gneiss, the oldest subdivision of the Sleaford Complex, suffered granulite facies regional metamorphism at about 2412 MA. Later, during the Kimban Orogeny, parts of the Sleaford Complex along the west coast suffered retrograde greenschist metamorphism and this is reflected in some K-Ar isotope dates of 1700 MA which are obtained from micas taken from rocks of the Sleaford Complex.

Mortimer et al (1979) and Bradley (1979) have found granulite facies mineral assemblages in rocks of the Lincoln Complex which are exposed along the southeastern coast of the Eyre Peninsula from Cape Donington to Memory Cove. Here the Rb-Sr isochrons calculated from the granulites indicate ages ranging from 1818 MA to 1767 MA for the main regional metamorphic event. Subsequent lower grade amphibolite facies retrogressive metamorphism is also noted in the area. Bradley (1979) reports that the retrogressive metamorphism is most intense in a 5-10 kilometre belt immediately east of the major mylonite zone. This mylonite zone has been mapped along virtually the whole of the eastern Eyre Peninsula by a large number of authors (see the extended abstracts from the Geological Society of Australia Symposium on the Gawler Craton, 1979) and is well documented in the Cowell area by Parker (1980).

The origin and true nature of the Lincoln Complex is highly controversial and not well understood by any of the geological fraternity. Two opposing schools of thought have evolved. The first suggests that the Lincoln Complex represents reworked and retrogressed Sleaford Complex. This is argued on the basis of the compositional similarity between both the quartzofeldspathic and basic rocks of Lincoln Complex and Sleaford Complex. The other school points out the "initial" Sr isotope ratios of the Lincoln Complex and the Hutchison Group are low, indicating that the sediments which were deformed and metamorphosed to form both these units could only have been deposited at the end of the 500 million year period of quiescence and certainly no earlier than 2000 MA. This second school considers the Lincoln Complex to be mostly reworked Hutchison Group.

5. GEOPHYSICS

5.1 Introduction

A combined aeromagnetic-airborne radiometric survey was flown over E.L. 578 by Austirex Aerial Surveys Pty Ltd in November, 1979. The flight lines in the southern part of the area have a 400 metres spacing. The central part of the area was flown with a spacing of 1600 metres and the northern part of the area with a spacing of 800 metres. The plane flew at an average ground clearance of 80 metres. Appendix II.

5.2 Aeromagnetics

A cursory appraisal of the aeromagnetic data, presented on the contoured map of total magnetic field, has been made. The features are described as being either linear or non-linear and as having a high, moderate, or low magnetic intensity. Values above 8900 nT are considered to be of high intensity while values below 8500 nT are considered to be of low intensity. On this basis E.L. 578 is divided into five areas, each having a characteristic aeromagnetic pattern.

5.2.1 "Area A" (subdivision 1, Page 9 in main report)

"Area A" contains mostly non-linear features of high to very high magnetic intensity. The contour lines have a circular to amoeboid shape. There are several areas of very high magnetic intensity, over 9500 nT. "Area Ab" corresponds to a part of "Unit 1" on Boston Point where considerable amounts of magnetite were found in the quartz-feldspar gneiss. In this area the trends of the regional foliation are mimiced almost by the trend of the contour lines on the map of total magnetic field. The other features of very high magnetic intensity appear to correspond to exposed area of granitic gneiss. The magnetic features with very high intensity in "Area A" do not correspond to any particular feature of the contoured radiometric maps.

8.2.2 "Area B" (subdivisions 2 and 3)

This area is characterised by a series of linear magnetic features having a high magnetic intensity. They form a linear zone which trends 015°N in the south swing to 035°N in the north. In the northern part of the area the trend of the small features is parallel to the overall trend of the zone. However in the central part of the area the individual small features trend north. This apparent discordance with the trend of the zone may be a feature (or fault) of computer contouring or it may be the result of the wider flight line spacing or it is a combination of the two.

Immediately to the east of the zone of high intensity features is another series of linear features which are of moderate intensity. This zone is called "Area B1".

By comparing the preliminary geological map with the map of total magnetic intensity it can be seen that "Unit 3" corresponds very closely to "Area B". Magnetite was found to be a very common accessory mineral in the microgneisses of "Unit 3" so its abundance in these rocks is the probable explanation for this magnetic high. Another interesting feature is the correspondence between the "shear zone" which separates "Units 2 and 3" and the linear magnetic trough immediately east of the magnetic high. A third fit is the relationship between "Unit 2" on the geology map and the area of 8700 to 8900 nT which is coloured yellow on the work sheet. All these features are of considerable interest because the geology map was compiled without reference to the map of total magnetic intensity.

Both these zones are cut by linear magnetic discontinuities which trend 070-080°N. The most spectacular is discontinuity "No. 1" which is associated with a very intense magnetic high. A brief reconnaissance in the field revealed that in this area there is a considerable variation in the trend of the regional foliation, the gneissosity and the lithological layering. In addition some of the mappable units are displaced and at least one fault has been inferred to explain this displacement. The inferred fault and the magnetic discontinuity do not correspond exactly but they are parallel. This area has not been mapped carefully and it is likely that there is a swarm of small faults and joints which may form a zone up to 5 km wide and trend at about 070°N.

5.2.3 "Area C" (subdivision 4)

"Area C" is an area of generally moderate magnetic intensity. "Area C1" contains numerous small linear features of high intensity surrounded by zones of moderate to low intensity. The apparent trend is about 000°-005°N but this may be an aberration caused by the computer or the wide flight-line spacing; the true bearing being closer to 020°N. The magnetic highs are thought to be associated with BIF's in "Unit 4" but to date there is no direct field evidence to support this assumption. One field observation which may correspond to a magnetic feature is the relationship between the zone of "intrusive" granite gneiss associated with the thinly layered metaquartzites and a linear feature of lower magnetic intensity on western side of "Area C1". This also corresponds to a number of linear features on the contoured map of the uranium channel.

"Area C2" consists mainly of non-linear features with moderate intensity. Along the western edge of this area there is a linear zone of moderate to high intensity.

"Area C3" is interesting because of the high intensity, arcuate, linear feature, which is probably related to the high intensity features in "Area C1" but which indicates a distinct variation in the trend of the regional foliation or layering.

"Area C4" appears to be similar to "Area C2".

5.2.4 "Area D" (subdivision 5)

"Area D" is distinctive because of its low featureless magnetic character. It has an interesting curvilinear contact with "Area C" in the east and an indistinct straight contact with "Area E". A comparison between the regional geology and the magnetic intensity maps shows that the Whidbey Granite and Kiana Granite of the Sleaford Complex are characterised by this low featureless pattern. However the older Carnot Gneiss is characterised by a pattern similar to "Area C".

5.2.5 "Area E" (subdivision 6)

This area only just appears on the map of total magnetic field. The high intensity magnetic feature shows up on the South Australian state 1:1 000 000 map of total magnetic intensity as a narrow linear feature which trends 355°N and flanks the west coast of Eyre Peninsula from Point Avoid in the south to Drummond Point in the north. It is probably associated with a deep seated fault system.

5.3 Airborne Radiometrics

Only a very cursory look has been made of the contour maps of the uranium channel and the uranium/potassium ratio. Some of the features of the uranium channel contour map have been discussed by P. Walker in monthly reports.

5.3.1 Uranium channel contour map

The most obvious feature on this map is the high counts registered over the Marble Range area where the Kiana Granite is exposed. In the east, the features are more subdued and difficult to relate to the geology. This is mainly a function of the lack of knowledge of the geology.

A comparison of the preliminary geology map and the contour map of the uranium channel shows that there is no response in the uranium channel over the sea. Over "Unit 1" the response is very weak. Traverses over this unit with the hand-held SPP2 scintillometer rarely registered more than 120 counts per second.

The response in the uranium channel over "Unit 2" is moderately strong and there are a number of small features about 2-3 square kilometres in area which register 50-60 counts per second. In general "Unit 2" registered between 180 and 240 counts per second on the SPP2. One feature picked up on the uranium channel can be associated with a known occurrence of uranium, the Ainslee South Prospect. Johns (1961, p. 81) describes it as "a small radioactive area in an outcrop of brecciated granitoid gneiss". He reports that it contained disseminated uraninite which yielded spot assays of 4 lb-15 lb U_3O_8/ton. This occurs very close to Port Lincoln and within a few tens of metres from a house on a small "hobby farm". No sampling of this prospect was made during this early stage of field work because I did not wish to create any anti-French or anti-uranium feeling in the Port Lincoln area.

"Unit 3" has only a minor response on the uranium channel. There are only a few small features over this unit which register more than 50 counts per second and all these features are less than a square kilometre in area. The microgneiss of "Unit 3" characteristically registered between 120 and 160 counts per second on the SPP2.

Over "Unit 4" the uranium channel had moderately good response and a number of large features of 4 to 8 square kilometres in area and registering 50 to 90 counts per second are recorded. These features appear to be concentrated along two zones with a central area which is virtually devoid of features registering over 50 counts per second. Many of these features appear to be related to laterite material. This relationship is, however, more complicated and it is suspected that the features reflect a type of lateritic enrichment from underlying material such as the "intrusive" granitic gneiss associated with "Unit 4".

5.3.2 Uranium/potassium ratio contour map

The laterite shows up very well on this map. Over "Unit 1" there is no response and only a very limited response over "Units 2 and 3". A very bizarre pattern is registered over the sea.

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APPENDIX II

CMS REPORT

by

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REPORT CMS 80/5/47

Port Lincoln-Tumby Bay Samples, Project 126, A3701 - A3740

Forty rock specimens were received for thin-section preparation and petrological description. Each sample was examined under the stereo-binocular and petrological microscopes, and potash-feldspar stain tests were carried out where necessary. The results were incorporated in the brief descriptions in the accompanying tables, with comments relevant to the specific questions asked.

Summary

All except two of the rocks are metamorphic; one is a chert (A3734) and one has been termed "granitoid" (A3720) because it appears granitic but may not be of orthodox magmatic formation.

The metamorphic rocks are of igneous (generally basic igneous) and sedimentary origin; in some, the origin is difficult to determine with certainty because of high metamorphic grade (and consequent extensive reorganisation) or because of paucity of diagnostic features. The rocks are of definite sedimentary origin, especially the quartzofeldspathic paragneisses, containing relict detrital heavy minerals. Some of the meta-igneous types are identified by relict igneous fabric, others by composition; however, in the case of some amphibolites and granulites, petrological information alone is not adequate for accurate interpretation, but must be considered in the light of field data.

The great majority of the metamorphics are products of regional metamorphism and are amphibolite-facies gneisses characterised by a mineral assemblage of K-feldspar, oligoclase, quartz, biotite and/or amphibole; this last-named mineral is generally distinctive and is a ferrohastingsite (containing Na), a species also occurring in the pre-Cambrian gneisses of the York Peninsula. A few hornblende-pyroxene granulites also occur. The gneisses grade into amphibolites, but not all the amphibolites are thought to be sedimentary (A3703 is interpreted as a meta-igneous). Whilst the rocks are almost all assigned to the amphibolite facies, they range from upper greenschist to granulite facies.

Compositionally, these rocks were semi-pelitic or arkosic sediments with varying amounts of calcareous and ferruginous material. The exception is A3731, which originated as a carbonaceous, impure chert.

A few contact-metamorphic rocks are represented, including a metagabbro (A3738) and a banded calc-silicate rock (A3735), both assigned to the hornblende-hornfels facies.

A number of rocks show the effects of two metamorphic events, the first regional and the second dynamic (generally accompanied by some recrystallization). The effects of the second event range from barely perceptible stress, through varying degrees of shearing/recrystallization, to intensive mylonitisation in one rock (A3701).

Many of the paragneisses are lithologically broadly similar, with the same accessory mineral suites; it is difficult to assess the significance of comparatively minor compositional differences and one would hardly expect complete uniformity of even the same unit over a reasonable strike length, in view of 'normal' variations in composition, response to metamorphism, tectonic and metamorphic factors. Perhaps the most distinctive rock in the whole suite is the graphitic metaquartzite (A3731), with the general character of a B.I.F. type and of potential value as a marker horizon.

Central Mineralogical Services

Sample No.	Rock Type - Composition	Fabric	Minor Minerals	Comments
A 3701 (T.S. 31993)	Mylonite. Splinters and larger fragments of strongly stressed quartz, K-feldspar, set in mylonitic rock-flour of the same minerals.	STrong banding and shear orientation, partial mobilisation; later fractures.	Epidote masses, lenses. Late quartz-chlorite veins; biotite.	Original rock was probably a quartz-feldspar paragneiss, is now a true mylonite.
A 3702	Sheared Quartzofeldspathic Gneiss. Lenses of coarser quartz, K-feldspar, set in medium-grained matrix of same minerals and chlorite; epidote veins cut rock.	All components stressed, with preferred orientation, some granulation.	Fractures contain cloudy epidote, sphene-leucoxene, chlorite.	Broadly similar composition to A 3701, but not mylonitised. Chlorite probably represents biotite.
A 3703	Amphibolite. Subparallel prismatic hornblende crystals (50-60 %), polygonal grains of argillised plagioclase, clear fresh microcline.	Typical medium/coarse amphibolite facies; no relict textures.	Scattered granular sphene, traces of epidote.	Believed to be of igneous origin, but rather featureless; amphibolite-facies regional metamorphism.
A 3704	Banded Gneiss. Porphyroblasts of quartz, microcline, albite, quartz-feldspar-biotite bands, with variable green biotite; bands of closely-packed hornblende.	Good gneissic fabric, compositional banding. Weakly sheared.	Patches of metamict ?allanite. Granular sphene; epidote traces.	Amphibolite-facies metasediment, semi-pelitic, with calcareous bands.
A 3705	Amphibolite. Mostly small poikiloblasts of hornblende, interspersed with granular quartz, untwinned sodic plagioclase; coarser lenses, bands.	Mostly medium-grained, homogeneous fabric, with coarser, gneissic bands.	Fine granular sphene; metamict zircon, rounded apatite grains.	Sphene as well as zircon weakly radioactive, causing pleochroic haloes in amphibole. Metasediment.
A 3706	Hornblende-Quartz-Feldspar Microgneiss. Thin streaks of very dark hornblende with magnetite, set in finely granular quartz-microcline mass.	Good preferred orientation, thin streaky banding. Medium/fine-grained.	Granular sphene throughout. Traces of pyrite.	Amphibolite facies metasediment. Hornblende in A 3705, A 3706 is ferrohastingsite (containing Na).
A 3707	Hornblende-Quartz-Feldspar Microgneiss. Grains, discontinuous streaks of dark hornblende, microgranular quartz, microcline, oligoclase; microcline porphyroblasts.	As above, with scattered, rounded porphyroblasts.	Granular sphene, magnetite; rounded zircon. Metamict ?allanite.	Closely resembles A 3706. Amber crystals = microcline. ?Allanite was probably detrital, overgrown with sphene.
A 3708	Hornblende-Quartz-Feldspar Gneiss. Porphyroblasts of dark hornblende, feldspars; quartz lenses; quartz-K-feldspar-plagioclase-magnetite matrix.	Verging on microgneissic fabric, with conspicuous porphyroblasts.	Detrital zircon, metamict ?allanite; microgranular sphene.	Compositionally very similar to A 3706-07, with slightly coarserfabric, less amphibole. Amphibolite facies metasediment.
A 3709	Hornblende-Quartz-Feldspar Microgneiss. Scattered small hornblende crystals in medium-granular quartz-microcline-sodic plagioclase matrix, with biotite shreds.	Well-orientated, weakly banded, medium-grained, uniform.	Conspicuous, irregular monazite grains; sphene, detrital zircon.	Monazite and other accessory grains all appear clastic. Rock resembles A 3706-3708, is amphibolite facies metasediment.

Sample No.	Rock Type - Composition	Fabric	Minor Minerals	Comments
A 3710	Sheared Gneiss. Lenses of stressed, dark hornblende intergrown with biotite; coarse masses of quartz, feldspars; partly recrystallized quartz-feldspar matrix.	Modified gneissic fabric, with marginally granulated recrystallized minerals.	Euhedral to granular sphene. Detrital, rounded zircon. Apatite. Metamict ?allanite.	Amphibolite-facies metasediment; sheared partly recrystallized after regional metamorphism.
A 3711	Hornblende-Biotite-Quartz-Feldspar Gneiss. Semi-continuous hornblende-biotite bands alternating with quartz-feldspar bands and lenses.	Stressed gneissic fabric, but mainly medium-grained.	Rounded apatite; Magnetite. granular-subhedral sphene. Magnetite.	Resembles A 3710, but with more hornblende (ferrohastingsite) and biotite. Amphibolite facies.
A 3712	Sheared Quartz-Feldspar Gneiss. Eyes and lenses of stressed orthoclase in a streaky microgranular quartz-microcline matrix with minor plagioclase. Stressed quartz veins.	Excellent fine streaky fabric, extensively recrystallized.	Fine epidote, chlorite, leucoxene. Detritally rounded zircon (very sparse).	Believed to have been a sediment, converted to gneiss, then sheared/recrystallized, but evidence of origin not very definite.
A 3713	Hornblende-Biotite Microgneiss. Small subparallel prismatic hornblende crystals, green biotite flakes, interstitial quartz, feldspars; conspicuous fine sphene.	Fine, well-orientated fabric; almost schistose; coarser lenses, pods, with porphyroblasts.	Granular epidote developed throughout. Quartz veins with oxidised pyrite.	Amphibolite-facies metasediment with unusually abundant sphene; verging on a schist. Weakly sheared.
A 3714	Sheared Quartz-Feldspar-Mica Gneiss. Stressed, fractured feldspar (K-feldspar, oligoclase) porphyroblasts, in microgranular quartz-feldspar-biotite matrix.	Originally coarser, but sheared, recrystallized; later fracturing.	Postmetamorphic epidote biotite veinlets; younger quartz-fluorite veins.	Complex history of regional, followed by dynamic metamorphism, two generations of veins (quartz-fluorite veins are unaffected.
A 3715	Banded Microgneiss. Dominantly fine streaky quartz-K-feldspar-plagioclase as thin bands, with interspersed hornblende-epidote bands.	Generally fine-grained and finely banded, with a few porphyroblasts.	Granular sphene; detrital zircon. Epidote veinlets.	Amphibolite-facies semi-pelitic sediment with calcareous bands. Weakly stressed after regional metamorphism.
A 3716	Banded Amphibolite. Light bands of fairly coarse quartz-feldspars (orthoclase, plagioclase), alternating with dark bands of hornblende-magnetite-quartz-feldspar.	Good preferred orientation, relatively coarse grainsizes, but uniform.	Granular sphene conspicuous; small apatite needles. Chloritised biotite.	Amphibolite-facies metasediment; perhaps not strictly an amphibolite, because hornblende is not abundant.
A 3717	Quartz-Feldspar-Biotite Microgneiss. Thin bands of microcline mosaics, alternating with finer intergrowths of quartz-feldspar-green biotite-epidote.	Finely banded fabric, medium-to fine-grained.	Granular sphene; rounded zircon, apatite grains. Trace Hornblende.	Mineral assemblage indicates upper greenschist facies verging on amphibolite facies. Metasediment.
A 3718	Microgneiss. Mainly medium-grained quartz, microcline, oligoclase mosaics, with interspersed minor dark hornblende, magnetite; coarser lenses.	Fairly uniform apart from a few coarser bands. Preferred orientation.	Detrital zircon; granular to euhedral apatite. Trace sphene.	Distinctly magnetic, but magnetite content <2 %. Amphibolite facies metasediment.

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Sample No.	Rock Type - Composition	Fabric	Minor Minerals	Comments
A 3719	Hornblende-Pyroxene Granulite. Small polygonal diopside crystals, subordinate hornblende, interspersed polygonal andesine-labradorite, minor quartz and microcline.	Well-orientated, typical granulitic fabric and textures.	Granular ilmenite. A few flakes of Ti-biotite.	Good example of granulite facies rock; origin could be sedimentary or basic igneous.
A 3720	Granitoid. Very coarse anhedral patches of microcline-perthite and quartz, both stressed; very minor plagioclase (argillised), myrmekite patches.	Very coarse, apparently homogeneous fabric shows no folding.	Isolated dark hornblende, degraded biotite. Trace apatite.	No folding was seen in hand specimen. Rock has granitoid composition and fabric, but thought to be metasedimentary.
A 3721	Microgneiss. Dominantly fairly fine, streaky quartz, K-feldspar, andesine; thin bands of dark hornblende with associated magnetite and sphene.	Well-orientated, fine- to medium-grained; thin parallel banding.	Detritally rounded zircon. Isolated metamict ?allanite.	Amphibolite-facies semi-pelitic metasediment with minor Fe. Fresh, unsheared. Weakly magnetic.
A 3722	Hornblende-Quartz-Feldspar Gneiss. Mainly granular, interlocking quartz and orthoclase; scattered patches of hornblende, associated magnetite, apatite.	Fairly homogeneous, with a few porphyroblasts. Orientation mediocre.	Oligoclase patches, but argillised. Biotite shreds. Detrital zircon.	Weakly stressed, but not sheared, recrystallized like A 3710; broadly similar composition, but more magnetite, apatite. Could be correlatable.
A 3723	Hornblende-Biotite Gneiss. Large orthoclase-perthite porphyroblasts set in medium-grained quartz-orthoclase-oligoclase matrix with streaks of biotite-dark hornblende.	Good preferred orientation, fine banding, medium-grained. Graphic textures.	Magnetite patches. Granular to subhedral apatite.	Broadly similar to A 3718, 3722; variations in composition, fabric are relatively minor and possibly insignificant.
A 3724 (T.S. 32016)	Hornblende-Pyroxene-Biotite Granulite. Bands and lenses of well-crystallized diopside, associated hornblende, Ti-biotite; polygonal oligoclase grains.	Relatively coarse, but typical granulitic fabric; preferred orientation.	Magnetite patches intergrown with ferromagnesians. Aligned apatite grains.	Similar to A 3719, but coarser, with magnetite. Possibly of mafic igneous origin.
A 3725 (T.S. 32071)	Sheared Biotite-Hornblende Gneiss. Stressed orthoclase, plagioclase porphyroblasts; lenses, streaks of hornblende, deformed biotite; granulated/recrystallized quartz-feldspar matrix.	Originally coarser, gneissic fabric, but tectonically granulated, recrystallized.	Magnetite, granular apatite; detrital zircon. Sericite patches.	Two distinct metamorphic episodes, the first regional (amphibolite facies), the second mainly dynamic. Metasediment.
A 3726	Hornblende-Pyroxene Granulite. Granular-polygonal diopside crystals, intergrown hornblende, forming patches, lenses, networks; interstitial andesine.	Granulitic fabric, general preferred orientation; uniform mineral distribution.	Finely-granular ilmenite; apatite needles. Trace biotite.	Closely resembles A 3719 in particular; more probably igneous than sedimentary origin.
A 3727	Pyroxene-Hornblende-Biotite Gneiss. Granular and porphyroblastic andesine, orthoclase, quartz; irregular clumps of hypersthene, hornblende and biotite intergrowths.	Fabric is coarse, gneissic, rather than granulitic. Components weakly stressed.	Granular magnetite, apatite. Detrital zircon.	Granulitic composition, but different from other granulites - hypersthene, quartz. Believed to be of sedimentary origin. Could correlate with A 3725.

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Sample No.	Rock Type - Composition	Fabric	Minor Minerals	Comments
A 3728 M16/11	Hypersthene-Hornblende Gneiss. Groups of prismatic hypersthene, hornblende crystals; polygonal to porphyroblastic oligoclase and orthoclase patches.	Partly granulitic, partly gneissic fabric, mostly medium-grained.	Granular magnetite, fine apatite. A few Ti-biotite shreds.	Probably a granulite-facies meta-igneous rock with confused fabric. Note absence of quartz. Doubtfully correlatable with A 3726.
A 3729 [illegible]	Biotite-Quartz-Feldspar Gneiss. Porphyroblasts of orthoclase, oligoclase in granular mass of orthoclase, oligoclase, quartz, subrandom Ti-biotite flakes.	Medium- to coarse-grained, with vague preferred orientation. Weakly stressed.	Poikiloblastic hornblende. Apatite, magnetite traces. Detrital zircon.	Amphibolite facies, very probably of sedimentary origin, thus broadly correlatable with A 3725, 3727, but some differences.
A 3730 [illegible]	Biotite-Quartz-Feldspar Gneiss. Oligoclase porphyroblasts in medium-grained mass of orthoclase, oligoclase, quartz, subparallel Ti-biotite flakes.	Tendsto be medium-grained, with good preferred orientation.	Granular hornblende, magnetite. Apatite. Detrital zircon not rare.	Similar to A 3729, though fabric is more organised. Assigned to amphibolite facies. Metasediment.
A 3731 [illegible] 1.22/4	Ferruginous, Graphitic Metaquartzite. Dominantly broad bands of fine mosaic quartz, with narrow bands of altered, ferruginised amphibole, and graphite flakes.	Well-banded, fine-grained, uniform. No relict textures.	Crosscutting quartz veinlets.	Originally a ferruginous, carbonaceous chert, metamorphosed to graphitic metaquartzite with amphibole (probably hastingsite) bands.
A 3732 [illegible]	Biotite-Quartz-Feldspar Gneiss. Scattered porphyroblasts of microcline, oligoclase, in a medium-grained matrix of quartz, feldspars and aligned biotite.	Relatively fine fabric for a gneiss; good preferred orientation.	A few hornblende and sphene porphyroblasts. Apatite. Detrital zircon.	Amphibolite-facies metasediment, perhaps more appropriately termed a microgneiss.
A 3733 1.22/9	Amphibolite. Fairly compact, massive hornblende, with interstitial green biotite, granular epidote, oligoclase; bands/lenses of quartz-orthoclase-oligoclase.	Gneissic fabric in the lighter quartz-feldspar bands. Remainder amphibolitic.	Microgranular sphene; traces of magnetite, apatite.	Amphibolite-facies metasediment, calcareous with quartzose bands or lenses.
A 3734 [illegible]	Chert. Mainly microcrystalline, formless quartz; haphazard patches of coarser re-crystallized quartz, and random diagenetic quartz veins.	Structureless rock, diagenetically recrystallized.	Minute grains of carbonate.	Featureless, virtually monomineralic rock. Not metamorphosed.
A 3735 [illegible]	Banded Calc-Silicate Rock. Small subhedral epidote crystals, acicular actinolite, mosaics of microcline, oligoclase; coarser/finer bands of the same minerals.	Weak preferred orientation at 30-35° to banding. Medium-grained.	Sphene, granular magnetite. Rare garnet (andradite) in coarser bands.	Com-positional and textural banding partly inherited from original sediment. Thermal rather than regional metamorphism (hornblende-hornfels facies).
A 3736 [illegible]	Biotite-Quartz-Feldspar Gneiss. Large microcline porphyroblasts in gneissic mass of microcline, oligoclase, quartz, biotite flakes and minor hornblende (hastingsite).	Good gneissic fabric, with porphyroblasts up to 15 mm across.	Ilmenite or magnetite with sphene rims. Granular apatite, zircon.	Amphibolite-facies metasediment, similar to A 3732, but lacking evidence of second metamorphism as in A 3725.

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Sample No.	Rock Type - Composition	Fabric	Minor Minerals	Comments
A 3737 A23/7	Biotite-Quartz-Feldspar Gneiss. Large microcline porphyroblasts, coarse, stressed quartz, oligoclase, microcline; streaks of parallel biotite flakes.	Coarse gneissic fabric; all components weakly stressed.	Microgranular sphene; chalcopyrite, pyrite, sphalerite patches.	Traces of post-metamorphic sulphide mineralisation. Rock is similar to A 3736.
A 3738 A23/7	Metagabbro. Pseudomorphs of fibrous actinolite, fringed with biotite, after pyroxene; laths and recrystallized patches of andesine.	Relict gabbroic fabric wellpreserved despite thorough recrystallization.	Scattered oxide opaques throughout (?ilmenite).	Original rock was a ferromagnesian-rich gabbro (metagabbro); thermally metamorphosed (hornblende-hornfels facies).
A 3739 A23/7	Gneissic Metagabbro. Parallel lenses of actinolite aggregates, streaks of foliated biotite, interstitial fragmented, recrystallized andesine.	Gneissic fabric, but relict gabbro features recognisable.	Scattered fine oxide opaques.	Obvious similarities with A 3738, but with overprinted gneissic fabric involving no compositional changes.
A3740 (T.S. 32086) A23/7	Hornblende-Biotite Gneiss. Dominantly coarse hornblende crystals, coarse, parallel biotite, interstitial andesine, bands/lenses of quartz, orthoclase, oligoclase.	Relatively coarsely crystalline minerals, pronounced gneissic fabric. Stressed.	Granular sphene, with pleochroic haloes (i.e. weakly radioactive).	Origin uncertain, but sedimentary or igneous derivation both possible, depending on field relations.

REPORT CMS 80/6/10

Project 126 - Rock Samples 2451 - 2460

Ten rock specimens were received for thin-section preparation and petrological examination; K-feldspar-stained offcuts and thin-sections were examined and are briefly described in the accompanying tables.

Summary

The rocks are all metamorphic and are thought to be of sedimentary origin, though not with an equal degree of certainty; the granulites in particular are difficult to interpret because of complete re-organisation obliterating relict features. However, 2451 is distinctively banded, both compositionally and texturally, and this is taken as evidence of sedimentary origin; by analogy (lithological similarities), 2452 and 2453 are also presumed to be metasediments; 2459 differs from the other granulites but its origin is also considered to be sedimentary.

Most of the other rocks are fairly conventional amphibolite-facies gneisses where "hornblende" occurs it is generally ferrohastingsite (containing Na), a distinctive mineral.

Sample 2455 is a metaquartzite with small fragments and rounded pebbles of tourmaline and 2457 is a talcose marble with an unusual carbonate, tentatively determined as pistomesite, an Mg-Fe carbonate (halfway between magnesite and siderite).

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Sample No.	Rock Type - Composition	Fabric	Minor Minerals	Comments
Project 126 2451 (T.S. 32220)	Banded Pyroxene Granulite. Fine-grained bands of labradorite, hypersthene, minor quartz; coarser bands of quartz, subordinate andesine, biotite, hypersthene.	General preferred orientation parallel with banding. Medium-to coarse-grained.	Granular oxide opaques, traces of apatite throughout. A few diopside patches.	Banding is partly compositional, partly textural and reflectsbanding in original rock. Probably a metasediment.
2452	Pyroxene Granulite. Granular, polygonal and subhedral crystals of hypersthene, pigeonite, calcic labradorite and quartz in approximately equal amounts.	Uniform, medium-grained fabric with faint banding, preferred orientatiOn.	Scattered oxide opaques (probably ilmenite) and traces of apatite throughout.	Similar to finer bands in 2451 and thought to be metasedimentary. High-grade metamorphic rock.
2453	Pyroxene Granulite. About 50 % labradorite, as clear, polygonal grains, 25 % each of subhedral hypersthene and diopsidic augite.	Medium-grained, homogeneous fabric; weak preferred orientation, no banding.	Granular ilmenite relatively common. Isolated biotite flakes, very minor quartz.	Resembles 2452 in particular; if lithologically related, then also of sedimentary origin.
2454	Quartz-Feldspar-Garnet-Biotite Gneiss. Large lenses, porphyroblasts of K-feldspar, polygonal quartz, oligoclase grains; granular garnet, subparallel Ti-biotite flakes.	Fairly coarse, gneissic fabric, no banding/ foliation on T.S. scale.	Well-rounded zircon relatively common. Scattered oxide opaques.	An amphibolite-facies paragneiss, i.e. of sedimentaryorigin; orthodox rock; garnet conspicuous compared with previous gneisses.
2455	Micaceous Metaquartzite. Dominantly fine to coarse, interlocking stressed quartz grains, fine parallel muscovite flakes; fragments, aggregates of tourmaline.	Good preferred orientation, due to mica flakes. No relict textures.	Granular rutile enclosed in tourmaline. Detrital zircon.	Dark "sphere" consists of matted dravite needles, and is a small pebble. Original rock was orthoquartzite with minor clay/mica.
2456	Quartz-Feldspar-Mica Gneiss. Porphyroblasts of microcline, coarse granular oligoclase, stressed, interlocking quartz patches, dark biotite, interleaved muscovite.	Typical gneissic fabric, coarse-grained, with crude preferred orientation.	Accessory apatite, detrital zircon. Pleochroic haloes in biotite.	Very similar to previously-described paragneisses (report CMS 80/5/47). Amphibolite facies.
2457	Talcose Marble. Scattered small flakes and occasional aggregates of talc in medium-crystalline carbonate ($Mg/FeCO_3$) mass.	Subhedral interlocking grains, average size = 0.3 mm. Talc is orientated.	None detected.	Carbonate species appears to be "pistomesite", with equal Mg-Fe. Fabric suggests contact-metamorphism, but could be regional.
2458	Quartz-Feldspar-Hornblende-Biotite Gneiss. Granular to poikiloblastic orthoclase, oligoclase, hornblende, subordinate quartz and biotite.	Granular, rather than gneissic fabric; very weak preferred orientation.	Apatite, zircon, oxide opaques, sphene; patches of metamict ?allanite.	A-ccessory minerals conspicuous, especially apatite which is distinctive (smoky). Amphibolite-facies metasediment.
2459	Biotite-Hornblende-Pyroxene Granulite. A few lenses of coarse andesine in streaky mass of quartz, K-feldspar, andesine, biotite, dark hornblende, hypersthene, diopside.	Not typical granulite fabric, more micro-gneissic.	Granular oxide opaques; apatite. Patches of fibrous replacive sericite.	Unusual rock, probably didnot achieve equilibrium. Thought to be of sedimentary origin.

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Sample No.	Rock Type - Composition	Fabric	Minor Minerals	Comments
2460 (T.S. 32229)	Hornblende-Quartz-Feldspar Gneiss. Porphyroblasts/lenses of microcline/quartz/oligoclase in much finer matrix of quartz, microcline hastingsite, minor biotite.	Mostly microgneissic, uniform; isolated coarse lenses.	Granular sphene, subhedral apatite; detrital zircon.	Amphibolite-facies metasediment. Coarse oligoclase is an unusual blue colour due to minute crystalline inclusions (optical effect).

REPORT CMS 80/6/11

Project 126 - Samples A3741 - A3750

Ten rock samples were received for petrological description and were prepared and examined in the usual way, using thin-sections and K-Feldspar stain tests on offcuts. The results are summarised in the accompanying tables.

Summary

Eight of the rocks are gneisses, one is a metaquartzite and one is an amphibolite; all except the amphibolite (A3750), are of sedimentary origin, and the metaquartzite was a chemical sediment (chert).

The amphibolite resembles A3703 in broad terms; both rocks are metamorphosed, basic igneous types.

In a general sense, the gneisses are related in that they were clastic sediments (with normal lithological variations), all subjected to amphibolite facies regional metamorphism; some contain evidence of a second dynamic phase of metamorphism involving shearing, granulation and partial recrystallisation as well as rotation of minerals ("snowball" garnets in A3742, hornblende in A3747).

There is a closer correlation between A3743-4-5-6 because of their accessory minerals, particularly metamict ?allanite and ?brannerite; since these two minerals are completely altered (consequent upon metamictisation) their identity cannot be proved, but they retain enough characteristic features to make identification reasonably confident. The minerals predate the dynamic metamorphism, and are products of regional metamorphism; there is no indication of a pre-metamorphic (i.e. clastic) derivation. Thus, the occurrences may well be significant and worth studying in further detail.

Sample A3705 is a para-amphibolite and A3735 is a banded calc-silicate rock and thus neither are particularly correlatable with A3743-4-5. Samples A3746 and A3711 are both gneisses with broadly similar lithology, and (probably) insignificant textural and compositional variations; no allanite was detected in A3711 and veining is absent.

The fluorite-epidote-adularia-chlorite veins in A3746 are interesting; they could have introduced other minerals (such as allanite, brannerite).

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Sample No.	Rock Type - Composition	Fabric	Minor Minerals	Comments
Project 126 A 3741 (T.S. 32232)	Quartz-Feldspar-Mica Gneiss. Very coarse masses of strongly stressed quartz, deformed muscovite; medium/coarse matrix of quartz, orthoclase, oligoclase, biotite, muscovite.	Coarse gneissic fabric with overprinted folding, deformation.	Probable relict sillimanite in muscovite. Apatite; zircon. Trace hastingsite amphibole.	Originally containing sillimanite; retrograde metamorphism during post-regional metamorphism deformation.
A 3742	Garnetiferous Gneiss. Dominantly lenses, porphyroblasts of orthoclase, interstitial granular quartz, orthoclase, wispy biotite, scattered "snowball" garnets.	Originally coarser, but evidence of younger deformation and recrystallization.	Well-rounded zircon. Oxide opaques. Apatite. Very minor oligoclase.	Amphibolite-facies metasediment. Some zircon is metamict, relatively common, thus rock weakly radioactive.
A 3743	Sheared, Quartzofeldspathic Gneiss. Deformed, granulated microcline porphyroblasts in granular quartz-microcline-oligoclase matrix with very minor biotite.	As above. Components strongly stressed, granulated. Preferred orientation.	Irregular patches of altered, metamict ?brannerite up to 1x2 mm. Magnetite.	Strong deformation superimposed on regionally metamorphosed metasediment. ?Brannerite identification reasonably confident.
A 3744	Sheared Gneiss (with Hornblende). Sheared, granulated lenses/porphyroblasts of orthoclase, oligoclase, hastingsite, in quartz-feldspar matrix with fine biotite.	As Above. Deformation, granulation, recrystallization more marked. Strong preferred orientation.	Metamict allanite with epidote rims. Leucoxenised metamict ?brannerite.	Both U/Th minerals thoroughly metamictised and altered, thus radioactivity lower than expected. Metasediment.
A 3745	Quartz-Feldspar-Biotite Gneiss. Very large, coarse microcline lenses/porphyrpblasts, medium-grained matrix of quartz, microcline, green biotite, occasional hastingsite.	Very coarse augengneiss fabric, weakly stressed/deformed.	Metamict allanite with epidote rims. Detrital apatite, zircon;granular sphene.Magnetite.	Very similar to A3743, 3744, and is amphibolite-facies metasediment, but less deformed than the others.
A 3746	Quartz-Feldspar-Hornblende Gneiss. Small porphyroblasts of orthoclase, oligoclase, hastingsite; matrix of granular quartz, feldspars, green biotite, sphene, epidote.	Generally medium-grained; inconspicuous porphyroblasts. Fractured,weakly stressed.	Traces of metamict allanite. Detrital zircon, apatite.Fluorite-epidote-adularia-chlorite veins.	Mineral assemblage resembles A 3743, 4, 5, especially minor minerals. Very little subsequent deformation.
A 3747	Sheared, Quartzofeldspathic Gneiss. Sheared lenses/porphyroblasts of microcline, quartz, oligoclase, in granular, streaky matrix. Some bands with hornblende, epidote.	Coarser gneiss originally, but sheared, partly recrystallized. Strong preferred orientation.	A few large, sheared hornblende crystals. Oxide opaques, sphene, zircon.	Very clear evidence of shearing, rotation of crystals, recrystallization and re-orientation; amphibolite facies.
A 3748	Metaquartzite. Parallel streaks of interlocking, strongly stressed quartz, with sheared fibrous bands. Thin, parallel muscovite streaks, pyrite films.	Strong crystallographic orientation of quartz streaks, at 18° to muscovite streaks.	Ultrafine intergranular carbonaceous material pigmenting quartz.	Originally a weakly carbonaceous and pyritic chert, thoroughly recrystallized (with directed pressure).
A 3749	Sheared Quartz-Feldspar Gneiss. Sheared, granulated porphyroblasts of quartz, orthoclase, oligoclase, in a streaky, granular matrix of the same minerals.	Modified gneissic fabric, granulated and partly recrystallized. Well orientated.	Occasional grains, pods of magnetite-maghemite.	Very simple composition of quartz and feldspars, virtually devoid of accessory minerals. ?Amphibolite-facies metasediment.

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Sample No.	Rock Type - Composition	Fabric	Minor Minerals	Comments
A 3750 (T.S. 32241)	Amphibolite. Parallel prismatic hornblende crystals, interstitial and lensoid aggregates of partly sericitised oligoclase and minor granular quartz.	Medium-grained, homogeneous, typical amphibolite fabric.	Fine oxide opaques throughout. Cross-cutting K-feldspar veinlets. Trace apatite.	Thought to be meta-igneous but, as with many amphibolites, origin not certain; field data may decide.

REPORT CMS 80/11/60

Tumby Bay Rock Samples

Thirteen rock samples were received for thin-section preparation and petrological examination and comparison. The thin-sections and K-stained offcuts were studied, and the rocks are described in the accompanying tables.

Summary, Comparisons

Samples 1424, 1425 and 1427 are amphibolites; 1425 and 1427 are closely similar, differing only in grainsize, and both are regarded as meta-igneous. 1424 differs from these in both composition and fabric, indicating a different origin (?metasedimentary) and metamorphic history.

Samples 1422, 1428, 1429, 1430 are all closely similar, with virtually the same mineral assemblage, fabric and metamorphic grade; minor variations can be accounted for by slightly different primary (sedimentary) lithologies, resulting in changes in metamorhic mineral proportions.

Sample 1426 at first sight gives the impression of a sheared rhyolite, but closer study indicates a sedimentary origin because of conspicuous detrital heavy-mineral grains; the rock was formed as a feldspathic metaquartzite with K-feldspar porphyroblasts, subsequently sheared, but not strictly mylonitised (depending on how strictly the term is applied).

1431-1435 are all closely similar, with a distinctive mineral assemblage characterised by abundant feldspars, very little quartz, diopside-hedenbergite, and the amphibole hastingsite (a soda-bearing variety). Accessory minerals are also distinctive and include oxide opaques (?ilmenite), strongly pleochroic sphene, metamict ?brannerite, and detrital heavy minerals especially apatite and zircon. The assemblage indicates derivation from a sediment of unusual composition.

The radioactivity can be related to sphene, metamict ?brannerite and possibly the oxide opaques, and it is believed that the ?brannerite and opaques were sedimentary; the sphene is clearly a metamorphic product. A more detailed study of these minerals would be needed to determine the extent to which each contributes to the radioactivity and this can be carried out if required.

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Sample No.	Rock Type - Composition	Fabric	Minor inerals	Comments
1422 (T.S. 35045)	Biotite-Garnet-Sillimanite Gneiss. Bundles of fibrous sillimanite, scattered almandine crystals, coarse parallel biotite, interstitial quartz and K-feldspar.	Fairly coarsely-crystalline gneissic fabric. Garnets are poikiloblasts.	Muscovite. Detrital zircon. Fine pleochroic haloes in biotite. Apatite.	Amphibolite facies metasediment, with distinctive, well-defined mineral assemblage.
1424) from) same	Amphibolite. Bands of coarse poikiloblastic and granular hornblende, alternating with broader bands of andesine mosaics; stringers and patches of sphene.	Banded amphibolite fabric, but also some hornfelsic features. Medium to coarse.	Granular diopside. Fine quartz throughout, embedded in plagioclase.	Upper amphibolite facies; partly hornfelsic fabric formed with falling pressures and rising temperatures. ?Sedimentary origin.
1425) hori-zon	Amphibolite. Small subparallel hornblende rods (65 %), interstitial polygonal andesine grains and minor quartz (total 35 %).	Excellent lineation; fairly fine-grained, uniform, no banding.	Microgranular sphene. Ultrafine oxide opaques.	Simple composition and fabric; could be a meta-igneous rock, i.e. ortho-amphibolite.
1426	Feldspathic Metaquartzite (Microgneiss). Thin parallel streaks of fine, stressed quartz and of K-feldspar; a few lenses, poikiloblasts of coarser K-feldspar.	Strongly lineated fabric. Components stressed, some shearing.	Fine leucoxene, hematite grains. Conspicuous fine rounded detrital zircon.	Could be interpreted as sheared rhyolite, but this origin excluded by zircon. Sheared, but not strictly mylonitic.
1427	Amphibolite. Small parallel rods/prismatic crystals of hornblende (60 %), interstitial polygonal andesine grains, mostly untwinned (40 %).	Very good lineation, medium-grained, uniform fabric.	Finely granular sphene and oxide opaques. Poikiloblastic tourmaline.	Very similar to 1425, slightly coarser; both rocks contrast with 1424, which formed under different conditions.
1428	Sillimanite-Mica-Quartz-Feldspar Gneiss. Thin bundles of sillimanite fibres; biotite and muscovite flakes, granular quartz and orthoclase.	Fairly uniform gneissic fabric; a few coarse muscovite flakes.	Detrital zircon. Isolated plagioclase patches. Detrital apatite.	Quite similar to 1422 and also assigned to amphibolite facies; no garnet detected, however.
1429	Biotite-Garnet-Sillimanite Gneiss. Poikiloblastic almandine, lenses/bundles of sillimanite, streaks/bands of biotite, granular quartz and orthoclase.	Pronounced gneissic fabric; sillimanite coarser than in 1422, 1428.	Detrital zircon. Pleochroic haloes in biotite.	Amphibolite facies metasediment, closely resembling 1422 in particular, also 1428.
1430	Garnet-Biotite-Sillimanite Gneiss. Abundant small garnets embedded in biotite bands, with bands of granular quartz, K-feldspar and oligoclase.	Gneissic fabric with compositional banding. Medium/coarse-grained.	Detrital zircon and apatite conspicuous. Metamorphosed quartz veins.	Same assemblage and metamorphic grade as 1422, 1428, 1429, with more garnet, less sillimanite.
1431 T.B. 20 anom.	Quartz-Plagioclase-Diopside Gneiss. Andesine porphyroblasts set in quartz-andesine mosaic, with streaks of diopside-hastingsite, oxide opaques and sphene.	Irregular grainsizes, gneissic fabric with good preferred orientation. Components are stressed.	Conspicuous granular/rounded apatite. Detrital zircons. Trace K-feldspar.	Upper amphibolite or hornblende-granulite facies metamorphism with some retrogression (probably during stress). Metasediment.

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Sample No.	Rock Type - Composition	Fabric	Minor Minerals	Comments
1432 5m W of TB20	Sheared Quartz-Feldspar-Biotite Gneiss. Stressed, granulated orthoclase, oligoclase porphyroblasts; fine quartz-feldspar matrix with fine biotite streaks, minor hornblende.	Gneissic fabric modified by later shearing, partial recrystallization.	Traces of sphene. Rounded detrital apatite, zircon.	Lower-grade (amphibolite facies) assemblage than 1431; retrogression accompanied shearing. Note paucity of sphene, opaques.
1433 TB20 anom	Pyroxene-Hornblende-Feldspar Gneiss. Irregular patches of intergrown hedenbergite (Fe-diopside) and hastingsite, in interlocking mass of oligoclase and microcline.	Crude gneissic fabric, lensoid to semi-banded dark minerals. Stressed.	Oxideopaques with sphene rims; metamict ?brannerite; zircon grains. Minor quartz.	Similar assemblage, metamorphic grade as 1431, with conspicuous sphene and opaques, probable associated brannerite.
1434 5m W of TB 20	Hastingsite-Feldspar Gneiss. Patches, bands of coarse prismatic hastingsite, and feldspathic bands of coarse and fine, interlocking microcline and oligoclase.	Compositionally banded, gneissic fabric; relict heavy-mineral layering.	Detrital apatite and zircon in layers. Isolated metamict ?brannerite. Opaques and sphene.	Amphibolite facies metasediment with unusual original composition; hastingsite is a soda-amphibole.
1435 20m E of TB20 (T.S. 35057)	Biotite-Hornblende-Quartz-Feldspar Gneiss. Thin bands of biotite-hastingsite; microcline porphyroblasts; granular quartz, microcline, oligoclase matrix.	Good gneissic fabric with some banding. Porphyroblastic textures. Stressed.	Opaques with sphene rims; granular apatite; rounded zircon. Metamict ?brannerite.	Quite similar to the other gneisses, amphibolite facies metasediment. Radioactivity is related to opaques, sphene, ?brannerite.

REPORT CMS 80/10/65

Project 126 Rock Samples

Fourteen rock samples were received for thin-section preparation and petrological examination; offcuts were subjected to K-stain tests and were examined under the stereobinocular microscope. The results of all the examinations are presented as brief descriptions in the table.

Summary

All the rocks are metamorphic, except for 1416 which is a laterite, and include orthoamphibolites, gneisses, metaquartzites and a marble.

Apart from the orthoamphibolites, which are of basic igneous origin and verge on the granulite facies (presence of minor diopside), the rocks are metasediments; some are tentatively assigned to the greenschist facies, but could be of higher grade, but most are clearly amphibolite-facies rocks. The marble is a product of medium-grade contact-metamorphism, judging from its fabric.

Samples 1417 to 1421 are all closely similar, differing only in comparatively minor respects; however, 1418-1420 contain appreciable more magnetite than 1417 and 1421. Also the magnetite tends to occur in distinct bands with biotite, which very probably enhances the magnetic response compared with rocks in which the magnetite is randomly scattered.

Sample 1416 is undoubtedly a laterite, but there is some textural evidence that it may have contained sulphide fragments.

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Sample No.	Rock Type - composition	Fabric	Minor Minerals	Comments
80/1408 (T.S. 35080)	Amphibolite. Small prismatic crystals of hornblende (about 60 %), interstitial polygonal oligoclase grains.	Well-lineated, uniform, medium-grained fabric.	Scattered microgranular sphene. A few diopside porphyroblasts.	Probably an ortho-amphibolite; upper amphibolite facies verging on hornblende-granulite facies.
80/1409	Banded Amphibolite. Thick and thin bands of prismatic hornblende, granular oligoclase; thin diopside-plagioclase bands.	Good lineation and fine banding. Medium-grained.	Granular sphene. Occasional stressed quartz patches.	Similar to 1408, but banded; assigned to hornblende-granulite facies. Thought to be of igneous origin.
80/1410	Biotite-Sillimanite Gneiss. Mostly polygonal and poikiloblastic oligoclase, microcline and quartz; biotite flakes, lenses of fibrous sillimanite.	Good preferred orientation provided by mica, sillimanite. Medium-grained, uniform.	Small, well-rounded zircons. Traces of fine ?graphite.	Metasediment of semi-pelitic composition; amphibolite-facies regional metamorphism.
80/1411	Feldspathic, Micaceous Metaquartzite. Mainly coarse, tabular, stressed quartz, with granular/lensoid microcline; muscovite flakes and laminae.	Strong preferred orientation, especially micas. Coarse-grained.	Conspicuous small rounded zircons, sphene grains. Trace biotite.	Relative abundance of zircon, presence of feldspar and micas indicates that original rock was clastic (sandstone).
80/1412	Biotite-Garnet-Sillimanite Gneiss. Porphyroblastic almandine, coarse biotite, fibrous sillimanite, polygonal grains of microcline, quartz. Strawberry Hill	Vague banding, and large felsic lenses. Medium/coarse-grained.	Small irregular apatite grains. Pleochroic haloes in biotite.	Amphibolite-facies metasediment, of semi-pelitic composition. No special features.
80/1413	Diopside Marble. Dominantly coarsely-crystalline dolomite, with scattered anhedral diopside grains. Calcite stain test negative. TB 29	Generally coarse fabric with finer intergranular grains. No preferred orientation.	Occasional chlorite flakes; apatite grains.	Simple composition, featureless rock. Medium-grade contact-metamorphism of fairly pure sediment.
80/1414	Quartz-Feldspar-Biotite Gneiss. Stressed porphyroblasts and lenses of microcline, plagioclase; granular quartz-feldspar matrix with biotite bands. TB 29	Typical porphyroblastic gneissic fabric, with compositional banding.	Well-rounded zircon grains relatively conspicuous.	Greenschist-facies metamorphism of originally coarse clastic sediment, but could be lower amphibolite facies.
80/1415	Garnetiferous Feldspathic Metaquartzite. Mostly small polygonal quartz, microcline, plagioclase; minor biotite, scattered garnet crystals.	Medium-grained. Small, tight folds outlined by biotite bands.	Granular sphene, scattered magnetite. Rounded zircon, apatite.	Could be termed a microgneiss; only the biotite shows preferred orientation. ?Greenschist facies.
80/1416	Laterite. Irregular grains of metaquartzite/stressed quartz, rounded ironstone fragments, all with limonite shells, cemented by goethite. Cellular goethite fragments.	Typical concretionary-pisolitic laterite textures. Coarse-grained.	Patches of ferruginised clay minerals.	Although regarded as laterite, rock is believed to contain fragments of oxidised pyrite and pyrrhotite.

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Sample No.	Rock Type - Classification	Fabric	Minor Minerals	Comments
80/1417	Hornblende-Biotite Gneiss. Porphyroblasts of plagioclase, microcline; a few hornblende crystals; biotite aggregates; granular quartz, feldspars.	Confused gneissic fabric; coarse-grained.	Minor magnetite (< 1 %) surrounded by granular sphene. Detrital zircon.	Amphibolite-facies metasediment. Magnetite possibly detrital, largely altered to sphene. Hornblende is hastingsite.
80/1418	Hornblende-Biotite Gneiss. Porphyroblasts of plagioclase, microcline, in mosaic of quartz, feldspars, dark biotite; scattered hastingsite.	Coarse gneissic fabric; biotite tends to be in bands.	1-2 % granular magnetite; granular sphene. Metamict ?thorite.	Same mineral assemblage and fabric as 1417, but more magnetite, in biotite bands.
80/1419	Hornblende-Biotite Gneiss. Microcline porphyroblasts set in finely-granular quartz-feldspar matrix with dark biotite, minor hastingsite.	Crudely gneissic fabric, with only weak preferred orientation.	1-2 % scattered magnetite with sphene rims. Isolated allanite, apatite.	As for 1418, but magnetite more scattered, banding not well-developed.
80/1420	Hornblende-Biotite Gneiss. Large lenses of coarse quartz-feldspar (partly argillised); coarse matrix of quartz, feldspar, biotite, hastingsite.	Coarse gneissic fabric, distinct compositional banding.	1-2 % magnetite, with sphene; apatite, allanite, ?metamict thorite.	Metamict ?thorite is very altered, and positive identification not possible.
80/1421 (T.S. 35093)	Hornblende-Biotite Gneiss. Coarse feldspar lenses, microgranular quartz-feldspar matrix; very minor biotite, sporadic hastingsite only.	Gneissic fabric, contrasting coarse and fine grainsizes.	Traces only of magnetite. Isolated rounded zircon, monazite, ?brannerite.	Similar to above, but more felsic, much less magnetite. ?Brannerite as minute altered grains with limonite haloes.

REPORT CMS 80/4/7

Eyre Peninsular Rocks

Sixteen rock samples were received for thin-section preparation and brief petrological examination and comment. The rocks are individually described in the accompanying tables and a summary follows. K-feldspar stain tests and stereobinocular examinations of offcuts were carried out in addition to thin-section microscopy and the results are incorporated in the descriptions.

Summary

All the rocks are metamorphic and, as far as can be determined, the great majority can be assigned to the amphibolite facies of regional metamorphism; a few lack critical, diagnostic "indicator" minerals enabling the rocks to be accurately assigned and could thus be either greenschist - or amphibolite - facies. One rock (A 3608) is definitely assigned to the greenschist facies on the basis of its composition.

Lithologically, the rocks ranged (as sediments) from fairly pure quartzites, through banded iron formations, to semi-pelitic and semi-calcareous rocks, and are now represented by metaquartzite, hematite-metaquartzite, quartz feldspar gneisses into amphibolites. However, not all the amphibolites are sedimentary; some are believed to be of igneous origin (especially A 3614, also A 3605 and possibly others). The question of origin of amphibolites is often problematical and cannot be based on petrological data alone; correct interpretation must also rely, sometimes heavily, on observations of field relationships. This applies particularly to regionally-metamorphosed rocks in which relict diagnostic textures are not preserved.

There is very little evidence of more than one metamorphic event except perhaps in A 3611/2, which shows the effects of a weak dynamic event following regional metamorphism. Certainly no mylonites, even in the broadest sense, were observed, nor do cataclasites or tectonic breccias occur in this suite.

Sample No.	Rock Type - Composition	Fabric	Minor Minerals	Comments
A 3601 (T.S. 31361)	Quartz-Feldspar-Biotite Gneiss. Porphyroblasts of microcline, plagioclase, set in medium-grained, stressed quartz, feldspars, dark subparallel biotite.	Typical gneissic fabric - "augen-gneiss" with preferred orientation.	Rounded, detrital zircon euhedral apatite. Metamict ?allanite (euhedral).	Sedimentary origin, broadly "granitic" composition; amphibolite-facies regional metamorphism.
A 3602	Hornblende Microgneiss. Small shapeless porphyroblasts of andesine, hornblende, quartz in medium-grained mass of quartz, feldspars, biotite.	Microgneissic, almost granular fabric; components weakly stressed. Banded.	Well-rounded, detrital zircon. Traces of sphene, apatite.	Feldspathic bands, free of biotite/hornblende. Semi-pelitic sediment; amphibolite-facies regional metamorphism.
A 3603	Amphibolite. Stubby prismatic crystals of hornblende (60-65 %), untwinned oligoclase (35-40 %), minor biotite, conspicuous granular leucoxenic sphene.	Fabric is granular, homogeneous, with preferred orientation.	Small grains of oxidised sulphide (pyrite or pyrrhotite). Very minor quartz.	Composition and fabric (paucity of quartz) suggests igneous origin, but field data may disagree.
A 3604	Quartz-Feldspar Microgneiss. Bands of interlocking microcline, minor oligoclase, altered ?amphibole, separated by thin bands of stressed quartz.	Fine parallel banding; granular, homogeneous fabric; medium-grained.	Rounded, detrital zircon, sphene. Oxidised euhedral magnetite or ilmenite.	Metasediment; fresh rock probably contained minor amphibole; amphibolite-facies regional metamorphism.
A 3605	Amphibolite. Small subparallel prismatic-acicular hornblende crystals (70 %), interstitial polygonal grains of twinned andesine (30 %).	Homogeneous orientated fabric; average grain-size = 0.2 - 0.3 mm.	Very small (< 50 µ) sphene grains throughout. Traces retrograde epidote.	Featureless, uniform amphibolite believed to be of igneous origin; finer-grained, but broadly similar to A 3603.
A 3606	Metaquartzite. Interlocking large and small, stressed lenses and grains of quartz. Virtually monomineralic, with iron-staining.	Flaser fabric, strong stress-patterns. Variable grainsizes, coarse to fine.	Traces of minute hornblende, feldspar, apatite crystals, oxide opaques.	Presence of hornblende suggests amphibolite facies, but "indicator" minerals scarce. Metasediment.
A 3607	Weathered Hematite-Metaquartzite. Alternating thin bands of hematite(-magnetite)-goethite, and of polygonal-interlocking quartz. Altered ?amphibole.	Small-scale, tight folding, with axial-plane cleavage developed.	Minute amphibole inclusions in quartz. Younger goethite veins.	Believed to be a metamorphosed B.I.F., originally containing magnetite and hornblende, i.e. amphibolite-facies metamorphism.
A 3608	Quartz-Feldspar-Mica Microgneiss. Medium-granular quartz, microcline, albite, with occasional porphyroblasts; small muscovite, biotite flakes.	Some banding, partly compositional, partly grainsize variations. Granular fabric.	Rounded and euhedral apatite, rounded detrital zircon. Adularia veins cut rock.	Metasediment (semi-pelitic); greenschist facies regional metamorphism.
A 3609	Amphibolite. Porphyroblastic and granular hastingsite amphibole (40-50 %), granular quartz, microcline, sericitised plagioclase; quartz-rich bands.	Medium-grained, banded, folded; later faulting, minor displacement.	Adularia-epidote veins coinciding with faults. Granular sphene. Rounded zircon.	Amphibolite-facies metasediment. Banding reflects original compositional variations. Differs from A 3603, A 3605.

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Sample NO.	Rock Type - Composition	Fabric	Minor Minerals	Comments
A 3610	Quartz-Feldspar-Hornblende Gneiss. Porphyroblasts of hornblende, microcline, oligoclase, in finely-granular matrix of the same minerals.	Fine folding revealed by K-staining. Fine banding, lensing.	Apatite, magnetite are conspicuous; traces of xenotime (euhedral crystals).	Believed to be of sedimentary origin, regionally metamorphosed to amphibolite facies. Note presence of xenotime.
A 3611/1	Amphibolite/Microgneiss. Quartz-microcline-oligoclase microgneiss interbanded with amphibolite (hornblende, andesine, minor sphene).	Amphibolite is slightly crosscutting (across foliation of microgneiss).	Microgneiss contains biotite, sphene, hornblende, traces metamict ?allanite.	Probably a metasedimentary sequence, regionally metamorphosed to amphibolite facies, but amphibolite possibly ?igneous.
A 3611/2	Quartz-Feldspar Gneiss. Porphyroblasts of K-feldspar, argillised plagioclase, set in streaky, granular fine quartz and K-feldspar.	Components stressed, marginally granulated, with minor recrystallization.	Small subparallel flakes of pale phlogopite.	Regionally metamorphosed semi-pelitic sediment, weakly affected by later dynamic phase.
A 3612	Quartz- Feldspar Gneiss. Small eyes and lenses of quartz, oligoclase, microcline, set in streaky, fine-grained mass of the same minerals.	Good preferred orientation, fine-grained, few porphyroblasts.	Small dark biotite flakes. Granular epidote, fine sphene; detrital zircon. ~~?Allanite.~~	Similar to A 3611/2. Metamorphic facies indeterminate because of lack of "indicator" minerals. Little evidence of later metamorphism.
A 3613	Amphibolite. Small subparallel granular to prismatic hornblende laths (50 %), interstitial quartz and altered, untwinned plagioclase, granular sphene.	Homogeneous, fine-grained; minor feldspathic lenses.	Crosscutting quartz-chlorite-fluorite veins. Trace epidote.	As with many amphibolites, origin not certain; no relict features occur. Field relationships may clarify origin.
A 3614	Amphibolite. Polygonal to prismatic grains of dark hornblende, fresh twinned labradorite, scattered labradorite porphyroblasts.	Medium-grained, uniform, well-crystallized.	Granular sphene, with cores of opaque oxides. Trace epidote.	Believed to be an orthoamphibolite, perhaps originally a dolerite with labradorite phenocrysts.
A 3615 (T.S. 31375)	Quartz-Feldspar-Hornblende Gneiss. Granular, interlocking shapeless patches of quartz, microcline, plagioclase; hornblende porphyroblasts.	Weak compositional banding (hornblende), preferred orientation.	Sporadic subparallel biotite flakes. Traces apatite, sphene. Detrital zircon.	Sedimentary origin; amphibolite facies regional metamorphism of semi-calcareous sediment.

Rock Samples A3616 - A3636

Nineteen rock samples were received for thin-section preparation and brief petrological descriptions; each sample was examined in hand specimen and thin-section and the results are presented in the accompanying tables.

Summary

Almost all the rocks are of sedimentary origin, except for A3617 and A3625, which are basic igneous types.

Of the metasediments, most are gneisses, i.e. products of regional metamorphism and are assigned to the amphibolite facies with varying degrees of confidence depending on the presence of critical "indicator" minerals. Evidence for a sedimentary origin has relied, in many cases, mainly on the presence of detrital heavy minerals, especially zircon because of its stability under severe metamorphic conditions. Contributory evidence came from composition and fabric (texture/structure). Some of the rocks, however, may well show an intrusive relationship in the field, and are probably tectogenic.

Two of the rocks (A3621, A3632) have distinctly hornfelsic fabrics and are considered to be products of contact metamorphism, perhaps a purely local phenomenon; to these may be added A3622 (a marble) and A3634 (a skarn type) depending on field data.

Several rocks contain evidence of more than one metamorphic episode, the first regional and the second dynamic; fabrics are of regional metamorphic formation, with superimposed shearing, granulation, varying degrees of recrystallization. One of these rocks is mylonitised (A3620) and another (A3626) may be grouped here, though not as markedly mylonitised.

The two igneous rocks were originally gabbros; one (A3617) is thermally metamorphosed, with partial retrogression to a hornblende-hornfels facies rock and the other was sheared after uralitisation.

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Sample No.	Rock Type - Composition	Fabric	Minor Minerals	Comments
A 3616 (T.S. 31900)	Biotite-Hornblende Gneiss. Orthoclase, oligoclase, dark hornblende porphyroblasts, in granular mass of quartz, orthoclase, oligoclase andesine, dark biotite flakes.	Medium/coarse-grained, gneissic fabric not marked, mostly granular.	Detritally-rounded zircon. Fibrous carbonate replacing feldspar. Magnetite.	Amphibolite-facies gneiss of sedimentary origin (detrital heavy minerals). Low-stress regional metamorphism.
A 3617	Metagabbro. Labradorite laths, stressed, partly recrystallized; recrystallized augite, partly altered to hornblende; biotite aggregates.	Well-preserved relict gabbroic fabric, no preferred orientation.	Primary oxide opaques, (ilmenite or magnetite), trace pyrite.	Thermally metamorphosed basic intrusive, with incipient retrogression to hornblende-hornfels facies.
A 3618	Quartz-Feldspar Gneiss. Large and small shapeless masses of stressed microcline, quartz, sericitised sodic plagioclase; biotite shreds.	Coarse, semi-granitoid fabric, weak preferred orientation.	Well-rounded, metamict zircon; apatite, sphene.	Sedimentary origin; regional metamorphism to ?amphibolite facies, but indicator mineral lacking.
A 3619	Banded Hornblende-Microgneiss. Thin bands of fine, dark hornblende (hastingsite) alternating with microgranular quartz-orthoclase-plagioclase bands.	Medium-granular fabric, good compositional banding.	Granular carbonate, sphene, conspicuous magnetite; rounded zircon.	Originally semi-calcareous sediment, finely laminated; regionally metamorphosed to amphibolite facies.
A 3620	Mylonitised Quartzofeldspathic Gneiss. Microcline lenses in microgranular quartz, K-feldspar, patchy muscovite; sheared veins of coarser quartz.	Fine banding simulates flow-banding, but caused by shearing, mylonitisation.	Fragmented tourmaline grains; fine detrital zircon.	Evidently formed as a coarser quartz-feldspar gneiss, subsequently sheared, mylonitised, partly recrystallized. Sedimentary origin.
A 3621	Hornblende-Quartz-Feldspar Hornfels. Homogeneous granular quartz, orthoclase, oligoclase scattered chlorite; porphyroblasts of hastingsite, orthoclase.	Evenly-granular, medium-crystalline fabric, no preferred orientation.	Epidote patches, veins, with prehnite; apatite, granular sphene.	Hornblende-hornfels facies contact-metamorphism of semi-pelitic sediment; retrogression later.
A 3622	Impure Marble. Mostly granular calcite, with partly altered diopside, antigorite, talc, tremolite-actinolite, epidote, plagioclase, quartz.	Typical crystalline, medium-grained fabric modified by shearing.	Ragged patches of sphene.	Originally impure calcareous sediment; medium-grade metamorphism and some retrogression.
A 3623	Metaquartzite. Coarse, interlocking, strongly stressed quartz patches, sporadic muscovite flakes and rounded microcline patches.	No relict textures or structures; medium- to coarse-grained.	Scattered rounded zircon grains.	Rather featureless rock, but presumably sedimentary; perhaps regionally, then dynamically metamorphosed.
A 3624	Graphite-Quartz Breccia. Angular quartz fragments; relatively coarse, crumpled graphite flakes; cemented by quartz and chalcedony.	Relict lineation in places, but mostly fragmented fabric.	Sporadic interstitial carbonate patches and cavity linings.	Originally a carbonaceous chert, metamorphosed to quartz-graphite schist, then dynamically metamorphosed-brecciated.

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Sample No.	Rock Type - Composition	Fabric	Minor Minerals	Comments
A 3625	Sheared, Uralitised Gabbro. Lensoid patches of hornblende, sericitised plagioclase, relict clinopyroxene; secondary chlorite, epidote, sheared quartz.	Relict gabbroic fabric with superimposed shearing.	Hematitised magnetite. Accessory apatite.	Fairly severely altered by deuteric processes and subsequent shearing, but very probably a basic intrusive.
A 3626	Sheared Quartzofeldspathic Gneiss. Eyes of altered, fragmented, granulated plagioclase set in fine parallel bands of quartz and of granular microcline/plagioclase.	Finebanding due to shearing, recrystallization. Fine-grained.	Thin films of oxide opaques. Secondary zoisite-epidote. Rounded zircon.	Original semi-pelitic sediment, regionally metamorphosed to a gneiss, then sheared and recrystallized. Cp. A 3620.
A 3627	Hornblende-Quartz-Feldspar Microgneiss. Mostly microgranular-interlocking quartz, microcline, plagioclase; thin bands of dark hastingsite amphibole.	Fine streaks or banded fabric, with poikiloblastic amphibole.	Granular sphene, oxide opaques (magnetite) throughout. Rounded apatite, zircon.	Similar to A 3619; sedimentary origin, amphibolite-facies metamorphism. Semi-calcareous, ferruginous sediment.
A 3629	Quartz-Feldspar-Biotite Gneiss. Coarse, porphyroblastic microcline, oligoclase, large dark biotite flakes, interlocking, stressed quartz; minor hastingsite.	Coarsely-crystalline, crude preferred orientation.	Granular sphene, conspicuous apatite; metamict ?allanite patches.	Amphibolite-facies regional metamorphism; origin of rock uncertain, but probably sedimentary.
A 3630	Garnetiferous Granite ?). Dominantly coarse, interlocking patches of orthoclase, minor interstitial stressed quartz; scattered subhedral almandine crystals.	Coarse, granitoid fabric, all components stressed.	Isolated rounded zircon and apatite grains.	Despite granite-like fabric and composition, rock is probably a metasediment, perhaps of tectogenic formation.
A 3631	Garnet-Biotite Gneiss. Quartz and orthoclase eyes/lenses, porphyroblastic almandine, subparallel Ti-biotite; granular quartz, orthoclase, oligoclase.	Faint compositional banding (dark/light); preferred orientation.	Rounded apatite and zircon, both premetamorphic (detrital).	Typical garnet-gneiss, of sedimentary origin, assigned to amphibolite facies of regional metamorphism.
A 3632	Quartz-Feldspar-Garnet Hornfels. Uniform, medium-granular quartz, orthoclase, oligoclase; scattered subhedral to poikiloblastic almandine.	Homogeneous textures and distribution of minerals; no preferred orientation.	Oxide opaque grains, films. Biotite shreds. Rounded zircon. Trace pyrite.	Fabric indicates contact-metamorphism of semi-pelitic rock (similar to A3621), rather than regional metamorphism
A 3634	Quartz-Diopside Rock. Mainly coarse subhedral diopside; clear quartz patches, prehnite aggregates, minor actinolite prisms.	Random, coarsely-crystalline fabric, no relict textures.	Occasional epidote grains.	Mineral assemblage suggests a type of skarn; no indication of natureof replaced rock, but presumably calcareous.
A 3635	Sheared, Muscovitised Granite(?). Mostly large subhedral orthoclase crystals, smaller albite laths, interstitial quartz; swarms of muscovite flakes intergrown with biotite.	Coarse, granitoid fabric with stressed, marginally granulated minerals.	Irregular magnetite grains. Rounded small zircons. Trace apatite.	Similar to A3630 in origin, i.e. tectogenic intrusive of sedimentary derivation, with later shearing, partial replacement by muscovite.

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Sample No.	Rock Type - Composition	Fabric	Minor Minerals	Comments
A 3636 (T.S. 31918)	Quartz-Feldspar-Biotite Gneiss. Coarse albite crystals with granulated margins, subordinate orthoclase, stressed, granular quartz, bundles of intergrown biotite/muscovite.	Coarse, porphyroblastic fabric, semi-continuous mica bands.	Rounded zircon grains. Magnetite. Metamict grains. Apatite.	Resembles A 3635; metamict grains are strongly radioactive, may have been thorite or brannerite - detrital.

REPORT CMS 80/5/41

Rocks A3637 - A3640

Four rocks were received for thin-section preparation and examination; they are briefly described in the accompanying table, using observations on thin-sections and K-feldspar stained offcuts.

Summary

Three of the rocks are quartz-feldspar-mica gneisses, representing sediments regionally metamorphosed to the upper greenschist or possibly lower amphibolite facies. They show increasing effects of dynamic metamorphism, accompanied by partial recrystallization of components, from A3637 to A3639; this phase clearly post-dates regional metamorphism.

The fourth rock (A3640) is a meta-arkose or feldspathic metaquartzite, originally a banded sediment with coarser and finer clastic beds and relatively abundant clay; this rock was presumably indurated and mildly metamorphosed, then sheared and partly recrystallized. Thus, although not thoroughly metamorphosed like the other three rocks, it was subjected to (?the same) episode of dynamic metamorphism.

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Sample No.	Rock Type - Composition	Fabric	Minor Minerals	Comments
A 3637 (T.S. 31939)	Quartz-Plagioclase-Mica Gneiss. Oligoclase porphyroblasts, quartz lenses, subparallel foliations of interleaved biotite, muscovite.	Medium-grained, augen-gneiss fabric; weakly stressed.	Apatite grains, tourmaline fragments; rounded zircon.	Conventional paragneiss (i.e. meta-sediment), upper greenschist or lower amphibolite facies.
A 3638	Quartz-Feldspar-Mica Gneiss. Eyes of microcline-perthite set in granular quartz and albite, with foliated muscovite and interleaved dark biotite.	Typical gneissic fabric, subsequently stressed, microfractured.	Traces of oxide opaques, rounded zircon.	Presence of albite indicates greenschist-facies regional metamorphism of semi-pelitic sediment.
A 3639	Sheared Gneiss. Large, disrupted and fractured eyes of orthoclase, quartz; contorted muscovite flakes. Granular quartz, albite, smaller muscovite, biotite flakes.	Coarse fabric, extensively granulated and disrupted stressed	Rounded zircon grains, traces of oxide opaques.	Resembles A 3638, but more severely dynamically metamorphosed, with granulation, small-scale recrystallization.
A 3640 (T.S. 31942)	Sheared Meta-Arkose. Coarse, stressed grains of quartz and microcline, with extensive matrix of fine muscovite; finer bands of same minerals.	Relict clastic textures preserved, but sheared, partly recrystallized.	Weak iron-staining only.	May have been feldspathic sandstone rather than arkose, with abundant clay matrix. Metamorphosed, sheared, with recrystallization of matrix.

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Samples A3630, A3635. A3636; A3638; A3641, A3642

Samples A3642 and A3642 are briefly described below and possible sources of radioactivity are discussed with respect to these two samples and those previously described.

A3641 (T.S. 32166)
This is a quartz-feldspar-mica gneiss and is of sedimentary origin; it is assigned to the amphibolite facies of regional metamorphism, and was weakly stressed at a later stage.

There are porphyroblasts of microcline and oligiclase with patches of clear quartz, feldspars and small interleaved flakes of biotite and muscovite. Accessory minerals include rounded zircons and other detrital heavy minerals and small irregular patches of ilmenite.

The rock has a typical gneissic fabric, in which most of the preferred orientation is provided by the matrix, especially the micas. All the components are stressed, though the effect is most noticeable in the quartz.

The detrital heavy mineral grains are surrounded by pleochroic haloes where they are embedded in biotite and thus they are radioactive; by the same reasoning, the opaque minerals are not radioactive. The main heavy mineral identified is metamict zircon, with apatite and sphene, possible monazite and/or xenotime; many of the grains are much too fine for positive identification. These minerals are relatively common and are thought to account for the observed level of radioactivity.

A3642 (T.S. 32167)
This is a biotite-granite, with typical granitic composition and fabric; however, it is believed to be of sedimentary origin, probably of tectogenic (synkinematic) formation.

The main components are quartz and microcline-perthite, with minor oligoclase and very dark biotite; the microcline forms large poikiloblastic patches up to 15 mm in size, with irregular inclusions of quartz, oligoclase and biotite. Oligoclase occurs as subhedral crystals which are partly argillised and shapeless interlocking quartzpatches show weak strain-extinction. The dark biotite is generally associated with traces of muscovite and is randomly-distributed and -orientated.

Accessory minerals comprise isolated, subrounded garnet grains (1 mm in size), relatively coarse (up to 0.3 mm) monazite grains with rounded to modified euhedral shapes (abraded edges) and well-rounded zircon grains. The garnets are regarded as detrital, not formed in situ.

Strong pleochroic haloes surround zircon and monazite grains where these are embedded in biotite, due to their radioactivity. A more detailed heavy mineral study, by means of heavy-liquid concentrates obtained from a crushed sample, would probably show a greater variety of mineral species containing U and/or Th, but it is believed that these inherited minerals would account for the measured radioactivity. Study of thin-sections alone gives too little information on such accessory components.

A3630 This contains very small (0.01 - 0.05 mm) rounded grains of metamict zircon embedded in feldspars; these would certainly be radioactive, though no pleochroic haloes are visible. No other potentially radioactive phases were detected.

A3635 Rounded grains of metamict zircon occur throughout the rock and are surrounded by pleochroic haloes where embedded in biotite; isolated patches of a completely decomposed, metamict mineral with the characteristics of allanite are seen. Some of the minute radioactive inclusions in biotite are too fine to be identified by optical methods alone.

A3636 In this rock too, rounded metamict zircon grains are an undoubted source of radioactivity; other grains embedded in biotite are also surrounded by conspicuous pleochroic haloes but are too altered for identification, though thorite and/or brannerite are suspected. Detrital apatite also occurs and is evidently weakly radioactive, being rimmed with thin pleochroic haloes in biotite.

A3638 Judging from pleochroic-halo effects in biotite, at least two types of radioactive particles occur; one type is identified as rounded, metamict zircon and the other is completely altered, metamict material similar to that in A3636 and possibly representing decomposed, brannerite or thorite of detrital origin.

In all samples, the information obtained from thin-sections alone is meagre; heavy-mineral concentrates would provide further data but in view of the clastic origin of these minerals, may not be justified.

REPORT CMS 80/8/23

Sample No.1/2 Hornblende-Granulite. Section No.33269

Hand Specimen:

Banded light/dark crystalline rock.
Significant radioactivity, especially in darker bands.

Microscopic:

This rock may be termed a hornblende-granulite and is intermediate between an amphibolite-facies rock and a pyroxene granulite. It is a metasediment and its composition is unusual.

The main constituents are prismatic to platy, poikiloblastic crystals of fresh oligoclase, with intergranular and included fine quartz. There are irregularly-spaced, generally thin (< 2 mm) bands of dark minerals, including brown hornblende, semi-opaque biotite, minor diopside, euhedral magnetite, traces of apatite, rounded zircon (detrital) and fresh (non-metamict) sphene in relatively conspicuous amounts. Minute radioactive grains of various types are also present and are invariably surrounded by intense pleochroic haloes and a rim of radiation damage; some grains are translucent and completely metamict, and could represent thorite or brannerite. Others are opaque (see below).

An autoradiograph was prepared; this showed small centres (i.e. grains) or intense radioactivity located in the dark bands. A polished section was prepared using the autoradiograph as a guide. The main radioactive mineral appears to be allanite and the minute opaque grains (5-40) are thought to be pitchblende. Thus, there are three sources of radioactivity: a) small (< 50) grains of metamict thorite or brannerite, b) minute grains of ?pitchblende, and c) larger sphene grains, 50-500 in size. Rather unexpectedly, the allanite is apparently not metamict, which is unusual for most radioactive minerals. An attempt will be made to isolate some of this material for a confirmatory XRD - sphene. Vague XRD pattern suggests partly metamict causes pleochroic holes in biotite when in contact. Main source of radioactivity.

Summary

The series A3643 - A3646 are all metamorphics and include an amphibolite verging on a hornblende-granulite and three gneisses; the amphibilite is probably meta-igneous, the others are metasediments. Two of the gneisses cannot be accurately assigned to metamorphic facies, because of the absence of specific facies indicator minerals.

Central Mineralogical Services

Sample No.	Rock Type - Composition	Fabric	Minor Minerals	Comments
A 3643 (T.S. 32859)	Amphibolite. Small stubby crystals of dark hornblende and of fresh andesine, with fine dispersed magnetite throughout.	Homogeneous grainsize and distribution; average grainsize = 0.2 mm.	Occasional diopside crystals; a few andesine porphyroblasts.	Verging on granulite facies rock, with incipient pyroxene development. Believed to be of basic igneous origin.
A 3644	Sheared Gneiss/Amphibolite. Porphyroblastic quartz-microcline-oligoclase gneiss merging into fine epidote-hornblende-quartz-feldspar amphibolite.	Components stressed, partly recrystallized; coarse- to medium-grained.	Metamict allanite, oxide opaques, sphene, scattered through amphibolite.	Both rocks are amphibolite-facies metasediments, feldspathic to semi-calcareous. Allanite could be detrital.
A 3645	Quartz-Microcline-Biotite Gneiss. Mostly granular, interlocking, stressed quartz and microcline, subparallel biotite flakes; lenses of coarser quartz, feldspar.	More granular than gneissic fabric, medium-grained. Good preferred orientation.	Occasional detritally rounded zircon grains.	Upper greenschist or lower amphibolite facies metasediment - absence of facies indicator minerals.
	Quartz-Feldspar-Biotite Gneiss. Coarser quartz-orthoclase lenses, finer bandsof quartz, orthoclase, oligoclase, biotite flakes.	Biotite-rich foliations. Typical gneissic fabric, with porphyroblasts.	Detritally rounded zircons embedded in biotite.	As above. Rocks of this type often difficult to accurately assign to metamorphic facies.

APPENDIX III

SPECIFICATIONS FOR AIRBORNE SURVEY

1. Mean terrain clearance 100 metres.

2. 800m linespacing in northern part of E.L. 1600m in the central part, and 400m in the southern part of the E.L.

3. Visual navigation with Doppler equipment. Vertical tracking films of average aircraft path with fiducial recovery intervals of 3000m on all flight lines.

4. Areas with more than 50 cps on the U-channel were selected for ground checking.

5. Though high background areas are most common where outcrop is best, most anomalies are over soil and not over outcrop.

6. The data was presented both as analogue charts and as contour maps.

Technical specifications:

A. Survey aircraft: Government Aircraft Factories NOMAD, Model 22B, Registration number VH-FZP.

B. Airborne Proton Magnetometer: Varian Model 49-595N Sensor and Aldetec magnetometer.

C. Ground Station Proton Magnetometer: Geometrics 826A magnetometer with a sensivity of 1.0nT.

D. Airborne Gamma-ray Spectrometer: Geometrics Model GR-800 with multi-channels of 256 and 128 channels for main and upwards crystal arrays. Energy windows set for potassium at 1.37 to 1.57 Mev, uranium at 1.66 to 1.86 Mev, thorium at 2.40 to 2.80 Mev, Total Count at 0.4-3.0 Mev, and cosmic background 3.0 to 6.0 Mev.

E. Crystal Detectors: Geometrics Model 3072/512R with sodium iodide (thallium-activitated) crystals with the main detector containing 50.34 litres and the upwards-looking detector containing 8.39 litres. All crystals are optically coupled to matched photo-multiplier tubes.

F. Radar Altimeter: Collins ALT.50 altimeter, measuring vertical distances from surface to aircraft with range 0 to 610 metres and accuracy $\pm$ 2%.

G. Doppler Navigation System. Sperry-Decca type 72 with TANS Computer 94420. Navigation in latitude-longitude, grid or range and bearing.

H. Aerial Tracking Camera: Vinten Mk3 scientific 16mm frame camera with wide-angle lens.

I. Digital Data Acquisition System. Sonotek Model IGSS, which is a software-controlled mini computer with 4K core memory and 2 Digi-Data 9 track tape decks.

J. Analogue Recorder: Geometrics Model GAR-6 with 6 channels of data provision.

APPENDIX IV

ANALYTICAL METHODS

Rocks:

Whole rock major elements: ICP
U, Th: XRF
U < 5ppm: Fluorimetry
As: Gutzeit method
Cu, Pb, Zn, Ag, Ni, Co: AAS
Other trace elements: Emission spectrometry (semi-quantitive).

Soils:

U, Th, Ti: XRF
U, < 5ppm: Fluorimetry
Sn, Mo, P: Emission spectrometry
As: Gutzeit method
Cu, Pb, Zn, Ag, Ni, Co, Ca: AAS
The - 80 mesh fraction gave better results than the -20 + 40 mesh fraction (Fig.15) and a $HCl/HNO_3/3NHCl$ digestion was found to be more efficient than $HClO_4/HNO_3/3NHCl$ digestion for Cu and Zn and slightly less efficient for Pb (Fig. 20). The values for Ag, Ni and Co were too low to determine the most efficient digestion.

APPENDIX V

SOIL SAMPLE ANALYSES

APPENDIX V: TUMBY BAY, EL 578; SOIL ANALYSIS

Sample No.	Anomaly	E	N	U Fluor ppm	Th XRF ppm	Cu AAS ppm	Pb AAS ppm	Zu AAS ppm	Aq AAS ppm	Ni AAS ppm	Co AAS ppm	Sn EMS ppm	Mo EMS ppm	Ca AAS %	Mg AAS %	P SPEC ppm	Ti XRF ppm
-80 mesh																	
30/11001	TB 29	10000	10400	1.52	10	10	-10	10	-2	30	-10	-1	-3				
2		10050		.90	10	-10	"	-10	"	-10	"	"	"				
3		10100		1.40	10	"	"	10	"	"	"	"	"				
4		10150		1.92	20	"	"	-10	"	"	"	"	"				
5		10200		3.60	30	"	"	10	"	10	"	"	"				
6		10250		5.00	35	15	20	40	"	20	"	"	"				
7		10300		5.50	50	-10	-10	15	"	-10	"	20	"				
8		10350		4.00	70	15	10	20	"	10	"	-1	"				
9		10400		4.40	90	10	-10	-10	"	-10	"	"	"				
10R		10400		5.00	85	10	20	20	"	20	10	"	"				
11		10450		5.80	115	10	-10	20	"	-10	10	"	"				
12		10500		6.10	125	10	"	20	"	"	-10	"	"				
13		10550		5.20	70	15	"	20	"	"	10	"	"				
14		10600		5.40	80	10	20	15	"	"	-10	"	"				
15		10650		5.20	100	-10	-10	20	"	"	"	"	"				
16		10700		7.70	130	10	15	10	"	10	"	"	"				
17		10750		10.80	165	-10	-10	25	"	-10	"	3	"				
18		10800		11.00	150	10	15	20	"	"	10	-1	"				
19		10000	11200	5.40	65	-10	-10	15	"	"	-10	"	"				
20		10050		5.20	50	"	"	-10	"	"	"	"	"				
21		10100		2.20	35	"	"	10	"	"	10	"	"				
22		10150		2.80	40	"	"	10	"	"	10	"	"				
23		10200		2.30	35	"	"	15	"	"	-10	"	"				
24		10250															

APPENDIX V: TUMBY BAY, EL 578; SOIL ANALYSIS

Sample No.	Anomaly	E	N	F Fluor ppm	Mn XRF ppm	Cu AAS ppm	Pb AAS ppm	Zn AAS ppm	Ag AAS ppm	Ni AAS ppm	Co AAS ppm	Sn EMS ppm	Mo EMS ppm	Ca AAS %	Mg AAS %	P SPEC ppm	Ti XRF ppm
80/11024		10250		1.92	20	-10	-10	10	-2	-10	-10	-1	-3				
25		10300		2.10	35	"	"	-10	"	"	"	"	"				
26		10350		3.20	30	"	"	"	"	15	"	3	"				
27		10400		2.80	40	"	"	10	"	-10	"	-1	"				
28		10450		3.20	50	"	"	-10	"	"	"	"	"				
29		10500		3.70	40	"	"	10	"	15	"	"	"				
30		10550		2.20	20	"	"	-10	"	-10	"	"	"				
31		10600		2.50	35	"	"	"	"	"	"	"	"				
32R		10600		2.70	20	"	"	10	"	"	"	"	"				
33	TB 1	10000	12600	1.48	20	"	"	-10	"	"	"	"	"				
34		10050		1.92	20	"	"	10	"	"	"	"	"				
35		10100		1.52	20	"	"	20	"	"	"	"	"				
36		10150		.90	15	"	"	10	"	"	"	"	"				
37		10200		1.36	25	"	"	10	"	"	"	"	"				
38		10250		1.14	20	15	"	15	"	10	"	"	"				
39		10300		1.64	20	10	"	15	"	-10	10	"	"				
40		10350		.50	20	20	"	20	"	20	15	3	"				
41		10400		1.58	20	10	-10	30	"	10	-10	10	"				
42		10450		1.78	25	10	"	15	"	-10	10	5	"				
43		10500		1.58	30	15	"	-10	"	"	-10	-1	"				
44		10550		1.70	40	10	"	"	"	30	"	"	"				
45		10600		1.26	40	-10	"	"	"	10	"	"	"				
46		10650		.82	50	"	"	"	"	15	"	"	"				
47		10700		1.00	60	"	"	"	"	10	10	"	"				
48		10750		1.83	45	10	"	10	25	10	10	"	"				

Sample No.	Anomaly	E	N	U Fluor ppm	Th XRF ppm	Cu AAS ppm	Pb AAS ppm	Zu AAS ppm	Aq AAS ppm	Ni AAS ppm	Co AAS ppm	Sn EMS ppm	Mo EMS ppm	Ca AAS %	Mg AAS %	P SPEC ppm	Ti XRF ppm
80/11049		10800		1.78	40	-10	-10	10	-2	10	-10	-1	-3				
50R		10800		1.64	65	"	15	15	"	20	"	"	"				
51		10360		1.46	20	25	-10	20	"	-10	10	"	"				
52		10370		1.73	20	20	"	20	"	"	15	"	"				
53		10380		1.64	15	15	"	20	"	20	20	"	"				
54		10390		0.88	25	-10	"	15	"	15	-10	"	"				
55	TB17	10400	10000	1.52	20	10	"	20	"	20	"	"	"	.21	.14	125	5330
56			10050	-.1	10	10	55	15	"	10	15	"	"	8.20	.34	130	4130
57			10100	2.9	25	20	60	15	"	20	-10	"	"	.48	.47	405	3160
58			10150	4.5	35	20	55	25	"	15	-10	"	"	2.60	.52	700	3720
59			10200	6.4	45	15	20	20	"	15	"	"	"	.20	.19	325	4150
60			10250	4.5	30	10	10	20	"	10	"	10	"	.38	.20	505	4190
61			10300	4.0	30	-10	-10	15	"	10	"	-1	"	.13	.10	150	3830
62			10350	4.5	30	15	20	10	"	10	"	"	"	.20	.13	450	4320
63			10400	4.1	25	20	15	10	"	-10	"	3	"	.16	.21	285	6080
64			10450	2.9	10	10	-10	20	"	15	"	-1	"	.09	.09	130	6110
65			10500	3.7	10	-10	"	15	"	-10	10	"	"	.90	.08	100	5740
66			10550	1.2	10	"	"	15	"	"	-10	5	"	.08	.07	175	4780
67			10600	3.7	10	"	"	10	"	"	"	-1	"	.13	.10	250	4930
68			10650	1.2	5	10	"	10	"	"	"	"	"	.13	.08	170	5750
69			10700	4.0	15	10	"	15	"	"	"	"	"	.20	.20	350	5880
70			10750	5.7	10	30	"	25	"	10	"	"	"	.16	.18	475	9360
71			10800	4.6	10	40	"	10	"	-10	"	"	"	.12	.31	340	5460
72			10850	2.8	10	25	40	15	"	10	10	"	"	.23	.26	455	6660
73			10900	1.96	25	20	30	10	"	-10	-10	3	"	.18	.47	405	3740

APPENDIX V: TUMBY BAY, EL 578; SOIL ANALYSIS

APPENDIX V: TUMBY BAY, EL 578; SOIL ANALYSIS

Sample No.	Anomaly	E	N	U Fluor ppm	Th XRF ppm	Cu AAS ppm	Pb AAS ppm	Zu AAS ppm	Aq AAS ppm	Ni AAS ppm	Co AAS ppm	Sn EMS ppm	Mo EMS ppm	Ca AAS %	Mg AAS %	P SPEC ppm	Ti XRF ppm
80/11074			10940	4.2	10	15	10	20	-2	-10	15	-1	-3	.20	.26	450	4720
75R			10940	2.2	10	20	30	20	"	"	15	"	"	10.8	.61	400	3030
76		10800	10950	2.4	15	30	20	15	"	"	10	"	"	1.40	.28	275	7260
77			10900	2.7	10	20	10	25	"	15	-10	"	"	1.30	.27	155	7220
78			10850	4.0	10	10	-10	15	"	-10	"	3	"	.10	.22	120	5830
79			10800	1.24	10	15	"	-10	"	"	"	-1	"	.09	.07	55	6190
80			10750	4.7	25	20	15	20	"	"	"	"	"	.14	.22	210	7060
81			10700	3.9	10	15	-10	35	"	"	"	"	"	.17	.11	175	8730
82			10650	3.9	15	20	"	35	"	"	10	"	"	.20	.15	165	8190
83			10600	5.9	15	30	"	35	"	10	10	"	"	.25	.22	330	7720
84			10550	4.7	15	20	"	20	"	10	-10	"	"	.23	.15	340	5590
85			10500	5.2	10	25	15	-10	"	10	10	"	"	.10	.10	375	5460
86			10450	2.9	10	15	20	15	"	20	-10	"	"	.05	.10	340	5010
87			10400	2.34	10	25	-10	40	"	30	10	"	"	.08	.14	375	3.88%
88			10350	3.30	10	30	"	25	"	10	15	3	"	.14	.17	450	3.16%
89			10300	4.90	20	10	"	15	"	10	-10	5	"	.06	.07	340	2.75%
90			10250	2.80	15	10	"	15	"	-10	10	10	"	.04	.09	150	7050
91			10200	3.30	15	10	"	20	"	"	-10	-1	"	.05	.11	100	4750
92			10150	2.18	10	-10	10	20	"	"	"	"	10	.73	.20	205	6430
93			10150	.94	15	10	-10	10	"	"	"	3	-3	.10	.07	285	7150
94			10050	.54	15	-10	"	10	"	"	"	3	"	.10	.06	205	5890
95			10000	.70	10	10	"	15	"	10	"	3	"	.13	.07	285	6100
96		10802	10000	1.00	10	10	"	25	"	-10	"	-1	"	.13	.09	335	6260

APPENDIX V: TUMBY BAY, EL 578; SOIL ANALYSIS

Sample No.	Anomaly	E	N	U Fluor ppm	Th XRF ppm	Cu AAS ppm	Pb AAS ppm	Zu AAS ppm	Aq AAS ppm	Ni AAS ppm	Co AAS ppm	Sn EMS ppm	Mo EMS ppm	Ca AAS %	Mg AAS %	P SPEC ppm	Ti XRF ppm
80/11097	TB 20	10000	12400	1.62	30	10	10	15	-2	25	-10	-1	-3				
98		10050		1.56	30	10	-10	15	"	10	"	30	"				
99		10100		1.62	25	20	"	30	"	10	"	-1	"				
100		10150		1.16	30	15	25	20	"	10	"	3	"				
01		10200		1.56	30	25	20	30	"	-10	"	-1	"				
02		10250		1.62	35	15	20	15	"	"	"	"	"				
03		10300		1.62	30	30	-10	30	"	25	15	"	"				
04		10350		1.24	40	30	10	40	"	20	10	"	"				
05		10400		.94	30	15	-10	20	"	20	-10	"	"				
06		10450		2.42	30	10	"	20	"	-10	"	"	"				
07		10500		2.34	40	20	10	30	"	10	"	3	"				
08		10550		5.20	35	20	10	20	"	10	10	-1	"				
09		10600		1.56	25	20	10	30	"	10	-10	"	"				
10		10650		6.20	30	15	15	30	"	15	"	"	"				
11		10700		3.30	35	40	20	35	"	15	15	"	"				
12		10750		4.40	40	25	10	40	"	15	-10	3	"				
13		10800		4.90	55	20	10	40	"	25	10	-1	"				
14		10850		4.40	40	-10	-10	15	"	15	-10	"	"				
15		10900		1.72	20	15	"	15	"	10	"	"	"				
16		10950		.78	30	15	"	10	"	-10	"	"	"				
17		11000		.80	20	10	"	30	"	"	"	"	"				
18		11050		.80	30	10	"	15	"	20	"	"	"				
19		11100		1.60	30	15	"	25	"	10	10	"	"				
20		11150		.56	25	20	"	30	"	10	-10	"	"				
21		11200		.72	30	20	"	30	"	30	"	"	"				

(5)

Sample No.	Anomaly	E	N	U Fluor ppm	Th XRF ppm	Cu AAS ppm	Pb AAS ppm	Zu AAS ppm	Aq AAS ppm	Ni AAS ppm	Co AAS ppm	Sn EMS ppm	Mo EMS ppm	Ca AAS %	Mg AAS %	P SPEC ppm	Ti XRF ppm
80/11022		11250		.48	10	15	-10	20	-2	10	-10	-1	-3				
23		11300		.88	15	15	"	25	"	15	"	"	"				
24		11350		1.28	10	10	"	35	"	20	"	"	"				
25		11400		-.1	10	15	"	25	"	10	"	"	"				
26		11450		.10	10	15	"	20	"	10	"	"	"				
27		11500		-.1	20	10	"	15	"	15	"	"	"				
28R		11500		-.1	15	-10	"	10	"	-10	"	"	"				

Lab Repeats

Sample No.	U	No	Cu	Pb	Zu	Aq	Ni	Co
80/11015	5.40	11010	10	20	15	-2	20	10
35	1.68	40	20	-10	20	-2	15	10
55	1.66	60	10	10	20	-2	10	-10
85	5.30	80	20	15	25	-2	-10	-10
105	1.20	110	15	20	20	-2	-10	-10

-20 + 40 Mesh

Sample No.	Anomaly	E	N	U	Th	Cu	Pb	Zu	Aq	Ni	Co	Sn	Mo
80/11001	TB 29	10000	10400	.64	25	-10	10	-10	-2	-10	-10	-1	-3
02		10050		1.20	-5	"	"	"	"	"	"	"	"
03		10100		1.28	5	"	"	"	"	"	"	3	"
04		10150		1.28	10	"	"	"	"	"	"	-1	"
05		10200		-.1	5	10	"	10	"	"	"	"	"
06		10250		1.84	15	10	10	35	"	"	"	3	"
07		10300		2.60	25	-10	-10	10	"	10	"	-1	"
08		10350		2.46	65	10	10	10	"	-10	"	3	"

APPENDIX V: TUMBY BAY, EL 578; SOIL ANALYSIS

				U	Th	Cu	Pb	Zu	Aq	Ni	Co	Sn	Mo	Ca	Mg	P	Ti
				Fluor	XRF	AAS	AAS	AAS	AAS	AAS	AAS	EMS	EMS	AAS	AAS	SPEC	XRF
Sample No.	Anomaly	E	N	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	%	ppm	ppm
80/11008		10350		2.46	65	10	10	10	-2	-10	-10	3	-3				
09		10400		1.44	45	-10	"	"	"	"	10	3	"				
10R		10400		2.20	50	10	20	10	"	"	-10	3	"				
11		10450		1.92	25	-10	-10	-10	"	"	"	-1	"				
12		10500		2.24	40	10	"	10	"	"	"	"	"				
13		10550		1.36	15	15	"	-10	"	"	"	3	"				
14		10600		2.40	15	10	"	10	"	"	"	3	"				
15		10650		2.10	20	-10	"	-10	"	"	"	-1	"				
16		10700		2.20	30	10	"	"	"	"	"	"	"				
17		10750		2.20	25	-10	"	"	"	"	"	"	"				
18		10800		3.40	25	"	"	"	"	"	"	"	"				
19		10000	11200	1.20	-5	"	"	"	"	"	"	5	"				
20		10050		1.12	5	"	"	"	"	"	"	3	"				
21		10100		2.20	-5	"	"	"	"	"	"	-1	"				
22		10150		2.38	"	"	"	"	"	"	"	"	"				
23		10200		.26	5	"	"	"	"	"	"	"	"				
24		10250		1.18	-5	"	"	"	"	"	"	"	"				
25		10300		-.1	5	"	"	"	"	"	"	"	"				
26		10350		-.1	5	"	"	"	"	"	"	"	"				
27		10400		.50	-5	"	"	"	"	"	"	"	"				
28		10450		.20	10	10	15	"	"	"	"	"	"				
29		10500		3.50	25	15	-10	10	"	"	"	"	"				
30		10550		-.1	5	-10	"	-10	"	"	"	"	"				
31		10600		1.38	20	"	"	"	"	"	"	"	"				
32R		10600		.64	10	"	"	"	"	"	"	"	"				

Sample No.	Anomaly	U E	U N	U Fluor ppm	Th XRF ppm	Cu AAS ppm	Pb AAS ppm	Zu AAS ppm	Aq AAS ppm	Ni AAS ppm	Co AAS ppm	Sn EMS ppm	Mo EMS ppm	Ca AAS %	Mg AAS %	P SPEC ppm	Ti XRF ppm
30/11033	TB 1	10000	12600	.84	10	-10	-10	-10	-2	-10	-10	-1	-3				
34		10050		1.18	10	"	"	"	"	10	"	"	"				
35		10100		.14	10	10	10	10	"	-10	"	"	"				
36		10150		.92	10	15	-10	-10	"	"	"	"	"				
37		10200		.84	10	-10	"	"	"	"	"	"	"				
38		10250		.84	5	10	"	"	"	"	"	"	"				
39		10300		1.10	10	-10	"	"	"	"	"	3	"				
40		10350		.38	15	25	"	15	"	15	"	-1	"				
41		10400		.76	5	-10	"	-10	"	-10	"	"	"				
42		10450		.72	20	10	"	"	"	"	"	"	"				
43		10500		1.34	35	-10	20	"	"	"	"	"	"				
44		10550		1.10	40	"	15	"	"	"	"	"	"				
45		10600		1.10	50	"	-10	"	"	"	"	"	"				
46		10650		-.1	60	"	"	"	"	"	"	"	"				
47		10700		-.1	40	"	"	"	"	"	"	"	"				
48		10750		1.18	100	10	20	10	"	"	15	"	"				
49		10800		4.80	110	10	15	10	"	30	-10	"	"				
50R		10800		4.50	140	15	25	-10	"	35	10	"	"				
51		10360		1.42	10	20	-10	10	"	-10	-10	"	"				
52		10370		1.10	10	20	"	10	"	"	"	"	"				
53		10380		1.38	10	10	"	10	"	"	"	"	"				
54		10390		1.34	10	10	"	-10	"	"	"	"	"				
55	TB 17	10400	10000	1.26	10	-10	10	10	"	"	"	"	"				
56			10050	.92	20	10	-10	10	"	"	"	"	"				

Sample No.	Anomaly	E	N	U Fluor ppm	Th XRF ppm	Cu AAS ppm	Pb AAS ppm	Zu AAS ppm	Aq AAS ppm	Ni AAS ppm	Co AAS ppm	Sn EMS ppm	Mo EMS ppm	Ca AAS %	Mg AAS %	P SPEC ppm	Ti XRF ppm
80/11057			10100	5.60	15	10	35	10	-2	-10	-10	-1	-3				
58			10150	4.80	20	35	10	10	"	"	"	"	"				
59			10200	3.20	20	10	-10	10	"	"	"	"	"				
60			10250	2.90	20	-10	"	10	"	"	"	"	"				
61			10300	1.52	10	"	"	10	"	"	"	"	"				
62			10350	3.50	10	"	15	-10	"	"	"	"	"				
63			10400	3.80	15	20	-10	10	"	"	"	"	"				
64			10450	1.74	-5	-10	"	-10	"	"	"	"	"				
65			10500	1.42	5	"	"	"	"	"	"	"	"				
66			10550	.62	-5	"	"	"	"	"	"	"	"				
67			10600	1.56	5	15	10	"	"	"	"	"	"				
68			10650	1.24	-5	-10	-10	"	"	"	"	"	"				
69			10700	2.20	10	"	"	10	"	"	"	"	"				
70			10750	8.70	15	25	25	20	"	"	"	"	"				
71			10800	3.10	-5	25	-10	20	"	"	"	"	"				
72			10850	1.20	5	20	"	-10	"	"	"	"	"				
73			10900	1.20	20	10	25	10	"	"	"	"	"				
74			10940	4.70	-5	15	10	10	"	"	"	"	"				
75R			10940	2.90	"	10	-10	15	"	"	15	"	"				
76		10800	10950	2.20	"	40	"	20	"	"	-10	"	"				
77			10900	4.40	"	15	"	20	"	"	"	"	"				
78			10850	4.90	5	10	"	15	"	10	"	"	"				
79			10800	1.24	-5	10	"	-10	"	-10	"	"	"				
80			10750	2.80	-5	-10	"	10	"	"	"	"	"				

APPENDIX V: TUMBY BAY, EL 578; SOIL ANALYSIS

Sample No.	Anomaly	E	N	U Fluor ppm	Th XRF ppm	Cu AAS ppm	Pb AAS ppm	Zu AAS ppm	Aq AAS ppm	Ni AAS ppm	Co AAS ppm	Sn EMS ppm	Mo EMS ppm	Ca AAS %	Mg AAS %	P SPEC ppm	Ti XRF ppm
80/11081			10700	1.36	5	15	-10	10	-2	-10	-10	-1	-3				
82			10650	2.80	10	15	"	20	"	"	"	"	"				
83			10600	2.90	10	35	"	20	"	"	"	"	"				
84			10550	1.20	-5	15	"	10	"	"	"	"	"				
85			10500	.94	5	15	"	10	"	"	"	"	"				
86			10450	.62	5	10	"	-10	"	"	"	"	"				
87			10400	1.84	20	20	"	30	"	"	"	"	"				
88			10350	4.00	10	10	"	20	"	"	"	"	"				
89			10300	2.50	10	10	10	10	"	"	"	"	"				
90			10250	1.70	10	15	-10	10	"	"	"	"	"				
91			10200	1.88	10	-10	"	-10	"	"	"	"	"				
92			10150	1.23	10	"	"	10	"	"	"	"	"				
93			10100	3.40	-5	"	"	-10	"	"	"	"	"				
94			10050	3.40	5	"	"	"	"	"	"	"	"				
95			10000	.70	10	"	"	15	"	"	"	"	"				
96		10802	10000	.62	10	"	"	10	"	10	"	"	"				
97	TB 20	10000	12400	.86	25	"	"	10	"	-10	"	"	"				
98		10050		.28	10	10	"	15	"	"	"	"	"				
99		10100		.66	15	10	"	10	"	"	"	"	"				
100		10150		.59	5	-10	"	15	"	"	"	"	"				
101		10200		.76	5	"	"	10	"	"	"	"	"				
102		10250		1.44	-5	15	"	10	"	"	"	"	"				
103		10300		.28	-5	20	10	20	"	"	"	"	"				
104		10350		2.00	10	15	-10	25	"	"	15	3	"				

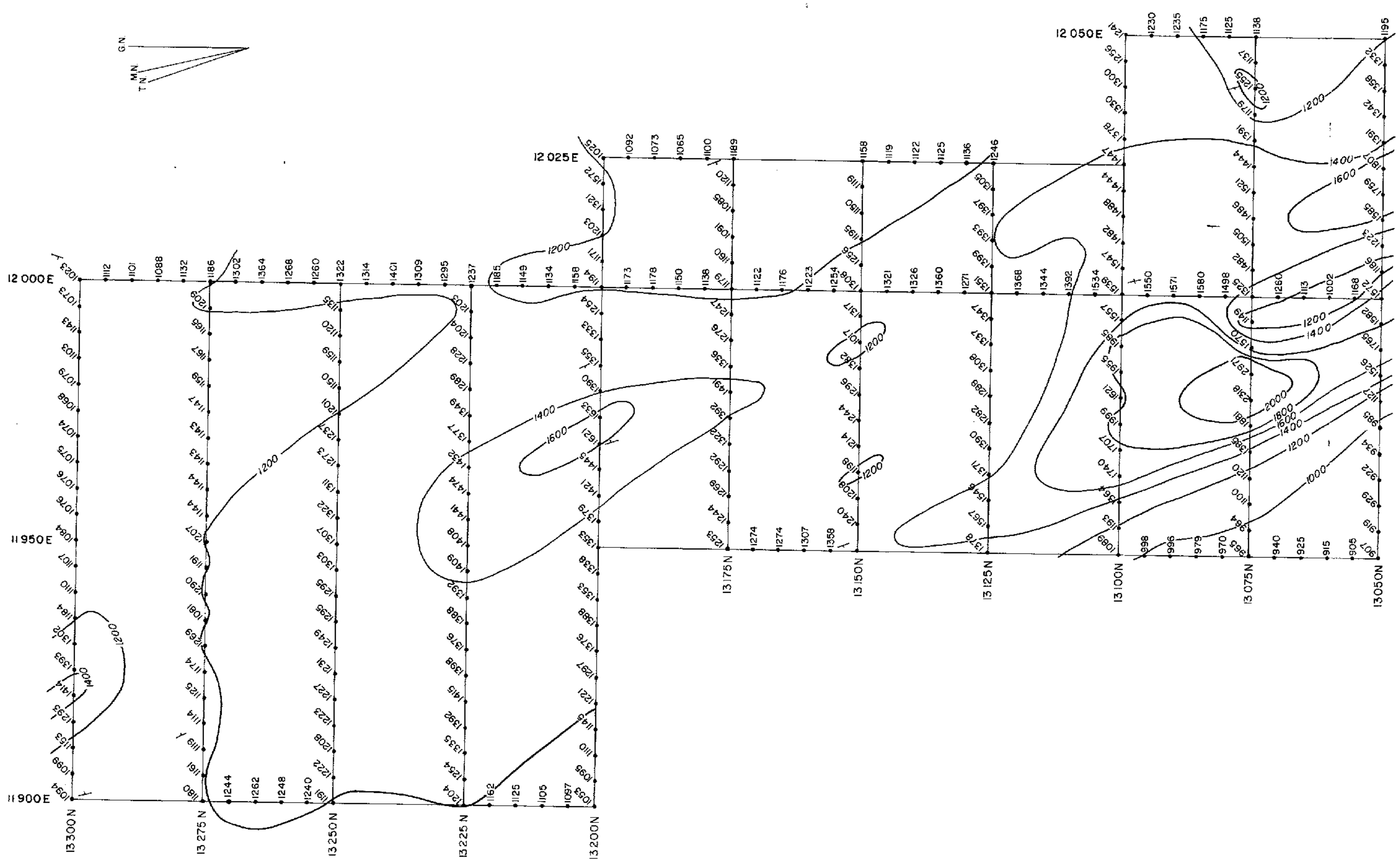
Sample No.	Anomaly	E	N	U Fluor ppm	Th SRF ppm	Cu AAS ppm	Pb AAS ppm	Zh AAS ppm	Aq AAS ppm	Ni AAS ppm	Co AAS ppm	Sn EMS ppm	Mo EMS ppm	Ca AAS %	Mg AAS %	P SPEC ppm	Ti XRF ppm
80/11105		10400		-.10	-5	-10	-10	10	-10	-10	-10	-1	-3				
106		10450		.66	-5	"	"	15	"	"	"	3	"				
107		10500		.28	-5	10	"	-10	"	"	"	-1	"				
108		10550		1.40	-5	15	"	10	"	"	"	"	"				
109		10600		.70	5	-10	"	10	"	"	"	"	"				
110		10650		.92	5	10	"	15	"	"	"	"	"				
111		10700		4.80	5	15	"	25	"	"	"	3	"				
112	TB 20	10750	12400	1.62	15	20	"	10	"	"	"	"	"				
113		10800		2.20	25	10	"	20	"	"	"	3	"				
114		10850		.92	20	-10	"	-10	"	"	"	-1	"				
115		10900		-.10	10	"	"	10	"	"	"	1	"				
116		10950		"	10	"	"	-10	"	"	"	-1	"				
117		11000		"	10	"	"	"	"	"	"	"	"				
118		11050		"	15	"	"	10	"	"	"	"	"				
119		11100		.38	20	10	"	15	"	"	"	"	"				
120		11150		.32	25	25	"	30	"	30	"	3	"				
121		11200		-.10	30	20	"	35	"	-10	10	-1	"				
122		11250		"	-5	10	"	10	"	"	-10	"	"				
123		11300		"	5	-10	"	15	"	"	"	"	"				
124		11350		"	10	25	"	30	"	"	"	"	"				
125		11400		"	5	10	"	15	"	"	"	"	"				
126		11450		"	10	20	"	15	"	"	"	"	"				
127		11500		"	10	-10	"	-10	"	"	"	"	"				

APPENDIX V: TUMBY BAY, EL 578; SOIL ANALYSIS (11)

Sample No.	Anomaly	E	N	U Fluor ppm	Th XRF ppm	Cu AAS ppm	Pb AAS ppm	Zu AAS ppm	Aq AAS ppm	Ni AAS ppm	Co AAS ppm	Sn EMS ppm	Mo EMS ppm	Ca AAS %	Mg AAS %	P SPEC ppm	Ti XRF ppm
80/11128R		11500		.56	10	10	-10	-10	-2	-10	-10	-1	-3				

Repeats

80/11015				2.20													
35				.18													
55				1.30													
85				.98													
105				-.10													



To Accompany Report WY. 80.7.

Plate 13

All readings are baseline 59000δ.
All readings in gammas (total field).
Augen gneiss outcrops, scattered throughout grid.

DRAWN	S.L.C.
DATE	JULY '81
GEOLOGY	F.B. & P.W.
APPROVED	
DWG.No.	SI 53-11.126.3506.
REV. No.	

AFMECO PTY. LTD.

SCALE 1 : 1000

0 10 20 30 40 m

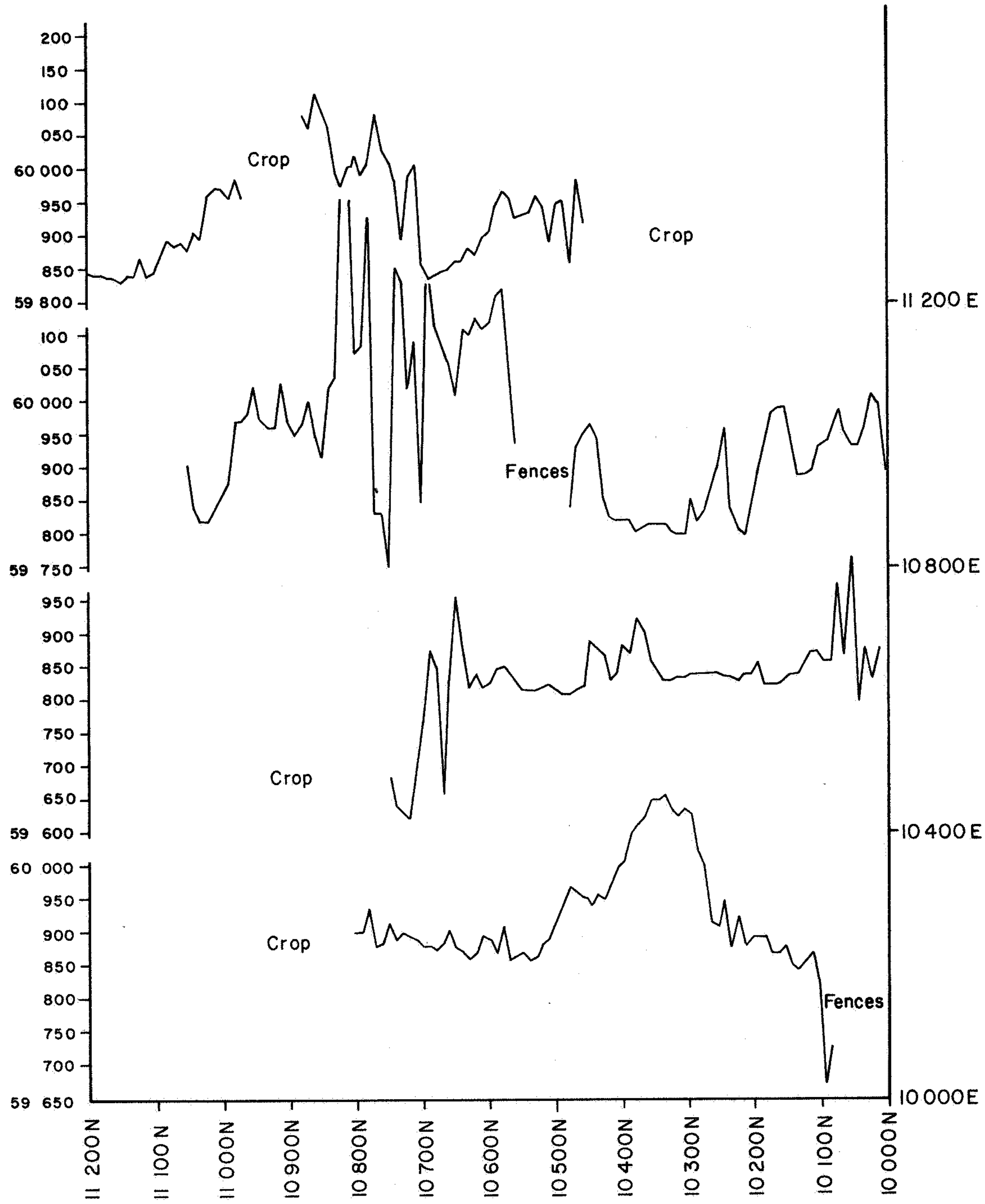
TUMBY BAY PROJECT

TB 1 GRID

TALLALA ANOMALY

MAGNETOMETRY

121

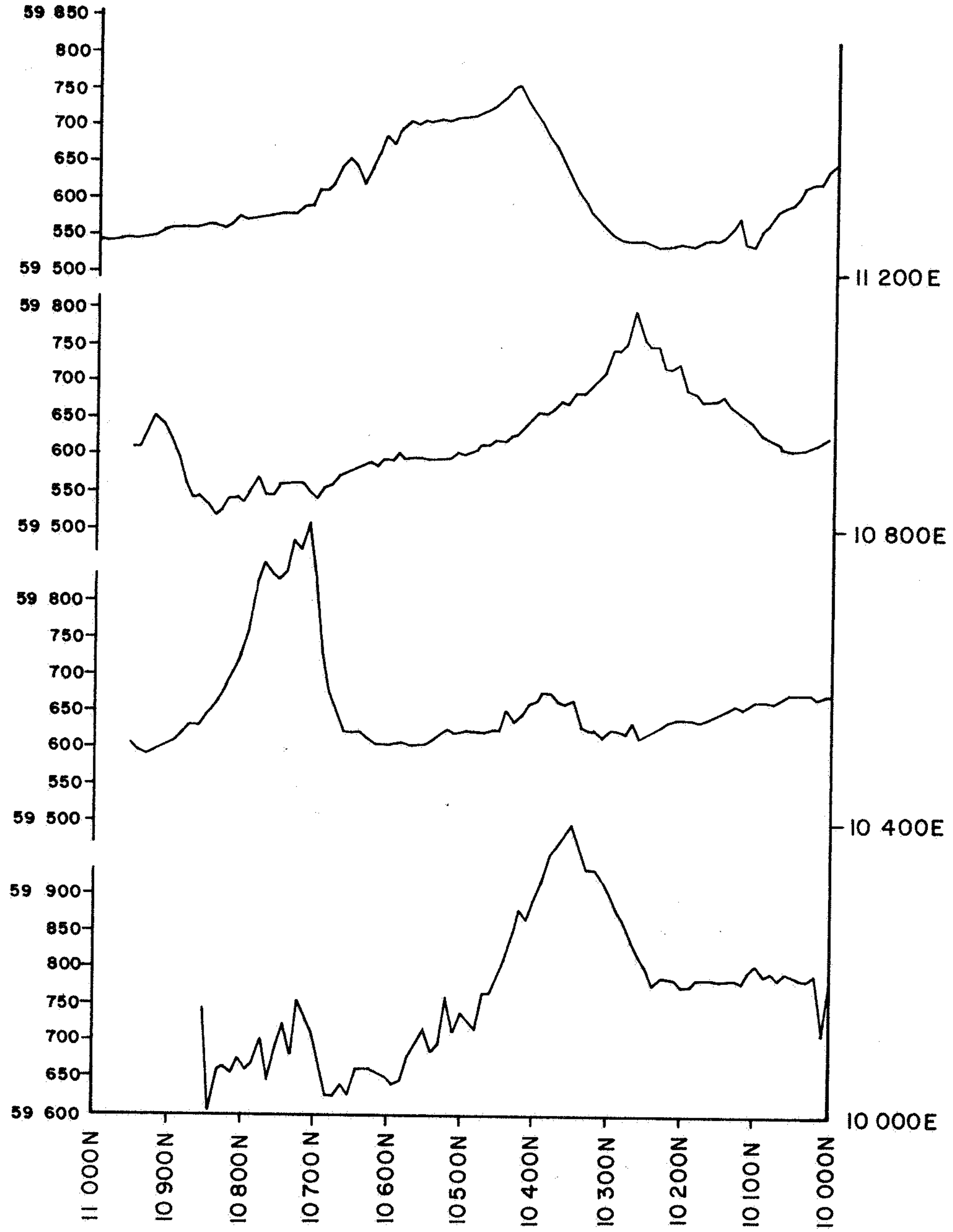


To Accompany Report WY. 80.7.

Plate 14

Readings in gammas (total field)

DRAWN S.L.C.	AFMECO PTY. LTD.
DATE JUNE '81	SCALE 1:1000 (0 10 20 30 40 m)
GEOLOGY F.B. & P.W.	TUMBY BAY PROJECT
APPROVED	TB 13 GRID
DWG. No. SI 53-11.126.3507.	GROUND MAGNETOMETRY
REV. No.	



To Accompany Report WY.80.7.

Plate 15

All readings in gammas(total field)
No outcrop on lines

DRAWN S.L.C.
DATE JUNE '81
GEOLOGY F.B. & P.W.
APPROVED
DWG. No. S153-11.126.3508.
REV. No.

AFMECO PTY. LTD.

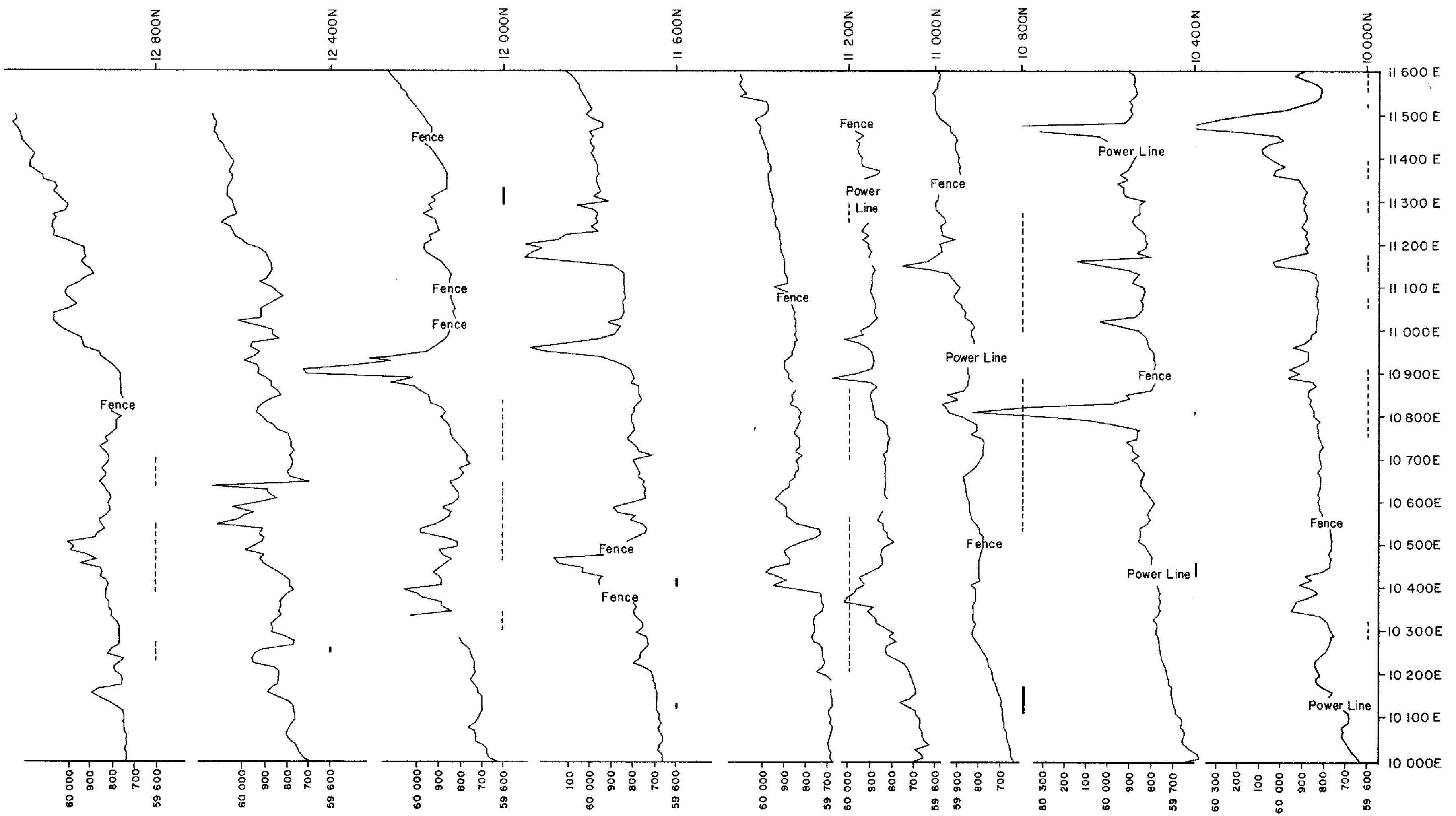
SCALE 1:1000

0 10 20 30 40m

TUMBY BAY PROJECT

TB 17 GRID

GROUND MAGNETOMETRY



To Accompany Report WY.80.7.

Plate 16

All readings in gammas (total field)
— Solid outcrop
---- Scattered outcrop
Blank: soil covered

DRAWN	S.L.C.
DATE	JUNE '81
GEOLOGY	F.B. & P.W.
APPROVED	
DWG. No.	S153-11.126.3509.
REV. No.	

AFMECO PTY. LTD.

SCALE 1:1000

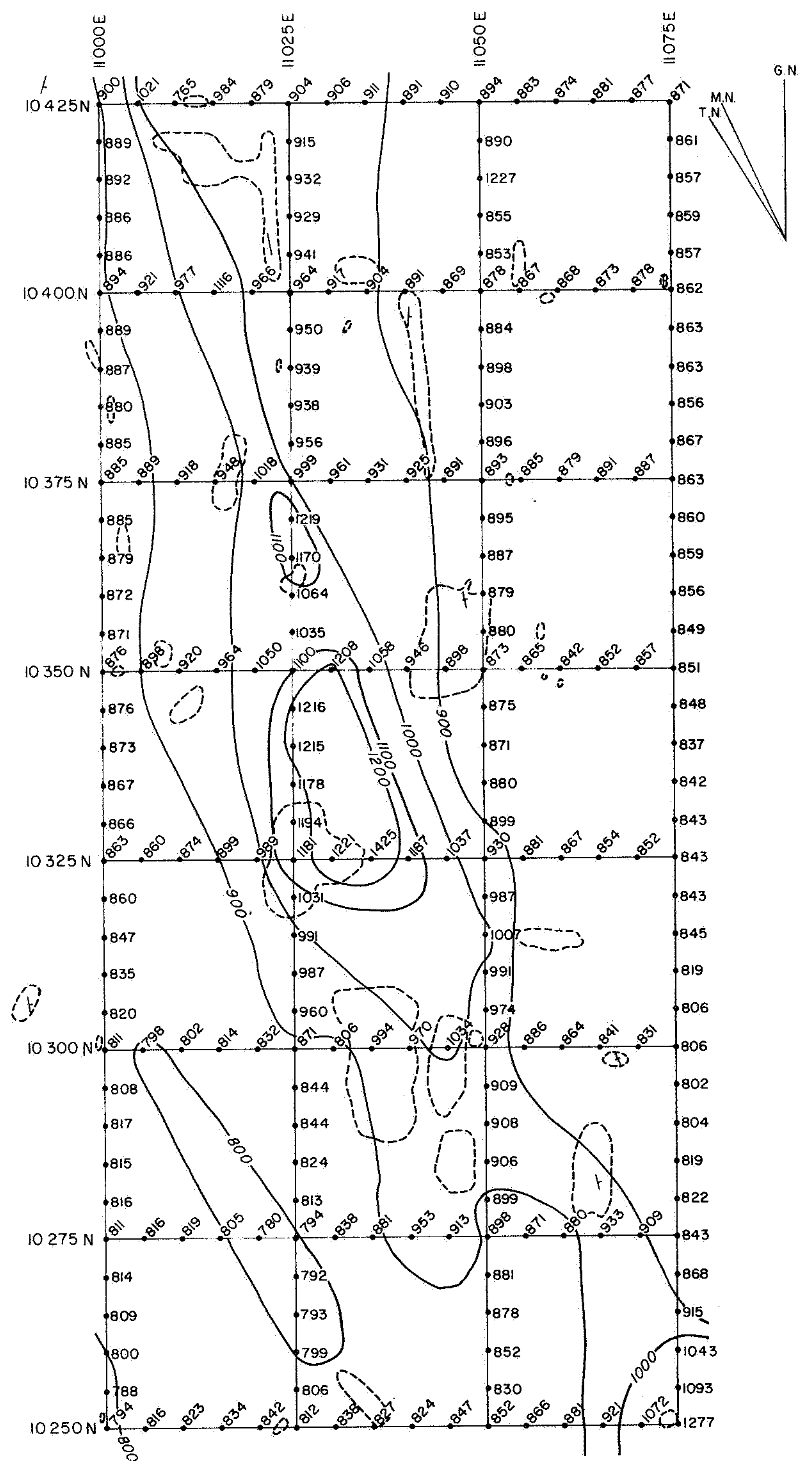
0 10 20 30 40m

TUMBY BAY PROJECT

TB 20 GRID

GROUND MAGNETOMETRY

130



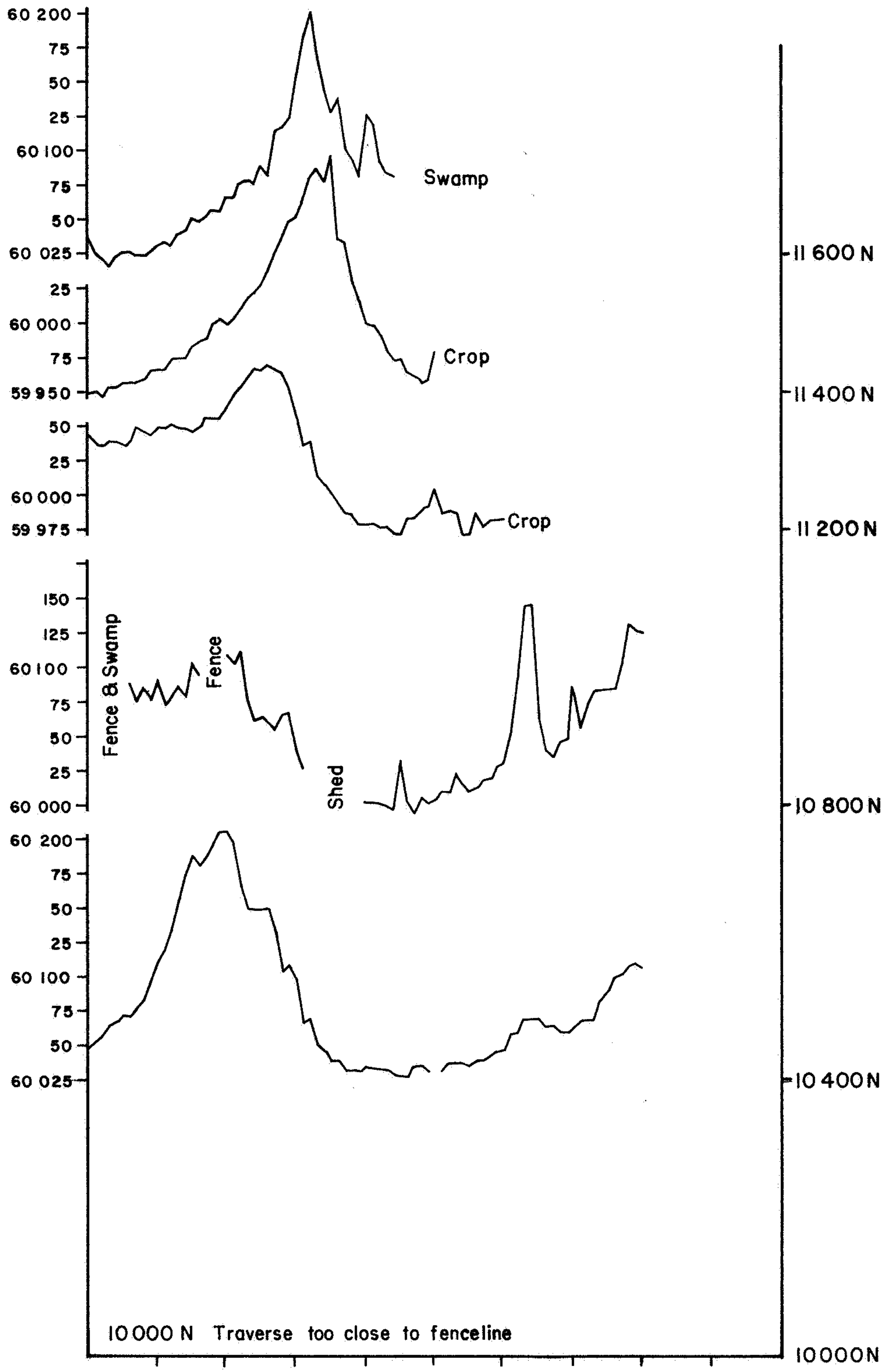
To Accompany Report WY.80.7.

Plate 17

All readings in gammas(total field).
Readings corrected for drift.
Base station 10400N 11000E = 59894δ.

Augen gneiss

DRAWN S.L.C.	AFMECO PTY. LTD.
DATE JULY '81	SCALE 1:1000 — 0 10 20 30 40
GEOLOGY F.B. & P.W.	
APPROVED	TUMBY BAY PROJECT
DWG. No S153-11.126.3510.	TB 20 GRID TB 20-1 ANOMALY GROUND MAGNETOMETRY AND OUTCROP GEOLOGY
REV. No	



To Accompany Report WY. 80.7.

Plate 18

All readings in gammas (total field)
No outcrop on lines

DRAWN	S.L.C.
DATE	JUNE '81
GEOLOGY	F.B. & P.W.
APPROVED	
DWG. No.	S153-11. 126.3511.
REV. No.	

AFMECO PTY. LTD.

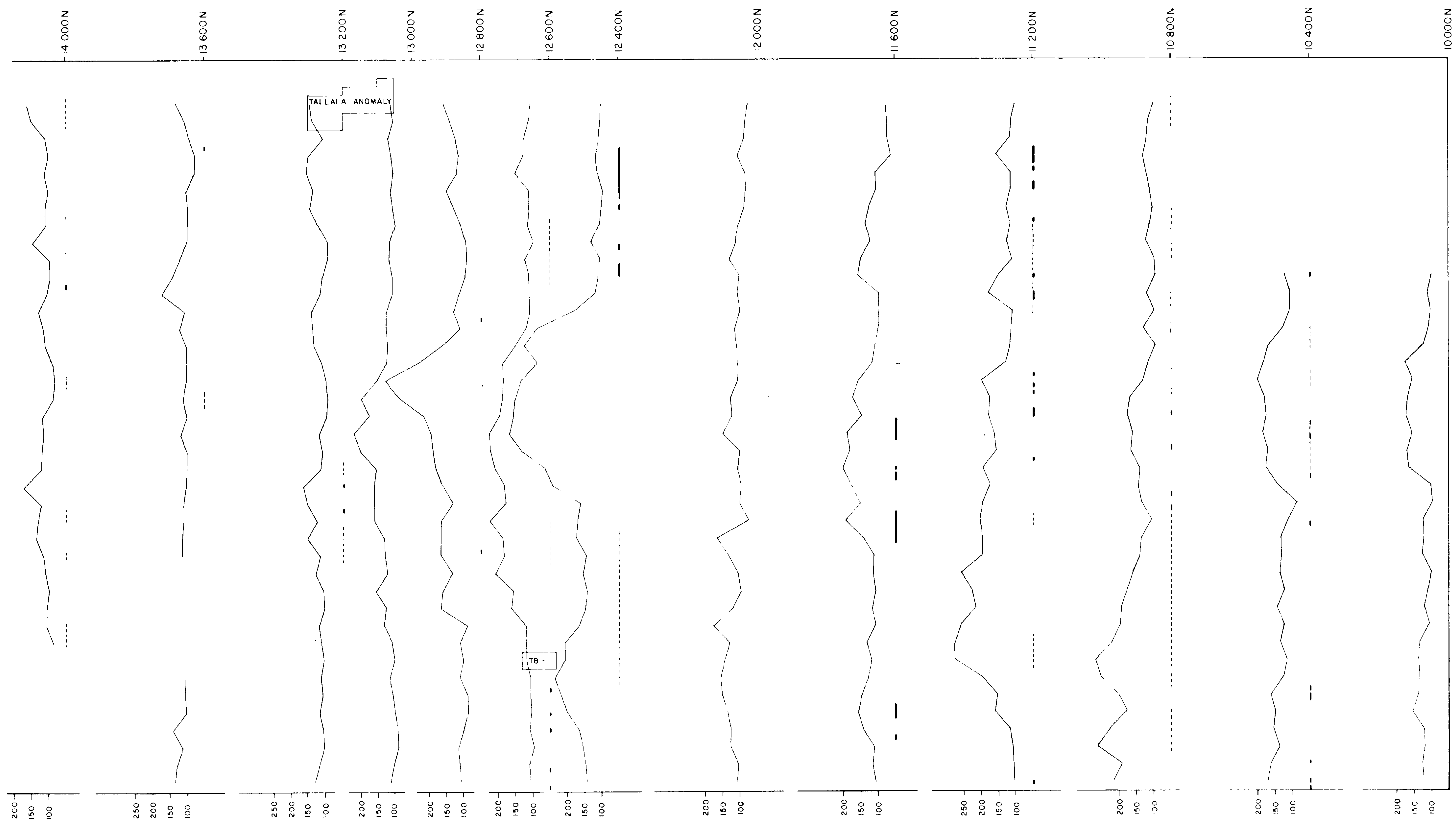
SCALE 1 : 1000

0 10 20 30 40 m

TUMBY BAY PROJECT

TB 29 GRID

GROUND MAGNETOMETRY



To Accompany Report WY. 80.7

Plate 19

All values in cps SPP2
Readings averaged over 50 m intervals
—— Solid outcrop } augen gneiss
----- Scattered outcrop } augen gneiss
Blank soil covered

DRAWN	S.L.C
DATE	JUNE '81
GEOLOGY	F.B & P.W.
APPROVED	
DWG No	S153-11.126.3512
REV No	

AFMECO PTY. LTD.

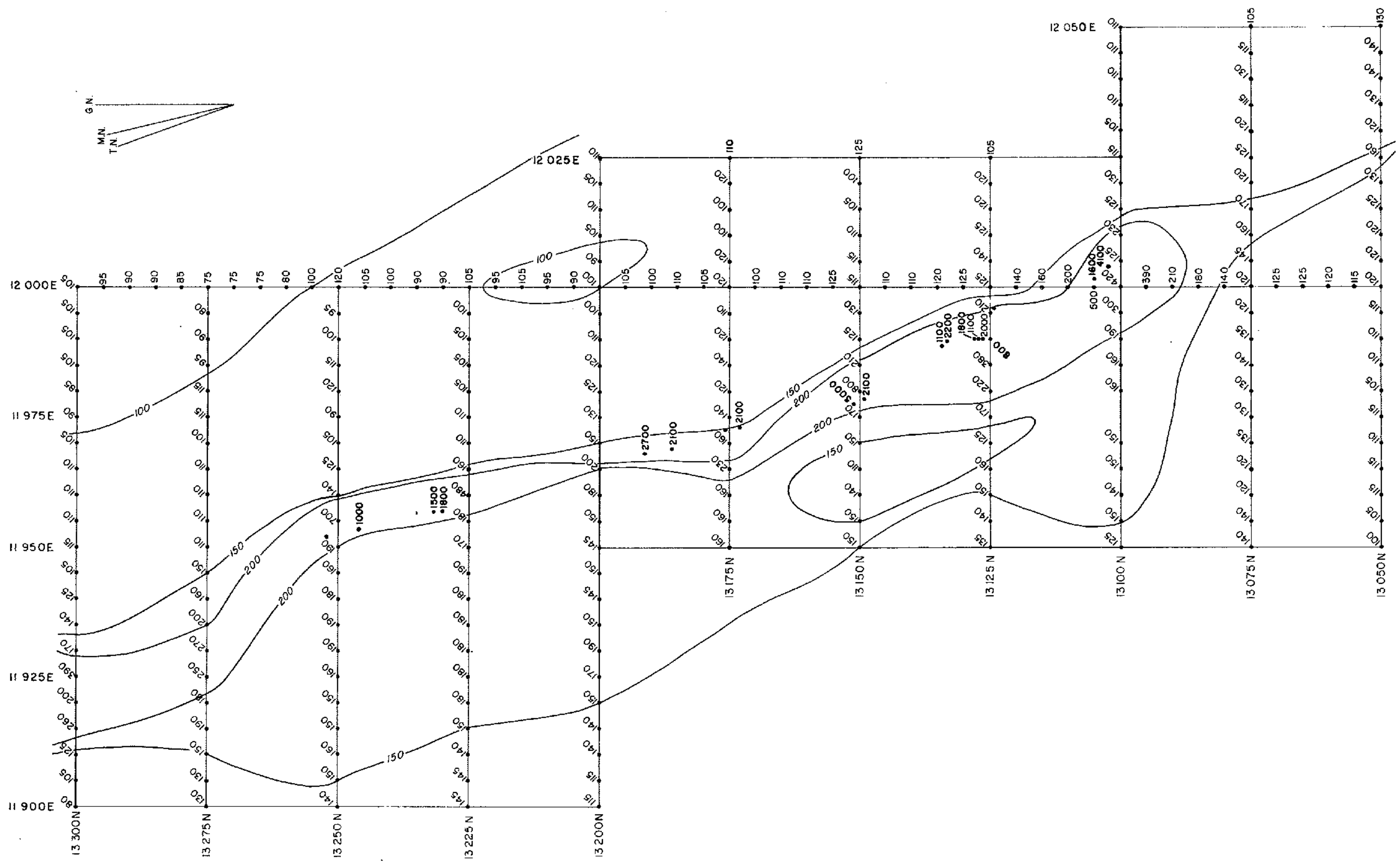
SCALE 1:10 000 — 0 100 200 300 400 m

TUMBY BAY PROJECT

TB I GRID

RADIOMETRY

5776(I)-13



To Accompany Report WY.80.7.

Plate 20

All readings in cps SPP2.
Scattered outcrop of auger gneiss throughout grid.

DRAWN	S.L.C.
DATE	JULY '81
GEOLOGY	F.B. & P.W.
APPROVED	
DWG. No.	S153-11.126.3513.
REV. No.	

AFMECO PTY. LTD.

SCALE 1:1000

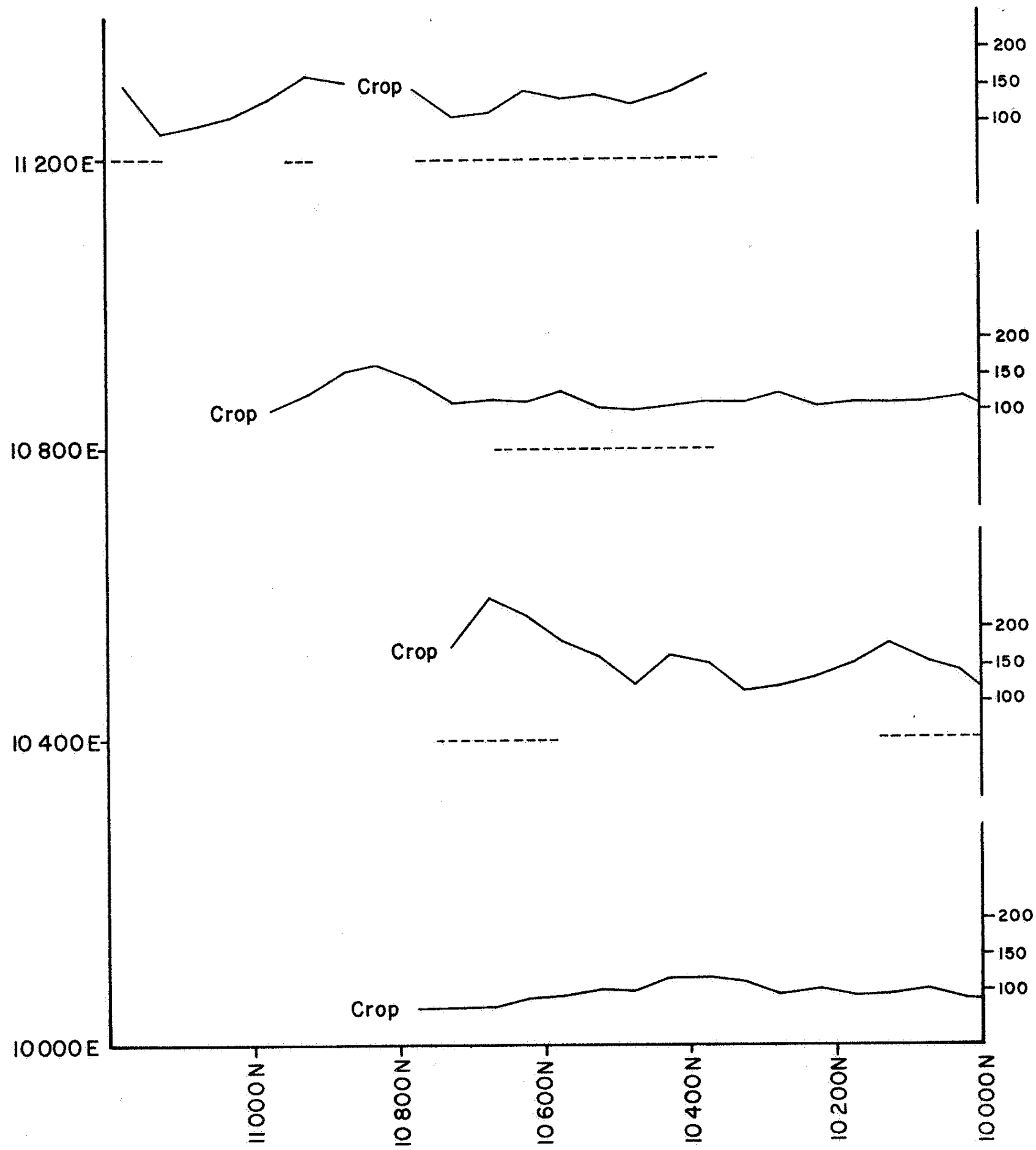
TUMBY BAY PROJECT

TB 1 GRID

TALLALA ANOMALY

GROUND RADIOMETRY

133



To Accompany Report WY. 80.7.

Plate 21

All readings in cps SPP2
Readings averaged over 50m intervals
----- Scattered outcrops (augen gneiss)
Blank or soil covered

DRAWN	S.L.C.
DATE	JUNE '81
GEOLOGY	F.B. & P.W.
APPROVED	
DWG. No	S153-11.126.3514.
REV. No	

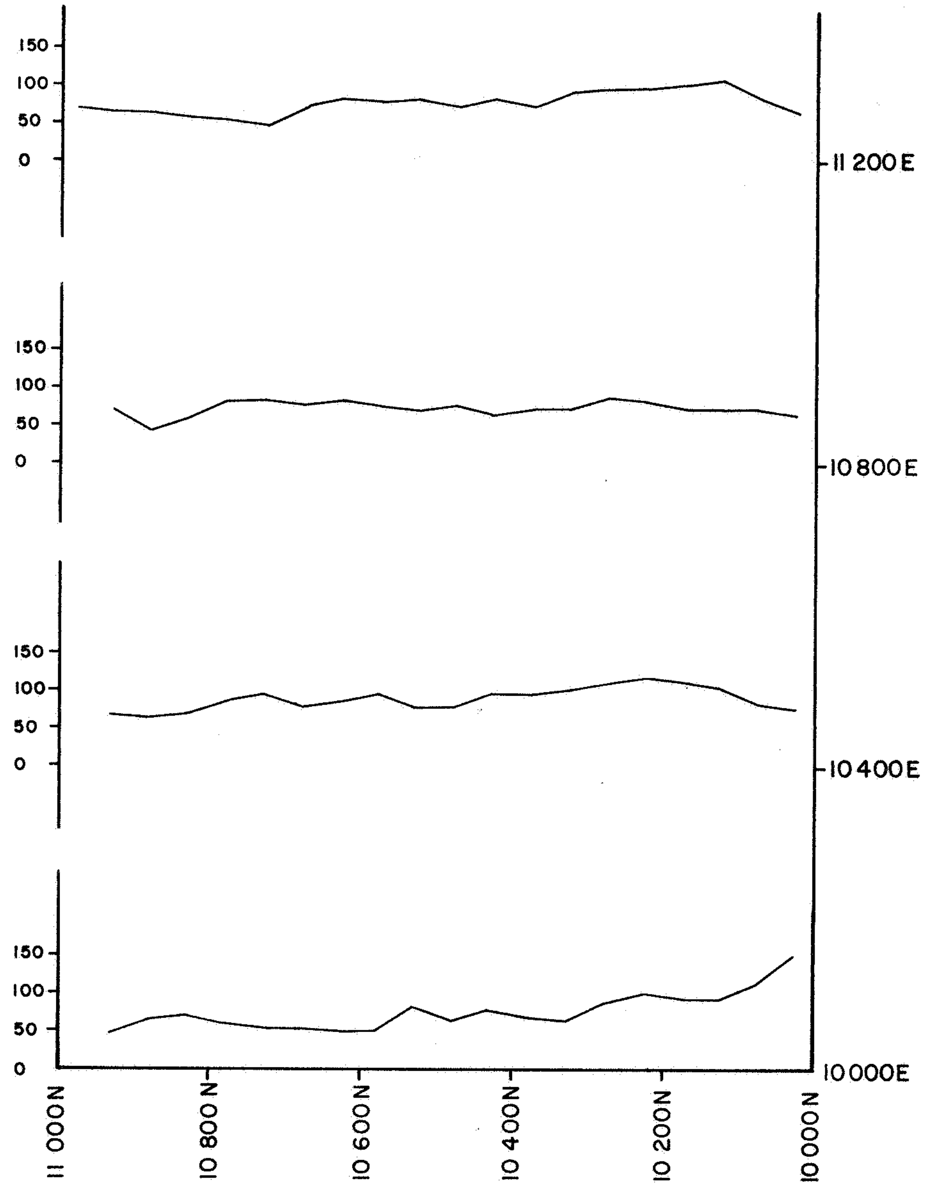
AFMECO PTY. LTD.

SCALE 1 : 1000 — 0 10 20 30 40 m

TUMBY BAY PROJECT

TB 13 GRID

GROUND RADIOMETRY



To Accompany Report WY.80.7.

Plate 22

All readings in cps SPP2
Readings averaged over 50m intervals
No outcrops on lines

DRAWN	S.L.C.
DATE	JUNE '81
GEOLOGY	F.B. & P.W.
APPROVED	
DWG. No.	S153-11.126.3415.
REV. No.	

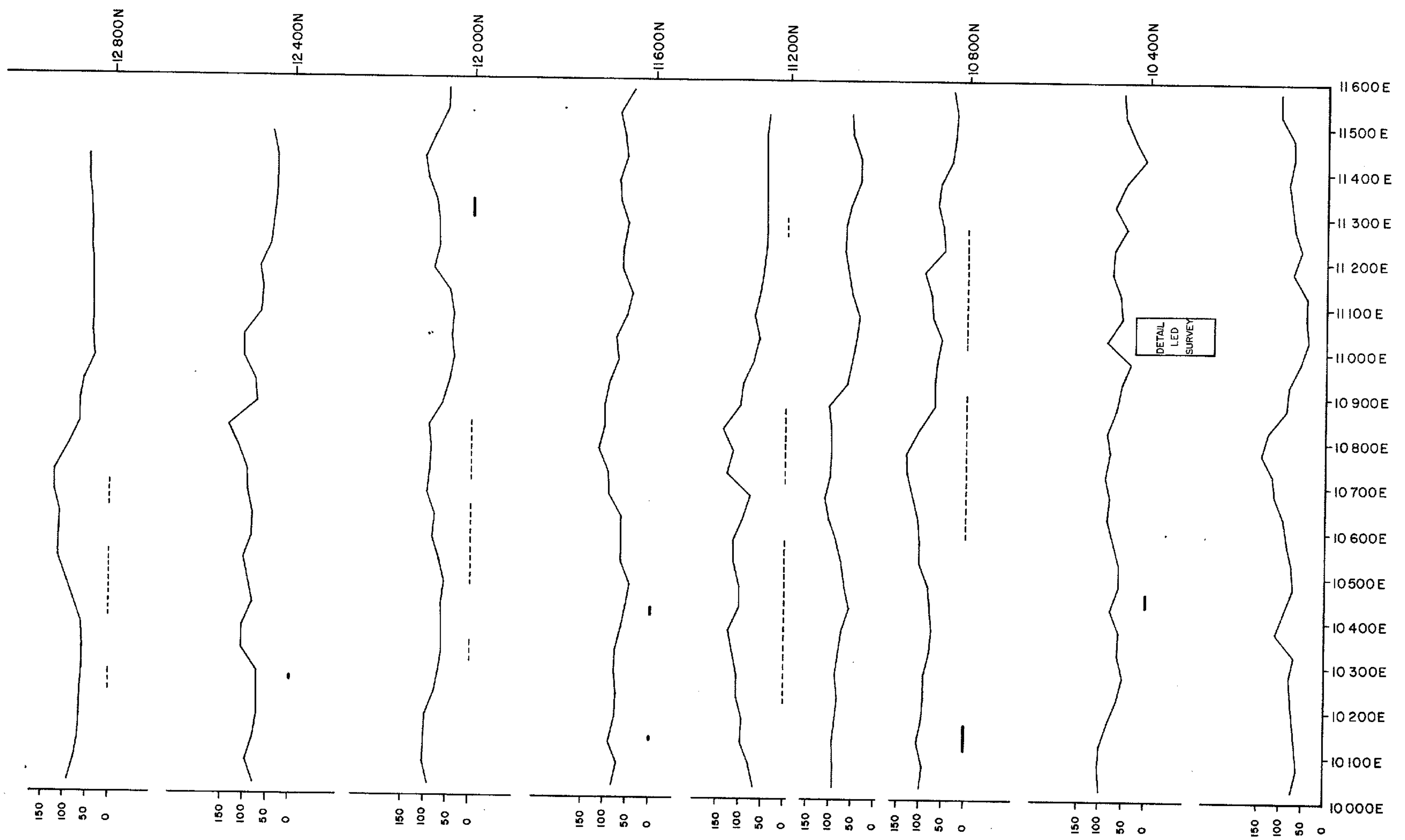
AFMECO PTY. LTD.

SCALE 1:1000 — 0 10 20 30 40 m

TUMBY BAY PROJECT

TB 17 GRID

GROUND RADIOMETRY



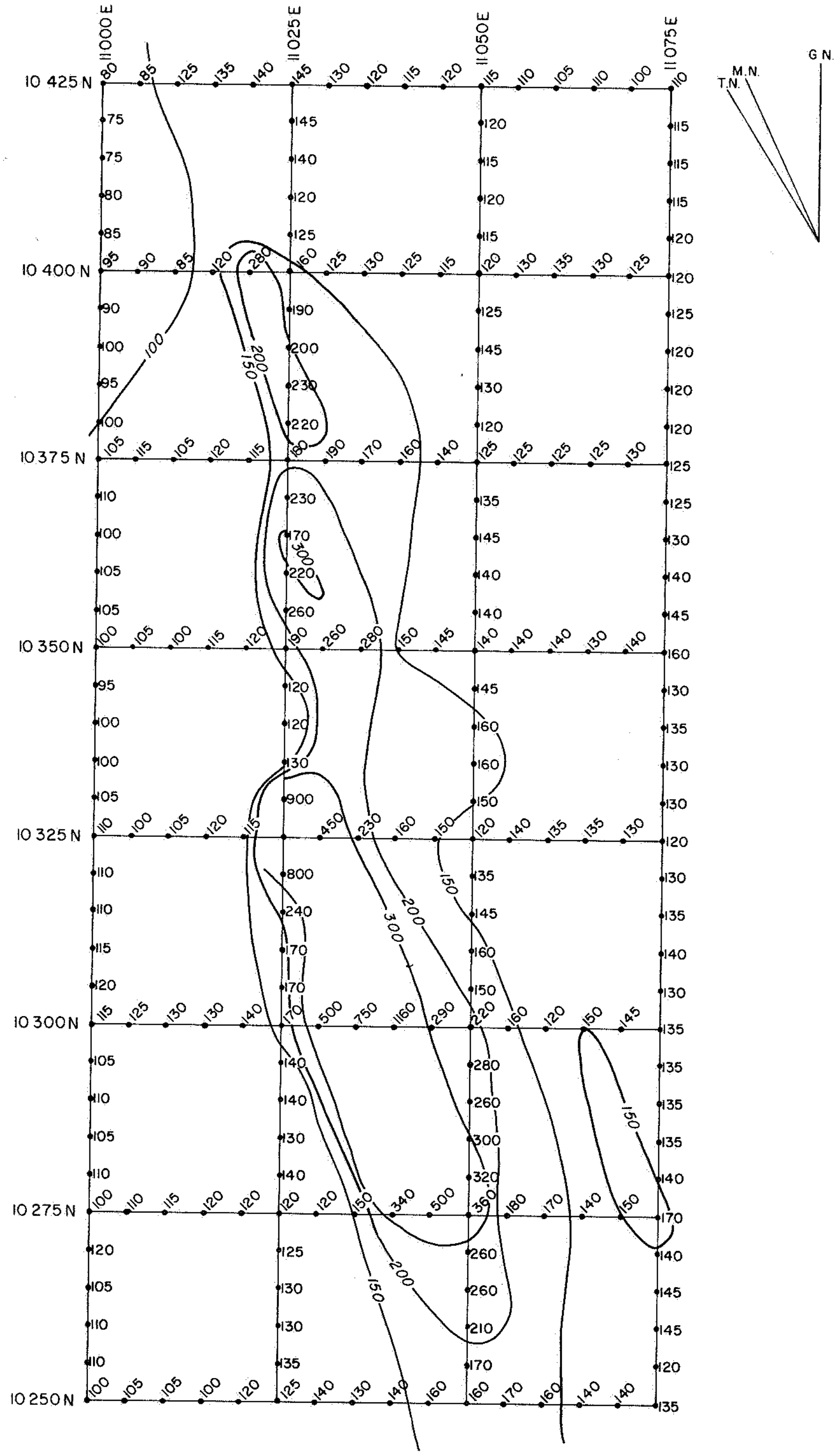
To Accompany Report WY. 80.7.

Plate 23

All readings in cps SPP2
Readings averaged over 50 m intervals
—— Solid outcrop } augen gneiss
----- Scattered outcrop } augen gneiss
Blank soil covered

DRAWN S.L.C.	**AFMECO PTY. LTD.**
DATE JUNE '81	SCALE 1:1000 — 0 10 20 30 40
GEOLOGY F.B. & P. W.	
APPROVED	TUMBY BAY PROJECT
DWG. Nº SI 53-11.126.3516.	TB 20 GRID
REV Nº	GROUND RADIOMETRY

136



To Accompany Report WY. 80.7.

