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No. 4032

EL 730 - EL 739

WYOLA PROJECT AREAS 1 - 10
[GREAT VICTORIA DESERT]

PROGRESS AND FINAL REPORTS
FOR THE PERIOD 6/10/80 TO 14/9/81

Submitted by

CRA Exploration Pty Ltd
1981

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

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PRIMARY INDUSTRIES
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EM	IP	INPUT	GMA	AMAG	GRV	SEOL	STGC	SOSE	RGC	RAB	PD	PD	TARSS

E.L. NO. : 732-3, 735-6 738-9.

NAME : Wyola 3, 4, 7, 8, 11, 13.

AREA : Eucla Basin.

DURATION :

TARGET : 1) Oil shale, 2) lignite 3) MVT.

COMPANY : CRA. Swan Resource & Eagle Corp.

REFERENCE : SADM ENV. 4112.

MAP SHEET : Ooldea, Nullabor. Murrice Wyola.

AREA OF BHP ELA COVERED:

1) No CO_2 in Observatory Hill Beds in area of ELs
 capped by ~~SADM~~ CRAE + SADM
 Rock chips now 350 ppm Cu (not found in assay sheets)
 Ba 1200 ppm As 270 ppm.

Holes drilled

80 EP 7 ~~but~~ intersected sand + red bed facies.

80 EP 2 TD 128 m

80 EP 3 TD 128 m

80 EP 7 TD 232 m 66-232 m Observatory Hill Beds

80 EP 4 144

80 EP 5 168

80 EP 6A 232 76-232 m Observatory Hill Beds

TENEMENT: WYOLA 2 E.L. 731, WYOLA 3 E.L. 732, WYOLA 4 E.L. 733
WYOLA 5 E.L. 734, WYOLA 7 E.L. 735, WYOLA 8 E.L. 736
WYOLA 10 E.L. 737, WYOLA 11 E.L. 738 and 739

TENEMENT HOLDER: C.R.A. Exploration Pty. Ltd

REPORT:

MANNING, R.A. 1981

First Quarterly report on Wyola E.L. 730,
South Australia. For the period
th October 1980 to 5th May 1981

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November - December . Drilling
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- b) Helicopter survey.
- c) Drilling programme.

(pgs. 34-52)

REPORT:

ANDREWS, D.L. 1981

Second quarterly report on Wyola 1 E.L. 730
Wyola 2 E.L. 731, WYOLA 5 E.L. 734 and WYOLA 10
E.L. 737.

South Australia. For the period ending 5th April
1981

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REPORT:

ANDREWS, D.L. 1981

Final report on Wyola 10 E.L. 737
South Australia.

(pgs. 72-104)

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REPORT:

ANDREWS, D.L. 1981

Final report on Wyola 1 E.L. 730
and Wyola 2 E.L. 731 South Australia.

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C.R.A. EXPLORATION PTY. LIMITED

FIRST QUARTERLY REPORT ON WYOLA 1 E.L. 730,
WYOLA 2 E.L. 731, WYOLA 3 E.L. 732, WYOLA 4 E.L. 733,
WYOLA 5 E.L. 734, WYOLA 7 E.L. 735, WYOLA 8 E.L. 736,
WYOLA 10 E.L. 737, WYOLA 11 E.L. 738
AND WYOLA E.L. 739, SOUTH AUSTRALIA
FOR THE PERIOD 6.10.80 TO 5.1.81

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AUTHOR : R.A. MANNING

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ACCEPTED BY : *[Signature]*

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1. SUMMARY

E.L.'s 730 to 739 were taken out to search for oil shale in the Cretaceous Madura Formation shales of the Eucla Basin. Secondary targets are the possibility of Mississippi Valley type lead-zinc mineralisation and oil shale accumulations in the Cambrian Observatory Hill Beds of the Officer Basin, and lignite occurrences in the Tertiary Pidinga Formation shales in the Eucla Basin. The programme is a joint venture between C.R.A. Exploration Pty. Ltd. (80%), Swan Resources Limited (10%) and Eagle Corporation Limited (10%) with C.R.A.E. acting as manager for the partners.

During the first quarter, research and data compilation for the Eucla Basin in South Australia were completed, and geophysical interpretation of available data carried out by consultant John Ashley. Cuttings of bores and oil wells drilled in the Eucla Basin were sampled from the S.A.D.M.E. core library. Samples were analysed for oil yields using a modified Fischer Distillation and results were low. A number of 5 to 15 litres/tonne yields have been intersected at depths of 73 metres and greater.

A helicopter sampling survey along the margin between the Eucla Basin and Officer Basin took place in November, 1980. Assays for basemetals yield low results, however, barium and fluorine results are anomalously high for a region in E.L. 737.

Six percussion drill holes were drilled north of the Transcontinental railway in E.L.'s 730 to 734 and 739. Drill hole 80 EP5 intersected a coal-bearing sub-basin within the Eucla Basin, close to the South Australia/Western Australia border. Contamination of samples was extreme and the nature and extent of the sub-bituminous coal is unknown. The remaining five holes intersected no coal or oil shale horizons. Modified Fischer Distillation of samples reveal low yields, with the exception of the interval from 82 to 168m in hole 80 EP5. //

2. INTRODUCTION

C.R.A. Exploration Pty. Limited entered into a joint venture agreement on the 9th April, 1980, with Swan Resources Limited and Eagle Corporation Limited to explore for oil shale in the Eucla Basin of South Australia. Exploration philosophy is based on a reported occurrence of a thick, oily Cretaceous shale horizon intersected in Muddaugana No. 7, a 1920's water bore. A multicommodity approach is being maintained, and some attention will be focused on the possibility of lead-zinc mineralisation and oil shales occurring in the Cambrian Observatory Hill Beds, and for Tertiary lignite deposits to occur along the margins of the Eucla Basin.

Limited oil exploration activities were undertaken by Outback Oil Company N.L. in the vicinity of Hughes and Denman Rail Sidings along the Transcontinental railway line, and south of the Eyre Highway near Mallabie Tanks. No evaluation of the oil shale potential of the Eucla Basin has previously been attempted.

During construction of the Transcontinental railway a number of water bores were sunk. These provided the first subsurface geological information on the basin. Drill logs and cuttings still exist for some bores.

In 1979 S.A.D.M.E. conducted a helicopter mapping and sampling programme along the southern Officer Basin. This was the last active research programme in the vicinity of the Wyola E.L.'s.

Wyola 1 E.L. 730, Wyola 2 E.L. 731, Wyola 3 E.L. 732, Wyola 4 E.L. 733, Wyola 5 E.L. 734, Wyola 7 E.L. 735, Wyola 8 E.L. 736, Wyola 10 E.L. 737, Wyola 11 E.L. 738 and Wyola 13 E.L. 739 were granted to the joint venture partners on 6th October, 1980. Total annual expenditure commitment to S.A.D.M.E. for the ten E.L.'s is \$750,000. The licences cover a combined area of 26,686 square kilometres.

3. CONCLUSIONS AND RECOMMENDATIONS

A subsurface sub-basin of unknown proportions and coal and oil shale potential was intersected in drill hole 80 EP5 of the recent drilling programme. Oil yields for samples between 82 and 168m are greater than 15 litres per tonne. Nothing of significance was encountered in the remainder of the programme.

Results from the recent helicopter survey indicate only one anomaly - a barium, arsenic anomaly in E.L. 737 (Wyola 10). Carbonate facies of the Observatory Hill Beds are restricted to the region outside the exploration licence areas along the South Australia/Western Australia border, thus, the potential for Mississippi Valley type mineralisation in the Observatory Hill Beds elsewhere in the E.L.'s is considerably downgraded.

It is recommended that both the anomalous findings of the helicopter and drilling programmes be followed-up (ressampling of the barium/arsenic anomaly in Wyola will require the use of a helicopter).

This work will involve the retention of the E.L.'s 730, 731 and 737. The oil shale and lead-zinc potential of E.L.'s 732-736, 738 and 739 is thought to be very low and it is recommended that they be relinquished.

Contractors have been contacted for follow-up drilling of 80 EP5. It is necessary that 80 EP5 be redrilled to quantify the quantity and quality of coal. The drilling method will preferably be percussion (or rotary air blasting) to the base of the limestone, and rotary mud coring of the remainder of the sedimentary sequence. Depending on the capabilities of the rig available it is recommended the underlying Observatory Hill Beds be tested for lead-zinc mineralisation. Step out drilling from 80 EP5 of distances of five to ten kilometres should be the extent of the initial follow-up drilling programme. At present a total of five holes are planned for this programme.

4. PREVIOUS EXPLORATION

4.1 Outback Oil Company N.L.

Previous exploration within the Eucla Basin has been restricted to oil exploration within the vicinity of the transcontinental railway line and south of the Eyre Highway near Mallabie Tanks.

Outback Oil Company N.L.'s exploration took place in three stages during the years 1964, 1966 and 1969.

1964

Cook No. 1 was drilled 21 miles south-east of the Cook Rail Siding. Total depth was 915 feet. No Cretaceous sediments (shales or sands) were intersected, although the Eocene Pidinga Formation encountered was highly carbonaceous with some coaly matter.

No hydrocarbons were detected.

1966

Exploration centred around the Denman and Hughes Rail Sidings where four deep holes were drilled. These were Hughes (R.S.) No. 1, Hughes (N.W.) No. 2, Hughes (N.E.) No. 3 and Denman No. 1.

All wells were abandoned in the Cambrian red-bed, dolomite and sandstone sequence of the Observatory Hill Beds.

Traces of soft, black, bituminous material were detected in Hughes (N.W.) No. 2 in Cretaceous gravels and in Cambrian Sediments of Denman No. 1. Occasional oil stained grains were also noted in Cambrian sands of Denman No. 1.

Cambrian sediments are considered to be the source beds with migration of hydrocarbons occurring between the Cambrian and Cretaceous strata. It is concluded that the majority of hydrocarbons were lost during the erosional hiatus which existed between Cambrian and Cretaceous times.

1969

Outback - Pickrell No. 1 Mallabie was drilled in the vicinity of the Mallabie Tanks.

No hydrocarbons were detected other than a gas show recorded whilst drilling in crystalline basement rocks. The show is of doubtful significance.

Geologically, Mallabie No. 1 proved the existence of a thicker sedimentary sequence than had previously been indicated. The large depression which Mallabie No. 1 penetrated was subsequently named the Mallabie Depression or Trough.

4.2 Water Bores

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During the 1920's a number of water bores were sunk during the construction of both the Transcontinental railway line and the old Eyre Highway. These bores provided the first subsurface geological information of the Eucla Basin in South Australia, and have been used in our correlations.

4.3 S.A.D.M.E.

In 1979 a helicopter mapping and sampling survey of the southern Officer Basin in South Australia and far eastern Western Australia was conducted by the South Australian Department of Mines and Energy. All results were made available to C.R.A.E.

The major unit encountered throughout the survey was the mid to upper Cambrian Wanna Beds sandstones and orthoquartzites. The lower Cambrian Observatory Hill Beds was found to be predominantly a sandstone unit with a carbonate facies occurring along the South Australian-Western Australian border in the Forrest Lakes region.

Petrological work was undertaken. No samples were assayed for any elements.

5. REGIONAL GEOLOGY

5.1 Eucla Basin

5.1.1 Structure

The Eucla Basin in South Australia is an arcuate basin deepening gradually to the west and south. To the north it overlies the early Palaeozoic Officer Basin, whilst westwards it onlaps crystalline basement rocks of the Gawler Craton.

The role of faulting and folding in the basement is unknown, and no evidence has yet been found for either. However, deep seated basement faults are likely to be responsible for the Denman and Mallabie Depressions, which are large basin-like depressions underlying the Eucla Basin. Limited information on the size and shape of these "basins" is available.

A small Tertiary depression in the Eucla Basin is revealed by Nullarbor No. 6 Bore where the Eocene Pidinga Formation thickens. Such marginal depressions may prove to be a feature of the Eucla Basin.

5.1.2 Stratigraphy

The "basement" underlying the Eucla Basin is composed of a variable suite of rocks, including crystalline rock units of the Gawler Craton, Proterozoic shales, Cambrian sandstones and limestones, and un-named Permian sediments. Along the eastern and western margins, the Eucla Basin onlaps crystalline basement. Proterozoic shales have been intersected in the central-southern portion of the basin, whilst Cambrian sediments are overlain throughout the basin. Permian strata is restricted to discrete depressions within the Cambrian-Precambrian surface (eg. Denman and Mallabie Depressions).

Sedimentation within the Eucla Basin was initiated in the Lower Cretaceous. Intermittent subsidence and stable basin conditions were followed by shallow marine conditions in the Upper Eocene and Miocene. 012

Very coarse to pebbly, quartz grits of the Loongana Conglomerate signify the commencement of deposition. Overlying the Loongana Conglomerate is the Lower Cretaceous Madura Formation, a sequence of grey to black siltstones, shales, mudstones and claystones which are monotonous and often very thick (up to 171 metres). Pyrite and glauconite are commonly associated with the carbonaceous sediments.

Disconformably overlying the Cretaceous are the Tertiary (Eocene) Hampton Conglomerate and Pidinga Formation. The Pidinga Formation is distributed mainly along the margins of the basin, and is a highly carbonaceous shale unit with lignite deposits located further to the east in the vicinity of Pidinga.

These Cretaceous and Eocene clastic sequences are considered to be paralic.

The upper Eocene Wilsons Bluff limestone and Miocene Nullarbor limestone disconformably overlie the sands and shales. These widespread, highly fossiliferous units represent complete inundation of the basin by shallow marine conditions.

5.2 Officer Basin

5.2.1. Structure

The Officer Basin deepens northwards where it abuts the Precambrian crystalline basement of the Musgrave Block. Cambrian strata outcrop along the basin's margin.

5.2.2 Stratigraphy

The Officer Basin is an elongate, intracratonic depression containing sediment of Late Proterozoic to Palaeozoic (Pre-Permian) age, with an unknown number of stratigraphic breaks.

The unit of interest to C.R.A. Exploration Pty. Limited is the Cambrian Observatory Hill Beds, which are a sequence of clastics and carbonates located predominantly along the eastern and southern margins. Chert-carbonate associations are a characteristic lithological unit, especially in the eastern section. The sediments were formed during a period of tectonic instability, and were deposited in a shallow water, medium to low energy environment. Mildly evaporitic conditions are indicated by the presence of beds of gypsum and chemically precipitated carbonates.

Overlying stratigraphic units within the basin are all of clastic nature.

6. C.R.A. EXPLORATION PROGRAMME AND RESULTS

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6.1 Research and Data Compilation

The Eucla Basin has been found to be an arcuate basin deepening gently to the west and south. The Cretaceous Madura Formation shales are a widespread grey to black carbonaceous unit, sandy in places (e.g. Mallabie Depression) and thinning towards the margins.

Comparison of contour maps of depth to basement (Outback Oil Company N.L., Env. 1172, S.A.D.M.E. Open File), depth to Cretaceous and thickness of the Madura Formation reveals that the structure of the Eucla Basin is complex and does not necessarily represent basement topography. The extent of the folding and faulting of the Eucla Basin is not known.

North of the Ooldea Sand Ridge a sequence of flat lying carbonates and sandstones of the Officer Basin are intermittently exposed. No Cretaceous sediments have been discovered north of this topographic feature.

Cross sections and isopach maps of the Eucla Basin are appended to this report.

6.2 Sampling for Water Bores

The Cretaceous Madura Formation has been sampled from all available drill cuttings held at S.A.D.M.E.'s core library. Results to date have been low, the maximum oil yield being 5 to 15 litres/tonne. These intersections are listed below.

<u>HOLE</u>	<u>DEPTH</u>
Hughes (R.S.) No. 1	152-155 162-165 171-174
Hughes (N.W.) No. 2	73- 74 116-119 122-125
Hughes (N.E.) No. 3	95- 98 113-117 174-177 (Cambrian Sediments)

Assays from the recent drilling program confirm these low oil yields for the Cretaceous sequence, except in a region north of Hughes (N.W.) No. 2.

6.3 Helicopter Sampling Survey

During the period November 5-12th, 1980, a helicopter sampling survey was completed in exploration licences 735 to 738 (Wyola 7,8,10,11).

A five seater Bell Jet Ranger III helicopter was chartered from Lloyd Helicopters, an Adelaide based company. The helicopter crew comprised of both a pilot and engineer. No technical problems were encountered throughout the duration of the programme.

The purpose of the survey was to map and sample the Cambrian Observatory Hill Beds which, to the north, is the basal unit of the Officer Basin. Carbonate facies of the beds intersected during earlier drilling by previous explorers to the north and south of the survey area have displayed potential for Mississippi Valley type lead-zinc mineralisation, for evaporite accumulations, and for the development of oil shales.

Minor development of carbonate facies in the Observatory Hill Beds, which was found along the South Australia/Western Australia border, extended into Western Australia. No evidence of oxidized sulphides or weathered oil shales was found in the sequence. The remaining Observatory Hill Beds outcrops were sandstones and siltstones located in E.L. 636 to the south of the Ooldea Sand Range. The predominant rock type encountered was a barren, pale sandstone of the Upper Cambrian Wanna Sandstone.

A total of 178 rock samples of variable lithologies were collected during the survey. All samples were submitted for copper, lead, zinc, barium, arsenic and uranium analyses. Observatory Hill lithologies were also analysed for fluorine and manganese. Assay results have been received, the maximum values being copper 350 p.p.m.; barium, 4,300 p.p.m.; arsenic, 530 p.p.m.; uranium, 8 p.p.m.; fluorine, 1000 p.p.m. and manganese, 1550 p.p.m.

Initial inspection of the assay results showed a barium and arsenic anomaly in the Wyola Lakes region of E.L. 737 (Wyola 10). This anomaly will be followed up by a resampling programme in the second quarter.

6.4 Drilling

Drilling operations have recently been completed on E.L.'s 730 to 734 and 739. Major targets of the programme were the possible development of thick oil shale accumulations in the Cretaceous Madura Formation, and lead-zinc mineralisation and oil shale development in the Cambrian Observatory Hill Beds. The Tertiary Pidinga Formation shales and the possibility of lignite occurrences around the margin of the basin were a secondary target.

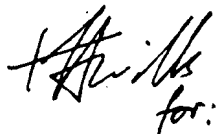
Diamond Drilling Pty. Limited (P. Nitschke) were contracted to drill six holes north of the Transcontinental railway. A total of 1032 metres were drilled. Drilling problems were frequently encountered and resulted in the premature abandonment of several holes. Tertiary and Cretaceous sediments were penetrated in all holes, however, the Cambrian Sequence was only reached in the northern two holes.

The Cretaceous Madura Formation was generally thinner and shallower than expected, except in the vicinity of 80 EP5 where a concealed, coal-bearing, sub-basin was penetrated. It is a feature in the underlying Cambrian or Precambrian basement surface, and its influence persisted throughout Cretaceous to early Tertiary times (coal sequences in Cretaceous (?) and lignitic and woody fragments in Eocene shales). A rough outline of the basin, subsequently named the Denman Trough, has been compiled from previous oil bores and geophysical work by consultant John Ashley (see plan SAa 655). The age of the sub-bituminous coal seams intersected in 80 EP5 is unknown but may be Cretaceous or possibly Permian.

Sections of the Observatory Hill Beds intersected in the northernmost holes - 80 EP6a and 7, were sandy and red bed facies rather than carbonate facies. This virtually eliminates the potential for Mississippi Valley type lead-zinc environments in these central E.L.'s. The potential for lead-zinc mineralisation in the southern areas remains untested due to drilling difficulties. No evidence has been noted for the development of Cambrian oil shales.

Distribution of the Eocene Pidinga Formation and Hampton Conglomerate appears to be irregular. Dark, grey and olive clays were intersected in most holes with or without the Hampton Conglomerate.

Modified Fischer Distillations were carried out on all samples of the Madura Formation and Observatory Hill Beds. With the exception of 80 EP5 oil yields were very low. The Madura Formation in drillhole 80 EP5 averaged an oil yield of greater than 15 litres/tonne. A Fischer Distillation will be carried on each of these samples to obtain more accurate oil yields. Results of these analyses are expected in the next quarter.



R.A. MANNING

KEYWORDS

Arsenic, barium, coal-sub-bituminous, oil shale, lead, zinc, black shale-pyritic, carbonate, basin, Palaeozoic-Cambrian, Mesozoic-Cretaceous, Tertiary-Eocene, assays-geochem.

LOCATION

Noorina	SH52-3	1:250,000 Map Sheet
Wells	SH52-4	" " "
Wyola	SH52-7	" " "
Maurice	SH52-8	" " "
Cook	SH52-11	" " "
Ooldea	SH52-12	" " "

LIST OF PLANS

SAa	404	Isopach Map of Thickness of the Lower Cretaceous	1:2,000,000
SAa	405	Isopach Map of Depths of the Lower Cretaceous	1:2,000,000
SAa	426	Cross Sections - Eucla Basin, S.A.	
SAa	657	Summary of Results - Drilling and Helicopter Survey, Eucla and Souther Officer Basin	1:2,000,000
SAa	658	Fence Diagram, Drilling Programme, November-December, 1980	1:250,000
SAa	641	Lithological Distribution Map - Helicopter Survey	1:1,000,000
SAa	642	Sample Sites - Noorina	1:250,000
SAa	643	Sample Lithologies - Noorina	1:250,000
SAa	646	Sample Sites - Wells	1:250,000
SAa	647	Sample Lithologies - Wells	1:250,000
SAa	644	Sample Sites - Wyola	1:250,000
SAa	645	Sample Lithologies - Wyola	1:250,000
SAa	648	Sample Sites - Maurice	1:250,000
SAa	649	Sample Lithologies - Maurice	1:250,000
SAa	650	Sample Sites - Wanna	1:250,000
SAa	651	Sample Lithologies - Wanna	1:250,000
SAa	652	Sample Sites - Mason	1:250,000
SAa	653	Sample Lithologies - Mason	1:250,000

APPENDICES

- Appendix I: Lithological Descriptions - Helicopter Survey
- Appendix II Sample Numbers, Locations and Descriptions - Helicopter Survey
- Appendix III Drill Logs - Summary Logs
- November-December Drilling Programme
- Appendix IV Assay Results
- a- Oil and Water Bore Sampling
 - b- Helicopter Survey
 - c- Drilling Programme

130° 30'

132°

WESTERN AUST.
SOUTH AUST.

KEY 018

• Petroleum Well.

x Water Well.

○² Proposed Drill Hole
location, number &
estimated depth.

0 20 40 60 80 100 KMS.

30°

30°

31°

31°

32°

32°

GREAT AUSTRALIAN BIGHT

EUCLA AND OFFICER BASINS

C.R.A. EXPLORATION PTY. LIMITED.

ISOPACH MAP OF THE THICKNESS
OF THE LOWER
CRETACEOUS MADURA FORMATION

Geol.: R.M.

Scale 1:2,000,000

Drawn: D.W.

Report N°: 10362

Date: MAR., 1980.

Plan N°: SAa 404

WESTERN AUST.
SOUTH AUST.

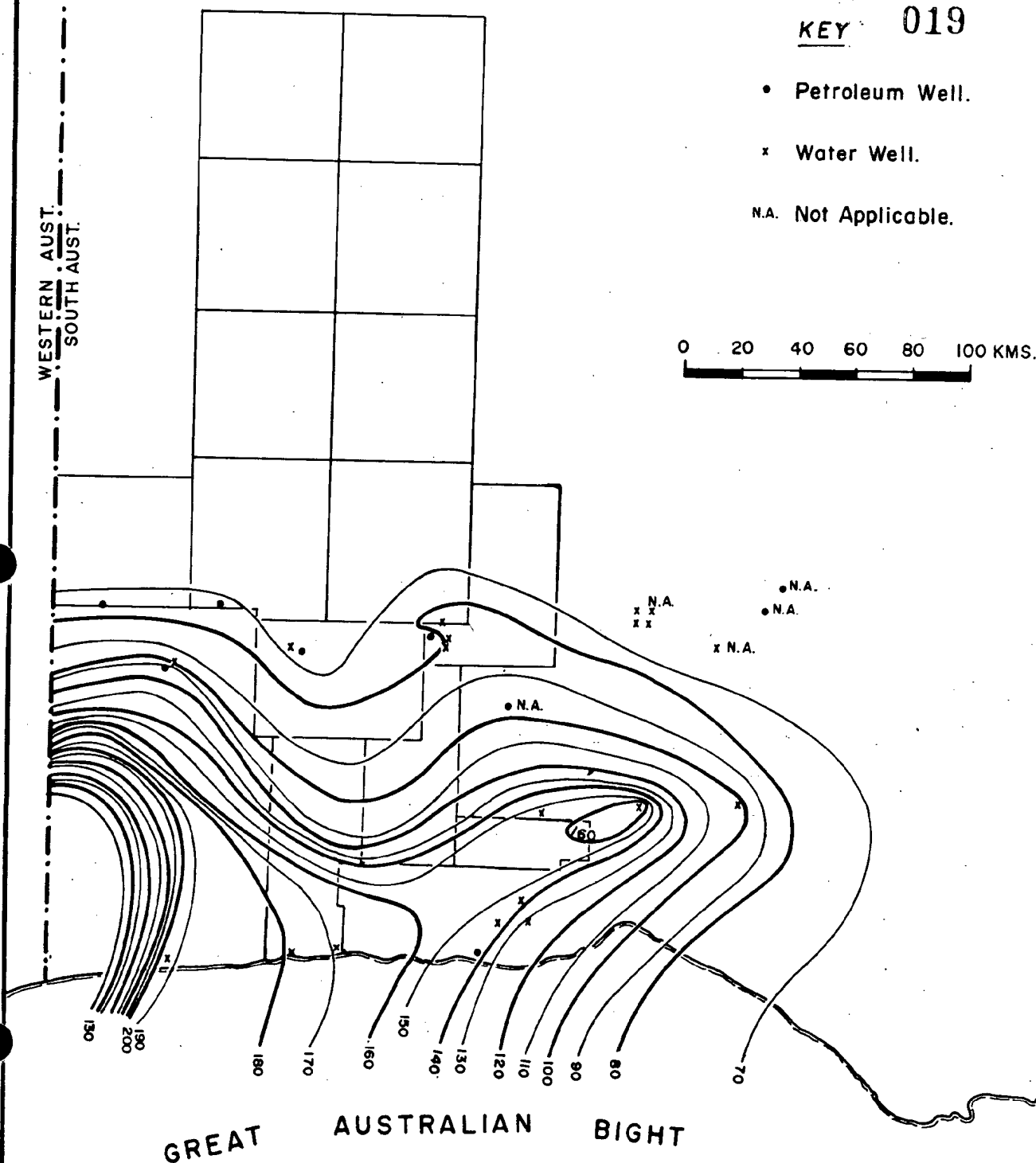
KEY 019

• Petroleum Well.

x Water Well.

N.A. Not Applicable.

0 20 40 60 80 100 KMS.



GREAT AUSTRALIAN BIGHT

C.R.A. EXPLORATION PTY. LIMITED.

ISOPACH MAP OF THE DEPTHS
OF THE LOWER
CRETACEOUS MADURA FORMATION

Geol.: R.M.	Scale 1:2,000,000
Drawn: D.W.	Report N°: 10362
Date: MAR, 1980	Plan N°: SAg 405.

APPENDIX 1

LITHOLOGICAL DESCRIPTIONS - HELICOPTER SURVEY

Appendix I - Lithological Descriptions

- Quaternary Calcrete (Qc) - Dull light brown to reddish grey calcrete. Some rounded quartz grains. Pisolitic. Occasionally fossiliferous. May be composed of rock fragments from underlying strata.
- Tertiary Limestone (Tl) - Dark grey, nodular and rubbly limestones. Often calcretised. Rare fossils.
- Pidinga Formation (Tp) - Yellow-brown to redbrown, bimodal, medium to coarse grained sandstone. Often poorly sorted. Micaceous in places. May contain quartzite pebbles in minor conglomeratic zones (quartzite pebbles float often near Pidinga outcrops). Locally very iron rich. Some forest beds.
- Wanna Beds (Ew) - Pale grey brown, micaceous, medium to coarse grained sandstones. Often silicified and may be ironstained and appear very similar to the Lennis Sandstone. Thinly bedded, crossbedded with good forests developed. Often extensively bioturbated and in places locally contorted.
- Lennis Sandstone (El) - Red-brown, micaceous, flaggy. Medium to coarse grained sandstone. Noncalcareous. Poorly laminated to massive sandstones, possibly slightly bioturbated.
- Observatory Hill Beds (Eo) - Micaceous, dull grey to greenish-yellow, well laminated, carbonates, calcareous shales and sandstones. Some minor purple staining. Carbonate content varies.

022

APPENDIX II

SAMPLE NUMBERS, LOCATIONS AND DESCRIPTIONS

HELICOPTER SURVEY

SITE NO.	SAMPLE NO.	PHOTO NO.	GRID CO-ORD.	1:250,000 SHEET	ROCK TYPE
890251	890251	2219/160	313332	Wyola	Wanna Beds
	890252		313332		Observatory Hill (??)
	890253		313332		
	890254		313332		
	890255		313332		
890256	890256	2219/160	312333		Observatory Hill (??)
890257	890257	2219/160	312335		Calcrete
	890258		312335		Tertiary l'stone (?)
890259	890259	2219/160	316332		Tertiary l'stone (?)
	890260		316332		Calcrete (?)
890261	890261	2219/160	317332		Tertiary l'stone (?)
	890262		317332		Calcrete
890263	890263		317333		Calcrete
890264	890264	2219/160	318333		Qtzite Wanna (?)
890265	890265	2219/160	321333		Tertiary (?) sandstone
	890266		321333		Qtzite
					Tertiary (?) sandstone
890267	890267	2219/160	324331		Qtzite
890268	890268	2219/094	326331		Silcrete
890269	890269	2219/094	327330		Orthoqtzite
890270	890270	2219/094	339326		Silcreted sandstone
890271	890271	2219/094	341325		Fe qtzite
	890272	2219/094	341325		Micaceous sandstone
890273	890273	2219/094	341325		Calcrete
890274	890274	2219/094	343326		Micaceous siltstone
890275	890275	2219/160	319334		Micaceous sandstone
890276	890276	2219/176	325393		Festone Tertiary
890277	890277	2219/176	326391		Micaceous sandstone Wanna
890278	890278	2219/176	324390		Micaceous siltstone
	890279	2219/176	324390		Wanna Beds
	890280	2219/176	324390		
	890281	2219/176	324390		
890282	890282	2219/176	323388		Wanna Beds
890283	890283	2219/176	328389		Clay lenses in Wanna Bed
890284	890284	2219/176	332385		Sandstone Wanna Beds
890285	890285	2219/176	332384		Sandstone Wanna Beds
890286	890286	2219/176	334380		Sandstone Wanna Beds
890287	890287	2219/176	332381		Sandstone Wanna Beds
890288	890288	2219/176	329376		Sandstone Wanna Beds
890289	890289	2219/176	327374		Sandstone Wanna Beds
890290	890290	2219/172	343384		Sandstone Wanna Beds
	890291	2219/172			Festone: over € prob t.
890292	890292	2219/172	349385		Festone: over € prob t.
	890293	2219/172	349385		Sandstone Wanna Beds
890294		2219/172	350384		Sandy limestone
890295		2219/172	349380		Silcrete green
890296		2219/172	348379		Off white - grey limestone

SITE NO.	SAMPLE NO.	PHOTO NO.	GRID CO-ORD.	1:250,000 SHEET	ROCK TYPE
890297	890297	2245/043	313384	Wyola	Pidinga sands (?)
890298	890298	2245/043	314385		Festone
890299	890299	2245/043	312386		Wanna Beds (sandstone)
	890300	2245/043	312386		Wanna Beds (sandstone) (Fe rich)
890301			312386		} CONTROL
890302			312386		
890303			312386		
890304			312386		
890305			312386		
890306			312386		
890307	890307	2245/043	313387	Wyola	Pidinga sandstone (?) / Hampton Congl.
890308	890308	2245/043	311387		Wanna beds micaceous sandstone
890309	890309	2245/043	309391		micaceous sandstone (Wanna Beds?)
890310	890310	2220/056	309394		Fe rich micaceous sandstone (Wanna Beds?)
890311	890311	2220/056	308396		micaceous sandstones (C)
890312	890312	2220/056	306398		knotted micaceous sandstones (C)
890313	890313	2220/056	303403		micaceous sandstone (C)
890314	890314	2220/060	302399		Pidinga Formation (?)
890315	890315	2245/048	289386		Fe rich micaceous sandstone (C)
890316	890316	2245/048	283383		Fe rich micaceous sandstone (C)
890317	890317	2245/048	285387		micaceous sandstone (C)
890318	890318	2245/048	286389		micaceous sandstone
890319	890319	1511/186	400339	Maurice	silcrete
	890320	1511/186	400339		Fe rich silcrete s/stone (C??)
	890321	1511/186	400339		calcareous sands cemented (C??)
	890322	1511/186	400339		claystone fissile (Obs. Hill S.A.D.M.E.)
890323	890323	2220/060	285390	Wyola	micaceous sandstone (C)
890324	890324	2220/062	281395		micaceous sandstone (C)
890325	890325	2220/062	276401		micaceous sandstone (C)
890326	890326	2220/064	273403		Tertiary sandstone
890327	890327	2220/064	277406		micaceous Fe rich sandstone
	890328	2220/064	277406		micaceous sandstone
890329	890329	2131/406	280417	Noorina	micaceous sandstone
890330	890330	2131/404	289423		grey tertiary l'stone
	890331	2131/404	289423		silt. from clay pan.
890332	890332	2131/404	296419		grey fine grained tertiary (?) l'stone
890333	890333	2131/402	300410		Ferruginized micaceous sandstone

SITE NO.	SAMPLE NO.	PHOTO NO.	GRID CO-ORD.	1:250,000 SHEET	ROCK TYPE
890334	890334	2131/400	317411	Noorina	tertiary limestone
890335	890335	2131/394	327410		micaceous sandstone
890336	890336	2131/394	327408		micaceous sandstone
890337	890337	2131/394	335409		calcrete
890338	890338	2131/390	340405	Wyola	micaceous sandstone
890339	890339	2131/390	348405	Maurice	micaceous sandstone
890340	890340	2131/390	347408	Wells	micaceous sandstone
890341	890341	2131/390	349413		micaceous sandstone
890342	890342	2132/196	369465		micaceous sandstone
890343	890343	2132/200	352425		Pisolithic calcrete
890344	890344	2132/200	48429		grey (Tertiary ?) limestone
890345	890345	2132/200	345428	Noorina	drill cuttings (Wanna Beds?)
890346	890346	2133/016	344428		micaceous sandstone
890347	890347	2219/179	346427		Fe stone
890348	890348	Serp. Lakes SE	SH52-7		
	890349	" "	190347	Wyola/	Obs. Hill carb.
	890350	" "	190347	Mason	Limestone Tertiary
	890351	" "	190347		Obs. Hill silicified
	890352				
	890353	CONTROL SAMPLES			CONTROL
	890354				
	890355				
	890356				
	890357		190347		Obs. Hill limestone
	890358		190347		Obs. Hill limestone
	890359		190347		Fe stone
	890360		190347		Obs. Hill sandstone
	890361		190347		Obs. Hill calcareous sandstone
	890362		190347		Obs. Hill calcareous sandstone
890363	890363		188346	Wyola	Obs. Hill calc. sandstone
890364	890364		187345	Wanna	Obs. Hill calc. sandstone (?)
890365	890365		188352	Wyola	Non calc. grey sandstone (Lennis)
890366	890366		187352	Wanna	Red Brown micaceous sandstone: Lennis
890367	890367		185352	Wanna	Red Brown micaceous sandstone: Lennis
890368	890368		184353	Wanna	Red Brown micaceous sandstone: Lennis
890369	890369		197363	Wyola	Red Brown micaceous sandstone: Lennis
890370	890370		193364		Lennis s/stone Obs. Hill Beds.
890371	890371		194365		Altered Lennis (?) s/stone
890372	890372		193365		Lennis sandstone (?)
890373	890373		189367		Lennis red brown sandstone
890374	890374	2246/046	297349	Wyola	Calcrete
890375	890375	2246/046	295347		Fe stone

SITE NO.	SAMPLE NO.	PHOTO NO.	GRID CO-ORD.	1:250,000 SHEET	ROCK TYPE
890376	890376	2246/046	293348	Wyola	Fe stone
890377	890377	2246/046	285352		Wanna Beds silicified
890378	890378	2246/046	283352		Pisolitic calcrete
890379	890379	2246/048	277353		Fe stone; Pidinga
890380	890380	2246/048	275353		Wanna Beds
890381	890381	2245/096	263363		Silicified sandstone
890382	890382	2245/096	247365		Wanna Beds
890383	890383	2245/058	259386		Wanna Beds
890384	890384	2245/058	246388		Wanna Beds
890385	890385	2220/072	241400		Wanna Beds
890386	890386	2245/062	232388		Wanna Beds
890387	890387	2220/078	203395		Lennis sandstone
890388	890388	2220/078	202398		Wanna Beds
890389	890389	2245/068	217377		Wanna Beds
890390	890390	2245/88	228375		Wanna Beds
890391	890391	2245/88	232367		Wanna Beds
		Serp. Lakes	SE	SH52-7	
890392	890392	"	" 190347	Mason	Calcareous Obs. Hill Beds
890393	890393	N/A	178355		Obs. Hill Beds (?)
890394	890394		176355		Obs. Hill Beds (?)
890395	890395		173353		Calcretized calc. Obs. Hill Beds.
890396	890396		165355		Obs. Hill Beds (?)
890397	890397		163353		Pisolitic Tertiary l'stone
890398	890398		148351		Wanna Beds sandstone
890399	890399		151356		Wanna Beds sandstone
890400	890400		157354		Wanna Beds sandstone
890401					} CONTROL
890402					
890403					
890404					
890405					
890406					
890407	890407		156360		Wanna Beds sandstone (?)
890408	890408		189365		Wanna Beds sandstone (?)
890409	890409		173371		Obs. Hill Beds/ <u>Wanna</u> Beds
890410	890410		160370		Lennis sandstone
890411	890411		154370		Lennis sandstone
890412	890412		176360		Pisolitic calcrete
890413	890413		172398	Mason	Wanna Beds sandstone
890414	890414		160401		Wanna Beds sandstone
890415	890415		138400		Wanna Beds sandstone
890416	890416		146393		Wanna Beds sandstone
890417	890417		143397		Wanna Beds sandstone
890418	890418		138401		Wanna Beds sandstone
890419	890419		135403		Wanna Beds sandstone
890420	890420		139404	Wanna	Wanna Beds sandstone
890421	890421		181406		Wanna Beds sandstone
890422	890422		184434		Wanna Beds sandstone

SITE NO.	SAMPLE NO.	PHOTO NO.	GRID CO-ORD.	1:250,000 SHEET	ROCK TYPE
890423	890423		185433	Wanna	Pidinga congl/cgr sandstone
890424	890424		167443	↓	Wanna Beds
890425	890425	N/A	142438		Wanna Beds sandstone
890426	890426		151424	↓	Wanna Beds sandstone
890427	890427	2219/030	263277	Wyola	Limestone (Nullarbor?)
890428	890428	2219/094	339316	↓	Orthoquartzite (Tertiary?)

028

APPENDIX III

DRILL LOGS

029

CO-ORDINATES Lat: 21°19' 00" S Long: 126°00' 00" E APPROX. AZIMUTH PERCUSSION DRILLERS NORTHBRIDGE PTY. LTD. COMMENCED 18.9.80 DEPTH 58 m HOLE No. 80 EP 1
 RL COLLAR INCLINATION VERTICAL DRILL TYPE SCHRAMM ROTADRILL TB85 COMPLETED 19.9.80 CASING LEFT 48m 8" DPO No. -

DEPTH FROM TO	REC %	SOLE DIAM. LOG	CUTTINGS DESCRIPTION	SPECIAL FEATURES WEAT., ALTERATION, FRACTURING, VEINING, MINERALIZATION	SAMPLE No.	FROM (m)	TO (m)	CONC. (%)	ASSAY VALUES
0	2	10"	Thin red-brown soil cover. (30cm)		894530	0	2		
2	4		NULLARBOR LIMESTONE - Buff to grey, crystalline limestone. Fossiliferous. Some cuttings show good laminations. Partially recrystallised.	Calcrete fragments.	894531	2	4		
4	6	8"		Quartz and calcite veining.	894532	4	6		
6	8			Vugs lined with crystalline calcite.	894533	6	8		
8	10		WILSONS BLUFF LIMESTONE - buff to white, porous polyzoal limestone. Fine to coarse fossil fragments. Hard. Ferruginous staining of some cuttings. Some soft chalky fragments. Fossils dominantly Bryozoa.	occasional dark grains	894534	8	10		
10	12		as before		894535	10	12		
12	14			Cave entered - 14m	894536	12	14		
14	16		NO RETURNS - CAVERNS			14	16		
16	18					16	18		
18	20			Floor of cave - 19m		18	20		
20	22					20	22		
22	24					22	24		
24	26					24	26		
26	28					26	28		
28	30			Numerous small honeycomb-like hollows 19-38 m.		28	30		
30	32					30	32		
32	34					32	34		
34	36					34	36		
36	38					36	38		
38	40			38-39m thick limestone		38	40		
40	42			Floor of cave. Drill bit threatened with jamming in hole. Hole cased at 48m.		40	42		
42	44	6"	Wilson's Bluff Limestone as before. Macro fossil - internal mould of a mollusc (1.5cm).		894537	42	44		
44	46		as before		894538	44	46		

CASE BY
PLAN No. 10 000

SUMMARY AND SPECIAL COMMENTS: HOLE ABANDONED DUE TO UNSUCCESSFUL ATTEMPTS TO DRILL THROUGH AND CASE TERTIARY LIMESTONE SEQUENCE VERY CAVERNOUS.

LOGGED BY R.A. MANNING DATE 18.19/9/80
SHEET 1 OF 2

030

Lat. 8°19' PERCUSSION DRILL CORE LOG PROJECT EUCLA BASIN JOINT VENTURE
CO-ORDINATES Long. 130°46' approx. AZIMUTH _____ DRILLERS NORTHBIDGE PTY. LTD. COMMENCED 18.9.80 DEPTH 58 m HOLE No. 80 EP 1
RL COLLAR _____ INCLINATION VERTICAL DRILL TYPE SCHRAMM ROTADRILL TGB5 COMPLETED 19.9.80 CASING LEFT 43 m 8" OPO MARK -

[illegible]

CRIME #7
PLANS 89-25-404

SUMMARY AND _____ HOLE ABANDONED
SPECIAL COMMENTS

LOGGED BY R.A. MANNING DATE 19.9.80

031

C.R.A. EXPLORATION PTY LIMITED

PERCUSSION **DRILL CORE LOG**

CO-ORDINATES Lat. $21^{\circ}19'$ Long. $130^{\circ}40'$ APPROX. AZIMUTH _____ DRILLERS NORTHBRIDGE PTY. LTD. COMMENCED 19.9.80 DEPTH 120 m HOLE No. 80 EP 1A

RL COLLAR _____ INCLINATION VERTICAL DRILL TYPE SCHRAMM ROTADRILL TB85 COMPLETED 20.9.80 CASING LEFT 1m R.V.C. DPO No.

DEPTH FROM TO	REC %	HOLE DIAM.	DRILLING LOG	CUTTINGS DESCRIPTION	SPECIAL FEATURES WEATH., ALTERATION, FRACTURING VEINING, MINERALIZATION	SAMPLE NO.	FROM (M)	TO (M)	CON (%)	ASSAY VALUES			
0 2		8"		Recent soil horizon - redbrown (10cm)		894540	0	2					
2 4				MULLARBOR LIMESTONE - Hard, crystalline, buff to gray-brown limestone. Fossiliferous. Same lithology as for Hole 1. Partially recrystallised. Some ferruginised limestone cuttings. Occasional soft chalky limestone fragments.		894541	2	4					
4 6				as before		894542	4	6					
6 8				as before		894543	6	8					
8 10				as before		894544	8	10					
10 12				limestone as before plus soft, white, chalky limestone cuttings.	Cherty Mullarbor limestone fragment shows Fe-rich laminations.	894545	10	12					
12 14				WILSONS BLUFF LIMESTONE - Soft, white, chalky, polyzoal limestone. Same lithology as for Hole 1.		894546	12	14					
14 16				Dominant fossil is bryozoa, other fossils include echinoid shell and spine fragments, minor large foraminifera, bivalve fragments, internal moulds of molluscs.		894547	14	16					
16 18				Although sections of the sequence is soft, the limestone is generally well cemented.		894548	16	18					
18 20				Silicified limestone bands are common.		894549	18	20					
20 22				as above		894550	20	22					
22 24				as above		894551	22	24					
24 26				as above		894552	24	26					
26 28				Goethite staining of some shell fragments and polyzoal limestone	Cherty limestone fragments common.	894553	26	28					
28 30				as above		894554	28	30					
30 32				as above		894555	30	32					
32 34				as above		894556	32	34					
34 36				as above		894557	34	36					
36 38				as above		894558	36	38					
38 40				as above		894559	38	40					
40 42				as above		894560	40	42					
42 44				Clear to milky, silicified limestone fragments with bryozoal inclusions - patch-like in appearance.		894561	42	44					
44 46				as above		894562	44	46					

SUMMARY AND SPECIAL COMMENTS: HOLE ABANDONED AT 120 m. IN SOFT UNCONSOLIDATED BRYOZOAL LIMESTONE. CIRCULATION LOST AT 114 m. CABLE TOOL RIG TO REDRILL AND CASE HOLE 1A LIMESTONE.

LOGGED BY R.A. MANNING DATE 20.9.80

C.R.A. EXPLORATION PTY. LIMITED

PROJECT EUCLA BASIN JOINT VENTURE

PERCUSSION DRILL CORE LOG

Lat. 31°19' S
CO-ORDINATES Long. 130°46' E approx.

AZIMUTH

DRILLERS NORTHBRIDGE PTY. LTD.

COMMENCED 19.9.80

DEPTH 120 m

HOLE No 80 EP 1A

RL COLLAR

INCLINATION VERTICAL

DRILL TYPE SCHRAMM ROTADRILL T685 COMPLETED 20.9.80

CASING LEFT 1m P.V.C. DPO No(s) -

DEPTH		REC	HOLE	GRAPHIC	CUTTINGS DESCRIPTION	SPECIAL FEATURES WEATH. ALTERATION, FRACTURING VEINING, MINERALIZATION	SAMPLE No	FROM (m)	TO (m)	CON (%)	ASSAY VALUES			
FROM (m)	TO (m)	%	DIAM	LOG										
46	48		8"		Wilson's Bluff limestone - as before		894563	46	48					
48	50				as above		894564	48	50					
50	52				as above		894565	50	52					
52	54				as above		894566	52	54					
54	56				as above		894567	54	56					
56	58				Amber coloured, clear fossil-free quartz nodules (uncommon). Greater than 1cm diam.		894568	56	58					
58	60				Encased in polyzool limestone.		894569	58	60					
60	62				These are minor in proportion to the milky- white silicified limestone, but do occur down		894570	60	62					
62	64				the limestone sequence.		894571	62	64					
64	66				as above		894572	64	66					
66	68				as above		894573	66	68					
68	70				as above		894574	68	70					
70	72				as above		894575	70	72					
72	74				as above		894576	72	74					
74	76				Buff coloured clay band - may be deteriorated limestone bed (eolite ground water passage?)		894577	74	76					
76	78				be damp & 'bally' - not drilling with water	Samples damp	894578	76	78					
78	80				Clays as before. large bivalve shell fragments limestones - as before.		894579	78	80					
80	82				Medium to hard, white polyzool limestone fragments	← From circulation	894580	80	82					
82	84				in addition to unconsolidated polyzool limestone.	recommended to	894581	82	84					
84	86				Polyzool limestone is dominantly bryozool fragments.	bring up bryozool limestone fragments	894582	84	86					
86	88				as above		894583	86	88					
88	90				as above	soft, rubbley or unconsolidated	894584	88	90					
90	92				as above	limestones cause drilling problems	894585	90	92					

END OF
PAGE THREEHOLE ABANDONED
SPECIAL COMMENTS

LOGGED BY R.A. MANNING DATE 20.9.80

SHEET 2 OF 3

033

CRA EXPLORATION PTY LIMITED

PERCUSSION DRILL CORE LOG

CO-ORDINATES Lat. 31°19' Long. 136°46' APPROX. AZIMUTH _____ DRILLERS NORTHERIDGE PTY. LTD. COMMENCED 19.9.80 DEPTH 120 m HOLE No. 80EP1 A
 RL COLLAR _____ INCLINATION VERTICAL DRILL TYPE SCHRAMM ROTADRILL 1005 COMPLETED 20.9.80 CASING LEFT (m P.V.C.) _____ DPO No(s) _____

DEPTH	REC	ROD	BRINE	CUTTINGS DESCRIPTION	SPECIAL FEATURES WEATH. ALTERATION, FRACTURING VEINING, MINERALIZATION	SAMPLE No.	FROM (m)	TO (m)	CON (%)	ASSAY VALUES
92	94			Wilson's Bluff Limestone - as before. Dominantly unconsolidated, polyzonal material with soft yet consolidated limestone cuttings plus silicified fragments.		894586	92	94		
94	96			as above		894587	94	96		
96	98			as above		894588	96	98		
98	100			as above		894589	98	100		
100	102			some iron staining of the limestone.		894590	100	102		
102	104			as above	Fe staining of fragments become more frequent towards base.	894591	102	104		
104	106			as above		894592	104	106		
106	108			as above		894593	106	108		
108	110			as above		894594	108	110		
110	112			as above		894595	110	112		
112	114			as above		894596	112	114		
114	116			NO RETURNS - LOST CIRCULATION		-	114	116		
116	118			" " " "		-	116	118		
118	120			" " " "		-	118	120		
120	122			yellowish-green sludge. Wilson's Bluff limestone + Pidinga Formation clays.	Hole had caved 1 m. Steel casing to 122m.	890001 890003	120	122		
122	124			Noncalcareous, gritty, grey-green shale. Very fine grained quartz & other dark rock fragments med. to soft.	Pidinga Formation	890004	122	124		
124	126			As above. grey shale, possibly sandy.	Fe staining.	890005	124	126		
126	128			light grey-green shale with some darker shale fragments. Pliable. Dark spots throughout. Slightly gritty.	Rare Fe staining.	890006	126	128		
128	130			medium grey shale to silty clay. Very soft and pliable. Dark carbonaceous fragments - hard.		890007	128	130		
130	132			As above with medium hard dark gritty shale fragments. Non calcareous, some glauconite.		890008	130	132		
132	134			Soft light grey clays/silts, with grey-black hard gritty shales. Quartz grains are subrounded & common.	Glauconite present washing detrital grains.	890009	132	134		
134	136			As above. Soft clay (45%) + dark grey gritty carbonaceous shales (55%).		890010	134	136		
136	138			Hard gritty shale as before with soft light grey clay balls.		890011	136	138		

28.10.80

6.11.80

CASE 87
PLAN 80-8-84

SUMMARY AND SPECIAL COMMENTS HOLE ABANDONED AT 120 m on 20.9.80. Drilling recommenced using a cable tool rig from L.J. Preiss & Son on 28.10.80. Northernidge recommenced 6.11.80.

LOGGED BY R.A. MANNING DATE 20.9.80

PAGE 2

APPENDIX IV - a

OIL AND WATER BORE ASSAYS

Oil Yield

p.p.m. 035

Depth (ft)	l/t	Cu	Pb	Zn	Ag	U
------------	-----	----	----	----	----	---

HUGHES (R.S.)

*1

370-380	1.5-5					
380-390	1.5-5					
390-400	1.5-5					
400-410	1.5-5					
410-420	0.5-1.5					
420-430	1.5-5					
430-440	0.5-1.5					
440-450	1.5-5					
450-460	0.5-1.5					
460-470	0.5-1.5					
470-480	1.5-5					
480-490	0.5-1.5					
490-500	1.5-5					
500-510	1.5-5					
510-520	1.5-5					
520-530	5-15					
530-540	1.5-5					
550-560	1.5-5					
560-570	5-15					
570-585	0.5-1.5					
593-600	1.5-5					
600-610	0.5-1.5					
610-620	0.5					
640-650	0.5					
880-890	0.5	5	5	35	1	4
980-990	0.5	8	15	100	1	4
1060-1080	0.5	12	20	60	1	4
1180-1190	0.5	15	15	75	1	4
1240-1250	0.5	45	25	90	1	4
1350-1360	0.5	5	5	65	1	4

HUGHES (N.W.)

*2

240-250	5-15
250-260	1.5-5
260-270	0.5-1.5
270-280	0.5-1.5
280-290	0.5-1.5
290-300	0.5-1.5
300-310	0.5-1.5
310-320	0.5-1.5
320-330	0.5
340-350	0.5-1.5
350-360	0.5-1.5
360-370	0.5-1.5
370-380	0.5-1.5
380-390	5-15
390-400	1.5-5
400-410	5-15
410-420	1.5-5
420-430	1.5-5

		p.p.m.				
		Oil Yield				
Depth (ft)	l/t	Cu	Pb	Zn	Ag	U
HUGHES (N.W.)						
*2 (cont.)						
440-450	1.5-5					
450-460	1.5-5					
460-470	0.5-1.5					
479-480	1.5-5					
480-490	1.5-5					
490-500	1.5-5					
500-510	0.5-1.5					
HUGHES (N.E.)						
*3						
250-270	0.5-1.5					
270-280	0.5-1.5					
310-320	5-15					
320-330	1.5-5					
330-340	1.5-5					
340-350	0.5-1.5					
350-360	5-15					
360-370	1.5-5					
370-380	5-15					
380-390	5-15					
390-400	1.5-5					
400-410	1.5-5					
410-420	0.5-1.5					
420-430	0.5-1.5					
430-440	0.5					
440-450	0.5-1.5					
540-550	0.5					
570-580	5-15	65	1400	560	5	4
620-630	1.5-5	35	290	170	1	4
640-650	0.5	8	5	30	1	4
670-680	0.5-1.5	15	55	55	1	4
700-710	0.5	8	5	40	1	4
720-730	0.5	10	70	43	1	4
770-790	0.5-1.5	10	30	25	1	4
820-830	0.5-1.5	8	30	25	1	4
840-850	0.5	5	5	15	1	4
870-880	0.5-1.5	8	25	30	1	4
910-918	0.5	5	18	12	1	4

Oil Yield

p.p.m.

037

Depth (ft)	l/t	Cu	Pb	Zn	U
DENMAN *1	230-240	0.5-1.5			
	240-250	0.5			
	250-260	0.5-1.5			
	260-270	0.5			
	270-280	0.5			
	280-290	0.5-1.5			
	290-300	0.5			
	300-310	0.5			
	310-320	0.5-1.5			
	320-330	0.5-1.5			
	330-340	0.5-1.5			
	340-350	0.5-1.5			
	350-360	1.5-5			
	360-370	0.5-1.5			
	370-380	1.5-5			
	380-390	1.5-5			
	390-400	1.5-5			
	410-420	0.5-1.5			
	420-430	0.5-1.5			
	430-440	0.5-1.5			
	440-450	1.5-5			
	450-460	1.5-5			
	460-470	1.5-5			
	470-480	1.5-5			
	480-490	1.5-5			
	490-500	1.5-5			
	513-520	1.5-5			
	520-530	0.5-1.5			
	530-540	1.5-5			
	540-550	1.5-5			
	550-560	1.5-5			
	560-570	0.5-1.5			
	570-580	0.5-1.5			
	580-590	1.5-5			
	590-600	0.5-1.5			
	660-670	1.5-5			

COOK
*1

710

5

30

160

1

038

APPENDIX IV - b

C.R.A.E. HELICOPTER SURVEY ASSAYS



ANALYTICAL REPORT

JOB COM 800562

039

Results in ppm

<u>SAMPLE</u>	<u>Cu</u>	<u>Pb</u>	<u>Zn</u>	<u>Ba</u>	<u>As</u>	<u>U</u>
890251	12	6	12	330	10	<4
2	12	24	14	400	12	-
3	18	12	28	550	20	-
4	10	18	22	260	270	-
5	10	12	8	260	165	-
6	10	12	2	80	11	-
7	12	12	6	100	<2	-
8	12	14	10	740	2	-
9	10	12	6	155	4	-
260	8	12	6	450	2	-
1	8	12	8	400	4	-
2	8	12	8	<10	12	-
3	6	16	8	40	<2	-
4	8	4	2	<10	5	-
5	8	<4	26	60	12	-
6	6	<4	2	<10	4	-
7	8	<4	12	160	3	-
8	10	4	12	95	100	-
9	8	6	4	140	28	-
270	10	8	32	370	50	-
1	6	<4	4	470	5	<4
2	10	4	2	130	10	4
3	38	8	40	540	50	4
4	10	10	24	340	20	<4
5	8	<4	12	60	<2	6
6	8	6	4	530	4	<4
7	10	6	8	490	18	<4
8	12	8	12	520	4	<4
890279	12	6	10	470	20	<4



COMLABS Pty Ltd
COMPUTERISED ANALYTICAL LABORATORIES

ANALYTICAL REPORT

040

JOB COM 800562

Results in ppm

<u>SAMPLE</u>	<u>Cu</u>	<u>Pb</u>	<u>Zn</u>	<u>Ba</u>	<u>As</u>	<u>U</u>
890230	10	4	8	430	2	<4
1	12	12	6	750	10	<4
2	16	4	4	500	16	<4
3	14	24	10	550	8	<4
4	12	8	6	480	6	<4
5	18	14	8	460	2	<4
6	12	4	8	490	2	<4
7	10	<4	8	460	<2	6
8	12	<4	12	530	<2	<4
9	16	6	12	520	7	<4
290	8	4	12	520	3	4
1	8	8	28	310	3	<4
2	10	4	12	520	5	<4
3	10	4	10	460	12	4
4	8	6	4	145	6	<4
5	20	22	10	165	60	<4
6	14	18	6	60	12	-
7	12	16	12	4300	530	-
8	10	<4	14	690	44	-
9	12	12	6	610	24	<4
300	10	28	6	110	105	<4
307	12	10	10	1350	50	<4
8	12	<4	34	440	4	<4
9	10	12	6	70	8	6
310	28	16	8	320	25	<4
1	12	4	8	480	13	6
2	20	22	12	460	7	4
3	10	4	8	260	4	<4
890314	14	10	16	160	14	<4



COMLABS Pty Ltd
COMPUTERISED ANALYTICAL LABORATORIES

ANALYTICAL REPORT

041

JOB COM 800562

Results in ppm

<u>SAMPLE</u>	<u>Cu</u>	<u>Pb</u>	<u>Zn</u>	<u>Ba</u>	<u>As</u>	<u>U</u>
890315	12	<4	12	500	4	<4
6	20	10	20	420	5	<4
7	12	6	60	320	7	<4
8	10	4	18	540	7	<4
9	16	6	8	1200	6	<4
320	12	<4	6	80	6	<4
1	12	10	14	100	10	<4
2	12	14	50	430	14	4
3	22	6	10	400	4	<4
4	14	4	12	780	6	<4
5	16	28	22	490	4	<4
6	14	6	10	530	3	<4
7	8	12	6	90	9	<4
8	10	6	10	165	3	<4
9	12	6	10	980	4	6
330	12	8	10	400	<2	-
1	16	10	28	250	5	-
2	18	8	30	220	3	-
3	10	12	10	105	6	-
4	18	4	10	220	5	-
5	18	4	10	1250	<2	<4
6	14	<4	10	1200	4	<4
7	18	8	8	200	2	4
8	8	6	8	540	40	<4
9	12	6	6	430	3	<4
340	10	6	6	510	3	<4
1	10	18	6	170	6	4
2	10	6	4	260	3	<4
890343	12	8	12	190	<2	-



COMLABS Pty Ltd
COMPUTERISED ANALYTICAL LABORATORIES

ANALYTICAL REPORT

042

JOB COM 800562

Results in ppm

<u>SAMPLE</u>	<u>Cu</u>	<u>Pb</u>	<u>Zn</u>	<u>Ba</u>	<u>As</u>	<u>U</u>
890344	12	8	10	220	<2	-
5	10	4	8	60	5	<4
6	8	4	6	710	4	<4
7	6	10	48	<10	9	4
8	4	12	40	240	13	-
9	8	4	8	130	4	-
350	6	<4	20	180	16	-
357	6	8	32	60	9	-
8	16	6	28	340	4	-
9	14	10	220	280	36	-
360	16	10	32	360	7	-
1	12	8	65	80	2	-
2	14	12	30	360	4	-
3	24	12	30	380	3	-
4	14	16	26	270	14	-
5	8	<4	12	420	2	4
6	10	<4	10	690	3	<4
7	8	<4	4	920	11	<4
8	10	<4	10	810	8	<4
9	12	<4	14	730	12	<4
370	8	4	6	1150	4	<4
1	10	16	28	620	20	4
2	12	12	28	870	10	<4
3	34	14	24	440	6	<4
4	14	6	8	130	2	4
5	12	<4	115	270	13	<4
6	6	<4	18	1150	110	6
7	6	6	4	300	20	6
890378	8	4	8	1200	<2	4



COMLABS Pty Ltd
COMPUTERISED ANALYTICAL LABORATORIES

ANALYTICAL REPORT

JOB COM 800562

Results in ppm

<u>SAMPLE</u>	<u>Cu</u>	<u>Pb</u>	<u>Zn</u>	<u>Ba</u>	<u>As</u>	<u>U</u>
890379	6	<4	22	140	<2	<4
380	6	6	8	450	5	<4
1	14	<4	8	220	26	<4
2	8	8	2	640	7	<4
3	8	6	10	610	7	<4
4	6	<4	4	850	6	<4
5	6	4	4	600	4	6
6	34	4	210	500	95	<4
7	10	6	32	390	2	6
8	8	10	8	430	11	4
9	8	6	4	1050	3	4
390	13	6	12	550	3	<4
1	12	<4	12	180	4	<4
2	6	8	95	40	7	<4
3	55	26	16	310	3	<4
4	12	28	26	410	22	<4
5	14	4	4	370	<2	<4
6	10	8	22	670	13	6
7	8	6	10	80	<2	<4
8	4	4	28	530	5	<4
9	8	6	8	450	<2	<4
400	4	6	14	600	<2	<4
407	4	4	8	560	2	<4
8	6	<4	16	1050	2	8
9	4	<4	12	400	3	<4
410	4	4	8	580	2	<4
1	4	6	14	620	<2	<4
2	12	6	10	270	4	<4
890413	8	12	36	510	8	4



COMLABS Pty Ltd
COMPUTERISED ANALYTICAL LABORATORIES

ANALYTICAL REPORT

044

JOB COM 800562

Results in ppm

<u>SAMPLE</u>	<u>Cu</u>	<u>Pb</u>	<u>Zn</u>	<u>Ba</u>	<u>As</u>	<u>U</u>
890414	8	4	14	460	6	<4
5	4	6	22	530	<2	<4
6	4	10	4	560	<2	<4
7	10	6	75	560	4	<4
8	8	8	75	580	6	4
9	8	8	20	780	9	<4
420	4	6	14	550	<2	<4
1	8	<4	8	500	4	<4
2	8	4	14	460	<2	<4
3	10	6	40	280	5	8
4	12	28	10	230	46	4
5	24	14	2	55	4	<4
6	14	8	8	240	3	<4
7	16	6	14	40	<2	<4
890428	350	60	22	80	3	<4



COMLABS Pty Ltd
COMPUTERISED ANALYTICAL LABORATORIES

ANALYTICAL REPORT

045

JOB COM 800562

Results in ppm

<u>SAMPLE</u>	<u>F</u>	<u>Mn</u>
890252	640	34
3	560	18
4	660	140
5	380	50
256	280	6
330	540	90
348	230	970
9	220	145
350	320	40
357	180	360
8	920	150
9	300	1550
360	950	95
1	300	440
2	850	220
3	1000	260
364	550	26
370	360	22
393	950	36
394	900	60
890409	380	40

Method of Analysis - Cu, Pb, Zn : AAS 1
Mn : AAS 2
Ba, As, U : XRF 1
F : SIE 4

046

APPENDIX IV - c

C.R.A.E. DRILLING PROGRAMME ASSAYS

80 EP. 2

	<u>OIL YIELDS 1/t</u>
78-80 m	0.5-1.5
80-82	0.5-1.5
82-84	<0.5
84-86	<0.5
86-88	0.5-1.5
88-90	0.5-1.5
92-92	0.5-1.5
92-94	0.5-1.5
94-96	0.5-1.5
96-98	0.5-1.5
98-100	0.5-1.5
100-102	1.5-5
102-104	0.5-1.5
104-106	0.5-1.5
106-108	<0.5
108-110	<0.5
110-112	0.5-1.5
112-114	<0.5
114-116	0.5-1.5
116-118	<0.5
118-120	<0.5
120-122	<0.5
122-124	0.5-1.5
124-126	0.5-1.5
126-128	<0.5

80 EP. 3

76-78 m	0.5-1.5
78-80	0.5-1.5
80-82	0.5-1.5
82-84	0.5-1.5
84-86	0.5-1.5
86-88	0.5-1.5
88-90	0.5-1.5
90-92	<0.5

80 EP. 3 (Cont.)

92-94 m

0.5-1.5

94-96

0.5-1.5

048

80 EP. 4

60-62 m

0.5-1.5

62-64

1.5-5

64-66

1.5-5

66-68

0.5-1.5

68-70

0.5-1.5

70-72

0.5-1.5

72-74

0.5-1.5

74-76

0.5-1.5

76-78

0.5-1.5

78-80

0.5-1.5

80-82

1.5-5

82-84

1.5-5
~~0.5-1.5~~

84-86

0.5-1.5

86-88

1.5-5

80 EP. 5

76-78 m

<0.5

78-80

0.5-1.5

80-82

0.5-1.5

82-84

5-15

84-86

>15

86-88

>15

88-90

>15

90-92

>15

92-94

5-15

94-96

>15

96-98

>15

98-100

>15

100-102

>15

102-104

>15

104-106

>15

106-108

>15

108-110

>15

110-112

>15

litres/tonne

80 EP 5 (cont)

112 - 114 m	>15
114 - 116	>15
116 - 118	>15
118 - 120	>15
120 - 122	5 - 15
122 - 124	>15
124 - 126	>15
126 - 128	>15
128 - 130	>15
130 - 132	>15
132 - 134	>15
134 - 136	>15
136 - 138	>15
138 - 140	>15
140 - 142	>15
142 - 144	>15
144 - 146	>15
146 - 148	>15
148 - 150	>15
150 - 152	>15
152 - 154	>15
154 - 156	>15
156 - 158	>15
158 - 160	>15
160 - 162	>15
162 - 164	>15
164 - 166	>15
166 - 168	>15

049

80 EP 6a

56 - 60	<0.5
60 - 62	0.5 - 1.5
62 - 64	<0.5
64 - 66	0.5 - 1.5
66 - 68	0.5 - 1.5
68 - 70	0.5 - 1.5
70 - 72	0.5 - 1.5

litres/tonne

<u>80 EP 6a (cont.)</u>	72-74m	0.5-1.5
	74-76	<0.5
	76-78	<0.5
	78-80	0.5-1.5
	80-82	<0.5
	82-84	0.5-1.5
	84-86	<0.5
	86-88	0.5-1.5
	88-90	<0.5
	90-92	0.5-1.5
	92-94	<0.5
	94-96	<0.5
	96-98	<0.5
	98-100	0.5-1.5
	100-102	0.6-1.5
	102-104	1.5-5
	104-106	1.5-5
	106-108	<0.5
	108-110	0.5-1.5
	110-112	<0.5
	112-114	<0.5
	114-116	0.5-1.5
	116-118	0.5-1.5
	118-120	0.5-1.5
	120-122	0.5-1.5
	122-124	1.5-5
	124-126	<0.5
	126-128	0.5-1.5
	128-130	0.5-1.5

<u>80 EP 7</u>	56-58 m	0.5-1.5
	58-60	0.5-1.5
	60-62	0.5-1.5
	62-64	<0.5
	64-66	0.5-1.5
	66-68	0.5-1.5

		litres/tonne
<u>80 EP 7</u> (cont.)	140 - 142 m	1.5 - 5
	142 - 144	0.5 - 1.5
	144 - 146	0.5 - 1.5
	146 - 148	<0.5
	148 - 150	<0.5
	150 - 152	0.5 - 1.5
	152 - 154	0.5 - 1.5
	154 - 156	0.5 - 1.5
	156 - 158	0.5 - 1.5
	158 - 160	0.5 - 1.5
	160 - 162	1.5 - 5
	162 - 164	0.5 - 1.5
	164 - 166	<0.5
	166 - 168	0.5 - 1.5
	168 - 170	<0.5
	170 - 172	0.5 - 1.5
	172 - 174	0.5 - 1.5
	174 - 176	1.5 - 5
	176 - 178	0.5 - 1.5
	178 - 180	0.5 - 1.5

		litres / tonne
<u>80 EP7 (cont)</u>	68-70 m	0.5-1.5
	70-72	<0.5
	72-74	<0.5
	74-76	<0.5
	76-78	0.5-1.5
	78-80	0.5-1.5
	80-82	<0.5
	82-84	0.5-1.5
	84-86	0.5-1.5
	86-88	1.5-5
	88-90	<0.5
	90-92	0.5-1.5
	92-94	<0.5
	94-96	0.5-1.5
	96-98	<0.5
	98-100	0.5-1.5
	100-102	<0.5
	102-104	0.5-1.5
	104-106	0.5-1.5
	106-108	<0.5
	108-110	0.5-1.5
	110-112	<0.5
	112-114	<0.5
	114-116	<0.5
	116-118	0.5-1.5
	118-120	<0.5
	120-122	0.5-1.5
	122-124	<0.5
	124-126	<0.5
	126-128	0.5-1.5
	128-130	0.5-1.5
	130-132	0.5-1.5
	132-134	0.5-1.5
	134-136	0.5-1.5
	136-138	0.5-1.5
	138-140	0.5-1.5

C.R.A. EXPLORATION PTY. LIMITED

SECOND QUARTERLY REPORT ON WYOLA 1 E.L. 730,
WYOLA 2 E.L. 731, WYOLA 5 E.L. 734 AND WYOLA 10
E.L. 737, SOUTH AUSTRALIA
FOR THE PERIOD ENDING APRIL 5TH, 1981

The contents of this report remain
the property of C.R.A. Exploration
Pty. Limited and may not be published
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company prospectus without the
written consent of the Company.

AUTHOR: D.L. ANDREWS

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SWAN RESOURCES LIMITED/
EAGLE CORPORATION LIMITED

DATE: 30TH APRIL, 1981

SUBMITTED BY: D.L. ANDREWS *per R.A.*

ACCEPTED BY: *R. Kennedy*

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1. SUMMARY

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Fischer distillation of chip samples from drill hole 80EP5 in E.L. 730 returned an average of 26 litres/tonne between 86 metres and 168 metres. Peak assay was 72 litres/tonne between 94 and 96 metres.

Follow up drilling has commenced in E.L. 730, 731 and 734 and was in progress at the end of the quarter. No results are yet available.

2. INTRODUCTION

C.R.A. Exploration Pty. Limited entered into a joint venture agreement on the 9th April, 1980, with Swan Resources Limited and Eagle Corporation Limited to explore for oil shale in the Eucla Basin of South Australia. Exploration philosophy is based on a reported occurrence of a thick, oily Cretaceous shale horizon intersected in Muddaugana No. 7, a 1920's water bore. A multicommodity approach maintained, and some attention has been focused on the possibility of lead-zinc mineralisation and oil shales occurring in the Cambrian Observatory Hill Beds.

Wyola 1 E.L. 730, Wyola 2 E.L. 731, Wyola 4 E.L. 733 and Wyola 10 E.L. 737 were granted to the joint venture partners on 6th October 1980 and cover an area of 9 673 square kilometres. (Plan SAa 724)

This report details all work completed between January 5th, 1981 and April 5th, 1981.

3. CONCLUSIONS AND RECOMMENDATIONS

1) That the region within E.L. 737 where anomalous barium, arsenic and vanadium was recorded during the 1980 survey be resampled and mapped in detail.

2) That assays of all samples, with the exception of the redrill of 80EP5 (81EPR5), be restricted to modified Fischer analyses and that samples returning greater than 15 litres/tonne then undergo Fischer distillation to determine accurate oil yields.

4. WORK DONE

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4.1 Rock Chip Sampling

A total of 178 rock chip samples were collected during a helicopter survey conducted in late November 1980. All rock chip samples were analysed for copper, lead, zinc, barium, arsenic and uranium. Results have been reported in "First Quarterly Report on Wyola 1 E.L. 730, Wyola 2 E.L. 731, Wyola 3 E.L. 732, Wyola 4 E.L. 733, Wyola 5 E.L. 734, Wyola 7 E.L. 735, Wyola 8 E.L. 736, Wyola 10 E.L. 737, Wyola 11 E.L. 738 and Wyola 13 E.L. 739, South Australia for the period 6/10/80 to 5/1/81."

The rock chip sampling highlighted a region within E.L. 737 west of Wyola Lakes from which samples returned anomalous barium and arsenic. (Plan SAa 663). Rock chip samples which recorded anomalous barium and arsenic have in addition been assayed for tin, tungsten, nickel, cobalt, silver, molybdenum, cadmium and vanadium. The results form Appendix 1. Sample number 890297 which previously returned assays of 4 300 p.p.m. barium and 530 p.p.m. arsenic returned a vanadium assay of 670 p.p.m. Background vanadium values for this region are between 40 p.p.m. and 60 p.p.m.

Followup work is planned to commence early in May.

4.2 Drilling

Drill hole 80EP5, completed during the first quarter within E.L. 730, intersected oil shale and coal within the Cretaceous Madura Formation. Approximate oil yields indicated oil yield >15 litres/tonne between 86metres and 168metres. Accurate oil yields received this quarter form Appendix II and average 26 litres/tonne between 86 metres and 168 metres with a peak oil yield of 72 litres/tonne between 94 metres and 96 metres. The contamination within this percussion drill hole was extreme below 138 metres and hence these analyses are indicative only. A redrill of 80EP5 which has been pre-collared adjacent to 80EP5 will be cored throughout the oil shale and coal horizons to obtain quantitative oil yields and thickness.

The oil shale and coal intersected in 80EP5 is believed to lie within a concealed sub basin. (Plan SAa 754) which may have extensions into E.L.'s 731 and 734. To test the extent of the interpreted sub basin in E.L. 730 and possible extensions into E.L.'s 731 and 734 a six hole open hole rotary mud drilling programme commenced during the quarter. Drill hole locations are shown on Plan SAa 724. At the end of the quarter all planned drill holes had been precollared to the base of the Tertiary limestone overlying the target Madura horizon. All holes have been precollared with an Ingersol Rand T3 percussion drilling rig. Additionally drill holes 81EPR4 (E.L. 731), 81EPR10 (E.L. 734) and

81EPR7 (E.L. 730) had been completed below the target Madura horizon. Drilling through the Madura horizon has been (and will be) undertaken using a Mayhew 1000 rotary mud rig in an attempt to minimize contamination.

Summary logs for 81EPR4, 81EPR7, 81EPR10 are presented below. Detailed logs comprise Appendix III.

Summary Logs

81 EPR4
(E.L. 731)

0 - 50m	Nullabor and Wilson Bluff Limestones - Miocene/ Eocene
50 - 126m	Madura Formation; carbonaceous claystones - Cretaceous
126 - 130m	Loongana conglomerate; coarse sands - Cretaceous
130 - 140m	Sands, fine grained - Permian (?) B.O.H. 140 metres

81EPR7
(E.L. 730)

0 - 60m	Nullabor and Wilson's Bluff Limestones
60 - 74m	Pidinga Formation, sands
74 - 144m	Madura Formation, carbonaceous claystones, ?oil shales
144 - 164m	Loongana Conglomerate - Cretaceous B.O.H. 164 metres

81EPR10
(E.L. 734)

0 - (?) 60m	Nullabor and Wilson's Bluff Limestones- Miocene/Eocene
(?) 60 - 76m	Pidinga Formation, sands - Eocene
76 - 96m	Madura Formation, claystones - Cretaceous
96 - 146m	Loongana Conglomerate - Cretaceous B.O.H. 146 metres

81EPR4, 81EPR7 and 81EPR10 have been geophysically logged by GEOEX for caliper, long spaced density, short spaced density, natural gamma, neutron-neutron, self potential and resistance.

No modified Fischer analyses for approximate oil yields were available at the end of the quarter.

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The thin sequence of Madura Formation present in 81EPR10, drilled within E.L. 734, indicates that the interpreted sub basin does not extend into E.L. 734 and dependent upon oil yields E.L. 734 may warrant relinquishment.

Drill hole 81EPR5 sited 100 metres north of 80EP5 was in progress at the end of the quarter. Summary log to date is:

- 0 - 59m Nullabor and Wilson's Bluff Limestones - Miocene/
Eocene
- 59 - 80m Pidinga Formation sands - Eocene
- 80 - 111m Madura Formation, oil shales - Cretaceous, Drilling
in progress

The interval 80-111m has been cored with recovery rate 90-95%.

D.L. ANDREWS

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KEYWORDS

Wyola, lead, zinc, barium, arsenic, vanadium, Eucla Basin, Cretaceous, drill-percussion, drill-rotary, oil shale, coal, drill logs, geochem-rock.

LOCATION

Wyola	SH52-7	1:250,000
Noorina	SH52-3	
Cook	SH52-11	

LIST OF PLANS

SAa Plan 724	Eucla and Officer Basins S.A. Drill Hole Locations and Geochemical Anomalies.	1:2 000 000
SAa Plan 663	Wyola Lakes E.L. 737 Ba - As Anomaly	1:100 000
SAa Plan 754	Eucla and Officer Basin Drilling and Helicopter Survey.	1:2 000 000

APPENDIX I

Rock chip assays

APPENDIX II

Assay results 80EP5

APPENDIX III

Drill Logs 81EPR4
81EPR7
81EPR10
with guide to computer logs.

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APPENDIX I

SAMPLE NO.	SITE NO.	GRID CO-ORD.	ROCK TYPE	Cu	Pb	Zn	Ba	As	U	Ni	Co	Ag	Mo	Cd	V	Sn	W
890276	890276	325393	Micaceous sandstone Wamma	8	6	4	530	4	<4	<4	<4	<1	<4	2	20	<4	<10
890277	890277	326391	Micaceous siltstone	10	6	8	490	18	<4	<4	<4	<1	<4	2	60	6	<10
890278	890278	324390	Wamma Beds	12	8	12	520	4	<4	<4	<4	<1	<4	2	40	<4	<10
890279		324390		12	6	10	470	20	<4	<4	<4	<1	<4	<1	190	<4	<10
890280		324390		10	4	8	430	2	<4	<4	<4	<1	<4	<1	50	4	<10
890281		324390		12	12	6	750	10	<4	<4	<4	<1	<4	<1	60	<4	<10
890282	890282	323388	Wamma Beds	16	4	4	500	16	<4	<4	<4	<1	<4	<1	70	4	10
890283	890283	328389	Clay lenses in Wamma Bed	14	24	10	550	8	<4	14	<4	<1	<4	<1	50	<4	<10
890284	890284	332385	Sandstone Wamma Beds	12	8	6	480	6	<4	<4	<4	<1	<4	3	40	4	<10
890285	890285	332384	Sandstone Wamma Beds	18	14	8	460	2	<4	<4	<4	<1	<4	2	50	<4	10
890286	890286	334380	Sandstone Wamma Beds	12	4	8	490	2	<4	<4	<4	<1	<4	3	40	<4	10
890287	890287	332381	Sandstone Wamma Beds	1)	<4	8	460	<2	6	20	<4	<1	<4	<1	50	<4	<10
890288	890288	329376	Sandstone Wamma Beds	12	<4	12	530	<2	<4	<4	<4	<1	<4	<1	30	<4	<10
890289	890289	327374	Sandstone Wamma Beds	16	6	12	520	7	<4	<4	12	<1	<4	2	30	8	<10
890290	890290	343384	Sandstone Wamma Beds	8	4	12	520	3	4	<4	<4	<1	<4	2	50	<4	<10
890291			Fe stone: over & prob t.	8	8	28	310	3	<4	<4	<4	<1	<4	<1	20	6	<10
890292	890292	349385	Fe stone: over & prob t.	10	4	12	520	5	<4	<4	<4	<1	<4	<1	20	6	<10
890293		349385	Sandstone Wamma Beds	10	4	10	460	12	4	<4	<4	<1	<4	<1	60	8	10
890294	890294	350384	Sandy limestone	8	6	4	145	6	<4	<4	<4	<1	<4	<1	20	4	<10
890295	890295	349380	Silcrete green	2)	22	10	165	60	<4	<4	<4	<1	<4	<1	190	<4	<10
890296	890296	348379	Off white - grey limestone	14	18	6	80	12	-	<4	<4	<1	<4	<1	40	6	10
890297	890297	313384	Pidinga sands (?)	12	16	12	450	530	-	<4	4	<1	<4	<1	670	<4	<10
890298	890298	314385	Fe stone	10	<4	14	690	44	-	<4	<4	<1	<4	<1	160	<4	15
890299	890299	312386	Wamma Beds (sandstone)	12	12	6	610	24	<4	<4	<4	<1	<4	<1	130	4	<10
890300		312386	Wamma Beds (sandstone) (Fe rich)	10	28	6	110	105	<4	<4	<4	<1	<4	<1	300	<4	10
890307	890307	313387	Pidinga sandstone (?)/Hampton Congl.	12	10	10	1350	50	<4	10	4	<1	<4	<1	280	<4	<10
890308	890308	311387	Wamma beds micaceous sandstone	12	<4	34	440	4	<4	<4	<4	<1	<4	<1	70	<4	<10
890309	890309	309391	Micaceous sandstone (Wamma Beds?)	10	12	6	70	8	6	<4	<4	<1	<4	<1	30	<4	<10
890310	890310	309394	Fe rich micaceous sandstone (Wamma Beds?)	28	16	8	320	25	<4	<4	<4	<1	<4	<1	40	<4	<10
890311	890311	308396	Micaceous sandstone (C)	12	4	8	480	13	6	<4	<4	<1	<4	<1	50	<4	<10
890312	890312	306398	Knotted micaceous sandstones (C)	20	22	12	460	7	4	<4	<4	<1	<4	<1	50	<4	<10
890313	890313	303403	Micaceous sandstone (C)	10	4	8	260	4	<4	<4	<4	<1	<4	<1	20	6	<10
890314	890314	302399	Pidinga Formation (?)	14	10	16	160	14	<4	<4	<4	<1	<4	<1	250	4	10
890315	890315	289386	Fe rich micaceous sandstone (C)	12	<4	12	500	4	<4	<4	<4	<1	<4	<1	20	<4	<10
890316	890316	283383	Fe rich micaceous sandstone (C)	20	10	20	420	5	<4	10	4	<1	<4	<1	10	10	<10
890317	890317	285387	Micaceous sandstone (C)	12	6	60	320	7	<4	<4	<4	<1	<4	<1	10	<4	<10
890318	890318	286389	Micaceous sandstone	10	4	18	540	7	<4	16	<4	<1	<4	<1	20	4	<10
890323	890323	285390	Micaceous sandstone (C)	22	6	10	400	4	<4	8	8	<1	<4	<1	20	6	<10
890324	890324	281395	Micaceous sandstone (C)	14	4	12	780	6	<4	8	4	<1	<4	2	30	<4	<10
890338	890338	340405	Micaceous sandstone	8	6	8	540	40	<4	<4	<4	<1	<4	<1	10	6	<10

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APPENDIX II

Sample No	Oil Yield l/tonne	Interval	Sample No	Oil Yield l/tonne	Interval
890901	<0.05	76-78	890926	28	126-128
890902	2	78-80	890927	19	128-130
890903	I/S	80-82	890928	23	130-132
890904	I/S	82-84	890929	20	132-134
890905	15	84-86	890930	22	134-136
890906	51	86-88	890931	27	136-138
890907	27	88-90	890932	33	138-140
890908	26	90-92	890933	27	140-142
890909	72	92-94	890934	26	142-144
890910	38	94-96	890935	29	144-146
890911	55	96-98	890936	25	146-148
890912	34	98-100	890937	29	148-150
890913	25	100-102	890938	13	150-152
890914	30	102-104	890939	16	152-154
890915	30	104-106	890940	11	154-156
890916	31	106-108	890941	23	156-158
890917	30	108-110	890942	26	158-160
890918	26	110-112	890943	13	160-162
890919	30	112-114	890944	7	162-164
890920	22	114-116	890945	21	164-166
890921	29	116-118	890946	36	166-168
890922	30	118-120			
890923	9	120-122		I/S =	Insufficient sample for
890924	22	122-124			Fischer Distillation
890925	18	124-126			

METHOD R6/1

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APPENDIX III



C.R.A. EXPLORATION PTY. LIMITED

(INC IN N.S.W.)

Adelaide Office: 31 OSMOND TERRACE, NORWOOD 5067

Head Office: 55 COLLINS STREET, MELBOURNE 3001

065

200 301 1111

TELEPHONE 065 065

TELEGRAMS C.R.A.

TELEX 11111

20th May, 1981.

Memorandum to: D.R. KENNEDY

Memorandum from: R. KELLY

Re: SUMMARY - DRILL LOGS - EUCLA-WYOLA

81EPR1

Abandoned at 141m in hard cavernous, off white to white crystalline limestone.

81EPR2

0 - 36m	Limestone open holed and cased to 72m by percussion rig.
96 - 124m	Limestone 70% crystalline, white, hard, small chips. Cement 30%.
124 - 126m	Mudstone 50% light grey, medium soft. Limestone 50% - as above.
126 - 132m	Mudstone 90% light grey, medium soft. Limestone 10% as above.
132 - 136m	Mudstone 99% light grey, medium soft, minor off white Limestone.
136 - 150m	Mudstone 99% light grey, medium soft.
150 - 152m	Mudstone 90% as above. Sand 10% off white, fine, subangular.
152 - 196m	Mudstone 99% as above. Minor sand also present.
196 - 230m	Mudstone 99% carbonaceous, dark grey, medium hard, small chips.
230 - 232m	Mudstone 90% as above. Sand 10% medium grained, off white to light grey, medium hard, angular.
232 - 236m	Sand 80% medium - coarse grained off white to light grey, medium hard angular grains. Mudstone 20% fine, muddy, dark grey.
236 - 244m	Sand 90% medium to very coarse off white to grey, medium soft loose. Mudstone 10% as above. TD 244m.

81EPR3

Cored to 68m.

68 - 72m	Sand 99% fine off white to light grey, clay matrix, minor pebbles. Minor mudstone chips. Minimal sample recovery.
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- 72 - 74m *Sand 80% as above.
Mudstone 20% carbonaceous, dark, grey, medium soft.
- 74 - 78m ^eMudstone 50% dark grey, carbonaceous, medium hard.
*Sand 50% as above.
- 78 - 84m ^eMudstone 80% as above.
*Sand 20% as above.
- 84 - 86m ^eMudstone 90% as above.
*Sand 10% as above.

- 86 - 132m Mudstone 99% dark grey-black, carbonaceous medium hard.
Minor sand grains present.

NOTE: Mudstone hard quartz band between 88.50m to 89.00m, minor chips of white quartz appear in samples around this interval.
*Minor pyrite.

- 132 - 176m Mudstone 99% carbonaceous, dark grey to black, small chips, medium hard, minor glauconite, minor coally chips, pyritic, minor off white sand grains.
- 176 - 180m Mudstone 99% as above.
Poor circulation resulting in only fine chips recovered.
Samples contain major amounts of hydropol.
- 180 - 186m Mudstone 90% dark grey, medium hard, only small chips, micaceous pyritic.
Sand 10% fine-medium, off white to light grey. A lot of hydropol present in sample.
- 186 - 188m Mudstone 50% as above.
Sand 50% as above.
- 188 - 192m Sand 99% medium to coarse, light grey to off white, subangular.
Minor mudstone also present.
- 192 - 195m Sand 99% fine to medium, off white to light grey.
Mudstone - minor chips present.
TD 195m.

81EPR04

- 0 - 50m Percussion drilled and cased.
- 50 - 52m Mudstone 80% dark green-black, medium hard, minor glauconite, carbonaceous.
Sand 20% fine dark grey to off-white subrounded.
- 52 - 120m Mudstone 99% dark grey-black, medium hard, minor glauconite.
- 120 - 122m Mudstone 50% as above.
Mudstone 50% green-grey, carbonaceous, medium hard.
- 122 - 124m Mudstone 60% green-grey, carbonaceous, medium hard.
Sand 30% subangular, medium grained grey-off white.
Mudstone 10% black highly carbonaceous, medium hard.
- 124 - 126m Mudstone 50% green-grey carbonaceous, medium hard.
Mudstone 20% black, carbonaceous, medium hard.
Sand 30% medium-coarse grained, off white-grey, medium hard.
- 126 - 128m Sand 60% as above.
Mudstone 20% as above.
Mudstone 20% as above.

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- 128 - 130m Sand 25% medium-coarse grained off white to grey, medium hard, subangular.
Mudstone 25% black carbonaceous medium hard.
Mudstone 25% green grey, carbonaceous, medium hard.
Claystone 25% off white, gritty, soft.
- 130 - 140m Claystone 90% off white, soft, gritty sand. 10% medium-coarse, subangular off-white to grey in colour.
TD 140m.

81EPR06

- 0 - 60m Drilled and cased by Percussion rig.
- 60 - 70m No samples recovered.
- 70 - 76m Mudstone 50% carbonaceous, black, soft.
Mudstone 50% glauconitic, green-grey, carbonaceous minor sands, soft.
- 76 - 80m Mudstone 80% carbonaceous, soft black.
Mudstone 20% green-grey, glauconitic, soft.
- 80 - 116m Mudstone 99% dark green-black, soft, carbonaceous.
- 116 - 118m Mudstone 99% black, gritty texture, possible sandstone contamination carbonaceous.
- 118 - 120m Mudstone 50% black, carbonaceous, medium hard.
Mudstone 50% gritty texture, black, carbonaceous.
- 120 - 122m Shale 70% black, carbonaceous, medium hard.
Mudstone 30% carbonaceous, slightly gritty, dark brown.
- 122 - 124m Mudstone 70% carbonaceous, black, with minor grey mudstone, gritty texture.
Shale 30% black, carbonaceous, medium hard.
- 124 - 130m Mudstone 60% as above.
Shale 40% as above.
- 130 - 144m Mudstone 80% carbonaceous, black, medium soft.
Shale 20% carbonaceous, medium hard, some cuttings up to 5cm in size.
- Minor coarse angular sand grains.
- 144 - 146m Mudstone 25% carbonaceous, black, medium soft.
Shale 25% carbonaceous, medium hard, large cuttings, dark grey.
Sand 50% medium to coarse grained, angular subangular.
- 146 - 164m Sand 90% off white to grey, coarse, angular to subrounded.
Shale 10% carbonaceous, dark grey, medium hard.
TD 164m.

81EPR7

- 0 - 56m Drilled and cased by percussion rig.
- 56 - 74m Insufficient sample returns to allow sampling.
- 56 - 58m No sample return.
- 58 - 70m Sand 99% fine to medium, buff to light grey, reasonably soft, quartzitic.
- 70 - 72m Sand 85% as above.
Mudstone 15% dark brown to black, carbonaceous, medium soft.