Plate 24

All readings cps SPP2

DRAWN	S.L.C.
DATE	JULY '81
GEOLOGY	F.B. & P.W.
APPROVED	
DWG. No.	S153-11.126.3517.
REV. No.	

AFMECO PTY. LTD.

SCALE 1:1000

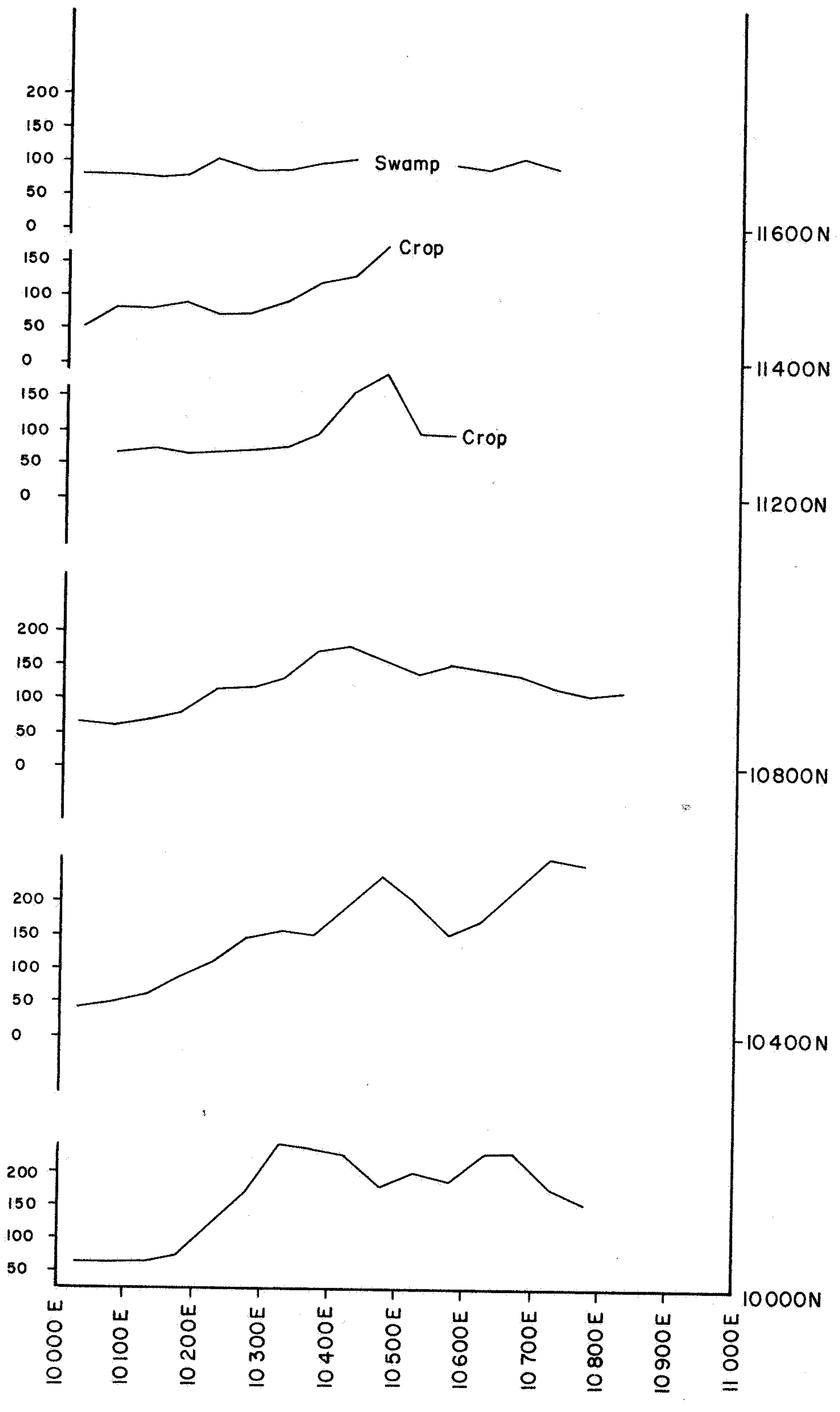
0 10 20 30 40

TUMBY BAY PROJECT

TB 20 GRID

TB 20-1 ANOMALY

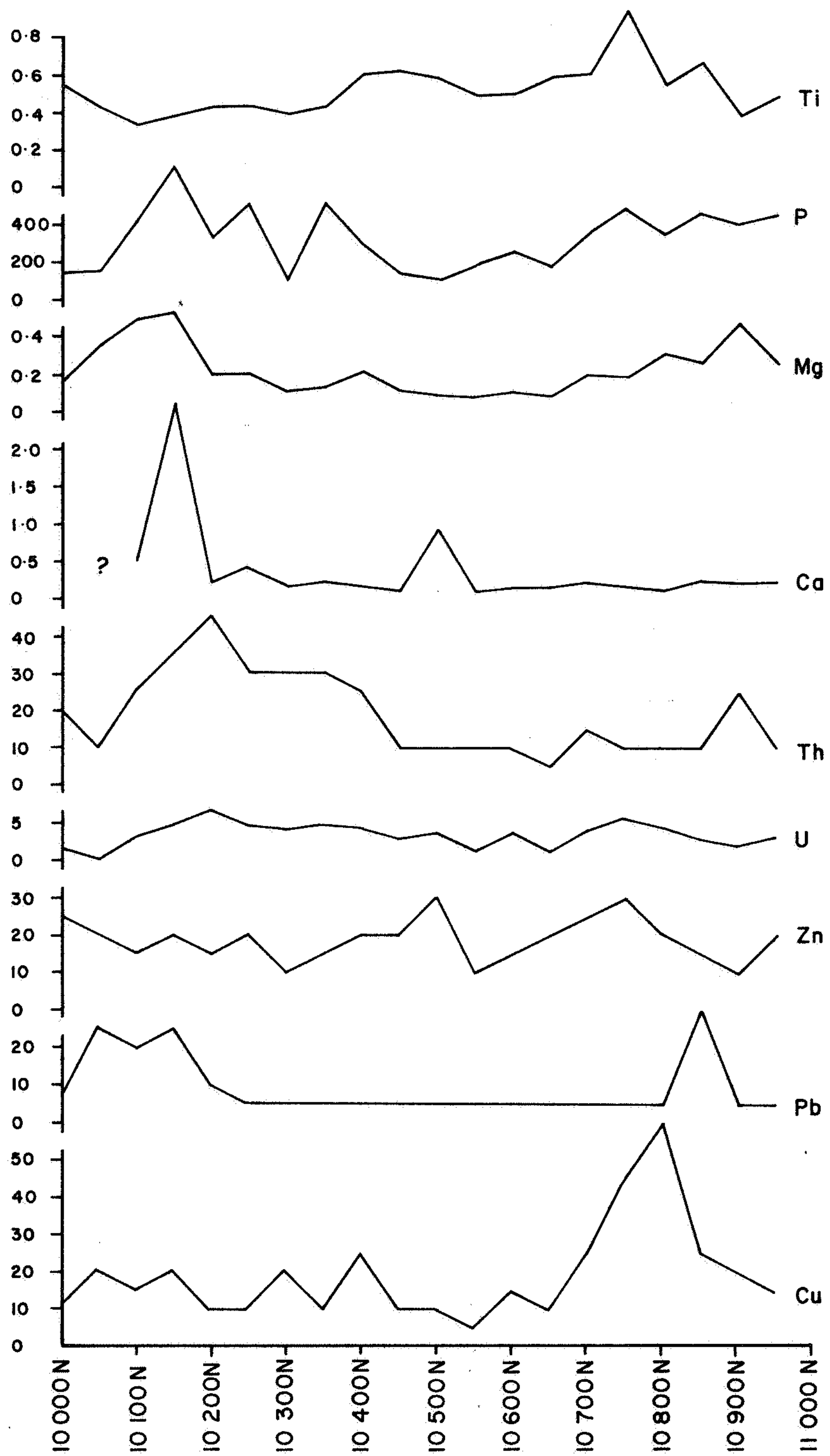
GROUND RADIOMETRY



To Accompany Report WY.80.7.

Plate 25

All readings in cps SPP2 Readings averaged over 50m intervals No outcrops on lines	**DRAWN** S.L.C. **DATE** JUNE '81 **GEOLOGY** F.B. & P.W. **APPROVED** **DWG. No.** S153-11.126.3518. **REV. No.**	**AFMECO PTY. LTD.** **SCALE** 1:1000 (0 10 20 30 40 m) TUMBY BAY PROJECT TB 29 GRID GROUND RADIOMETRY



To Accompany Report WY. 80.7.

Plate 26

A Horizon 30 - 50 cm depth
- 80 mesh fraction
HCl / HNO_3 / 3 NHCl digestion
All values in ppm

DRAWN	S.L.C.
DATE	JUNE '81
GEOLOGY	F.B. & P.W.
APPROVED	
DWG. No.	SI 53-11.126.3519.
REV. No.	

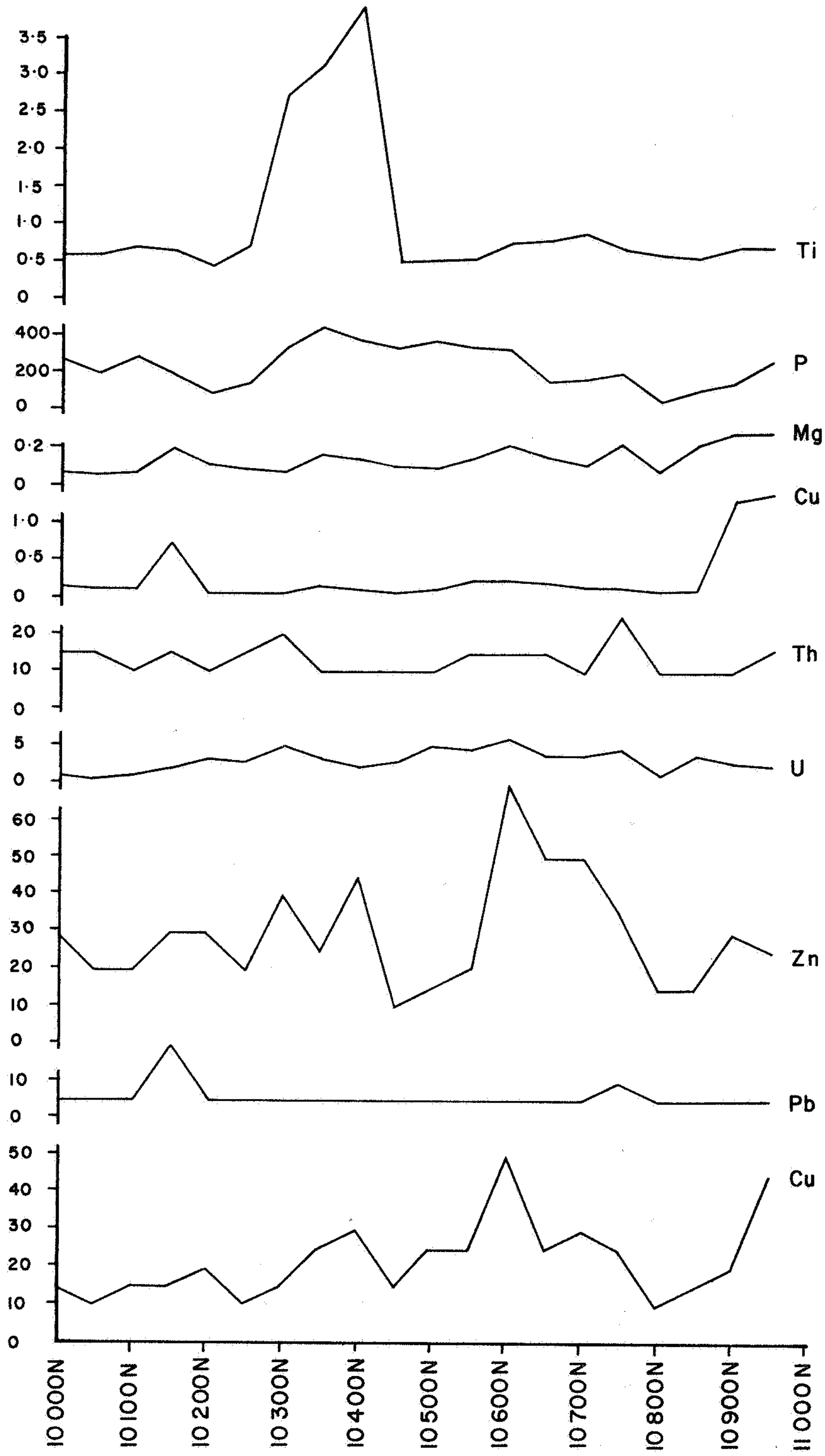
AFMECO PTY. LTD.

SCALE 1 : 1000

0 10 20 30 40 m

TUMBY BAY PROJECT

TB 17 GRID - 10 400 E TRAVERSE
SOIL SAMPLING
PILOT SURVEY



To Accompany Report WY. 80.7.

Plate 27

A Horizon 30 - 50cm depth.
-80 mesh fraction.
$HCl/HNO_3/3NHCl$ digestion
All values in ppm.

DRAWN	S.L.C.
DATE	JUNE '81
GEOLOGY	F.B. & P.W.
APPROVED	
DWG. No.	SI 53-11. 126.3520.
REV. No.	

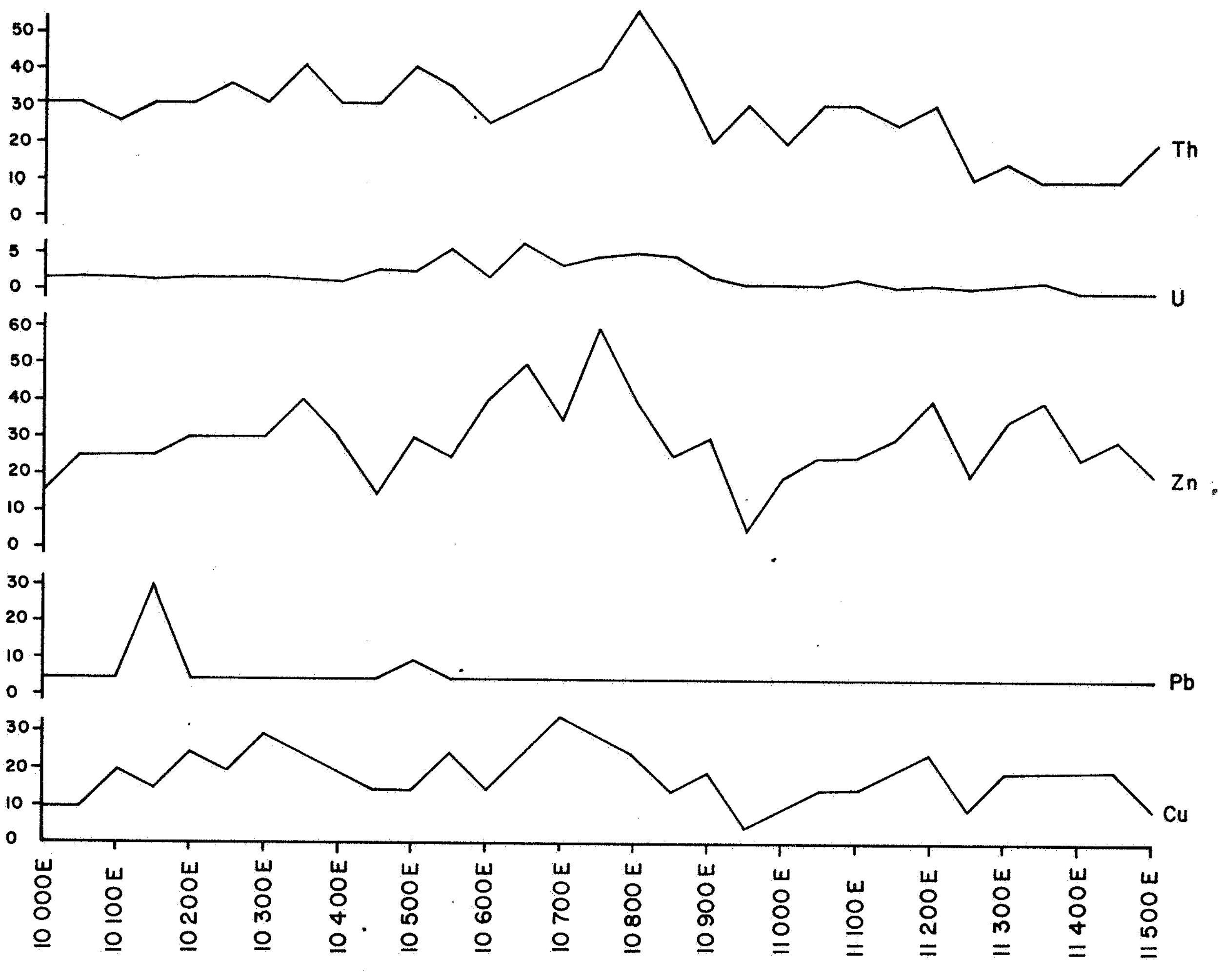
AFMECO PTY. LTD.

SCALE 1 : 1000 — 0 10 20 30 40

TUMBY BAY PROJECT

TB 17 GRID - 10800E TRAVERSE

SOIL SAMPLING
PILOT SURVEY



To Accompany Report WY.807.

Plate 28

A Horizon 30-50 cm depth. -80 mesh fraction. HCl / HNO_3 / 3NHCl digestion All values in ppm.	DRAWN S.L.C. DATE JUNE '81 GEOLOGY F.B. & P.W. APPROVED DWG. No. S153-11.126.3521. REV. No.	AFMECO PTY. LTD. SCALE 1 : 1000 (0 10 20 30 40) TUMBY BAY PROJECT TB 20 GRID - 12400 N TRAVERSE SOIL SAMPLING PILOT SURVEY

II

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AFMECO PTY. LTD.

11-13 Lucknow Place, West Perth, Western Australia
P.O. Box 526, West Perth, Western Australia, 6005
Telephone: (09) 321 9618, 321 9681
Telex: AFMECO 92077 Perth

MQ:pz 81-5506

December 7, 1981

The Director General
Department of Mines and Energy
PO Box 151
EASTWOOD SA 5063

Dear Sir,

Mining Act 1971-1978
Exploration Licence 578
2nd and 3rd Quarter Reports, Year 2
Periods 16.4.81 to 15.7.81
16.7.81 to 15.10.81

During the periods covered by this report the following work was carried out by Afmeco Pty Ltd.

(i) Drilling

Eight diamond drill holes with a total aggregate depth of 1167.5 metres were completed. The majority of these holes were sited on radiometric anomalies, however one was drilled as a stratigraphic test in an effort to define the lithological succession and bed thickness within the Hutchison Group.

(ii) Drilling Results

Most anomalies drilled appear to be small and discrete accumulations with very little vertical continuity. Some minor mineralisation was detected in two holes. Sampling and examination of the core is continuing preparatory to geochemical and petrographic analysis.

..2/

(iii) Geophysical Office Studies

An interpretative review of all the analog records from the 1979 Austirex aerial survey was conducted. A number of anomalies were identified and plotted on to aerial photographs.

(iv) Field Operations

Field work began in early October, with the task of identifying and locating the anomalies selected by the review. Some sixty-three anomalous features have been located in the field. Correlation between these features and local laterite capping appears to be strong. Interpretation of these data is proceeding.

Please find attached for your information and retention a statement of expenditure for the periods covered by this report.

Yours faithfully,
AFMECO PTY LTD

J.-P. Poggi
Managing Director

STATEMENT OF EXPENSES RELATING TO EXPLORATION PROGRAMME
EL 578 - SIX MONTHS 16.4.81 to 15.10.81 - TUMBY BAY

Personnel (Field work, evaluation, office work)	14 272.43
Material (Direct)	1 332.79
Travel, Accommodation (Direct)	5 111.59
Contracts, Supplies	85 532.31
Drafting Service, Preparation of Reports and Miscellaneous	2 955.33
Management/Overheads	5 460.22
	$114 664.67

Commitment: $60 000.00

Permit ends: 15.1.82

II

AFMECO PTY LTD

WHYALLA BASE

Report No. WY.81.8

TUMBY BAY
AUGER DRILLING AND DIAMOND DRILLING
FINAL REPORT

by

J.S. POOLE

WHYALLA

JULY 1981

JSP/jp

CONTENTS

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TABLES

1. INTRODUCTION

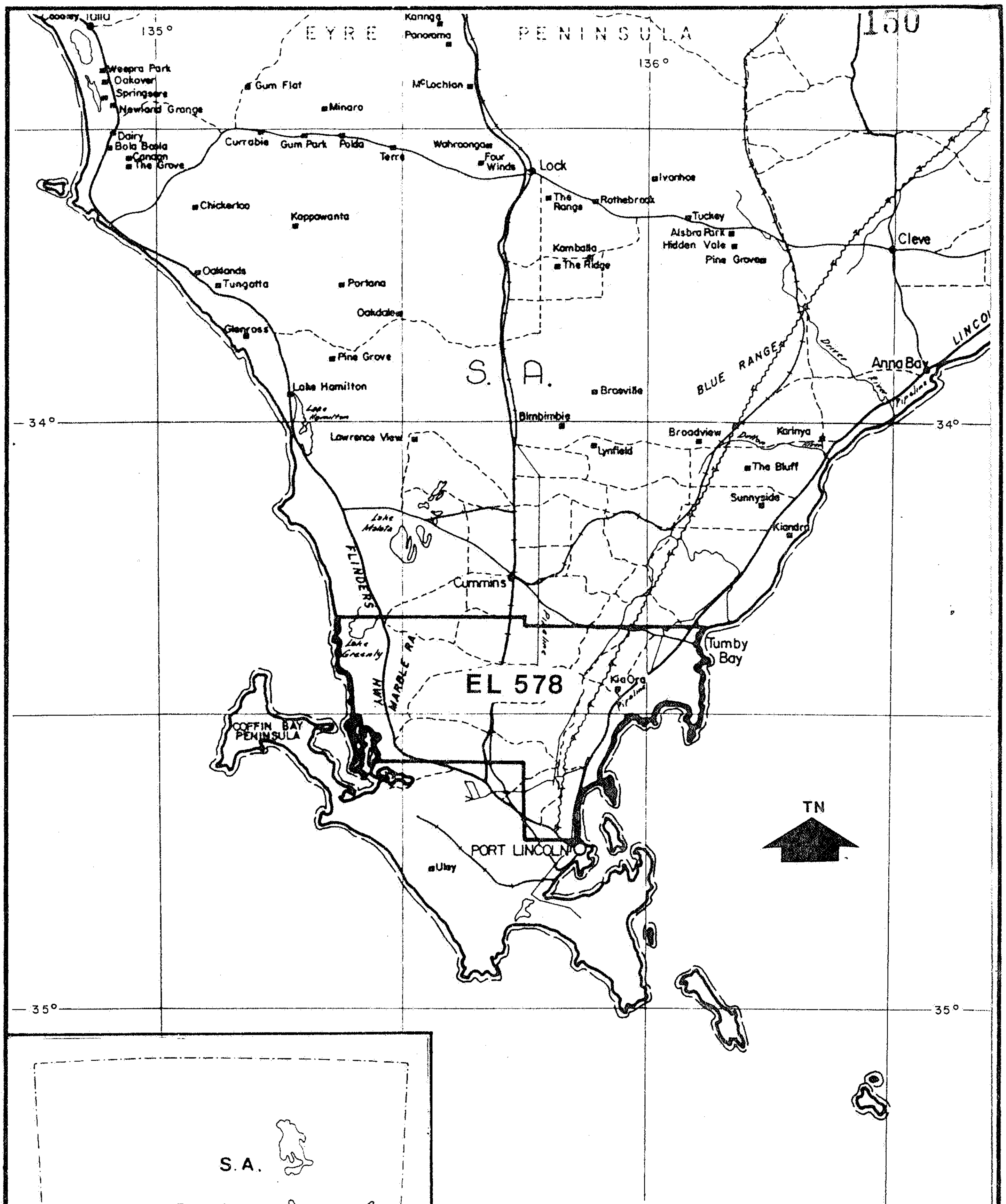
1.1 Aim of the Report

The aim of this report is to present and interpret the results of the Auger Drilling and Diamond Drilling programmes which were undertaken as follow up procedure to the mapping, geophysical and scintillometer work completed in 1980. The auger drilling and first two diamond drill holes had been completed prior to my commencement with AFMECO. Appendix 3 contains the draft report by F. Barrett on the auger drilling programme which I have used as a basis for my interpretation.

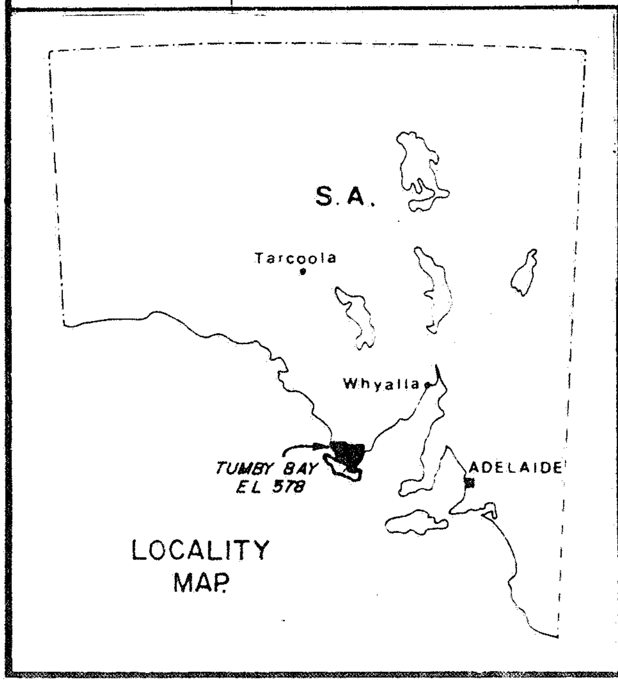
1.2 Aim of Programmes

(a) Auger Drilling (from appendix 3)

- (i) to test the thickness of the laterite profile in the centre of the Hutchison Group.
- (ii) to establish a geochemical profile through the laterites and determine the underlying bedrock.
- (iii) to establish the stratigraphy in the lower part of the Hutchison Group.
- (iv) to test the high radiometric background over soils in the TB29 grid.
- (v) to check high radiometric background over soils on the 124000 N traverse on the TB1 grid.
- (vi) to test laterite adjacent to the TB1 - 1 anomaly.
- (vii) to test stratigraphy in the TB17 grid area.
- (viii) to prepare for core drilling of the contact between the Lincoln Complex and the Hutchison Group.

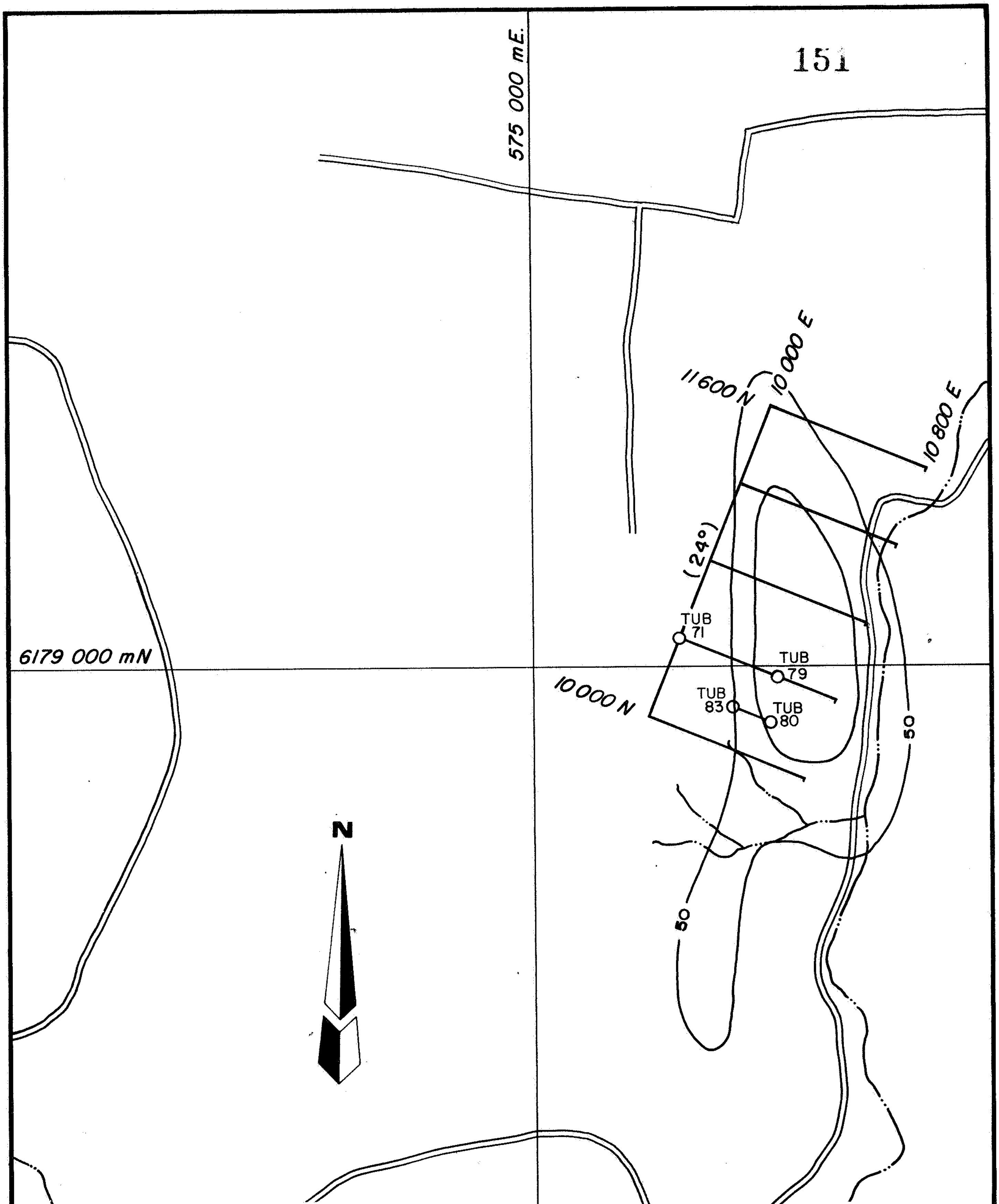


To Accompany Report N° WY 81.8 *Figure 1.*



LOCALITY MAP

DRAWN J.A.M.	AFMECO PTY. LTD.	
DATE September, 1981	SCALE 1:1 000 000	10 0 10 20 30 40 km
GEOLOGY F.M.B.	S.A. - GAWLER BLOCK	
APPROVED	TUMBY BAY EL 578	
DWG. No. S153.T.3743		
REV. No.		



To Accompany Report N° WY 81.8

Figure 2.

DRAWN	J.S.H.
DATE	January '82
COMPILED	F.M.B.
APPROVED	[signature]
DWG. N°	SI 53-11. 126. 4158.
REV.	

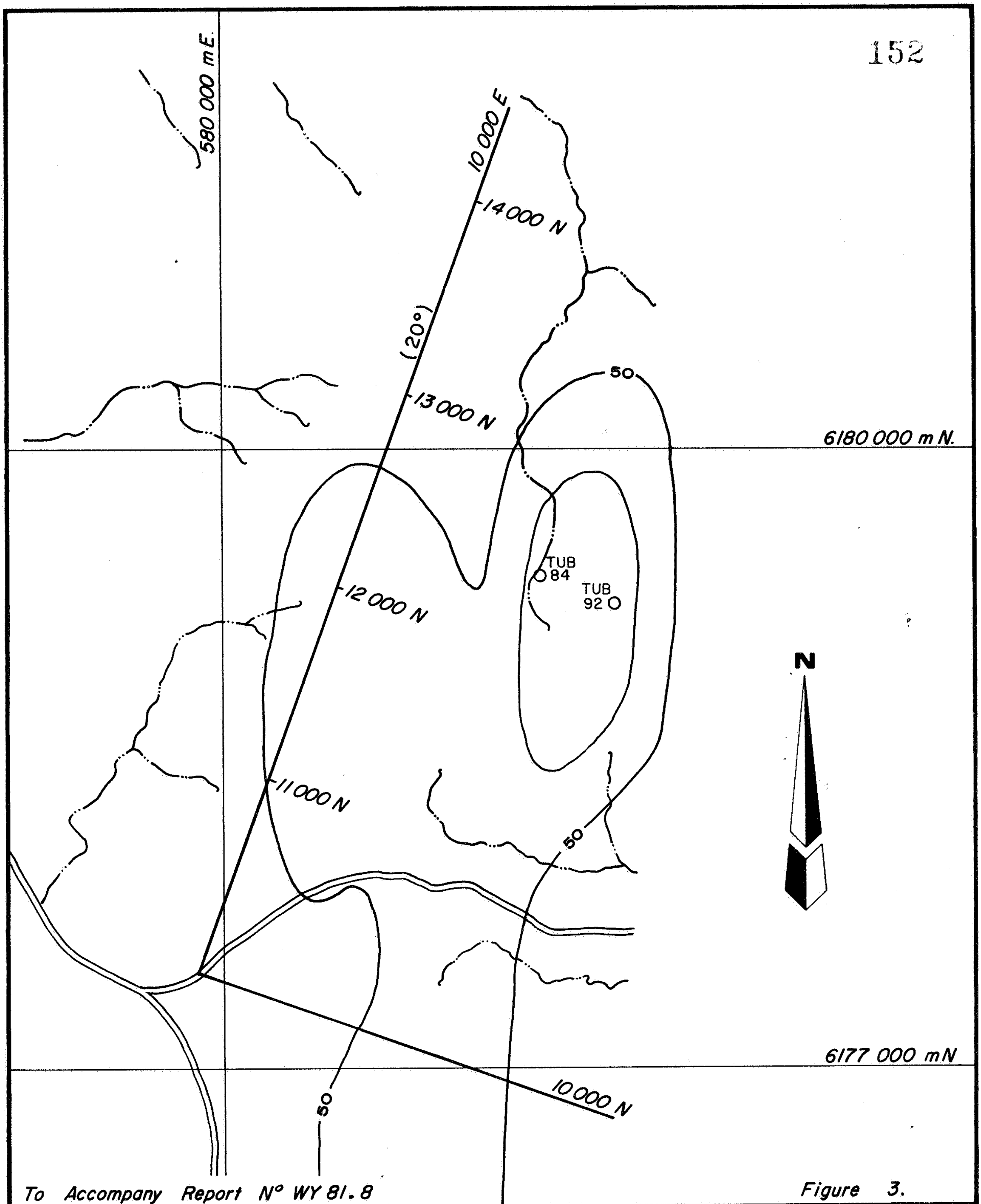
AFMECO PTY. LTD.

SCALE 1 : 25 000 — 200 0 200 400 600 800 1000 m.

S. AUST.
TUMBY BAY PROJECT.
E.L.578.

GRID PLAN FOR TB 29 AREA
SHOWING DRILL HOLE LOCATIONS.

NOTE ;-
For Location of This Grid
See PLATE I. (SI 53-11.126.4031)



To Accompany Report N° WY 81.8

Figure 3.

DRAWN	J. S. H.
DATE	January '82
COMPILED	F. M. B.
APPROVED	
DWG. N°	SI 53-11.126.4159.
REV.	

AFMECO PTY. LTD.

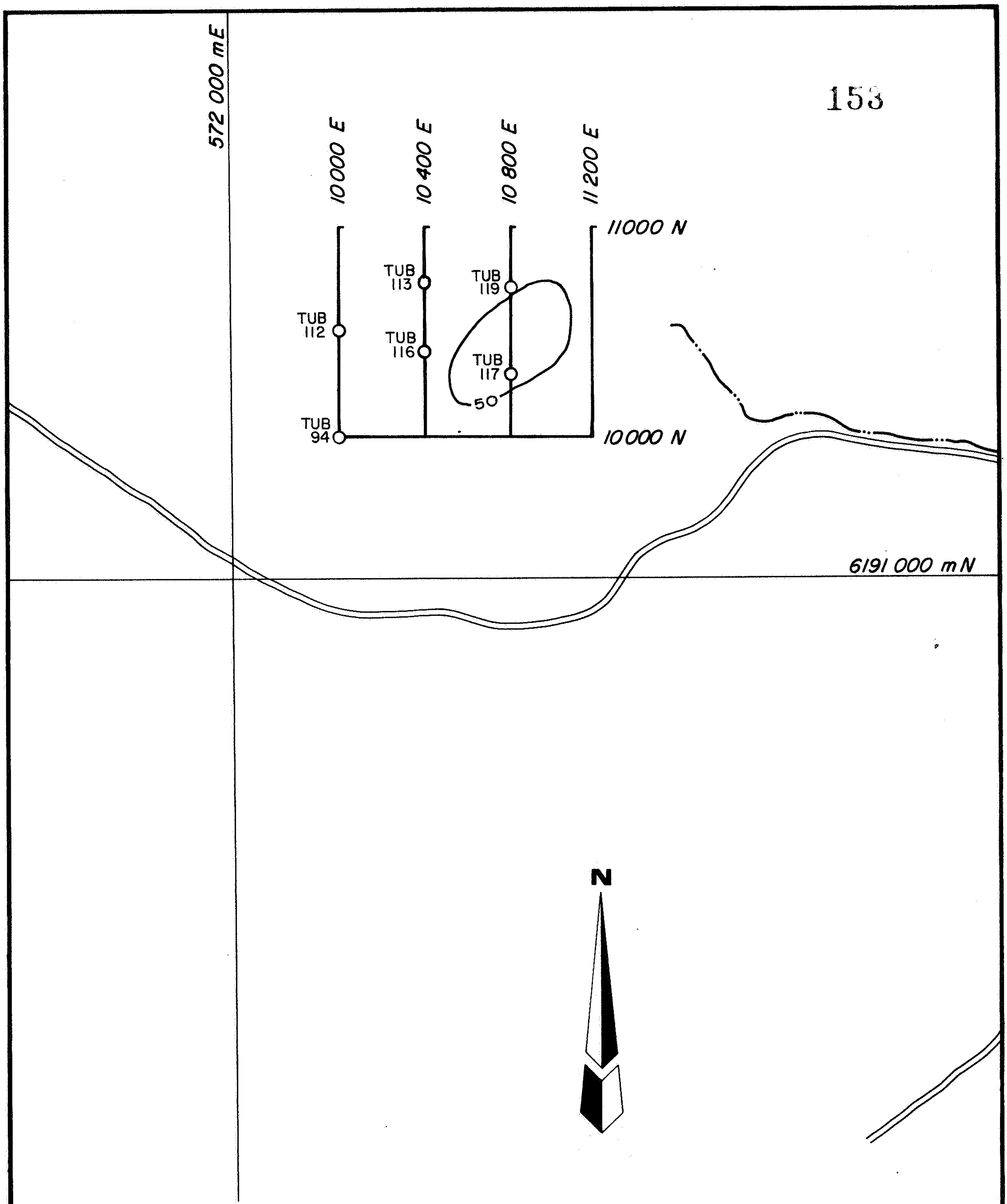
SCALE 1 : 25 000

200 0 200 400 600 800 1000 m.

S. AUST.
TUMBY BAY PROJECT.
E.L.578.

GRID PLAN FOR TB I AREA SHOWING DRILL HOLE LOCATIONS.

NOTE ;-
For Location of This Grid
See PLATE I. (SI 53-11.126.4031)



To Accompany Report N° WY 81.8

Figure 4.

	DRAWN J.S.H.	AFMECO PTY. LTD.
	DATE January '82	SCALE 1 : 25 000 — 200 0 200 400 600 800 1000 m.
	COMPILED F.M.B.	S. AUST. TUMBY BAY PROJECT. E.L.578.
	APPROVED	
NOTE ;- For Location of This Grid See PLATE I. (SI 53-11.126.4031)	DWG. N° SI 53-11.126.4156.	GRID PLAN FOR TB 17 AREA SHOWING DRILL HOLE LOCATIONS.
	REV.	

(b) Diamond Drilling

(i) to test the contact between the Lincoln Complex and the Hutchison Group.

(ii) to test the stratigraphy in the lower Hutchison Group.

(iii) to test surface uranium anomalies.

2. GEOLOGY

2.1 Lincoln Complex (Donington Granitoid Suite)

The Lincoln Complex is predominantly a microcline, quartz, biotite, hornblende augen ortho-gneiss of upper amphibolite to granulite facies. The main accessories are sphene, apatite, monazite, zircon and brannerite. Within the gneiss are abundant meta-dolerite amphibolites and occasional massive quartz beds. The western side of the Lincoln Complex contains a strong mylonite zone of D3* origin which grades gradually into augen gneiss on either side.

2.2 Hutchison Group

The Hutchison Group is a series of metamorphosed marine sediments ranging from greenschist to middle amphibolite facies in grade. The major rock types are mica schist, biotite gneisses, quartzites, thin BIF's, amphibolites, dolomites and graphite schists. There are minor biotite granites intruding the sediments.

More detailed geological descriptions are available in reports WY.80.7 (Barrett) and WY.80.3a (Walker). The name Donington Granitoid Suite has been suggested by C.M. Fanning and A.J. Parker of the South Australian Mines Department to replace the informal name, Lincoln Complex.

*D3 : Third phase of deformation

3. DRILLING PROGRAMMES

The auger drilling programme was conducted from January 6th to January 14th 1981 by Transdrill Pty. Ltd. using an Investigator MK5 drilling rig for a total of 1984.5m blade drilling and 50 metres hammer drilling. All holes except TUB16, 53, 54, 55 were logged by Geoscience Pty. Ltd. using a truck mounted geoscience standard rims 1000 metre bore-hole logging system.

The diamond drilling programme was conducted from the 6th of February 1981 to the 2nd of April 1981 by Longyear Australia using a skid mounted Longyear 38 drill rig. TBD3 and TBD4 were logged using a Mt. Sopris Model II logging machine. TBDs 6, 7, 8 were logged on the core using a SPP-2 Scintillometer. The total metreage drilled was 1167.5 metres.

4. RESULTS OF DRILLING

4.1 Auger Drilling

(a) Stratigraphy

Two holes TUB 1 and 2 were drilled in background anomaly TB28 to test the laterite and cover thickness. Both holes ended in biotite gneiss at depths of 58m and 41m respectively and showed laterite thicknesses of 3m (TUB 1)and 4m (TUB 2), Plate 3.

The stratigraphic profile, holes TUB 3 to TUB 69, was situated with the origin located at the lower most BIF horizon. A 25m spacing was used for the first 1375m and a 50m spacing for the last 550m with hole depths ranging from 2m to 45m. The profile shows a change from east to west to a homogeneous biotite schist in the west from gneiss, quartzite, metacherts and BIF in the eastern basal section, Plate 4.

Drilling on soil anomaly TB1m 12400N line, showed that the high background is restricted to the upper 1-2 metres of the soil profile. TUB 93 was drilled to 17 metres in laterite adjacent to TB1 - 1 anomaly and finished in similar augen gneiss as out-crops 50 metres westward at TB1 - 1.

The laterites in TB17 grid were shown to be thick with an under-lying stratigraphy in the Hutchison similar to the eastern side of the stratigraphic profile except that amphibolite is present, Plate 5.

(b) Geochemistry

The geochemical analysis for the drilling shows that the high background radiation in the tested areas is due to thorium con-centrated near the surface in the laterite profiles as can be seen from the down-hole geochemistry and the radiometric logs for each hole. The stratigraphic profile geochemistry reveals a sudden decrease in the thorium values to the west within the lower Hutchison mica schist. Both the down-hole analysis and the cross-section analysis for each area shows Cu-U-V associations in both the tertiary cover and the presumed bedrock geochemistry. The results are presented in plates 6 to 16 and the gamma logs in Appendix 1.

4.2 Diamond Drilling

(a) Stratigraphy

TBD1 was drilled through the Lincoln Complex - Hutchison Group contact and revealed a sequence of mylonitic gneiss, amphibolite, gneiss and ophicalcite on a faulted contact, (Appendix 1).

TBD2 and TBD5 were drilled at 180° to each other and 50 metres apart to give the stratigraphy of the lower Hutchison. From a very fractured and heavily weathered zone the core revealed a series of augen gneiss - mylonites, feldspathic quartzite and a siliceous dolomite (Appendix 1, logs TBD 2 & 5) with the Lincoln Complex - Hutchison Group contact in the first few meters of TBD2 and TBD5 within the warrow quartzite.

(b) Radiometric anomalies

Five holes were drilled on three radiometric anomalies within the Lincoln Complex. TBD's 3 and 4 located minor extensions at depth of the surface anomaly TB1 - 1 and one intersection of 0.15m of 1550 ppmU which does not relate to a surface anomaly. TBD6 on anomaly TB20 and TBDs 7 and 8 on anomaly TB1 - 2 (Taliala) failed to find any extension of the surface anomalies, (Appendix 1, logs TBD 3, 4, 6, 7 & 8).

5. DISCUSSION

Not being involved in the auger drilling programme but only in the final stages of the diamond drilling programme plus a lack of some basic information such as lithological logs for the auger drilling makes interpretation of the results difficult.

The geochemical results from the auger drilling must be questioned because:

1. As F. Barrett says in appendix 3 "Most holes were stopped when the rock type could be reliably identified",

and

2. the values given in the analysis are suspect as duplicate samples 11708 and 11718, and 11712 and 11719 indicate.

The significance of 1. is that without lithological logs for the auger drilling and a lack of a specific target such as bedrock it can only be assumed that the holes reached the C horizon and that the results reflect the bedrock geochemistry and stratigraphy.

The diamond drill hole through the contact of the Lincoln Complex and the Hutchison Group (TBD1) shows the contact to be faulted and may have some basic igneous activity adjacent to the fault. TBD2 also crosses the contact and shows it to be faulted with no basic igneous activity. The basal rock for the Hutchison in TBD1 is an ophicalcite with some preferred orientation of the olivine, whilst in TBD2 it is a feldspathic quartzite which is gneissic in appearance. Both TBD2 and TBD5 have been drilled in a badly faulted zone and intense weathering has made rock identification from the core extremely difficult in large parts of the holes, particularly TBD5. The faulting at the contact post dates the D 3 mylonite event and is not obviously related to it. These two holes, TBD2 and TBD5, did not fulfil their desired purpose due to poor location of the sites but useful information can still be extracted from them.

The Auger drill stratigraphic profile shows that the Hutchison Group becomes more homogeneous to the west, being essentially a mica-schist. The lower section consists of biotite gneisses, cherts, ferruginous quartzites, pegmatites and graphitic schists.

Testing of the high background soil areas have shown that the high levels are due to Thorium within the laterite profile which was evident from the earlier soil sampling programme over the same areas. The most interesting results of the auger drilling geochemistry are the sudden drop in thorium values in the upper Hutchison Group and the Cu - U - V associations in the tertiary cover overlying the Hutchison. The change in the thorium values should be tested on outcrops to see if it is a general trend in the Hutchison or only localized. The tertiary Cu - U - V association may explain some of the high background areas in the covered central portion of the E.L.

No significant extensions of the surface anomalies were detected by the drilling programme on TB1 - 1, TB1 - Tallala and TB20. The surface anomalies are very patchy and high values are found only in areas of a few square centimetres. The core reveals this to be a general trend in the Lincoln Complex with any mineralization located to date being patchy. The other known prospects in the Port Lincoln area appear to confirm this.

These uranium occurrences are probably due to remobilization of the uranium during the D3 deformation of the area and the subsequent retrograde metamorphism to middle amphibolite facies.

The intrusive amphibolites appear to be acting as structural controls for this minor mineralization and detailed study of the hornblende granites and their surrounding intrusive augen-gneiss-granites could reveal a more significant deposition of uranium within the Lincoln Complex where larger structural traps may have operated for the hydrothermal fluids. Of importance is the fact that in the concentrations of uranium intersected by the drilling is the presence of pitchblende as the major uranium mineral and its apparent hydrothermal origin as opposed to the more general refactory mineralization in the area. This mobilization of hydrothermal uranium within the Lincoln orthogneiss would suggest the contact zone with the Hutchison Group and its basal calc-silicate beds could be prospective for structurally controlled mineralization.

TABLE 1

HOLE NO.	TBD3	TBD3	TBD3	TBD3	TBD4	TBD4	TBD4	TBD4	TBD4	TBD3	TBD6	TBD6	TBD7
DEPTH (m)	7.8	8.5	58.4	61.6	62.5	14.6	14.7	15.3	59.6	22.9	34.6	57.0	113.4
SAMPLE NO.	1438	1439	1442	1443	1562	1566	1568	1570	1576	1580	1583	1584	1590
OXIDE													
SiO_2	49.00	69.50	70.90	46.20	69.90	61.70	63.30	62.30	66.20	47.60	67.70	46.80	51.90
TiO_2	3.00	0.42	0.48	0.73	0.46	0.55	0.53	0.60	0.48	1.50	0.68	1.55	1.25
AL_2O_3	12.50	14.50	13.70	13.40	13.70	16.90	17.60	17.50	15.90	15.40	13.90	15.60	12.10
*Fe_2O_3	17.10	3.25	3.55	11.10	3.65	5.20	4.30	4.60	4.25	13.80	5.45	15.50	13.30
MnO	0.20	0.03	0.02	0.17	0.03	0.07	0.05	0.05	0.06	0.19	0.07	0.18	0,21
MgO	4.50	0.70	0.60	13.20	0.90	2.80	1.10	1.00	0.90	5.70	1.10	6.60	4.60
CaO	8.45	2.00	1.65	9.05	1.45	5.50	5.15	5.35	4.20	8.15	3.15	8.70	12.10
Na_2O	1.83	2.57	2.53	1.24	2.45	5.12	5.30	5.23	4.00	3.42	2.37	2.22	3.95
K_2O	2.00	4.85	5.50	2.95	5.60	1.60	1.90	1.20	3.25	2.10	4.05	1.50	0.70
P_2O_5	0.54	0.09	0.10	0.10	0.09	0.17	0.21	0.24	0.17	0.19	0.14	0.16	0.54
TOTAL	99.12	97.91	99.03	98.14	98.23	99.61	99.44	98.07	99.41	98.05	98.61	98.81	100.65

** Fe_2O_3 is total Iron

HOLE NO.	TBD3	TBD3	TBD3	TBD3	TBD4	TBD4	TBD4	TBD4	TBD4	TBD3	TBD6	TBD6	TBD7
DEPTH (m)	7.8	8.5	58.4	61.6	62.5	14.6	14.7	15.3	59.6	22.9	34.6	57.0	113.4
SAMPLE NO.	1438	1439	1442	1443	1562	1566	1568	1570	1576	1580	1583	1584	1590
ELEMENT													
U	2.9	8.0	7.0	1.6	4.2	380	660	1550	320	130	9.5	3.5	8.0
Th	x	50	60	4	60	50	60	90	75	70	35	10	35
Ba	250	850	750	90	670	140	180	80	380	170	900	470	320
Sr	130	130	120	80	95	160	180	170	150	140	130	190	190
V	380	25	25	170	40	240	560	550	280	280	50	260	130
Y	50	30	30	20	45	85	65	85	150	130	45	25	170
Sn	x	6	5	x	x	15	8	7	15	25	x	x	10
Mo	5	x	x	x	x	9	10	30	10	x	x	x	x
As	8	x	x	x	6	x	x	x	x	x	6	x	10
Cu	150	25	5	105	30	40	5	5	5	10	20	150	5
Pb	60	20	25	40	25	120	210	430	95	50	10	15	5
Zn	90	35	40	80	30	55	40	45	40	135	60	100	45
Ag	1.0	x	x	x	x	x	x	x	x	x	x	x	x
Ni	50	15	15	470	20	65	20	20	15	100	20	90	20
Co	65	20	15	85	25	30	20	20	15	70	25	80	20
Cr	70	80	110	910	160	220	80	70	70	70	120	110	90

TABLE 1

TABLE 2 - AUGER DRILL ANALYSIS

HOLE NO. TUB	SAMPLE NO.	DEPTH m.	U	TH	Cu	V	Pb	Zn
1	11751	0-1	2.50	40	5	145	30	15
	2	1-2	0.50	40	<5	200	40	15
	3	2-3	<0.10	25	5	110	20	5
	4	3-4	1.34	25	5	110	60	10
	5	4-5	1.18	25	5	60	80	10
	6	5-6	0.68	25	5	70	50	10
	7	6-7	0.16	40	5	55	30	10
	8	7-8	1.18	20	5	40	30	15
	9	8-9	1.38	30	<5	45	40	10
	11760	9-10	0.88	30	<5	35	40	10
	1	10-11	1.80	30	5	45	40	10
	2	11-12	0.60	35	5	65	60	10
	3	12-13	0.54	30	5	25	45	10
	4	13-14	1.94	25	5	50	50	10
	5	14-15	2.18	35	5	80	60	10
	6	15-16	2.14	30	5	70	70	5
	7	16-17	1.72	25	5	30	60	5
	8	17-18	1.10	30	5	55	90	5
	9	18-19	0.84	30	10	90	80	5
	11770	19-20	0.54	25	5	70	70	10
	1	20-21	1.26	30	5	85	80	5
	2	21-22	1.78	40	5	85	70	5
	3	22-23	1.20	30	<5	65	50	5
	4	23-24	1.34	35	<5	75	40	5
	5	24-25	1.48	35	5	65	60	5
	6	25-26	1.60	30	5	75	70	5
	7	26-27	1.86	35	5	75	70	5
	8	27-28	3.20	25	10	30	50	5
	9	28-29	2.90	30	5	60	50	5
	11780	29-30	3.20	30	10	60	50	5
	1	30-31	2.50	30	10	115	50	5
	2	31-32	1.08	20	<5	85	40	5
	3	32-33	1.66	25	15	55	40	10
	4	33-34	3.50	25	20	65	50	10
	5	34-35	3.90	30	55	70	60	10
	6	35-36	5.60	30	60	60	30	10
	7	36-37	5.90	30	35	50	40	15
	8	37-38	5.70	30	40	50	40	15
	9	38-39	6.90	30	35	40	40	15
	11790	39-40	6.10	25	20	25	30	10
	1	40-41	5.30	30	15	40	30	10
	2	41-42	4.20	20	15	35	40	10
	3	42-43	4.90	25	15	35	30	10
	4	43-44	6.60	20	20	35	40	10
	5	44-45	7.40	25	40	30	50	25
	6	45-46	9.00	20	60	40	60	45
	7	46-47	11.60	20	65	20	50	60
	8	47-48	10.40	20	50	20	40	70
	9	48-49	9.00	15	55	30	50	95
	11800	49-50	8.50	20	35	45	50	120
	1	50-51	7.10	20	25	40	30	110
	2	51-52	6.50	15	15	50	40	160
	3	52-53	4.30	10	15	70	40	150
	4	53-54	3.90	15	20	75	30	140
	5	54-55	3.60	15	20	60	20	160
	6	55-56	4.80	20	30	75	30	75
	7	56-57	3.40	10	20	140	30	170
	11808	57-58	3.40	5	10	155	40	150

TABLE 2

)LE). JB	SAMPLE NO.	DEPTH m.	U	TH	Cu	V	Pb	Zn
	11501	0-1	6.30	135	10	400	55	10
	2	1-2	8.80	80	5	270	40	10
	3	2-3	2.60	40	5	85	50	10
	4	3-4	0.52	20	<5	15	40	5
	5	4-5	0.84	35	<5	10	50	5
	6	5-6	2.20	35	5	5	50	5
	7	6-7	0.60	80	5	90	120	10
	8	7-8	0.72	85	10	290	100	10
	9	8-9	0.90	60	10	40	100	10
	11510	9-10	0.82	40	5	35	120	10
	1	10-11	0.58	95	10	360	90	5
	2	11-12	1.16	20	10	<5	50	10
	3	12-13	0.72	30	5	10	40	15
	4	13-14	1.12	15	5	<5	30	10
	5	14-15	0.48	20	5	<5	<10	10
	6	15-16	1.60	10	10	5	<20	10
	7	16-17	2.20	40	20	5	<40	20
	8	17-18	2.70	30	25	10	30	10
	9	18-19	3.50	30	45	15	55	30
	11520	19-20	4.50	20	30	25	55	20
	1	20-21	2.70	35	30	20	30	20
	2	21-22	4.00	15	45	30	40	30
	3	22-23	5.90	10	75	145	40	30
	4	23-24	5.70	10	75	230	110	40
	5	24-25	5.20	10	65	195	60	50
	6	25-26	5.70	10	100	190	30	55
	7	26-27	2.70	5	120	175	30	60
	8	27-28	2.70	10	95	175	40	75
	9	28-29	3.40	10	85	160	50	70
	11530	29-30	5.00	<5	120	220	50	95
	1	30-31	2.90	5	150	210	40	150
	2	31-32	2.40	<5	110	220	60	130
	3	32-33	7.60	5	160	210	60	130
	4	33-34	6.00	<5	140	60	40	95
	5	34-35	4.70	10	25	5	20	55
	6	35-36	5.20	15	30	20	10	55
	7	36-37	4.60	10	45	15	25	50
	8	37-38	4.40	15	55	20	25	55
	9	38-39	5.90	10	75	25	15	80
	11540	39-40	4.10	15	50	20	<10	50
	1	40-41	7.70	10	55	15	20	55
	11542	16-17	2.50	15	10	<5	20	20
	3	16-17	4.80	25	5	45	15	20
	4	-	-	-	-	-	-	-
	5	13-14	4.50	35	15	110	65	30
	6	10-11	2.60	30	10	30	45	20
	7	12-13	4.30	25	10	25	20	15
	8	13-14	9.10	130	10	70	60	30
	9	6-7	2.40	20	10	30	40	40
	11550	4-5	1.10	40	5	15	20	50
	1	7-8	1.62	20	5	60	45	320
	2	14-15	0.66	30	20	90	25	40
	3	10-11	0.56	25	<5	70	25	30

TABLE 2

HOLE NO. TUB	SAMPLE NO.	DEPTH m.	U	TH	Cu	V	Pb	Zn
15	11554	1-2	1.34	40	45	325	50	20
	5	3-4	0.84	10	15	75	<10	25
	6	5-6	1.20	30	15	80	20	30
	7	7-8	2.26	15	15	95	40	45
	8	9-10	2.10	25	15	90	25	60
	9	11-12	1.20	10	30	45	15	70
	11560	13-14	0.70	30	25	35	40	90
	1	15-16	1.50	15	20	60	15	140
	2	17-18	3.00	35	5	100	50	25
	3	19-20	2.20	15	<5	75	30	50
	4	20-21	0.86	30	5	55	20	35
6	5	1-2	0.64	15	5	20	20	10
7	6	16-17	2.18	75	20	185	25	10
8	7	7-8	2.80	35	5	75	40	10
9	8	7-8	4.70	40	10	10	20	25
0	9	4-5	0.86	15	10	10	20	5
1	11570	6-7	2.86	5	25	105	30	75
2	1	7-8	3.80	20	45	60	40	95
3	2	9-10	19.20	95	10	15	50	15
4	3	1-2	4.00	25	15	100	60	15
	4	3-4	2.80	20	10	25	10	15
	5	5-6	4.30	30	10	<5	30	15
	6	7-8	2.80	10	15	20	40	10
	7	9-10	4.80	40	65	70	60	30
	8	11-12	1.74	10	35	20	70	15
	9	12-13	5.50	30	40	35	60	15
	11580	15-16	5.90	20	30	25	50	15
	1	17-18	6.30	15	45	20	150	25
	2	19-20	7.50	20	60	70	90	45
	3	21-22	8.50	20	50	75	80	75
	4	23-24	8.20	25	80	50	80	55
	5	25-26	6.00	20	20	50	70	35
	6	27-28	5.80	20	20	25	65	30
5	7	10-11	4.20	10	5	<5	35	10
5	8	10-11	8.60	30	70	30	50	20
7	9	1-2	1.96	45	10	150	60	20
	11590	3-4	5.20	45	10	160	65	15
	1	5-6	1.24	20	5	20	55	10
	2	7-8	0.94	10	10	25	35	10
	3	9-10	4.60	25	5	35	40	10
	4	11-12	4.30	25	5	45	80	10
	5	13-14	1.86	20	10	25	30	30
	6	15-16	6.80	15	15	10	150	25
	7	17-18	9.90	25	10	55	90	10
	8	19-20	13.40	135	20	45	60	15
	9	21-22	17.20	165	30	45	55	15
	11600	23-24	16.40	125	55	45	50	15
	1	25-26	18.00	130	45	50	40	15
	2	27-28	14.60	90	35	45	30	25
	3	29-30	14.00	110	10	50	70	20
	4	31-32	15.00	100	20	45	40	450
	5	33-34	11.80	115	15	45	50	270
	6	35-36	9.60	40	10	25	50	350
	7	37-38	8.30	20	10	25	45	200

TABLE 2

HOLE NO. TUB	SAMPLE NO.	DEPTH m.	U	TH	Cu	V	Pb	Zn
28	11608	7-8	5.90	45	10	15	90	25
29	9	7-8	7.90	35	10	30	50	20
30	11610	7-8	4.40	95	15	50	35	65
1	1	7-8	1.48	10	<5	<5	15	10
2	2	4-5	8.50	140	5	25	50	10
3	3	7-8	9.00	120	5	<5	10	20
4	4	7-8	7.60	60	10	55	50	30
5	5	19-20	6.30	30	15	35	30	75
6	6	7-8	9.80	110	10	<5	20	20
7	7	4-5	2.02	40	10	15	20	25
8	8	4-5	8.60	130	5	<5	20	15
9	9	7-8	5.30	<5	20	60	25	50
0	11620	7-8	6.10	15	25	55	30	95
1	1	13-14	5.50	10	20	10	60	40
2	2	7-8	5.30	20	30	55	20	65
3	3	12-12.5	2.80	15	30	40	25	70
4	4	10-11	4.50	15	40	75	25	120
5	5	7-8	5.10	20	45	80	20	150
	6	10-11	3.20	<5	25	270	30	130
	7	7-8	5.10	10	35	180	40	140
	8	7-8	14.60	15	55	55	30	110
	9	10-11	5.00	15	40	115	25	60
	11630	4-5	6.00	20	65	105	90	55
	1	4-5	4.40	10	50	100	35	110
	2	4-5	6.60	25	45	100	50	90
	3	1-2	3.80	20	75	115	60	80
	4	1-2	4.30	10	70	100	20	250
	5	1-2	2.50	10	35	50	20	70
	6	10-11	4.30	15	20	50	50	95
	7	13-14	3.80	15	55	100	70	110
	8	7-8	4.10	15	55	60	50	90
	9	13-14	1.18	<5	30	150	20	65
	11640	7-8	1.88	<5	10	<5	40	35
	1	7-8	2.30	10	60	110	30	140
	2	7-8	4.50	10	200	75	30	130
	3	4-5	1.76	5	270	285	15	140
	4	7-8	2.30	15	20	50	40	45
	5	10-11	3.50	10	70	70	45	150
	6	7-8	2.00	<5	55	270	40	75
	7	16-17	2.70	15	300	160	20	190
	8	15-16	2.40	20	20	65	50	15

TABLE 2

OLE O. UB	SAMPLE NO.	DEPTH m.	U	TH	Cu	V	Pb	Zn
9	11649	12-13	7.60	20	60	255	80	25
0	11650	-	-	-	-	-	-	-
1	1	7-8	1.08	<5	5	<5	15	10
2	2	22-23	1.88	20	60	55	25	60
3	3	5-6	2.20	10	25	<5	50	45
4	4	6-7	3.70	25	10	<5	50	45
5	5	16-17	8.10	20	10	<5	25	25
6	6	22-23	5.90	65	25	55	90	75
7	7	1-2	2.00	125	5	25	60	20
	8	3-4	3.40	130	5	25	40	20
	9	5-6	3.10	135	10	15	30	15
	11660	7-8	5.20	185	10	20	60	25
	1	9-10	4.80	145	10	15	45	20
	2	11-12	6.10	155	5	10	80	20
	3	13-14	6.00	140	10	20	60	30
	4	15-16	4.90	135	10	10	60	30
	5	17-18	4.50	125	15	45	40	30
	6	19-20	3.80	160	20	35	50	25
	7	21-22	3.70	85	30	20	40	30
	8	12-13	7.20	120	10	<5	40	35
	9	21-22	2.80	10	30	35	30	45
	11670	10-11	1.30	<5	10	<5	90	15
	1	9-10	7.00	125	10	<5	50	25
	2	14-15	4.50	65	5	<5	35	25
	3	15-16	4.60	100	10	30	20	50
	11674	6-7	5.90	55	10	5	30	30
	5	16-17	11.80	10	25	365	45	20
	6	12-13	5.00	100	10	65	110	10
	7	12-13	4.80	60	5	15	40	5
	8	10-11	5.50	65	15	25	50	25
	9	13-14	6.80	70	15	60	35	20
	11680	16-17	13.40	120	25	35	20	35
	1		1.80	25	5	35	10	5
	2	22-23	12.20	20	85	325	20	70
	3	16-17	4.60	50	30	80	40	25
	4	38-39	13.80	35	10	10	20	10
	5	41-42	7.00	5	10	15	30	20
	6	1-2	0.76	25	5	120	20	10
	7	3-4	0.10	15	5	145	20	5
	8	5-6	1.00	20	5	30	50	10
	9	7-8	<0.10	15	5	305	120	10
	11690	9-10	0.40	<5	10	35	30	10
	1	11-12	0.18	<5	5	35	20	10
	2	13-14	0.54	<5	15	30	30	10
	3	15-16	1.78	5	35	80	70	30
	4	17-18	1.02	25	20	<5	640	10

TABLE 2

:OLE 'O. 'UB	SAMPLE NO.	DEPTH m.	U	TH	Cu	V	Pb	Zn
7	11695	1-2	<0.10	25	5	80	80	<5
	6	3-4	<0.10	30	5	75	70	<5
	7	5-6	0.28	35	5	210	50	5
	8	7-8	0.84	20	5	40	100	5
	9	9-10	1.24	10	10	25	130	10
	11700	11-12	1.62	30	10	<5	120	5
	1	13-14	0.84	10	10	<5	90	5
	2	15-16	1.60	20	15	<5	80	10
	3	17-18	1.70	20	20	<5	60	10
	4	19-20	<0.10	20	10	<5	60	10
	5	21-22	1.18	15	10	<5	50	10
	6	23-24	1.78	25	15	<5	180	15
	7	25-26	1.16	10	10	<5	90	15
	8	27-28	3.00	40	160	50	3900	110
	11709	29-30	7.90	10	35	145	60	35
	11710	31-32	4.70	25	65	60	680	50
	1	33-34	6.20	15	20	40	50	20
	2	35-36	5.70	15	40	25	350	35
	3	37-38	7.20	5	25	150	60	20
	4	39-40	7.50	15	30	85	100	25
	5	41-42	10.00	10	30	140	70	35
	6	43-44	8.00	10	30	95	90	35
	*7	9-10	1.10	15	10	20	120	10
	*8	27-28	4.40	15	20	50	70	25
	*9	35-36	7.10	10	20	40	40	20
8	11720	38-39	6.70	10	10	10	60	60
9	1	43-44	4.10	15	<5	<5	20	25
)0	2	33-34	8.10	15	15	<5	130	75
	3	10-11	9.00	15	5	25	30	15
	4	25-26	8.40	5	15	50	40	75
)1	5	16-17	25.6	<5	25	90	20	60
	6	22-23	15.00	<5	30	100	30	75
	7	24-25	16.40	<5	30	100	20	75
)2	8	16-17	19.00	10	20	45	50	120
)3	9	19-20	5.80	<5	30	170	20	120
)4	11730	19-20	9.80	10	65	40	50	90
)5	1	15-16	3.20	<5	10	<5	20	10
)6	2	17-18	12.40	<5	75	130	40	75
)7	3	33-34	2.90	15	20	395	40	15
)8	4	27-28	1.26	<5	85	185	50	55
)9	5	27-28	4.80	<5	150	215	20	130
.0	6	23-24	7.80	<5	150	305	50	60
.1	7	20-21	8.30	210	25	45	60	35
2	8	10-11	1.36	<5	45	95	40	35
3	9		13.40	<5	25	60	40	150
4	11740		5.60	<5	5	<5	20	15
5	1	18-19	1.04	<5	5	<5	25	10
6	2	15-16	8.00	<5	50	<5	50	70
7	3	21-22	6.30	5	10	<5	35	15

TABLE 2

HOLE NO. TUB	SAMPLE NO.	DEPTH m.	U	TH	Cu	V	Pb	Zn
118	11744	60-61	17.40	<5	65	15	30	25
119	5	19-20	14.40	<5	20	<5	20	35
120	6	25-26	7.70	15	15	25	50	50
121	7	16-17	0.80	15	55	65	30	65

TABLE 3

SAMPLE NO.	HOLE NO.	DEPTH
1438	TBD3	7.8
1439	TBD3	8.6
1441	TBD3	34.6
1442	TBD3	58.4
1443	TBD3	61.6
1444	TBD3	64.6
1555	TBD4	46.4
1562	TBD4	62.5
1565	TBD4	91.4
1566	TBD4	14.6
1568/9	TBD4	14.7
1570	TBD4	15.3
1576	TBD4	59.6
1580/81	TBD3	22.9
1583	TBD6	34.6
1584	TBD6	57.0
1588	TBD7	80.1
1590	TBD7	113.4
1595	TBD1	157.4
1596	TBD1	160.8
1597	TBD1	162.0
1598	TBD1	164.0
1599	TBD1	171.7

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AFMECO PTY. LTD. | **HOLE Nº** TBD 1

PROJECT: TUMBY BAY **Nº.:** 126

1:250 000 MAP SHEET: LINCOLN **Nº.:** SI 53-11

Collar Coords (m): 575500 E, 6175400 N, (AMG ☒ GRID ☐)

Collar R.L.:

Azimuth: 280 °, (Mag ☒, Grid ☐)

Inclination: − 45 °,

Date begun 8-2-81

Date terminated 14-2-81

Contractor LONGYEAR

Drill LONGYEAR 38

Drilling techniques DIAMOND

Reasons for termination
TARGET REACHED

GEOLOGIST Y BLADIER
DATE 21-9-81

LITHOLOGY (Use BMR Symbols)

- MYLONITE
- GNEISS
- SCHIST
- OPHICALCITE
- DOLOMITE
- QUARTZITE
- AMPHIBOLITE
- SOIL COVER

CASING

Size	From	To
BW	0	96

STANDING WATER DEPTH

SAMPLE Nº

WEDGES PLACED

Type	Depth

HOLE CONDITIONS WHILE LOGGING

☐ DRY ☐ WATER ☐ MUD ☐ OPEN HOLE ☐ IN PIPE

ADDITIVES

STRUCTURE

Bedding · Banding · Foliation · Fracture, joint · Fault · Breccia

GENERAL COMMENTS

SCALE 1: 200

Depth (m) | Core / Non core | Hole size | % core recovery | Hole attitude | Lithology | Structure (angle to bedding) | **OBSERVATIONS** | **ANALYSIS** U, Th

SOIL COVER

MYLONITE DARK GREY WITH PHENOCRYSTS OF FELDSPAR UP TO 1CM DIAMETER FRACTURED ALONG FOLIATION PLANE

MYLONITE

MYLONITE

AUGEN GNEISS MYLONITE
INTERBEDS OF K FELDSPAR
QUARTZ AMPHIBOLE
AUGEN GNEISS WITH DARKER
MYLONITE LAYERS

OPHICALCITE

GNEISSIC MYLONITE

SLIGHTLY BANDED
SERPENTINE MARBLE
(OPHICALCITE)

3776(II)-2

AFMECO PTY. LTD.	HOLE Nº TBD-2

PROJECT: TUMBY BAY **Nº.:** 126

1:250 000 MAP SHEET: LINCOLN **Nº:** SI-53-11

Collar Coords (m): 576000 E, 61795 N, (AMG ☒ GRID ☐)

Collar R.L.:

Azimuth: 110°, (Mag ☒, Grid ☐)

Inclination: −45°,

Date begun 17-2-81

Date terminated 24-2-81

Contractor LONGYEAR

Drill LONGYEAR 38

Drilling techniques DIAMOND

Reasons for termination

TARGET REACHED

GEOLOGIST P WALKER

DATE 21-9-81

LITHOLOGY (Use BMR Symbols).

- SOIL COVER
- GNEISS
- MYLONITE
- QUARTZITE

CASING

Size	From	To
BW	0	80

STANDING WATER

DEPTH

SAMPLE Nº

WEDGES PLACED

Type	Depth

HOLE CONDITIONS WHILE LOGGING

☐ DRY ☐ WATER ☐ MUD ☐ OPEN HOLE ☐ IN PIPE

ADDITIVES

STRUCTURE

- Bedding
- Banding
- Foliation
- Fracture, joint
- Fault
- Breccia

GENERAL COMMENTS

VERY BAD GROUND CONDITIONS

SCALE 1:200

Depth (m)	Core / Non core	Hole size	% core recovery	Hole attitude	Lithology	Structure (angle to bedding)	OBSERVATIONS	ANALYSIS U	Th						
0							SOIL COVER								
							QUARTZ FELDSPAR MUSCOVITE QUARTZITE GNEISS(?)								
							QUARTZ FELDSPAR BIOTITE AUGEN GNEISS								

3776(II)-3

AFMECO PTY. LTD. | HOLE Nº: TBD-3

PROJECT: TUMBY BAY **Nº:** 126
250 000 MAP SHEET: LINCOLN **Nº:** SI 53-11
Collar Coords (m): 5812 E., 61798 N. (AMG ☒ GRID ☐)
Collar R.L.:
Azimuth: 125°, (Mag ☒, Grid ☐)
Inclination: -60°,

Hole begun: 28-2-81
Hole terminated: 5-3-81
Contractor: LONGYEAR
Drill: LONGYEAR 38
Drilling technique: DIAMOND

Reasons for termination
TARGET REACHED

GEOLOGIST: J. POOLE
DATE: 21-9-81

LITHOLOGY (Use BMR Symbols).

- SOIL COVER
- GNEISS
- AMPHIBOLITE

CASING			WEDGES PLACED	
Size	From	To	Type	Depth
	0	3		
	0	21		

HOLE CONDITIONS WHILE LOGGING
☐ DRY ☐ WATER ☐ MUD ☐ OPEN HOLE ☐ IN PIPE
ADDITIVES:

STRUCTURE

- Bedding
- Banding
- Foliation
- Fracture, joint
- Fault
- Breccia

GENERAL COMMENTS

SCALE: 1:200

OBSERVATIONS

- SOIL COVER
- DARK GREEN AMPHIBOLITE WITH GNEISSIC TEXTURE OF QUARTZ AND FELDSPAR
- QUARTZ FELDSPAR BIOTITE GNEISS
- AMPHIBOLITE
- QUARTZ FELDSPAR BIOTITE HORNBLENDE GNEISS WITH THIN CONCORDANT LAYERS OF AMPHIBOLITE
- AMPHIBOLITE
- QUARTZ FELDSPAR BIOTITE HORNBLENDE GNEISS WITH MINOR AMPHIBOLITE BANDS
- AMPHIBOLITE
- GNEISS
- GNEISS
- AMPHIBOLITE
- GNEISS
- AMPHIBOLITE
- GNEISS
- AMPHIBOLITE
- GNEISS AMPHIBOLITE
- QUARTZ FELDSPAR BIOTITE GNEISS WITH MINOR AMPHIBOLITES

ANALYSIS (ppm)

U	Th	V	Cu	Pb	Zn
2 9	x	380	[illegible]	69	95
8 0	50	25	25	20	90
130	70	280	10	50	135
75	60	25	5	25	40
1 6	4	170	105	40	80

AFMECO PTY. LTD. | **LOGGING DATA** | **Hole No.** TBD 3

PROJECT TUMBY BAY | Date 18.5.81 | Logger Type MT SOPRIS | Model No II
Co-ordinates XYZ 5812E 61798N | Operator I. NIEL | Serial No 152

GAMMA RAY

RUN No	1	2	3
Logged depth (m)	113		
Range (full scale)	500		
Time constant (sec)	4.5		
Paper scale	1:100		
Logging speed (m/min)	3		
Background count (cps)	25		
Source 1, 2, 3, 4 (cps)	350		
Probe No / type	SN815		
Dead time (μsec) PROBE / SYSTEM			
Bore hole medium			
Tubes in hole			

NEUTRON

RUN No	1	2	3
Logged depth (m)			
Range (full scale)			
Time constant (sec)			
Paper scale			
Logging speed (m/min)			
Source (cps)			
Probe No / type			
Source No			
Dead time			
Hole medium			
Hole diameter			
Standing water			
Tubes in hole			

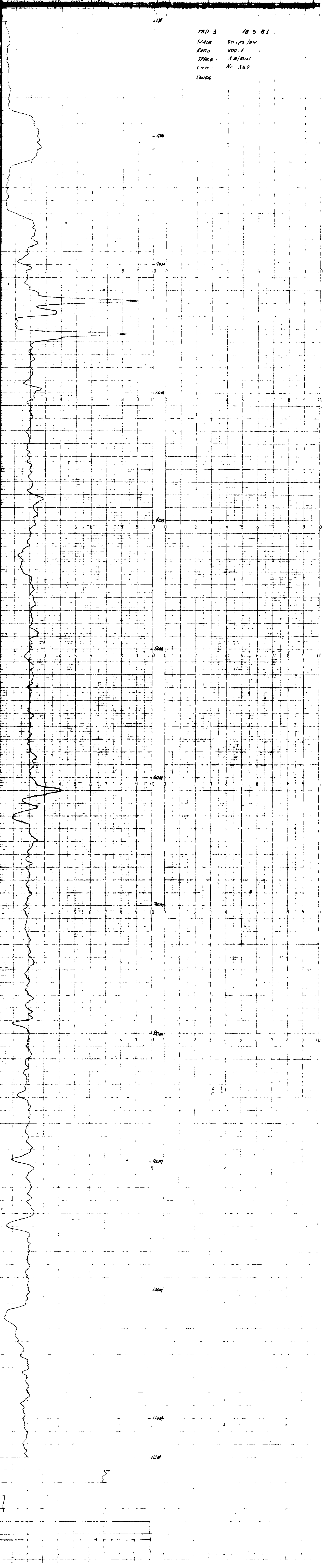
ELECTRIC

Logged depth (m)			
Resistivity scale			
S P scale			
Paper scale			
Logging speed (m/min)			
Probe			
Hole medium			

DIRECTIONAL

STN No	ANGLE	DIRECTION	CABLE DEPTH	TRUE DEPTH
1				
2				
3				
4				
5				
6				
7				
8				
9				

REMARKS



3776 (II) - 4

AFMECO PTY. LTD. | HOLE Nº TBD-4

PROJECT: TUMBY BAY **Nº:** 126

1 250 000 MAP SHEET: LINCOLN **Nº** SI 53-11

Collar Coords (m) 5812 E. 61798 N. (AMG ☒ GRID ☐)

Collar R.L.:

Azimuth: 95 ° (Mag ☐ Grid ☐)

Inclination: – 60 °

Date begun 5-3-81

Date terminated 7-3-81

Contractor LONGYEAR

Drill LONGYEAR 38

Drilling techniques DIAMOND

Reasons for termination
TARGET DEPTH

GEOLOGIST J POOLE
DATE

LITHOLOGY (Use BMR Symbols).

SOIL COVER
GNEISS
AMPHIBOLITE

CASING			WEDGES PLACED	
Size	From	To	Type	Depth
BW	0	3		

STANDING WATER DEPTH
SAMPLE Nº

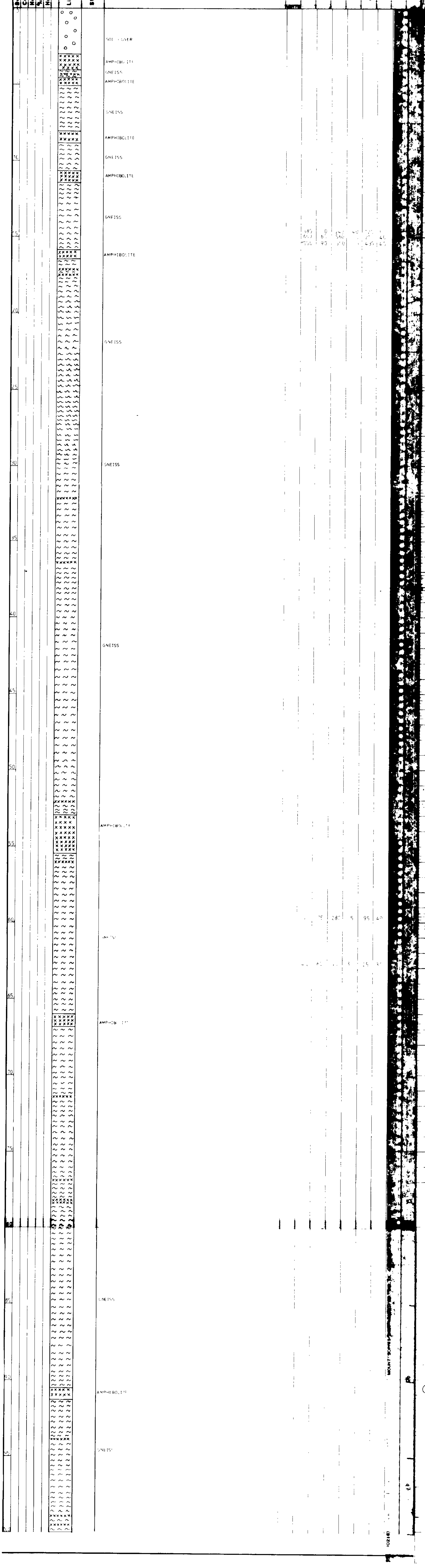
HOLE CONDITIONS WHILE LOGGING
☐ DRY ☐ OPEN HOLE
☐ WATER ☐ IN PIPE
☐ MUD
ADDITIVES

STRUCTURE

Bedding — Fracture, joint
Banding — Fault
Foliation — Breccia

GENERAL COMMENTS

SCALE 1: 200



AFMECO PTY. LTD. | **LOGGING DATA** | **Hole No.** TBD 4

PROJECT TUMBY BAY Date 18-5-81 Logger Type MT SOPRIS **Model No** II

Co-ordinates XYZ 5812E 61798N Operator E NIEL **Serial No** 352

GAMMA RAY	1	2	3
RUN No	1	2	3
Logged depth (m)	97	69	19
Range (full scale)	500	1000	5000
Time constant (sec)	45	45	45
Paper scale	1:100	1:50	1:50
Logging speed (m/min)	3	1	1
Background count (cps)	25	25	2
Source 1 (cps)	350	350	350
Source 2 (cps)			
Source 3 (cps)			
Source 4 (cps)			
Probe No / type	SN815	SN815	SN815
Dead time (μsec) PROBE / SYSTEM			
Bore hole medium			
Tubes in hole			

NEUTRON	1	2	3
RUN No			
Logged depth (m)			
Range (full scale)			
Time constant (sec)			
Paper scale			
Logging speed (m/min)			
Source (cps)			
Probe No / type			
Source No			
Dead time			
Hole medium			
Hole diameter			
Standing water			
Tubes in hole			

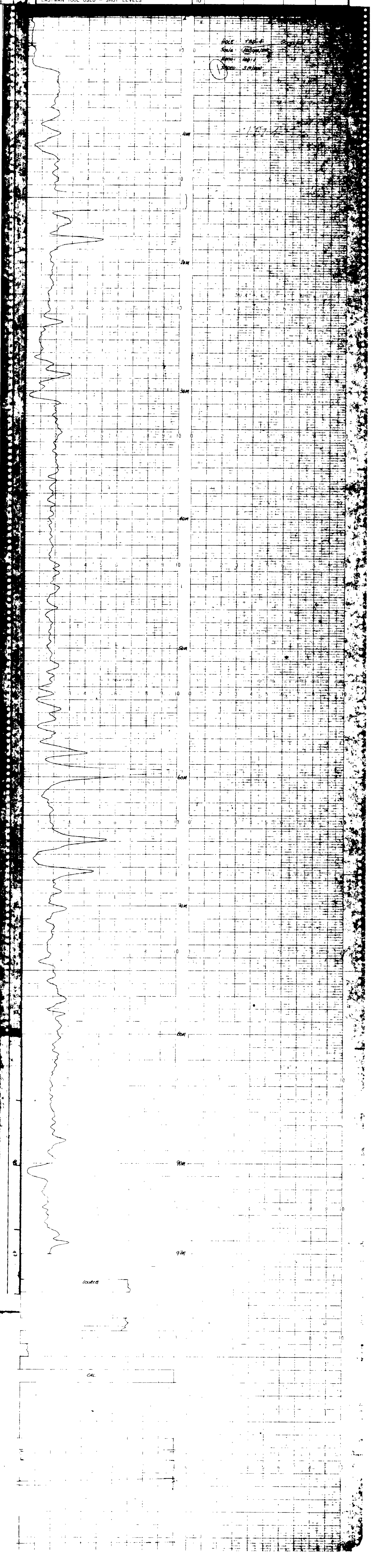
ELECTRIC			
Logged depth (m)			
Resistivity scale			
S P scale			
Paper scale			
Logging speed (m/min)			
Probe			
Hole medium			

DIRECTIONAL

STN No	ANGLE	DIRECTION	CABLE DEPTH	TRUE DEPTH
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				

REMARKS

EASTMAN TOOL USED – SHOT LEVELS



3776 (II) - 5

AFMECO PTY. LTD. | HOLE Nº TBD 5

PROJECT: TUMBY BAY, Nº: 126

1:250 000 MAP SHEET: LINCOLN, Nº: SI 53-11

Collar Coords (m): 5760 E, 61795 N, (AMG ☒ GRID ☐)

Collar R.L.:

Azimuth: 290 °, (Mag ☒, Grid ☐)

Inclination: − 45 °

Date begun 11-3-81

Date terminated 19-3-81

Contractor LONGYEAR

Drill LONGYEAR 38

Drilling techniques DIAMOND

Reasons for termination
TARGET DEPTH

GEOLOGIST J POOLE
DATE 21-9-81

LITHOLOGY (Use BMR Symbols).

- SOIL COVER
- KAOLINIZED QUARTZITE
- SERICITIC QUARTZITE
- BROWN SAND
- DOLOMITE

CASING			WEDGES PLACED	
Size	From	To	Type	Depth
NW	0	8		

STANDING WATER DEPTH

SAMPLE Nº

HOLE CONDITIONS WHILE LOGGING

☐ DRY ☐ WATER ☐ MUD ☐ OPEN HOLE ☐ IN PIPE

ADDITIVES

STRUCTURE

Bedding — Fracture, joint — Banding — Fault — Foliation — Breccia

GENERAL COMMENTS

VERY BAD GROUND-HEAVILY FRACTURED AND WEATHERED FOR ENTIRE HOLE TO 150m

SCALE 1: 200

Depth (m) | Core / Non core | Hole size | % core recovery | Hole attitude | Lithology | Structure (angle to bedding) | OBSERVATIONS | ANALYSIS: U, Th

0

SERICITE QUARTZITE

SERICITE QUARTZ FELDSPAR QUARTZITE

KAOLINIZED QUARTZITE

SERICITIC QUARTZITE

BROWN SAND

SERICITE QUARTZ (FELDSPAR)

QUARTZITE

SERICITIC QUARTZ GRADES TO KAOLINITIC CLAY

SILICIFIED DOLOMITE BECOMING LESS SILICIOUS WITH DEPTH

3776(II)-6

AFMECO PTY. LTD. | HOLE Nº TBD-6

PROJECT: TUMBY BAY **Nº:** 12b

1 250 000 MAP SHEET: LINCOLN **Nº** S 53-11

Collar Coords (m) 5836 E. 618295 N. (AMG ☒ GRID ☐)

Collar R.L

Azimuth 180 ° (Mag ☒ Grid ☐)

Inclination −60 °

Date begun 21-3-81

Date terminated 23-3-81

Contractor LONGYEAR

Drill LONGYEAR 38

Drilling techniques

Reasons for termination

TARGET DEPTH

GEOLOGIST J POOLE

DATE 21 9-81

LITHOLOGY (Use BMR Symbols)

SOIL COVER

GNEISS

AMPHIBOLITE

CASING		
Size	From	To
NW	0	55
BW	0	30

STANDING WATER DEPTH

SAMPLE Nº

WEDGES PLACED

Type | Depth

HOLE CONDITIONS WHILE LOGGING

☐ DRY ☐ WATER ☐ MUD ☐ OPEN HOLE ☐ IN PIPE

ADDITIVES

STRUCTURE

Bedding | Fracture, joint

Banding | Fault

Foliation | Breccia

GENERAL COMMENTS

SCALE 1 200

Depth (m) | Core / Non core | Hole size | % core recovery | Hole attitude | Lithology | Structure (angle to bedding) | OBSERVATIONS | ANALYSIS: CPT UNITS | U | Th | V | Cu | Pb | Zn

AFMECO PTY. LTD. | **LOGGING DATA** | **Hole No.** TBD-6

PROJECT TUMBY BAY Date 18-5-81 Logger Type SPP-2-NF Model No 19

Co-ordinates Operator J POOLE Serial No. 2170

GAMMA RAY	1	2	3
RUN No			
Logged depth (m)	130		
Range (full scale)	150		
Time constant (sec)	—		
Paper scale	1100		
Logging speed (m/min)	—		
Background count (cps)	45		
Source 1 (cps)			
2			
3			
4			
Probe No / type	—		
Dead time (μsec) PROBE / SYSTEM			
Bore hole medium	—		
Tubes in hole	—		

NEUTRON	1	2	3
RUN No			
Logged depth (m)			
Range (full scale)			
Time constant (sec)			
Paper scale			
Logging speed (m/min)			
Source (cps)			
Probe No / type			
Source No			
Dead time			
Hole medium			
Hole diameter			
Standing water			
Tubes in hole			

ELECTRIC	1	2	3
Logged depth (m)			
Resistivity scale			
S P scale			
Paper scale			
Logging speed (m/min)			
Probe			
Hole medium			

DIRECTIONAL STN No	ANGLE	DIRECTION	CABLE DEPTH	TRUE DEPTH
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				

REMARKS

EASTMAN TOOL USED — SHOT LEVELS

3776(#)-7

AFMECO PTY. LTD. | **HOLE Nº** TBD 7

PROJECT: TUMBY BAY **Nº.:** 126
1:250 000 MAP SHEET: LINCOLN **Nº.** SI 53-11
Collar Coords (m): 58285 E. 61797 N. (AMG ☒ GRID ☐)
Collar R.L.
Azimuth: 317 ° (Mag ☒ Grid ☐)
Inclination: – 60 °

Date begun: 26-3-81
Date terminated: 29-3-81
Contractor: LONGYEAR
Drill: LONGYEAR 38
Drilling techniques: DIAMOND

Reasons for termination
TARGET DEPTH

GEOLOGIST: J POOLE
DATE: 21-9-81

LITHOLOGY (Use BMR Symbols).
SOIL COVER
GNEISS
AMPHIBOLITE

CASING

Size	From	To
NW	0	4
BW	0	27

STANDING WATER DEPTH
SAMPLE Nº

WEDGES PLACED
Type | Depth

HOLE CONDITIONS WHILE LOGGING
DRY / WATER / MUD
OPEN HOLE / IN PIPE
ADDITIVES

STRUCTURE
Bedding
Banding
Foliation
Fracture, joint
Fault
Breccia

GENERAL COMMENTS

SCALE 1: 200

Depth (m)	Core / Non core	Hole size	% core recovery	Hole attitude	Lithology	Structure (angle to bedding)	OBSERVATIONS	UNITS	U	Th	ANALYSIS

AFMECO PTY. LTD. | **LOGGING DATA** | **Hole No.** TBD-7

PROJECT TUMBY BAY | Date 18-5-81 | Logger Type SPP-2-NF | Model No 19
Co-ordinates | Operator J POOLE | Serial No. 2170

GAMMA RAY

RUN No	1	2	3
Logged depth (m)	150		
Range (full scale)	150		
Time constant (sec)	–		
Paper scale	1:100		
Logging speed (m/min)	–		
Background count (cps)	45		
Source 1			
2, 3, 4 (cps)			
Probe No / type	–		
Dead time (μsec) PROBE SYSTEM			
Bore hole medium	–		
Tubes in hole	–		

NEUTRON

RUN No	1	2	3
Logged depth (m)			
Range (full scale)			
Time constant (sec)			
Paper scale			
Logging speed (m/min)			
Source (cps)			
Probe No / type			
Source No			
Dead time			
Hole medium			
Hole diameter			
Standing water			
Tubes in hole			

ELECTRIC

Logged depth (m)			
Resistivity scale			
S.P. scale			
Paper scale			
Logging speed (m/min)			
Probe			
Hole medium			

DIRECTIONAL

STN No	ANGLE	DIRECTION	CABLE DEPTH	TRUE DEPTH
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				

REMARKS
EASTMAN TOOL USED – SHOT LEVELS

3776(II)-8

AFMECO PTY. LTD. | HOLE Nº TBD-8

PROJECT: TUMBY BAY **Nº.:** 126
1:250 000 MAP SHEET LINCOLN **Nº.** SI 53-11
Collar Coords (m) 58285 E. 61797 N. (AMG [X] GRID [ ])
Collar R.L.:
Azimuth: 245° (Mag [X], Grid [ ])
Inclination: – 70°

Date begun 30-3-81
Date terminated 2-4-81
Contractor LONGYEAR
Drill LONGYEAR 38
Drilling techniques DIAMOND

Reasons for termination
TARGET DEPTH

GEOLOGIST J POOLE
DATE 21-9-81

LITHOLOGY (Use BMR Symbols).
SOIL COVER
GNEISS
AMPHIBOLITE

CASING		
Size	From	To
NW	0	4
3W	0	27

WEDGES PLACED Type | Depth

HOLE CONDITIONS WHILE LOGGING
DRY / WATER / MUD / OPEN HOLE / IN PIPE
ADDITIVES

STANDING WATER DEPTH
SAMPLE Nº

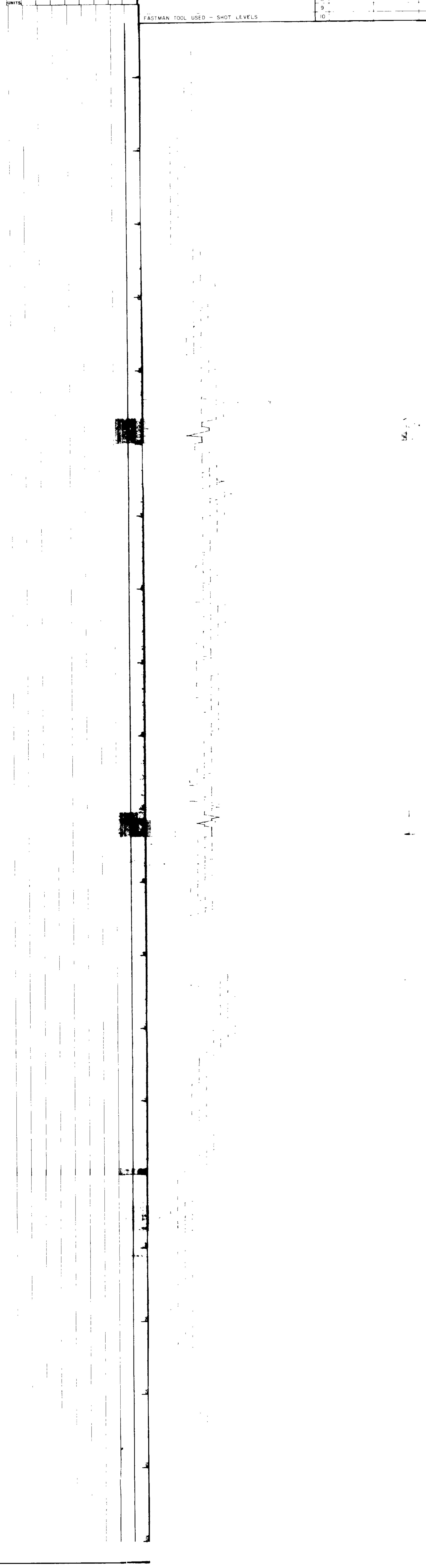
STRUCTURE
Bedding — Fracture, joint
Banding — Fault
Foliation — Breccia

GENERAL COMMENTS
VERY BAD GROUND AT 63.5m RUNNING SAND IN MAJOR FAULT

SCALE 1:200

Depth (m) | Core / Non core | Hole size | % core recovery | Hole attitude | Lithology | Structure (angle to bedding) | OBSERVATIONS | UNITS | ANALYSIS: U | Th

0 SOIL ... A
5 GNEISS
10 AMPHIBOLITE
15 NO CORE
GNEISS
20 NO CORE
GNEISS
AMPHIBOLITE
GNEISS
AMPHIBOLITE
25 GNEISS
30
35
40 GNEISS
45
50
55
60
65 NO CORE
70 GNEISS
75 AMPHIBOLITE
GNEISS
80 AMPHIBOLITE
85
90
95



AFMECO PTY. LTD. — LOGGING DATA — Hole No. TBD-8

PROJECT TUMBY BAY | Date 18-5-81 | Logger Type SPP-2-NF | Model No 19
Co-ordinates XYZ | Operator J POOLE | Serial No. 2170

GAMMA RAY

RUN No	1	2	3
Logged depth (m)	105		
Range (full scale)	150		
Time constant (sec)	–		
Paper scale	1100		
Logging speed (m/min)	–		
Background count (cps)	45		
Source 1 (cps)			
2			
3			
4			
Probe No / type	–		
Dead time (μsec) PROBE / SYSTEM			
Bore hole medium	–		
Tubes in hole	–		

NEUTRON

RUN No	1	2	3
Logged depth (m)			
Range (full scale)			
Time constant (sec)			
Paper scale			
Logging speed (m/min)			
Source (cps)			
Probe No / type			
Source No			
Dead time			
Hole medium			
Hole diameter			
Standing water			
Tubes in hole			

ELECTRIC

	1	2	3
Logged depth (m)			
Resistivity scale			
S.P. scale			
Paper scale			
Logging speed (m/min)			
Probe			
Hole medium			

DIRECTIONAL

STN No	ANGLE	DIRECTION	CABLE DEPTH	TRUE DEPTH
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				

REMARKS
FASTMAN TOOL USED – SHOT LEVELS

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GEOSCIENCE ASSOCIATES (AUSTRALIA) pty LTD
P O Box 239
Kilkenny, S A 5009
Phone 268 2898

HOLE

LOGGING DATA

DATE [illegible]

LOCATION [illegible]	HOLE NUMBER [illegible]	CLIENT [illegible]
State SOUTH AUSTRALIA	Collar elev ___ metres	Claim
Area	Depth drilled [illegible] metres	Owned by
Project	CASING DATA / HOLE DATA	Operated by
Prospect	Wall size ___ in / Dia ___ from ___ to ___	Unit Operator [illegible]
Lat ° ' " / Long ° ' "	Dia (inside) ___ in / Dia ___ from ___ to	Unit No ___ Office [illegible]

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft)	[illegible]			
Range (Full scale)	[illegible]			
Time constant (Sec)	[illegible]			
Paper speed cm/m				
Logging speed m/min	[illegible]			
Bkgnd count (cps)	[illegible]			
Probe No	[illegible]			
Size (dia) (in)	[illegible]			
Type	[illegible]			
Standard (cps)	[illegible]			
Dead time μ sec	[illegible]			
Amp Gain				
Ratemeter No				
Bore hole medium	[illegible]			
Mud density				
Digital readout	[illegible]			
Time base	[illegible]			
Upper Disc				
Lower Disc				

Cased from ___ to ___ mtrs / Dia ___ from ___ to
Cored hole ☐ / Non cored hole ☒
Sampled Interval [illegible] / Type [illegible]

INTERPRETATION DATA

Probe No	Standard	(cps) K factor
[illegible]	[illegible]	[illegible]

REMARKS

Fluid Level ___ metres

[illegible]

ELECTRIC

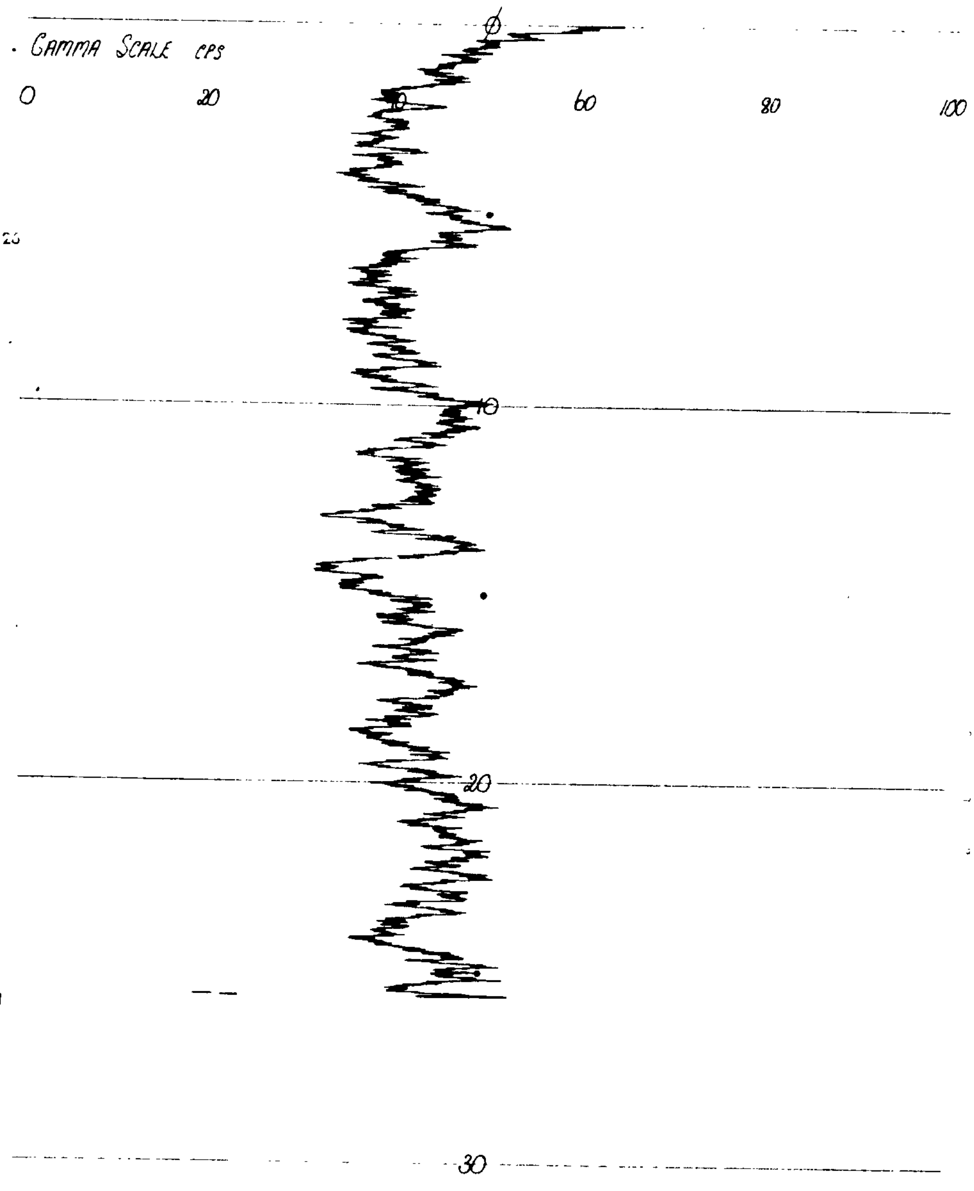
	1	2	3	4
Logged depth				
Resist scale				
S P scale				
Paper speed				
Logging speed				
Probe size in				
Type w/d				
Bias				

CALIPER

Logged depth	
Scale in/in def	
Paper Speed	
Logging speed	
Arm Length in	
Max Def in	

HOLE # TUB 1

6TH JANUARY 1981



GEOSCIENCE
LOGGING DATA
S P
RESISTIVITY
100 CPS
10% ST. DV.
9 m/min
GPA 5
245J06
AL 8
TUB 1
6 1 81
26.6 mtrs

GEOSCIENCE ASSOCIATES (AUSTRALIA) PTY LTD
P.O. Box 238
Kilkenny, S.A. 5009
Phone 268 2866

HOLE # TUB-2

LOGGING DATA

DATE 7TH JANUARY 1981

LOCATION TUMBY BAY
State SOUTH AUSTRALIA
Area:
Project
Prospect
Lat ° ' " Long ° ' "

HOLE NUMBER: TUB # 2
Collar elev. metres
Depth drilled 41·0 metres

CLIENT. AFMECO
Claim.
Owned by.
Operated by
Unit Operator: BARNETT
Unit No. AL 8 Office

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft.)	39.4			
Range (Full scale)	200			
Time constant (Sec.)	10%			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	59			
Probe No	GPA 5			
Size (dia.) (in.)	40mm			
Type No I	1½" x ½"			
Standard (cps)	500			
Dead time	6			μ sec.
Amp Gain				
Ratemeter No				
Bore hole medium	DRY HOLE			
Mud density				
Digital readout	2mtr			
Time base	1 sec			
Upper Disc				
Lower Disc.				

CASING DATA

Wall size in.
Dia. (inside) in
Cased from to mtrs

HOLE DATA

Dia. 4" from 0 to 41·0
Dia. from to
Dia. from to

Cored hole ☐ Non-cored hole ☑

Sampled Interval	Type
1 metre	ROTARY AIR

INTERPRETATION DATA

Probe No	Standard (cps)	K factor
GPA 5	500	3.15 x 10⁻⁶

REMARKS

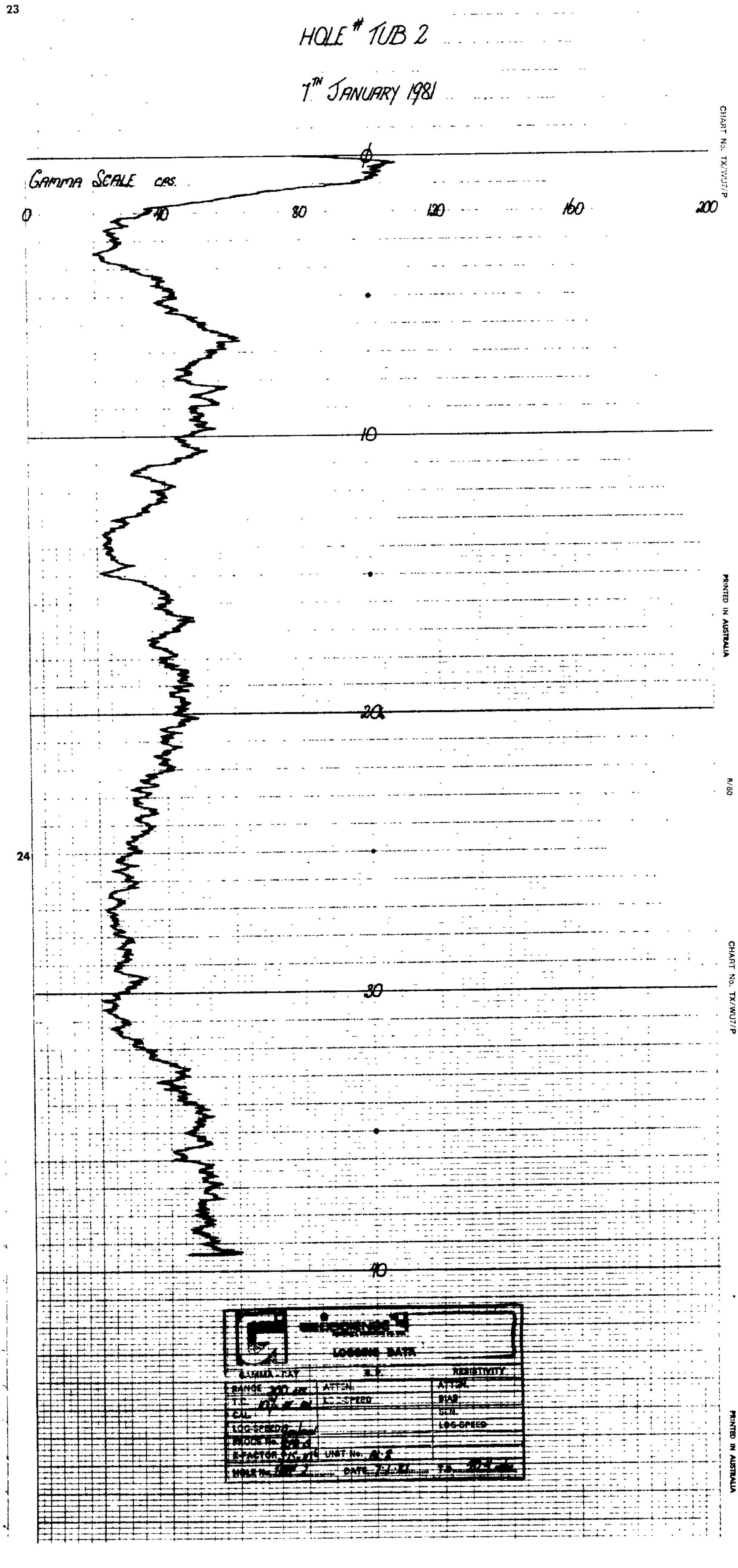
Fluid Level metres

ELECTRIC

	1	2	3	4
Logged depth				
Resist. scale				
S.P. scale				
Paper speed				
Logging speed				
Probe size in				
Type w/d				
Bias				

CALIPER

Logged depth				
Scale in/in def				
Paper Speed				
Logging speed				
Arm Length in				
Max. Def. in				



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P O Box 239
Kilkenny, S.A 5008
Phone 268 2898

HOLE # 1UB-3

LOGGING DATA

DATE 7TH JANUARY 1981

LOCATION Tumby Bay	HOLE NUMBER 1UB # 3	CLIENT AFMECO
State South Australia	Collar elev. metres	Claim
Area	Depth drilled 17.0 metres	Owned by
Project	CASING DATA / HOLE DATA	Operated by
Prospect	Wall size in / Dia 4" from 0 to 17.0	Unit Operator Barnett
Lat ° ' " Long ° ' "	Dia (inside) in / Dia from to	Unit No AL 8 Office Adelaide
	Cased from to mtrs / Dia from to	
	Cored hole ☐ / Non-cored hole ☑	

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft)	10.0			
Range (Full scale)	100 cps			
Time constant (Sec)	10% st. dv.			
Paper speed cm/m	1			
Logging speed m/min	9 m/min			
Bkgnd count (cps)	33			
Probe No	GPA 5			
Size (dia) (in)	40 mm			
Type Na I	1½" x 1½"			
Standard (cps)	500			
Dead time μ sec	6			
Amp Gain				
Ratemeter No				
Bore hole medium	Dry hole			
Mud density				
Digital readout	2 mtr.			
Time base	1 sec.			
Upper Disc				
Lower Disc				

Sampled Interval	Type
1 metre	Rotary Air.

INTERPRETATION DATA

Probe No	Standard (cps)	K factor
GPA 5	500	3.15×10^{-6}

REMARKS

Fluid Level metres

Hole fallen in at bottom.

ELECTRIC

	1	2	3	4
Logged depth				
Resist. scale				
S P scale				
Paper speed				
Logging speed				
Probe size in				
Type				
Bias				

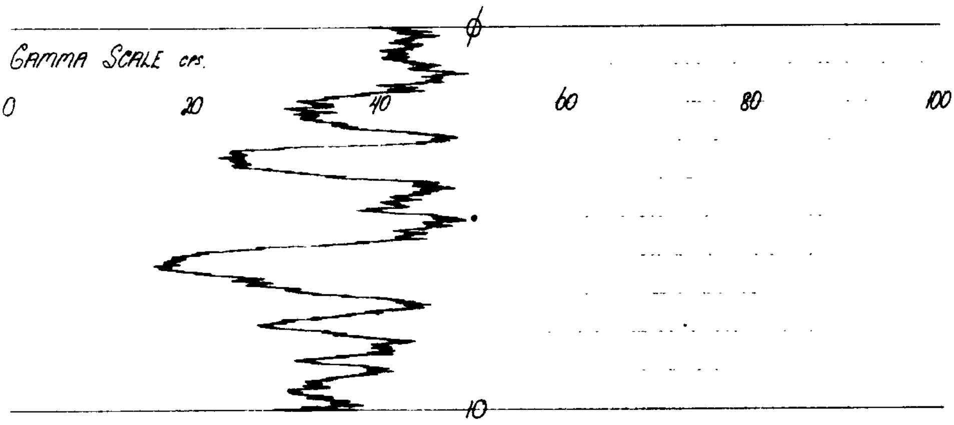
CALIPER

Logged depth				
Scale in/in def				
Paper Speed				
Logging speed				
Arm Length in				
Max Def in				

22

HOLE # 1UB-3

7TH January 1981



GEOSCIENCE ASSOCIATES (AUSTRALIA) pty LTD

LOGGING DATA

GAMMA - RAY	S. P	RESISTIVITY
RANGE 100 cps.	ATTEN.	ATTEN.
T.C 10% st. dv.	SPEED	BIAS
CAL		CON.
LOG SPEED 9 m/min		LOG-SPEED
PROBE No GPA 5		
K FACTOR 3.15×10^{-6}	UNIT No AL 8	
HOLE No. 1UB # 3	DATE 7.1.81	T.D. 11.0 mtrs.

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HOLE # TUB # 4 170

LOGGING DATA

DATE 7TH JANUARY 1981

LOCATION TUMBY BAY
State SOUTH AUSTRALIA
Area
Project
Prospect
Lat ° ' " | Long ° ' "

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft.)	158			
Range (Full scale)	100 cps			
Time constant (Sec)	10% ST. DV.			
Paper speed cm/m	1			
Logging speed m/min	9m/MIN			
Bkgnd count (cps)	24			
Probe No	GPA 5			
Size (dia) (in)	40mm			
Type Na I	1½" x ½"			
Standard (cps)	500			
Dead time μ sec	6			
Amp Gain				
Ratemeter No				
Bore hole medium	DRY HOLE			
Mud density				
Digital readout	2 mtr.			
Time base	1 sec.			
Upper Disc				
Lower Disc				

HOLE NUMBER TUB # 4
Collar elev metres
Depth drilled 17.0 metres

CASING DATA
Wall size in
Dia (inside) in
Cased from to mtrs
Cored hole ☐

HOLE DATA
Dia 4" from 0 to 17
Dia from to
Dia from to
Non-cored hole ☑

Sampled Interval: 1 metre.
Type: ROTARY AIR.

INTERPRETATION DATA

Probe No	Standard (cps)	K factor
GPA 5	500	3.15 x 10⁻⁶

REMARKS
Fluid Level metres

CLIENT AEMECO
Claim
Owned by
Operated by
Unit Operator BARNETT
Unit No AL 8
Office ADELAIDE

ELECTRIC

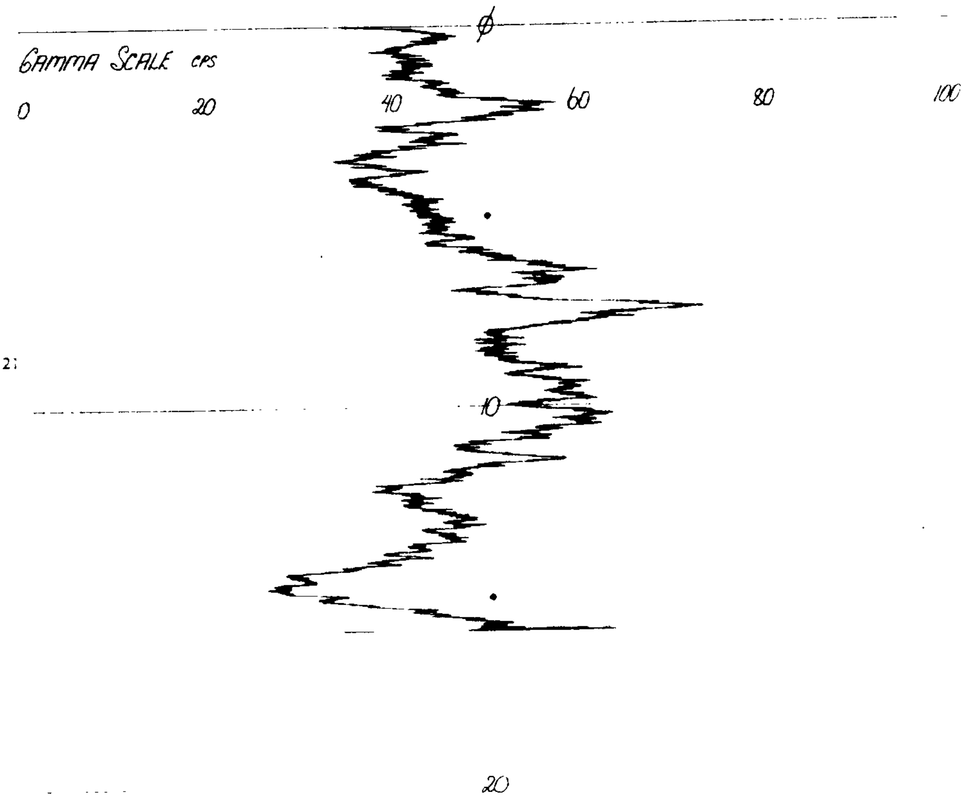
	1	2	3	4
Logged depth				
Resist scale				
S P scale				
Paper speed				
Logging speed				
Probe size in				
Type w/d				
Bias				

CALIPER

Logged depth			
Scale in/in def			
Paper Speed			
Logging speed			
Arm Length in			
Max Def in			

HOLE # TUB-4.

7TH JANUARY 1981.



LOGGING DATA
100 CPS
10% ST. DV.
9m/MIN
GPA-5
3.15 x 10⁻⁶
AL 8
HOLE No TUB # 4
7.1.80
16.8 mtrs.

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HOLE # 1UB-5

LOGGING DATA

DATE 7TH JANUARY 1981

LOCATION	Kimba Bay	HOLE NUMBER.	1UB #5	CLIENT	AFMECO
State	SOUTH AUSTRALIA	Collar elev. metres		Claim	
Area		Depth drilled 7.0 metres		Owned by	
Project		CASING DATA	HOLE DATA	Operated by	
Prospect		Wall size in.	Dia 4" from 0 to 7.0	Unit Operator	BARNETT
Lat ° ' "	Long ° ' "	Dia (inside) in	Dia. from to	Unit No HL-8	Office. ADELAIDE
		Cased from to mtrs	Dia from to		
		Cored hole ☐	Non-cored hole ☑		

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft.)	5.7			
Range (Full scale)	100 cps.			
Time constant (Sec)	10% ST. DV			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	39			
Probe No	GPA5			
Size (dia.) (in)	40mm.			
Type NaI	1½" × 1½"			
Standard (cps)	500			
Dead time	0			μ sec
Amp Gain				
Ratemeter No				
Bore hole medium	DRY HOLE			
Mud density				
Digital readout	2 mtr.			
Time base	1 sec.			
Upper Disc				
Lower Disc.				

Sampled Interval	Type
1 metre	ROTARY AIR.

INTERPRETATION DATA

Probe No	Standard (cps)	K factor
GPA-5	500	3.5×10^{-6}

REMARKS

Fluid Level metres

ELECTRIC

	1	2	3	4
Logged depth				
Resist scale				
S.P scale				
Paper speed				
Logging speed				
Probe size in				
Type w/d				
Bias				

CALIPER

Logged depth				
Scale in/in def				
Paper Speed				
Logging speed				
Arm Length in				
Max. Def. in				

HOLE # 1UB-5

7TH JANUARY 1981

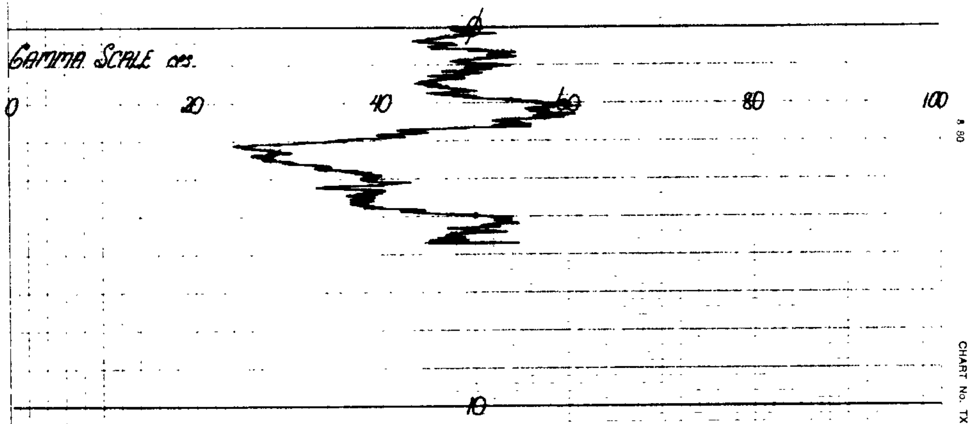

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CHART No. TX/W07/P

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GEOSCIENCE

LOGGING DATA

GAMMA - RAY	S.P.	RESISTIVITY
RANGE 100 cps	ATTEN.	ATTEN.
T.C. 10% ST. DV	LOG-SPEED	BIAS
CAL.		SCL.
LOG-SPEED 9 m/min		LOG-SPEED
PROBE No GPA5		
K-FACTOR 3.5×10⁻⁶	UNIT No. HL-8	
HOLE No. 1UB-5	DATE 7.1.80	T.D. 6.8 mtrs

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HOLE # TUB-6

LOGGING DATA

178

DATE 7th JANUARY 1981

LOCATION	HOLE NUMBER TUB # 6	CLIENT	
State SOUTH AUSTRALIA	Collar elev metres	Claim	
Area	Depth drilled 17 metres	Owned by	
Project	CASING DATA / HOLE DATA	Operated by	
Prospect	Wall size in / Dia 7" from 0 to 17	Unit Operator	
Lat ° ′ ″ / Long ° ′ ″	Dia (inside) in / Dia from to	Unit No AL 8	Office ADELAIDE
	Cased from to mtrs / Dia from to		
	Cored hole ☐ / Non-cored hole ☑		

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft)	12.8 mtrs.			
Range (Full scale)	200 cps.			
Time constant (Sec)	10 % st. dv.			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	53			
Probe No	GPA5			
Size (dia) (in)	46mm			
Type	NaI			
Standard (cps)	500			
Dead time μ sec	0			
Amp Gain				
Ratemeter No.				
Bore hole medium	DRY HOLE			
Mud density				
Digital readout	2mtr			
Time base	1 sec			
Upper Disc				
Lower Disc.				

Sampled Interval	Type
1 metre	ROTARY AIR

INTERPRETATION DATA

Probe No	Standard (cps)	K factor
GPA 5	500	3.5 x 10⁴

REMARKS

Fluid Level metres

ELECTRIC

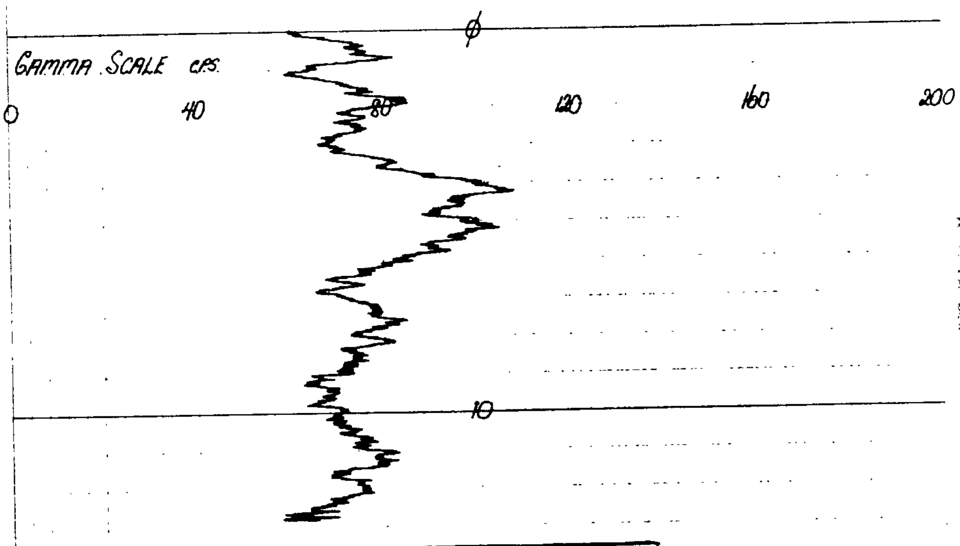
	1	2	3	4
Logged depth				
Resist scale				
S P scale				
Paper speed				
Logging speed				
Probe size in				
Type				
Bias				

CALIPER

Logged depth				
Scale in / in def				
Paper Speed				
Logging speed				
Arm Length in				
Max Def in				

HOLE # TUB-6

18 7th JANUARY 1981



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LOGGING DATA

GAMMA - RAY	S. P.	RESISTIVITY
RANGE 200	ATTEN.	ATTEN.
T.C. 10% st. dv.	LOG-SPEED	BIAS
CAL		SEN.
LOG-SPEED 9m/min		LOG-SPEED
PROBE No. GPA.5		
K-FACTOR 3.5x10⁴	UNIT No AL 8	
HOLE No. TUB # 6	DATE 7.1.81	T.D. 13.8 mtrs.

CHART No

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HOLE # TUB-7

LOGGING DATA

DATE 7TH JANUARY 1981

LOCATION TUMBY BAY	HOLE NUMBER TUB #7	CLIENT AEMECO
State SOUTH AUSTRALIA	Collar elev. metres	Claim.
Area	Depth drilled 11·0 metres	Owned by.
Project	CASING DATA / HOLE DATA	Operated by
Prospect:	Wall size in / Dia 4" from 0 to 11·0	Unit Operator BARNETT
Lat ° ′ ″ Long ° ′ ″	Dia (inside) in / Dia from to	Unit No ML·8 Office. BARNETT
	Cased from to mtrs / Dia from to	
	Cored hole ☐ Non-cored hole ☑	

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft.)	9.8			
Range (Full scale)	200 cps.			
Time constant (Sec)	10% st. dv.			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	32			
Probe No	GPA 5			
Size (dia.) (in)	40 mm			
Type Na I	1½" x ½"			
Standard (cps)	500			
Dead time μ sec	6			
Amp. Gain				
Ratemeter No.				
Bore hole medium	DRY.			
Mud density				
Digital readout	2 mtr.			
Time base	1 sec.			
Upper Disc.				
Lower Disc.				

Sampled Interval	Type
1 metre	ROTARY AIR.

INTERPRETATION DATA

Probe No	Standard (cps)	K factor
GPA 5	500	$3{\cdot}15 \times 10^{-6}$

REMARKS

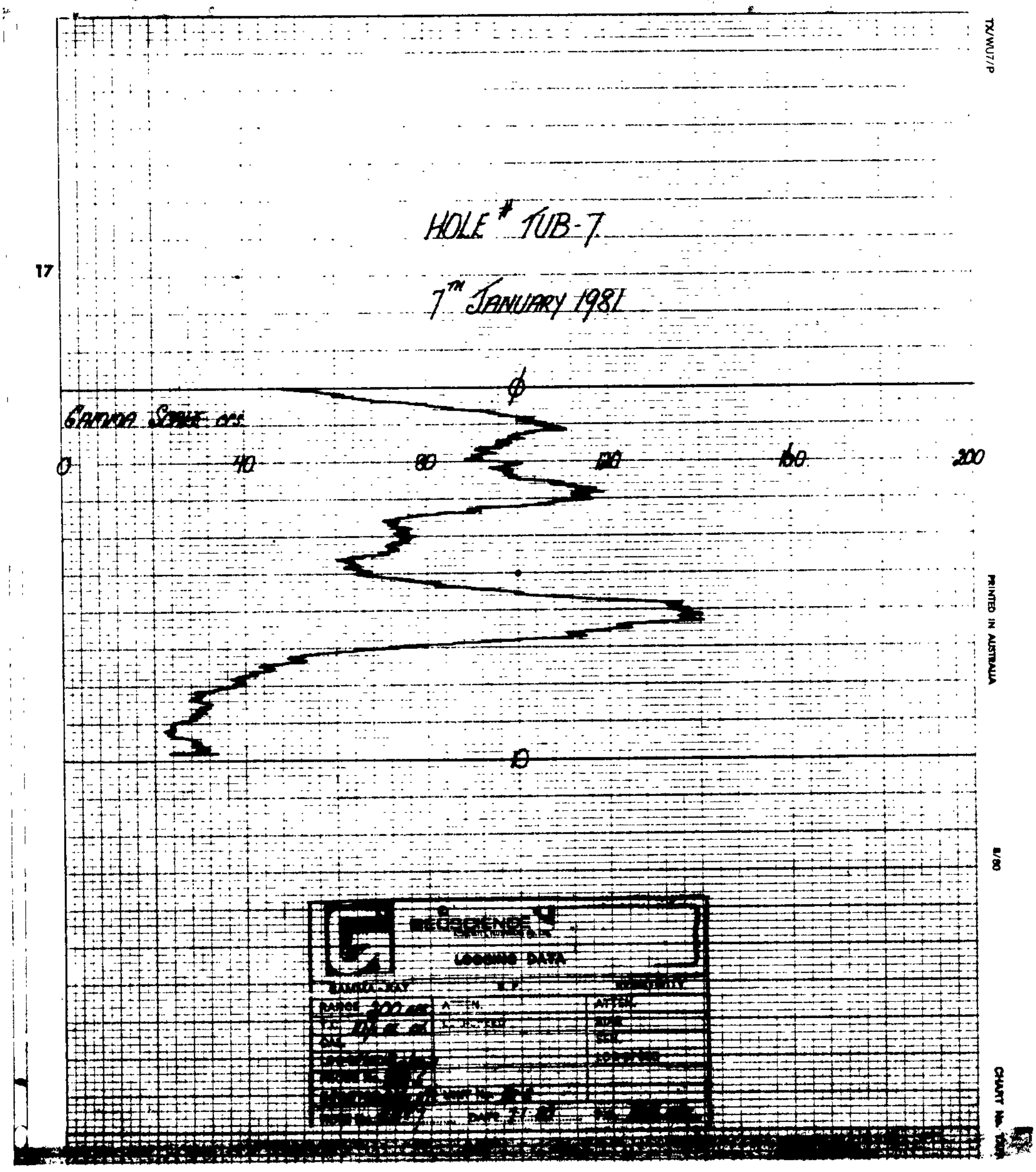
Fluid Level metres

ELECTRIC

	1	2	3	4
Logged depth				
Resist. scale				
S P scale				
Paper speed				
Logging speed				
Probe size in				
Type w/d				
Bias				

CALIPER

Logged depth				
Scale in/in def				
Paper Speed				
Logging speed				
Arm Length in				
Max Def in				



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HOLE # TUB-8

100

LOGGING DATA

DATE 7th January 1981

LOCATION Tumby Bay	HOLE NUMBER TUB # 8	CLIENT AFMECO
State South Australia	Collar elev. metres	Claim
Area	Depth drilled 13.0 metres	Owned by
Project	CASING DATA / HOLE DATA	Operated by
Prospect	Wall size in / Dia 4" from 0 to 13.0	Unit Operator BARNETT
Lat ° ' " Long ° ' "	Dia (inside) in / Dia from to	Unit No. AL 8 Office ADELAIDE

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft.)	11.8			
Range (Full scale)	200 cps.			
Time constant (Sec.)	10			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	350			
Probe No	GPA 5			
Size (dia)	40 mm			
Type Na	1½" × ½"			
Standard (cps)	500			
Dead time μ sec	6			
Amp Gain				
Ratemeter No.				
Bore hole medium	DRY			
Mud density				
Digital readout	2 mtr			
Time base	1 sec			
Upper Disc				
Lower Disc				

Cased from to mtrs / Dia from to
Cored hole ☐ Non-cored hole ☑

Sampled Interval	Type
1 metre	ROTARY AIR

INTERPRETATION DATA

Probe No	Standard (cps)	K factor
GPA 5	500	3.15×10^{-6}

REMARKS

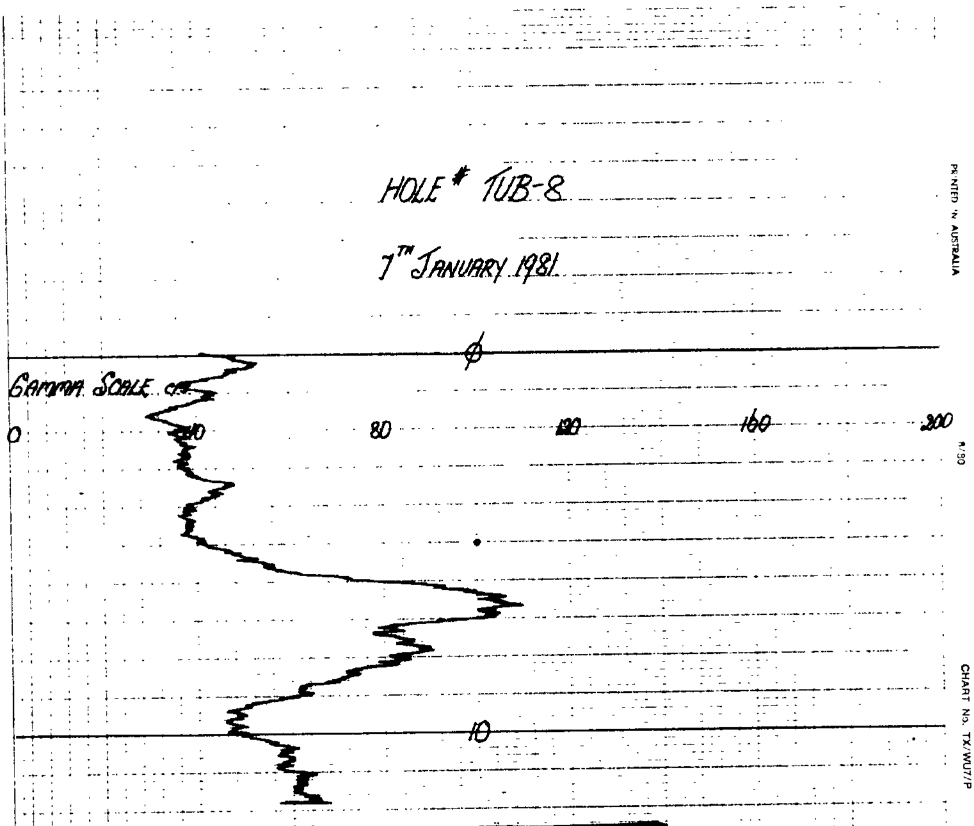
Fluid Level metres

ELECTRIC

	1	2	3	4
Logged depth				
Resist scale				
S.P. scale				
Paper speed				
Logging speed				
Probe size in				
Type				
Bias				

CALIPER

Logged depth				
Scale in/in def				
Paper Speed				
Logging speed				
Arm Length in				
Max. Def in				



GEOSCIENCE
LOGGING DATA

GAMMA RAY	S.P.	RESISTIVITY
RANGE 200 cps	ATTEN.	ATTEN.
T.C. 10 sec	LOG-SPEED	BIAS
CAL.		CAL.
LOG-SPEED 9 m/min		LOG-SPEED
PROBE No. GPA 5		
K-FACTOR 3.15 × 10⁻⁶	UNIT No. AL 8	
HOLE No. TUB 8	DATE 7.1.81	T.D. 11.8 mtrs

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HOLE # TUB-9

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LOGGING DATA

DATE 7th JANUARY 81

LOCATION	TUMB. BAY			
State	SOUTH AUSTRALIA			
Area				
Project				
Prospect				
Lat ° ′ ″	Long ° ′ ″			

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft)	12.8			
Range (Full scale)	200 cps			
Time constant (Sec)	10% st. dev.			
Paper speed cm/m				
Logging speed m/min	9			
Bkgnd count (cps)	33			
Probe No	SPP-5			
Size (dia) (in)	45 mm			
Type NaI	1"x1"			
Standard (cps)	500			
Dead time	0			µ sec
Amp Gain				
Ratemeter No				
Bore hole medium	air			
Mud density				
Digital readout	2 mtr			
Time base	sec			
Upper Disc				
Lower Disc				

HOLE NUMBER	TUB # 9		
Collar elev			metres
Depth drilled	17		metres

CASING DATA		HOLE DATA	
Wall size	in	Dia 4" from 0 to 14	
Dia (inside)	in	Dia from to	
Cased from to	mtrs	Dia from to	
Cored hole ☐		Non-cored hole ☒	
Sampled Interval	metre	Type	ROTARY AIR

INTERPRETATION DATA

Probe No	Standard (cps)	K factor
SPP-5	500	3.5 x 10⁻⁵

REMARKS

Fluid Level metres

CLIENT	HEMIC
Claim	
Owned by	
Operated by	
Unit Operator	BARNETT
Unit No	AL-8
Office	ADELAIDE

ELECTRIC

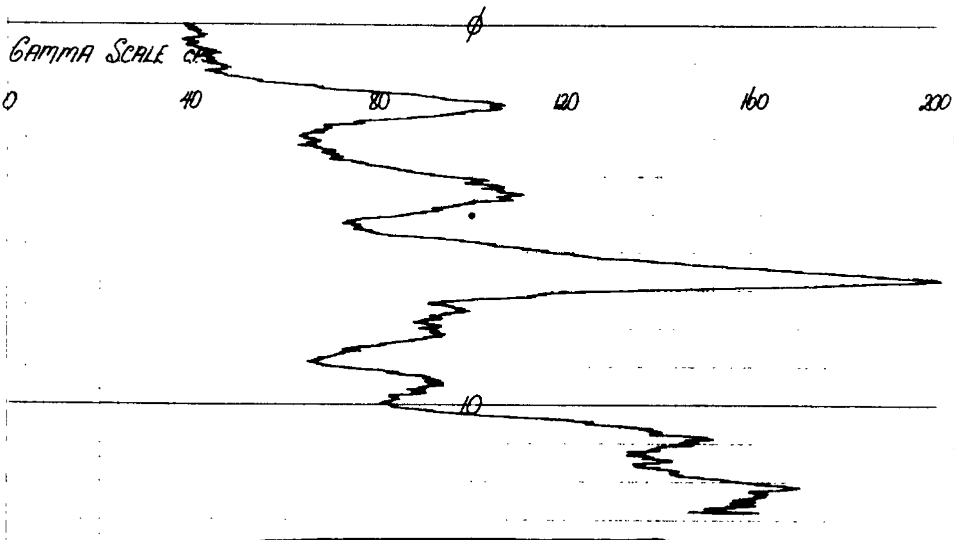
	1	2	3	4
Logged depth				
Resist scale				
S P scale				
Paper speed				
Logging speed				
Probe size	in			
Type	w/d			
Bias				

CALIPER

Logged depth				
Scale	in/in def			
Paper Speed				
Logging speed				
Arm Length	in			
Max Def	in			

HOLE # TUB-9

7th JANUARY 1981



GEOSCIENCE
ASSOCIATES (AUSTRALIA) pty LTD
LOGGING DATA

GAMMA-RAY	S.P.	RESISTIVITY
RANGE 200 cps	ATTEN.	ATTEN.
T.C. 10% st. dev.	LOG SPEED	BIAS
CAL.		CAL.
LOG SPEED 9m/min		LOG SPEED
PROBE No. SPP-5		
K-FACTOR 3.5x10⁻⁵	UNIT No. AL8	
HOLE No. TUB#9	DATE 7/1/80	T.D. 13.8 mtrs.

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HOLE # TUB-10 182

LOGGING DATA

DATE 7th JANUARY 1981

LOCATION TUMBY BAY
State SOUTH AUSTRALIA
Area
Project
Prospect
Lat ° ' " Long ° ' "

HOLE NUMBER TUB #-10
Collar elev metres
Depth drilled 10 metres

CASING DATA	HOLE DATA
Wall size in	Dia 4" from 0 to 10
Dia (inside) in	Dia from to
Cased from to mtrs	Dia from to

Cored hole ☐ Non-cored hole ☑

Sampled Interval: metre
Type: ROTARY AIR

CLIENT AEMECO
Claim
Owned by
Operated by
Unit Operator BARNETT
Unit No AL 8 Office ADELAIDE

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft)	5			
Range (Full scale)	100 cps			
Time constant (Sec)	10% ST DL			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	35			
Probe No	GPA-5			
Size (dia.) (in)	40mm			
Type NaI	1½" x ½"			
Standard (cps)	500			
Dead time	6			μ sec
Amp Gain				
Ratemeter No				
Bore hole medium	DRY			
Mud density				
Digital readout	2 mtr			
Time base	1 sec			
Upper Disc				
Lower Disc				

INTERPRETATION DATA

Probe No	Standard (cps)	K factor
GPA-5	500	3.15×10^{-6}

REMARKS

Fluid Level metres

ELECTRIC

	1	2	3	4
Logged depth				
Resist scale				
S P scale				
Paper speed				
Logging speed				
Probe size in				
Type w/d				
Bias				

CALIPER

Logged depth				
Scale in/in def				
Paper Speed				
Logging speed				
Arm Length in				
Max Def in				

HOLE # TUB-10

7th JANUARY 1981

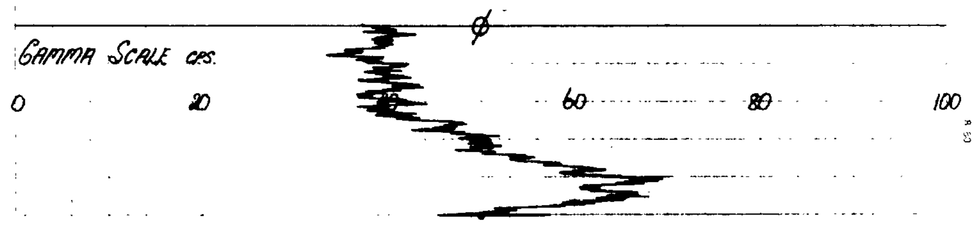

CHART No TX-WJ71P

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LOGGING DATA

GAMMA - RAY	S. P.	RESISTIVITY
RANGE 100 cps	ATTEN.	ATTEN.
T.C. 10%	LOG-SPEED	BIAS
CAL.		DIN.
LOG-SPEED 9m/min		LOG-SPEED
PROBE No. GPA 5		
K-FACTOR 3.15×10^{-6}	UNIT No. AL 8	
HOLE No. TUB # 10	DATE 7.1.81	T.D. 6 mtrs

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GEOSCIENCE
DIGITAL READOUT DATA

Client: AEMECO	K-Factor: 3.15×10^{-6}
Hole No. TUB # 5	Dead Time: 6 u sec
Date: 7.1.81	Unit No. AL 8
Readout: 2 mtr	Operator: BARNETT
Time Base: 1 sec	REMARKS GAMMA
Log Speed: 9 m/MIN	
Probe No.: GPA 5	

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HOLE # TUB-11

LOGGING DATA

DATE 7TH JANUARY 1981

LOCATION TUMBY BAY
State SOUTH AUSTRALIA
Area
Project
Prospect
Lat ° ' " Long ° ' "

HOLE NUMBER TUB # 11
Collar elev metres
Depth drilled 5 metres

CASING DATA	HOLE DATA
Wall size in	Dia 4" from 0 to 5.0
Dia (inside) in	Dia from to
Cased from to mtrs	Dia from to
Cored hole ☐	Non-cored hole ☑

Sampled Interval	Type
1 metre	ROTARY AIR.

INTERPRETATION DATA

Probe No	Standard (cps)	K factor
GPA-5	500	3.15×10^6

REMARKS

Fluid Level metres

CLIENT AEMSCC
Claim
Owned by
Operated by
Unit Operator BARNETT
Unit No AL-8 Office ADELAIDE

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft)	37			
Range (Full scale)	100 cps.			
Time constant (Sec)	10% St. Dv.			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	32			
Probe No	GPA-5			
Size (dia) (in)	40mm.			
Type NaI	1½" x ½"			
Standard (cps)	500			
Dead time	6			μ sec
Amp Gain				
Ratemeter No				
Bore hole medium	DRY			
Mud density				
Digital readout	2mtr.			
Time base	1 sec.			
Upper Disc				
Lower Disc				

ELECTRIC

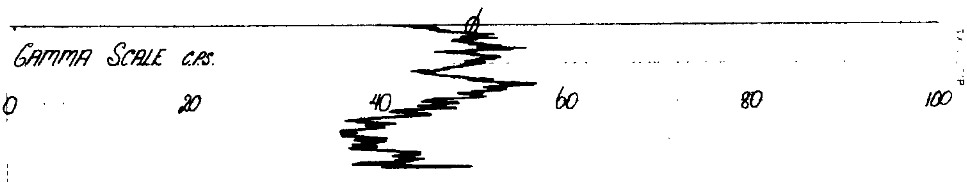
	1	2	3	4
Logged depth				
Resist. scale				
S P scale				
Paper speed				
Logging speed				
Probe size in				
Type w/d				
Bias				

CALIPER

	1	2	3	4
Logged depth				
Scale in/in def				
Paper Speed				
Logging speed				
Arm Length in				
Max Def in				

HOLE # TUB-11

7TH JANUARY 1981



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GEOSCIENCE

LOGGING DATA

GAMMA-RAY	S.P	RESISTIVITY
RANGE 100	ATTEN	ATTEN.
T.C. 10%	LOG SPEED	BIAS
CAL		CON.
LOG SPEED 9		LOG SPEED
PROBE No. GPA-5		
K-FACTOR 3.15x10⁶	UNIT No. AL-8	

HOLE No. TUB # 11 DATE 7/1/80 T.D. 4.7 mtrs.

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HOLE # TUB-12

LOGGING DATA

DATE 7TH JANUARY 81

LOCATION	TUMBY BAY			
State	SOUTH AUSTRALIA			
Area				
Project				
Prospect				
Lat		Long		

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft.)	6.6			
Range (Full scale)	100 cps			
Time constant (Sec.)	10/0 st. dv.			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	27			
Probe No	GPA5			
Size (dia.) (in)	40mm			
Type NaI	1½" x ½"			
Standard (cps)	500			
Dead time	6			μ sec
Amp Gain				
Ratemeter No				
Bore hole medium	DRY			
Mud density				
Digital readout	2 mtr			
Time base	1 sec			
Upper Disc.				
Lower Disc.				

HOLE NUMBER	TUB # 12
Collar elev	metres
Depth drilled	8 metres

CASING DATA	HOLE DATA
Wall size in	Dia 4" from 0 to 6.6
Dia (inside) in	Dia from to 8.0m
Cased from to mtrs	Dia. from to
Cored hole ☐	Non-cored hole ☑

Sampled Interval	Type
1 metre	ROTARY AIR

INTERPRETATION DATA

Probe No	Standard (cps)	K factor
GPA-5	500	3.15 x 10⁻⁶

REMARKS

Fluid Level metres

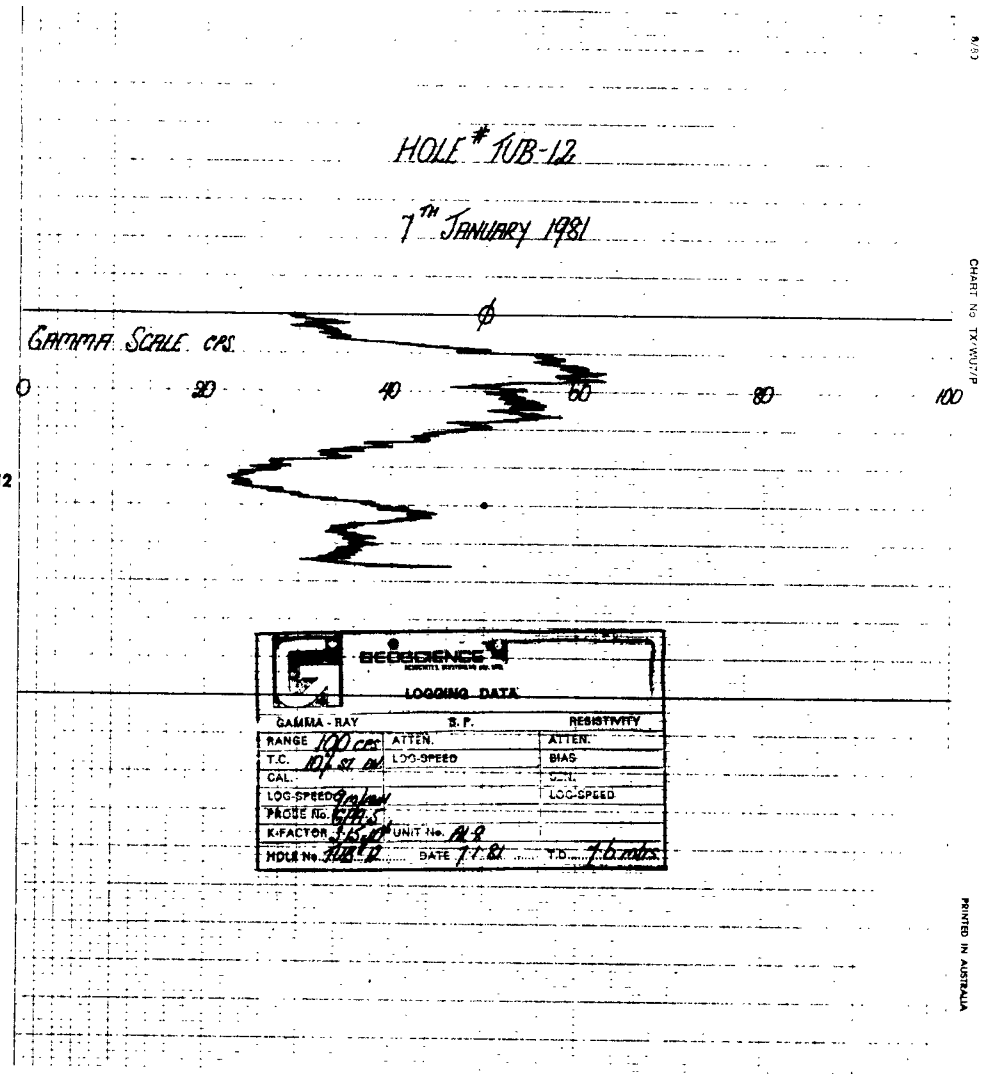
CLIENT	BEMECO
Claim	
Owned by	
Operated by	
Unit Operator	BARNETT
Unit No	AL-8
Office	ADELAIDE

ELECTRIC

	1	2	3	4
Logged depth				
Resist. scale				
S.P. scale				
Paper speed				
Logging speed				
Probe size in				
Type				
Bias				

CALIPER

Logged depth		
Scale	in/in def	
Paper Speed		
Logging speed		
Arm Length	in	
Max Def.	in	



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LOGGING DATA

GAMMA - RAY	S.P.	RESISTIVITY
RANGE 100 cps	ATTEN.	ATTEN.
T.C. 10/0 st. dv.	LOG-SPEED	BIAS
CAL.		
LOG-SPEED 9 m/min		LOG-SPEED
PROBE No. GPA5		
K-FACTOR 3.15x10⁻⁶	UNIT No. AL8	
HOLE No. TUB12	DATE 7.1.81	T.D. 7.6 mtrs

HOLE # TUB-13 — 185

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LOGGING DATA

DATE 7TH JANUARY 1981

LOCATION: Cumby Bay
State: South Australia
Area:
Project:
Prospect:
Lat / Long:

HOLE NUMBER: TUB # 13
Collar elev: metres
Depth drilled: 140 metres

CLIENT: AEMCO
Claim:
Owned by:
Operated by:
Unit Operator: Barnett
Unit No: A/3
Office: Adelaide

CASING DATA / HOLE DATA
Wall size: in — Dia 4" from 0 to 140
Dia (inside): in — Dia from to
Cased from to mtrs — Dia from to
Cored hole ☐ — Non-cored hole ☑

Sampled Interval: 1 metre
Type: Rotary Air.

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft)	126			
Range (Full scale)	100 cps			
Time constant (Sec)	10% std dev			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	25			
Probe No.	GPA 5			
Size (dia) (in)	40mm			
Type	Na I 1½" x ½"			
Standard (cps)	500			
Dead time µ sec	6			
Amp Gain				
Ratemeter No				
Bore hole medium	DRY			
Mud density				
Digital readout	2 mtr			
Time base	1 sec			
Upper Disc				
Lower Disc				

INTERPRETATION DATA

Probe No	Standard (cps)	K factor
GPA 5	500	3.15 x 10⁻⁶

REMARKS
Fluid Level: metres

ELECTRIC

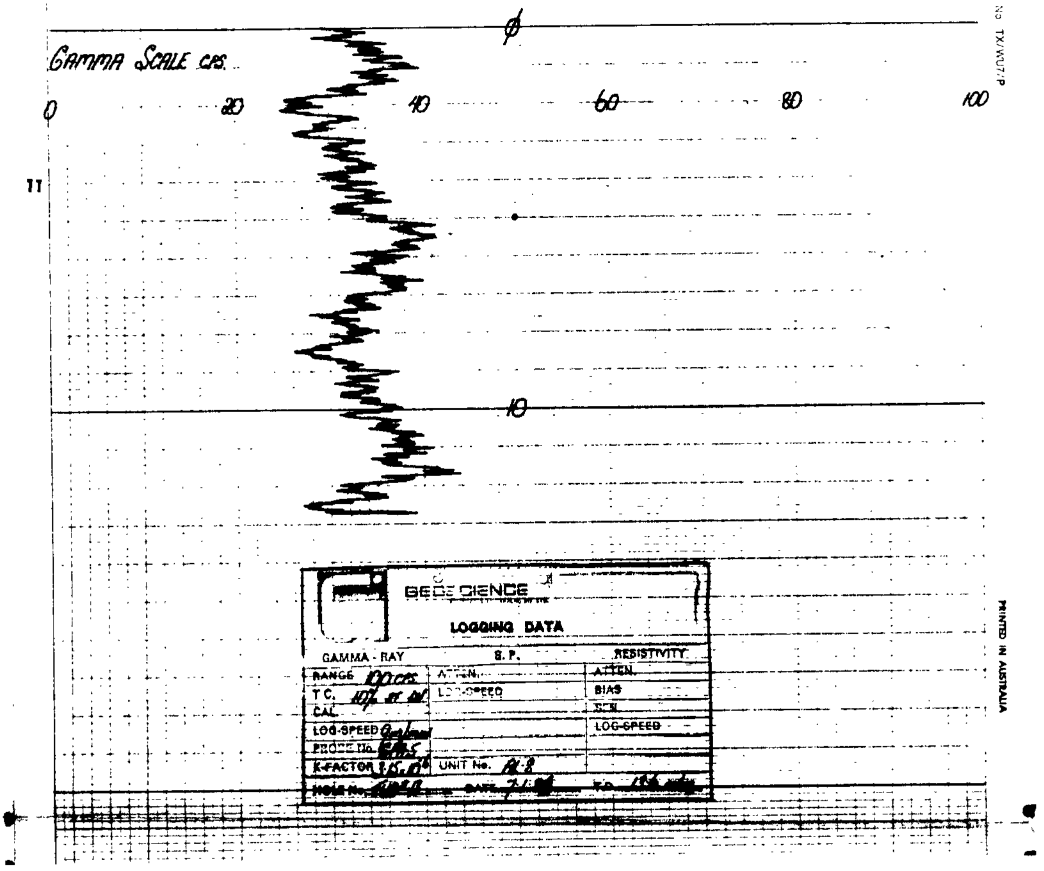
	1	2	3	4
Logged depth				
Resist scale				
S P scale				
Paper speed				
Logging speed				
Probe size in				
Type				
Bias				

CALIPER

Logged depth	
Scale in/in def	
Paper Speed	
Logging speed	
Arm Length in	
Max Def in	

HOLE # TUB-13.

7TH JANUARY 1981



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HOLE # TUB-14

180

LOGGING DATA

DATE 7TH JANUARY 1981

LOCATION		HOLE NUMBER TUB # 14		CLIENT AEMSC
State SOUTH AUSTRALIA		Collar elev metres		Claim
Area		Depth drilled 10.8 metres		Owned by
Project		CASING DATA	HOLE DATA	Operated by
Prospect		Wall size in	Dia 4" from 0 to 10.8	Unit Operator BYRNE T
Lat °	Long °	Dia (inside) in	Dia from to	Unit No B-3 Office ADELAIDE

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft)	9.8			
Range (Full scale)	100 cps			
Time constant (Sec)	10% st. dv			
Paper speed cm/m	1			
Logging speed m/min	4			
Bkgnd count (cps)	29			
Probe No	GPH-5			
Size (dia) (in)	40mm			
Type NaI	1½" x 1½"			
Standard (cps)	500			
Dead time μ sec				
Amp Gain				
Ratemeter No				
Bore hole medium	DRY			
Mud density				
Digital readout	2 mtr			
Time base	1 sec			
Upper Disc.				
Lower Disc				

Cased from to mtrs	Dia from to
Cored hole ☐	Non-cored hole ☒
Sampled Interval	Type
1 mtrs	ROTARY A.R.

INTERPRETATION DATA

Probe No	Standard	(cps) K factor
GPH-5	500	3.15×10^{6}

REMARKS

Fluid Level metres

ELECTRIC

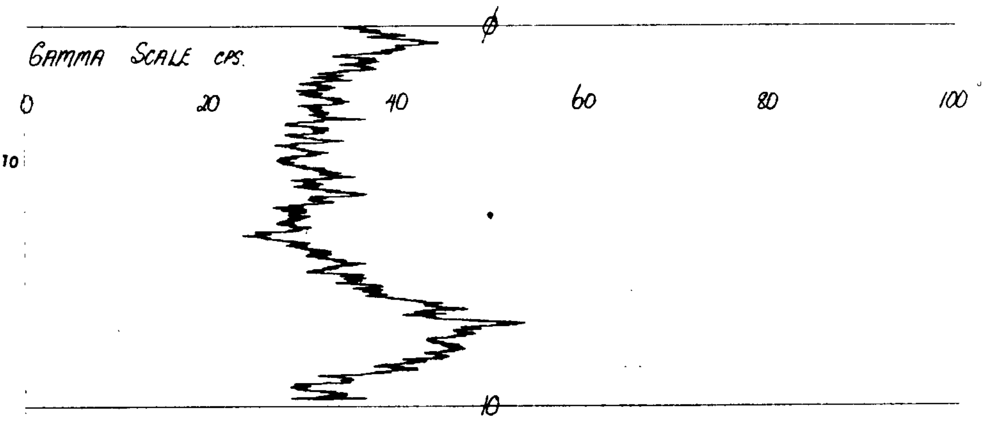
	1	2	3	4
Logged depth				
Resist scale				
S P scale				
Paper speed				
Logging speed				
Probe size in				
Type				
Bias				

CALIPER

Logged depth	
Scale in/in def	
Paper Speed	
Logging speed	
Arm Length in	
Max Def in	

HOLE # TUB-14.

7TH JANUARY 1981



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LOGGING DATA

GAMMA - RAY	S.P.	RESISTIVITY
RANGE 100 cps	ATTN.	ATTN.
T.C. 10% st. dv	LOG SPEED	BIAS
CAL.		GEN.
LOG SPEED 4m/min		LOG SPEED
PROBE No. GPH-5		
K-FACTOR 3.15×10^{6}	UNIT No. B	
HOLE No. TUB # 14	DATE 7.1.81	T.D. 10.8 mtrs

HOLE # 1UB-15 187

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Phone 268 2898

LOGGING DATA

DATE 7TH JANUARY 1981

LOCATION	Kimby Bay
State	South Australia
Area	
Project	
Prospect	
Lat ° ′ ″	Long ° ′ ″

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft)	21.0			
Range (Full scale)	100 cps			
Time constant (Sec)	10% st. dev.			
Paper speed cm/m	1			
Logging speed m/min	9.			
Bkgnd count (cps)	21.			
Probe No	GPA-5.			
Size (dia.) (in)	40mm			
Type Na I	1½" x ½"			
Standard (cps)	500			
Dead time	6			μ sec.
Amp Gain				
Ratemeter No				
Bore hole medium	DRY			
Mud density				
Digital readout	2mtr.			
Time base	1sec.			
Upper Disc				
Lower Disc				

HOLE NUMBER	1UB # 15
Collar elev.	metres
Depth drilled	23.0 metres

CASING DATA	HOLE DATA
Wall size in	Dia 4" from 0 to 23.0
Dia. (inside) in	Dia from to
Cased from to mtrs	Dia from to
Cored hole ☐	Non-cored hole ☑

Sampled Interval	Type
1 metre	ROTARY AIR.