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- 72 - 74m Sand 60% as above.
Mudstone 40% dark brown to black medium soft.
- 74 - 76m Mudstone 60% dark brown to black, medium soft.
Sand 40% fine to medium, light grey reasonably soft, quartzitic.
- 76 - 82m Mudstone 90% carbonaceous, dark brown to black medium soft.
Claystone 10% grey-green, glauconitic, minor carbonaceous wisps.
Minor sand grains.
- 82 - 84m Mudstone 80% carbonaceous, dark brown to black, medium soft.
Claystone 10% grey-green, glauconitic, medium soft.
Sand 10% fine-medium, strong, grey.
- 84 - 86m Mudstone 60% dark brown to black, medium soft, carbonaceous.
Claystone 40% light grey to off white, minor glauconite, minor carbonaceous inclusions
- 86 - 90m Mudstone 80% dark brown to black, medium soft, carbonaceous.
Claystone 20% light grey to off white, minor glauconite, minor carbonaceous inclusions.
- 90 - 96m Mudstone 90% dark brown to black, medium soft, carbonaceous.
Claystone 10% light grey to off white, minor glauconite, minor carbonaceous inclusions.
- 96 - 140m Mudstone 99% dark brown to black, medium soft carbonaceous.
- 140 - 142m Sand 70% medium to coarse, grey, medium firm, subangular to sub-rounded.
Mudstone 30% dark brown to black, medium soft, carbonaceous.
- 142 - 152m Sand 85% medium to coarse, grey, medium firm, subangular to sub-rounded.
Mudstone 15% dark brown to black medium soft, carbonaceous.
Minor off white clay.

81EPRO8

- 0 - 2m Soil 50% brick red.
Limestone 50% crystalline, off white, some Iron staining.
- 2 - 10m Limestone 99% off white, crystalline, minor calcrete.
- 10 - 14m Limestone 70% off white, hard, crystalline.
Mudstone ? 30% brick red, Iron stained, hard.
- 14 - 24m Limestone 80% as above.
Mudstone ? 20% as above.
- 24 - 26m Limestone 80% crystalline, off white, hard.
Mudstone 20% grey-green, hard, glauconitic.
- 36 - 54m Limestone 99% fine crystalline, off white to white, hard.
Minor glauconitic material recovered.
- 54 - 56m Sand 99% fine to coarse, firm light grey minor glauconite.
- 56 - 60m No sample recovery - some sand remained in circulation in drilling fluid.
- 60 - 64m Sand 99% fine to medium, quartzitic, light grey, orange to brick red mud matrix, minor glauconitic clay.
- 64 - 70m Sand 80% fine to medium, red and orange mud (?) matrix.
Claystone 20% Clayconitic, green-grey, medium soft.
- 70 - 72m Sand 60% as above.
Claystone 40% as above

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- 72 - 74m Clay 60% glauconitic, green-grey, medium soft.
Sand 40% fine to medium, red and orange mud (?) matrix.
- 74 - 80m Clay 80% glauconitic green-grey, medium soft.
Sand 20% fine to medium, red and orange mud (?) matrix.
- 80 - 82m Clay 60% as above.
Mudstone 40% dark brown to black, carbonaceous, medium soft, minor sand.
- 82 - 86m Mudstone 50% dark brown to black, carbonaceous, medium soft.
Clay 50% green-grey, glauconitic, medium soft.
- Minor sand also present.
- 86 - 92m Mudstone 95% dark brown, to black, carbonaceous, medium hard, recovered, as large rounded blobs.
Clay 5%, glauconitic, off white to green-grey, medium soft.
Minor sand also present.
- 92 - 94m Mudstone 80% dark brown to black carbonaceous, medium hard.
Clay 20% glauconitic, off white to green-grey, medium soft.
Minor sand also present.
- 94 - 100m Mudstone 80% dark brown, to black, medium hard, carbonaceous.
Clay 20% glauconitic, off white to green-grey, medium soft.
Chips smaller and more angular.
- 100 - 102m Mudstone 90% as above.
Clay 10% as above.
- 102 - 146m Mudstone 99% dark grey to black, carbonaceous medium hard, minor chips.
Minor light grey mudstone.
- 146 - 148m Sand 90% grey - fine medium grained subangular, medium hard.
Mudstone 10% carbonaceous, black to dark grey, medium hard.
Minor off white clay.
- 148 - 152m Sand 70%, medium to coarse grained, grey, subrounded firm.
Mudstone 30% as above.
Minor off white claystone.
- 152 - 154 Sand 90% coarse to medium grained grey, firm, subangular.
Mudstone 10% as above.

TD 154m.

81EPR09

- 0 - 2m Limestone 80% off white, hard, crystalline.
Soil 20%.
- 2 - 8m Limestone -9% off white, crystalline, hard.
- 8-- 10m Limestone 90% off white, crystalline, hard.
Mudstone 10% red brown, fine, possibly iron stained.
- 10 - 24m Limestone 50% off white, crystalline, hard.
Mudstone 50% red brown, fine, possibly iron stained.
- 24 - 34m Limestone 99% crystalline, light orange to grey.
- 34 - 54m Limestone 99% off white, crystalline, hard.
- 54 - 56m Limestone 70% off white, crystalline, hard.
Sandstone 30% fine, light grey, subangular grains.

HOLE DRILLED AND CASED TO 56 metres by Percussion Rig.

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- 56 - 79m No sample returns; hole cemented back to casing.
- 79 - 82m Mudstone 10% dark brown, carbonaceous, medium soft.
Claystone 10% off white to light brown, medium soft.
Cement 80%.
- 82 - 84m Mudstone 10% dark brown, carbonaceous, medium soft.
Claystone 40% off white, to light brown, medium soft.
Cement 50%.
- 84 - 86m Cement 80%.
Claystone 10% off white - light brown medium soft.
Mudstone 90% dark brown - black, medium soft, carbonaceous, large rounded chips.
Claystone 10% light grey to off white, medium soft.
- 92 - 96m Mudstone 70% dark brown carbonaceous, medium soft.
Claystone 20% light grey to off white, medium soft.
Sand 10% fine, rounded, light grey.
- 96 - 110m Mudstone 90% dark grey-black, carbonaceous, medium soft, small angular chips.
Claystone 10% light grey to off white, medium soft.
- 110 - 156m Mudstone 99% dark grey-black carbonaceous, medium hard, small angular chips. Minor glauconitic claystone and dark brown mudstone.
- 156 - 160m Sand 60% medium to coarse, firm, light to dark grey, subangular grains.
Mudstone 40% dark grey-black, carbonaceous, medium hard.
- 160 - 165m Sand 90% medium to coarse, firm, light to dark grey, subangular grains.
Mudstone 10% dark grey-black, carbonaceous.
TD 165m.

81EPR10

Open hole drilled and cased to 64m. by Percussion rig.

- 64 - 72m No sample recovery.
- 72 - 76m Claystone 70% off white to grey, hard.
Mudstone 20% dark grey, hard, carbonaceous. Minor red and orange mudstone and clay.
- 76 - 78m Mudstone 60% carbonaceous, dark grey, medium hard.
Claystone 30%, grey, hard.
Minor red-brown and orange claystone chips.
- 78 - 80m Mudstone 80% soft, dark grey, carbonaceous.
Claystone 20% light grey, medium hard.
- 80 - 88m Mudstone 99% dark grey-black, soft.
Claystone - minor, light grey chips.
- 88 - 90m Mudstone 99% dark grey-black, soft, minor clay and sand recovered.
- 90 - 92m Mudstone 90% dark grey to black, soft.
Sandstone 10% angular to subangular, fine to medium grains, light grey colour.
- 92 - 94m Mudstone 85% dark grey, soft, carbonaceous.
Sand 15% light grey, angular to subangular, fine to medium grained.
- 94 - 96m Mudstone 70% dark grey, soft, carbonaceous.
Sand 30% medium to coarse, off white to light grey, subangular-

- 96 - 100m Sand 70% medium to coarse, off white to light grey, subangular grains.
Mudstone 30% dark grey, soft, carbonaceous.
- 100 - 140m Sand 99% fine-medium, light grey, angular to subangular, minor carbonaceous chips.
- 140 - 146m Sand 99% fine light to mid grey, minor carbonaceous chips, white clay particles, silty at base.
End of hole 146.40m.

80EP1

- 0 - 126m No samples.
- 126 - 140m Cement.
- 140 - 156m Cement with some minor sand which was fine and off white in colour.
- 156 - 158m Mudstone 80% grey, medium hard, small chips, minor sand grains.
Cement 20%.
- 158 - 160m Mudstone 99%, grey, medium hard, small chips, muddy texture.
- 160 - 228m Mudstone 99% dark grey-brown, medium hard.
- 228 - 230m Mudstone 50% as above.
Sand 50% subrounded, off white to light grey, hard, medium grained.
- 230 - 232m Sand 90% as above.
Mudstone 10% as above.
TD 232m.

ROSS KELLY

RK/lp

CRA EXPLORATION PTY. LIMITED

072

FINAL REPORT ON WYOLA 10 E.L. 737,

SOUTH AUSTRALIA

The contents of this report remain the property of C.R.A. Exploration Pty. Limited and may not be published in whole or in part nor used in a company prospectus without the written consent of the Company.

AUTHOR: D.L. ANDREWS

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DATE: 8TH JULY, 1981.

SUBMITTED BY:

D.L. Andrews.

ACCEPTED BY:

R. Kennedy

REPORT NO. 10362.

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1. SUMMARY

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Regional helicopter borne rock chip sampling surveys, conducted during 1980/81 indicated a zone of anomalous barium - arsenic - vanadium within E.L. 737. The maximum assay results were 4300 p.p.m. barium, 530 p.p.m. arsenic and 670 p.p.m. vanadium. Repeat rock chip sampling defined the anomalous region as being closely associated with a locally cellular, lateritic ironstone. Auger gridding, rock chip sampling and ground magnetic traverses have failed to define drill targets.

Potential for the development of the Cretaceous Madura Formation has been significantly down-graded by the helicopter surveys.

2. INTRODUCTION

CRA Exploration entered into a joint venture agreement on the 9th April, 1980, with Swan Resources Limited and Eagle Corporation Limited to explore for oil shale in the Eucla Basin and Southern Officer Basin of South Australia. The exploration philosophy was based on a reported occurrence of a thick, oily Cretaceous shale horizon intersected in Muddaugana No. 7. A multi-commodity approach was maintained with attention also being focused on the lead-zinc potential of the Cambrian Observatory Hill beds.

Wyola 10 E.L. 737 was granted to the joint venture partners on the 6th October, 1980 for a twelve month period.

E.L. 737 lies west of Wyola Lakes approximately 220 kilometres northwest of Ooldea railway siding and covers an area of approximately 2,552 square kilometres. This report summarizes all work completed by the joint venture partners within Wyola 10 E.L. 737 (Plan SAa 881).

3. CONCLUSIONS AND RECOMMENDATIONS

1) Reconnaissance mapping of outcrop within the northern Eucla and Southern Officer Basins of South Australia indicates that Cretaceous shale horizons are not likely to be extensively developed within E.L. 737. This is supported by drilling completed 100 kilometres to the south by CRA Exploration within E.L. 733 which intersected only a thin sequence of Cretaceous shales.

Outcrop within the exploration licence is dominantly Tertiary lateritized sands unconformably overlying Cambrian (?) Wanna Beds.

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2) The anomalous barium - vanadium - arsenic region is coincident with a Tertiary laterite developed over Wanna beds. Rock chip sampling, auger gridding and ground magnetic surveys refined the extent of the anomaly but failed to define drill targets or base metal anomalies.

As a consequence of the negative results it is recommended that Wyola 10 E.L. 737 be relinquished by the joint venture partners.

4. WORK DONE

4.1 ROCK CHIP SAMPLING

A regional helicopter borne survey in November, 1980 was undertaken throughout Wyola 737 to determine the extent and distribution of the Cretaceous Madura Formation and the Cambrian Observatory Hill Beds. No outcrops of either formation was recorded within E.L. 737.

178 rock chip samples of the Pidinga Formation, Wanna Beds and ironstones were collected and analysed for copper, lead and zinc by A.A.S. and for barium, arsenic and uranium by X.R.F. A detailed report is presented in Manning, 1981.

No significant base metal anomalies were recorded although the rock chip sampling highlighted a region immediately west of Wyola Lakes (Plan SAa 663) which returned anomalous barium, arsenic and vanadium. The maximum assay recorded was 4300 p.p.m. barium, 530 p.p.m. arsenic and 670 p.p.m. vanadium. All samples anomalous in barium and arsenic were assayed for tin, tungsten, nickel, cobalt, silver, molybdenum, cadmium and vanadium. Results are presented in Appendix I.

A further 132 rock chip samples of the Pidinga Formation, Wanna beds and ironstones were collected in 1981 and were analysed on a semi quantitative basis by emission spectroscopy. Results are presented in Appendix II and Plans SAa 772 and 770.

Petrographic descriptions of the rock type returning the anomalous barium - arsenic - vanadium indicate that it is "a massive (non bedded), generally medium to coarse quartz sand, extensively permeated by (and cemented by) migratory limonite (lateritised); incorporating abundant random, angular fragments of wood or related organic fibrous/cellulose material which have been leached and intensely ferruginised".

Detailed petrographic descriptions form Appendix III,

4.2 AUGER DRILLING

190 Auger holes on twenty five metre centres were completed over, and adjacent to rock outcrops, which returned anomalous barium - arsenic - vanadium, (SAa 772). All samples were analysed for copper, lead, zinc and vanadium by A.A.S. and barium and arsenic by X.R.F. techniques. Barium, vanadium and arsenic were the only strongly anomalous elements. Results are presented in Appendix IV. Most auger holes within topographic lows penetrated a white sandy clay typical of weathered Wana beds. (Cambrian)

4.3 GROUND MAGNETIC SURVEY

A ground magnetic survey was completed over the outcrop and subcrop which returned anomalous barium - arsenic - vanadium.

Survey specifications were:-

Magnetometer	:	Scintrex MP -2
Sensitivity	:	+/- 1.0 nT
Line orientation	:	East-West (magnetic)
Line spacing	:	200 metres
Station spacing	:	25 metres
Gridding	:	Compass and toposil

For the duration of the survey drift corrections were made by returning to a base station every 15 minutes. All data presented is corrected for drift. Results are summarized in Plan SAa 880.

4.4 STREAM SEDIMENT SURVEY

The topography within E.L. 737 consists of low relief easterly trending sand dunes. Small clay pans and salt lakes are sporadically developed throughout the E.L. with their maximum development being the Wyola Lakes system. Drainage is very poorly developed and confined to small (less than 2km in length) channels draining into claypans.

At each stream sediment sample site -80# and -10# +40# fractions were taken. Sample site locations are shown on Plan SAa 770 and results presented in Appendix V. The only anomalous elements were barium - arsenic and vanadium, (maximum assays were barium 620 p.p.m., arsenic 55 p.p.m. and vanadium 50 p.p.m.).

5. INTERPRETATION

5.1 OIL SHALE POTENTIAL

At the outcrops where the contact of the Pidinga Formation and underlying sequence was exposed within E.L. 737 the Pidinga Formation was invariably unconformably overlying the Cambrian (?) Wana beds. No outcrops of definitive Cretaceous sediments were observed.

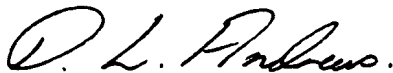
077

This strongly suggests that the sedimentation of the cretaceous Madura Formation within E.L. 737 did not extend into the southern Office Basin or that, if sedimentation did occur, it was removed prior to the deposition of the mid Eocene Pidinga Formation. The presence of sapropelic coal in the Eastern Eucla Basin within the Pidinga Formation indicates that potential exists for the development of oil shale within the Pidinga Formation. However, comparison with the eastern Eucla Basin suggests that the tonnages developed would not be large.

5.2 BASE METAL POTENTIAL

Extensive sampling of the ironstone outcrops and augering of subcrop have failed to detect anomalous base metal, gold or uranium values and have only confirmed the presence of a barium - arsenic - vanadium anomaly within a Tertiary laterite. The presence of white sandy clay present in auger samples taken from topographic lows suggest that the Wanna Beds are very shallowly underlying the Tertiary laterite. Samples of the clay did not return anomalous values.

The absence of a base metal anomaly downgrades the prospect and no further work is recommended.



D.L. ANDREWS

DLA/lc

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KEYWORDS

Madura Formation, Pidinga Formation, oil shale, barium, arsenic, vanadium, rockchip-geochem, auger-geochem, ground magnetics, stream sediment geochem.

REFERENCES

- Manning R.A., 1981. First Quarterly Report on Wyola 1 E.L. 730, Wyola 2 E.L. 731, Wyola 3 E.L. 732, Wyola 4 E.L. 733, Wyola 5 E.L. 734, Wyola 7 E.L. 735, Wyola 8 E.L. 736, Wyola 10 E.L. 737, Wyola 11 E.L. 738 and Wyola 11 E.L. 739, South Australia for the Period 6.10.80 to 5.1.81.
- Andrews D.L., 1981. Second Quarterly Report on Wyola 1 E.L. 730, Wyola 2 E.L. 731, Wyola 5 E.L. 734 and Wyola 10 E.L. 737 South Australia for the Period Ending April 5th, 1981.

LOCATION

Wyola SH52 - 7 1:250,000

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LIST OF PLANS

SAa 881	:	Location plan of Wyola E.L. 737	1:250,000
SAa 663	:	Wyola Lakes E.L. 737 Ba-As anomaly	1:100,000
SAa 770	:	Wyola Lakes E.L. 737, Rock Chip Auger and stream sediment sample locations.	1:40,000
SAa 772	:	E.L. 737, Wyola Lakes ground magnetics and auger grid, anomaly 793297.	1:5,000
SAa 880	:	Ground magnetic traverses anomaly 793297 Wyola Lakes E.L. 737	1:5,000

APPENDICES

- Appendix I Analyses of anomalous samples E.L. 737. Collected 1980.
- Appendix II Analyses of rock chip samples Wyola Lakes region E.L. 737 Collected 1981.
- Appendix III Petrographic description of Ferruginous rock sample.
- Appendix IV Auger sample analyses.
- Appendix V Stream sediment results Wyola E.L. 737 -80# and -10# +40#.

APPENDIX I

ANALYSES OF ANOMALOUS SAMPLES E.L. 737

SAMPLE NO.	SITE NO.	GRID CO-ORD.	ROCK TYPE	Cu	Pb	Zn	Ba	As	V	Ni	Co	Mn	Cd	V	Sn	W	
890276	890276	325393	Micaceous sandstone Vanna	8	6	4	530	4	<4	<4	<4	<1	<4	2	20	<4	<10
890277	890277	326391	Micaceous siltstone	10	6	8	490	18	<4	<4	<4	<1	<4	2	60	6	<10
890278	890278	324390	Vanna Beds	12	8	12	520	4	<4	<4	<4	<1	<4	2	40	<4	<10
890279		324390		12	6	10	470	20	<4	<4	<4	<1	<4	<1	190	<4	<10
890280		324390		10	4	8	430	2	<4	<4	<4	<1	<4	<1	50	4	<10
890281		324390		12	12	6	750	10	<4	<4	<4	<1	<4	<1	60	<4	<10
890282	890282	323388	Vanna Beds	16	4	4	500	16	<4	<4	<4	<1	<4	<1	70	4	10
890283	890283	328389	Clay lenses in Vanna Bed	14	24	10	550	8	<4	14	<4	<1	<4	<1	50	<4	<10
890284	890284	332385	Sandstone Vanna Beds	12	8	6	480	6	<4	<4	<4	<1	<4	3	40	4	<10
890285	890285	332384	Sandstone Vanna Beds	18	14	8	460	2	<4	<4	<4	<1	<4	2	50	<4	10
890286	890286	334380	Sandstone Vanna Beds	12	4	8	490	2	<4	<4	<4	<1	<4	3	40	<4	10
890287	890287	332381	Sandstone Vanna Beds	12	<4	8	460	<2	6	20	<4	<1	<4	<1	50	<4	<10
890288	890288	329376	Sandstone Vanna Beds	12	<4	12	530	<2	<4	<4	<4	<1	<4	<1	30	<4	<10
890289	890289	327374	Sandstone Vanna Beds	16	6	12	520	7	<4	<4	12	<1	<4	2	30	8	<10
890290	890290	343384	Sandstone Vanna Beds	8	4	12	520	3	4	<4	<4	<1	<4	2	50	4	<10
890291			Fe stone: over 4 prob t.	8	8	28	310	3	<4	<4	<4	<1	<4	<1	20	6	<10
890292	890292	349385	Fe stone: over 4 prob t.	10	4	12	520	3	<4	<4	<4	<1	<4	<1	20	6	<10
890293		349385	Sandstone Vanna Beds	10	4	12	460	12	4	<4	<4	<1	<4	<1	60	8	10
890294	890294	350384	Sandy limestone	8	6	4	145	6	<4	<4	<4	<1	<4	<1	20	4	<10
890295	890295	349380	Silicrete green	23	22	10	165	60	<4	<4	<4	<1	<4	<1	190	<4	<10
890296	890296	348379	Off white - grey limestone	14	18	6	60	12	-	<4	<4	<1	<4	<1	40	6	10
890297	890297	313384	Pidings sands (?)	12	16	12	430	330	-	<4	4	<1	<4	<1	670	<4	<10
890298	890298	314383	Fe stone	10	<4	14	690	44	-	<4	<4	<1	<4	<1	160	<4	15
890299	890299	312386	Vanna Beds (sandstone)	12	12	6	610	24	<4	<4	<4	<1	<4	<1	130	4	<10
890300		312386	Vanna Beds (sandstone) (Fe rich)	10	28	6	110	105	<4	<4	<4	<1	<4	<1	300	<4	10
890307	890307	313387	Pidings sandstone (?)/Hampton Congl.	12	10	10	1350	50	<4	10	4	<1	<4	<1	280	<4	<10
890308	890308	311387	Vanna beds micaceous sandstone	12	<4	36	440	4	<4	<4	<4	<1	<4	<1	70	<4	<10
890309	890309	309391	Micaceous sandstone (Vanna Beds?)	10	12	6	70	8	6	<4	<4	<1	<4	<1	30	<4	<10
890310	890310	309394	Fe rich micaceous sandstone (Vanna Beds?)	28	16	8	320	25	<4	<4	<4	<1	<4	<1	40	<4	<10
890311	890311	308396	Micaceous sandstone (C)	12	4	8	480	13	6	<4	<4	<1	<4	<1	50	<4	<10
890312	890312	306398	Knotted micaceous sandstones (C)	20	22	12	440	7	4	<4	<4	<1	<4	<1	50	<4	<10
890313	890313	303403	Micaceous sandstone (C)	10	4	8	260	4	<4	<4	<4	<1	<4	<1	20	6	<10
890314	890314	302399	Pidings Formation (?)	14	10	16	160	14	<4	<4	<4	<1	<4	<1	250	4	10
890315	890315	289386	Fe rich micaceous sandstone (C)	12	<4	12	500	4	<4	<4	<4	<1	<4	<1	20	<4	<10
890316	890316	283383	Fe rich micaceous sandstone (C)	20	10	20	420	3	<4	10	4	<1	<4	<1	10	10	<10
890317	890317	285387	Micaceous sandstone (C)	12	6	60	320	7	<4	<4	<4	<1	<4	<1	10	<4	<10
890318	890318	286389	Micaceous sandstone	10	4	18	540	7	<4	16	<4	<1	<4	<1	20	4	<10
890323	890323	285390	Micaceous sandstone (C)	22	6	10	430	4	<4	8	8	<1	<4	<1	20	6	<10
890324	890324	281395	Micaceous sandstone (C)	14	4	12	780	6	<4	8	4	<1	<4	2	30	<4	<10
890338	890338	360405	Micaceous sandstone	8	6	8	540	40	<4	<4	<4	<1	<4	<1	10	6	<10

APPENDIX II

ANALYSES OF ROCK CHIP SAMPLES WYOLA

LAKES REGION E.L. 737

COLLECTED 1981.

30-JUN-81 083

30-JUN-81

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*      *****      *      *****      *
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*      *      *      *      *      *      *
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A PROGRAM IN THE MICRO-GAS SYSTEM TO
PRINT A LISTING OF A DATA SET

VERSION 3.2 FEB 1980.

083

DATA TITLE: WYOLA LAKES ROCK CHIP DATA

THE FOLLOWING VARIABLES ARE IN THE DATA SET:

BA	CO	CR	LA	MN	MO	NI	SC	SR	TI
U	Y	YB	ZR	AG	AS	CU	GA	GE	PB
SN	ZN	PSEUDO	RX						

084

LISTING OF ARCHIVAL INFORMATION FOR THE INPUT DATA

084

THESE SAMPLES ARE ALL ROCK CHIP SAMPLES COLLECTED DURING MAY 1981 FROM IRONSTONE/SILCRETE/SANDSTONE OUTCROPS ADJACENT TO AND WITHIN A FIVE KILOMETRE RADIUS OF A BA-25-V ANOMALY RECORDED IN THE DECEMBER 1980 WYOLA ROCK CHIP SAMPLING PROGRAMME.

ALL ASSAYS ARE SEMI QUANTITATIVE EMISSION SPECTROSCOPY RESULTS ANALYSED BY AMDEL USING CODES A1 AND A2 D.P.O. NUMBER B:0474. RESULTS ARE REPORTED IN P.P.M. DETECTION LIMITS ARE:

BA(200), CO(5), CR(20), LA(50), MN(10), MO(3), NI(5), SC(3), SR(50), TI(100), V(10), Y(10), YB(1), ZR(10), AG(0.1), AS(50), CU(1), GA(1), GE(1), PB(1), SN(1), ZN(20).

ELEMENTS ANALYSED FOR BUT NOT RECORDED IN ANY SAMPLES ARE AS FOLLOWS (DETECTION LIMIT IN BRACKETS):

BE(1), CE(1), HR(20), TA(100), TH(100), W(50), BI(1), CD(3), IN(10), SB(30), ZN(20).

THE PSEUDO LABEL REFERS TO PRESENCE OF VAGUE ROCKWORK TYPE STRUCTURES BELIEVED TO BE PSEUDO MORPHS OF EVAPORITES. IF PRESENT RECORDED AS 2, ABSENT 1, NOT RECORDED -1.

RX LABEL REFERS TO ROCK TYPE.

THE FOLLOWING CODING SYSTEM HAS BEEN USED:

PIDINGA FORMATION SANDSTONE	1
WANNA BEDS SANDSTONE	2
SILCRETE	3
FERRUGINOUS SANDSTONE	4
MASSIVE IRONSTONE	5
CALCRETE	6
OTHER	-1

SAMPLE LOCATION SHOWN ON PLAN SA# 772

ELEMENTS WHICH WERE BELOW DETECTION LIMITS ON SOME SAMPLES HAVE BEEN RECORDED AS HALF OF THE DETECTION LIMIT EXCEPT FOR SILVER AND ZINC WHICH HAVE BEEN ASSIGNED -1 WHEN BELOW DETECTION LIMIT

***** INFORMATION ADDED BY CRUNCH *****

085

***** THE FOLLOWING SPECIAL VALUES WERE RECORDED TO EQUAL -1234.567 *****

VARIABLE NAME SPECIAL VALUE

DA	-1.000
CO	-1.000
CR	-1.000
LA	-1.000
AN	-1.000
MO	-1.000
NI	-1.000
SC	-1.000
NR	-1.000
II	-1.000
V	-1.000
F	-1.000
FB	-1.000
ER	-1.000
AG	-1.000
AS	-1.000
CU	-1.000
CA	-1.000
DE	-1.000
FB	-1.000
EN	-1.000
ZH	-1.000
PSEUDO	-1.000
R*	-1.000

***** NO TRANSFORMATIONS OR SELECTIONS WERE MADE DURING CRUNCH *****

NUMBER OF RECORDS WRITTEN IS : 132

RECORD LENGTH IS : 26

085

SAMPLE NO.	BA	CO	CR	LA	MN	MO	NI	SC	SR	TI	V	Y
913301	800.00	2.50	60.000	25.000	20.000	1.500	2.500	3.000	100.000	2000.000	40.000	5.000
913302	800.00	2.50	40.000	25.000	40.000	1.500	5.000	3.000	100.000	3000.000	40.000	10.000
913303	800.00	2.50	20.000	25.000	10.000	1.500	2.500	1.500	200.000	2000.000	60.000	5.000
913304	800.00	40.00	80.000	25.000	100.000	25.000	40.000	3.000	150.000	1500.000	100.000	5.000
913305	800.00	2.50	20.000	25.000	40.000	1.500	2.500	3.000	100.000	2000.000	30.000	5.000
913306	1500.00	2.50	40.000	25.000	40.000	1.500	2.500	3.000	100.000	2000.000	80.000	5.000
913307	800.00	2.50	80.000	25.000	100.000	10.000	5.000	3.000	100.000	2000.000	200.000	10.000
913308	1000.00	2.50	60.000	25.000	10.000	1.500	2.500	6.000	300.000	2500.000	60.000	5.000
913309	800.00	2.50	20.000	25.000	40.000	1.500	2.500	6.000	600.000	2000.000	30.000	5.000
913310	1000.00	2.50	60.000	25.000	80.000	1.500	2.500	3.000	1000.000	3000.000	200.000	5.000
913312	300.00	2.50	20.000	25.000	40.000	1.500	2.500	1.500	50.000	600.000	30.000	5.000
913314	800.00	20.00	20.000	50.000	100.000	1.500	40.000	6.000	100.000	3000.000	40.000	20.000
913315	1000.00	5.00	40.000	50.000	80.000	1.500	30.000	6.000	100.000	4000.000	80.000	20.000
913316	1000.00	2.50	40.000	50.000	80.000	1.500	30.000	6.000	100.000	4000.000	80.000	10.000
913317	200.00	2.50	40.000	25.000	40.000	1.500	2.500	1.500	25.000	2000.000	100.000	5.000
913320	600.00	2.50	80.000	25.000	20.000	1.500	2.500	1.500	25.000	3000.000	200.000	5.000
913321	800.00	2.50	40.000	25.000	100.000	1.500	2.500	1.500	50.000	10000.000	80.000	5.000
913322	1500.00	2.50	80.000	25.000	20.000	3.000	2.500	3.000	100.000	8000.000	200.000	5.000
913323	100.00	2.50	10.000	25.000	5.000	1.500	2.500	1.500	25.000	50.000	5.000	5.000
913324	300.00	5.00	80.000	25.000	80.000	1.500	5.000	1.500	25.000	1000.000	200.000	5.000
913325	200.00	2.50	20.000	25.000	60.000	1.500	20.000	1.500	300.000	400.000	20.000	5.000
913326	100.00	2.50	40.000	25.000	20.000	1.500	15.000	1.500	25.000	800.000	150.000	5.000
913327	800.00	2.50	40.000	25.000	80.000	1.500	2.500	1.500	50.000	10000.000	150.000	5.000
913328	100.00	2.50	40.000	25.000	10.000	1.500	40.000	3.000	25.000	400.000	80.000	5.000
913329	800.00	2.50	20.000	25.000	60.000	1.500	2.500	1.500	50.000	800.000	200.000	5.000
913330	800.00	2.50	80.000	25.000	30.000	1.500	40.000	10.000	150.000	1000.000	150.000	5.000
913331	100.00	2.50	40.000	25.000	30.000	1.500	2.500	6.000	100.000	400.000	80.000	5.000
913332	1500.00	2.50	80.000	25.000	80.000	3.000	15.000	1.500	50.000	1000.000	200.000	5.000
913333	800.00	2.50	60.000	25.000	5.000	1.500	2.500	1.500	25.000	1000.000	80.000	5.000
913334	2000.00	2.50	60.000	25.000	40.000	3.000	2.500	1.500	100.000	6000.000	100.000	5.000
913335	400.00	2.50	60.000	25.000	10.000	1.500	2.500	1.500	50.000	600.000	80.000	5.000
913336	5000.00	2.50	80.000	25.000	10.000	1.500	2.500	1.500	50.000	4000.000	200.000	5.000
913337	1500.00	2.50	50.000	25.000	30.000	1.500	10.000	1.500	50.000	4000.000	200.000	5.000
913338	1000.00	2.50	60.000	25.000	30.000	1.500	5.000	3.000	50.000	1000.000	150.000	5.000
913340	200.00	2.50	40.000	25.000	30.000	1.500	2.500	1.500	25.000	3000.000	200.000	5.000
913341	400.00	5.00	10.000	25.000	100.000	1.500	2.500	1.500	25.000	200.000	20.000	5.000
913342	800.00	2.50	20.000	25.000	80.000	1.500	20.000	1.500	50.000	10000.000	60.000	5.000
913343	400.00	2.50	20.000	25.000	80.000	1.500	2.500	1.500	25.000	8000.000	40.000	5.000
913344	100.00	2.50	40.000	25.000	100.000	1.500	10.000	1.500	25.000	600.000	30.000	5.000
913345	1000.00	2.50	80.000	25.000	150.000	1.500	20.000	1.500	25.000	400.000	300.000	5.000
913346	1000.00	2.50	60.000	25.000	30.000	1.500	10.000	3.000	25.000	1500.000	80.000	5.000
913347	100.00	2.50	80.000	25.000	150.000	3.000	10.000	1.500	25.000	800.000	300.000	5.000
913348	100.00	2.50	60.000	25.000	30.000	1.500	10.000	1.500	25.000	600.000	80.000	5.000
913349	400.00	2.50	80.000	25.000	100.000	1.500	5.000	1.500	25.000	2000.000	100.000	5.000
913451	1000.00	2.50	80.000	100.000	40.000	1.500	2.500	6.000	250.000	8000.000	80.000	20.000
913452	100.00	2.50	60.000	25.000	40.000	1.500	2.500	1.500	25.000	4000.000	40.000	5.000
913455	1000.00	2.50	40.000	25.000	40.000	1.500	20.000	3.000	100.000	2000.000	80.000	10.000
913456	1000.00	2.50	40.000	25.000	60.000	1.500	5.000	6.000	250.000	2000.000	80.000	20.000
913457	1000.00	2.50	80.000	50.000	40.000	1.500	5.000	6.000	50.000	3000.000	80.000	20.000
913458	100.00	2.50	10.000	25.000	300.000	1.500	30.000	1.500	100.000	1500.000	30.000	5.000
913459	1000.00	2.50	40.000	50.000	40.000	1.500	2.500	3.000	100.000	4000.000	100.000	20.000
913460	1000.00	2.50	60.000	50.000	40.000	1.500	2.500	6.000	150.000	4000.000	80.000	10.000
913461	800.00	2.50	40.000	25.000	100.000	1.500	2.500	1.500	50.000	2000.000	100.000	5.000
913462	200.00	2.50	100.000	150.000	40.000	1.500	20.000	6.000	50.000	4000.000	80.000	20.000
913463	800.00	2.50	40.000	25.000	70.000	1.500	2.500	1.500	100.000	2500.000	80.000	5.000
913464	100.00	2.50	40.000	25.000	40.000	1.500	2.500	1.500	50.000	2000.000	80.000	5.000
913465	100.00	2.50	40.000	25.000	20.000	1.500	15.000	3.000	250.000	2500.000	60.000	5.000
913466	100.00	2.50	60.000	25.000	100.000	3.000	15.000	3.000	25.000	2500.000	150.000	10.000
913467	100.00	2.50	40.000	25.000	20.000	1.500	2.500	3.000	25.000	3000.000	60.000	5.000
913468	100.00	2.50	60.000	25.000	60.000	1.500	15.000	1.500	50.000	600.000	200.000	5.000

SAMPLE NO.	RA	CO	CR	LA	MN	MO	NI	SC	SR	TI	V	Y
913469	1000.00	2.50	60.000	25.000	40.000	1.500	30.000	6.000	100.000	3000.000	60.000	5.000
913470	100.00	2.50	10.000	50.000	10.000	1.500	2.500	1.500	2000.000	200.000	20.000	5.000
913471	400.00	2.50	20.000	25.000	50.000	1.500	5.000	1.500	600.000	600.000	30.000	5.000
913472	800.00	2.50	40.000	25.000	30.000	1.500	2.500	6.000	100.000	6000.000	60.000	60.000
913473	1000.00	2.50	80.000	50.000	250.000	6.000	20.000	3.000	400.000	2500.000	200.000	10.000
913474	1000.00	2.50	60.000	50.000	30.000	1.500	2.500	10.000	100.000	4000.000	80.000	20.000
913475	100.00	2.50	80.000	25.000	250.000	3.000	15.000	1.500	25.000	1000.000	200.000	5.000
913476	100.00	2.50	40.000	25.000	60.000	1.500	2.500	1.500	50.000	2000.000	40.000	5.000
913477	800.00	2.50	40.000	25.000	80.000	1.500	2.500	3.000	50.000	4000.000	40.000	10.000
913478	100.00	2.50	100.000	25.000	100.000	3.000	20.000	3.000	25.000	3000.000	200.000	5.000
913479	100.00	2.50	60.000	50.000	30.000	1.500	2.500	6.000	25.000	6000.000	80.000	20.000
913780	100.00	2.50	80.000	25.000	30.000	3.000	15.000	6.000	100.000	4000.000	200.000	5.000
913781	400.00	2.50	40.000	25.000	400.000	3.000	2.500	3.000	100.000	2500.000	60.000	5.000
913482	100.00	2.50	10.000	25.000	60.000	1.500	2.500	1.500	25.000	600.000	5.000	5.000
913483	400.00	2.50	60.000	25.000	60.000	1.500	15.000	1.500	25.000	800.000	200.000	5.000
913484	100.00	2.50	80.000	25.000	30.000	1.500	60.000	1.500	25.000	1500.000	600.000	5.000
913485	100.00	2.50	40.000	25.000	60.000	1.500	5.000	1.500	25.000	100.000	80.000	5.000
913487	200.00	2.50	80.000	25.000	100.000	1.500	30.000	1.500	25.000	2500.000	80.000	5.000
913489	100.00	2.50	20.000	25.000	20.000	1.500	2.500	1.500	25.000	800.000	40.000	5.000
913491	100.00	2.50	40.000	25.000	40.000	1.500	2.500	1.500	25.000	2000.000	60.000	5.000
913492	100.00	2.50	10.000	25.000	80.000	1.500	5.000	1.500	100.000	400.000	40.000	5.000
913494	1000.00	2.50	20.000	25.000	20.000	1.500	5.000	3.000	50.000	1500.000	40.000	10.000
913495	600.00	2.50	10.000	25.000	20.000	1.500	2.500	3.000	100.000	1000.000	80.000	5.000
913496	600.00	2.50	20.000	50.000	40.000	1.500	10.000	6.000	250.000	1000.000	60.000	5.000
913497	100.00	2.50	20.000	25.000	100.000	1.500	5.000	1.500	25.000	400.000	60.000	5.000
913498	600.00	2.50	80.000	25.000	80.000	3.000	20.000	1.500	25.000	8000.000	200.000	5.000
913499	400.00	2.50	20.000	25.000	80.000	1.500	20.000	1.500	300.000	800.000	30.000	5.000
913500	800.00	2.50	80.000	25.000	80.000	15.000	40.000	1.500	25.000	2000.000	600.000	5.000
913541	100.00	2.50	60.000	25.000	80.000	1.500	5.000	1.500	25.000	3000.000	100.000	5.000
913542	400.00	2.50	40.000	25.000	80.000	1.500	2.500	1.500	25.000	3000.000	100.000	5.000
913543	100.00	2.50	40.000	25.000	60.000	1.500	5.000	1.500	25.000	3000.000	80.000	5.000
913544	400.00	25.00	80.000	25.000	80.000	3.000	15.000	1.500	25.000	4000.000	150.000	5.000
913545	400.00	25.00	80.000	25.000	60.000	1.500	5.000	1.500	25.000	4000.000	150.000	5.000
913546	1000.00	25.00	80.000	25.000	40.000	3.000	30.000	1.500	50.000	4000.000	250.000	5.000
913547	200.00	25.00	80.000	25.000	80.000	1.500	30.000	1.500	25.000	4000.000	250.000	5.000
913548	800.00	25.00	80.000	25.000	80.000	1.500	15.000	1.500	25.000	2000.000	150.000	5.000
913549	200.00	25.00	40.000	25.000	30.000	1.500	2.500	1.500	25.000	1500.000	150.000	5.000
913550	100.00	25.00	20.000	25.000	60.000	1.500	2.500	1.500	25.000	1000.000	100.000	5.000
913551	100.00	2.50	40.000	25.000	60.000	1.500	5.000	1.500	25.000	2000.000	80.000	5.000
913552	100.00	2.50	20.000	25.000	60.000	1.500	5.000	1.500	25.000	800.000	80.000	5.000
913553	400.00	2.50	40.000	25.000	100.000	6.000	20.000	1.500	25.000	800.000	300.000	5.000
913554	1000.00	2.50	60.000	25.000	80.000	3.000	40.000	3.000	50.000	800.000	300.000	5.000
913555	200.00	2.50	40.000	25.000	80.000	1.500	15.000	1.500	25.000	1000.000	150.000	5.000
913556	800.00	2.50	60.000	25.000	60.000	1.500	2.500	3.000	50.000	800.000	150.000	5.000
913557	200.00	2.50	60.000	25.000	40.000	1.500	2.500	3.000	25.000	800.000	80.000	5.000
913558	200.00	2.50	80.000	25.000	40.000	3.000	10.000	3.000	25.000	1000.000	200.000	5.000
913559	400.00	2.50	60.000	25.000	60.000	3.000	5.000	3.000	25.000	1000.000	150.000	5.000
913560	100.00	2.50	20.000	25.000	30.000	1.500	5.000	1.500	25.000	600.000	60.000	5.000
913561	100.00	2.50	60.000	25.000	60.000	1.500	5.000	1.500	25.000	800.000	100.000	5.000
913562	1000.00	2.50	80.000	25.000	80.000	3.000	30.000	1.500	50.000	1000.000	200.000	5.000
913563	400.00	2.50	60.000	25.000	20.000	1.500	60.000	1.500	25.000	1000.000	100.000	5.000
913564	400.00	2.50	80.000	25.000	20.000	1.500	80.000	1.500	50.000	1500.000	150.000	5.000
913565	200.00	25.00	80.000	25.000	60.000	1.500	5.000	1.500	25.000	400.000	100.000	25.000
913566	400.00	25.00	80.000	25.000	30.000	1.500	2.500	1.500	25.000	600.000	100.000	25.000
913567	600.00	25.00	80.000	25.000	60.000	1.500	5.000	3.000	25.000	400.000	150.000	25.000
913568	600.00	25.00	60.000	25.000	30.000	1.500	2.500	1.500	25.000	200.000	200.000	25.000
913569	600.00	25.00	60.000	25.000	30.000	1.500	2.500	1.500	25.000	400.000	80.000	25.000
913570	600.00	25.00	80.000	25.000	40.000	1.500	80.000	3.000	25.000	600.000	100.000	25.000
913571	800.00	25.00	80.000	25.000	40.000	1.500	5.000	3.000	50.000	200.000	100.000	25.000
913572	600.00	2.50	60.000	25.000	40.000	1.500	5.000	3.000	25.000	400.000	150.000	5.000

087

SAMPLE NO.	BA	CO	CR	LA	MN	MO	NI	SC	SR	TI	U	Y
913573	100.00	2.50	60.000	25.000	60.000	1.500	40.000	1.500	25.000	1500.000	150.000	5.000
913574	600.00	2.50	60.000	25.000	30.000	1.500	2.500	3.000	25.000	200.000	150.000	5.000
913575	100.00	2.50	40.000	25.000	100.000	1.500	5.000	1.500	25.000	1000.000	150.000	5.000
913576	100.00	2.50	40.000	25.000	80.000	1.500	2.500	1.500	25.000	1500.000	150.000	5.000
913577	400.00	2.50	80.000	25.000	40.000	1.500	2.500	3.000	25.000	400.000	150.000	5.000
913578	400.00	2.50	60.000	25.000	80.000	1.500	2.500	1.500	25.000	600.000	100.000	5.000
913579	400.00	2.50	40.000	25.000	60.000	1.500	2.500	1.500	25.000	800.000	80.000	5.000
913580	600.00	2.50	80.000	25.000	250.000	1.500	80.000	3.000	50.000	2500.000	1000.000	10.000
913581	100.00	2.50	40.000	25.000	40.000	1.500	2.500	1.500	25.000	2000.000	80.000	5.000
913582	100.00	2.50	40.000	25.000	80.000	1.500	15.000	1.500	25.000	1000.000	80.000	5.000
913583	100.00	2.50	20.000	25.000	80.000	1.500	40.000	1.500	25.000	1000.000	60.000	5.000
913584	100.00	2.50	20.000	25.000	40.000	1.500	5.000	1.500	25.000	800.000	40.000	5.000

SAMPLE NO.	YB	ZR	AG	AS	CU	GA	GE	PB	SN	ZN	PSEUDO	RX
913301	0.50	60.00	-1234.567	25.000	6.000	6.000	0.500	15.000	0.500	-1234.567	1.000	2.000
913302	2.00	150.00	-1234.567	25.000	4.000	6.000	0.500	15.000	0.500	-1234.567	1.000	2.000
913303	0.50	100.00	-1234.567	25.000	2.000	6.000	0.500	15.000	0.500	-1234.567	1.000	2.000
913304	0.50	300.00	-1234.567	25.000	15.000	6.000	0.500	25.000	0.500	-1234.567	1.000	2.000
913305	0.50	80.00	-1234.567	25.000	3.000	6.000	0.500	15.000	0.500	-1234.567	1.000	2.000
913306	0.50	80.00	-1234.567	25.000	3.000	3.000	0.500	15.000	0.500	-1234.567	1.000	2.000
913307	1.00	300.00	-1234.567	25.000	8.000	3.000	0.500	30.000	0.500	-1234.567	1.000	2.000
913308	5.00	100.00	-1234.567	25.000	4.000	6.000	0.500	15.000	0.500	-1234.567	1.000	2.000
913309	5.00	80.00	-1234.567	25.000	3.000	3.000	0.500	15.000	0.500	-1234.567	1.000	2.000
913310	5.00	200.00	-1234.567	25.000	4.000	6.000	0.500	15.000	0.500	-1234.567	1.000	2.000
913312	5.00	40.00	-1234.567	25.000	10.000	1.000	0.500	3.000	0.500	-1234.567	1.000	-1234.567
913314	2.00	150.00	-1234.567	25.000	3.000	6.000	0.500	20.000	0.500	-1234.567	1.000	2.000
913315	2.00	100.00	-1234.567	25.000	6.000	6.000	0.500	20.000	0.500	-1234.567	1.000	2.000
913316	1.00	100.00	-1234.567	25.000	6.000	6.000	0.500	20.000	0.500	-1234.567	1.000	2.000
913319	0.50	250.00	0.100	500.000	6.000	3.000	0.500	10.000	0.500	-1234.567	2.000	5.000
913320	0.50	300.00	0.100	300.000	6.000	6.000	0.500	25.000	0.500	-1234.567	1.000	4.000
913321	0.50	300.00	0.100	25.000	15.000	0.500	0.500	10.000	3.000	-1234.567	1.000	3.000
913322	0.50	400.00	0.100	500.000	4.000	3.000	0.500	30.000	0.500	-1234.567	1.000	3.000
913323	0.50	5.00	-1234.567	25.000	0.500	0.500	0.500	0.500	0.500	-1234.567	1.000	-1234.567
913324	0.50	200.00	-1234.567	150.000	8.000	0.500	0.500	20.000	0.500	-1234.567	1.000	1.000
913325	0.50	100.00	-1234.567	25.000	8.000	1.000	0.500	6.000	0.500	-1234.567	1.000	6.000
913326	0.50	150.00	0.100	600.000	3.000	0.500	0.500	3.000	0.500	-1234.567	1.000	5.000
913327	0.50	300.00	0.100	25.000	6.000	3.000	0.500	10.000	1.000	-1234.567	1.000	3.000
913328	0.50	80.00	-1234.567	25.000	4.000	0.500	0.500	25.000	0.500	-1234.567	1.000	2.000
913329	0.50	100.00	-1234.567	300.000	6.000	1.000	0.500	15.000	0.500	-1234.567	1.000	4.000
913330	0.50	200.00	-1234.567	25.000	4.000	0.500	0.500	30.000	0.500	-1234.567	1.000	2.000
913331	0.50	100.00	-1234.567	25.000	1.000	0.500	0.500	3.000	3.000	-1234.567	1.000	1.000
913332	0.50	150.00	-1234.567	100.000	6.000	6.000	0.500	25.000	0.500	-1234.567	1.000	4.000
913333	0.50	150.00	-1234.567	25.000	4.000	0.500	0.500	15.000	0.500	-1234.567	1.000	5.000
913334	0.50	300.00	0.100	25.000	6.000	6.000	0.500	15.000	2.000	-1234.567	1.000	6.000
913335	0.50	150.00	-1234.567	25.000	3.000	3.000	0.500	15.000	0.500	-1234.567	2.000	5.000
913336	0.50	150.00	0.100	25.000	4.000	15.000	0.500	15.000	1.000	-1234.567	1.000	1.000
913337	0.50	150.00	0.100	25.000	6.000	15.000	0.500	20.000	2.000	-1234.567	1.000	1.000
913338	0.50	100.00	0.300	25.000	3.000	3.000	0.500	10.000	0.500	-1234.567	1.000	5.000
913340	0.50	250.00	-1234.567	300.000	2.000	3.000	0.500	15.000	0.500	-1234.567	2.000	5.000
913341	0.50	60.00	-1234.567	25.000	6.000	3.000	0.500	25.000	0.500	-1234.567	1.000	3.000
913342	0.50	250.00	0.100	25.000	4.000	0.500	0.500	10.000	1.000	-1234.567	1.000	3.000
913343	0.50	700.00	0.100	25.000	6.000	0.500	0.500	10.000	2.000	-1234.567	1.000	3.000
913344	0.50	80.00	-1234.567	25.000	4.000	0.500	0.500	6.000	0.500	-1234.567	1.000	4.000
913345	0.50	200.00	-1234.567	800.000	2.000	1.000	0.500	20.000	0.500	-1234.567	1.000	5.000
913346	0.50	150.00	-1234.567	25.000	6.000	10.000	0.500	6.000	0.500	-1234.567	1.000	1.000
913347	0.50	250.00	-1234.567	800.000	6.000	3.000	0.500	20.000	0.500	-1234.567	1.000	4.000
913348	0.50	200.00	-1234.567	25.000	4.000	0.500	0.500	10.000	0.500	-1234.567	1.000	5.000
913349	0.50	250.00	-1234.567	25.000	4.000	1.000	0.500	15.000	0.500	-1234.567	1.000	5.000
913451	1.00	150.00	-1234.567	25.000	6.000	6.000	0.500	20.000	0.500	-1234.567	1.000	2.000
913452	0.50	100.00	0.100	25.000	6.000	0.500	0.500	6.000	0.500	-1234.567	1.000	2.000
913455	1.00	80.00	-1234.567	25.000	20.000	6.000	0.500	20.000	0.500	-1234.567	1.000	2.000
913456	1.00	80.00	-1234.567	25.000	10.000	10.000	0.500	15.000	0.500	-1234.567	1.000	2.000
913457	1.00	200.00	-1234.567	25.000	8.000	10.000	0.500	15.000	0.500	-1234.567	1.000	2.000
913458	0.50	250.00	-1234.567	25.000	10.000	0.500	0.500	4.000	0.500	100.000	1.000	5.000
913459	2.00	250.00	-1234.567	25.000	8.000	6.000	0.500	10.000	0.500	-1234.567	1.000	2.000
913460	2.00	200.00	-1234.567	25.000	20.000	10.000	0.500	15.000	0.500	-1234.567	1.000	2.000
913461	0.50	600.00	-1234.567	25.000	10.000	3.000	2.000	30.000	3.000	-1234.567	1.000	4.000
913462	2.00	200.00	0.100	25.000	80.000	20.000	0.500	30.000	6.000	-1234.567	1.000	2.000
913463	0.50	100.00	-1234.567	25.000	10.000	6.000	0.500	10.000	0.500	-1234.567	1.000	2.000
913464	0.50	150.00	-1234.567	25.000	10.000	3.000	0.500	2.000	0.500	-1234.567	1.000	4.000
913465	0.50	100.00	-1234.567	25.000	8.000	10.000	0.500	25.000	0.500	-1234.567	1.000	2.000
913466	1.00	300.00	-1234.567	25.000	10.000	3.000	2.000	25.000	1.000	-1234.567	1.000	4.000
913467	0.50	100.00	-1234.567	25.000	8.000	6.000	0.500	10.000	0.500	-1234.567	1.000	2.000
913468	0.50	200.00	-1234.567	25.000	20.000	25.000	1.000	40.000	0.500	-1234.567	1.000	4.000

SAMPLE NO.	YR	ZR	AG	AS	CU	BA	GE	PB	SN	ZN	PSEUDO	RX
913469	0.50	100.00	-1234.567	25.000	30.000	10.000	0.500	20.000	0.500	-1234.567	1.000	2.000
913470	0.50	5.00	0.100	25.000	6.000	0.500	0.500	6.000	0.500	-1234.567	1.000	-1234.567
913471	0.50	40.00	-1234.567	25.000	4.000	3.000	0.500	25.000	0.500	-1234.567	1.000	2.000
913472	8.00	250.00	-1234.567	25.000	4.000	6.000	0.500	20.000	0.500	-1234.567	1.000	2.000
913473	1.00	250.00	-1234.567	25.000	6.000	6.000	0.500	20.000	0.500	-1234.567	1.000	2.000
913474	2.00	150.00	-1234.567	25.000	6.000	6.000	0.500	15.000	0.500	-1234.567	1.000	2.000
913475	0.50	300.00	-1234.567	25.000	6.000	1.000	0.500	4.000	0.500	-1234.567	1.000	4.000
913476	0.50	100.00	-1234.567	25.000	4.000	6.000	0.500	6.000	0.500	-1234.567	1.000	2.000
913477	0.50	100.00	-1234.567	25.000	6.000	3.000	0.500	8.000	0.500	-1234.567	1.000	2.000
913478	0.50	250.00	-1234.567	25.000	6.000	10.000	0.500	10.000	2.000	-1234.567	1.000	4.000
913479	1.00	250.00	-1234.567	25.000	4.000	10.000	0.500	40.000	1.000	-1234.567	1.000	4.000
913780	0.50	250.00	0.100	25.000	6.000	10.000	0.500	15.000	2.000	-1234.567	1.000	4.000
913781	0.50	150.00	-1234.567	25.000	6.000	3.000	0.500	40.000	2.000	-1234.567	1.000	2.000
913482	0.50	150.00	-1234.567	25.000	4.000	0.500	0.500	2.000	0.500	-1234.567	1.000	2.000
913483	0.50	200.00	-1234.567	800.000	4.000	1.000	0.500	4.000	0.500	-1234.567	1.000	5.000
913484	0.50	150.00	0.100	1000.000	4.000	30.000	0.500	20.000	0.500	-1234.567	1.000	4.000
913485	0.50	150.00	-1234.567	300.000	2.000	0.500	0.500	3.000	0.500	-1234.567	1.000	5.000
913487	0.50	300.00	0.100	25.000	6.000	0.500	0.500	3.000	0.500	-1234.567	1.000	5.000
913489	0.50	150.00	-1234.567	25.000	2.000	0.500	0.500	4.000	0.500	-1234.567	2.000	5.000
913491	0.50	200.00	-1234.567	25.000	2.000	0.500	0.500	4.000	0.500	-1234.567	2.000	5.000
913492	0.50	100.00	-1234.567	25.000	8.000	0.500	0.500	3.000	0.500	-1234.567	1.000	-1234.567
913494	1.00	80.00	-1234.567	25.000	8.000	10.000	0.500	20.000	0.500	-1234.567	1.000	2.000
913495	0.50	100.00	-1234.567	25.000	6.000	10.000	0.500	15.000	0.500	-1234.567	1.000	2.000
913496	0.50	150.00	-1234.567	25.000	8.000	10.000	0.500	15.000	0.500	-1234.567	1.000	2.000
913497	0.50	100.00	-1234.567	25.000	4.000	6.000	0.500	10.000	0.500	-1234.567	1.000	4.000
913498	0.50	300.00	0.100	25.000	6.000	30.000	1.000	15.000	3.000	-1234.567	1.000	5.000
913499	0.50	80.00	-1234.567	25.000	6.000	0.500	0.500	1.000	0.500	-1234.567	1.000	6.000
913500	0.50	200.00	-1234.567	400.000	80.000	10.000	1.000	40.000	15.000	-1234.567	1.000	4.000
913541	0.50	250.00	-1234.567	400.000	4.000	3.000	0.500	4.000	0.500	-1234.567	2.000	5.000
913542	0.50	200.00	-1234.567	400.000	3.000	3.000	0.500	4.000	0.500	-1234.567	2.000	5.000
913543	0.50	200.00	-1234.567	400.000	3.000	1.000	0.500	4.000	0.500	-1234.567	2.000	5.000
913544	0.50	300.00	-1234.567	500.000	4.000	3.000	0.500	6.000	0.500	-1234.567	2.000	5.000
913545	0.50	250.00	-1234.567	300.000	6.000	3.000	0.500	6.000	0.500	-1234.567	2.000	5.000
913546	0.50	250.00	-1234.567	300.000	6.000	6.000	0.500	15.000	0.500	-1234.567	2.000	5.000
913547	0.50	300.00	0.100	400.000	6.000	3.000	0.500	6.000	0.500	-1234.567	2.000	5.000
913548	0.50	250.00	-1234.567	400.000	4.000	6.000	0.500	10.000	0.500	-1234.567	2.000	5.000
913549	0.50	250.00	-1234.567	400.000	3.000	3.000	0.500	6.000	0.500	-1234.567	2.000	5.000
913550	0.50	150.00	-1234.567	150.000	3.000	1.000	0.500	15.000	0.500	-1234.567	2.000	5.000
913551	0.50	250.00	-1234.567	150.000	4.000	1.000	0.500	15.000	0.500	-1234.567	2.000	5.000
913552	0.50	200.00	0.100	250.000	3.000	1.000	0.500	20.000	0.500	-1234.567	2.000	5.000
913553	0.50	100.00	0.100	1000.000	8.000	3.000	0.500	25.000	0.500	-1234.567	2.000	5.000
913554	0.50	150.00	-1234.567	800.000	6.000	3.000	0.500	20.000	0.500	-1234.567	2.000	5.000
913555	0.50	150.00	-1234.567	500.000	3.000	4.000	0.500	20.000	0.500	-1234.567	2.000	5.000
913556	0.50	200.00	-1234.567	100.000	6.000	3.000	0.500	20.000	0.500	-1234.567	1.000	5.000
913557	0.50	200.00	-1234.567	25.000	4.000	1.000	0.500	25.000	0.500	-1234.567	1.000	5.000
913558	0.50	200.00	-1234.567	25.000	4.000	1.000	0.500	20.000	0.500	-1234.567	1.000	5.000
913559	0.50	200.00	-1234.567	25.000	6.000	3.000	0.500	25.000	0.500	-1234.567	1.000	5.000
913560	0.50	100.00	-1234.567	100.000	2.000	6.000	0.500	30.000	0.500	-1234.567	1.000	5.000
913561	0.50	200.00	-1234.567	25.000	8.000	3.000	0.500	30.000	0.500	-1234.567	1.000	5.000
913562	0.50	250.00	-1234.567	200.000	4.000	6.000	0.500	20.000	0.500	-1234.567	1.000	5.000
913563	0.50	100.00	-1234.567	50.000	4.000	3.000	0.500	20.000	0.500	-1234.567	1.000	5.000
913564	0.50	200.00	-1234.567	25.000	6.000	3.000	0.500	25.000	0.500	-1234.567	1.000	5.000
913565	0.50	200.00	-1234.567	25.000	6.000	1.000	0.500	25.000	0.500	-1234.567	-1234.567	5.000
913566	0.50	200.00	-1234.567	25.000	6.000	1.000	0.500	25.000	0.500	-1234.567	-1234.567	5.000
913567	0.50	200.00	-1234.567	25.000	6.000	1.000	0.500	25.000	0.500	-1234.567	-1234.567	5.000
913568	0.50	150.00	-1234.567	300.000	4.000	1.000	0.500	15.000	0.500	-1234.567	-1234.567	5.000
913569	0.50	100.00	-1234.567	100.000	6.000	1.000	0.500	15.000	0.500	-1234.567	-1234.567	5.000
913570	0.50	250.00	-1234.567	100.000	6.000	0.500	0.500	15.000	0.500	-1234.567	-1234.567	5.000
913571	0.50	100.00	-1234.567	100.000	8.000	0.500	0.500	10.000	0.500	-1234.567	-1234.567	5.000
913572	0.50	100.00	-1234.567	800.000	4.000	3.000	0.500	20.000	0.500	-1234.567	-1234.567	5.000

SAMPLE NO.	YB	ZR	AG	AS	CU	GA	GE	PB	SN	ZN	PSEUDO	RX
913573	0.50	200.00	-1234.567	25.000	4.000	0.500	0.500	10.000	0.500	-1234.567	-1234.567	5.000
913574	0.50	150.00	-1234.567	25.000	10.000	1.000	0.500	20.000	0.500	-1234.567	-1234.567	5.000
913575	0.50	200.00	-1234.567	25.000	6.000	0.500	0.500	10.000	10.000	-1234.567	-1234.567	5.000
913576	0.50	150.00	-1234.567	25.000	3.000	0.500	0.500	15.000	0.500	-1234.567	-1234.567	5.000
913577	0.50	150.00	-1234.567	25.000	3.000	0.500	0.500	15.000	0.500	-1234.567	-1234.567	5.000
913578	0.50	150.00	-1234.567	150.000	4.000	1.000	0.500	25.000	0.500	-1234.567	-1234.567	5.000
913579	0.50	150.00	-1234.567	25.000	4.000	0.500	0.500	15.000	0.500	-1234.567	1.000	5.000
913580	0.50	300.00	-1234.567	800.000	6.000	20.000	0.500	40.000	1.000	40.000	1.000	4.000
913581	0.50	250.00	-1234.567	150.000	4.000	3.000	0.500	10.000	0.500	-1234.567	2.000	5.000
913582	0.50	200.00	-1234.567	100.000	3.000	0.500	0.500	6.000	0.500	-1234.567	1.000	5.000
913583	0.50	150.00	-1234.567	100.000	3.000	1.000	0.500	15.000	1.000	-1234.567	2.000	5.000
913584	0.50	150.00	-1234.567	100.000	1.000	0.500	0.500	15.000	1.000	-1234.567	2.000	5.000

NUMBERS THAT ARE CODED -1234.567 REPRESENT 'SPECIAL VALUES'.
THESE VALUES WILL BE EXCLUDED FROM ALL CALCUALTIONS IN THE
MICRO-GAS SYSTEM.

092

APPENDIX III
PETROGRAPHIC DESCRIPTION OF
FERRUGINOUS ROCK SAMPLE.

Pontifex & Associates Pty. Ltd. 093

TEL. 332 6744
A.H. 31 3816

26 KENSINGTON ROAD, ROSE PARK
SOUTH AUSTRALIA

P.O. BOX 91, NORWOOD
SOUTH AUSTRALIA 5067

MINERALOGICAL REPORT NO. 3340

24th June, 1981

TO: Mr. D.L. Andrews,
C.R.A. Exploration Pty. Ltd.,
P.O. Box 254,
NORWOOD, S.A. 5067

YOUR REFERENCE: Order No. B/0476

MATERIAL: Large ferruginous rock sample

IDENTIFICATION: 913326

WORK REQUESTED: Description of bulk rock,
also petrographic description
(from thin section)

SAMPLE & SECTION: Returned to you
with this report



PONTIFEX & ASSOCIATES PTY. LTD.

913326 : massive, (non-bedded), generally medium to coarse quartz sand, extensively permeated by (and cemented by) migratory limonite ('lateritised'); incorporating abundant random, angular fragments of wood or related organic fibrous/cellulose material, which have been leached and intensely ferruginised

Under binocular microscope, notably on a sawn surface, this bulk rock is seen to consist largely (50 - 60%) of a massive, fairly homogeneous matrix of brown limonite or siliceous-limonite, and minor patches of white kunkar, widespread throughout a rather loose sandy aggregate. Indeed these secondary/supergene materials appear to cement, and fill voids within the sand aggregate.

This matrix contains abundant randomly disposed angular 'fragments', ranging in size between 5 mm and 25 mm in maximum dimension, commonly surrounded by an ~~envelope about 3 mm thick, of colloform siliceous-limonite.~~ These fragments are almost invariably very ferruginous, leached and somewhat cellular, with a relict, compact-fibrous to platy texture, ~~which macroscopically may be tentatively considered as original fragments of shale or phyllite which had intersecting cleavages (lineation fabric), (or possibly they represent fragments of 'wood' or related organic fibrous/cellulose material, selectively leached and impregnated by limonite).~~

In thin section, the rock matrix is seen to consist largely of a random, rather loose-packed aggregate of subrounded to rounded quartz grains, generally single crystal grains clouded with dusty inclusions, commonly in trails. Sorting is fairly poor, with a size range from 0.1 to 1.5 in maximum dimension. Accessory argillaceous grains (+ limonite) and ~~trace zircon~~ grains occur in the aggregate.

.../

913326 contd. ..

Intergranular areas have been totally invaded by an exotic, migratory ~~limonite~~ cement (possibly + minor supergene hematite).

The fragments noted macroscopically also display a generalised ~~'compact-fibrous'~~ texture preserved in limonite, in this thin section. In addition however, ~~an almost certain micro-knotted, fibrous/cellulose~~ texture is manifest in the cores of most fragments, notably the less leached, and more intensely ferruginous ones. Certainly there is no clear evidence of a diagnostic rock fabric, and no evidence of indigenous silicate (or carbonate) mineral phases.

096

APPENDIX IV
AUGER SAMPLE ANALYSES

DATA TITLE: WYOLA LAKES AUGER GRID

097

THE FOLLOWING VARIABLES ARE IN THE DATA SET:

NORTH EAST DEPTH CU PB ZN MN V BA AS

097

LISTING OF ARCHIVAL INFORMATION FOR THE INPUT DATA

THESE SAMPLES ARE ALL AUGER SAMPLES COLLECTED BY ANDREWS DURING MAY '81. THE AUGER GRID WAS ORIENTATED EAST-WEST OVER SUBCROP OF A TERTIARY LATERITIC SURFACE DEVELOPED ON THE TERTIARY PIDINGA FORMATION IMMEDIATELY OVERLYING THE CAMBRIAN WANNA BEDS, NEAR WYOLA LAKES.

THE GRID WAS CENTRED ON THE ANOMALOUS ROCK CHIP SAMPLE 890297 WHICH RETURNED 4300 P.P.M. BA, 530AS, 670V.

ALL ASSAYS WERE COMPLETED BY COMLABS USING A.A.S. FOR CU, PB, ZN, MN AND V AND BY X.R.F. FOR BA AND AS. D.P.O. NO. B0473.

RESULTS ARE REPORTED IN P.P.M.

DETECTION LIMITS WERE: CU (4), PB (4), ZN (2), MN (4), V (20), BA (10), AS (2).

ELEMENTS BELOW DETECTION LIMIT HAVE BEEN RECORDED AS HALF OF THE DETECTION LIMIT.

CO-ORDINATES REFER TO LOCAL GRID SHOWN ON PLAN SAA 772.

DEPTH REFERS TO DEPTH OF AUGER SAMPLE IN METRES.

***** INFORMATION ADDED BY CRUNCH *****

***** THE FOLLOWING SPECIAL VALUES WERE RECORDED TO EQUAL -1234.567 *****

VARIABLE NAME SPECIAL VALUE

NORTH	-1.000
EAST	-1.000
DEPTH	-1.000
CU	-1.000
PB	-1.000
ZN	-1.000
MN	-1.000
V	-1.000
BA	-1.000
AS	-1.000

***** NO TRANSFORMATIONS OR SELECTIONS WERE MADE DURING CRUNCH *****

NUMBER OF RECORDS WRITTEN IS : 141

RECORD LENGTH IS : 12

SAMPLE NO.	NORTH	EAST	DEPTH	CU	PB	ZN	MN	V	BA	AS
913350	300.00	600.00	-1234.567	6.000	12.000	12.000	26.000	20.000	70.000	7.000
913351	300.00	575.00	-1234.567	6.000	12.000	6.000	10.000	20.000	65.000	6.000
913352	300.00	550.00	-1234.567	8.000	16.000	6.000	20.000	40.000	90.000	7.000
913353	300.00	525.00	-1234.567	8.000	8.000	6.000	50.000	40.000	100.000	22.000
913354	300.00	500.00	-1234.567	6.000	4.000	8.000	26.000	20.000	70.000	1.000
913355	300.00	475.00	-1234.567	6.000	2.000	8.000	18.000	20.000	75.000	6.000
913356	300.00	450.00	-1234.567	4.000	2.000	8.000	26.000	20.000	100.000	4.000
913357	300.00	425.00	-1234.567	6.000	4.000	8.000	30.000	20.000	75.000	5.000
913358	300.00	400.00	-1234.567	6.000	4.000	8.000	34.000	20.000	100.000	6.000
913359	300.00	625.00	-1234.567	10.000	16.000	26.000	80.000	30.000	100.000	10.000
913360	300.00	650.00	-1234.567	14.000	16.000	30.000	115.000	50.000	135.000	16.000
913361	300.00	675.00	-1234.567	12.000	16.000	26.000	100.000	30.000	135.000	12.000
913362	300.00	700.00	-1234.567	10.000	12.000	20.000	100.000	40.000	130.000	10.000
913363	300.00	725.00	-1234.567	8.000	8.000	12.000	60.000	20.000	120.000	4.000
913364	300.00	750.00	-1234.567	6.000	4.000	12.000	80.000	20.000	130.000	5.000
913365	300.00	775.00	-1234.567	8.000	8.000	12.000	70.000	30.000	110.000	7.000
913366	300.00	800.00	-1234.567	6.000	8.000	10.000	38.000	20.000	105.000	6.000
913367	300.00	825.00	-1234.567	6.000	2.000	8.000	32.000	20.000	125.000	5.000
913368	300.00	850.00	-1234.567	6.000	2.000	10.000	36.000	20.000	115.000	4.000
913369	300.00	875.00	-1234.567	6.000	2.000	10.000	46.000	20.000	105.000	2.000
913370	100.00	600.00	-1234.567	8.000	16.000	28.000	60.000	30.000	95.000	10.000
913371	100.00	575.00	-1234.567	8.000	4.000	18.000	70.000	30.000	110.000	8.000
913372	100.00	550.00	-1234.567	6.000	2.000	8.000	48.000	20.000	110.000	5.000
913373	100.00	525.00	-1234.567	6.000	12.000	8.000	24.000	30.000	130.000	9.000
913374	100.00	500.00	-1234.567	6.000	32.000	6.000	14.000	30.000	95.000	3.000
913375	100.00	475.00	-1234.567	4.000	8.000	8.000	32.000	30.000	85.000	9.000
913376	100.00	450.00	-1234.567	10.000	20.000	12.000	40.000	50.000	510.000	115.000
913377	100.00	425.00	-1234.567	8.000	8.000	14.000	70.000	110.000	390.000	50.000
913378	100.00	400.00	-1234.567	12.000	8.000	12.000	48.000	160.000	1160.000	32.000
913379	275.00	600.00	-1234.567	6.000	16.000	8.000	16.000	40.000	180.000	14.000
913380	250.00	600.00	-1234.567	4.000	2.000	8.000	28.000	10.000	100.000	4.000
913381	225.00	600.00	-1234.567	4.000	2.000	8.000	20.000	20.000	80.000	5.000
913382	200.00	600.00	-1234.567	4.000	2.000	8.000	30.000	20.000	105.000	4.000
913383	175.00	600.00	-1234.567	4.000	2.000	10.000	38.000	30.000	105.000	9.000
913384	150.00	600.00	-1234.567	6.000	2.000	12.000	60.000	30.000	125.000	10.000
913385	125.00	600.00	-1234.567	8.000	2.000	16.000	115.000	30.000	150.000	10.000
913386	600.00	600.00	1.000	4.000	2.000	8.000	28.000	20.000	85.000	2.000
913387	600.00	575.00	1.000	4.000	2.000	6.000	24.000	20.000	95.000	4.000
913388	600.00	550.00	1.000	4.000	2.000	6.000	20.000	20.000	65.000	4.000
913389	600.00	525.00	1.000	4.000	2.000	8.000	26.000	20.000	75.000	5.000
913390	600.00	500.00	1.000	4.000	2.000	8.000	28.000	20.000	110.000	5.000
913391	600.00	475.00	1.000	4.000	2.000	6.000	26.000	10.000	95.000	6.000
913392	600.00	450.00	1.000	4.000	2.000	8.000	30.000	20.000	105.000	7.000
913393	600.00	425.00	1.000	4.000	2.000	8.000	30.000	30.000	110.000	7.000
913394	600.00	400.00	1.000	4.000	2.000	8.000	32.000	20.000	120.000	7.000
913395	600.00	375.00	1.000	6.000	2.000	8.000	26.000	30.000	90.000	9.000
913396	600.00	350.00	1.000	6.000	4.000	8.000	38.000	30.000	145.000	7.000
913397	600.00	325.00	1.000	6.000	2.000	10.000	38.000	40.000	145.000	10.000
913398	600.00	300.00	1.000	6.000	2.000	10.000	44.000	20.000	140.000	4.000
913399	500.00	600.00	1.000	8.000	28.000	12.000	24.000	60.000	180.000	12.000
913400	500.00	575.00	1.000	10.000	8.000	20.000	75.000	40.000	135.000	8.000
913401	500.00	550.00	1.000	8.000	2.000	12.000	30.000	20.000	105.000	7.000
913402	500.00	525.00	1.000	4.000	2.000	8.000	28.000	20.000	105.000	7.000
913403	500.00	500.00	1.000	4.000	2.000	10.000	40.000	20.000	70.000	5.000
913404	500.00	475.00	1.000	4.000	2.000	8.000	24.000	20.000	105.000	4.000
913405	500.00	450.00	1.000	4.000	2.000	8.000	24.000	20.000	85.000	5.000
913406	500.00	425.00	1.000	4.000	2.000	8.000	24.000	20.000	80.000	4.000
913407	500.00	400.00	1.000	4.000	2.000	8.000	24.000	20.000	120.000	5.000
913408	500.00	375.00	1.000	6.000	2.000	8.000	20.000	20.000	115.000	5.000
913409	500.00	350.00	0.800	16.000	2.000	12.000	45.000	60.000	170.000	8.000

098

SAMPLE NO.	NORTH	EAST	DEPTH	CU	PB	ZN	MN	U	BA	AS
913410	500.00	325.00	1.000	4.000	16.000	8.000	20.000	90.000	200.000	85.000
913411	500.00	300.00	1.000	6.000	2.000	8.000	32.000	20.000	140.000	6.000
913412	400.00	600.00	1.000	6.000	16.000	16.000	36.000	60.000	215.000	12.000
913413	400.00	575.00	1.000	4.000	28.000	10.000	44.000	60.000	205.000	16.000
913414	400.00	550.00	1.000	6.000	16.000	16.000	48.000	40.000	85.000	6.000
913415	400.00	525.00	1.000	6.000	16.000	16.000	10.000	36.000	30.000	85.000
913316	400.00	500.00	1.000	4.000	4.000	8.000	40.000	20.000	105.000	5.000
913417	400.00	475.00	1.000	4.000	4.000	6.000	20.000	20.000	100.000	3.000
913418	400.00	450.00	1.000	4.000	4.000	8.000	20.000	30.000	90.000	5.000
913419	400.00	425.00	1.000	4.000	4.000	8.000	28.000	20.000	110.000	1.000
913420	400.00	400.00	1.000	2.000	2.000	8.000	16.000	30.000	70.000	3.000
913421	200.00	600.00	1.000	4.000	2.000	8.000	28.000	30.000	120.000	5.000
913422	200.00	575.00	0.500	6.000	8.000	8.000	40.000	150.000	310.000	80.000
913423	200.00	550.00	0.400	4.000	2.000	10.000	40.000	30.000	85.000	5.000
913424	200.00	525.00	1.000	4.000	2.000	8.000	28.000	30.000	100.000	5.000
913425	200.00	500.00	0.500	4.000	2.000	10.000	32.000	30.000	120.000	4.000
913426	200.00	475.00	1.000	4.000	4.000	10.000	32.000	30.000	110.000	5.000
913427	200.00	450.00	0.900	4.000	2.000	12.000	36.000	30.000	85.000	4.000
913428	200.00	425.00	1.000	6.000	4.000	12.000	36.000	30.000	105.000	6.000
913429	200.00	400.00	1.000	6.000	4.000	12.000	36.000	30.000	120.000	6.000
913430	100.00	375.00	0.300	6.000	8.000	14.000	80.000	40.000	150.000	5.000
913431	100.00	350.00	0.300	8.000	8.000	12.000	75.000	30.000	155.000	7.000
913432	100.00	325.00	1.000	4.000	4.000	12.000	36.000	30.000	90.000	6.000
913433	100.00	300.00	1.000	6.000	12.000	10.000	44.000	30.000	110.000	6.000
913434	100.00	275.00	1.000	2.000	4.000	8.000	24.000	30.000	80.000	5.000
913435	100.00	250.00	1.000	2.000	2.000	8.000	24.000	30.000	70.000	6.000
913436	100.00	225.00	1.000	4.000	2.000	8.000	32.000	30.000	90.000	8.000
913437	100.00	200.00	1.000	4.000	2.000	8.000	32.000	40.000	110.000	5.000
913438	100.00	175.00	1.000	4.000	8.000	8.000	24.000	30.000	95.000	6.000
913439	100.00	150.00	1.000	4.000	4.000	10.000	28.000	30.000	100.000	7.000
913450	0.00	525.00	1.000	10.000	16.000	18.000	48.000	80.000	170.000	40.000
913440	100.00	125.00	1.000	4.000	2.000	10.000	40.000	30.000	115.000	8.000
913441	100.00	100.00	1.000	4.000	2.000	8.000	26.000	30.000	130.000	8.000
913442	100.00	75.00	1.000	4.000	2.000	8.000	36.000	30.000	105.000	9.000
913443	100.00	50.00	1.000	6.000	2.000	16.000	70.000	60.000	180.000	12.000
913444	100.00	25.00	0.300	18.000	8.000	12.000	32.000	40.000	190.000	4.000
913445	100.00	0.00	0.400	12.000	4.000	10.000	24.000	120.000	1850.000	50.000
913446	75.00	-25.00	1.000	6.000	12.000	12.000	40.000	50.000	140.000	16.000
913447	75.00	-50.00	1.000	6.000	4.000	12.000	44.000	30.000	150.000	8.000
913448	0.00	575.00	1.000	10.000	16.000	10.000	20.000	20.000	80.000	6.000
913449	0.00	550.00	1.000	10.000	12.000	10.000	32.000	60.000	220.000	26.000
913501	0.00	500.00	1.000	6.000	8.000	8.000	20.000	60.000	150.000	32.000
913502	0.00	475.00	1.000	8.000	12.000	8.000	20.000	70.000	180.000	38.000
913503	0.00	450.00	1.000	4.000	8.000	8.000	40.000	20.000	115.000	5.000
913504	0.00	425.00	1.000	4.000	2.000	10.000	44.000	20.000	110.000	6.000
913505	0.00	400.00	1.000	6.000	2.000	10.000	24.000	20.000	135.000	6.000
913506	0.00	375.00	0.800	16.000	12.000	12.000	48.000	40.000	660.000	14.000
913507	0.00	350.00	0.500	12.000	12.000	20.000	65.000	110.000	650.000	42.000
913508	0.00	325.00	0.300	10.000	16.000	14.000	80.000	350.000	540.000	105.000
913509	0.00	300.00	0.400	6.000	2.000	12.000	50.000	40.000	135.000	8.000
913510	0.00	275.00	0.900	6.000	4.000	14.000	48.000	20.000	110.000	4.000
913511	0.00	250.00	1.000	4.000	2.000	8.000	24.000	20.000	70.000	7.000
913512	0.00	225.00	1.000	4.000	2.000	8.000	16.000	20.000	75.000	5.000
913513	0.00	200.00	1.000	4.000	2.000	6.000	20.000	20.000	70.000	6.000
913514	0.00	175.00	1.000	4.000	2.000	8.000	28.000	20.000	85.000	6.000
913515	0.00	150.00	1.000	4.000	2.000	8.000	28.000	30.000	90.000	4.000
913516	0.00	125.00	1.000	4.000	4.000	8.000	24.000	30.000	90.000	10.000
913517	0.00	100.00	1.000	4.000	4.000	8.000	28.000	30.000	85.000	6.000
913518	0.00	75.00	1.000	4.000	2.000	8.000	24.000	20.000	90.000	6.000
913519	0.00	50.00	1.000	4.000	2.000	8.000	28.000	20.000	95.000	3.000

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SAMPLE NO.	NORTH	EAST	DEPTH	CU	PR	ZN	MN	V	BA	AS
913520	0.00	25.00	1.000	4.000	4.000	8.000	28.000	20.000	115.000	2.000
913521	0.00	0.00	1.000	4.000	4.000	8.000	20.000	20.000	95.000	5.000
913522	0.00	600.00	-1234.567	4.000	16.000	6.000	12.000	20.000	80.000	4.000
913523	150.00	150.00	1.000	4.000	2.000	10.000	32.000	30.000	95.000	5.000
913524	150.00	125.00	1.000	6.000	2.000	12.000	28.000	30.000	115.000	5.000
913525	150.00	100.00	1.000	4.000	2.000	10.000	32.000	20.000	105.000	6.000
913526	150.00	75.00	1.000	6.000	2.000	10.000	28.000	20.000	110.000	5.000
913527	150.00	50.00	1.000	4.000	2.000	6.000	28.000	30.000	85.000	7.000
913528	150.00	25.00	1.000	6.000	16.000	10.000	44.000	150.000	245.000	38.000
913529	150.00	0.00	1.000	6.000	4.000	12.000	40.000	40.000	145.000	4.000
913530	150.00	-25.00	1.000	8.000	8.000	10.000	40.000	40.000	65.000	5.000
913531	150.00	-50.00	1.000	4.000	4.000	8.000	32.000	30.000	90.000	2.000
913532	50.00	150.00	1.000	4.000	8.000	8.000	36.000	40.000	90.000	6.000
913533	50.00	125.00	1.000	4.000	8.000	8.000	32.000	30.000	125.000	5.000
913534	50.00	100.00	1.000	8.000	8.000	18.000	70.000	50.000	130.000	9.000
913535	50.00	75.00	1.000	8.000	8.000	16.000	70.000	60.000	190.000	14.000
913536	50.00	50.00	1.000	8.000	4.000	14.000	60.000	70.000	195.000	16.000
913537	50.00	25.00	1.000	6.000	4.000	12.000	60.000	80.000	200.000	16.000
913538	50.00	0.00	1.000	8.000	12.000	14.000	60.000	100.000	210.000	22.000
913539	50.00	-25.00	1.000	12.000	20.000	22.000	95.000	100.000	190.000	20.000
913540	50.00	-50.00	1.000	14.000	20.000	30.000	110.000	80.000	195.000	14.000

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NUMBERS THAT ARE CODED -1234.567 REPRESENT 'SPECIAL VALUES'.
THESE VALUES WILL BE EXCLUDED FROM ALL CALCUALTIONS IN THE
MICRO-GAS SYSTEM.

APPENDIX V
STREAM SEDIMENT RESULTS
WYOLA E.L. 737
-80# and -10# +40#



COMLABS Pty Ltd
COMPUTERISED ANALYTICAL LABORATORIES

~~3 EL. ROCK CHIP.~~
STM SED

102

OUR REF.: COM 810543
YOUR REF.: D.P.O. B0472

305 SOUTH ROAD
MILE END SOUTH
STH. AUST. 5031
TEL.: (08) 43 5722
TELEX: AA 89323

Mr.D. Andrews,
C.R.A. Exploration,
P.O. Box 254,
NORWOOD. S.A. 5067.

29.5.81

Dear Dave,

RE: JOB COM 810543

Enclosed are the assays for the samples delivered to our laboratory on the 12th May, 1981.

Samples 913308, 12, 14 and A series-listed not received.

Samples 913311,13,17 and A series were received not listed.

Yours sincerely,

Phillip Harvey
Laboratory Manager

c.c. NORWOOD



COMLABS Pty Ltd

COMPUTERISED ANALYTICAL LABORATORIES

ANALYTICAL REPORT

JOB COM810543

O/N : B 0472

Results in ppm

103

SAMPLE	Cu	Pb	Zn	Mn	Mo	V
<i>Loam</i> 913311 - 90# 6	<4	6	44	4	<10	
913311A - 10# + 40# 6	4	12	65	4	20	
<i>Sh. soil</i> 913313 - 80# 6	<4	18	110	<4	<10	
913313A - 10# + 40# 6	<4	18	115	<4	<10	
<i>Stm soil</i> 913317 - 80# 6	<4	14	60	<4	<10	
913317A - 10# + 40# 6	<4	22	80	<4	<10	
913339 - 80# 6	<4	16	70	<4	10	
913339A - 10# + 40# 6	8	10	60	<4	50	
913453 - 80# 4	<4	6	28	<4	<10	
913453A - 10# + 40# 8	<4	8	32	<4	10	
913454 - 80# 6	<4	4	28	<4	10	
913454A - 10# + 40# 12	<4	8	36	<4	10	
913493 - 80# 4	<4	12	55	<4	10	
913493A - 10# + 40# 2	<4	4	16	<4	<10	

Method of Analysis : Cu Pb Zn : AAS 1
Mn : AAS 2
Mo V : AAS 3



COMLABS Pty Ltd

COMPUTERISED ANALYTICAL LABORATORIES

ANALYTICAL REPORT

JOB COM810543

O/N : B 0472

104

Results in ppm

SAMPLE	Ba	As	Sn	W
913311	190	3	<4	<10
913311A	240	24	4	<10
913313	320	6	<4	<10
913313A	470	9	<4	<10
913317	270	5	4	<10
913317A	620	8	<4	<10
913339	155	12	4	<10
913339A	300	55	8	<10
913453	380	3	8	<10
913453A	280	12	4	<10
913454	430	5	4	<10
913454A	510	18	4	<10
913493	130	5	<4	10
913493A	55	3	4	<10

Method of Analysis : Ba As Sn W : XRF1

FINAL REPORT ON WYOLA 1, E.L. 730
AND WYOLA 2, E.L. 731, SOUTH AUSTRALIA.

The contents of this report remain
the property of C.R.A. Exploration
Pty. Limited and may not be published
in whole or in part nor used in a
company prospectus without the
written consent of the Company.

AUTHOR: D.L. ANDREWS

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SWAN RESOURCES LTD./
EAGLE CORPORATION LTD.

DATE: 9TH JULY, 1981

SUBMITTED BY: *D.L. Andrews*

ACCEPTED BY: *R. Kennedy*

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1. SUMMARY

Drill hole 81EPR5 intersected oil shale averaging 56 litres/tonne between 84 metres and 94 metres within the middle Eocene Pidinga Formation.

Seven other drill holes completed within the Exploration Licences penetrated the Pidinga and Madura Formations but did not recover any significantly anomalous oil shale.

Contours of the top of the Madura Formation derived from all available surface information indicate that the oil shale is developed within a small Tertiary basin or channel having a north east - south west orientation.

If this interpretation is correct the exploration potential of the E.L.'s to host large laterally extensive oil shale deposits is severely downgraded.

2. INTRODUCTION

CRA Exploration Pty. Limited entered into a joint venture agreement on the 9th April, 1980, with Swan Resources Limited and Eagle Corporation Limited to explore for oil shale in the Eucla Basin of South Australia. Exploration philosophy was based on a reported occurrence of a thick oily Cretaceous shale horizon, of the Madura Formation, intersected in Muddaugana No. 7: a 1920's water bore.

Wyola 1 E.L. 730 and Wyola 2 E.L. 731 were granted to the joint venture partners on 6th October 1980 for a period of twelve months. The exploration licences are located approximately 20 kilometres north of Hughes and Denman railway sidings and comprise an aggregate area of 4 656 square kilometres. (Plan SAa 882).

This report details all work carried out by the joint venture partners within E.L.'s 730 and 731.

3. CONCLUSIONS AND RECOMMENDATIONS

1. The intersection of oil shale within the Pidinga Formation highlights the previously unrecognised potential of the Pidinga Formation to host significant oil shale deposits. However, the limited basinal character of the deposit coupled with the thick limestone overburden does not make this type of deposit a viable exploration target within E.L.'s 730 and 731.

2. The uniformly low oil yields (maximum 5-15 litres/tonne) recovered from the Madura Formation indicates that thick laterally extensive developments of oil shale are extremely unlikely within the Madura Formation in the western Eucla Basin of South Australia.

3. As a consequence of the above it is recommended that no further work be undertaken by the joint venture partners within these E.L.'s.

4. WORK DONE

4.1 Research and Data Compilation

The Eucla Basin has been found to be an arcuate basin deepening gently to the west and south. The Cretaceous Madura Formation shales are a widespread grey to black carbonaceous unit, sandy in places (e.g. Mallabie Depression) and thinning towards the margins.

Comparison of contour maps of depth to basement (Outback Oil Company N.L., Env. 1172, S.A.D.M.E. Open File), depth to Cretaceous of the Eucla Basin is complex and does not necessarily represent basement topography. The extent of the folding and faulting of the Eucla Basin is not known.

North of the Ooldea Sand Ridge a sequence of flat lying carbonates and sandstones of the Officer Basin are intermittently exposed. No Cretaceous sediments have been discovered north of this topographic feature.

Cross sections and isopach maps of the Eucla Basin are appended to this report.

4.2 Oil Bore Sampling

In 1966 Outback Oil Company N.L. drilled Hughes Number 2 which penetrated the Madura Formation (Plan SAa 882). The Madura Formation was sampled by CRAE between the interval 73.1 metres and 155.4 metres at approximately three metre intervals. All samples were submitted to AMDEL for approximate oil yields using a modified Fischer distillation. Maximum oil yields obtained were 5-15 litres/tonne. Results form Appendix I.

4.3 Drilling

4.3.1 Percussion Drilling

As part of a large drilling programme, Diamond Drilling Pty. Ltd. were contracted to drill two percussion holes within E.L. 730 and 731 during late 1980. (Plan SAa 882). Drilling problems were encountered in both holes and resulted in extreme contamination in cuttings from drill hole 80EP5. Geological and geophysical logs with assays are presented in Appendix II. Analysis of drill cuttings from drill hole 80EP5 returned oil yields between 84 metres and 168 metres. The maximum oil yield recovered was 72 litres/tonne between 92 metres and 94 metres. No significant oil yields were recovered from drill hole 80EP4.

The drill cuttings which returned anomalous oil yields were dark grey/black claystones with minor lignitic fragments which at the time were interpreted as being samples of Cretaceous Madura Formation.

4.3.2 Percussion/Rotary Mud Drilling

As a follow up to the oil shale intersection recorded in 80EP5 six rotary mud drill holes were planned to test the Pidinga and Madura Formations. (Plan SAa 737). All drill holes were percussion precollared through the Nullarbor and Wilson Bluff Limestones. The rotary mud drilling programme involved one cored hole: a cored redrill of 80EP5 to obtain geological control on the formation containing anomalous oil shale and to obtain accurate oil yields. The other five drill holes were open through the Pidinga, Madura and Loongana Conglomerate. All drill holes were geophysically logged by GEOEX for caliper, short spaced density, long spaced density, natural gamma, neutron-neutron, point resistance and self potential. Assay and drill logs are presented in Plans SAa 870, 871, 866, 865, 864 and 863.

The geological logs have been adjusted to match the detailed geophysical logs. These adjusted logs have been used in the interpretation of the depth, extent and thickness of the Madura Formation (Plans SAa 823, 824, 868 and 755). Assay results are summarised on Plan SAa 869.