INTERPRETATION DATA

Probe No	Standard (cps)	K factor
GPA-5	500	3.15×10^{-6}

REMARKS

Fluid Level metres

CLIENT	AFMECO
Claim	
Owned by	
Operated by	
Unit Operator	BARNETT
Unit No	AL-8 Office ADELAIDE

ELECTRIC

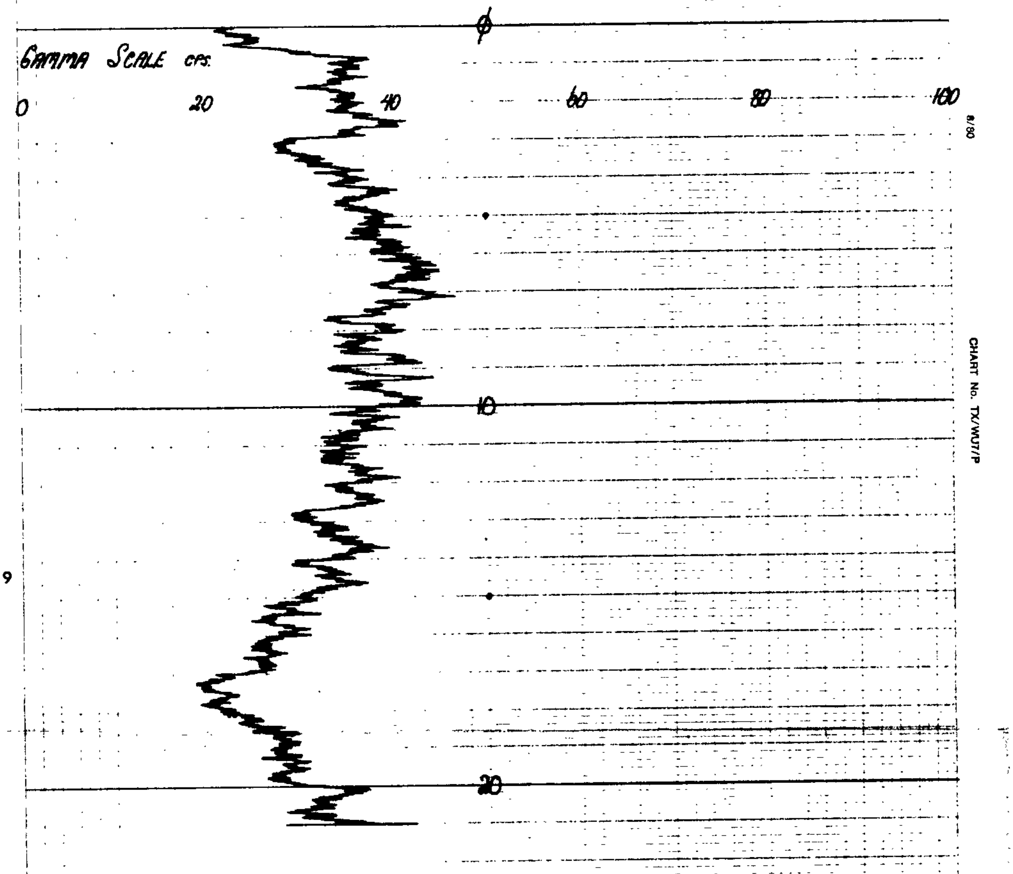
	1	2	3	4
Logged depth				
Resist. scale				
S P scale				
Paper speed				
Logging speed				
Probe size	in			
Type	w/d			
Bias				

CALIPER

Logged depth				
Scale	in/in def			
Paper Speed				
Logging speed				
Arm Length	in			
Max Def	in			

HOLE # 1UB-15

7TH JANUARY 1981



LOGGING DATA

GAMMA - RAY	S.P.	RESISTIVITY
RANGE 100 cps	ATTEN.	ATTEN.
T.C. 10% st. dev.	LOG-SPEED	BIAS
CAL.		SEN.
LOG-SPEED 9m/min		LOG-SPEED
PROBE No. GPA-5		
K-FACTOR 3.15 x 10⁻⁶	UNIT No. AL-8	
HOLE No. 1UB # 15	DATE 7.1.81	T.D. 23.0 mtrs

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HOLE # TUB-17

LOGGING DATA

DATE 7th January 1981

LOCATION	Tumby Bay
State	South Australia
Area	
Project	
Prospect	
Lat ° ' "	Long ° ' "

HOLE NUMBER	TUB # 17
Collar elev	metres
Depth drilled	170 metres

CASING DATA	HOLE DATA
Wall size in	Dia. 4" from 0 to 170
Dia (inside) in	Dia from to
Cased from to mtrs	Dia. from to
Cored hole ☐	Non-cored hole ☑
Sampled Interval: . metre	Type: Rotary Air

CLIENT.	AEMECO
Claim.	
Owned by	
Operated by.	
Unit Operator.	Barnett
Unit No	AL-8
Office	Adelaide

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft)	15.7			
Range (Full scale)	100 cps.			
Time constant (Sec)	10% st dv			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	30			
Probe No	GPA 5			
Size (dia) (in)	40mm.			
Type Na I	1½" x ½"			
Standard (cps)	500			
Dead time μ sec	6			
Amp Gain				
Ratemeter No				
Bore hole medium	DRY			
Mud density				
Digital readout	2mtr.			
Time base	1 sec.			
Upper Disc				
Lower Disc				

INTERPRETATION DATA

Probe No	Standard (cps)	K factor
GPA 5	500	$3{\cdot}15 \times 10^{-6}$

REMARKS

Fluid Level metres

ELECTRIC

	1	2	3	4
Logged depth				
Resist. scale				
S.P. scale				
Paper speed				
Logging speed				
Probe size in				
Type w/d				
Bias				

CALIPER

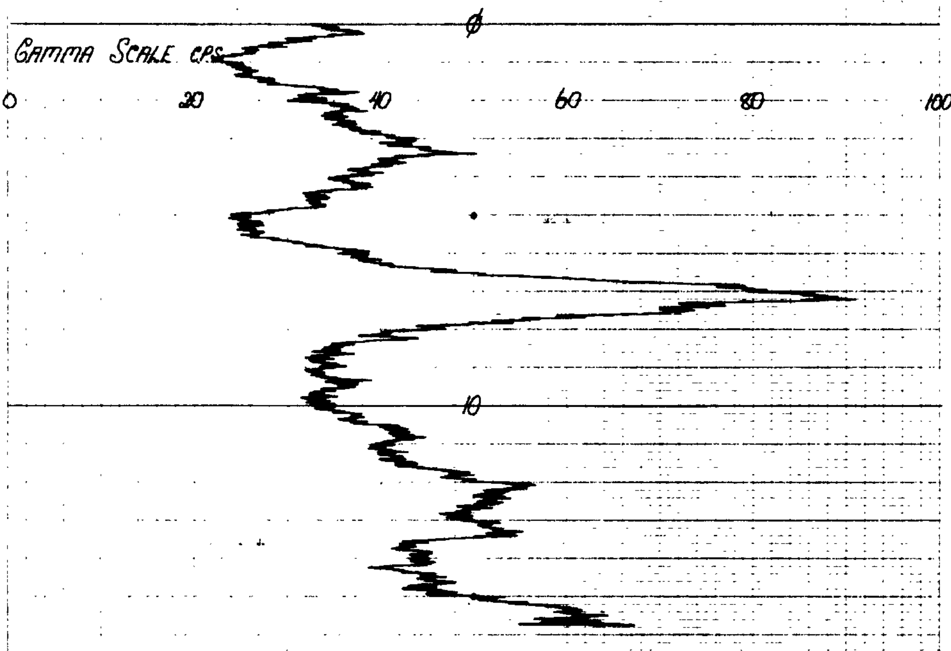
Logged depth	
Scale in/in def	
Paper Speed	
Logging speed	
Arm Length in	
Max Def. in	

8/80

HOLE # TUB-17

7th January 1981

CHART No. TX/WU7/P



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LOGGING DATA

GAMMA - RAY	S. P.	RESISTIVITY
RANGE 100 CPS	ATTEN	ATTEN.
T.C. 10% st dv	LOG-SPEED	BIAS
CAL.		SEN
LOG-SPEED 9m/min		LOG-SPEED
PROBE No. GPA 5		
K-FACTOR $3{\cdot}15 \times 10^{-6}$	UNIT No AL-8	
HOLE No. TUB # 17	DATE 7.1.81	T.D. 16.7 mtrs.

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HOLE # 1UB 18

LOGGING DATA

DATE 7th JANUARY 93.

LOCATION JIMBO BAY	HOLE NUMBER 1UB # 18	CLIENT RENDEC
State SOUTH AUSTRALIA	Collar elev metres	Claim.
Area	Depth drilled 8.0 metres	Owned by
Project	**CASING DATA** / **HOLE DATA**	Operated by
Prospect	Wall size in / Dia 4" from 0 to 8.0	Unit Operator BARNETT
Lat ° ' " Long ° ' "	Dia (inside) in / Dia from to	Unit No 4.8 Office ADELAIDE
	Cased from to mtrs / Dia. from to	
	Cored hole ☐ / Non-cored hole ☑	

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft)	8			
Range (Full scale)	100 CPS			
Time constant (Sec)	10% ST. DV.			
Paper speed cm/m				
Logging speed m/min	9.			
Bkgnd count (cps)	37			
Probe No	GPA-5			
Size (dia) (in)	40mm.			
Type NaI	1½" × 1½"			
Standard (cps)	500			
Dead time	0			μ sec
Amp Gain				
Ratemeter No				
Bore hole medium	DRY			
Mud density				
Digital readout	2mtr			
Time base	1sec.			
Upper Disc				
Lower Disc				

Sampled Interval	Type
1 metre	ROTARY AIR.

INTERPRETATION DATA

Probe No	Standard (cps)	K factor
GPA-5	500	3.15×10^{-6}

REMARKS

Fluid Level metres

ELECTRIC

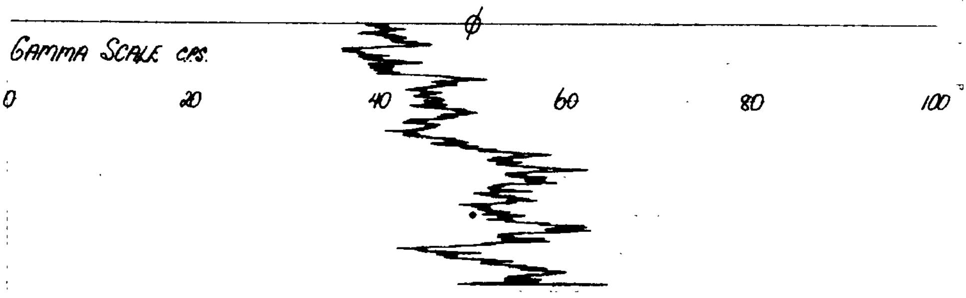
	1	2	3	4
Logged depth				
Resist scale				
S P scale				
Paper speed				
Logging speed				
Probe size in				
Type w/d				
Bias				

CALIPER

Logged depth			
Scale in/in def			
Paper Speed			
Logging speed			
Arm Length in			
Max Def in			

HOLE # 1UB-18

7TH JANUARY 1981



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LOGGING DATA

GAMMA - RAY	S. P.	RESISTIVITY
RANGE 100 CPS	ATTEN	ATTEN.
T.C. 10% ST. DV.	LOG SPEED	BIAS
CAL.		SEN.
LOG-SPEED 9m/min		LOG-SPEED
PROBE No. GPA-5		
K-FACTOR 3.15×10^{-6}	UNIT No. AL 8	
HOLE No. 1UB # 18	DATE 7.1.81	T.D. 7.8 mtrs

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HOLE # TUB-19

LOGGING DATA

DATE 7th JANUARY, 81

LOCATION TUMBY BAY
State SOUTH AUSTRALIA
Area
Project
Prospect
Lat ° ' " Long ° ' "

HOLE NUMBER TUB # 19
Collar elev metres
Depth drilled 80 metres

CLIENT BEMCO
Claim
Owned by
Operated by
Unit Operator SHANKIE
Unit No G 8 Office ADELAIDE

CASING DATA

Wall size in
Dia (inside) in
Cased from to mtrs

HOLE DATA

Dia 2" from 0 to 80
Dia from to
Dia from to
Cored hole ☐
Non-cored hole ☑

Sampled Interval: 1 metre
Type: ROTARY AIR

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft)	68			
Range (Full scale)	200 CPS.			
Time constant (Sec)	10% st. dl.			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	38			
Probe No	GPA-5			
Size (dia) (in)	40mm			
Type Na I 1/2" × 1"				
Standard (cps)	500			
Dead time	6			μ sec.
Amp Gain				
Ratemeter No				
Bore hole medium	DRY			
Mud density				
Digital readout	2 mtr.			
Time base	1 sec.			
Upper Disc				
Lower Disc				

INTERPRETATION DATA

Probe No	Standard (cps)	K factor
GPA-5	500	$3 \cdot 15 \times 10^{-6}$

REMARKS

Fluid Level metres

ELECTRIC

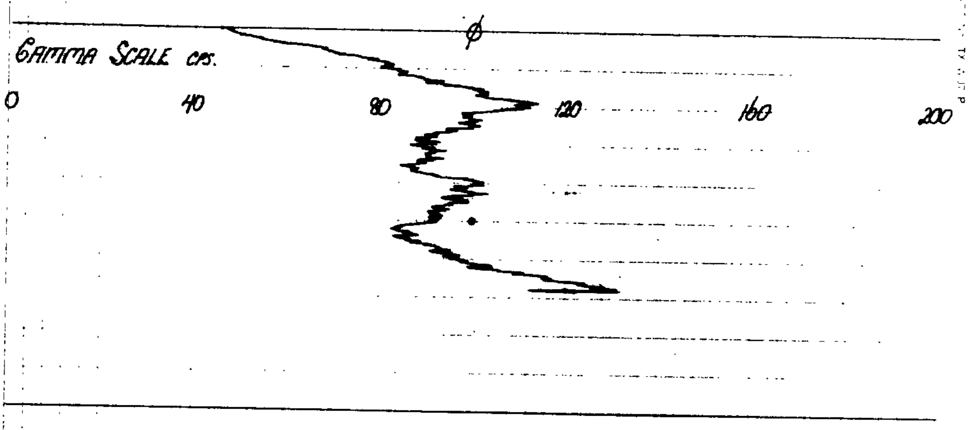
	1	2	3	4
Logged depth				
Resist scale				
SP scale				
Paper speed				
Logging speed				
Probe size in				
Type W/d				
Bias				

CALIPER

Logged depth		
Scale in/in def		
Paper Speed		
Logging speed		
Arm Length in		
Max Def. in		

HOLE # TUB-19.

7th JANUARY 1981



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LOGGING DATA

GAMMA - RAY	S. P.	RESISTIVITY
RANGE 200	ATTEN.	ATTEN.
T.C. 10% st. dl.	LOG-SPEED	BIAS
CAL.		SEN.
LOG-SPEED 9m/min		LOG-SPEED
PROBE No. GPA-5		
K-FACTOR 3.15×10⁻⁶	UNIT No. G 8	

HOLE No. TUB # 19 DATE 7.1.81 T.D. 78 mtr.

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HOLE # 1UB-20

LOGGING DATA

DATE 7th JANUARY 81

LOCATION	Lime Bay	HOLE NUMBER	1UB # 20	CLIENT.	AFMECO
State	SOUTH AUSTRALIA	Collar elev.	metres	Claim	
Area		Depth drilled	5·0 metres	Owned by	
Project		CASING DATA	HOLE DATA	Operated by	
Prospect		Wall size in	Dia 4" from 0 to 5·0	Unit Operator	BARNETT
Lat ° ' "	Long ° ' "	Dia (inside) in.	Dia from to	Unit No	AL 8 Office ADELAIDE

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft)	38			
Range (Full scale)	100 cps			
Time constant (Sec)	10% st. dv.			
Paper speed cm/m				
Logging speed m/min	9			
Bkgnd count (cps)	31			
Probe No	6PH5			
Size (dia) (in)	40mm			
Type NaI	1½" x 2½"			
Standard (cps)	500			
Dead time	6			μ sec
Amp Gain				
Ratemeter No				
Bore hole medium	DRY			
Mud density				
Digital readout	2 mtr.			
Time base	1 sec.			
Upper Disc				
Lower Disc				

Cased from to mtrs Dia from to

Cored hole ☐ Non-cored hole ☑

Sampled Interval	Type
1 metre	ROTARY AIR.

INTERPRETATION DATA

Probe No	Standard (cps)	K factor
6PH-5	500	3.15×10^{-6}

REMARKS

Fluid Level metres

ELECTRIC

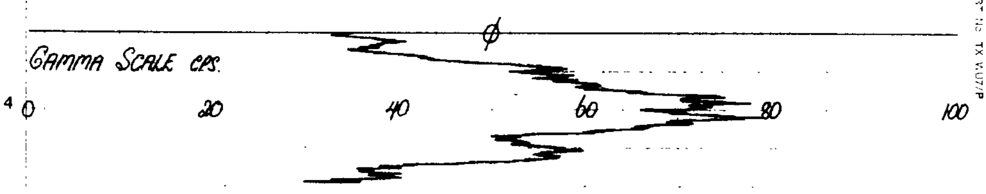
	1	2	3	4
Logged depth				
Resist scale				
S.P scale				
Paper speed				
Logging speed				
Probe size	in			
Type	w/d			
Bias				

CALIPER

Logged depth				
Scale	in/in def			
Paper Speed				
Logging speed				
Arm Length	in			
Max Def	in			

HOLE # 1UB-20

7th JANUARY 1981



GEOSCIENCE

LOGGING DATA

GAMMA - RAY	S P.	RESISTIVITY
RANGE 100 cps.	ATTEN.	ATTEN.
T.C. 10% ST. DV.	LOG-SPEED	BIAS
CAL		CAL
LOG-SPEED 9m/min		LOG-SPEED
PROBE No. 6PH5		
K-FACTOR 3.15×10^{-6}	UNIT No. AL 8	
HOLE No. 1UB #20	DATE 7.1.81	T.D. 4.8 mts

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HOLE # 1UB-21

LOGGING DATA

DATE 7TH JANUARY 1981

LOCATION 1 (MB) SA
State SOUTH AUSTRALIA
Area
Project
Prospect
Lat ° ' " Long ° ' "

HOLE NUMBER 1UB # 21
Collar elev. metres
Depth drilled 7.0 metres

CLIENT AFMECO
Claim
Owned by
Operated by
Unit Operator DARNETT
Unit No. AL 8 Office ADELAIDE

CASING DATA / **HOLE DATA**

CASING DATA		HOLE DATA
Wall size	in	Dia 4" from 0 to 7.0
Dia (inside)	in	Dia from to
Cased from to	mtrs	Dia from to
Cored hole ☐		Non-cored hole ☑

Sampled Interval	Type
1 metre.	ROTARY AIR.

INTERPRETATION DATA

Probe No	Standard (cps)	K factor
3PA-5	500	3.15×10^{-6}

REMARKS

Fluid Level metres

GAMMA RAY

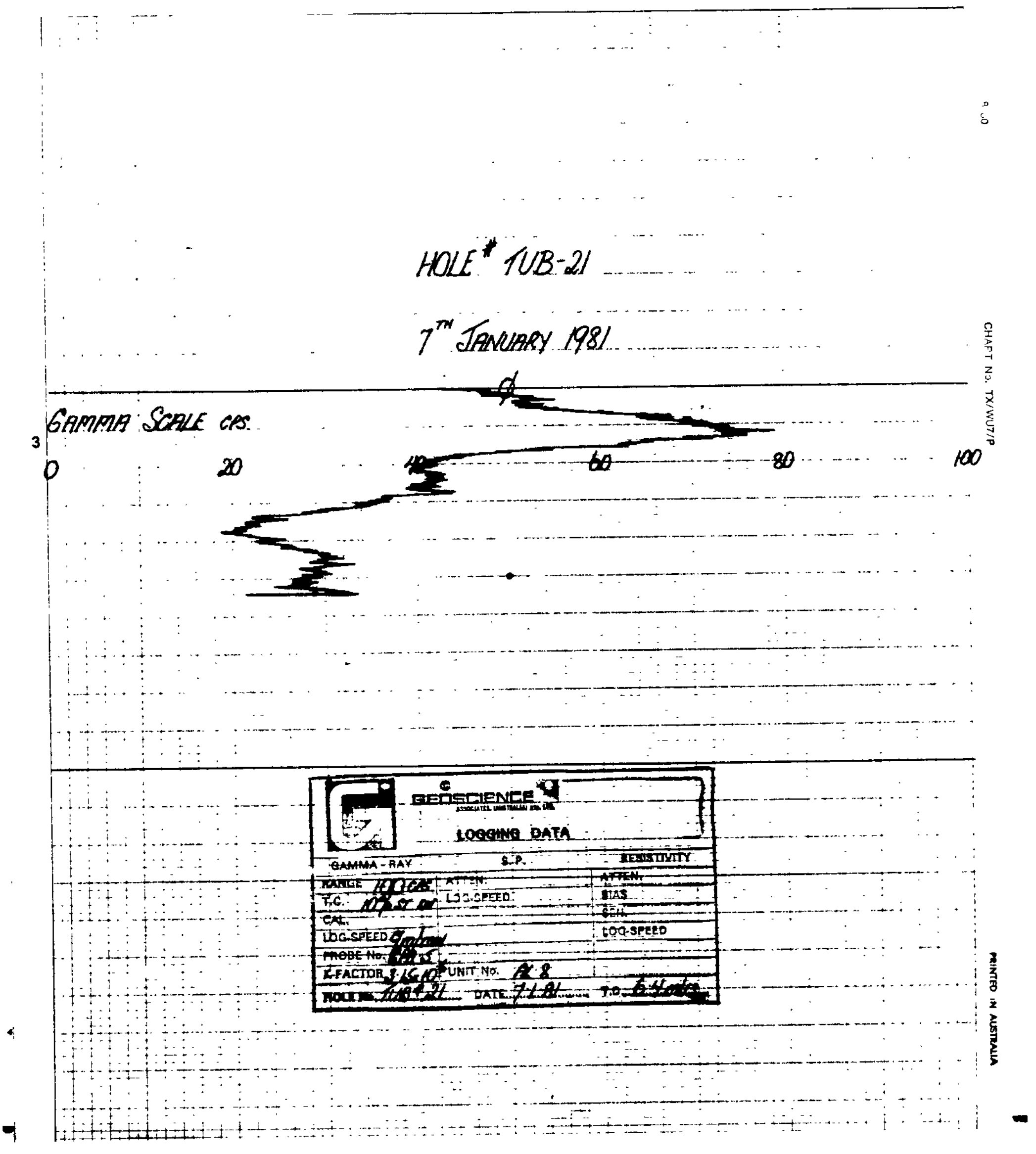
	INITIAL RUN	2	3	4
Logged depth (ft)	5.4			
Range (Full scale)	100 cps			
Time constant (Sec)	0.5 ST. DV.			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	129			
Probe No	3PA-5			
Size (dia) (in)	40mm			
Type NaI	1½" x ½"			
Standard (cps)	500			
Dead time	6			μ sec
Amp Gain				
Ratemeter No				
Bore hole medium	DRY			
Mud density				
Digital readout	2mtc			
Time base	1 sec.			
Upper Disc				
Lower Disc				

ELECTRIC

	1	2	3	4
Logged depth				
Resist. scale				
S P scale				
Paper speed				
Logging speed				
Probe size in				
Type w/d				
Bias				

CALIPER

Logged depth	
Scale in/in def	
Paper Speed	
Logging speed	
Arm Length in	
Max Def in	



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HOLE # TUB-22 — 193

LOGGING DATA

DATE 7TH JANUARY, 981

LOCATION	TUMBY BAY
State	SOUTH AUSTRALIA
Area	
Project	
Prospect	
Lat ° ' "	Long ° ' "

HOLE NUMBER	TUB # 22
Collar elev	metres
Depth drilled	8.0 metres

CLIENT	REMECO
Claim	
Owned by	
Operated by	
Unit Operator	BARNETT
Unit No	AK-8
Office	ADELAIDE

CASING DATA / **HOLE DATA**

CASING DATA	HOLE DATA
Wall size in.	Dia 4" from 0 to 8.0
Dia (inside) in.	Dia from to
Cased from to mtrs.	Dia from to
Cored hole ☐	Non-cored hole ☑
Sampled Interval: 1 metre	Type: ROTARY AIR.

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft)	6.9			
Range (Full scale)	100 cps			
Time constant (Sec)	10% st. dv.			
Paper speed cm/m				
Logging speed m/min	9			
Bkgnd count (cps)	37			
Probe No	GPA-5			
Size (dia) (in)	40mm			
Type Na I	1½" x ½"			
Standard (cps)	500			
Dead time	0			μ sec
Amp Gain				
Ratemeter No				
Bore hole medium	DRY			
Mud density				
Digital readout	.2 mtr			
Time base	1 sec			
Upper Disc				
Lower Disc				

INTERPRETATION DATA

Probe No	Standard (cps)	K factor
GPA-5	500	3.15×10^{-6}

REMARKS

Fluid Level metres

ELECTRIC

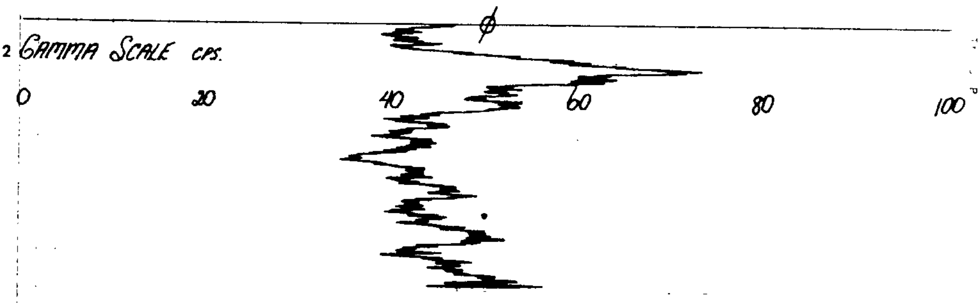
	1	2	3	4
Logged depth				
Resist. scale				
S P scale				
Paper speed				
Logging speed				
Probe size in				
Type w/d				
Bias				

CALIPER

Logged depth		
Scale	in/in def	
Paper Speed		
Logging speed		
Arm Length	in	
Max Def	in	

HOLE # TUB-22.

7TH JANUARY 1981



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LOGGING DATA

GAMMA - RAY	S. P	RESISTIVITY
RANGE 100 CPS	ATTEN.	ATTEN.
T C 10% ST. DV	LOG-SPEED	BIAS
CAL		SEN
LOG SPEED 9m/min		LOG SPEED
PROBE No GPA-5		
K-FACTOR 3.15×10^{-6}	UNIT No AK-8	
HOLE No. TUB # 22	DATE 7-1-81	T.D. 7.9 mtrs

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HOLE # [illegible]

LOGGING DATA

194

DATE 7th JANUARY 1981

LOCATION [illegible]
State SOUTH AUSTRALIA
Area
Project
Prospect
Lat ° ' " Long ° ' "

HOLE NUMBER TUB#23
Collar elev metres
Depth drilled 10.0 metres

CLIENT AFMECO
Claim.
Owned by.
Operated by
Unit Operator BARNETT
Unit No AL-8 Office ADELAIDE

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft)	[illegible]			
Range (Full scale)	100 cps			
Time constant (Sec)	10% st. dev.			
Paper speed cm m				
Logging speed m/min	3			
Bkgnd count (cps)	[illegible]			
Probe No	[illegible]			
Size (dia) (in)	[illegible] mm			
Type	[illegible]			
Standard (cps)	500			
Dead time μ sec	0			
Amp Gain				
Ratemeter No				
Bore hole medium	Dry			
Mud density				
Digital readout	[illegible]			
Time base	[illegible]			
Upper Disc				
Lower Disc				

CASING DATA / HOLE DATA

Wall size in | Dia 4" from 0 to 10.0
Dia (inside) in | Dia from to
Cased from to mtrs | Dia from to
Cored hole ☐ | Non cored hole ☒

Sampled Interval: .1 metre
Type: [illegible]

INTERPRETATION DATA

Probe No	Standard	(cps) K factor
[illegible]	500	3.15×10^{-6}

REMARKS

Fluid Level metres

ELECTRIC

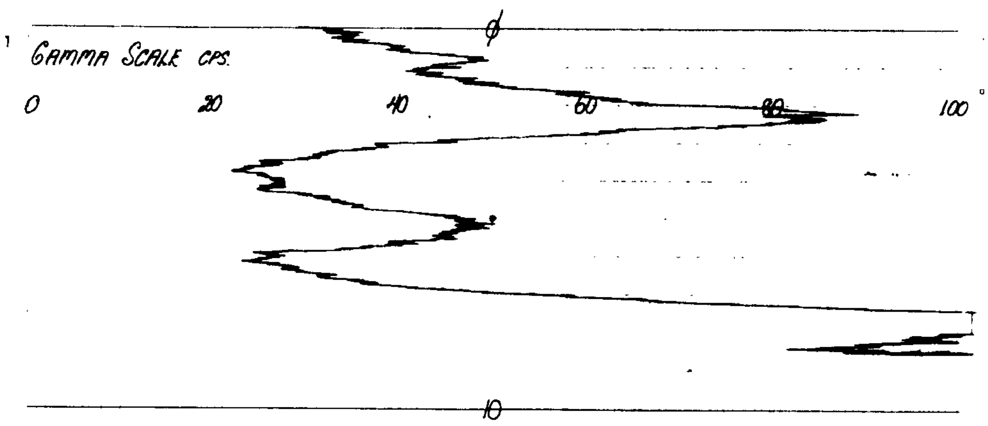
	1	2	3	4
Logged depth				
Resist scale				
S P scale				
Paper speed				
Logging speed				
Probe size in				
Type				
Bias				

CALIPER

Logged depth			
Scale in/in def			
Paper Speed			
Logging speed			
Arm Length in			
Max Def in			

HOLE # TUB-23.

7TH JANUARY 1981



GEOSCIENCE LOGGING DATA

GAMMA-RAY	S.P.	RESISTIVITY
RANGE 100 CPS	ATTEN.	ATTEN.
T.C. 10% ST. DV.	LOG SPEED	BIAS
CAL.		CON.
LOG SPEED 3m/min		LOG SPEED
PROBE NO GPA-5		
K-FACTOR 3.15.10	UNIT NO AL-8	

HOLE No. TUB#23 DATE 7.1.81 T.D. 9.5 mtrs.

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HOLE # 1UB-24

LOGGING DATA

DATE 8TH JANUARY 1981

LOCATION TUMBY BAY	HOLE NUMBER TUB # 24	CLIENT. AEMECO
State: SOUTH AUSTRALIA	Collar elev. metres	Claim.
Area:	Depth drilled: 30·0 metres	Owned by:
Project	CASING DATA / HOLE DATA	Operated by
Prospect	Wall size in / Dia 4" from 0 to 30.	Unit Operator. BARNETT
Lat ° ' " / Long ° ' "	Dia. (inside) in / Dia from to	Unit No. AL 8 / Office ADELAIDE

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft)	28·6			
Range (Full scale)	100 cps			
Time constant (Sec.)	10% st. dv.			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	31			
Probe No.	GPA-5			
Size (dia) (in)	40mm			
Type	Na I 1½" x ½"			
Standard (cps)	500			
Dead time μ sec.	6			
Amp Gain				
Ratemeter No.				
Bore hole medium	DRY			
Mud density				
Digital readout	·2 mtr.			
Time base	1 sec.			
Upper Disc.				
Lower Disc				

Cased from to mtrs / Dia from to

Cored hole ☐ Non-cored hole ☑

Sampled Interval	Type
1 metre	ROTARY AIR.

INTERPRETATION DATA

Probe No.	Standard (cps)	K factor
GPA-5	500	$3{\cdot}15 \times 10^{-6}$

REMARKS

Fluid Level metres

ELECTRIC

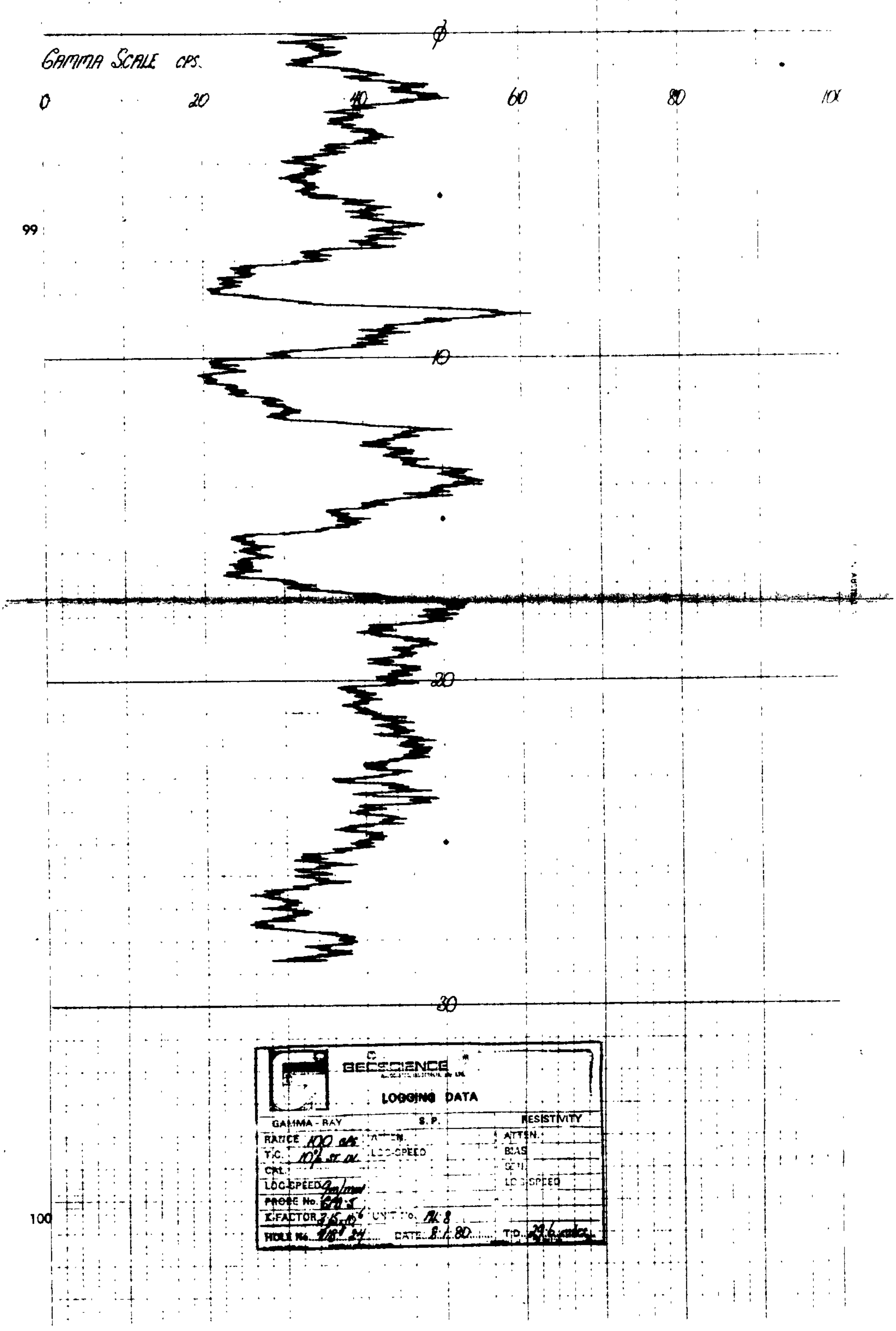
	1	2	3	4
Logged depth				
Resist. scale				
S.P. scale				
Paper speed				
Logging speed				
Probe size in				
Type w/d				
Bias				

CALIPER

Logged depth	
Scale in/in def	
Paper Speed	
Logging speed	
Arm Length in	
Max. Def in	

HOLE # 1UB-24

8TH JANUARY 1981



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HOLE # 1UB-25

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LOGGING DATA

DATE 8TH JANUARY, 1981

LOCATION	TUMBY BAY
State	SOUTH AUSTRALIA
Area	
Project	
Prospect	
Lat	Long

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft)	9.8			
Range (Full scale)	200 CPS			
Time constant (Sec)	10%			
Paper speed cm/m	7			
Logging speed m/min	9			
Bkgnd count (cps)	39			
Probe No	GPA-5			
Size (dia) (in)	40mm			
Type	NaI 1½" x ½"			
Standard (cps)	500			
Dead time μ sec	6			
Amp Gain				
Ratemeter No				
Bore hole medium	DRY			
Mud density				
Digital readout	2mtr			
Time base	1sec			
Upper Disc				
Lower Disc				

HOLE NUMBER	1UB # 25
Collar elev	metres
Depth drilled	11 metres

CASING DATA / **HOLE DATA**

Wall size	in.	Dia 4"	from 0 to 11
Dia. (inside)	in.	Dia.	from to
Cased from to	mtrs	Dia	from to
Cored hole		Non-cored hole	✓
Sampled Interval	1 metre	Type	ROTARY AIR

INTERPRETATION DATA

Probe No	Standard (cps)	K factor
GPA-5	500	3.15×10^{-6}

REMARKS

Fluid Level metres

CLIENT	AEMECO
Claim	
Owned by	
Operated by	
Unit Operator	BARNETT
Unit No.	AL-8
Office	ADELAIDE

ELECTRIC

	1	2	3	4
Logged depth				
Resist. scale				
S P scale				
Paper speed				
Logging speed				
Probe size in				
Type w/d				
Bias				

CALIPER

Logged depth	
Scale in/in def	
Paper Speed	
Logging speed	
Arm Length in	
Max. Def in	

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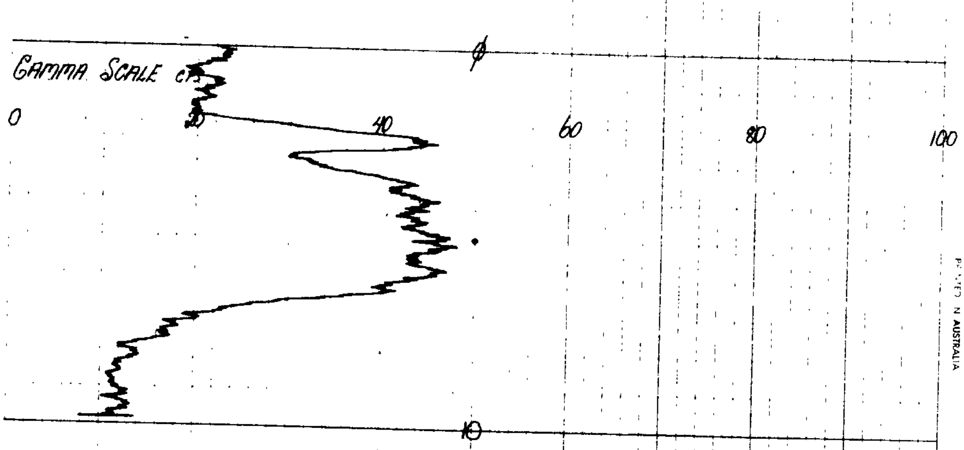
HOLE # 1UB-25

8TH JANUARY 1981



GEOSCIENCE
LOGGING DATA

GAMMA-RAY	S.P.	RESISTIVITY
RANGE 200 CPS	ATTEN.	ATTEN.
T.C. 10% ST. DV.	LOG SPEED	BIAS
CAL.		
LOG-SPEED 9m/min		LOG-SPEED
PROBE No. GPA-5		
K-FACTOR 3.15×10⁻⁶	UNIT AL8	
HOLE No. 1UB 25	DATE 8.1.81	T.D. 10.8 mtrs

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HOLE # 1UB-26

LOGGING DATA

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DATE 8th JANUARY 1981

LOCATION Tumby Bay	HOLE NUMBER 1UB # 26	CLIENT AEMECC
State SOUTH AUSTRALIA	Collar elev metres	Claim
Area	Depth drilled 11 metres	Owned by
Project	CASING DATA / HOLE DATA	Operated by
Prospect	Wall size in. / Dia 4" from 0 to 11	Unit Operator BARNETT
Lat ° ' " Long ° ' "	Dia (inside) in / Dia from to	Unit No AL 8 Office ADELAIDE

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft.)	9.8			
Range (Full scale)	100 cps			
Time constant (Sec)	10%			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	45			
Probe No	6PA-5			
Size (dia) (In)	40mm			
Type NaI	1½" x 1½"			
Standard (cps)	500			
Dead time μ sec	6			
Amp Gain				
Ratemeter No.				
Bore hole medium	DRY			
Mud density				
Digital readout	2mtr			
Time base	1sec			
Upper Disc				
Lower Disc				

Cased from to mtrs	Dia from to
Cored hole ☐	Non-cored hole ☑
Sampled Interval: 1 metre	Type: ROTARY AIR

INTERPRETATION DATA

Probe No	Standard (cps)	K factor
6PA-5	500	3.15×10^{-6}

REMARKS

Fluid Level metres

ELECTRIC

	1	2	3	4
Logged depth				
Resist scale				
S.P. scale				
Paper speed				
Logging speed				
Probe size in				
Type w/d				
Bias				

CALIPER

Logged depth				
Scale in/in def				
Paper Speed				
Logging speed				
Arm Length in				
Max Def in				

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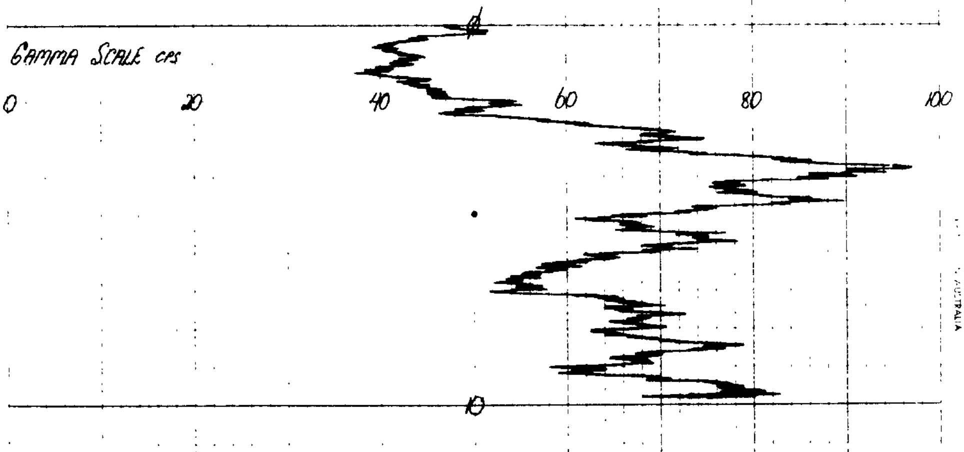
HOLE # 1UB-26.

8TH JANUARY 1981



GEOSCIENCE

LOGGING DATA

GAMMA - RAY	S.P.	RESISTIVITY
RANGE 100 cps	ATTEN	ATTEN
T.C. 10% ST. DV	LOG-SPEED	BIAS
CAL		DCT
LOG-SPEED 9m/min		LOG-SPEED
PROBE No. 6PA-5		
K-FACTOR 3.15×10^{-6}	UNIT No AL 8	
HOLE No. 1UB#26	DATE 8.1.81	T.D. 10.8 mts

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HOLE # TUB-27

LOGGING DATA

DATE 8TH JANUARY 1981

LOCATION: TUMBY BAY	HOLE NUMBER: TUB# 27		CLIENT: AEMECO
State: SOUTH AUSTRALIA	Collar elev. metres		Claim:
Area	Depth drilled: 45 metres		Owned by:
Project:	CASING DATA	HOLE DATA	Operated by
Prospect	Wall size in.	Dia. 4" from 0 to 45	Unit Operator: BARNETT
Lat ° ' " / Long ° ' "	Dia. (inside) in	Dia. from to	Unit No. AL 8 / Office ADELAIDE
	Cased from to mtrs	Dia. from to	
	Cored hole ☐	Non-cored hole ☑	

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft.)	42.9			
Range (Full scale)	200 cps			
Time constant (sec.)	10% st. dev			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	53			
Probe No	GPA.5			
Size (dia.) (in.)	40mm			
Type Na I	1½" x ½"			
Standard (cps)	500			
Dead time	6			µ sec.
Amp. Gain				
Ratemeter No.				
Bore hole medium	DRY			
Mud density				
Digital readout	2mtr			
Time base	1sec			
Upper Disc				
Lower Disc.				

Sampled Interval	Type
1 metre	ROTARY AIR.

INTERPRETATION DATA

Probe No	Standard (cps)	K factor
GPA 5	500	3.65×10^{-6}

REMARKS

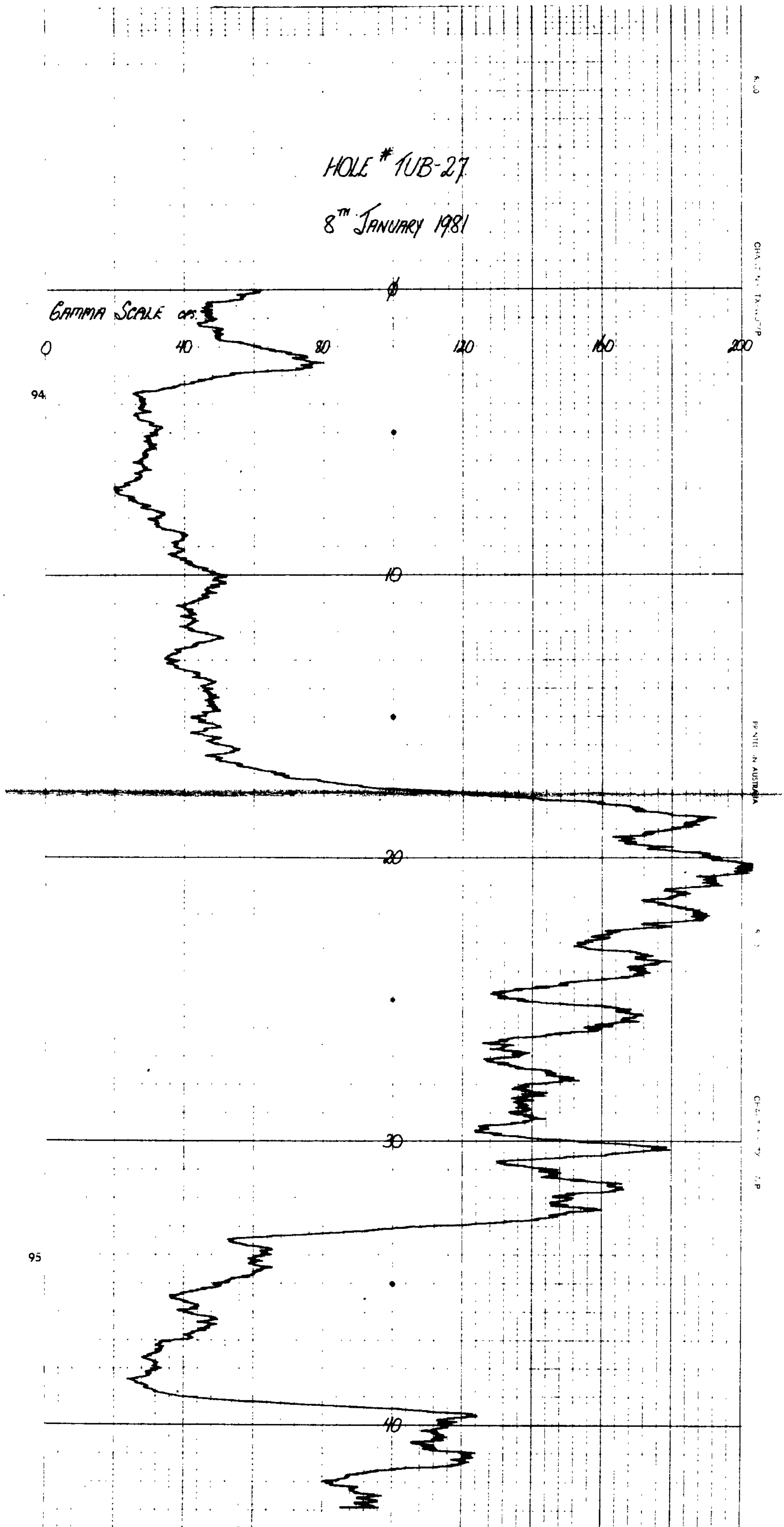
Fluid Level metres

ELECTRIC

	1	2	3	4
Logged depth				
Resist. scale				
S.P. scale				
Paper speed				
Logging speed				
Probe size in				
Type w/d				
Bias				

CALIPER

Logged depth				
Scale in/in def				
Paper Speed				
Logging speed				
Arm Length in				
Max Def. in				



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LOGGING DATA

GAMMA-RAY	S.P.	SENSITIVITY
RANGE 200 cps	ATTEN.	ATTEN.
T.C. 10% st dev	LOG-SPEED	BIAS
CAL.		SENS
LOG-SPEED 9 m/min		LOG-SPEED
PROBE No. GPA 5		
K-FACTOR 3.65×10^{-6}	UNIT No. AL 8	
HOLE No. TUB 27	DATE 8.1.81	T.D. 43 metres

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HOLE # TUB-28

LOGGING DATA

DATE 8TH JANUARY 1981

LOCATION TUMBY BAY	HOLE NUMBER TUB# 28	CLIENT PEMECO
State SOUTH AUSTRALIA	Collar elev ___ metres	Claim
Area	Depth drilled 8 metres	Owned by
Project	CASING DATA / HOLE DATA	Operated by
Prospect	Wall size ___ in / Dia 4" from 0 to 8	Unit Operator BARNETT
Lat ° ′ ″ Long °	Dia (inside) ___ in / Dia ___ from ___ to	Unit No AK-8 Office ADELAIDE
	Cased from ___ to ___ mtrs / Dia ___ from ___ to	
	Cored hole ☐ / Non-cored hole ☑	

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft)	7.2			
Range (Full scale)	100 CPS.			
Time constant (Sec)	10% ST. DV			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	47			
Probe No	GPA 5			
Size (dia) (in)	40mm			
Type NaI	1½ x ½"			
Standard (cps)	500			
Dead time µ sec	6			
Amp Gain				
Ratemeter No				
Bore hole medium	DRY			
Mud density				
Digital readout	2mtr.			
Time base	1sec.			
Upper Disc				
Lower Disc				

Sampled Interval	Type
1 metre	ROTARY AIR.

INTERPRETATION DATA

Probe No.	Standard (cps)	K factor
GPA 5	500	3.15×10^{-6}

REMARKS

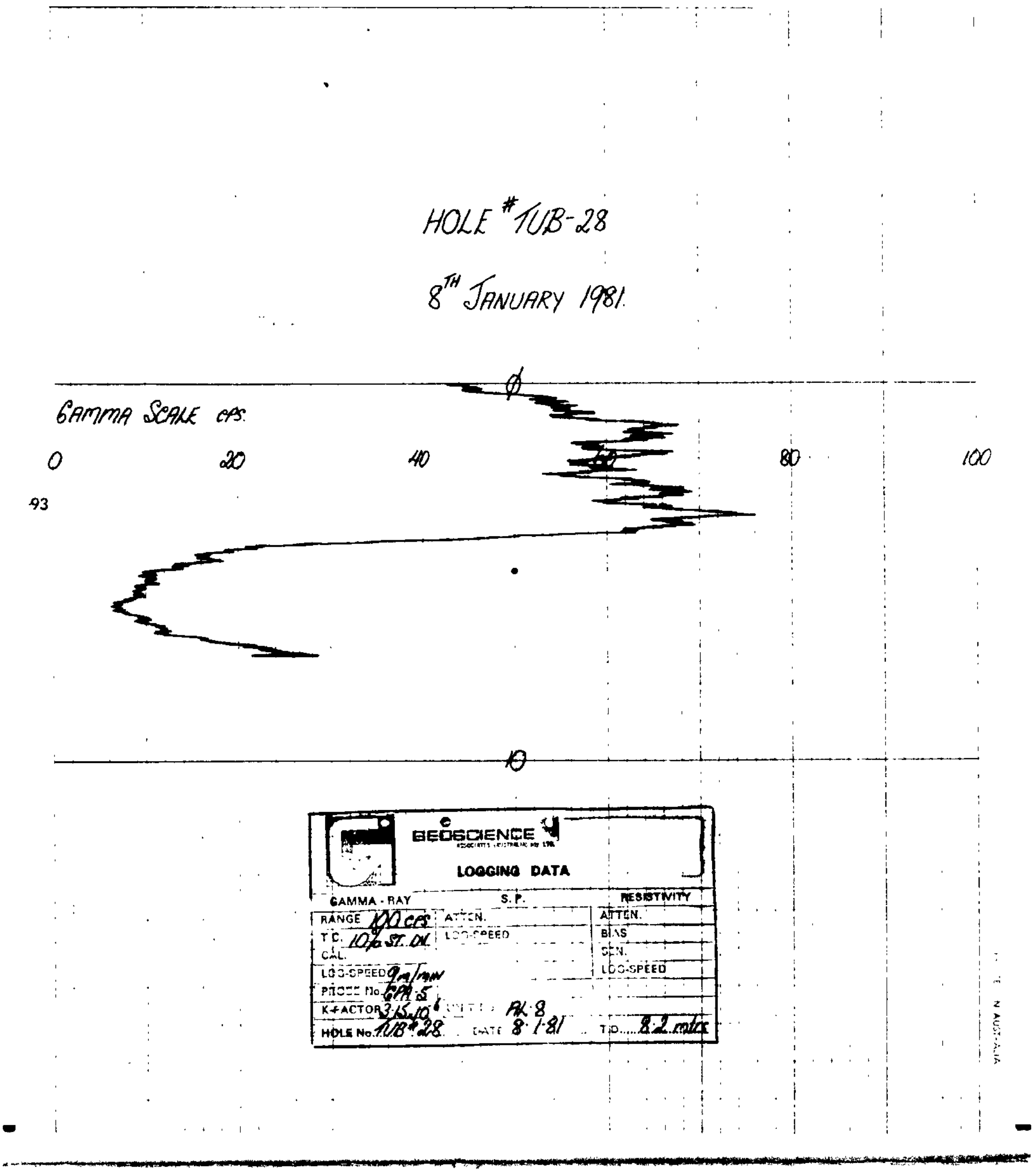
Fluid Level ___ metres

ELECTRIC

	1	2	3	4
Logged depth				
Resist. scale				
S P scale				
Paper speed				
Logging speed				
Probe size in				
Type				
Bias				

CALIPER

Logged depth				
Scale in/in def				
Paper Speed				
Logging speed				
Arm Length in				
Max Def in				



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HOLE # TUB-29

LOGGING DATA

DATE 8TH JANUARY 1981

LOCATION	TUMBY BAY			
State.	SOUTH AUSTRALIA			
Area				
Project				
Prospect				
Lat ° ' "	Long ° ' "			

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft)	69.			
Range (Full scale)	100 cps.			
Time constant (Sec)	10% st dv.			
Paper speed cm/m	1			
Logging speed m/min	9.			
Bkgnd count (cps)	46			
Probe No	GPA 5.			
Size (dia.) (in)	40mm.			
Type Na I	1½" x ½"			
Standard (cps)	500			
Dead time	6			μ sec
Amp Gain				
Ratemeter No				
Bore hole medium	DRY.			
Mud density				
Digital readout	2 mtr.			
Time base	1 sec			
Upper Disc.				
Lower Disc				

HOLE NUMBER: TUB # 29

Collar elev.	metres
Depth drilled: 8	metres

CASING DATA	HOLE DATA
Wall size in.	Dia 4" from 0 to 8
Dia. (inside) in.	Dia. from to
Cased from to mtrs	Dia from to
Cored hole ☐	Non-cored hole ☑

Sampled Interval	Type
1 metre	ROTARY AIR

INTERPRETATION DATA

Probe No	Standard (cps)	K factor
GPA-5	500	3.15×10^{-6}

REMARKS

Fluid Level metres

CLIENT: AFMECO

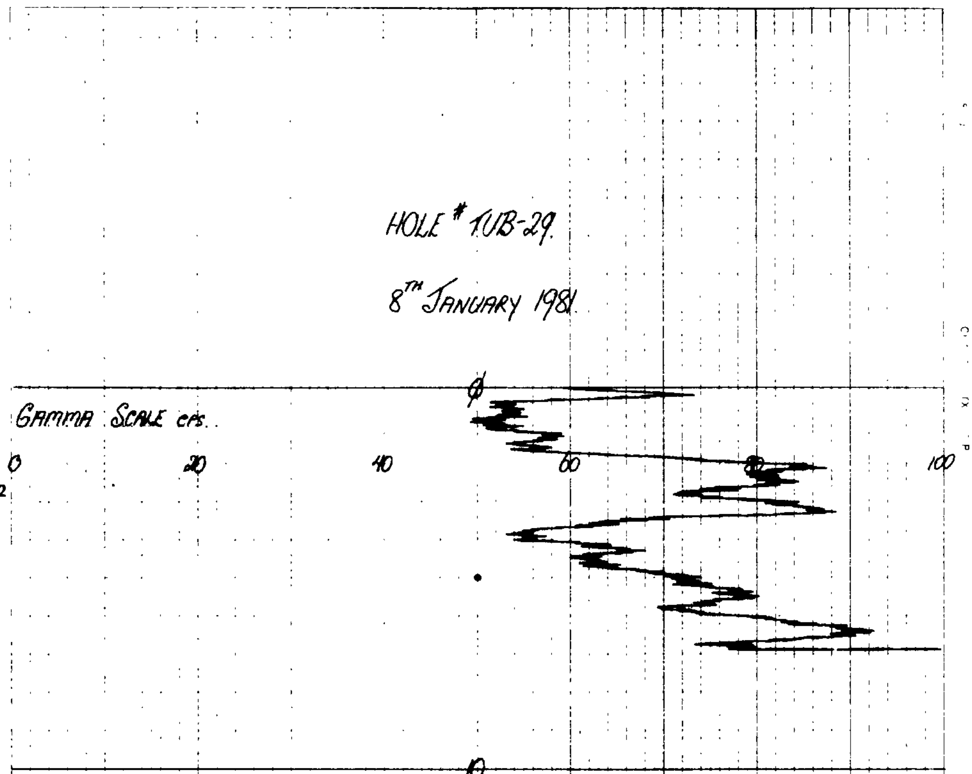
Claim	
Owned by:	
Operated by	
Unit Operator.	BARNETT
Unit No.	AL 8
Office.	ADELAIDE

ELECTRIC

	1	2	3	4
Logged depth				
Resist scale				
S.P scale				
Paper speed				
Logging speed				
Probe size in				
Type w/d				
Bias				

CALIPER

Logged depth		
Scale	in/in def	
Paper Speed		
Logging speed		
Arm Length	in	
Max Def	in	



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LOGGING DATA

GAMMA - RAY	S. P.	RESISTIVITY
RANGE 100 cps	ATTEN.	ATTEN.
T.C. 10% st dv	LOG-SPEED	BIAS
CAL.		SCN.
LOG SPEED 9m/min		LOG-SPEED
PROBE No. GPA 5		
K-FACTOR 3.15x10⁻⁶	UNIT No AL 8	
HOLE No. TUB # 29	DATE 8.1.81	TD 7.9 mtrs

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HOLE # TUB-30

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LOGGING DATA

DATE 8th JANUARY 1981

LOCATION TUMBY BAY
State SOUTH AUSTRALIA
Area
Project
Prospect
Lat ° ' " Long ° ' "

GAMMA RAY	INITIAL RUN	2	3	4
Logged depth (ft.)	6.8			
Range (Full scale)	200 cps.			
Time constant (Sec.)	10% St. dv.			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)				
Probe No.	GPA 5.			
Size (dia.) in.	40 mm			
Type	Na I 1½" x ½"			
Standard (cps)	500			
Dead time	6			μ sec
Amp. Gain				
Ratemeter No				
Bore hole medium	DRY			
Mud density				
Digital readout	2 mtr.			
Time base	1 sec			
Upper Disc				
Lower Disc				

HOLE NUMBER TUB # 30
Collar elev metres
Depth drilled 8 metres

CASING DATA	HOLE DATA
Wall size in	Dia 4" from 0 to 8
Dia (inside) in	Dia from to
Cased from to mtrs	Dia from to
Cored hole ☐	Non-cored hole ☑

Sampled Interval: 1 metre
Type: ROTARY AIR

INTERPRETATION DATA

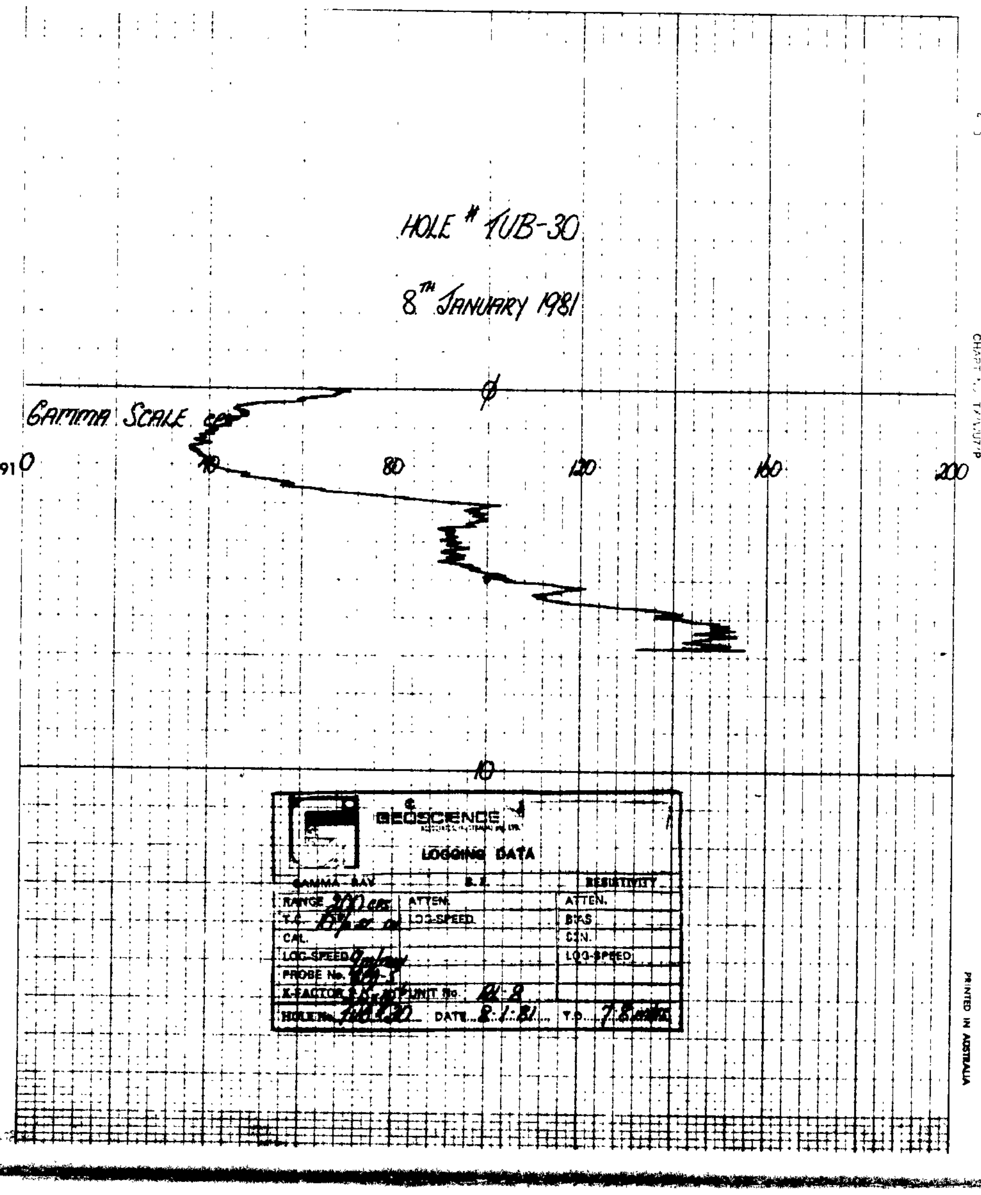
Probe No.	Standard (cps)	K factor
GPA 5	500	3.15×10^{-6}

REMARKS
Fluid Level metres

CLIENT HEMECO
Claim
Owned by
Operated by
Unit Operator BARNETT
Unit No AU 8 Office ADELAIDE

ELECTRIC	1	2	3	4
Logged depth				
Resist scale				
S P scale				
Paper speed				
Logging speed				
Probe size in				
Type				
Bias				

CALIPER			
Logged depth			
Scale in/in def			
Paper Speed			
Logging speed			
Arm Length in			
Max. Def in			



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LOGGING DATA

GAMMA-RAY	S.P.	RESISTIVITY
RANGE 200 cps	ATTEN.	ATTEN.
T.C. 10% st. dv.	LOG-SPEED	BIAS
CAL.		CON.
LOG-SPEED 9 m/min		LOG-SPEED
PROBE No. GPA 5		
K-FACTOR 3.15 x 10⁻⁶	UNIT No. AU 8	
HOLE No. TUB 30	DATE 8.1.81	T.D. 7.8 mtrs

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HOLE # 1UB-31

202

LOGGING DATA

DATE 8TH JANUARY 1981

LOCATION	TUMBY BAY.				
State	SOUTH AUSTRALIA				
Area					
Project					
Prospect					
Lat ° ' "	Long ° ' "				

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft)	6.9			
Range (Full scale)	200 cps			
Time constant (Sec)	10% st. dv.			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	40			
Probe No	GPA-5			
Size (dia) (in)	40mm			
Type Na I	1½" x ½"			
Standard (cps)	500			
Dead time µ sec.	6			
Amp Gain				
Ratemeter No				
Bore hole medium	DRY			
Mud density				
Digital readout	2 mtr.			
Time base	1 sec.			
Upper Disc				
Lower Disc				

HOLE NUMBER	1UB #- 31.	
Collar elev.		metres
Depth drilled	8	metres

CASING DATA	HOLE DATA
Wall size in	Dia 4" from 0 to 8
Dia (inside) in	Dia from to
Cased from to mtrs	Dia from to
Cored hole ☐	Non-cored hole ☒

Sampled Interval	Type
1 metre	ROTARY AIR

INTERPRETATION DATA

Probe No	Standard (cps)	K factor
GPA-5	500	3.15×10^{-6}

REMARKS

Fluid Level metres

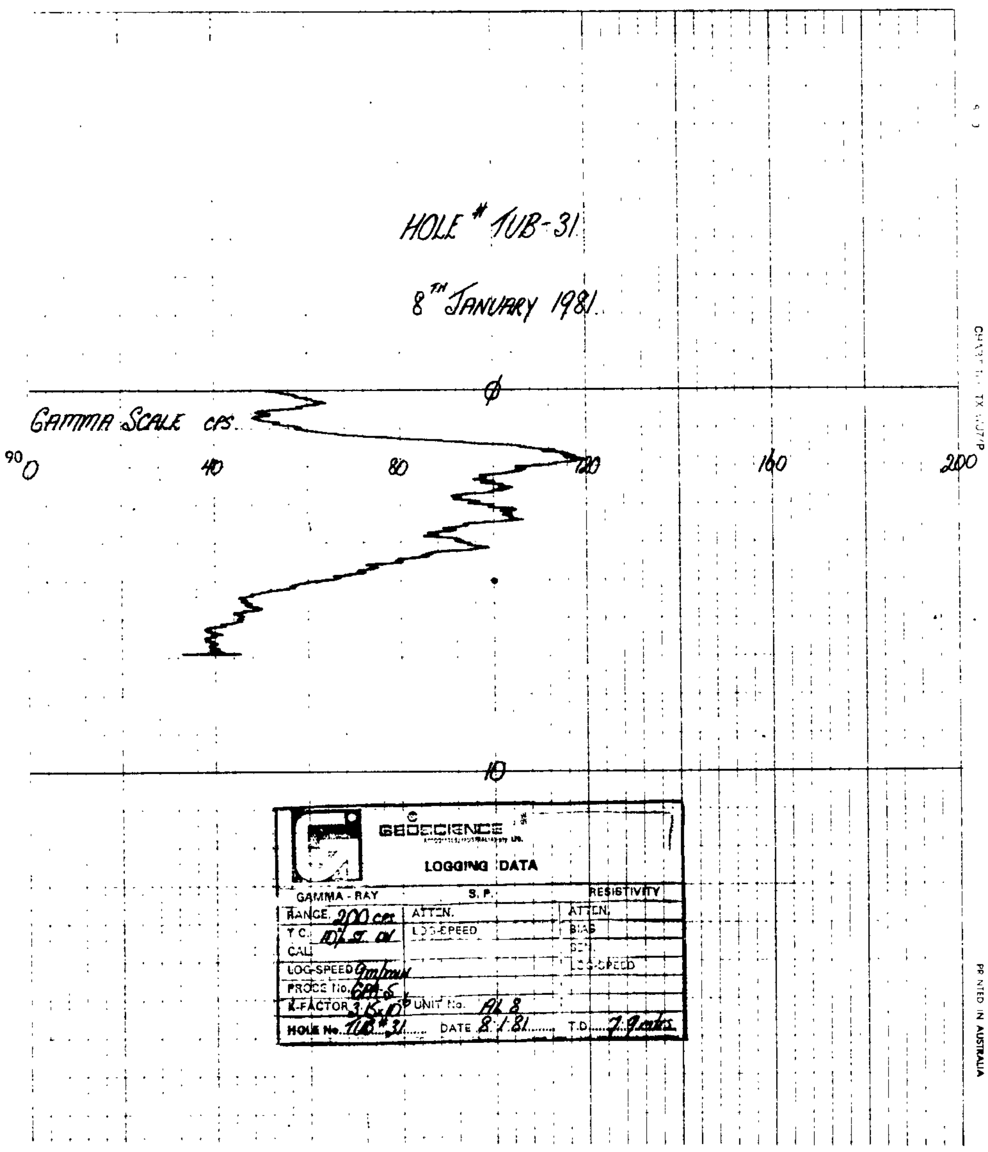
CLIENT	AEMECO	
Claim		
Owned by		
Operated by		
Unit Operator	BARNETT	
Unit No.	AL-8	Office ADELAIDE

ELECTRIC

	1	2	3	4
Logged depth				
Resist scale				
S.P. scale				
Paper speed				
Logging speed				
Probe size in				
Type w/d				
Bias				

CALIPER

Logged depth				
Scale in/in def				
Paper Speed				
Logging speed				
Arm Length in				
Max Def. in				



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HOLE # 1UB-32

LOGGING DATA

DATE 8TH JANUARY 1981

LOCATION	TUMBY BAY				
State	SOUTH AUSTRALIA				
Area.					
Project					
Prospect					
Lat ° ' "		Long ° ' "			

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft.)	3·8			
Range (Full scale)	100 cps			
Time constant (Sec)	10%			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	44			
Probe No.	6PA5			
Size (dia) (in)	40mm			
Type NaI	1½" x ½"			
Standard (cps)	500			
Dead time	6			μ sec
Amp. Gain				
Ratemeter No				
Bore hole medium	DRY			
Mud density				
Digital readout	2mtr			
Time base	1sec			
Upper Disc				
Lower Disc.				

HOLE NUMBER	1UB # 32
Collar elev	metres
Depth drilled	5 metres

CASING DATA	HOLE DATA
Wall size in	Dia 4" from 0 to 5
Dia (inside) in	Dia from to
Cased from to mtrs	Dia from to
Cored hole ☐	Non-cored hole ☑

Sampled Interval	Type
1 metre.	ROTARY AIR.

INTERPRETATION DATA

Probe No	Standard (cps)	K factor
6PA-5	500	3.15×10^{-6}

REMARKS

Fluid Level metres

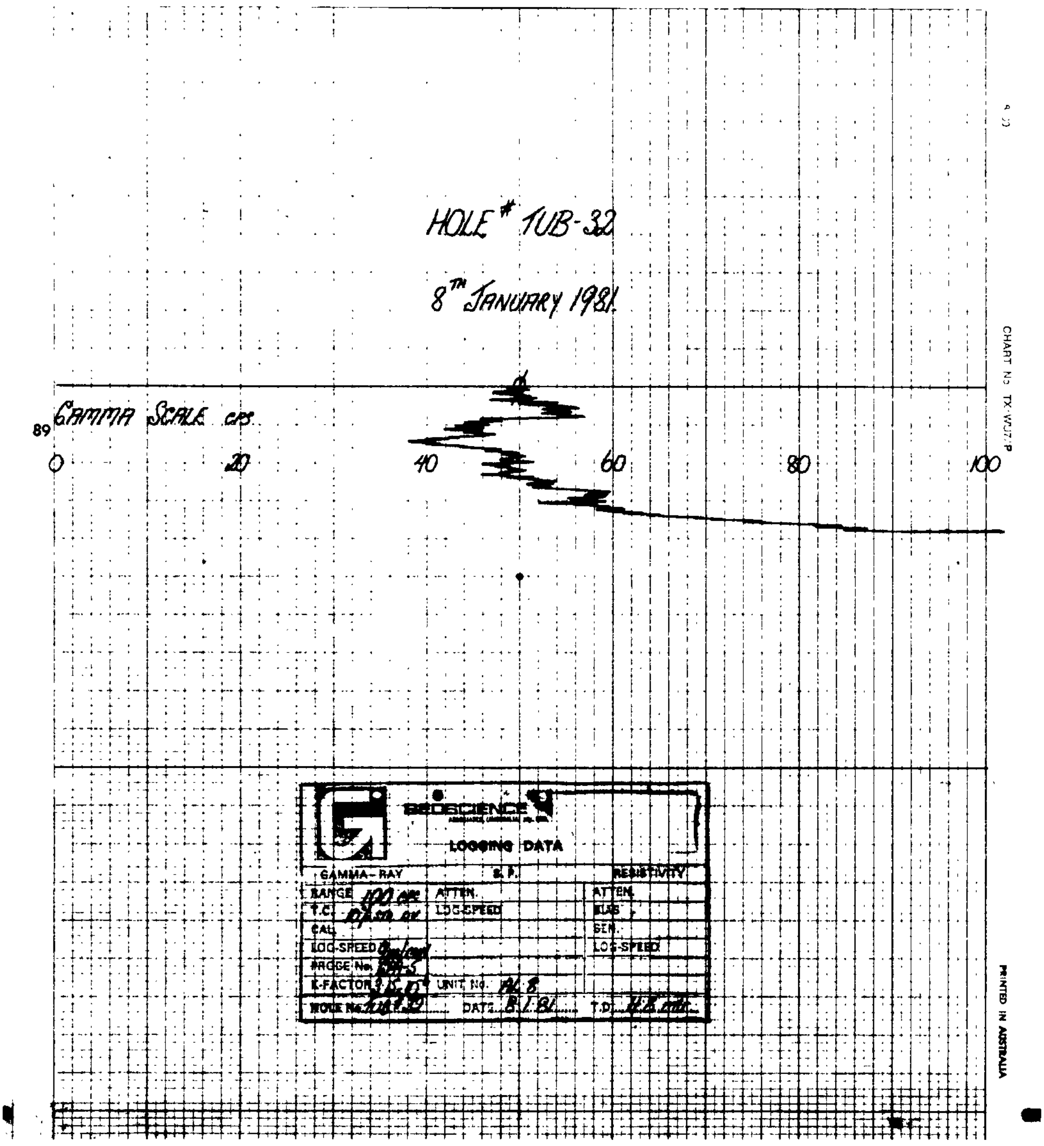
CLIENT	AFMECO
Claim	
Owned by	
Operated by	
Unit Operator	OPHNK I.T.
Unit No.	AL 8
Office	ADELAIDE

ELECTRIC

	1	2	3	4
Logged depth				
Resist scale				
S P scale				
Paper speed				
Logging speed				
Probe size in				
Type w/d				
Bias				

CALIPER

Logged depth				
Scale in/in def				
Paper Speed				
Logging speed				
Arm Length in				
Max Def. in				



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Phone 268 2898

HOLE # TUB-33

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LOGGING DATA

DATE 8TH JANUARY 1981

LOCATION	TUMBY BAY
State	SOUTH AUSTRALIA
Area	
Project	
Prospect	
Lat ° ' "	Long ° ' "

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft.)	67			
Range (Full scale)	200 cps			
Time constant (Sec.)	10% st. dv.			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	5			
Probe No	GPA-5			
Size (dia.) (in.)	40 mm			
Type Na I	1½" x ½"			
Standard (cps)	500			
Dead time	6			μ sec
Amp. Gain				
Ratemeter No				
Bore hole medium	DRY			
Mud density				
Digital readout	2 mtr.			
Time base	1 sec.			
Upper Disc				
Lower Disc				

HOLE NUMBER	TUB # 33
Collar elev.	metres
Depth drilled	8 metres

CASING DATA

Wall size	in
Dia (inside)	in.
Cased from to	mtrs
Cored hole ☐	

HOLE DATA

Dia 7" from 0 to 8	
Dia from to	
Dia from to	
Non-cored hole ☒	

Sampled Interval	Type
1 metre.	ROTARY AIR.

INTERPRETATION DATA

Probe No	Standard (cps)	K factor
GPA-5	500	3.15×10^{-6}

REMARKS

Fluid Level metres

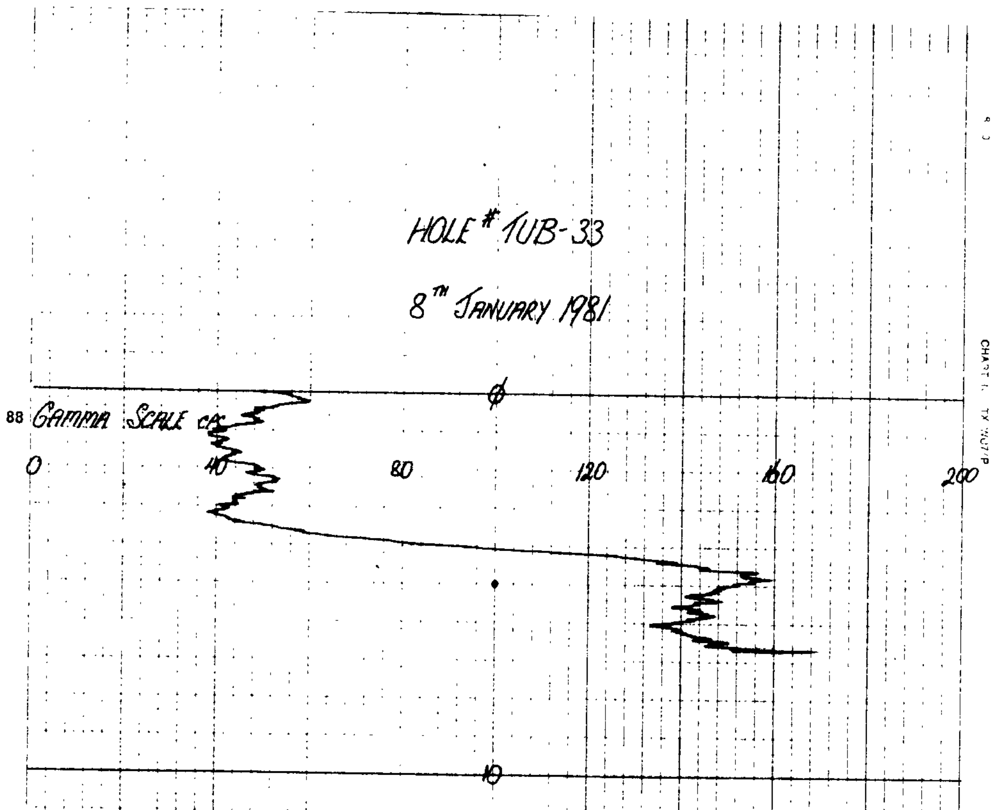
CLIENT:	REMECO
Claim	
Owned by:	
Operated by.	
Unit Operator.	BARNETT.
Unit No.	AL-8 Office ADELAIDE

ELECTRIC

	1	2	3	4
Logged depth				
Resist. scale				
S.P scale				
Paper speed				
Logging speed				
Probe size	in			
Type	w/d			
Bias				

CALIPER

Logged depth				
Scale	in/in def			
Paper Speed				
Logging speed				
Arm Length	in			
Max Def	in			



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LOGGING DATA

GAMMA-RAY	S.P.	RESISTIVITY
RANGE 200 cps	ATTEN.	ATTEN.
T.C. 10% st. dv.	LOG-SPEED	BIAS
CAL.		CAL.
LOG-SPEED 9 m/min		LOG-SPEED
PROBE No. GPA-5		
K-FACTOR 3.15×10⁻⁶	UNIT No. AL-8	

HOLE No. TUB # 33 DATE 8.1.81 T.D. 7.7 metres

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HOLE # 1UB-34

LOGGING DATA

DATE 8TH JANUARY 1981

LOCATION	WHYALLA BAY	HOLE NUMBER	1UB # 34	CLIENT	...
State	SOUTH AUSTRALIA	Collar elev.	metres	Claim	
Area		Depth drilled	8 metres	Owned by	
Project		CASING DATA	HOLE DATA	Operated by	
Prospect		Wall size in.	Dia 4" from 0 to 8	Unit Operator	BARNETT
Lat ° ' "	Long ° ' "	Dia (inside) in	Dia from to	Unit No.	AL-8 Office: ADELAIDE

GAMMA RAY	INITIAL RUN	2	3	4
Logged depth (ft.)	26.9			
Range (Full scale)	200 cps			
Time constant (Sec)	10			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	43			
Probe No	GPA-5			
Size (dia)	40 mm			
Type	Na I 1½" × ½"			
Standard (cps)	500			
Dead time μ sec.	6			
Amp Gain				
Ratemeter No				
Bore hole medium	DRY			
Mud density				
Digital readout	2 mtr			
Time base	1 sec			
Upper Disc				
Lower Disc				

Cased from to mtrs | Dia. from to

Cored hole ☐ Non-cored hole ☑

Sampled Interval	Type
1 metre	ROTARY AIR.

INTERPRETATION DATA

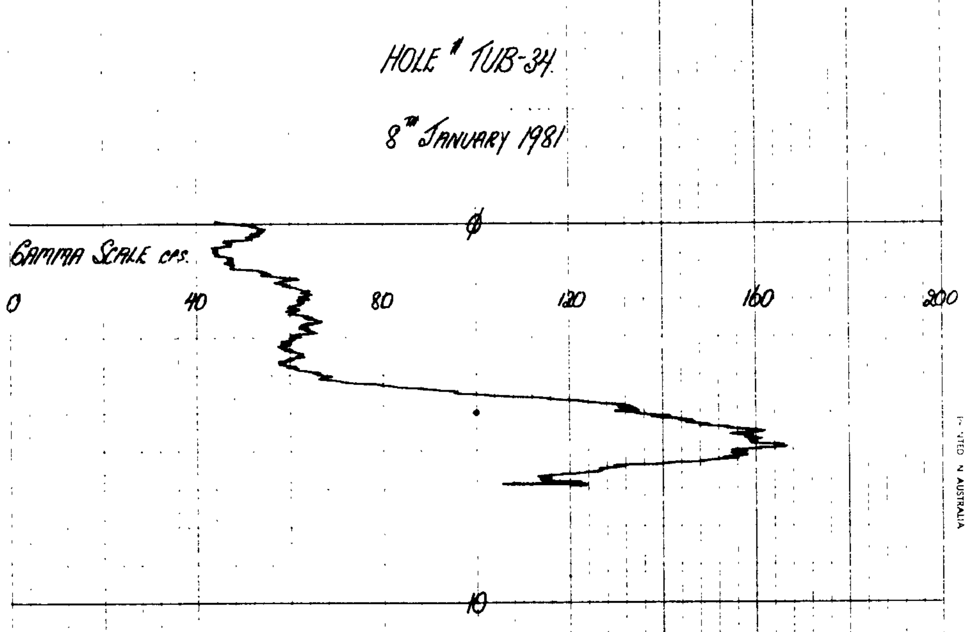
Probe No	Standard (cps)	K factor
GPA-5	500	315 × 10⁻⁶

REMARKS

Fluid Level metres

ELECTRIC	1	2	3	4
Logged depth				
Resist scale				
S.P. scale				
Paper speed				
Logging speed				
Probe size in				
Type				
Bias				

CALIPER	1	2	3	4
Logged depth				
Scale in/in def				
Paper Speed				
Logging speed				
Arm Length in				
Max Def in				



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LOGGING DATA

GAMMA - RAY	S.P.	RESISTIVITY
RANGE 200 cps	ATTEN.	ATTEN.
T.C. 10 sec	LOG SPEED	BIAS
CAL.		S.P.
LOG SPEED 9 m/min		LOG SPEED
PROBE No GPA-5		
K-FACTOR 315 × 10⁻⁶	UNIT No AL-8	
HOLE No 1UB 34	DATE 8.1.81	T.D. 7.9 mtrs

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HOLE # TUB-35

LOGGING DATA

DATE 8th JANUARY 1981

LOCATION	TUMBY BAY
State	SOUTH AUSTRALIA
Area	
Project	
Prospect	
Lat ° ' "	Long ° ' "

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft)	18.9			
Range (Full scale)	200 CPS.			
Time constant (sec)	10% std. dev.			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	40			
Probe No	GPA-5			
Size (dia.) (in)	40mm			
Type Na I	1½" x ½"			
Standard (cps)	500			
Dead time	6			μ sec.
Amp Gain				
Ratemeter No.				
Bore hole medium	DRY			
Mud density				
Digital readout	2mtr.			
Time base	1sec.			
Upper Disc				
Lower Disc.				

HOLE NUMBER	TUB # 35
Collar elev.	metres
Depth drilled:	20 metres

CASING DATA	HOLE DATA
Wall size in.	Dia. 4" from 0 to 20
Dia (inside) in	Dia from to
Cased from to mtrs	Dia. from to
Cored hole ☐	Non-cored hole ☑

Sampled Interval	Type
1metre	ROTARY AIR.

INTERPRETATION DATA

Probe No.	Standard (cps)	K factor
GPA-5	500	3.15×10^{-6}

REMARKS

Fluid Level metres

CLIENT	AEMECO
Claim.	
Owned by	
Operated by	
Unit Operator.	BARNETT.
Unit No	AL 8
Office	ADELAIDE

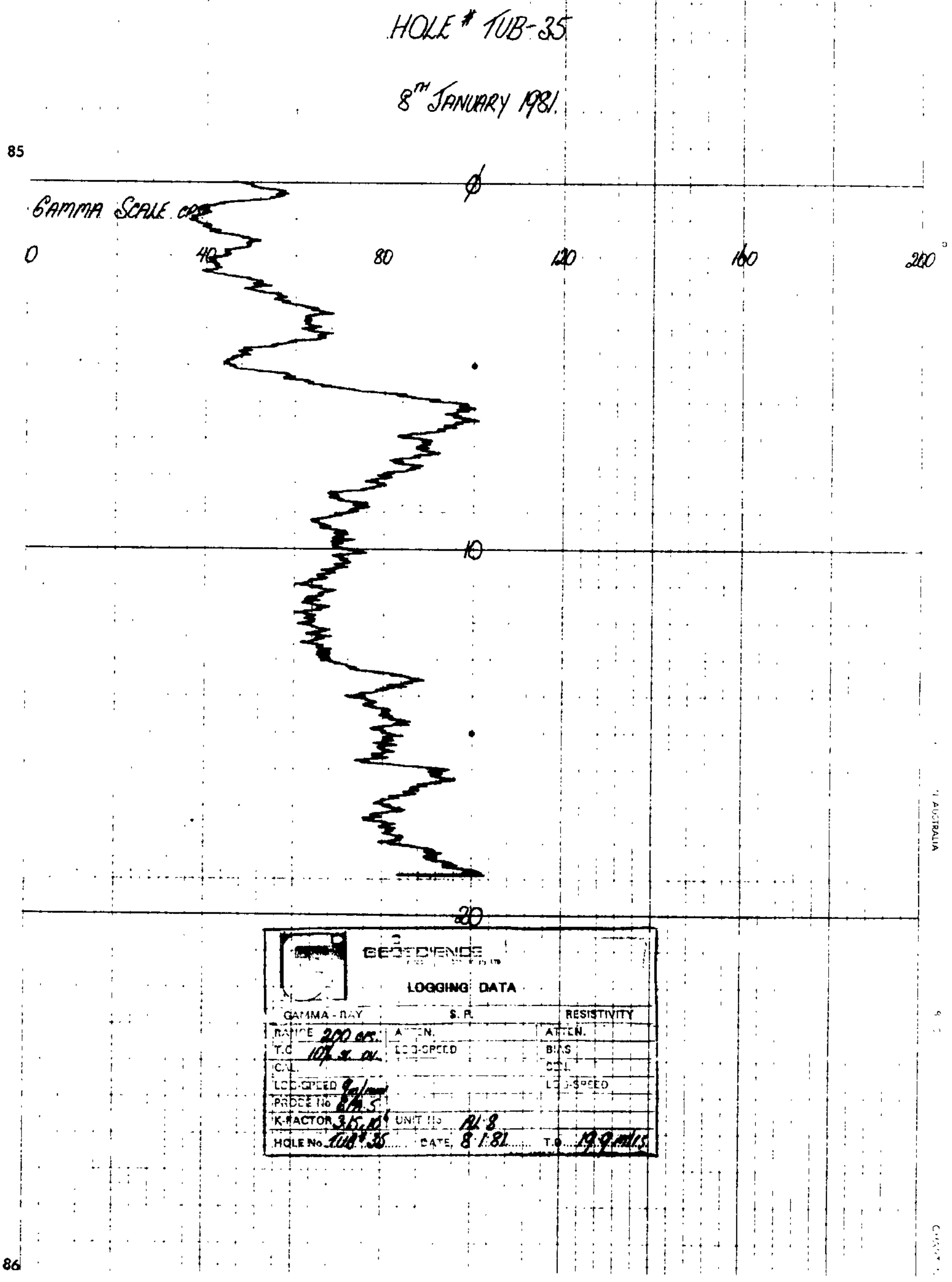
ELECTRIC

	1	2	3	4
Logged depth				
Resist scale				
S.P scale				
Paper speed				
Logging speed				
Probe size	in			
Type	w/d			
Bias				

CALIPER

Logged depth				
Scale	in/in def			
Paper Speed				
Logging speed				
Arm Length	in			
Max Def	in			

85



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HOLE # TUB-36 .. 201

LOGGING DATA

DATE 8TH JANUARY 1981

LOCATION	TUMBY BAY	HOLE NUMBER	TUB # 36
State	SOUTH AUSTRALIA	Collar elev. metres	
Area		Depth drilled 8 metres	
Project		CASING DATA	HOLE DATA
Prospect		Wall size in	Dia 4" from 0 to 8
Lat	Long	Dia (inside) in	Dia from to
		Cased from to mtrs	Dia from to
		Cored hole ☐	Non-cored hole ☑

CLIENT AFMECO
Claim
Owned by
Operated by
Unit Operator BARNETT
Unit No AK-8 Office ADELAIDE

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft)	6.8			
Range (Full scale)	500 cps			
Time constant (Sec)	3% st. dev			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	44			
Probe No	GPA-5			
Size (dia.) (in)	40mm			
Type NaI	1½" x ½"			
Standard (cps)	500			
Dead time μ sec	6			
Amp Gain				
Ratemeter No				
Bore hole medium	DRY			
Mud density				
Digital readout	2mtr			
Time base	1sec			
Upper Disc				
Lower Disc				

Sampled Interval	Type
1 metre	ROTARY AIR

INTERPRETATION DATA

Probe No	Standard (cps)	K factor
GPA-5	500	3.15×10^{-6}

REMARKS

Fluid Level metres

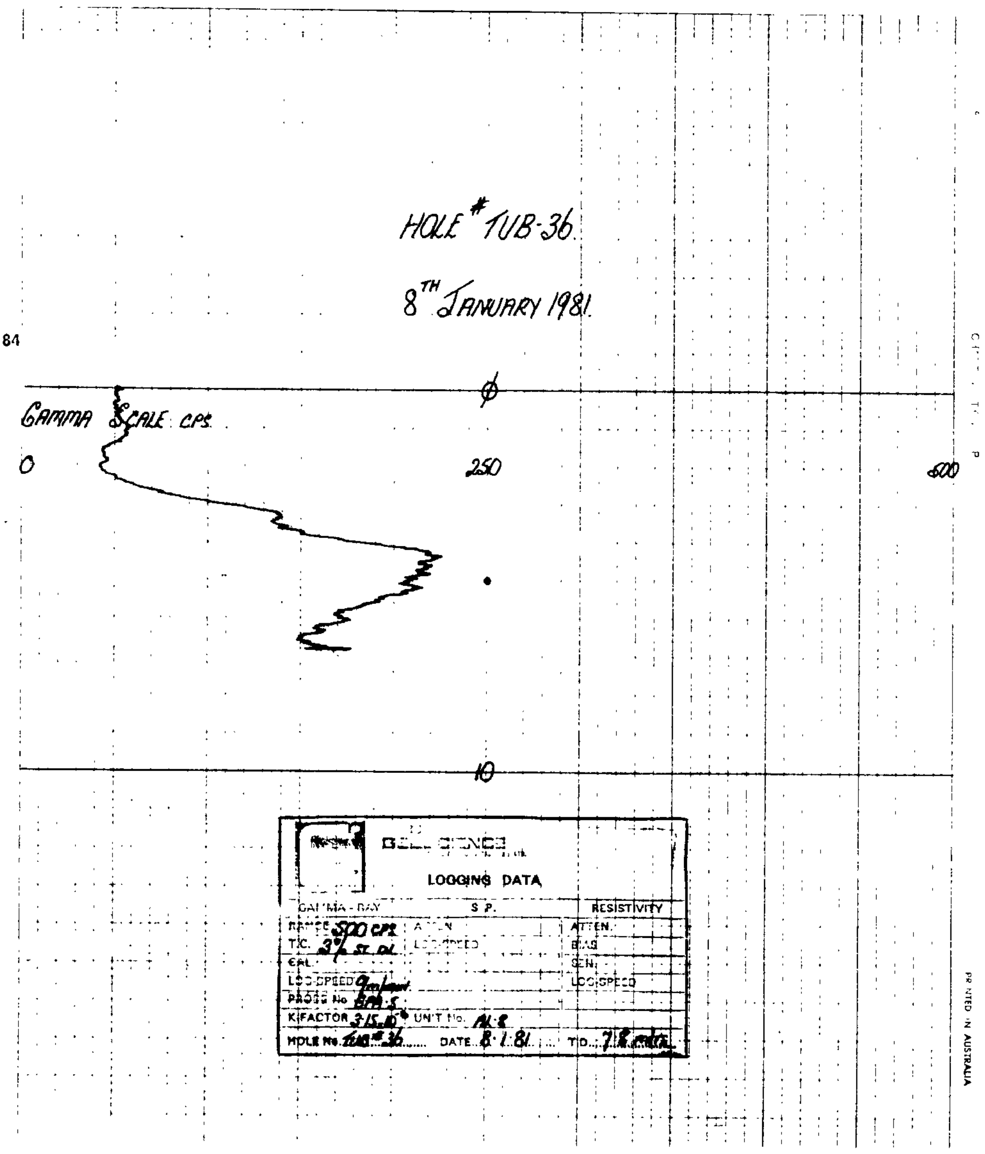
ELECTRIC

	1	2	3	4
Logged depth				
Resist. scale				
S.P. scale				
Paper speed				
Logging speed				
Probe size in				
Type				
Bias				

CALIPER

Logged depth				
Scale in/in def				
Paper Speed				
Logging speed				
Arm Length in				
Max Def. in				

84



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HOLE # 1UB-37

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LOGGING DATA

DATE 8th January 1981

LOCATION	Tumby Bay.	HOLE NUMBER:	1UB # 37
State	South Aust.	Collar elev metres	
Area		Depth drilled 6 metres	
Project.			
Prospect			
Lat. ° ' "	Long ° ' "		

CLIENT	AFMECO
Claim	
Owned by	
Operated by	
Unit Operator	BARNETT.
Unit No.	RL 8
Office	ADELAIDE

CASING DATA

Wall size	in.
Dia. (inside)	in.
Cased from to	mtrs

HOLE DATA

Dia. 4" from 0 to 6.	
Dia. from to	
Dia. from to	

Cored hole ☐ Non-cored hole ☒

Sampled Interval	Type
1 metre.	Rotary Air.

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft)	4·1			
Range (Full scale)	200 cps.			
Time constant (Sec)	10% st dv.			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	39			
Probe No.	GPA 5			
Size (dia) (in)	40 mm.			
Type Na I	1½" x ½"			
Standard (cps)	500			
Dead time	6			μ sec.
Amp. Gain				
Ratemeter No.				
Bore hole medium	DRY			
Mud density				
Digital readout	2 mtr			
Time base	1 sec.			
Upper Disc				
Lower Disc				

INTERPRETATION DATA

Probe No.	Standard (cps)	K factor
GPA 5	500	3.15×10^{-6}

REMARKS

Fluid Level metres

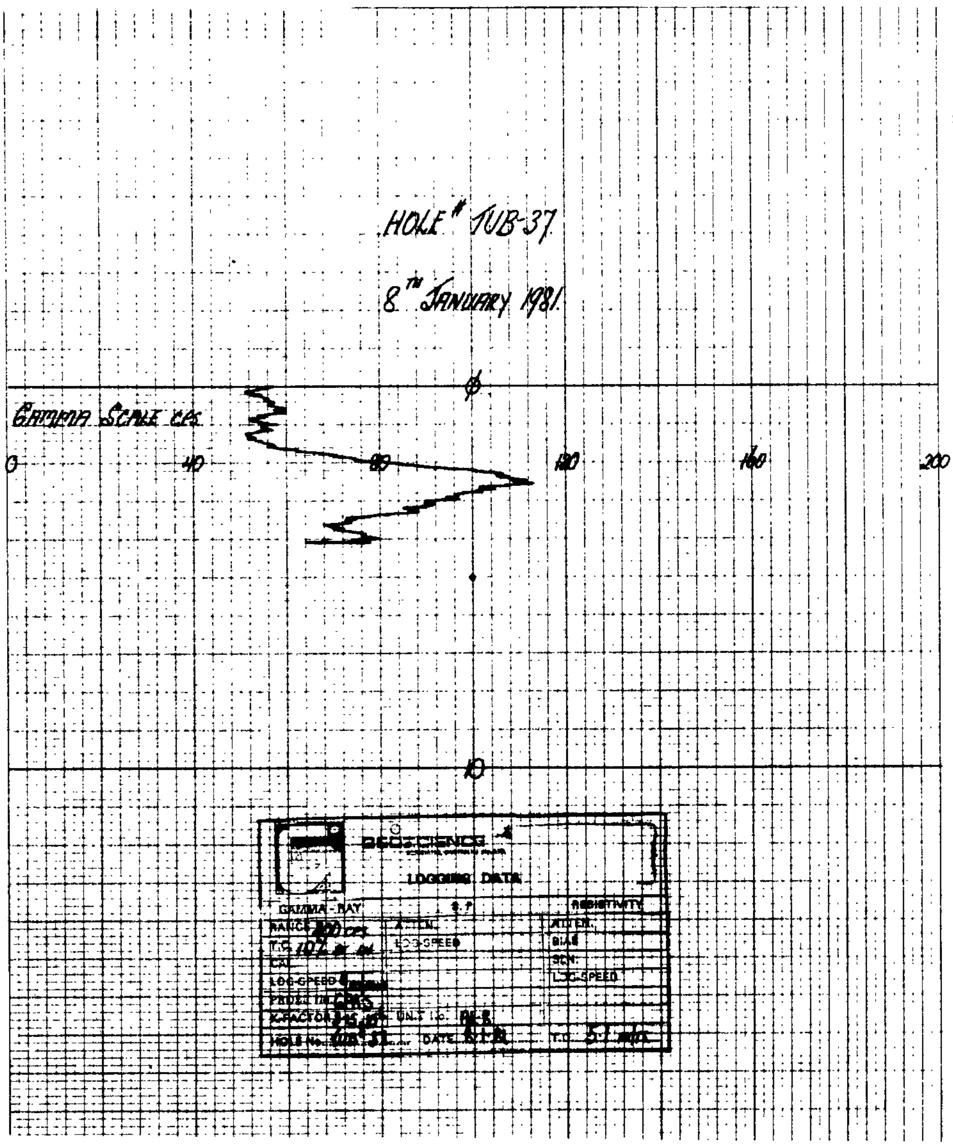
ELECTRIC

	1	2	3	4
Logged depth				
Resist. scale				
S.P. scale				
Paper speed				
Logging speed				
Probe size in				
Type w/d				
Bias				

CALIPER

Logged depth				
Scale in/in def				
Paper Speed				
Logging speed				
Arm Length in				
Max. Def. in.				

83



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HOLE # TUB-38

LOGGING DATA

DATE 8TH JANUARY 1980

LOCATION TUMBY BAY		HOLE NUMBER: TUB # 38		CLIENT AFMECO
State SOUTH AUST.		Collar elev metres		Claim
Area		Depth drilled 6 metres		Owned by
Project		CASING DATA	HOLE DATA	Operated by
Prospect		Wall size in.	Dia. 4" from 0 to 6	Unit Operator BARNETT
Lat	Long	Dia (inside) in	Dia from to	Unit No AL-8 Office ADELAIDE
		Cased from to mtrs	Dia. from to	

GAMMA RAY	INITIAL RUN	2	3	4
Logged depth (ft)	4.6			
Range (Full scale)	200 cps			
Time constant (sec)	10 " ST. DV			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	42			
Probe No	GPA 5			
Size (dia.) (in)	40mm			
Type	Na I 1½ x 1½"			
Standard (cps)	500			
Dead time µ sec	6			
Amp Gain				
Ratemeter No.				
Bore hole medium	DRY			
Mud density				
Digital readout	2 mtr.			
Time base	1 sec.			
Upper Disc.				
Lower Disc.				

Cored hole ☐ Non-cored hole ☑

Sampled interval	Type
1 metre	ROTARY AIR

INTERPRETATION DATA

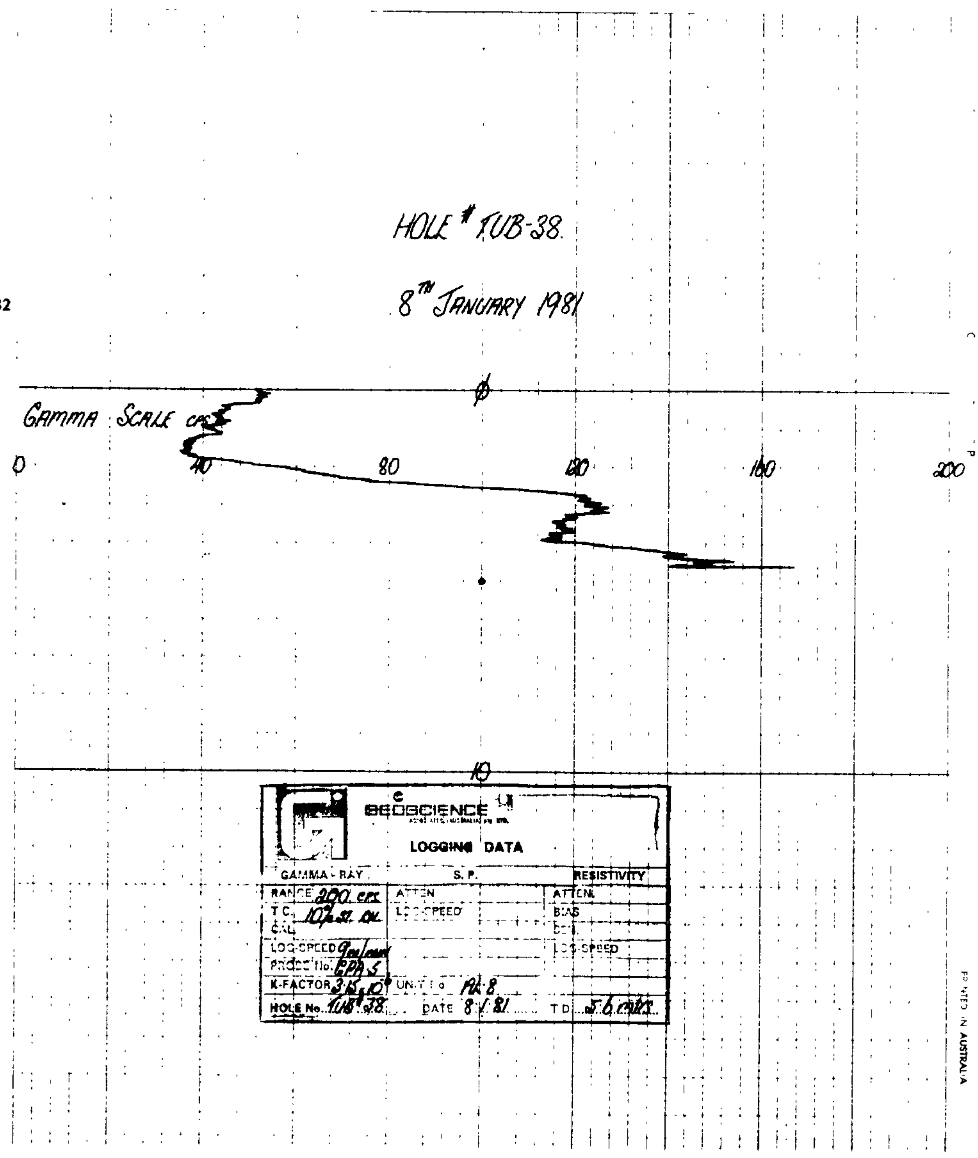
Probe No	Standard (cps)	K factor
GPA 5	500	3.16×10^{-6}

REMARKS

Fluid Level metres

ELECTRIC	1	2	3	4
Logged depth				
Resist. scale				
S P scale				
Paper speed				
Logging speed				
Probe size in				
Type w/d				
Bias				

CALIPER				
Logged depth				
Scale in/in def				
Paper Speed				
Logging speed				
Arm Length in				
Max Def in				



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LOGGING DATA

GAMMA - RAY	S. P.	RESISTIVITY
RANGE 200 cps	ATTEN	ATTEN
T.C. 10 sec ST. DV	LOG SPEED	BIAS
CAL		B.L
LOG SPEED 9m/min		LOG SPEED
PROBE No. GPA 5		
K-FACTOR 3.16×10^{-6}	UNIT No AL 8	
HOLE No. TUB 38	DATE 8.1.81	T.D. 5.6 mtr.

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HOLE # TUB-39

LOGGING DATA

DATE 8TH JANUARY 1981

LOCATION	TUMBY BAY
State	SOUTH AUST.
Area	
Project	
Prospect	
Lat ° ′ ″	Long ° ′ ″

HOLE NUMBER	TUB # 39
Collar elev	metres
Depth drilled.	5 metres

CASING DATA		HOLE DATA	
Wall size	in	Dia 4″ from 0 to 5	
Dia (inside)	in	Dia from to	
Cased from to	mtrs	Dia. from to	
Cored hole ☐		Non-cored hole ☒	

Sampled Interval	Type
1 metre	ROTARY AIR.

INTERPRETATION DATA

Probe No.	Standard (cps)	K factor
GPA-5	500	3.15×10^{-6}

REMARKS

Fluid Level metres

CLIENT.	BEIMESCO
Claim:	
Owned by	
Operated by	
Unit Operator	BARNETT
Unit No	AL-8
Office	ADELAIDE

GAMMA RAY

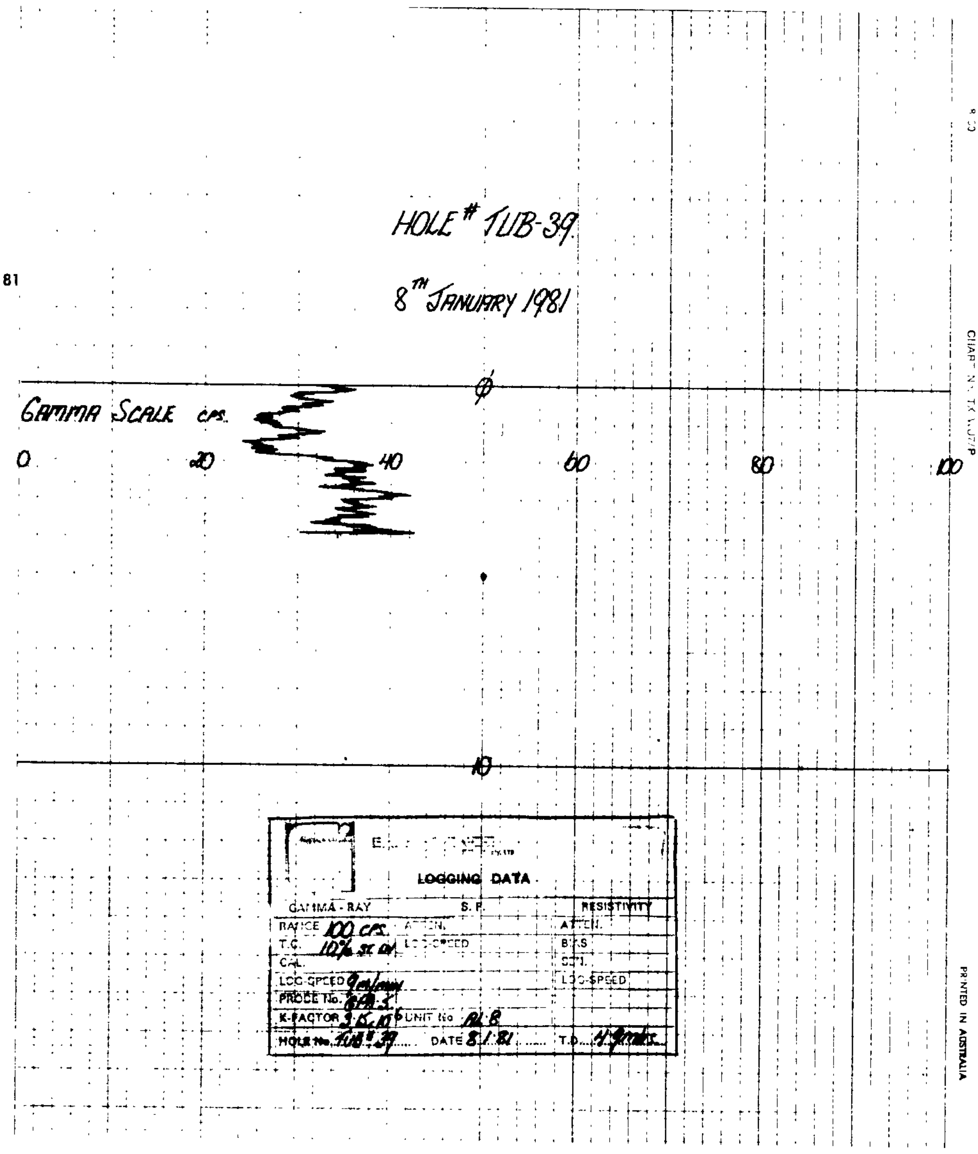
	INITIAL RUN	2	3	4
Logged depth (ft.)	39			
Range (Full scale)	100 cps			
Time constant (Sec.)	10% st. dv.			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	29			
Probe No	GPA-5			
Size (dia) (in)	40 mm			
Type Na I	1½″ x ½″			
Standard (cps)	500			
Dead time μ sec	6			
Amp Gain				
Ratemeter No				
Bore hole medium	DRY			
Mud density				
Digital readout	2 mtr			
Time base	1 sec			
Upper Disc				
Lower Disc.				

ELECTRIC

	1	2	3	4
Logged depth				
Resist scale				
S P scale				
Paper speed				
Logging speed				
Probe size in				
Type				
Bias				

CALIPER

	1	2	3	4
Logged depth				
Scale in/in def				
Paper Speed				
Logging speed				
Arm Length in				
Max. Def in				



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HOLE # TUB-40

LOGGING DATA

DATE 8TH JANUARY 1981

LOCATION	TUMBY BAY
State	SOUTH AUST
Area	
Project	
Prospect	
Lat ° ' "	Long ° ' "

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft.)	6.8			
Range (Full scale)	100 cps			
Time constant (Sec)	10% st. dv.			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	31			
Probe No	GPA-5			
Size (dia.) (in.)	40 mm			
Type Na I	1½" × 1½"			
Standard (cps)	500			
Dead time	6			μ sec.
Amp. Gain				
Ratemeter No.				
Bore hole medium	DRY			
Mud density				
Digital readout	2 mtr			
Time base	1 sec			
Upper Disc				
Lower Disc.				

HOLE NUMBER	TUB # 40
Collar elev.	metres
Depth drilled	8 metres

CASING DATA	HOLE DATA
Wall size in	Dia 4" from 0 to 8
Dia. (inside) in	Dia from to
Cased from to mtrs	Dia. from to
Cored hole ☐	Non-cored hole ☒

Sampled Interval	Type
1 metre	ROTARY AIR

INTERPRETATION DATA

Probe No	Standard (cps)	K factor
GPA-5	500	3.15×10^{-6}

REMARKS

Fluid Level metres

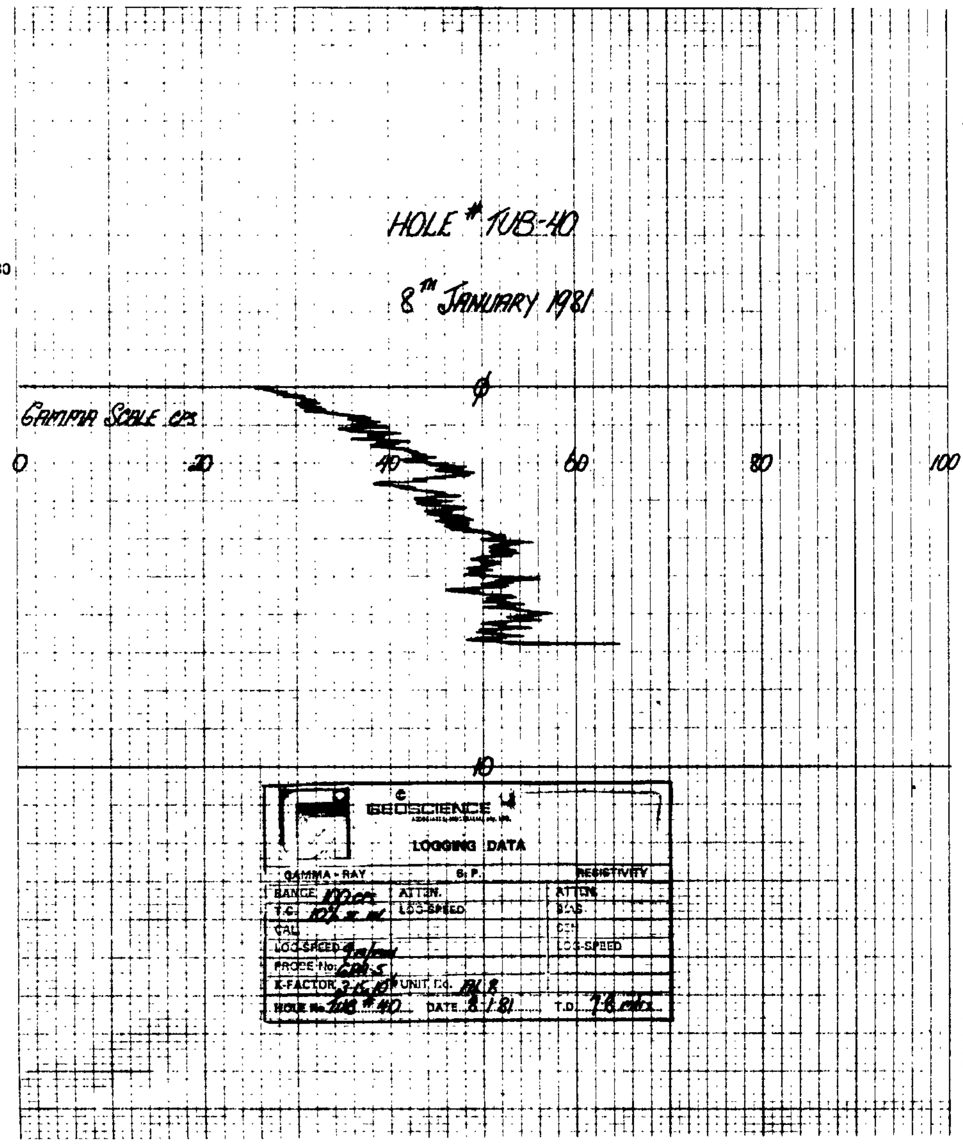
CLIENT	AEMECO
Claim.	
Owned by.	
Operated by	
Unit Operator	BARNETT
Unit No.	AL 8
Office	ADELAIDE

ELECTRIC

	1	2	3	4
Logged depth				
Resist scale				
S P scale				
Paper speed				
Logging speed				
Probe size in				
Type				
Bias				

CALIPER

Logged depth				
Scale in/in def				
Paper Speed				
Logging speed				
Arm Length in				
Max. Def in				



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HOLE # TUB-41

212

LOGGING DATA

DATE 8TH JANUARY 1981.

LOCATION	-IMBY BAY
State	SOUTH AUST.
Area	
Project	
Prospect	
Lat ° ' "	Long ° ' "

HOLE NUMBER	TUB # 41.
Collar elev	metres
Depth drilled	14. metres

CLIENT	AFMECO
Claim	
Owned by	
Operated by	
Unit Operator	BARNETT
Unit No	AL-8
Office	ADELAIDE

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft)	12.7			
Range (Full scale)	100 cps.			
Time constant (Sec)	10% ST. DV.			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	30			
Probe No	GPA-5.			
Size (dia.) (in)	40mm.			
Type NaI	1½" x 1½"			
Standard (cps)	500			
Dead time	6			μ sec.
Amp Gain				
Ratemeter No.				
Bore hole medium	DRY.			
Mud density				
Digital readout	2mts.			
Time base	1 sec.			
Upper Disc				
Lower Disc				

CASING DATA

Wall size	in
Dia (inside)	in
Cased from	to mtrs

HOLE DATA

Dia. 4'	from 0 to 14
Dia.	from to
Dia	from to

Cored hole ☐ Non-cored hole ☑

Sampled Interval	Type
1 metre	ROTARY AIR.

INTERPRETATION DATA

Probe No	Standard (cps)	K factor
GPA-5	500	3.15×10^{-6}

REMARKS

Fluid Level metres

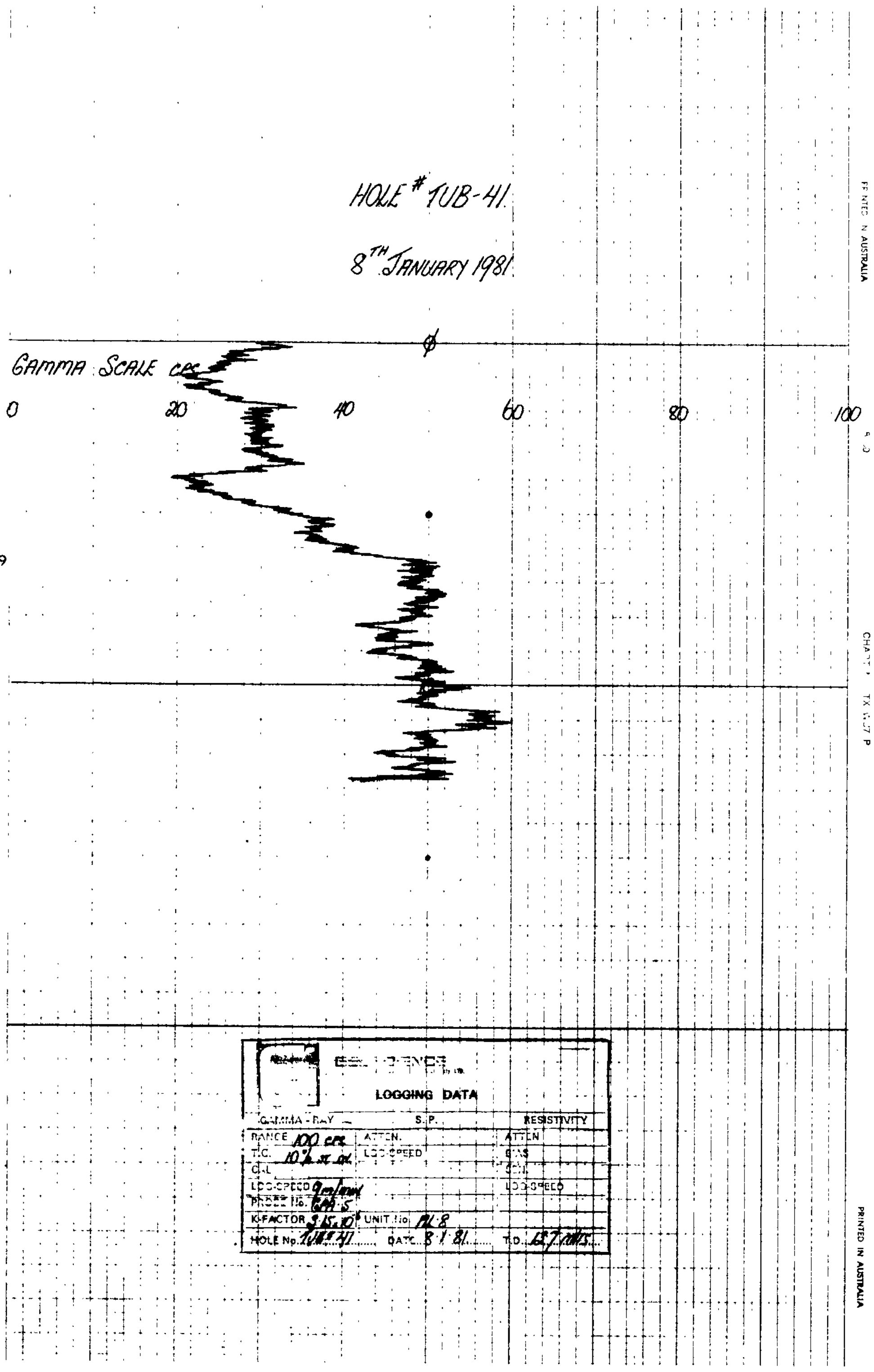
ELECTRIC

	1	2	3	4
Logged depth				
Resist scale				
S P scale				
Paper speed				
Logging speed				
Probe size in				
Type w/d				
Bias				

CALIPER

Logged depth				
Scale in/in def				
Paper Speed				
Logging speed				
Arm Length in				
Max Def. in				

79



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HOLE # TUB-42

LOGGING DATA

DATE 8TH JANUARY 1981

LOCATION	[illegible]BY BAY	HOLE NUMBER TUB # 42	CLIENT: AEMECO
State	SOUTH AUST.	Collar elev metres	Claim.
Area		Depth drilled 8 metres	Owned by.
Project		CASING DATA / HOLE DATA	Operated by:
Prospect.		Wall size in / Dia 4" from 0 to 8	Unit Operator BARNETT
Lat ° ' "	Long ° ' "	Dia (inside) in / Dia. from to	Unit No AL 8 Office ADELAIDE
		Cased from to mtrs / Dia. from to	

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft)	6 8			
Range (Full scale)	100 cps.			
Time constant (Sec)	10% ST DV.			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	29			
Probe No	GPA 5			
Size (dia) (in)	40mm.			
Type Na I	1½" x 1½"			
Standard (cps)	500			
Dead time µ sec	6			
Amp. Gain				
Ratemeter No				
Bore hole medium	DRY.			
Mud density				
Digital readout	2mtr.			
Time base	1sec.			
Upper Disc				
Lower Disc				

Cored hole ☐ Non-cored hole ☑

Sampled Interval	Type
1 metre.	ROTARY AIR.

INTERPRETATION DATA

Probe No.	Standard (cps)	K factor
GPA 5	500	3.15×10^{-6}

REMARKS

Fluid Level metres

ELECTRIC

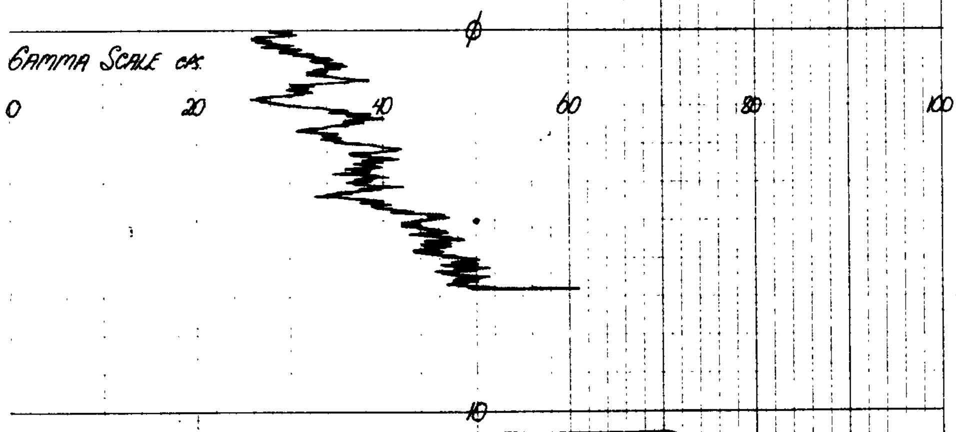
	1	2	3	4
Logged depth				
Resist scale				
S.P. scale				
Paper speed				
Logging speed				
Probe size in				
Type				
Bias				

CALIPER

Logged depth				
Scale in/in def				
Paper Speed				
Logging speed				
Arm Length in				
Max. Def. in.				

HOLE # TUB-42

8TH JANUARY 1981



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LOGGING DATA

GAMMA - RAY	S. P.	RESISTIVITY
RANGE 100 CPS	ATTEN.	ATTEN.
T.C. 10% ST DV	LOG-SPEED	BIAS
CAL		SEN.
LOG-SPEED 9m/min		LOG-SPEED
PROBE No. GPA 5		
K-FACTOR 3.15×10^{-6}	UNIT No. AL 8	

HOLE No. TUB # 42 DATE 8.1.81 T.D. 7.8 mtrs

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HOLE # 1UB-43

214

LOGGING DATA

DATE 8TH JANUARY 1981

LOCATION	Jimbs? Bay	HOLE NUMBER	1UB # 43	CLIENT	AFMECO
State	South Aust	Collar elev.	metres	Claim	
Area		Depth drilled	13 metres	Owned by	
Project		CASING DATA	HOLE DATA	Operated by	
Prospect		Wall size in	Dia 4" from 0 to 13	Unit Operator	BARNETT
Lat ° ' "	Long ° ' "	Dia (inside) in	Dia from to	Unit No. AL-8	Office [illegible]
		Cased from to mtrs	Dia from to		
		Cored hole ☐	Non-cored hole ☑		

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft)	10.8			
Range (Full scale)	100 cps.			
Time constant (Sec)	10% st dv			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	32			
Probe No	GPA 5			
Size (dia) (in)	40 mm			
Type NaI	1½" x ½"			
Standard (cps)	500			
Dead time	6			μ sec.
Amp Gain				
Ratemeter No				
Bore hole medium	DRY			
Mud density				
Digital readout	2 mtr.			
Time base	1 sec			
Upper Disc.				
Lower Disc.				

Sampled Interval	Type
1 metre	ROTARY AIR

INTERPRETATION DATA

Probe No	Standard (cps)	K factor
GPA-5	500	3.15×10^{-6}

REMARKS

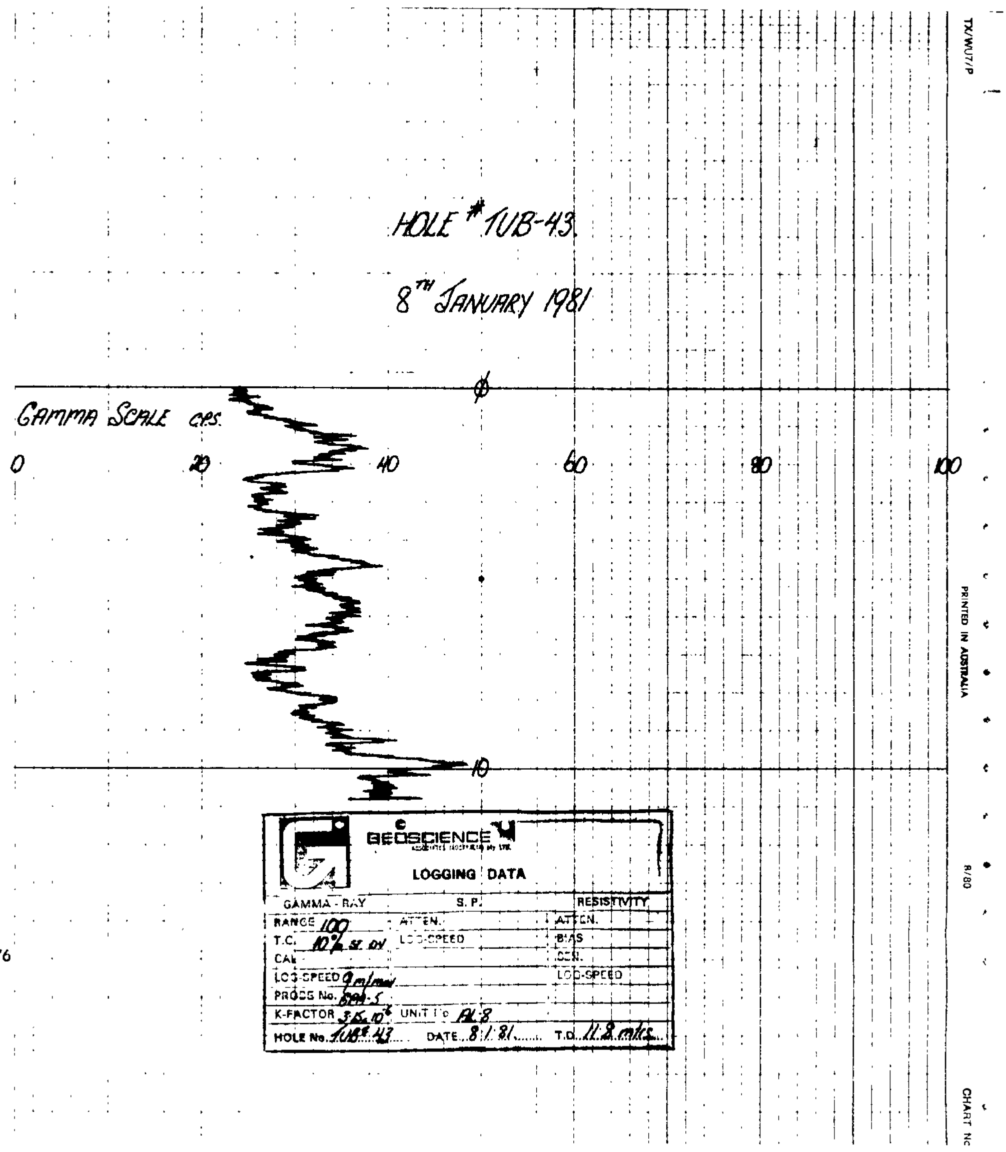
Fluid Level metres

ELECTRIC

	1	2	3	4
Logged depth				
Resist scale				
S.P. scale				
Paper speed				
Logging speed				
Probe size in				
Type w/d				
Bias				

CALIPER

Logged depth		
Scale	in/in def	
Paper Speed		
Logging speed		
Arm Length	in	
Max Def.	in	



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Phone 268 2898

HOLE # 1UB-44

LOGGING DATA

DATE 8TH JANUARY 1981

LOCATION	Tumby Bay
State	South Aust.
Area	
Project	
Prospect	
Lat ° ′ ″	Long ° ′ ″

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft)	9.7			
Range (Full scale)	100 cps			
Time constant (Sec)	10% st dv			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	28			
Probe No	GPA 5			
Size (dia) (in)	40 mm			
Type Na I	1½" x ½"			
Standard (cps)	500			
Dead time	6			μ sec
Amp Gain				
Ratemeter No.				
Bore hole medium	DRY			
Mud density				
Digital readout	2 mtr			
Time base	1 sec			
Upper Disc				
Lower Disc				

HOLE NUMBER	1UB # 44
Collar elev.	metres
Depth drilled	11 metres

CASING DATA	HOLE DATA
Wall size in	Dia. 4" from 0 to 11
Dia (inside) in	Dia from to
Cased from to mtrs	Dia from to
Cored hole ☐	Non-cored hole ☑

Sampled Interval	Type
1 metre	Rotary Air.

INTERPRETATION DATA

Probe No.	Standard (cps)	K factor
GPA 5	500	3.15×10^{-6}

REMARKS

Fluid Level metres

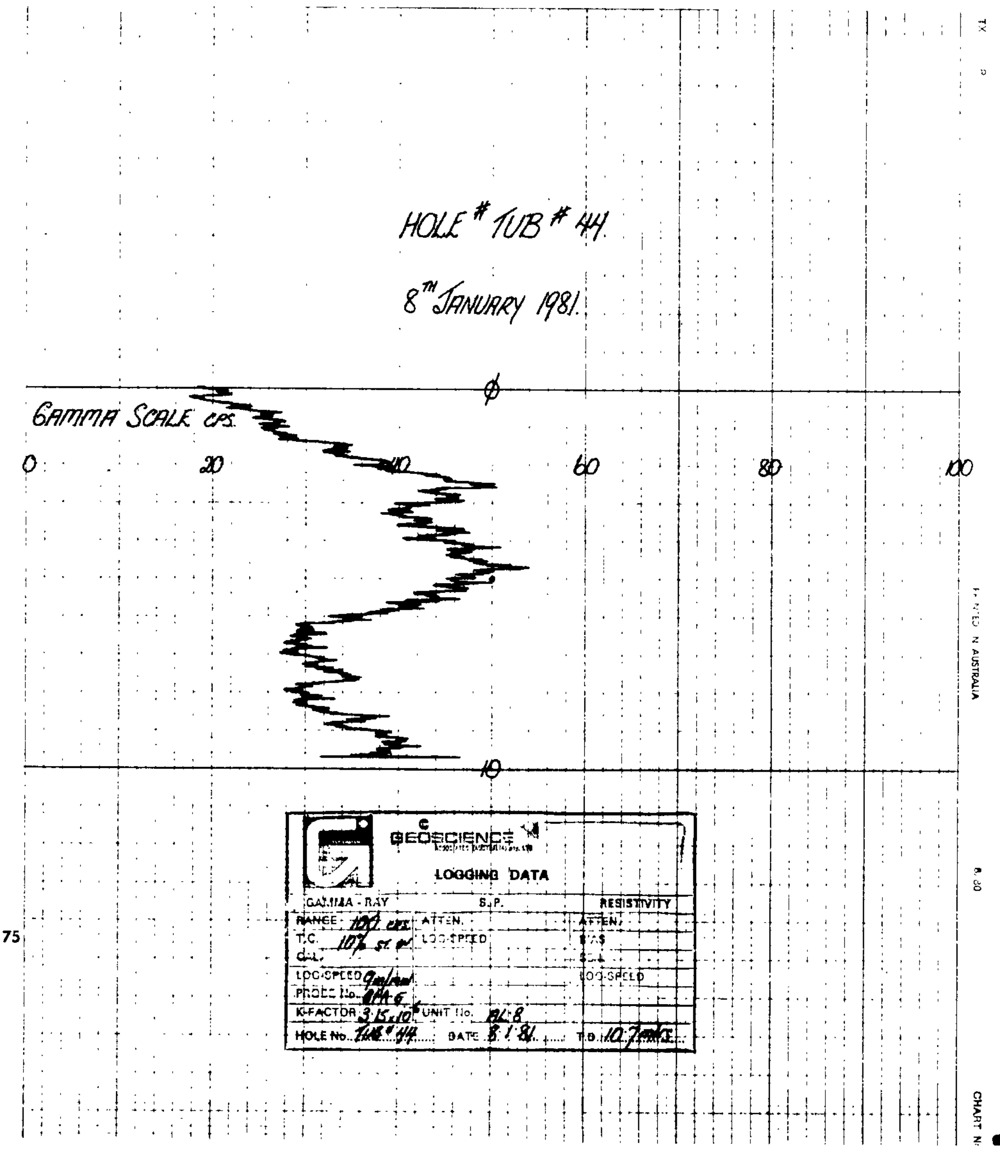
CLIENT	AEMECO
Claim	
Owned by	
Operated by	
Unit Operator	Barnett
Unit No.	AL 8
Office	Adelaide

ELECTRIC

	1	2	3	4
Logged depth				
Resist. scale				
S.P scale				
Paper speed				
Logging speed				
Probe size	in			
Type	w/d			
Bias				

CALIPER

	1	2	3	4
Logged depth				
Scale	in/in def			
Paper Speed				
Logging speed				
Arm Length	in			
Max Def.	in			



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HOLE # TUB-45

LOGGING DATA

DATE 8TH JANUARY 1981

LOCATION	TUMBY BAY
State	SOUTH AUST
Area	
Project:	
Prospect	
Lat ° ' "	Long ° ' "

HOLE NUMBER	TUB # 45
Collar elev.	metres
Depth drilled	8 metres

CASING DATA	HOLE DATA
Wall size in.	Dia. 4" from 0 to 8
Dia (inside) in.	Dia from to
Cased from to mtrs	Dia. from to
Cored hole ☐	Non-cored hole ☑

Sampled Interval	Type
1 metre	ROTARY AIR

INTERPRETATION DATA

Probe No	Standard (cps)	K factor
GPA-5	500	315×10^{-6}

REMARKS

Fluid Level metres

CLIENT.	AEMECO
Claim	
Owned by	
Operated by	
Unit Operator	BARNETT
Unit No	AL 8 Office ADELAIDE

GAMMA RAY

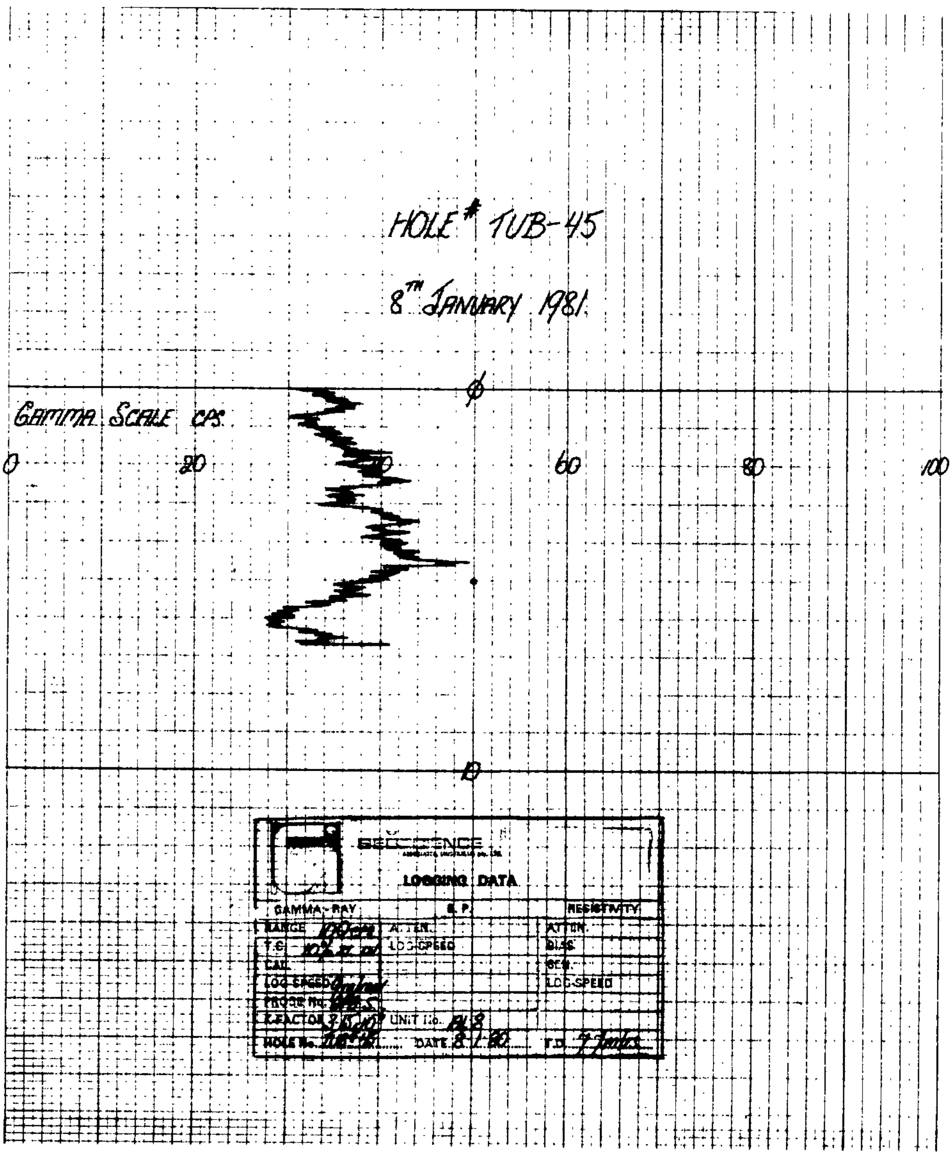
	INITIAL RUN	2	3	4
Logged depth (ft.)	6.7			
Range (Full scale)	100 cps			
Time constant (Sec.)	10% st dv			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	21			
Probe No.	GPA 5			
Size (dia) (in.)	40 mm			
Type Na I	1½" × ½"			
Standard (cps)	500			
Dead time	6			μ sec.
Amp. Gain				
Ratemeter No				
Bore hole medium	DRY			
Mud density				
Digital readout	2 m/c			
Time base	1 sec.			
Upper Disc.				
Lower Disc.				

ELECTRIC

	1	2	3	4
Logged depth				
Resist. scale				
S P scale				
Paper speed				
Logging speed				
Probe size in				
Type w/d				
Bias				

CALIPER

Logged depth				
Scale in/in. def				
Paper Speed				
Logging speed				
Arm Length in				
Max. Def. in				



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HOLE # TUB-46

LOGGING DATA

DATE 8TH JANUARY 1981

LOCATION: TUMBY BAY
State: SOUTH AUST.
Area:
Project:
Prospect:
Lat ° ' " | Long ° ' "

HOLE NUMBER: TUB # 46
Collar elev.: metres
Depth drilled: 11 metres

CLIENT: AFMECO
Claim:
Owned by:
Operated by:
Unit Operator: BARNETT
Unit No.: AL-8 Office: ADELAIDE

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft.)	9.7			
Range (Full scale)	100 cps.			
Time constant (Sec.)	10% ST. DV.			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	24.			
Probe No	GPA-5			
Size (dia.) (in.)	40 mm.			
Type NaI	1½ x ½"			
Standard (cps)	500			
Dead time	6			μ sec.
Amp. Gain				
Ratemeter No.				
Bore hole medium	DRY			
Mud density				
Digital readout	2 mtr.			
Time base	1 sec.			
Upper Disc				
Lower Disc.				

CASING DATA
Wall size: in.
Dia. (inside): in.
Cased from to mtrs

HOLE DATA
Dia. 4" from 0 to 11.
Dia. from to
Dia. from to

Cored hole ☐ Non-cored hole ☑

Sampled Interval	Type
1 metre	ROTARY AIR.

INTERPRETATION DATA

Probe No	Standard (cps)	K factor
GPA-5	500	3.65×10^{-6}

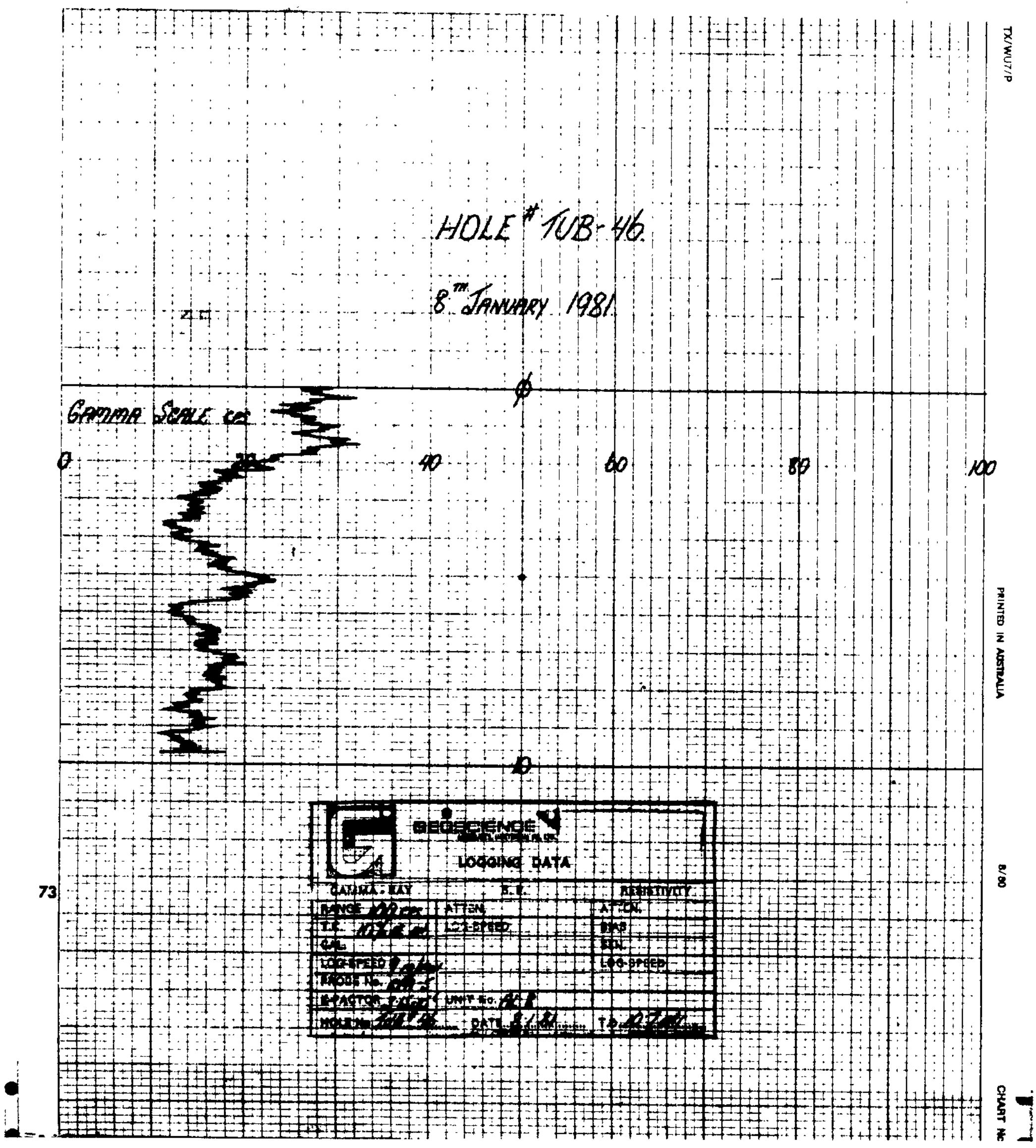
REMARKS
Fluid Level: metres

ELECTRIC

	1	2	3	4
Logged depth				
Resist. scale				
S.P. scale				
Paper speed				
Logging speed				
Probe size in				
Type				
Bias				

CALIPER

Logged depth				
Scale in/in def				
Paper Speed				
Logging speed				
Arm Length in				
Max. Def. in.				



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HOLE # TUB-47

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LOGGING DATA

DATE 8TH JANUARY 1981

LOCATION TUMBY BAY
State SOUTH AUST.
Area
Project
Prospect
Lat ° ' " Long ° ' "

HOLE NUMBER: TUB # 47
Collar elev metres
Depth drilled 8 metres

CASING DATA
Wall size in.
Dia. (inside) in
Cased from to mtrs

HOLE DATA
Dia. 4" from 0 to 8
Dia. from to
Dia. from to

Cored hole ☐ Non-cored hole ☑

CLIENT HEMECO
Claim:
Owned by:
Operated by
Unit Operator: BARNETT
Unit No. AL-8 Office ADELAIDE

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft.)	6.8			
Range (Full scale)	100 cps.			
Time constant (Sec)	10% ST. DV.			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	27			
Probe No	GPA-5			
Size (dia.) (in)	40 mm			
Type NaI	1½" x ½"			
Standard (cps)	500			
Dead time	6			μ sec.
Amp. Gain				
Ratemeter No.				
Bore hole medium	DRY			
Mud density				
Digital readout	2 mtr.			
Time base	1 sec.			
Upper Disc.				
Lower Disc.				

Sampled Interval	Type
1 metre	ROTARY AIR

INTERPRETATION DATA

Probe No.	Standard (cps)	K factor
GPA-5	500	3.15×10^{-6}

REMARKS

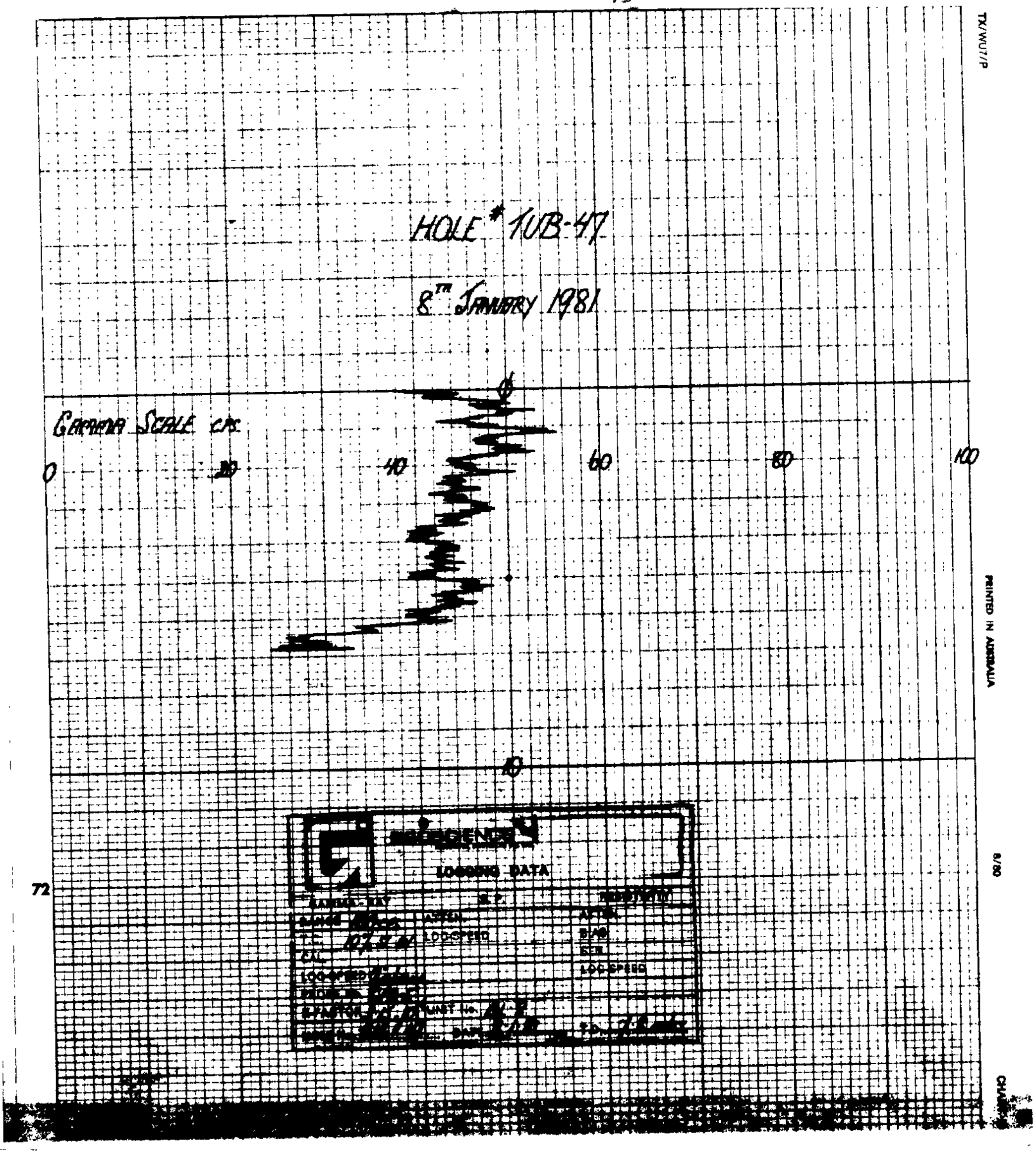
Fluid Level metres

ELECTRIC

	1	2	3	4
Logged depth				
Resist. scale				
S.P. scale				
Paper speed				
Logging speed				
Probe size in				
Type				
Bias				

CALIPER

Logged depth				
Scale in/in def				
Paper Speed				
Logging speed				
Arm Length in				
Max. Def. in				



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HOLE # TUB-48

LOGGING DATA

DATE 8TH JANUARY 1981

LOCATION	TUMBY BAY
State	SOUTH AUST.
Area	
Project	
Prospect	
Lat. ° ' "	Long ° ' "

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft.)	6.5			
Range (Full scale)	100 cps			
Time constant (Sec.)	10% ST. DV.			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	20			
Probe No.	GPA 5			
Size (dia.) (in.)	40mm			
Type	NaI 1½" x ½"			
Standard (cps)	500			
Dead time	6			μ sec.
Amp Gain				
Ratemeter No				
Bore hole medium	DRY			
Mud density				
Digital readout	2mtr			
Time base	1 sec			
Upper Disc				
Lower Disc.				

HOLE NUMBER.	TUB # 48
Collar elev.	metres
Depth drilled	11 metres

CASING DATA / **HOLE DATA**

Wall size in.	Dia. 4" from 0 to 11
Dia. (inside) in.	Dia. from to
Cased from to mtrs	Dia. from to
Cored hole ☐	Non-cored hole ☑

Sampled Interval	Type
1 metre	ROTARY AIR

INTERPRETATION DATA

Probe No.	Standard (cps)	K factor
GPA 5	500	3.15×10^{-6}

REMARKS

Fluid Level metres

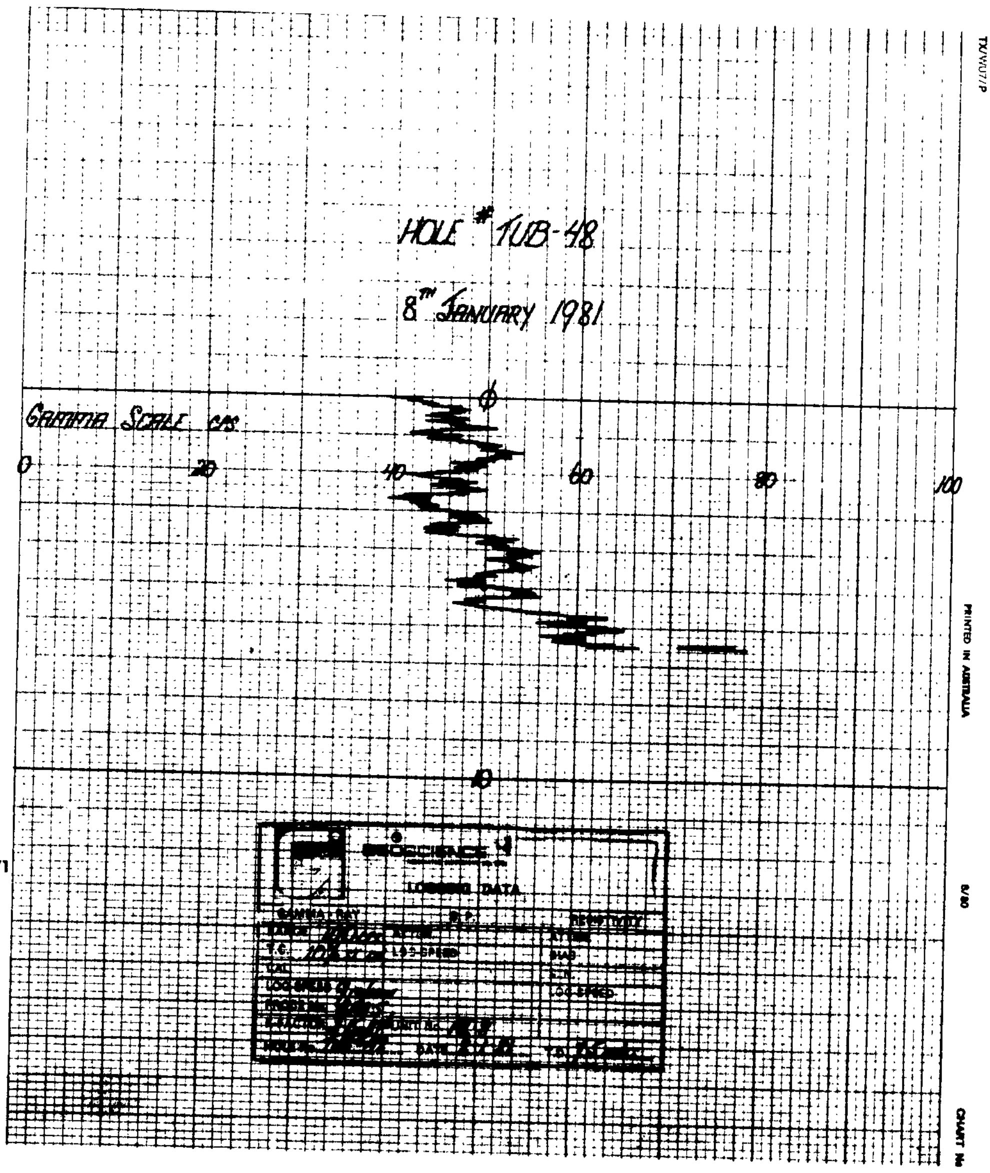
CLIENT:	AFMECO
Claim:	
Owned by:	
Operated by	
Unit Operator:	BARNETT
Unit No	AL 8
Office	ADELAIDE

ELECTRIC

	1	2	3	4
Logged depth				
Resist. scale				
S.P. scale				
Paper speed				
Logging speed				
Probe size in				
Type				
Bias				

CALIPER

Logged depth		
Scale	in/in def	
Paper Speed		
Logging speed		
Arm Length	in	
Max. Def.	in	



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HOLE # TUB-49

220

LOGGING DATA

DATE 9th JANUARY 1981

LOCATION	TUMBY BAY	HOLE NUMBER:	TUB # 49	CLIENT:	AFMECO
State	SOUTH AUST	Collar elev. metres		Claim:	
Area		Depth drilled. metres	11	Owned by.	
Project		CASING DATA	HOLE DATA	Operated by	
Prospect.		Wall size in	Dia 4" from 0 to 11	Unit Operator	BARNETT
Lat ° ' "	Long ° ' "	Dia (inside) in	Dia from to	Unit No. AL-8	Office: ADELAIDE

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft.)	99			
Range (Full scale)	100 cps			
Time constant (Sec.)	10% or av			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	37			
Probe No.	GPA-5			
Size (dia.) (in.)	40mm			
Type Na I	1½" x ½"			
Standard (cps)	490			
Dead time	6			μ sec.
Amp. Gain				
Ratemeter No.				
Bore hole medium	DRY			
Mud density				
Digital readout	2mtr			
Time base	1 sec			
Upper Disc.				
Lower Disc.				

Cased from to mtrs	Dia. from to
Cored hole ☐	Non-cored hole ☑
Sampled Interval	Type
1 metre	ROTARY AIR

INTERPRETATION DATA

Probe No	Standard (cps)	K factor
GPA-5	490	3.15×10^{-6}

REMARKS

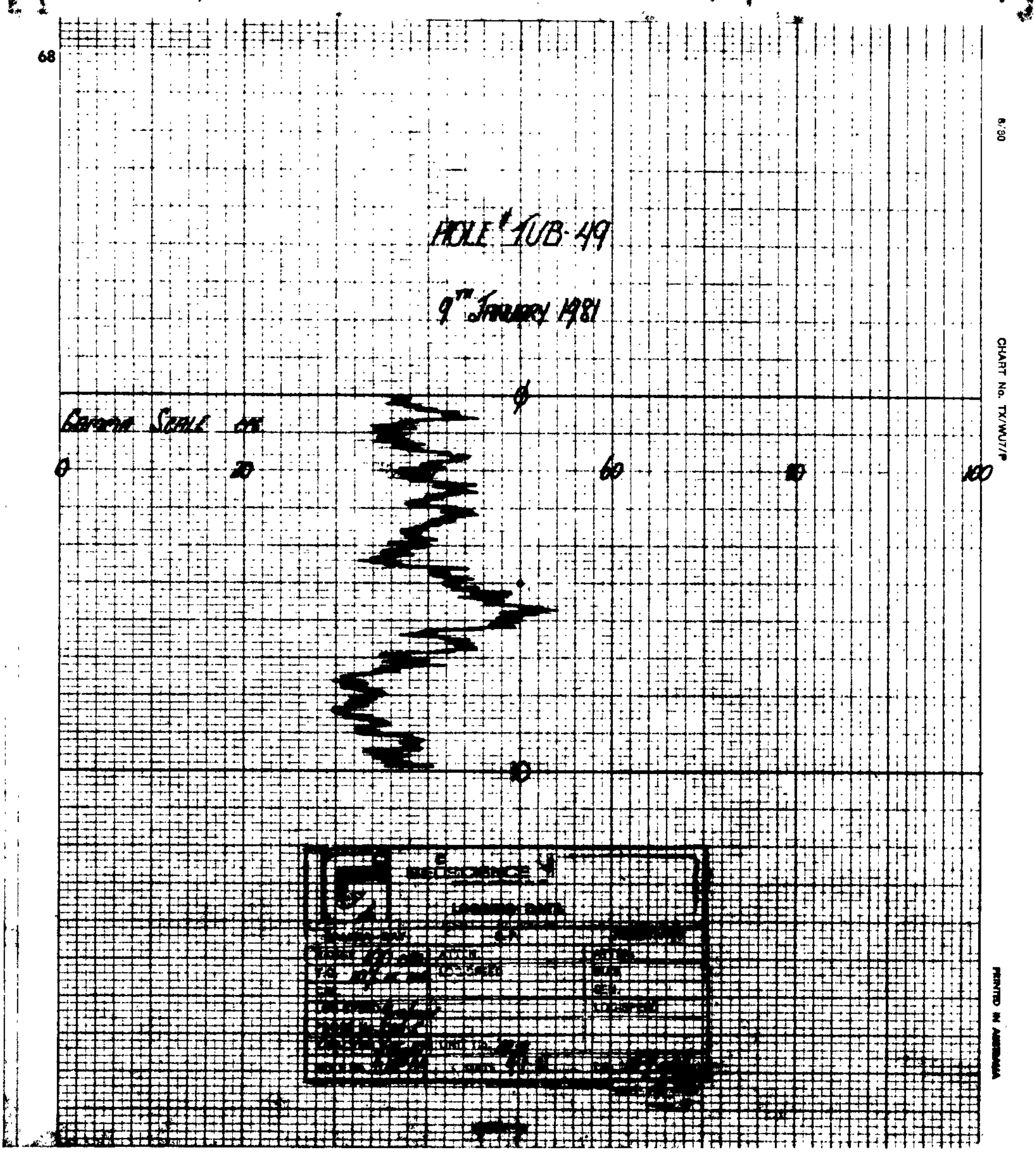
Fluid Level metres

ELECTRIC

	1	2	3	4
Logged depth				
Resist. scale				
S P scale				
Paper speed				
Logging speed				
Probe size in				
Type				
Bias				

CALIPER

	1	2	3	4
Logged depth				
Scale in/in def				
Paper Speed				
Logging speed				
Arm Length in				
Max. Def. in.				



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HOLE # 1UB-50

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LOGGING DATA

DATE 9TH JANUARY, '81

LOCATION LIMBY BAY	HOLE NUMBER. 1UB # 50	CLIENT. AFMECO
State SOUTH AUST	Collar elev. metres	Claim
Area	Depth drilled: 50 metres	Owned by.
Project	CASING DATA / HOLE DATA	Operated by
Prospect	Wall size in. / Dia. 4" from 0 to 50	Unit Operator. BARNETT.
Lat ° ' " / Long ° ' "	Dia (inside) in / Dia from to	Unit No AL-8 Office: ADELAIDE
	Cased from to mtrs / Dia. from to	
	Cored hole ☐ / Non-cored hole ☑	

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft.)	39			
Range (Full scale)	100 cps			
Time constant (Sec)	10% st. dv.			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	26			
Probe No	GPA-5.			
Size (dia) (In)	40mm.			
Type Na I	1½"×½"			
Standard (cps)	490			
Dead time μ sec	6			
Amp Gain				
Ratemeter No				
Bore hole medium	DRY.			
Mud density				
Digital readout	2mtr.			
Time base	1sec			
Upper Disc.				
Lower Disc				

Sampled Interval	Type
1 metre	ROTARY AIR

INTERPRETATION DATA

Probe No	Standard (cps)	K factor
GPA-5	490	315×10^{-6}

REMARKS

Fluid Level metres

ELECTRIC

	1	2	3	4
Logged depth				
Resist scale				
S.P scale				
Paper speed				
Logging speed				
Probe size in				
Type w/d				
Bias				

CALIPER

Logged depth				
Scale in/in def				
Paper Speed				
Logging speed				
Arm Length in				
Max. Def in				

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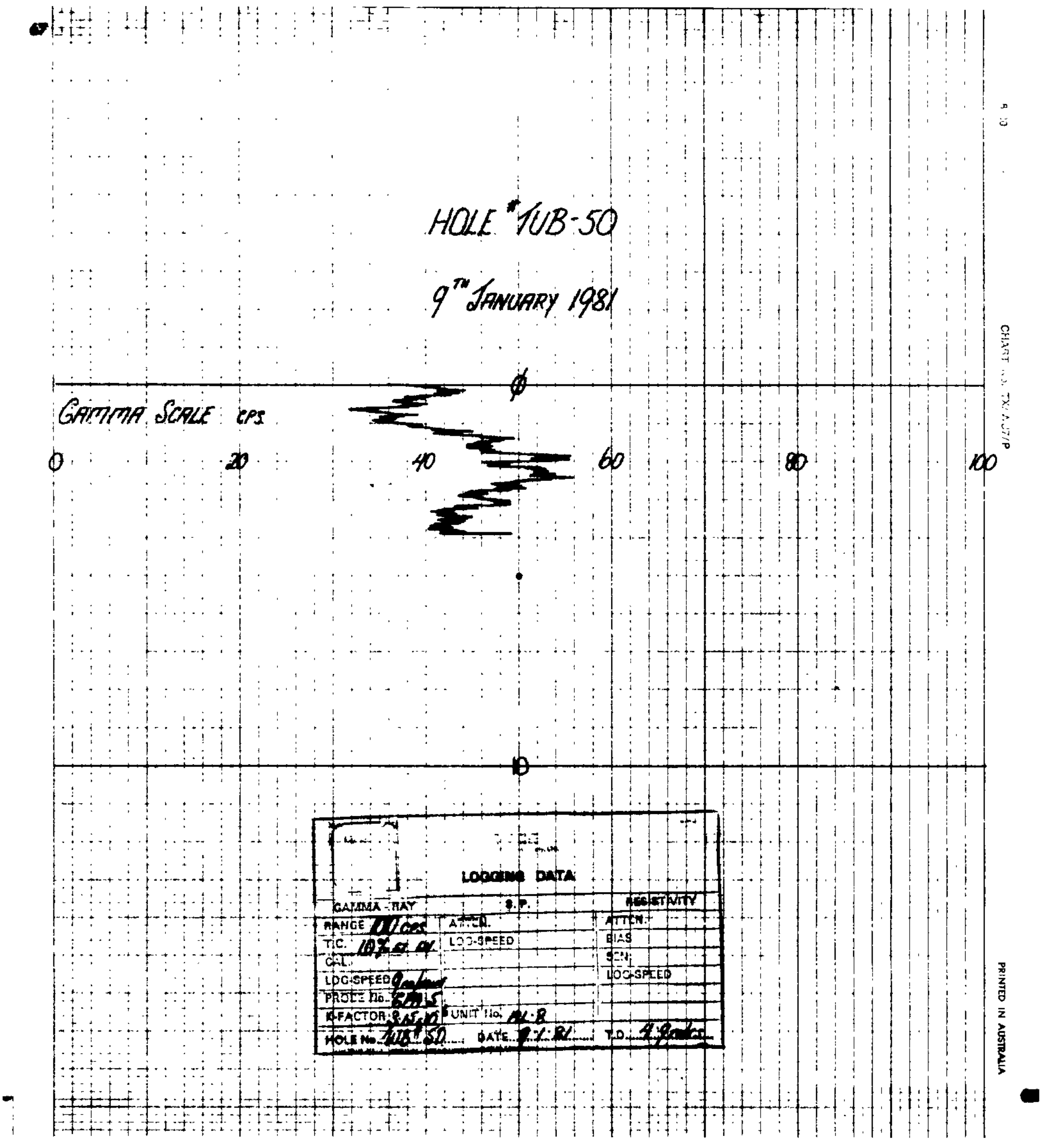

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HOLE # TUB-51

LOGGING DATA

DATE 9th JANUARY 1981

LOCATION TUMBY BAY		HOLE NUMBER TUB# 51	CLIENT PANECO
State SOUTH AUST.		Collar elev. metres	Claim.
Area.		Depth drilled 50 metres	Owned by
Project.		CASING DATA / HOLE DATA	Operated by
Prospect		Wall size in / Dia 4" from 0 to 50	Unit Operator BARNETT
Lat ° ' "	Long ° ' "	Dia. (inside) in / Dia. from to	Unit No. AL 8 Office. ADELAIDE

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft.)	38			
Range (Full scale)	100 cps			
Time constant (Sec)	10% SD OV			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	28			
Probe No	GPA 5			
Size (dia) (in)	40mm.			
Type Na I	1½" x ½"			
Standard (cps)	490			
Dead time	6			μ sec.
Amp Gain				
Ratemeter No.				
Bore hole medium	DRY			
Mud density				
Digital readout	2mtr			
Time base	1sec.			
Upper Disc				
Lower Disc.				

Cased from to mtrs / Dia. from to

Cored hole ☐ Non-cored hole ☑

Sampled Interval	Type
1 metre	ROTARY AIR

INTERPRETATION DATA

Probe No	Standard (cps)	K factor
GPA-5	490	3.15 x 10⁻⁶

REMARKS

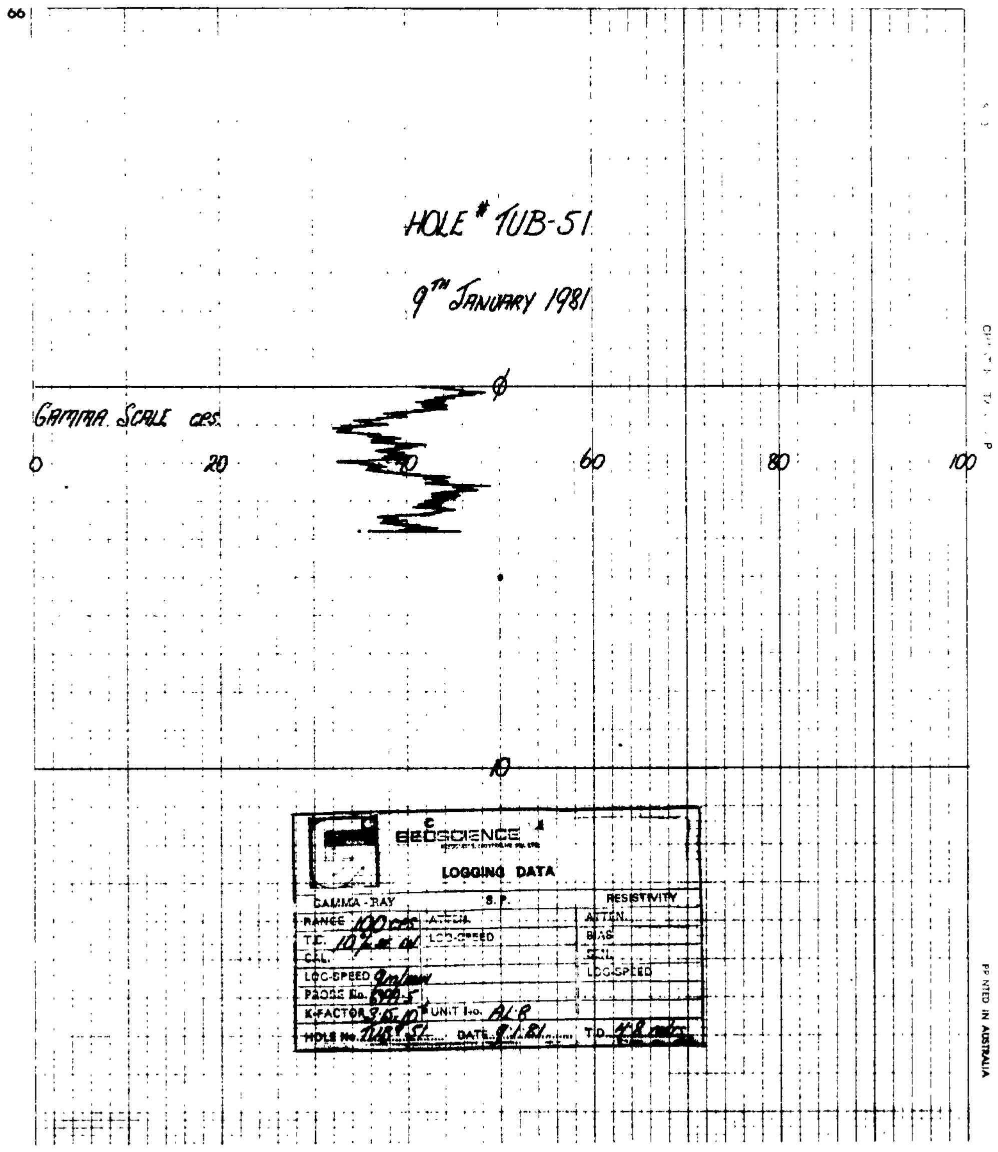
Fluid Level metres

ELECTRIC

	1	2	3	4
Logged depth				
Resist. scale				
S.P. scale				
Paper speed				
Logging speed				
Probe size	in			
Type	w/d			
Bias				

CALIPER

Logged depth				
Scale	in/in def			
Paper Speed				
Logging speed				
Arm Length	in			
Max. Def	in			



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HOLE # TUB-52

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LOGGING DATA

DATE 9TH JANUARY 1981

LOCATION	TUMBY BAY
State	SOUTH AUST.
Area.	
Project:	
Prospect:	
Lat ° ' "	Long ° ' "

HOLE NUMBER.	TUB # 52
Collar elev. metres	
Depth drilled: metres	5.0

CASING DATA		HOLE DATA	
Wall size	in.	Dia. 4" from 0 to 5.0	
Dia. (inside)	in	Dia from to	
Cased from to	mtrs	Dia. from to	
Cored hole ☐		Non-cored hole ☑	

Sampled Interval	Type
1 metre	ROTARY AIR.

CLIENT.	AFMECO
Claim:	
Owned by:	
Operated by:	
Unit Operator:	BARNETT
Unit No	AK-8
Office.	ADELAIDE

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft.)	38			
Range (Full scale)	100 cps			
Time constant (Sec.)	10% ST DV.			
Paper speed cm/m	1			
Logging speed m/min	9.			
Bkgnd count (cps)	36			
Probe No.	GPA-5			
Size (dia.) (in.)	40 mm			
Type Na I	1½" x ½"			
Standard (cps)	490			
Dead time	6			μ sec.
Amp. Gain				
Ratemeter No.				
Bore hole medium	DRY			
Mud density				
Digital readout	2 mtr			
Time base	1 sec			
Upper Disc.				
Lower Disc.				

INTERPRETATION DATA

Probe No.	Standard (cps)	K factor
GPA-5	490	3.65×10^{-6}

REMARKS

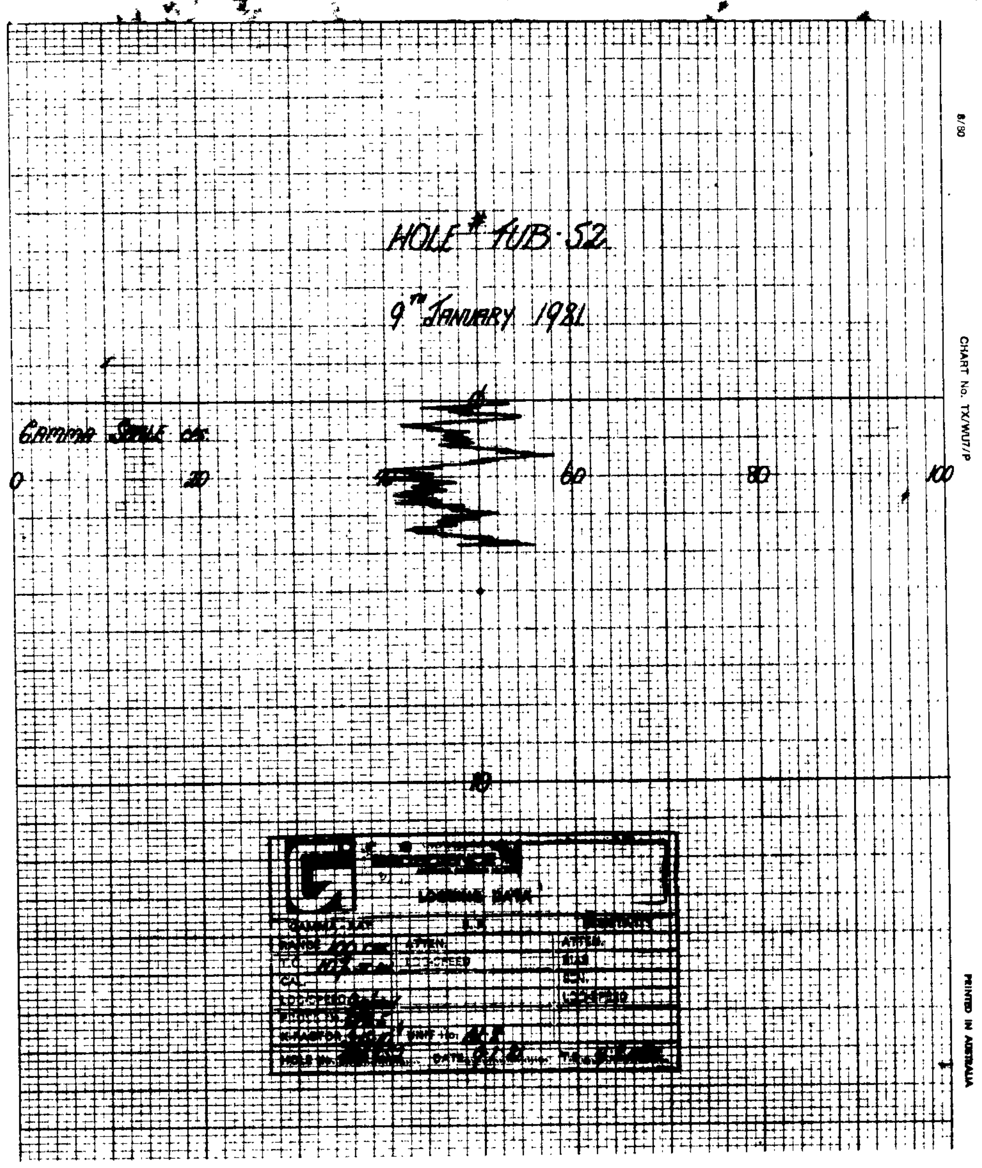
Fluid Level metres

ELECTRIC

	1	2	3	4
Logged depth				
Resist. scale				
S.P. scale				
Paper speed				
Logging speed				
Probe size	in			
Type	w/d			
Bias				

CALIPER

Logged depth				
Scale	in/in. def			
Paper Speed				
Logging speed				
Arm Length	in			
Max. Def.	in.			



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HOLE # TUB-56

LOGGING DATA

DATE 9th JANUARY 1981

LOCATION TUMBY BAY	HOLE NUMBER. TUB # 56		CLIENT. AFMECO
State SOUTH AUST	Collar elev. metres		Claim.
Area	Depth drilled 11 metres		Owned by.
Project	CASING DATA	HOLE DATA	Operated by.
Prospect	Wall size in.	Dia. 4" from 0 to 11.0	Unit Operator. BARNETT
Lat ° ' " Long ° ' "	Dia (inside) in	Dia from to	Unit No AL 8 Office. ADELAIDE
	Cased from to mtrs	Dia from to	
	Cored hole ☐	Non-cored hole ☑	

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft)	7.5			
Range (Full scale)	100 cps			
Time constant (Sec)	10			
Paper speed cm/m				
Logging speed m/min	1			
Bkgnd count (cps)	25			
Probe No	SPA-5			
Size (dia) (in)	45 mm			
Type NaI	1.25" × 2"			
Standard (cps)	490			
Dead time μ sec.	6			
Amp Gain				
Ratemeter No				
Bore hole medium	DRY			
Mud density				
Digital readout	2 mtr			
Time base	1 sec			
Upper Disc				
Lower Disc.				

Sampled Interval	Type
1 metre	ROTARY AIR.

INTERPRETATION DATA

Probe No	Standard (cps)	K factor
SPA-5	490	3.15×10^{6}

REMARKS

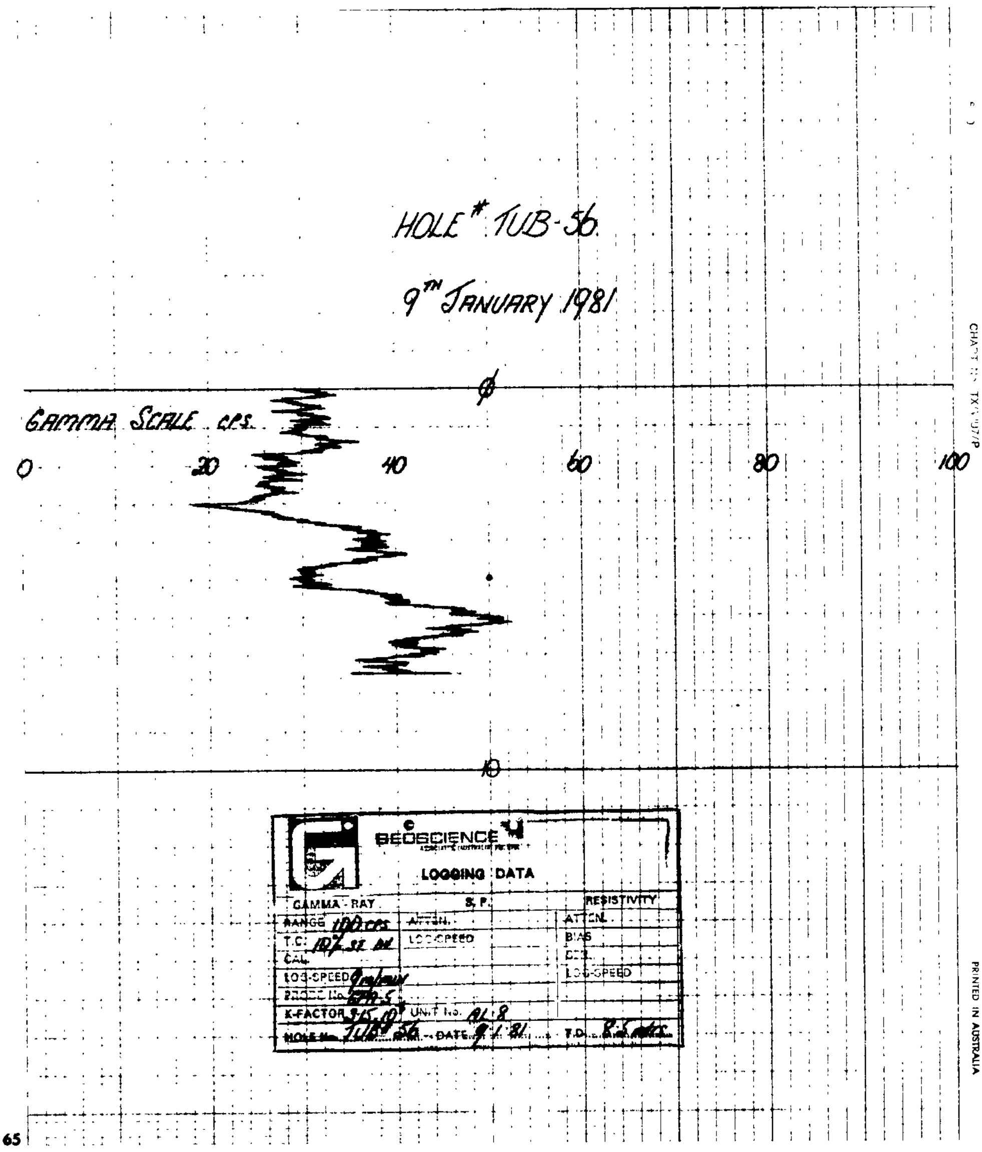
Fluid Level metres

ELECTRIC

	1	2	3	4
Logged depth				
Resist. scale				
S P scale				
Paper speed				
Logging speed				
Probe size in				
Type w/d				
Bias				

CALIPER

Logged depth				
Scale in/in def				
Paper Speed				
Logging speed				
Arm Length in				
Max Def. in				



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HOLE # TUB-57

LOGGING DATA

DATE 9th JAN 81

LOCATION Tumby Bay	HOLE NUMBER TUB# 57	CLIENT: UTMAG
State South Aust.	Collar elev. metres	Claim
Area	Depth drilled 14.0 metres	Owned by
Project	CASING DATA / HOLE DATA	Operated by
Prospect.	Wall size in. / Dia. 4" from 0 to 14.0	Unit Operator Garnett
Lat ° ' " Long ° ' "	Dia. (inside) in. / Dia. from to	Unit No AL-8 Office ADELAIDE
	Cased from to mtrs / Dia from to	

GAMMA RAY	INITIAL RUN	2	3	4
Logged depth (ft.)	12.0			
Range (Full scale)	100 cps			
Time constant (Sec.)	10% 20 DEV			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	23			
Probe No	GPA5			
Size (dia.) (In.)	40mm			
Type NaI	1½" x 1½"			
Standard (cps)	495			
Dead time	6			μ sec.
Amp Gain				
Ratemeter No.				
Bore hole medium	DRY			
Mud density				
Digital readout	2mtr			
Time base	1sec			
Upper Disc				
Lower Disc				

Cored hole ☐ Non-cored hole ☑

Sampled Interval	Type
1 metre	ROTARY AIR

INTERPRETATION DATA

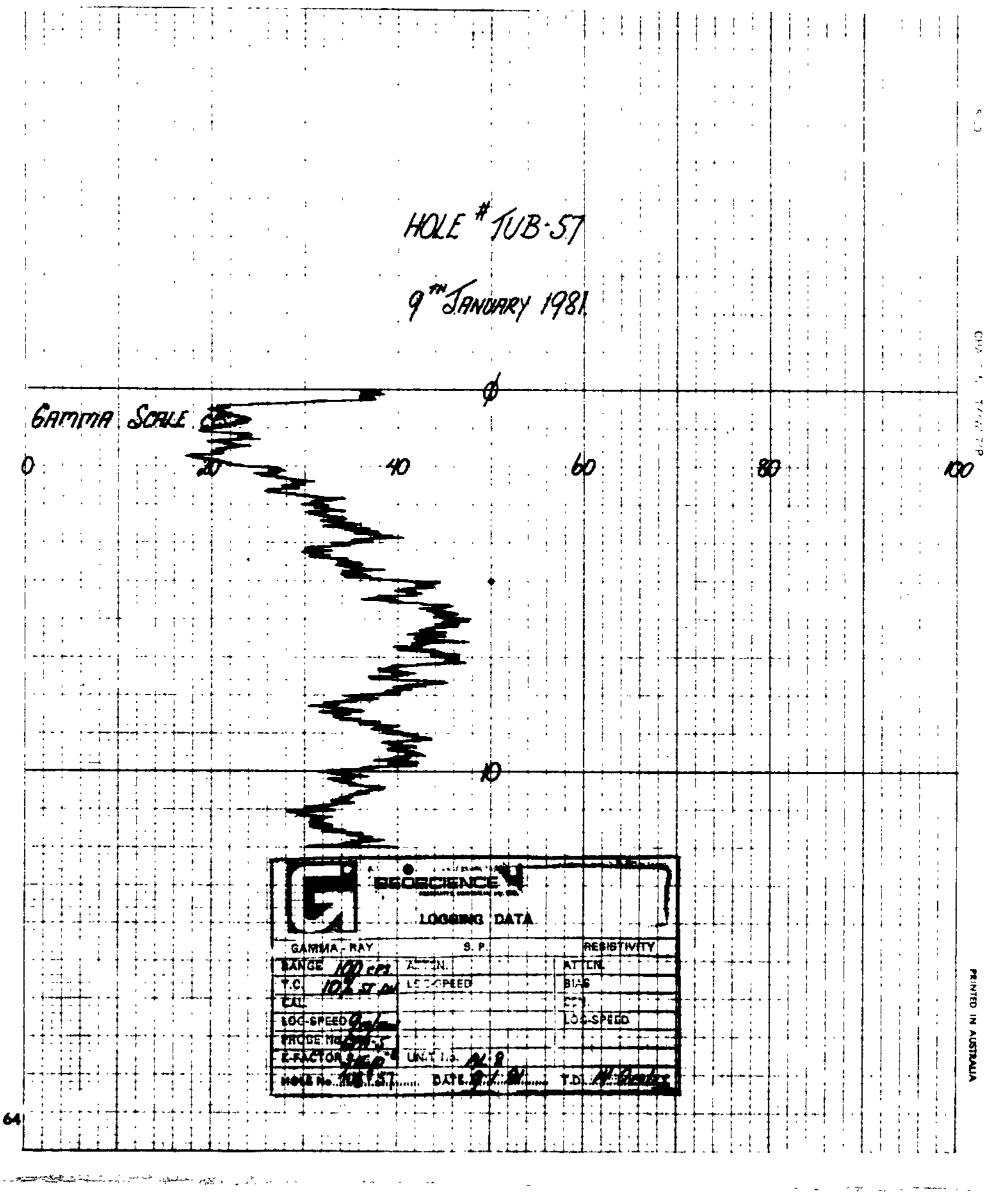
Probe No.	Standard (cps)	K factor
GPA-5	495	3.2 x 10⁻⁵

REMARKS

Fluid Level metres

ELECTRIC	1	2	3	4
Logged depth				
Resist scale				
S.P. scale				
Paper speed				
Logging speed				
Probe size in				
Type w/d				
Bias				

CALIPER	1	2	3	4
Logged depth				
Scale in/in def				
Paper Speed				
Logging speed				
Arm Length in				
Max Def in				



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HOLE # 1UB-58

220

LOGGING DATA

DATE 9th January 1981

LOCATION Kimby Bay	HOLE NUMBER 1UB # 58	CLIENT AFMECO
State South Aust	Collar elev metres	Claim
Area	Depth drilled. 8 metres metres	Owned by
Project	CASING DATA / HOLE DATA	Operated by.
Prospect	Wall size in. / Dia. 4" from 0 to 8	Unit Operator. BARNETT
Lat ° ' " / Long ° ' "	Dia (inside) in / Dia. from to	Unit No AL-8 Office ADELAIDE

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft)	68			
Range (Full scale)	100 cps			
Time constant (Sec)	10% std dev			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	28			
Probe No.	GPA-5			
Size (dia) mm	40 mm			
Crystal	NaI 1½" x ½"			
Standard (cps)	490			
Dead time µ sec.	6			
Amp Gain (disc)				
Ratemeter No.				
Bore hole medium	DRY			
Mud density				
Digital readout m.	2m			
Time base (sec)	1			
Upper Disc.				
Lower Disc.				

Cased from to mtrs / Dia from to

Cored hole ☐ Non-cored hole ☑

Sampled Interval	Type
1 metre	Rotary Air

INTERPRETATION DATA

Probe No.	Standard (cps)	K factor
GPA-5	490	$3 \cdot 15 \times 10^{-6}$

REMARKS

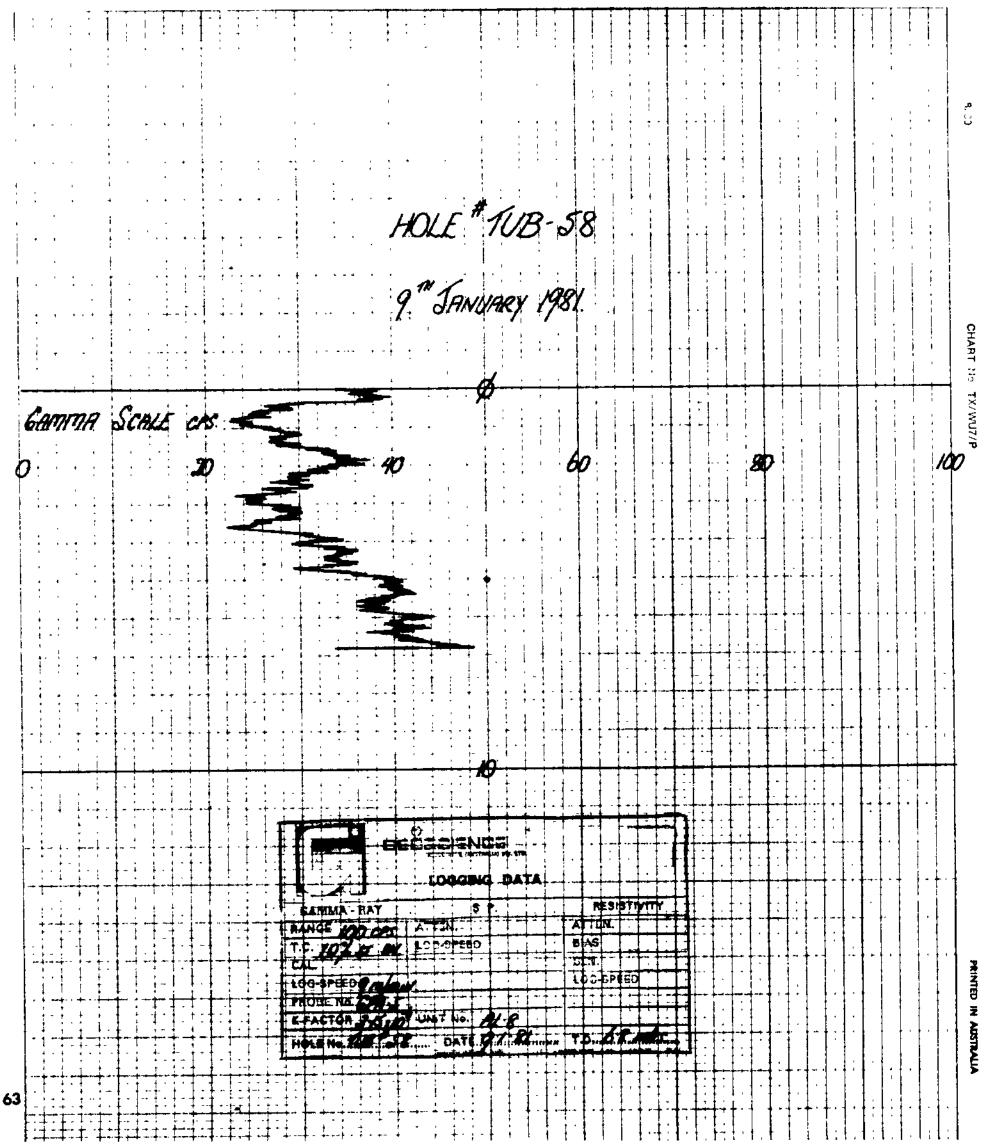
Fluid Level metres

ELECTRIC

	1	2	3	4
Logged depth				
Resist. scale Ω/div				
S.P. scale m.v.				
Paper speed cm/m				
Logging speed m/min				
Probe size				
Bias				

CALIPER

Logged depth			
Scale	in/in def		
Paper Speed			
Logging speed			
Arm Length	in		
Max. Def.	in		



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HOLE #-1UB 59

221

LOGGING DATA

DATE 9TH JANUARY 1981.

LOCATION Tumby Bay.	HOLE NUMBER 1UB #59.	CLIENT AEMECO
State South Aust.	Collar elev metres	Claim
Area	Depth drilled 14. metres	Owned by
Project	CASING DATA / HOLE DATA	Operated by
Prospect	Wall size in. / Dia. 4" from 0 to 14.	Unit Operater. Barnett
Lat ° Long °	Dia (inside) in / Dia from to	Unit No AL 8 Office Adelaide
	Cased from to mtrs / Dia. from to	
	Cored hole ☐ / Non-cored hole ☑	

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft)	28			
Range (Full scale)	100 cps.			
Time constant (Sec)	10% st. dv			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	29.			
Probe No	GPA 5.			
Size (dia) mm	40.			
Crystal	NaI 1½" x 1½"			
Standard (cps)	490			
Dead time µ sec.	6			
Amp Gain (disc)				
Ratemeter No.				
Bore hole medium	DRY.			
Mud density				
Digital readout m.	2			
Time base (sec)	1			
Upper Disc.				
Lower Disc.				

Sampled Interval	Type
1 metre	Rotary Air.

INTERPRETATION DATA

Probe No	Standard (cps)	K factor
GPA 5	490	3.15×10^{-6}

REMARKS

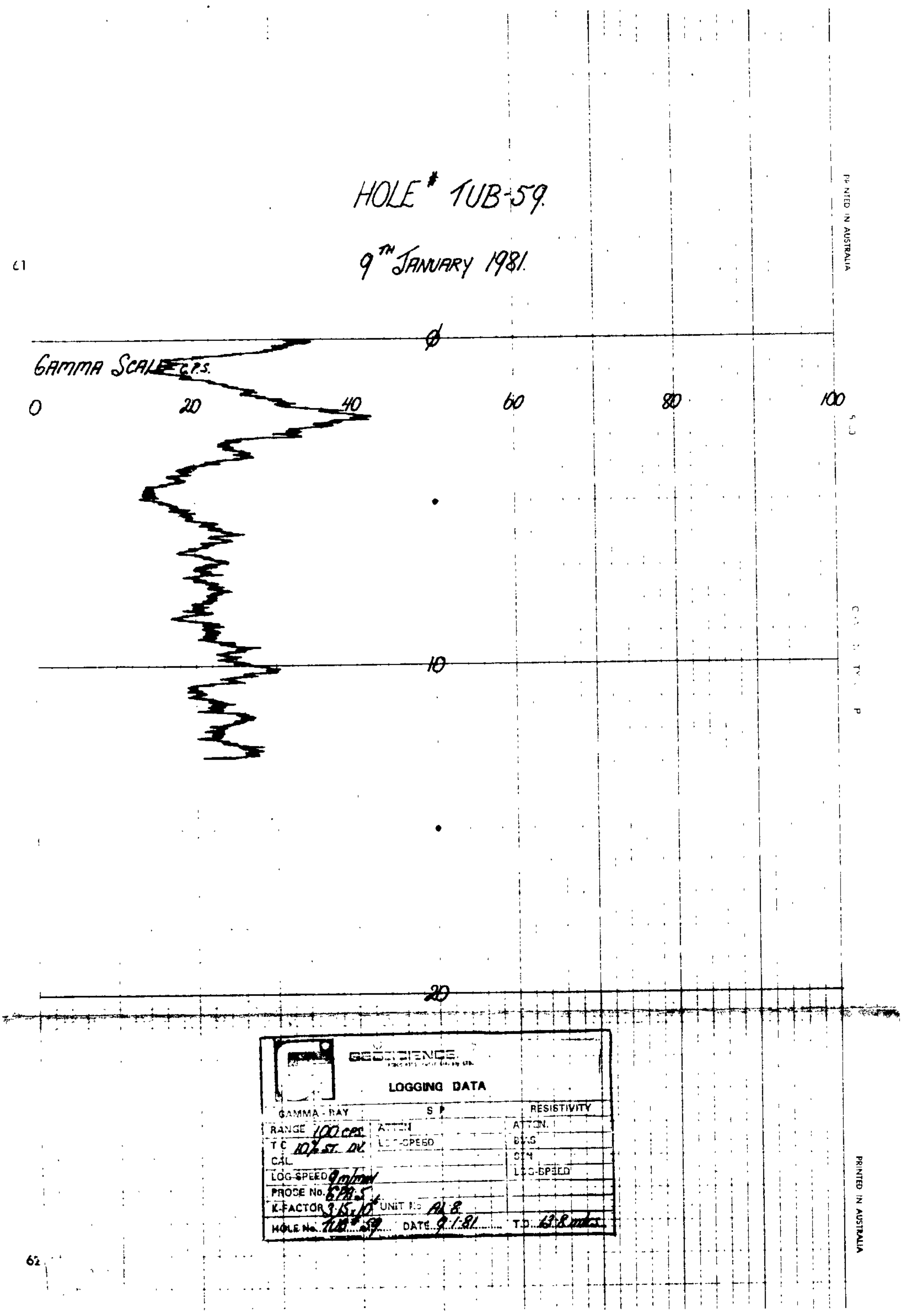
Fluid Level metres

ELECTRIC

	1	2	3	4
Logged depth				
Resist. scale Ω/div				
S.P scale mv				
Paper speed cm/m				
Logging speed m/min				
Probe size				
Bias				

CALIPER

Logged depth				
Scale	in/in def			
Paper Speed				
Logging speed				
Arm Length	in			
Max. Def.	in			



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HOLE # 1UB-60

226

LOGGING DATA

DATE 9th JANUARY 1981

LOCATION	LUMBY BAY
State	SOUTH AUST
Area	
Project	
Prospect	
Lat ° ' "	Long ° ' "

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft)	69			
Range (Full scale)	100 CPS			
Time constant (Sec)	10% ST DV			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	27			
Probe No	GPA-5			
Size (dia.) mm	40			
Crystal NaI	1½" x 1½"			
Standard (cps)	490			
Dead time	6			μ sec
Amp Gain (disc)				
Ratemeter No.				
Bore hole medium	DRY			
Mud density				
Digital readout m.	2			
Time base (sec)	1			
Upper Disc.				
Lower Disc.				

HOLE NUMBER	1UB # 60
Collar elev.	metres
Depth drilled	8.0 metres

CASING DATA		HOLE DATA
Wall size	in	Dia 4" from 0 to 8.0
Dia (inside)	in	Dia. from to
Cased from to	mtrs	Dia from to
Cored hole ☐		Non-cored hole ☑

Sampled Interval	Type
1 metre	ROTARY AIR

INTERPRETATION DATA

Probe No	Standard (cps)	K factor
GPA-5	490	3.15×10^{-6}

REMARKS

Fluid Level metres

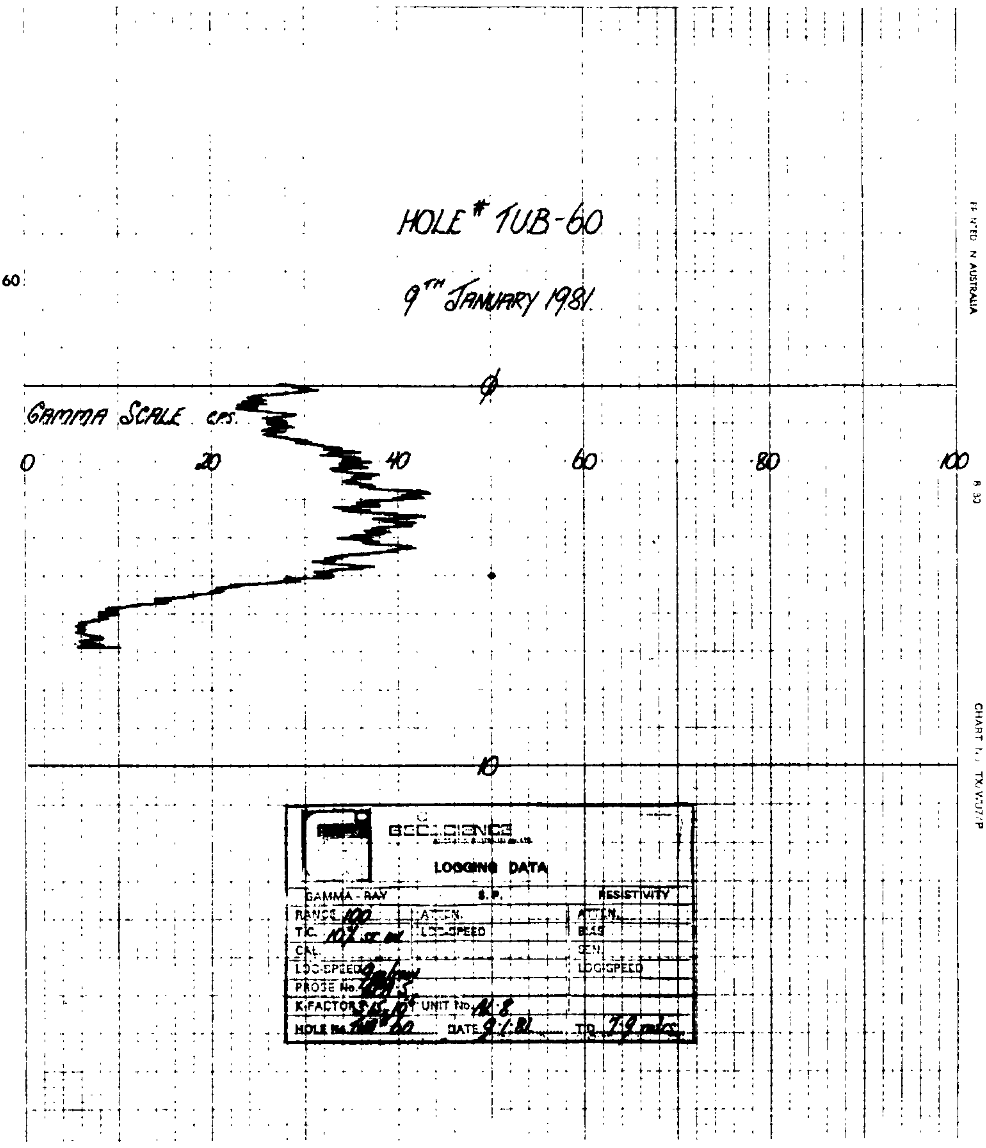
CLIENT	AEMECC
Claim	
Owned by	
Operated by	
Unit Operator	BARNETT
Unit No.	AL-8 Office ADELAIDE

ELECTRIC

	1	2	3	4
Logged depth				
Resist. scale				
S.P scale				
Paper speed				
Logging speed				
Probe size				
Bias				

CALIPER

Logged depth				
Scale	in/in def			
Paper Speed				
Logging speed				
Arm Length	in			
Max. Def.	in			



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HOLE # TUB-61

LOGGING DATA

DATE 9th JANUARY 1981

LOCATION	TUMBY BAY	HOLE NUMBER	TUB # 61
State	SOUTH AUST.	Collar elev	metres
Area		Depth drilled	8.0 metres
Project		CLIENT	AFMECO
Prospect		Claim:	
Lat ° ' "	Long ° ' "	Owned by	
		Operated by	
		Unit Operator	BARNETT
		Unit No	AL 8
		Office	ADELAIDE

CASING DATA		HOLE DATA	
Wall size	in.	Dia. 4" from 0 to 8.0	
Dia. (inside)	in	Dia. from to	
Cased from to	mtrs	Dia. from to	
Cored hole ☐		Non-cored hole ☑	

Sampled Interval	Type
1 metre	ROTARY AIR.

INTERPRETATION DATA

Probe No.	Standard (cps)	K factor
GPA-5	490	3.15×10^{-6}

REMARKS

Fluid Level metres

GAMMA RAY

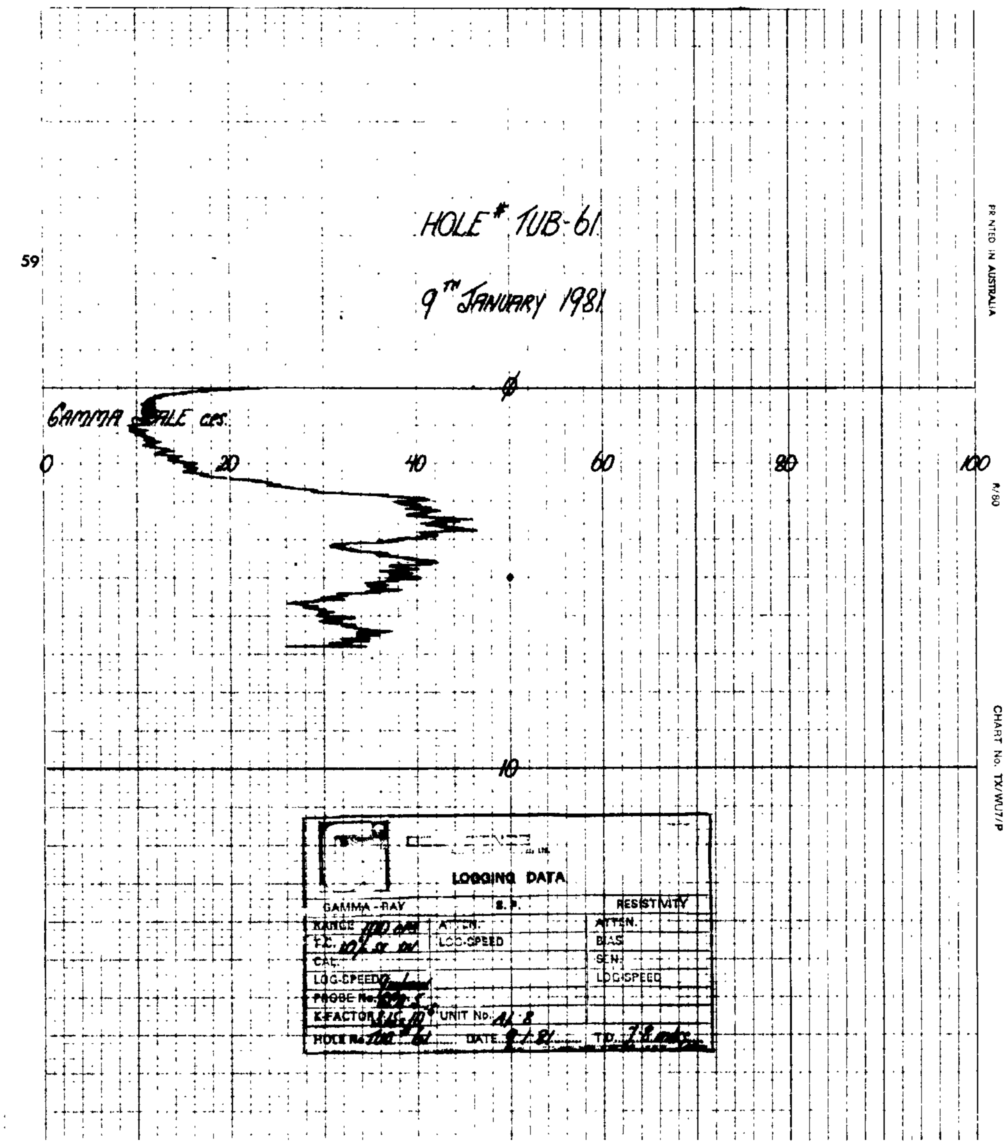
	INITIAL RUN	2	3	4
Logged depth (ft.)	6.8			
Range (Full scale)	100 cps			
Time constant (Sec.)	10% st. dev			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	28			
Probe No	GPA-5			
Size (dia.) mm	40			
Crystal NaI	1½" x ½"			
Standard (cps)	490			
Dead time	6			µ sec.
Amp Gain (disc)				
Ratemeter No.				
Bore hole medium	DRY			
Mud density				
Digital readout m.	.2			
Time base (sec)	1			
Upper Disc.				
Lower Disc.				

ELECTRIC

	1	2	3	4
Logged depth				
Resist. scale Ω/div				
S.P. scale mv				
Paper speed cm/m				
Logging speed m/min				
Probe size				
Bias				

CALIPER

Logged depth		
Scale	in/in def	
Paper Speed		
Logging speed		
Arm Length	in	
Max. Def.	in	



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HOLE # TUB-62

250

LOGGING DATA

DATE 9TH JANUARY 1981

LOCATION TUMBY BAY	HOLE NUMBER: TUB #62	CLIENT AFMECO
State SOUTH AUST	Collar elev. metres	Claim:
Area	Depth drilled: 8.0 metres	Owned by
Project	CASING DATA / HOLE DATA	Operated by:
Prospect	Wall size in. / Dia. 4" from 0 to 8.0	Unit Operator. BARNETT
Lat ° ' " / Long ° ' "	Dia. (inside) in / Dia. from to	Unit No AL-8 Office. ADELAIDE
GAMMA RAY	Cased from to mtrs / Dia from to	ELECTRIC

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft)	6.6			
Range (Full scale)	100 CPS			
Time constant (Sec)	10% st. dv.			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	32			
Probe No	GPA-5			
Size (dia) mm	40			
Crystal NaI	1½" x ½"			
Standard (cps)	490			
Dead time	6			μ sec.
Amp Gain (disc)				
Ratemeter No.				
Bore hole medium	DRY			
Mud density				
Digital readout m.	·2			
Time base (sec)	1			
Upper Disc.				
Lower Disc.				

Cored hole ☐ Non-cored hole ☑

Sampled Interval	Type
1 metre	ROTARY AIR.

INTERPRETATION DATA

Probe No.	Standard (cps)	K factor
GPA-5	490	3.15×10^{-6}

REMARKS

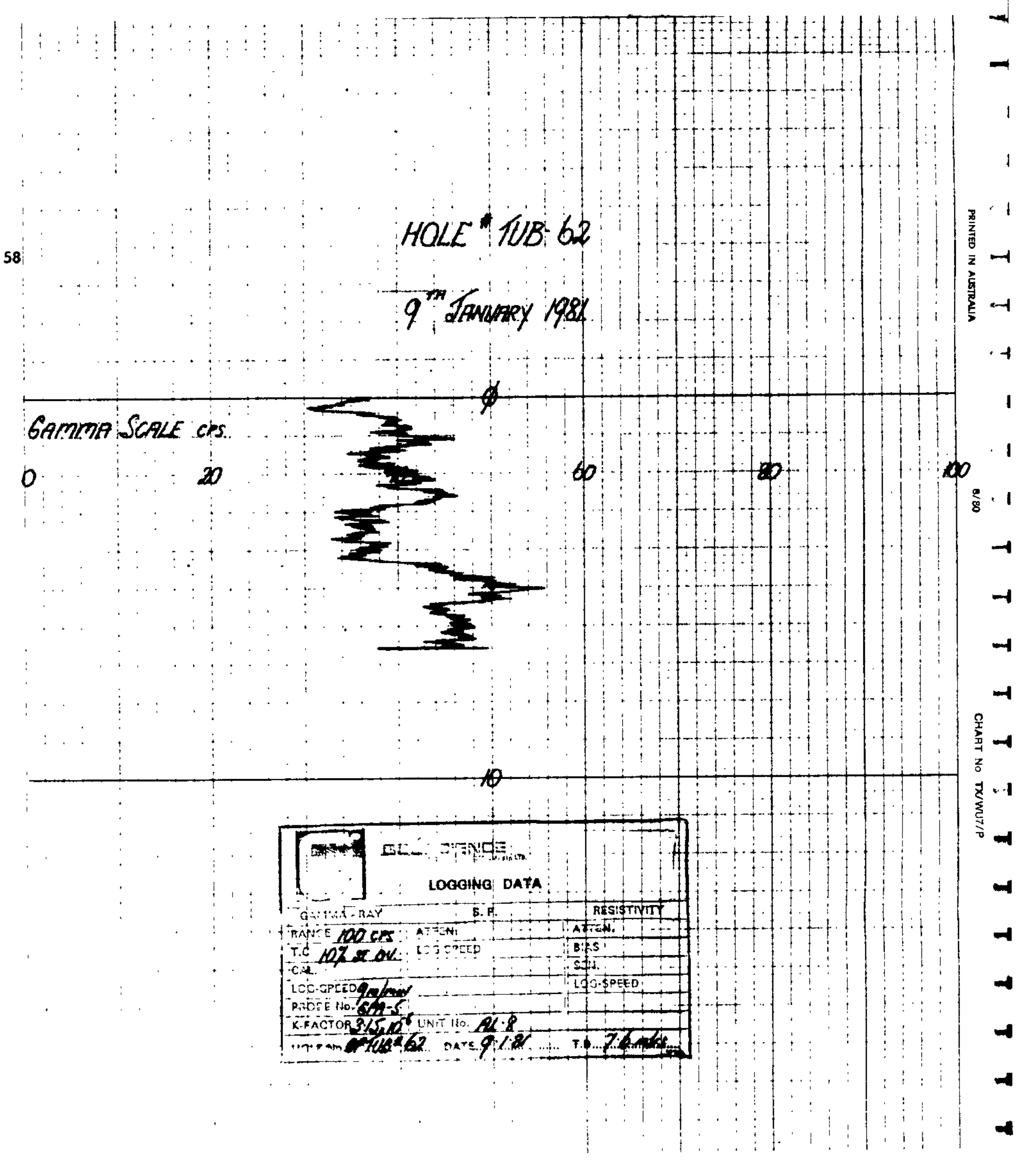
Fluid Level metres

ELECTRIC

	1	2	3	4
Logged depth				
Resist scale Ω/div				
S.P. scale m.v.				
Paper speed cm/m				
Logging speed m/min				
Probe size				
Bias				

CALIPER

	1	2	3	4
Logged depth				
Scale	in/in def.			
Paper Speed				
Logging speed				
Arm Length	in			
Max. Def.	in			



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HOLE # 7UB-63

LOGGING DATA

DATE 9TH JANUARY 1981.

LOCATION	TUMBY BAY			
State	SOUTH AUST.			
Area.				
Project				
Prospect				
Lat ° ' "	Long ° ' "			

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft.)	39.			
Range (Full scale)	100 cps.			
Time constant (Sec)	10% st. dv.			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	25			
Probe No	GPA.5.			
Size (dia) mm	40			
Crystal NaI	1½" x ½"			
Standard (cps)	490			
Dead time	6			μ sec.
Amp. Gain (disc)				
Ratemeter No				
Bore hole medium	DRY			
Mud density				
Digital readout m.	·2			
Time base (sec)	1			
Upper Disc.				
Lower Disc.				

HOLE NUMBER. 7UB# 63.			
Collar elev	metres		
Depth drilled: 50	metres		
CASING DATA		HOLE DATA	
Wall size	in	Dia 4" from 0 to 50	
Dia (inside)	in	Dia from to	
Cased from to	mtrs	Dia from to	
Cored hole ☐		Non-cored hole ☑	
Sampled Interval: 1 metre.		Type: ROTARY AIR.	

INTERPRETATION DATA

Probe No	Standard (cps)	K factor
GPA.5	490	3.15×10^{-6}

REMARKS

Fluid Level metres

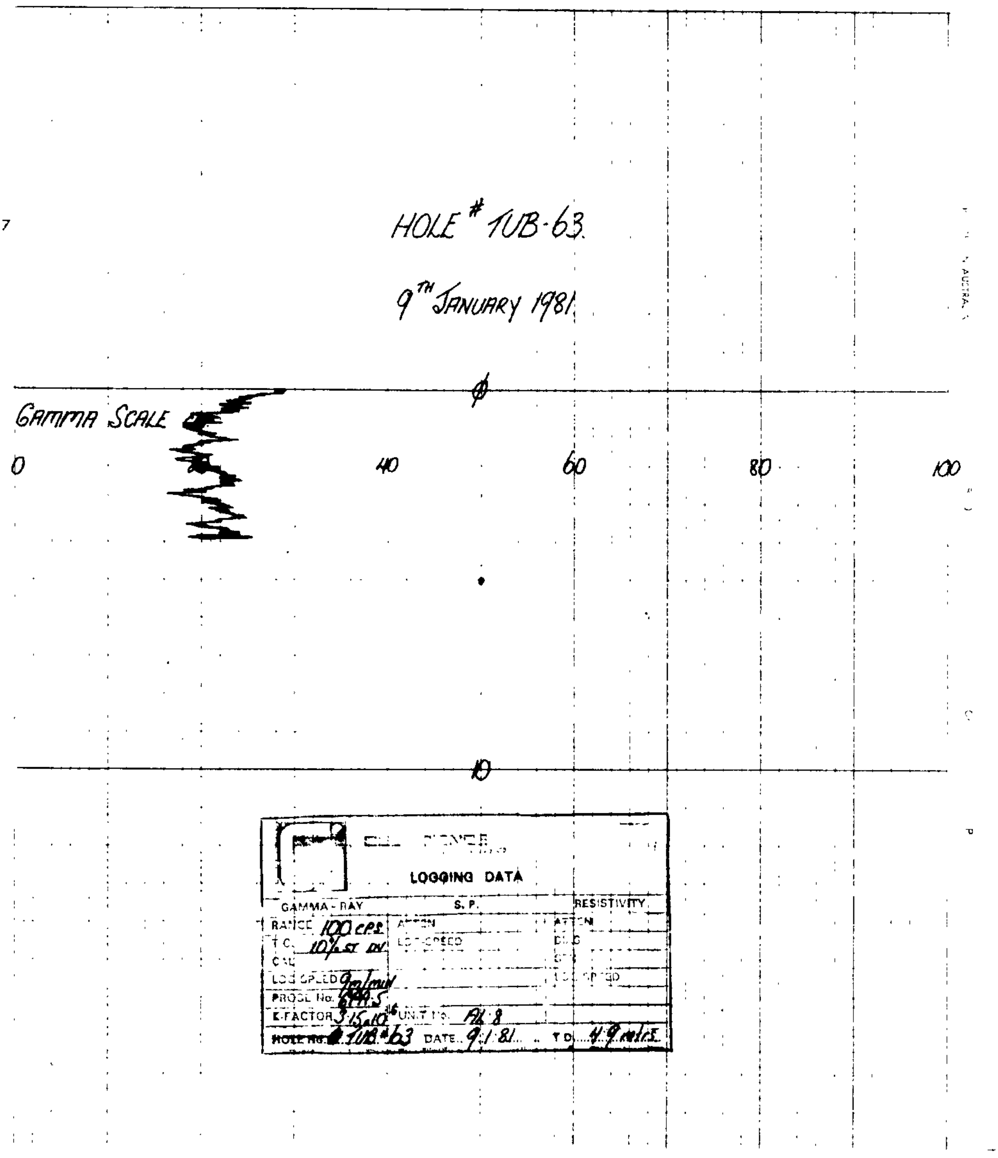
CLIENT.	AEMECO
Claim	
Owned by	
Operated by	
Unit Operator	BARNETT
Unit No.	AL-8
Office	ADELAIDE

ELECTRIC

	1	2	3	4
Logged depth				
Resist. scale				
S.P. scale m.v.				
Paper speed				
Logging speed m/min				
Probe size				
Bias				

CALIPER

	1	2	3	4
Logged depth				
Scale	in/in def			
Paper Speed				
Logging speed				
Arm Length	in			
Max Def	in			



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HOLE # 1UB-64

LOGGING DATA

DATE 9TH JANUARY 1981

LOCATION TUMBY BAY
State SOUTH AUST.
Area
Project
Prospect
Lat ° ' " Long ° ' "

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft)	6·8			
Range (Full scale)	100 cps			
Time constant (Sec)	10% ST DV.			
Paper speed cm/m	1			
Logging speed m/min	9.			
Bkgnd count (cps)	22			
Probe No	GPA-5			
Size (dia.) mm	40			
Crystal NaI	1½" x ½"			
Standard (cps)	490			
Dead time	6			μ sec.
Amp Gain (disc)				
Ratemeter No.				
Bore hole medium	DRY			
Mud density				
Digital readout m.	2mtr			
Time base (sec)	1			
Upper Disc.				
Lower Disc.				

HOLE NUMBER: 1UB # 64.
Collar elev metres
Depth drilled 80 metres

CASING DATA	HOLE DATA
Wall size in	Dia 4" from 0 to 80
Dia. (inside) in	Dia. from to
Cased from to mtrs	Dia from to
Cored hole ☐	Non-cored hole ☑

Sampled Interval	Type
1 metre	ROTARY AIR

INTERPRETATION DATA

Probe No.	Standard (cps)	K factor
GPA-5	490	3.15×10^{-6}

REMARKS

Fluid Level metres

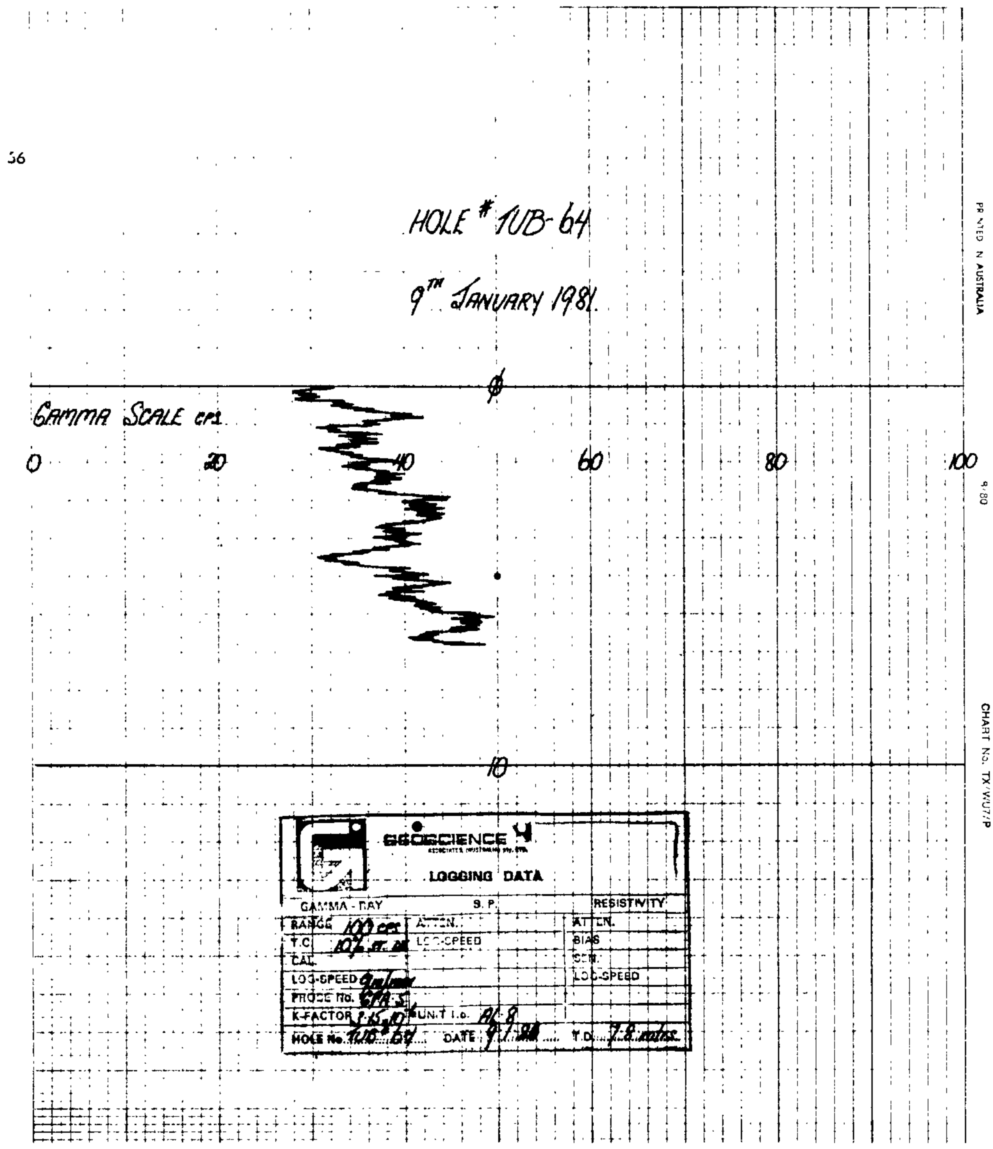
CLIENT AEMECO
Claim
Owned by:
Operated by:
Unit Operator: BARNETT
Unit No AL-8 Office ADELAIDE

ELECTRIC

	1	2	3	4
Logged depth				
Resist scale Ω/div				
S.P scale mv				
Paper speed cm/m				
Logging speed m/min				
Probe size				
Bias				

CALIPER

Logged depth				
Scale	in/in def			
Paper Speed				
Logging speed				
Arm Length	in			
Max. Def.	in			



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HOLE # 1UB-65

LOGGING DATA

DATE 9th January 1981.

LOCATION	Tumby Bay
State	South Aust.
Area	
Project	
Prospect	
Lat ° ' "	Long ° ' "

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft)	9.8			
Range (Full scale)	100 cps			
Time constant (Sec)	10% st. dv.			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	21			
Probe No	GPA-5			
Size (dia) mm	40			
Crystal NaI	1½" × ½"			
Standard (cps)	490			
Dead time	6			μ sec.
Amp Gain (disc)				
Ratemeter No.				
Bore hole medium	DRY			
Mud density				
Digital readout m.	2			
Time base (sec)	1			
Upper Disc.				
Lower Disc.				

HOLE NUMBER	1UB# 65.
Collar elev	metres
Depth drilled	110 metres

CASING DATA		HOLE DATA
Wall size	in.	Dia. 4" from 0 to 110
Dia (inside)	in	Dia. from to
Cased from to	mtrs	Dia. from to
Cored hole ☐		Non-cored hole ☑

Sampled Interval	Type
1 metre	Rotary Air.

INTERPRETATION DATA

Probe No	Standard (cps)	K factor
GPA-5	490	3.15×10^{-6}

REMARKS

Fluid Level metres

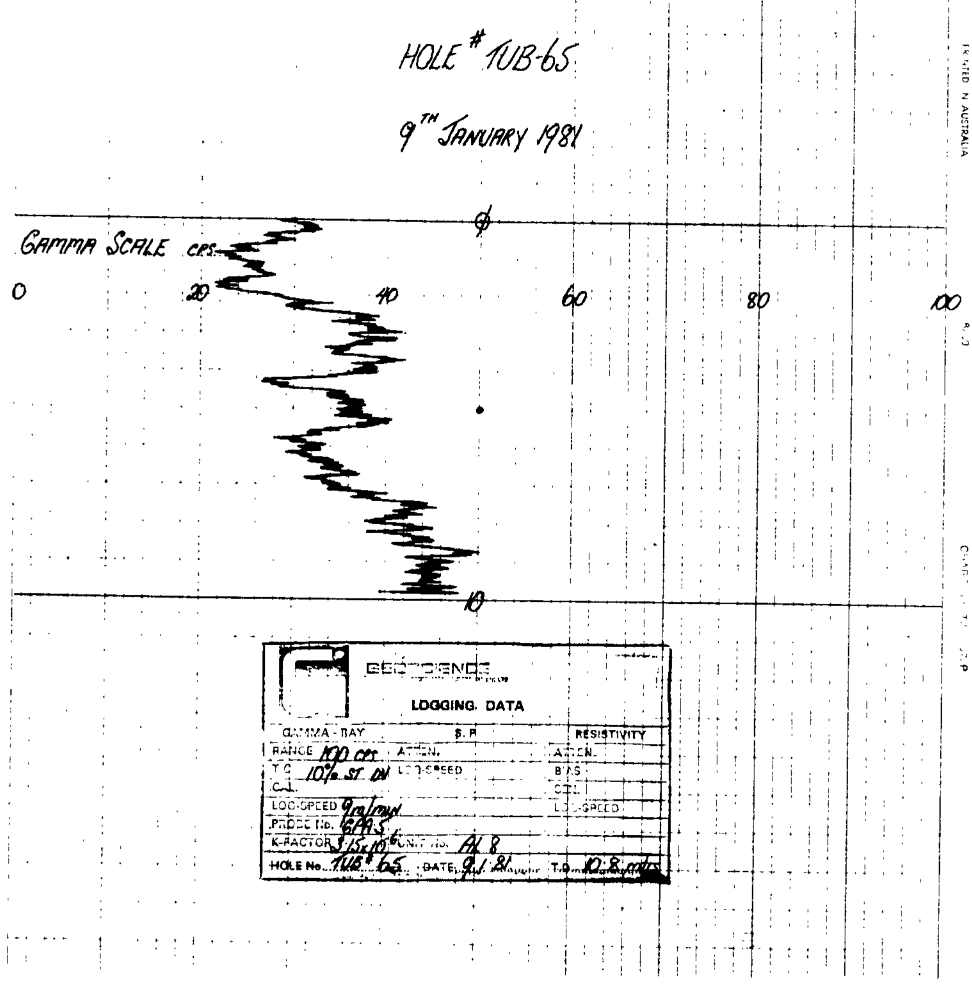
CLIENT	AFMECO
Claim	
Owned by:	
Operated by:	
Unit Operator	BARNETT
Unit No	AL 8
Office	ADELAIDE

ELECTRIC

	1	2	3	4
Logged depth				
Resist. scale Ω/div				
S.P scale m.v.				
Paper speed cm/m				
Logging speed m/min				
Probe size				
Bias				

CALIPER

Logged depth				
Scale	in/in def			
Paper Speed				
Logging speed				
Arm Length	in			
Max. Def.	in			



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HOLE # 1UB # 66

LOGGING DATA

DATE 9th JANUARY 1981

LOCATION Tumby Bay
State South Aust
Area
Project
Prospect
Lat ° ' " Long ° ' "

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft)	6.0			
Range (Full scale)	100 cps			
Time constant (Sec)	10% st. dv.			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	22			
Probe No	GPA.5			
Size (dia) mm	40			
Crystal NaI	1½" x ½"			
Standard (cps)	490			
Dead time µ sec	6			
Amp Gain (disc)				
Ratemeter No				
Bore hole medium	DRY			
Mud density				
Digital readout m.	2			
Time base (sec)	1			
Upper Disc.				
Lower Disc.				

HOLE NUMBER 1UB # 66
Collar elev metres
Depth drilled 8.0 metres

CASING DATA
Wall size in
Dia (inside) in
Cased from to metrs
Cored hole ☐

HOLE DATA
Dia 4" from 0 to 8.0
Dia from to
Dia from to
Non cored hole ☑

Sampled Interval: 1 metre
Type: ROTARY AIR

INTERPRETATION DATA

Probe No	Standard (cps)	K factor
GPA.5	490	3.15×10^{-6}

REMARKS
Fluid Level metres

CLIENT Aemeco
Claim
Owned by
Operated by
Unit Operator Barnett
Unit No AL 8 Office Adelaide

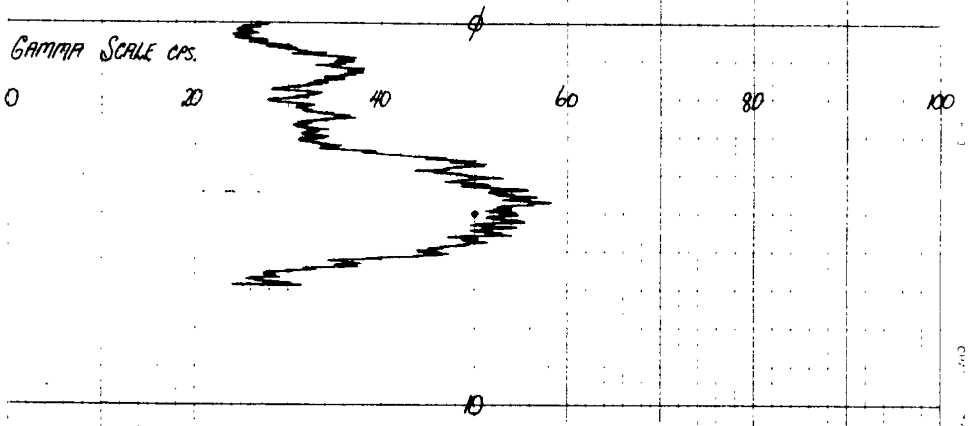
ELECTRIC

	1	2	3	4
Logged depth				
Resist scale				
S.P scale				
Paper speed				
Logging speed				
Probe size				
Bias				

CALIPER

Logged depth				
Scale in/in def				
Paper Speed				
Logging speed				
Arm Length in				
Max Def in				

HOLE # 1UB-66
9th JANUARY 1981



GEOSCIENCE
LOGGING DATA

GAMMA-RAY	S.P.	RESISTIVITY
RANGE 100 CPS	ATTEN	ATTEN.
T.C 10%	LOG SPEED	BIAS
C.L.		
LOG-SPEED 9m/min		LOG SPEED
PROBE No. GPA-5		
K-FACTOR 3.15×10^{-6}	UNIT No AL 8	
HOLE No. 1UB # 66	DATE 9/1/81	T.D. 7.9mtr

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HOLE #TUB 67

LOGGING DATA

DATE 9TH JANUARY 1981

LOCATION TUMBY BAY
State SOUTH AUST
Area
Project
Prospect
Lat ° ' " | Long ° ' "

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft.)	14.0			
Range (Full scale)	100 CPS.			
Time constant (Sec)	10% ST DV			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	20			
Probe No	GPA5			
Size (dia) mm	40			
Crystal NaI	1½" 1½"			
Standard (cps)	490			
Dead time	6		μ sec	
Amp. Gain (disc)				
Ratemeter No				
Bore hole medium	DRY			
Mud density				
Digital readout m.	.2			
Time base (sec)	1			
Upper Disc.				
Lower Disc.				

HOLE NUMBER TUB# 67
Collar elev. metres
Depth drilled. 15.0 metres

CASING DATA		HOLE DATA
Wall size	in.	Dia 4" from 0 to 15.0
Dia (inside)	in	Dia. from to
Cased from to	mtrs	Dia. from to

Cored hole ☐ Non-cored hole ☑

Sampled Interval	Type
1 metre.	ROTARY AIR.

INTERPRETATION DATA

Probe No	Standard (cps)	K factor
GPA5	490	3.15×10^{-6}

REMARKS

Fluid Level metres

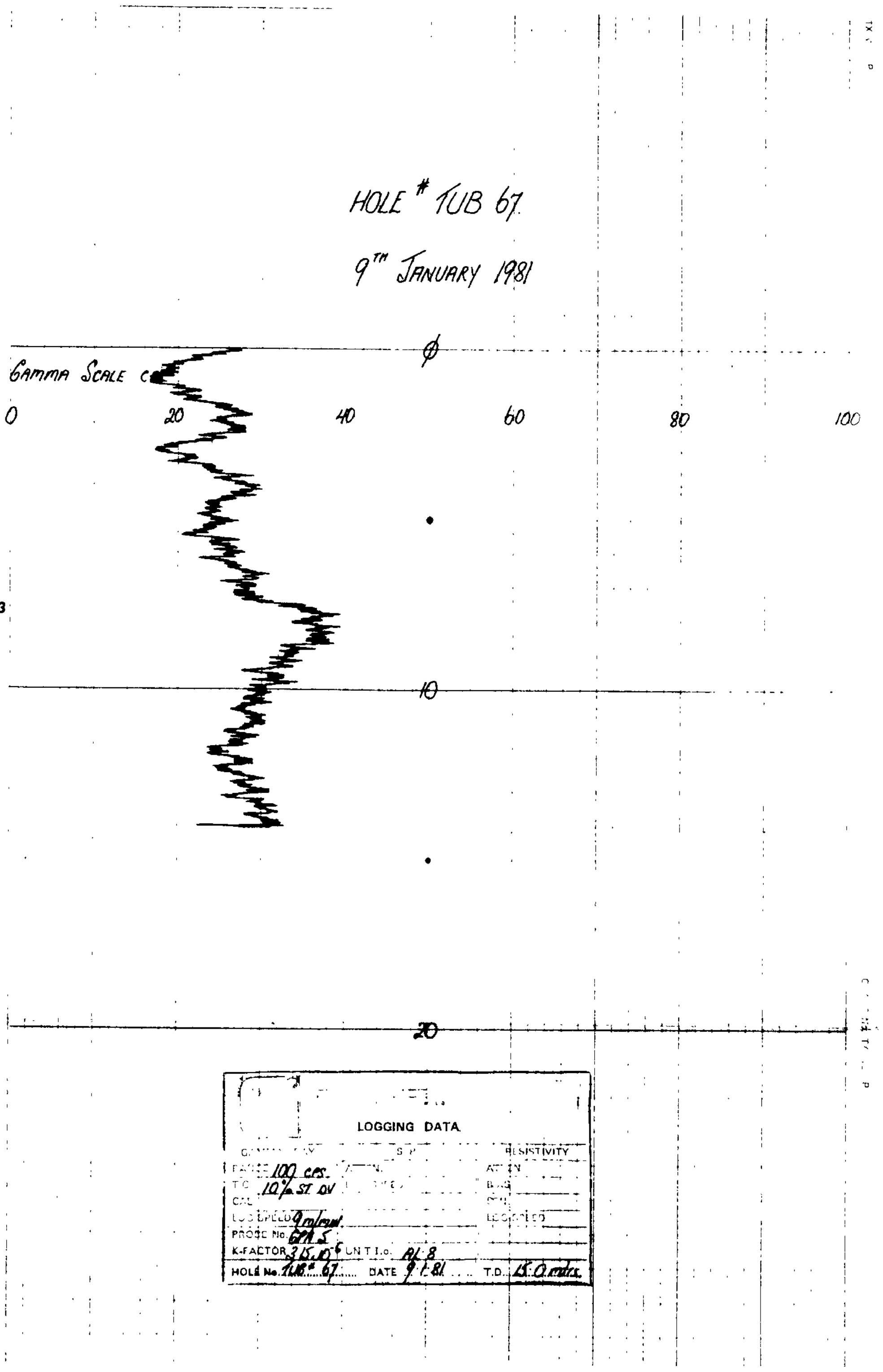
CLIENT AFMECO
Claim
Owned by
Operated by
Unit Operator BARNETT
Unit No AL-8 Office ADELAIDE

ELECTRIC

	1	2	3	4
Logged depth				
Resist scale				
S P scale				
Paper speed				
Logging speed				
Probe size				
Bias				

CALIPER

Logged depth				
Scale	in/in def			
Paper Speed				
Logging speed				
Arm Length	in			
Max Def.	in			



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Phone: 268 2868

HOLE # TUB-68

LOGGING DATA

DATE 9TH JANUARY 1981

LOCATION TUMBY BAY	HOLE NUMBER: TUB # 68	CLIENT: AEMECO	
State: SOUTH AUST.	Collar elev metres	Claim.	
Area:	Depth drilled: 23·0 metres	Owned by:	
Project:	CASING DATA / HOLE DATA	Operated by:	
Prospect.	Wall size in. / Dia. 4" from 0 to 33·0	Unit Operator: BARNETT	
Lat. ° ′ ″ Long ° ′ ″	Dia. (inside) in / Dia. from to	Unit No AL 8	Office ADELAIDE
	Cased from to mtrs / Dia. from to		
	Cored hole ☐ Non-cored hole ☑		

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft.)	29·9			
Range (Full scale)	100 cps			
Time constant (Sec.)	10% ST DV			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	27			
Probe No.	6PA-5			
Size (dia.) mm	40			
Crystal Na I	1½" × 1½"			
Standard (cps)	490			
Dead time	6			μ sec.
Amp. Gain (disc)				
Ratemeter No.				
Bore hole medium	DRY			
Mud density				
Digital readout m.	·2			
Time base (sec)	1			
Upper Disc.				
Lower Disc.				

Sampled Interval	Type
1 metre	ROTARY AIR.

INTERPRETATION DATA

Probe No.	Standard (cps)	K factor
6PA-5	490	$3{\cdot}15 \times 10^{-6}$

REMARKS

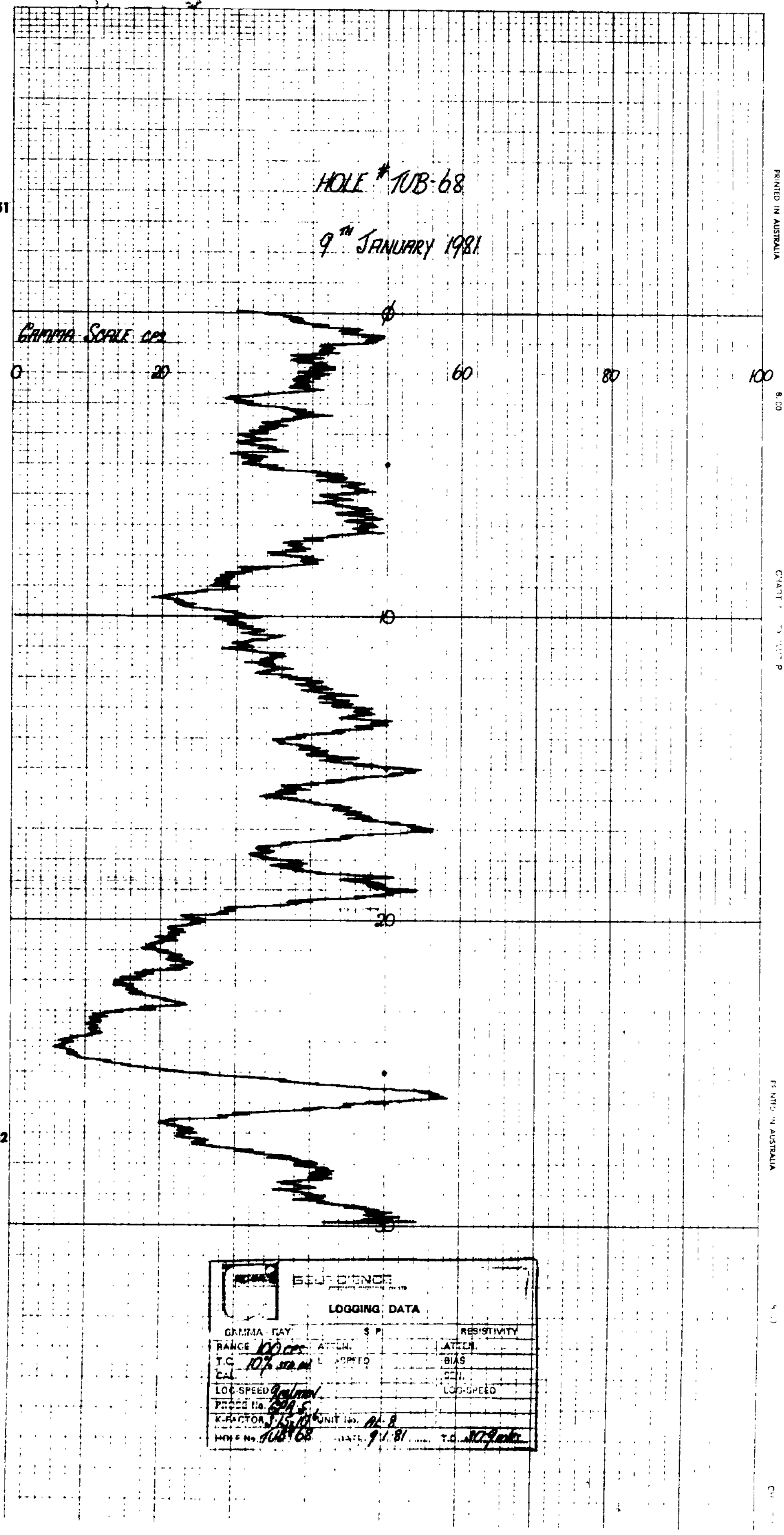
Fluid Level metres

ELECTRIC

	1	2	3	4
Logged depth				
Resist. scale Ω/div				
S.P. scale m.v.				
Paper speed cm/m				
Logging speed m/min				
Probe size				
Bias				

CALIPER

Logged depth				
Scale	in/in. def			
Paper Speed				
Logging speed				
Arm Length	in			
Max. Def.	in.			



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HOLE # TUB-69

237

LOGGING DATA

DATE 9TH JANUARY 1981.

LOCATION	[illegible] BAY				
State	SOUTH AUST.				
Area					
Project					
Prospect					
Lat ° ' "		Long ° ' "			

HOLE NUMBER	TUB # 69	
Collar elev		metres
Depth drilled	16.0	metres

CASING DATA		HOLE DATA
Wall size	in.	Dia 4" from 0 to 16.0
Dia (inside)	in	Dia. from to
Cased from to	mtrs	Dia from to
Cored hole ☐		Non-cored hole ☑

Sampled Interval	Type
1 metre	ROTARY AIR.

CLIENT	AFMECO
Claim.	
Owned by	
Operated by.	
Unit Operator	BARNETT
Unit No.	AK 8
Office	ADELAIDE

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft.)	4.8			
Range (Full scale)	100 cps			
Time constant (Sec)	10% st. dv.			
Paper speed cm/m	1			
Logging speed m/min	9.			
Bkgnd count (cps)	32			
Probe No	GPA 5.			
Size (dia) mm	40			
Crystal	NaI 1½" x 1½"			
Standard (cps)	490			
Dead time μ sec	6			
Amp. Gain (disc)				
Ratemeter No.				
Bore hole medium	DRY			
Mud density				
Digital readout m.	2			
Time base (sec)	1			
Upper Disc.				
Lower Disc.				

INTERPRETATION DATA

Probe No.	Standard (cps)	K factor
GPA 5	490	3.15×10^{-6}

REMARKS

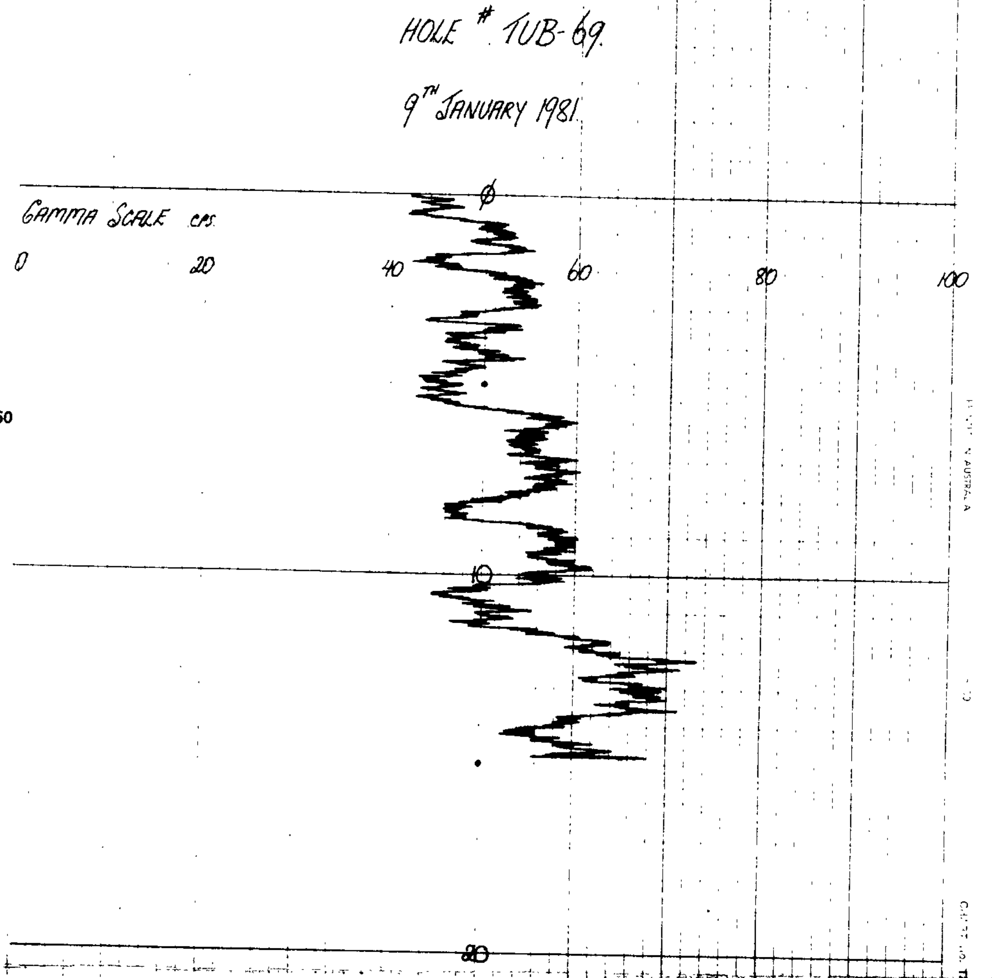
Fluid Level metres

ELECTRIC

	1	2	3	4
Logged depth				
Resist. scale Ω/div				
SP scale mv				
Paper speed cm/m				
Logging speed m/min				
Probe size				
Bias				

CALIPER

Logged depth				
Scale in/in def				
Paper Speed				
Logging speed				
Arm Length in				
Max. Def in				



GEOSCIENCE

LOGGING DATA

GAMMA RAY		S.P.	RESISTIVITY
RANGE	100 cps		
T.C.	10% st. dv.		
C.L.			
LOG SPEED	9m/min		LOG SPEED
PROBE No.	GPA 5		
K-FACTOR	3.15×10^{-6}	UNIT	AK 8.

HOLE No. TUB # 69 DATE 9.1.80 T.D. 15.8 mtrs.

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HOLE # TUB # 70

230

LOGGING DATA

DATE 8TH JANUARY 1981

LOCATION	[illegible]
State	SOUTH AUST
Area	
Project	
Prospect	
Lat °	Long ° ' "

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft)	15			
Range (Full scale)	100 cps			
Time constant (Sec)	10% st dv			
Paper speed cm m				
Logging speed m min	9			
Bkgnd count (cps)	20			
Probe No	GPA 5			
Size (dia) mm	75			
[illegible]	[illegible]			
Standard (cps)	490			
Dead time μ sec	0			
Amp Gain				
Ratemeter No				
Bore hole medium	DRY			
Mud density				
Digital readout m.	2			
Time base (sec)				
Upper Disc.				
Lower Disc.				

HOLE NUMBER	TUB # 70
Collar elev	metres
Depth drilled	170 metres

CASING DATA		HOLE DATA
Wall size	in	Dia 4" from 0 to 170
Dia (inside)	in	Dia from to
Cased from to	mtrs	Dia from to
Cored hole ☐		Non-cored hole ☑

Sampled Interval	Type
1 metre	ROTARY AIR

INTERPRETATION DATA

Probe No	Standard (cps)	K factor
GPA 5	490	3.15×10^{-6}

REMARKS

Fluid Level metres

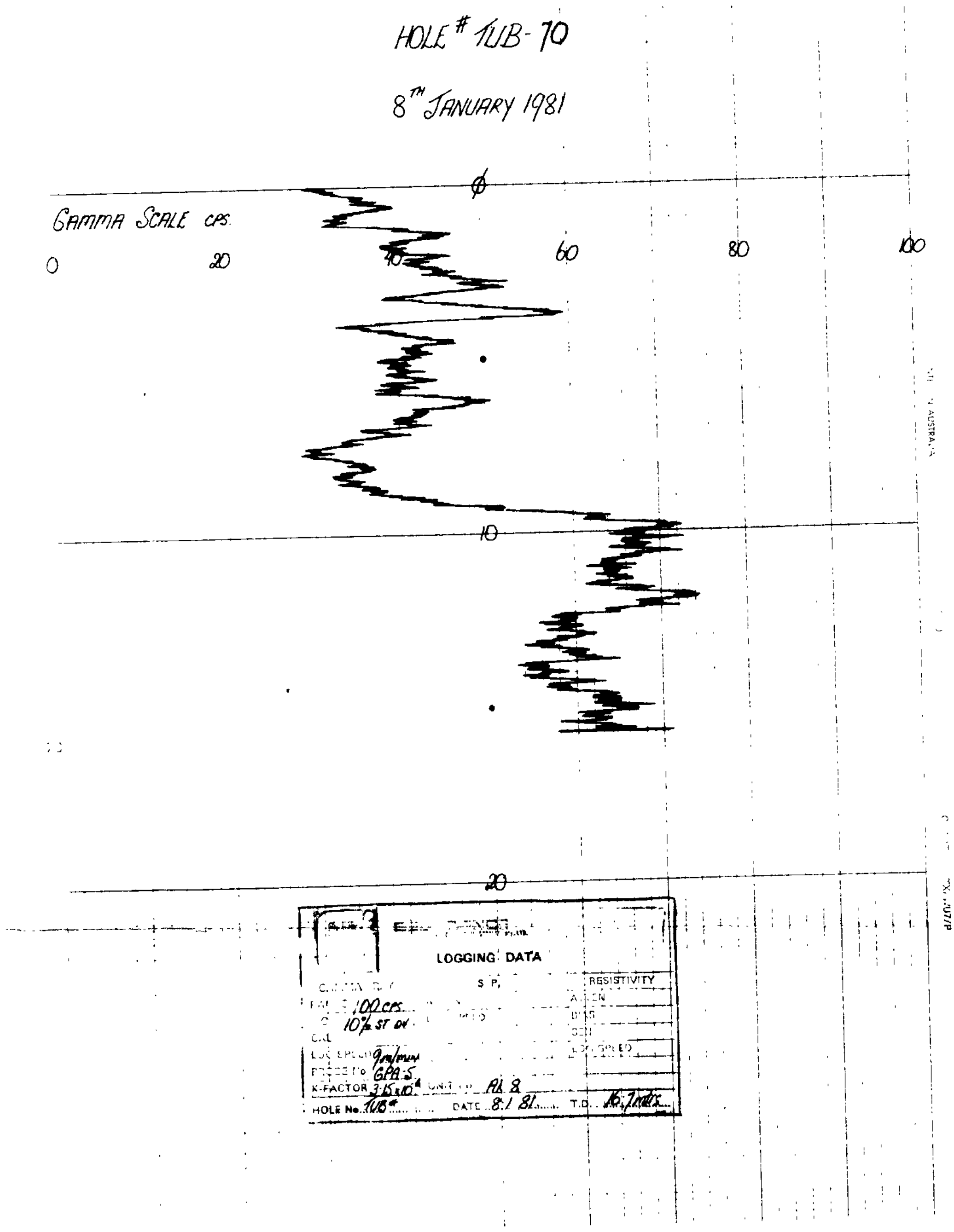
CLIENT	AFMECO
Claim	
Owned by	
Operated by	
Unit Operator	BARNETT
Unit No	AL 8
Office	ADELAIDE

ELECTRIC

	1	2	3	4
Logged depth				
Resist scale				
S.P scale				
Paper speed				
Logging speed				
Probe size				
Bias				

CALIPER

Logged depth				
Scale	in/in def			
Paper Speed				
Logging speed				
Arm Length	in			
Max Def.	in			



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HOLE # 7UB-71

LOGGING DATA

239

DATE 9TH JANUARY 1981

LOCATION	TUMBY BAY				
State	SOUTH AUST				
Area					
Project					
Prospect					
Lat ° ' "		Long ° ' "			

HOLE NUMBER	TUB# 71	
Collar elev		metres
Depth drilled	70	metres

CASING DATA		HOLE DATA	
Wall size	in.	Dia. 4" from 0 to 70	
Dia (inside)	in	Dia from to	
Cased from to	mtrs	Dia. from to	
Cored hole ☐		Non-cored hole ☑	
Sampled Interval	1 metre	Type	ROTARY AIR.

CLIENT	AEMECO
Claim	
Owned by	
Operated by	
Unit Operator	BARNETT
Unit No	AL 8
Office	ADELAIDE

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft)	56			
Range (Full scale)	100 cps			
Time constant (Sec)	10% ST DV.			
Paper speed cm/m	2			
Logging speed m/min	9			
Bkgnd count (cps)	13			
Probe No	GPA-5			
Size (dia) mm	40			
Crystal NaI	1½" x ½"			
Standard (cps)	490			
Dead time	6			µ sec.
Amp Gain (disc)				
Ratemeter No.				
Bore hole medium	DRY			
Mud density				
Digital readout m.	2			
Time base (sec)	1			
Upper Disc.				
Lower Disc.				

INTERPRETATION DATA

Probe No	Standard (cps)	K factor
GPA-5	490	3.15×10^{-6}

REMARKS

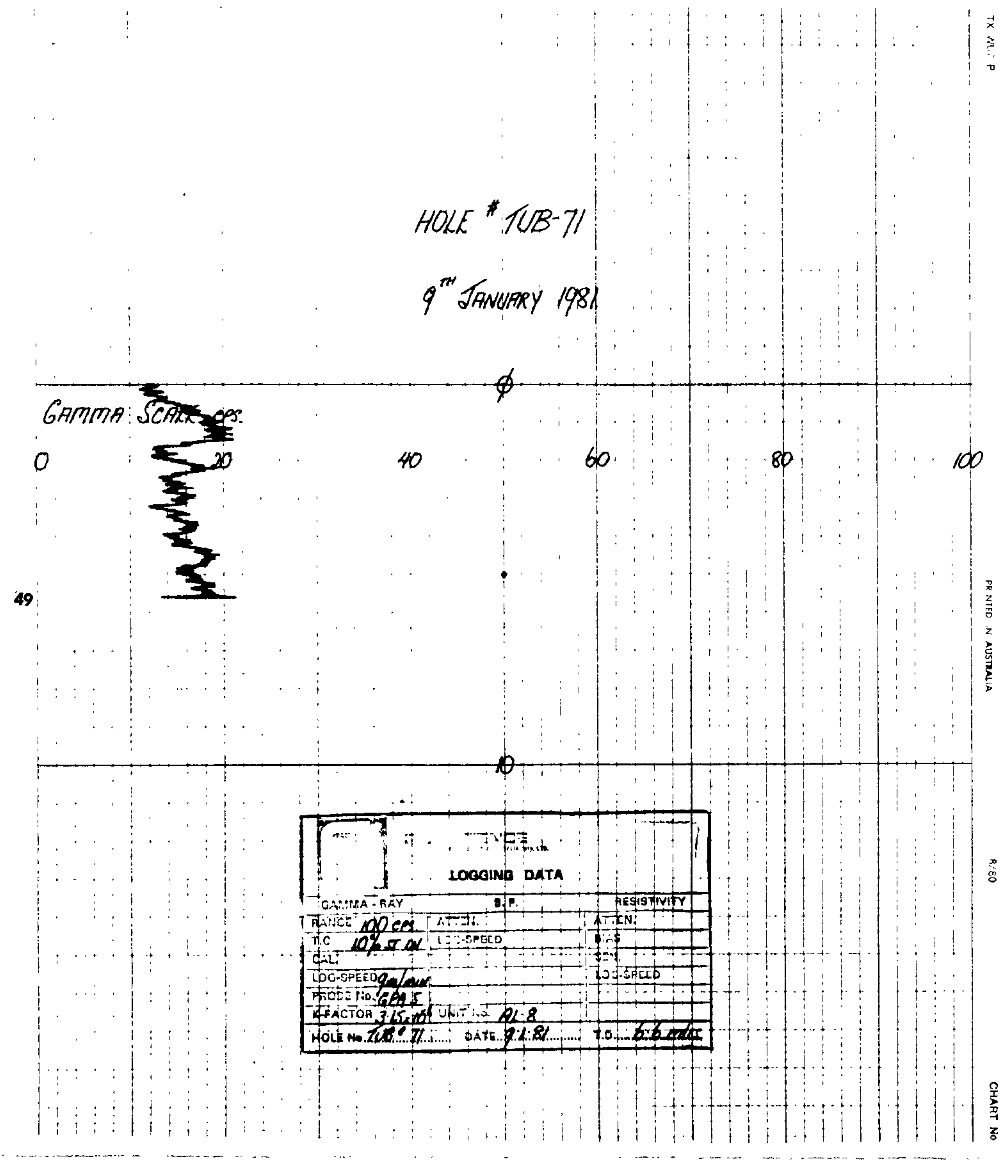
Fluid Level metres

ELECTRIC

	1	2	3	4
Logged depth				
Resist scale				
S P scale				
Paper speed				
Logging speed				
Probe size				
Bias				

CALIPER

Logged depth				
Scale in/in def				
Paper Speed				
Logging speed				
Arm Length in				
Max. Def. in				



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HOLE # TUB-72

LOGGING DATA

DATE 9TH JANUARY 1981

LOCATION	TUMBY BAY
State	SOUTH AUST
Area	
Project	
Prospect	
Lat ° ' "	Long ° ' "

HOLE NUMBER. TUB# 72	
Collar elev. metres	
Depth drilled 230 metres	
CASING DATA	HOLE DATA
Wall size in	Dia. 7" from 0 to 230
Dia. (inside) in	Dia from to
Cased from to mtrs	Dia from to
Cored hole ☐	Non-cored hole ☑

CLIENT.	AEMECO
Claim	
Owned by:	
Operated by:	
Unit Operator.	BARNETT
Unit No	GK B — Office [illegible]

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft)	215			
Range (Full scale)	100cps			
Time constant (Sec)	10% ST DV.			
Paper speed cm/m	1			
Logging speed m/min	9.			
Bkgnd count (cps)	23.			
Probe No	GPA-5			
Size (dia.) mm	40			
Crystal NaI	1½" x ½"			
Standard (cps)	490			
Dead time	6			μ sec
Amp Gain (disc)				
Ratemeter No				
Bore hole medium	DRY			
Mud density				
Digital readout m.	2			
Time base (sec)	1			
Upper Disc.				
Lower Disc.				

Sampled Interval	Type
1 metre	ROTARY AIR.

INTERPRETATION DATA

Probe No	Standard (cps)	K factor
GPA-5	490	3.65×10^{-6}

REMARKS

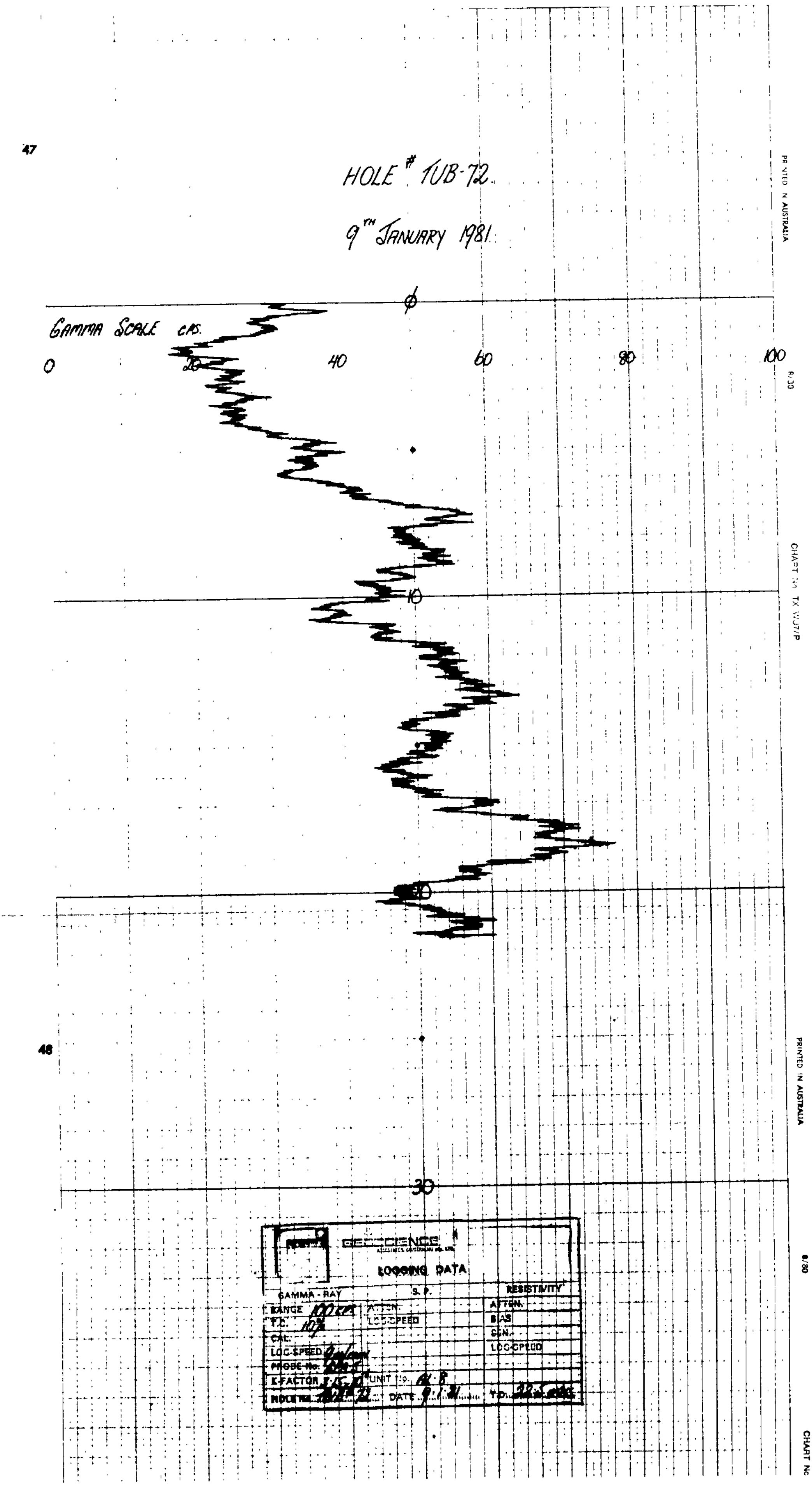
Fluid Level metres

ELECTRIC

	1	2	3	4
Logged depth				
Resist. scale Ω/div				
S P scale m.v.				
Paper speed cm/m				
Logging speed m/min				
Probe size				
Bias				

CALIPER

Logged depth				
Scale	in/in def			
Paper Speed				
Logging speed				
Arm Length	in			
Max. Def.	in			



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HOLE # TUB-73

LOGGING DATA

241

DATE 9TH JANUARY 1981

LOCATION	TUMBY BAY
State	SOUTH AUST.
Area	
Project	
Prospect	
Lat ° '	Long ° '

HOLE NUMBER	TUB # 73	
Collar elev		metres
Depth drilled	60	metres

CASING DATA		HOLE DATA	
Wall size	in	Dia 4" from 0 to 60	
Dia (inside)	in	Dia from to	
Cased from to	mtrs	Dia from to	
Cored hole ☐		Non cored hole ☑	

Sampled Interval	Type
1 metre	ROTARY AIR

CLIENT	AFMECO
Claim	
Owned by	
Operated by	
Unit Operator	BARNETT
Unit No	AL8
Office	ADELAIDE

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft)	40			
Range (Full scale)	100 CPS			
Time constant (Sec)	10% ST. DV.			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	28			
Probe No	GPA 5			
Size (dia) mm	40			
Crystal	NaI 1½" x 1½"			
Standard (cps)	490			
Dead time μ sec	0			
Amp. Gain (disc)				
Ratemeter No				
Bore hole medium	DRY			
Mud density				
Digital readout m.	2			
Time base (sec)	1			
Upper Disc.				
Lower Disc.				

INTERPRETATION DATA

Probe No.	Standard (cps)	K factor
GPA 5	490	3.15×10^{-6}

REMARKS

Fluid Level metres

ELECTRIC

	1	2	3	4
Logged depth				
Resist. scale Ω/in				
SP scale mv/in				
Paper speed cm/m				
Logging speed m/min				
Probe size				
Bias				

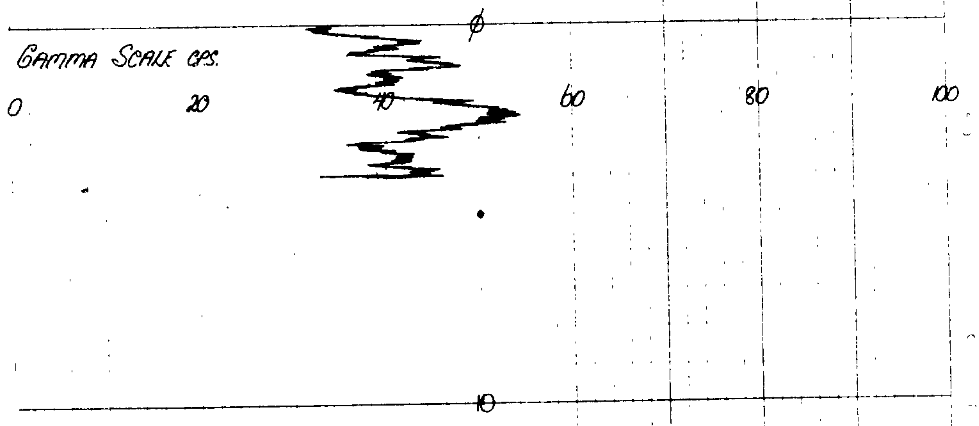
CALIPER

Logged depth				
Scale in / in def				
Paper Speed				
Logging speed				
Arm Length in				
Max Def in				

46

HOLE # TUB-73.

9TH JANUARY 1981



GEOSCIENCE LOGGING DATA

GAMMA-RAY	S.P.	RESISTIVITY
RANGE 100 CPS	ATTEN	ATTEN
T.C. 10% ST. DV.	LOG SPEED	BIAS
CAL.		SEN
LOG SPEED 9 m/min		LOG SPEED
PROBE No GPA 5		
K-FACTOR 3.15×10^{-6}	UNIT No AL8	
HOLE No. TUB # 73	DATE 9.1.81	T.O. S. Oates

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HOLE # 1UB-74

242

LOGGING DATA

DATE 9TH JANUARY 1981

LOCATION TUMBY BAY
State SOUTH AUST.
Area.
Project.
Prospect.
Lat ° ' " Long ° ' "

HOLE NUMBER: 1UB# 74
Collar elev. metres
Depth drilled. 7.0 metres

CLIENT AFMECO
Claim
Owned by.
Operated by
Unit Operator BARNETT
Unit No. AL 8 Office: ADELAIDE

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft.)	5.2			
Range (Full scale)	100 cps			
Time constant (Sec)	10% st. dv			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	40			
Probe No.	GPA-5			
Size (dia.) mm	40			
Crystal No I	1½" × ½"			
Standard (cps)	490			
Dead time	6			µ sec.
Amp. Gain (disc)				
Ratemeter No.				
Bore hole medium	DRY			
Mud density				
Digital readout m.	.2			
Time base (sec)	1			
Upper Disc.				
Lower Disc.				

CASING DATA / HOLE DATA

CASING DATA		HOLE DATA		
Wall size	in.	Dia 4"	from 0	to 7.0
Dia. (inside)	in.	Dia.	from	to
Cased from to	mtrs	Dia	from	to

Cored hole ☐ Non-cored hole ☑

Sampled Interval	Type
1 metre	ROTARY AIR.

INTERPRETATION DATA

Probe No.	Standard (cps)	K factor
GPA-5	490	3.15×10^{-6}

REMARKS

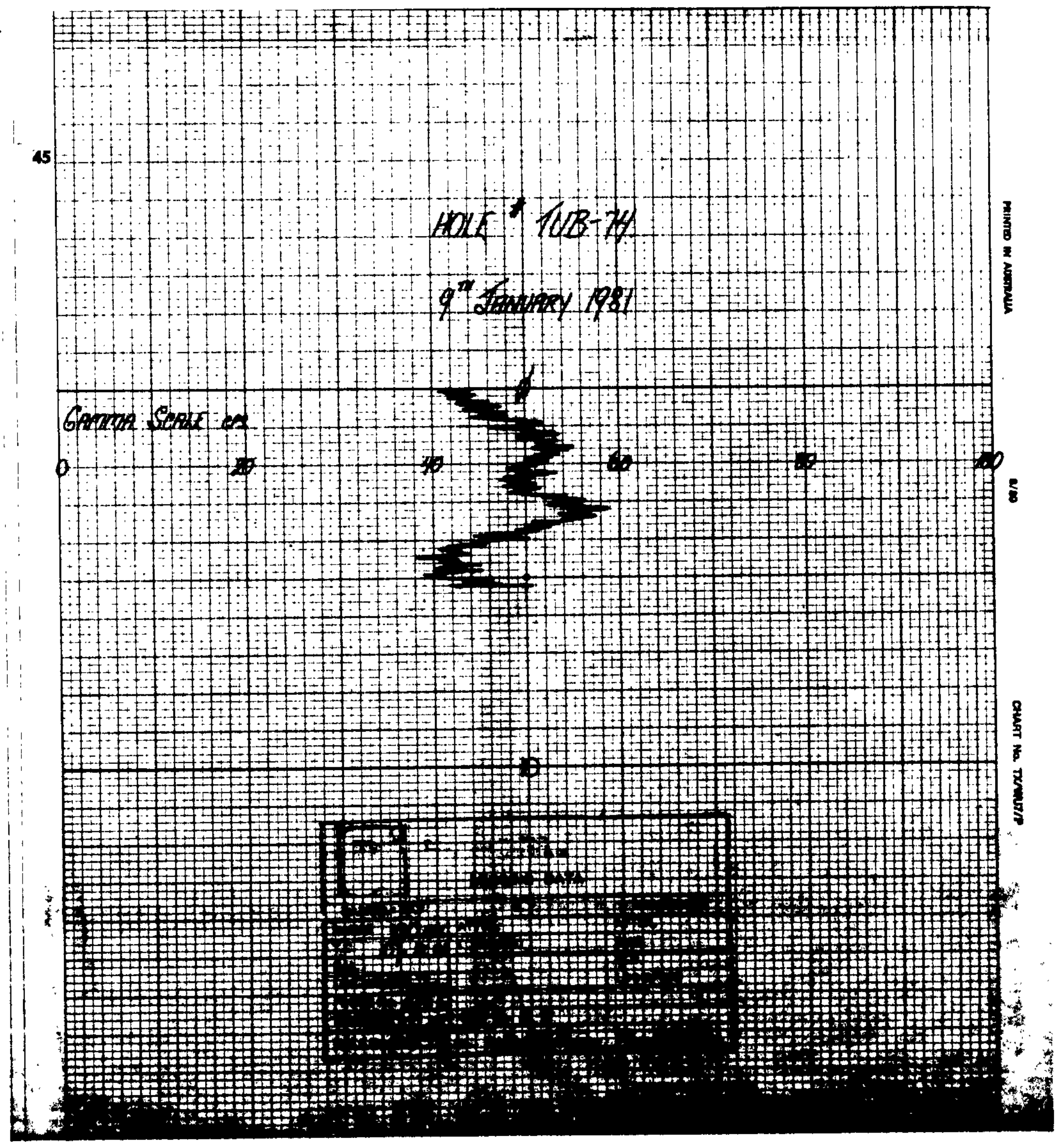
Fluid Level metres

ELECTRIC

	1	2	3	4
Logged depth				
Resist. scale Ω/div				
S.P. scale mv.				
Paper speed cm/m				
Logging speed m/min				
Probe size				
Bias				

CALIPER

Logged depth				
Scale	in/in def			
Paper Speed				
Logging speed				
Arm Length	in			
Max. Def.	in.			



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HOLE # TUB-75

LOGGING DATA

DATE 9TH JANUARY 1981

LOCATION TUMBY BAY	HOLE NUMBER TUB# 75		CLIENT AFMECO
State SOUTH AUST	Collar elev. metres		Claim
Area	Depth drilled 23·0 metres		Owned by
Project	CASING DATA	HOLE DATA	Operated by
Prospect	Wall size in.	Dia. 4" from 0 to 23·0	Unit Operator BARNETT
Lat ° ′ ″ / Long ° ′ ″	Dia (inside) in	Dia from to	Unit No AL 8 / Office ADELAIDE
	Cased from to mtrs	Dia. from to	
	Cored hole ☐	Non-cored hole ☒	

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft)	18·4			
Range (Full scale)	200 cps			
Time constant (Sec)	10% ST DV.			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	48			
Probe No	GPA·5			
Size (dia.) mm	40			
Crystal NaI	1½" x ½"			
Standard (cps)	490			
Dead time	6			µ sec.
Amp. Gain (disc)				
Ratemeter No.				
Bore hole medium	DRY			
Mud density				
Digital readout m.	·2			
Time base (sec)	1			
Upper Disc.				
Lower Disc.				

Sampled Interval	Type
1 metre	ROTARY AIR

INTERPRETATION DATA

Probe No.	Standard (cps)	K factor
GPA·5	490	3·65x10⁻⁶

REMARKS

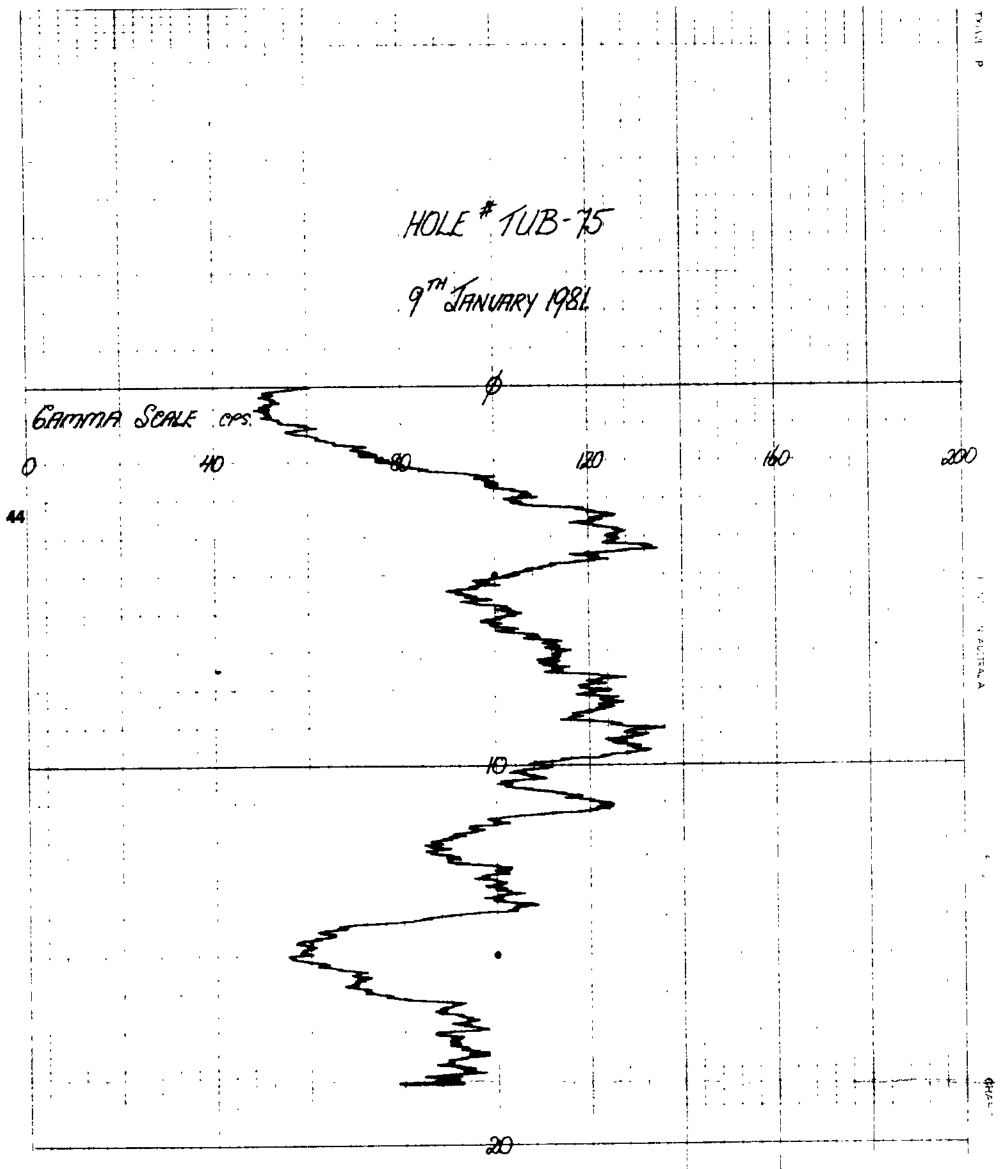
Fluid Level metres

ELECTRIC

	1	2	3	4
Logged depth				
Resist. scale ohm				
S P scale m.v.				
Paper speed cm/m				
Logging speed m/min				
Probe size				
Bias				

CALIPER

Logged depth				
Scale	in/in def			
Paper Speed				
Logging speed				
Arm Length	in			
Max Def.	in			



GEOSCIENCE
LOGGING DATA

GAMMA RAY	S P	RESISTIVITY
RANGE 200 cps		ATTEN
T.C. 10% ST DV.	LOG SPEED	BIAS
CAL		LOG SPEED
LOG SPEED 9m/min		
PROBE No GPA·5		
K-FACTOR 3·65x10⁻⁶	UNIT No AL 8	
HOLE No. TUB# 75	DATE 9.1.81	T.D. 19.4 mtrs

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HOLE # TUB-76

244

LOGGING DATA

DATE 9TH JANUARY 1981

LOCATION TUMBY BAY
State SOUTH AUST
Area
Project
Prospect
Lat ° ' " Long ° ' "

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft)	21·8			
Range (Full scale)	200 cps.			
Time constant (Sec)	10, 0 ST. DV			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	53			
Probe No	GPA 5			
Size (dia) mm	40			
Crystal NaI	1½" x 1½"			
Standard (cps)	490			
Dead time	6			μ sec.
Amp. Gain (disc)				
Ratemeter No.				
Bore hole medium	H_2O			
Mud density				
Digital readout m.	·2			
Time base (sec)	1			
Upper Disc.				
Lower Disc.				

HOLE NUMBER TUB # 76
Collar elev. metres
Depth drilled 23·0 metres

CASING DATA	HOLE DATA
Wall size in.	Dia. 4" from 0 to 23·0
Dia (inside) in	Dia from to
Cased from to mtrs	Dia from to
Cored hole ☐	Non-cored hole ☑

Sampled Interval	Type
1 metre	ROTARY AIR

INTERPRETATION DATA

Probe No	Standard (cps)	K factor
GPA 5	490	$3{\cdot}15 \times 10^{-6}$

REMARKS

Fluid Level − 15·0 metres metres

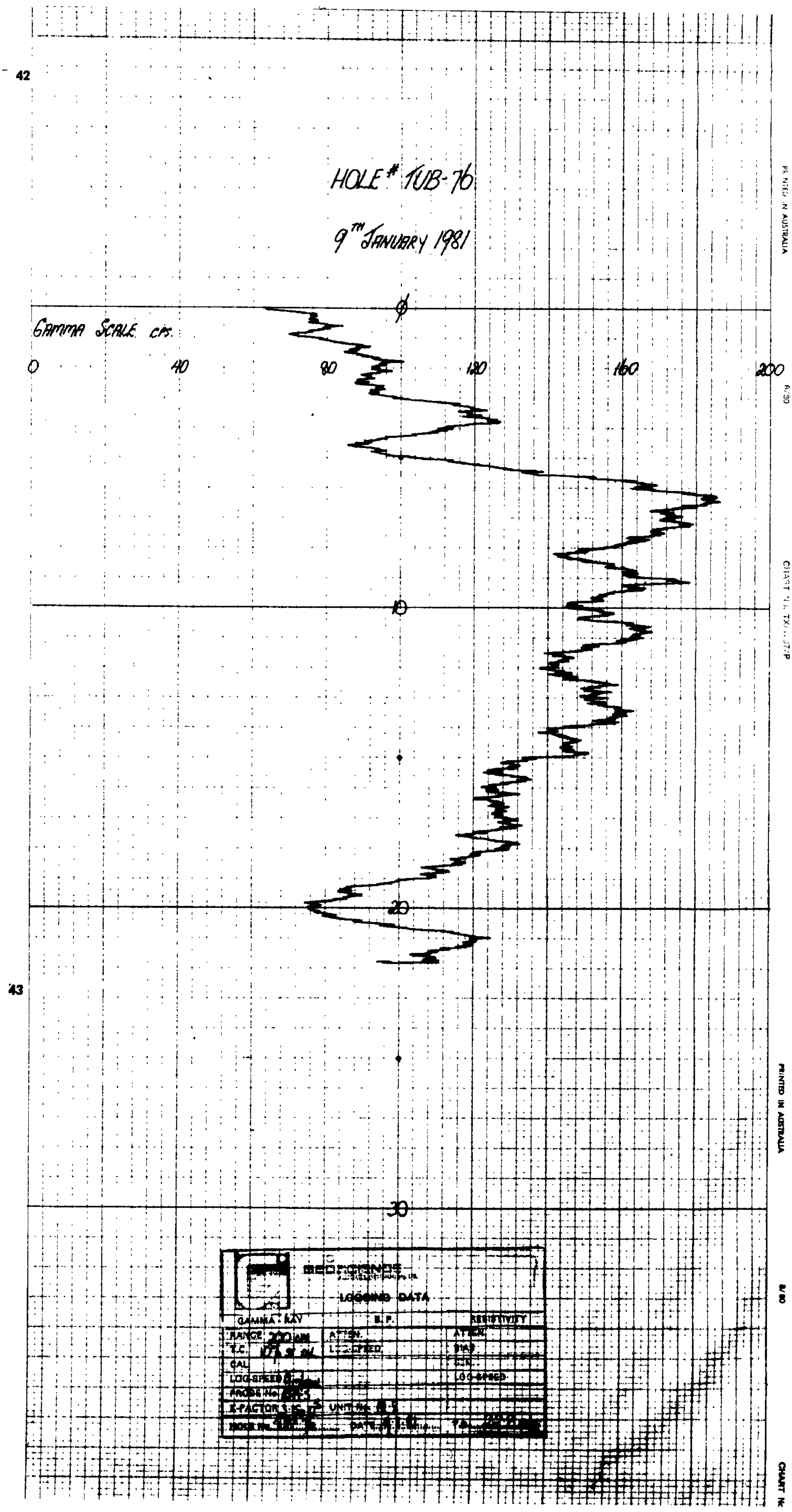
CLIENT AEMECO
Claim
Owned by
Operated by
Unit Operator BARNETT
Unit No. AL 8 Office ADELAIDE

ELECTRIC

	1	2	3	4
Logged depth				
Resist. scale Ω/div				
SP scale m.v.				
Paper speed cm/min				
Logging speed m/min				
Probe size				
Bias				

CALIPER

Logged depth				
Scale	in/in. def			
Paper Speed				
Logging speed				
Arm Length	in			
Max. Def.	in			



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HOLE # 1UB-77

LOGGING DATA

DATE 9TH JANUARY 1981.

LOCATION	1UMBY BAY				
State	SOUTH AUST.				
Area					
Project					
Prospect					
Lat ° ' "		Long ° ' "			

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft)	20.9			
Range (Full scale)	500 CPS			
Time constant (sec)	3" e ST. DV.			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	47			
Probe No	GPA-5			
Size (dia) mm	40			
Crystal NaI	1½" x 1½"			
Standard (cps)	490			
Dead time	6			μ sec
Amp Gain (disc)				
Ratemeter No				
Bore hole medium	DRY			
Mud density				
Digital readout m.	.2			
Time base (sec)	1			
Upper Disc.				
Lower Disc.				

HOLE NUMBER: 1UB# 77

Collar elev			metres
Depth drilled	25.0		metres
CASING DATA		**HOLE DATA**	
Wall size	in	Dia. 4" from 0 to 25 metres	
Dia (inside)	in	Dia from to	
Cased from to	mtrs	Dia from to	
Cored hole ☐		Non-cored hole ☑	
Sampled Interval		Type	
1 metres		ROTARY AIR	

INTERPRETATION DATA

Probe No.	Standard (cps)	K factor
GPA-5	490	3.15×10^{-6}

REMARKS

Fluid Level metres

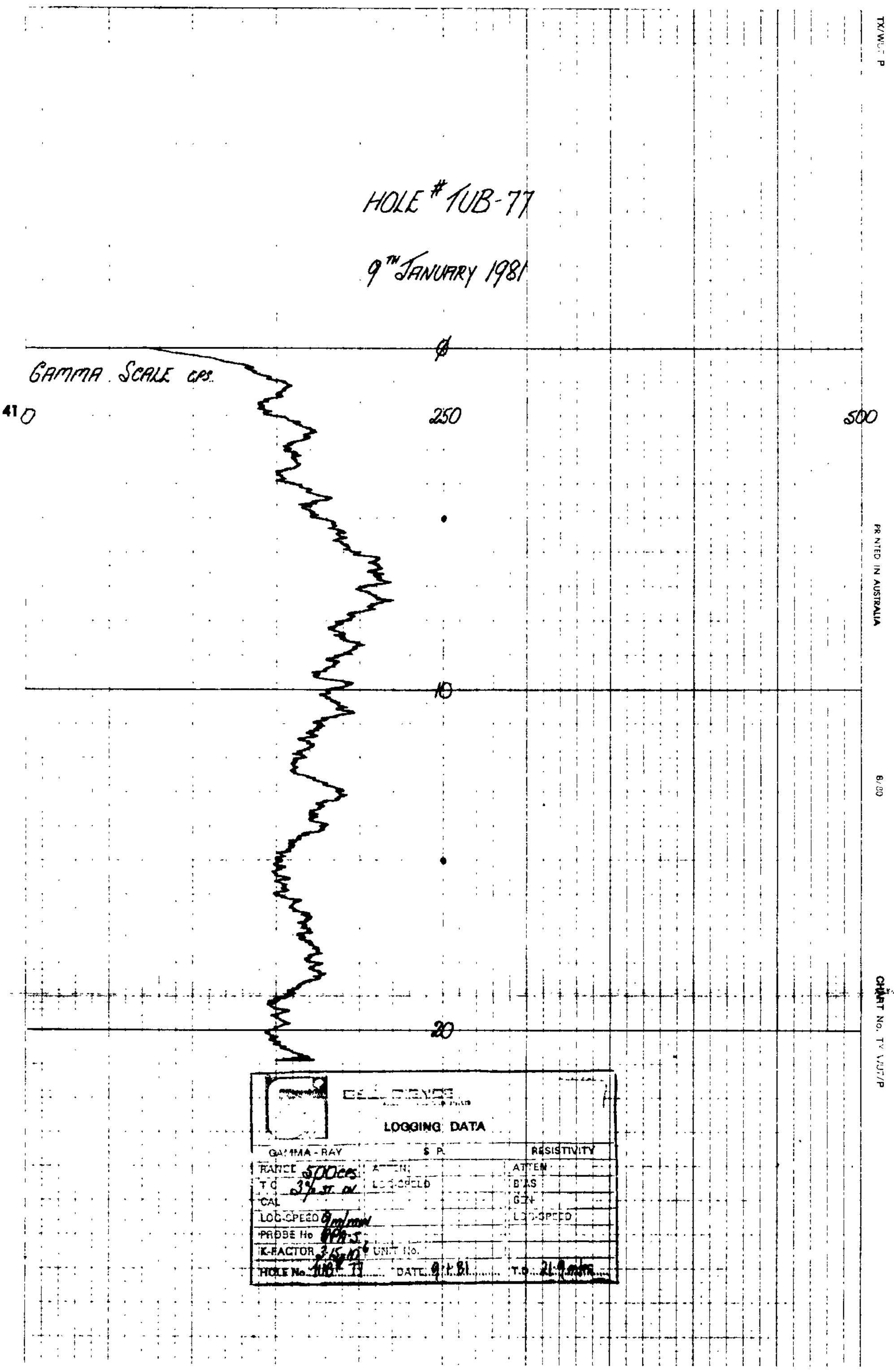
CLIENT	AEMECO		
Claim			
Owned by.			
Operated by.			
Unit Operator.	BARNETT		
Unit No	AL 8	Office.	ADELAIDE

ELECTRIC

	1	2	3	4
Logged depth				
Resist. scale Ω/div				
S.P. scale mv				
Paper speed cm/m				
Logging speed m/min				
Probe size				
Bias				

CALIPER

Logged depth				
Scale	in/in def			
Paper Speed				
Logging speed				
Arm Length	in			
Max. Def.	in			



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HOLE # TUB-78

LOGGING DATA

DATE 9TH January 1981.

LOCATION	TUMBY BAY.	HOLE NUMBER	TUB # 78
State	SOUTH AUST.	Collar elev	metres
Area		Depth drilled	140 metres
Project		CASING DATA / HOLE DATA	
Prospect		Wall size in	Dia 4" from 0 to 140
Lat ° ' "	Long ° ' "	Dia (inside) in	Dia from to
		Cased from to mtrs	Dia from to
		Cored hole ☐	Non-cored hole ☑

CLIENT	AFMECO		
Claim			
Owned by			
Operated by			
Unit Operator	BARNETT		
Unit No.	AL 8	Office	ADELAIDE

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft)	12·8			
Range (Full scale)	200 cps.			
Time constant (Sec)	10% ST. DV.			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	68			
Probe No.	GPA-5			
Size (dia) mm	40			
Crystal Na I	1½" x ½"			
Standard (cps)	490			
Dead time	6			μ sec.
Amp Gain (disc)				
Ratemeter No.				
Bore hole medium	DRY			
Mud density				
Digital readout m.	·2			
Time base (sec)	1			
Upper Disc.				
Lower Disc.				

Sampled Interval	Type
1 metre	ROTARY AIR.

INTERPRETATION DATA

Probe No.	Standard (cps)	K factor
GPA-5	490	3.15×10^{-6}

REMARKS

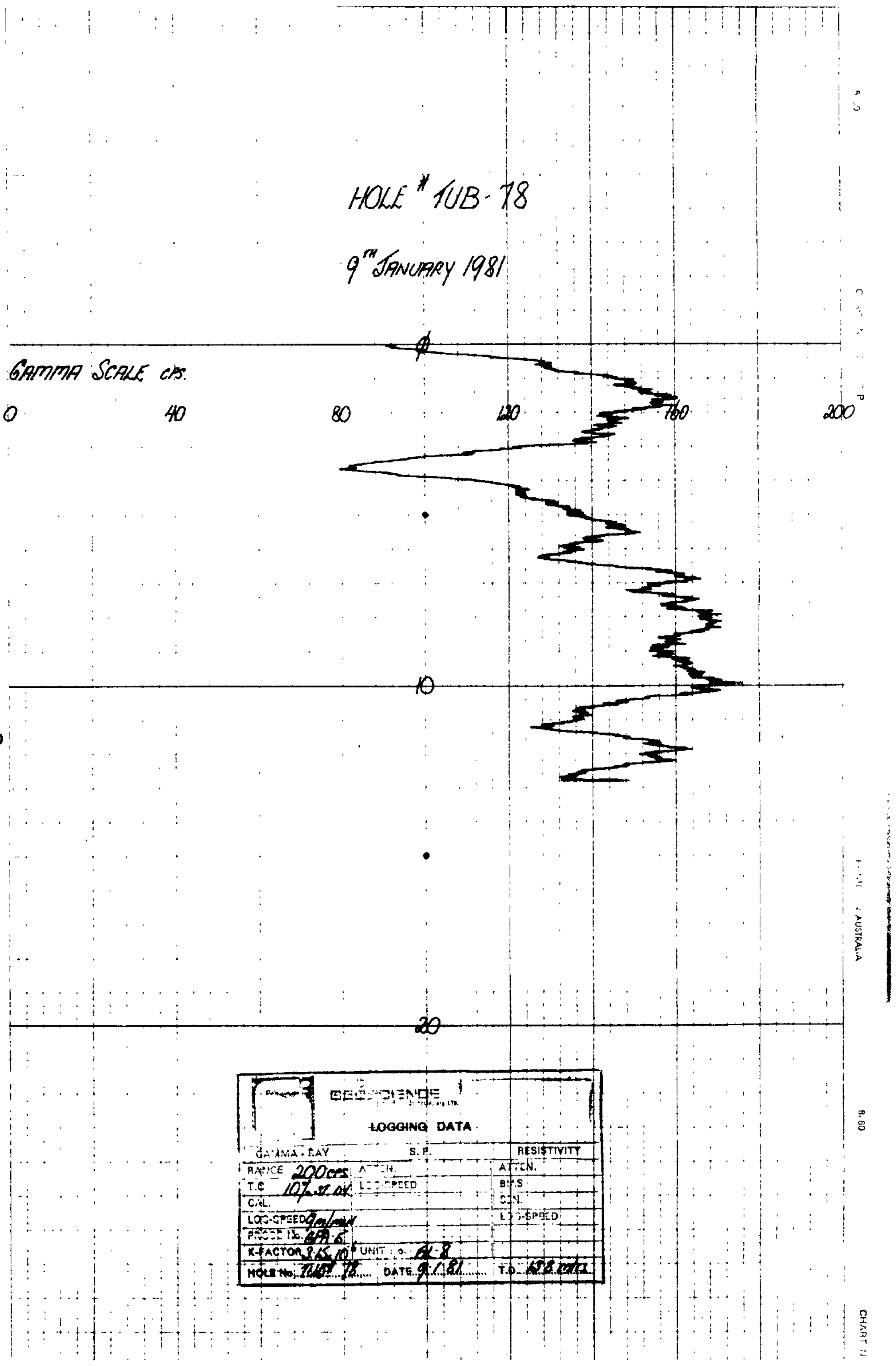
Fluid Level metres

ELECTRIC

	1	2	3	4
Logged depth				
Resist. scale Ω/div				
S P scale mV				
Paper speed cm/m				
Logging speed m/min				
Probe size				
Bias				

CALIPER

Logged depth				
Scale	in/in def			
Paper Speed				
Logging speed				
Arm Length	in			
Max Def.	in			



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HOLE # TUB 79

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LOGGING DATA

DATE 9th January 1981

LOCATION	Tumby Bay			
State	South Aust			
Area				
Project				
Prospect				
Lat ° ' "		Long ° ' "		
GAMMA RAY				
	INITIAL RUN	2	3	4
Logged depth (ft)	20.3			
Range (Full scale)	200 CPS			
Time constant (Sec)	10% ST. DV			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	61			
Probe No	GPA-5			
Size (dia) mm	40			
Crystal NaI	1½" × 1½"			
Standard (cps)	495			
Dead time	6			μ sec.
Amp Gain (disc)				
Ratemeter No				
Bore hole medium	DRY			
Mud density				
Digital readout m.	2			
Time base (sec)	1			
Upper Disc.				
Lower Disc.				

HOLE NUMBER	TUB # 79		
Collar elev			metres
Depth drilled	23.0		metres
CASING DATA		**HOLE DATA**	
Wall size	in	Dia. 4" from 0 to 23.0	
Dia (inside)	in	Dia. from to	
Cased from to	mtrs	Dia from to	
Cored hole ☐		Non-cored hole ☑	
Sampled Interval		Type	
1 metre		Rotary Air	

INTERPRETATION DATA

Probe No	Standard (cps)	K factor
GPA 5	495	3.15×10^{-6}

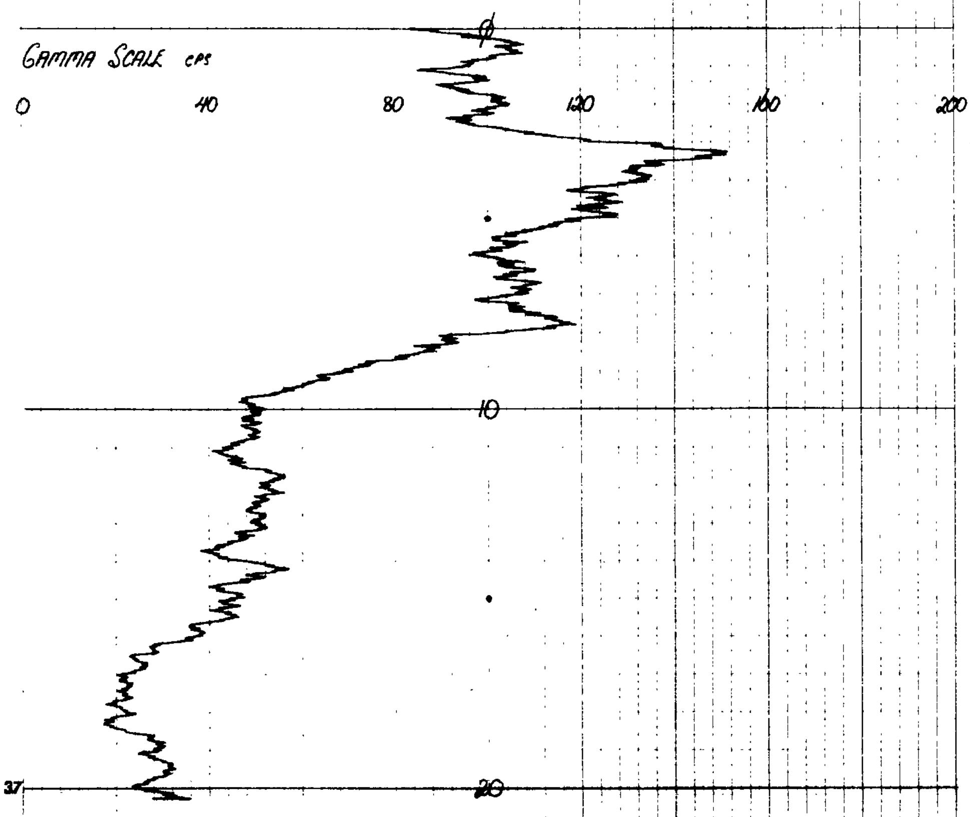
REMARKS

Fluid Level metres

CLIENT	AEMECO			
Claim				
Owned by				
Operated by.				
Unit Operator	Barnett			
Unit No	AL 8	Office	Adelaide	
ELECTRIC				
	1	2	3	4
Logged depth				
Resist. scale Ω/div				
S.P scale m.v.				
Paper speed cm/m				
Logging speed m/min				
Probe size				
Bias				
CALIPER				
Logged depth				
Scale	in/in def			
Paper Speed				
Logging speed				
Arm Length	in			
Max Def.	in			

HOLE # TUB-79

9th January 1981



LOGGING DATA

GAMMA-RAY	S.P.	RESISTIVITY
RANGE 200 CPS.	ATTEN.	ATTEN
T.C. 10% ST. DV	LOG SPEED	BIAS
CAL		CEN.
LOG SPEED 9m/min		LOG SPEED
PROBE No. GPA5		
K-FACTOR 3.15×10^{-6}	UNIT No. AL 8	
HOLE No. TUB # 79	DATE 10.1.81	T.D. 21.3 mtrs.

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LOGGING DATA

GAMMA-RAY	S.P.	RESISTIVITY
RANGE 200 CPS	ATTEN.	ATTEN.
T.C. 10% ST. DV	LOG SPEED	BIAS
CAL		CEN.
LOG-SPEED 9m/min		LOG-SPEED
PROBE No. GPA5		
K-FACTOR 3.15×10^{-6}	UNIT No. AL 8	
HOLE No. TUB # 79	DATE 10.1.81	T.D. 21.3

CHART No

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HOLE # 1UB-80

LOGGING DATA

DATE 10th January 1981

LOCATION Lumbs Bay	HOLE NUMBER 1UB # 80	CLIENT
State South Aust	Collar elev. metres	Claim
Area	Depth drilled 170 metres	Owned by
Project	CASING DATA / HOLE DATA	Operated by
Prospect	Wall size in / Dia 4" from 0 to 170	Unit Operator
Lat ° ' " Long ° ' "	Dia (inside) in / Dia from to	Unit No PK 8 Office
	Cased from to mtrs / Dia from to	
	Cored hole ☐ / Non-cored hole ☑	

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft)	43			
Range (Full scale)	100 cps			
Time constant (Sec)	10% st. dv.			
Paper speed cm/m	2			
Logging speed m/min	9			
Bkgnd count (cps)	40			
Probe No	GPA 5			
Size (dia) mm	40			
Crystal	NaI 1½"x2"			
Standard (cps)	495			
Dead time μ sec	2			
Amp Gain (disc)				
Ratemeter No				
Bore hole medium	DRY			
Mud density				
Digital readout m.				
Time base (sec)				
Upper Disc.				
Lower Disc.				

Sampled Interval	Type
2 metre	Rotary Air

INTERPRETATION DATA

Probe No	Standard (cps)	K factor
GPA 5	495	3.15x10⁻⁶

REMARKS

Fluid Level metres

ELECTRIC

	1	2	3	4
Logged depth				
Resist scale				
S P scale				
Paper speed				
Logging speed				
Probe size				
Bias				

CALIPER

Logged depth				
Scale in/in def				
Paper Speed				
Logging speed				
Arm Length in				
Max Def. in				

HOLE # 1UB-80

10th January 1981

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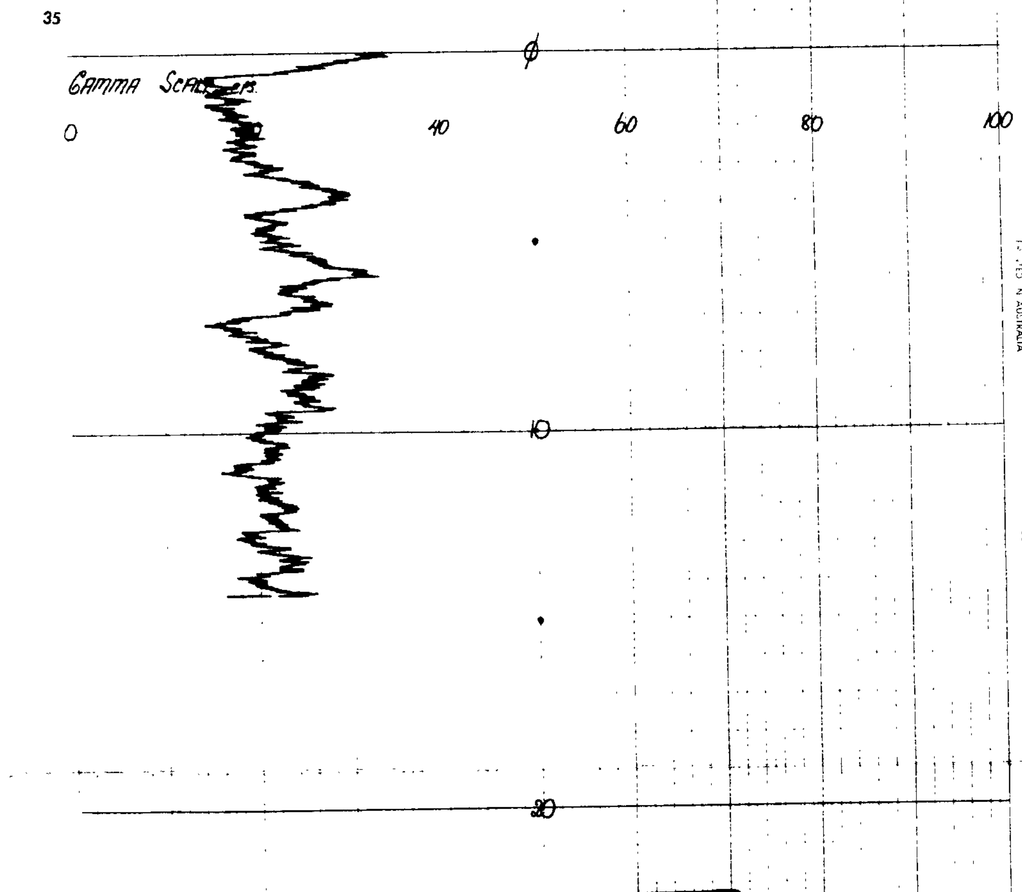

LOGGING DATA

GAMMA-RAY	S P	RESISTIVITY
RANGE 100CPS		ATTEN.
T C 10% ST DV		B.S
CAL.		
LOG-SPEED 9m/min		LOG-SPEED
PROBE No. GPA 5		
K-FACTOR 3.15x10⁻⁶	UNIT NO. PK 8	
HOLE No. 1UB # 80	DATE 10.1.81	T.D. 15.3 mtrs

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HOLE # TUB # 81

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LOGGING DATA

DATE 10TH JANUARY 1981

LOCATION Tumby Bay	HOLE NUMBER TUB # 81	CLIENT AFMECO	
State SOUTH AUST	Collar elev metres	Claim	
Area	Depth drilled 10.0 metres	Owned by	
Project	CASING DATA / HOLE DATA	Operated by	
Prospect	Wall size in / Dia. 4" from 0 to 10.0	Unit Operator BARNETT	
Lat ° ' " / Long ° ' "	Dia (inside) in / Dia from to	Unit No AL 8	Office ADELAIDE

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft)	8			
Range (Full scale)	200 cps			
Time constant (Sec)	10 sec			
Paper speed cm/m	4			
Logging speed m/min	9			
Bkgnd count (cps)	9			
Probe No	GPS5			
Size (dia.) mm	42			
Crystal				
Standard (cps)	495			
Dead time µ sec.	6			
Amp. Gain (disc)				
Ratemeter No				
Bore hole medium	DRY			
Mud density				
Digital readout m.				
Time base (sec)				
Upper Disc.				
Lower Disc.				

Cased from to mtrs / Dia from to

Cored hole ☐ Non-cored hole ☑

Sampled Interval	Type
metre	ROTARY AIR.

INTERPRETATION DATA

Probe No.	Standard (cps)	K factor
GPS 5	495	3.15×10^{-6}

REMARKS

Fluid Level metres

ELECTRIC

	1	2	3	4
Logged depth				
Resist scale				
S P scale				
Paper speed				
Logging speed				
Probe size				
Bias				

CALIPER

Logged depth				
Scale in/in def				
Paper Speed				
Logging speed				
Arm Length in				
Max Def. in				

HOLE # TUB 81.

10TH JANUARY 1981

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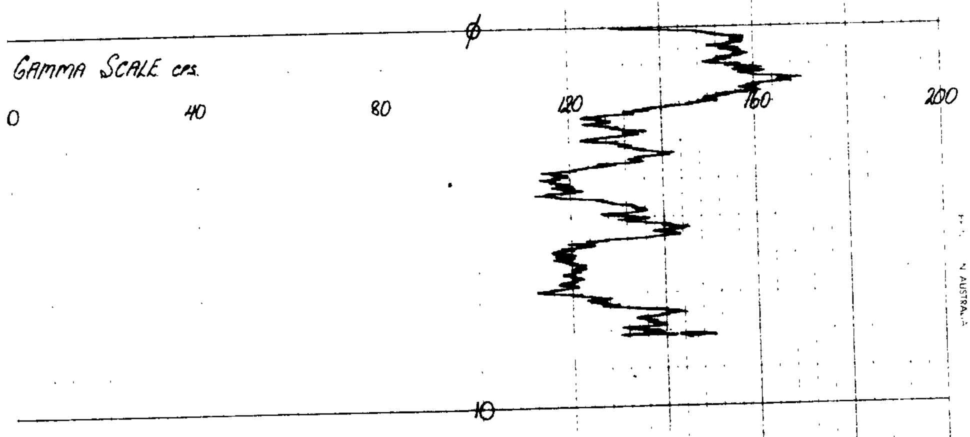

LOGGING DATA

GAMMA - RAY	S.P.	RESISTIVITY
RANGE 200 cps		ATTEN.
T.C. 10 sec		
CAL.		
LOG-SPEED 9 m/min		LOG-SPEED
PROBE No. GPS 5		
K-FACTOR 3.15×10^{-6}	UNIT AL 8	
HOLE No. TUB # 81	DATE 10.1.81	T.D. 9.1 mtrs.

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HOLE # 1UB-82

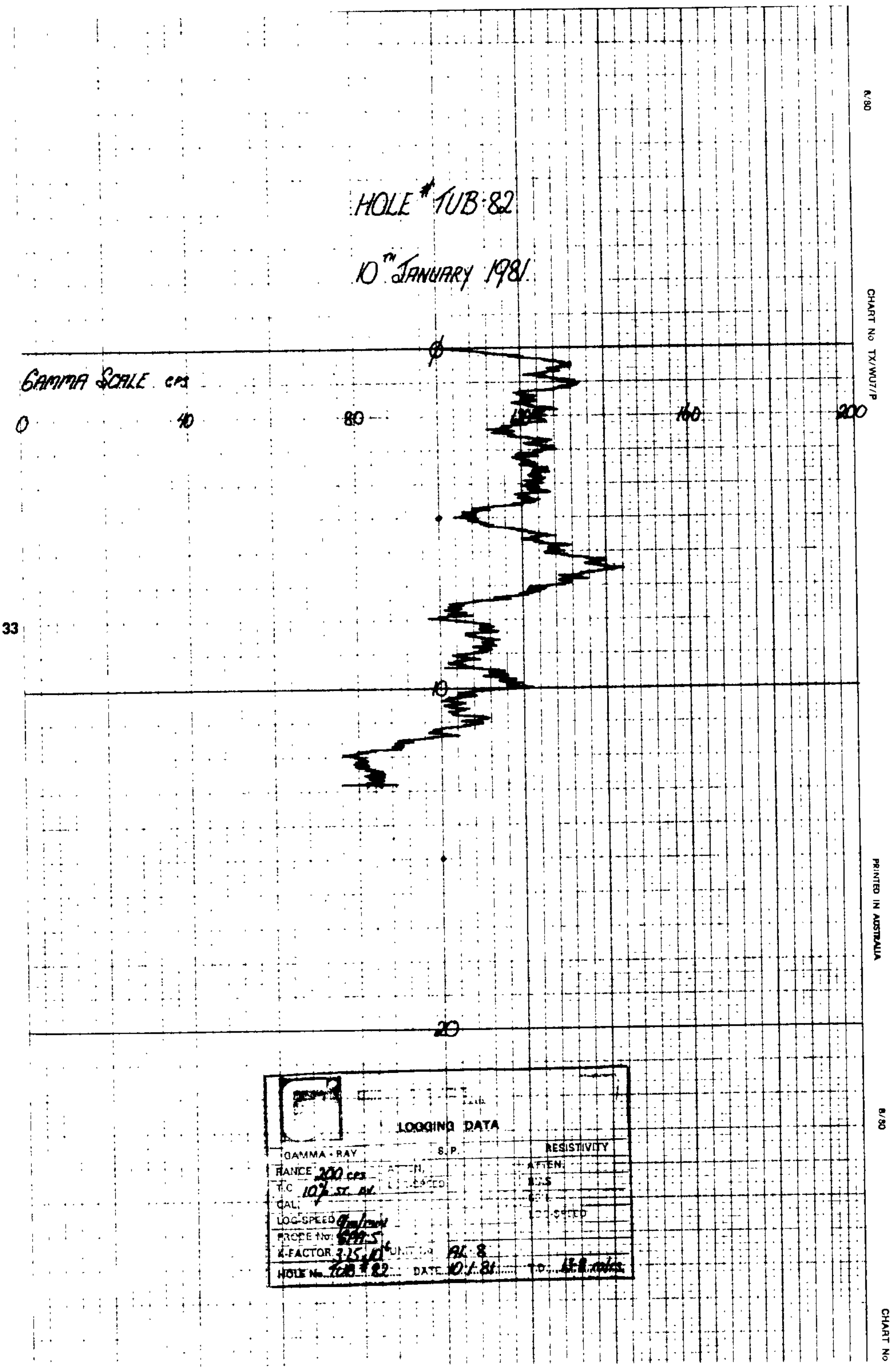
LOGGING DATA

DATE 10th JANUARY 1981

LOCATION TUMBY BAY				
State SOUTH AUST.				
Area				
Project				
Prospect				
Lat ° ' "	Long ° ' "			
GAMMA RAY				
	INITIAL RUN	2	3	4
Logged depth (ft)	128			
Range (Full scale)	200 cps.			
Time constant (Sec)	10% st. dev			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	68			
Probe No	GPA 5			
Size (dia) mm	40			
Crystal NaI	1½ x ½"			
Standard (cps)	495			
Dead time	6			μ sec.
Amp. Gain (disc)				
Ratemeter No				
Bore hole medium	DRY			
Mud density				
Digital readout m.	.2			
Time base (sec)	1			
Upper Disc.				
Lower Disc.				