Significant oil shale yields were restricted to drill holes 81EPR5, the cored redrill of 80EP5, which returned 56 litres/tonne between 84 metres and 94 metres and included a one metre intersection between 89 metres and 90 metres which returned 167 litres/tonne; and drill hole 81EPR9 which returned

29 litres/tonne between 86 metres and 92 metres. The analyses from 81EPR9 were determined by Fischer distillation of rotary mud cuttings.

Palynological work completed by Harris (Appendix III) indicate that the oil shale horizon is of middle Eocene age and hence is a shale oil rich sequence within the Pidinga Formation. A coal analysis of the interval between 89 metres and 90 metres from drill hole 81EPR5, presented as Appendix IV, indicates that the oil shale is closely associated with a dirty sapropelic coal.

5. INTERPRETATION

Contours of the depth to the top of the Madura Formation (which are equivalent contours to the depth of the base of the Pidinga Formation) strongly suggest that drill holes 81EPR5 and 80EP5 are centrally located in a small Tertiary basin or broad channel. (Plan SAa 755).

A south west trend of the basin/channel is indicated by drill hole 81EPR9 (located five kilometres south west of 81EPR5) which returned a six metre interval of oil shale within the same stratigraphic horizon as the oil shale in 81EPR5.

Comparisons with the lignites of the Pidinga Formation on the Eastern Eucla basin margins suggest that coal developments are likely to be restricted to broad channels or depressions within which thin discontinuous coal seams are present. Where there is a thick blanketing cover of Tertiary Limestone, as in E.L. 730 and 731, this type of deposit does not represent a viable exploration target.

D. L. Andrews.

D.L. ANDREWS

DLA/PW

KEYWORDS

Oil shale, Eucla Basin, Cretaceous, Tertiary, Madura Formation, Pidinga Formation, coal, drilling-percussion, drilling-rotary, geophys-logging, assays.

REFERENCES

- ANDREWS, D.L.
April 1981 Second Quarterly Report on Wyola 1, E.L. 730, Wyola 2 E.L. 731, Wyola 5 E.L. 734 and Wyola 10 E.L. 737 South Australia For The Period Ending April 5, 1981.
- MANNING, R.A.
January 1981 First Quarterly Report on Wyola 1 E.L. 730, Wyola 2 E.L. 731, Wyola 3 E.L. 732, Wyola 4 E.L. 733, Wyola 5 E.L. 734, Wyola 7 E.L. 735, Wyola 8 E.L. 736, Wyola 10 E.L. 737, Wyola 11 E.L. 738 and Wyola E.L. 739 South Australia For The Period 6/10/80 to 5/1/81.

LOCATION

Cook SH 52-11 1:250 000

LIST OF PLANS

<u>Plan No.</u>	<u>Title</u>	<u>Scale</u>
SAa 882	Wyola 1 E.L. 730 and Wyola 2 E.L. 731 Location Plan	1:500 000
SAa 426	Cross-sections - Eucla Basin, S.A.	
SAa 734	Wyola E.L.'s 730, 731 Fence Diagram	1:250 000
SAa 737	Wyola Area, Drill Hole Summary Plan	1:500 000
SAa 755	Wyola Area, Isopach Map of the Cretaceous Madura Formation	1:500 000
SAa 823	Eucla Basin, Isopach Map of the Lower Cretaceous Madura Formation	1:2 000 000
SAa 824	Eucla Basin Depth to Top of Madura Formation	1:2 000 000
SAa 868	Depth to Base of the Cretaceous Madura Formation	1:500 000
SAa 869	Summary Assay Results, Wyola Area	1:500 000
SAa 870	Eucla Basin Composite Log 81EPR8	1:200

<u>Plan No.</u>	<u>Title</u>	<u>Scale</u>
SAa 871	Eucla Basin Composite Log 81EPR9	1:200
SAa 866	Eucla Basin Composite Log 81EPR7	1:200
SAa 865	Eucla Basin Composite Log 81EPR6	1:200
SAa 864	Eucla Basin Composite Log 81EPR5	1:200
SAa 863	Eucla Basin Composite Log 81EPR4	1:200

LIST OF APPENDICES

Appendix I	Hughes Number 2: Approximate oil yields
Appendix II	Assay Results and Drill Logs 80EP4, 80EP5
Appendix III	Palynological Report on Core From 81EPR5: Harris
Appendix IV	Coal Analysis 81EPR5 Interval 89-90 metres

130°30'

113

KEY

- Petroleum Well.
- x Water Well.
- o Drill Hole

WESTERN AUST.
SOUTH AUST.

30°00'

31°00'

32°00'

GREAT AUSTRALIAN BIGHT

0 20 40 60 80 100 Kms.

C. R. A. EXPLORATION PTY. LIMITED

EUCLA BASIN
ISOPACH MAP OF THE LOWER
CRETACEOUS MADURA FORMATION

Ref. WYOLA SH52-7, COOK SH52-11, COOMPANA SH52-15

Scale 1: 2,000,000

Drawn J.C.R.

Author D.L.A.

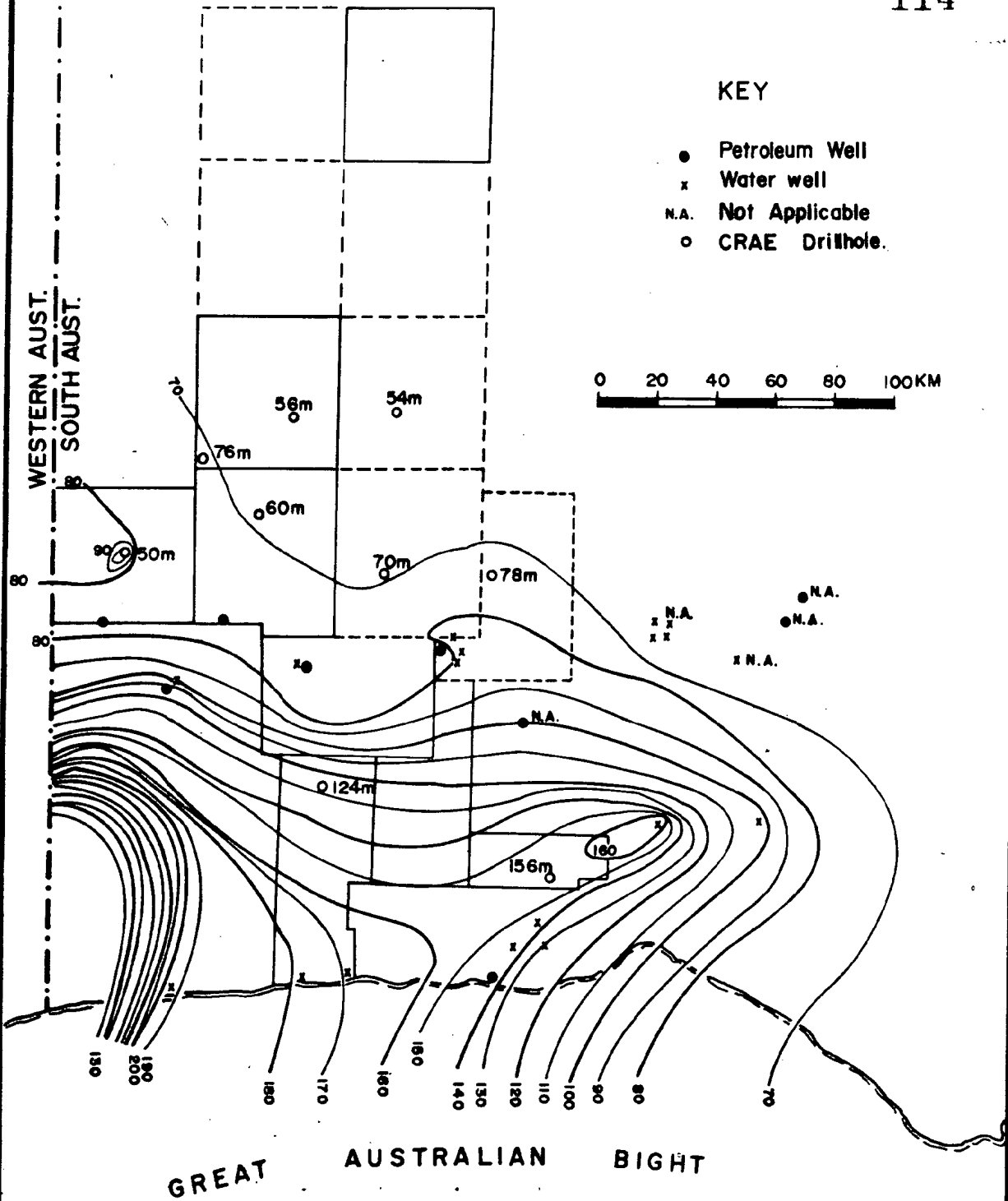
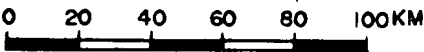
Report No. 10362

Date June 1981

Plan No. SAa 823

KEY

- Petroleum Well
- x Water well
- N.A. Not Applicable
- CRAE Drillhole



C. R. A. EXPLORATION PTY. LIMITED	
EUCLA BASIN	
DEPTH TO TOP OF MADURA FORMATION	
Ref. WYOLO SH52-7, COOK 52-11, COOMPANA 52-15	
Scale 1:200000	Drawn DD
Author D.L.A.	Report No. 10362
Date JUNE 1981	Plan No. SAc824

APPENDIX I

HUGHES NUMBER 2: APPROXIMATE OIL YIELDS

Oil Yield

p.p.m.

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U

Depth (ft)	l/t	Cu	Pb	Zn	Ag	
HUGHES (N.W.)						
*2						
240 - 250	5 - 15					
250 - 260	1.5 - 5					
260 - 270	0.5 - 1.5					
270 - 280	0.5 - 1.5					
280 - 290	0.5 - 1.5					
290 - 300	0.5 - 1.5					
300 - 310	0.5 - 1.5					
310 - 320	0.5 - 1.5					
320 - 330	0.5					
340 - 350	0.5 - 1.5					
350 - 360	0.5 - 1.5					
360 - 370	0.5 - 1.5					
370 - 380	0.5 - 1.5					
380 - 390	5 - 15					
390 - 400	1.5 - 5					
400 - 410	5 - 15					
410 - 420	1.5 - 5					
420 - 430	1.5 - 5					
440 - 450	1.5 - 5					
450 - 460	1.5 - 5					
460 - 470	0.5 - 1.5					
479 - 480	1.5 - 5					
480 - 490	1.5 - 5					
490 - 500	1.5 - 5					
500 - 510	0.5 - 1.5					

APPENDIX II

DRILL LOGS AND ASSAYS 80EP4 AND 80EP5

APPENDIX III
PALYNOLOGICAL REPORT ON CORE
FROM 81EPR5: HARRIS

W K HARRIS AND ASSOCIATESPALYNOLOGICAL REPORT

119

CLIENT: CRA Exploration Pty LtdSTUDY: 5 core samples from the Eucla Basin.AIMS: Determination of age and environment of deposition.INTRODUCTION

Five core samples were received and one (9109042) showed obvious signs of disturbance and contamination. The other samples were intact and presumed to be genuine core material.

The samples and preparation numbers are as follows:

CRA No: 919009	Prep No: WM 645
919020	WM 648
919030	WM 650
919042	WM 647
919055	WM 649

The CRA numbers are in order of increasing depth.

All were processed by standard palynological techniques and all yielded adequate microfossils.

OBSERVATIONS

The assemblages fall into two distinct groups, viz numbers 919009, 919020, 919042; and 919030 and 919055.

The first group have assemblages characterised by abundant *Nothofagidites* spp. and a diverse spore/pollen flora which include the following species:

Arecipites sp.
Cupanieidites orthoteichus
Dacrycarpites australiensis
Halorogacidites harrisii
Helcioporites astrus
Ilexipollenites anguloclavatus
Lygistepollenites florinii
Malvacipollis diversus
Myrtaceidites parvus
Microcachryidites antarcticus
Nothofagidites emarcidus
N. falcatus
N. brachyspinulosus
N. vansteenisi
Phyllocladidites mawsonii
"Polycolpites" reticulatus
Podosporites microsaccatus
Polyporopollenites vesicus
Polycolpites esobalteus
Proteacidites adenanthoides
P. pachypolus
P. scaboratus
Santalumidites cainozoicus
Simplicepollenis meridianus
Tricolpites thomasi
Tricolporites adelaidensis

Assemblages from the other group are less diverse but very distinctive.

They comprise spores and pollen together with abundant (up to 50% of the assemblage of fossils) microplankton (both acritarchs and dinoflagellate cysts).

Spores and pollen include:

Alisporites similis
Alisporites grandis
Araucariacutes australia
Baculatisporites comaunensis
Caytonipollenites pallidus
Ceratosporites equalis
Cicatricosporites australiensis
Classopollis sp.
Crybelosporites stylosis
Cyathidites australis
Ginkgocycadophytus sp.
Leptolepidites verrucosus
Microcachryidites antarcticus
Neoraistrickia truncata
Podocarpidites sp.
Reticulatisporites pudens
Retitriletes austroclavatidites
Rouseisporites reticulatus
Stereisporites antiquasporites

Microplankton include:

Canningia sp.
Chlamydophorella nyei
Diconodinium sp.
Dingodinium cerviculum
Micrhystridium spp.
Muderougia staurota
M. vicwaei
Meiourogonocaulax sp.
Odontochitina operculata
Trichodinium sp.
Veryhachium sp.

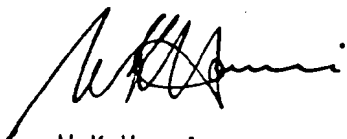
121

DISCUSSION

The first group of samples are clearly of Eocene age and fall more precisely in the Middle Eocene, a position consistent with the lower part of the Pidinga Formation and in the spore/pollen zone of *Proteacidites pachypolus*. These assemblages are non-marine and were deposited by fluvial processes.

The other group are Early Cretaceous in age and fall within the late Neocomian to Early Aptian interval within the spore/pollen zone of *Crybelosporites stylosus* or in the contiguous microplankton zone of *Odontochitina operculata*. The presence of a reasonably diverse microplankton component points to a near shore marine environment, with low energy and reducing or anoxic conditions.

Clearly sample 919042 is out of place in between two Cretaceous assemblages. The condition of the "core" with the obvious contamination and lack of structure would indicate that the sample originated from higher in the hole.



W K Harris
Consulting Geologist - Palynology

14 August, 1981

APPENDIX IV

COAL ANALYSIS OF THE INTERVAL

89 METRES - 90 METRES FROM 81EPR5



Laboratories Division

123

COAL ANALYSIS REPORT

REPORT No.: SL 0757

DATE IN: 13/5/81

DATE OUT: 10/6/81

CLIENT: CRA Exploration P/L

CLIENT REFERENCE:

ADDRESS: P.O. Box 254 Norwood S.A. 5067

RESULTS TO: Mr D R McBain

COPY TO:

SAMPLE REFERENCE: Sample 892131 - *Wysla sample.*
81EPR 5 89m - 90m.

ANALYSIS		892131					
Total Moisture %							
Moisture %		11.0					
Ash %		51.7					
Volatile Matter %		23.5					
Fixed Carbon %		13.8					
Crucible Swelling No.							
Specific Energy Mj/kg		8.60					
Total Sulphur %		0.82					
Carbon %		22.05					
Hydrogen %		2.27					
Nitrogen %		1.42					
Oxygen %							
Carbon Dioxide %							
Organic Iron %		0.188					

DETERMINED IN ACCORDANCE WITH: AS 1038

BASIS RESULTS REPORTED ON Air dried Basis

B. Harro
.....
Harold Read
Manager - Coal Exploration
Services



This Laboratory is registered by the National Association of Testing Authorities, Australia. The test(s) reported herein have been performed in accordance with its terms of registration.



SGS Australia Pty. Ltd.

Formerly General Superintendence Company Pty. Ltd.

Laboratories Division

124

COAL ANALYSIS REPORT

REPORT NO: SL 0757

DATE IN: 13.5.81

DATE OUT: 10.6.81

CLIENT: CRA Exploration Pty. Ltd.,

CLIENT REFERENCE:

ADDRESS: P.O. Box 254 Norwood S.A. 5067

RESULTS TO: Mr. D. R. McBain

COPY TO:

SAMPLE REFERENCE: Sample 892131

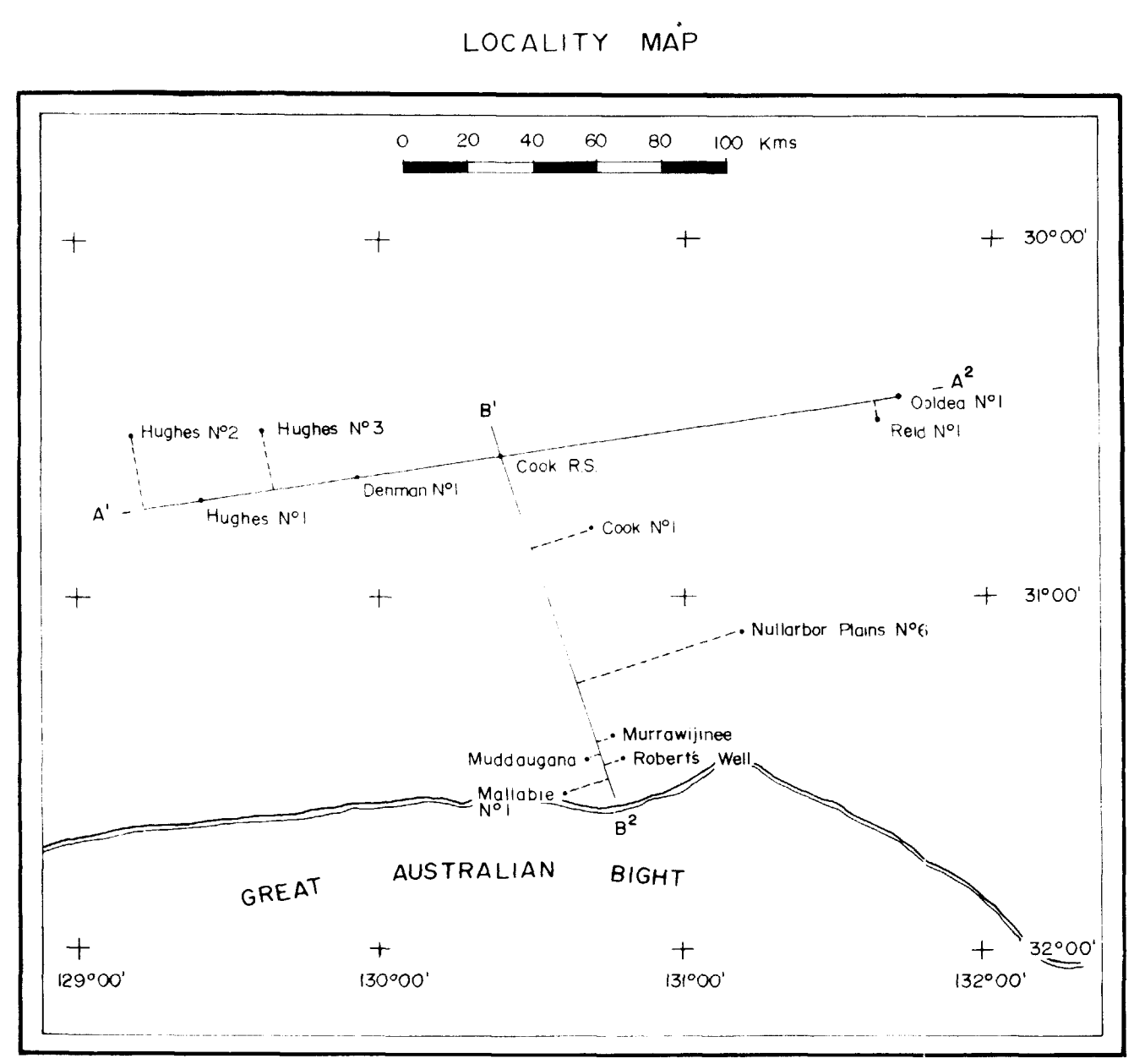
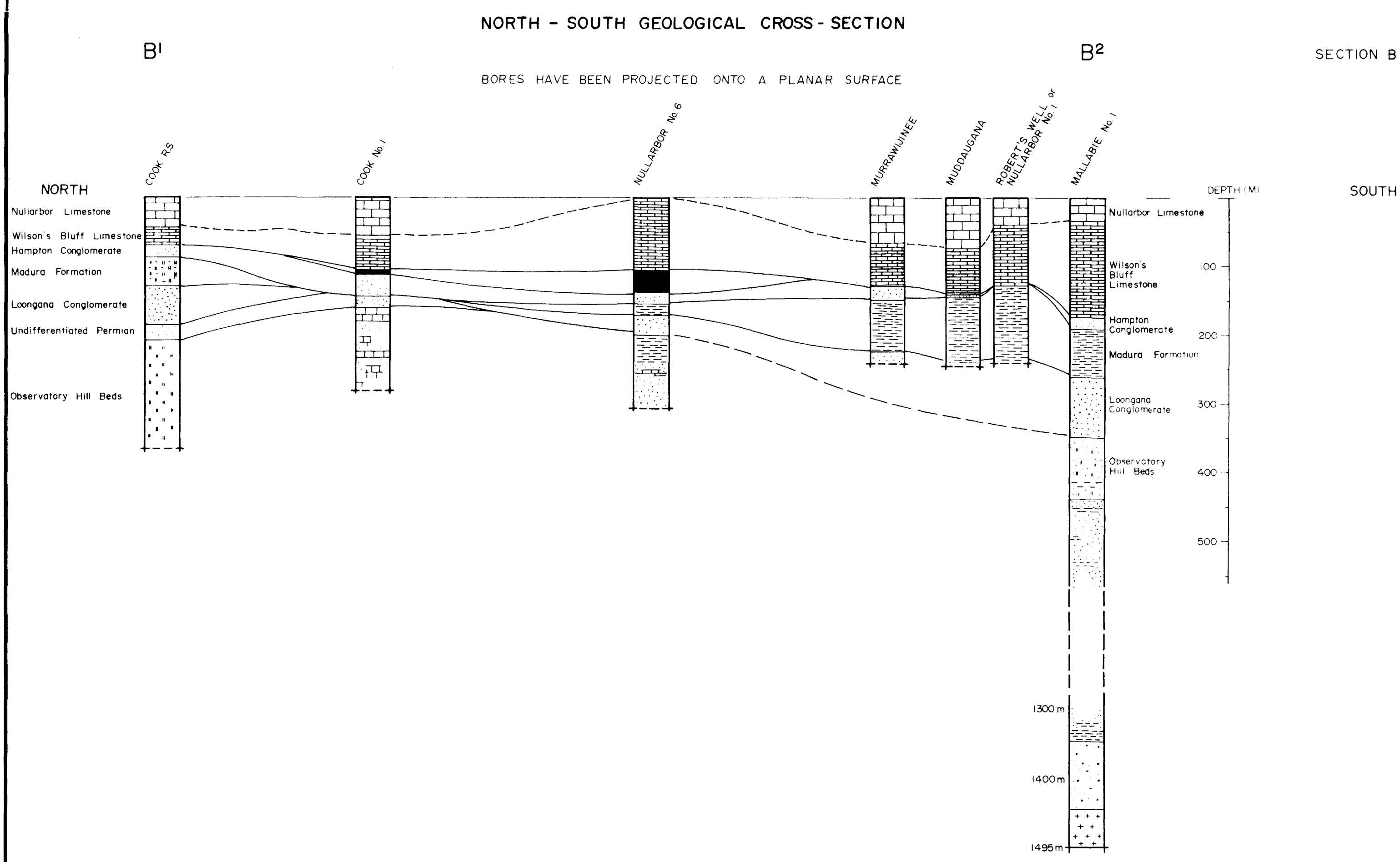
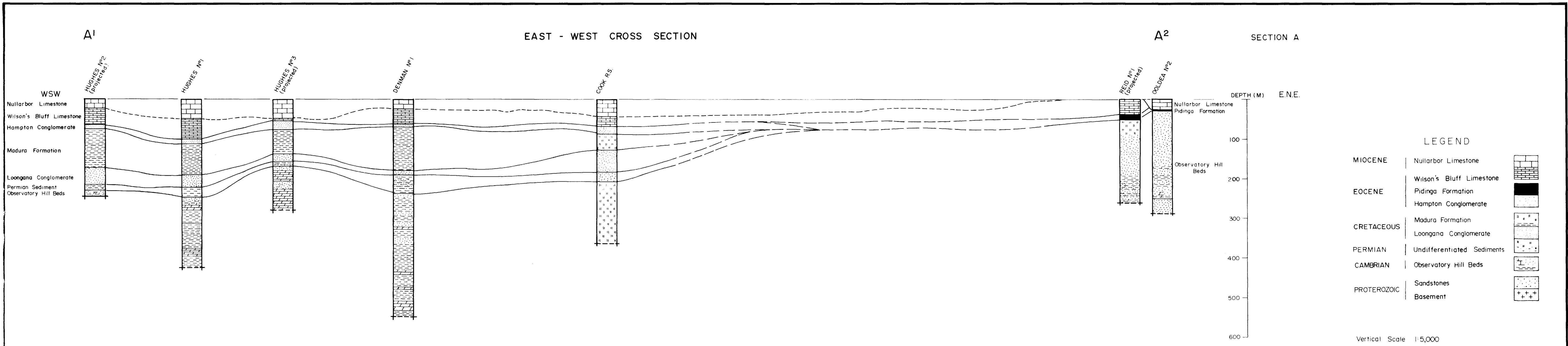
ELEMENTS IN COAL ASH

Sample No(s) 892131

Analysis:

Iron %	0.74
Magnesium %	0.29
Calcium %	1.48
Sodium %	0.47

B. J. Read
.....
Harold Read - Manager Coal
Exploration Services.

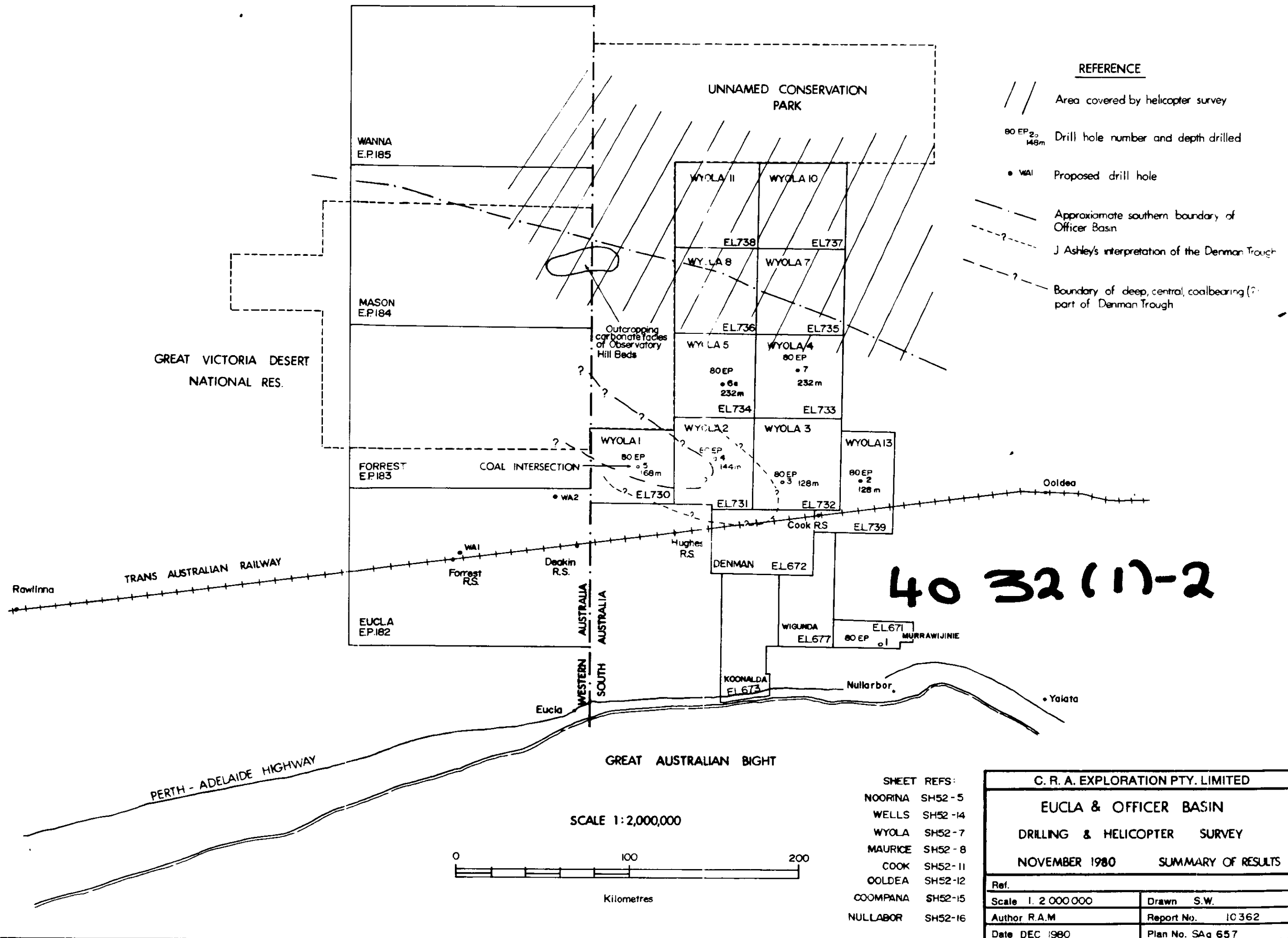


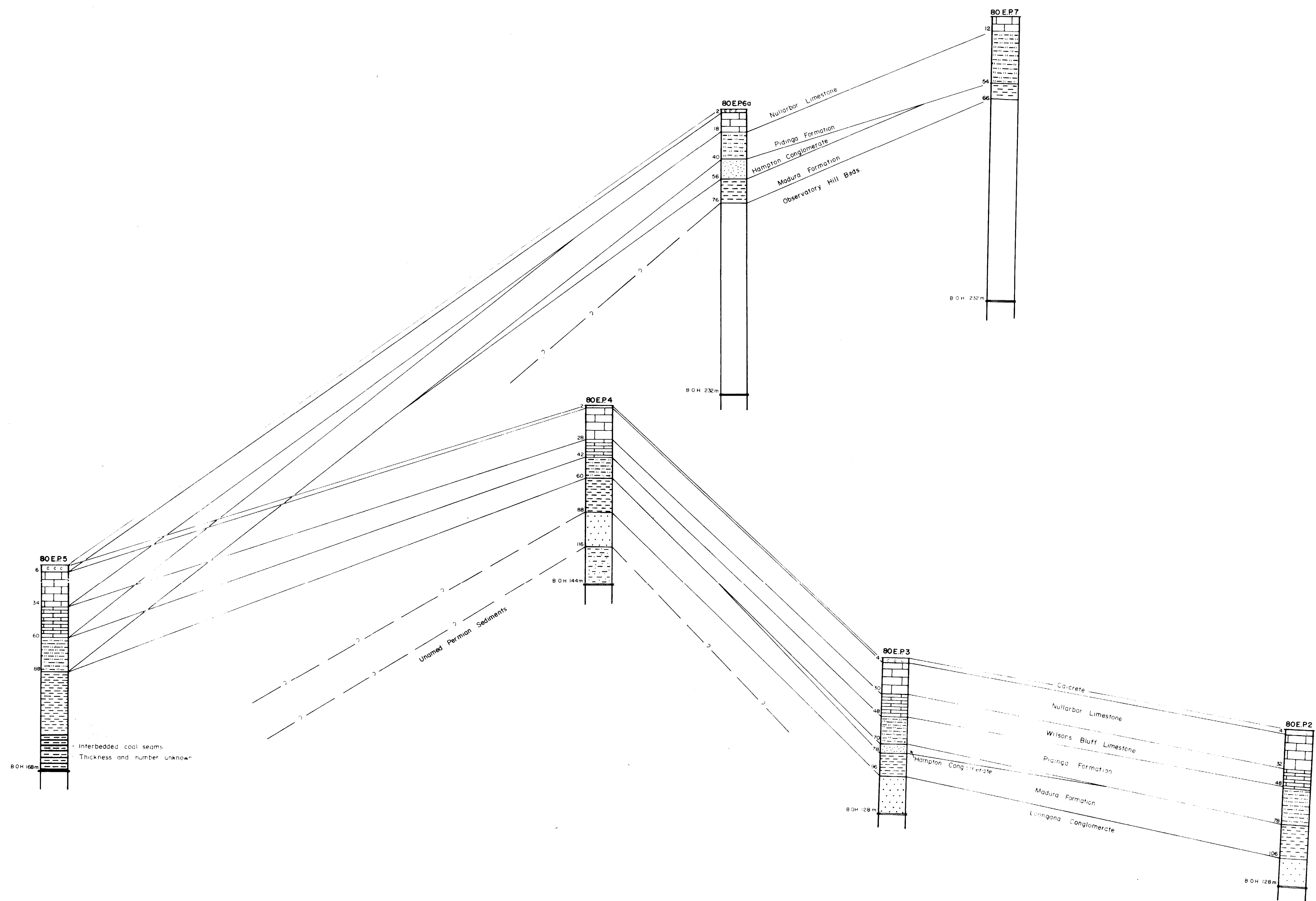
4032(1)-1

C.R.A. EXPLORATION PTY. LTD.	
EUCLA BASIN, S.A.	
CROSS - SECTIONS A ¹ - A ² , B ¹ - B ²	
Geol. : R.M.	Scale : 1:500,000
Drawn. : J.C.R. / D.R.W.	Report N° : 10362
Date : April, 1980	Plan N° : SAa 426

Cook SH52-11,
Ooldea SH52-12
Coompana SH52-15
Nullarbor SH52-16

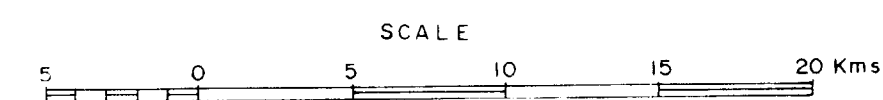
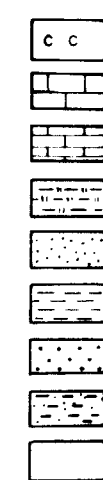
1:250,000 References :





LEGEND

QUATERNARY	Calcrete
MIocene	Nullarbor Limestone
TERTIARY	Wilsons Bluff Limestone
Eocene	Pidinga Formation
CRETACEOUS	Hampton Conglomerate
	Madura Formation
	Loongana Conglomerate
PERMIAN	Un-named Permian Sediments
CAMBRIAN	Observatory Hill Beds



Vert. Scale
1:200

4032(1)-3

C.R.A. EXPLORATION PTY. LTD.		
WYOLA E.L.'s 730-734,739		
FENCE DIAGRAM		
COMPILATION OF RESULTS FROM NOVEMBER - DECEMBER 1980 DRILLING PROGRAM		
SHEET REF: WYOLA 8188-71 COOK 3182-11, 30, 30A 3182-12		
Geol: R.A.M.	Date: Dec. 1980	Report No.: 10362
Drawn: J.C.R.	Scale: 1:250,000	Plan No. SAa 658



KEY

QUATERNARY	Qc	Calcrete - dull light brown to reddish grey. Some rounded quartz grains. Pisolitic. Occasionally fossiliferous.
TERTIARY	T ₁	<u>Limestone</u> - dark grey, nodular and rubbly. Often calcitised.
	T ₂	<u>Pidinga Formation</u> - yellow-brown, bimodal, medium to coarse grained sandstone.
	T ₃	<u>Wanna Beds</u> - pale grey-brown, micaceous, silicified sandstone. Thinly bedded, cross bedded. Often extensively bioturbated.
CAMBRIAN	C ₁	<u>Lennis Sandstone</u> - red-brown, micaceous, flaggy, medium to coarse grained sandstone. Poorly laminated to massive.
	C ₂	<u>Observatory Hill Beds</u> - micaceous, dull grey to greenish yellow, well laminated, calcareous shales and sandstones. Some minor purple staining. Carbonate content varies.

€w C.R.A.E. Sample
€w S.A.D.M.E. Sample.

4032(1)-4

Sheet Refs

Mason	SH52-6
Wanna	SH52-2
Noorina	SH52-5
Wells	SH52-14
Wyola	SH52-7
Maurice	SH52-8

C.R.A. EXPLORATION PTY. LTD.

LITHOLOGICAL DISTRIBUTION MAP -

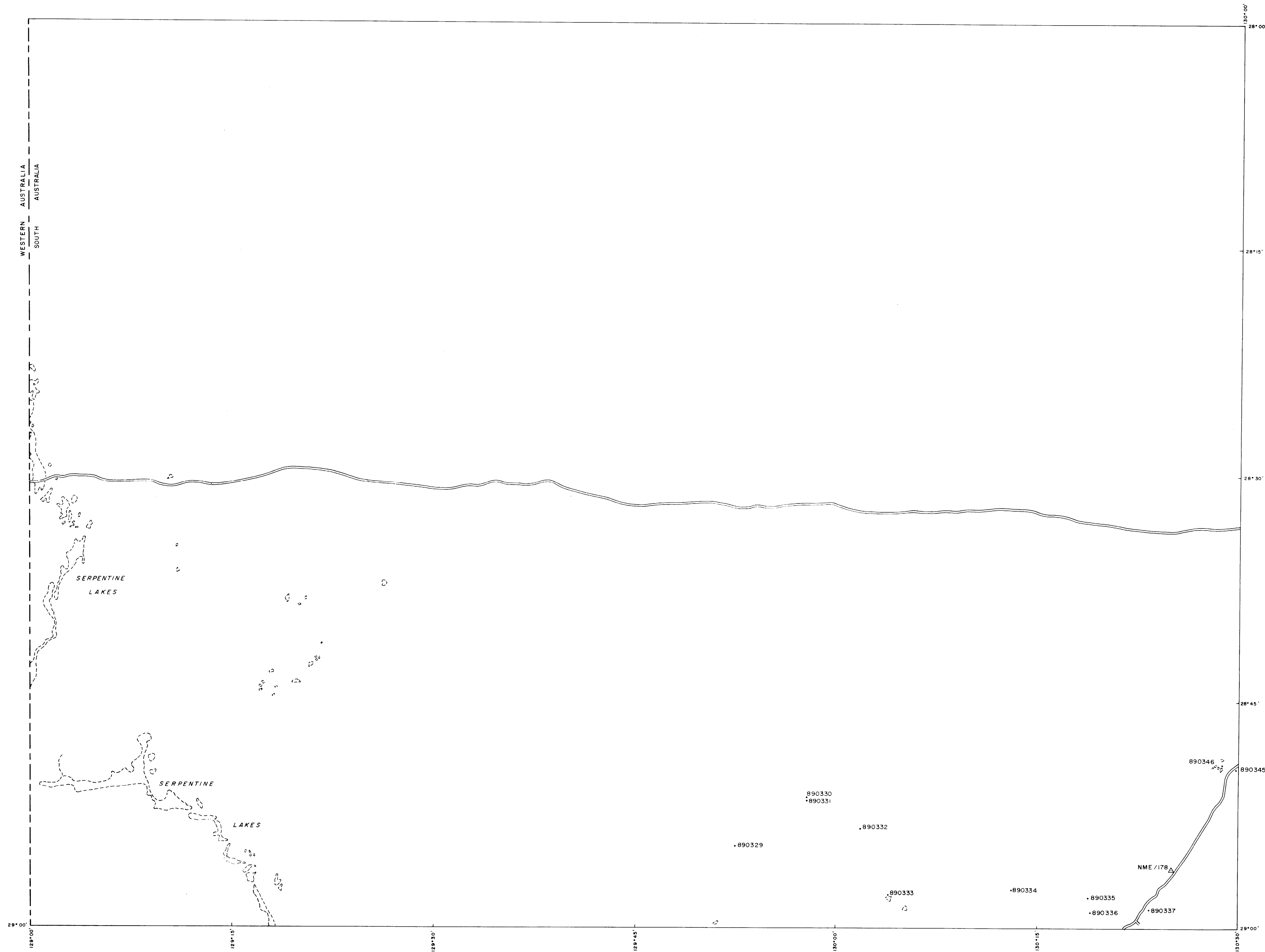
HELICOPTER SURVEY,
SOUTHERN OFFICER BASIN.

NOVEMBER 1980.

Geol: R.A.M./D.L.A.	Date: JAN., 1981	Report No.: 10362
Drawn: S.J.B.	Scale: 1:1,000,000.	Plan No.: SA6 641.

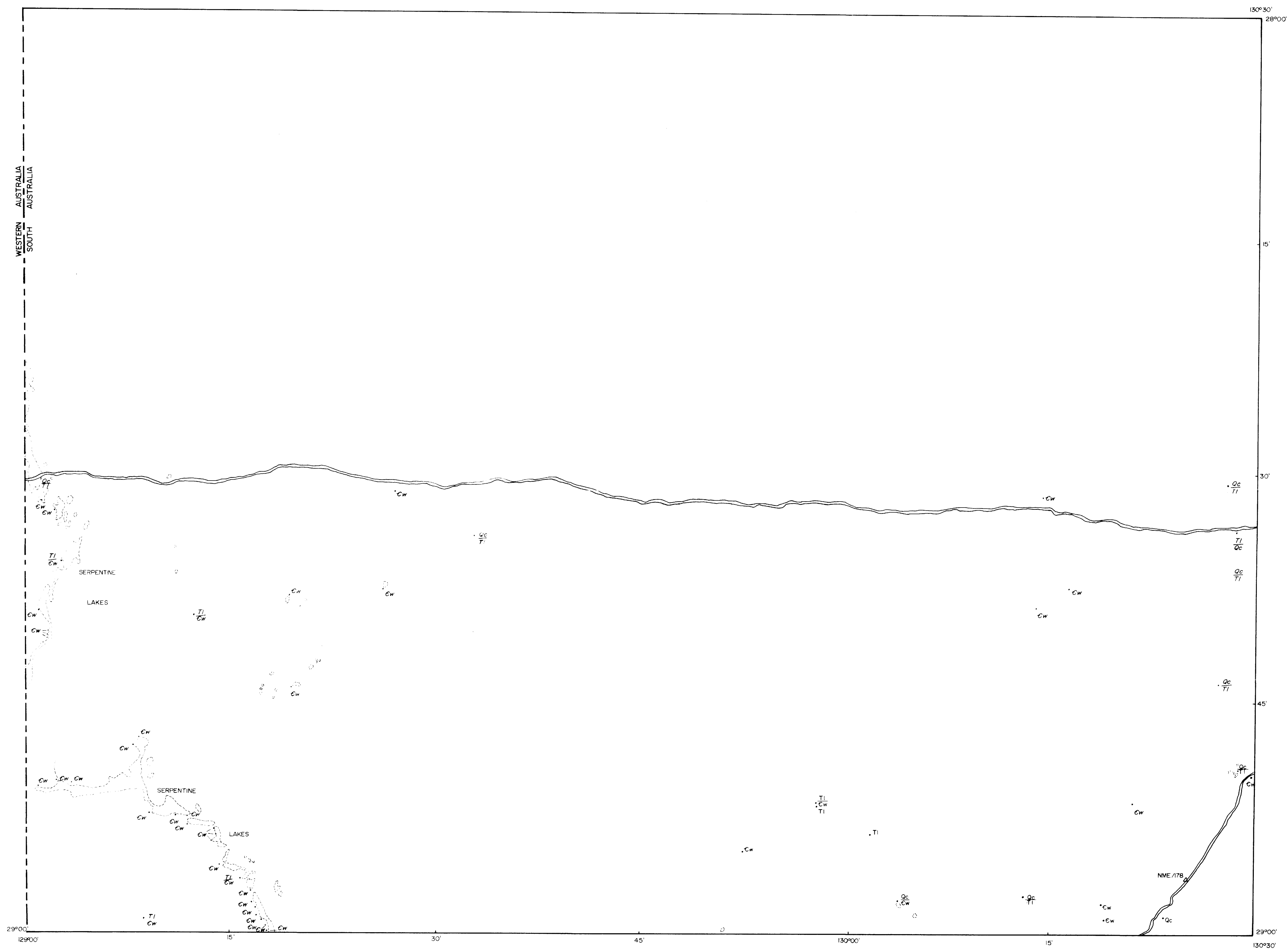
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KILOMETRES 50 0 50 100 150 KILOMETRES



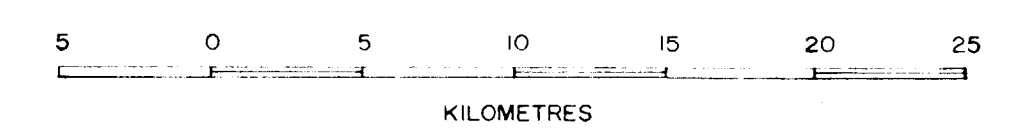
4032 (1)-5

C.R.A. EXPLORATION PTY. LTD.		
SAMPLE SITES - NOORINA		
HELICOPTER SURVEY		
SOUTHERN OFFICER BASIN		
NOVEMBER, 1980.		
REF: NOORINA SH 92-5		
Geol: D.L.A./R.A.M.	Date: JANUARY 1981	Report No.: 10362
Drawn: N.B.	Scale: 1:250,000	Plan No. 5Aa 642

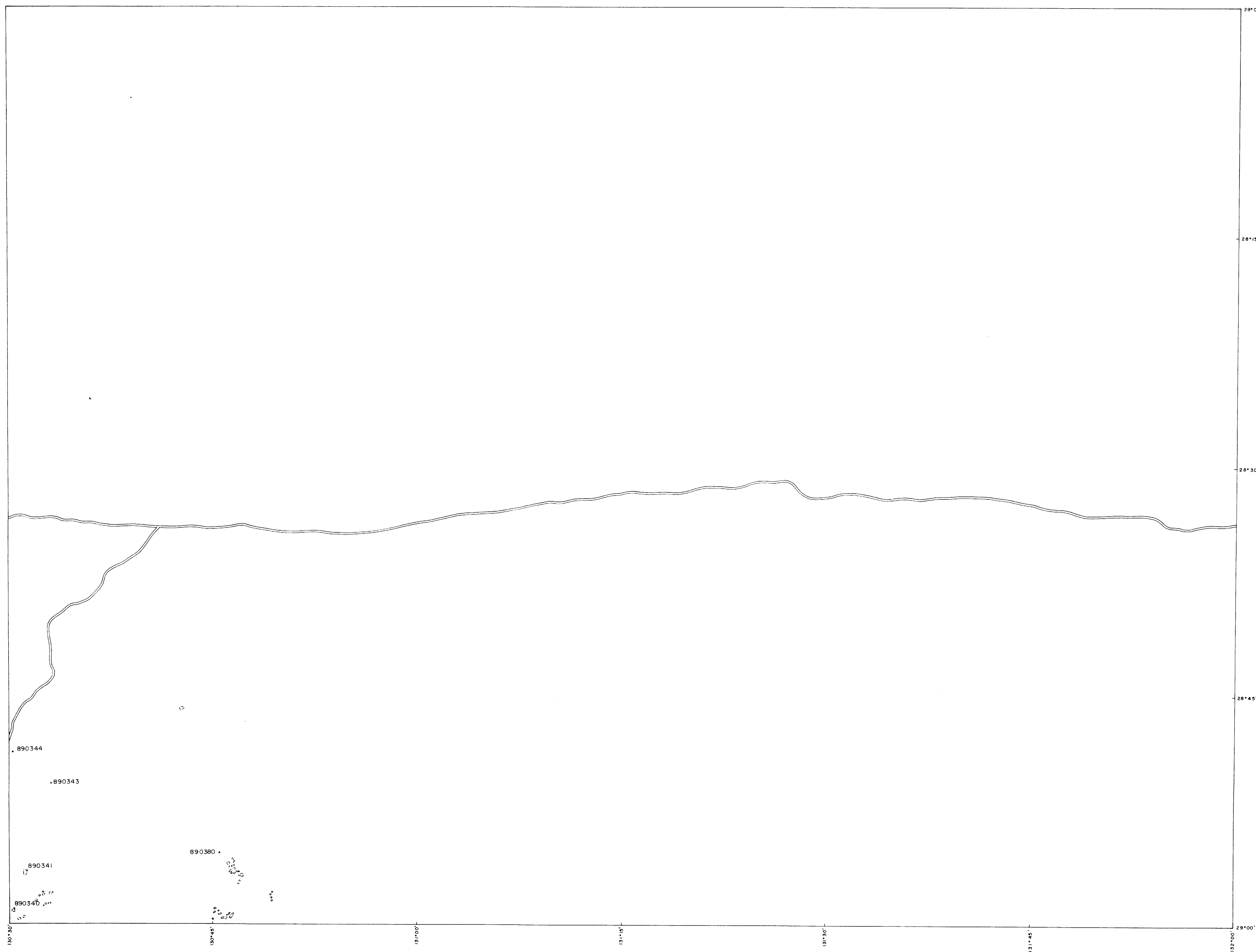


- KEY**
- Quaternary [Qc
Calcrete - dull light brown to reddish grey. Some rounded quartz grains. Pisolitic. Occasionally fossiliferous.
- Tertiary [Tl
Limestone - dark grey, nodular and rubbly. Often calcarenised.
Td
Piding Formation - yellow-brown, bimodal, medium to coarse grained sandstone. Locally very friable. Some foreset beds.
- Cambrian [Cw
Wanna Beds - pale grey-brown, micaceous, silicified sandstone. Thinly bedded, cross bedded. Often extensively bioturbated.
Cl
Lennis Sandstone - red-brown, micaceous, flaggy, medium to coarse grained sandstone. Poorly laminated to massive.
Co
Observatory Hill Beds - micaceous, dull grey to greenish yellow, well laminated, calcareous shales and sandstone. Some minor purple staining. Carbonate content varies.
- Cw - C.R.A.E. Sample
Cw - S.A.D.M.E. Sample

4032(17)-6

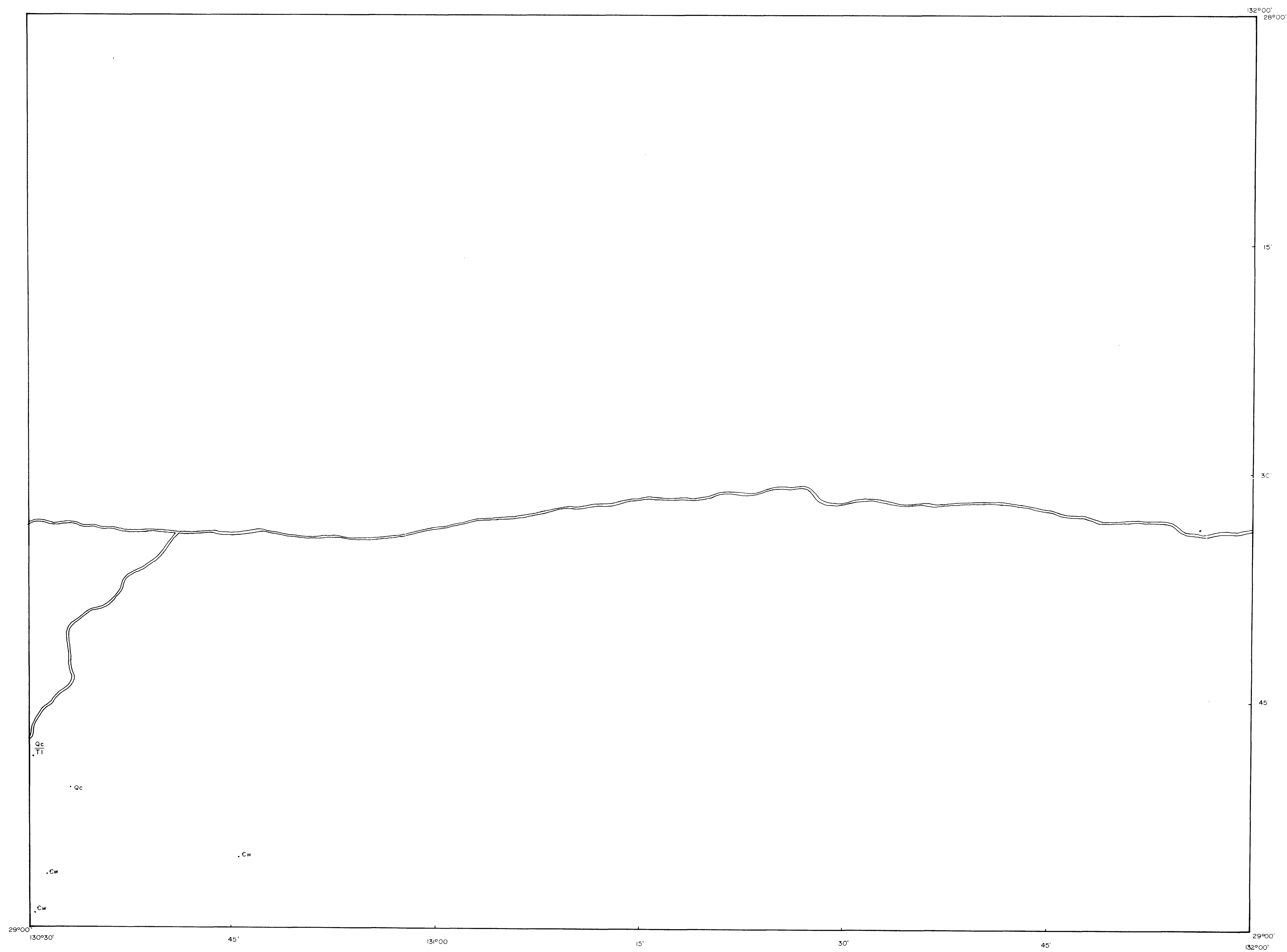


C.R.A. EXPLORATION PTY. LTD.		
SAMPLE LITHOLOGIES - NOORINA HELICOPTER SURVEY SOUTHERN OFFICER BASIN NOVEMBER 1980 REF: NOORINA SH 32-5		
Geol: D.L.A / R.A.M	Date: JANUARY 1981	Report No.: 10362
Drawn: S.W	Scale: 1:250,000	Plan No. SA 643



4032(1)-7

C.R.A. EXPLORATION PTY. LTD.		
SAMPLE SITES - WELLS		
HELICOPTER SURVEY		
SOUTHERN OFFICER BASIN		
NOVEMBER, 1980.		
REF: WELLS SH 52-14		
Geol: D.L.A. / R.A.M.	Date: JANUARY 1981	Report No.: 10362
Drawn: N.B.	Scale: 1: 250,000	Plan No. SAo 646



KEY

- QUATERNARY [Qc Calcrete - dull light brown to reddish grey. Some rounded quartz grains. Pisolitic. Occasionally fossiliferous.
- TERTIARY [Ti Limestone - dark grey, nodular and rubbly. Often calcretised.
- [Tp Pidinga Formation - yellow-brown, bimodal, medium to coarse grained sandstone.
- [Cw Wanna Beds - pale grey-brown, micaceous, silicified sandstone. Thinly bedded, cross bedded. Often extensively bioturbated.
- CAMBRIAN [Ci Lennis Sandstone - red-brown, micaceous, flaggy, medium to coarse grained sandstone. Poorly laminated to massive.
- [Co Observatory Hill Beds - micaceous, dull grey to greenish yellow, well laminated, calcareous shales and sandstones. Some minor purple staining. Carbonate content varies.

- Cw C.R.A.E. Sample.
- Cw S.A.D.M.E. Sample

4032(1)-8

C.R.A. EXPLORATION PTY. LTD.		
SAMPLE LITHOLOGIES - WELLS		
HELICOPTER SURVEY,		
SOUTHERN OFFICER BASIN.		
NOVEMBER 1980.		
REF. WELLS SH 52-14		
Geol: D.L.A./R.A.M.	Date: JAN, 1981	Report No.: 10362
Drawn: S.W.	Scale: 1:250,000	Plan No.: SAo 647



KEY

QUATERNARY	Qc	Calcrete - dull light brown to reddish grey. Some rounded quartz grains. Pisolithic. Occasionally fossiliferous.
	Ti	Limestone - dark grey, nodular and rubbly. Often calcretised.
TERTIARY	Tp	Pidinga Formation - yellow-brown, bimodal, medium to coarse grained sandstone.
	Ew	Wanna Beds - pale grey-brown, micaceous, silicified sandstone. Thinly bedded, cross bedded. Often extensively bioturbated.
CAMBRIAN	Ei	Lennis Sandstone - red-brown, micaceous, flaggy, medium to coarse grained sandstone. Poorly laminated to massive.
	Co	Observatory Hill Beds - micaceous, dull grey to greenish yellow, well laminated, calcareous shales and sandstones. Some minor purple staining. Carbonate content varies.

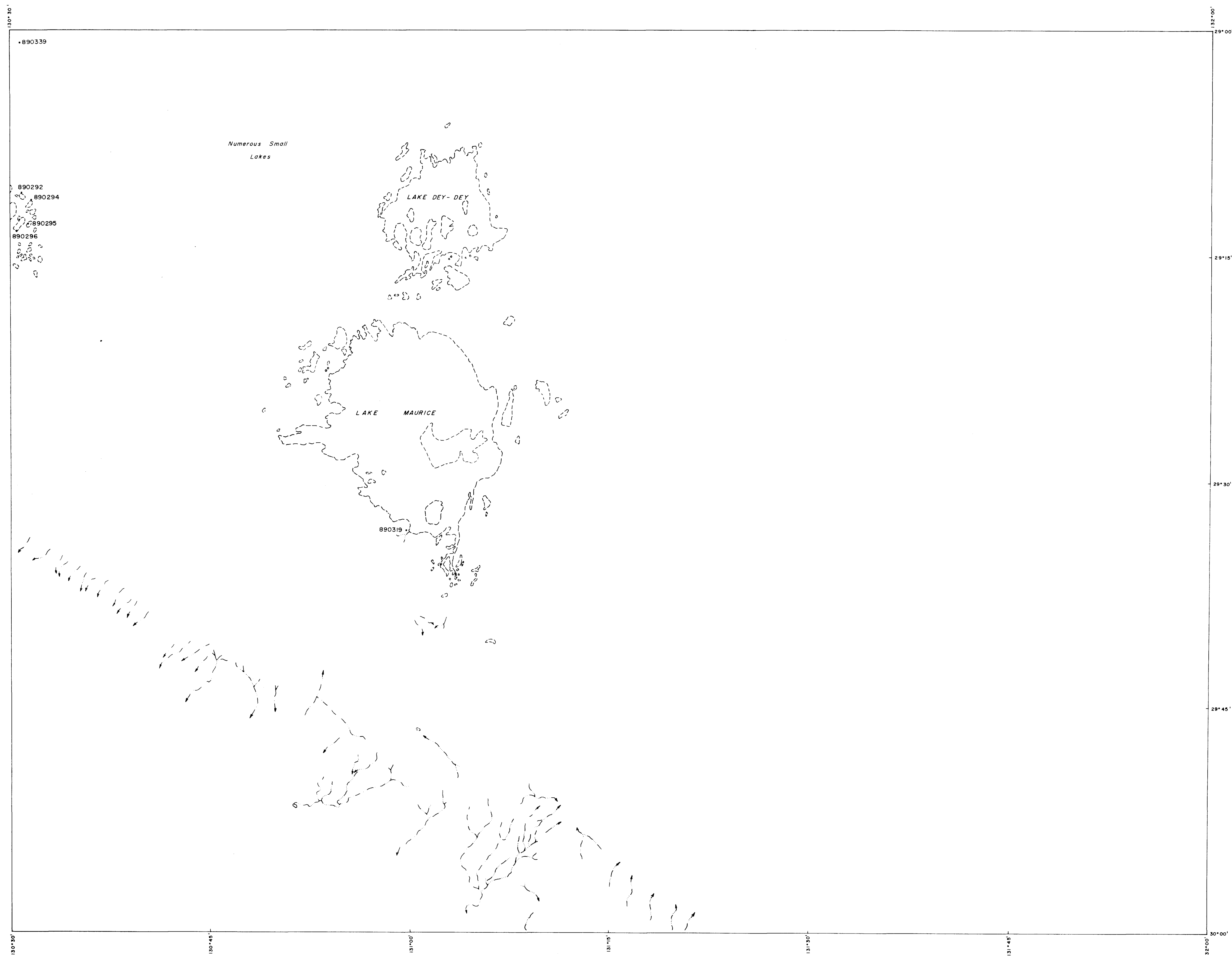
Cw C.R.A.E. Sample.
cw S.A.D.M.E. Sample.

— Fault

4032 (1)-10

Scale 1:250,000
KILOMETRES 0 5 10 15 20 25 KILOMETRES

C.R.A. EXPLORATION PTY. LTD.		
SAMPLE LITHOLOGIES - WYOLA		
HELICOPTER SURVEY, SOUTHERN OFFICER BASIN, NOVEMBER 1980.		
REF: WYOLA SH52-7		
Geol: D.L.A. / R.A.M.	Date: JAN, 1981	Report No.: 10362
Drawn: S.J.B.	Scale: 1:250,000	Plan No.: SAA 645.



4032 C11-11

C.R.A. EXPLORATION PTY. LTD.		
SAMPLE SITES - MAURICE		
HELICOPTER SURVEY		
SOUTHERN OFFICER BASIN		
NOVEMBER, 1980.		
REF: MAURICE SH 52-8		
Geol: D.L.A. / R.A.M.	Date: JANUARY 1981	Report No.: 10362
Drawn: N.B.	Scale: 1: 250,000	Plan No. SAa 648



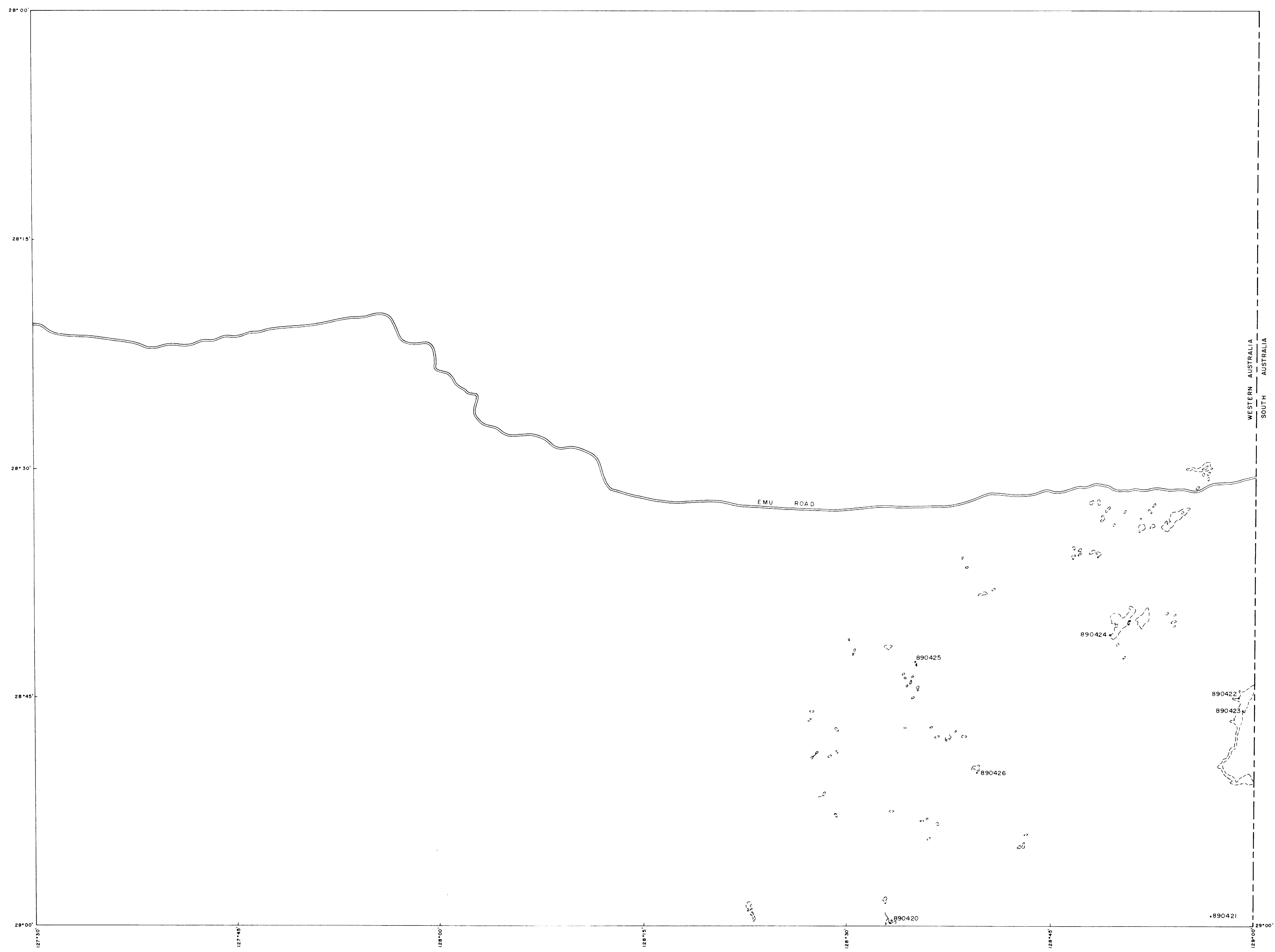
KEY

Quaternary	[Qc]	Calcrete - dull light brown to reddish grey. Some rounded quartz grains. Pisolitic. Occasionally fossiliferous.
Tertiary	[Ti]	Limestone - dark grey, nodular and rubby. Often calcareous.
	[Tp]	Pidinga Formation - yellow-brown, bimodal, medium to coarse grained sandstone. Locally very Fe rich. Some foreset beds.
Cambrian	[Cw]	Wanna Beds - pale grey-brown, micaceous, siliceous sandstone. Thinly bedded, cross bedded. Often extensively bioturbated.
	[Ci]	Lennis Sandstone - red-brown, micaceous, flaggy, medium to coarse grained sandstone. Poorly laminated to massive.
	[Co]	Observatory Hill Beds - micaceous, dull grey to greenish yellow, well laminated, calcareous shales and sandstones. Some minor purple staining. Carbonate content varies.

Cw - C.R.A.E. Sample
Cw - S.A.D.M.E. Sample

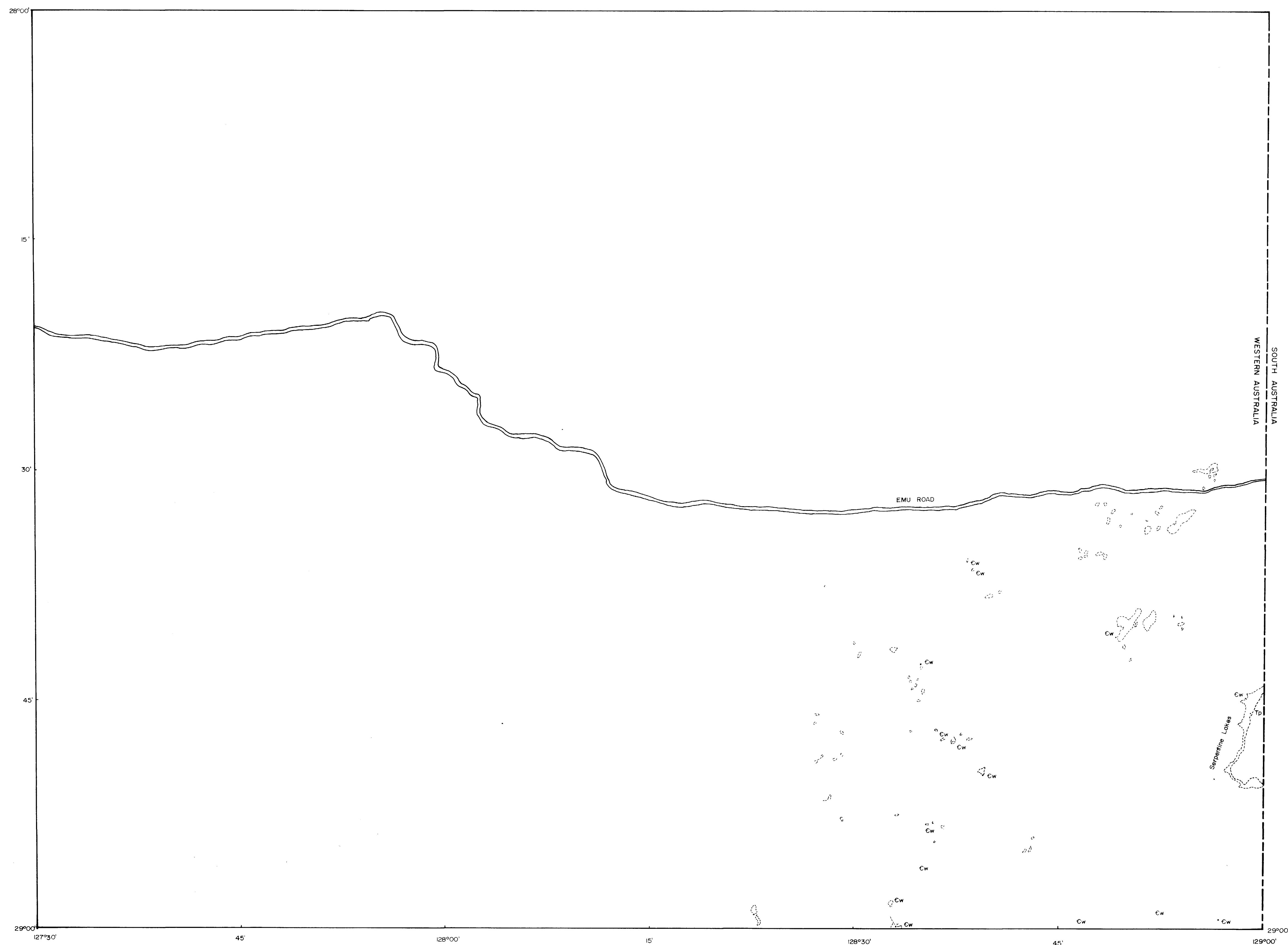
4032(1)-12

C.R.A. EXPLORATION PTY. LTD.		
SAMPLE LITHOLOGIES - MAURICE		
HELICOPTER SURVEY		
SOUTHERN OFFICER BASIN		
NOVEMBER 1980		
REF: MAURICE SH 22-8		
Geol: DLA/RAM	Date: JANUARY 1981	Report No.: 10362
Drawn: S.W.	Scale: 1:250,000	Plan No. SAQ 649



4032 C17-13

C.R.A. EXPLORATION PTY. LTD.		
SAMPLE SITES - WANNA		
HELICOPTER SURVEY		
SOUTHERN OFFICER BASIN		
NOVEMBER, 1980		
REF. WANNA SH 52-2		
Geol: DLA / R.A.M.	Date: JANUARY 1981	Report No.: 10362
Drawn: N.B.	Scale: 1:250,000	Plan No. SA 650



KEY

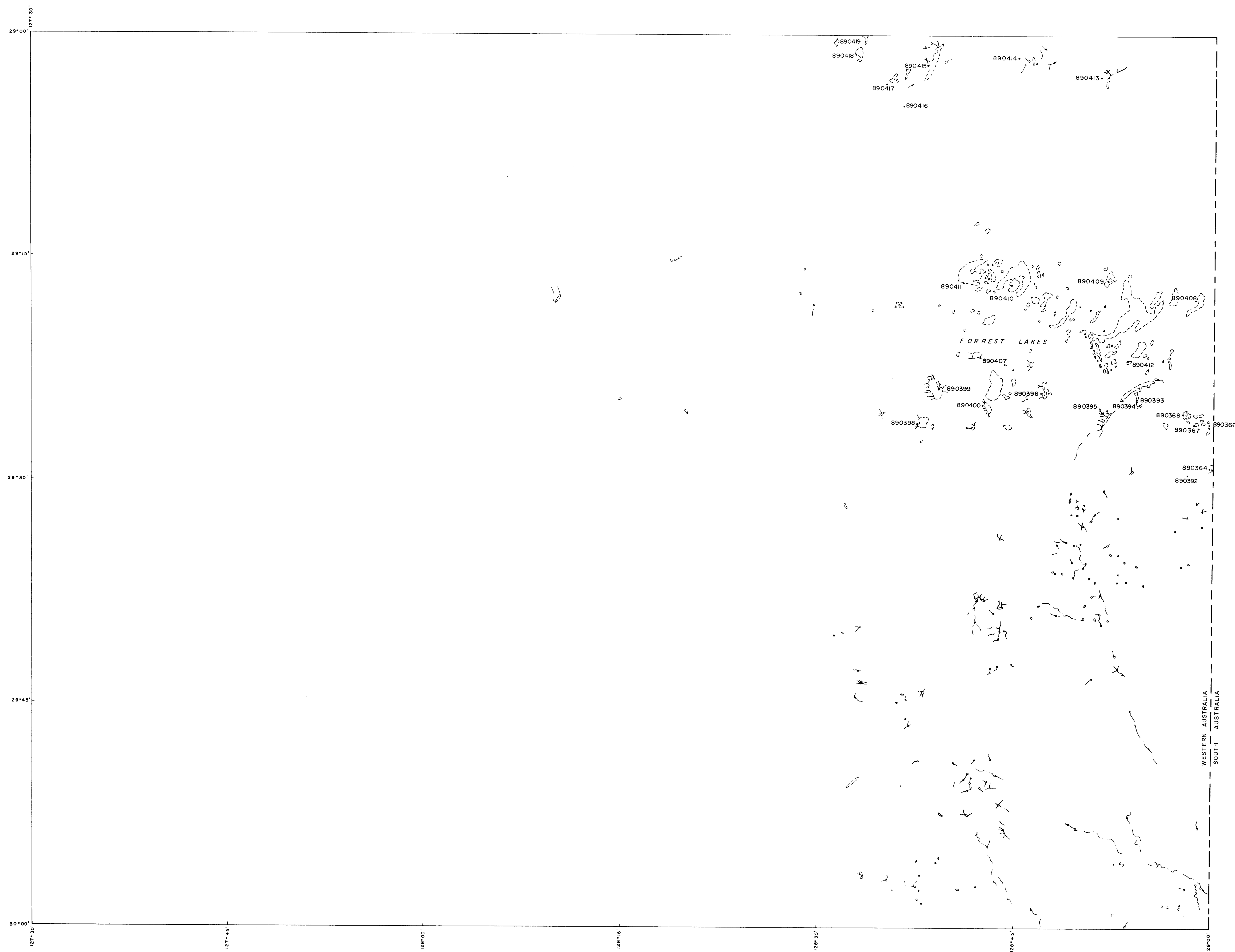
Quaternary	[Qc]	Calcrete - dull light brown to reddish grey. Some rounded quartz grains. Pisolitic. Occasionally fossiliferous.
Tertiary	[Ti]	Limestone - dark grey, nodular and rubbly. Often calcitised.
	[Tp]	Pidinga Formation - yellow - brown, bimodal, medium to coarse grained sandstone. Locally very Fe rich. Some foreset beds.
Cambrian	[Cw]	Wanna Beds - pale grey brown, micaceous, silicified sandstone. Thinly bedded, cross bedded. Often extensively bioturbated.
	[Ci]	Lennis Sandstone - red-brown, micaceous, flaggy, medium to coarse grained sandstone. Poorly laminated to massive.
	[Co]	Observatory Hill Beds - micaceous, dull grey to greenish yellow, well laminated, calcareous shales and sandstones. Some minor purple staining. Carbonate content varies.

Cw - CRAE Sample
Cw - SADME Sample

4032 (1)-14

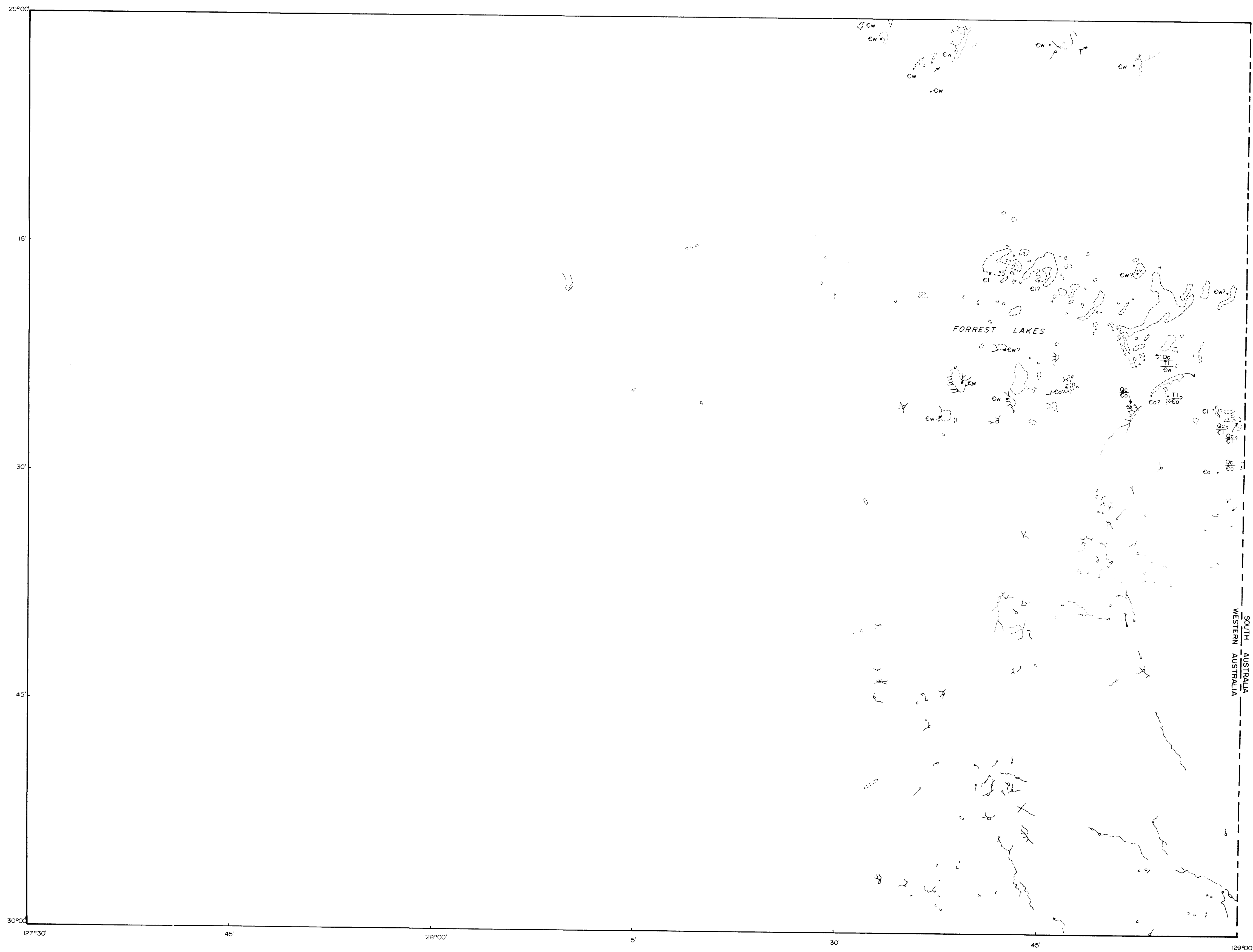


C.R.A. EXPLORATION PTY. LTD.		
SAMPLE LITHOLOGIES - WANNA HELICOPTER SURVEY SOUTHERN OFFICER BASIN		
NOVEMBER 1980 REF: WANNA SH 52 - 2		
Geol: D.L.A./R.A.M.	Date: JANUARY 1981	Report No.: 10362
Drawn: S.W.	Scale: 1:250,000	Plan No. SA 651



4032 (1)-15

C.R.A. EXPLORATION PTY. LTD.		
SAMPLE SITES - MASON		
HELICOPTER SURVEY		
SOUTHERN OFFICER BASIN		
NOVEMBER, 1980.		
REF: MASON SH 52 - 6		
Geol: D.L.A./R.A.M.	Date: JANUARY 1981	Report No.: 10362
Drawn: N.B.	Scale: 1:250,000	Plan No. SAo 652

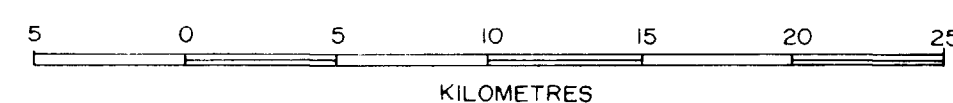


KEY

- Quaternary [Gc Calcrete - dull light brown to reddish grey. Some rounded quartz grains. Pisolithic. Occasionally fossiliferous.
- Tertiary [Tl Limestone - dark grey, nodular and rubbly. Often calcareous.
- [Tp Pidinga Formation - yellow-brown, bimodal, medium to coarse grained sandstone, locally very Fe-rich. Some forrest beds.
- Cw Wanna Beds - pale grey brown, micaceous, silicified sandstone. Thinly bedded, cross bedded. Often extensively bioturbated.
- Cambrian [Cl Lennis Sandstone - red-brown, micaceous, flaggy, medium to coarse grained sandstone. Poorly laminated to massive.
- [Co Observatory Hill Beds - micaceous, dull grey to greenish yellow, well laminated, calcareous shales and sandstone. Some minor purple staining. Carbonate content varies.

Cw - C.R.A.E. Sample
Cw - S.A.D.M.E. Sample

4032 (1) 16



C.R.A. EXPLORATION PTY. LTD.		
SAMPLE LITHOLOGIES - MASON		
HELICOPTER SURVEY		
SOUTHERN OFFICER BASIN		
NOVEMBER 1980		
REF: MASON SH 52-6		
Geol: D.L.A./RAM	Date: JANUARY 1981	Report No.: 10362
Drawn: S.W.	Scale: 1:250,000	Plan No. SA 653

80EP2

DATE 5/12/80

LOGGED BY G. COLLINS

LOGGING SPEED 5m/min

CASING 600mm

NATURAL GAMMA

50 cps full scale

Time Constant = 2

Depth logged 110.2 metres

DENSITY

5000 cps full scale

Time Constant = 2

Depth logged 93.5 metres

Source - crystal spacing - 45 cm

CRA EXPLORATION PTY LIMITED

PROJECT EUCLA BASIN JOINT VENTURE

PERCUSSION

DRILL CORE LOG

CO-ORDINATES lat. 30°31' long. 130°35'

AZIMUTH

DRILLERS DIAMOND DRILLING PL.

COMMENCED 3/12/80

DEPTH 128 m

HOLE No. 80 E.P. 2

RL COLLAR

INCLINATION

DRILL TYPE INGERSOL RAND TH3

COMPLETED 4/12/80

CASING LEFT

DPO No(s)

DEPTH		REC %	HOLE DIAM.	GRAPHIC LOG	CUTTINGS DESCRIPTION	SPECIAL FEATURES WEATH., ALTERATION, FRACTURING VEINING, MINERALIZATION	SAMPLE No.	FROM (M)	TO (M)	CON (%)	ASSAY VALUES				
FROM (M)	TO (M)														
0	2				Dark grey calcareate + dirt		890799	0	2						
2	4				Dark grey calcareate + pale grey / offwhite crystalline limestone		800	2	4						
4	6				Pale grey / off white crystalline limestone		801	4	6						
6	8				As above	Fossiliferous	802	6	8						
8	10				As above		803	8	10						
10	12				As above		804	10	12						
12	14				Pale grey / off white crystalline limestone + sandy carbonaceous grey limestone		805	12	14						
14	16				Pale grey and pale pink, soft, friable limestone		806	14	16						
16	18				As above		807	16	18						
18	20				As above		808	18	20						
20	22				As above		809	20	22						
22	24				off white / pale pink, pisolitic / oolitic?? limestone		890810	22	24						
24	26				As above		811	24	26						
26	28				As above		812	26	28						
28	30				As above. Minor brown Fe staining + brown friable limestone.		813	28	30						
30	32				As above		814	30	32						
32	34				Brownish green, sandy, soft limestone, trace glauconitic	Wilson's Bluff??	815	32	34						
34	36				Brownish green, soft, sandy limestone (70%) + hard light grey crystalline limestone (30%)		816	34	36						
36	38				As above. (80%) (20%)	Carbonaceous.	817	36	38						
38	40				As above (90%) (10%)	Bryozoa	818	38	40						
40	42				Brown green and brown very fossiliferous soft, glauconitic limestone.		819	40	42						
42	44				As above.		890820	42	44						
44	46				As above		821	44	46						

SUMMARY AND
SPECIAL COMMENTS

LOGGED BY D.L. ANDREWS DATE 4/12/80

SHEET 1 OF 3

4032(1)-17a

PERCUSSION DRILL CORE LOG

CO-ORDINATES lat. 30°31', long 130°35' AZIMUTH _____ DRILLERS DIAMOND DRILLING P/L COMMENCED 3/12/80 DEPTH 128m HOLE No. 80 EP 2
RL COLLAR _____ INCLINATION _____ DRILL TYPE INGERSOL RAND TH3 COMPLETED 4/12/80 CASING LEFT _____ DPO No(s) _____

DEPTH		REC %	HOLE DIAM	GRAPHIC LOG	CUTTINGS DESCRIPTION	SPECIAL FEATURES WEATH. ALTERATION, FRACTURING VEINING, MINERALIZATION	SAMPLE No.	FROM (M)	TO (M)	CON (%)	ASSAY VALUES			
FROM (M)	TO (M)													
46	48				Brownish green & honey brown very fossiliferous limestone (almost grad. to marl) soft	Brachiopod (?) frags?	890822	46	48					
48	50				Green, fine grained, glauconitic sands, rounded		823	48	50					
50	52				Slightly clayey matrix. Very calcareous.	Minor glauconite, minor Fe staining	824	50	52					
52	54				As above	"	825	52	54					
54	56				As above	"	826	54	56					
56	58				As above	"	827	56	58					
58	60				As above	"	828	58	60					
60	62				As above, slightly coarser grained -> medium grained.	"	829	60	62					
62	64				Honey brown, medium gr., calcareous clayey sands + stiff olive brown/green fine grained clays.		890830	62	64					
64	66				Pale and dark grey, stiff, slightly silty clays, dark grey carbonaceous clays.		831	64	66					
66	68				Dark grey and black, fissile soft shales.	trace pyrite (?)	832	66	68					
68	70				Slightly micaceous.	"	833	68	70					
70	72				As above	"	834	70	72					
72	74				As above	"	835	72	74					
74	76				As above	"	836	74	76					
76	78				As above	"	837	76	78					
78	80				Black, moderately fissile, micaceous claystone. Moderately hard.	Madura(?) Formation Non calcareous.	838	78	80					
80	82				As above. Slightly greasy.		839	80	82					
82	84				As above		890840	82	84					
84	86				As above		841	84	86					
86	88				As above	Minor dendritic Fe-oxides	842	86	88					
88	90				As above		843	88	90					
90	92				As above		844	90	92					

SUMMARY AND SPECIAL COMMENTS _____

LOGGED BY D.L. ANDREWS DATE 4/12/80
SHEET 2 OF 3

4032 (11-17) b

PERCUSSION DRILL CORE LOG

CO ORDINATES lat. 20°31', long. 130°35' AZIMUTH - DRILLERS DIAMOND DRILLING P/L COMMENCED 3/12/80 DEPTH 128 m HOLE No. 80 E.P.2
 RL COLLAR - INCLINATION - DRILL TYPE INGERSOL RAND TH3 COMPLETED 4/12/80 CASING LEFT - DPO No(s) -

DEPTH FROM (M) TO (M)	REC %	HOLE DIAM	GRAPHIC LOG	CUTTINGS DESCRIPTION	SPECIAL FEATURES WEATH. ALTERATION, FRACTURING VEINING, MINERALIZATION	SAMPLE No	FROM (M)	TO (M)	CON (%)	ASSAY VALUES				
92				Black, fine grained, moderately hard siltstone	Madura (??)	890845	92							
94				Carbonaceous. Trace pyritic, micaceous.	Non-calcareous.			94						
94				As above		846	94							
96				As above		847	96							
98				As above		848	98							
100				As above		849	100							
102				As above		890850	102							
104				As above		851	104							
106				Dark grey, clayey, coarse grained sands ->	Becoming sandy	852	106							
108				gravel, slightly rounded blue-grey quartz grains	Loongana ??	853	108							
110				As above	Non-calcareous	854	110							
112				As above	Minor smokey quartz grains.	855	112							
114				As above. Minor hard, Fe stained thin bands.		856	114							
116				Dark grey-green, coarse sands -> gravel.		857	116							
118				Slightly rounded blue grey smokey quartz grains.		858	118							
120				As above		859	120							
122				As above		890860	122							
124				Grey coarse grained sands + fine grained		861	124							
126				light grey/off white sands & silts.		862	126							
128				As above				128						
B.O.H. 128 m Caving of clayey sands.														