HOLE NUMBER 1UB # 82		
Collar elev		metres
Depth drilled 150		metres
CASING DATA	**HOLE DATA**	
Wall size in	Dia. 4" from 0 to 150	
Dia (inside) in	Dia from to	
Cased from to mtrs	Dia from to	
Cored hole ☐	Non-cored hole ☑	
Sampled Interval	Type	
1 metre	ROTARY AIR	
INTERPRETATION DATA		
Probe No	Standard (cps)	K factor
GPA 5	495	3.15×10^{-6}
REMARKS		
Fluid Level		metres

CLIENT AFMECO				
Claim.				
Owned by				
Operated by				
Unit Operator BARNETT				
Unit No AL 8	Office ADELAIDE			
ELECTRIC				
	1	2	3	4
Logged depth				
Resist scale Ω/div				
SP scale m.v.				
Paper speed cm				
Logging speed m/min				
Probe size				
Bias				
CALIPER				
Logged depth				
Scale in/in def				
Paper Speed				
Logging speed				
Arm Length in				
Max. Def. in				



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Phone: 268 2988

HOLE # TUB-83

LOGGING DATA

DATE 10th JANUARY 1981

LOCATION TUMBY BAY	HOLE NUMBER TUB # 83	CLIENT AEMECO
State SOUTH AUST	Collar elev metres	Claim
Area:	Depth drilled 15.0 metres	Owned by:
Project	CASING DATA / HOLE DATA	Operated by
Prospect	Wall size in. / Dia. 4" from 0 to 15.0	Unit Operator BARNETT
Lat. ° ' " Long ° ' "	Dia. (inside) in / Dia from to	Unit No AL 8 Office ADELAIDE

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft.)	13.5			
Range (Full scale)	200 cps			
Time constant (Sec)	10% ST DV			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	57			
Probe No.	GPA-5			
Size (dia.) mm	40			
Crystal NaI	1½" x ½"			
Standard (cps)	495			
Dead time	6			μ sec.
Amp Gain (disc)				
Ratemeter No.				
Bore hole medium	DRY			
Mud density				
Digital readout m.	2			
Time base (sec)	1			
Upper Disc.				
Lower Disc.				

Cased from to mtrs	Dia from to
Cored hole ☐	Non-cored hole ☑
Sampled Interval	Type
1 metre	ROTARY AIR

INTERPRETATION DATA

Probe No.	Standard (cps)	K factor
GPA-5	495	3.15×10^{-6}

REMARKS

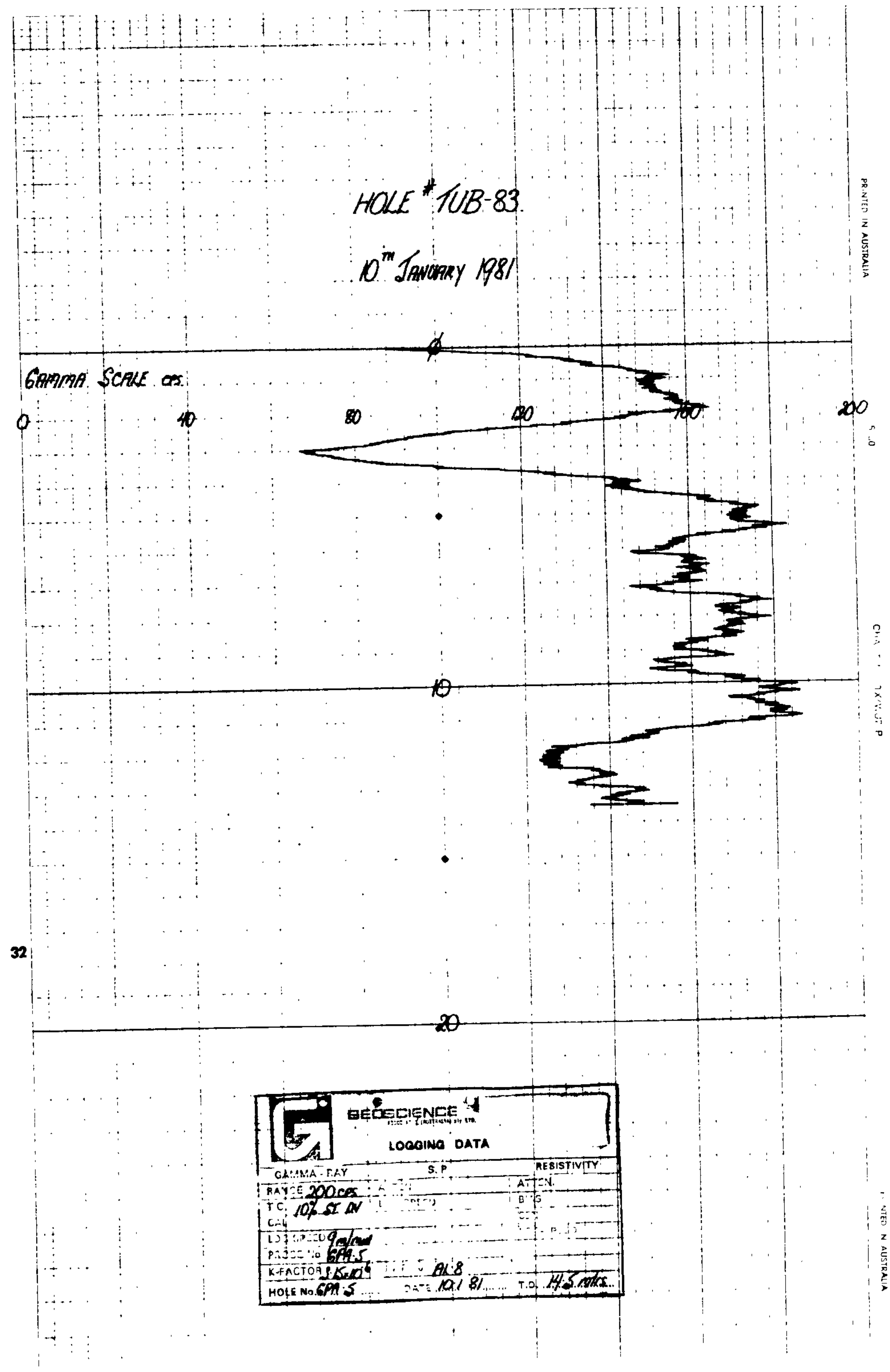
Fluid Level metres

ELECTRIC

	1	2	3	4
Logged depth				
Resist. scale Ω/div				
S.P. scale m.v.				
Paper speed cm/m				
Logging speed m/min				
Probe size				
Bias				

CALIPER

Logged depth				
Scale	in/in def			
Paper Speed				
Logging speed				
Arm Length	in			
Max. Def.	in			



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HOLE # TUB-84

LOGGING DATA

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DATE 10th JANUARY 1981

LOCATION	TUMBY BAY	HOLE NUMBER:	TUB # 84	CLIENT.	AFMECO
State	SOUTH AUST	Collar elev.	metres	Claim	
Area		Depth drilled:	7.0 metres	Owned by:	
Project		CASING DATA	HOLE DATA	Operated by	
Prospect		Wall size in.	Dia. 4" from 0 to 7.0	Unit Operator.	BARNET
Lat ° ' "	Long ° ' "	Dia (inside) in	Dia from to	Unit No AK 8	Office ADELAIDE

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft.)	5.2			
Range (Full scale)	100 cps			
Time constant (Sec)	10, ST. DV			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	52			
Probe No	GPA-5			
Size (dia) mm	40			
Crystal NaI	1½ x ½"			
Standard (cps)	495			
Dead time	6			μ sec.
Amp. Gain (disc)				
Ratemeter No				
Bore hole medium	DRY			
Mud density				
Digital readout m.	2			
Time base (sec)	1			
Upper Disc				
Lower Disc				

Cased from to mtrs	Dia from to
Cored hole ☐	Non-cored hole ☑
Sampled Interval	Type
1 metre	ROTARY AIR

INTERPRETATION DATA

Probe No.	Standard (cps)	K factor
GPA-5	495	3.65×10^{-6}

REMARKS

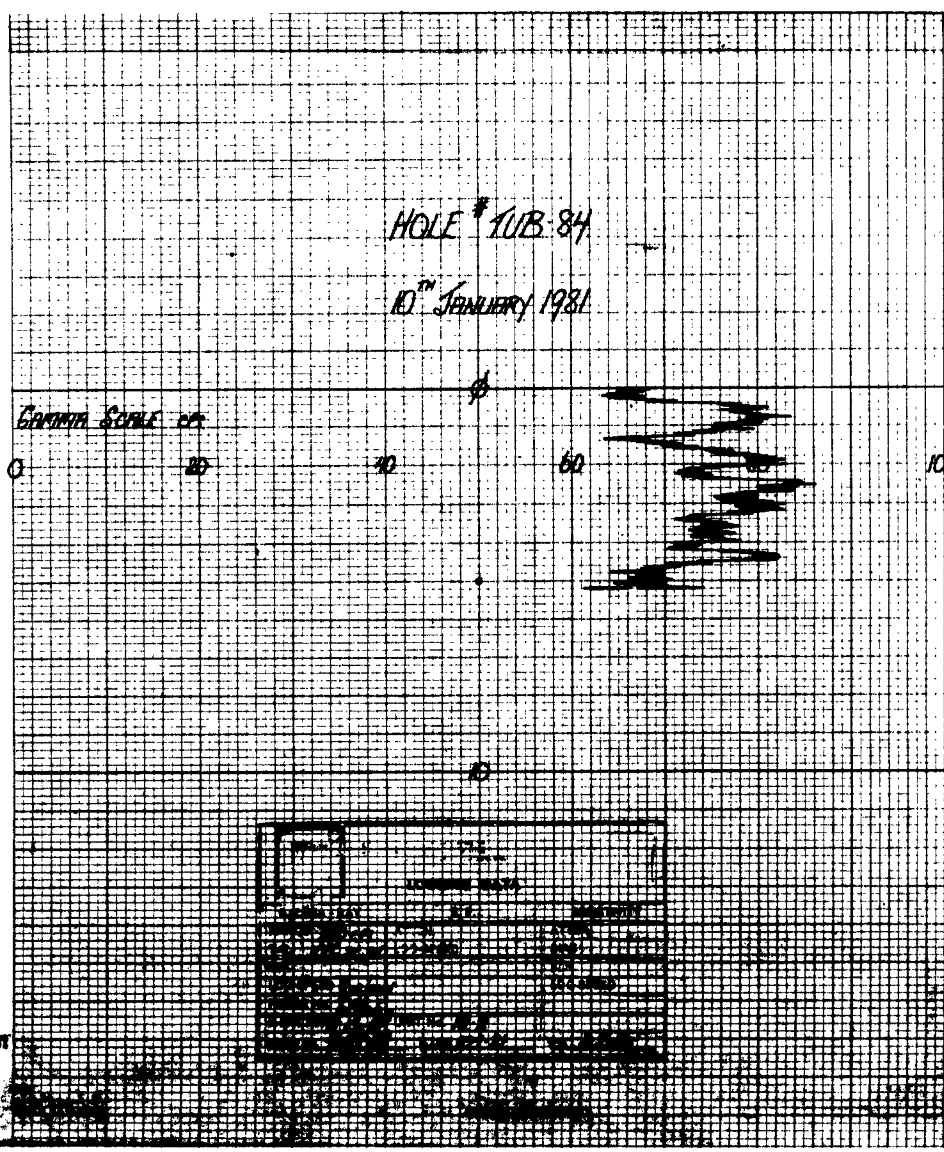
Fluid Level metres

ELECTRIC

	1	2	3	4
Logged depth				
Resist. scale Ω/div				
S.P scale m.v.				
Paper speed cm/m				
Logging speed m/min				
Probe size				
Bias				

CALIPER

Logged depth	
Scale	in/in def
Paper Speed	
Logging speed	
Arm Length	in
Max. Def	in



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HOLE # TUB-85

LOGGING DATA

DATE 10TH JANUARY 1981

LOCATION	TUMBY BAY
State	SOUTH AUST
Area	
Project:	
Prospect	
Lat. ° ' "	Long ° ' "

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft)	14.8			
Range (Full scale)	200 CPS			
Time constant (Sec)	10% ST. DV			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	72			
Probe No	GPA-5			
Size (dia) mm	40			
Crystal NaI	1½" x ½"			
Standard (cps)	495			
Dead time	6			µ sec.
Amp Gain (div)				
Ratemeter No				
Bore hole medium	DRY			
Mud density				
Digital readout m	.2			
Time base (sec)	1			
Upper Disc				
Lower Disc.				

HOLE NUMBER:	TUB # 85
Collar elev.	metres
Depth drilled.	170 metres

CASING DATA	HOLE DATA
Wall size in	Dia 4" from 0 to 170
Dia (inside) in.	Dia from to
Cased from to mtrs	Dia from to
Cored hole ☐	Non-cored hole ☑

Sampled Interval	Type
1 metre	ROTARY AIR

INTERPRETATION DATA

Probe No	Standard (cps)	K factor
GPA-5	495	3.65×10^{-6}

REMARKS

Fluid Level metres

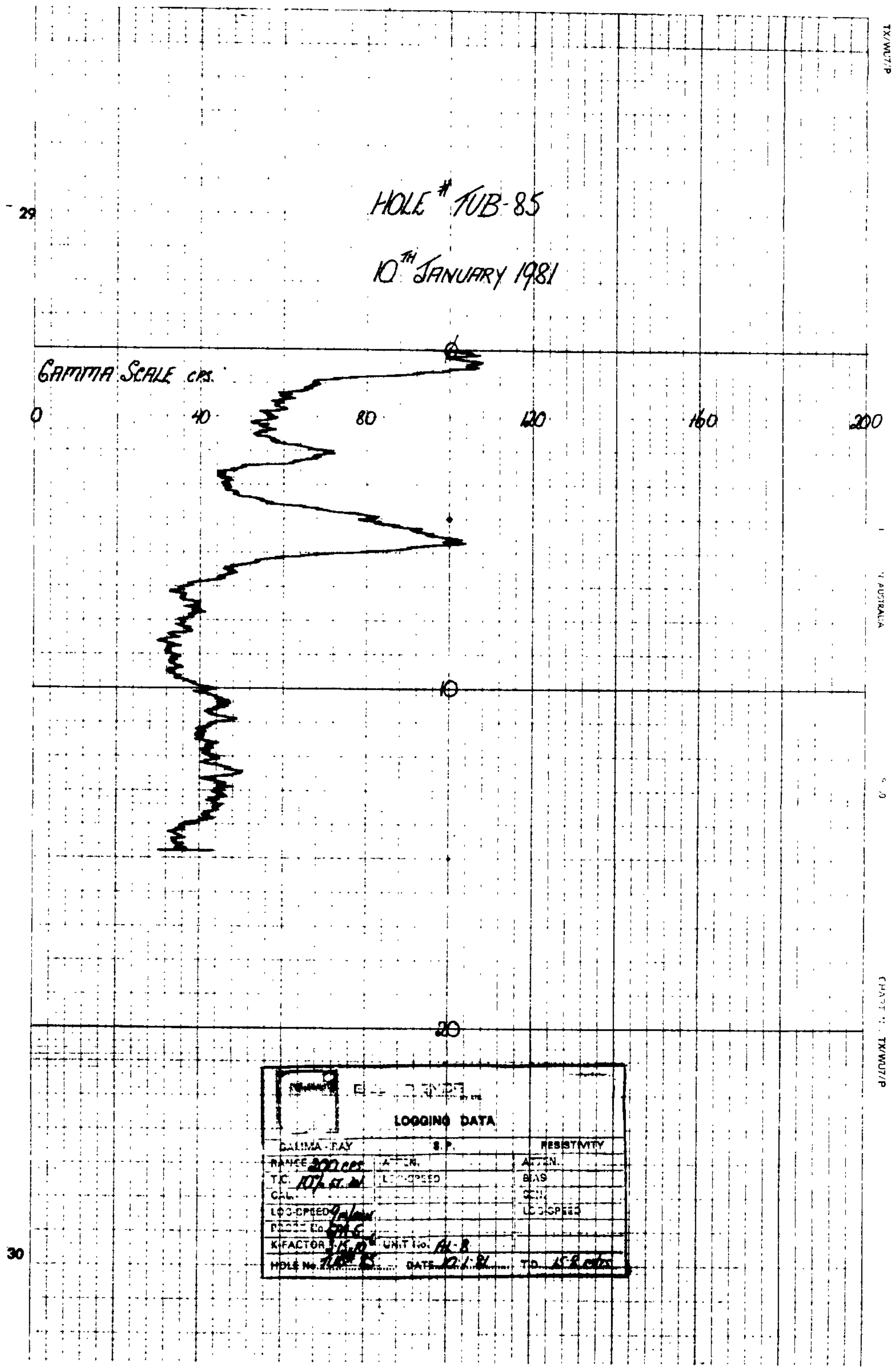
CLIENT:	AEMECO
Claim:	
Owned by:	
Operated by:	
Unit Operator:	BARNETT
Unit No.	AL-8
Office.	[illegible]

ELECTRIC

	1	2	3	4
Logged depth				
Resist. scale Ω/div				
S.P scale mV				
Paper speed cm/m				
Logging speed m/min				
Probe size				
Bias				

CALIPER

Logged depth				
Scale	in/in def			
Paper Speed				
Logging speed				
Arm Length	in			
Max Def.	in			



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HOLE# TUB-86

LOGGING DATA

DATE 10th January 1981

LOCATION Tumby Bay
State South Aust
Area.
Project
Prospect
Lat ° ' " Long ° ' "

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft)	18.0			
Range (Full scale)	200 cps			
Time constant (Sec)	10% st. dv			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	67			
Probe No	GPA-5			
Size (dia) mm	40			
Crystal NaI	1½" × ½"			
Standard (cps)	495			
Dead time μ sec	6			
Amp Gain				
Ratemeter No				
Bore hole medium	DRY			
Mud density				
Digital readout m	2m			
Time base (sec)	1			
Upper Disc				
Lower Disc				

HOLE NUMBER: TUB# 86
Collar elev. metres
Depth drilled 20.0 metres

CASING DATA / **HOLE DATA**

CASING DATA	HOLE DATA
Wall size in.	Dia 4" from 0 to 20.0
Dia (inside) in	Dia from to
Cased from to mtrs	Dia from to
Cored hole ☐	Non-cored hole ☑

Sampled Interval	Type
1 metre	Rotary Air

INTERPRETATION DATA

Probe No.	Standard (cps)	K factor
GPA-5	495	3.15×10^{-6}

REMARKS

Fluid Level metres

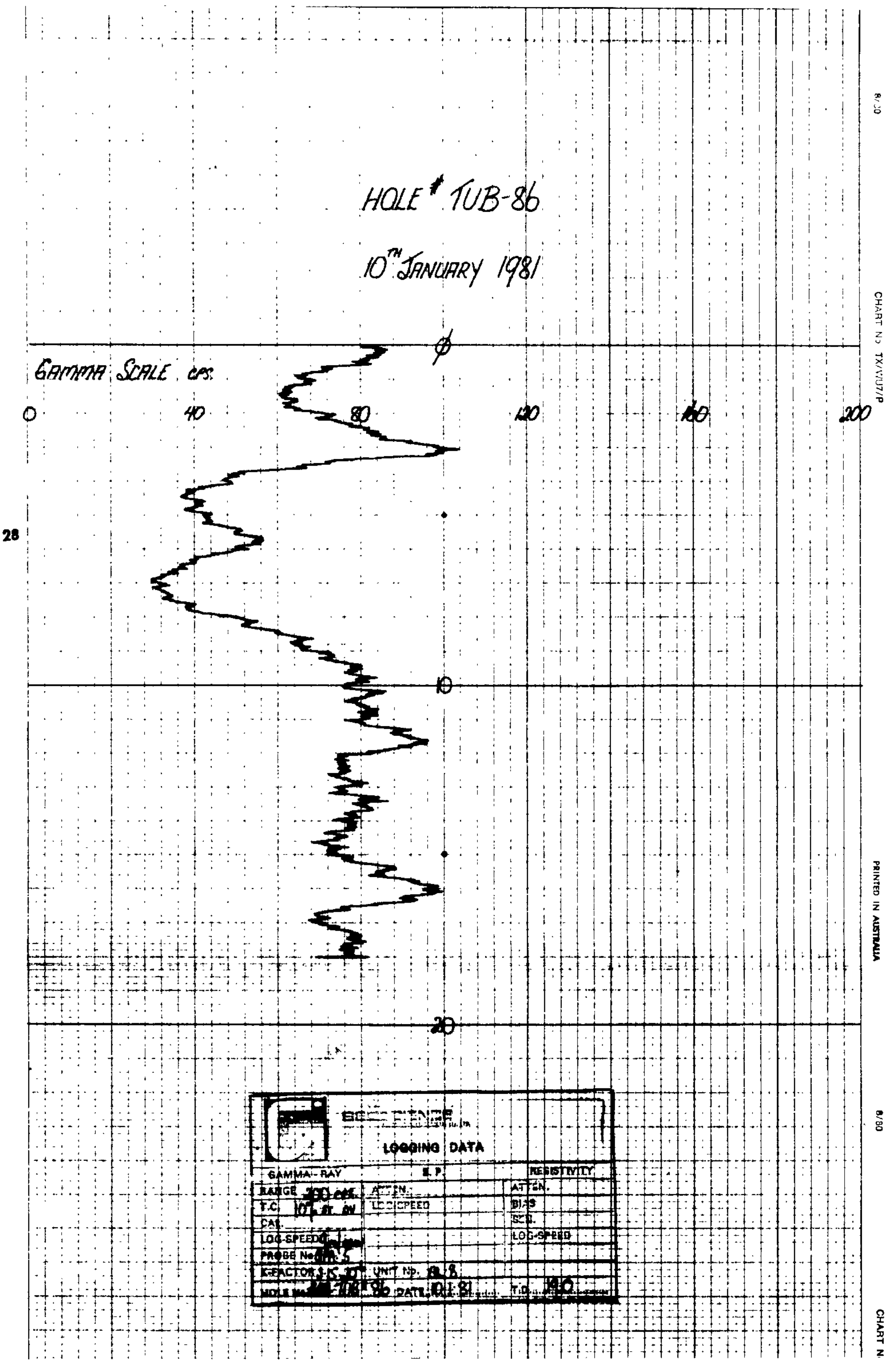
CLIENT AFMECO
Claim
Owned by
Operated by:
Unit Operator BARNETT
Unit No AL8 Office ADELAIDE

ELECTRIC

	1	2	3	4
Logged depth				
Resist. scale Ω/div				
S.P scale mv				
Paper speed cm/m				
Logging speed m/min				
Probe size				
Bias				

CALIPER

Logged depth	
Scale in/in def	
Paper Speed	
Logging speed	
Arm Length in	
Max Def in	



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HOLE # TUB-87 255

LOGGING DATA

DATE 10th JANUARY 1981

LOCATION	TUMBY BAY			
State	SOUTH AUST			
Area.				
Project				
Prospect				
Lat ° ' "	Long ° ' "			

GAMMA RAY	INITIAL RUN	2	3	4
Logged depth (ft)	12.6			
Range (Full scale)	200 cps			
Time constant (Sec)	10% st dv			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	114			
Probe No	GPA-5			
Size (dia) mm	40			
Crystal	NaI 1½" x ½"			
Standard (cps)	495			
Dead time	6			μ sec.
Amp Gain (disc)				
Ratemeter No.				
Bore hole medium	DRY			
Mud density				
Digital readout m.	2			
Time base (sec)	1			
Upper Disc				
Lower Disc				

HOLE NUMBER:	TUB # 87
Collar elev.	metres
Depth drilled.	17.0 metres

CASING DATA	HOLE DATA
Wall size in	Dia 4" from 0 to 17.0
Dia. (inside) in.	Dia. from to
Cased from to mtrs	Dia from to
Cored hole ☐	Non-cored hole ☑

Sampled Interval	Type
1 metre	ROTARY AIR

INTERPRETATION DATA

Probe No.	Standard (cps)	K factor
GPA-5	495	3.15×10^{-6}

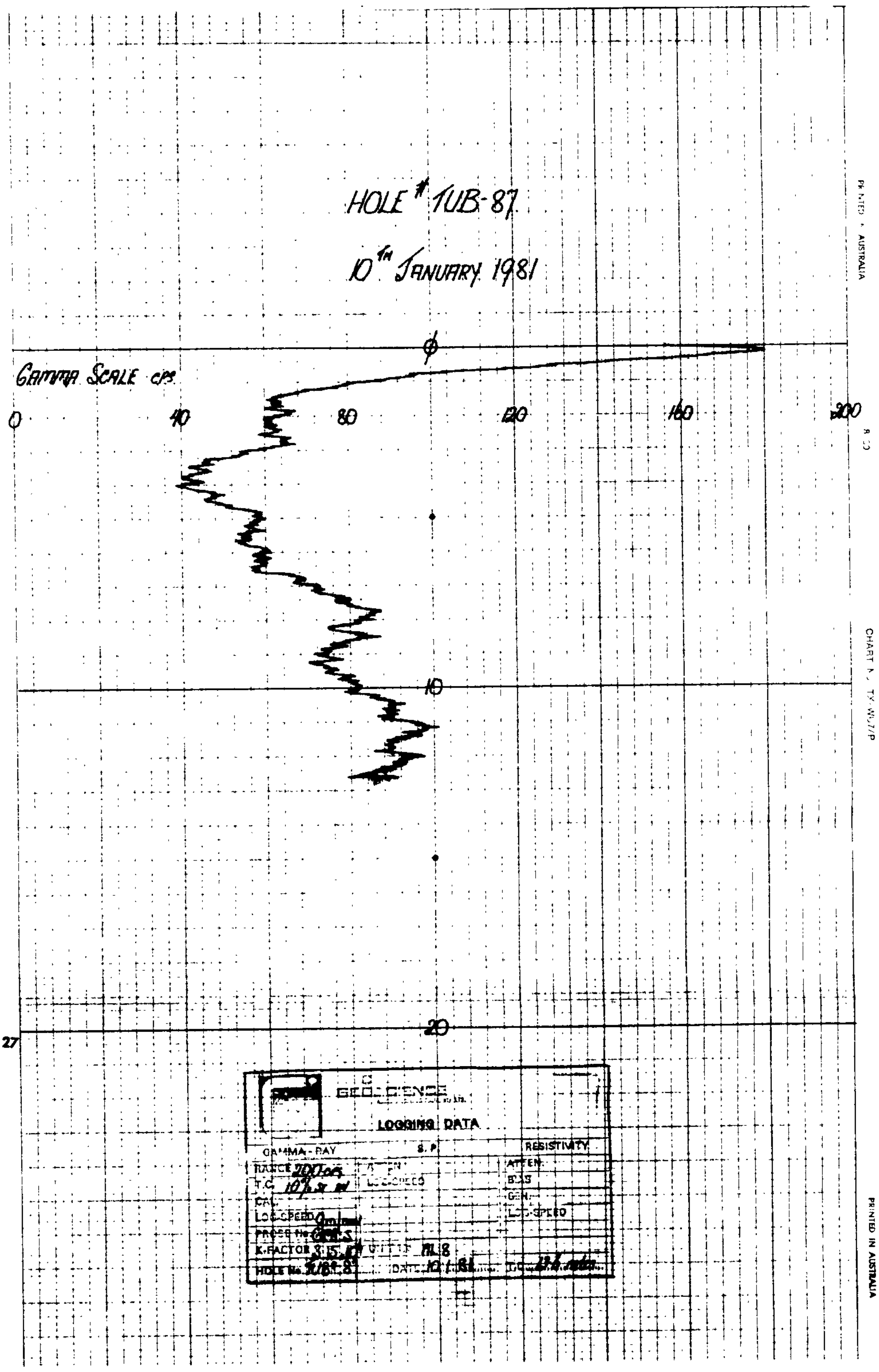
REMARKS

Fluid Level metres

CLIENT:	AFMECO
Claim	
Owned by	
Operated by	
Unit Operator.	BARNETT
Unit No.	AL-8
Office	ADELAIDE

ELECTRIC	1	2	3	4
Logged depth				
Resist. scale %/div				
S.P. scale mv				
Paper speed cm/m				
Logging speed m/min				
Probe size				
Bias				

CALIPER				
Logged depth				
Scale in/in def				
Paper Speed				
Logging speed				
Arm Length in				
Max Def. in				



GEOSCIENCE ASSOCIATES AUSTRALIA pty LTD
P.O Box 239
Kilkenny, S.A 5009
Phone 268 2898

HOLE # 1UB-88

250

LOGGING DATA

DATE 10TH JANUARY 1981

LOCATION	[illegible] SA,
State	SOUTH AUST
Area	
Project	
Prospect	
Lat ° ' "	Long ° ' "

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft)	22.8			
Range (Full scale)	200 cps			
Time constant (Sec)	10% Std.			
Paper speed cm/m				
Logging speed m/min	9			
Bkgnd count (cps)	39			
Probe No	GPH-5			
Size (dia) mm	76			
Crystal	[illegible]			
Standard (cps)	495			
Dead time	6			μ sec
Amp Gain				
Ratemeter No				
Bore hole medium	DRY			
Mud density				
Digital readout	2			
Time base (Sec)				
Upper Disc				
Lower Disc				

HOLE NUMBER	1UB # 88
Collar elev.	metres
Depth drilled	250 metres

CASING DATA	HOLE DATA
Wall size in	Dia 4" from 0 to 250
Dia (inside) in	Dia from to
Cased from to mtrs	Dia from to
Cored hole ☐	Non-cored hole ☑

Sampled Interval	Type
1 metre	ROTARY AIR.

INTERPRETATION DATA

Probe No	Standard (cps)	K factor
GPH-5	495	3.15×10^{-4}

REMARKS

Fluid Level metres

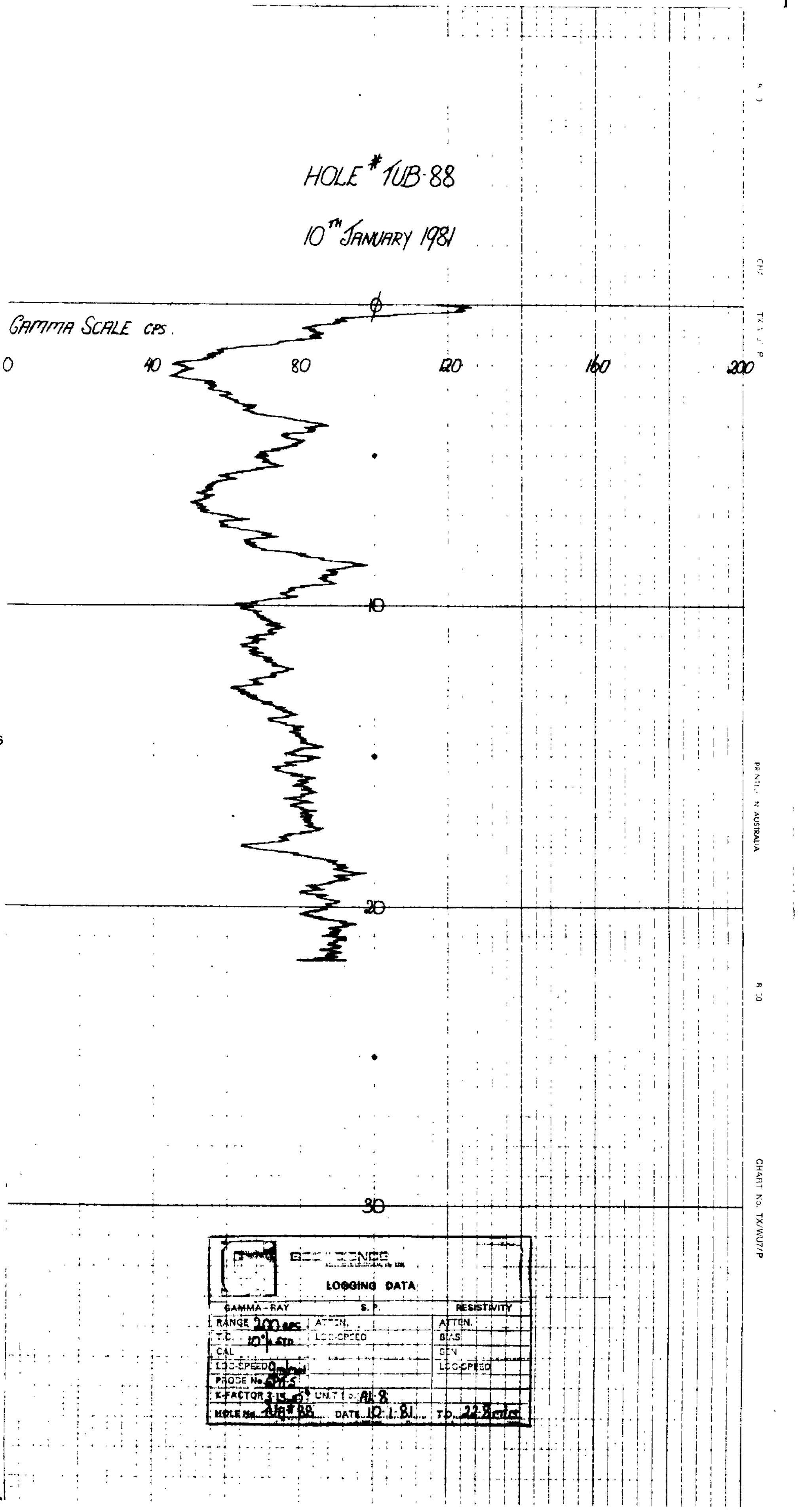
CLIENT	PEMSCO
Claim	
Owned by	
Operated by	
Unit Operator	BARNETT
Unit No	AL 8
Office	ADELAIDE

ELECTRIC

	1	2	3	4
Logged depth				
Resist scale				
S.P scale				
Paper speed				
Logging speed				
Probe size				
Bias				

CALIPER

Logged depth	
Scale	
Paper Speed	
Logging speed	
Arm Length in	
Max Def in	



GEOSCIENCE ASSOCIATES AUSTRALIA pty LTD

LOGGING DATA

GAMMA - RAY	S. P.	RESISTIVITY
RANGE 200 cps	ATTEN.	ATTEN.
T.C. 10% STD	LOG-SPEED	BIAS
CAL		SEN
LOG-SPEED 9 m/min		LOG-SPEED
PROBE No. GPH-5		
K-FACTOR 3.15×10^{-4}	UNIT No. AL 8	
HOLE No. 1UB # 88	DATE 10.1.81	T.D. 22.8 mtrs

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HOLE # TUB-89

LOGGING DATA

257

DATE 10TH JANUARY 1981

LOCATION	TUMBY BAY
State	SOUTH AUST
Area	
Project	
Prospect	
Lat ° ' "	Long ° ' "

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft)	12·8			
Range (Full scale)	200 CPS			
Time constant (Sec)	10% ST. DV			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	91			
Probe No	GPA-5			
Size (dia.) mm	40			
Crystal NaI	1½"×½"			
Standard (cps)	495			
Dead time µ sec	6			
Amp Gain (disc)				
Ratemeter No				
Bore hole medium	DRY			
Mud density				
Digital readout m.	2			
Time base (sec)	1			
Upper Disc.				
Lower Disc				

HOLE NUMBER	TUB# 89
Collar elev	metres
Depth drilled:	19.0 metres

CASING DATA	HOLE DATA
Wall size in	Dia 4" from 0 to 19·0
Dia (inside) in	Dia from to
Cased from to mtrs	Dia from to
Cored hole ☐	Non-cored hole ☑

Sampled Interval	Type
1 metre	ROTARY AIR

INTERPRETATION DATA

Probe No	Standard (cps)	K factor
GPA-5	495	3.15×10^{-6}

REMARKS

Fluid Level metres

CLIENT.	AEMECO
Claim	
Owned by	
Operated by	
Unit Operator.	BARNETT
Unit No	AL-8 Office ADELAIDE

ELECTRIC

	1	2	3	4
Logged depth				
Resist. scale Ω/div				
S.P. scale mV				
Paper speed cm/m				
Logging speed m/min				
Probe size				
Bias				

CALIPER

Logged depth	
Scale	in/in def
Paper Speed	
Logging speed	
Arm Length	in
Max Def	in

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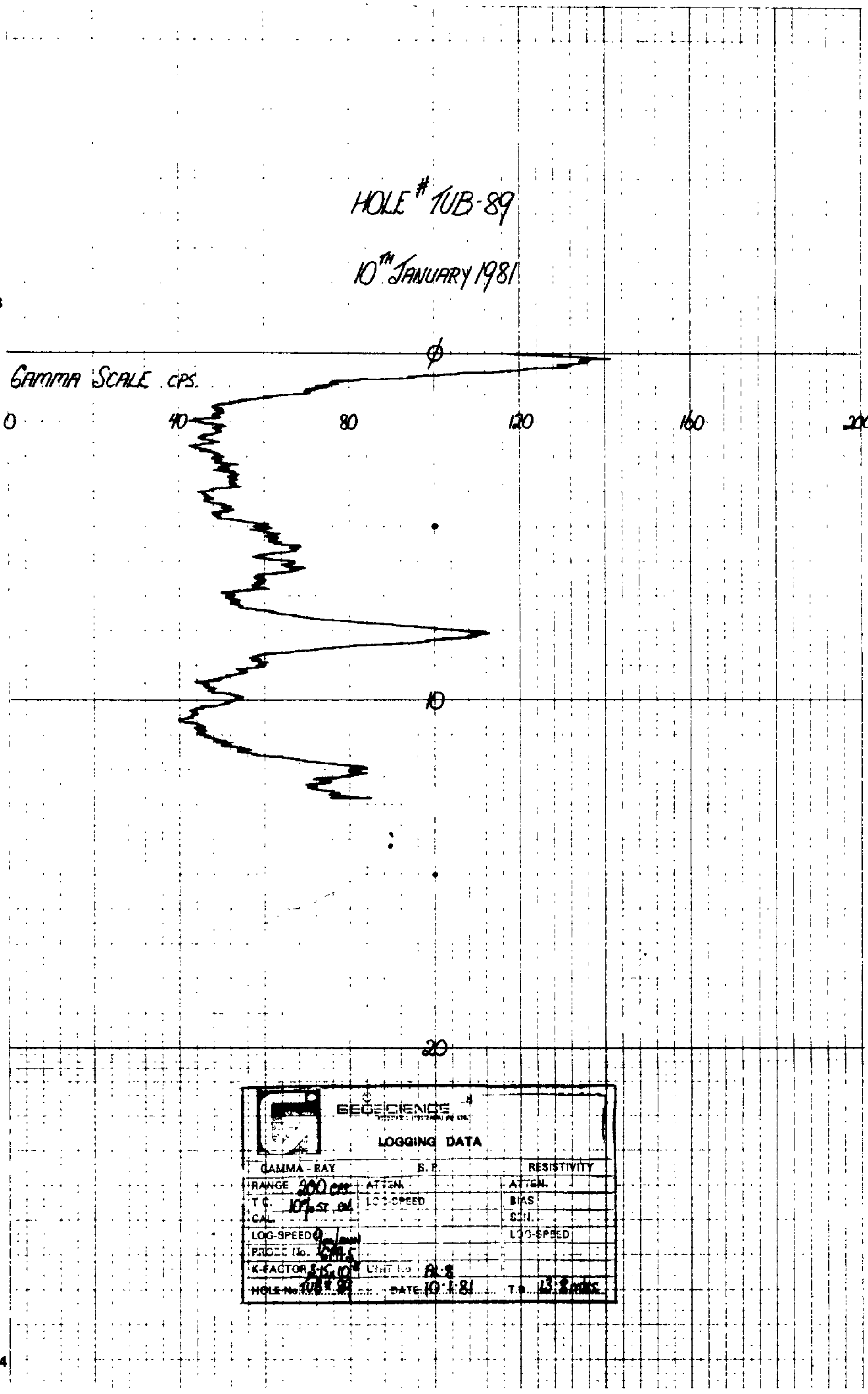

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Phone: 268 2988

HOLE # TUB-90

250

LOGGING DATA

DATE 10TH JANUARY 1981

LOCATION Tumby Bay	HOLE NUMBER: TUB # 90		CLIENT. AFMECO
State: South Aust	Collar elev metres		Claim:
Area.	Depth drilled: 23·0 metres		Owned by.
Project.	CASING DATA	HOLE DATA	Operated by:
Prospect.	Wall size in.	Dia 4" from 0 to 23·0	Unit Operator Barnett
Lat ° ' " / Long ° ' "	Dia (inside) in	Dia from to	Unit No AL·8 Office Adelaide
	Cased from to mtrs	Dia from to	
	Cored hole ☐	Non-cored hole ☑	

GAMMA RAY	INITIAL RUN	2	3	4
Logged depth (ft.)	20·8			
Range (Full scale)	200 cps.			
Time constant (sec)	10% st. dv.			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	90			
Probe No	GPA-5			
Size (dia.) mm	40			
Crystal NaI	1½" x ½"			
Standard (cps)	495			
Dead time μ sec.	6			
Amp Gain (disc)				
Ratemeter No				
Bore hole medium	DRY			
Mud density				
Digital readout m.	·2			
Time base (sec)	1			
Upper Disc.				
Lower Disc.				

Sampled Interval	Type
1 metre	Rotary Air

INTERPRETATION DATA

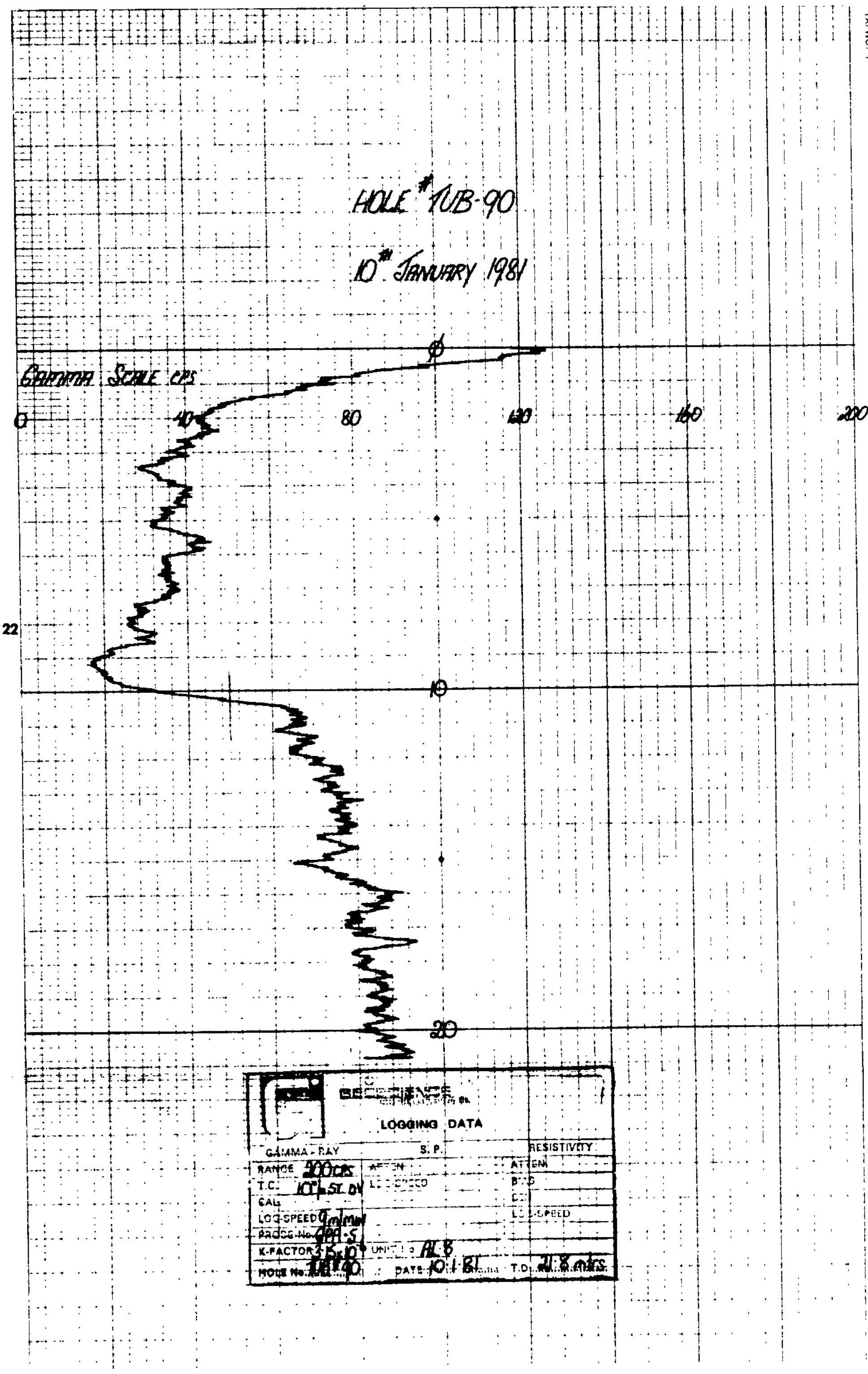
Probe No	Standard (cps)	K factor
GPA-5	495	$3{\cdot}15 \times 10^{-6}$

REMARKS

Fluid Level metres

ELECTRIC	1	2	3	4
Logged depth				
Resist. scale Ω/div				
S.P. scale mv.				
Paper speed cm/m				
Logging speed m/min				
Probe size				
Bias				

CALIPER	
Logged depth	
Scale	in/in def
Paper Speed	
Logging speed	
Arm Length	in
Max. Def	in



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HOLE # 1UB-91 259

LOGGING DATA

DATE 10TH JANUARY 1981

LOCATION Tumby Bay	HOLE NUMBER 1UB # 91		CLIENT AEMECO
State South Aust	Collar elev metres		Claim:
Area	Depth drilled 140 metres		Owned by:
Project	CASING DATA	HOLE DATA	Operated by:
Prospect	Wall size in.	Dia. 4" from 0 to 140	Unit Operator Barnett
Lat ° ' " / Long ° ' "	Dia (inside) in	Dia from to	Unit No. AL 8 Office Adelaide
	Cased from to mtrs	Dia. from to	
	Cored hole ☐	Non-cored hole ☑	

GAMMA RAY	INITIAL RUN	2	3	4
Logged depth (ft)	128			
Range (Full scale)	200 cps			
Time constant (Sec)	10% st dv			
Paper speed cm/m	"			
Logging speed m/min	9			
Bkgnd count (cps)	73			
Probe No.	GM-5			
Size (dia) mm	40			
Crystal NaI	1½" x ½"			
Standard (cps)	495			
Dead time	6			µ sec.
Amp. Gain (disc)				
Ratemeter No.				
Bore hole medium	DRY			
Mud density				
Digital readout m.	.2			
Time base (sec)	1			
Upper Disc.				
Lower Disc.				

Sampled Interval	Type
1 metre	Rotary Air

INTERPRETATION DATA

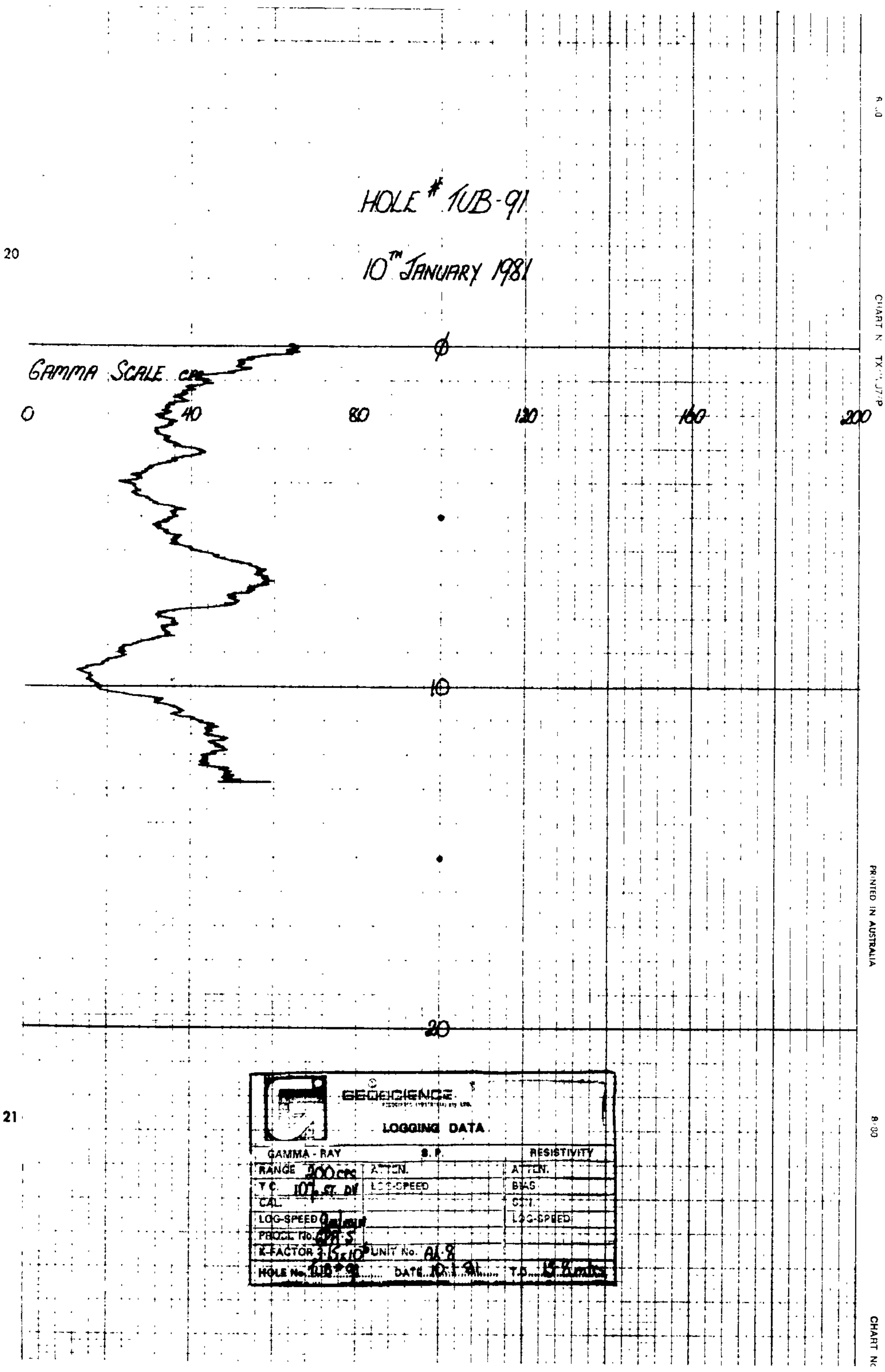
Probe No	Standard (cps)	K factor
GM-5	495	3.15×10^{-6}

REMARKS

Fluid Level metres

ELECTRIC	1	2	3	4
Logged depth				
Resist. scale Ω/div				
S.P scale m.v.				
Paper speed cm/m				
Logging speed m/min				
Probe size				
Bias				

CALIPER				
Logged depth				
Scale	in/in def			
Paper Speed				
Logging speed				
Arm Length	in			
Max. Def.	in			



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HOLE# TUB-92

LOGGING DATA

DATE 10TH JANUARY 1981

LOCATION	TUMBY BAY				
State	SOUTH AUST				
Area					
Project					
Prospect					
Lat ° ′ ″		Long ° ′ ″			
GAMMA RAY	INITIAL RUN	2	3	4	
Logged depth (ft.)	212				
Range (Full scale)	200 cps				
Time constant (Sec.)	10% st dev				
Paper speed cm/m	1				
Logging speed m/min	9				
Bkgnd count (cps)	74				
Probe No.	GPA-5				
Size (dia) mm	40				
Crystal Na I	1½" x 1½"				
Standard (cps)	495				
Dead time	6			µ sec.	
Amp Gain (disc)					
Ratemeter No.					
Bore hole medium	DRY				
Mud density					
Digital readout m.	.2				
Time base (sec)	1				
Upper Disc.					
Lower Disc.					

HOLE NUMBER	TUB# 92		
Collar elev.	metres		
Depth drilled	230 metres		
CASING DATA		HOLE DATA	
Wall size	in	Dia 4″ from 0 to 230	
Dia. (inside)	in	Dia from to	
Cased from to	mtrs	Dia from to	
Cored hole ☐		Non-cored hole ☑	
Sampled Interval	1 metre	Type	ROTARY AIR

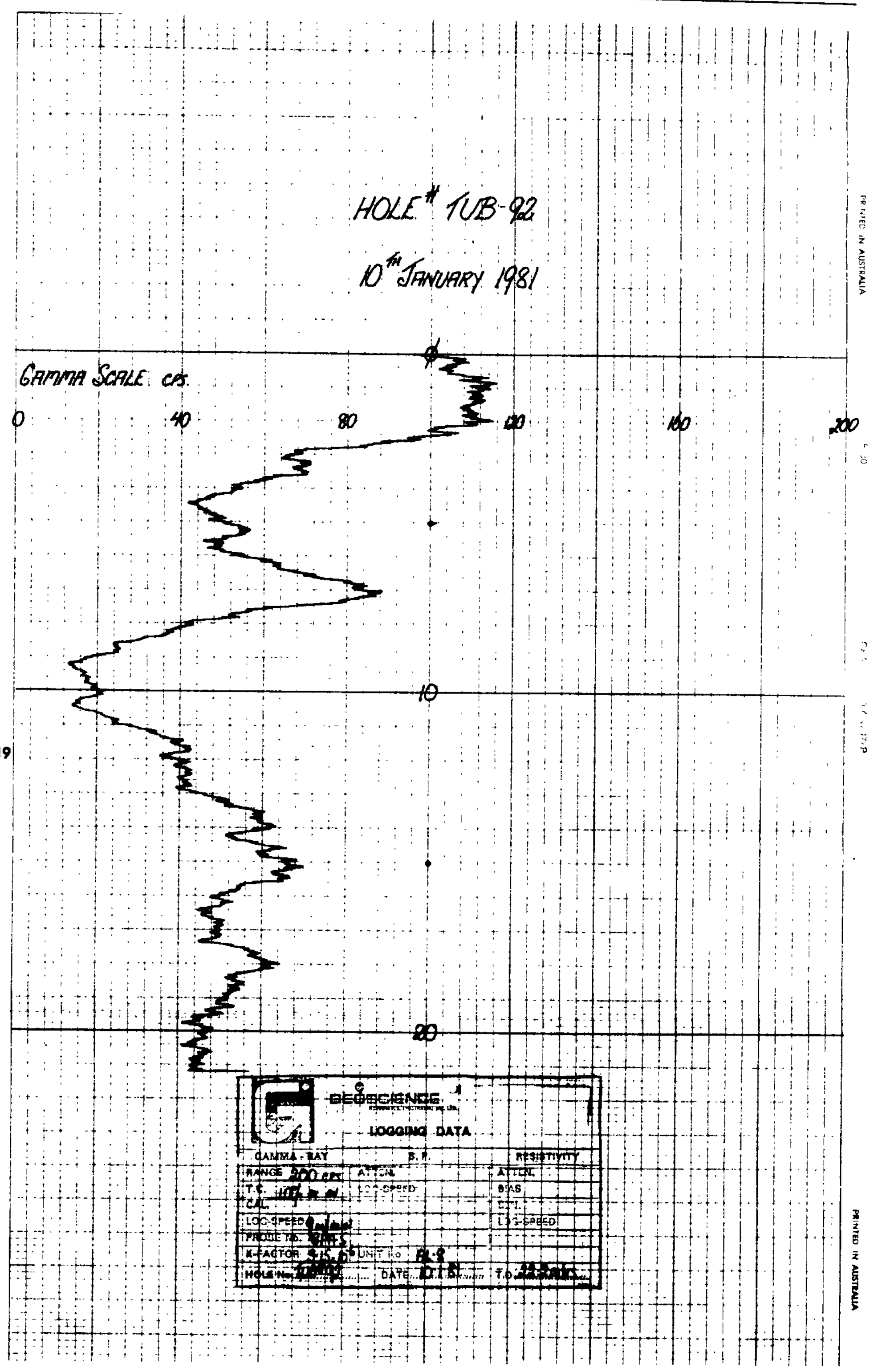
INTERPRETATION DATA

Probe No	Standard (cps)	K factor
GPA-5	495	3.15×10^{-6}

REMARKS

Fluid Level metres

CLIENT	AEMECO				
Claim					
Owned by					
Operated by					
Unit Operator	BARNETT				
Unit No	AL 8	Office ADELAIDE			
ELECTRIC		1	2	3	4
Logged depth					
Resist. scale					
S.P scale					
Paper speed					
Logging speed					
Probe size					
Bias					
CALIPER					
Logged depth					
Scale	in/in. def				
Paper Speed					
Logging speed					
Arm Length	in				
Max. Def.	in				



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HOLE # TUB-93

LOGGING DATA

DATE 10TH JANUARY 1981

LOCATION	TUMBY BAY			
State	SOUTH AUST			
Area				
Project				
Prospect				
Lat ° ' "	Long ° ' "			

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft.)	15.8			
Range (Full scale)	100 cps			
Time constant (Sec)	10% st dv			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	41			
Probe No.	GPA 5			
Size (dia.) mm	40			
Crystal	NaI 1½" x ½"			
Standard (cps)	495			
Dead time	6			µ sec.
Amp Gain (disc)				
Ratemeter No.				
Bore hole medium	DRY			
Mud density				
Digital readout m.	.2			
Time base (sec)	1			
Upper Disc.				
Lower Disc.				

HOLE NUMBER	TUB # 93
Collar elev.	metres
Depth drilled	17.0 metres

CASING DATA	HOLE DATA
Wall size in	Dia 4" from 0 to 17.0
Dia (inside) in.	Dia from to
Cased from to mtrs	Dia. from to
Cored hole ☐	Non-cored hole ☑

Sampled Interval	Type
1 metre	ROTARY AIR

INTERPRETATION DATA

Probe No.	Standard (cps)	K factor
GPA 5	495	3.15×10^{-6}

REMARKS

Fluid Level metres

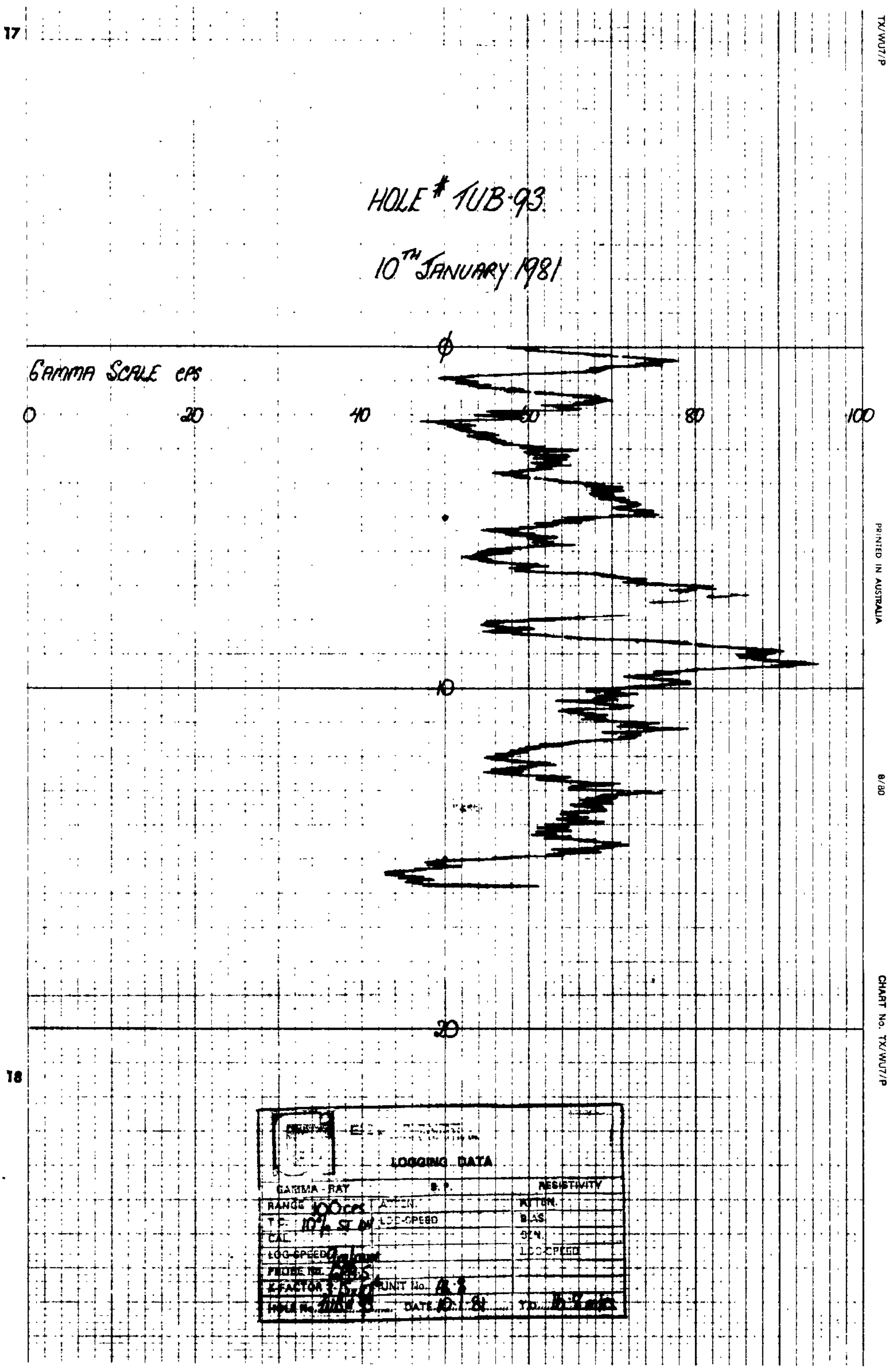
CLIENT	AEMECO
Claim.	
Owned by	
Operated by	
Unit Operator	BARNETT
Unit No	AL 8
Office	ADELAIDE

ELECTRIC

	1	2	3	4
Logged depth				
Resist. scale Ω/div				
SP scale mv				
Paper speed cm/m				
Logging speed m/min				
Probe size				
Bias				

CALIPER

Logged depth				
Scale	in/in def			
Paper Speed				
Logging speed				
Arm Length	in			
Max. Def.	in			



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HOLE # TUB-94

LOGGING DATA

DATE 11TH JANUARY 1981

LOCATION	TUMBY BAY
State	SOUTH AUST
Area	
Project	
Prospect	
Lat ° ' "	Long ° ' "

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft.)	47.1			
Range (Full scale)	200 cps			
Time constant (Sec.)	10% st dv			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	45			
Probe No	6PA5			
Size (dia.) mm	40			
Crystal NaI	1½" × ½"			
Standard (cps)	485			
Dead time	6			µ sec
Amp Gain (disc)				
Ratemeter No.				
Bore hole medium	DRY			
Mud density				
Digital readout m.	.2			
Time base (sec)	1			
Upper Disc.				
Lower Disc.				

HOLE NUMBER	TUB# 94
Collar elev.	metres
Depth drilled	53.0 metres

CASING DATA		HOLE DATA		
Wall size	in.	Dia 4"	from 0	to 53.0
Dia. (inside)	in.	Dia	from	to
Cased from to	mtrs	Dia	from	to
Cored hole ☐		Non-cored hole ☑		

Sampled Interval	Type
1 metre	ROTARY AIR.

INTERPRETATION DATA

Probe No.	Standard (cps)	K factor
6PA5	485	3.15×10^{-6}

REMARKS

Fluid Level metres

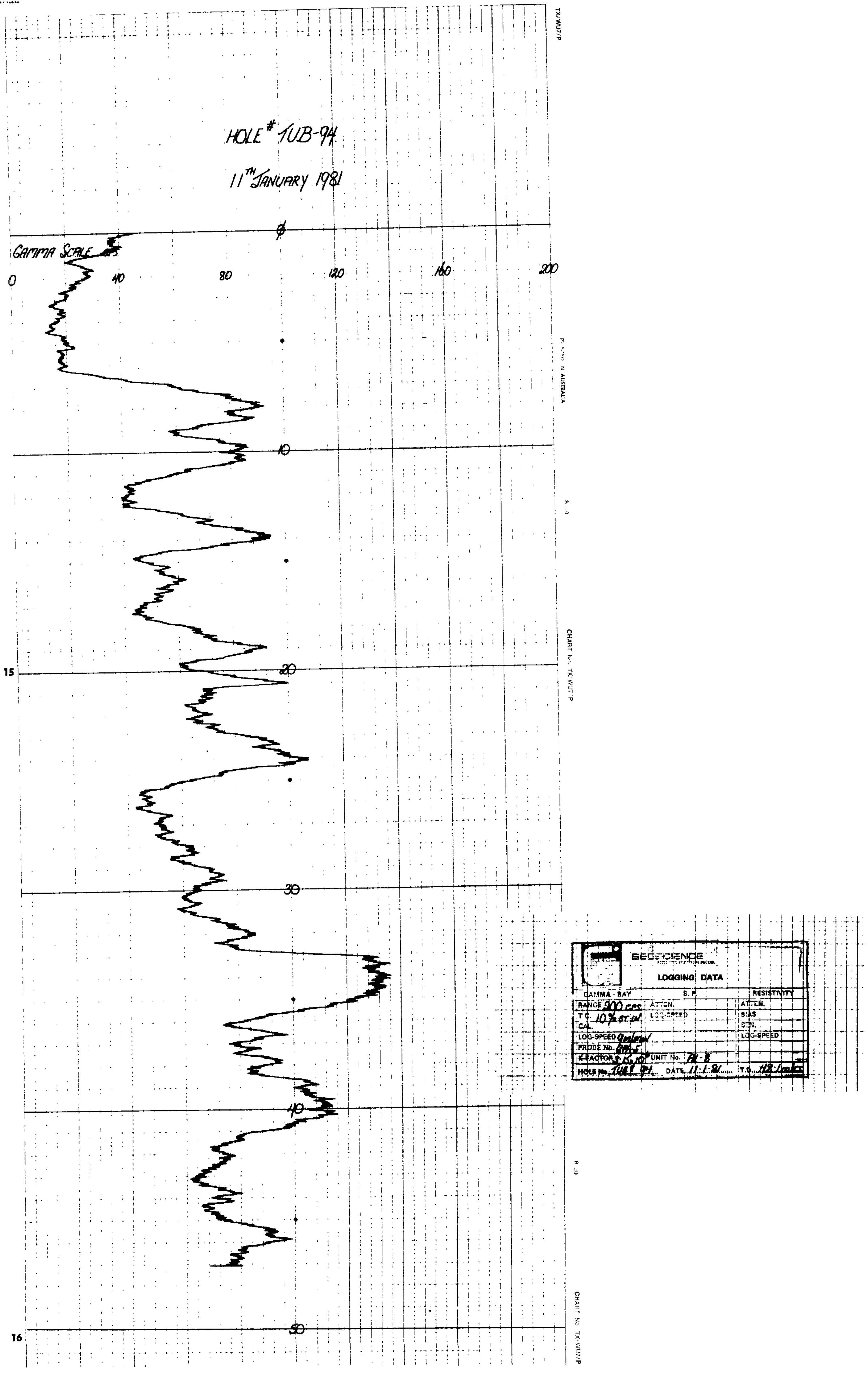
CLIENT	AEMECO
Claim	
Owned by	
Operated by	
Unit Operator	BARNETT
Unit No	AL 8
Office	ADELAIDE

ELECTRIC

	1	2	3	4
Logged depth				
Resist. scale				
S.P. scale				
Paper speed				
Logging speed				
Probe size				
Bias				

CALIPER

Logged depth				
Scale	in/in def			
Paper Speed				
Logging speed				
Arm Length	in			
Max. Def.	in			



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Phone: 268 2866

HOLE # TUB-95

265

LOGGING DATA

DATE 11TH JANUARY 1981

LOCATION: TUMBY BAY
State: SOUTH AUST
Area:
Project:
Prospect:
Lat ° ' " | Long ° ' "

HOLE NUMBER: TUB # 95
Collar elev. metres
Depth drilled: 45.0 metres

CLIENT: AFMECO
Claim:
Owned by:
Operated by:
Unit Operator: BARNETT
Unit No.: AK-8 | Office: ADELAIDE

CASING DATA		HOLE DATA
Wall size	in.	Dia. 4" from 0 to 45.0
Dia. (inside)	in	Dia from to
Cased from to	mtrs	Dia. from to
Cored hole ☐		Non-cored hole ☑

Sampled Interval	Type
1 metre	ROTARY AIR

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft)	43.4			
Range (Full scale)	200 cps			
Time constant (Sec.)	10% st dev			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	36			
Probe No.	GPA-5			
Size (dia.) mm	40			
Crystal NaI	1½" × ½"			
Standard (cps)	485			
Dead time	6			μ sec.
Amp. Gain (disc)				
Ratemeter No.				
Bore hole medium	DRY			
Mud density				
Digital readout m.	.2			
Time base (sec)	1			
Upper Disc.				
Lower Disc.				

INTERPRETATION DATA

Probe No.	Standard (cps)	K factor
GPA-5	485	3.15×10^{-6}

REMARKS

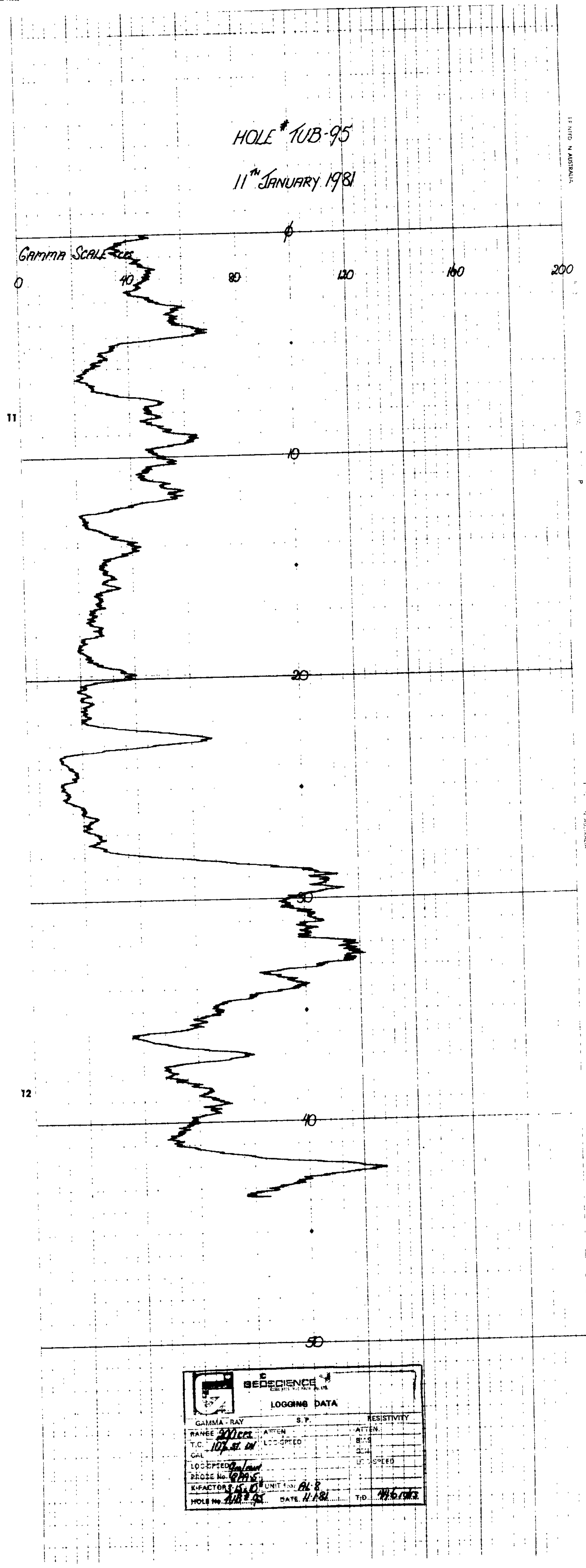
Fluid Level metres

ELECTRIC

	1	2	3	4
Logged depth				
Resist. scale Ω/div				
S.P. scale m.v.				
Paper speed cm/m				
Logging speed m/min				
Probe size				
Bias				

CALIPER

Logged depth				
Scale	in./in. def			
Paper Speed				
Logging speed				
Arm Length	in.			
Max. Def.	in			



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HOLE # TUB-96

LOGGING DATA

DATE 11TH JANUARY 1981

LOCATION TUMBY BAY
State South Aust
Area
Project
Prospect
Lat ° ' " Long ° ' "

GAMMA RAY	INITIAL RUN	2	3	4
Logged depth (ft)	15.9			
Range (Full scale)	100 cps			
Time constant (Sec)	10% st dev			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	28			
Probe No	GPA-5			
Size (dia) mm	40			
Crystal	NaI 1½" x 1½"			
Standard (cps)	485			
Dead time	6			μ sec.
Amp Gain (disc)				
Ratemeter No				
Bore hole medium	DRY			
Mud density				
Digital readout m.	.2			
Time base (sec)	1			
Upper Disc.				
Lower Disc.				

HOLE NUMBER TUB # 96
Collar elev metres
Depth drilled 17.5 metres

CASING DATA	HOLE DATA
Wall size in	Dia 4" from 0 to 17.5
Dia (inside) in	Dia from to
Cased from to mtrs	Dia. from to
Cored hole ☐	Non-cored hole ☑

Sampled Interval	Type
1 metre	ROTARY AIR

INTERPRETATION DATA

Probe No	Standard (cps)	K factor
GPA-5	485	3.15×10^{-6}

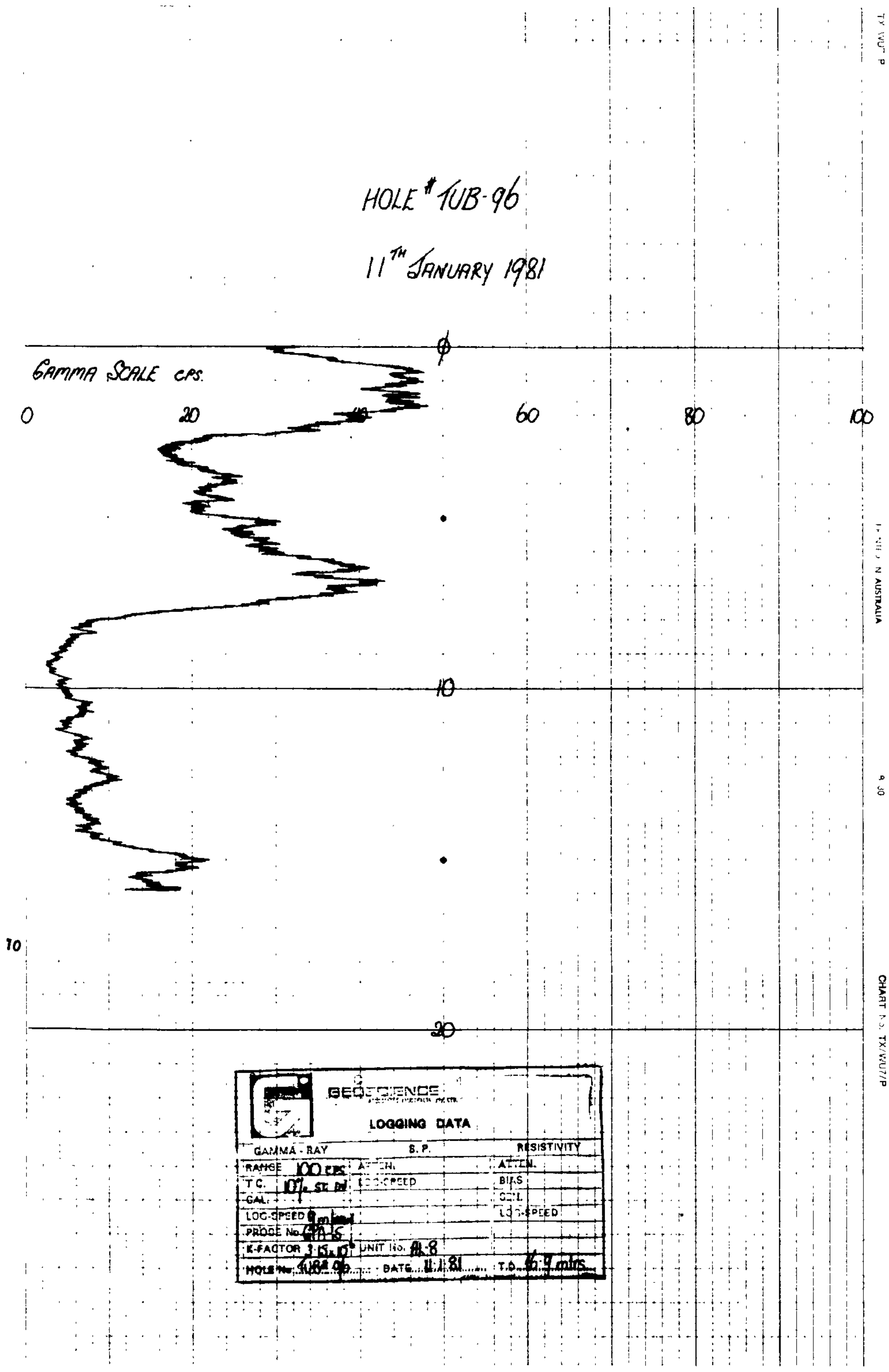
REMARKS

Fluid Level metres

CLIENT AFMECO
Claim.
Owned by.
Operated by
Unit Operator BARNETT
Unit No AL 8 Office ADELAIDE

ELECTRIC	1	2	3	4
Logged depth				
Resist scale				
S.P scale m.v.				
Paper speed cm/m				
Logging speed m/min				
Probe size				
Bias				

CALIPER				
Logged depth				
Scale	in/in def			
Paper Speed				
Logging speed				
Arm Length	in			
Max. Def	in			



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HOLE # TUB-97

LOGGING DATA

265

DATE 12TH January 1981

LOCATION	TUMBY BAY
State	SOUTH AUST
Area	
Project	
Prospect	
Lat ° ' "	Long ° ' "

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft)	61.7			
Range (Full scale)	200cps			
Time constant (Sec)	10 1/2 sec			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	20			
Probe No.	GM9.5			
Size (dia) mm	40			
Crystal NaI	1½" x 1½"			
Standard (cps)	495			
Dead time	6			μ sec.
Amp. Gain (disc)				
Ratemeter No.				
Bore hole medium	DRY			
Mud density				
Digital readout m.	.2			
Time base (sec)	1			
Upper Disc.				
Lower Disc.				

HOLE NUMBER:	TUB# 97
Collar elev.	metres
Depth drilled:	63.0 metres

CASING DATA		HOLE DATA
Wall size	in.	Dia. 4" from 0 to 63.0
Dia. (inside)	in.	Dia. from to
Cased from to	mtrs	Dia. from to
Cored hole ☐		Non-cored hole ☑

Sampled Interval	Type
1 metre	Rotary Air

INTERPRETATION DATA

Probe No.	Standard (cps)	K factor
GM9.5	495	3.15×10^{-6}

REMARKS

Fluid Level metres

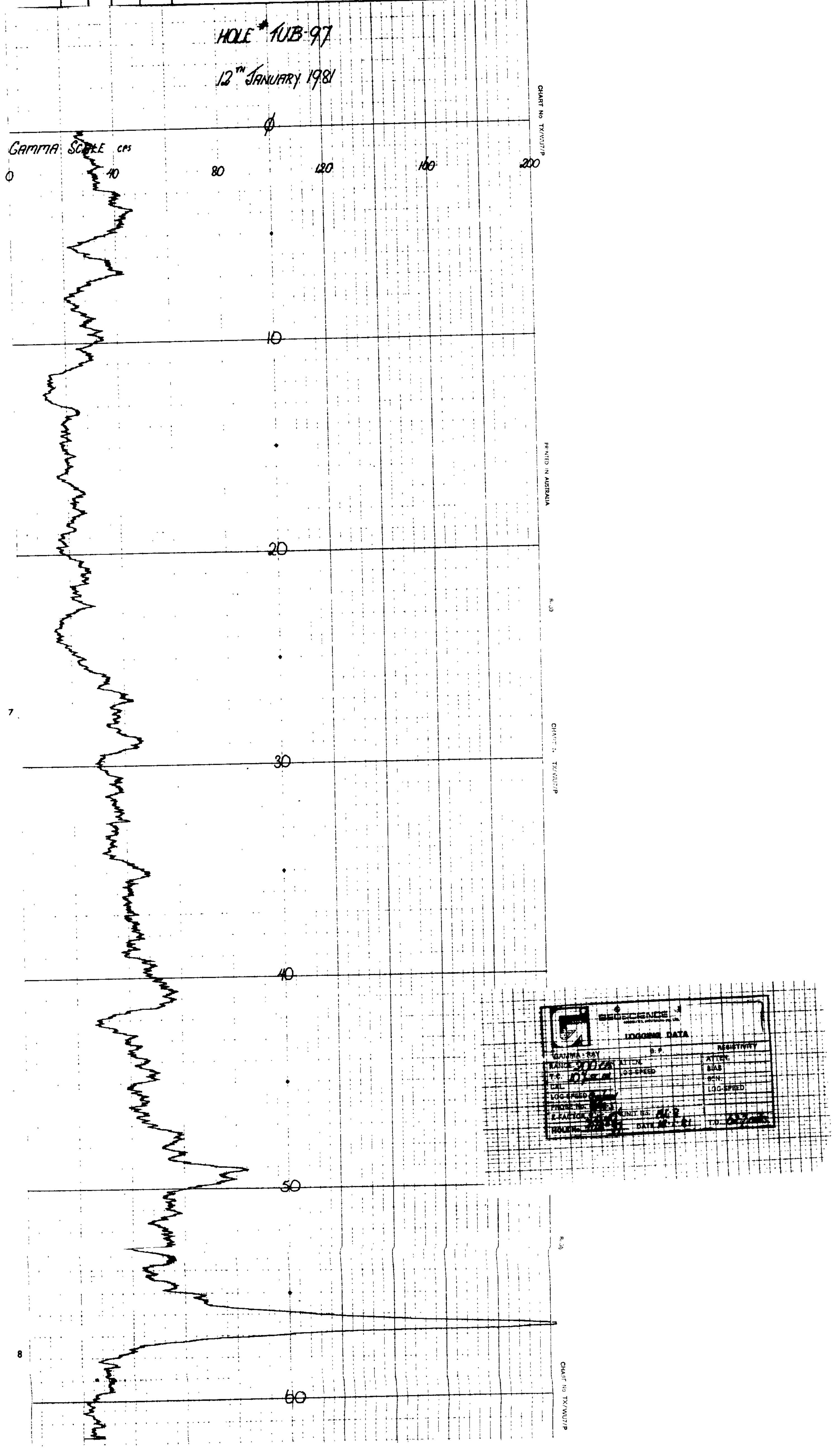
CLIENT.	AFMECO
Claim:	
Owned by:	
Operated by:	
Unit Operator:	BARNETT
Unit No	AL-8 Office ADELAIDE

ELECTRIC

	1	2	3	4
Logged depth				
Resist. scale Ω/div				
S.P. scale m.v.				
Paper speed cm/m				
Logging speed m/min				
Probe size				
Bias				

CALIPER

Logged depth				
Scale	in/in def			
Paper Speed				
Logging speed				
Arm Length	in.			
Max. Def.	in.			



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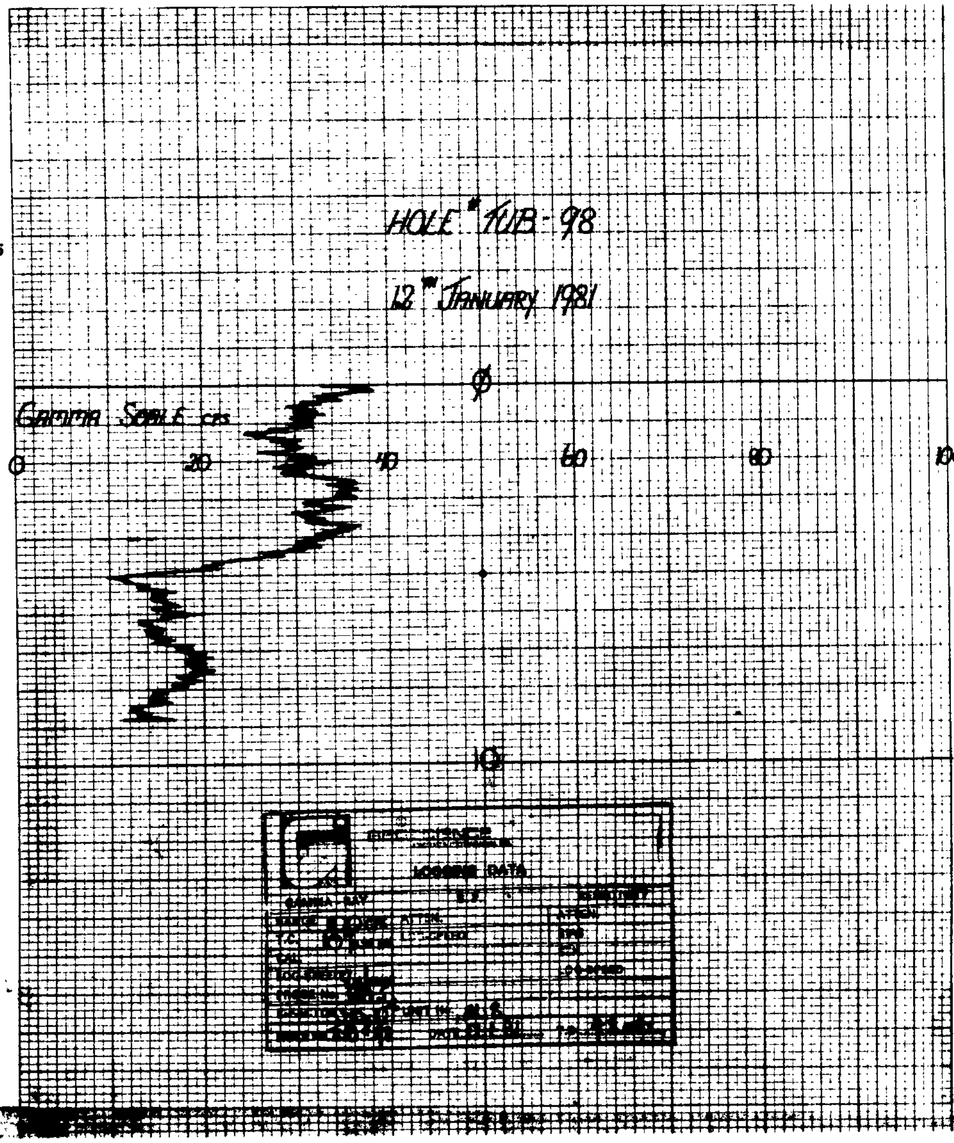
Phone: 268 2066

HOLE # TUB-98

LOGGING DATA

DATE 12th January 1981

LOCATION	Tumby Bay					HOLE NUMBER.	TUB # 98		CLIENT	AEMECO			
State	South Aust					Collar elev.		metres	Claim.				
Area						Depth drilled:	40·0	metres	Owned by:				
Project:						CASING DATA	HOLE DATA		Operated by:				
Prospect						Wall size in.	Dia 4" from 0 to 40·0		Unit Operator:	Barnett			
Lat ° ' "		Long ° ' "				Dia. (inside) in	Dia. from to		Unit No.	AL 8	Office	Adelaide	
GAMMA RAY						Cased from to mtrs	Dia. from to		ELECTRIC				
	INITIAL RUN	2	3	4		Cored hole ☐	Non-cored hole ☑			1	2	3	4
Logged depth (ft.)	8·8					Sampled Interval	Type		Logged depth				
Range (Full scale)	100 cps					1 metre	Rotary Air		Resist. scale				
Time constant (Sec.)	10% at 1 cps								S.P. scale				
Paper speed cm/m	1					INTERPRETATION DATA			Paper speed				
Logging speed m/min	9					Probe No.	Standard (cps)	K factor	Logging speed				
Bkgnd count (cps)	28					GPA-5	495	$3{\cdot}15 \times 10^{-6}$	Probe size				
Probe No.	GPA-5												
Size (dia.) mm	40								Bias				
Crystal	NaI 1½" x ½"					REMARKS			CALIPER				
Standard (cps)	495					Fluid Level		metres	Logged depth				
Dead time	6			μ sec.					Scale	in/in def			
Amp. Gain (disc)						HOLE FALLEN IN			Paper Speed				
Ratemeter No.									Logging speed				
Bore hole medium	DRY								Arm Length	in			
Mud density									Max. Def.	in.			
Digital readout m.	·2												
Time base (sec)	1												
Upper Disc.													
Lower Disc.													



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HOLE # TUB-99

LOGGING DATA

DATE 12TH JANUARY 1981

LOCATION Tumby Bay	HOLE NUMBER TUB # 99	CLIENT AEMECO
State South Aust.	Collar elev metres	Claim
Area	Depth drilled 53·0 metres	Owned by
Project	CASING DATA / HOLE DATA	Operated by
Prospect	Wall size in / Dia 4" from 0 to 53·0	Unit Operator Barnett
Lat ° ' " / Long ° ' "	Dia (inside) in / Dia from to	Unit No AL 8 / Office Adelaide
	Cased from to mtrs / Dia from to	
	Cored hole ☐ / Non-cored hole ☑	

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft)	46.5			
Range (Full scale)	100 cps			
Time constant (Sec)	10% st dv			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	28			
Probe No	GPA-5			
Size (dia.) mm	40			
Crystal NaI	1½" × 1½"			
Standard (cps)	495			
Dead time µ sec	6			
Amp Gain (disc)				
Ratemeter No				
Bore hole medium	DRY			
Mud density				
Digital readout m.	·2			
Time base (sec)	1			
Upper Disc.				
Lower Disc.				

Sampled Interval	Type
1 metre	Rotary Air

INTERPRETATION DATA

Probe No	Standard (cps)	K factor
GPA-5	495	3.15×10^{-6}

REMARKS

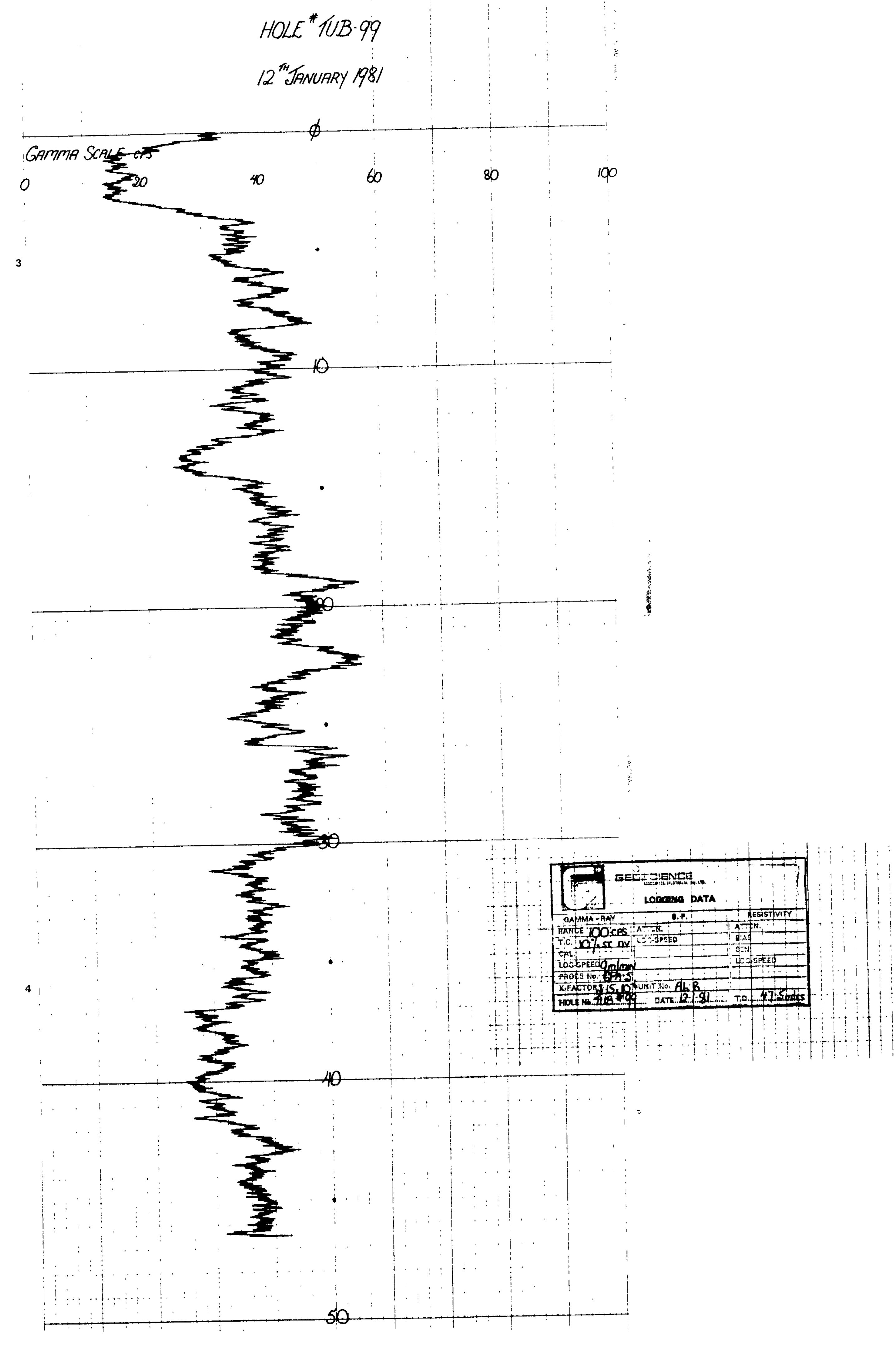
Fluid Level metres

ELECTRIC

	1	2	3	4
Logged depth				
Resist scale				
S P scale				
Paper speed				
Logging speed				
Probe size				
Bias				

CALIPER

Logged depth		
Scale	in/in def	
Paper Speed		
Logging speed		
Arm Length	in	
Max Def	in	



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HOLE # TUB-100

LOGGING DATA

DATE 12th January 1981

LOCATION Tumby Bay
State: South Aust
Area.
Project
Prospect.
Lat ° ' " Long ° ' "

HOLE NUMBER: TUB # 100
Collar elev. metres
Depth drilled: 34.0 metres

CASING DATA	HOLE DATA
Wall size in.	Dia. 4" from 0 to 34.0
Dia (inside) in.	Dia. from to
Cased from to metre	Dia. from to
Cored hole ☐	Non-cored hole ☑

CLIENT: AFMECO
Claim:
Owned by:
Operated by:
Unit Operator: Barnett
Unit No. AL-8 Office: Adelaide

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft.)	32.7			
Range (Full scale)	100 cps			
Time constant (Sec)	10% st dv			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	17			
Probe No	GPA-5			
Size (dia.) mm	40			
Crystal NaI	1½" x ½"			
Standard (cps)	495			
Dead time	6			μ sec.
Amp. Gain (disc)				
Ratemeter No.				
Bore hole medium	DRY			
Mud density				
Digital readout m.	·2			
Time base (sec)	1			
Upper Disc.				
Lower Disc.				

Sampled Interval	Type
1 metre	Rotary Air

INTERPRETATION DATA

Probe No.	Standard (cps)	K factor
GPA-5	495	3.15×10^{-6}

*REMARKS

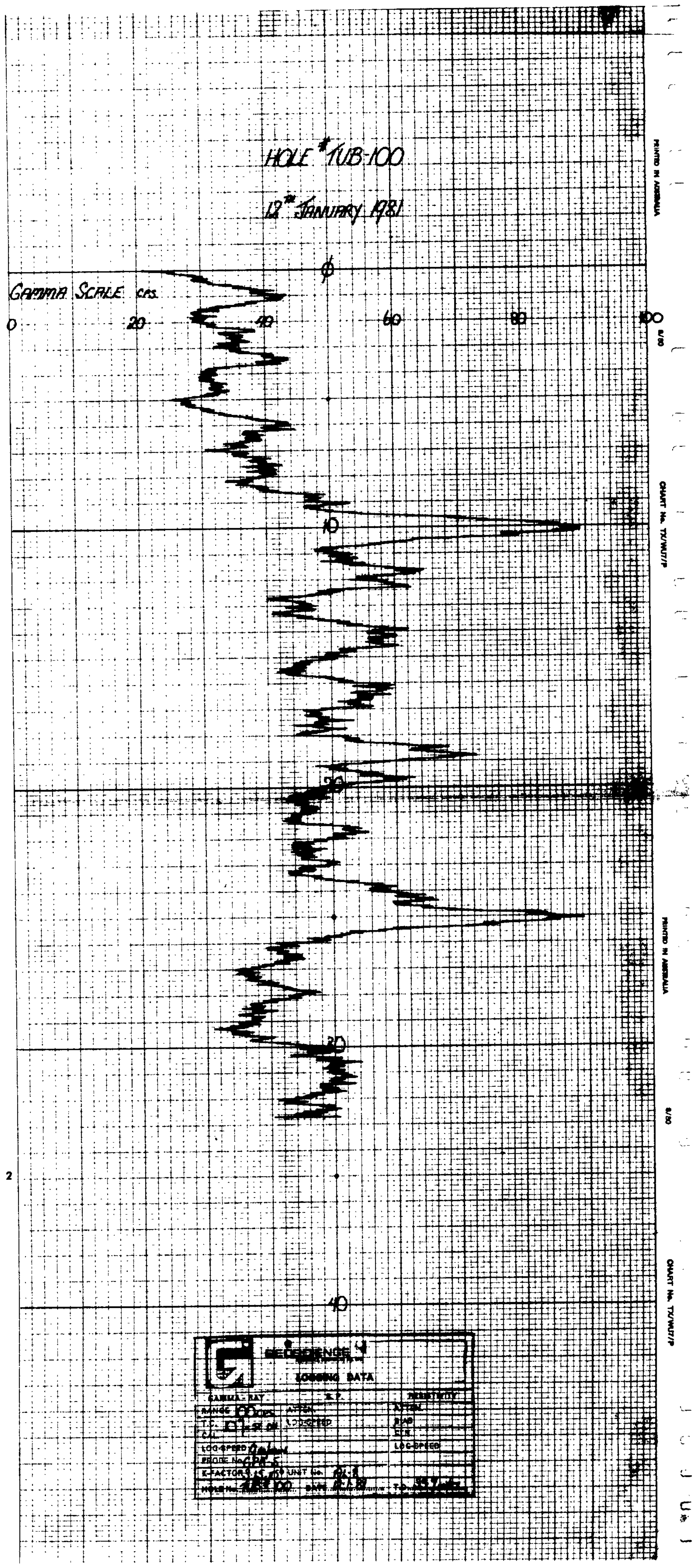
Fluid Level metres

ELECTRIC

	1	2	3	4
Logged depth				
Resist. scale Ω/div				
S.P. scale m.v.				
Paper speed cm/m				
Logging speed m/min				
Probe size				
Bias				

CALIPER

Logged depth				
Scale	in/in. def			
Paper Speed				
Logging speed				
Arm Length	in.			
Max. Def.	in.			



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HOLE # TUB-101

LOGGING DATA

260

DATE 12th January 1981

LOCATION	Tumby Bay
State	South Aust
Area.	
Project:	
Prospect	
Lat ° ' "	Long ° ' "

HOLE NUMBER:	TUB # 101
Collar elev.	metres
Depth drilled:	260 metres

CASING DATA	HOLE DATA
Wall size in	Dia 4" from 0 to 260
Dia (inside) in	Dia from to
Cased from to mtrs	Dia. from to
Cored hole ☐	Non-cored hole ☑

CLIENT:	AFMECO
Claim.	
Owned by:	
Operated by:	
Unit Operator:	Barnett
Unit No. AK 8	Office. Adelaide

GAMMA RAY	INITIAL RUN	2	3	4
Logged depth (ft.)	248			
Range (Full scale)	100 cps			
Time constant (Sec.)	10% St Dv			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	23			
Probe No.	GPA-5			
Size (dia.) mm	40			
Crystal NaI	1½" x ½"			
Standard (cps)	49.5			
Dead time	6			μ sec.
Amp Gain (disc)				
Ratemeter No.				
Bore hole medium	DRY			
Mud density				
Digital readout m.	.2			
Time base (sec)	1			
Upper Disc.				
Lower Disc.				

Sampled Interval	Type
1 metre	Rotary Air

INTERPRETATION DATA

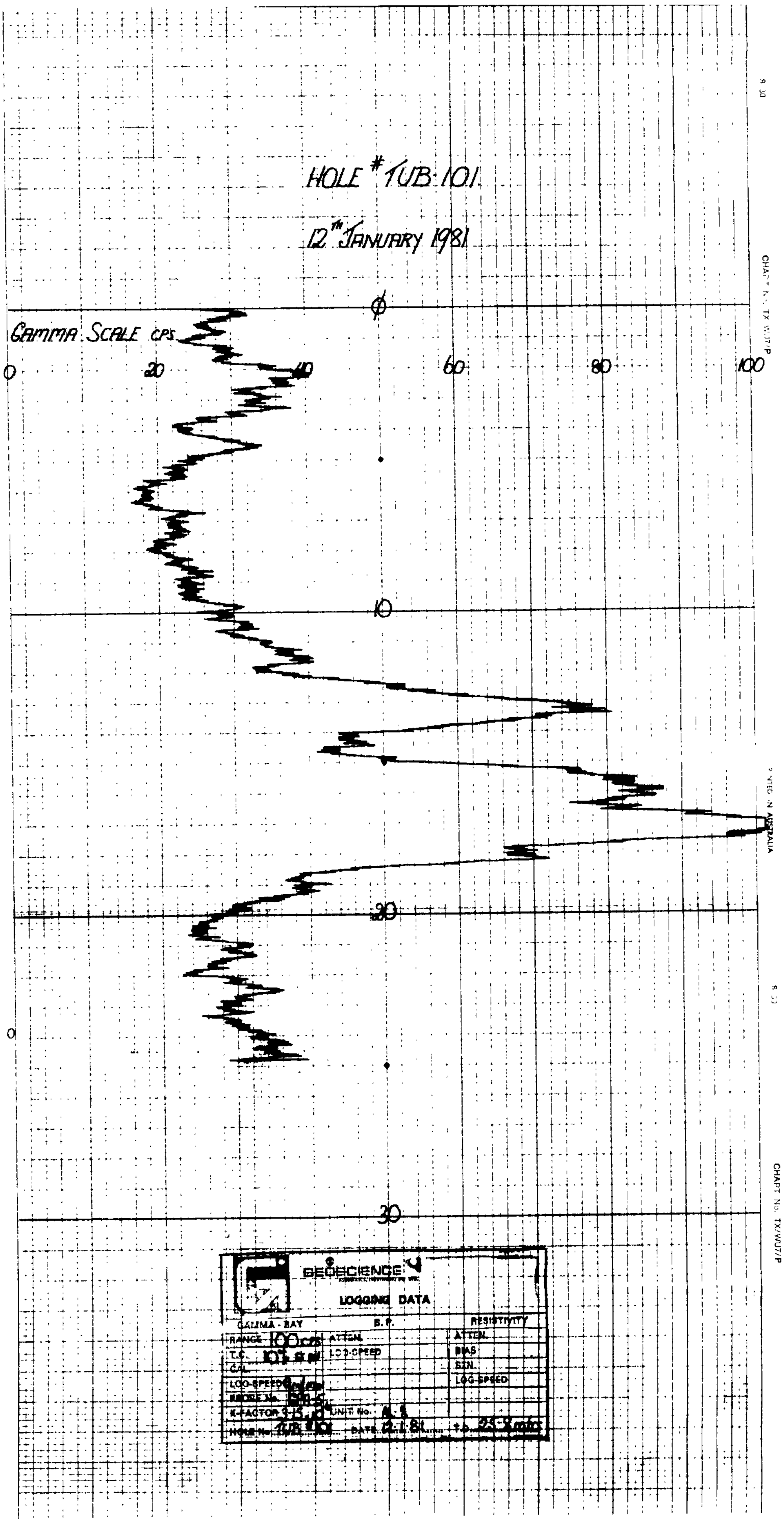
Probe No.	Standard (cps)	K factor
GPA-5	49.5	3.15 x 10⁻⁶

*REMARKS

Fluid Level metres

ELECTRIC	1	2	3	4
Logged depth				
Resist. scale Ω/div				
S.P. scale m.v.				
Paper speed cm/m				
Logging speed m/min				
Probe size				
Bias				

CALIPER				
Logged depth				
Scale in/in def				
Paper Speed				
Logging speed				
Arm Length in				
Max. Def. in.				



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HOLE # TUB-102

269

LOGGING DATA

DATE 12TH JANUARY 1981

LOCATION TUMBY BAY				
State: SOUTH AUST				
Area.				
Project				
Prospect:				
Lat. ° ' "	Long ° ' "			

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft)	36.8			
Range (Full scale)	200 cps			
Time constant (Sec)	10% st dv			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	21			
Probe No.	GPA-5			
Size (dia.) mm	40			
Crystal Na I	1½" x ½"			
Standard (cps)	495			
Dead time	6			μ sec.
Amp. Gain (disc)				
Ratemeter No.				
Bore hole medium	DRY			
Mud density				
Digital readout m.	.2			
Time base (sec)	1			
Upper Disc.				
Lower Disc.				

HOLE NUMBER TUB# 102	
Collar elev.	metres
Depth drilled: 38.0	metres

CASING DATA	HOLE DATA
Wall size in.	Dia. 4" from 0 to 38.0
Dia. (inside) in.	Dia. from to
Cased from to mtrs	Dia. from to
Cored hole ☐	Non-cored hole ☑

Sampled Interval	Type
1 metre	ROTARY AIR

INTERPRETATION DATA

Probe No.	Standard (cps)	K factor
GPA-5	495	3.15×10^{-6}

REMARKS

Fluid Level metres

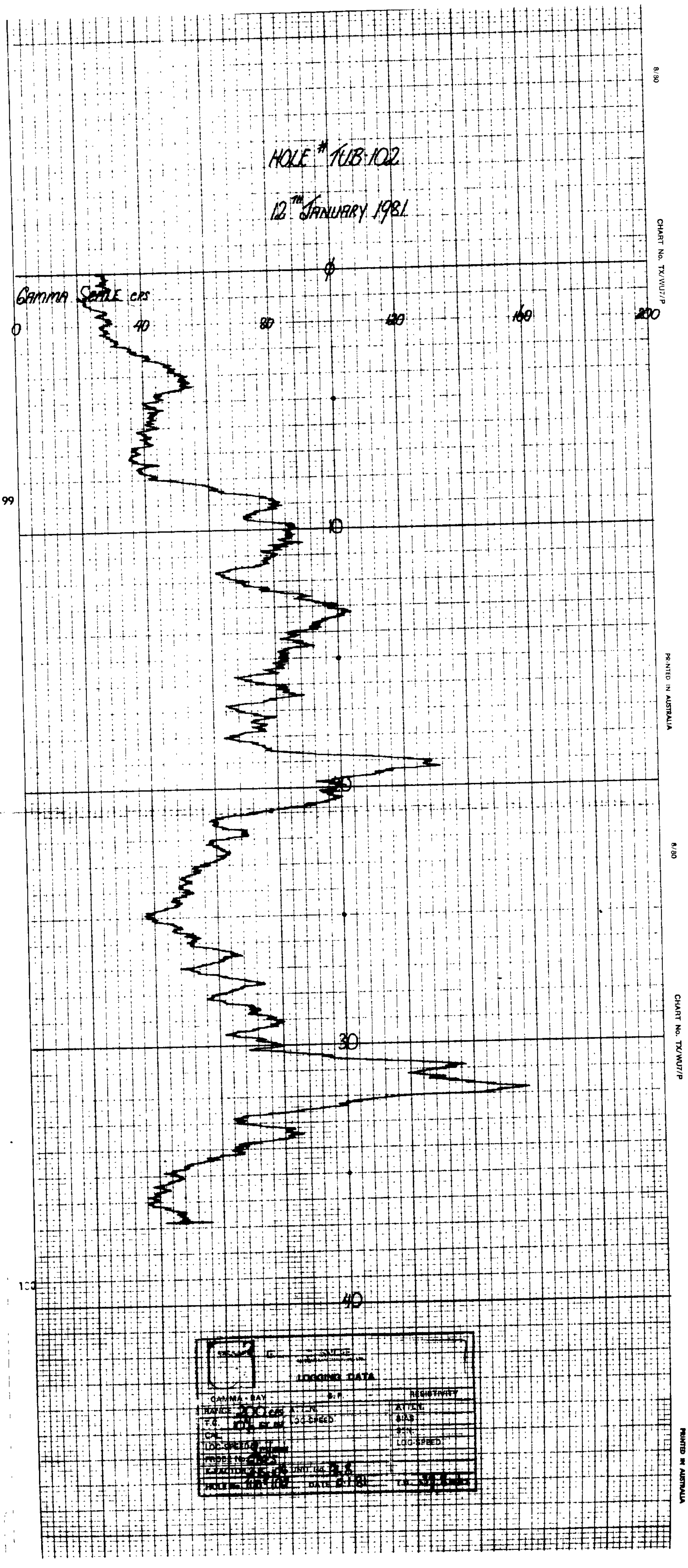
CLIENT. AFMECO	
Claim:	
Owned by.	
Operated by.	
Unit Operator. BARNETT	
Unit No AL 8	Office: ADELAIDE

ELECTRIC

	1	2	3	4
Logged depth				
Resist. scale %/div				
S.P scale m.v.				
Paper speed cm/m				
Logging speed m/min				
Probe size				
Bias				

CALIPER

Logged depth				
Scale in/in def				
Paper Speed				
Logging speed				
Arm Length in				
Max. Def. in.				



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HOLE #TUB-103

270

LOGGING DATA

DATE 13TH JANUARY 1981

LOCATION	TUMBY BAY	HOLE NUMBER: TUB # 103	CLIENT AEMECO
State	SOUTH AUST.	Collar elev. metres	Claim
Area		Depth drilled 230 metres	Owned by:
Project		CASING DATA / HOLE DATA	Operated by:
Prospect		Wall size in. / Dia. 4" from 0 to 230	Unit Operator BARNETT
Lat ° ' "	Long ° ' "	Dia (inside) in. / Dia. from to	Unit No AL 8 Office ADELAIDE
		Cased from to mtrs / Dia. from to	
		Cored hole ☐ / Non-cored hole ☑	

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft)	212			
Range (Full scale)	100 cps			
Time constant (Sec)	10% STDN			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	19			
Probe No	GPA 5			
Size (dia) mm	40			
Crystal NaI	1½ x 1½"			
Standard (cps)	495			
Dead time μ sec.	6			
Amp. Gain (disc)				
Ratemeter No.				
Bore hole medium	DRY			
Mud density				
Digital readout m.	.2			
Time base (sec)	1			
Upper Disc.				
Lower Disc.				

Sampled Interval	Type
1 metre	ROTARY AIR

INTERPRETATION DATA

Probe No	Standard (cps)	K factor
GPA 5	495	3.15 x 10⁻⁶

REMARKS

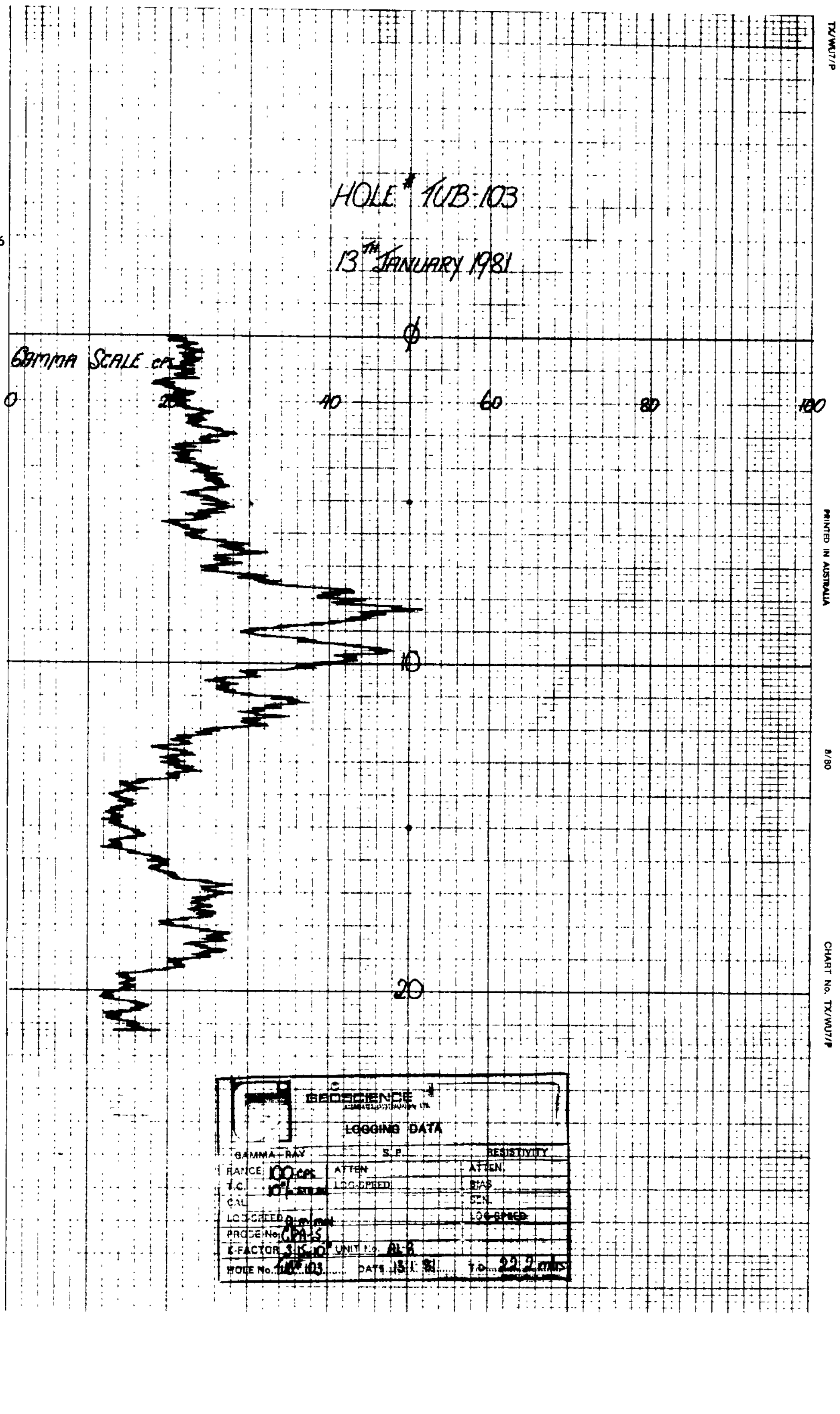
Fluid Level metres

ELECTRIC

	1	2	3	4
Logged depth				
Resist. scale Ω/div				
S.P. scale m.v.				
Paper speed cm/m				
Logging speed m/min				
Probe size				
Bias				

CALIPER

Logged depth			
Scale in/in. def			
Paper Speed			
Logging speed			
Arm Length in			
Max. Def. in.			



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HOLE # TUB-104

LOGGING DATA

27
DATE 13TH JANUARY 1981

LOCATION	TUMBY BAY
State:	SOUTH AUST.
Area	
Project	
Prospect	
Lat ° ' "	Long ° ' "

HOLE NUMBER:	TUB # 104
Collar elev.	metres
Depth drilled:	21.0 metres

CLIENT.	AEMECO
Claim:	
Owned by	
Operated by:	
Unit Operator	BARNETT
Unit No.	AL 8 Office ADELAIDE

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft.)	19.3			
Range (Full scale)	100 cps			
Time constant (Sec.)	10% st.dev.			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	16			
Probe No.	GPA 5			
Size (dia.) mm	40			
Crystal NaI	1½" x 1½"			
Standard (cps)	495			
Dead time	6			μ sec.
Amp. Gain (disc)				
Ratemeter No.				
Bore hole medium	DRY			
Mud density				
Digital readout m.	.2			
Time base (sec)	1			
Upper Disc.				
Lower Disc.				

CASING DATA

Wall size	in.
Dia. (inside)	in.
Cased from to	mtrs
Cored hole ☐	

HOLE DATA

Dia. 4" from 0 to 21.0	
Dia. from to	
Dia. from to	
Non-cored hole ☑	

Sampled Interval	Type
1 metre	ROTARY AIR

INTERPRETATION DATA

Probe No.	Standard (cps)	K factor
GPA-5	495	3.15×10^{-6}

REMARKS

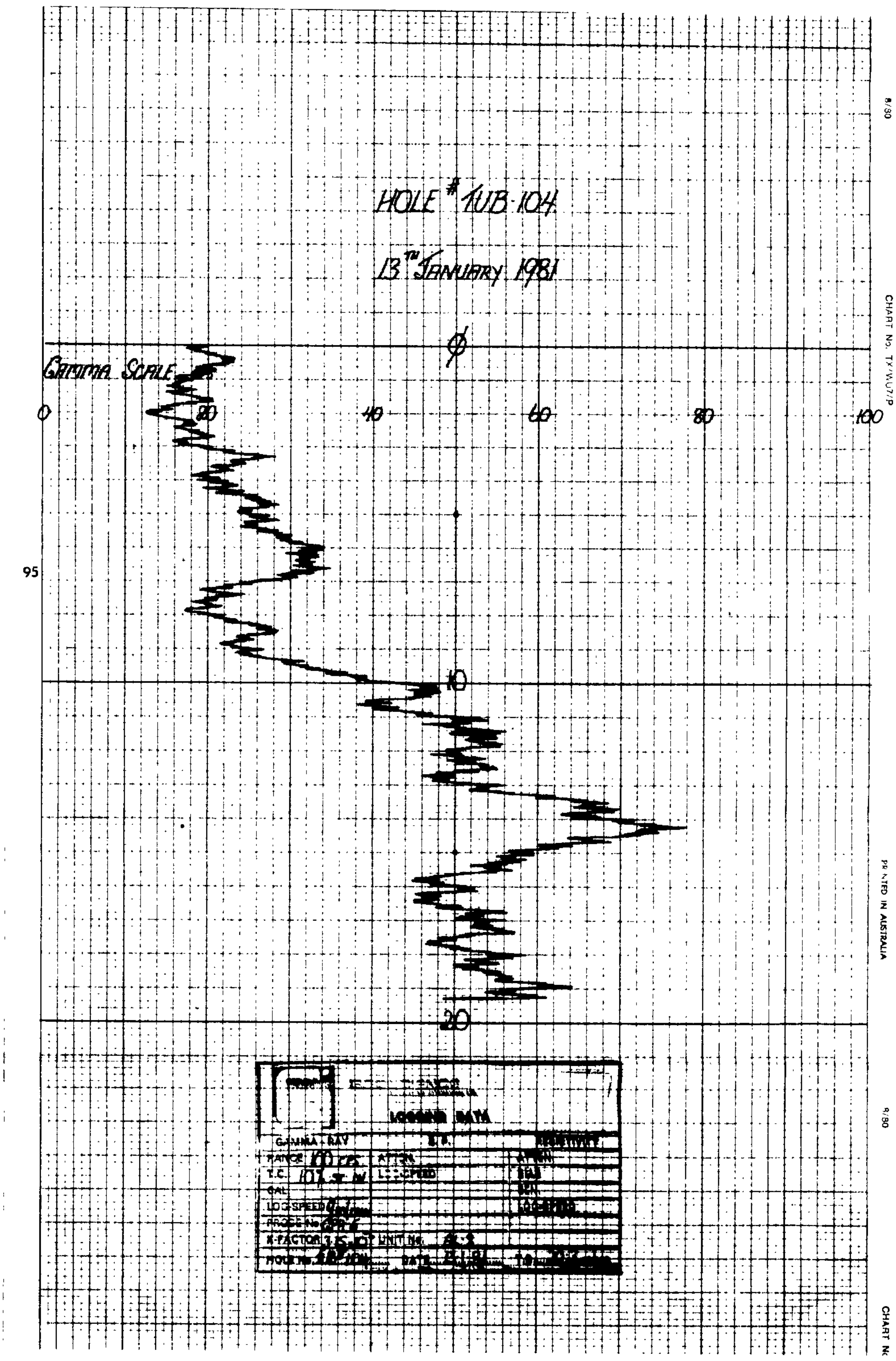
Fluid Level metres

ELECTRIC

	1	2	3	4
Logged depth				
Resist. scale ω/div				
S.P. scale m.v.				
Paper speed cm/m				
Logging speed m/min				
Probe size				
Bias				

CALIPER

Logged depth				
Scale	in./in. def			
Paper Speed				
Logging speed				
Arm Length	in			
Max. Def.	in			



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HOLE # TUB 105

LOGGING DATA

27..

DATE 13th January 1981

LOCATION	Tumby Bay
State.	South Aust
Area.	
Project	
Prospect.	
Lat ° ' "	Long ° ' "

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft.)	14.7			
Range (Full scale)	100 cps			
Time constant (Sec.)	10% st. dv			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	19			
Probe No.	GPA-5			
Size (dia.) mm	40			
Crystal NaI	1½" x ½"			
Standard (cps)	495			
Dead time	6			µ sec.
Amp. Gain (disc)				
Ratemeter No.				
Bore hole medium	DRY			
Mud density				
Digital readout m.	.2			
Time base (sec)	1			
Upper Disc.				
Lower Disc.				

HOLE NUMBER.	TUB# 105
Collar elev.	metres
Depth drilled.	16.0 metres

CASING DATA		HOLE DATA
Wall size	in.	Dia. 4" from 0 to 16.0
Dia (inside)	in	Dia. from to
Cased from to	mtrs	Dia. from to
Cored hole ☐		Non-cored hole ☑

Sampled Interval	Type
1 metre	Rotary Air

INTERPRETATION DATA

Probe No.	Standard (cps)	K factor
GPA-5	495	3.15×10^{-6}

*REMARKS

Fluid Level metres

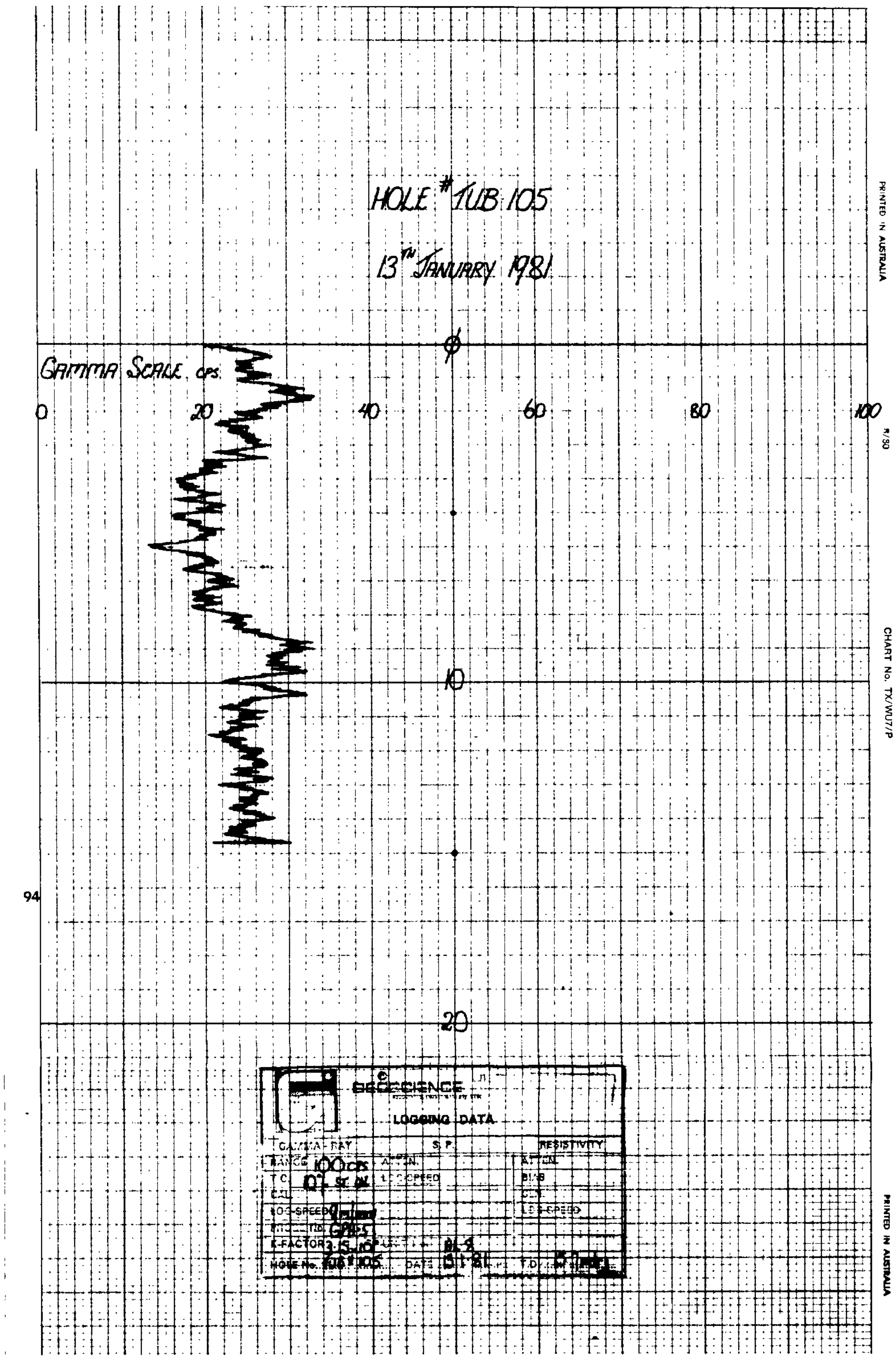
CLIENT.	AFMECO
Claim.	
Owned by:	
Operated by.	
Unit Operator:	Barnett
Unit No.	AL-8 Office Adelaide

ELECTRIC

	1	2	3	4
Logged depth				
Resist. scale Ω/div				
S.P scale m.v.				
Paper speed cm/m				
Logging speed m/min				
Probe size				
Bias				

CALIPER

	1	2	3	4
Logged depth				
Scale	in/in def			
Paper Speed				
Logging speed				
Arm Length	in.			
Max. Def.	in.			



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HOLE # TUB-106

LOGGING DATA

273

DATE 13TH JANUARY 1981

LOCATION	TUMBY BAY
State	SOUTH AUST
Area.	
Project	
Prospect	
Lat ° ' "	Long ° ' "

HOLE NUMBER	TUB# 106
Collar elev	metres
Depth drilled	18.0 metres

CLIENT	AEMECO
Claim.	
Owned by	
Operated by:	
Unit Operator.	BARNETT
Unit No	AL 8 — Office: ADELAIDE

CASING DATA		HOLE DATA	
Wall size	in.	Dia. 4" from 0 to 18.0	
Dia. (inside)	in	Dia from to	
Cased from to	mtrs	Dia from to	
Cored hole ☐		Non-cored hole ☑	

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft)	16.5			
Range (Full scale)	100 cps.			
Time constant (Sec)	10% st. dv			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	17			
Probe No	GPA-5			
Size (dia.) mm	40			
Crystal NaI	1½" x ½"			
Standard (cps)	495			
Dead time	6			µ sec.
Amp Gain (disc)				
Ratemeter No.				
Bore hole medium	DRY			
Mud density				
Digital readout m.	.2			
Time base (sec)	1			
Upper Disc.				
Lower Disc.				

Sampled Interval	Type
1 metre	ROTARY AIR

INTERPRETATION DATA

Probe No.	Standard (cps)	K factor
GPA-5	495	3.15×10^{-6}

***REMARKS**

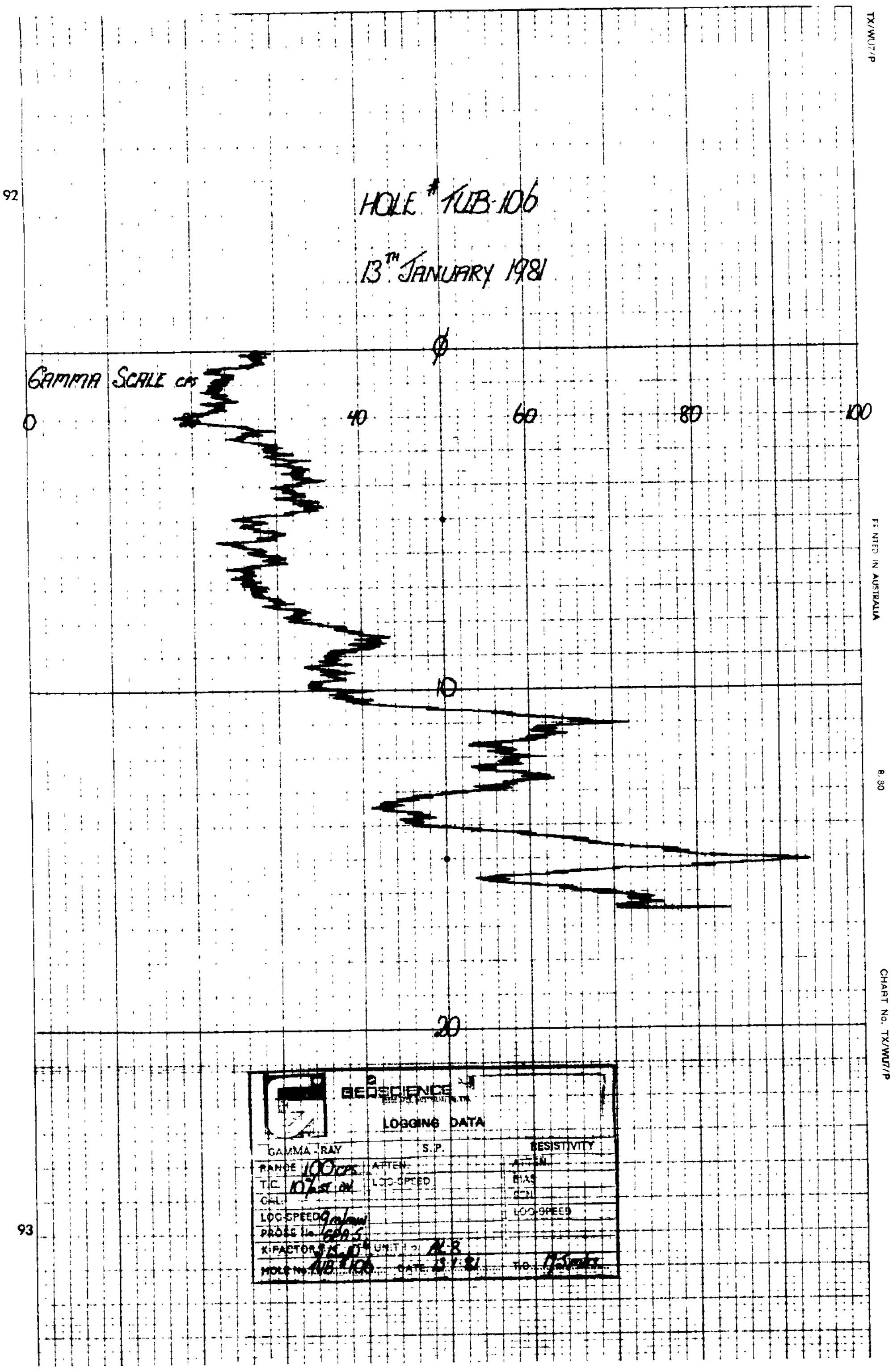
Fluid Level metres

ELECTRIC

	1	2	3	4
Logged depth				
Resist scale Ω/div				
S.P. scale m.v.				
Paper speed cm/m				
Logging speed m/min				
Probe size				
Bias				

CALIPER

Logged depth				
Scale	in/in. def			
Paper Speed				
Logging speed				
Arm Length	in			
Max. Def.	in			



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HOLE # TUB-107

LOGGING DATA

DATE 13TH JANUARY 1981

LOCATION	Tumby Bay							
State	South Aust.							
Area.								
Project								
Prospect								
Lat ° ' "		Long ° ' "						

HOLE NUMBER: TUB# 107	
Collar elev. metres	
Depth drilled. 34.0 metres	
CASING DATA	**HOLE DATA**
Wall size in	Dia. 4" from 0 to 34.0
Dia. (inside) in	Dia. from to
Cased from to mtrs	Dia. from to
Cored hole ☐	Non-cored hole ☑
Sampled Interval	Type
1 metre	Rotary Air

CLIENT. AEMECO
Claim.
Owned by
Operated by:
Unit Operator Barnett
Unit No AL-8 Office: Adelaide

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft.)	26.0			
Range (Full scale)	100 cps			
Time constant (Sec.)	10% st. dev			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	17			
Probe No.	GPA-5			
Size (dia.) mm	40			
Crystal NaI	1½" x ½"			
Standard (cps)	495			
Dead time	6			μ sec.
Amp. Gain (disc)				
Ratemeter No.				
Bore hole medium	H_2O			
Mud density				
Digital readout m.	.2m			
Time base (sec)	1 sec			
Upper Disc.				
Lower Disc.				

INTERPRETATION DATA

Probe No.	Standard (cps)	K factor
GPA-5	495	3.15×10^{-6}

REMARKS

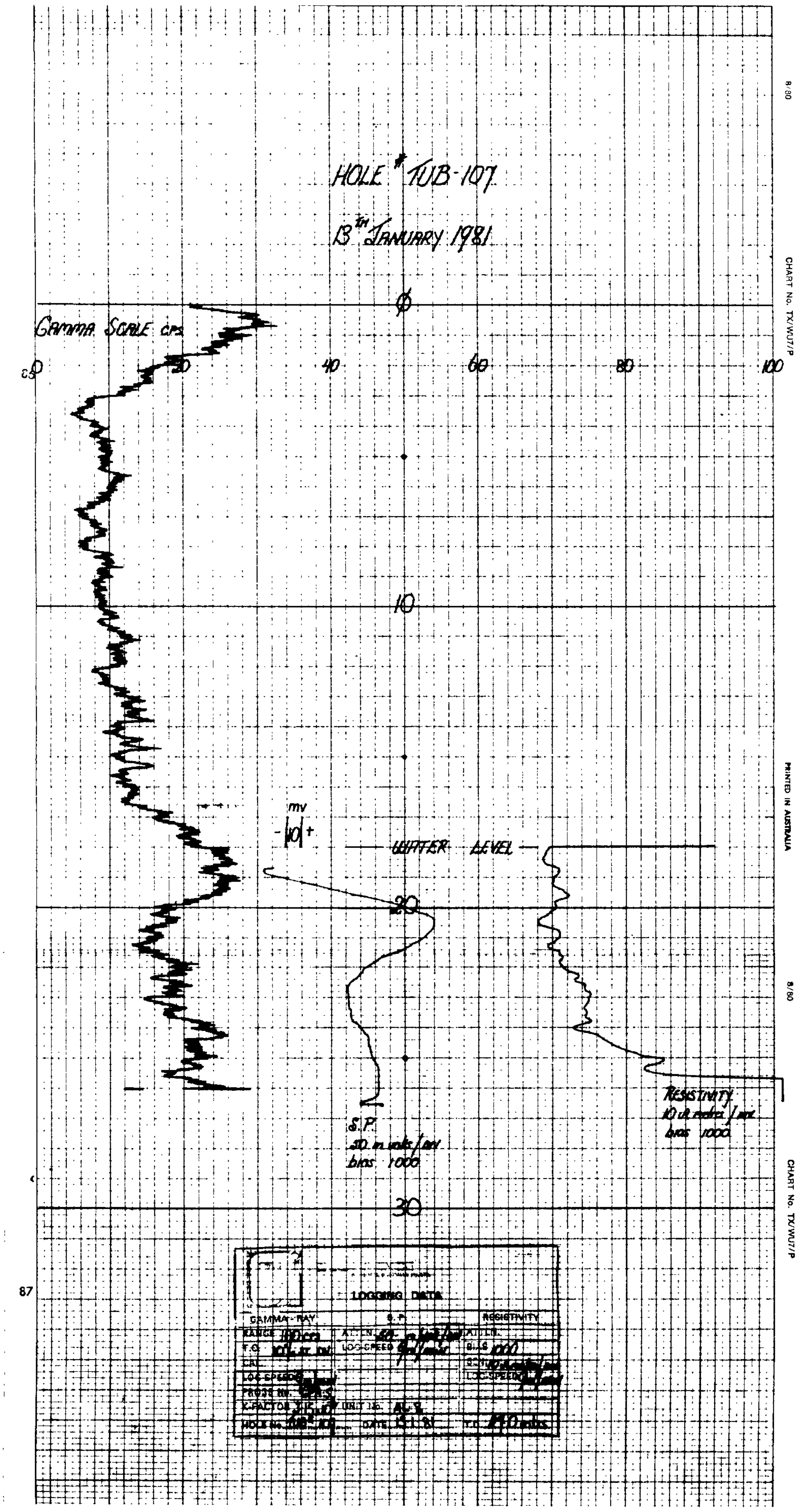
Fluid Level metres

ELECTRIC

	1	2	3	4
Logged depth	77	77		
Resist scale Ωm/div	10			
S.P. scale m.v.		50		
Paper speed cm/m	1	1		
Logging speed m/min	9	9		
Probe size	40 mm	40mm		
Bias	1000	1000		

CALIPER

Logged depth				
Scale	in/in def			
Paper Speed				
Logging speed				
Arm Length	in			
Max. Def.	in			



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HOLE # TUB-108

270

LOGGING DATA

DATE 13th January 1981

LOCATION	Tumby Bay
State:	South Aust
Area:	
Project:	
Prospect.	
Lat. ° ′ ″	Long ° ′ ″

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft.)	24·8			
Range (Full scale)	100 cps			
Time constant (Sec)	10% st dev			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	16			
Probe No	GPA-5			
Size (dia.) mm	40			
Crystal NaI	1½"x½"			
Standard (cps)	495			
Dead time	6			μ sec.
Amp. Gain (disc)				
Ratemeter No.				
Bore hole medium	DRY			
Mud density				
Digital readout m.	·2			
Time base (sec)	1			
Upper Disc.				
Lower Disc.				

HOLE NUMBER:	TUB # 108
Collar elev.	metres
Depth drilled:	280 metres

CASING DATA	HOLE DATA
Wall size in.	Dia. 4" from 0 to 280
Dia. (inside) in.	Dia. from to
Cased from to mtrs	Dia. from to
Cored hole ☐	Non-cored hole ☑

Sampled Interval	Type
1 metre	Rotary Air

INTERPRETATION DATA

Probe No.	Standard (cps)	K factor
GPA-5	495	3.15×10^{-6}

REMARKS

Fluid Level metres

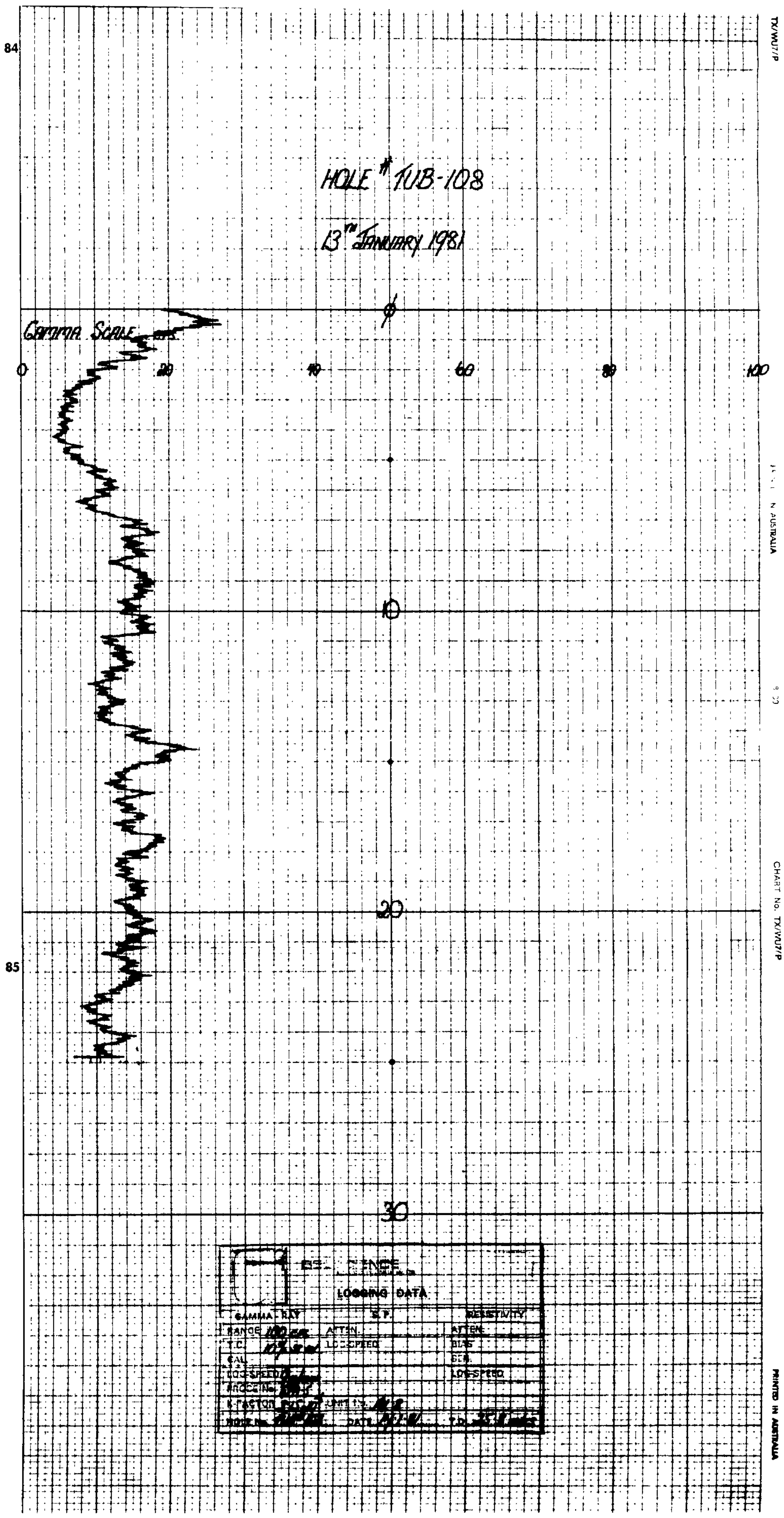
CLIENT.	AFMECO
Claim:	
Owned by:	
Operated by:	
Unit Operator	Barnett
Unit No.	AL8
Office	Adelaide

ELECTRIC

	1	2	3	4
Logged depth				
Resist. scale Ω/div				
S.P. scale m.v.				
Paper speed cm/m				
Logging speed m/min				
Probe size				
Bias				

CALIPER

Logged depth				
Scale	in/in def			
Paper Speed				
Logging speed				
Arm Length	in.			
Max. Def.	in			



GEOSCIENCE ASSOCIATES (AUSTRALIA) pty LTD
P.O. Box 230
Kilkenny, S.A. 5009
Phone 268 2866

HOLE # TUB-109

LOGGING DATA

270

DATE 13TH JANUARY 1981

LOCATION	TUMBY BAY
State	SOUTH AUST
Area	
Project	
Prospect	
Lat ° ' "	Long ° ' "

GAMMA RAY	INITIAL RUN	2	3	4
Logged depth (ft.)	26.9			
Range (Full scale)	100 cps			
Time constant (Sec)	10% st. dv			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	22			
Probe No	GPA 5			
Size (dia) mm	40			
Crystal	NaI 1½" x 1½"			
Standard (cps)	495			
Dead time μ sec.	6			
Amp Gain (disc)				
Ratemeter No.				
Bore hole medium	DRY			
Mud density				
Digital readout m.	2			
Time base (sec)	1			
Upper Disc.				
Lower Disc.				

HOLE NUMBER	TUB # 109
Collar elev	metres
Depth drilled	28.0 metres

CASING DATA		HOLE DATA	
Wall size	in	Dia. 4" from 0 to 28.0	
Dia (inside)	in	Dia. from to	
Cased from to	mtrs	Dia from to	
Cored hole ☐		Non-cored hole ☑	

Sampled Interval	Type
1 metre	ROTARY AIR.

INTERPRETATION DATA

Probe No.	Standard (cps)	K factor
GPA 5	495	3.65×10^{-6}

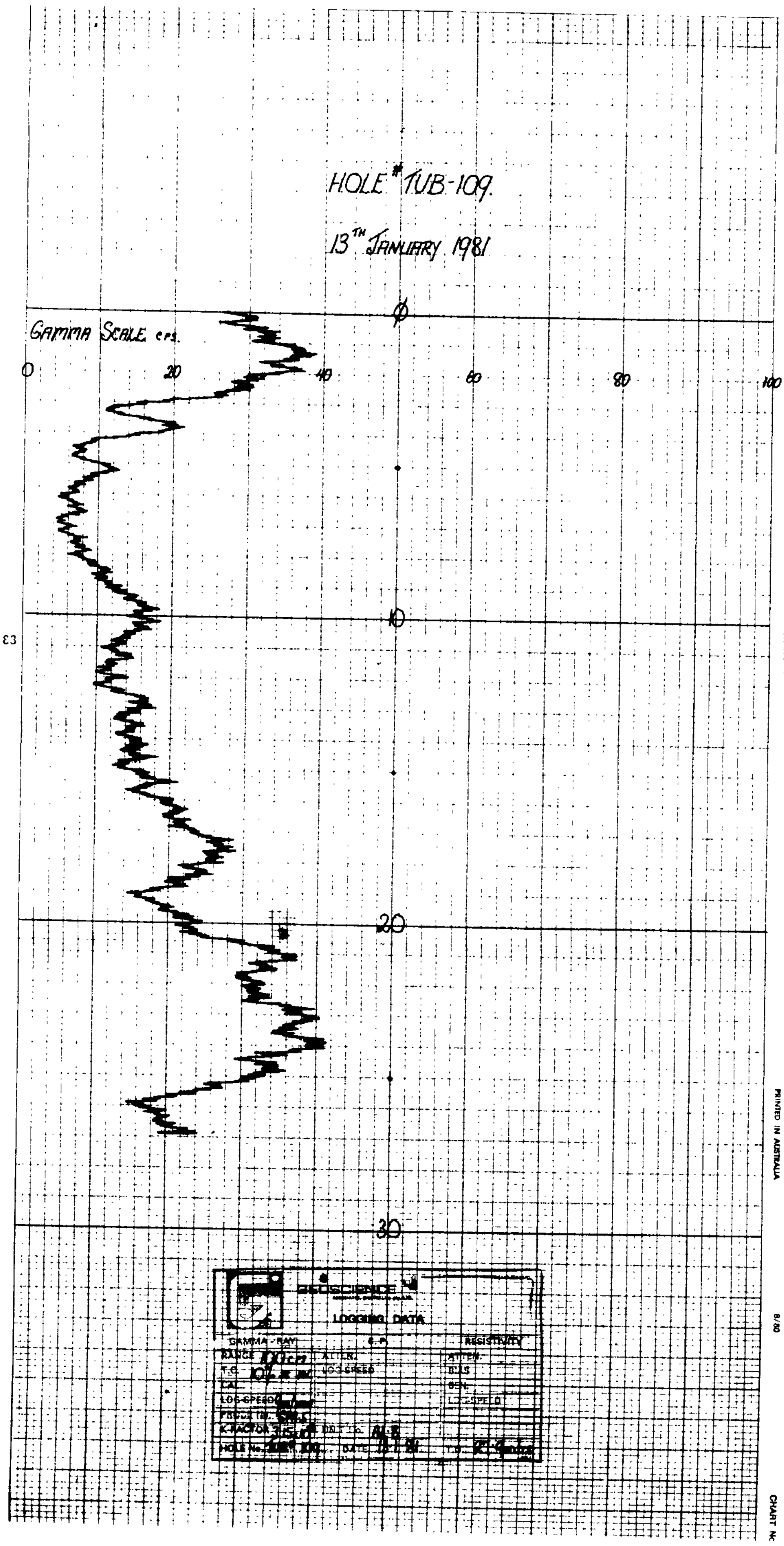
REMARKS

Fluid Level metres

CLIENT.	AEMECO
Claim	
Owned by	
Operated by	
Unit Operator	BARNETT
Unit No	AL 8
Office	ADELAIDE

ELECTRIC	1	2	3	4
Logged depth				
Resist. scale				
S.P. scale				
Paper speed				
Logging speed				
Probe size				
Bias				

CALIPER				
Logged depth				
Scale in/in def				
Paper Speed				
Logging speed				
Arm Length in				
Max. Def. in				



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P O Box 239
Kilkenny S.A 5009
Phone 268 2898

HOLE # TUB-110

277

LOGGING DATA

DATE 13TH JANUARY 1981

LOCATION TUMBY BAY
State SOUTH AUST
Area
Project
Prospect
Lat ° ' " Long ° ' "

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft)	21.7			
Range (Full scale)	100 cps			
Time constant (Sec)	10% ST. DV.			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	16			
Probe No	GPA-5			
Size (dia.) mm	40			
Crystal NaI	1½" x ½"			
Standard (cps)	495			
Dead time μ sec	6			
Amp Gain (disc)				
Ratemeter No				
Bore hole medium	DRY			
Mud density				
Digital readout m.	.2m			
Time base (sec)	1			
Upper Disc.				
Lower Disc.				

HOLE NUMBER: TUB # 110
Collar elev. metres
Depth drilled 24.0 metres

CASING DATA	HOLE DATA
Wall size in.	Dia. 4" from 0 to 24.0
Dia (inside) in	Dia from to
Cased from to mtrs	Dia from to
Cored hole ☐	Non-cored hole ☑

Sampled Interval	Type
1 metre	ROTARY AIR

INTERPRETATION DATA

Probe No	Standard (cps)	K factor
GPA-5	495	3.15 x 10⁻⁶

*REMARKS
Fluid Level metres

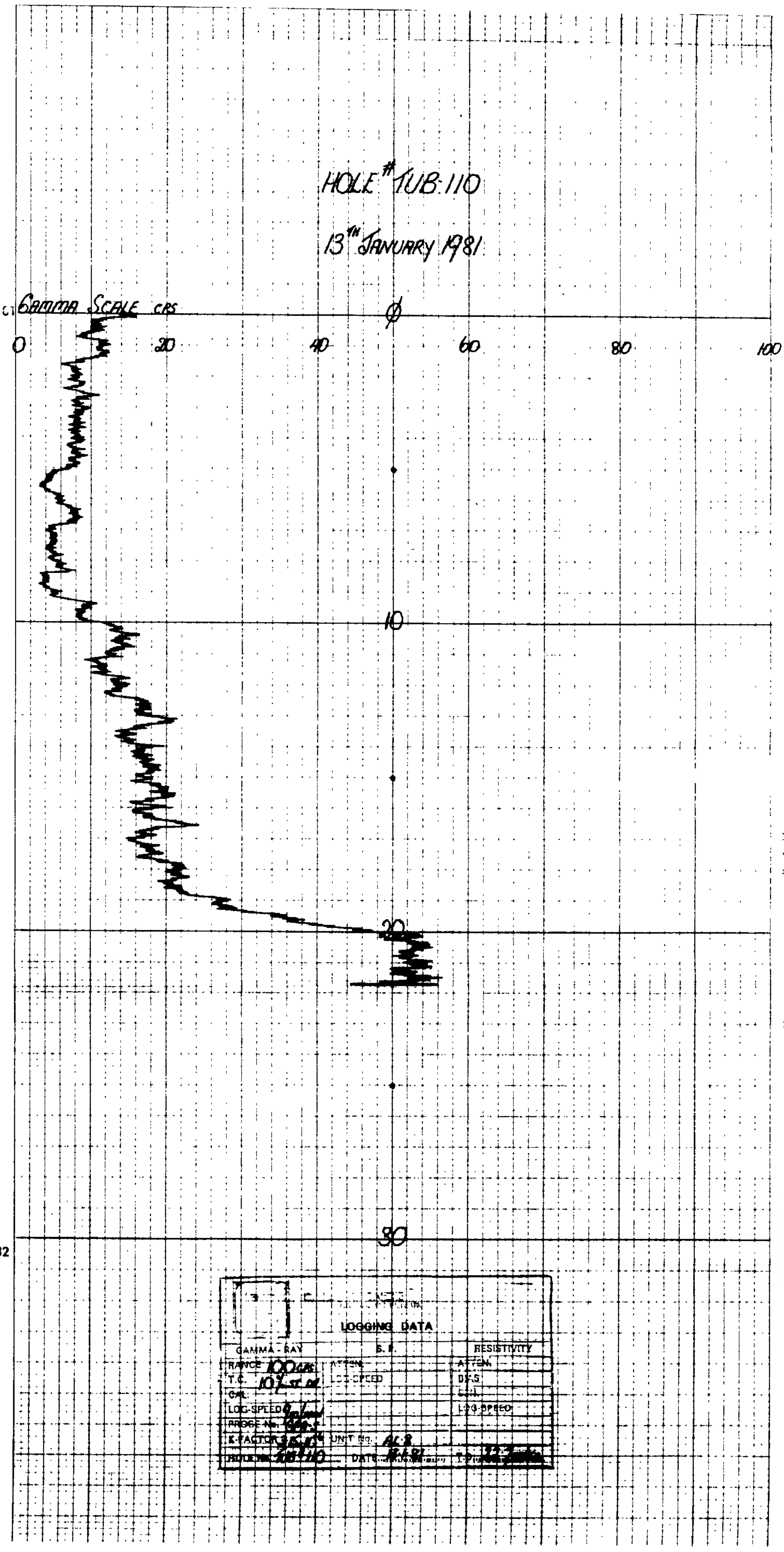
CLIENT: AFMECO
Claim
Owned by
Operated by
Unit Operator BARNETT
Unit No AL 8 Office ADELAIDE

ELECTRIC

	1	2	3	4
Logged depth				
Resist. scale				
S.P scale				
Paper speed				
Logging speed				
Probe size				
Bias				

CALIPER

Logged depth				
Scale in/in def				
Paper Speed				
Logging speed				
Arm Length in				
Max Def. in				



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Phone: 268 2988

HOLE # TUB-111

270

LOGGING DATA

DATE 13TH JANUARY 1981

LOCATION TUMBY BAY		HOLE NUMBER TUB# 111		CLIENT AFMECO	
State SOUTH AUST		Collar elev.	metres	Claim	
Area		Depth drilled 24.0	metres	Owned by:	
Project		CASING DATA	HOLE DATA	Operated by:	
Prospect		Wall size in.	Dia 4" from 0 to 24.0	Unit Operator BARNETT	
Lat	Long	Dia. (inside) in	Dia from to	Unit No AL 8	Office ADELAIDE
		Cased from to mtrs	Dia. from to		
		Cored hole ☐	Non-cored hole ☑		

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft)	19			
Range (Full scale)	200 cps.			
Time constant (Sec)	10% std dev			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	16			
Probe No	GPA-5			
Size (dia) mm	40			
Crystal NaI	1½" x ½"			
Standard (cps)	495			
Dead time	6			μ sec.
Amp Gain (disc)				
Ratemeter No.				
Bore hole medium	H_2O			
Mud density				
Digital readout m.	.2			
Time base (sec)	1			
Upper Disc.				
Lower Disc.				

Sampled Interval	Type
1 metre	ROTARY AIR

INTERPRETATION DATA

Probe No.	Standard (cps)	K factor
GPA-5	495	3.65×10^{-6}

REMARKS

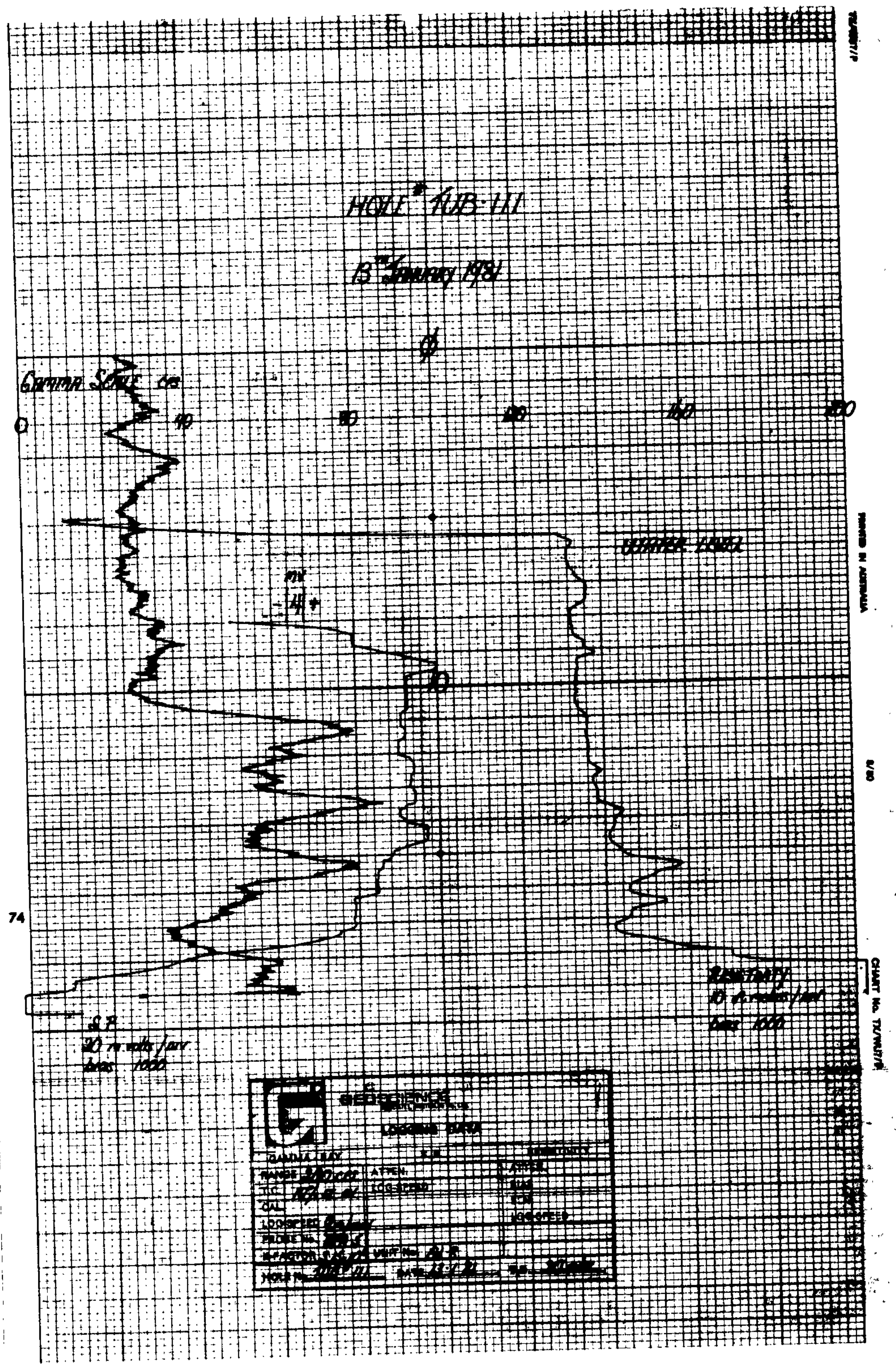
Fluid Level 5.6 metres

ELECTRIC

	1	2	3	4
Logged depth	12.8	11.0		
Resist. scale Ω/div	10			
S.P. scale mV		20		
Paper speed cm/m	1	1		
Logging speed m/min	9	9		
Probe size	40mm	40mm		
Bias	1000	1000		

CALIPER

Logged depth				
Scale in/in def				
Paper Speed				
Logging speed				
Arm Length in.				
Max. Def. in.				



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HOLE # TUB-112

LOGGING DATA

279

DATE 14TH JANUARY 1981

LOCATION	TUMBY BAY			
State	South Aust.			
Area				
Project				
Prospect				
Lat ° '	Long ° '			

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft)	8.4			
Range (Full scale)	100 cps			
Time constant (Sec)	10 @ 5T DV			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	23			
Probe No	GPA-5			
Size (dia) mm	40			
Crystal				
Standard (cps)	505			
Dead time μ sec.				
Amp Gain				
Ratemeter No.				
Bore hole medium	DRY			
Mud density				
Digital readout				
Time base (sec)				
Upper Disc.				
Lower Disc.				