SUMMARY AND SPECIAL COMMENTS
 Scint. : < 30 cps 0-128 m
 Bad Contamination 92-128 m

LOGGED BY D.L. ANDREWS DATE 4/3/80
 SHEET 3 OF 3

4032(17-17c

80EP3

DATE: 2/12/80

LOGGED BY: G COLLINS

LOGGING SPEED: 5m/min

CASING: 62C metres

NATURAL GAMMA

50 cps full scale

Time Constant = 2

Depth logged: 102.1 metres

DENSITY

2500 cps full scale

Time Constant = 2

Depth logged: 62.9 metres

Source - crystal spacing 45 cm

CRA EXPLORATION PTY LIMITED

PROJECT EUCLA BASIN JOINT VENTURE

PERCUSSION DRILL CORE LOG

CO ORDINATES lat. 30°23', long. 130°09' AZIMUTH -
RL COLLAR INCLINATION -

DRILLERS DIAMOND DRILLING P/L. COMMENCED 1/12/80
DRILL TYPE INGERSOLL RAND TH3 COMPLETED 2/12/80

DEPTH 128m HOLE No 80 EP3
CASING LEFT - DPO No(s) -

DEPTH		REC %	HOLE DIAM	GRAPHIC LOG	CUTTINGS DESCRIPTION	SPECIAL FEATURES WEATH. ALTERATION, FRACTURING, VENING, MINERALIZATION	SAMPLE No	FROM (M)	TO (M)	CON (%)	ASSAY VALUES			
FROM (M)	TO (M)													
0	2				Calcrete & redbrown soil		890738	0	2					
2	4				As above		739	2	4					
4	6				Hard, grey brown, crystalline limestone	Brachiopod fragments	740	4	6					
6	8				As above		741	6	8					
8	10				As above		742	8	10					
10	12				As above. Slightly sandy, honey brown carbonate (calcite, crystalline, botryoidal/vuggy)	Fossiliferous	743	10	12					
12	14				Soft, friable, pinkish brown and yellow brown let.		744	12	14					
14	16				As above		745	14	16					
16	18				As above		746	16	18					
18	20				As above		747	18	20					
20	22				As Above		748	20	22					
22	24				As Above		749	22	24					
24	26				Hard grey and grey brown limestone, crystalline	Fossiliferous	890750	24	26					
26	28				As above	" "	751	26	28					
28	30				As above		752	28	30					
30	32				Brown grey and brown, soft, friable limestone & grey green, glauconitic, clayrich limestone.	Wilson's Bluff	753	30	32					
32	34				As above		754	32	34					
34	36				As above		755	34	36					
36	38				Soft, pale cream limestone		756	36	38					
38	40				As above		757	38	40					
40	42				No sample recovery. Caving problems			40	42					
42	44							42	44					
44	46							44	46					

SUMMARY AND SPECIAL COMMENTS Cased to 62 m. Lost circulation @ 24m and 40 m
Spent ≤ 30 cps 0-128m

LOGGED BY D.L. ANDREWS DATE 2/12/80
SHEET 1 OF 3

4032(1)-18a

PERCUSSION DRILL CORE LOG

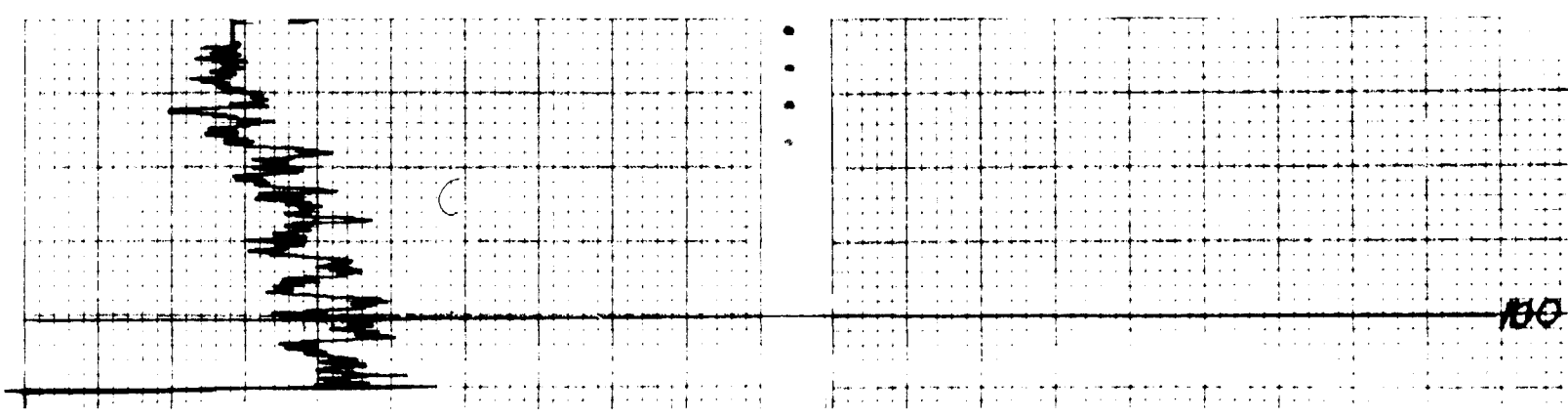
CO-ORDINATES	Lat. <u>30°23'</u> , long. <u>130°09'</u>	AZIMUTH	-	DRILLERS	<u>DIAMOND DRILLING P/L</u>	COMMENCED	<u>1/12/80</u>	DEPTH	<u>128 m</u>	HOLE No	<u>80 E.P.3</u>
RL COLLAR		INCLINATION	-	DRILL TYPE	<u>INGERSOLL RAND TH3</u>	COMPLETED	<u>2/12/80</u>	CASING LEFT	-	DPO No(s)	

[illegible]

SUMMARY AND SPECIAL COMMENTS: Pidinga Formation → Hampton Conglomerate → Madura Formation

LOGGED BY D.L. ANDREWS DATE 2/12/80
SHEET 2 OF 3

4032(1)-18b



C R A EXPLORATION PTY LIMITED										PROJECT EUCLA BASIN JOINT VENTURE																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
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DEPTH		REC %	HOLE DIAM	GRAPHIC LOG	CUTTINGS DESCRIPTION	SPECIAL FEATURES		SAMPLE No	FROM (M)	TO (M)	CON (%)	ASSAY VALUES																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
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92	94				Dark grey, fine grained, poorly bedded mudstone/siltstone. Minor sands.			890781	92	94																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																

4032C17-RC

80EP4

DATE: 30/11/80

LOGGED BY: G. COLLINS

LOGGING SPEED 5m/min

CASING 6.20 metres

NATURAL GAMMA

50 cps full scale

Time Constant = 2

Depth logged: 26.8 metres

DENSITY

2500 cps full scale

Time Constant = 2

Depth logged: 25.7 metres

Source - crystal spacing 45 cm

C.R.A. EXPLORATION PTY. LIMITED

PROJECT EUCLA BASIN JOINT VENTURE

PERCUSSION DRILL CORE LOG

CO-ORDINATES 30°13'S, 129°51'E

AZ. MUTH

DRILLERS DIAMOND DRILLING P/L.

COMMENCED 28/11/80

DEPTH 144m

HOLE No 80 E.P.4

RL COLLAR

INCLINATION

DRILL TYPE INGERSOLL RAND TH3

COMPLETED 30/11/80

CASING LEFT

DPO No(s)

DEPTH FROM (M)	TO (M)	REC. HOLE % DIAM	GRAPHIC LOG	CUTTINGS DESCRIPTION	SPECIAL FEATURES WEATH. ALTERATION FRACTURING VENING MINERALIZATION	SAMPLE No	FROM M.	TO M.	CON. (%)	ASSAY VALUES	
0	2			Calcrete & buff brown crystalline limestone		880666	0	2			
2	4			Buff brown & grey hard crystalline limestone	tr. manganese staining	667	2	4			
4	6			As above		668	4	6			
6	8			As above		669	6	8			
8	10			As above		880670	8	10			
10	12			Grey hard crystalline limestone + red brown silt		671	10	12			
12	14			As above		672	12	14			
14	16			Grey & buff brown, hard, crystalline limestone		673	14	16			
16	18			As above		674	16	18			
18	20			As above		675	18	20			
20	22			Grey hard crystalline limestone + red brown silt	tr. manganese staining	676	20	22			
22	24			Grey and honey brown hard crystalline limestone + pale greenish-brown clayey silt.		677	22	24			
24	26			As above		678	24	26			
26	28			As above		679	26	28			
28	30			As above Clayey silt becoming deep green	glaucconitic	880680	28	30			
30	32			As above		681	30	32			
32	34			As above		682	32	34			
34	36			Minor hard grey crystalline limestone + grey green soft limestone: Wilsons Bluff?		683	34	36			
36	38			Grey-green and pale brown soft clayey limestone		684	36	38			
38	40			As above	Water 39 m	685	38	40			
40	42			As above		686	40	42			
42	44			Pale grey-brown clays with minor sands. Some green glauconitic clays.	calcareous → 20 m.	687	42	44			
44	46			Stiff pale grey-brown clays + stiff orange brown silty clays	Minor red iron staining	688	44	46			

SUMMARY AND
SPECIAL COMMENTSNullarbor & Wilsons Bluff Limestone. Pidinga at base.
Sint: 10-15 cps Mag. Susc: (5-30) x 10⁻⁵ cgs

LOGGED BY D.L. ANDREWS DATE 28/11/80

SHEET 1 OF 4

4032(1)-19a

CO-ORDINATES lat 30°13', long 129°15'

PERCUSSION

DRILL CORE LOG

DRILLERS DIAMOND DRILLING P/L.

COMMENCED 28/11/80

DEPTH 144m

HOLE No. 80 EP4

RL COLLAR

INCLINATION

DRILL TYPE INGERSOLL RAND TH3

COMPLETED 30/11/80

CASING LEFT

DPO No(s)

DEPTH FROM (m)	TO (m)	REC %	HOLE DIAM	GRAPHIC LOG	CUTTINGS DESCRIPTION	SPECIAL FEATURES WEATH. ALTERATION, FRACTURING VEINING, MINERALIZATION	SAMPLE No.	FROM (m)	TO (m)	CON (%)	ASSAY VALUES				
46	48				Pale grey-brown clays (80%) + red brown fine gr. silty sands (5%) + black carbonaceous clays (65%)	Possibly lignitic.	890689	46							
48	50				Black, carbonaceous, fine grained silts & clays.		690	48							
50	52				As above, becoming sandy at base.	Saint: 15-20 cps	691	50							
52	54				Black carbonaceous clays & fine gr. sands	Mag. Succ: (10-30) x 10 ⁻⁵	692	52							
54	56				Dark grey & pale brown fine grained sands, minor carbonaceous clay (contamination??)	poss. soil interference	693	54							
56	58				Dark grey & pale brown fine grained silty sands, slightly micaceous.		694	56							
58	60				As above.		695	58							
60	62				Black, very fine grained muds, some hard chips	Madura noncalc.	696	60							
62	64				showing poorly developed partings, non micaceous, uniform.		697	62							
64	66				As above. Very fine grained soft to moderately hard black shales.		698	64							
66	68				As above.		699	66							
68	70				As above.	Saint: Δ 15 cps.	890700	68							
70	72				As above.	Mag. Succ: (5-20) x 10 ⁻⁵	701	70							
72	74				As above.		702	72							
74	76				As above.		703	74							
76	78				As above.		704	76							
78	80				As above.		705	78							
80	82				As above.		706	80							
82	84				As above.		707	82							
84	86				As above.		708	84							
86	88				As above.		709	86							
88	90				Black to dark grey clays + coarse grained blue-grey quartz. Yellow brown f. spar (tr) sands.	Laongana Cgl.	890710	88							
90	92				As above.	grey-green noncalcareous.	711	90							
92															

SUMMARY AND
SPECIAL COMMENTS

Pidlinga → Madura → Laongana

No sign of oil shales.

LOGGED BY D.L. ANDRENS

DATE 28/11/80

SHEET 2 OF 4

4032(1)-19b

PERCUSSION DRILL CORE LOG

 CO-ORDINATES lat. 30°15', long. 129°51' AZIMUTH _____
 RL COLLAR _____ INCLINATION _____

DRILLERS DIAMOND DRILLING P/L

COMMENCED 28/11/80 DEPTH 144m HOLE No. 80 EP 4

DRILL TYPE INGERSOLL RAND T-13

COMPLETED 30/11/80 CASING LEFT _____ DPO No(s) _____

DEPTH PRECEDENCE	TO (M)	REC %	HOLE DIAM	GRAPHIC LOG	CUTTINGS DESCRIPTION	SPECIAL FEATURES WEAR ALTERATION, FRACTURING VEINING, MINERALIZATION	SAMPLE No.	FROM (M)	TO (M)	CON (%)	ASSAY VALUES	
82	84				Coarse grained, rounded - sub angular sands. Quartz grains - blue grey → smokey. Some iron staining.		890712	92	94			
94	96				As above		713	94	96			
96	98				As above Minor thin, ferruginised bands.		714	96	98			
98	100				Med to coarse grained, rounded to sub angular sands. Quartz - blue grey. Some angular feldspar.		716	98	100			
100	102				As above		716	100	102			
102	104				As above		717	102	104			
104	106				As above		718	104	106			
106	108				As above		719	106	108			
108	110				As above		890720	108	110			
110	112				As above		721	110	112			
112	114				As above		722	112	114			
114	116				As above		723	114	116			
116	118				As above		724	116	118			
118	120				Dark grey and brown fine grained sands & silts. Micaceous Carbonaceous.	Permian?	725	118	120			
120	122				Dark grey (30%) & light grey/off white (60%) fine grained sands and silts.	micaceous → 144m Bad contam. from Madura	726	120	122			
122	124				As above		727	122	124			
124	126				As above		728	124	126			
126	128				As above		729	126	128			
128	130				As above		890730	128	130			
130	132				As above		731	130	132			
132	134				Dark grey brown sands & silts.		732	132	134			
134	136				As above		733	134	136			
136	138				light grey fine grained sands and silts		734	136	138			

SUMMARY AND SPECIAL COMMENTS

Loongana Conglomerate → Permian Sands

LOGGED BY D.L. ANDREWS DATE 30/11/80

SHEET 3 OF 4

4032617-19c

PERCUSSION

DRILL CORE LOG

 CO-ORDINATES Lat 30°15', Long 129°51' AZIMUTH _____
 RL COLLAR _____ INCLINATION _____
 DRILLERS DIAMOND DRILLING P/L. COMMENCED 28/11/80 DEPTH 144 m HOLE No 80 EP4
 DRILL TYPE INGERSOLL RAND TH3 COMPLETED 30/11/80 CASING LEFT _____ DPO No(1) _____

DEPTH		REC %	HOLE DIAM	GRAPHIC LOG	CUTTINGS DESCRIPTION	SPECIAL FEATURES WEATH. ALTERATION FRACTURING VEINING MINERALIZATION	SAMPLE No	FROM (M)	TO (M)	CON (%)	ASSAY VALUES	
FROM (M)	TO (M)											
138	140				Light grey, fine grained silts and sands.	Bad contamination from Madura	880955	138	140			
140	142				As above	↓	736	140	142			
142	144				As above	↓	737	142	144			
					B.O.H. 144 m							

 SUMMARY AND SPECIAL COMMENTS The completed in Permian Sands, caving problems.
 Geophysical log to 87 m.

 LOGGED BY D.L. ANDREWS DATE 30/11/80
 SHEET 4 OF 4

4032617-19d

80EP5

DATE: 8/12/80

LOGGED BY: G COLLINS

LOGGING SPEED: 5m/min

CASING: 64.5 metres

DENSITY

5000 cps full scale

Time Constant = 2

Depth logged: 84.5 metres

Source - crystal spacing: 4.5 cm

NEUTRON

1000 cps full scale

Time Constant = 5

Depth logged: 31.5 metres

NATURAL GAMMA

50 cps full scale

Time Constant = 2

Depth logged: 85.6 metres

CRA EXPLORATION PTY LIMITED

PROJECT: EUCLA BASIN JOINT VENTURE

PERCUSSION DRILL CORE LOG

CO ORDINATES Lat 30°07', Long 129°17' AZIMUTH

DRILLERS DIAMOND DRILLING P/L

COMMENCED 8/12/80

DEPTH 108m

HOLE No. 80 EP. 5

RL COLLAR

INCLINATION

DRILL TYPE INGERSOLL RAND TH3

COMPLETED 8/12/80

CASING LEFT 84m

DPO No(s)

DEPTH FROM (M) TO (M)	REC %	HOLE DIAM	GRAPHIC LOG	CUTTINGS DESCRIPTION	SPECIAL FEATURES WEATH. ALTERATION, FRACTURING VEINING, MINERALIZATION	SAMPLE No.	FROM (M)	TO (M)	CON (%)	ASSAY VALUES				
0 0				Red dirt + calcrete		880863	0	2						
2 2				Calcrete - brown & speckled		864	2	4						
4 4				Brown calcrete & hard grey crystalline limestone		865	4	6						
6 6				Pale grey & pale brownish pink, hard, crystalline limestone		866	6	8						
8 8				As above		867	8	10						
10 10				As above	fossiliferous Brachiopod fragments?	868	10	12						
12 12				As above	crystalline calcite	869	12	14						
14 14				As above + very fine grained red brown mud (dried)		880870	14	16						
16 16				As above		871	16	18						
18 18				As above		872	18	20						
20 20				Grey & pale brown hard limestone, crystalline		873	20	22						
22 22				As above		874	22	24						
24 24				As above		875	24	26						
26 26				Greenish brown marls and limestone, possible oxidised glauconite present		876	26	28						
28 28				Off white & pale brown hard crystalline limestone		877	28	30						
30 30				As above		878	30	32						
32 32				As above		879	32	34						
34 34				Green brown limestone, soft and clayey		880880	34	36						
36 36				As above		881	36	38						
38 38				As above trans to 880883		882	38	40						
40 40				Pale grey & honey brown hard limestone crystalline	Fossiliferous Brachiopods	883	40	42						
42 42				As above		884	42	44						
44 44				As above		885	44	46						
46 46														

SUMMARY AND
SPECIAL COMMENTS

Scint: 2 10 c.p.s. → 108m

Mullaneer St → 34m, Wilsons Bluff Lst → 60m

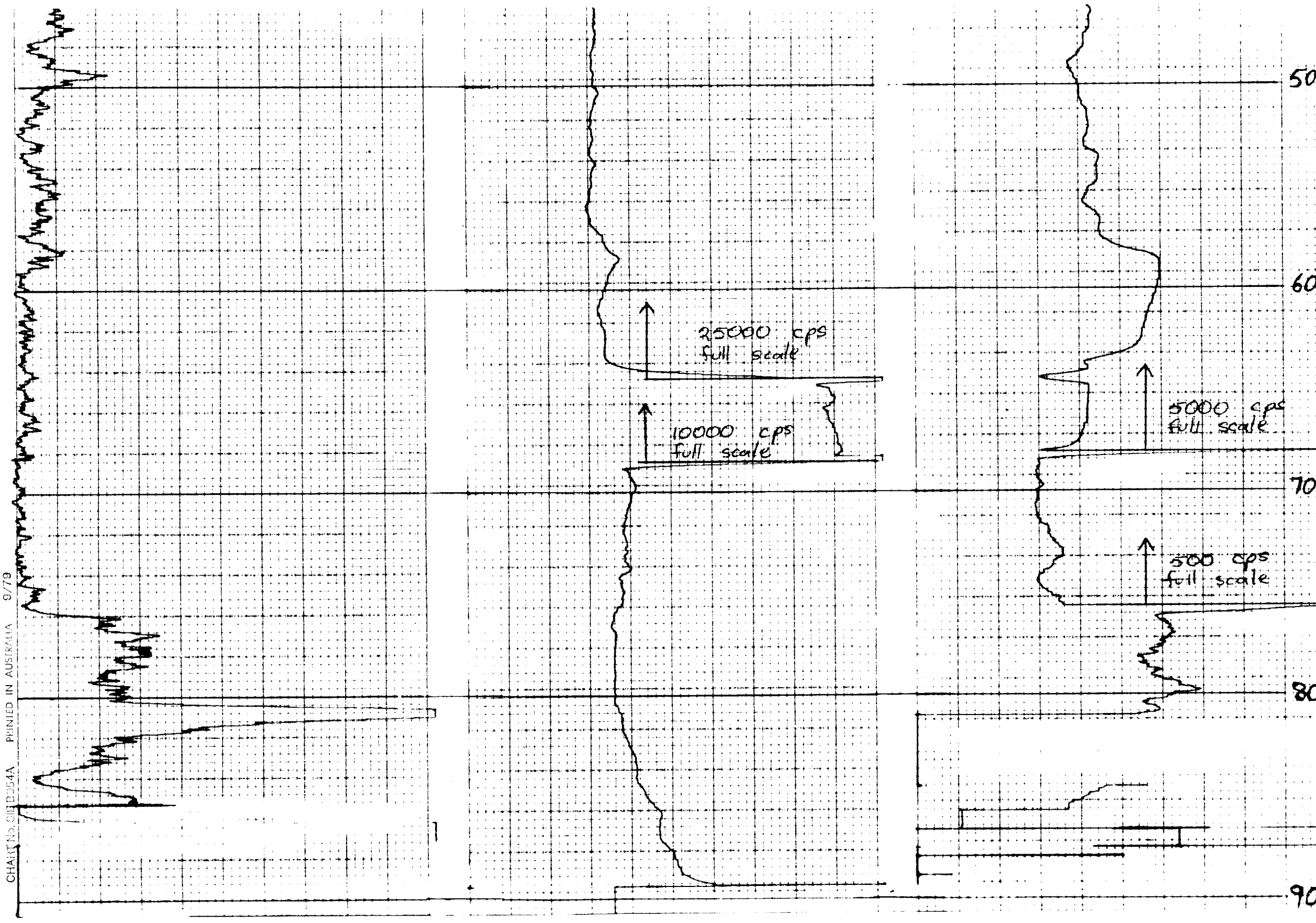
LOGGED BY D.L. ANDREWS

DATE 8/12/80

SHEET 1 OF 4

4032(1)-20a

CHART NO. CHD 054A PRINTED IN AUSTRALIA 9/79



C R A EXPLORATION PTY LIMITED										PROJECT EUCLA BASIN JOINT VENTURE									
PERCUSSION DRILL CORE LOG																			
COORDINATES lat. 30°07', long. 129°17'					AZIMUTH -					DRILLERS DIAMOND DRILLING P/L.					COMMENCED 6/12/80				
R/L COLLAR					INCLINATION -					DRILL TYPE INGERSOL RAND TH3					COMPLETED 8/12/80				
															DEPTH 168m				
															HOLE No 80 EP 5				
															CASING LEFT 84m				
															DPO No(s)				
DEPTH		REC %	HOLE DIAM	GRAPHIC LOG	CUTTINGS DESCRIPTION	SPECIAL FEATURES WEATH. ALTERATION FRACTURING VEINING MINERALIZATION	SAMPLE No	FROM (M)	TO (M)	CON (%)	ASSAY VALUES								
FROM (M)	TO (M)																		
46	48				Pale brown bryozoal limestone, soft, minor iron staining.		880886	46	48										
48	50				As above		887	48	50										
50	52				As above		888	50	52										
52	54				As above		889	52	54										
54	56				Off white & pale brown, soft, bryozoal limestone		890890	54	56										
56	58				As above		891	56	58										
58	60				As above + minor yellow brown silty clay.		892	58	60										
60	62				Minor limestone + olive & brown fine grained sands with rounded coarse gr. quartz gravel.	Fe stained, glauconitic	893	60	62										
62	64				Yellow brown medium grained sands, rounded, iron stained. Gradually becoming coarse grained to 70m.	tr. carbonaceous	894	62	64										
64	66				As above	" " "	895	64	66										
66	68				As above	" "	896	66	68										
68	70				As above	" "	897	68	70										
70	72				Yellow-brown, medium to coarse sands, rounded	" "	898	70	72										
72	74				Fe stained	tr. calcareous	899	72	74										
74	76				As above	" "	890900	74	76										
76	78				As above + minor olive clays, stiff.	tr. lignitic	901	76	78										
78	80				As above + minor black carbonaceous/lignitic clays.	" "	902	78	80										
80	82				Dark grey carbonaceous clayey silt. Minor black fine grained clasts ≤ 1cm	" "	903	80	82										
82	84				As above. Clay content increasing.	" "	904	82	84										
84	86				As above	" "	905	84	86										
86	88				As above	" "	906	86	88										
88	90				Black, very fine grained, stiff clays.	non-calcareous	907	88	90										
90	92				trace micaceous.		908	90	92										
					As above														
SUMMARY AND SPECIAL COMMENTS										Wilson's Bluff → 60 m, Pidinga → 88 m(?), Madura → 168 m									
										LOGGED BY D.L. ANDREWS DATE 8/12/80									
										SHEET 2 OF 4									

4032 (1)-20b

PERCUSSION DRILL CORE LOG

CO-ORDINATES lat. 30°07' long. 128°17'

AZIMUTH

DRILLERS DIAMOND DRILLING P/L.

COMMENCED 6/12/80

DEPTH 103m

HOLE No 80 EP 5

RL COLLAR

INCLINATION

DRILL TYPE INGERSOL RAND TH3

COMPLETED 8/12/80

CASING LEFT 84m

DPO No(s)

DEPTH FROM (m)	TO (m)	REC %	HOLE DIAM	GRAPHIC LOG	CUTTINGS DESCRIPTION	SPECIAL FEATURES WEATH. ALTERATION FRACTURING VEINING MINERALIZATION	SAMPLE No	FROM (m)	TO (m)	CON (%)	ASSAY VALUES	
92	94				Black silty clay, micaceous, laminated, "greasy"		900909	92	94			
94	96				non-calcareous							
					As above		910	94	96			
96	98				As above		911	96	98			
98	100				As above. Rare angular sand grains (qtz)		912	98	100			
100	102				Black fine grained muds, fine to medium grained		913	100	102			
					sands. Carbonaceous. Non-calcareous.							
102	104						914	102	104			
104	106						915	104	106			
106	108						916	106	108			
108	110						917	108	110			
110	112						918	110	112			
112	114						919	112	114			
114	116				As above		820920	114	116			
116	118						921	116	118			
118	120						922	118	120			
120	122						923	120	122			
122	124						924	122	124			
124	126						925	124	126			
126	128						926	126	128			
128	130						927	128	130			
130	132				Black muds and medium grained sands +	tr. pyritic	928	130	132			
					dark grey, fine grained mudstone. Non-calcareous.							
132	134				As above. Less sandy.	pyrite aggregates <0.5mm	929	132	134			
134	136				As above		820930	134	136			
136	138				As above	lignitic	931	136	138			

4032617-20c

PERCUSSION

DRILL CORE LOG

CO-ORDINATES lat. 30°07', long 129°17'

AZIMUTH

DRILLERS DIAMOND DRILLING P/L

COMMENCED 8/12/80

DEPTH 168m

HOLE No. 80 EP 3

RL COLLAR

INCLINATION

DRILL TYPE INGERSOLL RAND TH3

COMPLETED 8/12/80

CASING LEFT 64m

DPO NAME

DEPTH	REC	ROD	ROD	ROD	CUTTINGS DESCRIPTION	SPECIAL FEATURES WEATH., ALTERATION, FRACTURING VEINING, MINERALIZATION	SAMPLE No.	FROM (m)	TO (m)	CON (%)	ASSAY VALUES
FEET	%	DIAM.	LOG								
138					Dark grey fine grained shales (20%) + black, f. gr.		92082	138			
140					shales (15%) + black, fine gr. sands (25%) + coal (10%)			140			
140					Medium grained black, pyritic sands (70%) +		923	140			
142					lignite (20%) + fine grained, dark grey mudstone			142			
142					As above		934	142			
144								144			
144					As above		935	144			
146								146			
146					Dark grey/black, fine grained mudstone, slightly		936	146			
148					greasy texture + medium grained sands (60%)			148			
148					Predominantly black, medium grained sands (70%)		937	148			
150					+ lignite (5%) + dark grey greasy shales (15%)			150			
150					As above		938	150			
152					(70%) + lignite (25%) + (5%)			152			
152					As above		939	152			
154					(80%) + lignite (15%) + (5%)			154			
154					As above		940	154			
156					(85%) + lignite (10%) + (5%)			156			
156					As above		941	156			
158								158			
158					Black, fine grained sands (85%) + lignite (15%)		942	158			
160								160			
160					As above		943	160			
162								162			
162					As above		944	162			
164								164			
164					Black, fine grained sands (80%) + lignite (15%) +		945	164			
166					dark grey/black shales (5%)			166			
166					As above		946	166			
168								168			
					B.O.H. 168m						
					Abandoned due to no returns from 168m						

SUMMARY AND
SPECIAL COMMENTS

LOGGED BY DL ANDREWS DATE 8/12/80

SHEET 4 OF 4

4032617-20d

80EP6a

DATE: 20/11/80, 7/12/80

LOGGED BY: G. COLLINS

LOGGING SPEED 5m/min.

CASING: 47.8 metres

NATURAL GAMMA
100 cps full scale
Time Constant = 2
Depth logged: 230.8 metres

DENSITY
2500 cps full scale
Time Constant = 2
Depth logged: 230.4 metres
Source-crystal spacing: 4.5 cm

DENSITY
10000 cps full scale
Time Constant = 2
Depth logged: 229.2 metres
Source-crystal spacing: 4.5 cm

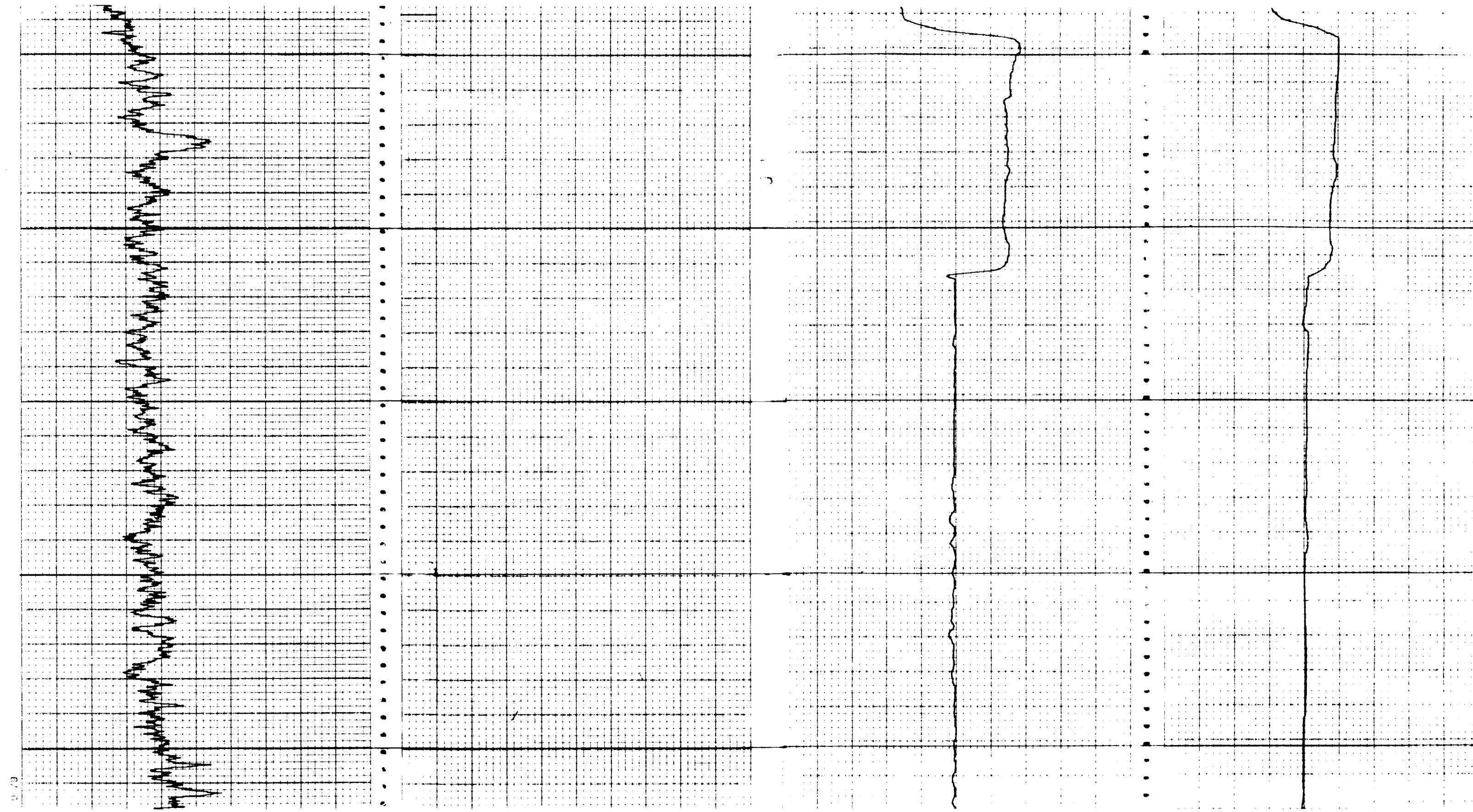
NEUTRON
500 cps full scale
Time Constant = 5
Depth logged: 230.0 metres

C R A EXPLORATION PTY LIMITED										PROJECT EUCLA BASIN JOINT VENTURE																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
PERCUSSION DRILL CORE LOG																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
CO-ORDINATES Lat 29°51', Long 129°58'					AZIMUTH -					DRILLERS DIAMOND DRILLING P/L					COMMENCED 24/11/80																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
RL COLLAR					INCLINATION -					DRILL TYPE INGERSOLL RAND TH3					COMPLETED 25/11/80																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
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										CASING LEFT 58.6m					DPO No(s)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
DEPTH		REC %	HOLE DIAM	GRAPHIC LOG	CUTTINGS DESCRIPTION	SPECIAL FEATURES WEATH., ALTERATION, FRACTURING VEINING, MINERALIZATION	SAMPLE No.	FROM (M)	TO (M)	CON (%)	ASSAY VALUES																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
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0	2				Pale brown calccrete		890429	0	2																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	

SUMMARY AND SPECIAL COMMENTS

LOGGED BY D.L. ANDREWS DATE 24/11/80
SHEET 1 OF 5

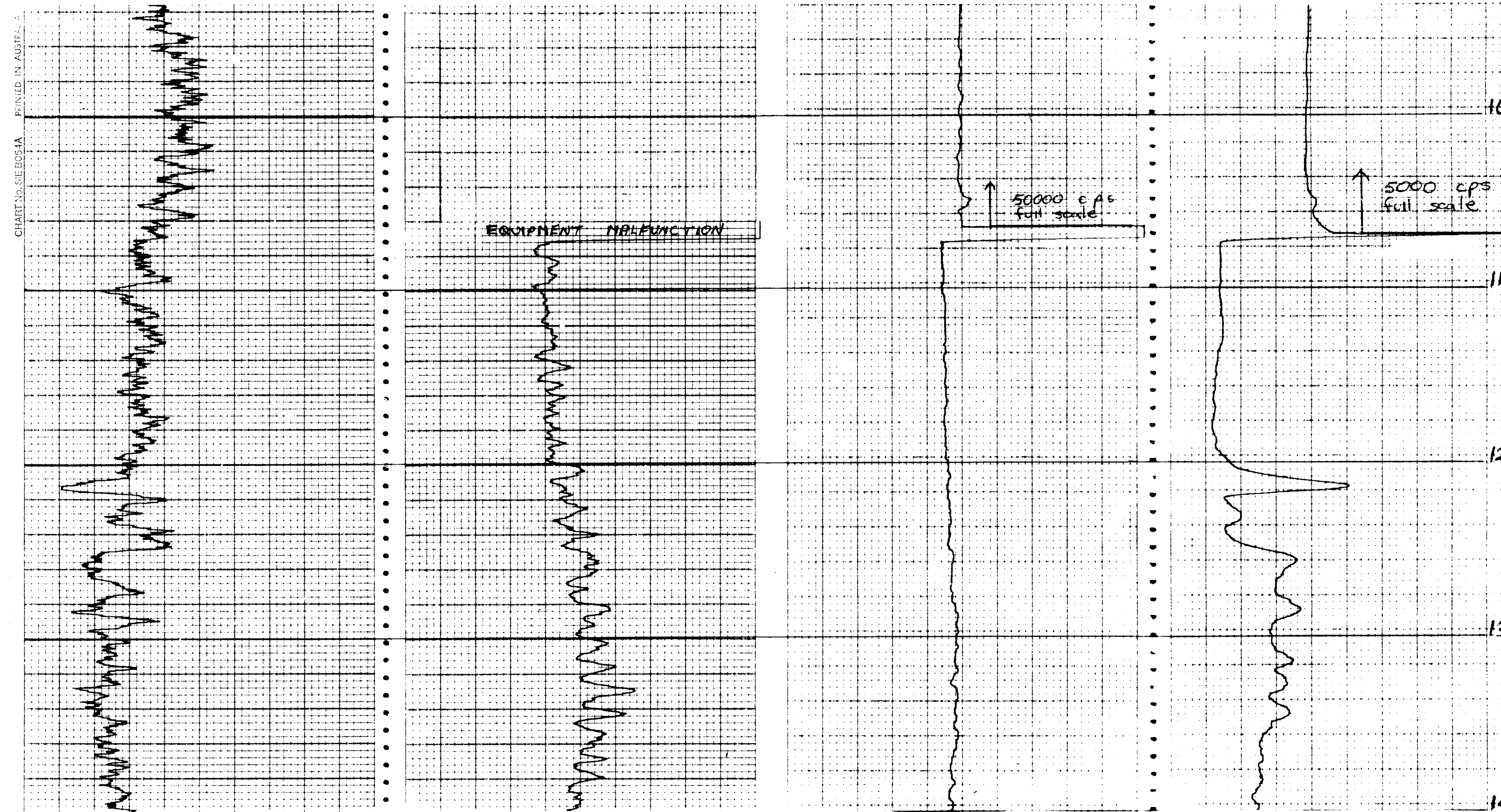
4032(1)-21a



C.R.A. EXPLORATION PTY LIMITED										PROJECT EUCLA BASIN JOINT VENTURE																			
PERCUSSION DRILL CORE LOG																													
CO-ORDINATES lat. 29°51', long 129°58'					AZIMUTH -					DRILLERS DIAMOND DRILLING P/L.					COMMENCED 24/11/80					DEPTH 232m					HOLE No. 80 EPGA.				
RL COLLAR					INCLINATION -					DRILL TYPE INGERSOL BAND TH3					COMPLETED 25/11/80					CASING LEFT 58.6m					DPO No(s)				
DEPTH		REC %	WOLE DIAM	REMARKS	CUTTINGS DESCRIPTION					SPECIAL FEATURES WEATH. ALTERATION, FRACTURING VEINING, MINERALIZATION					SAMPLE No.	FROM (M)	TO (M)	CON (%)	ASSAY VALUES										
MEASURE	TIME																												
48					As above										800457	48	50												
50					As for 890451 loose sands, very poor sample recovery.											50	52												
52																52	54												
54																54	56												
56																56	58												
58					Moderately hard, fissile, very fine grained shale, dark grey non-calcareous.										458	58	60												
60					As above										459	60	62												
62					As above. Hardness increasing, changed from drag bit to hammer										800460	62	64												
64					Green clays, very bad contamination.										461	64	66												
66					Grey to dark grey shales, poorly bedded in cuttings, fissile very fine grained.										462	66	68												
68					As above										463	68	70												
70					As above										464	70	72												
72					As above										465	72	74												
74					As above + dark grey-brown shales (10%)										466	74	76												
76					As above										467	76	78												
78					As above + (20%)										468	78	80												
80					Dark grey-brown to brown, fissile, fine grained shales (10%) and dark greenish grey fine grained fissile shales (30%)										469	80	82												
82					As above (10%) + (30%)										800470	82	84												
84					As above (40%) + (60%)					trace micaceous, very fine grained.					471	84	86												
86					As above (30%) + (70%)										472	86	88												
88					As above (50%) + (50%)					grey clay rich balls (contamination?)					473	88	90												
90					As above (90%) + (10%)										474	90	92												
92					As above (10%) + (90%)										475	92	94												
94																94													
SUMMARY AND SPECIAL COMMENTS										Madura Formation is non-calcareous, no petroliferous colour. Casing to 58.6 m																			
										LOGGED BY D.L. ANDREWS DATE 25/11/80																			
										SHEET 2 OF 5																			

4032(1)-21b

CHART No. SIE 8034A
PRINTED IN AUSTRALIA



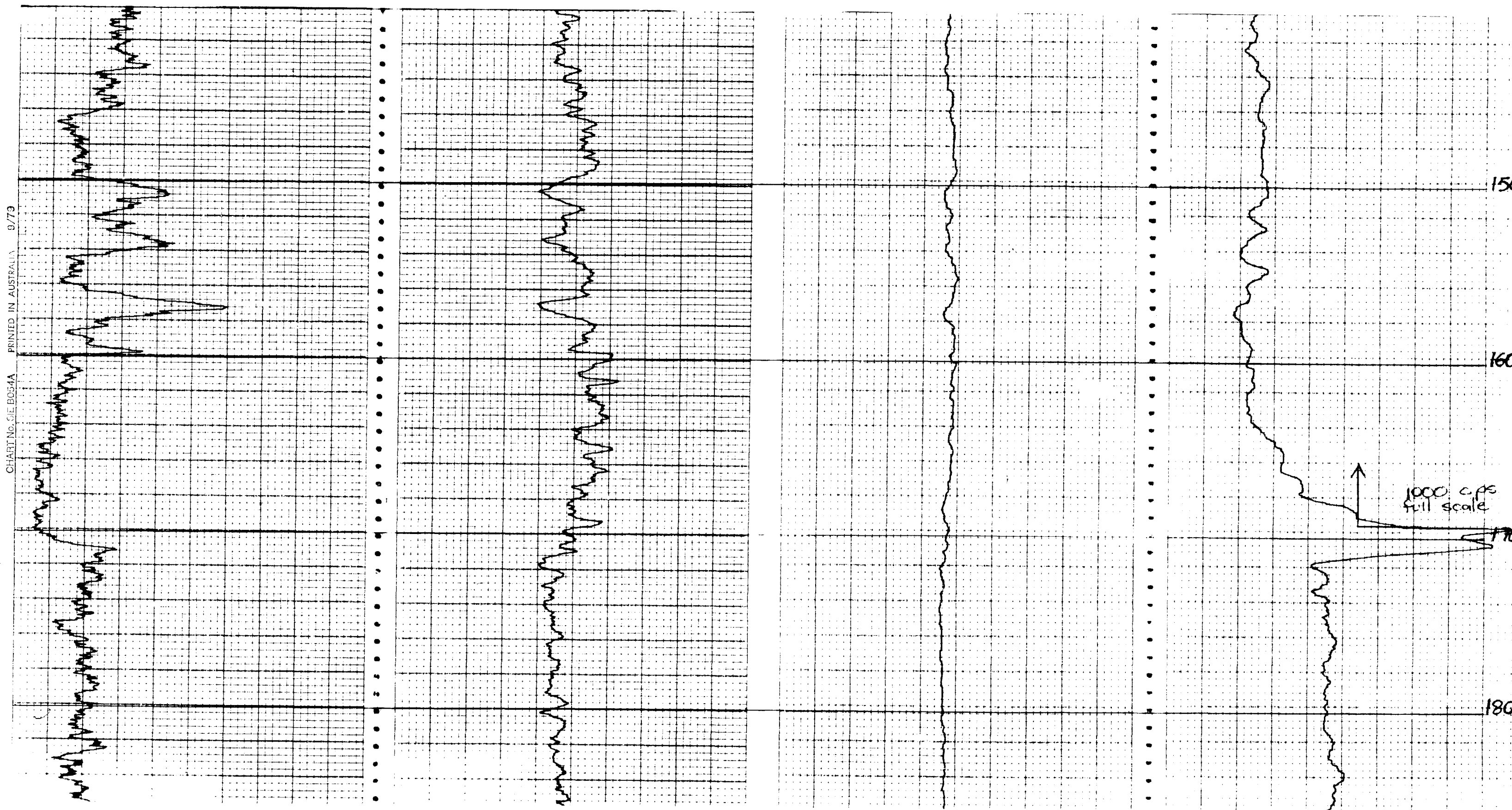
CRA EXPLORATION PTY LIMITED										PROJECT EUCLA BASIN JOINT VENTURE									
PERCUSSION DRILL CORE LOG																			
CO ORDINATES Lat. 29°31', Long. 129°58'					AZIMUTH					DRILLERS DIAMOND DRILLING P/L					COMMENCED 24/11/80				
RL COLLAR					INCLINATION					DRILL TYPE INGERSOLL RAND THB					COMPLETED 25/11/80				
															DEPTH 232m				
															CASING LEFT 58.6m				
															HOLE No. 80 EP 6a				
															DPO No(s)				
DEPTH		REC %	HOLE DIAM	GRAPHIC LOG	CUTTINGS DESCRIPTION	SPECIAL FEATURES WEATH. ALTERATION, FRACTURING VEINING, MINERALIZATION	SAMPLE No	FROM (M)	TO (M)	CON (%)	ASSAY VALUES								
FROM (M)	TO (M)																		
94	96				Dark grey, fissile shales becoming slightly coarse grained, locally gradational to siltstone (85%) + dark brown equivalents (40%)		880476	94	96										
96	98				Dark brown, hard & very hard fissile shale, slightly micaceous(?)		477	96	98										
98	100				As above (65%) + dark grey equivalents (35%)		478	98	100										
100	102				As above		479	100	102										
102	104				As above		880480	102	104										
104	106				As above (95%) + (5%)	Slight contamination from glauconitic clays	481	104	106										
106	108				Dark brown, hard fissile shales, slightly micaceous.		482	106	108										
108	110				As above.		483	108	110										
110	112				As above. Becoming more massive.		484	110	112										
112	114				As above		485	112	114										
114	116				Dark brown shale, hard with poorly developed partings, slightly micaceous.		486	114	116										
116	118				As above		487	116	118										
118	120				Dark brown shale with moderately developed partings, slightly micaceous.		488	118	120										
120	122				As above (75%) + dark grey equivalents (25%)		489	120	122										
122	124				As above (55%) + (40%) + dark brown fine grained siltstone	Laminated (<1mm) grey-brown shale. Trace calcareous.	880480	122	124										
124	126				Dark grey fissile, hard shales with rare dark brown mottling.		491	124	126										
126	128				As above (75%) + dark brown equivalents (25%)		492	126	128										
128	130				Light and dark grey spotted siltstones, very fine grained sandstones. Biotite spots (<0.8 mm). Non calcareous.		493	128	130										
130	132				As above.		494	130	132										
132	134				As above (20%) + pale brown nonmicaceous, very fine grained sandstones (80%)		495	132	134										
134	136				As above but grey, micaceous, very fine grained sandstone (70%) and brown, very fine grained siltstone (30%)		496	134	136										
136	138				As above (60%) + (40%); weakly friable.		497	136	138										
138	140				As above (40%) + (60%), friable		498	138	140										