HOLE NUMBER	TUB # 112
Collar elev	metres
Depth drilled	metres

CASING DATA / **HOLE DATA**

Wall size in	Dia 4" from 0 to 12
Dia (inside) in	Dia from to
Cased from to mtrs	Dia from to
Cored hole ☐	Non-cored hole ☑

Sampled Interval: 1 metre — Type: ROTARY AIR

INTERPRETATION DATA

Probe No	Standard (cps)	K factor
GPA-5	505	3.15×10^{-6}

REMARKS

Fluid Level metres

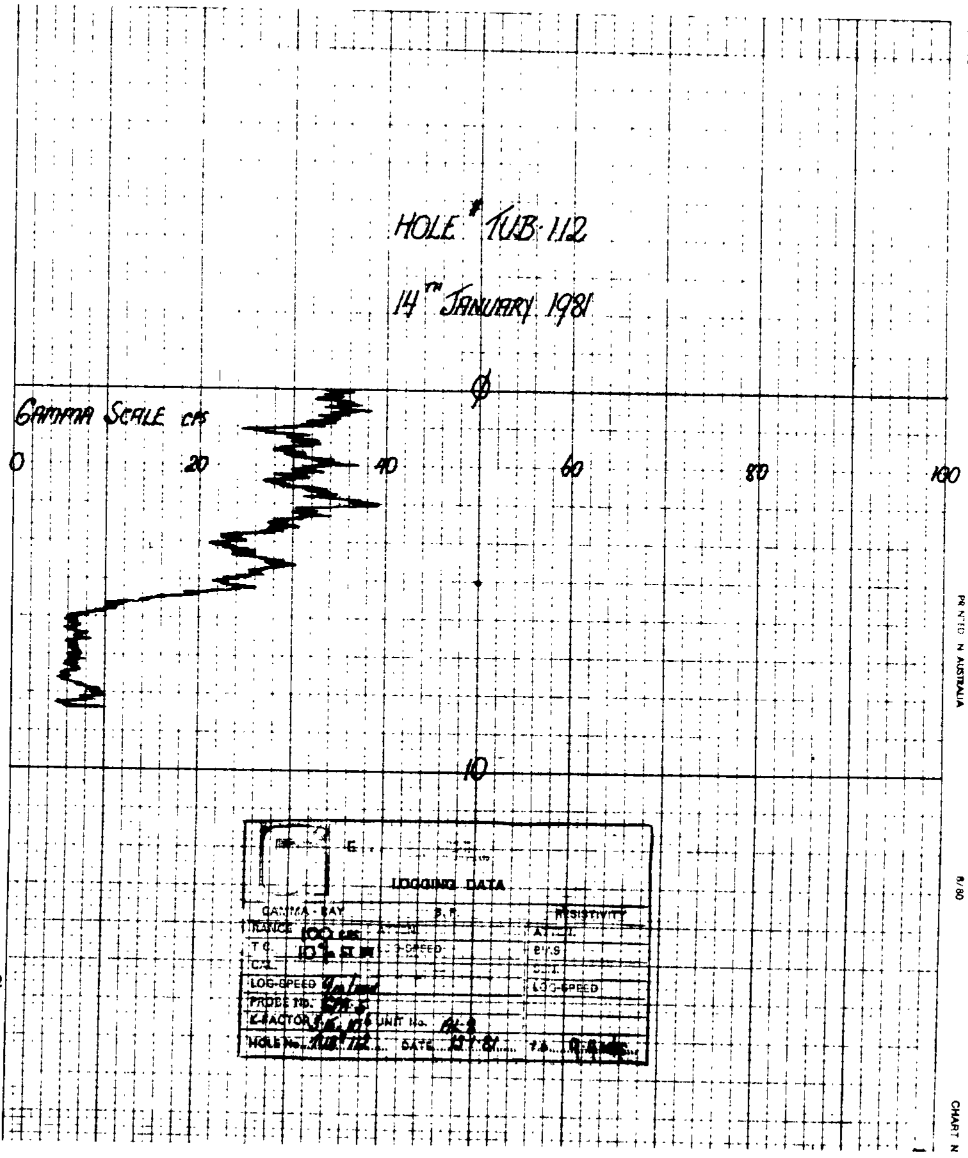
CLIENT	AFMECO
Claim	
Owned by	
Operated by	
Unit Operator	BARNETT
Unit No.	AL 5 — Office ADELAIDE

ELECTRIC

	1	2	3	4
Logged depth				
Resist scale				
S.P. scale				
Paper speed				
Logging speed				
Probe size				
Bias				

CALIPER

Logged depth	
Scale	in/in def
Paper Speed	
Logging speed	
Arm Length	in
Max Def.	in



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Phone: 268 2888

HOLE # TUB-114

LOGGING DATA

DATE 14TH JANUARY 1981.

LOCATION	TUMBY BAY				
State	SOUTH AUST				
Area					
Project					
Prospect					
Lat ° ' "	Long ° ' "				
GAMMA RAY					
	INITIAL RUN	2	3	4	
Logged depth (ft.)	12.7				
Range (Full scale)	100 cps.				
Time constant (Sec)	10% st. dv				
Paper speed cm/m	1				
Logging speed m/min	9				
Bkgnd count (cps)	25				
Probe No	GPA-5				
Size (dia) mm	40				
Crystal NaI	1½" x ½"				
Standard (cps)	505				
Dead time	6			μ sec.	
Amp Gain (disc)					
Ratemeter No					
Bore hole medium	DRY				
Mud density					
Digital readout m.	·2				
Time base (sec)	1				
Upper Disc.					
Lower Disc.					

HOLE NUMBER	TUB# 114
Collar elev	metres
Depth drilled.	14·0 metres
CASING DATA	**HOLE DATA**
Wall size in.	Dia. 4" from 0 to 14.0
Dia (inside) in	Dia from to
Cased from to mtrs	Dia from to
Cored hole ☐	Non-cored hole ☑
Sampled Interval: 1 metre	Type: ROTARY AIR.

INTERPRETATION DATA

Probe No	Standard (cps)	K factor
GPA-5	505	2.15×10^{-6}

REMARKS

Fluid Level metres

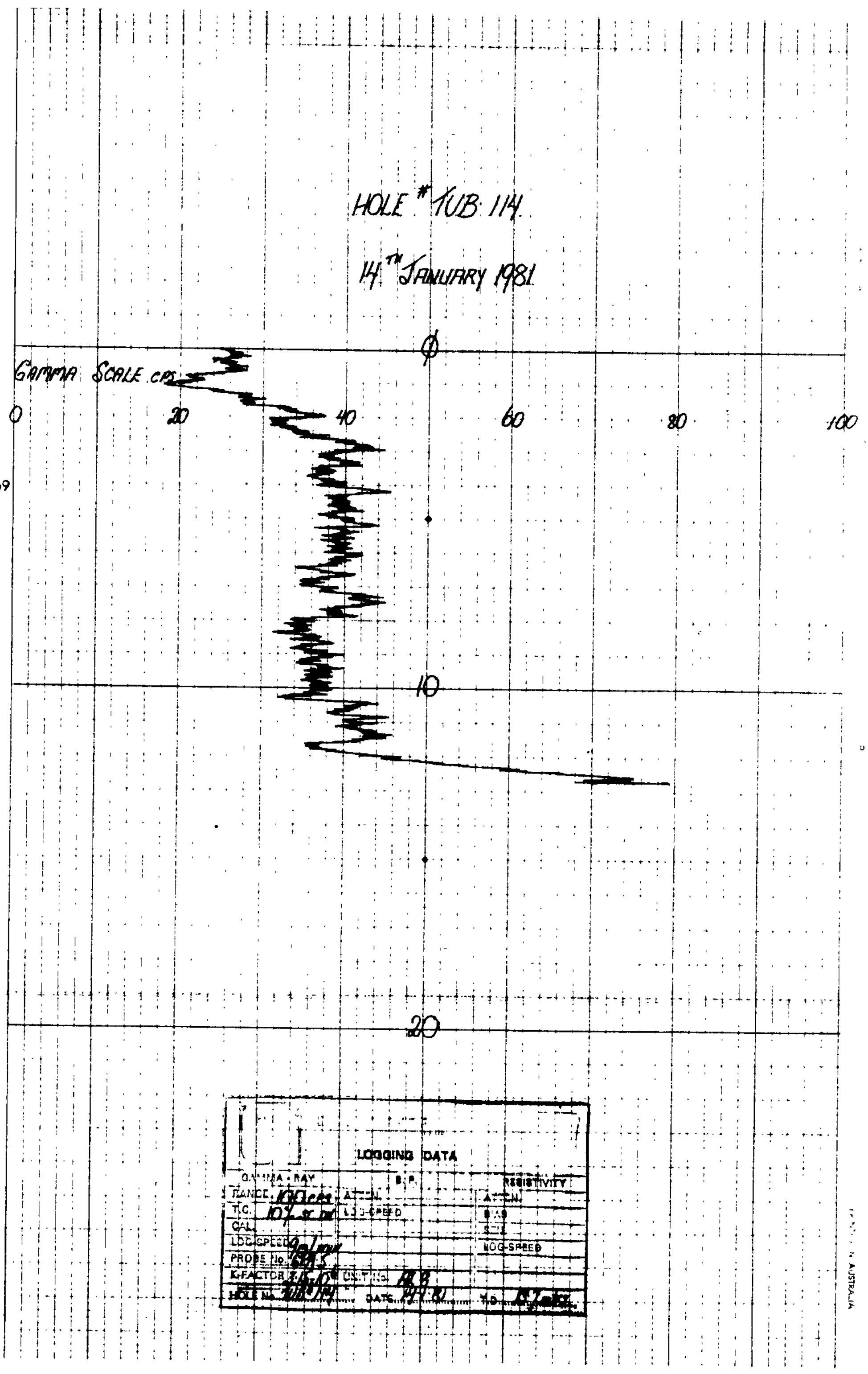
CLIENT	AEMECO
Claim.	
Owned by	
Operated by	
Unit Operator	BARNETT
Unit No.	AL-8
Office	ADELAIDE

ELECTRIC

	1	2	3	4
Logged depth				
Resist scale				
S P scale				
Paper speed				
Logging speed				
Probe size				
Bias				

CALIPER

Logged depth	
Scale	in/in def
Paper Speed	
Logging speed	
Arm Length	in
Max. Def.	in



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Phone 268 2898

HOLE # TUB-115

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LOGGING DATA

DATE 14TH JANUARY 1981

LOCATION TUMBY BAY	HOLE NUMBER TUB# 115	CLIENT AEMECO
State SOUTH AUST	Collar elev metres	Claim
Area	Depth drilled 19.0 metres	Owned by
Project	CASING DATA / HOLE DATA	Operated by
Prospect	Wall size in / Dia 4" from 0 to 19.0	Unit Operator BARNETT
Lat ° ' " / Long ° ' "	Dia (inside) in / Dia from to	Unit No AL8 / Office ADELAIDE

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft)	17.3			
Range (Full scale)	100 cps			
Time constant (Sec)	10% st dv			
Paper speed cm/m	5			
Logging speed m/min	9			
Bkgnd count (cps)	23			
Probe No	GPA-5			
Size (dia) mm	40			
Crystal	NaI 1½" x 2"			
Standard (cps)	505			
Dead time μ sec	6			
Amp Gain (disc)				
Ratemeter No				
Bore hole medium	DRY			
Mud density				
Digital readout m.	.2			
Time base (sec)	1			
Upper Disc.				
Lower Disc.				

Cased from to mtrs Dia from to

Cored hole ☐ Non-cored hole ☑

Sampled Interval	Type
1 metre	ROTARY AIR

INTERPRETATION DATA

Probe No	Standard	(cps) K factor
GPA-5	505	3.15×10^{6}

REMARKS

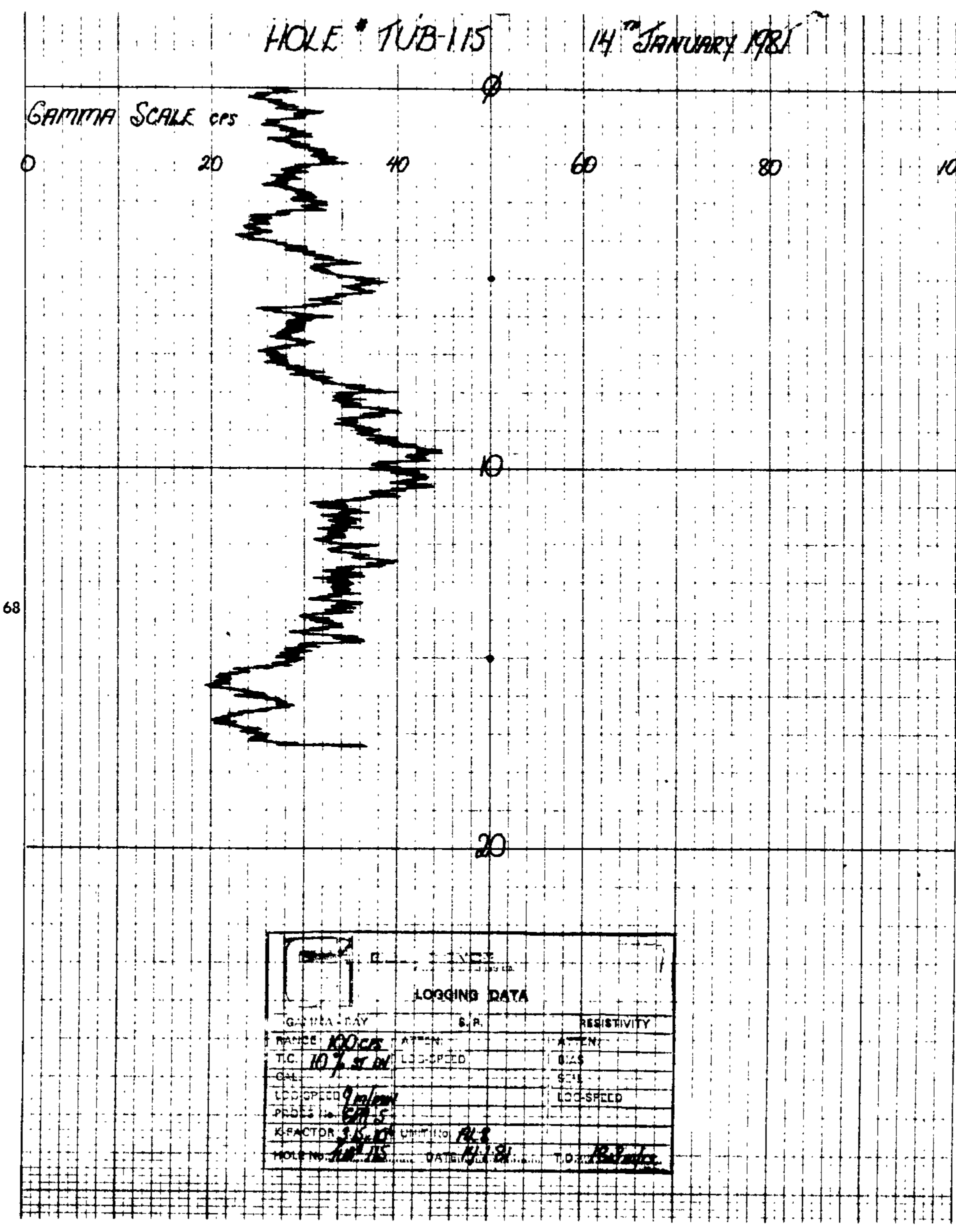
Fluid Level metres

ELECTRIC

	1	2	3	4
Logged depth				
Resist. scale				
S P scale				
Paper speed				
Logging speed				
Probe size				
Bias				

CALIPER

Logged depth				
Scale in/in def				
Paper Speed				
Logging speed				
Arm Length in				
Max Def. in				



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Phone 268 2898

HOLE # TUB-116

LOGGING DATA

DATE 14TH JANUARY 1981

LOCATION	TUMBY BAY	HOLE NUMBER	TUB # 116	CLIENT	AFMECO
State	SOUTH AUST	Collar elev	metres	Claim	
Area		Depth drilled	150 metres	Owned by	
Project		CASING DATA	HOLE DATA	Operated by	
Prospect		Wall size in	Dia. 4" from 0 to 150	Unit Operator	BARNETT
Lat °	Long °	Dia (inside) in	Dia from to	Unit No	PK 8 Office ADELAIDE

GAMMA RAY	INITIAL RUN	2	3	4
Logged depth (ft.)	35			
Range (Full scale)	100 cps			
Time constant (Sec)	10, st. dv.			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	28			
Probe No	GPA5			
Size (dia.) mm	46			
Crystal Na I	1⅛" × 2½"			
Standard (cps)	565			
Dead time μ sec	6			
Amp. Gain (disc)				
Ratemeter No				
Bore hole medium	DRY			
Mud density				
Digital readout m.	.2			
Time base (sec)	1			
Upper Disc.				
Lower Disc.				

Cased from to mtrs	Dia from to	
Cored hole ☐	Non-cored hole ☑	
Sampled Interval	Type	
.1 metre	ROTARY AIR	

INTERPRETATION DATA

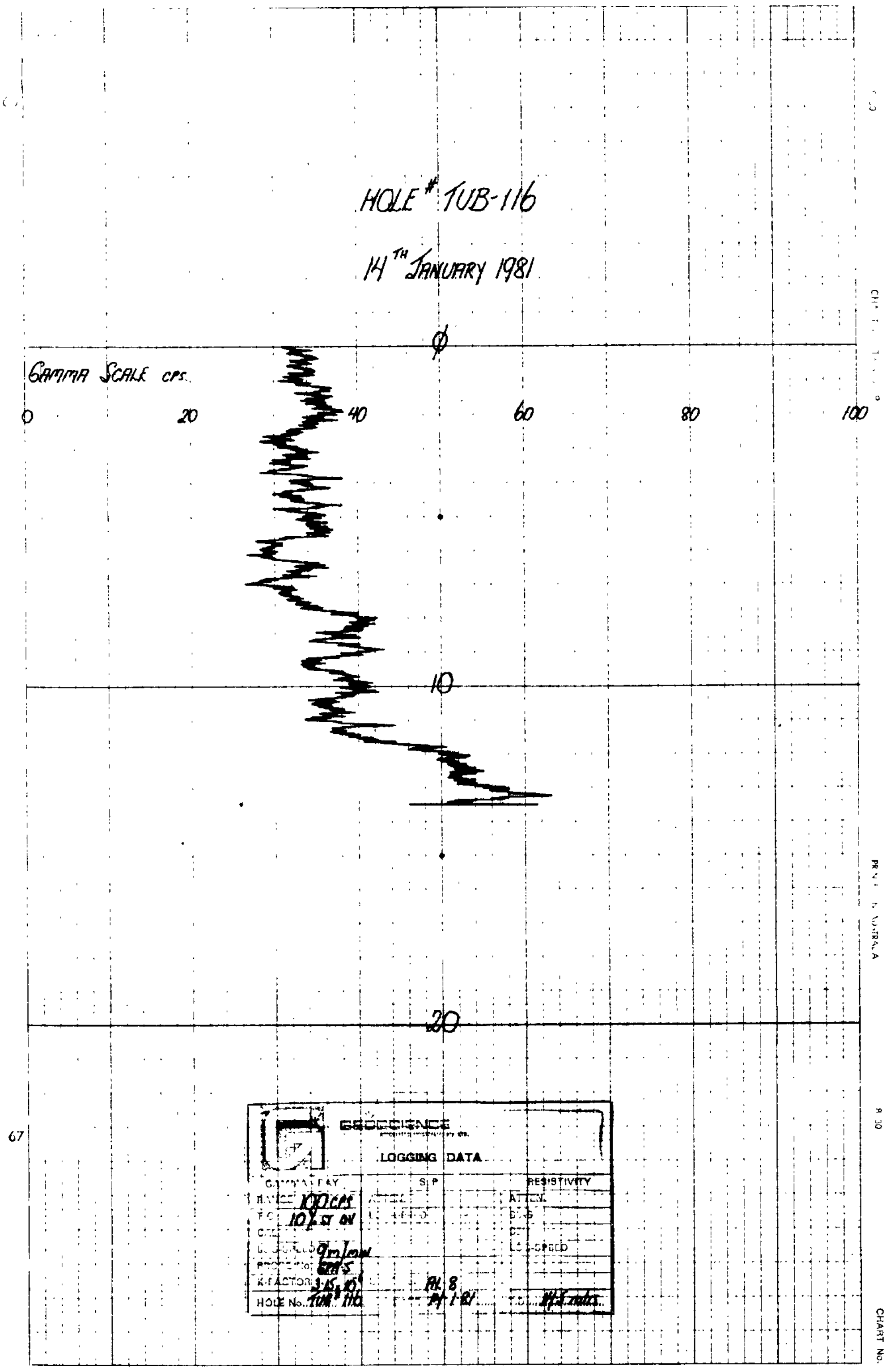
Probe No	Standard (cps)	K factor
GPA5	565	3.5×10⁶

REMARKS

Fluid Level metres

ELECTRIC	1	2	3	4
Logged depth				
Resist scale				
S P scale				
Paper speed				
Logging speed				
Probe size				
Bias				

CALIPER	
Logged depth	
Scale	in/in def
Paper Speed	
Logging speed	
Arm Length	in
Max. Def.	in



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P.O. Box 238
Kilkenny, S.A 5009
Phone: 268 2868

HOLE #100 117

LOGGING DATA

DATE 14TH JANUARY 1981

LOCATION	TUMBY BAY				
State:	SOUTH AUST				
Area.					
Project					
Prospect					
Lat ° ′ ″	Long ° ′ ″				

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft.)	21.9			
Range (Full scale)	100 cps			
Time constant (Sec)	10% st. dv.			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	27			
Probe No.	GPA-5			
Size (dia.) mm	40			
Crystal NaI	1½" x ½"			
Standard (cps)	505			
Dead time	6			μ sec.
Amp. Gain (disc)				
Ratemeter No.				
Bore hole medium	DRY			
Mud density				
Digital readout m.	·2			
Time base (sec)	1			
Upper Disc.				
Lower Disc.				

HOLE NUMBER	TUB #117
Collar elev.	metres
Depth drilled:	23.0 metres

CASING DATA		HOLE DATA
Wall size	in	Dia 4" from 0 to 23.0
Dia (inside)	in	Dia from to
Cased from to	mtrs	Dia from to
Cored hole ☐		Non-cored hole ☑

Sampled Interval	Type
1 metre	ROTARY AIR

INTERPRETATION DATA

Probe No.	Standard (cps)	K factor
GPA-5	505	3.15×10^{-6}

REMARKS

Fluid Level metres

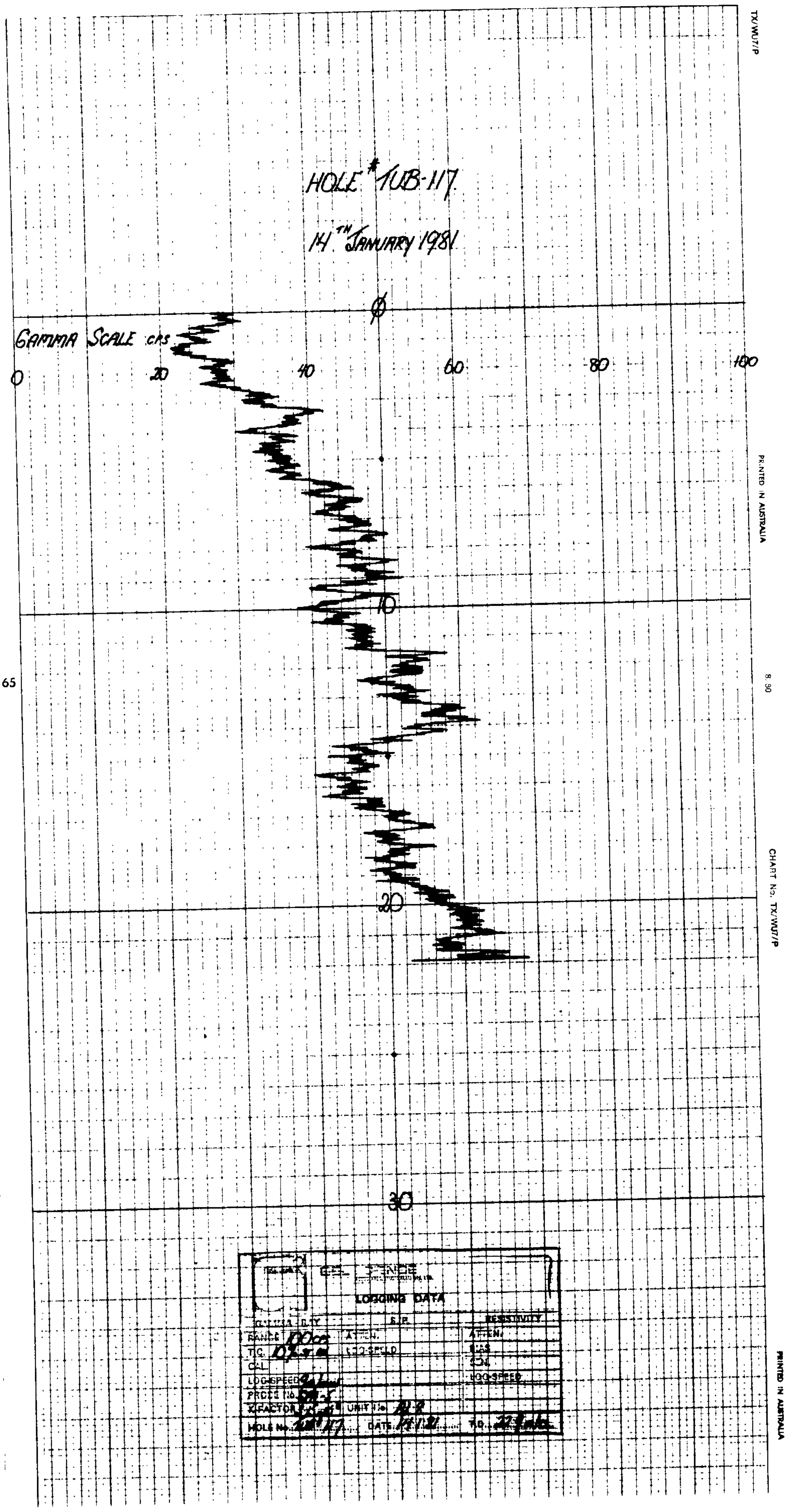
CLIENT:	AFMECO
Claim.	
Owned by.	
Operated by.	
Unit Operator.	BARNETT
Unit No	AL 8
Office	ADELAIDE

ELECTRIC

	1	2	3	4
Logged depth				
Resist. scale Ω/div				
S P scale m.v.				
Paper speed cm/m				
Logging speed m/min				
Probe size				
Bias				

CALIPER

Logged depth				
Scale	in/in. def			
Paper Speed				
Logging speed				
Arm Length	in			
Max. Def.	in			



HOLE # TUB-118 285

GEOSCIENCE

P.O. Box 320 Kilburn, S.A. 5084 Phone: 260 2000

LOGGING DATA

DATE 14th January 1981

LOCATION Tumby Bay	HOLE NUMBER: TUB# 118	CLIENT: AFMECO
State SOUTH AUST	Collar elev. metres	Claim:
Area:	Depth drilled: 61.0 metres	Owned by:
Project:	CASING DATA / HOLE DATA	Operated by:
Prospect:	Wall size in. / Dia. 4" from 0 to 61.0	Unit Operator: BARNETT
Lat: ° ' " / Long ° ' "	Dia. (inside) in. / Dia. from to	Unit No. AL8 Office: ADELAIDE
	Cased from to metre / Dia. from to	
	Cored hole ☐ / Non-cored hole ☑	

GAMMA RAY RERUN

	INITIAL RUN	2	3	4
Logged depth (ft.)	59.0		6	
Range (Full scale)	100 cps		500 cps	
Time constant (Sec.)	10% st dev		3% st dev	
Paper speed cm/m	1		1	
Logging speed m/min	9		9	
Bkgnd count (cps)	28			
Probe No.	GPA-5		GPA-5	
Size (dia.) mm	40		40	
Crystal NaI	1½" × 3"			
Standard (cps)	505			
Dead time	6			μ sec.
Amp. Gain (disc)				
Ratemeter No.				
Bore hole medium	DRY			
Mud density				
Digital interval m	.2			
Time (sec)	1			
Upper				
Lower				

Sampled Interval	Type
1 metre	ROTARY AIR

INTERPRETATION DATA

Probe No.	Standard (cps)	K factor
GPA-5	505	3.15×10^{-6}

REMARKS

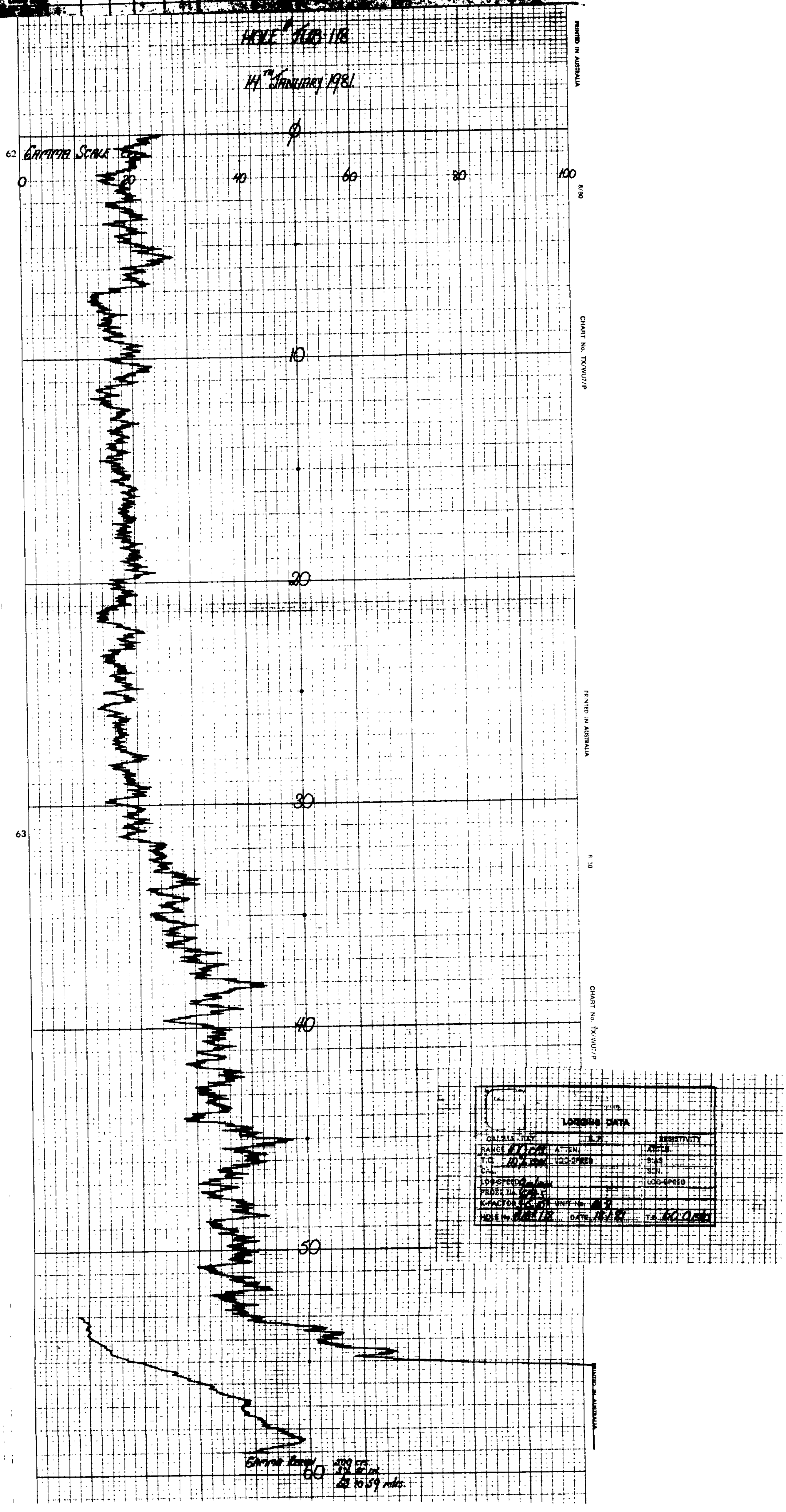
Fluid Level metres

ELECTRIC

	1	2	3	4
Logged depth				
Resist. scale /div				
S.P. scale m.v.				
Paper speed cm/m				
Logging speed m/min				
Probe size				
Bias				

CALIPER

Logged depth				
Scale	in./in. def.			
Paper Speed				
Logging speed				
Arm Length	in.			
Max. Def.	in.			



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HOLE # TUB - 119

LOGGING DATA

DATE 14TH JANUARY 1981

LOCATION	TUMBY BAY
State	SOUTH AUST.
Area	
Project	
Prospect	
Lat ° ' "	Long ° ' "

GAMMA RAY	INITIAL RUN	2	3 RERUN	4
Logged depth (ft)	18.8		20	
Range (Full scale)	100 CPS.		200 CPS.	
Time constant (Sec)	10% ST. DV.		10% ST. DV.	
Paper speed cm/m	1		1	
Logging speed m/min	9		9	
Bkgnd count (cps)	21			
Probe No.	GPA-5		GPA-5	
Size (dia.) mm	40		40	
Crystal NaI	1½" x ½"			
Standard (cps)	505			
Dead time	6			μ sec.
Amp. Gain (disc)				
Ratemeter No.				
Bore hole medium	DRY			
Mud density				
Digital readout m.	.2			
Time base (sec)	1			
Upper Disc.				
Lower Disc.				

HOLE NUMBER.	TUB # 119
Collar elev	metres
Depth drilled	20.0 metres

CASING DATA	HOLE DATA
Wall size in	Dia 4" from 0 to 20.0
Dia (inside) in	Dia from to
Cased from to mtrs	Dia from to
Cored hole ☐	Non-cored hole ☑

Sampled Interval	Type
1 metre	ROTARY AIR.

INTERPRETATION DATA

Probe No.	Standard (cps)	K factor
GPA-5	505	3.15×10^{-6}

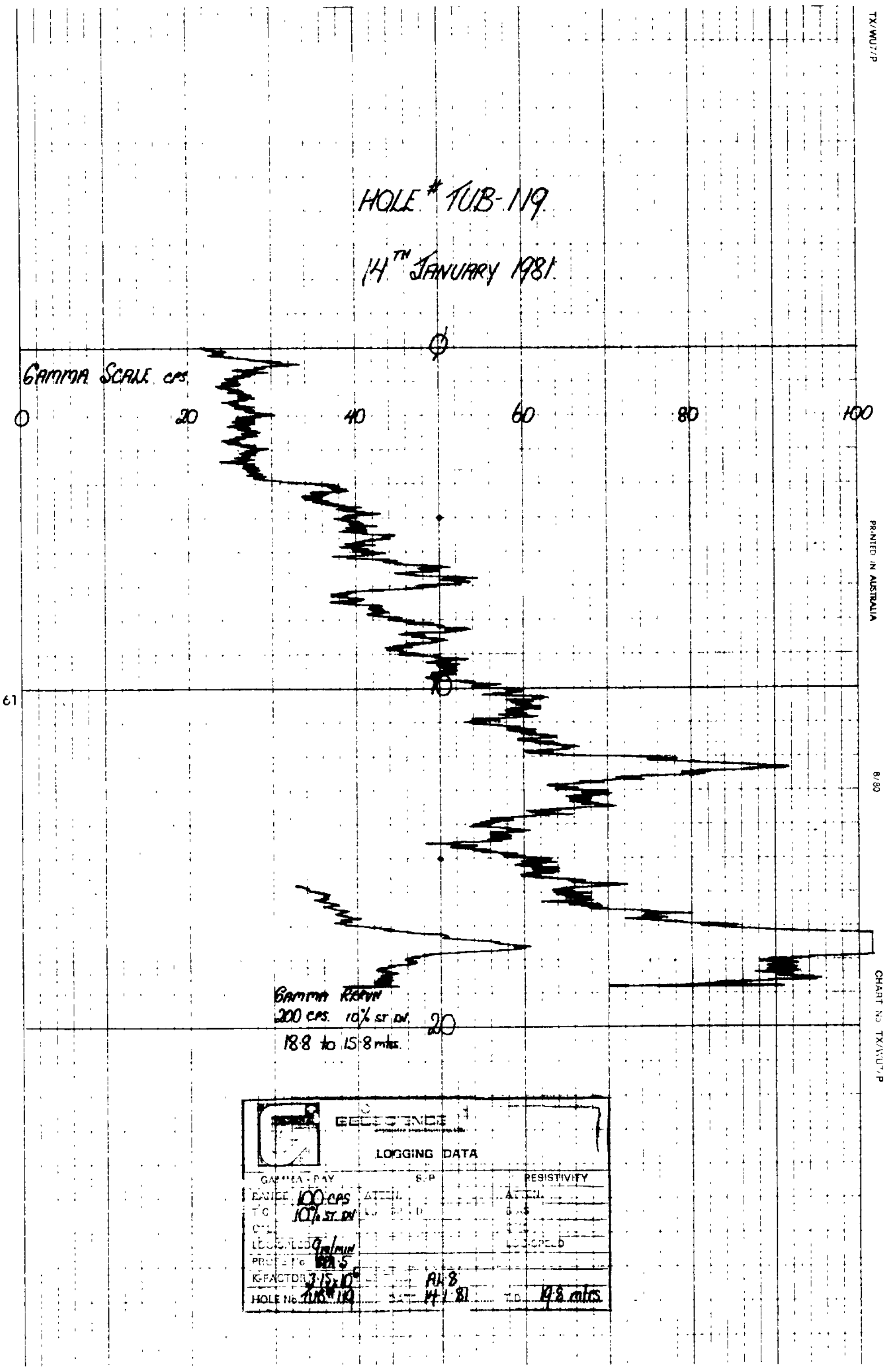
*REMARKS

Fluid Level metres

CLIENT	AEMECO
Claim.	
Owned by	
Operated by	
Unit Operator.	BARNETT.
Unit No	AL 8
Office	ADELAIDE

ELECTRIC	1	2	3	4
Logged depth				
Resist. scale Ω/div				
S.P scale m.v.				
Paper speed cm/m				
Logging speed m/min				
Probe size				
Bias				

CALIPER			
Logged depth			
Scale in/in def			
Paper Speed			
Logging speed			
Arm Length in			
Max Def. in			



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Kilkenny, S.A. 5009
Phone 268 2888

HOLE # TUB-120

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LOGGING DATA

DATE 14TH JANUARY 1981

LOCATION TUMBY BAY
State SOUTH AUST
Area
Project
Prospect
Lat ° ' " Long ° ' "

HOLE NUMBER TUB # 120
Collar elev metres
Depth drilled 26.0 metres

CLIENT AEMECO
Claim
Owned by
Operated by
Unit Operator BARNETT
Unit No AL 8 Office ADELAIDE

GAMMA RAY	INITIAL RUN	2	3	4
Logged depth (ft)	24.7			
Range (Full scale)	100 cps.			
Time constant (sec)	10% st. dv			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	33			
Probe No	GPA-5			
Size (dia) mm	4C			
Crystal NaI	1½" × ½"			
Standard (cps)	505			
Dead time μ sec.	6			
Amp Gain (disc)				
Ratemeter No.				
Bore hole medium	DRY			
Mud density				
Digital readout m.	2			
Time base (sec)	1			
Upper Disc.				
Lower Disc.				

CASING DATA
Wall size in
Dia (inside) in
Cased from to mtrs
Cored hole ☐

HOLE DATA
Dia 4" from 0 to 26.0
Dia from to
Dia from to
Non cored hole ☑

Sampled Interval 1 metre
Type ROTARY AIR

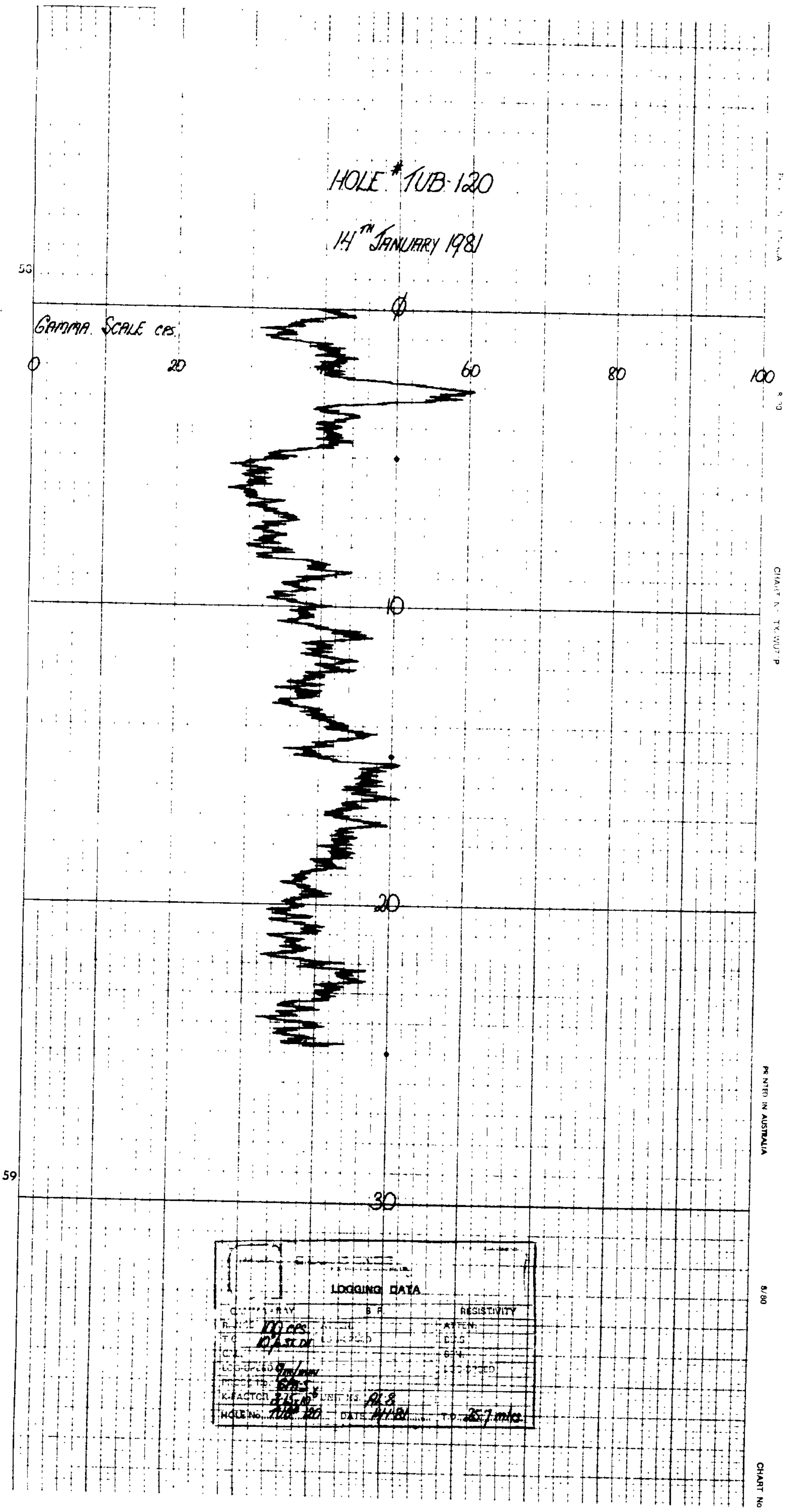
INTERPRETATION DATA

Probe No	Standard (cps)	K factor
GPA-5	505	3.15×10^{6}

REMARKS
Fluid Level metres

ELECTRIC	1	2	3	4
Logged depth				
Resist. scale Ω/div				
SP scale mv				
Paper speed cm/m				
Logging speed m/min				
Probe size				
Bias				

CALIPER				
Logged depth				
Scale in/in def				
Paper Speed				
Logging speed				
Arm Length in				
Max Def in				



GEOSCIENCE ASSOCIATES (AUSTRALIA) pty LTD
P O Box 239
Kilkenny, S.A 5008
Phone 268 2898

HOLE # TUB-121

LOGGING DATA

DATE 14TH JANUARY 1981

LOCATION	TUMBY BAY			
State	SOUTH AUST			
Area				
Project				
Prospect				
Lat ° ' "	Long ° ' "			

GAMMA RAY

	INITIAL RUN	2	3	4
Logged depth (ft)	157			
Range (Full scale)	100 cps			
Time constant (Sec)	10% st. dv			
Paper speed cm/m	1			
Logging speed m/min	9			
Bkgnd count (cps)	30			
Probe No	GPA-5			
Size (dia.) mm	40			
Crystal NaI	1½" × ½"			
Standard (cps)	505			
Dead time μ sec.	6			
Amp Gain (disc)				
Ratemeter No				
Bore hole medium	H_2O			
Mud density				
Digital readout m.	.2			
Time base (sec)	1			
Upper Disc.				
Lower Disc.				

HOLE NUMBER TUB # 121
Collar elev ____ metres
Depth drilled 190 metres

CASING DATA

Wall size ____ in
Dia (inside) ____ in
Cased from ____ to ____ mtrs

HOLE DATA

Dia 4" from 0 to 190
Dia ____ from ____ to ____
Dia ____ from ____ to ____

Cored hole ☐ Non-cored hole ☒

Sampled Interval	Type
1 metre	ROTARY AIR

INTERPRETATION DATA

Probe No.	Standard (cps)	K factor
GPA-5	505	3.15×10^{-6}

REMARKS

Fluid Level 110 metres metres

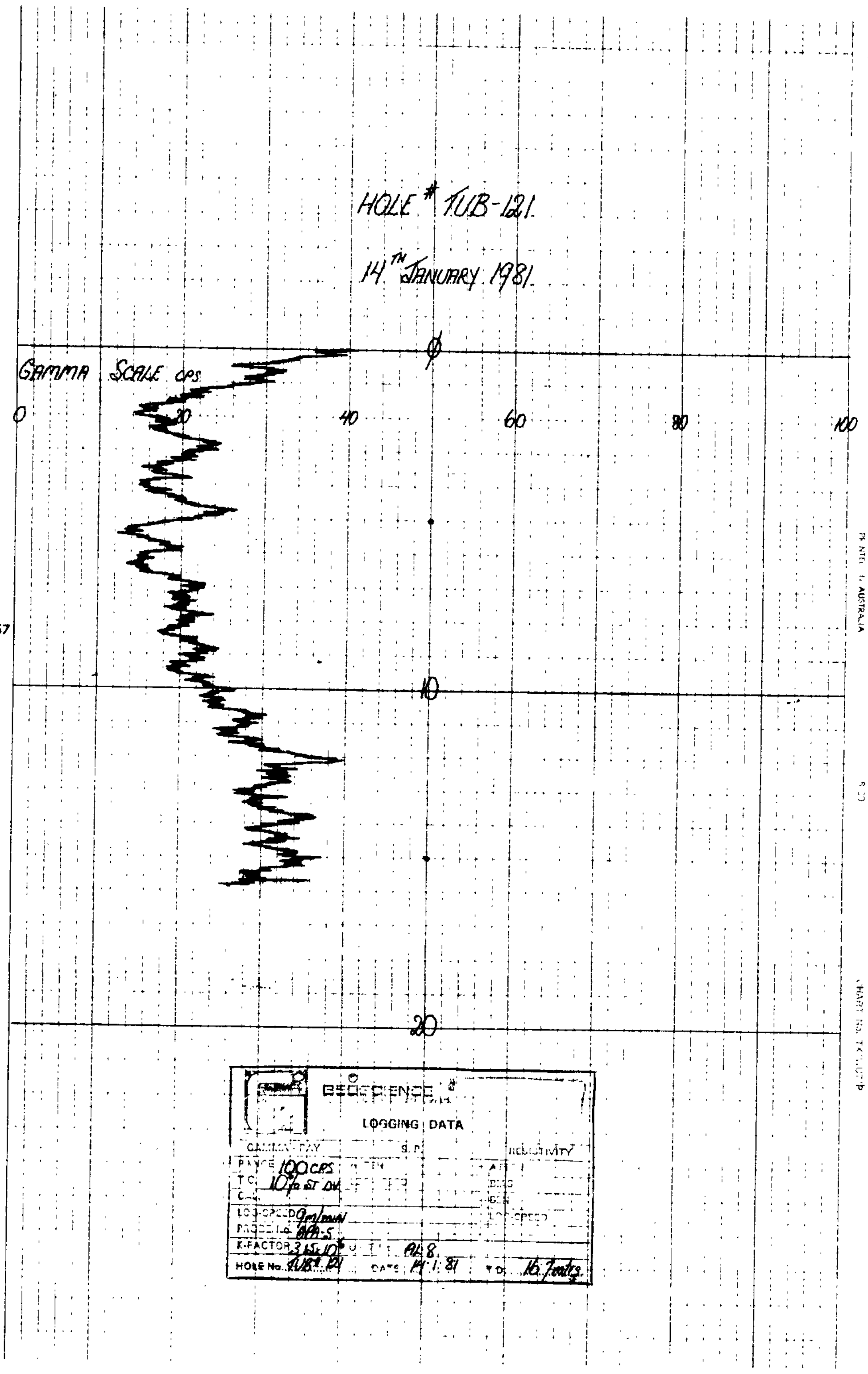
CLIENT AEMECO
Claim
Owned by
Operated by
Unit Operator BARNETT
Unit No AL 8 Office ADELAIDE

ELECTRIC

	1	2	3	4
Logged depth				
Resist. scale				
S P scale				
Paper speed				
Logging speed				
Probe size				
Bias				

CALIPER

Logged depth		
Scale	in/in def	
Paper Speed		
Logging speed		
Arm Length	in	
Max. Def.	in	



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APPENDIX 3

UNEDITED PRELIMINARY REPORT

BY F. BARRETT

TUMBY BAY AREA E.L. 578

RAB DRILLING 6-14 JANUARY 1981

As a follow-up to the mapping and ground geophysics carried out in September-December 1980, 2014.5m of rotary airblast drilling was carried out in January 1981.

The main aims of the drilling were:

1. To test the thickness of the laterite profile in the centre of the Hutchison Group.

2. To establish a geochemical profile through the laterites, and to determine the bedrock underneath the laterite.

3. To establish the stratigraphy in the lower part of the Hutchison Group.

4. To check the high radiometric background over soils on the 12400N traverse on the TB1 grid.

5. To test laterite adjacent to the TB1 anomaly.

6. To check the stratigraphy in the TB17 area.

7. To prepare for core drilling on the contact between the Lincoln Complex and the Hutchison Group.

All holes deeper than 3 metres were radiometrically logged, and at least 1 sample collected for analysis from each hole. Some of the deeper holes were sampled at every 2 metres to give a geochemical profile.

As the weathered crust turned out to be considerably thicker than expected (5-10m), most holes were stopped when the rocktype could be reliably identified. A few holes were taken to solid bedrock for geochemical profiles. As the metasediments are very steeply dipping (near vertical) in all the drilled areas, only one rocktype was encountered in each hole.

RESULTS

1. The 2 holes drilled through the laterite (TUB1 5741E 61835N, TUB2 5736E 6183N) were both located within the TB28 anomaly. Both holes finished in a biotite rich gneiss at 58m and 41m. The very thick laterite profiles (Plate 1) in the central part of the Hutchison Group, will make exploration in this part of the E.L. slow and expensive.

2-3. The stratigraphic profile line was situated in an E-W farm track with the starting point on the lower most BIF horizon. 67 holes were drilled with 25m spacing for the first 1375m, then 50m spacing for the last 550m.

Depths ranged between 2m and 45m. The profile showed a gradual change from east to west with biotite gneisses, quartzites, metacherts, banded iron formation in the basal part of the Hutchison changing to a sequence of predominantly biotite schists and biotite rich gneisses in the central part. Due to the hole spacing, some of the thinner units like the marbles and graphite schists seen in creek exposures south TB29 were not intersected in the profile. Assuming no repetition of the sequence due to isoclinal folding the generalised stratigraphy in the lower Hutchison Group is as follows:

Biotite schists	300m+
Quartzite	25m
Biotite schist	600m
Biotite gneiss	75m
Biotite schist	25m
Biotite gneiss	100m
Biotite schist	25m
Biotite gneiss	25m
Biotite schist	25m
Quartzite	50m

Biotite schist/gneiss	75m
Quartzite	25m
Biotite schist	80m
Metachert	40m
Biotite gneiss	125m
Quartzite/BIF	25m
Biotite gneiss	125m
Banded iron formation	40m
? ?	20m

Lincoln Complex

The radiometric background was generally higher in the biotite gneisses than in the other lithologies. Highest background was generally encountered in the white leached zone below the ferruginous surface zone. Drilling on the TB29 grid showed that the high radiometric background found in the soil persisted down into the bedrock. The highest count was 261 cps at a depth of 6.8m on 10400N 10400E. Measurements with the GAD-6 Spectrometer indicated that most of the high background was due to thorium.

4. Drilling of the soil anomaly on TB1 12400N line showed that the high background was restricted to the upper 1-2m of the soil profile.

5. TUB93 drilled to 17m in laterite adjacent to TB1 - 1 anomaly, showed that the bedrock under the laterite is similar to the augen gneisses outcropping 50m to the west.

6. The drilling in the TB17 area showed very thick laterite profiles (50-60) on top of hills where the bedrock is a gneiss. In a general sense the sequence becomes more diversified eastwards towards the contact with a higher abundance of amphibolites, micaschists and banded iron formations. The holes on lines 10400E and 10800E were drilled on magnetic highs and lows (see magnetic profiles in Tumby Bay Report). The

bedrock in most of the holes on 10400E and 10800E is a coarse grained biotite gneiss.

7. Two holes (TUB120-121) were drilled in preparation for the diamond drilling. TUB120 was drilled 25m east of the lower most banded iron formation and finished in a siliceous and ferruginised fine grained biotite gneiss of uncertain origin. TUB121 located 75m east of the banded iron formation finished at a depth of 17m in fresh migmatitic hornblende biotite gneiss similar to the Lincoln Complex gneisses outcropping in the nearby creek.

APPENDIX 4

PETROLOGICAL DESCRIPTIONS

BY R. TOWNEND

MINERAL INVESTIGATORS

INTRODUCTION

This suite of metamorphic rocks is closely related with the exception of the two marbles. In general they can be described as subalkaline acid gneisses in which the mafic silicates are characterised by enrichment in iron, suggesting differentiated igneous rocks as source material. Many of these gneisses have suffered a dislocation metamorphism subsequent to the regional metamorphism. This latter was amphibolite grade. There are examples of uraniferous gneisses in Brazil that have ferro-hastingsite as a major constituent, but there, albitization is an important process.

The nature of the uranium mineralization indicates a hydrothermal origin, possibly related to shearing, often an important fact in the localization of solutions. Scanner qualitative analysis indicate interesting concentrations of the rare earth metal cerium, in the halos around the botryoidal pitchblende.

80-1438

MACROSCOPIC: Pyritic amphibolite

MICROSCOPIC: Quartz biotite amphibolite

Hornblende	45-50%
Plagioclase	35-40%
Quartz	10-15%
Biotite	5-10%
Sphene	2%
Opaques	1%
Apatite	$<$1%

The core is dominantly a slightly mafic amphibolite, with a rough handing due to alternation of felsic and mafic constituents but with a poor lineation or schistosity. Grain diameters for the quite equidimensional amphibole and feldspar are around 0.3 mm.

The amphibole is not very idioblastic, contacts with feldspar and quartz being irregular; it usually contains a fine network of semi-opaque ? hematite. Pleochroism, yellow-green to deep blue-green and optic sign (low -ve 2V) suggest an iron-rich hornblende, of the hastingsitic type.

The plagioclase is slightly spotted with sericite, has poorly developed twinned, often vee-type and, from relief, is of oligoclase composition.

Quartz is either of similar dimension externally to the above silicate, particularly in the felsic bands, or forms blebby inclusions within plagioclase. The coarser masses are internally of quartzite texture.

Biotite occurs throughout as fresh, yellow to orange-brown flakes, without orientation, most attached to amphibole, perhaps an incipient replacement. Sphene is relatively abundant, most being of anhedral habit, the coarser examples (0.25 mm) containing opaque ? ilmenite nucleii. Apatites are fine, and both squat and semi-needle-like in habit. As can be seen from the core piece, there are bands relatively rich in pyrite.

The absence of chlorite indicates low amphibolite grade or metamorphism. The apparent iron-rich nature of the amphibole is unusual for a normal metabasic rock and may support a para-amphibolite.

80-1439

MACROSCOPIC: Biotite acid gneiss

MICROSCOPIC: Biotite granite gneiss

Microcline	Dominant
Quartz	Major
Plagioclase	Major
Biotite	Major
Hornblende	Minor
Sphene	Accessory
Opaques	Accessory
Zircon	Accessory
Altered Mineral	Accessory

This is a potash-rich gneiss containing thin mafic bands and some K feldspar-poor zones. Staining of the hand specimen shows that microcline forms more than 80% of some centimetre-wide bands. These bands consist of 1-2 mm. fresh microcline perthites, with interstitial fine grained microcline-quartz associations, plus some plagioclase. Quartz also occurs as inclusions that tend to be idioblastic.

The adjacent biotite layers are quartz-rich with grains usually under 0.3 mm, and relatively smooth contacts. The oriented biotite, with minor amphibole, is fresh, very variable in flake size, 1 mm to 0.1 mm, with a straw yellow to deep brown pleochroism (? lepidomelane). The amphibole appears Fe-rich also, like that of 80-1438. Like 80-1438, there is extensive sphene, some apatite but also zircon.

These biotite zones also feature patches of totally altered material, now composed of secondary ? clay products, with marked darkening or halos of the surrounding mica, suggesting some degree of radioactivity. None of the zircons or sphenes have this granulometry or show alteration tendencies, so another species is indicated. The opaques are largely confined to the cores of sphene aggregates.

The plagioclase zones have similar textures to the potash ones, millimetric oligoclase-andesine, separated by interstitial quartz and K feldspar, the latter often associated with myrmekite. In more quartzose zones, the quartz develops a marked deformation texture and it is likely that the fine interstitial matrix is the result of recrystallization under stress, better seen in 80-1441. This is, perhaps, also suggested by the relatively poor orientation of much of the biotite, of 80-1438.

The gneiss appears to have some affinity with the basic assemblage, 80-1438, although compositionally rather different. Being heterogeneous, comments on genesis are not useful.

80-1441

MACROSCOPIC: Weakly magnetic biotite acid gneiss 301

MICROSCOPIC: Sheared biotite potassic gneiss

Microcline	40-45%
Quartz	30-35%
Plagioclase	20-25%
Biotite	3- 5%
Hornblende	1- 2%
Opaques	1%
Apatite	<1%
Zircon	<1%

A gneiss quite similar to 80-1439, with the presence of numerous shear zones. This results in a more extreme porphyroclastic texture. The main clasts are microcline perthite, rarely coarser than a millimetre. Plagioclase has a similar habit and size, although less abundant. Quartz-rich zones may be of similar dimensions but internally are deformed quartzite fabrics.

In the shear zones, semi-mylonitic textures prevail and quartz and biotite seem dominant constituents, the latter streaked out into very thin layers.

The matrix away from the 'mylonite' zones is extensively myrmekitic in character.

The association of mica, Fe hornblende and accessories is identical to 80-1439. Opaques are,apparently, oxides only and must include magnetite. The 'metamict' material described for 1439 was not present.

Alteration is quite insignificant, apart from sericitic spotting of the plagioclase. Genesis would be identical to 80-1439.

80-1442

MACROSCOPIC: Biotite gneiss

MICROSCOPIC: Sheared biotite potassic gneiss

Microcline	45-50%
Quartz	30-35%
Plagioclase	15-20%
Biotite	5-10%
Hornblende	1- 2%
Sphene	<1%
Opaques	<1%
Apatite	<1%
Zircon	<1%
Altered mineral	Trace

A very similar gneiss to 80-1441, the pinkish tinge in the feldspathic zones visible here, and not in 80-1441, are probably due to fine iron oxide dust. The mylonitic zones are not present, but recrystallization is more advanced, resulting in a type of mortar or very clastic texture. The porphyroclasts are dominantly microcline perthite, with grain diameters variable, between 0.5 and 2.5 mm. They contain few inclusions, apart from blebby quartz. Plagioclase is less common and sometimes shows extensive sericitization. Both have irregular margins with the matrix. Although mylonite zones s.s. are absent, quartz often shows marked deformation, in curved lenses, with highly castellated internal contacts.

The fairly extensive matrix to the above is often very fine grained and a mixture of the three silicates, without a marked preferred orientation due apparently to the presence of significant quantities of feldspar.

The mafic concentrations are, as in the other samples, biotite plus various accessories. The biotite is fresh, rather fine and shows little preferred orientation. In contrast, the amphibole is mostly coarse (0.5 - 1 mm), with the strong pleochroism of the hastingsite type. The accessories are as before, but with a higher content of zircon, with crystals, subeuhedral to subrounded, to 0.2 mm lengths.

The metamict material, described for 80-1439, is present in an identical way, coarser than the normal accessories, up to 0.5 mm, a totally isotropic rim to a chloritic ? core. Fine oriented opaques preserved in a cleavage show the material to have been a single crystal.

Considering the deformation etc., the silicates are remarkably fresh, apart from sericitic spotting of the plagioclase.

80-1443

MACROSCOPIC: Pale green hornblende gneiss

MICROSCOPIC: Hornblende-rich biotite amphibolite

Hornblende	85-90%
Plagioclase	5- 7%
Biotite	5- 7%
Sphene	1- 2%
Opaques	<1%
Apatite	<1%

A well foliated almost ultramafic gneiss with less than 10% felsic material. The dominant constituent is a yellow-green to green amphibole, with properties of normal hornblende. The crystals are mostly subidioblastic, with a strong tendency for the long axes, averaging around 0.5 mm, to adopt a preferred orientation.

Weakly pleochroic biotite is evenly distributed and strongly oriented, rimming the amphibole and sometimes ? replacing the outer portion. Associated with this mica are rather abundant fine sphene granules. Apatite is mostly confined to felsic areas. The plagioclase is allotriomorphic to the coarser, dominant amphibole. The plagioclase is mostly fresh, well twinned with andesine composition.

Sericitization of the feldspar can totally be complete.

This mafic gneiss differs from 1438 by its non iron-rich amphibole and lack of quartz, and seems more likely to be of igneous origin.

80-1444

MACROSCOPIC: Epidote veined pinkish flaser acid gneiss

MICROSCOPIC: Dislocated potassic gneiss, with epidote veins

		VEIN	SECONDARY
Microcline	40-45%	Epidote-clinozoisite	Chlorite
Quartz	30-35%		
Plagioclase	25-30%		
Sphene	1%		
Opaques	<1%		
Apatite	<1%		
Zircon	Trace		

The core represents a more sheared and altered equivalent of 80-1442, plus locally extensive epidote veining. The pink tinge is as for 1442.

The slide shows the same mortar or porphyroclastic texture with millimetric microclines and half millimetre plagioclases surrounded by a fine grained, often strongly foliated, semi-cataclastic matrix. As before, where feldspar is prominent in the matrix, a linearity is lacking, where quartz is dominant, a marked lineation occurs.

In contrast to the other biotite potash gneisses, the mica is entirely chloritised. It is again accompanied by the same accessories, although there is only a trace of zircon. The chloritization may be linked to the epidote veining.

The veining was accompanied by dislocation and, being at right angles to the earlier shear, the resulting host rock texture is a microbreccia. Away from the veins proper, some epidotization of plagioclase is visible and smaller, epidote veinlets to not traverse quartz bands.

Genesis, etc. as for 80-1442.

80-1555

MACROSCOPIC: Hornblende acid gneiss

MICROSCOPIC: Deformed hastingsite 'granite'.

Microcline	40-45%	SECONDARY
Quartz	30-35%	Sericite
Plagioclase	20-25%	Carbonate
Hornblende	3- 5%	
Biotite	1- 2%	
Sphene	1%	
Opaques	$<$1%	
Apatite	$<$1%	

This core is clearly related to the amphibole biotite K feldspar gneisses described above. It has a marked porphyroclastic texture, but a preferred orientation is only visible in quartzite lenses. The texture is dominated by coarse microcline perthites, 1 - 2 mm, with fretted margins. Characteristically plagioclase is finer, and more altered to sericite. Quartz is present partly as lensoid quartzite, with highly castellated margins, or in the semi-mylonitic matrix, with the two feldspars, where grain sizes fall below 20 microns and myrmekite is common.

Mafics are dominated by 0.5 - 1 mm amphibole, with optics suggesting ferrohastingsite. It is accompanied by minor fresh biotite, often attached, perpendicular to the amphibole margin. Some thin biotite zones with associated accessories follow the clast margins. The slide contains two types of sphene, in some cases, forming zoned crystals. The normal pale coloured variety occurs in fine granular association with opaques and mica, but it may also rim a darker sphene, with distinct lamellar twinning.

Apart from the usual sericite formation of the plagioclase, there is also a fine incipient carbonate veining throughout. This rock appears to represent a less gneissose or flaser equivalent of Samples 1439, 1441 and 1444 and, of these acid rocks, is the only one with amphibole dominant over biotite.

80-1562

MACROSCOPIC: Altered micaceous acid gneiss

MICROSCOPIC: Chloritised 'granitic' gneiss

Quartz	40-45%	SECONDARY		VEIN
Microcline	25-30%	Sericite		Epidote
Plagioclase	25-30%	Chlorite	5-7%	
Hornblende	<1%	Altered Mineral		
Sphene	<1%			
Zircon	<1%			
Apatite	<1%			
Opaques	<1%			

A more altered gneiss than those previously described. All the biotite has been chloritised and much of the feldspar content sericitised.

The texture is again porphyroclastic, with 0.5 - 2 mm microclines and plagioclase surrounded by a finer, probably recrystallized matrix. Quartz is dominant, typically lensoid, with castellated internal margins. There are some zones with concentrations of chlorite and quartz with strong deformation character, but much of the feldspar matrix is relatively well crystallized, granoblastic, 0.1 - 2 mm, without any deformation textures.

The accessories are associated with the chlorite, and the sphene can have the lamellar twinned character noted in 80-1555. Some of the zircon, based on its birefringence, may be partly metamict. The few opaques include some perfect pyrite cubes.

A relatively coarse, 0.5 mm, totally altered mass, identical to that described for 80-1442, was observed in contact with chlorite and sphene. The rare crystals of amphibole have depth of colour typical of the hastingsite group. The core is clearly related to the hastingsite biotite potassic gneisses.

80-1565

MACROSCOPIC: Amphibolite band enclosed in acid gneiss

MICROSCOPIC: See below

AMPHIBOLITE	
Hornblende	45-50%
Plagioclase	40-45%
Chlorite)	
Epidote)	5%
K feldspar)	
Sphene	1%

GNEISS	
Quartz	45-50%
Microcline	20-25%
Plagioclase	20-25%
Chlorite/Biotite	3- 5%
Hornblende	1%
Sphene	1%
Apatite	$<1\%$
Pyrite	$<1\%$
Fluorite	$<1\%$
Epidote	$<1\%$

Another porphyroclastic gneiss, with a similar degree of alteration to 1562. Thus, most of the biotite is chlorite and some of the feldspar porphyroclasts are sericitised. The microcline perthites may exceed 2 mm, with fretted margins and fractures, showing recrystallization. They are relatively fresh compared with plagioclase, which is invariably spotted with sericite and saussurite. There is a rough banding of K feldspar-rich and plagioclase-rich zones, parallel to the amphibolite contact. Quartz forms folded lenses also following this direction, but the internal lineation is approximately perpendicular to it. As in other samples, the thin chloritised biotite layers are sites for the concentration of the heavy accessories, although some of the sphene may be secondary, released by chloritization of the mica. There is a little epidote associated with the chlorite.

The not infrequent zircons have quite marked halos, preserved in the surrounding chlorite. They have a low birefringence, indicative of a partial metamict state. The very occasional emphiboles have Fe-rich optics. Several coarse euhedral pyrite crystals occur within the gneiss adjacent to the amphibolite contact. The larger of these has a partial rim of fluorite, on the side facing the amphibolite, which may be the source of the sulphur.

The contact of the amphibolite with gneiss is marked by a narrow epidote-chlorite concentration.

The amphibolite is largely composed of the two constituents, with the 0.5 mm subidioblastic amphibole, probably intermediate in composition between 'normal' hornblende and hastingsite. It is moderately well oriented. The plagioclase is heavily altered to sericite and saussurite, and there is evidence that it has partially recrystallized. Locally, sphene inclusions are common. Some biotite has been totally chloritised.

80-1569

MACROSCOPIC: Hornblende feldspathic gneiss

MICROSCOPIC: Ferrohastingsite quartz oligoclase gneiss

Plagioclase	70-75%
Quartz	15-20%
Ferrohastingsite	5-10%
Microcline	2- 3%
Biotite	2- 3%
Sphene	1- 2%
Ilmenite	<1%
Magnetite	<1%
Apatite	<1%
Zircon	<1%
Pitchblende	Trace

A plagioclase-rich gneiss, in which the 'gneissocity' is only evident from the discontinuous mafic concentrations. The main plagioclase component is non-lineated, with a mortar granoblastic texture. The 'primary' oligoclases are fresh, equidimensional 0.3 - 0.4 mm, crystals with poor, sometimes distorted, albite twinning. They are about 50% of the mode, surrounded by a fresh, non-lineated fine granoblastic plagioclase-rich plus some quartz and microcline matrix.

The mafic association is 0.5 mm. ferrohastingsite, 0.2 mm. ? lepidomelane, and 0.1 mm aggregate of strongly pleochroic sphene (yellow to orange), subrounded zircons with halos in the amphibole, apatite, oxide opaques with a sphene rim, and the altered metamict mineral, probably similar to that described earlier, and showing radial cracking in the surrounding amphibole, supporting a radioactive type.

A scanner check of a polished section found uranium lead concentrations, plus silica in the nucleii of the spots, identical to 80-1570. Likewise, the arcuate calcium cerium silica rims were also present. Magnetic and ilmenite were accessory oxides, often as sphene cores, and there was a trace of pyrite.

It is a potash-poor equivalent of the hastingsite microcline gneisses. The low quartz content contributes to the poorly developed preferred fabric.

80-1570

MACROSCOPIC: Amphibole feldspar gneiss

MICROSCOPIC: Ferrohastingsite quartz oligoclase gneiss

Plagioclase	60-65%
Quartz	15-20%
Ferrohastingsite	5-10%
Biotite	3- 5%
Microcline	2- 3%
Sphene	2- 3%
Apatite	<1%
Zircon	<1%
'Pitchblende'	<1%
Ilmenite	<1%
Galena	Trace
Magnetite	Trace

A gneiss very similar to 80-1569. Oligoclase is dominant in two grain sizes, with quartz very subordinate and microcline only as fine interstitial material. There is little evidence of a preferred fabric. The amphibole has a dominantly green to brown pleochroic schemat, and a very low 2V indicating ferrohastingsite. The mica, which has some parallel aspects, has deep absorbtion suggesting an iron-rich species, ? lepidomelane.

The mafic clusters centred around coarse amphibole, differ from 80-1569 by the colour of the amphibole and the presence of numerous fine opaque specks, rarely exceeding 0.04 mm diameter, and with a pronounced alteration halo, equivalent to the diameter of the nucleii, even in feldspar.

These spherical bodies are clearly radioactive, and examination by polished section, and electron scanner confirmed their uranium-rich composition. There appears to be at least three stages in the alteration of the uranium mineral. The original core is a uranium-oxide, with some lead and a dominantly silicate halo, assuming a silicate host. The next stage sees the breakdown of the pitchblende, with precipatation of radiogenic lead, particularly at the margins. Further alteration may be responsible for the development of an arc, not usually a ring, of a calcium cerium silicate. Finally, as seen in other samples such as 1581, the only remnant is a spherical body composed of Ca, Ce and Si. No thorium was detected in these scans.

The lack of thorium and rare earths in the nucleii supports their pitchblende identification, and probable hydrothermal origin. The 'atolls' of high cerium and calcium, both elements common in uraninite, could indicate zoning, although the lack of uranium indicates leaching.

80-1576

MACROSCOPIC: Amphibole feldspathic gneiss

MICROSCOPIC: Ferrohastingsite quartz feldspar gneiss

Microcline	30-35%
Plagioclase	30-35%
Quartz	25-30%
Ferrohastingsite	5-10%
Biotite	2- 4%
Sphene	1- 2%
Apatite	<1%
Zircon	<1%
Ilmenite	<1%
Pyrite	Trace
Sphalerite	Trace
Galena	Trace
Chalcopyrite	Trace
Uranium mineral	Trace

A strongly porphyroclastic texture, similar to other potassic gneisses. The 'clasts' consist again of the two feldspars, ranging from 0.5 to 2 mm diameter, with fretted margins and, in some cases, a suggestion of rounding of microcline in quartz. As before, where the fine matrix is feldspar-rich, the texture is granoblastic, but where quartz is dominant, a marked lineation is present. Exceptions to the above find wedge-shaped microcline perthites associated with hair-like mylonite zones.

The amphibole has a deep blue-green pleochroism and low 2V (10-15^{o}) characteristic of ferrohastingsite. The amphibole, which has lengths between 0.5 and 1 mm, is idioblastic when isolated in feldspar zones, but in the mafic clusters becomes much more irregular of outline. The mica pleochroism is different from the usual in this suite, being an olive-green tint in the strongly absorbed position.

The slide features particularly coarse sphene, to 0.5 mm lengths, with a strong orange pleochroism, and also lower birefringent colours, indicative of incipient alteration. One wedge-shaped crystal is partly altered, down to first order colours. Some of these larger sphenes are partially intergrown with ? replacive quartz. Opaque inclusions are common in sphene. Much of the amphibole and biotite have vein-like halos, in some cases due to very fine 'opaque' threads.

In polished section traces of sulphides were found, sometimes composite, or discrete, these were galena, pyrite and sphalerite, the latter with negligible iron, confirmed by the scanner. Some sphenes have ilmenite cores.

A scanner check of the polished section found uranium concentrations in veinlets, probably corresponding to the tracks with halos observed within the mafic silicates. These rather vague bodies also contained Ca, Y and Si, plus a little iron, although the latter two elements may be 'contaminations' due to the fineness of the material. The association of yttrium with uranium is usually in non-silicates, particularly the niobate-tantalates. However, it would require further studies for a proper elucidation.

80-1581

MACROSCOPIC: Amphibolite contact with hastingsite feldspar gneiss

MICROSCOPIC: See below

AMPHIBOLITE		GNEISS	
Hastingsite	50-55%	Ferrohastingsite	Major
Plagioclase	40-45%	Plagioclase	Major
Biotite	3- 5%	Quartz	Minor
Sphene	1%	Microcline	Minor
Apatite	<1%	Sphene	Minor
Ilmenite	<1%	Altered Mineral	Accessory
Fluorite	Trace	Apatite	Accessory
Cerium Mineral	<1%	Fluorite	Accessory
		Zircon	Accessory

The core piece is largely an amphibolitic rock having a contact at one end with a coarser feldspathic gneiss.

The amphibolite is dominantly hornblende and sodic plagioclase, with a moderate lineation of the amphibole parallel to the axis of the core. The 0.5 mm average amphiboles do not have the intense pleochroism and very small 2V of ferrohastingsite, but appear intermediate, probably hastingsite. They are accompanied by a well oriented dark brown biotite. Plagioclase is finer grained than the amphibole, quite fresh, and of granoblastic texture, approaching granoblastic. Sphene is the main accessory to 0.2 mm, with the intense colour and probable metamict condition, noted in other cores such as 80.1576.

The fine (20 microns) opaques with halos identified as 80.1576, are not uncommon throughout the slide which covers about 1.5 cm of the amphibolite. In terms of the type of amphibole, this mafic portion is similar to 80.1438.

The coarse feldspathic portion features 5 mm. plagioclases set in deformed granuloblastic plagioclase mosaic, with an occasional 'quartzite' lens. At the contact with the 'amphibolite', coarse ferrohastingsite is developed, plus 0.3 mm diameter, totally altered (metamict) masses, as described for 80.1569 and others.

Within the 'gneiss', clusters of coarse ferrohastingsite are characterised by extensive pleochroic halo trails, as described for 80.1576. These amphiboles have perimeters suggesting that they have suffered attrition. The haloed spots are lacking.

The accessories are relatively coarse, sphene reaching 0.3 mm, the zircon is partly metamict. There is also a 0.5 mm length metamict relict, attached to one amphibole.

In polished section, minor ilmenite was identified. No reflective mineral corresponding to the haloed spots was detectable. Under the scanner these spherical bodies were found to be calcium cerium silica concentrations, similar to the pitchblende halos of Sample 80.1570.

80-1583

MACROSCOPIC: Biotite amphibole augen gneiss

MICROSCOPIC: Biotite ferrohastingsite feldspar quartz gneiss

Quartz	40-45%
Plagioclase	25-30%
Microcline	20-25%
Biotite	5- 7%
Ferrohastingsite	5- 7%
Sphene	1%
Apatite	<1%
Zircon	Trace

This is a more foliated gneiss than most of the ones in this suite, due perhaps to a higher quartz content. Thus, the proportion of feldspar 'clasts' is less, although some clusters of plagioclase can exceed several millimetres across. This is exceptional, most being under 0.5 mm, with a long dimension tending to follow the matrix preferred fabric. There is probably a gradation in granulometry down to the 50 micron polygonal textured matrix. Quartz-rich lenses have strain extinction and castellated internal margins. Both feldspars are fresh, aside from minor sericitization of the oligoclase.

The biotite, which tends to occur in narrow strips, is strongly aligned. The iron-rich amphibole, likewise, can be present as well oriented laths, but also forms coarser, 0.5 mm equidimensional semi-porphyroblastic crystals.

The accessories are typically closely associated with these mafic bands. The sphene lacks the strong pleochroism described for other core, and individuals are rather ragged in outline, but usually with long dimensions following the mica. Apatites are subeuhedral, and tend to be outside the ferromagnesians, contrasting the zircons which are mostly enclosed within biotite, with a small halo. The core is unusually deficient in opaque material.

80-1584

MACROSCOPIC: Weathered amphibolite

MICROSCOPIC: Biotite amphibolite

Hornblende	40-45%
Plagioclase	40-45%
Biotite	10-15%
Sphene	1%
Apatite	<1%
Opaques	<1%
Clinozoisite	<1%

This is an amphibolite of standard type, except for some biotite-rich layers.

The amphibole is a yellow-green to green pleochroic hornblende, subidioblastic habit, 0.5 to 1 mm long dimensions, most with some degree of orientation. A zoned texture is shown by cores of ? exsolved hematite dust. The plagioclase is finer grained, almost granoblastic without orientation and is rarely without extensive sericitization.

The biotite occurs either as narrow, well oriented, strongly pleochroic flakes, or as basal flakes in the same band as the other mica, demonstrating that the fabric is not a simple schistosity.

Accessories are abundant sphene, of rather ragged habit, and weak colour, finer subhedral apatite, and limonite-goethite semi-opaque masses, plus a little ? ilmenite inside sphene. Very occasionally alteration of the plagioclase has resulted in the development of clinozoisite.

The core can be compared with the amphibolite band in 1565.

80-1590

322

MACROSCOPIC: Magnetic basic 'gneiss'.

MICROSCOPIC: 'Diopside' bearing magnetite feldspar gneiss.

Clinopyroxene	30-35%
Plagioclase	30-35%
Hastingsite	10-15%
Microcline	5-10%
Quartz	4- 6%
Opaques	3- 5%
Sphene	3- 5%
Apatite	1%

A metamorphic mafic assemblage lacking a preferred fabric, with millimetre plus grains predominant, to centimetre sized pyroxene in the core piece. The sample relates to the other gneisses by its extremely variable grain sizes, but the 'matrix', often associated with myrmekite, is less than 20% of the volume.

A distinctive feature of this rock is the presence of a major clinopyroxene. This is green in polarised light, very weakly pleochroic, and optics suggest a salite variety. It is invariably rimmed by a very strongly pleochroic amphibole, probably a member of the hastingsite suite.

The coarser plagioclase shows the vee twinning of higher grade metamorphic rocks, sometimes bent. Optics show it to be oligoclase. The matrix to this coarse fabric is polygonal textured, almost granuloblastic with very straight edges, apart from myrmekite, and grain diameters are around 0.15 mm. There is some coarse microcline but quartz is mostly matrix.

The accessories are not entirely associated with the pyriboles. Sphenes, with their light orange colour, are coarse enough to be visible to the naked eye in hand specimen. Clusters of 0.3 - 0.5 mm wedge-shaped material are not rare. Their colour in polarised light is orange but the strength of the pleochroism is less than that of 1581, for example.

This core has significant magnetite, of similar dimensions to the sphene, but only showing faces in the smaller diameter material. The third relatively abundant accessory is apatite, subhedral 0.1 mm crystals which are commonly included within, or attached to, magnetite. Most of the opaque material has a thin rim of colourless sphene, suggesting the presence of ilmenite or titanomagnetite.

The presence of a diopside series mineral with oligoclase is slightly anomalous for an amphibolite grade rock. However, the relatively iron-rich nature of the ferromagnesians probably alters the PT conditions from the standard 'basic' rock. If a basic origin is envisaged, high iron and potash would infer a highly differentiated type.

80-1595

MACROSCOPIC: Amphibolite

MICROSCOPIC: Partially recrystallized pyroxene amphibolite

Hornblende	50-60%	SECONDARY	40-50%
'Plagioclase'	40-50%	Sericite	
Clinopyroxene	5-10%	Carbonate	
Biotite	$<1\%$	Saussurite	
Opaques	1%	Chlorite	

An amphibolitic rock that is considerably modified, most of the plagioclase being a mixture of secondary sericite and saussurite, and the hornblende at least 50% recrystallized.

The prograde fabric was a lineated amphibole of 0.5 mm dimensions with interstitial finer grained plagioclase and occasional ? diopsides. Accessories were limited to minor opaques.

The retrograde metamorphism has caused the above modifications, and also a lowering of the birefringence of the pyriboles to first order. The coarse amphibole includes a brown pleochroic colour suggesting a high grade, upper amphibolite ?, metamorphism. This amphibole is surrounded by a fine (0.1 mm) polygonally textured mosaic of a pale green amphibole, ? actinolite. There is evidence that this is lineated.

The clinopyroxene has an irregular outline, due to replacement by the amphibole mosaic. The pyroxene is anomalous in having a small 2V (30^{o} + ve), only found in pigeonite or subcalcic augite, both igneous pyroxenes.

Minor biotite is well oriented and may have formed during the recrystallization process, as it is within the fine amphibole masses.

The carbonate and chlorite are present in veins.

80-1596

325

MACROSCOPIC: Fine grained augen gneiss

MICROSCOPIC: Blastomylonite

CLASTS 10%	MATRIX 90%		SECONDARY
Plagioclase	Quartz)		Sericite
Microcline	Plagioclase)	80-90%	Chlorite
	Microcline)		Carbonate
	Biotite	5-10%	
	Amphibole	5-10%	
	Opaques	<1%	
	Zircon	<1%	
	Apatite	<1%	

A heterogeneous banded 'gneiss' containing a number of very angular feldspar clasts, the largest of which, in the slide, measures 2 mm. It is a soda-rich plagioclase with a coarse antiperthite texture. Other plagioclase clasts have highly distorted albite twinning. These crystals, sometimes aggregates, grade down to a fine schistose matrix. This matrix is banded, alternations of amphibolite, biotite semi-pelite and quarts-feldspar layers, which are not always continuous. The gneiss is considered to be a product of dislocation metamorphism. Because there is evidence of recrystallization, formation of biotite, etc., following mylonitization, the rock can be described as a blastomylonite.

The fineness of the matrix makes estimation of composition difficult, but there is a tendency for quartz to occur in narrow ribbon-like layers. Much of the plagioclase is sericitised, while 'clots' of chlorite possibly are the product of breakdown under shearing of ferromagnesians.

Some of the zircons appear partly metamict.

Within the amphibolite band, there are rare ? palimpsests of coarser brown ? hastingsitic amphibole in a matrix of fine, well aligned hornblendes.

Chlorite-carbonate veins are similar to those of 1595.

80-1597

MACROSCOPIC: 'Striped' migmatitic basic gneiss

MICROSCOPIC: See below

AMPHIBOLITE	
Hornblende	45-50%
Plagioclase	45-50%
Biotite	5-10%
Opaques	2- 3%
Zircon	1%
Apatite	1%

BIOTITE SCHIST	
Plagioclase	50-60%
Quartz	20-25%
Biotite	20-25%
Zircon	1%

QUARTZ FELDSPAR GNEISS	
Quartz	60%
Plagioclase	40%
Carbonate	
Pyrite	

A coarse banded metamorphite, in which mafic to semi-mafic layers alternate with leucocratic layers, in the manner of a migmatite. The amphibolite band is similar to 80-1595, with porphyroblasts of brown to green hornblende sporadically distributed through a fine equidimensional green hornblende-plagioclase matrix, with some oriented biotite. The biotite-rich pelitic layers are mostly fine grained, but altered porphyroclastic amphibole and plagioclase are present.

The felsic bands are simple banded quartz and sericitised plagioclase, the latter either forming simple alternate layers with quartz or as 0.5 - 1 mm blasts.

There is evidence that the quartz-plagioclase bands were a later injection, or vein, into the amphibolite, with biotite forming as the contact layers. Supporting this are palimpsest blasts, now carbonate, at the contact or within the acid vein, probably replaced amphibole blasts.

This phenomenon is, therefore, a good example of an injection gneiss, where lower temperature quartz and feldspar have been mobilized and vein the more mafic rock, although it may be only at a contact, i.e. is very localised.

80-1598

MACROSCOPIC: Carbonate rock

MICROSCOPIC: Serpentinised olivine marble

Calcite	80-85%
Serpentinised olivine	10-15%
Talc	5%
Pyrite	1%
Brucite	?

A slightly banded marble due to alignment of concentrations of altered olivine. The main fabric is inequigranular (0.2 - 1 mm) xenoblastic calcite with grain contacts moderately irregular and some interlocking.

Altered olivine, with a characteristic oval shape, and grain size variation similar to carbonate, is very largely serpentinised. This serpentine varies in colour from yellow, to colourless, but is not accompanied by secondary magnetite. Replacement by talc and carbonate and ? brucite can also be found. Rare fresh olivine has optics suggesting chrysolite, not forsterite.

There is a trace of an isotropic mineral, probably grossular, surrounded by another unidentified silicate.

The minor talc content is confined to incipient layers and shows orientation.

Olivine marbles are usually considered to be derived from siliceous dolomites.

80-1599

MACROSCOPIC: Serpentine marble

MICROSCOPIC: Serpentinised 'olivine' marble

Carbonate	65-70%
Serpentine	30-35%
Opaques	$<1\%$
Chlorite	$<1\%$

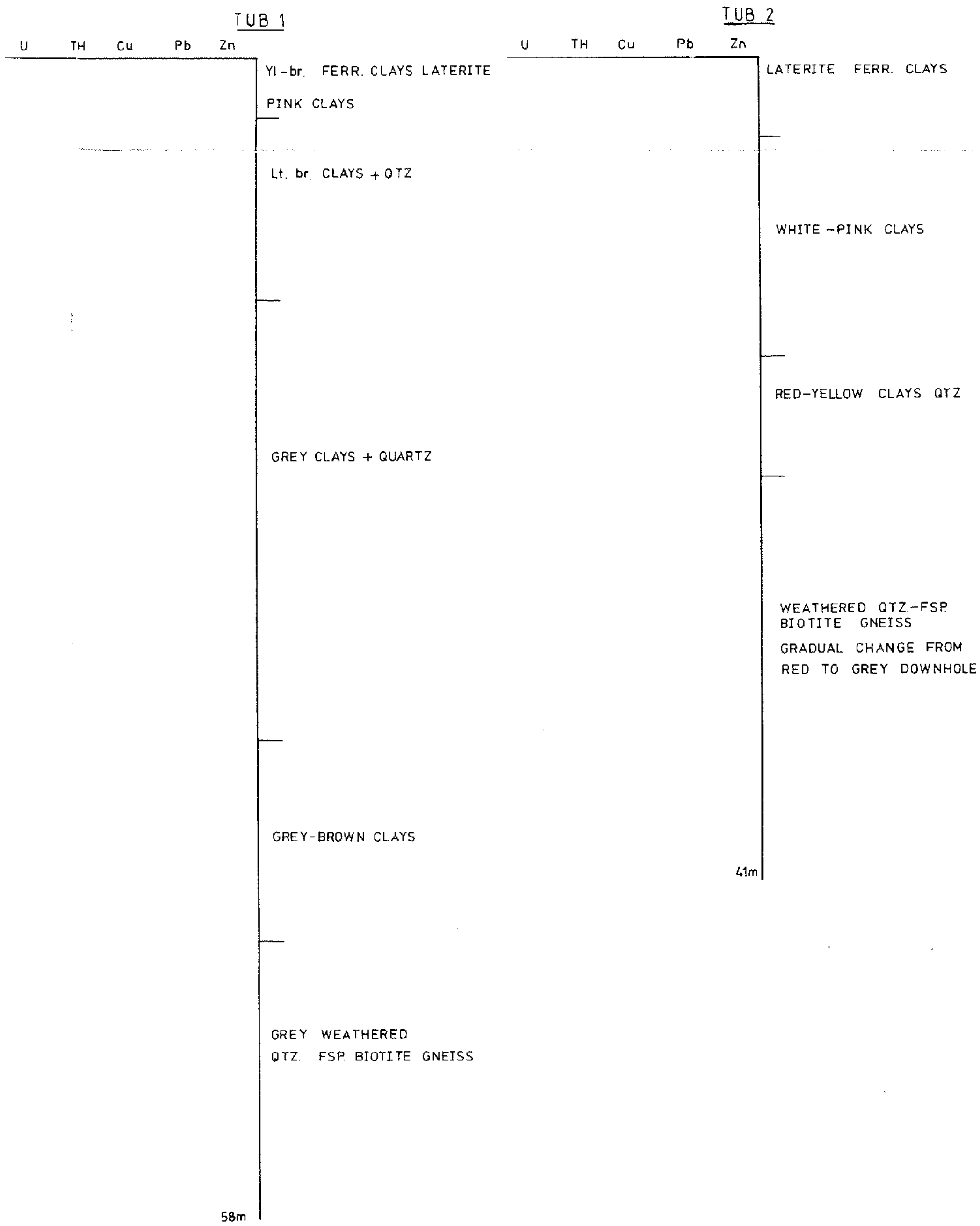
A similar interval to 80-1598, with a greater content of serpentinised olivine. No primary olivine is preserved, but the olivine habit is preserved by the serpentine pseudomorphs, which range normally from 0.1 to 0.5 mm long dimension. The coarser the pseudomorph, the less perfect the euhedral habit. Some appear to have been deformed.

Internally the serpentine (? lizardite) texture consists of oriented plates, crossed by numerous serpentine veins. Many also contain carbonate. Opaques (non-magnetic) are an occasional ragged concentration, mostly at the serpentine margin.

The calcite is similar to 80-1598, inequigranular xenoblastic, with castellated contacts. There is a trace of pale chlorite within the carbonate. Genesis as for 80-1598.

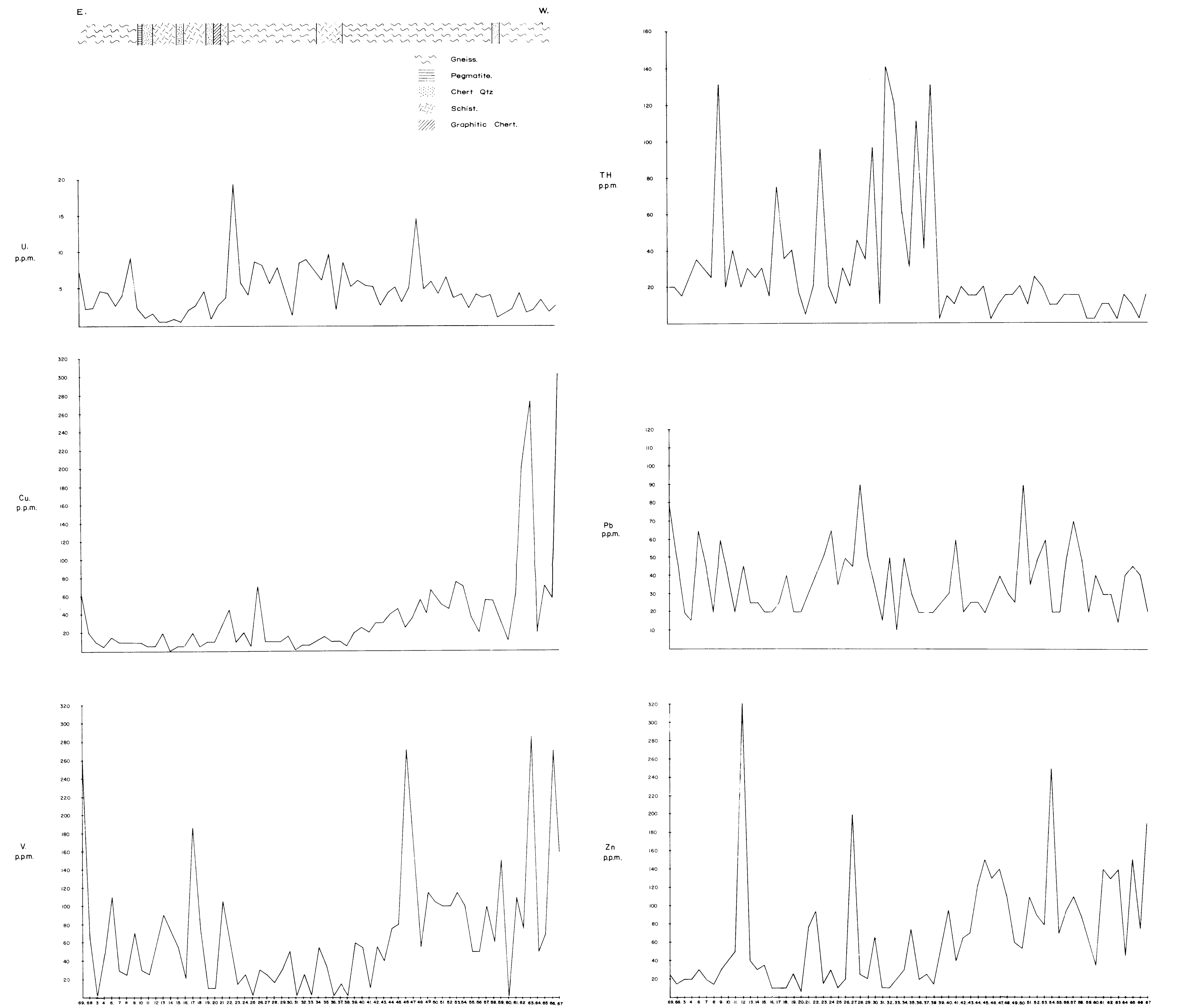

TUMBY BAY
E.L. 578
SPENCER GULF
GREAT AUSTRALIAN BIGHT
BOSTON BAY
PORT LINCOLN
LEGEND
Rock sample location and number — THIN SECTION
Rock sample location and number — ANALYSIS & THIN SECTION
Grid location and Number
Auger drillhole location and number (NOTE TUB 1,2,3 & 69 were analysed)
Diamond drill hole location and number
Aeromagnetic and spectrometry survey area boundary
E.L. Boundary
To Accompany Report Nº WY 81.8
Plate 1.
REVISION
DATE
Drillholes Aeromag
DEC '81
AFMECO PTY. LTD.
SCALE
1 100 000
S. AUST
TUMBY BAY PROJECT
E.L.578
DRILL HOLE and GRID
LOCALITY MAP.
3776 (II)-9
DRAWN
Bernie
DATE
June, 1981
GEOLOGY
PW, FB, DB
APPROVED
DWG. Nº
S153-11 126 4031

TUMBY BAY
E.L. 578
SPENCER GULF
SPENCER GULF
GREAT AUSTRALIAN BIGHT
TN
LEGEND
X 500 Counts sppg
Uranium Anomalies from Airborne Survey Number
Grid location and Number
Auger drillhole location
To Accompany Report WY 81.8
PLATE 2
REVISION
DATE
AFMECO PTY. LTD.
SCALE
Km
DRAWN
Bernie
DATE
GEOLOGY
APPROVED
DWG No
S. AUST.
TUMBY BAY PROJECT
E.L.578.
LOCATION MAP FOR
HIGH BACKGROUND AREAS.
3776 (II)-10



DRAWN J.P.	S. AUST. TUMBY BAY PROJECT. E.L.578.
DATE January '82	**LITHOLOGICAL LOGS FOR**
DWG. N° SI53-11.126.4166	**TUB I and TUB 2.**

To Accompany Report N° WY81.8 *Plate 3.*

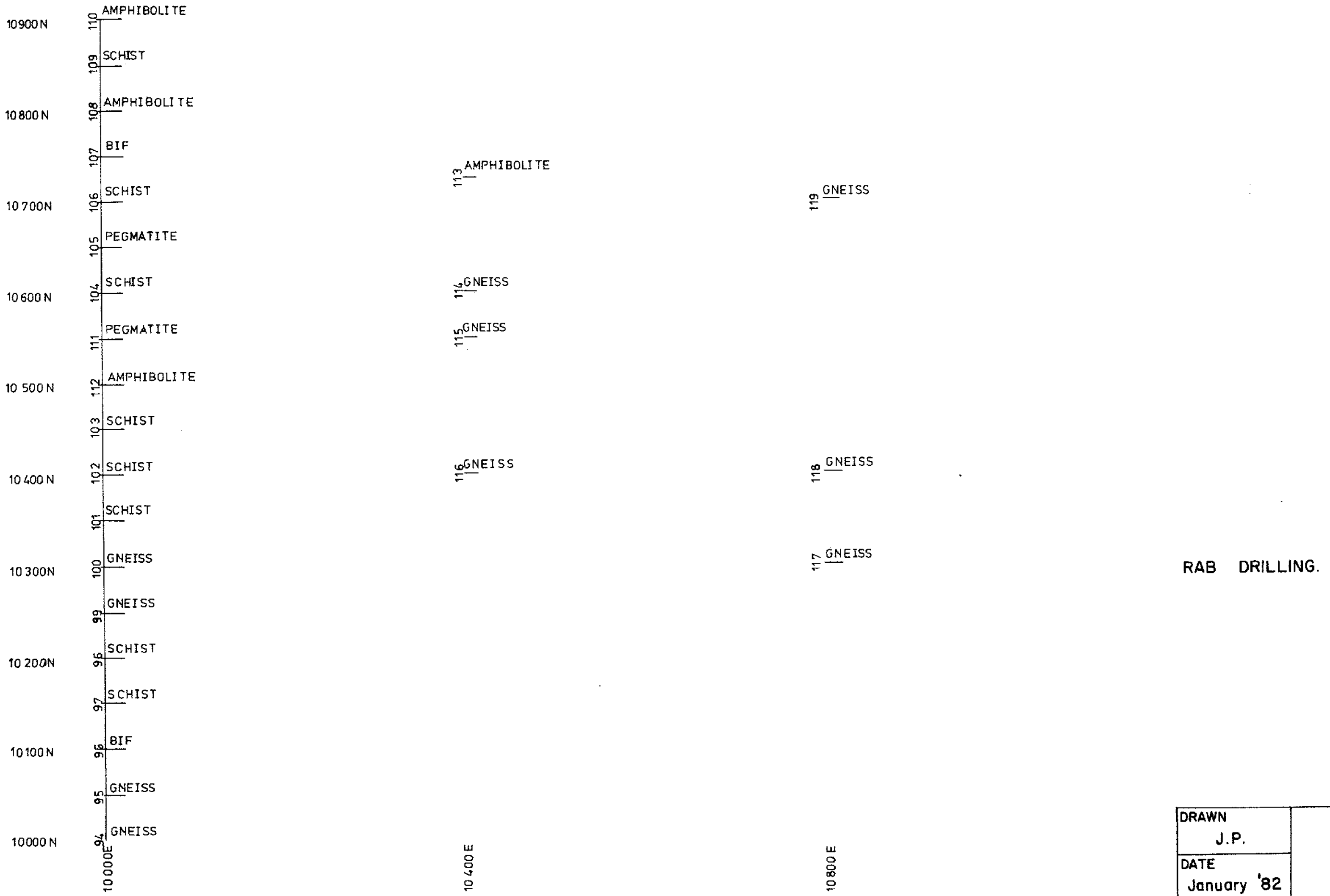


To Accompany Report N° WY 81. 8

Plate 4.

REVISION	DATE		
			AFMECO PTY. LTD.
			SCALE
		DRAWN J.P.	S. AUST. TUMBY BAY PROJECT. E.L.578.
		DATE January '82.	
		COMPILED J.P.	LITHOLOGY AND GEOCHEMISTRY FOR STRATIGRAPHIC PROFILE.
DWG. N° SI 53-11.126.4167.		APPROVED	

3776 (II) -11



DRAWN J.P.	S. AUST. TUMBY BAY PROJECT. E.L.578.
DATE January '82	**LITHOLOGY FOR GRID TB 17 AREA.**
DWG Nº SI53-11.126.4168.	

331

To Accompany Report Nº WY81.8 — *Plate 5.*

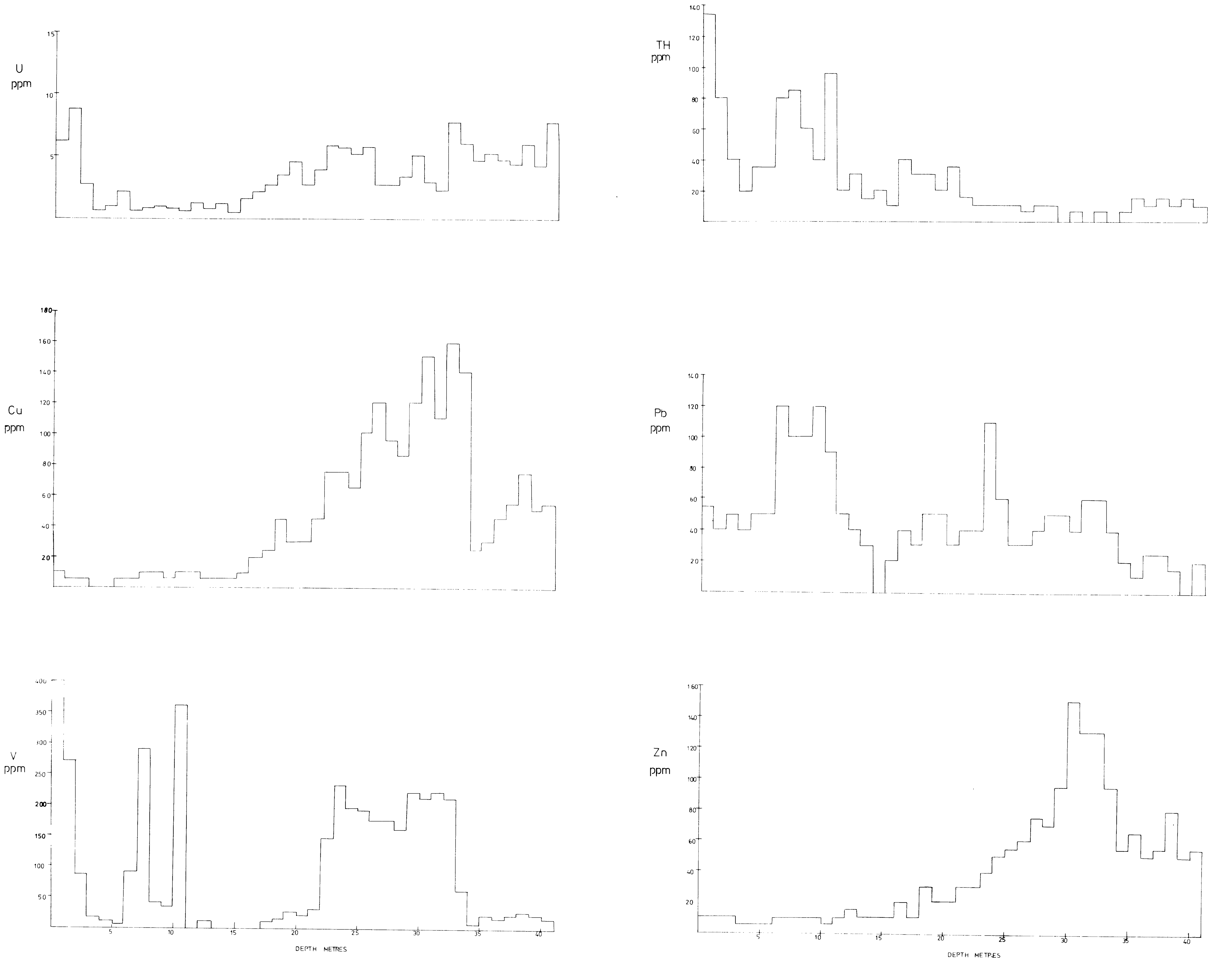
3776 (II) - 12

DRAWN J.P.	S. AUST. TUMBY BAY PROJECT. E.L.578.
DATE January '82	**GEOCHEMISTRY FOR HOLE TUB I.**
DWG N° S153-11.126.4169.	

To Accompany Report N° WY 81.8

Plate 6.

TUB 2

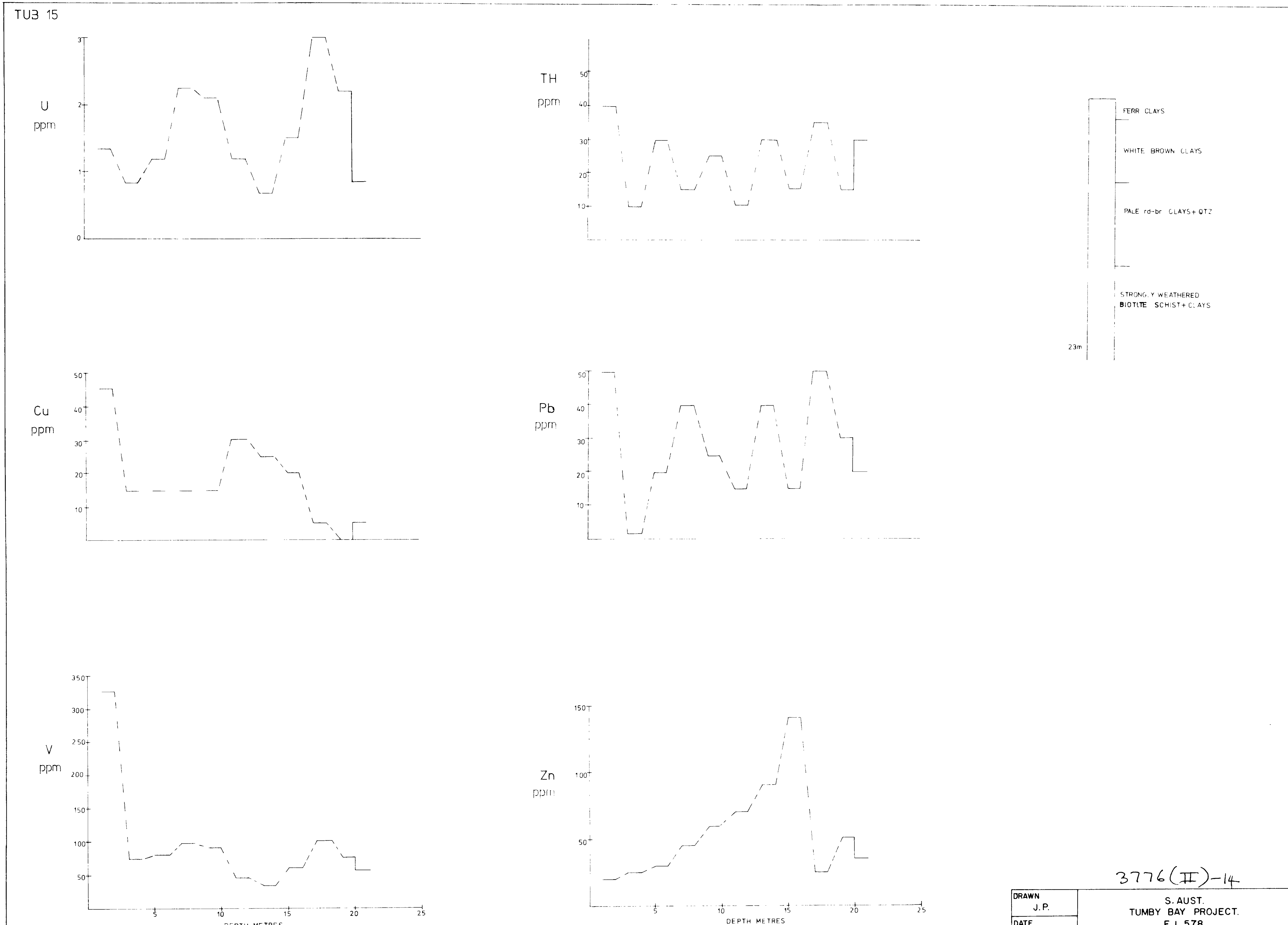


3776 (II)-13

DRAWN J.P.	S. AUST. TUMBY BAY PROJECT. E.L.578.
DATE January '82	**GEOCHEMISTRY FOR HOLE TUB 2.**
DWG No SI53-11.126.4170.	

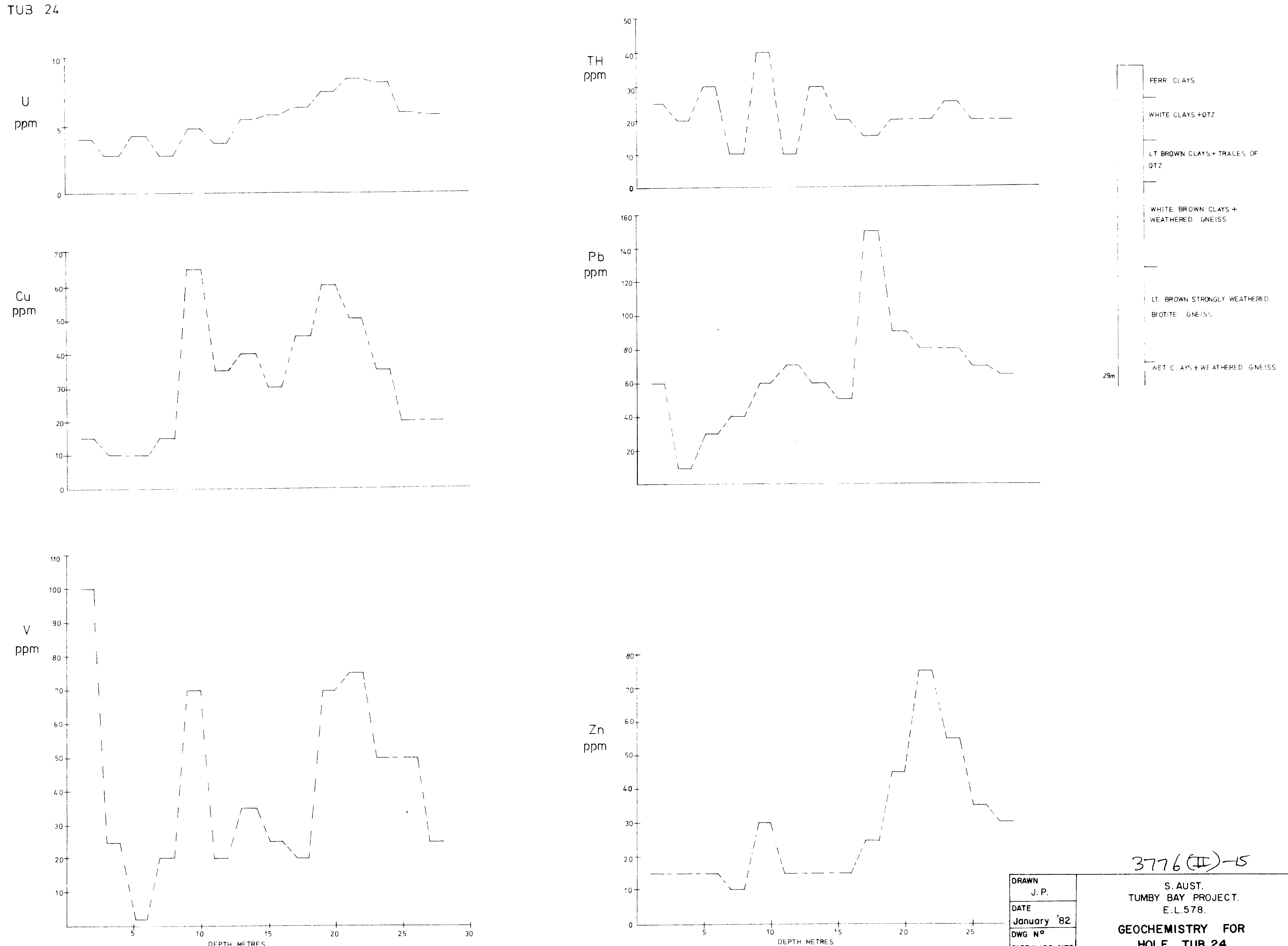
To Accompany Report No WY81.8

Plate 7.



3776(II)-14

DRAWN J.P.	S. AUST. TUMBY BAY PROJECT. E.L.578.
DATE January '82	GEOCHEMISTRY FOR HOLE TUB 15.
DWG N° SI 53-11.126.4171	

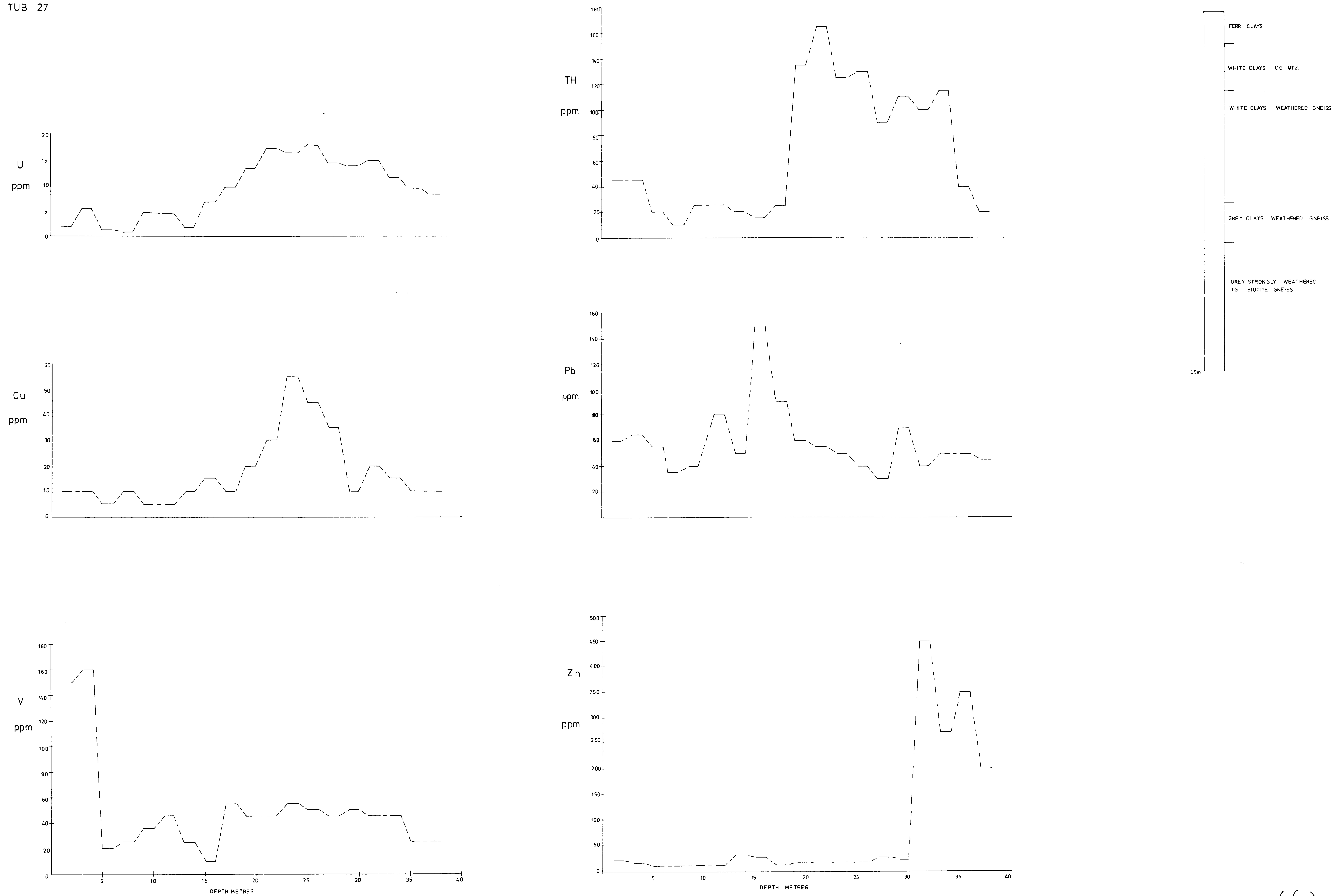


3776 (II)-15

DRAWN J. P.	S. AUST. TUMBY BAY PROJECT. E.L.578.
DATE January '82	**GEOCHEMISTRY FOR HOLE TUB 24.**
DWG No S153-11.126.4172	

To Accompany Report No WY 81.8

Plate 9.



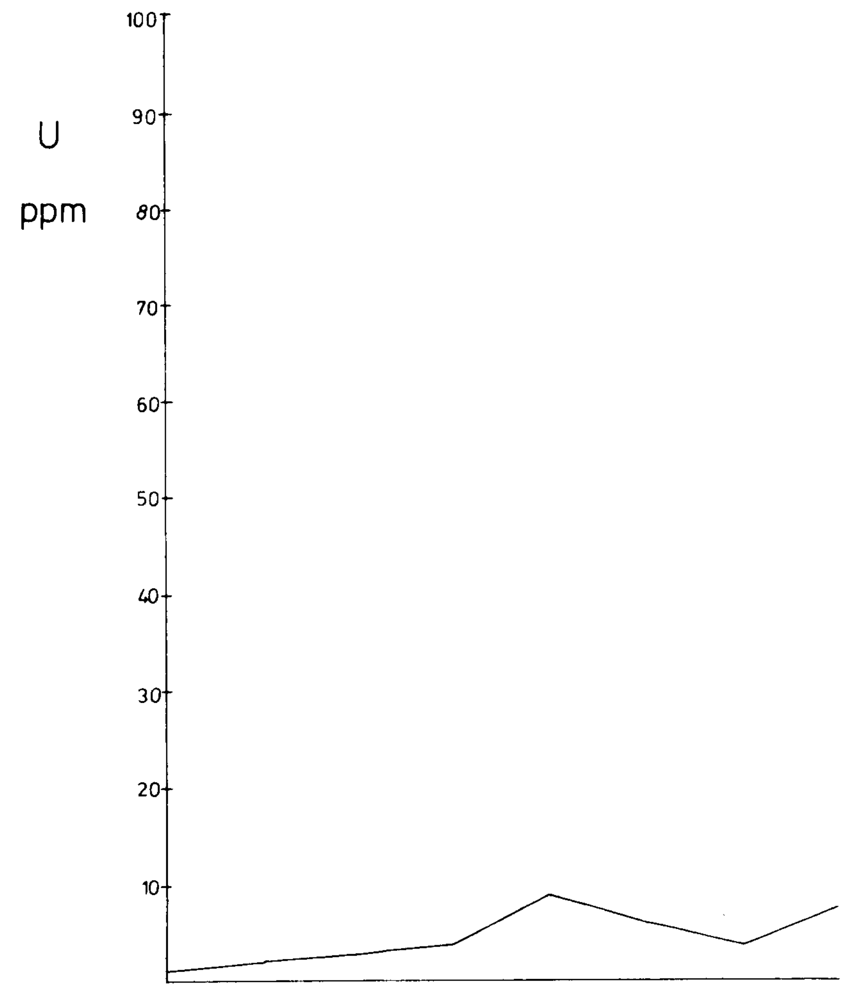
3776 (II)-16

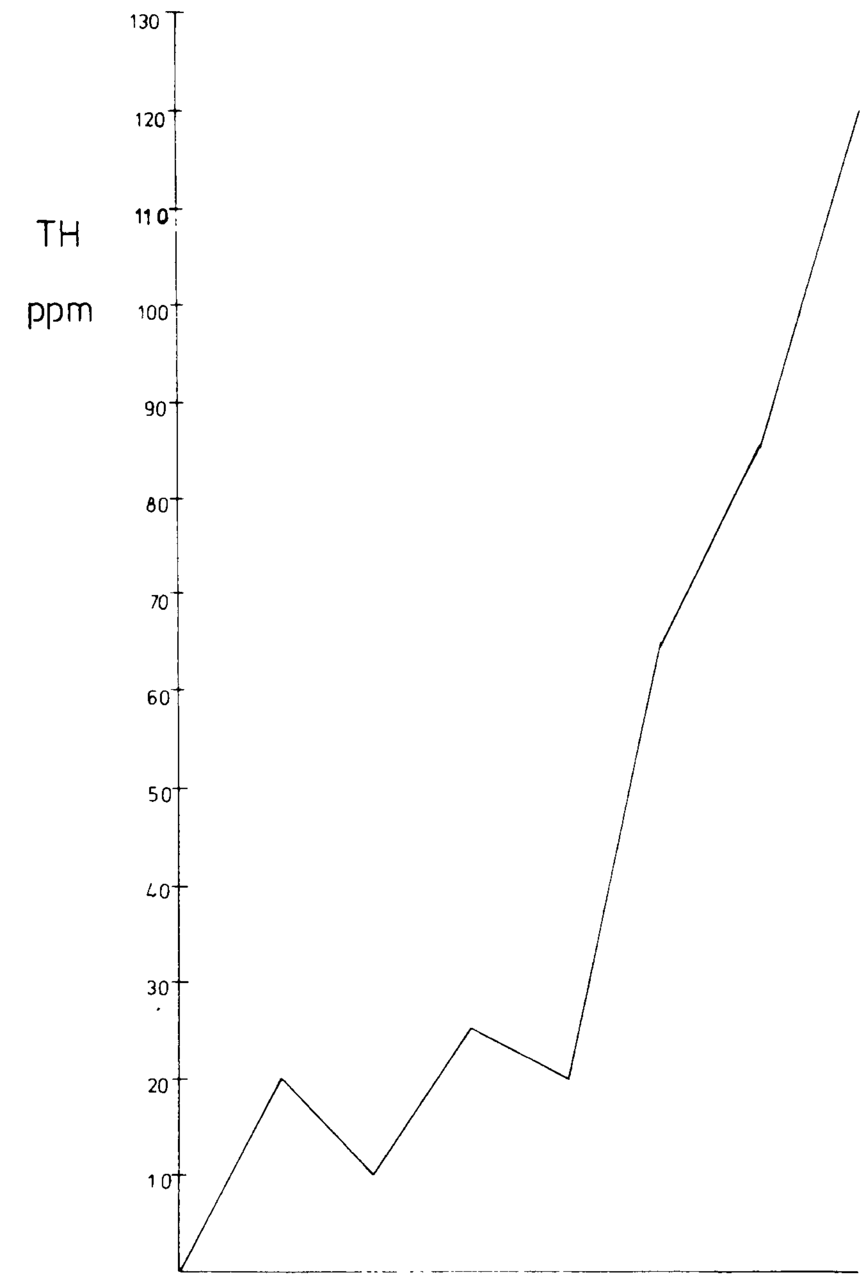
DRAWN J.P.	S. AUST. TUMBY BAY PROJECT. E.L.578.
DATE January '82	**GEOCHEMISTRY FOR HOLE TUB 27.**
DWG Nº S153-11.126.4173.	

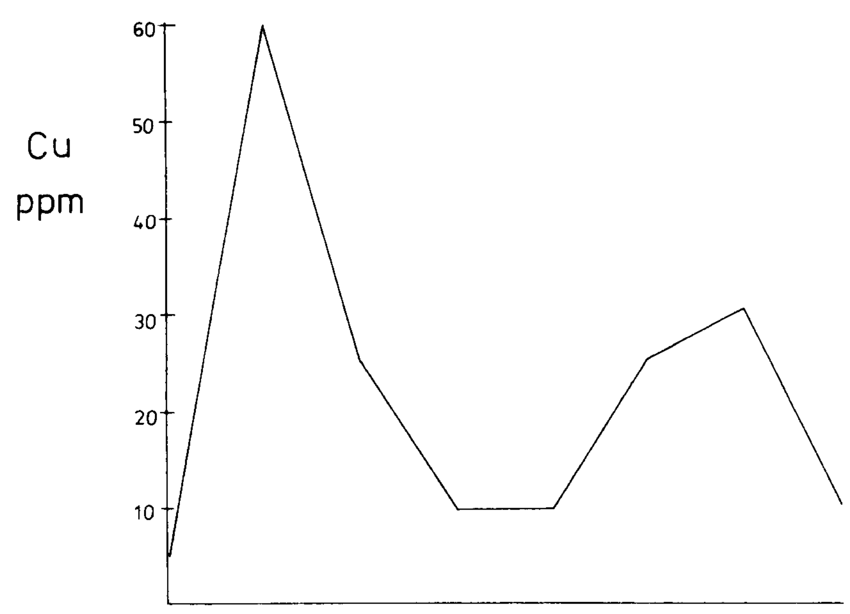
To Accompany Report Nº WY 81.8

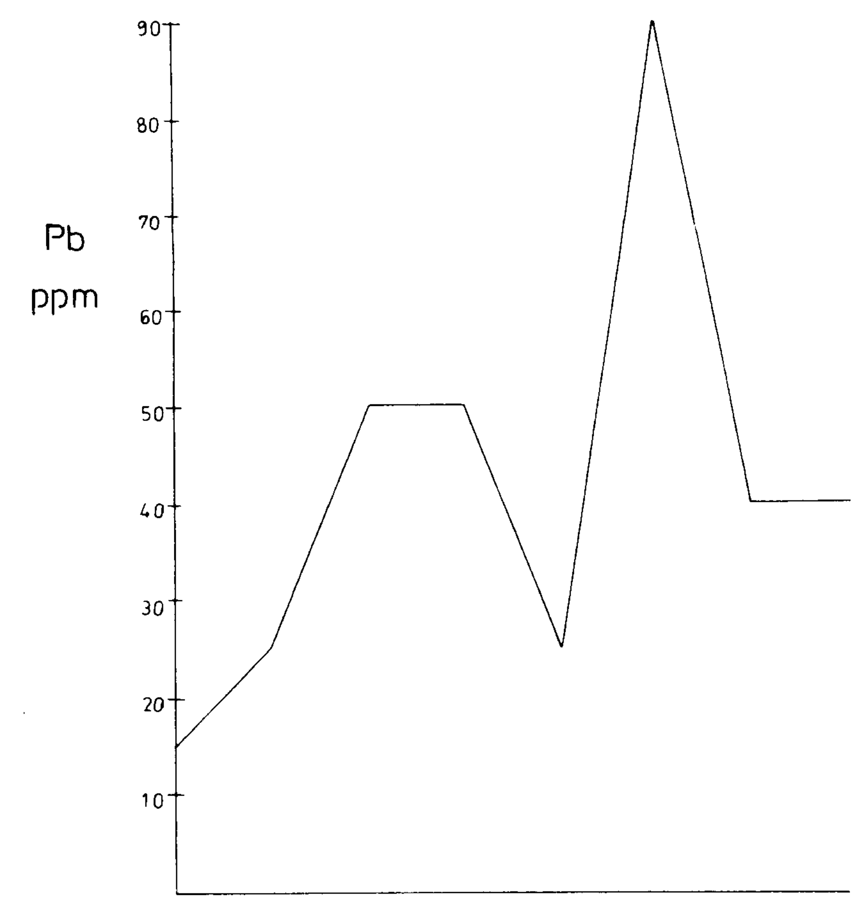
Plate 10.

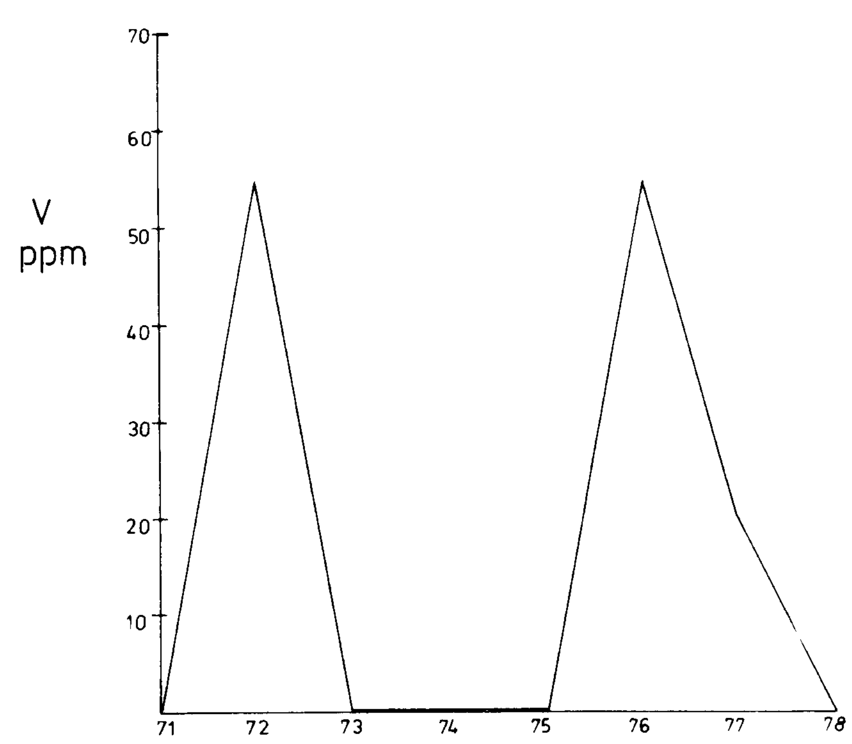
GRID TUB 29

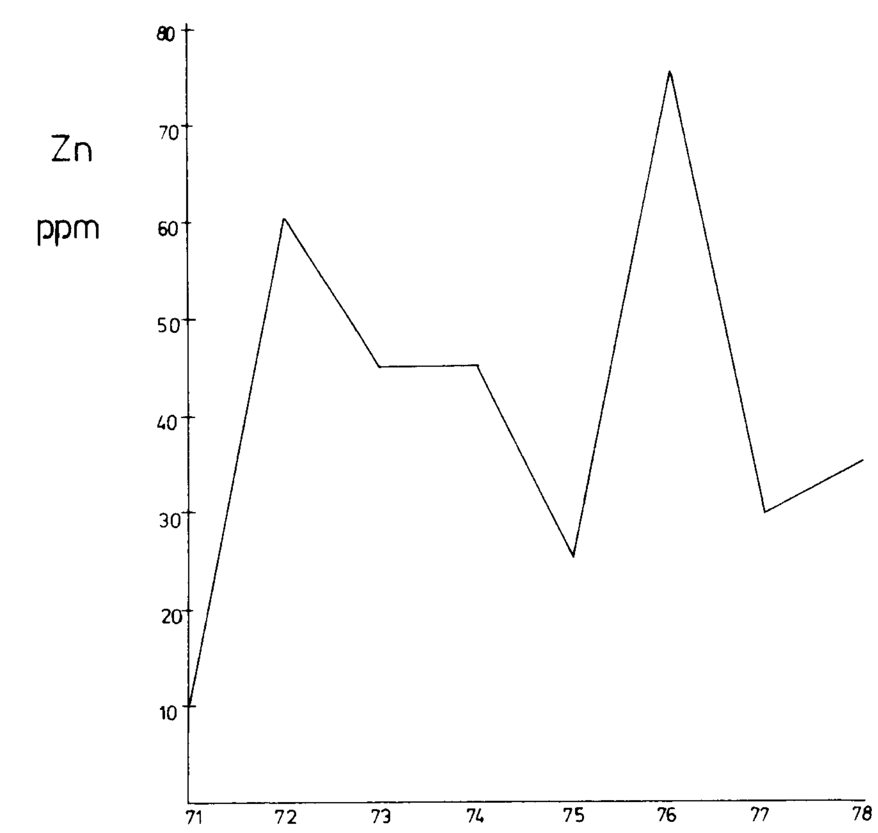










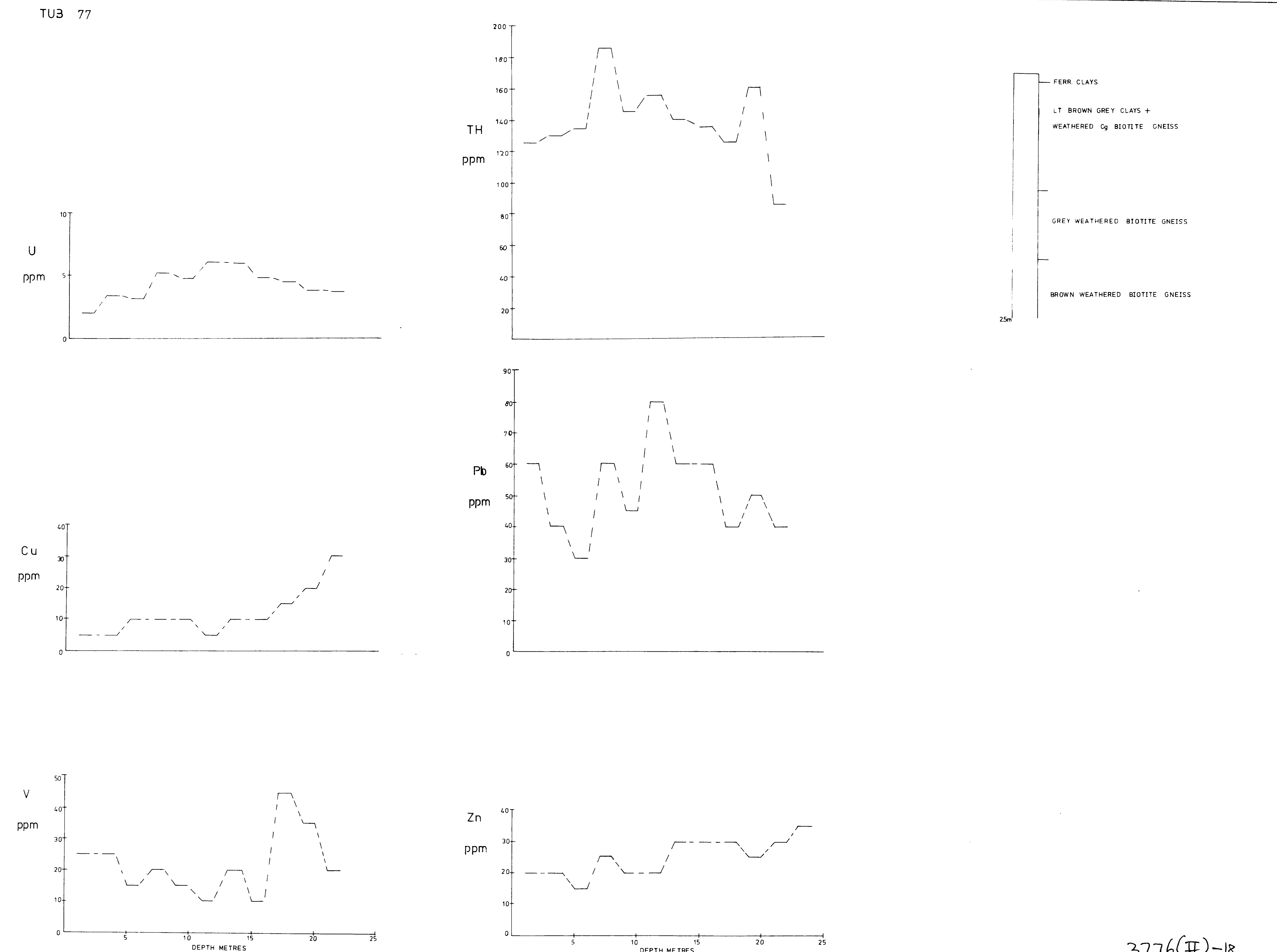


DATE January '82 DWG N° SI53-11.126.4174	S. AUST. TUMBY BAY PROJECT. E.L.578.	**GEOCHEMISTRY FOR GRID TB 29.**

To Accompany Report N° WY 81.8

3776(II)-17

Plate 11.



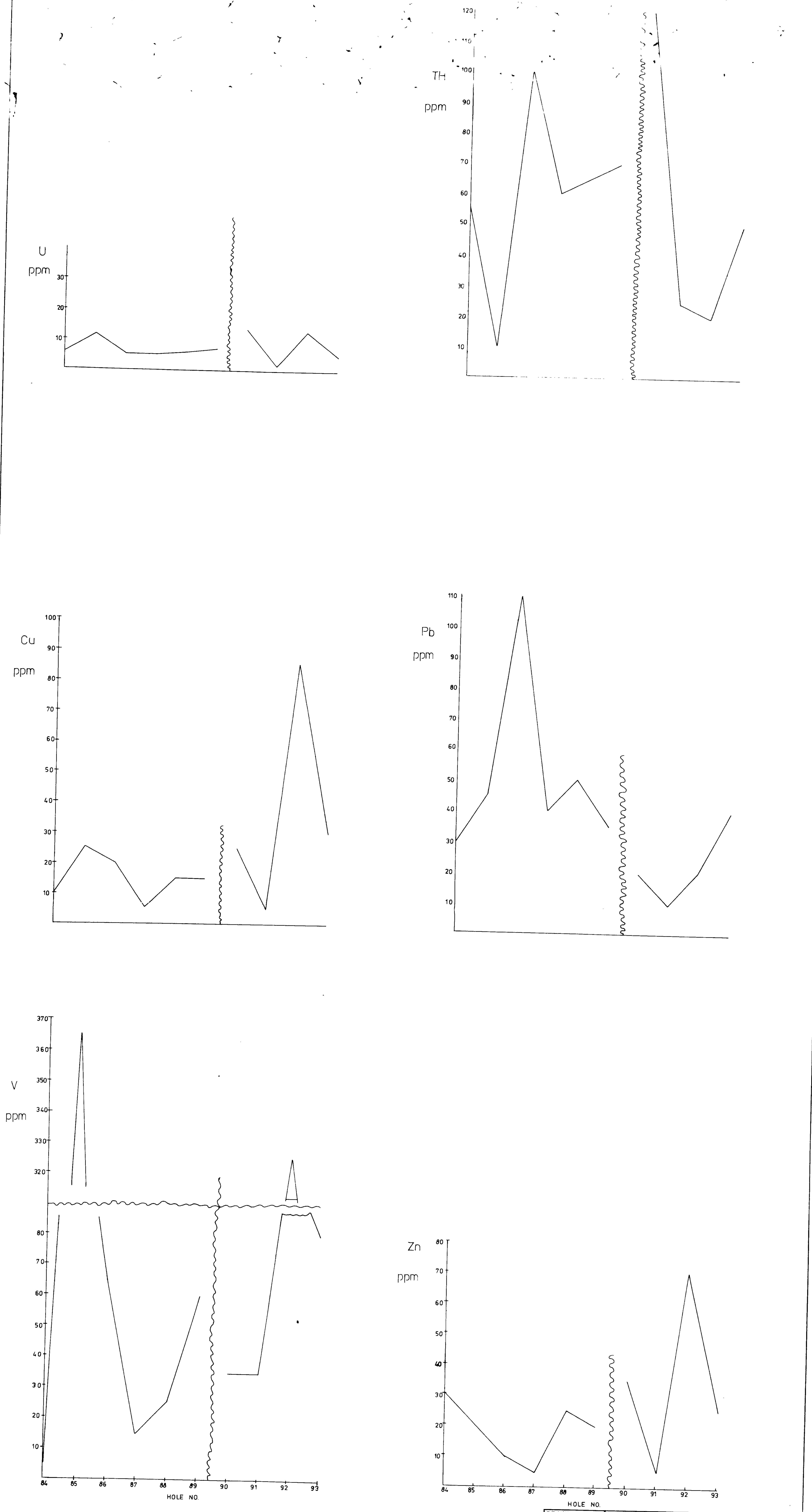
3776(II)-18

DRAWN J. P.	S. AUST. TUMBY BAY PROJECT. E.L.578.
DATE January '82	GEOCHEMISTRY FOR HOLE TUB 77.
DWG Nº S1 53 11.126.4175.	

To Accompany Report Nº WY 81. 8

Plate 12.

GRID TB



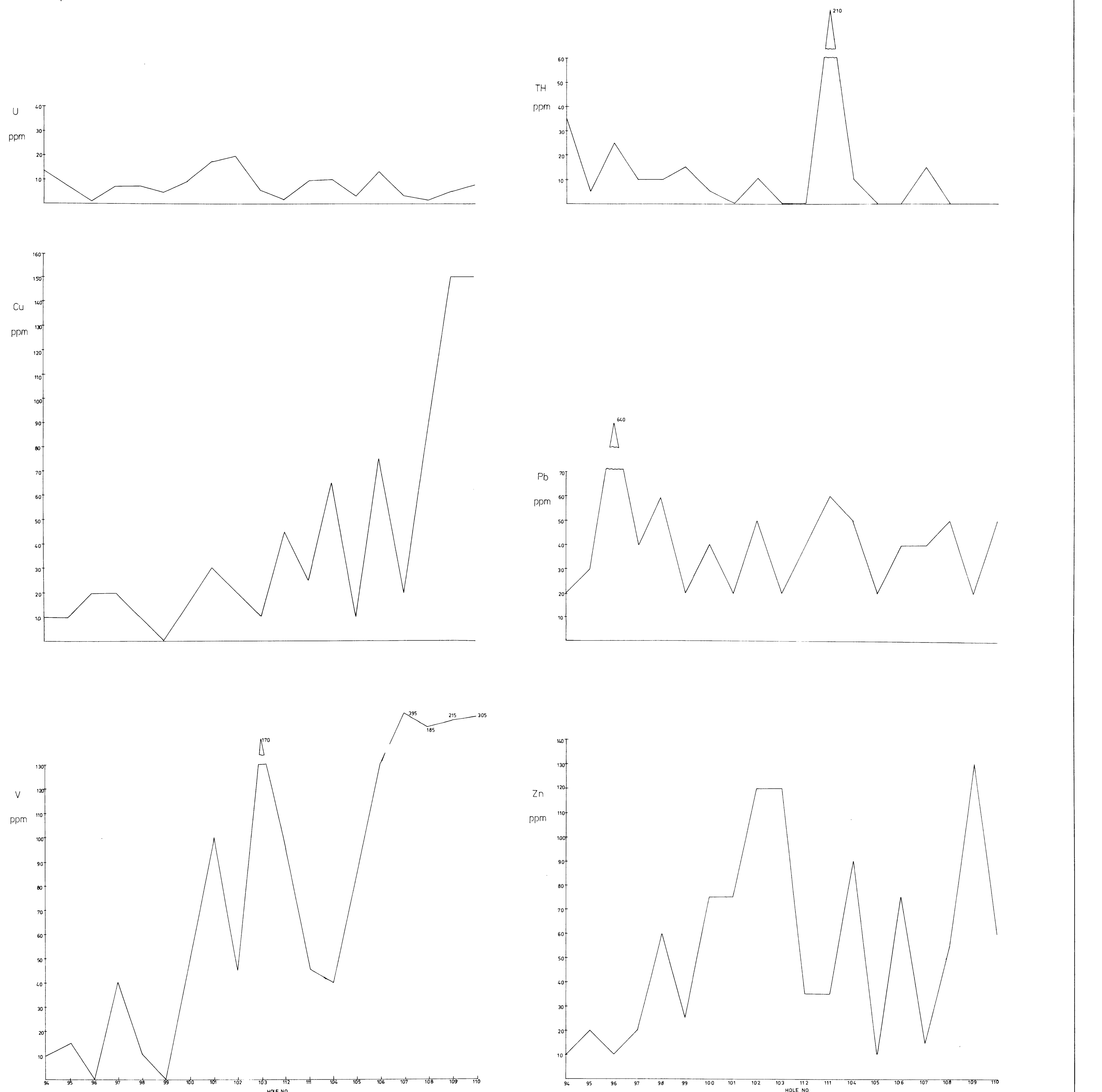
DRAWN J.P.	S. AUST. TUMBY BAY PROJECT. E.L.578.
DATE January '82	**GEOCHEMISTRY FOR GRID TB I.**
DWG. No S153-11.126.4176.	

To Accompany Report No WY81.8

Plate 13.

3776(II)-19

TB 17

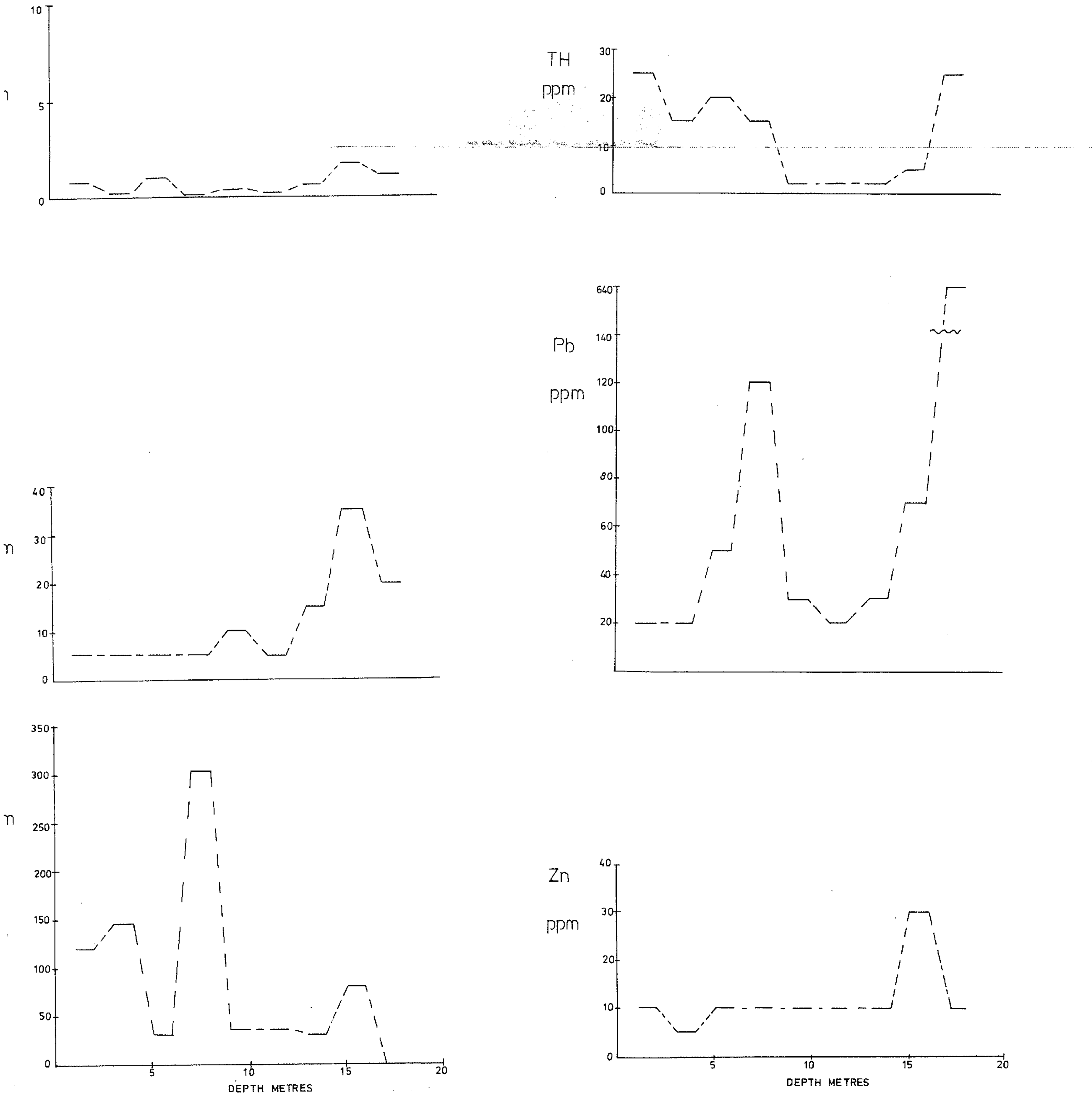


DRAWN J.P.	S. AUST. TUMBY BAY PROJECT. E.L. 578
DATE January '82	GEOCHEMISTRY FOR GRID TB 17.
DWG Nº SI 53-11. 126. 4176.	

To Accompany Report Nº WY 81. 8

3776 (II) - 20

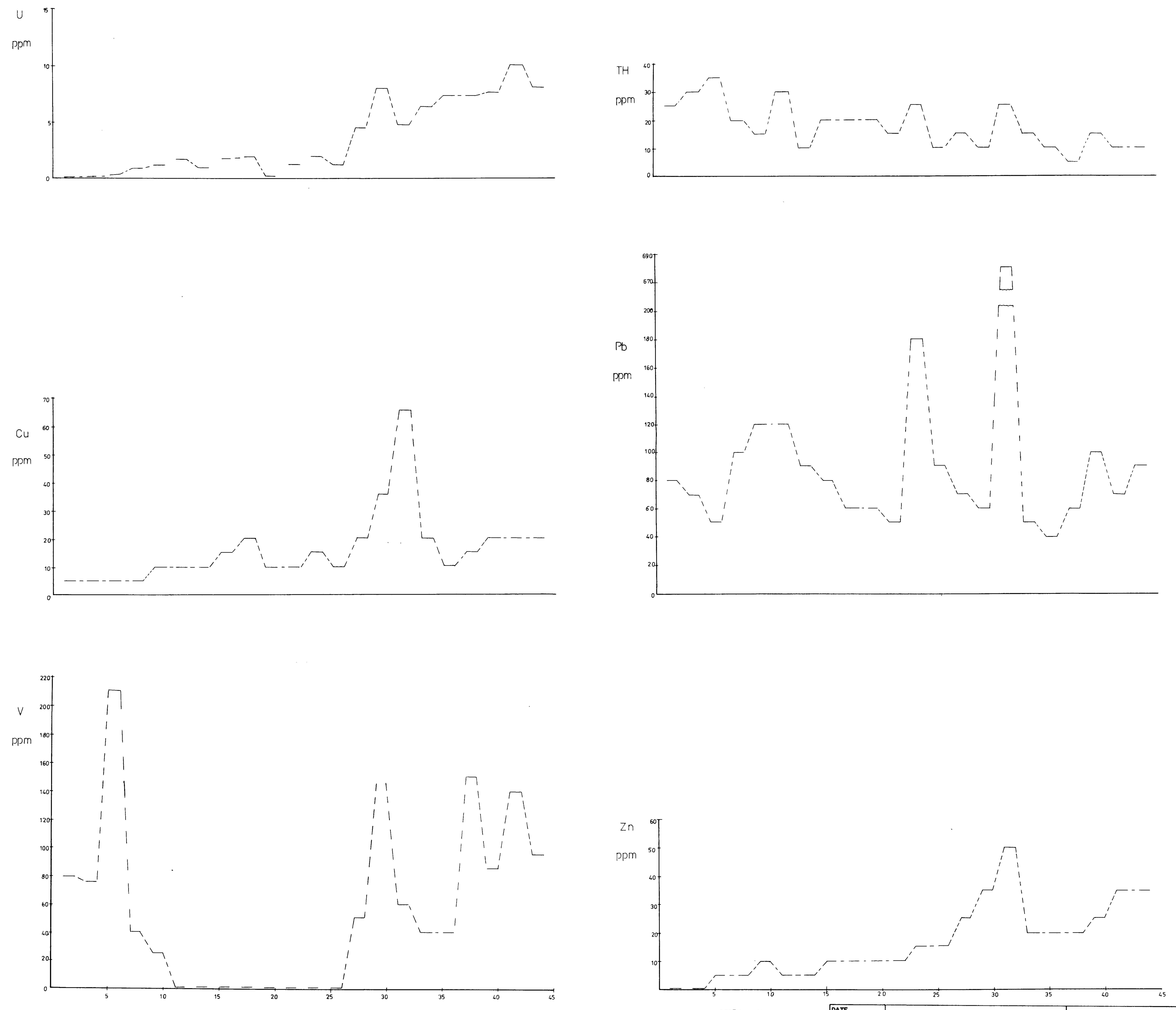
Plate 14.



DRAWN J. P.	S. AUST. TUMBY BAY PROJECT. E.L.578.
DATE January '82	**GEOCHEMISTRY FOR HOLE TUB 96.**
DWG N° SI 53-11.126.4178.	

To Accompany Report N° WY 81.8 *Plate 15.*

TUB 97



DATE January '82	S. AUST. TUMBY BAY PROJECT. E.L. 578.	GEOCHEMISTRY FOR HOLE TUB 97.
DWG Nº S153-11.126.4174		

To Accompany Report Nº WY 81.8

3776(II)-21

Plate 16.

II

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Telephone: (09) 321 9618, 321 9681
Telex: AFMECO 92077 Perth

MQ/1k 82-0495

24th February, 1982

The Director General,
Department of Mines and Energy,
P.O. Box 151,
EASTWOOD SA 5063

Dear Sir,

Mining Act 1971 to 1978
Exploration Licence No. 578
4th Quarter Report Year 2
Period 16.10.81 to 15.1.82

During the period covered by this report, Afmeco Pty. Ltd., carried out the following field work:

(1) Geophysical Field Work

The majority of anomalies selected from the interpretation of 1979 Austirex analog data were located in the field but proved to non-prospective. Most radioactive occurrences are related to the extensive laterite capping which covers the area.

However, one anomaly located with a radioactive background of around 50 to 100 c/s SPP2, was situated in a mildly schistose quartzitic conglomerate of the Hutchison group (Warrow Quartzite). This would seem to indicate that schists with high background readings warrant further investigation. Some occurrences with uniformily higher activities between 300 and 500 c/s SPP2 have been noted.

Exploration of high uranium background areas, defined by the Austirex airborne survey at 100 metre line spacing continued. In areas containing the Lincoln Complex, high readings of 400 to 450 c/s SPP2 were recorded, however, spectrometer readings indicated the source as thorium.

(2) Geological Mapping

In the Koppio area of the licence, a programme of detailed geological mapping has commenced. The purpose of this operation is to establish the structure of the Hutchison

Group as an aid to stratigraphic interpretation and to locate prospective areas.

(3) Comments

The Hutchison Group rocks of this area are near vertical in dip and appear to form an anticline.

Mapping has proved difficult due to the sparse outcropping and extensive laterite cover, however there is the possibility that a usable stratigraphy for the area can be established.

Please find enclosed for your information and retention an expenditure statement covering the period of this report.

Yours faithfully,
AFMECO PTY. LTD.

Po

J.-P. POGGI
Managing Director

Encl.

STATEMENT OF EXPENSES RELATING TO EXPLORATION PROGRAMME

EL 578 QUARTER 16.10.81 to 15.1.82
FINAL REPORT

PERSONNEL (FIELD WORK, EVALUATION, OFFICE WORK)	15,550.56
MATERIAL (DIRECT)	778.55
TRAVEL, ACCOMMODATION (DIRECT)	5,285.70
CONTRACTS, SUPPLIES	1.972.17
DRAFTING SERVICE, PREPARATION OF REPORTS	
	7,156.12
MISCELLANEOUS	
MANAGEMENT/OVERHEADS	1,537.15
	$32,280.25

Permit Year Ends: 15.1.82

Commitment : $60,000.00

Total Expenditure Reported To Date:

$222,334.63

II

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AFMECO PTY. LTD.
11-13 Lucknow Place, West Perth, Western Australia
P.O. Box 526, West Perth, Western Australia, 6005
Telephone: (09) 321 9618, 321 9681
Telex: AFMECO 92077 Perth

MQ/lk 82-1210

27th May, 1982

The Director General,
Department of Mines and Energy,
P.O. Box 151,
EASTWOOD SA 5063

Dear Sir,

Mining Act 1971 to 1980
Exploration Licence No. 578
Quarterly Report
Period 16.1.82 to 15.4.82

As you will be aware, Afmeco Pty Ltd applied for the renewal of this exploration licence on 8th December, 1981. On March 29th, 1982, we were advised by the Mining Registrar that our application had been sucessful and that the new exploration licence No 981 was to commence on 29th March, 1982.

This report covers the period between the expiration of the former tenement to two weeks after the granting of the new licence. We will make the necessary adjustments to reporting procedures for the first quarter report of EL 981 to account for the two week period.

During the period of this report, Afmeco Pty Ltd carried out the following field work:

(1) Ground Survey

Field work continued to investigate the high background areas detected by the previous quarters aerial survey. No major anomalies, that is, > 1000c/s SPP2 were located. Some minor anomalous areas, covered by lateritic soils, with background readings of 150-200 c/s SPP2, but with no outcropping rocks were checked.

The ground survey was conducted over 2 months and apart from ground verification methods, Afmeco conducted an extensive car-borne scintillometry programme using a SPP2 - NF detection unit.

(2) Results

In total over 86 anomalies selected from the airborne survey by Austirex and an additional 34 areas with high radiometric backgrounds were investigated and verified by field staff.

Results were generally disappointing due mainly to the soil and laterite cover which extends over the area. However, detailed ground work in the high background reading areas did detect one anomaly which maybe prospective. This will be further investigated using costeans to assess its significance.

(3) Geological Mapping

Following the results of the ground survey a reconnaissance mapping programme was conducted over some 450 square kilometres of the licence. The data gained from this exercise has improved Afmeco's appreciation of the geology of the area.

(4) Conclusions

Although results gained from ground survey methods of the selected anomalies, derived from the airborne survey, appeared disappointing, Afmeco has designed a different approach to the exploration of this area.

Early indications from the reconnaissance mapping illustrate the need to continue with this programme in more detail.

Please find enclosed for your information and retention, a statement of expenditure covering the period of this report.

Yours faithfully,
AFMECO PTY. LTD.

J.-P. POGGI
Managing Director

Encl. 1

STATEMENT OF EXPENSES RELATING TO EXPLORATION PROGRAMME

EL 578 (now 981) QUARTER 16.1.82 to 15.4.82

PERSONNEL (FIELD WORK, EVALUATION, OFFICE WORK)	16,308.60
MATERIAL (DIRECT)	2,480.92
TRAVEL, ACCOMMODATION (DIRECT)	4,868.47
CONTRACTS, SUPPLIES	56.80
DRAFTING SERVICE, PREPARATION OF REPORTS & MISCELLANEOUS	7,905.60
MANAGEMENT/OVERHEADS	1,581.02
	$33,201.41

II

AFMECO PTY. LTD.

11-13 Lucknow Place, West Perth, Western Australia
P.O. Box 526, West Perth, Western Australia, 6005
Telephone: (09) 321 9618, 321 9681
Telex: AFMECO 92077 Perth

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MQ/1k 82-1673

7th July, 1982

The Director General,
Department of Mines and Energy,
P.O. Box 151,
EASTWOOD SA 5063

Dear Sir,

Mining Act 1971 to 1980
Exploration Licence No. 981
1st Quarter Report, Year 1
Period 16.4.82 to 28.6.82

We refer to our letter 82-1210, of 27th May, 1982, wherein we reported exploration and expenditure activities for the period 16.1.82 to 15.4.82. This was the normal report period for former EL 578 which covered the present licence area of EL 981. The latter licence was granted on 29th March, 1982, so the report period overlapped by some two weeks the new licence commencement date.

In this report, cognizance has been paid to this overlap and the period has been adjusted accordingly.

Afmeco Pty Ltd conducted the following field work on the exploration licence during the period of this report:

(1) Regional Mapping

Extensive regional mapping of the licence continued during this period with the aim of defining targets for a planned geochemical programme scheduled to commence later this year.

(2) Geological Investigations

Trenching was carried out over uranium anomalies and it appears from the results that the mineralisation discovered is associated with a pegmatitic granite which intrudes into a banded gneiss, presumed to be of the Sleaford Complex.

At this time investigations are being directed to the metamorphosed Hutchison Group sediments which may have been more susceptible to preconcentrations of uranium.

.../2

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So far preliminary studies indicate that the western side of the Hutchison Belt was subjected to less metamorphism and folding as previously thought. Sedimentary facies to the east of the belt are of a more marine nature and do not contain elements of intertidal or recifal phases which would be desirable in the context of a unconformity model type.

?

(3) Conclusion

Five areas have been retained for further exploration. Various criteria such as proximity to major fault zones presence of weak uranium anomalies associated with pegmatitic granite intrusions and "favourable" paleogeographic location were used to help define these areas. More work will be undertaken to verify these occurrences in the field.

Please find enclosed for your information and retention an expenditure statement for the period covered by this report.

Yours faithfully,
AFMECO PTY. LTD.

J.-P. POGGI
Managing Director

Encl.

STATEMENT OF EXPENSES RELATING TO EXPLORATION PROGRAMME

EL 981 PERIOD 16.4.82 to 28.6.82

PERSONNEL (FIELD WORK, EVALUATION, OFFICE WORK)	5 405.03
MATERIAL (DIRECT)	NIL
TRAVEL, ACCOMMODATION (DIRECT)	2 956.47
CONTRACTS, SUPPLIES	99.70
DRAFTING SERVICE, PREPARATION OF REPORTS	
&	NIL
MISCELLANEOUS	
MANAGEMENT/OVERHEADS	423.06
	$8 884.26

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AFMECO PTY. LTD.

11-13 Lucknow Place, West Perth, Western Australia
P.O. Box 526, West Perth, Western Australia, 6005
Telephone: (09) 321 9618, 321 9681
Telex: AFMECO 92077 Perth

MQ/lk 82-2178

5th October, 1982

The Director General,
Department of Mines and Energy,
P.O. Box 151,
EASTWOOD SA 5063

Dear Sir,

Mining Act 1971 to 1980
Exploration Licence No. 981
2nd Quarter Report, Year 1
Period 29.6.82 to 29.9.82

During the period of this report, the following field work was carried out over the area of exploration licence No. 981:

1. Mapping

   Regional mapping of the eastern half of the area defined the basic structure as a synclinorium composed of several synclines and anticlines, with at least one saddle structure.

   The Katunga Dolomite unit appears to be exposed as two long thin sub-parallel areas striking N30°.

   A Sleaford gneiss ridge located in the central portion of the eastern area is probably tectonic in origin and separates two other tectonic units. The most highly deformed and metamorphosed rocks are located on the eastern side.

2. Mapping Results

   Six areas have been tentatively selected for geochemical sampling on the basis of the regional mapping. At this time a programme of more detailed mapping is planned to further define the selected sites, prior to geochemical profiling.

3. Future Programme

   Permission has been sought from the Department, and landowners in the area notified, of our intention to carry out a limited geochemical auger sampling programme over the area of this licence. This programme is due to commence during October, 1982.

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Please find enclosed an expenditure statement covering the period of this report.

Yours faithfully,
AFMECO PTY. LTD.

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J.-P. POGGI
Managing Director

Encl. 1

STATEMENT OF EXPENSES RELATING TO EXPLORATION PROGRAMME EL 981 QUARTER 29.6.82 to 28.9.82

PERSONNEL (FIELD WORK, EVALUATION, OFFICE WORK)	11 670.49
MATERIAL (DIRECT)	(1 466.25)
TRAVEL, ACCOMMODATION (DIRECT)	9 317.92
CONTRACTS, SUPPLIES	495.30
DRAFTING SERVICE, PREP. OF REPORTS & MISCELLANEOUS	849.67
MANAGEMENT/OVERHEADS	1 043.36
	$21 910.49

AFMECO PTY. LTD.
(Incorporated in South Australia)

11-13 Lucknow Place, West Perth, Western Australia
P.O. Box 526, West Perth, Western Australia, 6005
Telephone: (09) 321 9681 Telex: 92077

MQ/ds 83-0146

21st February, 1983

The Director General,
Department of Mines and Energy,
P.O. Box 151,
EASTWOOD S.A. 5063

Dear Sir,

Mining Act 1971 to 1980
Exploration Licence No. 981
3rd Quarter Report, Year 1
Period 29/9/82 to 28/12/82

During the period of this report the following field work was carried out over the area of Exploration Licence No. 981.

1. Drilling

An extensive geochemical sample drilling programme was conducted over the area of this tenement. Commencing in September 1982, the Schramm T64 drilling rig using rotary air blast techniques, drilled 153 holes for a combined total depth of 4007 metres RAB drilling and 6 metres core drilling.

The areas tested were selected on the basis of regional mapping and were assessed as being the most prospective. In all, four separate localities were drilled and the following resume details the results.

2. Results of Drilling

a) Pillaworta Hill Area

The target at this location was the Katunga Dolomite intruded by a granite. The two profiles intercepted the potential sequence but no high radioactivity was recorded.

b) White Flat Area

The objective at White Flat was the Katunga Dolomite/Lincoln complex contact. Sampling failed to locate any significant increase in radioactivity although the potential horizon was intercepted.

c) Marble Range Area

This area was selected because of a hypothetically favourable palaeo-geographical environment. Schist and phyllite were known from previous drilling and old mine workings.

Drilling progress was hindered by running sands of Tertiary Age. However, sufficient holes reached the basement to allow geological assessment. It appears that the Hutchinson Group metasediments occur only in a narrow strip, east of Marble Range and the central section of the zone is made up of Sleaford Complex gneisses. No high radioactivity was encountered.

d) Koppio Area

Sampling was conducted along the extension of the Koppio Mine graphite horizon. The objective was interupted, however no anomaly was noted.

3) Analysis Results

Analytical results from the geochemical sample drilling proved disappointing. Only one higher than background uranium value was noted. This was associated with an intrusive leucogranite (max. 350 ppm Uranium). Similarly only a few base metal values above background were listed and these were associated with weak anomalies.

4) Conclusions

The extensive exploration programme ascertained that there is little potential for uranium mineralisation in the tenement area. Consequently, surrender documents were forwarded to the Department of Mines and Energy on November 11th, 1982.

At present the final report describing the comprehensive prospecting, geological mapping and geochemical sampling conducted over the area over the past field season is being finalised preparatory to submission to the Department.

We enclose for your information an expenditure statement covering the period of this report.

Yours faithfully,
AFMECO PTY LTD

PO

J.-P. POGGI,
Managing Director

000347

STATEMENT OF EXPENSES RELATING TO EXPLORATION PROGRAMME
E.L. 981 QUARTER 29/9/82 to 28/12/82

	$
PERSONNEL (FIELD WORK, EVALUATION, OFFICE WORK)	19,179.94
MATERIAL (DIRECT)	372.70
TRAVEL, ACCOMMODATION (DIRECT)	7,926.64
CONTRACTS, SUPPLIES	20,562.07
DRAFTING SERVICE, PREP. OF REPORTS & MISCELLANEOUS	3,242.68
MANAGEMENT/OVERHEADS	2,564.20
	$ 53,848.23

Commitment: $60,000.00
Total Expenditure as at 28/12/82: $84,642.98

000348

AFMECO PTY LTD

WHYALLA BASE

Report No. WY.82.15

TUMBY BAY
ANNUAL REPORT 1982

by

J.S. POOLE

WHYALLA

NOVEMBER 1982

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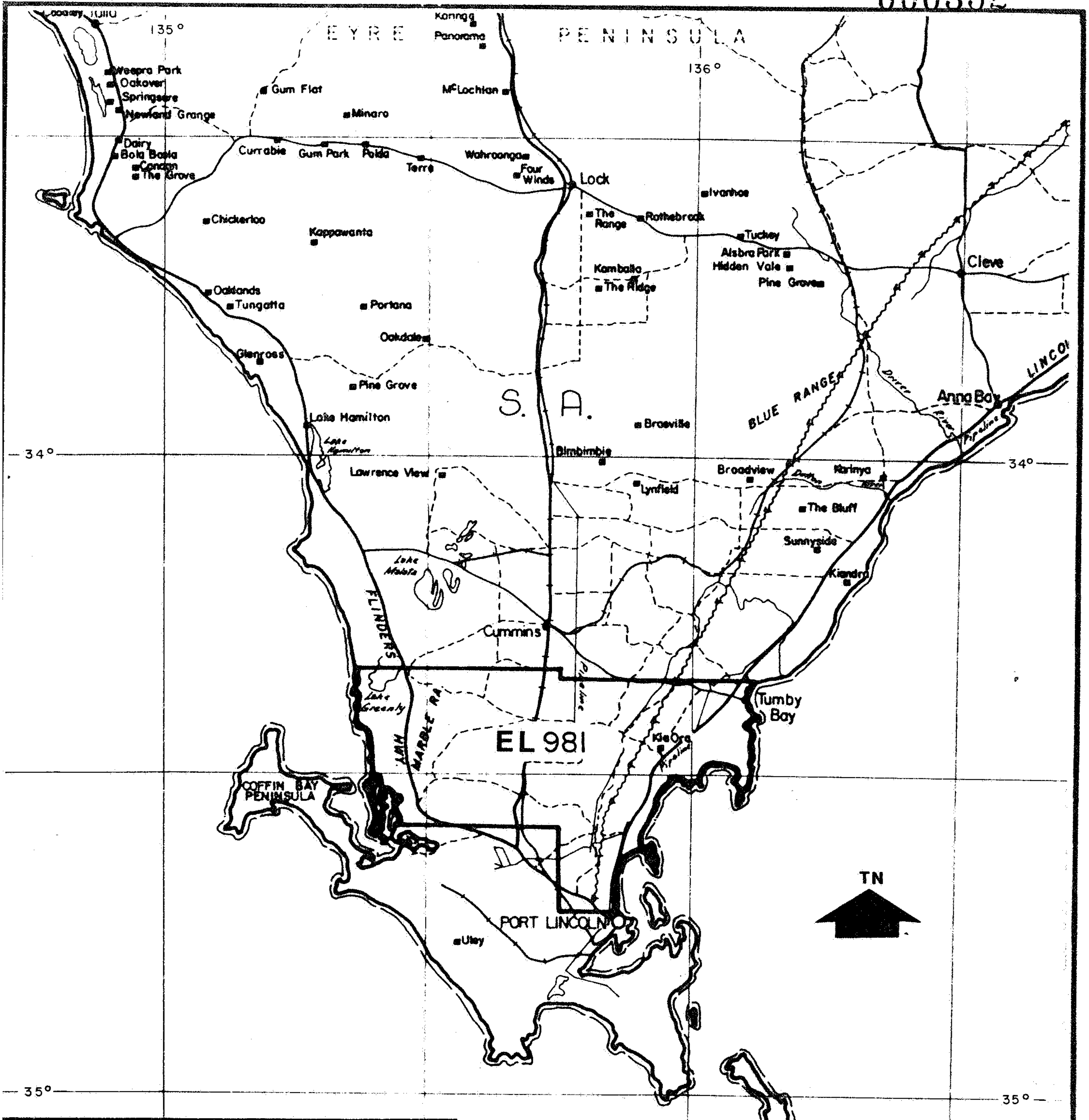
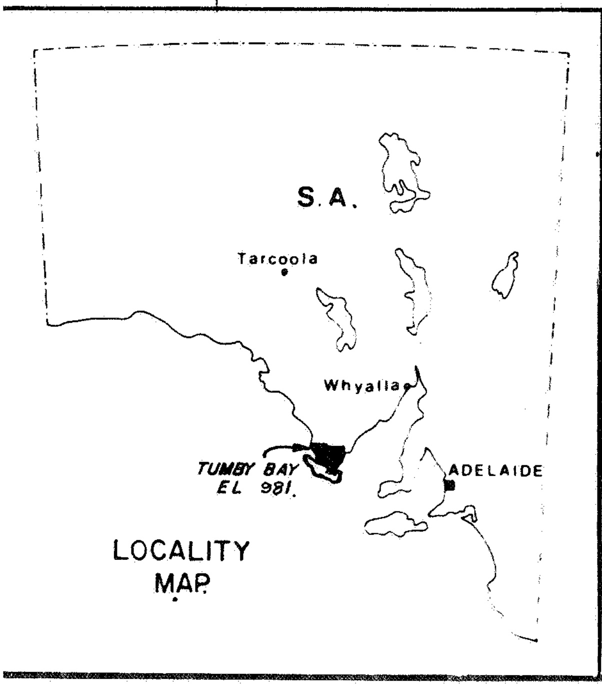




To Accompany Report N° WY82.15 *Figure 1a*

DRAWN J. A. M.	**AFMECO PTY. LTD.**
DATE September, 1981	**SCALE** 1:1 000 000 — 10 0 10 20 30 40 km
GEOLOGY F. M. B.	S.A. - GAWLER BLOCK
APPROVED [signature]	
DWG. NO S153.T.3743	TUMBY BAY EL 981 LOCATION MAP
REV. NO *July '82*	

1. INTRODUCTION

000353

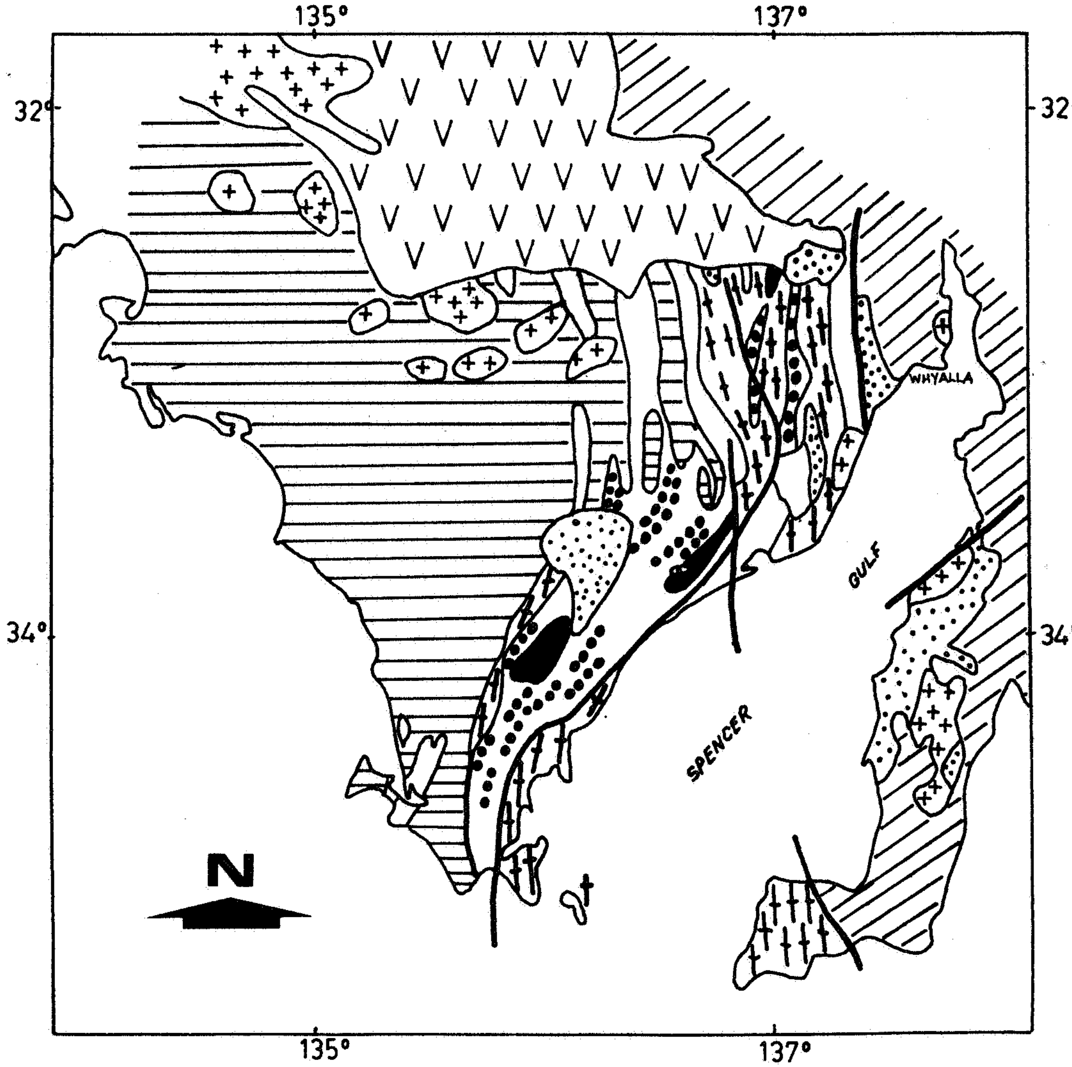
This report describes the work done and results obtained for the period November 1981 to October 1982 for E.L. 981 (formerly E.L. 578) under project 126. The work was carried out in several stages with the programme being modified as results were received and interpreted. The first stage was a review of the airborne geophysical data by consultant geophysicist B. Dockery and the selection of some 86 uranium anomalies from the analog chart by D. Benko (District Geologist). Stage two consisted of three parts (a) a carborne scintillometer survey over all roads within the area, (b) ground checking of the airborne anomalies and (c) prospecting of higher background areas defined from the uranium contour map. Stage three consisted of a review of all open file data held at the S.A.D.M.E., inspection of existing core at the S.A.D.M.E. core library and a regional mapping programme The fourth stage consisted of R.A.B. geochemical sampling of six areas selected from a compilation of all data and several suitable model types and the digging of two trenches in the TB17 area.

1.1 REGIONAL GEOLOGY SOUTHERN EYRE PENINSULA (Fig. 1 (b)).

The oldest rocks in the area belong to the Archean Sleaford Complex with Rb-Sr ages of 2.3-2.5 b.y. The Complex has been dated at Cape Carnot south of the E.L. where a steeply dipping N-S striking sequence of granulite facies, highly aluminous metasediments, basic granulites and augen gneisses outcrops.

The western part of the Sleaford Complex, consisting of greenschist to lower amphibolite facies, biotite muscovite gneisses of possible igneous origin and more massive granites, givesages between 2400 and 2300 MA. The N-S striking steeply dipping rocks mainly outcrop in coastal exposures and in the Marble Range. The Sleaford gneisses mainly outcrop where they are protected by a capping of Lower Proterozoic Warrow Quartzite. The low metamorphic grade is due to retrograde metamorphism during the Kimban Orogeny.

000354



LEGEND

MAJOR FAULT

Adelaidean . Palaeozoic Sediments

Post tectonic granites

Gawler Range Volcanics

Middle Proterozoic sediments

Banded Iron Formation

Hutchison Group

Syntectonic granites

Lincoln Complex

Sleaford Complex

To Accompany Report N° WY 82.15 *Figure 1b*

DRAWN J.P	AFMECO PTY. LTD.
DATE NOV. '82	SCALE 0 50 100 150 km
GEOLOGY J.P	TUMBY BAY PROJECT
APPROVED	REGIONAL GEOLOGY OF THE SOUTHERN PART OF THE GAWLER DOMAIN ON EYRE PENINSULA
DWG. No S153.12.5125	
REV. No	

These rocks have been equated to the Mulgathing Complex rocks found in the northern area of the Gawler Craton.

The Lincoln Complex is exposed in a N-S or NE-SW trending zone, between Spencer Gulf and the Hutchison Group in the east. The exposed rocks are augen gneisses, basic granulites, amphibolites, migmatitic banded gneisses and minor intrusive biotite-hornblende granites. The metamorphic grade is high with granulite facies to the east and high amphibolite facies to the west. The dominant rock type, an augen gneiss, that can be followed from Port Lincoln to north of Cowell, has been dated at 1816 $\pm$ 10 m.y. The date is interpreted as the age of the main metamorphic event. Some of the migmatitic banded gneisses are considered to be reworked Archaean gneisses on the basis of lithological and structural similarities. Dips of all Lincoln gneisses are normally steep and the strike varies from N-S in the south of the area to ENE-WSW in the north of the area. Four phases of deformation have been recognised with the high grade metamorphism taking place during the first two phases. The third and fourth phases are related to the formation of the mylonite zone and locally to retrograde metamorphism.

The regional mylonite zone can be followed from Sleaford Bay in the south to where it disappears under the Gawler Volcanics to the north and forms the contact between the Lincoln Complex and the Hutchison Group in the northern part of the E.L. In the southern part of the E.L. the main branch of the mylonite zone is approximately 2 km. E of the Lincoln-Hutchison contact.

A sequence of Lower Proterozoic metasediments, designated the Hutchison Group, can be followed from the Port Lincoln area to Cowell and the Middleback Range in the north of the Eyre Peninsula. Metaquartzites (Warrow Quartzite) and low grade micaschists overlying the Sleaford Complex in the Marble Range-Coffin Bay area have also been included in the Hutchison Group.

Parker (1979) has established the stratigraphy (Fig. 34), in the Cowell area with 3 main sequences; a basal quartzite sequence equated with the Warrow Quartzite; a mixed chemical and clastic sequence with cherts, B.I.F.'s, carbonates, graphite schists, metapsammites and metapelites, (Middleback Subgroup), and an upper pelitic unit, the Yadnarie Schist. The total thickness has been estimated at 2000-3000 metres, but the original thickness could have been considerably greater. Metamorphic grades are mid to high amphibolite facies and whole rock Rb-Sr ages yielded 1800-1700 Ma in the Cowell and Coffin Bay areas. Four phases of deformation have been recognised with the main metamorphism related to the second phase. Post orogenic granites, minor gabbros and pyroxenites intrude the Hutchison Group.

There is no record of any geological activity between the Mid-Proterozoic and the Lower Tertiary, when deep weathering with laterite development took place. During the Tertiary, carbonaceous sands were deposited on the eroded Sleaford Complex (Wanilla Formation). Associated with the deposition was the uplift of the area covered by the Hutchison Group and part of the Lincoln Complex. The fault scarps, probably following ancient lineaments, now form the edge of the coastal plain. During the Tertiary and the Quarternary, large parts of the Southern Eyre Peninsula were covered by eolian calcareous sandstones.

2. WORK COMPLETED

2.1 GEOPHYSICAL REVIEW

B. Dockery was given all the data from AFMECO'S airborne survey as well as regional data as published by the S.A.D.M.E. on 1:250,000 sheets for gravity and magnetics to produce a structural interpretation for the E.L. with reference to the published geology.

A total of 86 radiometric anomalies were selected from the analog record. Each anomaly was sited on 1:25,000 scale aerial photographs from the flight line plots and an area of approximately 500 m. radius was defined to be checked at each site.

2.2 CARBORNE SCINTILLOMETER SURVEY

The scintillometer survey was carried out by two field assistants taking continuous readings and plotting values every 500 m. on to 1:100,000 scale topographic maps. A total of 569.3 km. was covered on all existing roads within the E.L.

2.3 AIRBORNE ANOMALIES

The selected anomalies were surveyed in the field by two field assistants and a geologist, with the geology and type of anomaly being noted.

2.4 HIGH BACKGROUND AREAS

The high background areas were defined from the U-channel contour map as areas of 50 cps background. A total area of 156.4 km^2 was prospected by four field assistants using SPP2's on approximate 100m line intervals across the areas. Representative samples of the higher background zones were taken along with GAD-6 spectrometer readings. The samples were submitted for U,Th,Pb,Zn and Cu analysis.

2.5 OPEN FILE SEARCH

All open file data pertinent to the area was examined as well as all core held by the S.A.D.M.E. to complement the information held by AFMECO.

2.6 TRENCHING

Two trenches were opened on uranium anomalies in ferruginised and laterised gneiss/schist and granite sub-outcrops in the TB17 grid area. Both walls and the floor of the trenches were mapped and sampled. A John Deere 510 backhoe was used by the contractor D.K. Quarries of Pt. Lincoln.

2.7 REGIONAL MAPPING

A programme of stratigraphic and structural mapping at 1:100,000 scale was undertaken over the eastern half of the E.L. to correct the then held geology map of Barrett and Walker (Report WY.80.7) which had been found to be inaccurate.

2.8 R.A.B. GEOCHEMICAL SAMPLING

Six areas were chosen on a geological basis for geochemical sampling and 153 holes were drilled at an average depth of 26.2 m. for a total of 4007.5 m. R.A.B. drilling and 6.5 m. core. The target was fresh rock in order to provide an accurate geochemical sample for Hutchison Group rocks.

The contractor was Southern Drilling of Adelaide using a Schramm T64 multipurpose drill rig.

3. RESULTS

3.1 GEOPHYSICAL REVIEW (Plate 1 (a) (b) (c))

The western third of the area was identified as Sleaford Complex due to its relatively undisturbed magnetic character. The response is typical of a quartz feldspar biotite gneiss. Minor magnetic trends within the zone have been marked as ferro-magnesium rich gneiss. These could be, for example, lenses of high biotite content. A silicic to felsic gneiss would also account for the low regional gravity field over this part of the Prospect.

In the far west of the area, a very large amplitude magnetic response has been tentatively identified as an ultramafic intrusive, however a banded iron formation would also give a similar large amplitude response. A north-northeast trending magnetic maximum has been used as the boundary between the Sleaford Complex and the Lincoln Complex in the central west of the area. This trend is interrupted in the north by an irregular magnetic pattern that has been attributed to an invading granite pluton.

The central western one sixth and the eastern third of the area have been attributed to Lincoln Complex due to its magnetic character. This has been subdivided into:-

(a) Banded Migmatitic Gneiss exhibiting distinct trends of higher magnetic field,

(b) Mylonite exhibiting a magnetic low due to the magnetite having been altered to hematite or mobilized completely away from the high pressure mylonite zone, and,

(c) Augen gneiss showing as an irregular pattern of lower magnetic field values.

Discontinuities in the magnetic trends within the Lincoln Complex have been postulated to be faults.

The remaining central-east part of the area was identified as Hutchison Group. This showed above background uranium response and uranium/potassium ratio on the gamma spectrometer results. The magnetic response was generally low but contained some large amplitude, linear trends. There was no clear western boundary to the Hutchison Group on the geophysical results.

It has been drawn along a possible trend in magnetic and uranium/potassium response. The eastern boundary of the Hutchison Group has been drawn along a clear change from low to high magnetic field and from high to low radiometric answer in an east-west direction and uranium/potassium response attributed to the contact between the Hutchison Group and Banded Migmatite Gneiss of the Lincoln Group.

The large amplitude, linear magnetic trends within the Hutchison Group have been attributed to amphibolite and/or banded iron formation. In particular, two north-northeast zones of magnetic maxima surrounded by minima have been attributed to shallow, tightly folded synclines of amphibolite and banded iron formation. Other low amplitude, magnetic features are present but the flight line spacing is too large for these to be correctly identified from line to line.

An intersection of three major faults is interpreted for the TB17 area and shows this as a structurally complex area.

3.2 CARBORNE SCINTILLOMETER SURVEY

A number of higher background areas was located during the carborne survey, several of which do correspond to the high background areas of the airborne survey. In general the area overlying the Lincoln Complex has a higher background when compared to the Hutchison Group area. Caution is required in placing emphasis on these high background areas over roads due to the extensive use of a thoraniferous laterite as road dressing material in the area; this could explain the higher background areas noted on this survey. The survey results are presented in Plate (2) with the values being in counts per second for a SPP2 and plotted every 500 m.

3.3 AIRBORNE ANOMALIES

The result from the checking of 86 anomalies was disappointing in that no primary uranium anomalies were located and also, in general, the anomalous areas are due to thorium. The programme did however distinguish three types of anomalies within the area. The most numerous type of anomaly is due to thorium enriched laterite horizons usually in areas of no outcrop and lower general background. The second type is a contrast anomaly between low background soil and higher background outcrop; this type is in general found over the Lincoln and Sleaford Complexes. The last type, a true anomalous outcrop area within lower background outcrop, had only one representative found and this was due to thorium containing heavy minerals within a layer of quartz conglomerate in the Warrow Quartzite. Table (1) presents the results for the programme and Plate (3) shows the anomaly distribution within the E.L.

3.4 HIGH BACKGROUND AREA PROSPECTING

The high background prospecting programme had similar results to the anomaly checking programme in that the areas were due to thoraniferous laterites and lateritic soils over the Hutchison Group. The areas over the Lincoln and Sleaford Complexes are largely due to high background outcrops (thoraniferous) within lower background soils. Two uranium anomalies were located during the programme, one in laterite overlying presumed Hutchison Group rocks at TB17 and the other, a spot anomaly of 5 cm^2, in the Kiana granite of the Sleaford Complex in Marble Range.

During follow-up checking by geologists, significant geological features were noted; a younger granite, which appears very similar to the uraniferous Moody granite, was located near Edillilie in the centre of the E.L. as were graphitic schist and quartzite units.

TABLE 1

AIRBORNE ANOMALY	SPP2 (1)	T/C	GAD 6 (2) K	U	Th	TYPE
A 1	320	214.7	10.1	11.2	18.4	Soil
2	380	200.1	21.6	11.3	14.9	Soil
3	550	250.3	19.6	19.6	15.4	Outcrop
4						
5	Not found					
6	540	370.4	22.9	22.4	36.0	Soil
7	660	749.8	42.6	47.0	71.0	Outcrop
8	125	65.2	15.0	12.1	11.8	Soil
9	300	149.8	12.6	11.3	9.7	Soil
10	200	102.2	17.1	15.5	14.1	Contrast
11	575	288.7	27.8	18.8	18.6	Contrast
12	400	236.7	21.7	15.3	17.9	Soil
13	150	101.2	6.7	6.0	7.1	Contrast
14	300	141.1	11.3	10.7	10.7	Contrast
15	300	138.6	14.2	10.7	9.1	Contrast
16, 17	250	200.0	21.6	10.1	12.0	Soil
18	550	361.6	27.3	23.6	27.0	Soil
19	550	291.7	25.1	17.6	21.2	Soil
20	Not found					
21	250	124.5	17.6	5.9	7.0	Soil
22	500	219.2	27.5	11.6	14.7	Contrast
23	300	151.8	10.4	10.3	12.4	Contrast
24, 25	as for 21, 22, 23					
26	300	231.5	11.0	12.4	18.3	Contrast
27	350	200.0	13.2	13.5	18.0	Contrast
28	250	215.0	12.3	10.5	13.9	Soil
29, 30	510	245.5	25.7	14.6	19.5	Soil
31	250	159.4	11.4	10.5	14.5	Soil
32	300	127.5	14.6	10.9	7.3	Soil
33, 34	350	191.2	19.7	11.4	12.9	Contrast
35, 36	700	382.2	38.4	23.3	28.5	Contrast
37	500	220.6	14.0	13.6	19.8	Soil

TABLE 1 Cont...

AIRBORNE ANOMALY	SPP2 (1)	T/C	GAD 6 (2) K	U	Th	TYPE
A 38	450	257.5	17.6	15.7	21.8	Soil
39	600	337.5	19.8	23.2	29.9	Soil
40	500	329.5	21.0	21.0	29.1	Soil
41	420	249.2	15.5	14.8	14.2	Soil
42	200	100.5	9.3	8.7	12.5	Soil
43	370	255.3	16.5	15.3	16.1	Contrast
44	Drill site TBD 6					
45 } 46 }	520	290.8	20.0	19.4	25.0	Soil
47	190	123.6	10.0	10.9	10.8	Soil
48	200	150.2	8.4	10.3	12.1	Soil
49	500	209.3	27.5	11.1	11.6	Soil
50	320	170.3	12.3	12.1	14.3	Soil
51	300	141.0	10.4	10.7	11.7	Soil
52	180	112.3	10.7	11.2	18.9	Soil
53	380	156.5	9.7	11.1	12.1	Soil
54	260	110.5	9.7	10.2	8.9	Soil
55	450	158.7	10.8	11.1	13.5	Soil
56	350	147.0	9.8	10.7	12.2	Soil
57	450	223.7	14.3	14.1	20.2	Soil
58	250	140.0	8.6	10.7	10.5	Soil
59	250	130.0	7.5	8.7	10.5	Soil
60	350	258.9	37.5	15.0	13.5	Contrast
61	275	139.4	9.3	8.8	10.9	Contrast
62	230	125.3	8.5	9.0	11.0	Soil
63	150	77.1	5.9	5.3	6.2	Soil
64	130	48.3	4.1	3.6	3.2	Soil
65	Not found					
66	Not found					
67	Not found					
68	120	52.8	5.6	3.4	4.0	Soil
69	370	255.3	18.0	17.9	22.3	Soil
70	130	60.1	6.7	4.3	5.4	Soil
71	120	79.5	4.3	7.5	5.1	Soil
72	300	226.9	16.0	11.4	19.2	Soil
73	220	144.5	14.1	12.5	12.8	Soil
74	520	252.0	17.5	18.5	19.9	Contrast
75	320	136.9	8.0	7.5	9.2	Soil
76	160	108.0	21.3	4.3	4.3	Soil
77	350	215.2	29.2	13.7	8.9	Contrast

TABLE 1 Cont...

AIRBORNE ANOMALY	SPP2 (1)	T/C	GAD 6 (2) K	U	Th	TYPE
A 78	500	286.2	33.9	19.5	14.8	Contrast
79	450	232.8	22.6	13.1	17.9	Soil
80	Not found					
81	Not found					
82	300	166.7	11.1	11.6	12.9	Soil
83	330	168.6	11.8	11.2	14.7	Soil
84	370	245.8	15.8	16.3	22.5	Soil
85	370	177.7	11.9	12.7	15.4	Soil
86	450	256.2	15.8	17.9	23.0	Soil

1) SPP2 Readings on soil are at 10 cm. depth.
2) GAD-6 values are not compton stripped.

Further evidence for the low metamorphic grade of the western area was established by the location of phyllites at the Lady Franklin and Moonlight Pb, Ag, Au, Cu mines near Marble Range. Again this programme raised serious doubts as to the accuracy of the geological map held at that time and the reliability of a previous prospecting programme over the areas as the high SPP2 readings recorded in 1980 could not be relocated. The results are presented in plate (4) and tables (2) and (3).

3.5 OPEN FILE SEARCH

The study of open file data pertinent to E.L. 981 revealed significant information which was not held in the Whyalla office although it may have been seen by previous workers.

Env. 2378 - Australian Anglo-American Ltd. (1975) is most useful in that it summarises Env. 1214, Pechiney (Aust.) Expl. (1971) (for Pacminex) and covers the area east of 135°45' with an aerial input EM and magnetics survey on a 500 meter line spacing at 120 m. altitude. (AFMECO'S cover of the same area is 800 and 1600 m. line spacing). The report does not include original EM data but the magnetic interpretation has several features similar to B. Dockery's interpretation such as the triple point of faults near TB17. The follow-up to the survey consisted of hand auger profiles and several percussion holes on four E.M. anomalies, no regional geological work was done.

Env. 2552 - Uranerz Australia Pty., Ltd., (1975) provides good basement (Lower Proterozoic-Archean-Sleaford Complex) profiles from seismic and gravity surveys west of 135°45' and indicates at least one major structural lineament with an associated paleo drainage system (Tertiary) with minor uranium enrichment, but no apparent trapping mechanism. The Uranerz programme and results parallel those of Endeavour Minerals N.L. (1972) in Env. 1943.

Env. 934 - Noranda Australia Ltd., (1969) conducted a airborne radiometric survey over the eastern area (mainly Lincoln Complex) and produced similar results to AFMECO'S to date, i.e. large low grade anomalies over masked outcrop and laterite profiles; but very little follow-up appears to have been done.

000366

TABLE 2

GAD 6 (1)

AREA	SPP2	T/C	K	U	Th
TB1	310	242.4	0.2	1.4	20.0
TB2	150	63.6	0.8	0.6	5.3
TB3	250	143.6	13.8	2.8	7.1
TB4	300	249.2	15.5	4.8	14.2
TB5	400	203.2	8.4	0.5	15.8
TB6	180	123.6	0.0	0.9	10.8
TB7	150	59.6	1.0	0.8	4.5
TB8	200	61.5	0.1	0.4	5.0
TB9	300	141.0	0.4	0.7	11.7
TB10	250	118.6	0.0	1.4	10.0
TB11	250	186.9	0.1	2.3	15.2
TB12	200	133.8	20.7	1.0	9.7
TB13	300	226.9	0.0	1.4	19.2
TB14	150	58.3	0.9	0.9	4.0
TB15	Not prospected				
TB16	200	155.4	0.1	1.8	12.0
TB17	150	63.8	0.9	3.2	3.0
TB18	170	65.2	1.2	2.5	4.5
TB19	200	104.2	16.2	1.2	3.8
TB20	210	161.4	0.3	1.4	13.8
TB21	450	231.1	0.1	1.8	19.5
TB22	160	79.5	0.3	2.5	5.1
TB23	200	82.4	1.4	1.1	5.8
TB24	Not prospected				
TB25	Not prospected				
TB26	250	112.3	0.7	1.2	8.9
TB27	250	210.0	0.2	1.2	17.6
TB28	200	146.6	0.0	1.6	12.4
TB29	250	127.5	11.8	0.7	7.4
TB30	125	100.4	16.6	1.2	3.9
TB31	200	127.5	14.6	0.9	7.3
TB32	140	95.2	0.4	1.3	7.6
TB33	300	147.9	20.4	8.3	2.1
TB34	250	156.4	0.0	0.1	13.9
TB35	300	214.7	0.1	1.2	18.4
TB36	150	123.3	0.0	0.4	11.5
TB37	80	76.8	5.8	0.9	4.9

TABLE 2 Cont....

AREA	SPP2	GAD 6 (1) T/C	K	U	Th
		ANOMALOUS ZONES			
GP1	400	180.8	10.9	12.0	15.4
2	550	300.2	19.2	3.0	18.8
3	550	268.2	24.2	5.7	13.0
4					
5	450	330.6	19.3	8.1	19.3
6	300	287.9	25.2	18.3	5.9
RK1					
2	TBD6				
3	500	268.3	21.9	2.6	16.5
4	500	265.6	16.9	7.9	13.8
5	550	286.0	17.0	2.8	18.8
SH1	550	247.4	16.9	7.9	11.8
2	550	359.3	17.4	1.1	26.8
3	600	287.5	9.0	2.8	21.4
LA1	450	235.1	17.6	1.3	15.7
TB33	1000	406.3	22.5	35.8	4.7
TB17	1000	567.2	6.8	62.0	2.6
TB16	650	376.2	0.0	0.3	34.6

1) Values are compton stripped

TABLE 3

AREA	SAMPLE NO.	U	Th	Cu	Pb	Zn
TB2	12044	x	x	5	x	x
4	12029	5	30	10	40	x
6	12030	x	35	20	50	x
8	12031	4	70	30	15	30
9	12032	4	180	15	5	15
11	12033	8	200	15	20	25
12	12034	4	45	15	25	x
13	12035	x	200	10	10	25
17	12036	x	9	40	90	x
19	12038	3	30	20	95	x
20	12039	x	120	20	25	25
21	12040	x	100	15	15	75
26	12041	x	150	10	5	x
30	12042	x	50	30	60	15
31	12024	x	50	25	105	x
33	12043	3	15	5	25	10

ANOMALOUS ZONES

GP3	12019	10	80	10	15	15
5	12020	6	100	5	15	10
6	12045	6	100	25	35	15
RK3	12011	10	130	10	10	15
4	12012	10	110	x	20	15
5	12013	10	80	5	40	10
SH1	12014	10	85	5	15	x
2	12015	7	190	x	35	20
LA1	12016	6	120	x	25	5
TB17	12026	100	20	190	115	25
TB16	12027	3	660	20	60	55
JP3	12018	x	30	120	320	200
C1	12023	15	25	55	55	x

Env. 1170 - Pine Vale Mines Pty., Ltd., (1970) contains drilling results of four diamond holes on a large linear magnetic and gravity high at Coffins Bay. The holes intersected very low grade magnetic schists and phyllites overlain by non-magnetic schists and phyllites all dipping at 45°. These upper units probably correlate to the phyllites and schists of the Lady Franklin and Moonlight Mines (Pb, Cu, Ag, Au) near Marble Range. They are overlain by up to 84 metres of Tertiary sediments and extend to at least 180 metres in depth.

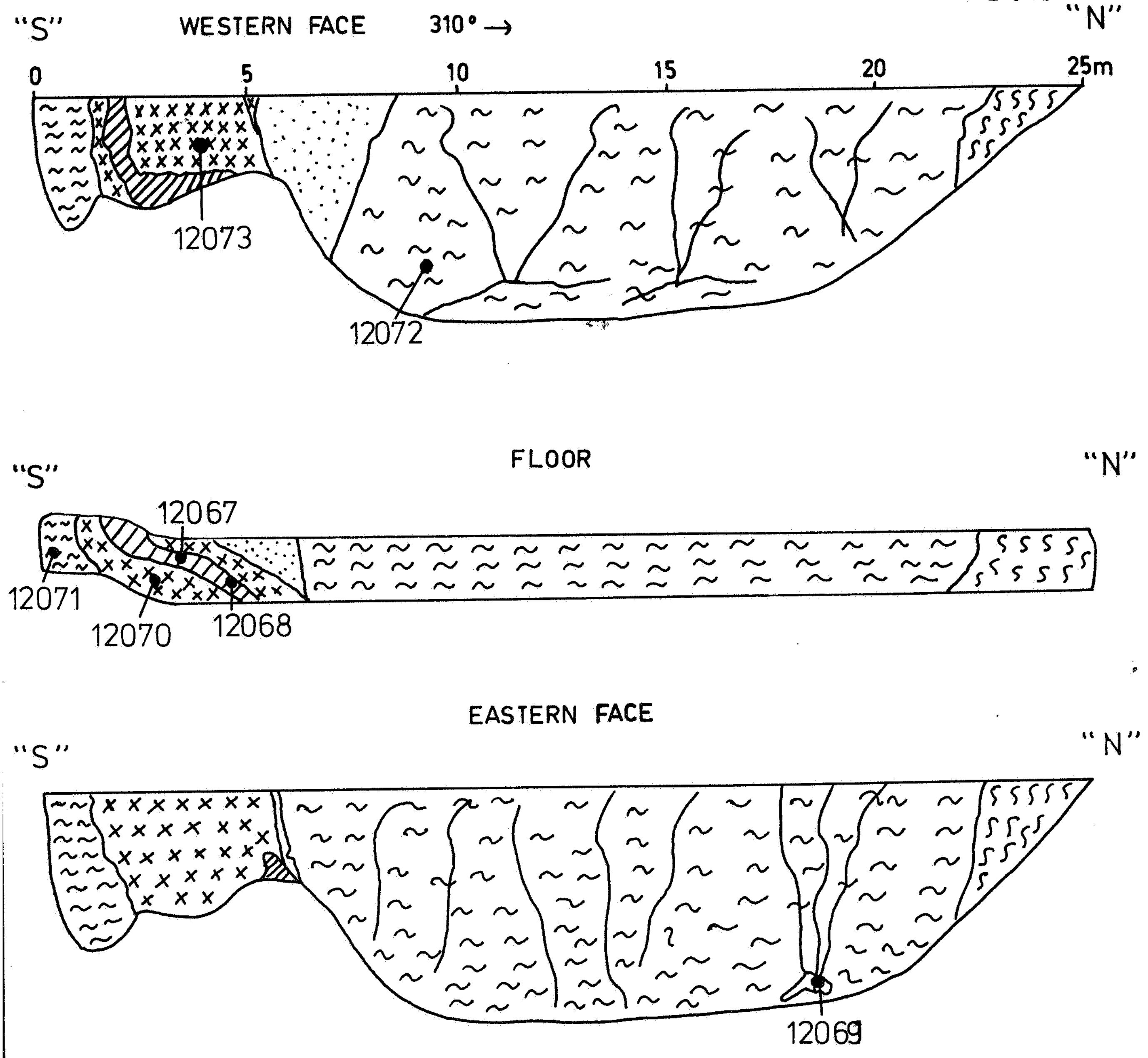
Env. 2963 - C.R.A. Pty., Ltd., (1977) drilled a percussion hole at Bald Hill and intersected pyrite with minor Cu mineralisation at the contact between a magnetite - quartz schist (B.I.F.?) and a garnet rich pegmatite (granite ?).

A large scale investigation was carried out in the early 1960's by the Mines Department into the then known B.I.F. - Jaspilite occurrences in the area and the subsequent drilling and detailed mapping report books (62/41, 60/25, 59/139, 61/80, 61/121. 59/12) contain useful information on the structure of these rock units and hence of the area as a whole.

Inspection of all core stored at the Department Core Library confirmed the published logs and checking with a SPP2 found no anomalous radioactivity.

Copies of Envelopes 2552, 2378; report books 62/41, 60/25, 59/139, 61/80, 61/121 and 59/12; and Mining Reviews 119, 120 are now held in the Whyalla Office.

000372



-Legend-

Fe STAINED QUARTZ VEINS/BRECCIA

WHITE TO YELLOW KAOLINISED GNEISS SOME MINOR IRON STAINING

MEDIUM GRAINED KAOLINISED QUARTZ FELDSPAR **GRANITE** BRECCIATED AT ORE CONTACT.

Fe-Mn OXIDE CEMENTED **GRANITE** Av 500 CPS SPP2

FINE GRAINED WHITE KAOLINISED QUARTZ FELDSPAR **GRANITE**.

Fe-Mn OXIDE STAINED KAOLINISED GNEISS

To Accompany Report Nº WY82.15 *Figure 2*

DRAWN J.P.	AFMECO PTY. LTD.
DATE 14·5·82	SCALE 1:1500 10 0 10 20 30 40 50 60 m
GEOLOGY J.S.P.	TRENCH 1 - Geology
APPROVED	TB 17 AREA E.L.981
DWG. Nº S153.12.5126	TUMBY BAY
REV. Nº	

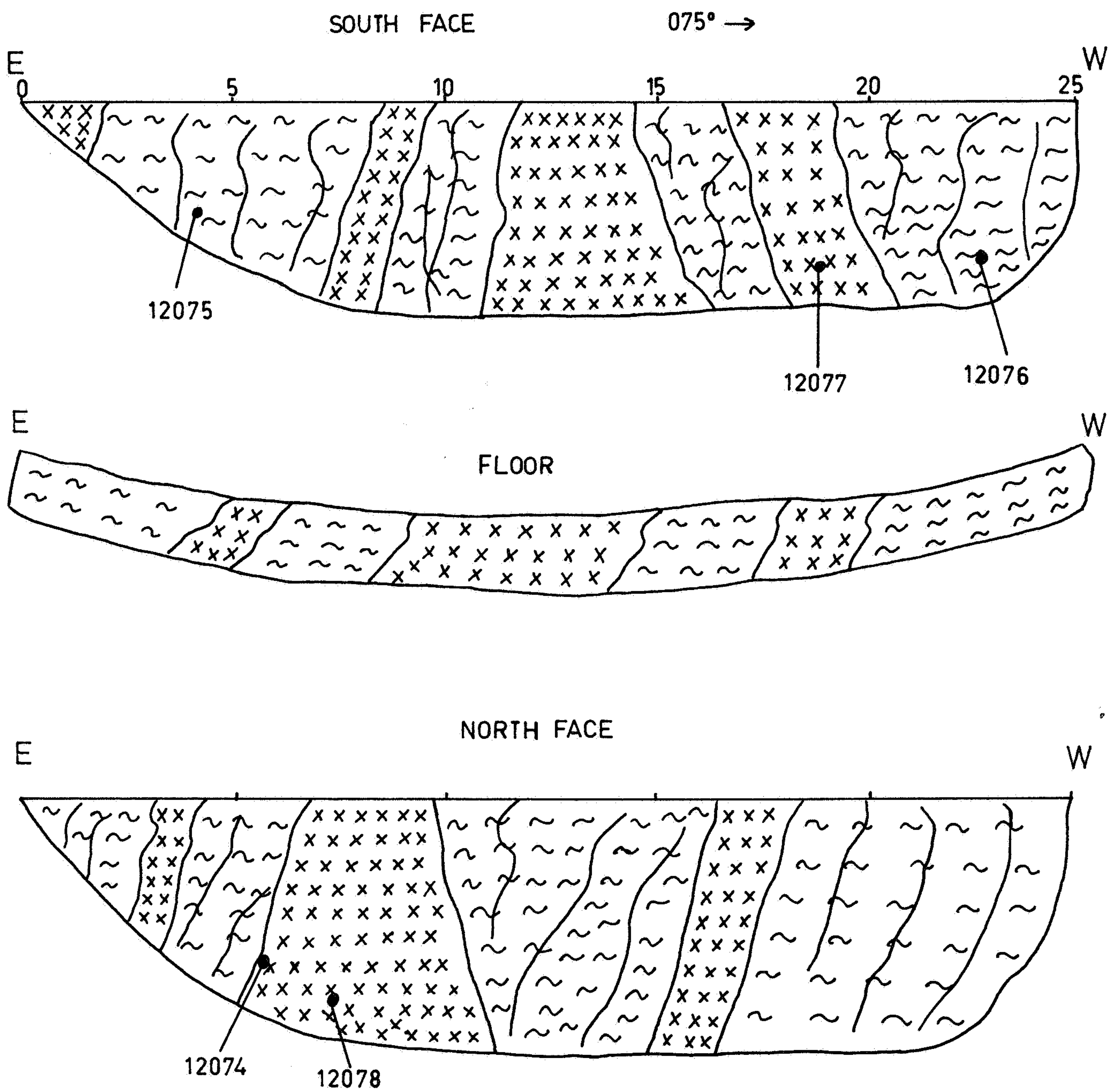
3.6 TRENCHING IN TB17 AREA

Both trenches were opened over a length of 25 metres and to a depth of approximately 5 metres on an uraniferous ironstone capping over a saprolite profile.

In trench 1 the anomalous radioactivity is confined to a narrow (50 cm.) iron-manganese oxide rich band of ferruginised granite within a kaolinised quartz feldspar leucogranite intrusive in a kaolinised feldspar quartz leuco gneiss. The anomalous zone had an average count of 500 cps SPP2 compared to a background of 80 - 120 cps in the rest of the trench. Analysis confirmed the source to be uranium with a maximum value of 120 ppm U (sample 12067) in the trench. The maximum surface reading had been 1000 cps SPP2 with an analysis of 100 ppm U (sample 12026) and 185 ppm (sample 17/1 table 6, Barrett WY.80.7).

In trench 2 the anomalous radioactivity is confined to a very narrow (2-4 cm.) ferruginous quartz vein forming the boundary between the quartz feldspar leuco granite and the feldspar quartz gneiss. As in trench 1 both rock types are heavily weathered and kaolinised forming a saprolite profile. Analysis gave a maximum value of 110 ppm U (sample 12074).

In both cases the original surface area of the anomalies (5-10 m^2) did not reflect the subsurface extent, this being much smaller in both cases with no increase in uranium concentration. The results are shown in figures (2, 3) and table (4).



Legend

WHITE TO YELLOW KAOLINISED GNEISS SOME IRON STAINING

MEDIUM-COURSE GRAINED KAOLINISED QUARTZ FELDSPAR **GRANITE**.

IRON STAINED QUARTZ VEINS-BRECCIAS

To Accompany Report Nº WY82.15 *Figure 3*

DRAWN J.P.	AFMECO PTY. LTD.
DATE 14·5·82	SCALE 1:1500 10 0 10 20 30 40 50 60
GEOLOGY J.S.P.	TRENCH 2 - Geology
APPROVED	TB 17 AREA E.L. 981
DWG. Nº. S153.12.5127	TUMBY BAY
REV. Nº.	

3.7 REGIONAL MAPPING PROGRAM (Plate 5)

The mapping programme was concentrated in the area bounded by Yallunda Flat to Pillaworta in the north and White Flat to Wanilla in the south as this area presents the best outcrop in the E.L. However, the outcrop situation is poor and limited to quartzite, banded iron formation and some calc-silicates and gneisses. The extensive tertiary laterisation has obscured the vast majority of basement rocks and continuity of outcrop either along strike or across dip is rare. Hence no "type" section occurs in the area and field evidence for repetition by isoclinal folding is minimal.

The major change in the geology as proposed by Barrett, Walker and Bourke (Plate 1 WY.80.7) is a result of the mapping of quartzite units overlying Sleaford Complex rocks in the central part of the E.L., thus establishing a western boundary for the higher metamorphic grade and more highly deformed Hutchison Group rocks as distinct from the relatively low grade units in the far west of the area. Two areas, one at Koppio and the other west south west of Yallunda Flat, previously described as Lincoln Complex, are now assigned to the Sleaford Complex.

Allowing for repetition within the sequence due to isoclinal folding, the stratigraphy can be easily correlated to that of Lemon and Parker for the Cowell/Cleve area with the upper most unit in the E.L. area being the Cook Gap Schist unit of the Middle-back Subgroup.

Evidence also now exists for fairly extensive post tectonic intrusion of predominantly quartz plagioclase granite ± tourmaline and biotite in the Koppio and Pillaworta areas as conformable sills and stocks. In the eastern area, at the contact with the Lincoln Complex, the basal Warrow quartzite appears to have either lensed out, been assimilated as a quartz feldspar augen gneiss or faulted out at the contact. All three proposals are probably true in different parts of the contact zone.

All the units appear to be thin, mostly only a few tens of metres thick with tight folding producing the apparently large thickness of units. The basic structure of the area can now be described as a regional synclinorium bounded to the east by the Lincoln Complex and to the west by the Sleaford Complex basement.

3.8 R.A.B. GEOCHEMICAL SAMPLING (Figure 4)

3.8.1 Area 1 Koppio 1

This area was selected for geochemical sampling for several reasons, these being:-

a) This is a structurally complex area with the intersection of three major faults interpreted by two unrelated geophysical surveys.

b) The favourable Hutchison Group rock units appeared to be present on the limited outcrop.

c) The presence of a younger intrusive granite which may have provided a remobilisation mechanism for uranium.

d) The existence of two uranium anomalies in the area. These were trenched and are discussed above.

Anomalous uranium values were encountered in four holes near the trenches discussed above, the holes were KA 3, 4, 32, 33. In all cases the anomalous values were at or near the contact between the intrusive granite and a ferruginised schist unit. The maximum value obtained was 350 ppm U (sample 80-16455) in hole KA 4. These high readings were not reflected in the fresh rock at the bottom of each hole. The geological information obtained from the drilling also confirmed the geological model for this area. Results in tables (5,13) and figures (5, 6 and 7).

3.8.2 Area 2 Koppio 2

This area was selected because it presented a similar geological cross section to area one in the Hutchison Group and is on the opposite side of the granite intrusion.

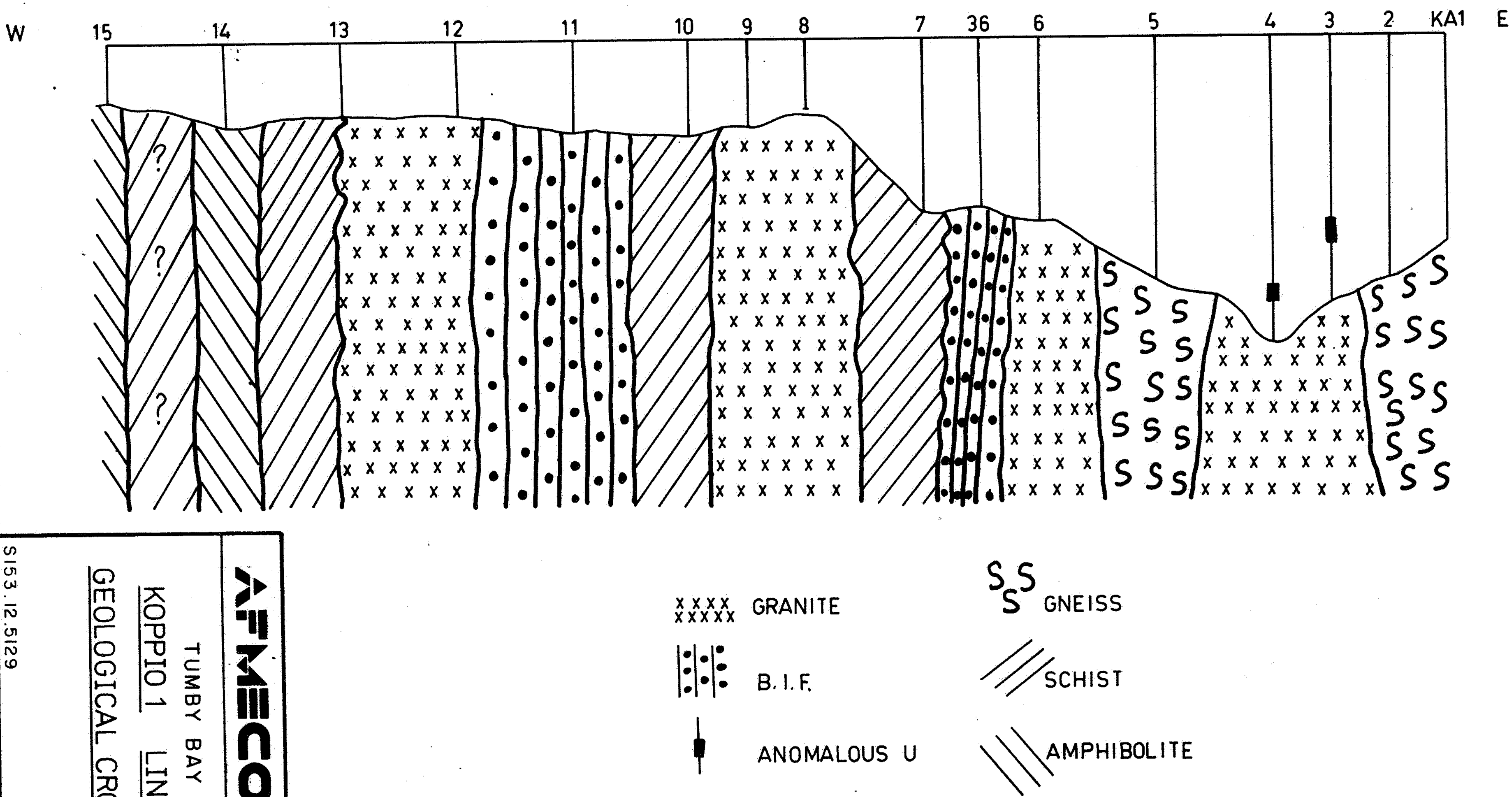
The drill geology supported the selection but no anomalous uranium values were found, the maximum value being 15 ppm. Results in tables (6,13) and figures 8,9,10.

000374

TABLE 4

TRENCH SAMPLES

S.N.	U	Th	Cu	Pb	Zn	F
12067	120	x	150	40	70	x
12068	50	9	95	20	75	x
12069	10	x	30	x	10	x
12070	6	15	35	90	15	x
12071	9	8	10	70	15	180
12072	x	20	25	x	20	x
12073	3	15	15	90	10	130
12074	110	15	160	20	245	x
12075	8	9	160	10	100	x
12076	7	8	35	10	35	x
12077	x	7	15	90	15	x
12078	10	20	15	55	25	x



SCALE
HORIZONTAL 1 cm 40 metres
VERTICAL 1 cm 10 metres

AFMECO PTY. LTD.

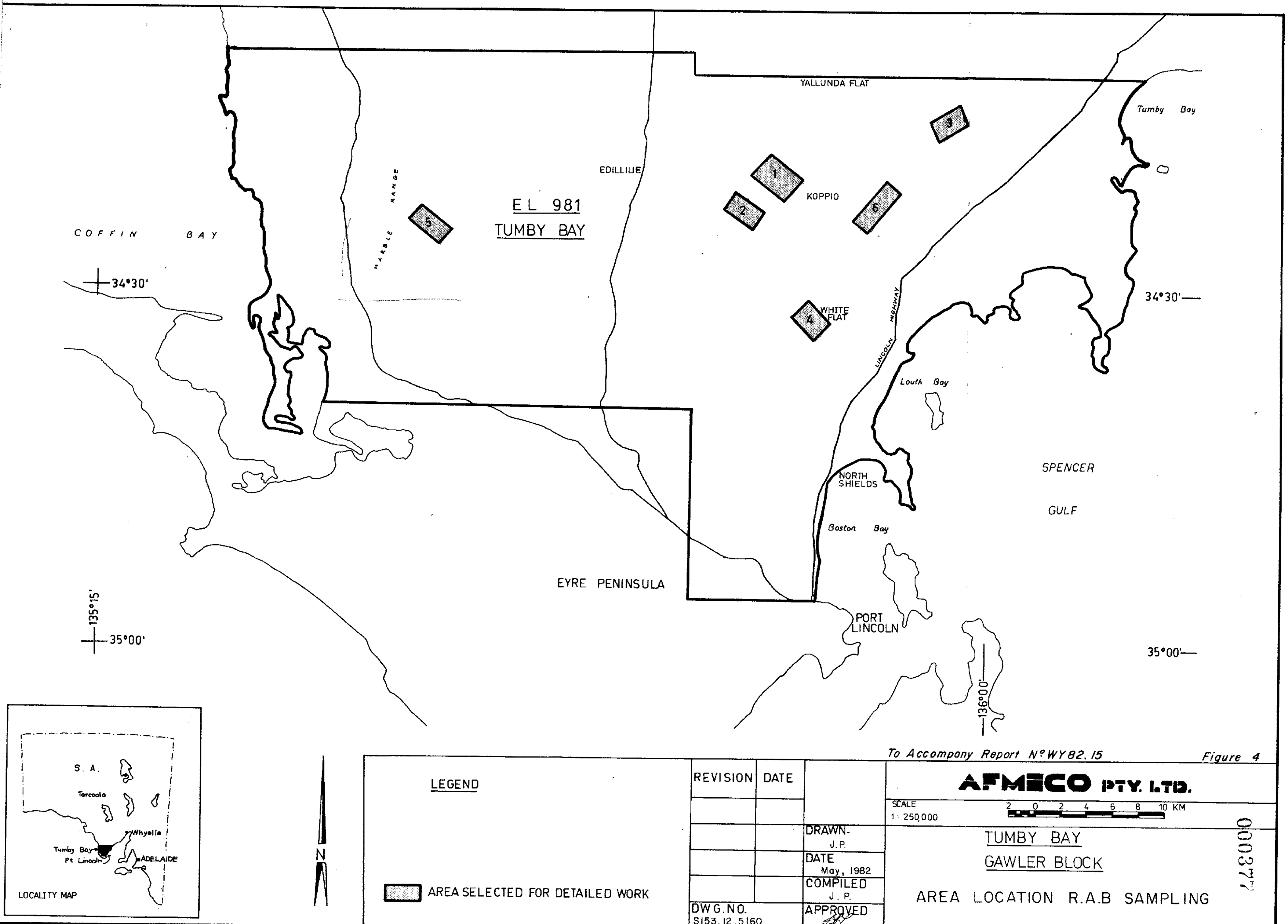
TUMBY BAY

KOPPIO 1 LINE 1 - AREA I

GEOLOGICAL CROSS SECTION

S153.12.5129

To Accompany Report N° WY 82.15 *Figure 6*



To Accompany Report Nº WY82.15

Figure 4

LEGEND

AREA SELECTED FOR DETAILED WORK

REVISION	DATE

DRAWN- J.P.

DATE May, 1982

COMPILED J.P.

APPROVED

DWG. NO. S153.12.5160

AFMECO PTY. LTD.

SCALE 1: 250,000

2 0 2 4 6 8 10 KM

TUMBY BAY

GAWLER BLOCK

AREA LOCATION R.A.B SAMPLING

000377

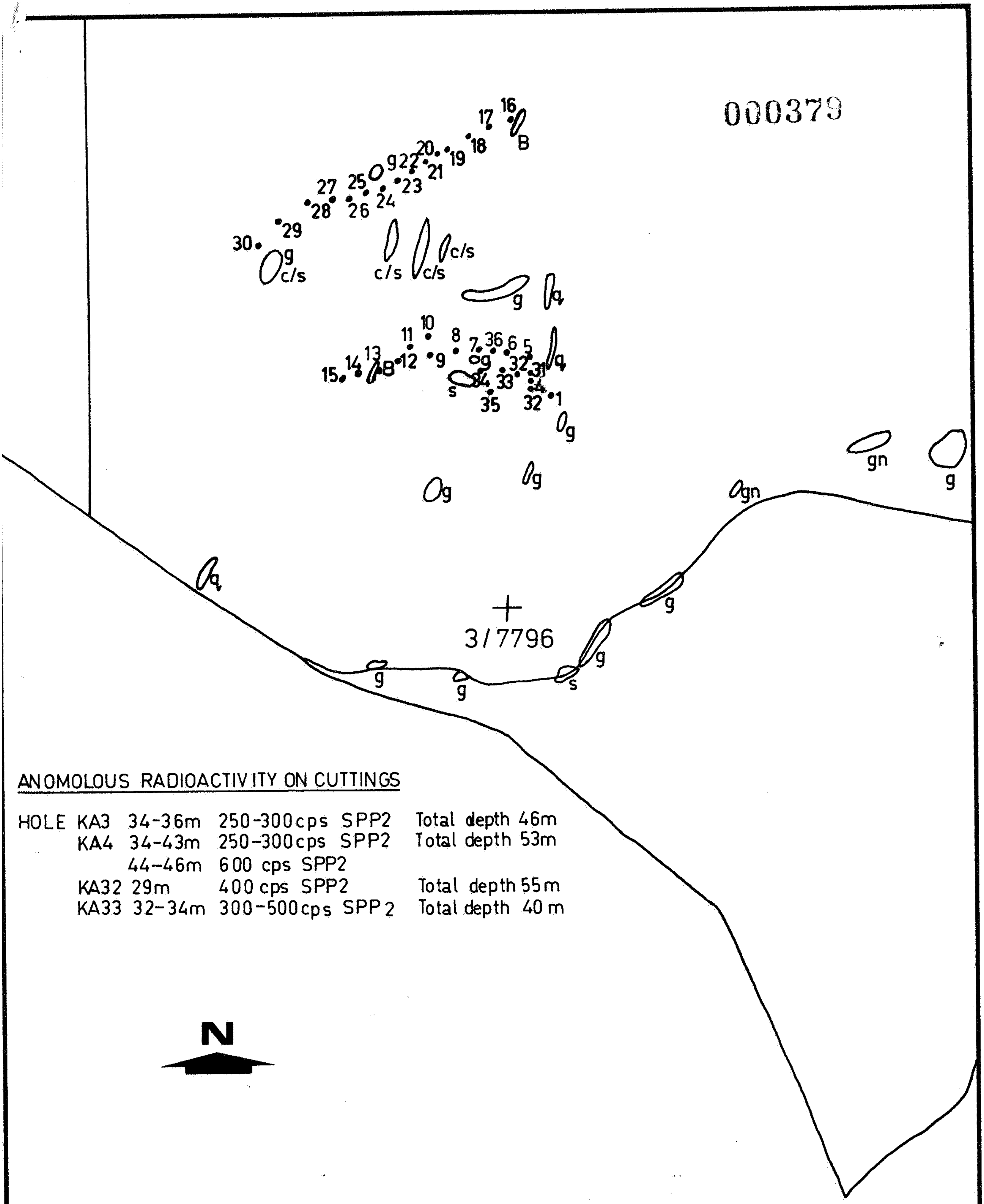
000378

TABLE 5

RAB GEOCHEMISTRY FOR AREA 1

HOLE NO.	SAMPLE NO.	DEPTH	U	Th	Cu	Zn	Pb
KA1	80-16461	36	6	10	15	55	10
KA2	80-16462	42	10	20	45	55	x
KA3	80-16451	32-33	50	15	55	15	x
	80-16452	33-34	65	10	120	50	5
	80-16453	34-35	55	15	125	65	x
	80-16454	35-36	130	10	440	180	x
	80-16463	46	20	7	20	x	10
KA4	80-16455	44-45	350	9	50	290	x
	80-16456	45-46	90	9	25	200	x
	80-16464	53	25	9	25	130	5
KA5	80-16465	42	6	10	36	25	10
KA6	80-16466	32	25	20	15	5	5
KA7	80-16467	30	5	x	10	25	x
KA8	80-16468	12	x	4	5	x	15
KA9	80-16469	15	10	8	5	x	5
KA10	80-16470	17	10	7	35	90	x
KA11	80-16471	16	3	x	20	5	x
KA12	80-16472	13	20	x	15	5	x
KA13	80-16473	13	6	10	55	95	x
KA14	80-16474	15	15	15	130	85	x
KA15	80-16475	10	x	30	20	5	15
KA16	80-16476	22	x	10	5	80	x
KA17	80-16477	12	x	50	25	40	x
KA18	80-16478	16	x	65	5	70	x
KA20	80-16479	15	x	25	10	40	x
KA21	80-16480	21	x	20	10	60	x
KA22	80-16481	22	x	50	35	115	5
KA23	80-16482	7	x	10	30	30	10
KA24	80-16483	6	3	35	15	70	x
KA25	80-16484	12	x	45	55	80	5
KA26	80-16485	3	x	70	10	5	5
KA27	80-16486	13	4	30	15	30	5
KA28	80-16487	2	x	30	15	5	5
KA29	80-16488	9	x	30	20	80	65
KA30	80-16489	23	x	40	20	15	5
KA31	80-16490	34.5	4	10	40	25	x
KA32	80-16491	55	10	5	25	190	x
KA33	80-16492	40	15	10	40	105	x
KA34	80-16493	61	10	6	40	95	5
KA35	80-16494	57	7	10	35	5	15
KA36	80-16495	29	10	15	10	x	15

000379



ANOMOLOUS RADIOACTIVITY ON CUTTINGS

HOLE	KA3	34-36m	250-300cps SPP2	Total depth 46m
	KA4	34-43m	250-300cps SPP2	Total depth 53m
		44-46m	600 cps SPP2	
	KA32	29m	400 cps SPP2	Total depth 55m
	KA33	32-34m	300-500cps SPP 2	Total depth 40 m

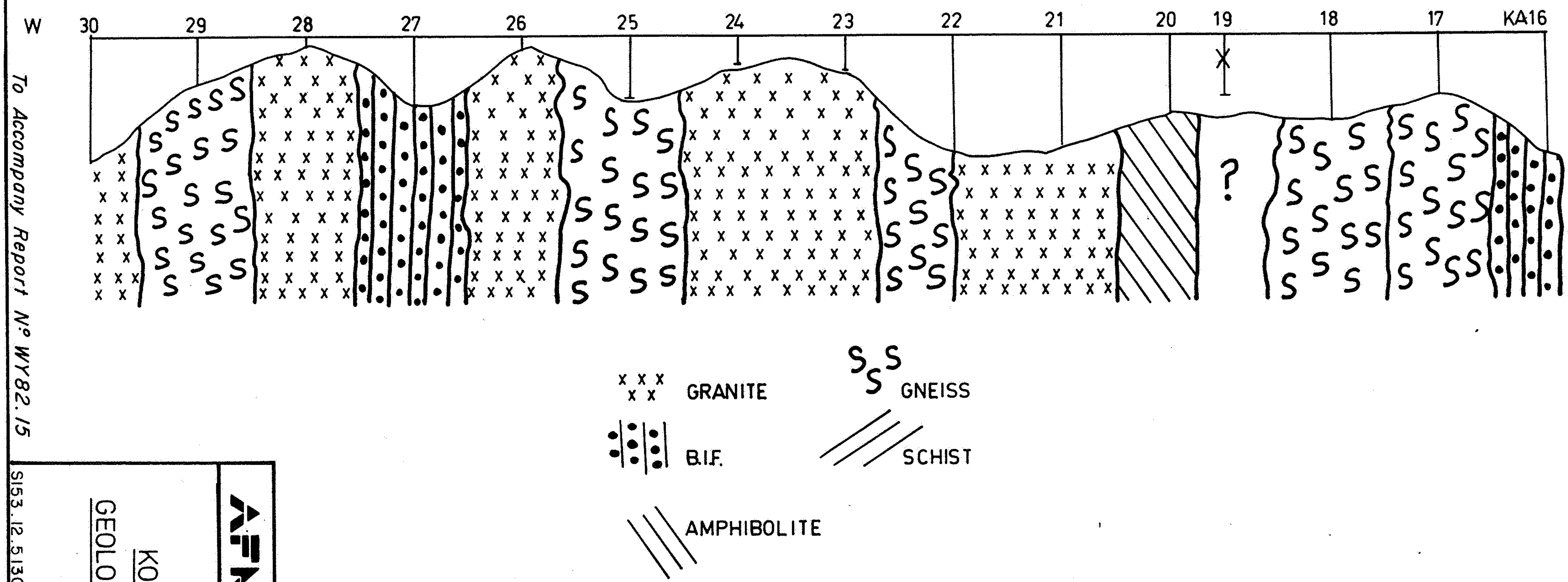
To Accompany Report Nº WY82.15 *Figure 5*

PHOTO 7796 RUN 3

B - B.I.F.
g - granite
gr - graphite
gn - gneiss
L/C - Lincoln Complex
c/s - calc silicate
q - quartzite

DRAWN J.P.	AFMECO PTY. LTD.
DATE May, 1982	SCALE 1:25 000 — 200 0 200 400 600 800 1000 m
GEOLOGY J.P.	TUMBY BAY PROJECT
APPROVED	KOPPIO – AREA I
DWG. Nº S153.12.5128	R. A. B. HOLE LOCATIONS
REV. Nº	

00038



SCALE
HORIZONTAL 1cm 40 metres
VERTICAL 1cm 10 metres

To Accompany Report No WY82.15

SI53.12.5130

GEOLOGICAL CROSS SECTION

KOPPIO 1 LINE 2 - AREA 1

TUMBY BAY

AFMECO PTY. LTD.

Figure 7

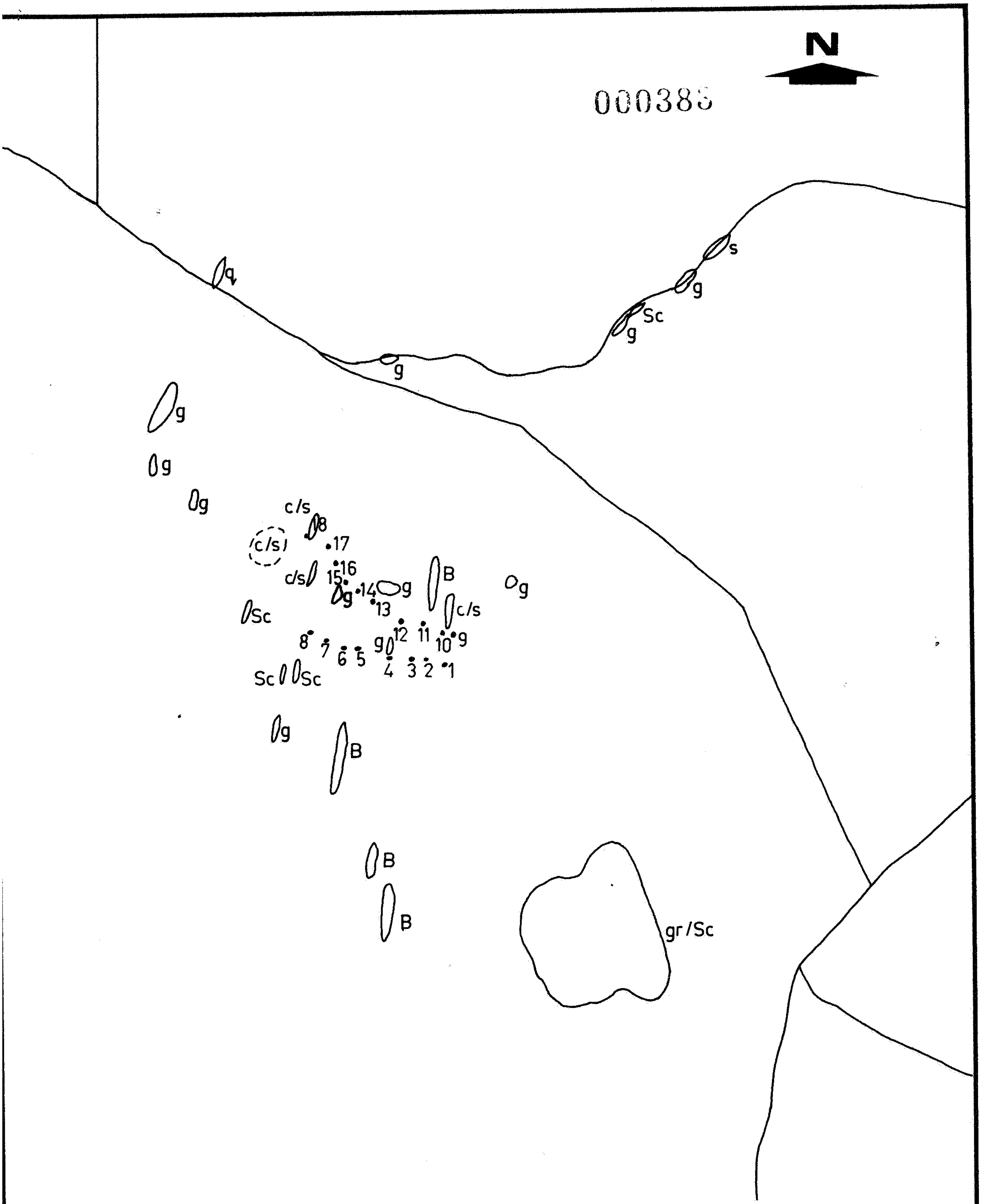
000382

TABLE 6

RAB GEOCHEMISTRY FOR AREA 2

HOLE NO.	SAMPLE NO.	DEPTH	U	Th	Cu	Zn	Pb
KB1	80-16496	22	10	x	85	60	20
KB2	80-16497	13	x	x	5	x	x
KB3	80-16498	12	15	15	190	215	x
KB4	80-16499	4	x	8	20	10	x
KB5	80-16500	4	x	x	140	90	x
KB6	80-16501	13	6	x	40	45	x
KB7	80-16502	8.5	x	x	65	75	x
KB8	80-16503	13	15	5	130	65	x
KB9	80-16504	22	x	x	90	190	x
KB10	80-16505	12	x	25	40	60	x
KB11	80-16506	10	5	x	25	15	5
KB12	80-16507	10	4	7	150	70	x
KB13	80-16508	3	x	7	80	130	20
KB14	80-16509	7	x	x	20	35	x
KB15	80-16510	2	x	20	20	50	15
KB16	80-16511	8	x	x	300	170	x
KB17	80-16512	7.5	x	x	90	90	x
KB18	80-16513	32	10	15	15	100	20

000383



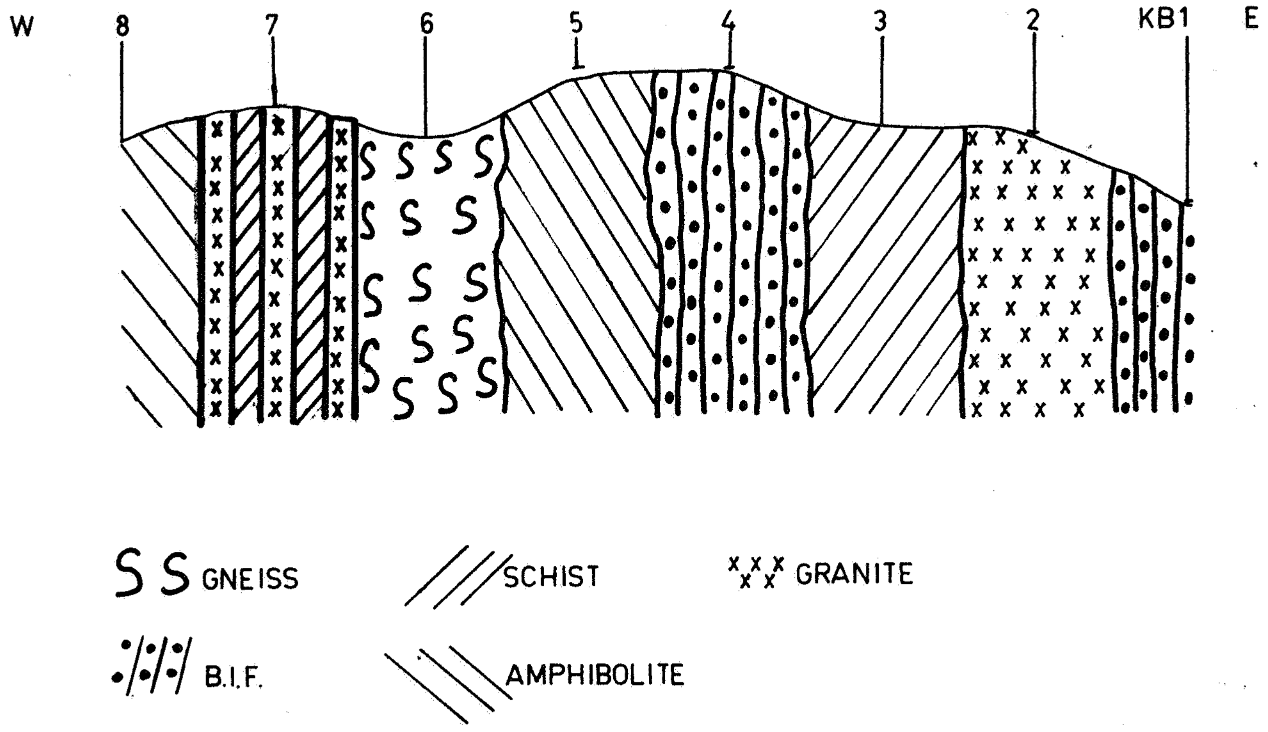
To Accompany Report Nº WY82.15 *Figure 8*

PHOTO 7796 RUN 3

B - BIF
g - granite
gr - graphite
q - quartzite
c/s - calc silicate
Sc - Schist

DRAWN J.P.	AFMECO PTY. LTD.
DATE May, 1982	SCALE 1:25 000 — 200 0 200 400 600 800 1000 m
GEOLOGY J.P.	TUMBY BAY PROJECT
APPROVED	KOPPIO (K.B) AREA 2 R.A.B. HOLE LOCATIONS
DWG. Nº S153.12.5131	
REV. Nº	

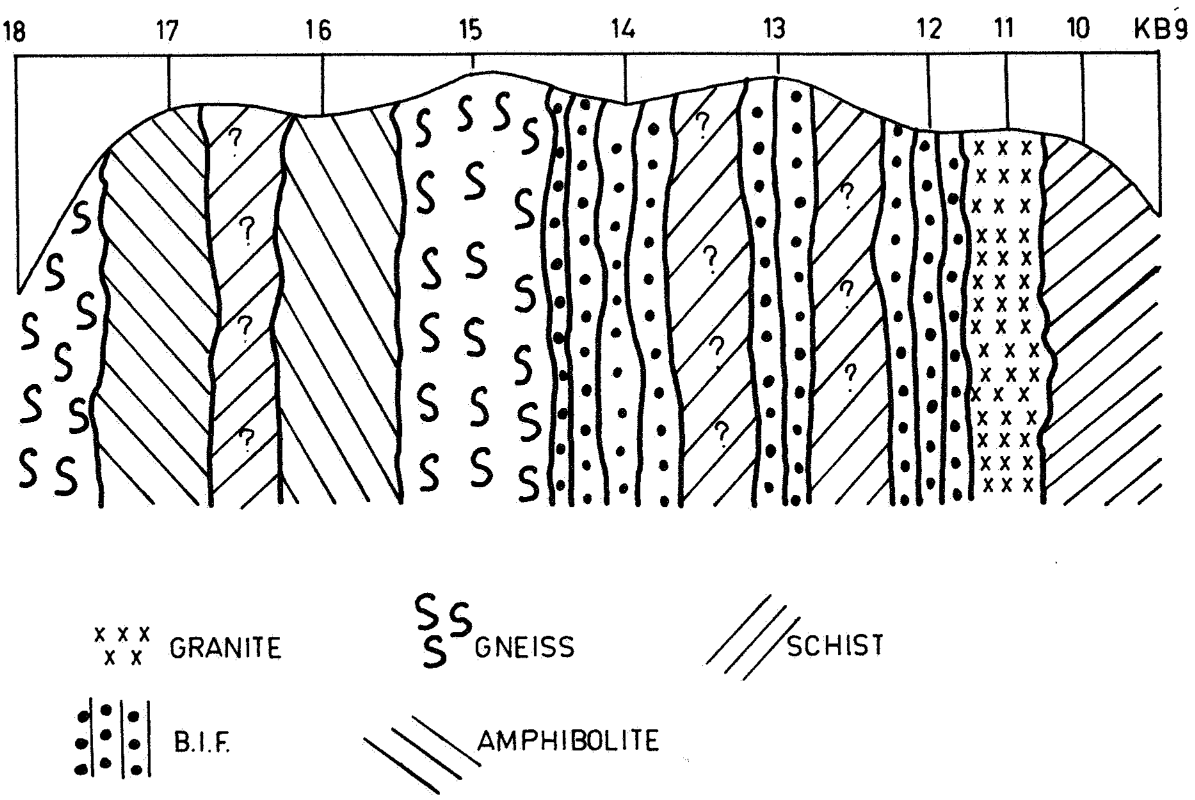
000384



To Accompany Report Nº WY82.15 *Figure 9*

SCALE HORIZONTAL 1cm = 40 metres VERTICAL 1cm = 10 metres	DRAWN J.P. DATE May, 1982 GEOLOGY J.P. APPROVED DWG Nº S153.12.5132 REV Nº	AFMECO PTY. LTD. KOPPIO 2 LINE 1 - AREA 2 GEOLOGICAL CROSS SECTION TUMBY BAY

000385



To Accompany Report Nº WY82.15

Figure 10

SCALE HORIZONTAL 1cm = 40 metres VERTICAL 1cm = 10 metres	DRAWN J.P.	AFMECO PTY. LTD.
	DATE May 1982	
	GEOLOGY J.P.	KOPPIO 2 LINE 2 - AREA 2
	APPROVED	GEOLOGICAL CROSS SECTION
	DWG. Nº S153.12.5133	TUMBY BAY
	REV. Nº	

000386

3.8.3 Area 3 Pillaworta

This area was selected as it presented a good cross section of basal Hutchison units in contact with the Lincoln Complex and again an intrusive granite to provide a remobilisation mechanism. Sub-outcrops of graphitic schist suggested that the Katunga dolomite horizon was present, (although not outcropping) and might host any present mineralisation

The drilling confirmed the presence of the dolomite unit but the maximum uranium value was only 15 ppm U. Results in tables (7 and 13) and Figures 11, 12 and 13 .

3.8.4 Area 4 White Flat

Area four was selected due to structurally complex Hutchison Group rocks, including some outcropping dolomite, being associated with a higher background zone over soil and adjacent to the Lincoln Complex contact.

Drilling confirmed the presence of the dolomite unit but the best value was 9 ppm uranium and up to 100 ppm thorium. Results are in tables (8 and 13) and Figures 14, 15 and 16 .

3.8.5 Area 5 Marble Range

Area 5 was selected to test the extent of Hutchison Group rocks to the east of Marble Range and their suitability for uranium mineralisation as they do not outcrop and are only known from old mine workings. The drilling produced a very narrow sequence of Hutchison rocks consisting of a phyllitic slate overlying a quartzite. The maximum value for uranium was 10 ppm. Results are in figures 17 and 18 and tables (9 and 13).

3.8.6 Area 6 Koppio 3

This area was chosen to test the graphitic horizon apparently directly overlying the Lincoln Complex. The sequence was found to be more complex than the limited outcrop indicated and a maximum value of 8 ppm uranium was obtained. Results are in figures 19,20, and 21 and tables (10 and 13).

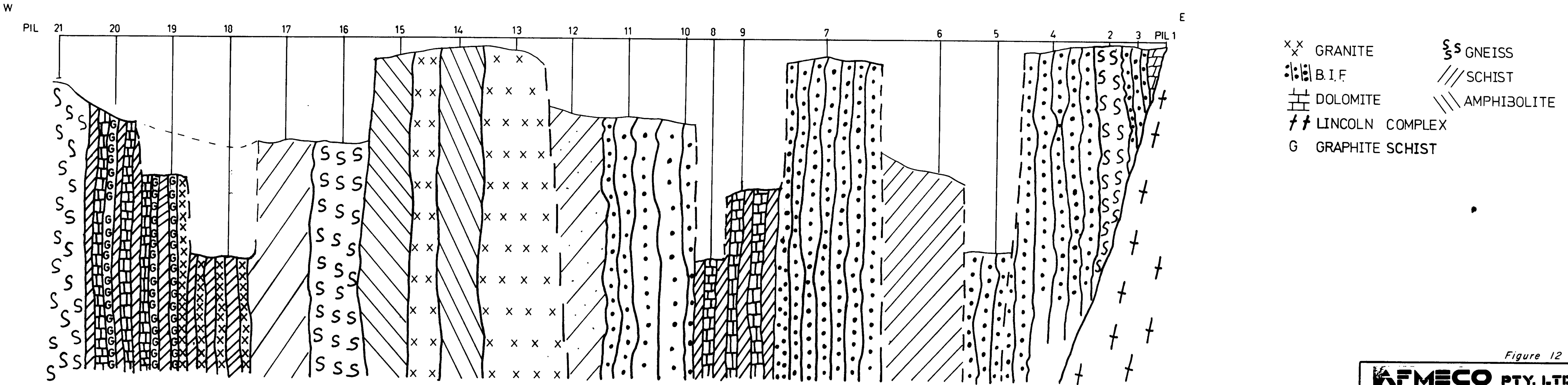


Figure 12

AFMECO PTY. LTD.

PILLAWORTA LINE 1 - AREA 3

GEOLOGICAL CROSS SECTION

TUMBY BAY

S153.12.5161

To Accompany Report Nº WY82.15

3776(III)-1

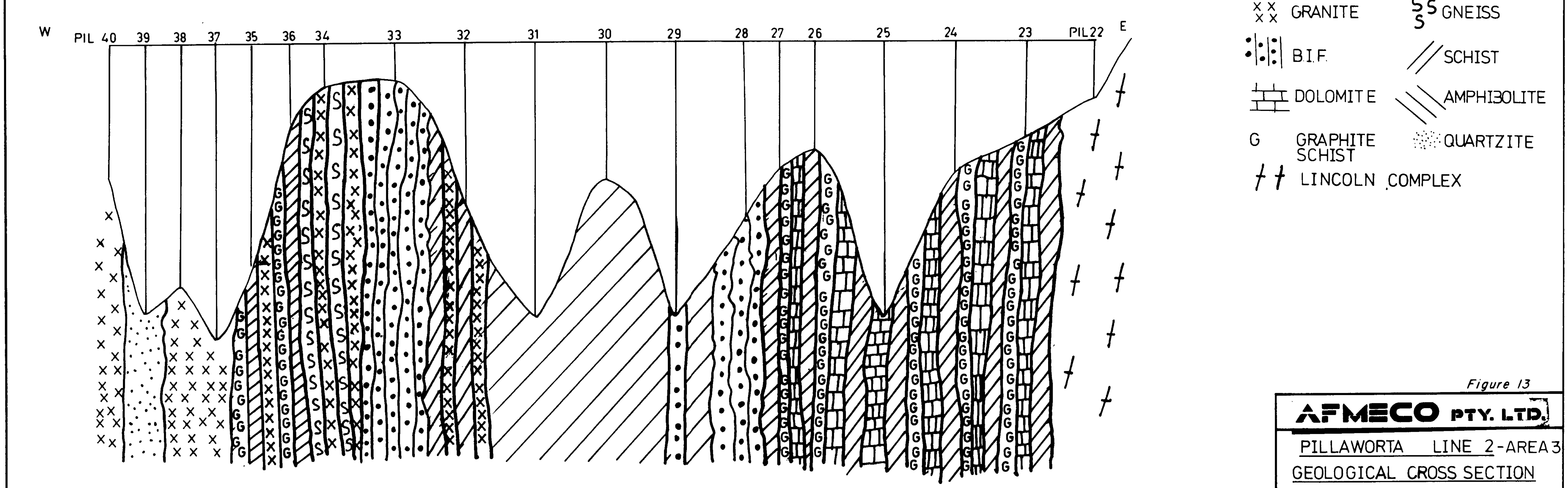


Figure 13

AFMECO PTY. LTD.

PILLAWORTA LINE 2-AREA 3

GEOLOGICAL CROSS SECTION

TUMBY BAY

To Accompany Report Nº WY82.15

S153. 12. 5162

3776 (III) -2

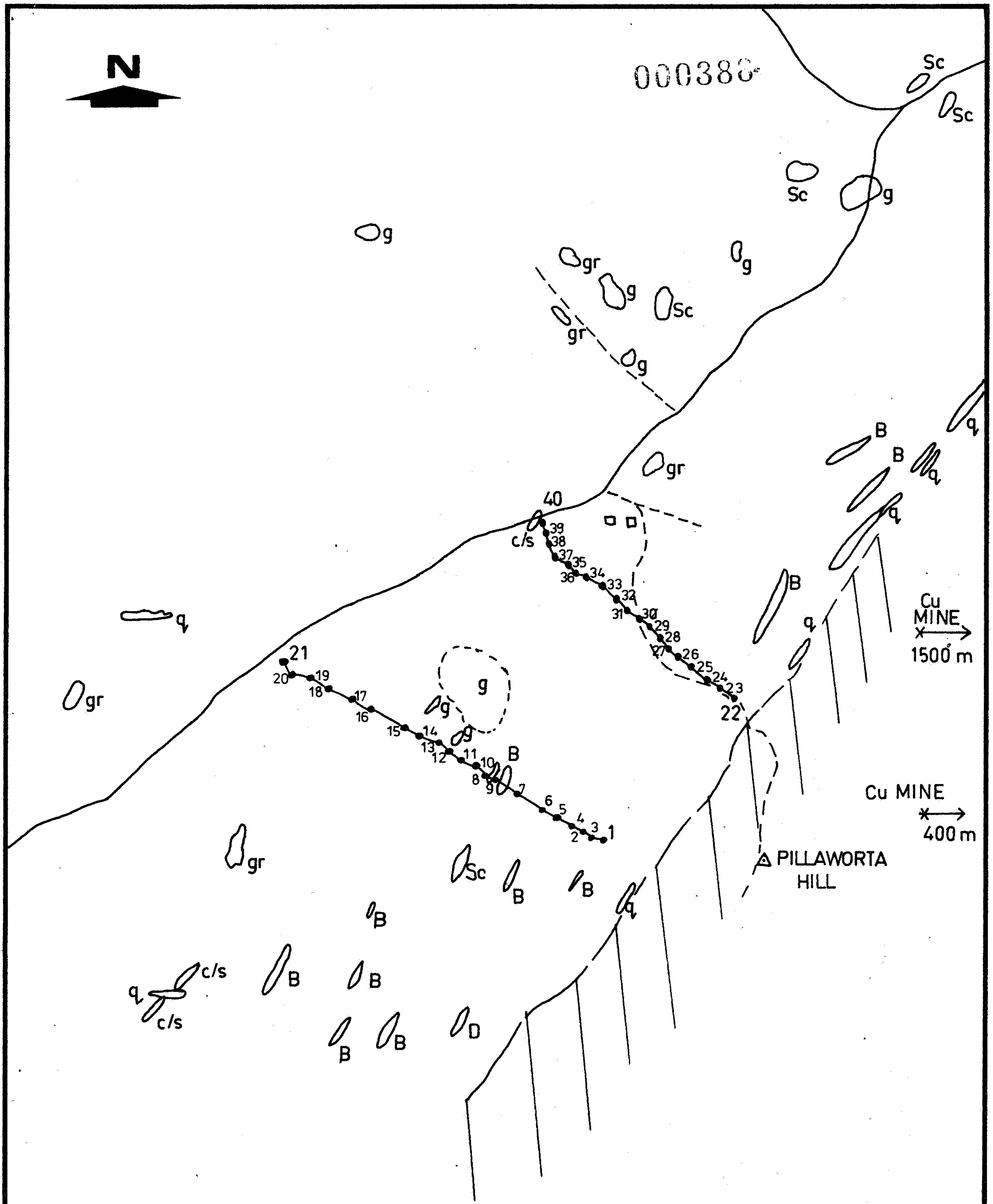
000387

TABLE 7

RAB GEOCHEMISTRY FOR AREA 3

HOLE NO.	SAMPLE NO.	DEPTH	U	Th	Cu	Zn	Pb
PIL1	80-16514	2.5	x	20	50	100	x
PIL2	80-16515	2	x	x	110	100	x
PIL3	80-16516	3	x	7	75	90	x
PIL4	80-16517	4	x	x	65	95	x
PIL5	80-16518	75	x	15	30	110	x
PIL6	80-16519	47	x	20	15	120	10
PIL7	80-16520	7	x	x	20	55	5
PIL8	80-16521	78	x	25	45	130	x
PIL9	80-16522	54	x	20	25	120	x
PIL10	80-16523	30	9	20	95	110	105
PIL11	80-16524	28	x	7	40	155	x
PIL12	80-16525	27	6	15	40	120	x
PIL13	80-16526	5	4	20	25	75	x
PIL14	80-16527	4	x	x	35	130	x
PIL15	80-16528	7	5	x	130	90	x
PIL16	80-16529	38	x	15	60	160	x
PIL17	80-16530	36	3	25	40	120	x
PIL18	80-16531	74	10	30	20	275	20
PIL19	80-16532	49	x	20	25	130	10
PIL20	80-16533	30	x	15	20	130	x
PIL21	80-16534	16	x	10	10	115	x
PIL22	80-16535	16.5	x	x	155	435	130
PIL23	80-16536	28	15	7	135	115	15
PIL24	80-16537	36.5	x	25	55	50	50
PIL25	80-16538	78	x	25	60	85	x
PIL26	80-16539	31	5	10	85	85	25
PIL27	80-16540	37	x	x	40	50	15
PIL28	80-16541	50	x	x	10	150	x
PIL29	80-16542	78	x	30	30	80	x
PIL30	80-16543	39	x	x	20	35	20
PIL31	80-16544	78	3	20	40	140	x
PIL32	80-16545	46	10	120	10	50	10
PIL33	80-16546	11	x	x	5	25	x
PIL34	80-16547	13	3	6	195	50	x
PIL35	80-16548	63	x	20	30	95	x
PIL36	80-16549	25.5	x	8	10	70	x
PIL37	80-16550	84	x	25	20	100	x
PIL38	80-16551	69	x	20	20	115	x
PIL39	80-16552	76	x	25	20	165	x
PIL40	80-16553	38	x	8	10	115	x

000386



To Accompany Report Nº WY82.15   Figure 11

PHOTO 7818 RUN 2

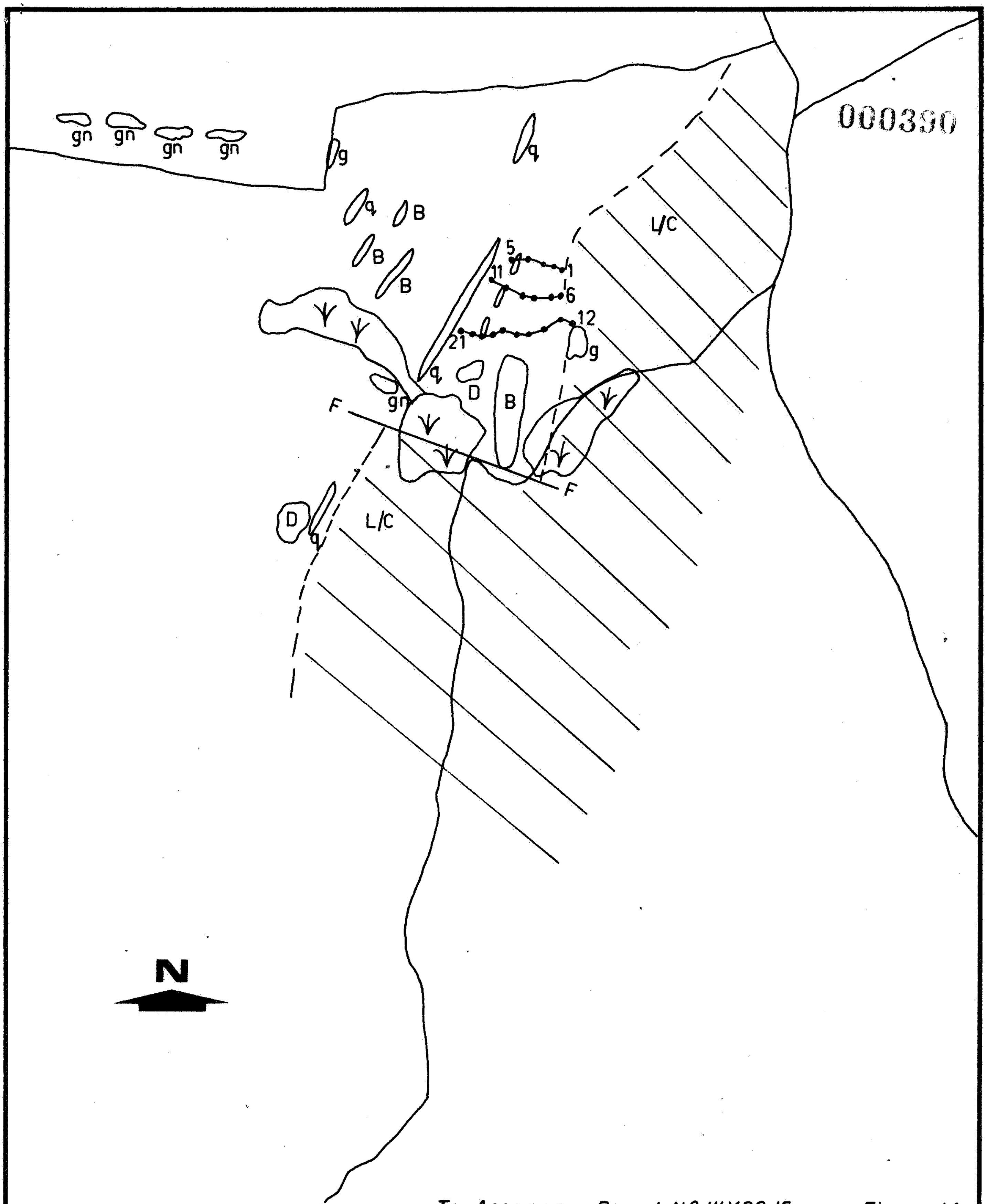
B – BIF
g – granite
gr – graphite
gn – gneiss
q – quartzite
L/C – Lincoln Complex
c/s – calc-silicate
Sc – Schist

DRAWN J.P.	AFMECO PTY. LTD.
DATE May, 1982	SCALE 1:25 000 (200 0 200 400 600 800 1000 m)
GEOLOGY J.P.	AREA 3 – PILLAWORTA HILL
APPROVED	TUMBY BAY PROJECT
DWG. Nº S153.12.5134	R.A.B HOLE LOCATIONS
REV. Nº	

TABLE 8

RAB GEOCHEMISTRY FOR AREA 4

HOLE NO.	SAMPLE NO.	DEPTH	U	Th	Cu	Zn	Pb
WHF1	80-16554	73	x	8	80	95	x
WHF2	80-16555	38	x	x	30	300	x
WHF3	80-16556	18	x	25	30	170	x
WHF4	80-16557	16	x	85	5	40	10
WHF5	80-16558	22	x	100	10	60	x
WHF6	80-16559	33	x	25	20	40	x
WHF7	80-16560	25	x	x	10	110	x
WHF8	80-16561	63	x	30	50	380	x
WHF9	80-16562	21	7	25	30	350	x
WHF10	80-16563	15.5	3	90	60	150	x
WHF11	80-16564	41	x	8	20	140	x
WHF12	80-16565	7	4	35	25	100	x
WHF13	80-16566	22.5	x	30	30	40	5
WHF14	80-16567	14.5	x	15	65	136	x
WHF15	80-16568	32	x	40	25	65	x
WHF16	80-16569	11.5	3	10	10	40	x
WHF17	80-16570	18	x	10	60	25	x
WHF18	80-16571	14	9	15	25	515	x
WHF19	80-16572	6.5	3	35	20	40	x
WHF20	80-16573	13	x	45	5	30	x
WHF21	80-16574	21	3	45	5	85	x



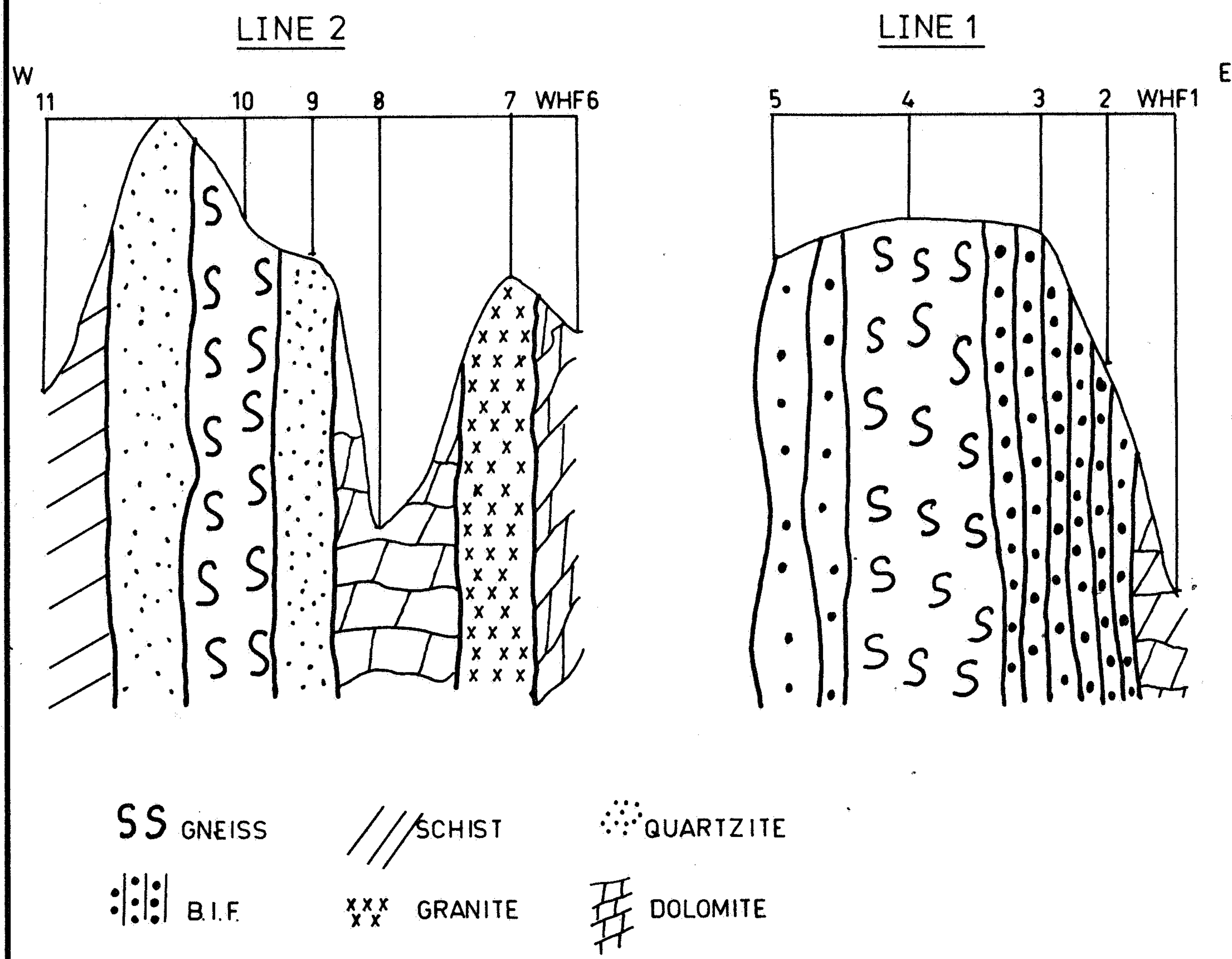
To Accompany Report N.º WY82.15 — Figure 14

PHOTO 7693 RUN 6

B - BIF
g - granite
gn - gneiss
L/C - Lincoln Complex
q - quartzite
D - dolomite
swamp areas

DRAWN J. P.	**AFMECO PTY. LTD.**
DATE May, 1982	SCALE 1:50 000 (10 0 10 20 km)
GEOLOGY J. P	AREA 4 WHITE FLAT
APPROVED	TUMBY BAY PROJECT
DWG. No. S153.12.5135	R.A.B HOLE LOCATIONS
REV. No.	

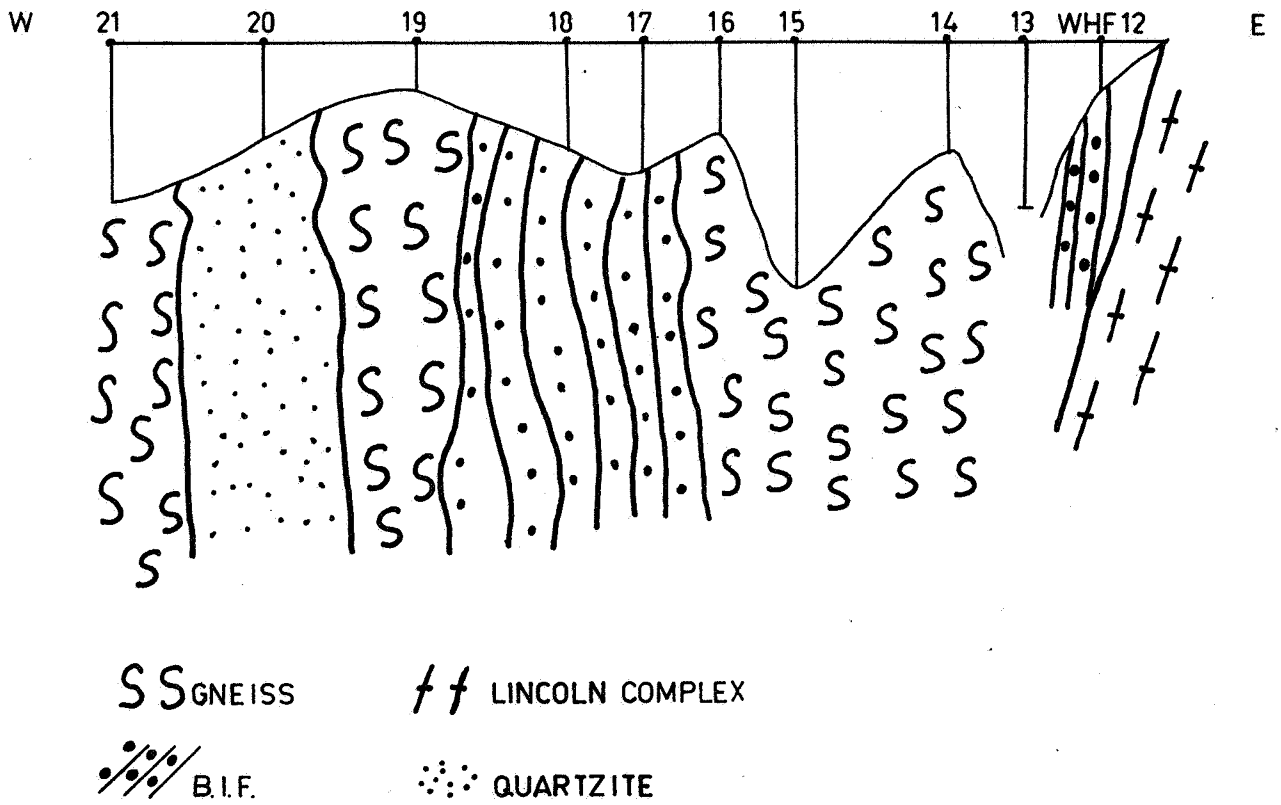
000391



To Accompany Report Nº WY82.15 *Figure 15*

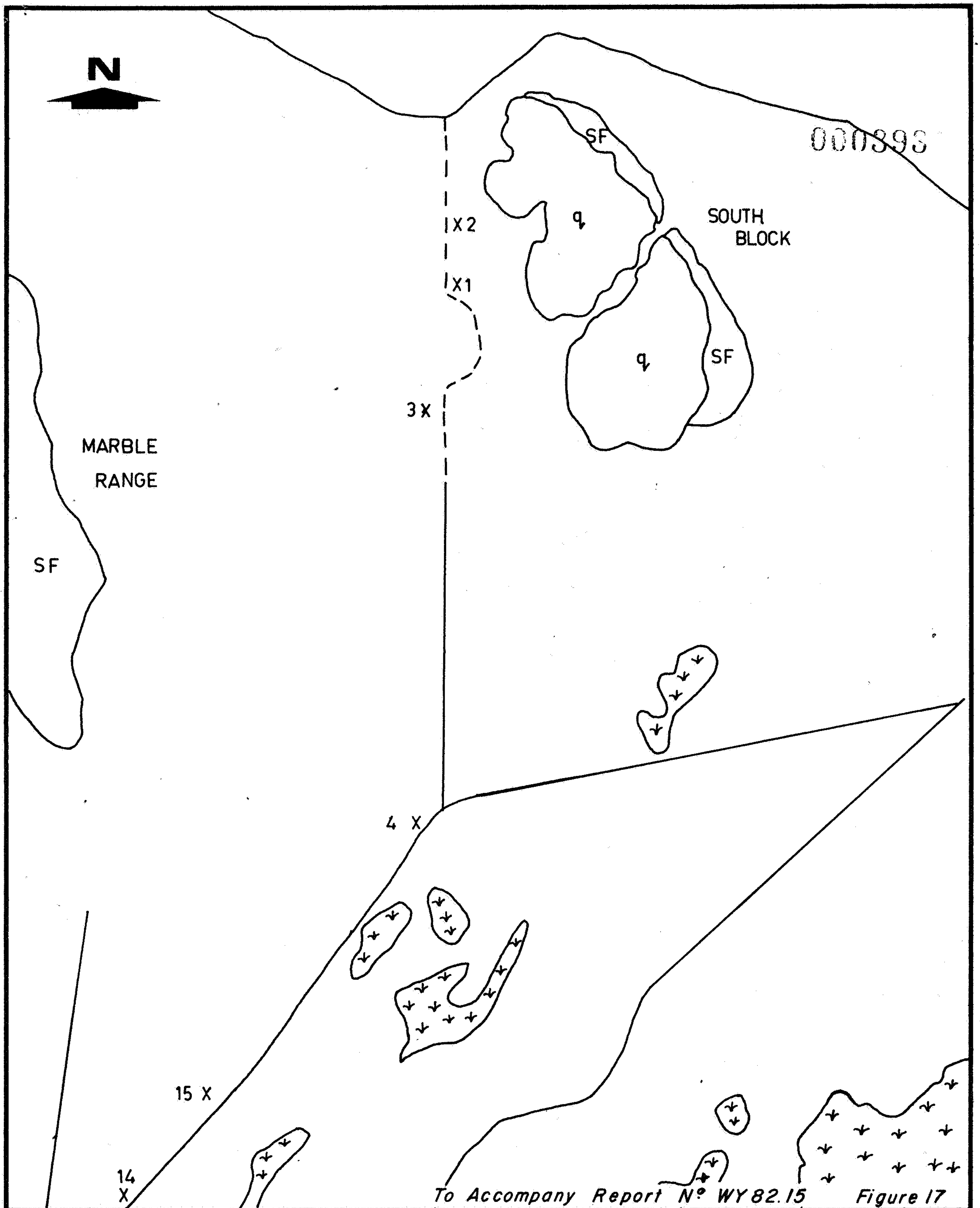
SCALE HORIZONTAL 1cm = 40 metres VERTICAL 1cm = 10 metres	DRAWN J.P. DATE May, 1982 GEOLOGY JP APPROVED DWG Nº S153.12.5136 REV Nº	AFMECO PTY. LTD. WHITE FLAT GEOLOGICAL CROSS SECTION LINES 1 & 2 AREA 4 TUMBY BAY

000392



To Accompany Report N° WY82.15 Figure 16

SCALE HORIZONTAL 1cm = 40metres VERTICAL 1cm = 10metres	DRAWN J. P.	AFMECO PTY. LTD.
	DATE May, 1982	
	GEOLOGY J. P.	WHITE FLAT LINE 3
	APPROVED	GEOLOGICAL CROSS SECTION
	DWG. N° S153.12.5137	AREA 4
	REV. N°	TUMBY BAY



To Accompany Report Nº WY 82.15 Figure 17

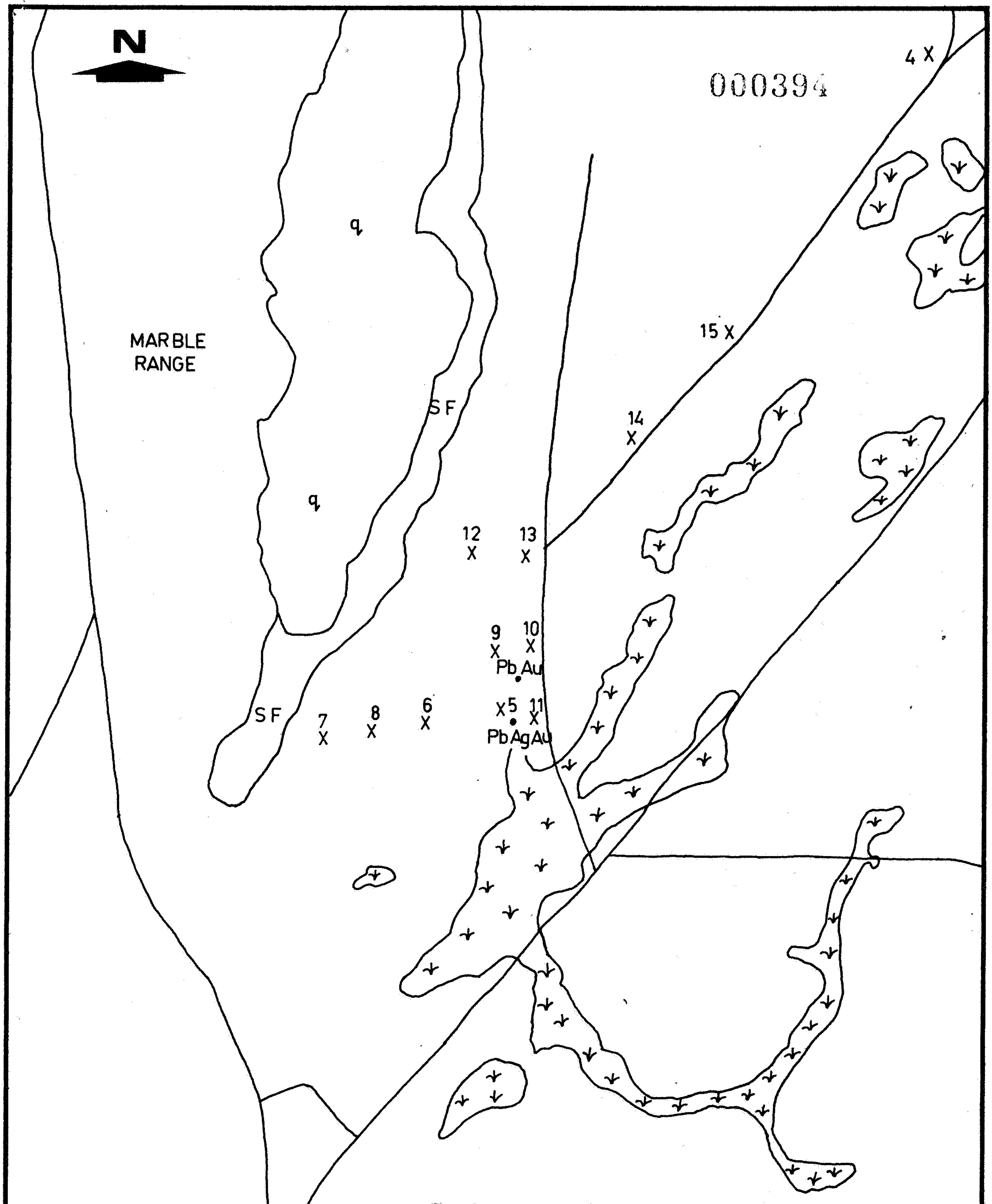
-LEGEND-

q quartzite

SF SLEAFORD COMPLEX

areas of swamp

DRAWN J.P.	AFMECO PTY. LTD.
DATE May, 1982	SCALE 1:50 000 (10 0 10 20 km)
GEOLOGY J.P.	AREA 5 MARBLE RANGE (1)
APPROVED	R.A.B HOLE LOCATIONS
DWG. Nº S153.12.5138	TUMBY BAY
REV. Nº	



To Accompany Report Nº WY82.15 *Figure 18*

LEGEND :

q quartzite

SF SLEAFORD COMPLEX

areas of swamp

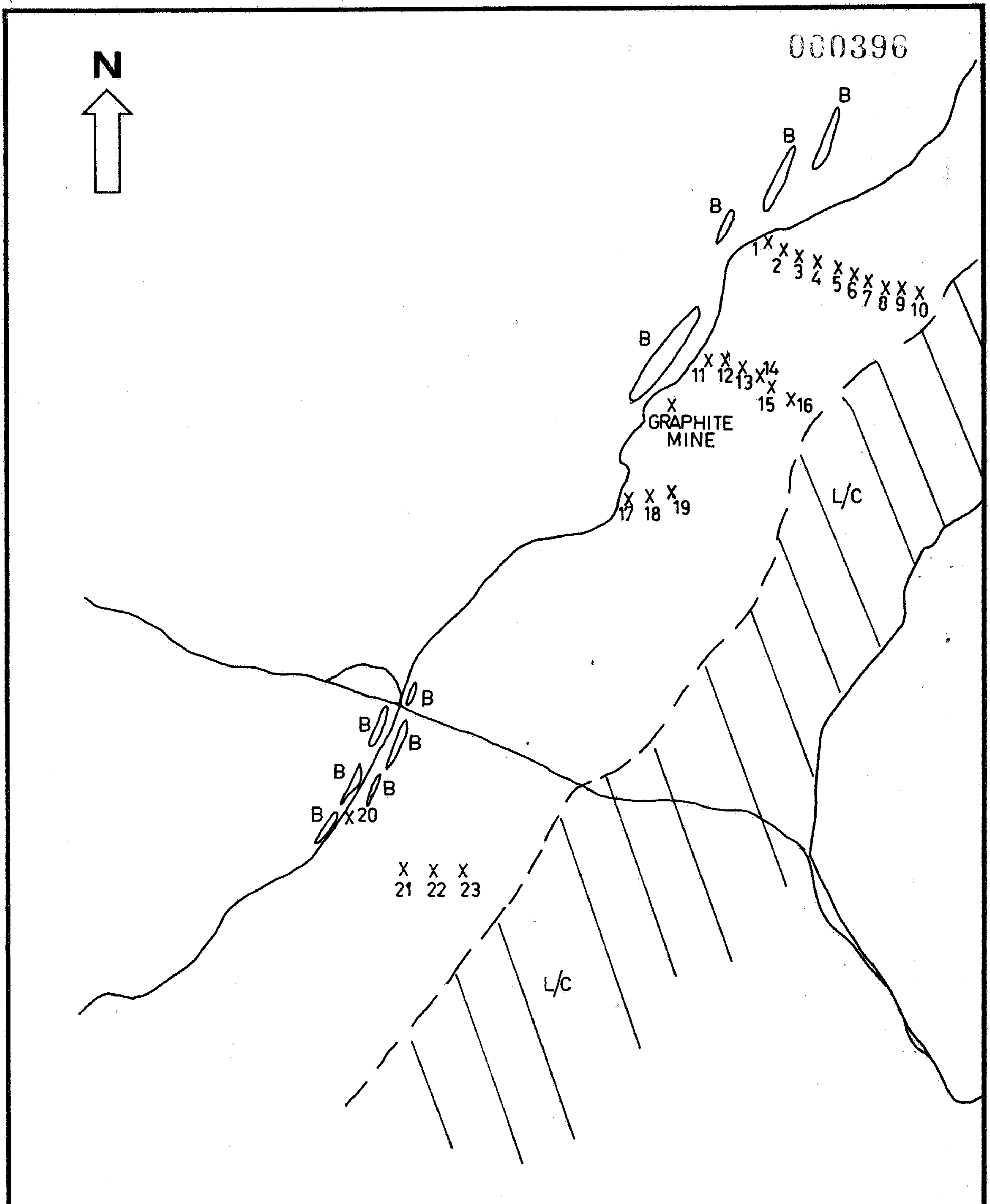
DRAWN J. P.	AFMECO PTY. LTD.
DATE May, 1982	SCALE 1:50 000 — 10 0 10 20 km
GEOLOGY J. P.	
APPROVED	AREA 5 MARBLE RANGE (2)
DWG. Nº S153.12.5139	R.A.B HOLE LOCATIONS TUMBY BAY
REV. Nº	

TABLE 9

RAB GEOCHEMISTRY FOR AREA 5

HOLE NO.	SAMPLE NO.	DEPTH	U	Th	Cu	Zn	Pb
MR1	80-16575	30	x	15	10	10	x
MR2	80-16576	60	5	35	10	15	x
MR3	80-16577	19	3	10	10	30	x
MR4	80-16578	18	4	5	5	5	x
MR5	80-16579	14	x	15	10	40	x
MR6	80-16580	56.5	4	25	15	115	10
MR7	80-16581	13	10	170	15	35	10
MR8	80-16582	16	10	380	10	15	30
MR9	80-16583	12	x	40	15	25	10
MR10	80-16584	7	x	10	15	65	x
MR11	80-16585	12.5	6	30	30	70	30
MR12	80-16586	78	x	25	10	5	x
MR13	80-16587	26	x	9	10	40	x
MR14	80-16588	13	3	15	40	125	x
MR15	80-16589	11	x	x	10	10	15

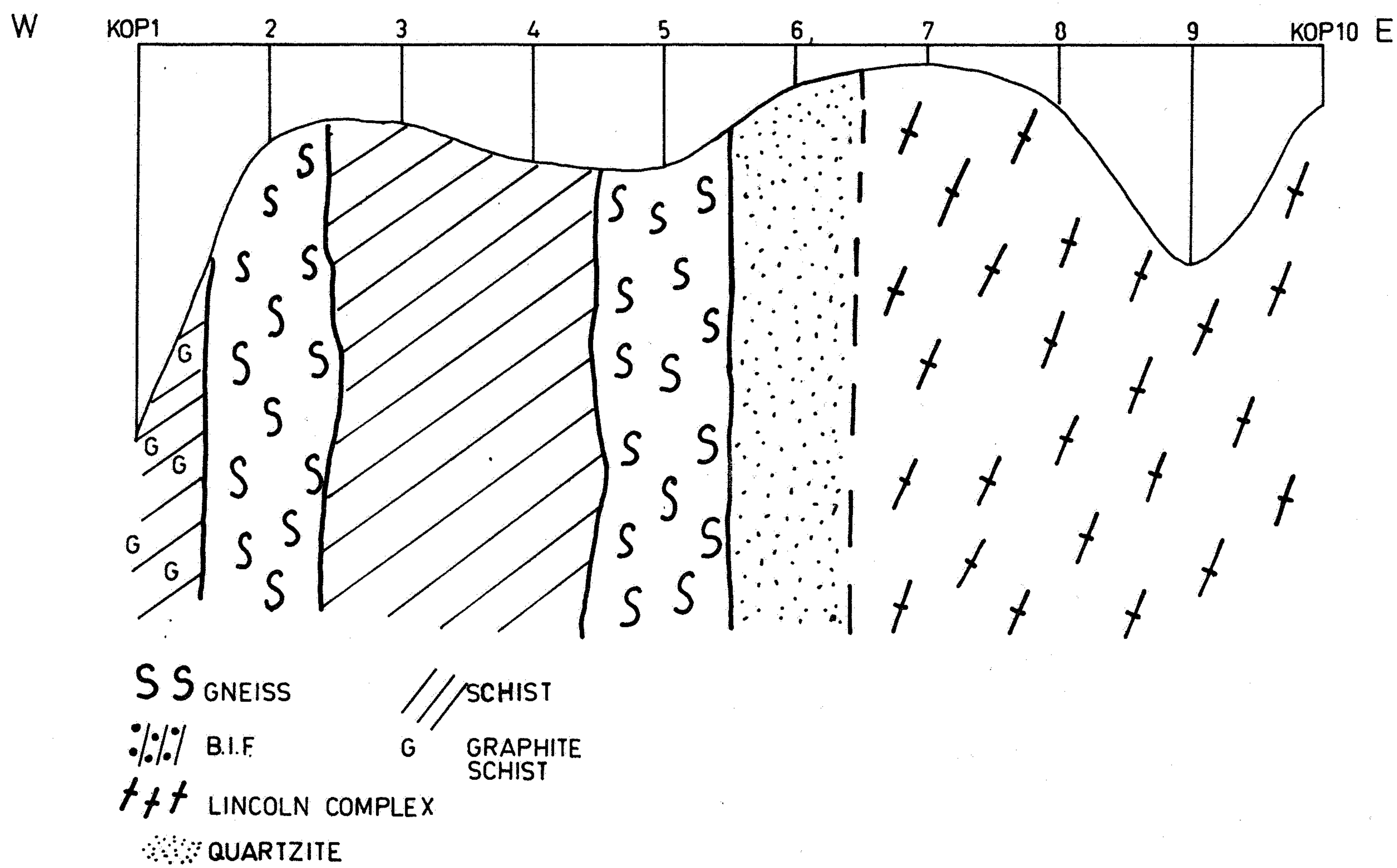
000396



To Accompany Report Nº WY82.15 *Figure 19*

Legend : B - BIF L/C - LINCOLN COMPLEX	DRAWN J.P.	AFMECO PTY. LTD.	
	DATE May, 1982	SCALE 1:25 000	200 0 200 400 600 800 1000 m
	GEOLOGY J.P.	AREA 6 KOPPIO	
	APPROVED	R.A.B HOLE LOCATION TUMBY BAY	
	DWG. Nº S153.12.5140		
	REV. Nº		

000397



SCALE
HORIZONTAL 1cm=40 metres
VERTICAL 1cm=10 metres

DRAWN	J.P.
DATE	May, 1982
GEOLOGY	J.P.
APPROVED	
DWG. No	S153.12.5141
REV. No	

To Accompany Report Nº WY82.15 Figure 20

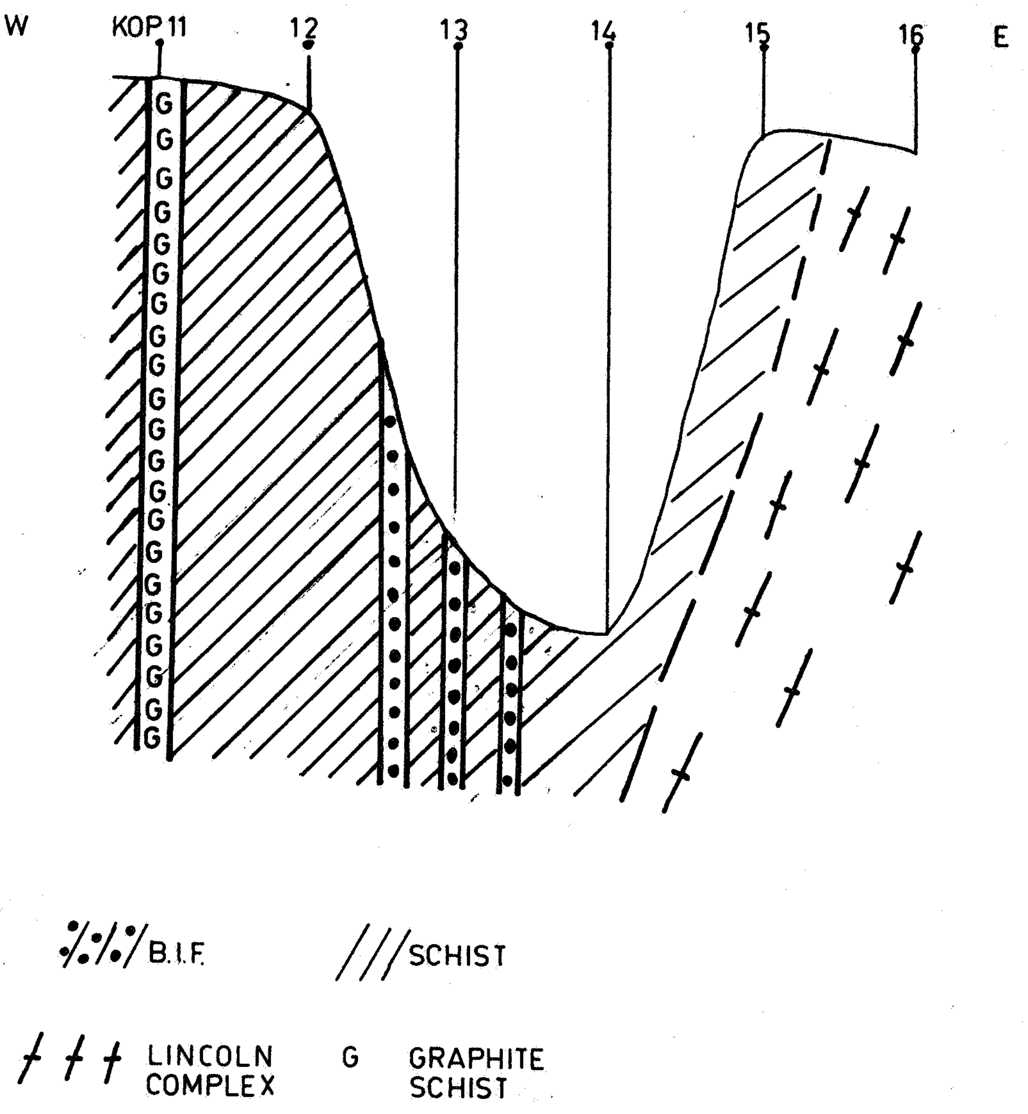
AFMECO PTY. LTD.

KOPPIO 3 LINE 1-AREA 6

GEOLOGICAL CROSS SECTION

TUMBY BAY

000398



To Accompany Report Nº WY 82.15 *Figure 21*

SCALE HORIZONTAL 1cm = 40 metres VERTICAL 1cm = 10 metres	DRAWN J.P.	AFMECO PTY. LTD.
	DATE May, 1982	
	GEOLOGY J.P.	KOPPIO 3 LINE 2 - AREA 6 GEOLOGICAL CROSS SECTION TUMBY BAY
	APPROVED	
	DWG. Nº S153.12.5142	
	REV Nº	

TABLE 10

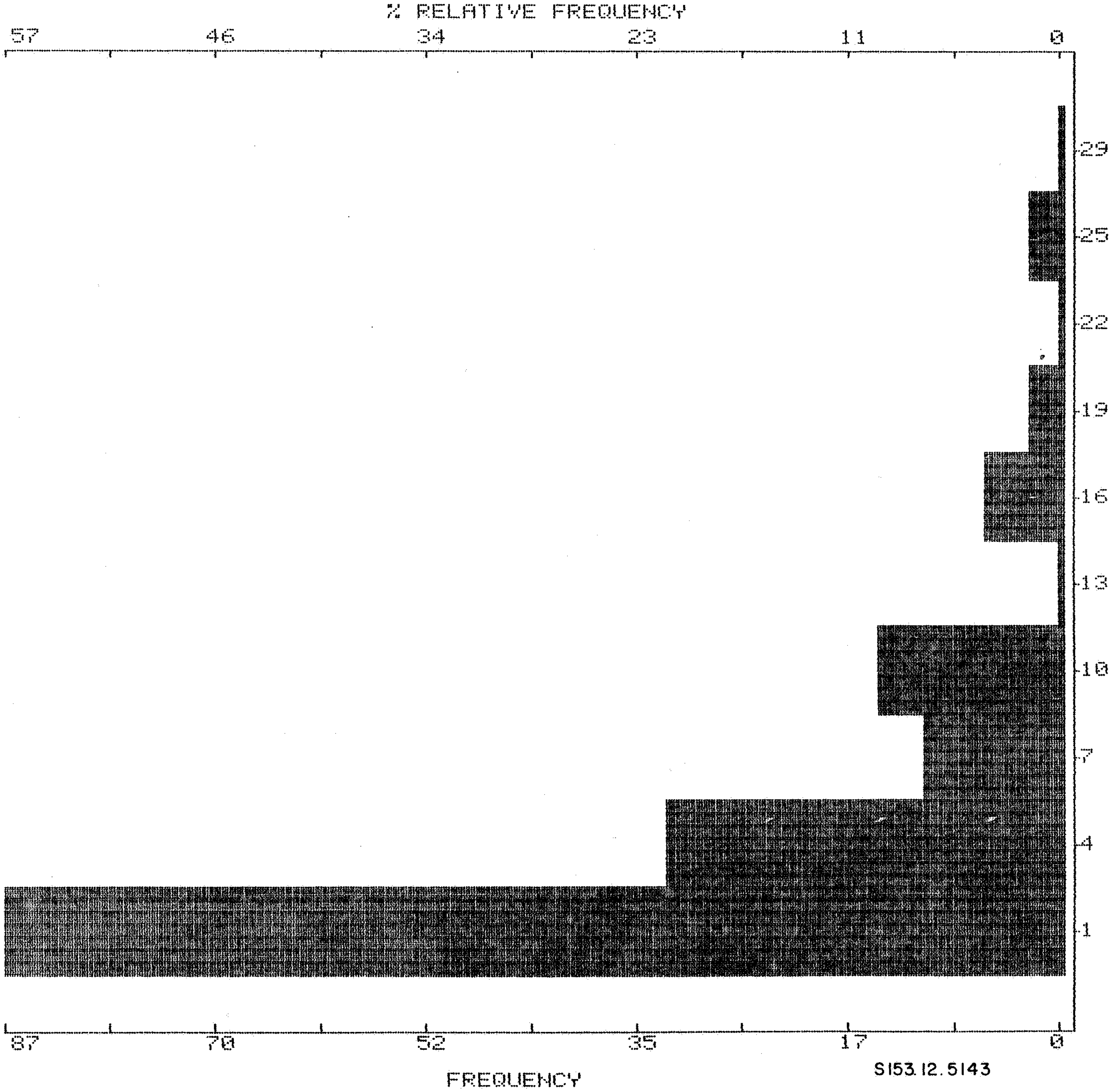
RAB GEOCHEMISTRY FOR AREA 6

HOLE NO.	SAMPLE NO.	DEPTH	U	Th	Cu	Zn	Pb
KOP1	80-16590	60	3	15	25	105	25
KOP2	80-16591	15	4	30	50	130	x
KOP3	80-16592	12	x	35	30	105	x
KOP4	80-16593	18	x	30	20	130	x
KOP5	80-16594	19.5	x	15	75	110	x
KOP6	80-16595	6.5	x	x	55	65	x
KOP7	80-16596	3	5	20	55	65	x
KOP8	80-16597	9	x	6	75	125	x
KOP9	80-16598	34	x	15	20	135	x
KOP10	80-16599	9	x	85	145	125	x
KOP11	80-16600	5	5	10	125	75	x
KOP12	80-16601	9	x	x	100	155	x
KOP13	80-16602	66	6	45	30	220	x
KOP14	80-16603	78	3	25	35	365	5
KOP15	80-16604	12	3	15	75	115	x
KOP16	80-16605	14	x	7	75	100	x
KOP17	80-16606	18	3	35	30	60	x
KOP18	80-16607	30	x	35	35	115	x
KOP19	80-16608	6	x	15	30	85	x
KOP20	80-16609	54	8	40	15	75	x
KOP21	80-16610	5	3	140	60	115	5
KOP22	80-16611	9	x	45	60	70	x
KOP23	80-16612	23	4	25	65	135	x

The cumulative and relative frequency for the samples are displayed in Figures 22 to 31 for U, Th, Cu, Pb, Zn, the drilling statistics are presented in Tables 11 and 12 and Figure 32.

000401

HISTOGRAM for U/401



S153.12.5143

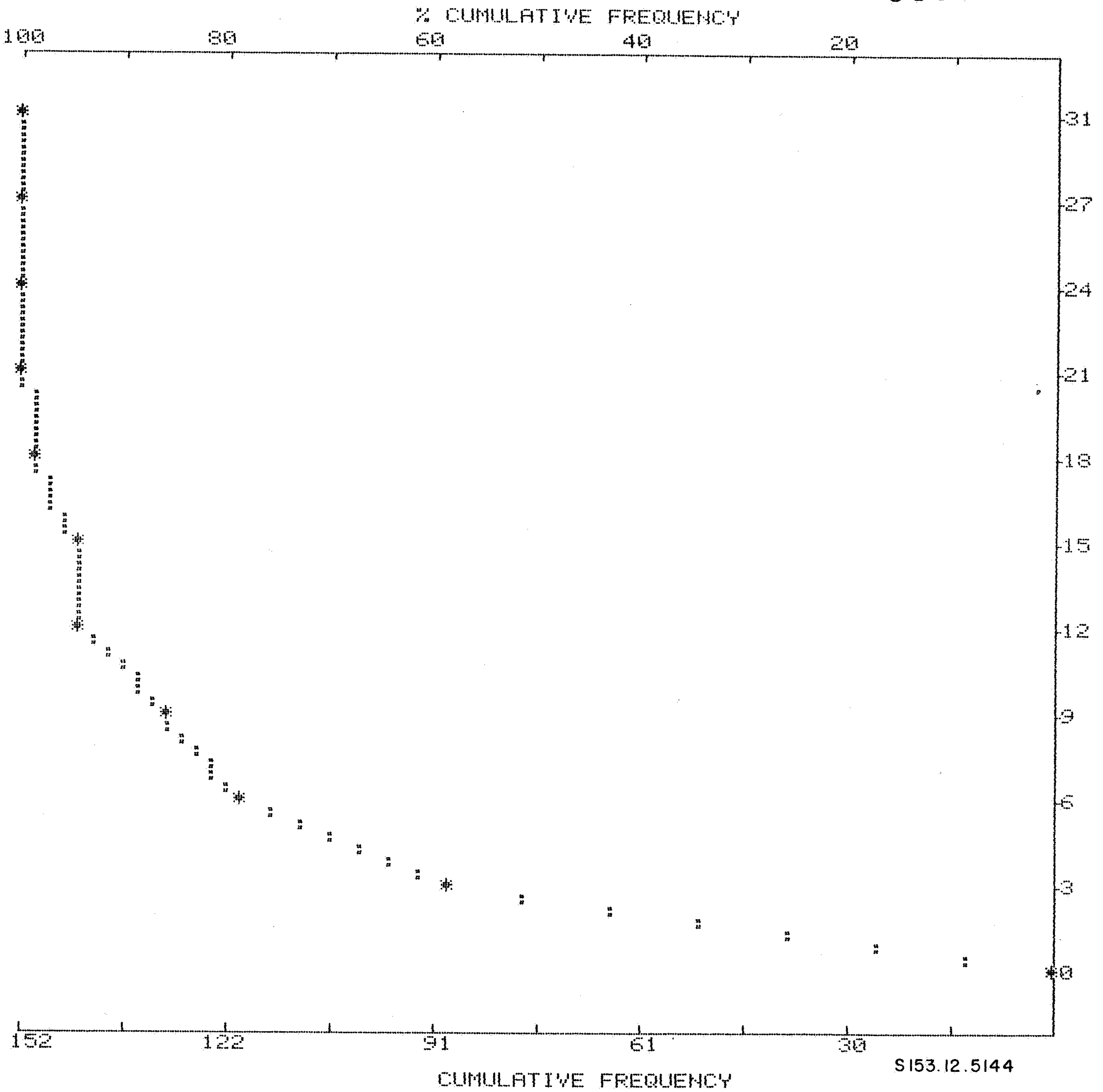
TUMBY BAY

FREQUENCY HISTOGRAM FOR U R.A.B. PROGRAM

To Accompany Report Nº WY 82.15   Figure 22

CUMULATIVE FREQUENCY PLOT for U/401

000402



S153.12.5144

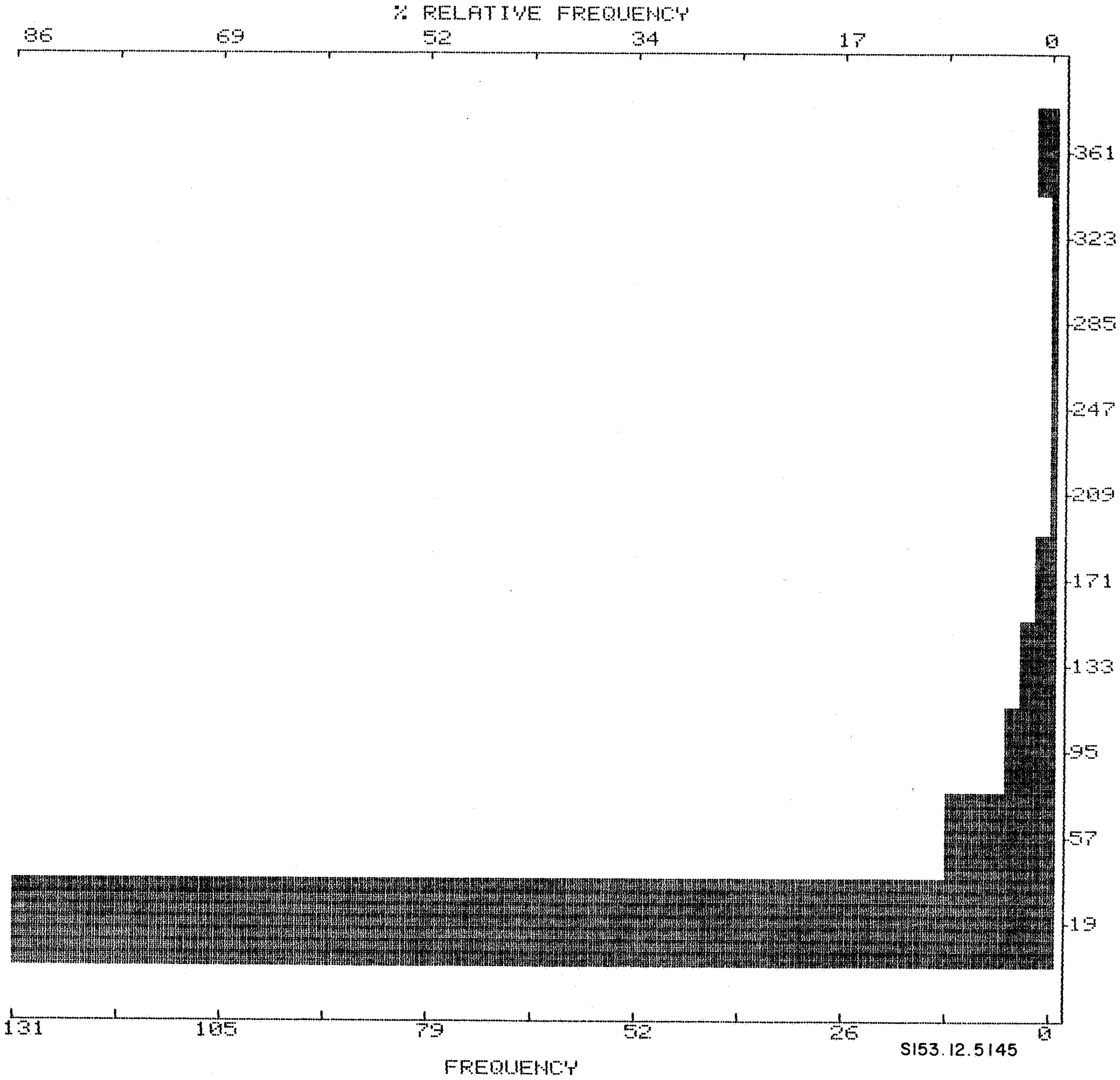
TUMBY BAY

CUMULATIVE FREQUENCY FOR U R.A.B, PROGRAM

To Accompany Report Nº WY82.15 Figure 23

HISTOGRAM for Th/401

000403



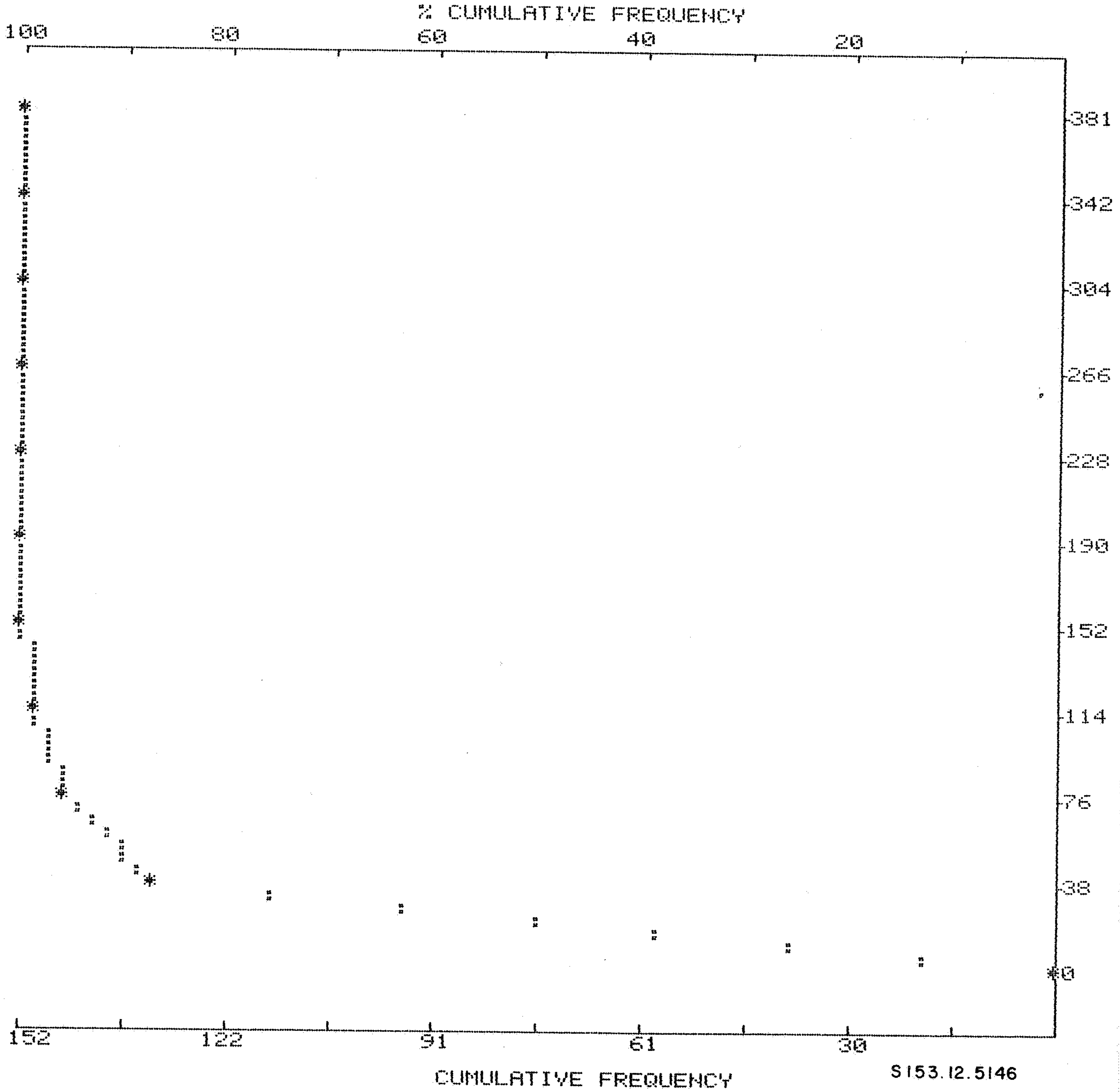
TUMBY BAY

FREQUENCY HISTOGRAM FOR Th R.A.B. PROGRAM

To Accompany Report Nº WY82.15 Figure 24

CUMULATIVE FREQUENCY PLOT for Th/401

000404



S153.12.5146

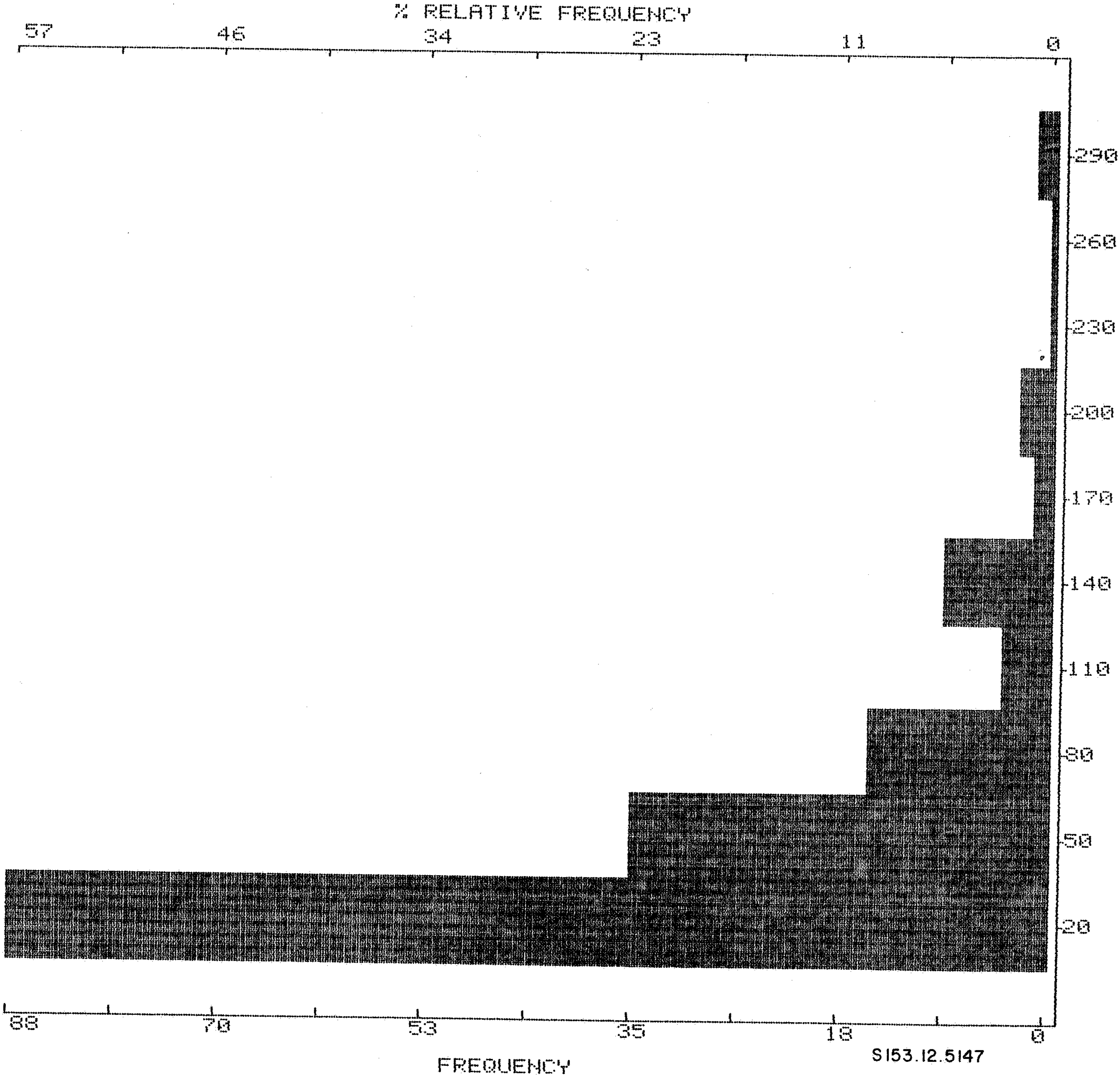
TUMBY BAY

CUMULATIVE FREQUENCY FOR Th R.A.B. PROGRAM

To Accompany Report N° WY82.15 Figure 25

HISTOGRAM for Cu/101

000405



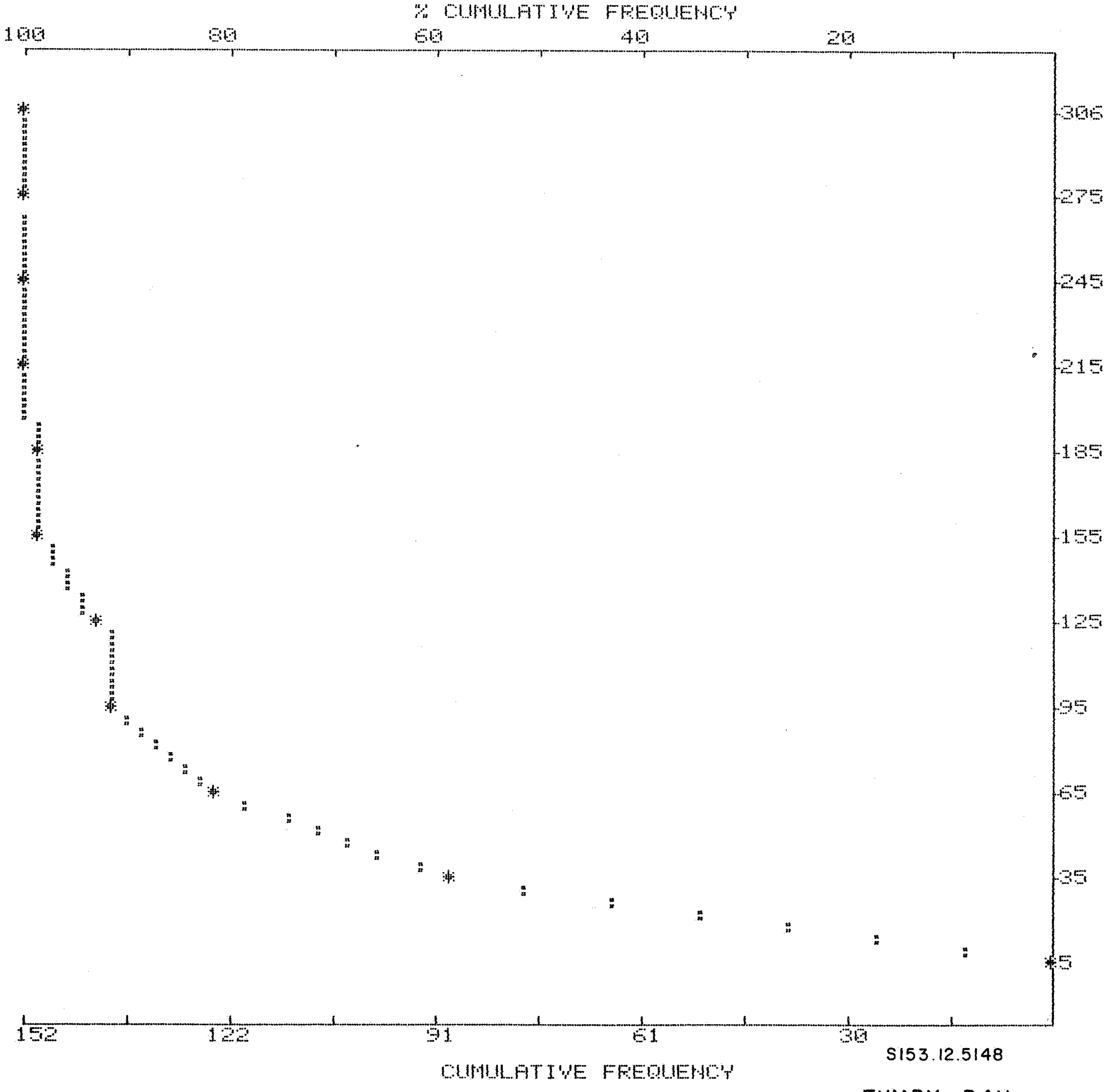
TUMBY BAY

FREQUENCY HISTOGRAM FOR Cu R.A.B PROGRAM

To Accompany Report Nº WY82.15 Figure 26

CUMULATIVE FREQUENCY PLOT for Cu/101

000406



S153.12.5148

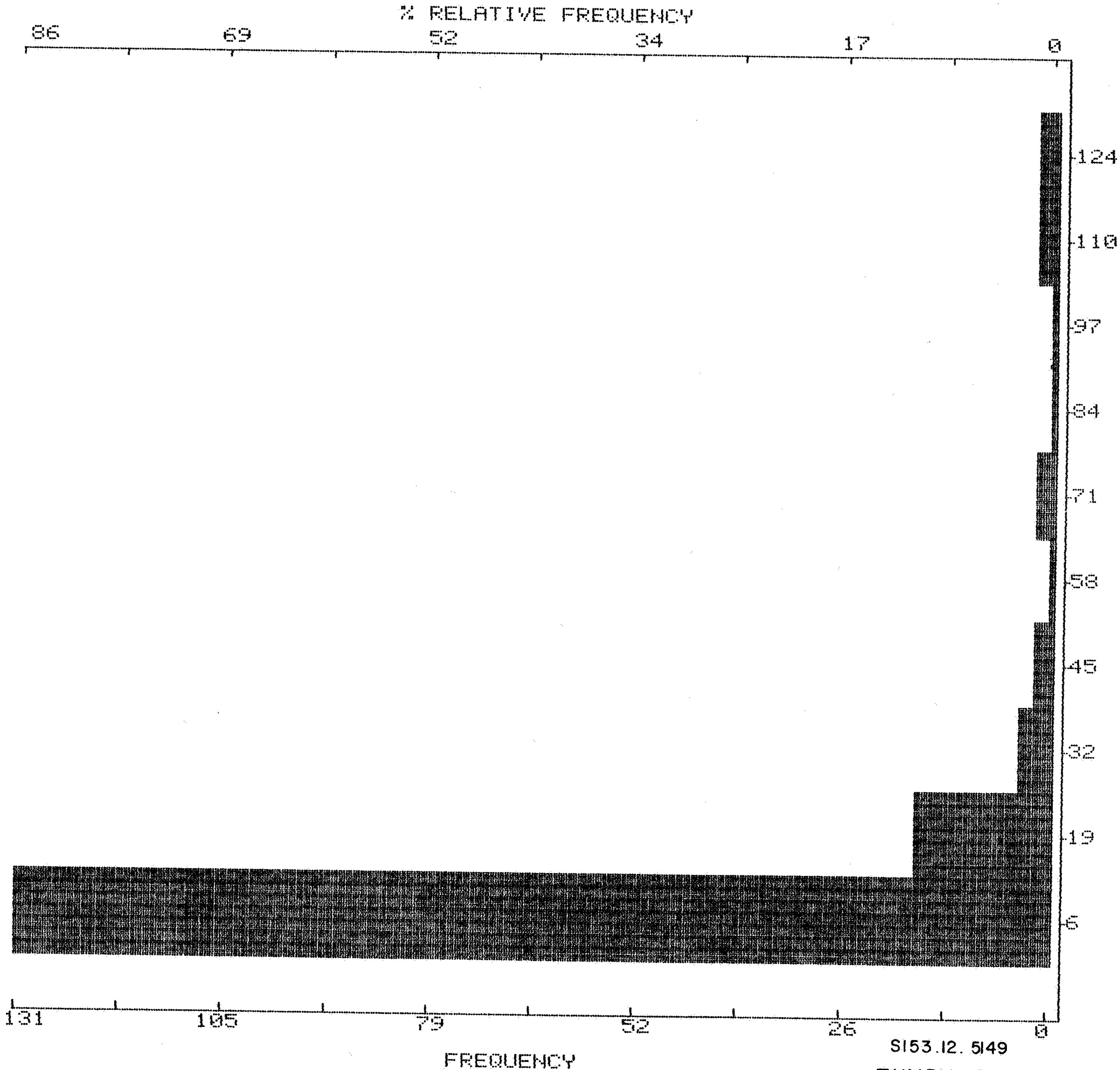
TUMBY BAY

CUMULATIVE FREQUENCY FOR Cu R.A.B. PROGRAM

To Accompany Report N° WY82.15 . Figure 27

HISTOGRAM for Pb/101

000407



S153.12. 5149

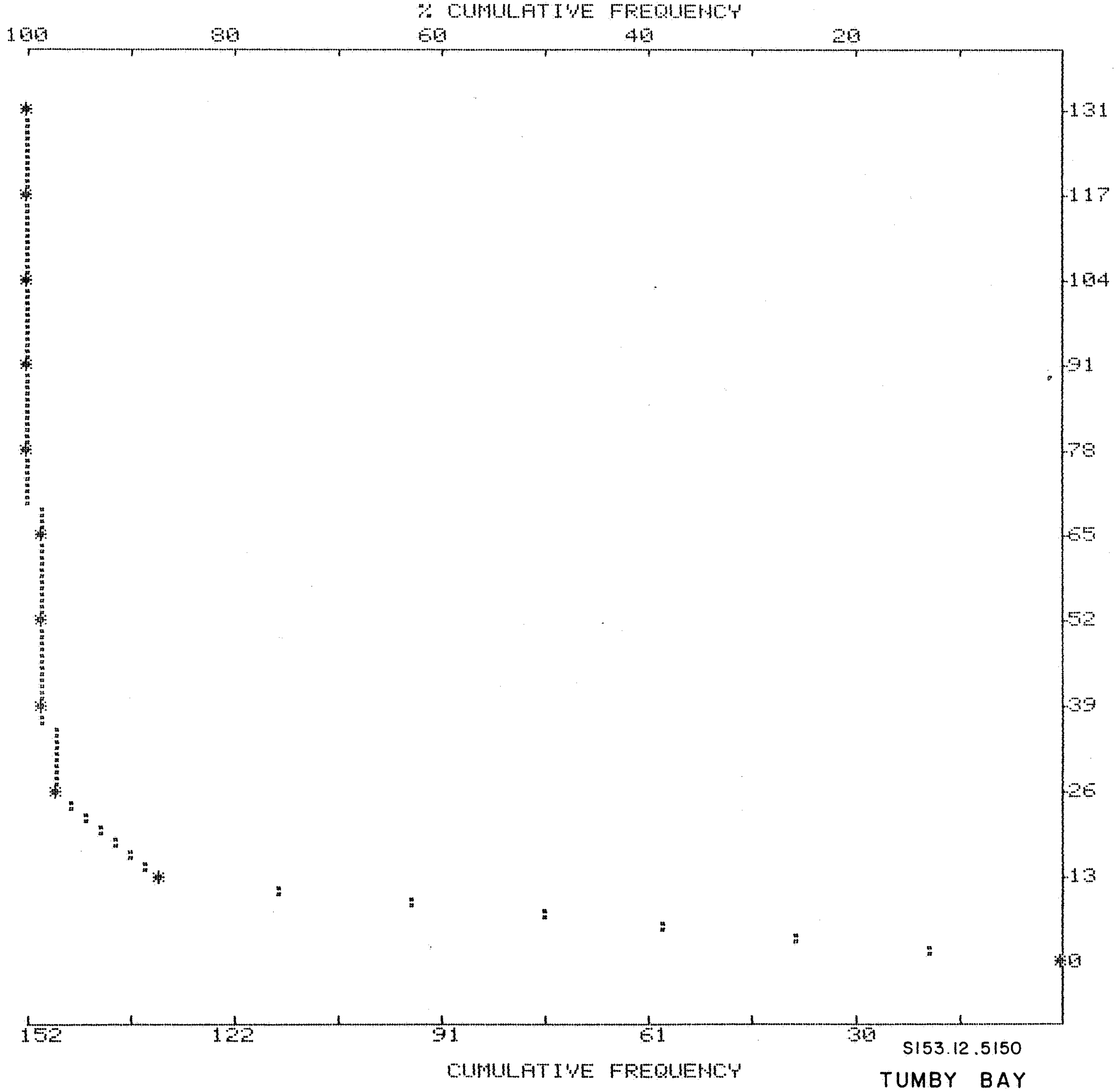
TUMBY BAY

FREQUENCY HISTOGRAM FOR Pb R.A.B. PROGRAM

To Accompany Report Nº WY 82.15 *Figure 28*

CUMULATIVE FREQUENCY PLOT for Pb/101

000408



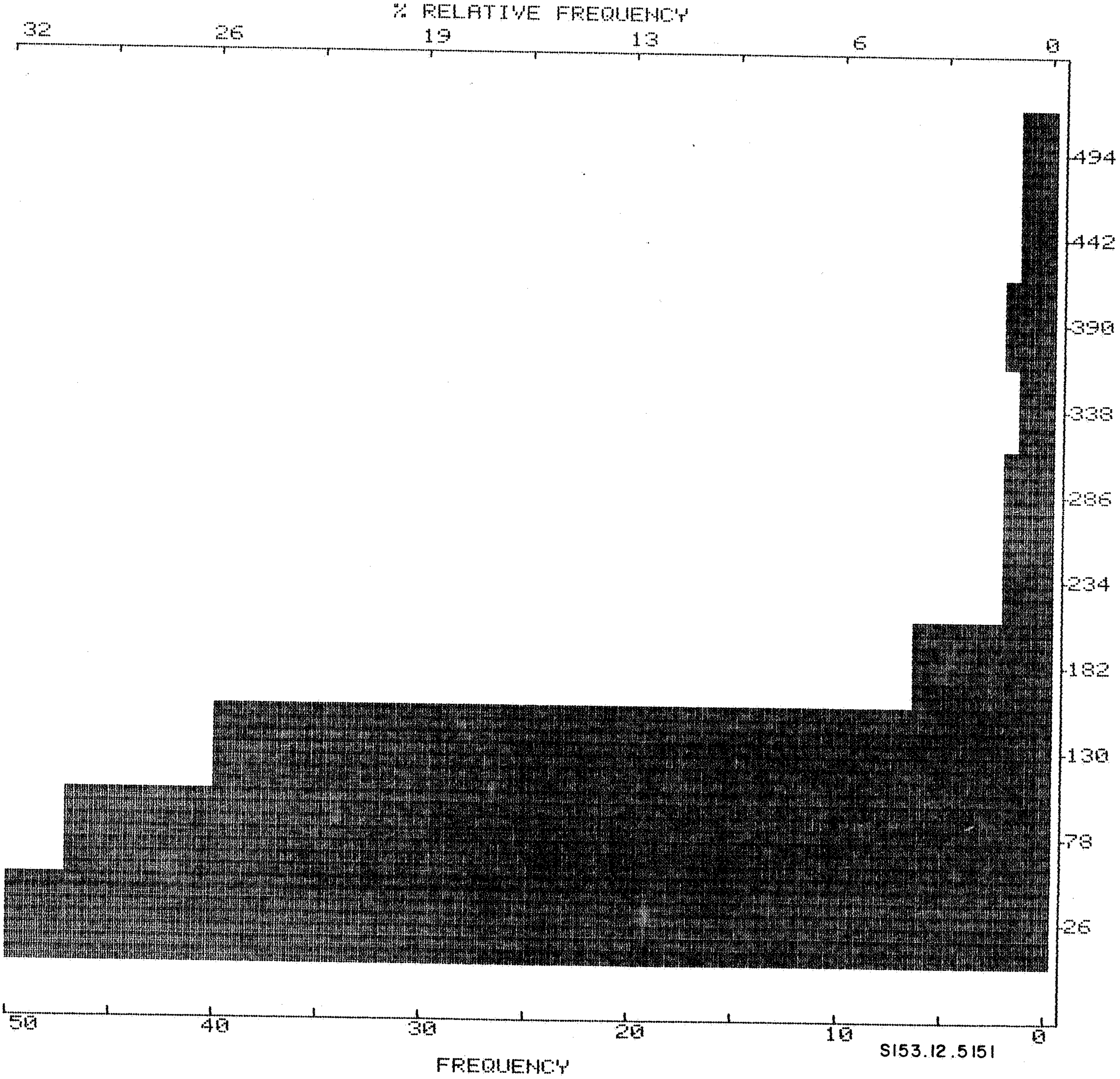
S153.12.5150

TUMBY BAY

CUMULATIVE FREQUENCY FOR Pb R.A.B. PROGRAM

To Accompany Report Nº WY82.15 Figure 29

HISTOGRAM for Zn/101



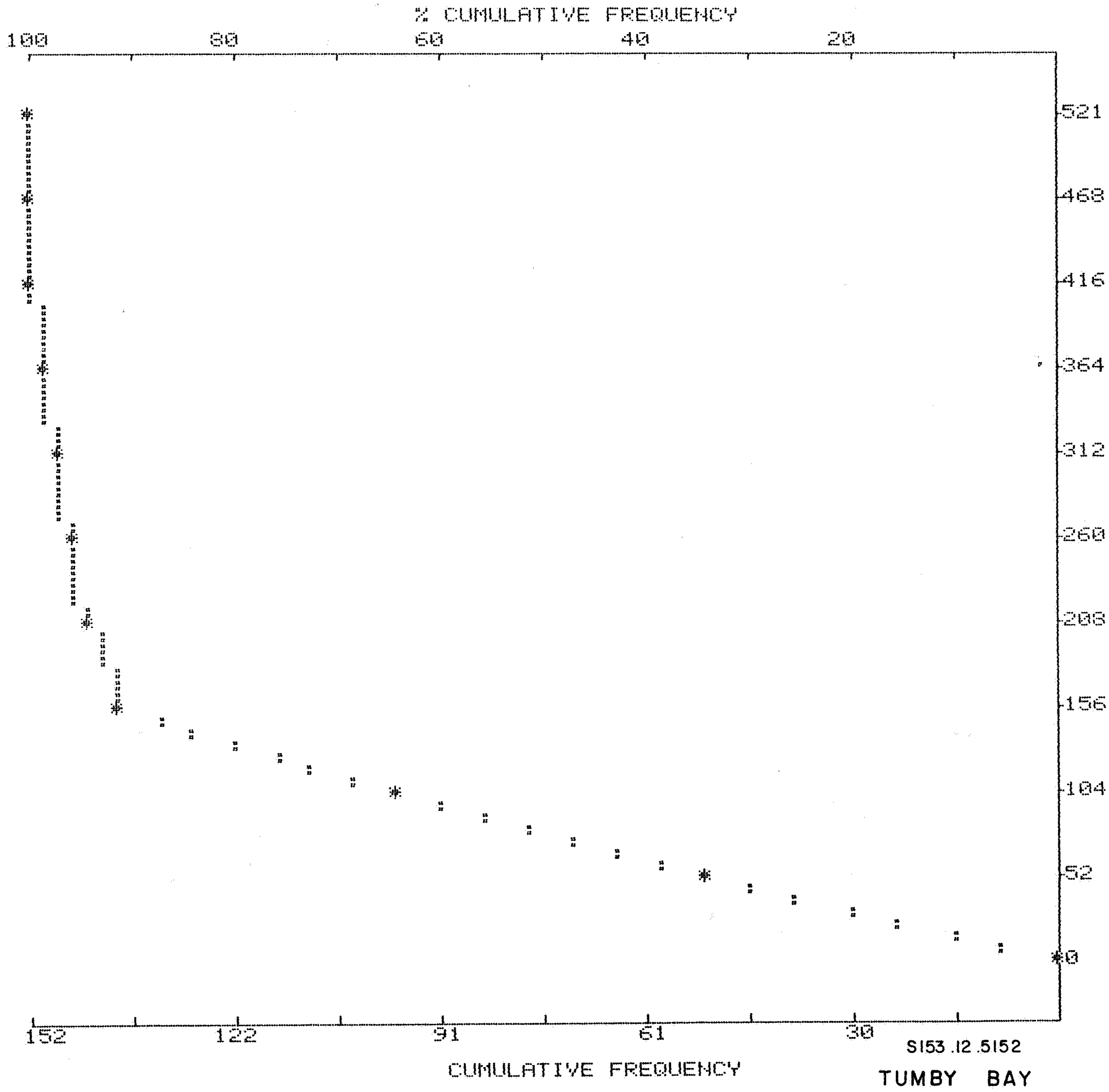
TUMBY BAY

FREQUENCY HISTOGRAM FOR Zn R.A.B. PROGRAM

To Accompany Report Nº WY 82.15 - Figure 30

CUMULATIVE FREQUENCY PLOT for Zn/101

000410



S153 .12 .5152

TUMBY BAY

CUMULATIVE FREQUENCY FOR Zn R.A.B. PROGRAM

To Accompany Report Nº WY 82.15 Figure 31

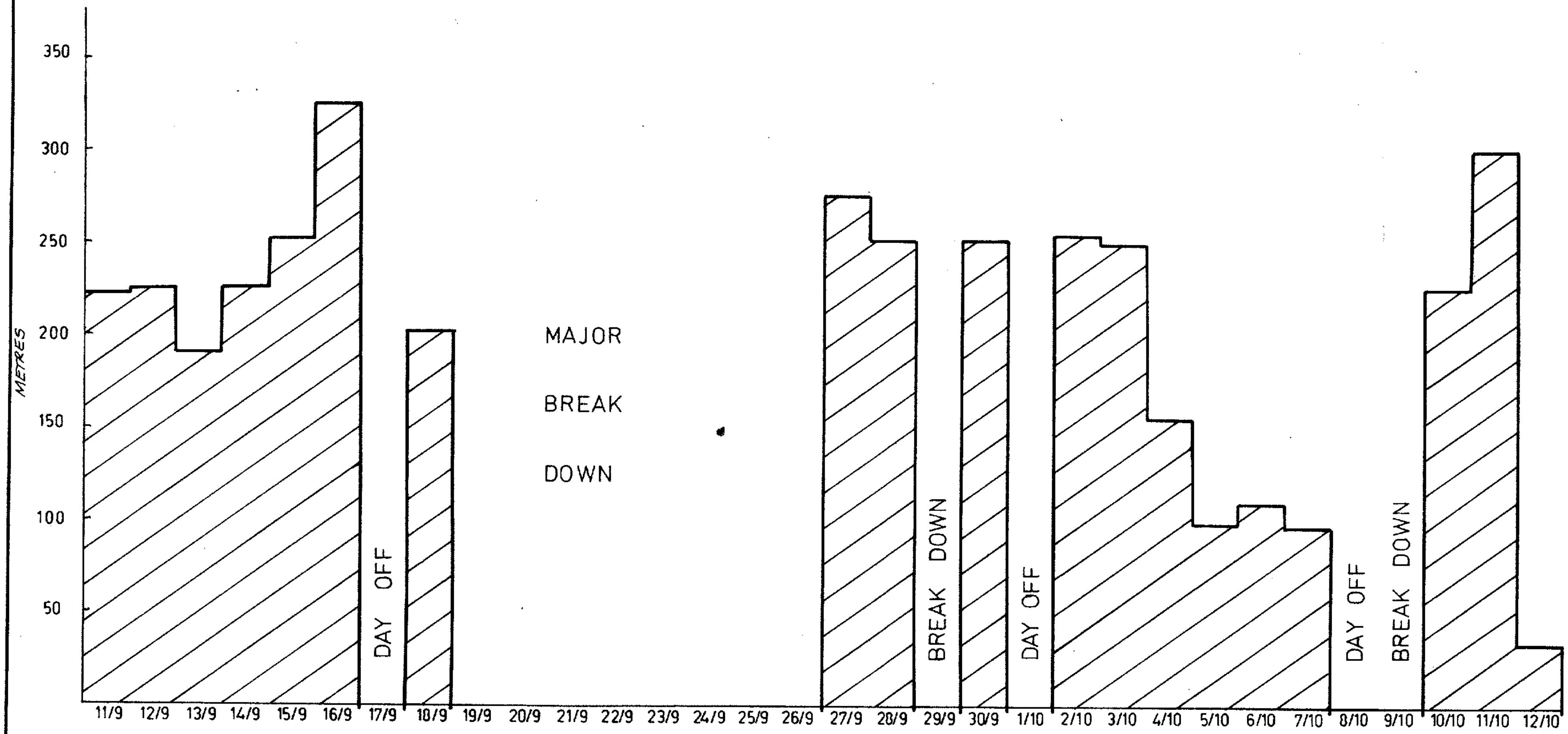


Figure 32

TUMBY BAY

DAILY DRILLING SUMMARY

To Accompany Report Nº WY82. 15

S153. 12. 5163

0004111

TABLE 11

RAB DRILL HOLE LOCATIONS

AREA	DATE	HOLE NO.	COORDS.	RAB METERAGE
KOPPIO 1	11/9/82	KA1	6192210N 573590E	36
		KA2	6192190N 573525E	42
		KA3	6192160N 573475E	46
		KA4	6192250N 573425E	53
		KA5	6192400N 573375E	42
	12/9/82	KA6	6192400N 573260E	32
		KA7	6192400N 573150E	30
		KA8	6192400N 573100E	12
		KA9	6192400N 573020E	15
		KA10	6192460N 572960E	17
		KA11	6192390N 572900E	16
		KA12	6192350N 572800E	13
		KA13	6192340N 572700E	13
		KA14	6192280N 572600E	15
		KA15	6192250N 572440E	10
		KA16	6193500N 573540E	22
		KA17	6193500N 573420E	12
		KA18	6193450N 573340E	15
	13/9/82	KA19	6193400N 573200E	12
		KA20	6193360N 573160E	16
		KA21	6193340N 573100E	21
		KA22	6193300N 573050E	22
		KA23	6193280N 573000E	7
		KA24	6193280N 572950E	6
		KA25	6193250N 572850E	12
		KA26	6193250N 572700E	3
		KA27	6193200N 572620E	13
		KA28	6193180N 572500E	2.5
		KA29	6193050N 572380E	9
		KA30	6192900N 572250E	23
		KA31	6192300N 573400E	34.5
	14/9/82	KA32	6192300N 573320E	55
		KA33	6192300N 573280E	40
		KA34	6192300N 573240E	61
		KA35	6192200N 573300E	57
		KA36	6192400N 573200E	29

000414

AREA	DATE	HOLE NO.	COORDS.	RAB METERAGE
PILLAWORTA	18/9/82	PIL21	6195130N 585550E	16
	27/9/82	PIL22	6194825N 587710E	16.5
		PIL23	6194950N 587600E	28
		PIL24	6195050N 587500E	36.5
		PIL25	6195100N 587425E	78
		PIL26	6195175N 587350E	31
		PIL27	6195225N 587275E	37
		PIL28	6195300N 587250E	50
	28/9/82	PIL29	6195360N 587200E	78
		PIL30	6195375N 587125E	39
		PIL31	6195450N 587075E	78
		PIL32	6195480N 587000E	46
		PIL33	6195500N 586925E	11
	29-30/9/82	PIL34	6195550N 586875E	13
		PIL35	6195600N 586800E	63
		PIL36	6195590N 586850E	25.5
		PIL37	6195625N 586700E	84
		PIL38	6195700N 586660E	69
	2/10/82	PIL39	6195700N 586625E	76
		PIL40	6195750N 586600E	38
WHITE FLAT	2/10/82	WHF1	6180680N 577180E	73
		WHF2	6180680N 577140E	38
		WHF3	6180680N 577060E	18
		WHF4	6180700N 577000E	16
	3/10/82	WHF5	6180720N 576940E	22
		WHF6	6180520N 577160E	33
		WHF7	6180520N 577110E	25
		WHF8	6180510N 577030E	63
		WHF9	6180510N 576990E	21
		WHF10	6180520N 576910E	15.5
		WHF11	6180600N 576820E	41
		WHF12	6180400N 577220E	7
		WHF13	6180420N 577160E	22.5
	4/10/82	WHF14	6180360N 577090E	14.5
		WHF15	6180360N 577040E	32
		WHF16	6180380N 576960E	11.5
		WHF17	6180480N 576900E	18
		WHF18	6180380N 576840E	14
		WHF19	6180400N 576800E	6.5

000415

AREA	DATE	HOLE NO.	COORDS.	RAB METERAGE
WHITE FLAT	4/10/82	WHF20	6180400N 576760E	13
		WHF21	6180380N 576700E	21
MARBLE RANGE		MR1	6194600N 550625E	30
	5/10/82	MR2	6195075N 550650E	60
		MR3	6193675N 550350E	19
		MR4	6189475N 550350E	18
	6/10/82	MR5	6183080N 546140E	14 + 1 m. core
		MR6	6183240N 545520E	56.5 + 1 m. core
		MR7	6183280N 544950E	13
		MR8	6183260N 545260E	16 + 1.0 m. core
		MR9	6183640N 546180E	12 + 1 m. core
		MR10	6183740N 546600E	7 + 1 m. core
	7/10/82	MR11	6182840N 546620E	12.5 + 1.5 m. core
		MR12	6184520N 546270E	78
	9-10/10/82	MR13	6184540N 546640E	26
		MR14	6184780N 547700E	13
		MR15	6186500N 548420E	11
KOPPIO 3		KOP1	6190700N 583750E	60
		KOP2	6190675N 583850E	15
		KOP3	6190600N 583975E	12
		KOP4	6190600N 584100E	18
		KOP5	6190550N 584250E	19.5
		KOP6	6190475N 584400E	6.5
		KOP7	6190425N 584500E	3
		KOP8	6190400N 584575E	9
		KOP9	6190375N 584675E	34
	11/10/82	KOP10	6190350N 584775E	9
		KOP11	6190000N 584300E	5
		KOP12	6190000N 583425E	9
		KOP13	6190000N 583550E	66
		KOP14	6190000N 583700E	78
		KOP15	6189875N 583800E	12
		KOP16	6189600N 583875E	14
		KOP17	6189600N 583660E	18
		KOP18	6189575N 583175E	30
		KOP19	6189500N 583375E	6
		KOP20	6187950N 581650E	54
	12/10/82	KOP21	6187675N 581900E	5
		KOP22	6187650N 582050E	9
		KOP23	6187650N 582200E	23

13

AREA	DATE	HOLE NO.	COORDS.	RAB METERAGE
KOPPIO 2	14/9/82	KB1	6189400N 572900E	22
		KB2	6189400N 572800E	13
	15/9/82	KB3	6189400N 572720E	12
		KB4	6189400N 572600E	4
		KB5	6189400N 572475E	4
		KB6	6189420N 572400E	13
		KB7	6189430N 572270E	8.5
		KB8	6189400N 572175E	13
		KB9	6189575N 572975E	22
		KB10	6189600N 572900E	12
		KB11	6189600N 572840E	10
		KB12	6189600N 572750E	10
		KB13	6189700N 572620E	3
		KB14	6189740N 572520E	7
		KB15	6189790N 572425E	2
		KB16	6189940N 572420E	8
		KB17	6189750N 572278E	7.5
		KB18	6190025N 572150E	32
PILLAWORTA		PIL1	6194250N 586900E	2.5
		PIL2	6194300N 586800E	2
		PIL3	6194275N 586850E	3
		PIL4	6194350N 586725E	4
		PIL5	6194400N 586675E	75
	16/9/82	PIL6	6194450N 586600E	47
		PIL7	6194500N 586475E	7
		PIL8	6194680N 586360E	78
		PIL9	6194560N 586440E	54
		PIL10	6194625N 586310E	30
		PIL11	6194700N 586275E	28
		PIL12	6194725N 586210E	27
		PIL13	6194775N 586175E	5
		PIL14	6194800N 586150E	4
		PIL15	6194800N 586060E	7
		PIL16	6194875N 585975E	38
	18/9/82	PIL17	6194900N 585875E	36
		PIL18	6194950N 585800E	74
		PIL19	6195000N 585675E	49
		PIL20	6195025N 585550E	30

000416

TABLE 12

DAILY DRILLING PERFORMANCE

DAY	RAB	HAMMER	HOURS	CORE	HOURS
11/9	219		5.51		
12/9	222		5.32		
13/9	181		4.83		
14/9	277		4.47		
15/9	254.5		5.03		
16/9	325		5.62		
18/9	205		5.35		
27/9	277		5.73		
28/9	252		5.28		
30/9	254.5		5.78		
2/10	259		5.87		
3/10	250		5.25		
4/10	160.5		4.28		
5/10	97		5.17		
6/10	113.5	5	3.10	4.5	5.00
7/10	90.5		3.15	2.0	2.00
10/10	227		4.31		
11/10	301		5.45		
12/10	37		0.78		
TOTALS	4002.5	5	90.28	6.5	7.00

Metre/Drilling Day = 210.9

Metre/all days = 125.2

Metre/Drill hour = 44.39 RAB

TOTAL DRILLING COST

$18,381.30 ≈ $4.59/m

TABLE 13

ROCK TYPE DESCRIPTIONS

AREA 1	HOLE NO.	DESCRIPTION
KOPPIO 1	KA 1	Quartz, muscovite gneiss.
	KA 2	Quartz, muscovite gneiss.
	KA 3	Plagioclase quartz granite.
	KA 4	Plagioclase quartz biotite garnet granite.
	KA 5	Plagioclase quartz muscovite gneiss.
	KA 6	Plagioclase quartz biotite granite.
	KA 7	Muscovite garnet feldspar quartz schist.
	KA 8	Quartz plagioclase muscovite granite.
	KA 9	Plagioclase quartz granite.
	KA 10	Biotite feldspar quartz schist.
	KA 11	Chert - Fe oxide. (B.I.F.)
	KA 12	Quartz plagioclase granite.
	KA 13	Biotite schist + quartz plagioclase, granite.
	KA 14	Amphibolite.
	KA 15	Amphibolite.
	KA 16	Chert - Fe oxides (B.I.F.)
	KA 17	Quartz plagioclase gneiss.
	KA 18	K-feldspar quartz hornblende gneiss.
	KA 19	Not completed.
	KA 21	K-feldspar hornblende quartz granite
	KA 22	K-feldspar hornblende gneiss.
	KA 23	K-feldspar quartz granite.
	KA 24	K-feldspar quartz granite.
	KA 25	Quartz biotite plagioclase gneiss.
	KA 26	Quartz plagioclase granite.
	KA 27	Chert - Fe oxide (B.I.F.)
	KA 28	Quartz-plagioclase granite.
	KA 29	Quartz-plagioclase biotite gneiss.
	KA 30	Quartz-plagioclase granite.
	KA 31	Quartz biotite plagioclase gneiss.
	KA 32	Biotite schist/quartz plagioclase granite.

000418

TABLE 13

KOPPIO 1	HOLE NO.	DESCRIPTION
	KA 33	Quartz biotite schist/quartz plagioclase granite.
	KA 34	Garnet diopside/olivene marble?
	KA 35	Quartz plagioclase biotite gneiss.
	KA 36	Chert (B.I.F.)
AREA 2		
KOPPIO 2	KB 1	Chert (B.I.F.)
	KB 2	Quartz plagioclase microgranite.
	KB 3	Biotite garnet quartz feldspar schist.
	KB 4	Chert (B.I.F.)
	KB 5	Amphibolite.
	KB 6	Biotite feldspar quartz gneiss.
	KB 7	Biotite schist/plagioclase quartz granite.
	KB 8	Amphibolite.
	KB 9	Graphite schist minor chert.
	KB 10	Biotite garnet feldspar quartz schist.
	KB 11	Biotite schist/quartz plagioclase granite.
	KB 12	Chert (B.I.F.)
	KB 13	Chert (B.I.F.)
	KB 14	Chert (B.I.F.)
	KB 15	Quartz feldspar biotite gneiss.
	KB 16	Amphibolite.
	KB 17	Amphibolite.
	KB 18	Biotite quartz feldspar gneiss.
AREA 3		
PILLAWORTA	PIL 1	Contact dolomite over Lincoln Complex gneiss.
	PIL 2	Quartz feldspar biotite $\pm$ calcite micro gneiss.
	PIL 3	Carbonate facies B.I.F.
	PIL 4	Chert (B.I.F.)
	PIL 5	Chert (B.I.F.)
	PIL 6	Chert (B.I.F.)
	PIL 7	Chert (B.I.F.)
	PIL 8	Ferruginous dolomite schist.
	PIL 9	Ferruginous biotite garnet biotite schist.
	PIL 10	Chert (B.I.F.)

TABLE 13

000419

AREA	HOLE NO.	DESCRIPTION
AREA 3 PILLAWORTA	PIL 11	Chert (B.I.F.)
	PIL 12	Feldspar biotite schist + chert.
	PIL 13	Quartz plagioclase granite.
	PIL 14	Amphibolite.
	PIL 15	Amphibolite.
	PIL 16	Ferruginous feldspar biotite quartz micro gneiss.
	PIL 17	Ferruginous feldspar biotite quartz schist.
	PIL 18	Biotite schist + quartz feldspar granite interbeds.
	PIL 19	Graphite schist.
	PIL 20	Dolomite graphite schist.
	PIL 21	Feldspar biotite quartz micro gneiss.
	PIL 22	Quartz biotite feldspar gneiss.
	PIL 23	Dolomite biotite schist.
	PIL 24	Graphite dolomite schist.
	PIL 25	Dolomite graphite schist.
	PIL 26	Dolomite biotite schist.
	PIL 27	Talc graphite schist.
	PIL 28	Chert - Fe oxide (B.I.F.)
	PIL 29	Biotite garnet feldspar ± chert schist.
	PIL 30	Ferruginous muscovite schist.
	PIL 31	Biotite feldspar garnet schist.
	PIL 32	Quartz feldspar biotite gneiss.
	PIL 33	Jaspilite.
	PIL 34	Feldspar quartz biotite gneiss.
	PIL 35	Graphite schist.
	PIL 36	Muscovite schist.
	PIL 37	Quartz plagioclase granite.
	PIL 38	Quartz plagioclase granite.
	PIL 39	Quartzite.
	PIL 40	Quartz feldspar granite.
AREA 4 WHITE FLAT	WHF 1	Dolomite.
	WHF 2	Pyrite/phyrrolite rich biotite schist.
	WHF 3	Chert (B.I.F.)
	WHF 4	Feldspar quartz biotite gneiss.
	WHF 5	Chert and Jaspilite (B.I.F.)

000420

TABLE 13

AREA	HOLE NO.	DESCRIPTION
AREA 4 WHITE FLAT	WHF 6	Chert and diopside dolomite schist.
	WHF 7	Plagioclase quartz tourmaline granite.
	WHF 8	Serpentine dolomite.
	WHF 9	Quartzite.
	WHF 10	Ferruginous chloritic gneiss.
	WHF 11	Chlorite sericite schist.
	WHF 12	Green jade and L/C gneiss contact?
	WHF 13	Not to basement.
	WHF 14	Mylonite.
	WHF 15	Quartz plagioclase biotite gneiss.
	WHF 16	Quartz plagioclase biotite gneiss.
	WHF 17	Brecciated quartzite.
	WHF 18	Chert (B.I.F.)
	WHF 19	Plagioclase quartz gneiss.
	WHF 20	Quartzite.
	WHF 21	Muscovite feldspar quartz gneiss.
AREA 5 MARBLE RANGE	MR 1	Not to basement.
	MR 2	Not to basement.
	MR 3	Not to basement.
	MR 4	Not to basement.
	MR 5	Sericitic phylite slate.
	MR 6	Muscovite sericite schist.
	MR 7	Quartz feldspar gneiss (Sleaford).
	MR 8	Quartz feldspar gneiss (Sleaford).
	MR 9	Muscovite sericite phylite schist.
	MR 10	Warrow Quartzite.
	MR 11	Muscovite phylite schist.
	MR 12	Not to basement.
	MR 13	Biotite quartz schist over quartzite
	MR 14	Quartz feldspar garnet muscovite gneiss (Sleaford).
	MR 15	Quartz feldspar biotite gneiss (Sleaford).
AREA 6 KOPPIO 3	KOP 1	Muscovite feldspar graphite schist.
	KOP 2	Quartz feldspar garnet biotite gneiss.
	KOP 3	Biotite garnet feldspar quartz schist.
	KOP 4	Muscovite quartz schist.

TABLE 13

AREA 6	HOLE NO.	DESCRIPTION
KOPPIO 3	KOP 5	Quartz muscovite feldspar gneiss.
	KOP 6	Deformed quartzite.
	KOP 7	Quartz feldspar micro gneiss.
	KOP 8	Quartz feldspar micro gneiss.
	KOP 9	Mylonite.
	KOP 10	Biotite quartz feldspar gneiss.
	KOP 11	Graphite schist + biotite quartz gneiss.
	KOP 12	Muscovite schist + biotite quartz gneiss.
	KOP 13	Porous hedenburgite feldspar schist.
	KOP 14	Chlorite feldspar quartz schist.
	KOP 15	Quartz K feldspar gneiss.
	KOP 16	K - feldspar quartz gneiss.
	KOP 17	Fe oxide + biotite feldspar quartz gneiss.
	KOP 18	Dolomitic muscovite schist.
	KOP 19	Mylonite.
	KOP 20	Chert + feldspar biotite schist.
	KOP 21	Deformed quartzite.
	KOP 22	K - feldspar quartz gneiss.
	KOP 23	Mylonite.

4. DISCUSSION

The work carried out during the period covering this report has, as far as possible, been described in chronological order to show the progress of the programme as results were obtained and the different variations brought to it accordingly to these results.

The geophysical review by B. Dockery did not produce a great deal of useful information although this is mainly due to the paucity of data resulting from the large line spacing flown (800 and 1 600m.). The large linear magnetic feature attributed to an ultra mafic intrusive or possibly a banded iron formation actually lies approximately 5 km. offshore. It can be related to a regional magnetic feature which was drilled by Pine Vale Mines in 1970 and ascribed to magnetite rich phyllites. The main feature of the interpretation was the postulated intersection of three major fault zones in the TB17 area as this could have provided a suitable structural trap for mineralisation. Other such structures could well exist within the area but lack of data definition precluded their location by geophysical means.

As prelude to the more intensive ground prospecting programme, a car scintillometer survey was run to provide general background data as a supplement to the airborne survey and to develop a "feel" of the area in general.

Predictably, the results reflected the airborne survey and also revealed the first doubts about its effectiveness, due to the extensive Tertiary laterites. The latter commonly range up to 500 cps SPP2 because of the amount of thorium probably contained in residual heavy minerals.

The condensed ground work commenced with checking on the ground of the 86 analog chart anomalies. Although none of the selected ones could be called good anomalies, it was thought the large line spacing was to blame and at least some of them would be "edge" effects from anomalies between the lines as the survey covered only 12.5% of the area.

As can be observed from the results, this programme was unsuccessful in locating any uranium anomalies. It also raised doubts about the results of a previous prospecting programme performed in 1980 and the accuracy of the geological map available then.

Because of the suggested unreliability of the previous work, it was decided to re-prospect the high background areas defined from the uranium channel contour map in order to relocate the high readings shown on our maps and try relating them to results obtained.

For this purpose, four field assistants were assigned to prospect these areas on approximately 50-100 metre line spacing under the supervision of a geologist. None of the previously reported readings was relocated, even in tightly defined areas, and geological information gathered at that time disagreed with the existent geology map.

The only significant uranium anomaly located during this extensive programme was situated at TB17 in a ferruginous laterite capping, next to the previous geochemical drilling grid.

The lack of complementary results and the growing contradictory geological evidence suggested then the need for review of all data held by the S.A.D.M.E. and AFMECO. This reconsideration provided useful geological information, particularly on structure from the B.I.F. investigations and enabled AFMECO map to be modified, thus indicating the areas which would give most details for a mapping programme. Data was also collected on the basement topography and structure in the western half of the area, giving a general idea of the overall structure for the whole area.

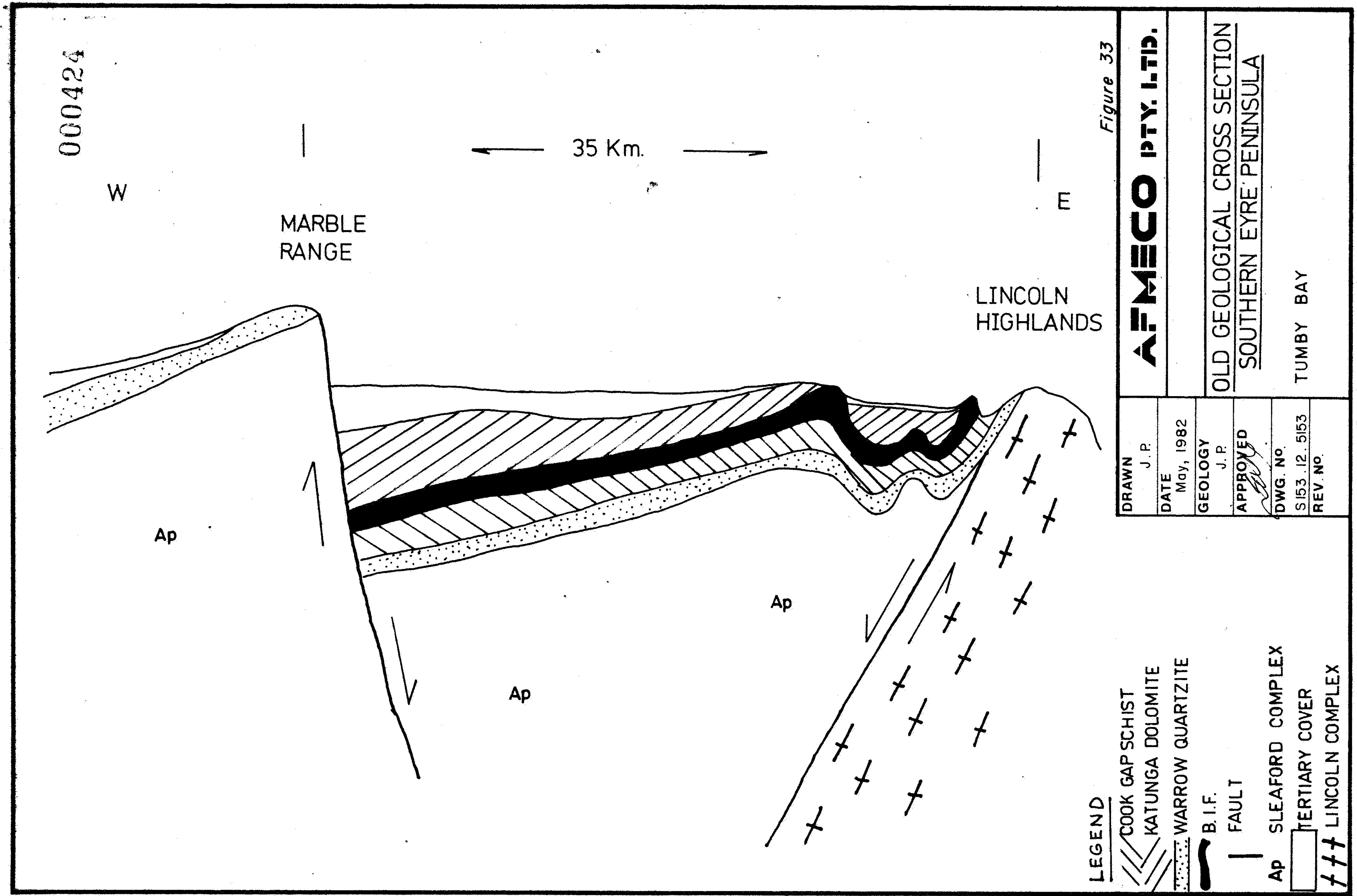
It was decided to open the anomaly at TB17 in two trenches to determine the origin of the uranium and see if this could apply to other areas within the E.L. In both trenches the uranium appeared to have been trapped in iron and manganese oxides in minor faults or joints and is a secondary enrichment of uranium leached from the surrounding rocks during the deep Tertiary weathering.

A regional mapping programme was undertaken, firstly to correct the geological map in Barrett (Report WY 80.7) and secondly to provide sufficient structural, stratigraphic details of selected areas for follow-up of geochemical sampling. The resultant map differs significantly from the previous one as it geologically divides the area into two separate structural and metamorphic areas, especially when the data accumulated from the open file research is incorporated into it.

In the original map, the Hutchison Group apparently disappears to the west under the Tertiary sediments and is faulted out against the eastern side of Marble Range, so forming a large synclinal basin across the whole width of the area (as is shown in a diagramatic cross section in Figure 33). This interpretation is at odds with the open file data, the magnetic interpretation and also the geological data gathered in the mapping programme. The mapping of Sleaford Complex gneisses, Warrow quartzite and graphitic schists in the central portion of the E.L., previously mapped entirely as biotite schist, requires major modification to the basic geology of the area.

The first modification arises from the identification of a "ridge" of Sleaford Complex gneisses striking NNE to the east of the middle of the area. This ridge appears to be the most easterly expression of non-reworked Sleaford Complex rocks and marks the western boundary of both the higher metamorphic grade Hutchison Group rocks and the Lincoln Complex. In this context, the Lincoln Complex is taken to be reworked basement, i.e. Sleaford Complex, with associated plutons: the Donnington Granitoid Suite. Bearing this in mind, there has been a major uplift of the Lincoln Complex to the east along the mylonite zone and some assimilation of Hutchison Group rocks but the contact between the two units is in no way clear and distinct and varies in style throughout its extent.

Uranerz and Endeavour seismic and drilling programmes (1972-1975) determined a paleo valley in the mid-west of the area, showing an associated major fault corresponding to the boundary marked on the geophysical interpretation between the Sleaford and the Linclon Complexes established for that area.


000424
W
MARBLE RANGE
35 Km.
E
LINCOLN HIGHLANDS
Ap
Ap
Ap
LEGEND
COOK GAP SCHIST
KATUNGA DOLOMITE
WARROW QUARTZITE
B.I.F.
FAULT
Ap SLEAFORD COMPLEX
TERTIARY COVER
LINCOLN COMPLEX
Figure 33
AFMECO PTY. LTD.
OLD GEOLOGICAL CROSS SECTION
SOUTHERN EYRE PENINSULA
TUMBY BAY
DRAWN J.P.
DATE May, 1982
GEOLOGY J.P.
APPROVED
DWG. No. S153.12.5153
REV. No.
To Accompany Report No WY82.15

This is now undoubtedly incorrect; the magnetic feature reflects the major fault in the area and in this instance, the Lincoln Complex should be replaced with Sleaford Complex.

From the available evidence, the eastern Hutchison Group has been confirmed to be contained in a tightly folded synclinorium with much unit repetition due to isoclinal folding. For this ascertainment, we must also take into account the paucity of the outcrop and the lack of field data.

The Warrow Quartzite forms the basal units in the central area overlying Sleaford Complex gneisses, reappearing as a ring on a Sleaford Inlier in the Koppio-Pillaworta area; but on the eastern margin (at the contact with the Lincoln Complex) it is indistinct and discontinuous.

In this area, the basal unit overlying the Lincoln Complex is often the lower iron formation horizon with dolomite and graphitic schists as the basal facies.

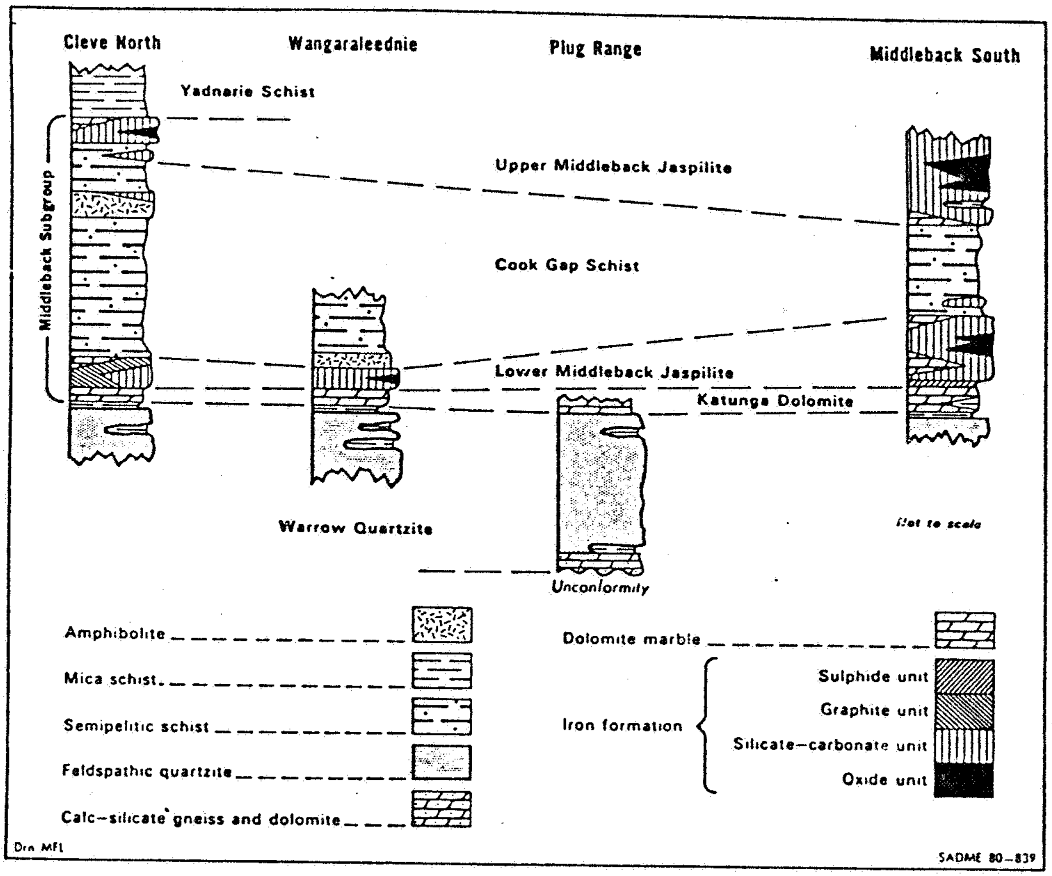
The proposed stratigraphy of the Hutchison Group is the same as that of Parker and Lemon (Figure 34) but is truncated at the Cook Gap Schist, implying that the second transgression did not reach this area. The new geological interpretation for this area is summarized in Figures 35, 36 37, 38 and plate 6.

In the far west of the area, the phyllite schists reported at the Lady Franklin and Moonlight mines have been correlated to the schists found by Pine Vale Mines and are confined to a narrow fault block to the east of Marble Range (Fig. 39). They probably develop extensively to the west of the Range both under the Tertiary cover and the ocean - at least to the large linear magnetic feature referred to earlier.

On the basis of the accumulated data and to test several various geological environments, six areas were selected for R.A.B. geochemical sampling.

As can be concluded from the tabulated results, no encouragement was found for uranium or base metals as no anomalous values were recorded.

Consequently, the area must be downgraded and no further work is recommended.



Stratigraphic correlation of Hutchison Group sequences from the Cleve North, Wangaraleednie, Plug Range and South Middleback Range Areas. Not to scale.

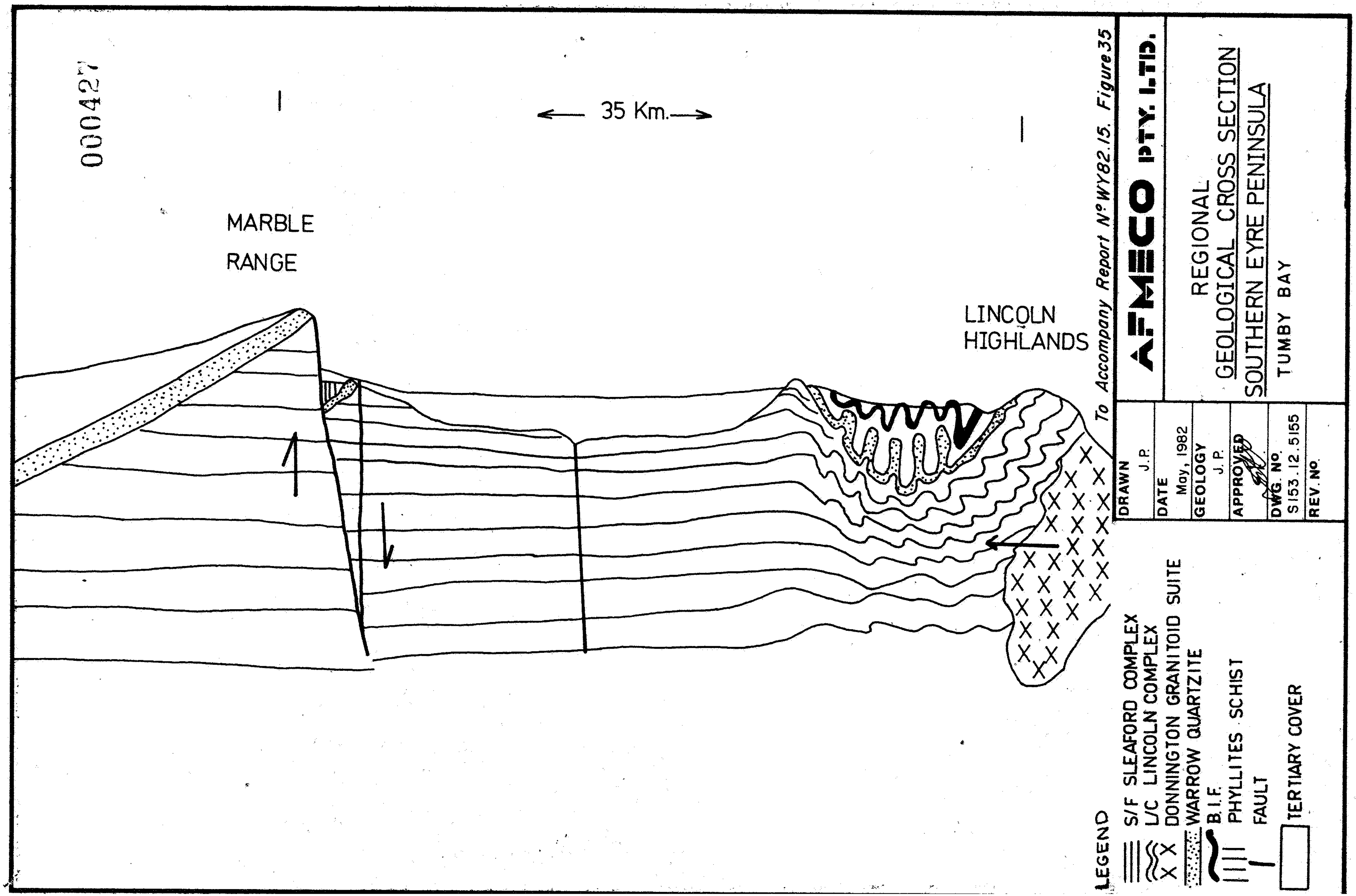
TUMBY BAY

HUTCHISON GROUP STRATIGRAPHY

To Accompany Report Nº WY82.15 *Figure 34*

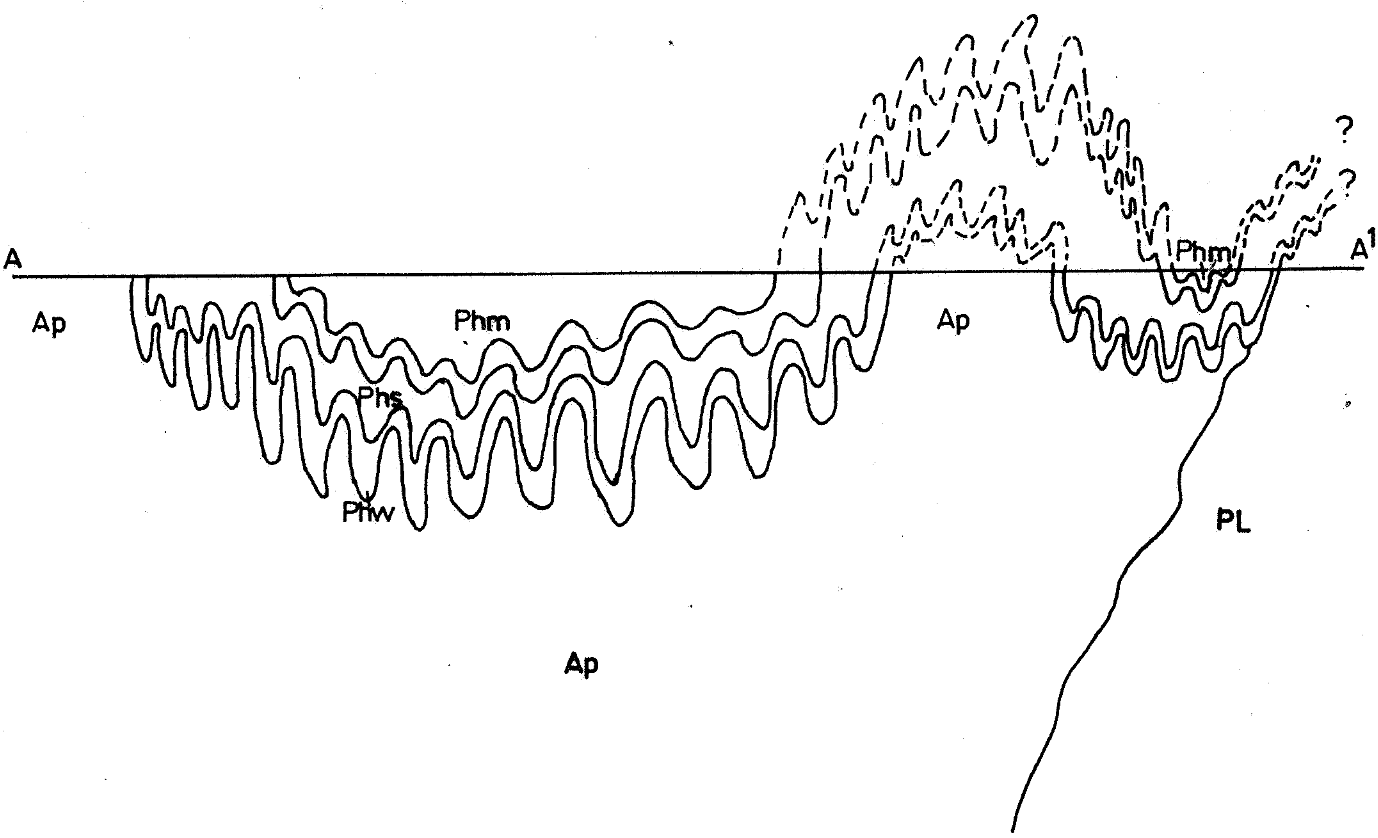
S153.12.5154

000427



35 Km.
MARBLE RANGE
LINCOLN HIGHLANDS
To Accompany Report Nº WY82/15. Figure 35
AFMECO PTY. LTD.
REGIONAL
GEOLOGICAL CROSS SECTION
SOUTHERN EYRE PENINSULA
TUMBY BAY
DRAWN J.P.
DATE May, 1982
GEOLOGY J.P.
APPROVED
DWG. Nº S153.12.5155
REV. Nº
LEGEND
S/F SLEAFORD COMPLEX
L/C LINCOLN COMPLEX
DONNINGTON GRANITOID SUITE
WARROW QUARTZITE
B.I.F.
PHYLLITES SCHIST
FAULT
TERTIARY COVER

000428



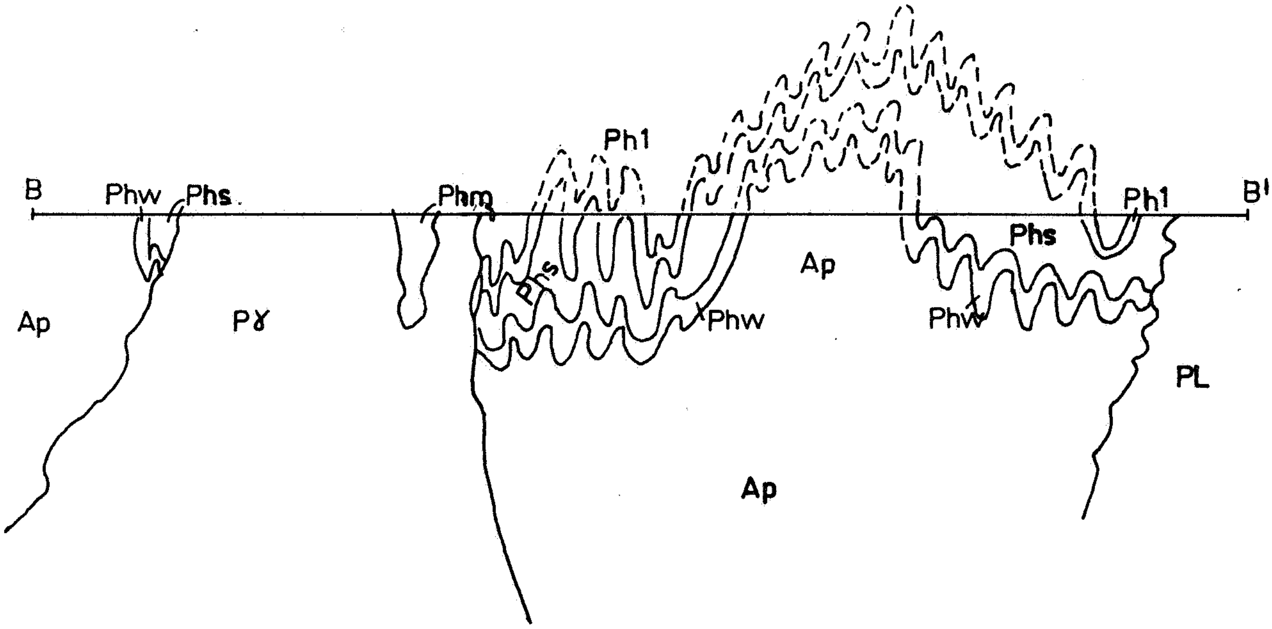
Legend:

Ap—Sleaford Complex
Phm-Cook Gap (Mangalo) Schist
Phs—Biotite Schist (contains Phg, Phc, Phk)
Phw—Warrow Quartzite
PL - LINCOLN COMPLEX

To Accompany Report Nº WY 82.15 *Figure 36*

DRAWN J.P.	AFMECO PTY. LTD.
DATE May, 1982	
GEOLOGY J.P.	TUMBY BAY
APPROVED	INTERPRETED CROSS-SECTION A-A1
DWG. NO. S153.12.5156	
REV. NO.	

000429



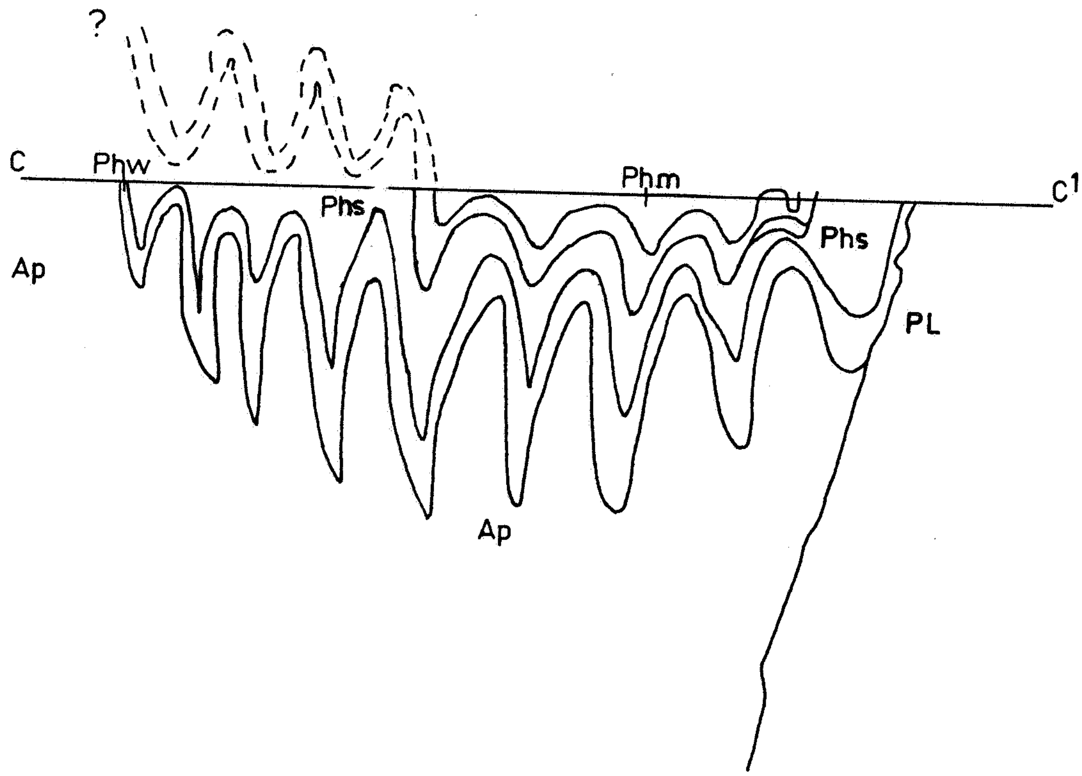
Legend:

Pɣ — POST TECTONIC GRANITE
Ph1 — B.I.F.
Phm — COOK GAP (MANGALO) SCHIST
Phs — BIOTITE SCHIST (CONTAINS Phg, Phc, Phk)
Phw — WARROW QUARTZITE
Ap — SLEAFORD COMPLEX
PL — LINCOLN COMPLEX

To Accompany Report Nº WY82.15 *Figure 37*

DRAWN J.P.	AFMECO PTY. LTD.
DATE May, 1982	
GEOLOGY J.P.	
APPROVED	TUMBY BAY
DWG Nº S153.12.5157	INTERPRETED CROSS- -SECTION B-B'
REV Nº	

000430

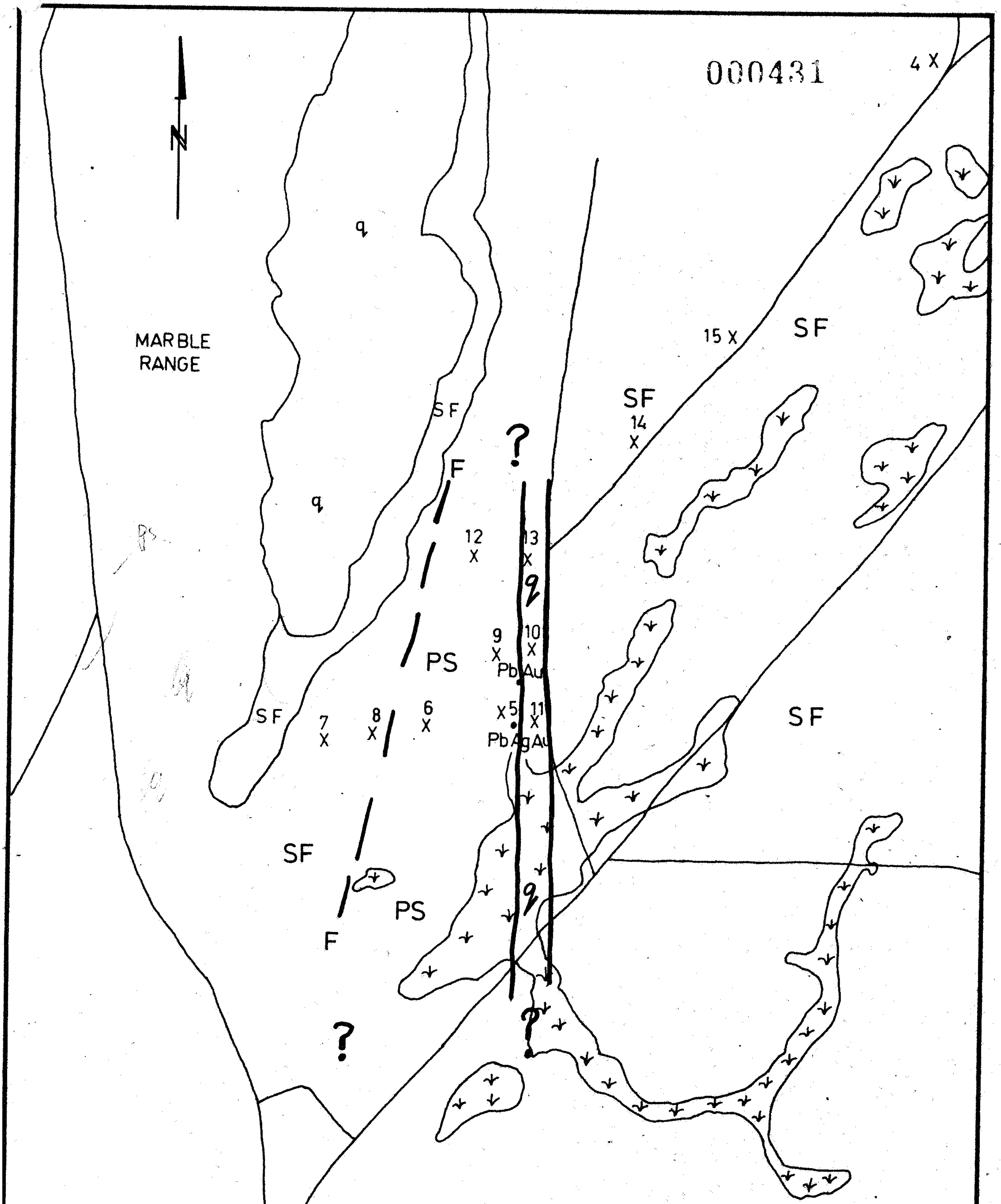


Legend:

PL — LINCOLN COMPLEX
Phm — COOK GAP (MANGALO) SCHIST
Phs — BIOTITE SCHIST (CONTAINS Phg, Phc Phk)
Phw — WARROW QUARTZITE
Ap — SLEAFORD COMPLEX

To Accompany Report Nº WY82.15 *Figure 38*

DRAWN J. P.	AFMECO PTY. LTD.
DATE May, 1982	
GEOLOGY J. P.	
APPROVED	TUMBY BAY
DWG. Nº S153.12.5158	INTERPRETED CROSS-SECTION C – C¹
REV. Nº	



To Accompany Report Nº WY82.15 *Figure 39*

Legend:

q quartzite

SF SLEAFORD COMPLEX

areas of swamp

PS Phyllite Schist

DRAWN J.P.

DATE May, 1982

GEOLOGY J.P.

APPROVED

DWG Nº S153.12.5159

REV Nº

AFMECO PTY. LTD.

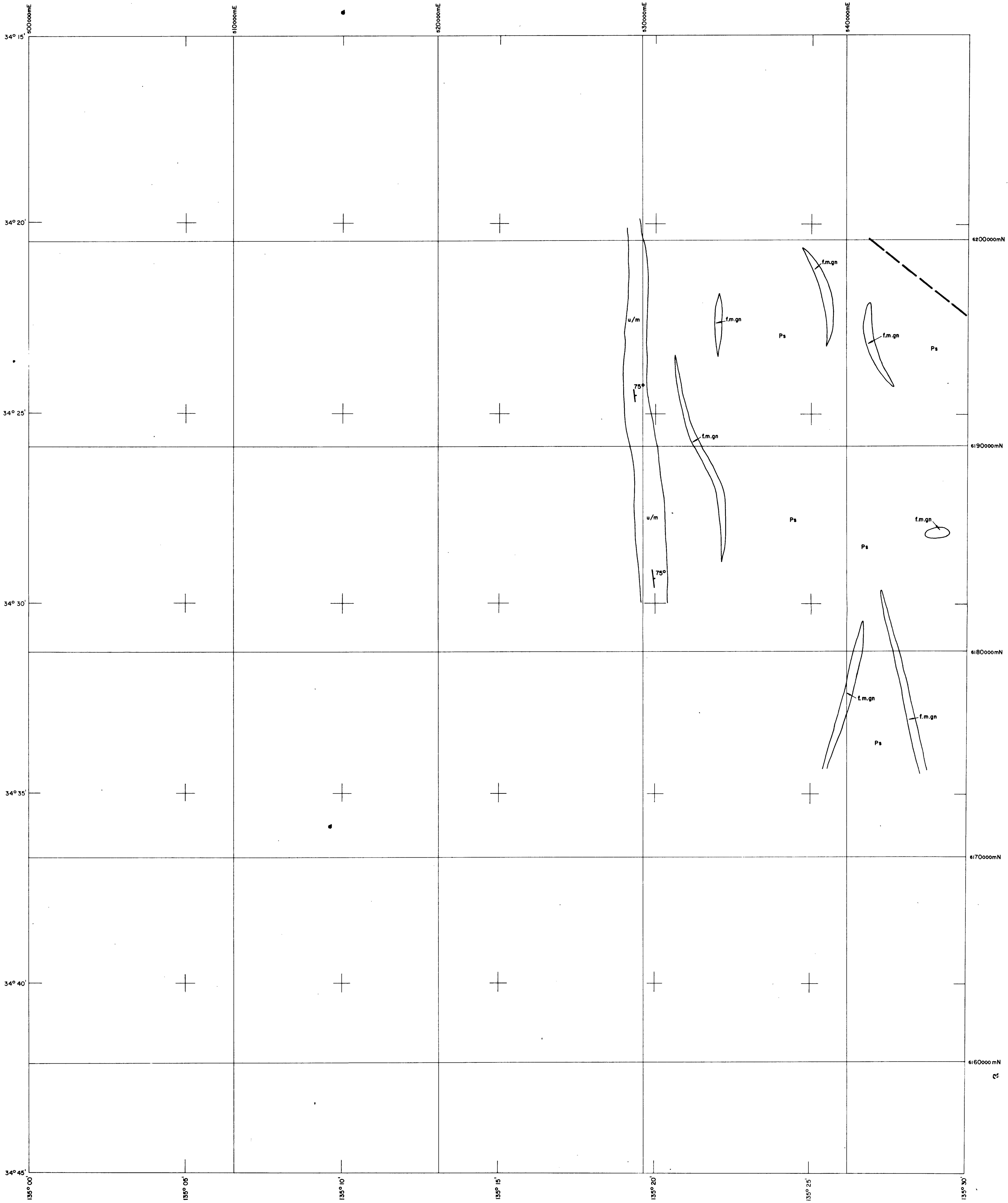
SCALE 1:50 000 10 0 10 20 km

AREA 5 MARBLE RANGE (2)

TUMBY BAY

INTERPRETED GEOLOGY

MARBLE RANGE AREA



LINCOLN
Parts of
COULTA 5929
and
WANGARY 5928
Sheets

AFMECO PTY. LTD.

N

SCALE: 1 : 100 000

2 0 2 4 6 8 10 12 km

AUSTRALIAN MAP GRID

1	2	3

SHEET LAYOUT

UNIVERSAL TRANSVERSE MERCATOR PROJECTION

LEGEND

LINCOLN COMPLEX
- Plu AUGENGNEISS
- Plm MYLONITE
- Plb BANDED MIGMATITE GNEISS

- Ph HUTCHISON GROUP
- Pha AMPHIBOLITE
- Phi BANDED IRON FORMATION

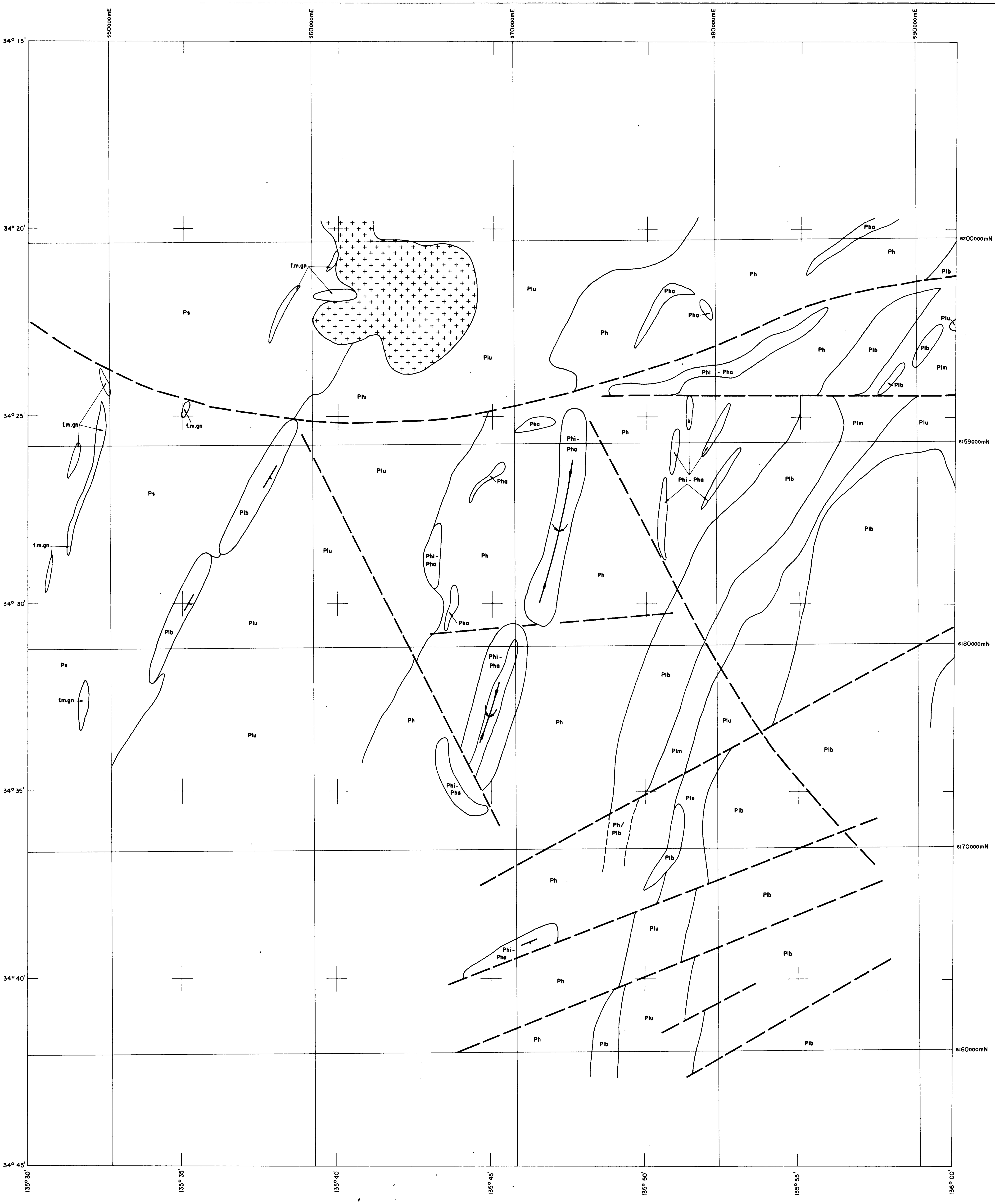
- Ps SLEAFORD COMPLEX
- f.m.gn FERRO-MAGNESIUM RICH GNEISS

- + + GRANITE
- u/m ULTRAMAFIC INTRUSIVE
- DIP DIRECTION
- FAULT
- SYNCLINE

To Accompany Report Nº WY82.15

PLATE Ia

REVISION	DATE	DRAWN A.E.M.	
		DATE November 1981	S. AUST. - TUMBY BAY AREA
		GEOLOGY B. Dockery	AEROMAGNETIC INTERPRETATION
		APPROVED	Sheet 1 of 3
REVISION Nº	SIZE	DRAWING Nº SI 53-11. 126. 3940.	3776(III)-3



LINCOLN

Parts of CUMMINGS 6029 and LINCOLN 6028 Sheets

AFMECO PTY. LTD.

N

SCALE: 1 : 100 000

2 0 2 4 6 8 10 12 km

AUSTRALIAN MAP GRID

1	2	3

SHEET LAYOUT

UNIVERSAL TRANSVERSE MERCATOR PROJECTION

LEGEND

LINCOLN COMPLEX

- Plu AUGENGNEISS
- Plm MYLONITE
- Plb BANDED MIGMATITE GNEISS

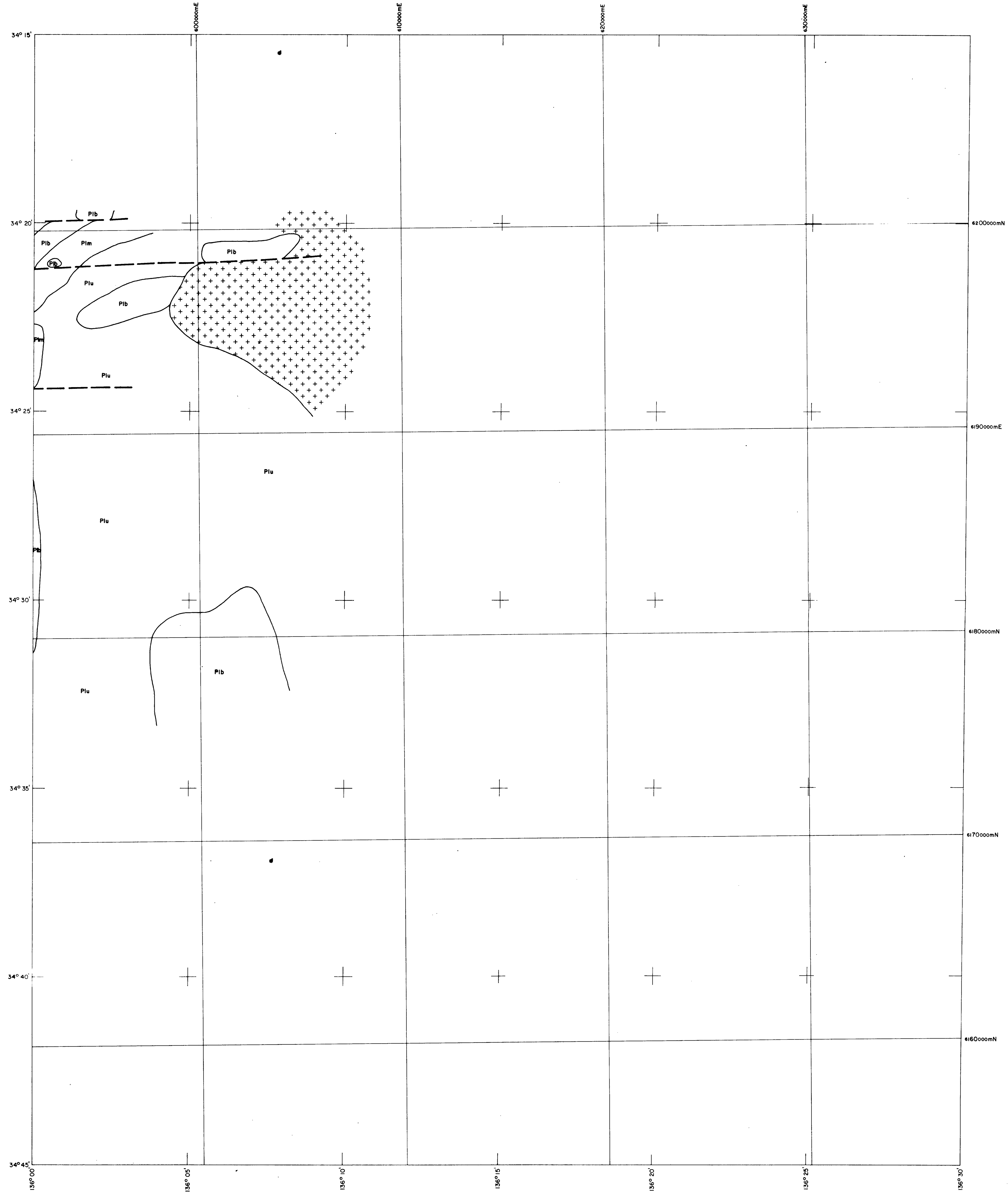
- Ph HUTCHISON GROUP
- Pha AMPHIBOLITE
- Phi BANDED IRON FORMATION

- Ps SLEAFORD COMPLEX
- f.m.gn FERRO-MAGNESIUM RICH GNEISS

- + + GRANITE
- u/m ULTRAMAFIC INTRUSIVE
- DIP DIRECTION
- FAULT
- SYNCLINE

To Accompany Report Nº WY82.15 *PLATE 1b*

REVISION	DATE	DRAWN A.E.M.	
		DATE November, 1981	S.AUST. - TUMBY BAY PROJECT
		GEOLOGY B. Dockery	AEROMAGNETIC INTERPRETATION
		APPROVED	Sheet 2 of 3
REVISION Nº	SIZE	DRAWING Nº SI 53-11. 126. 3941.	3776(111)-4



LINCOLN
Parts of
TUMBY 6129
and
SPILSBY 6128
Sheets

AFMECO PTY. LTD.

N

SCALE: 1 : 100 000

2 0 2 4 6 8 10 12 km

AUSTRALIAN MAP GRID

1	2	3

SHEET LAYOUT

UNIVERSAL TRANSVERSE MERCATOR PROJECTION

LEGEND

LINCOLN COMPLEX
- Plu AUGENGNEISS
- Plm MYLONITE
- Plb BANDED MIGMATITE GNEISS

- Ph HUTCHISON GROUP
- Pha AMPHIBOLITE
- Phi BANDED IRON FORMATION

- Ps SLEAFORD COMPLEX
- f.m.gn FERRO-MAGNESIUM RICH GNEISS

- + + GRANITE
- u/m ULTRAMAFIC INTRUSIVE
- DIP DIRECTION
- FAULT
- SYNCLINE

To Accompany Report Nº WY82.15 *PLATE 1c*

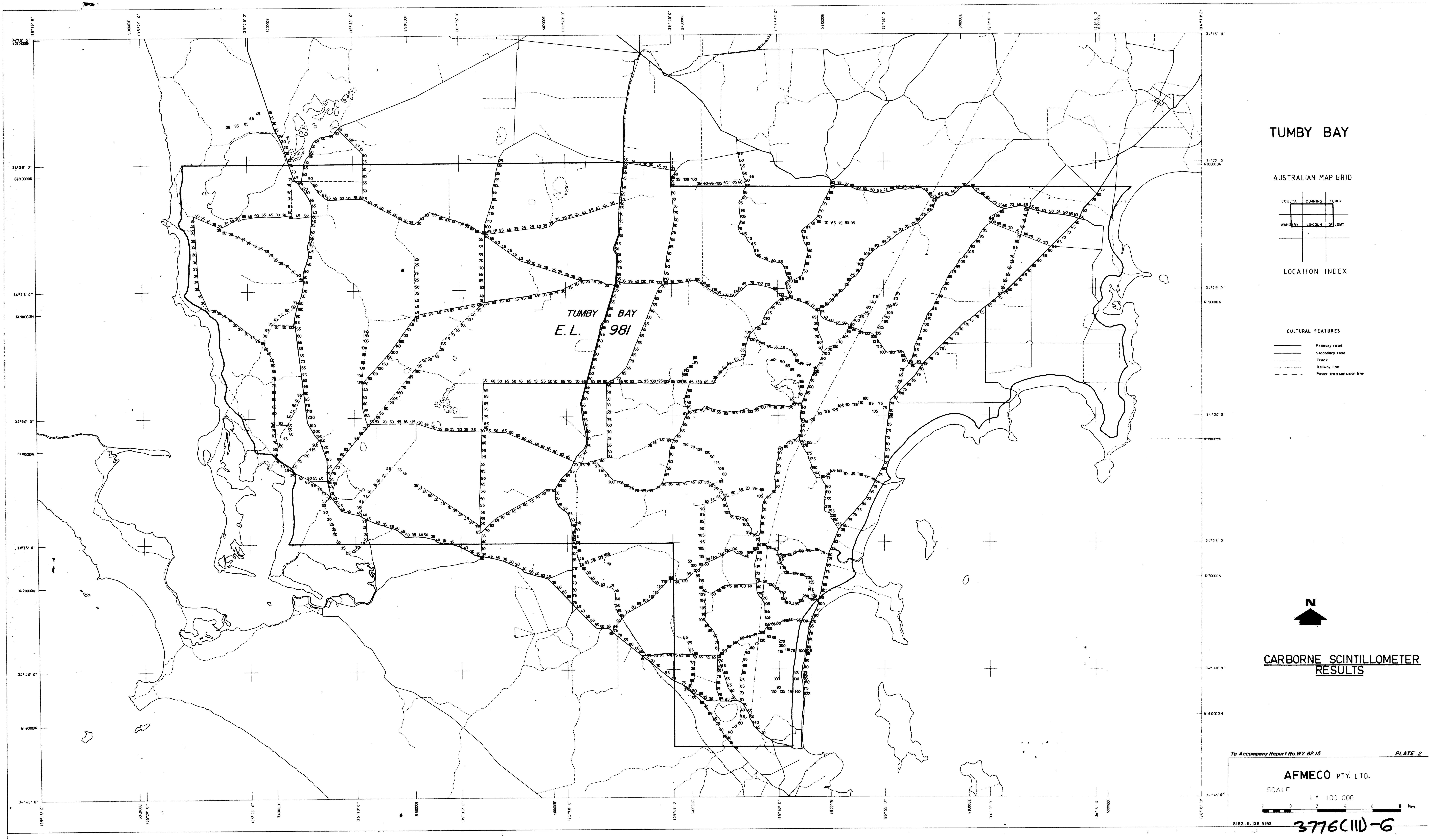
REVISION	DATE	DRAWN A.E.M.
		DATE November, 1981
		GEOLOGY B. Dockery
		APPROVED
REVISION Nº	SIZE	DRAWING Nº S1 53-11 126. 3942

S. AUST. - TUMBY BAY PROJECT

AEROMAGNETIC INTERPRETATION

Sheet 3 of 3

3776(III)-5


TUMBY BAY
E.L. 981
TUMBY BAY
AUSTRALIAN MAP GRID
COULTA
CUMMINS
TUMBY
WANGARY
LINCOLN
SPILSBY
LOCATION INDEX
CULTURAL FEATURES
Primary road
Secondary road
Track
Railway line
Power transmission line
N
CARBORNE SCINTILLOMETER RESULTS
To Accompany Report No. WY. 82.15
PLATE 2
AFMECO PTY. LTD.
SCALE 1 : 100 000
Km.
S153-11. 126. 5193
3776(III)-6


TUMBY BAY
E.L. 981
SPENCER GULF
GREAT AUSTRALIAN BIGHT
BOSTON BAY
LOUTH BAY
LEGEND
44 Sample Location and Number
EL Boundary
TN
NOTE: This map is a composite of portions of the 6 x 1:100 000 maps which make up the LINCOLN 1 250 000 (Portion of Coulta 5929, Cummings 6029, Tumby 6129, Wangary 5928, Lincoln 6028, Spilsby 6128)
To Accompany Report WY. 82.15
PLATE 3
REVISION
DATE
AFMECO PTY. LTD.
SCALE
1:100 000
Km
DRAWN
Bernie
DATE
April, 1983
GEOLOGY
J. Poole
APPROVED
DWG. No.
S153-11 126. 5194
S. AUST.
TUMBY BAY PROJECT
E.L. 981
AIRBORNE ANOMALY LOCATIONS
3776(III)-7


TUMBY BAY
E.L. 981
SPENCER GULF
GREAT AUSTRALIAN BIGHT
COFFIN BAY
PORT DOUGLAS
KELLIDIE BAY
LOUTH BAY
BOSTON BAY
PORT LINCOLN
TB1
TB2
TB3
TB4
TB5
TB7
TB8
TB9
TB10
TB11
TB12
TB13
TB14
TB15
TB16
TB17
TB18
TB19
TB20
TB21
TB22
TB23
TB24
TB25
TB26
TB27
TB28
TB29
TB30
TB31
TB32
TB33
TB34
TB35
TB36
TB37
TN
LEGEND
.300 Counts spp2
TB20 Uranium Anomalies from Airborne Survey Number
NOTE: This map is a composite of portions of the 6 x 1:100 000 maps which make up the LINCOLN 1:250 000.
(Portion of: Coulta 5929, Cummings 6029, Tumby 6129, Wangary 5928, Lincoln 6028, Spilsby 6128)
To Accompany Report WY.82.15
PLATE 4
REVISION
DATE
AFMECO PTY. LTD.
SCALE 1:100 000
Km
DRAWN Bernie
DATE Dec. 1982
GEOLOGY J. Poole
APPROVED
DWG. No. S153-11.126.5199
TUMBY BAY PROJECT
HIGH BACKGROUND AREA PROSPECTING RESULTS
3776(III)-8

TUMBY BAY
E.L. 981
SPENCER GULF
GREAT AUSTRALIAN BIGHT
COFFIN BAY
PORT DOUGLAS
DUTTON BAY
KELLIDIE BAY
LOUTH BAY
BOSTON BAY
BOSTON ISLAND
PORT LINCOLN
Paleo Valley Outline
LEGEND
P8 Post Tectonic Granite
PL Lincoln Complex
Ph1 B.I.F.
Phm Cook Gap (Mangalo) Schist
Phg Graphite Schist
Phc Calcsilicate - Amphibolite
Phk Dolomite
Phs Biotite Schist
Phw Warrow Quartzite
Ap Sleaford Complex
F Fault
NOTE : This map is a composite of portions of the 6 x 1:100 000 maps which make up the LINCOLN 1:250 000 (Portion of Coulta 5929, Cummings 6029, Tumby 6129, Wangary 5928, Lincoln 6028, Spilsby 6128)
To Accompany Report WY. 82.15
PLATE 5
REVISION DATE
AFMECO PTY. LTD.
SCALE 1:100 000
S. AUST.
TUMBY BAY PROJECT
E.L. 981
DRAWN Bernie
DATE Dec. 1982
GEOLOGY J. Poole
APPROVED
REGIONAL MAPPING OUTCROP MAP
DWG. NO. S153-11, 126, 5197
3776 (111) - 9


TUMBY BAY
E.L. 981
SPENCER GULF
GREAT AUSTRALIAN BIGHT
LEGEND
P Post Tectonic Granite
PL Lincoln Complex
Phl B.T.F.
Phm Cook Gap (Mangalo) Schist
Phs Biotite Schist (Contains Phg, Phc, Phk)
Phw Warrow Quartzite
Ap. Sleaford Complex
EL Boundary
A A' Line of Section
NOTE: This map is a composite of portions of the 6 x 1:100 000 maps which make up the LINCOLN 1:250 000.
(Portion of Coulta 5929, Cummings 6029, Tumby 6129, Wangary 5928, Lincoln 6028, Spilsby 6128)
To Accompany Report WY.82.15
PLATE 6
REVISION
DATE
AFMECO PTY. LTD.
SCALE 1:100 000
DRAWN Bernie
DATE Dec, 1982
GEOLOGY J. Poole
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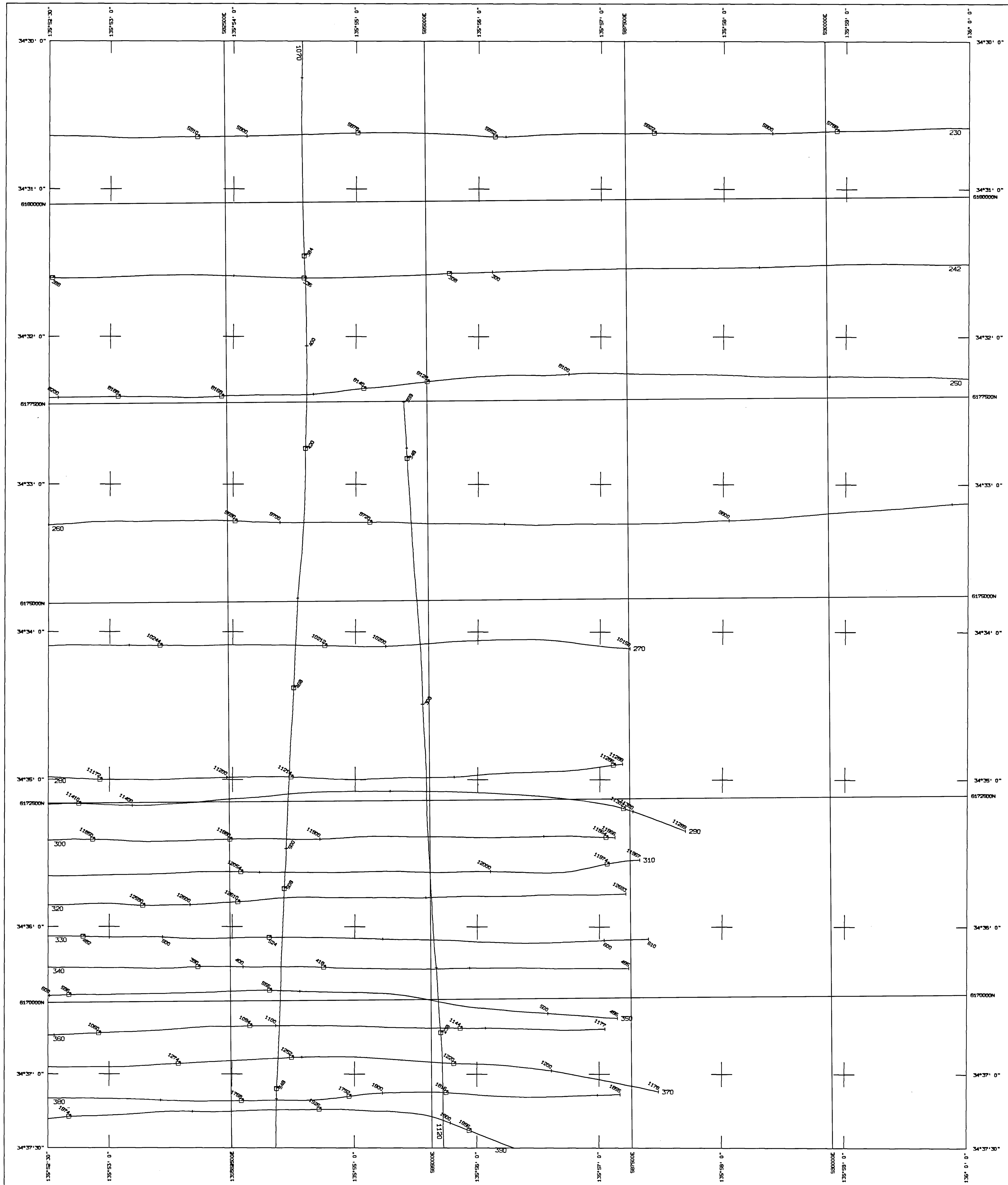
DWG. No. S153-11.128.5196
S. AUST.
TUMBY BAY PROJECT
E.L. 981
DIAGRAMATIC HUTCHISON GROUP
STRUCTURAL GEOLOGY
3776(111)-10



TUMBY BAY - FLIGHT LINES

SHEET - 6028-I-NE

1 : 25 000

0 1 2

AUSTIREX AERIAL SURVEYS PTY. LTD. 18/MAR/80

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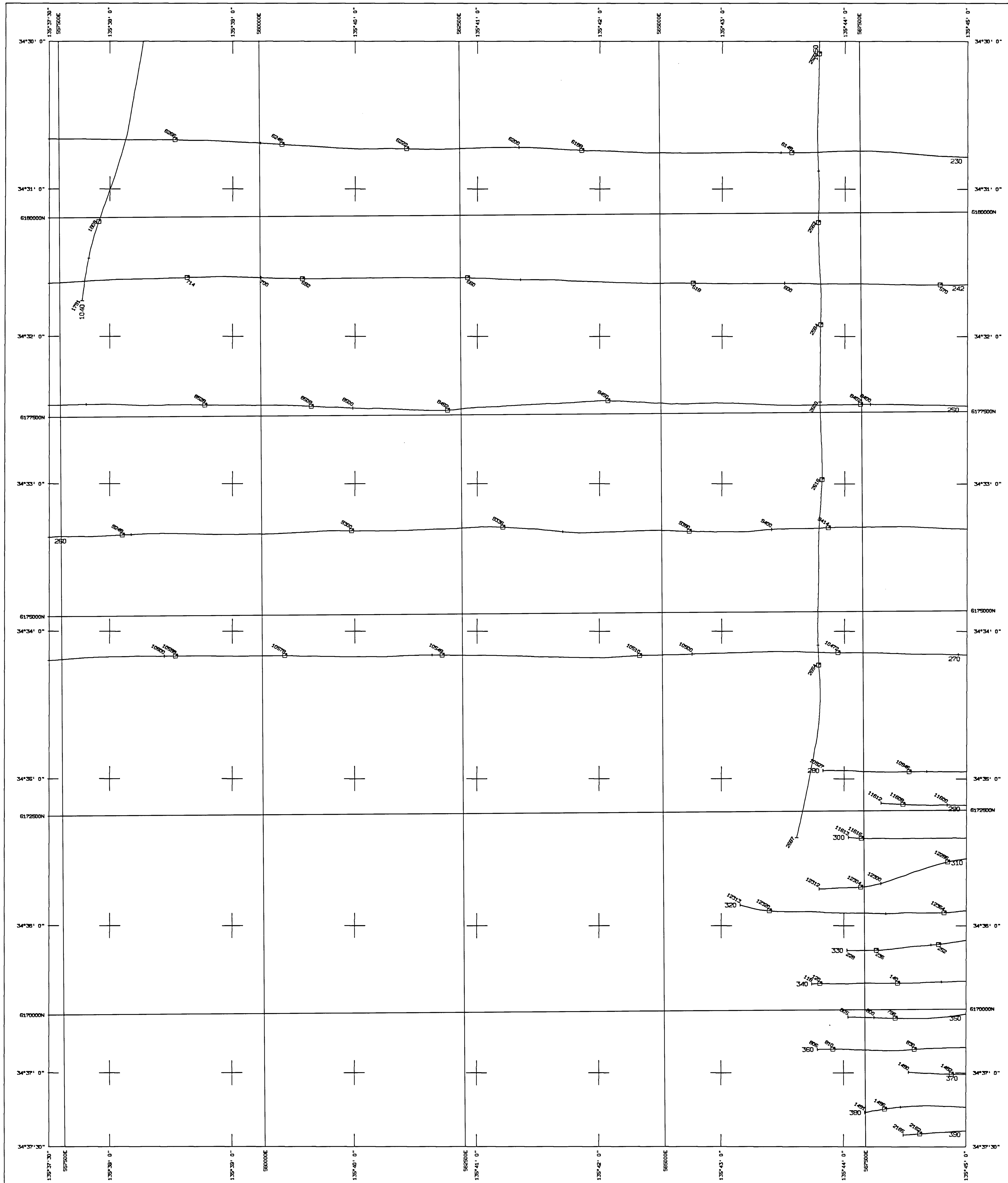

TUMBY BAY - FLIGHT LINES

SHEET - 6028-IV-NE

1 : 25 000

0 1 2

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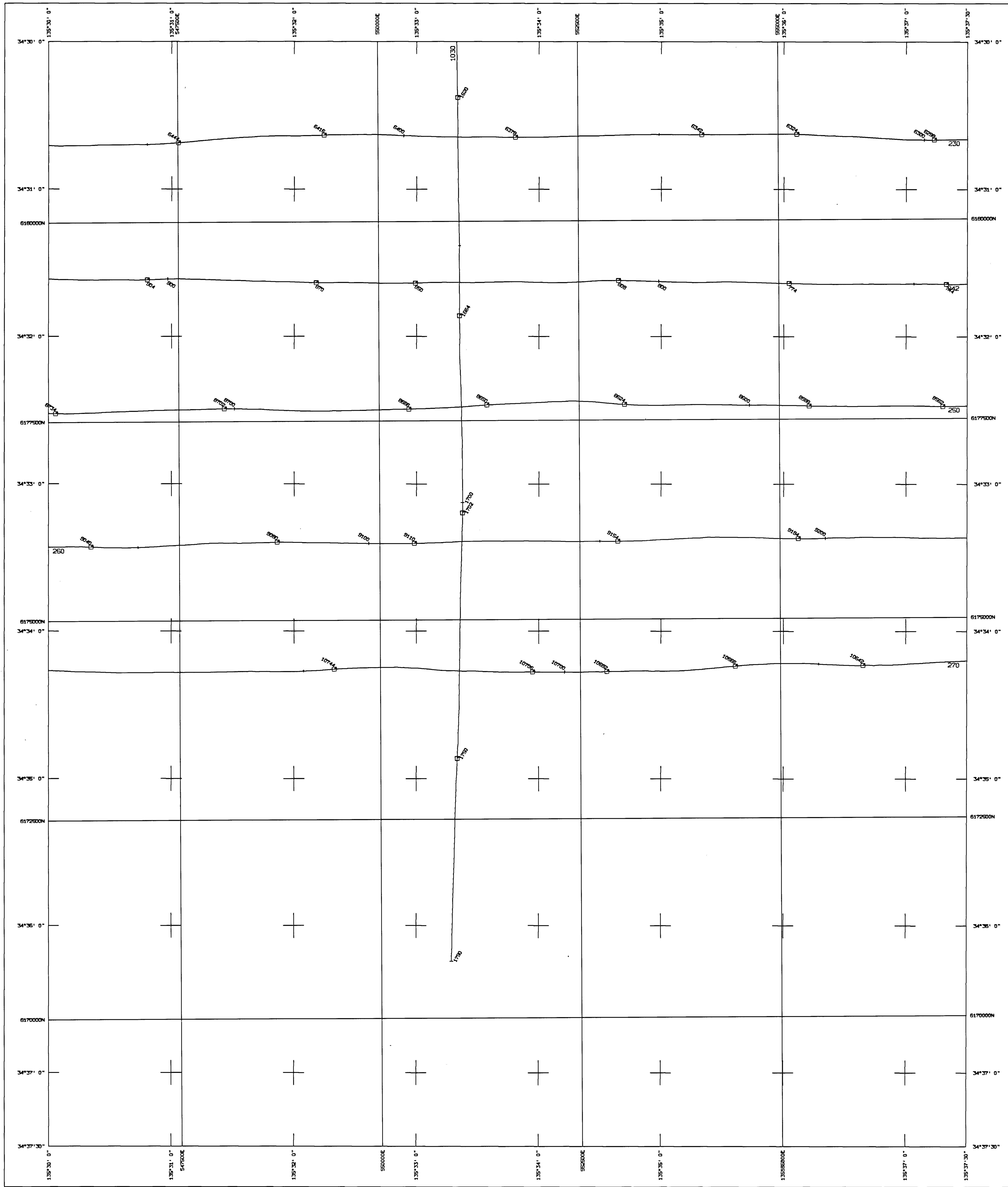


TUMBY BAY - FLIGHT LINES

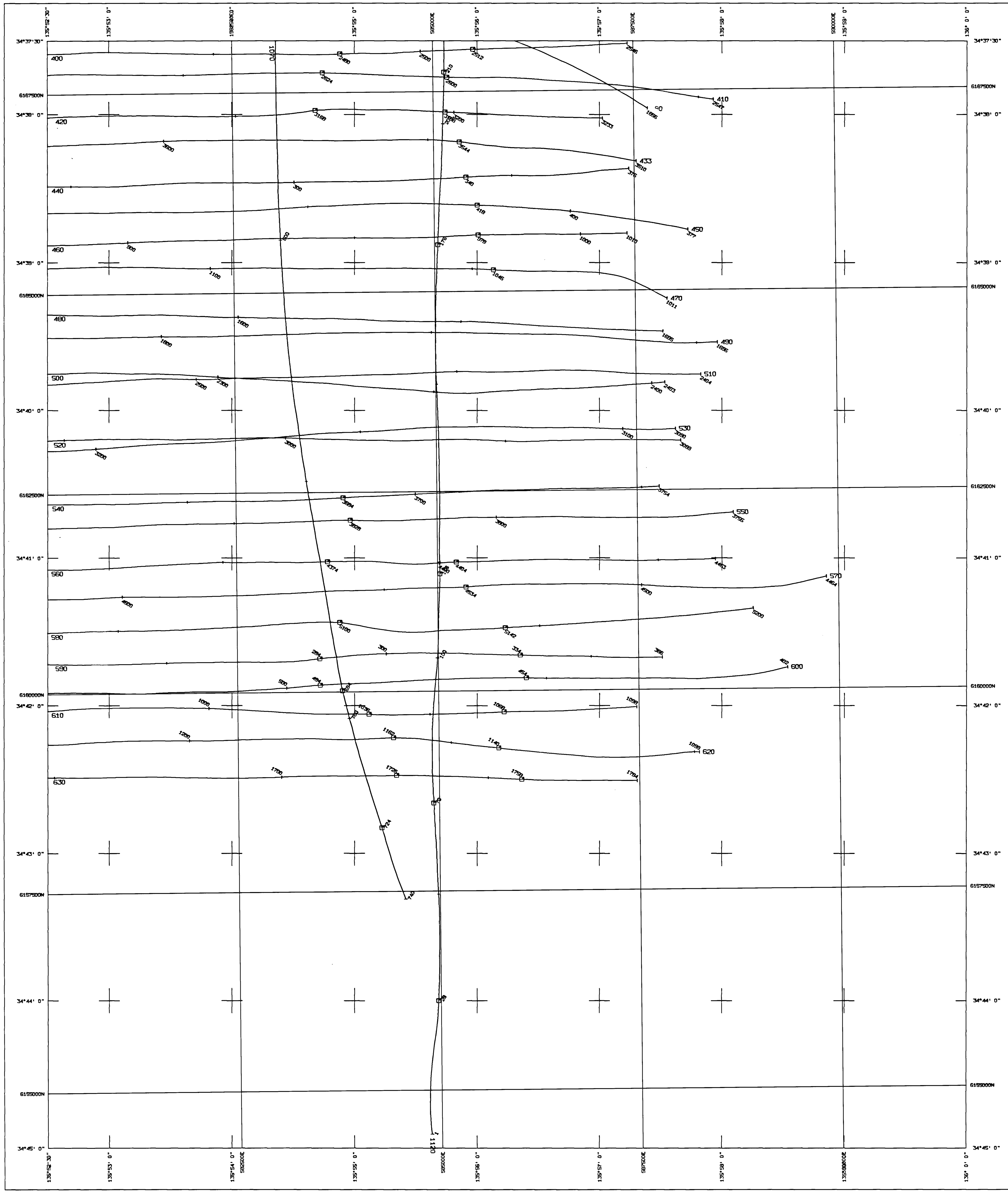
SHEET - 6028-IV-NW

1 : 25 000

0 1 2

AUSTIREX AERIAL SURVEYS PTY. LTD. 18/MAR/80

DWG.No.S153-11.S.2689



TUMBY BAY - FLIGHT LINES

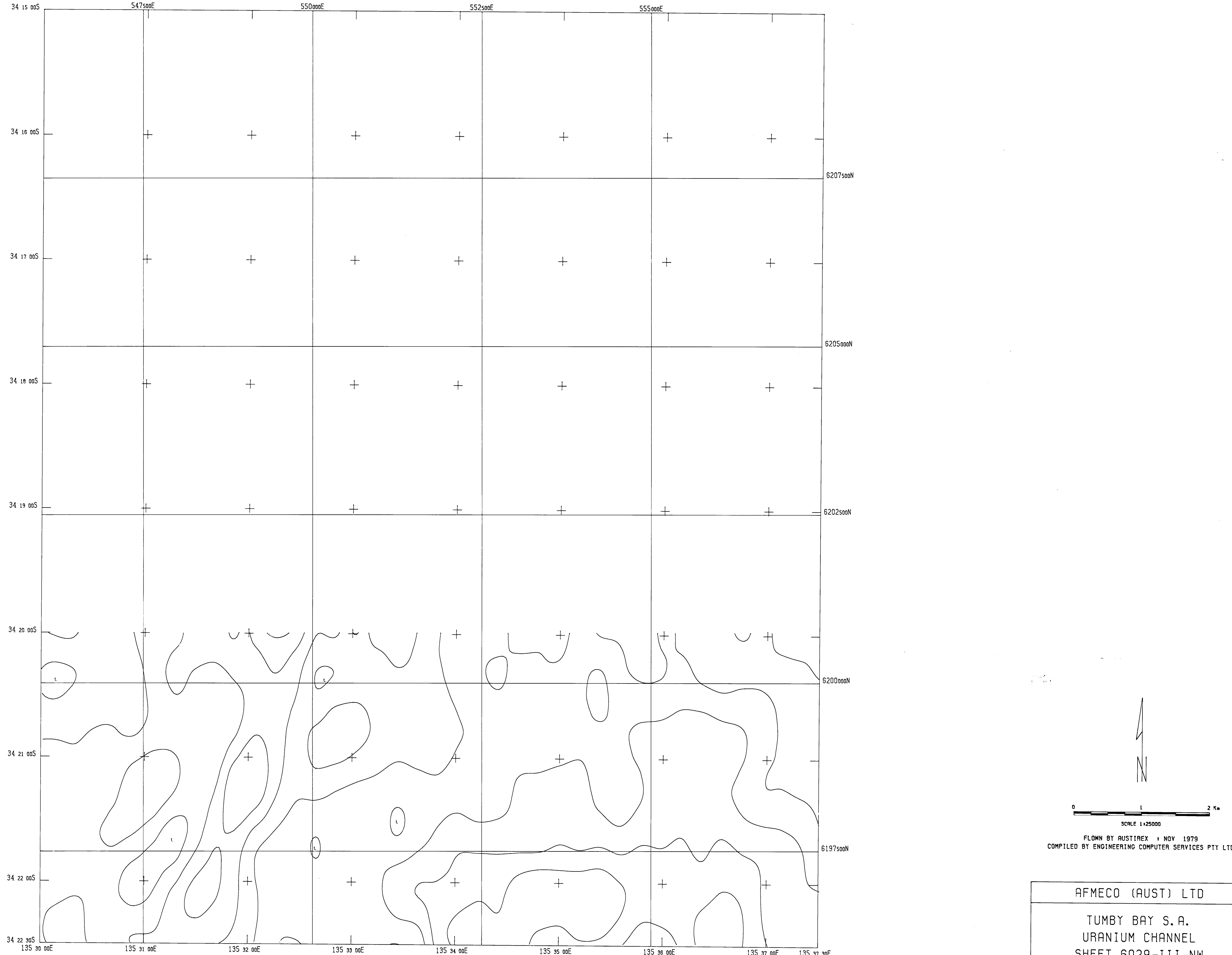
SHEET - 6028-I-SE

1 : 25 000

0 1 2

AUSTIREX AERIAL SURVEYS PTY. LTD. 18/MAR/80

DWG.No.S153-11.S.2685



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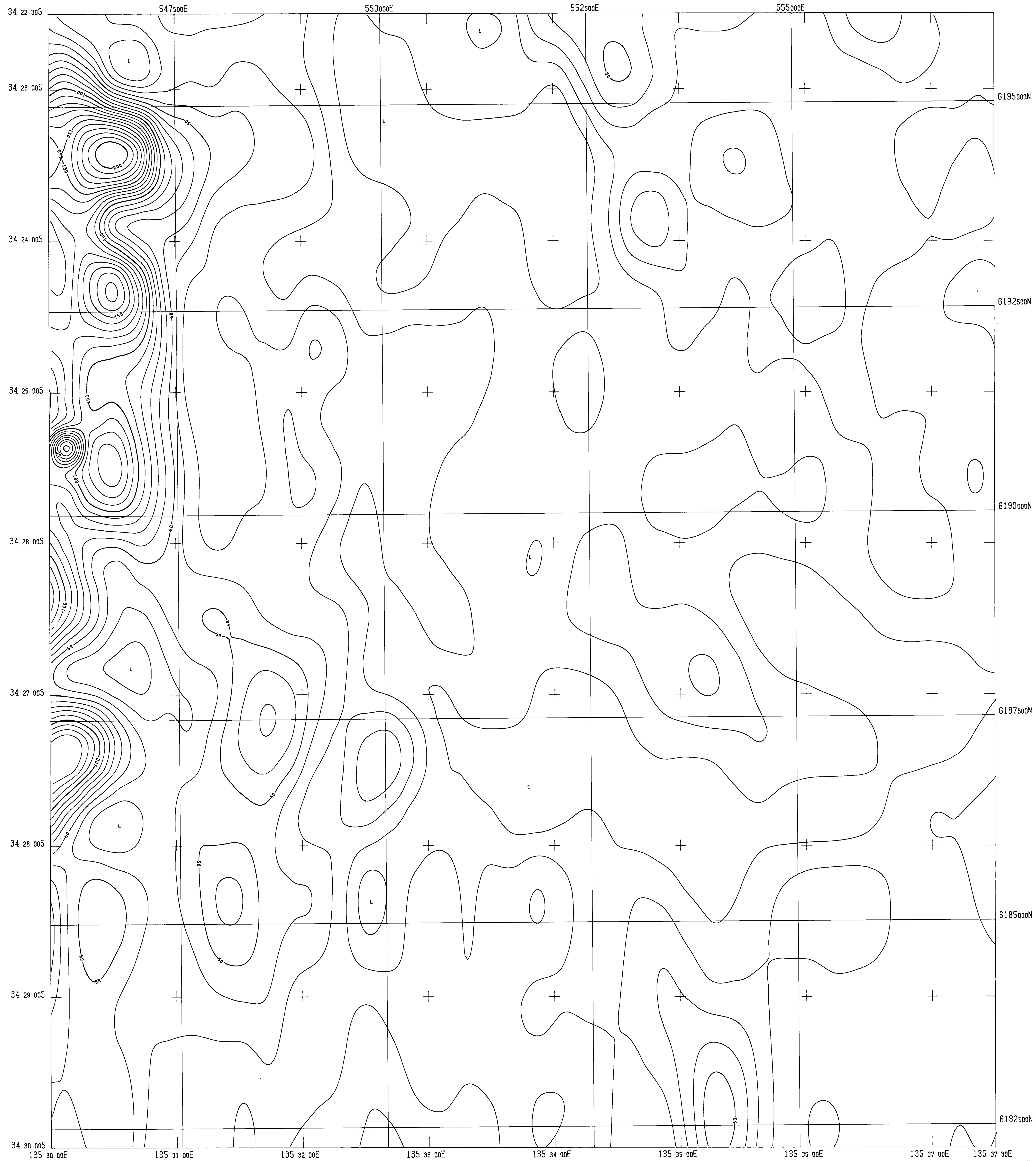
AFMECO (AUST) LTD

TUMBY BAY S.A.
URANIUM CHANNEL
SHEET 6029-III-NW

DWG.No. S153-11. GPR. 2696 | DATE: 18-FEB-80



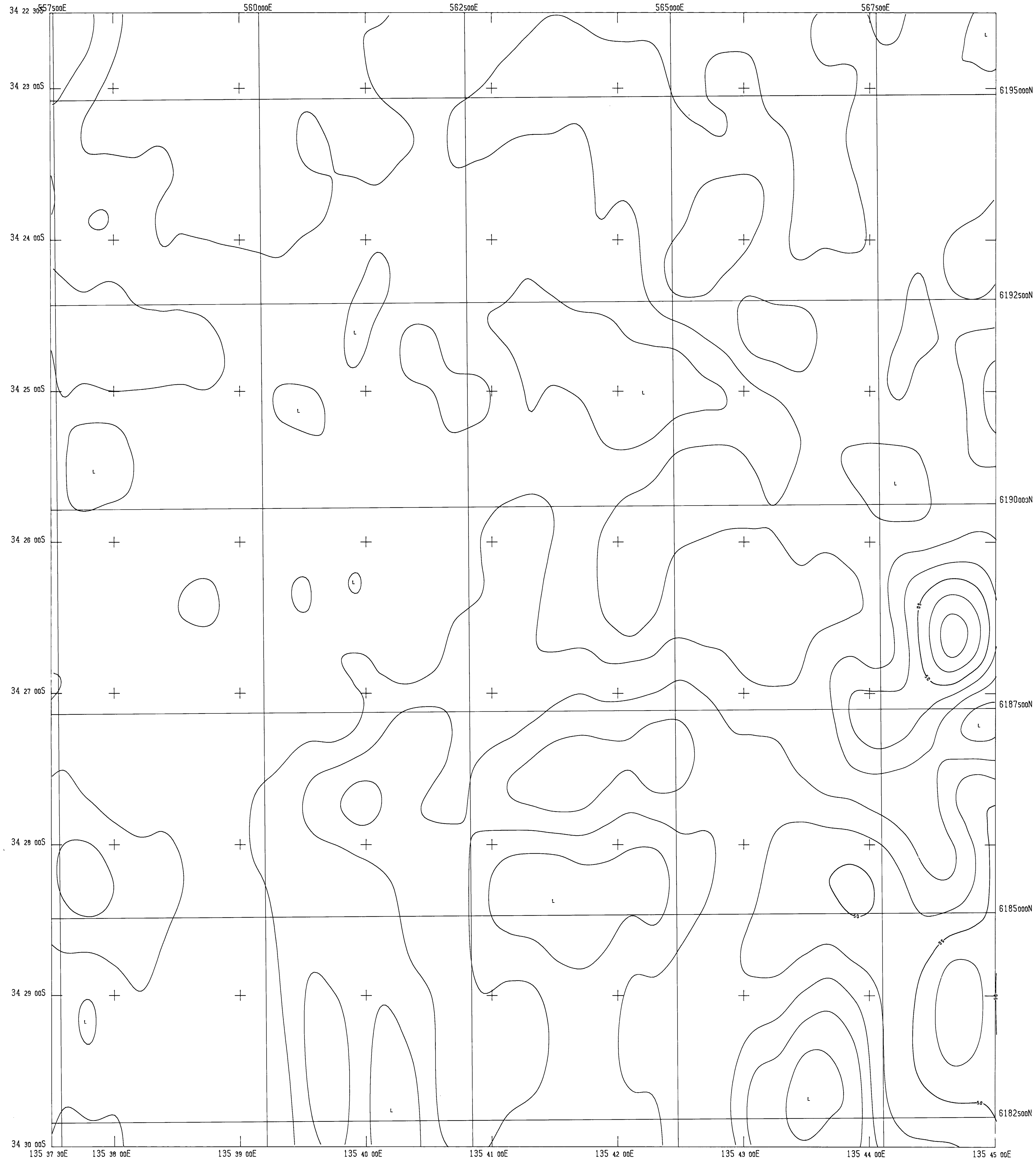
N

0 1 2 Km

SCALE 1:25000

FLOWN BY AUSTIREX : NOV 1979
COMPILED BY ENGINEERING COMPUTER SERVICES PTY LTD

AFMECO (AUST) LTD	
TUMBY BAY S.A. URANIUM CHANNEL SHEET 6029-III-SW	
DWG. No.S153-II.GPR.2695	DATE: 18-FEB-80



N

0 1 2 Km

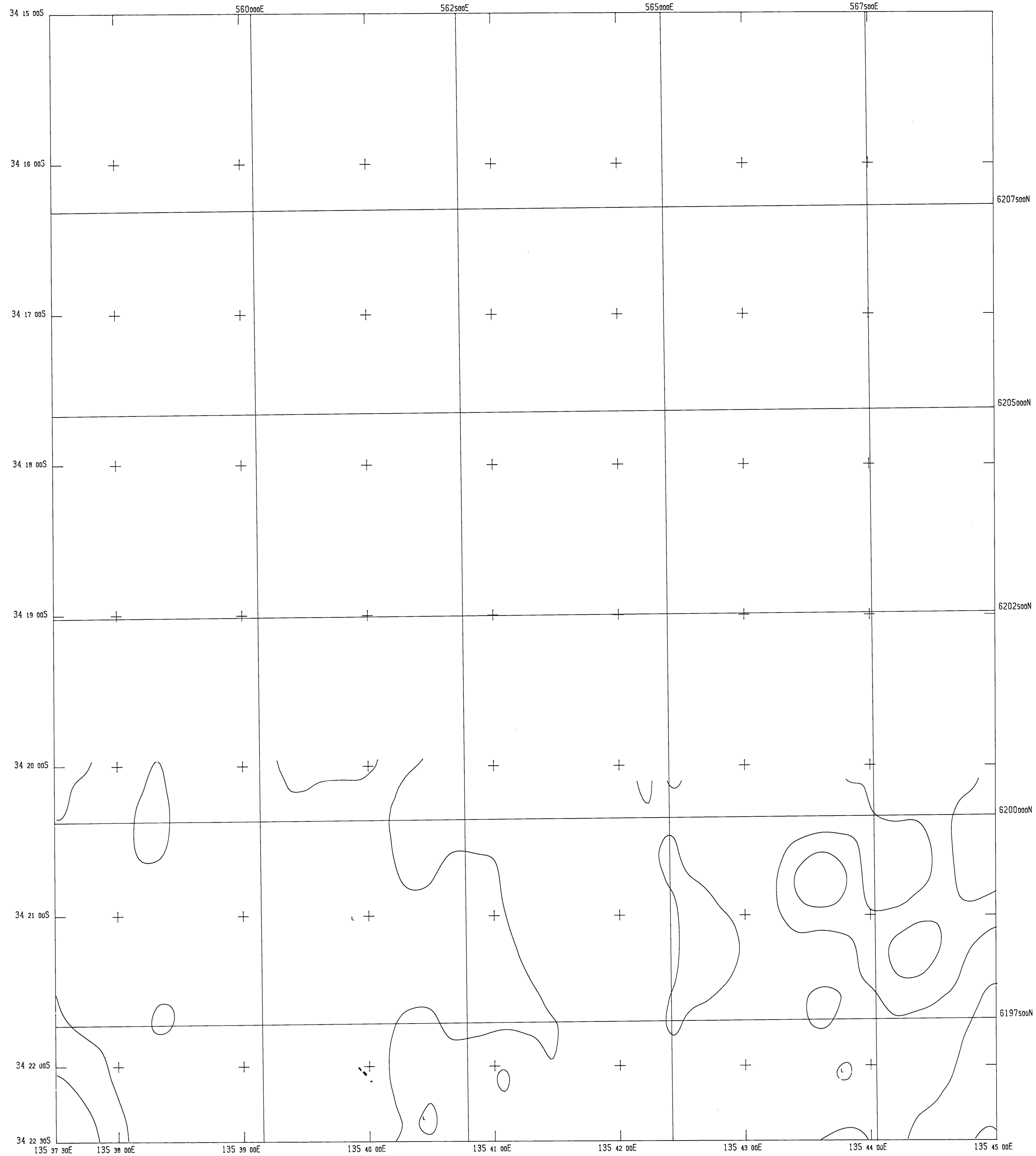
SCALE 1:25000

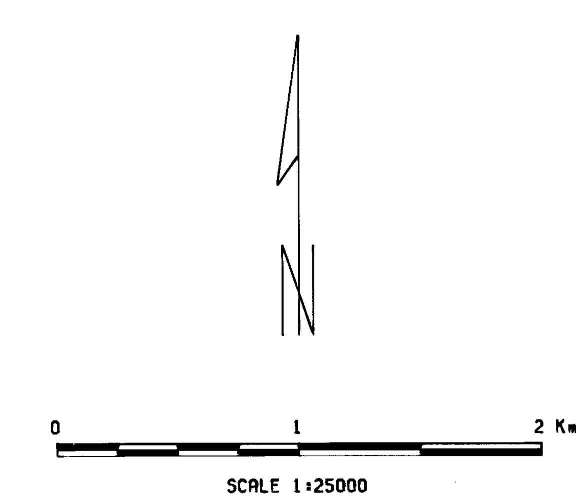
FLOWN BY AUSTIREX : NOV 1979
COMPILED BY ENGINEERING COMPUTER SERVICES PTY LTD

AFMECO (AUST) LTD

TUMBY BAY S. A.
URANIUM CHANNEL
SHEET 6029-III-SE

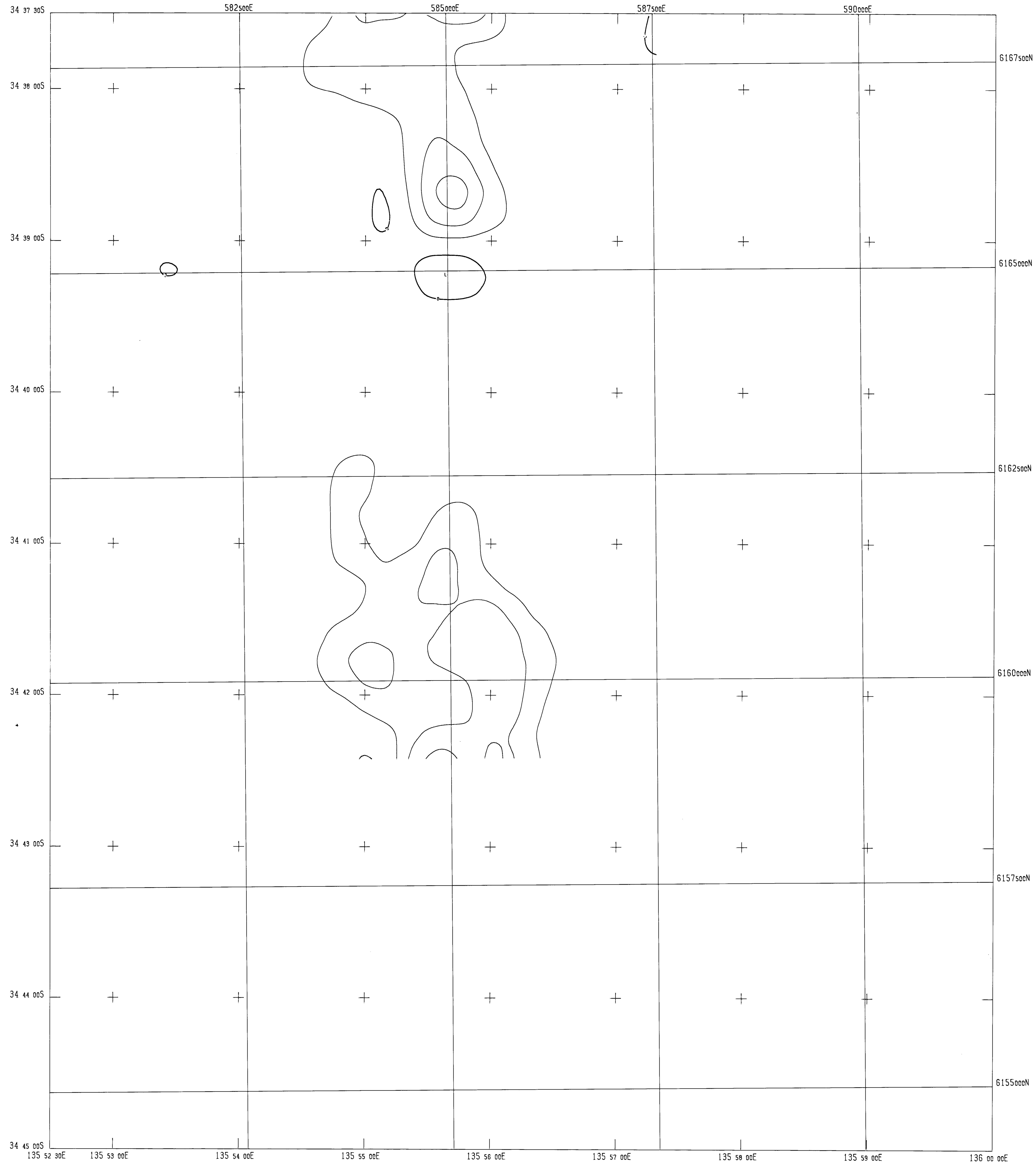
DWG. No.S153-11.GPR.2694	DATE: 18-FEB-80





FLOWN BY AUSTIREX : NOV 1979
COMPILED BY ENGINEERING COMPUTER SERVICES PTY LTD

AFMECO (AUST) LTD	
TUMBY BAY S. A. URANIUM CHANNEL SHEET 6029-III-NE	
DWG.No. S153-11.GPR.2692	DATE: 18-FEB-80



N

0 1 2 Km

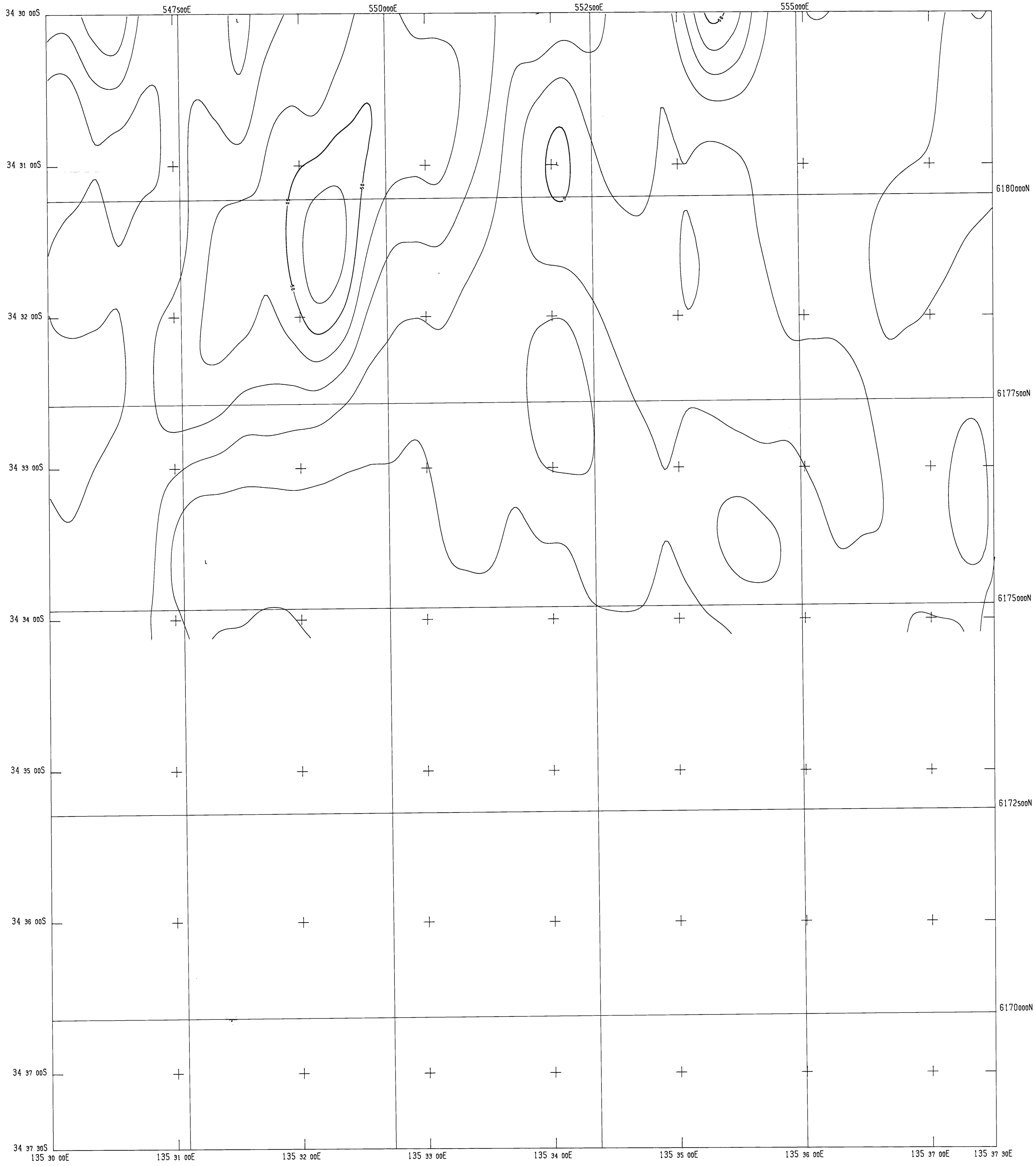
SCALE 1:25000

FLOWN BY AUSTIREX : NOV 1979
COMPILED BY ENGINEERING COMPUTER SERVICES PTY LTD

AFMECO (AUST) LTD

TUMBY BAY S.A.
URANIUM CHANNEL
SHEET 6028-I-SE

DWG.No. SI53-11.GPR.2679 | DATE: 19-FEB-80



N

0 1 2 Km

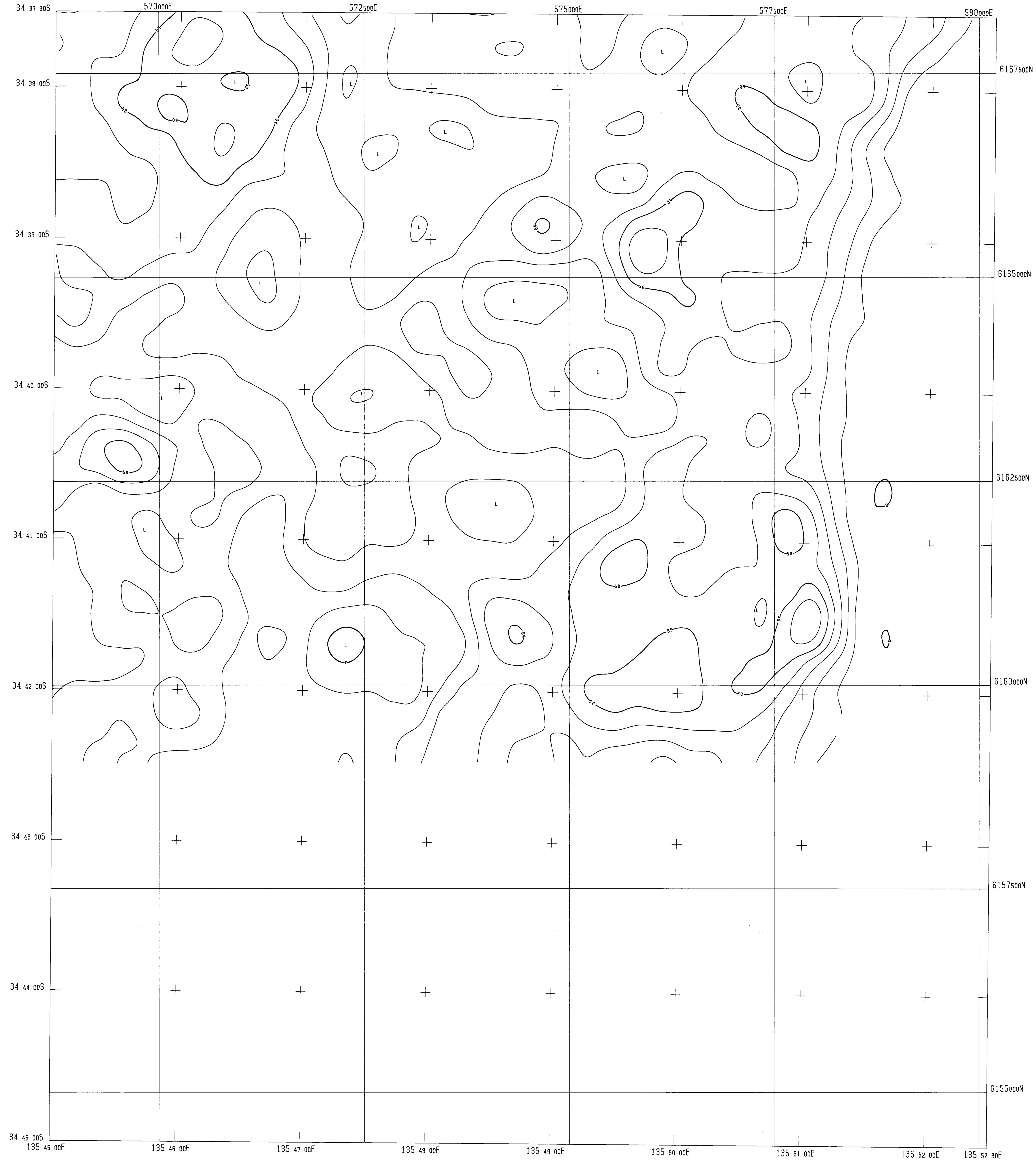
SCALE 1:25000

FLOWN BY AUSTIREX : NOV 1979
COMPILED BY ENGINEERING COMPUTER SERVICES PTY LTD

AFMECO (AUST) LTD

TUMBY BAY S.A.
URANIUM CHANNEL
SHEET 6028-IV-NW

DWG. No. S153-11. GPR. 2683	DATE:	19-FEB-80



N

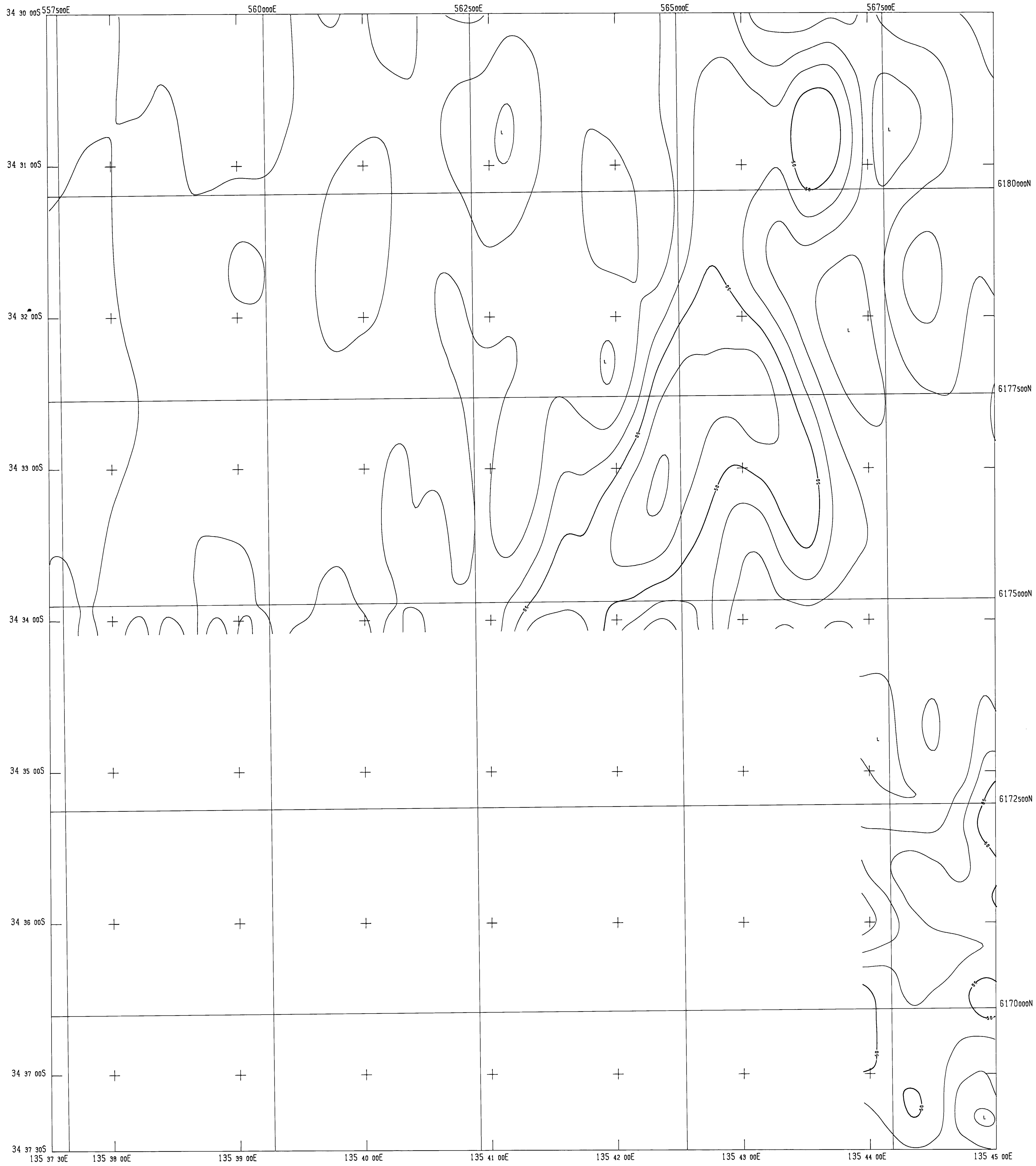
0 1 2 Km
SCALE 1:25000

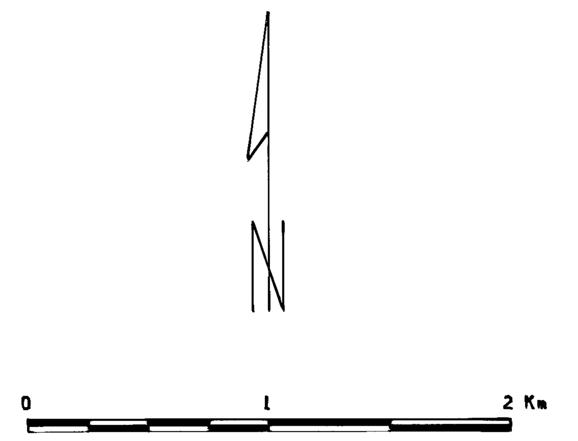
FLOWN BY AUSTIREX : NOV 1979
COMPILED BY ENGINEERING COMPUTER SERVICES PTY LTD

AFMECO (AUST) LTD

TUMBY BAY S.A.
URANIUM CHANNEL
SHEET 6028-I-SW

DWG. No. S153-11.GPR.2680	DATE:	19-FEB-80





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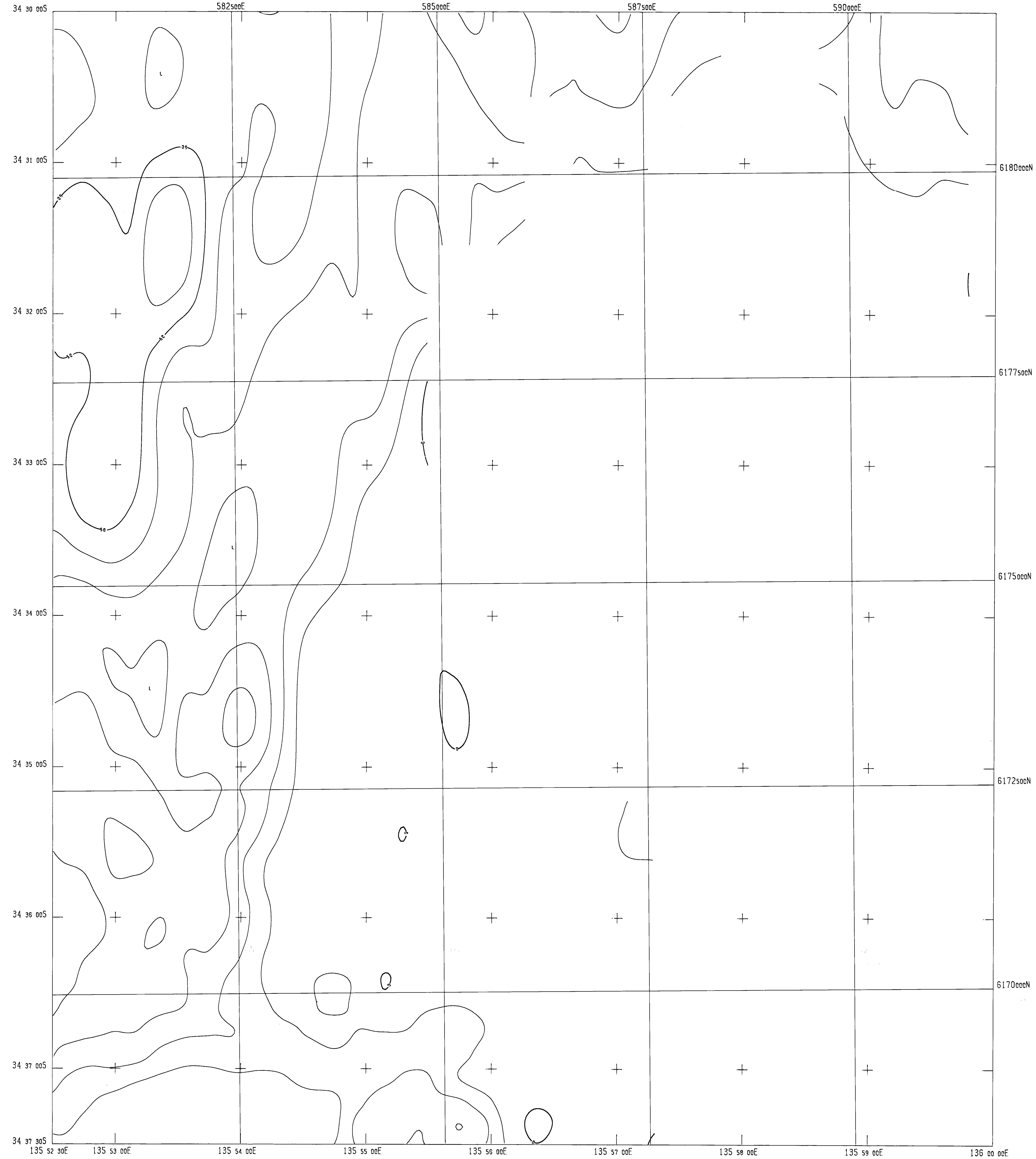
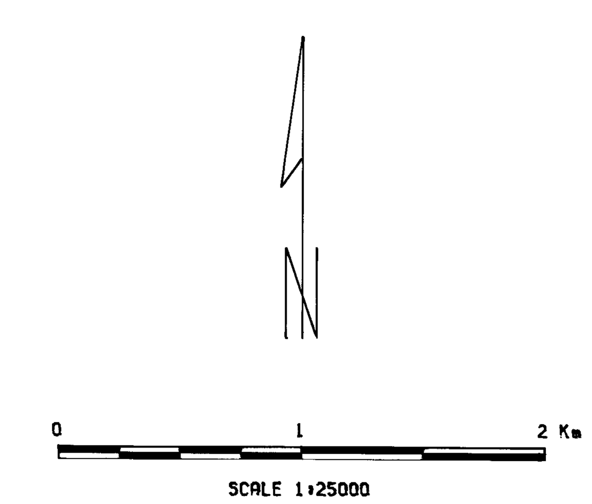
AFMECO (AUST) LTD

TUMBY BAY S.A.
URANIUM CHANNEL
SHEET 6028-IV-NE

DWG.No.S153-11.GPR.2682 | DATE: 19-FEB-80





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AFMECO (AUST) LTD	
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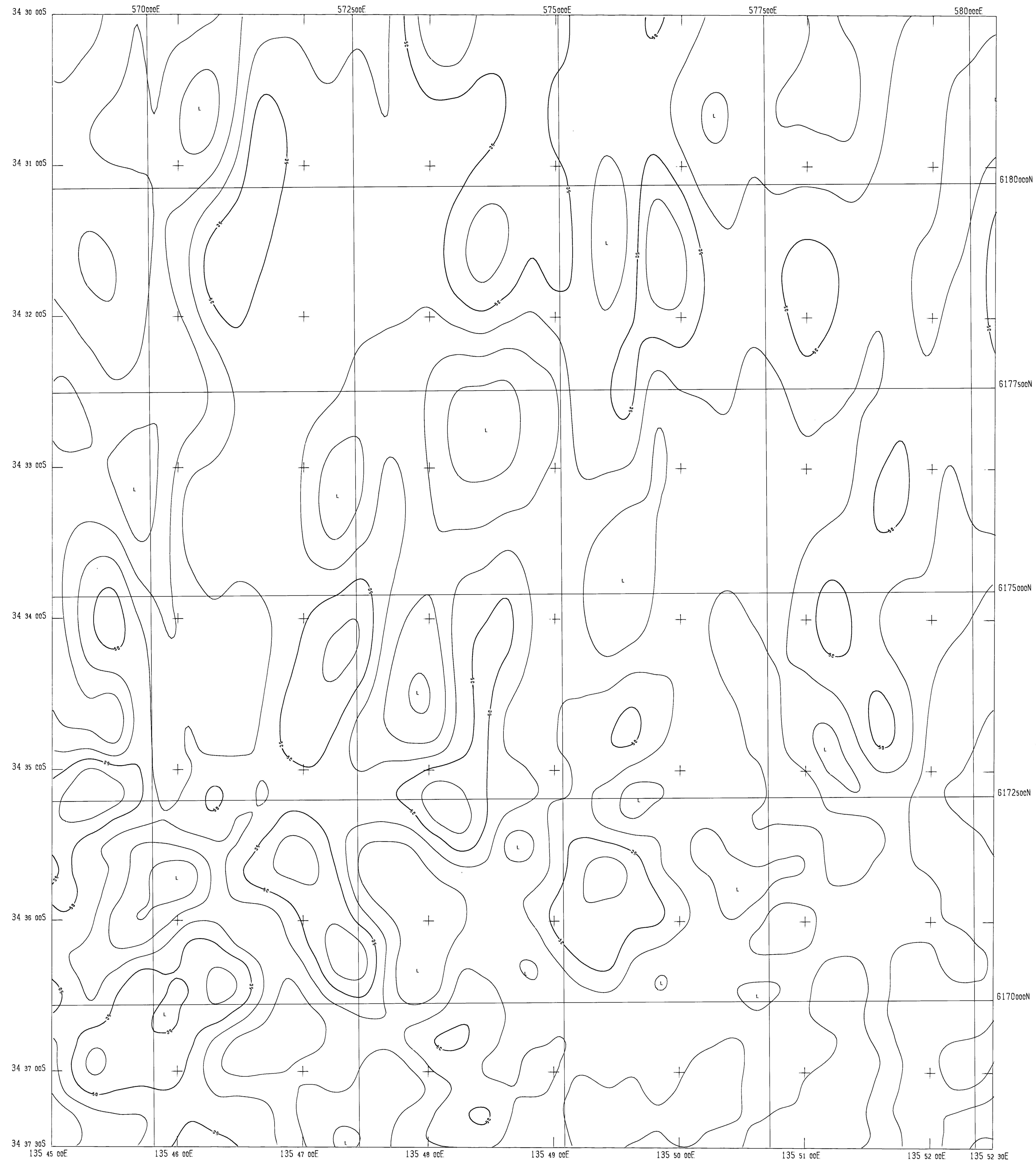
DWG. No. S153-11. GPR. 2678	DATE: 19-FEB-80



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AFMECO (AUST) LTD	
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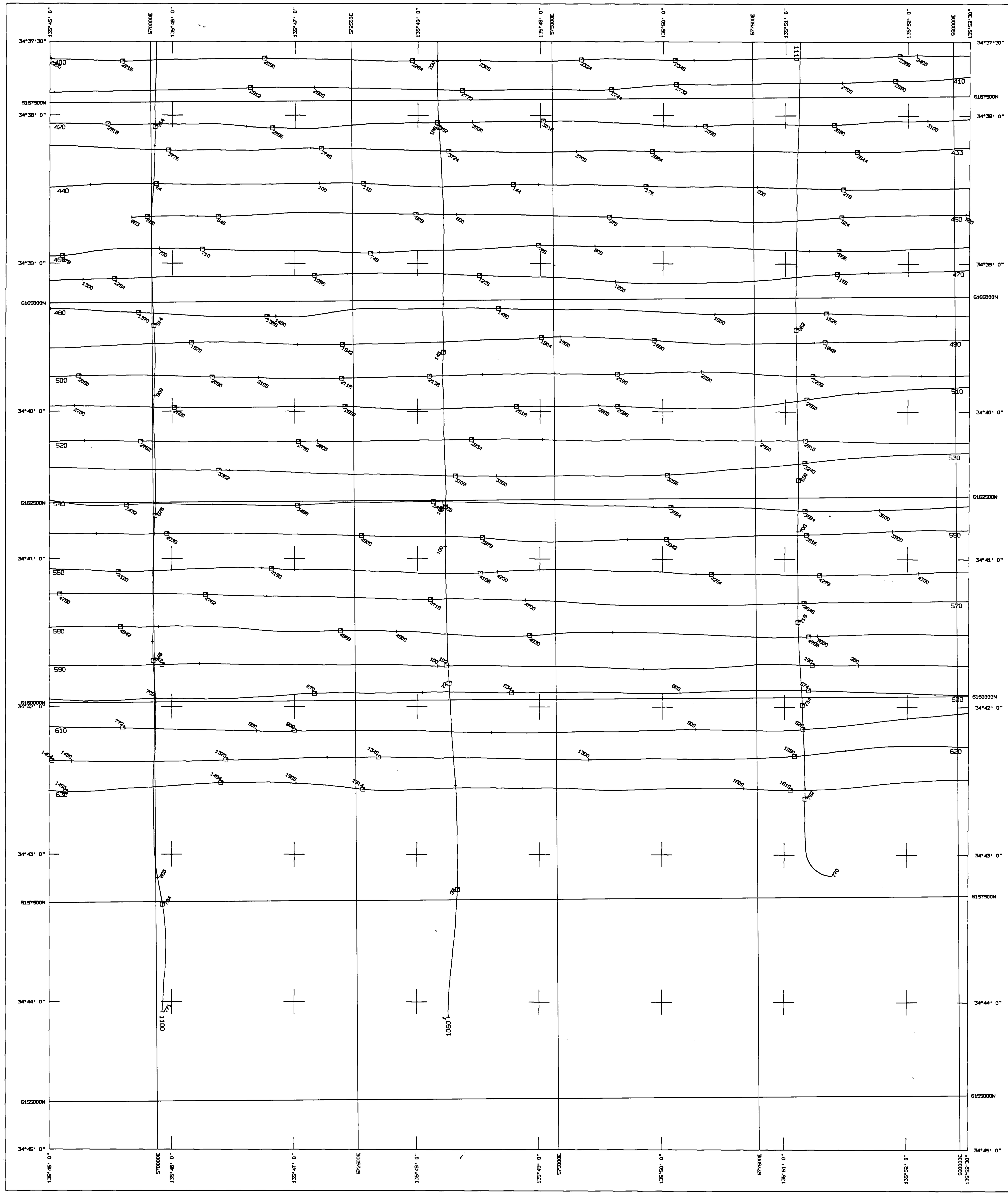

TUMBY BAY – FLIGHT LINES

SHEET – 6028-I-SW

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AUSTIREX AERIAL SURVEYS PTY. LTD. 19/MAR/80

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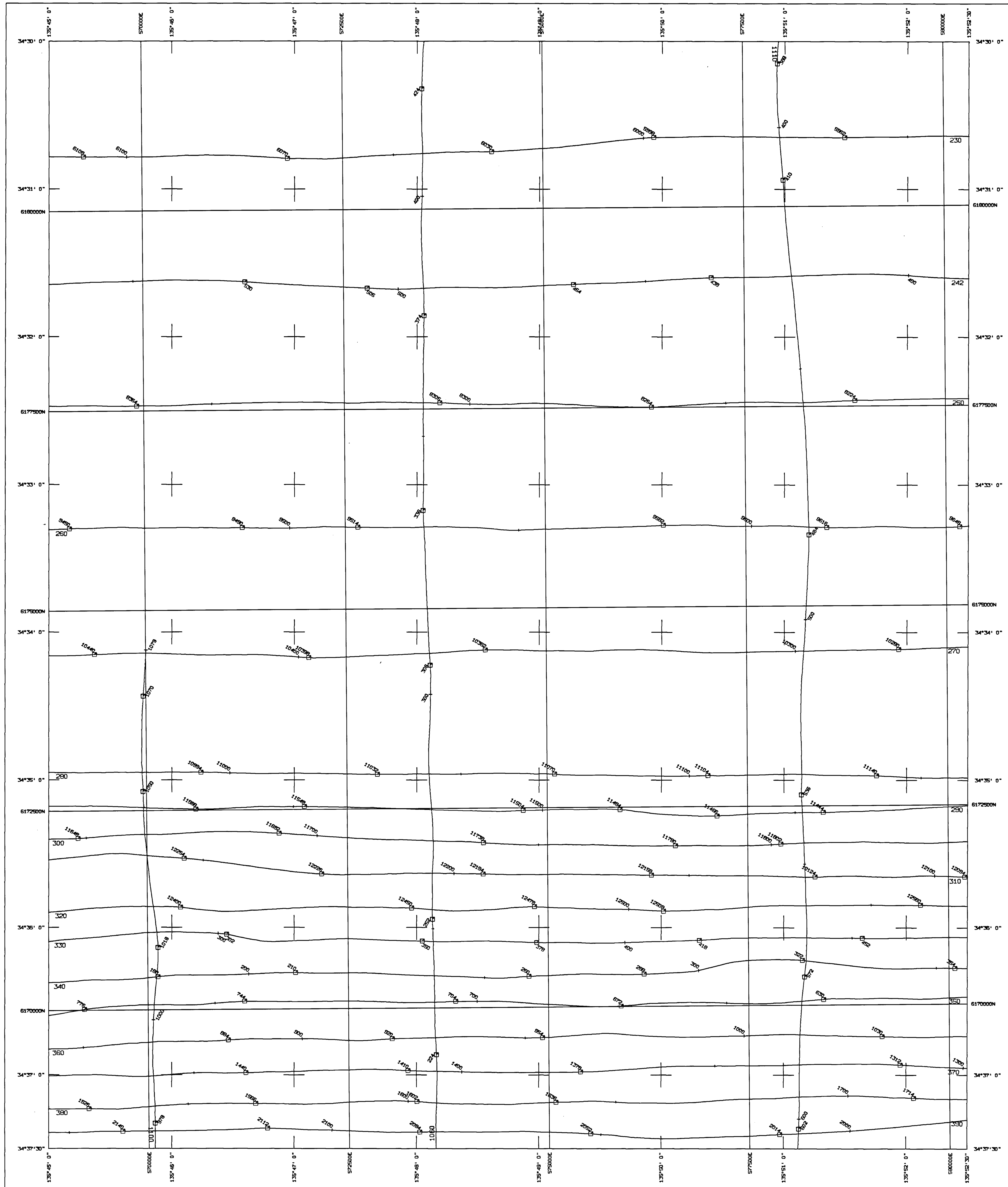

TUMBY BAY - FLIGHT LINES

SHEET - 6028-I-NW

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AUSTIREX AERIAL SURVEYS PTY. LTD. 18/MAR/80

DWG.No.S153-11.S.2687