SUMMARY AND SPECIAL COMMENTS

LOGGED BY D.L. ANDREWS DATE 25/11/80

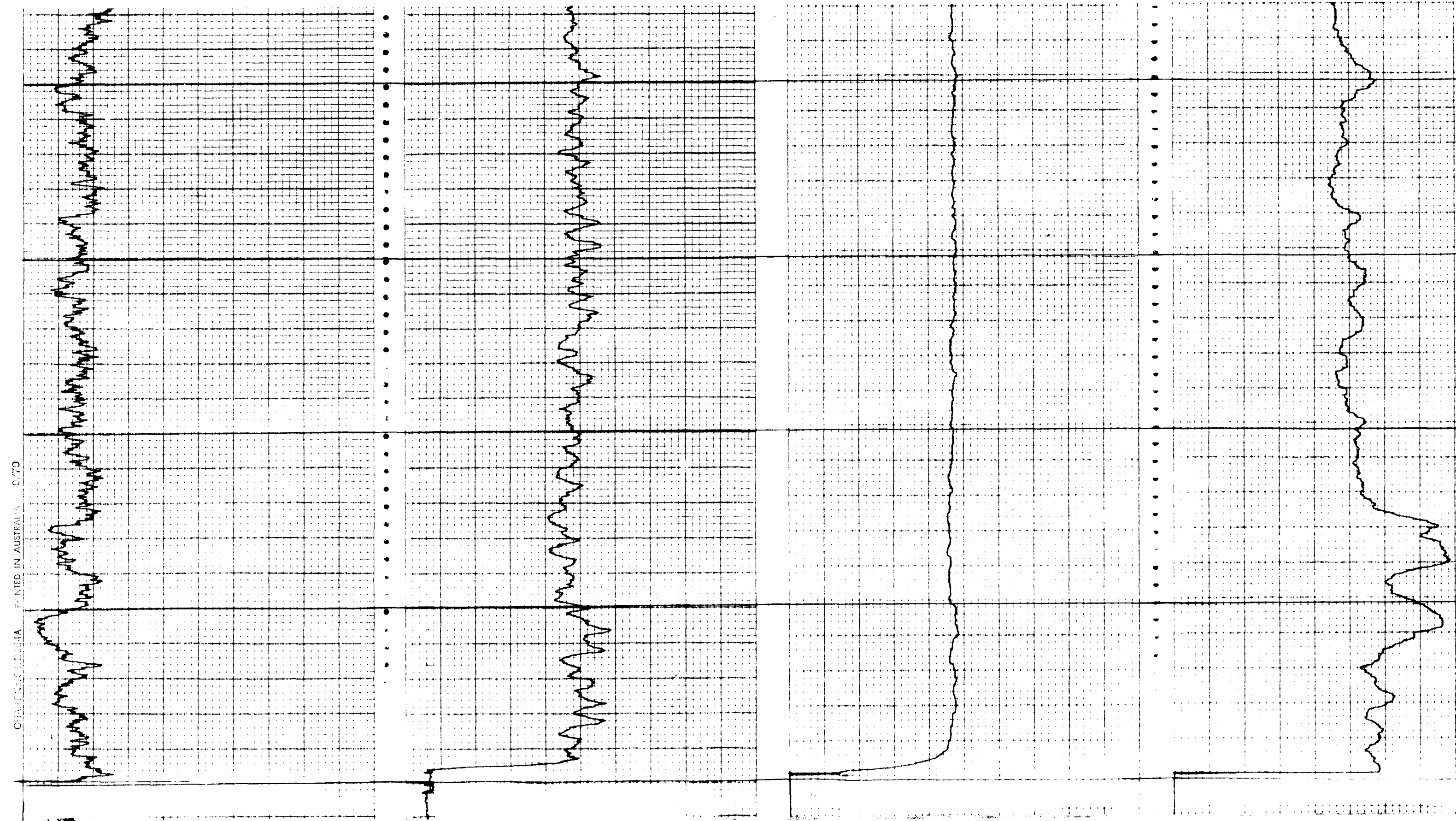
SHEET 3 OF 5

4032(1)-21c



CRA EXPLORATION PTY LIMITED										PROJECT EUCLA BASIN JOINT VENTURE									
PERCUSSION DRILL CORE LOG																			
CO ORDINATES Lat. 29°51', Long. 129°58'					AZIMUTH					DRILLERS DIAMOND DRILLING P/L.					COMMENCED 24/11/80				
RL COLLAR					INCLINATION					DRILL TYPE INGERSOLL RAND TH3					COMPLETED 25/11/80				
										DEPTH 232m					HOLE No. 80 EPGa				
										CASINO LEFT 58.6m					DPO No(s)				
DEPTH		NLC %	HOLE DIAM	GRAPHIC LOG	CUTTINGS DESCRIPTION	SPECIAL FEATURES WEATH. ALTERATION, FRACTURING VEINING, MINERALIZATION	SAMPLE No	FROM (M)	TO (M)	CON (%)	ASSAY VALUES								
POSITION	TO (M)																		
140	142				Mottled dark brown and light grey, friable, micaceous (biot.), very fine grained sandstone.		890499	140	142										
142	144				As above. Predominantly dark brown (85%), very friable.		500	142	144										
144	146				As above. Predominantly dark brown (90%), very friable.	Biotite defines the laminations within light grey sandstone.	501	144	146										
146	148				As above. Gradational to siltstone. Very friable.		502	146	148										
148	150				As above		503	148	150										
150	152				Dark brown very fine grained sands, poorly cemented slightly micaceous with minor light grey cements & biotite sandstone.		504	150	152										
152	154				As above		505	152	154										
154	156				As above		506	154	156										
156	158				As above		507	156	158										
158	160				As above		508	158	160										
160	162				Chocolate very fine grained sands and silts.		509	160	162										
162	164				As above		890510	162	164										
164	166				As above. Trace medium to coarse grained, rounded, grey quartz grains - possibly contamination (no).		511	164	166										
166	168				As above		512	166	168										
168	170				As above		513	168	170										
170	172				As above		514	170	172										
172	174				Dark grey, micaceous, band, biotite shales + chocolate fine grained sand and silts. Med to coarse sandstone with v.f.gr matrix, cemented.		515	172	174										
174	176				As above. Moderate clay contamination.		516	174	176										
176	178				As above + oxidised micaceous shales		517	176	178										
178	180				Chocolate fine grained shales with moderately developed partings - micaceous; minor grey micaceous shales.		518	178	180										
180	182				As above		519	180	182										
182	184				As above	Brown & grey shales/siltstone are weathered. Equivalent mottling in some chips - both brown & grey.	890520	182	184										
184	186				As above		521	184	186										
SUMMARY AND SPECIAL COMMENTS																			
Water at 168 m.										Observatory Hill Beds.									
LOGGED BY D.L. ANDREWS										DATE 25/11/80									
SHEET 4										OF 5									

4032(1)-21d



C.R.A. EXPLORATION PTY LIMITED										PROJECT EUCLA BASIN JOINT VENTURE													
PERCUSSION DRILL CORE LOG																							
CO-ORDINATES		lat 29°51', long 129°58'		AZIMUTH		-		DRILLERS DIAMOND DRILLING P/L		COMMENCED		24/11/80		DEPTH		232 m		HOLE No.		80EP6a			
RL COLLAR		INCLINATION		-		DRILL TYPE		INGERSOL RAND TH3		COMPLETED		25/11/80		CASING LEFT		58.6 m		DPO No(s)					
DEPTH		REC	HOLE	DIAM	LOG	CUTTINGS DESCRIPTION		SPECIAL FEATURES WEATH., ALTERATION, FRACTURING VEINING, MINERALIZATION		SAMPLE	FROM	TO	CON	ASSAY VALUES									
FEET	TD(M)	%								No.	(M)	(M)	(%)										
186	188					As above.		Non - calcareous		890522	186	188											
188	190					As above. Becoming medium grained to coarse sand (≥1 mm grain size)				523	188	190											
190	192					Chocolate brown & light grey, biotite sandstone, fine grained.				524	190	192											
192	194					As above				525	192	194											
194	196					Chocolate brown & light grey, biotite sandstone				526	194	196											
196	198					As above + grey micaceous shale (contaminated?)				527	196	198											
198	200					As above + minor grey micaceous shale				528	198	200											
200	202					As above		trace calcareous		529	200	202											
202	204					As above		Non - calcareous		890530	202	204											
204	206					As above				531	204	206											
206	208					As above				532	206	208											
208	210					As above				533	208	210											
210	212					As above				534	210	212											
212	214					As above				535	212	214											
214	216					Chocolate brown & minor light grey, fissile, micaceous (biotite) siltstones.				536	214	216											
216	218					As above				537	216	218											
218	220					As above				538	218	220											
220	222					As above. Gradational to sandstone.				539	220	222											
222	224					As above. Slightly coarser grained.				890540	222	224											
224	226					As above				541	224	226											
226	228					Biotite sandstones and siltstones, large amount of loose medium grained sands in samples.				542	226	228											
228	230					As above				543	228	230											
230	232					As above		trace calcareous		544	230	232											
B.O.H. 232 m																							
SUMMARY AND SPECIAL COMMENTS										B.O.H. is in Cambrian Observatory Hill Beds - siltstone and shale member										LOGGED BY D.L. ANDREWS		DATE 25/11/80	
																				SHEET 5		OF 5	

4032C1721e

80EP7

DATE: 27/11/80

LOGGED BY: G COLLINS

LOGGING SPEED: 5m/min

CASING: 32.6 metres

DENSITY

2500 cps full scale

Time Constant = 2

Depth logged: 231.3 metres

Source - crystal spacing: 4.5 cm

SELF-POTENTIAL & RESISTANCE

50 mV full scale (S.P.)

25 Ω full scale (R_{sp})

Depth logged: 231.3 metres

Water table: 72.5 metres

CRA EXPLORATION PTY LIMITED

PROJECT EUCLA BASIN JOINT VENTURE

PERCUSSION DRILL CORE LOG

CO-ORDINATES: Lat 32°35', Long 130°17'

AZIMUTH

DRILLERS DIAMOND DRILLING P/L

COMMENCED 26/11/80

DEPTH 232m

HOLE No. 80 EP7

RL COLLAR

INCLINATION

DRILL TYPE INGERSOLL RAND TH3

COMPLETED 27/11/80

CASING LEFT

DPO No(s)

DEPTH	REC	HOLE	GRAPHIC	CUTTINGS DESCRIPTION	SPECIAL FEATURES WEATH. ALTERATION, FRACTURING VEINING, MINERALIZATION	SAMPLE No	FROM (M)	TO (M)	CON (%)	ASSAY VALUES
FROM (M)	TO (M)	%	DIAM	LOG						
0	2			Buff-brown calcareate		890550	0	2		
2	4			Buff-brown calcareate + hard buff-brown limestone		551	2	4		
4	6			Hard, buff-brown, fossiliferous limestone		552	4	6		
6	8			Hard, buff-brown to honey, fossiliferous limestone		553	6	8		
8	10			Buff-brown to light grey, fossiliferous limestone		554	8	10		
10	12			As above		555	10	12		
12	14			Green-brown and brown sandy clays, minor glauconite, slightly calcareous		556	12	14		
14	16			Yellow-brown, rounded, coarse grained sands, fine silty matrix. Non-calcareous		557	14	16		
16	18			Yellow-brown, fine grained silty sands		558	16	18		
18	20			Pale yellow-brown sands, moderately rounded. Clay rich matrix. Slightly silty.		559	18	20		
20	22			As above with poorly sorted ferruginised bands		890560	20	22		
22	24			As above		561	22	24		
24	26			Red and pale grey ferruginised sands, predominantly free running although some clay matrix - pale grey. Pale orange equivalent of 24-26m. Some minor (<5%) large grey quartz grains (<3mm).		562	24	26		
26	28			Light grey, off-white free running, fine to medium grained micaceous sands. Mica is muscovite.		563	26	28		
28	30			Pale brown, weakly ironstained sands. Rounded.		564	28	30		
30	32			Off-white, medium grained sands, rounded, minor white kaolinitic(?) clay forms matrix for 15% of sample - probably bands.		565	30	32		
32	34			Fine grained, off-white sandy silts and well bedded laminations (1-3mm).		566	32	34		
34	36			off-white to brown laminated, micaceous (musc + biot) silts.		567	34	36		
36	38			Pale off-white sands and silts with some clay matrix.		568	36	38		
38	40			Minor ironstaining on some grains.		569	38	40		
40	42			As above. Micaceous.		890570	40	42		
42	44			Pale off-white sands, medium grained. Minor clays.		571	42	44		
44	46			As above with shale interbeds, laminated, minor ironstaining, off-white.		572	44	46		
46				Pale off-white, medium grained sands.						

SUMMARY AND
SPECIAL COMMENTS

Scint: <15 cps

Mag Susceptibility (5-25) $\times 10^{-5}$ cgs

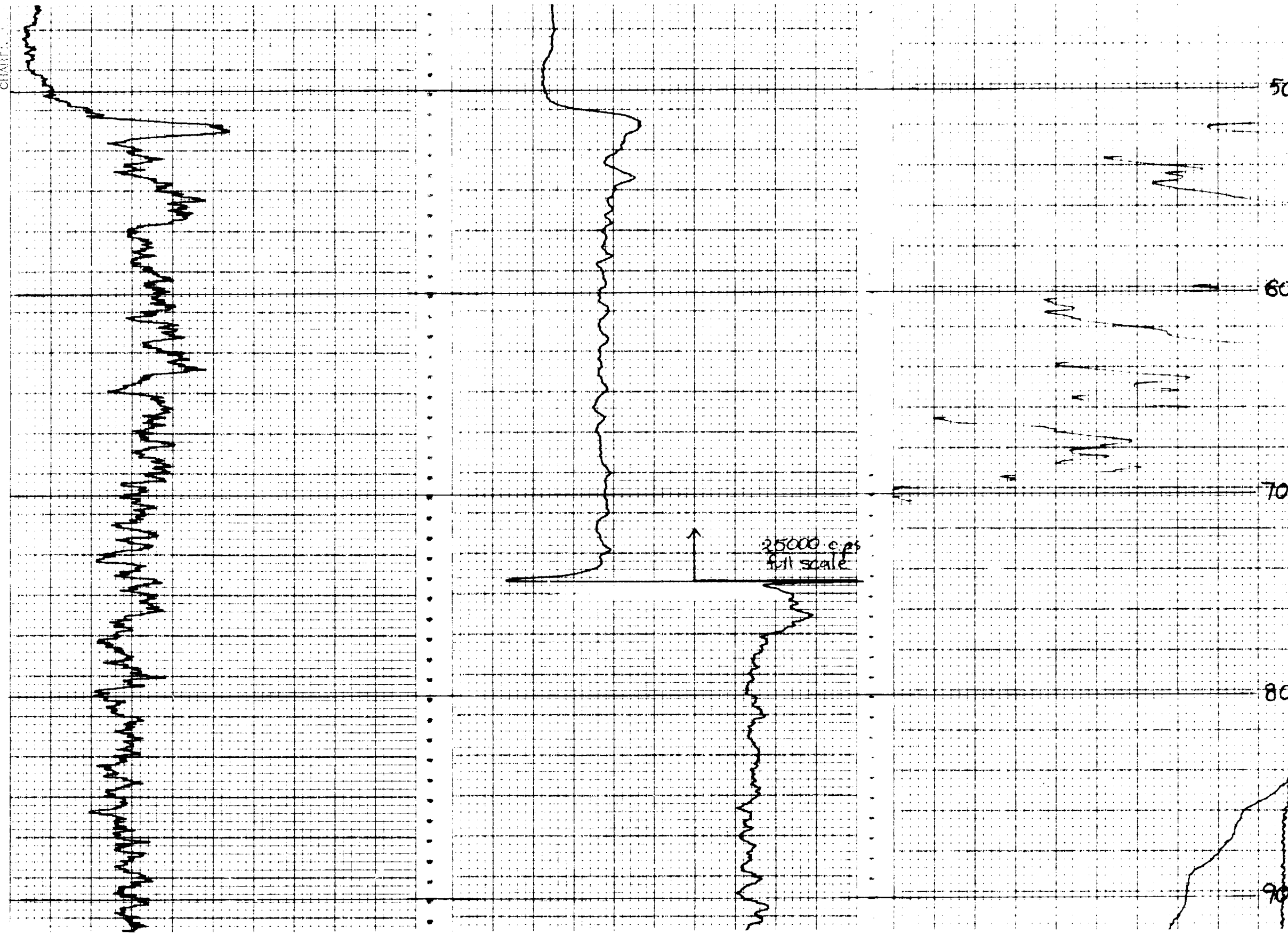
LOGGED BY D.L. ANDREWS

DATE 26/11/80

SHEET 1 OF 6

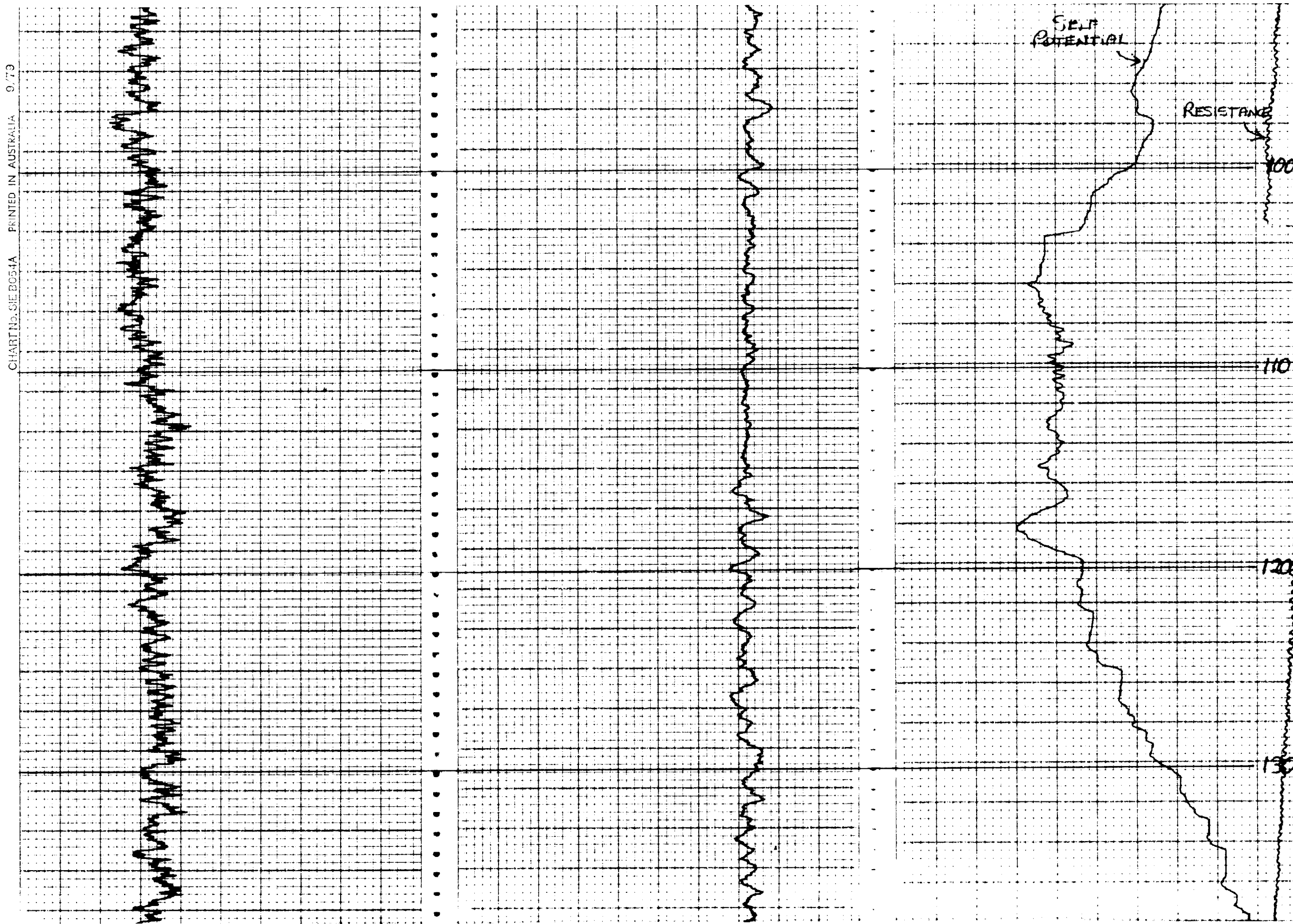
4032(17)-22a

CHART



C.R.A. EXPLORATION PTY LIMITED										PROJECT EUCLA BASIN JOINT VENTURE																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
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CO-ORDINATES lat. 30°52', long. 130°17'					AZIMUTH					DRILLERS DIAMOND DRILLING P/L					COMMENCED 26/11/80																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
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DEPTH		REC %	HOLE DIAM	GRAPHIC LOG	CUTTINGS DESCRIPTION	SPECIAL FEATURES		SAMPLE No.	FROM (M)	TO (M)	CON (%)	ASSAY VALUES																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
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46	48				Pale off-white, medium grained sands. Water at 48m.	trace calcareous		890573	46																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						

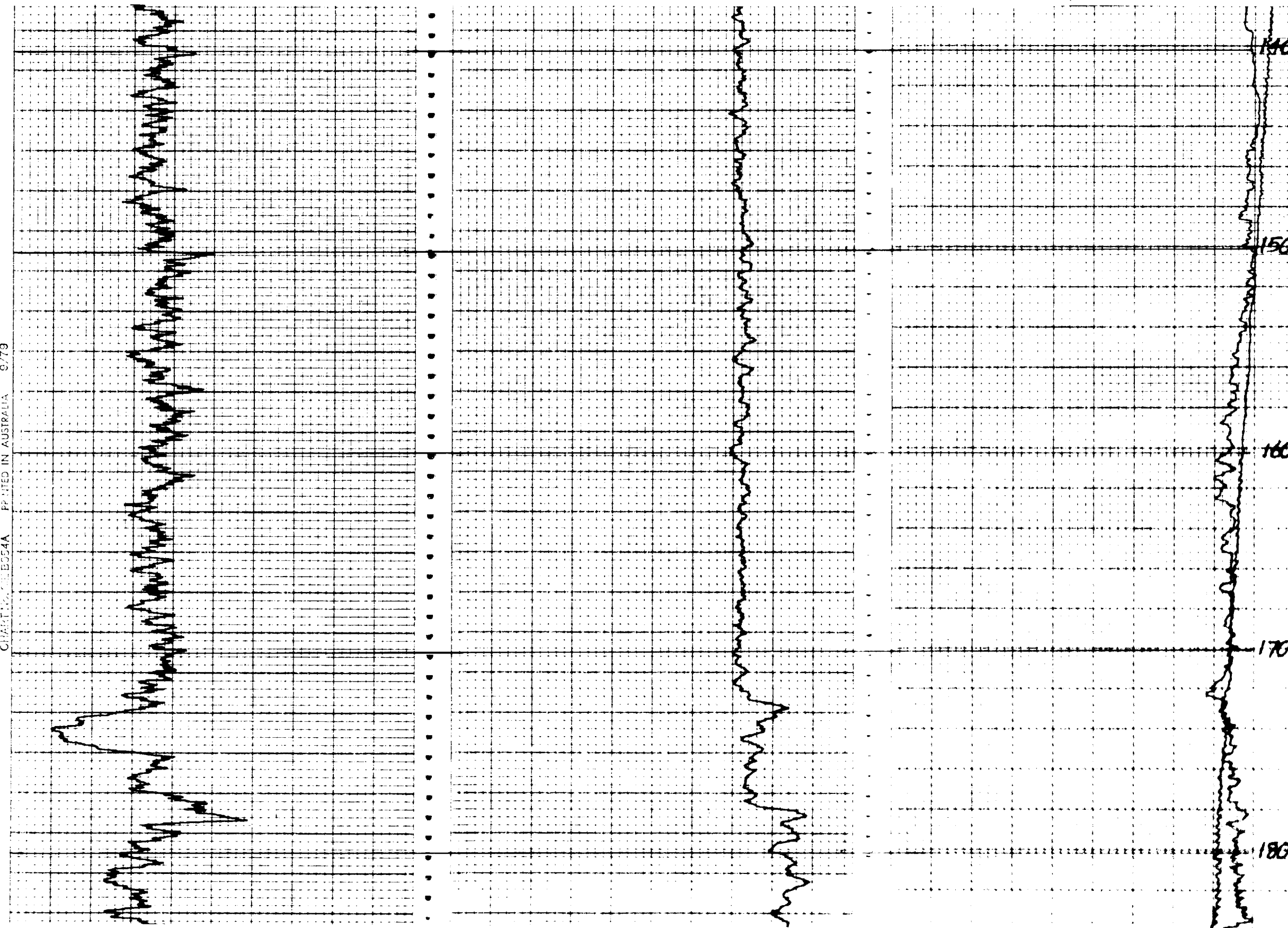
4032C17-22b



C.R.A. EXPLORATION PTY LIMITED						PROJECT EUCLA BASIN JOINT VENTURE													
PERCUSSION DRILL CORE LOG																			
CO-ORDINATES lat 30°52', long 130°17'			AZIMUTH -			DRILLERS DIAMOND DRILLING P/L			COMMENCED 26/11/80			DEPTH 232m			HOLE No. 80 EP7				
RL COLLAR			INCLINATION -			DRILL TYPE INGERSOLL RAND TH3			COMPLETED 27/11/80			CASING LEFT -			DPO No(s)				
DEPTH		REC %	HOLE DIAM	GRAPHIC LOG	CUTTINGS DESCRIPTION	SPECIAL FEATURES WEATH, ALTERATION, FRACTURING VEINING, MINERALIZATION	SAMPLE No.	FROM (M)	TO (M)	CON (%)	ASSAY VALUES								
FROM (M)	TO (M)																		
92					Dark grey, fine grained, micaceous shales with moderately developed partings.	non-calcareous	890586	92											
	94				As above		597	94	94										
94					As above				96										
	96				As above		598	96	98										
96					As above, slightly more massive.		599	98	100										
	98																		
98					Dark grey, fine grained shale, possibly with a trace of chloritic alteration(?)		890500	100	102										
	100				As above. Gradational to siltstone.		601	102	104										
100					Dark grey, hard, very fine grained shale.		602	104	106										
	102				As above + purple grey, very fine grained, micaceous shale		603	106	108										
102					As above		604	108	110										
	104				Dark purple-grey/purple-brown fine grained shale moderately hard with moderately developed partings.		605	110	112										
104					As above.		606	112	114										
	106				Dark purple-brown, fissile, fine grained shale		607	114	116										
106					As above + small (≈ 0.8 mm) light brown specks (possibly after evaporites?) - irregular.		608	116	118										
	108				Dark medium grained, laminated siltstone with minor shales similar to those from 116-118 m.		609	118	120										
108					Dark grey, laminated, fissile siltstone.		890610	120	122										
	110				As above with dark purple-brown, fissile shales		611	122	124										
110					Dark grey laminated siltstone, slightly soapy texture, gradational to claystone.		612	124	126										
	112				As above with rare (1-2 mm) irregular pale grey spots.		613	126	128										
112					As above, fissile		614	128	130										
	114				Chocolate brown shale, with well developed parting		615	130	132										
114					Dark grey, laminated shale.		616	132	134										
	116				As above + fine grained, chocolate shales, fissile.		617	134	136										
116					As above		618	136	138										
	118																		
118																			
	120																		
120																			
	122																		
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	136																		
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	138																		
138																			
SUMMARY AND SPECIAL COMMENTS																			
Sonic: 20-35 cps Observatory Hill Beds. LOGGED BY D.L. ANDREWS DATE 27/11/80																			
Magnetic Susceptibility: (20-40) x 10 ⁻⁵ cgs SHEET 3 OF 5																			

SUMMARY AND SPECIAL COMMENTS: Sclint: 20-35 cps; Magnetic Susceptibility: (20-40) x 10⁻⁵ cgs; Observatory Hill Beds. LOGGED BY D.L. ANDREWS DATE 27/11/80 SHEET 3 OF 5

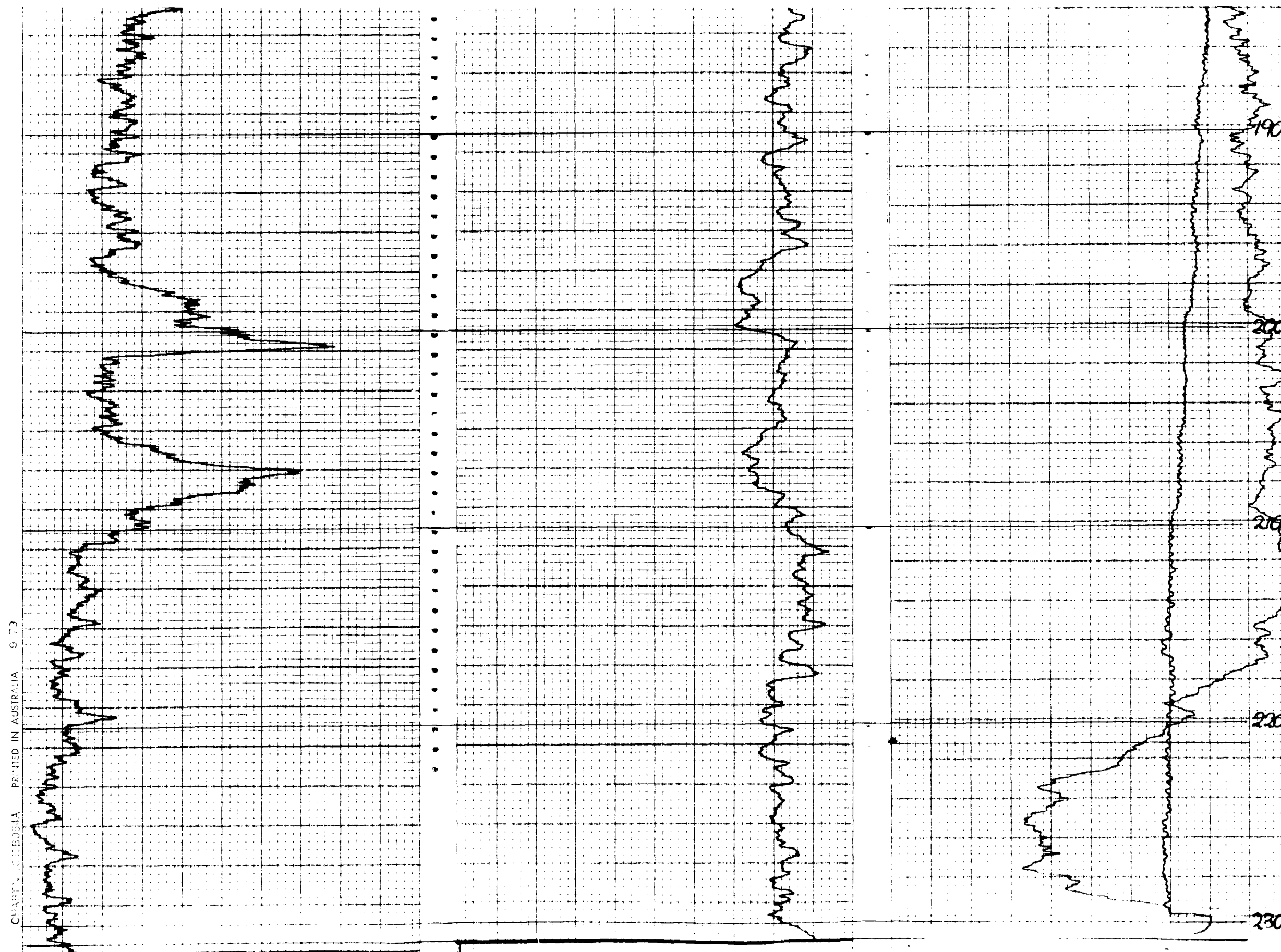
4032(17)-22c



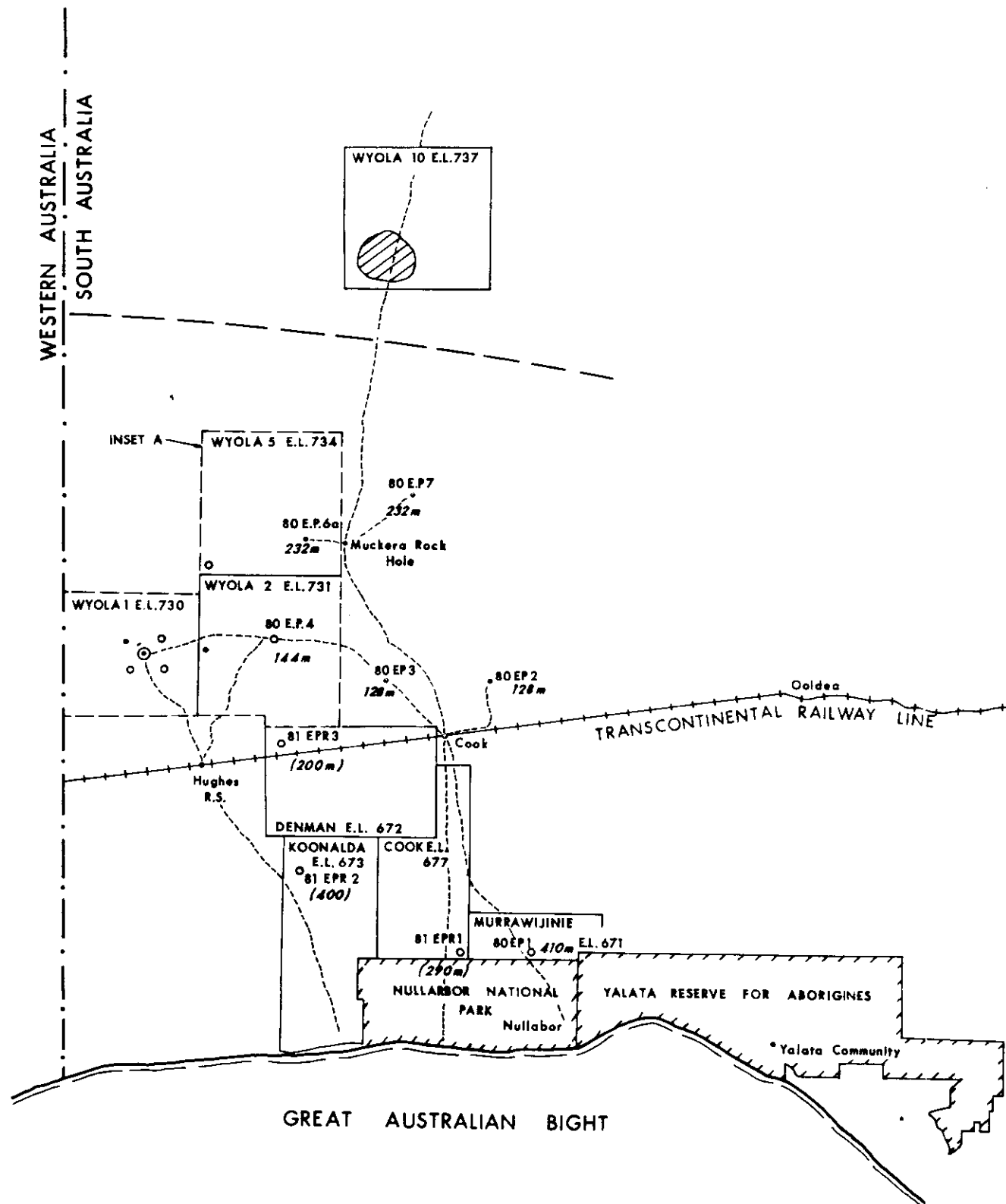
C.R.A. EXPLORATION PTY LIMITED										PROJECT EUCLA BASIN JOINT VENTURE																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
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CO-ORDINATES Lat. 30°52', Long. 130°17'					AZIMUTH -					DRILLERS DIAMOND DRILLING P/L.					COMMENCED 26/11/80																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
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DEPTH		REC %	HOLE DIAM.	GRAPHIC LOG	CUTTINGS DESCRIPTION	SPECIAL FEATURES WEATH., ALTERATION, FRACTURING VEINING, MINERALIZATION	SAMPLE No.	FROM (M)	TO (M)	CON (%)	ASSAY VALUES																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
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138	140				Dark purple-brown and greenish grey, fissile, fine grained shales.	Non - calcareous	890619	138	140																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															</

SUMMARY AND SPECIAL COMMENTS: Spent 20-30 c.p.s. LOGGED BY: C.L. ANDREWS DATE: 27/11/80 SHEET: 4 OF 5

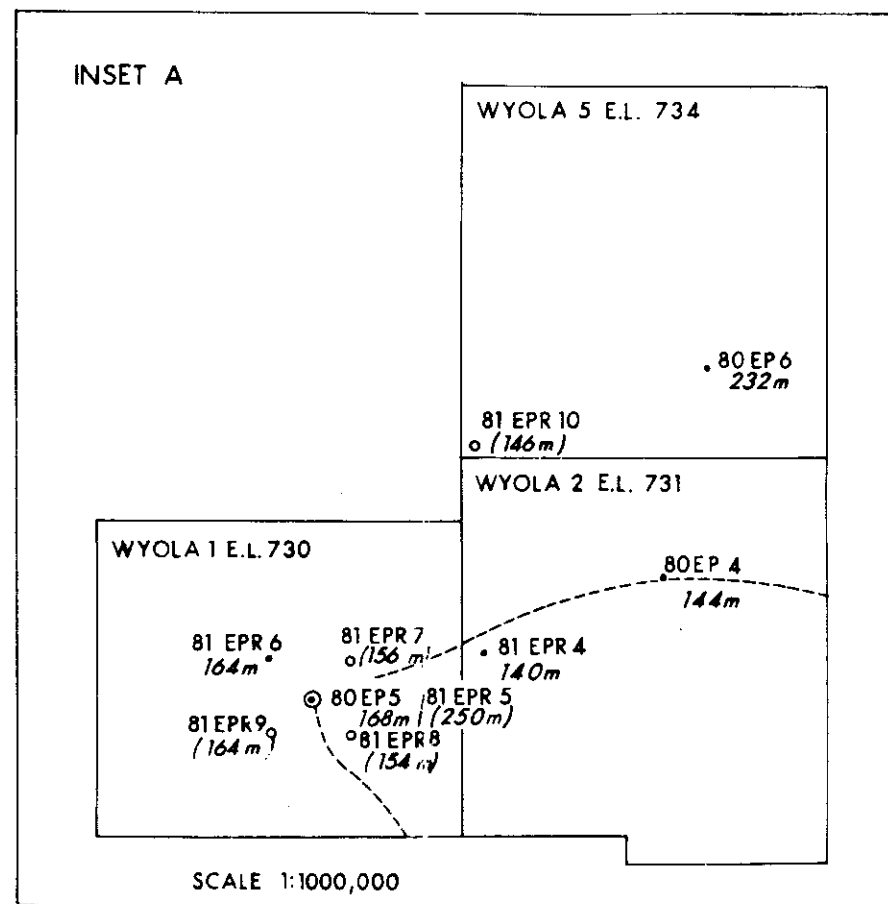
4032(17)-22d



CRA EXPLORATION PTY LIMITED									
PROJECT EUCLA BASIN JOINT VENTURE									
PERCUSSION DRILL CORE LOG									
COORDINATES (lat 30°52', long 130°17')				DRILLERS DIAMOND DRILLING P/L		COMMENCED 26/11/80		DEPTH 232m	
HOLE NO. 80 EP7				DRILL TYPE INGERSOLL RAND TH3		COMPLETED 27/11/80		CASING LEFT	
COLEGAR				INCLINATION		DPO No(s)			
DEPTH	FROM (M)	TO (M)	DESCRIPTION	SPECIAL FEATURES	SAMPLE No	FROM (M)	TO (M)	CON (%)	ASSAY VALUES
184	186		Fine grained, chocolate brown sandstone + minor dark grey-green shales + offwhite, f.gr. sandstone	Non-calcareous micaceous	890642	184	186		
186	188		As above		643	186	188		
188	190		As above		644	188	190		
190	192		As above		645	190	192		
192	194		As above		646	192	194		
194	196		As above		647	194	196		
196	198		As above		648	196	198		
198	200		As above, but grey green shales form ~ 60%		649	198	200		
200	202		Fine grained to very fine grained chocolate brown sandstone		890650	200	202		
202	204		As above		651	202	204		
204	206		As above		652	204	206		
206	208		As above		653	206	208		
208	210		As above		654	208	210		
210	212		As above		655	210	212		
212	214		As above		656	212	214		
214	216		As Above + finegrained, offwhite, micaceous sandstone with some medium grained grey quartz grains (<2mm)		657	214	216		
216	218		As above		658	216	218		
218	220		As above		659	218	220		
220	222		Pale grey sandstone, micaceous (biot) + med. grained dark grey sandstone with biotite spec.	Mag Susc - 35×10^{-5} cgs	890660	220	222		
222	224		Pale grey and offwhite, finegrained, micaceous sandstone with some medium grained quartz grains		661	222	224		
224	226		As above		662	224	226		
226	228		Pale grey to offwhite, fine grained, micaceous sandstone		663	226	228		
228	230		As above		664	228	230		
230	232		As above BOH 232 m		665	230	232		
SUMMARY AND SPECIAL COMMENTS: Scent 15-20 c.p.s. Observatory Hill Beds. LOGGED BY D.L. ANDREWS DATE 27/11/80 Mag Susceptibility dominantly $(0-20) \times 10^{-5}$ cgs. SHEET 5 OF 5									



0 20 40 60 80 100 Kms



REFERENCE

- 80EP2 168m Completed drill hole location, number & depth
- 81EPR (250m) Proposed drill hole location, number & estimated depth
- ◐ Ba & As anomaly 1980 Sampling Program
- - - Approximate southern boundary of Officer Basin
- - - Existing vehicular tracks

4032627-1

SHEET REFS:	
NOORINA	SH 52-5
WELLS	SH 52-14
WYOLA	SH 52-7
MAURICE	SH 52-6
COOK	SH 52-11
OOLDEA	SH 52-12
COOMPANA	SH 52-15
NULLARBOR	SH 52-15

C. R. A. EXPLORATION PTY. LIMITED

EUCLA AND OFFICER BASINS
SOUTH AUSTRALIA
DRILL HOLE LOCATIONS AND
GEOCHEMICAL ANOMALIES

Ref.	
Scale 1:2000,000	Drawn S.W.
Author R.A.M.	Report No. 10362
Date MARCH 1981	Plan No. SA 724

139°05'
29°00' +

130°25'
29°00' +

REFERENCE

890297 Sample Site Number (1980
Helicopter Survey).

4300 Barium p.p.m.

530 Arsenic p.p.m.

Tertiary Tp Pidinga Formation.

Cambrian Ew Wana Beds.



4032627-2



C. R. A. EXPLORATION PTY. LIMITED

WYOLA LAKES, E.L. 737

Ba - As ANOMALY

Ref. : WYOLA SH 52 - 7.

Scale: 1:100,000.

Author: D.L.A.

Date: JAN., 1981.

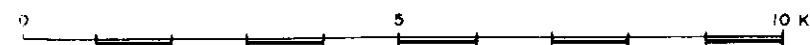
Drawn: S.J.B.

Report No.: 10362

Plan No.: SAa 663.

29°13' +
139°05'

BOUNDARY OF E.L. 737



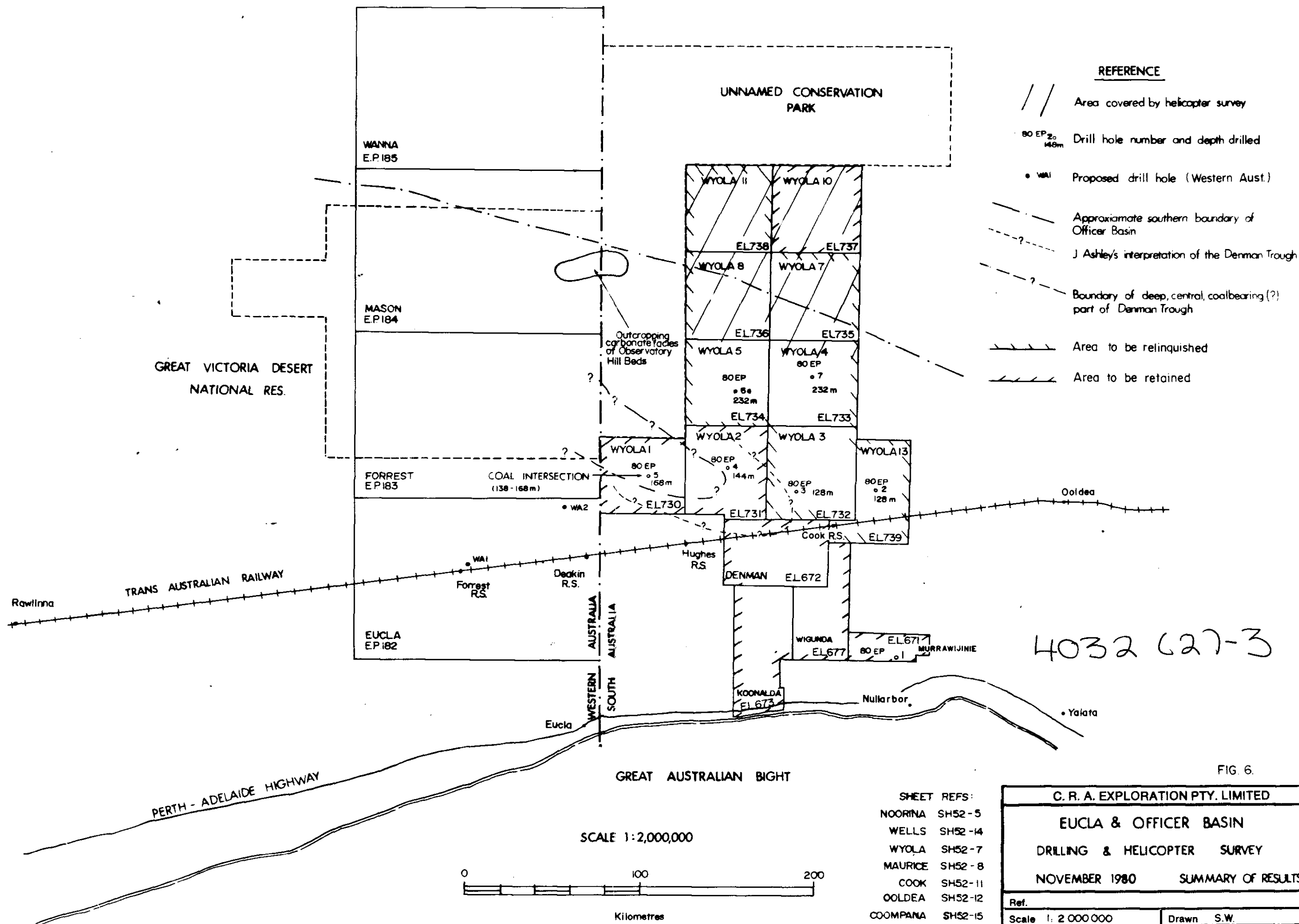


FIG. 6.

SHEET REFS:	
NOORINA	SH52-5
WELLS	SH52-14
WYOLA	SH52-7
MAURICE	SH52-8
COOK	SH52-11
OOLDEA	SH52-12
COOMPANA	SH52-15
NULLABOR	SH52-16

C. R. A. EXPLORATION PTY. LIMITED	
EUCLA & OFFICER BASIN	
DRILLING & HELICOPTER SURVEY	
NOVEMBER 1980 SUMMARY OF RESULTS	
Ref.	
Scale 1: 2 000 000	Drawn S.W.
Author R.A.M.	Report No. 10362
Date DEC 1980	Plan No. SAq 754



GEOEX

PTY LTD COMPUTERISED BOREHOLE LOGGING

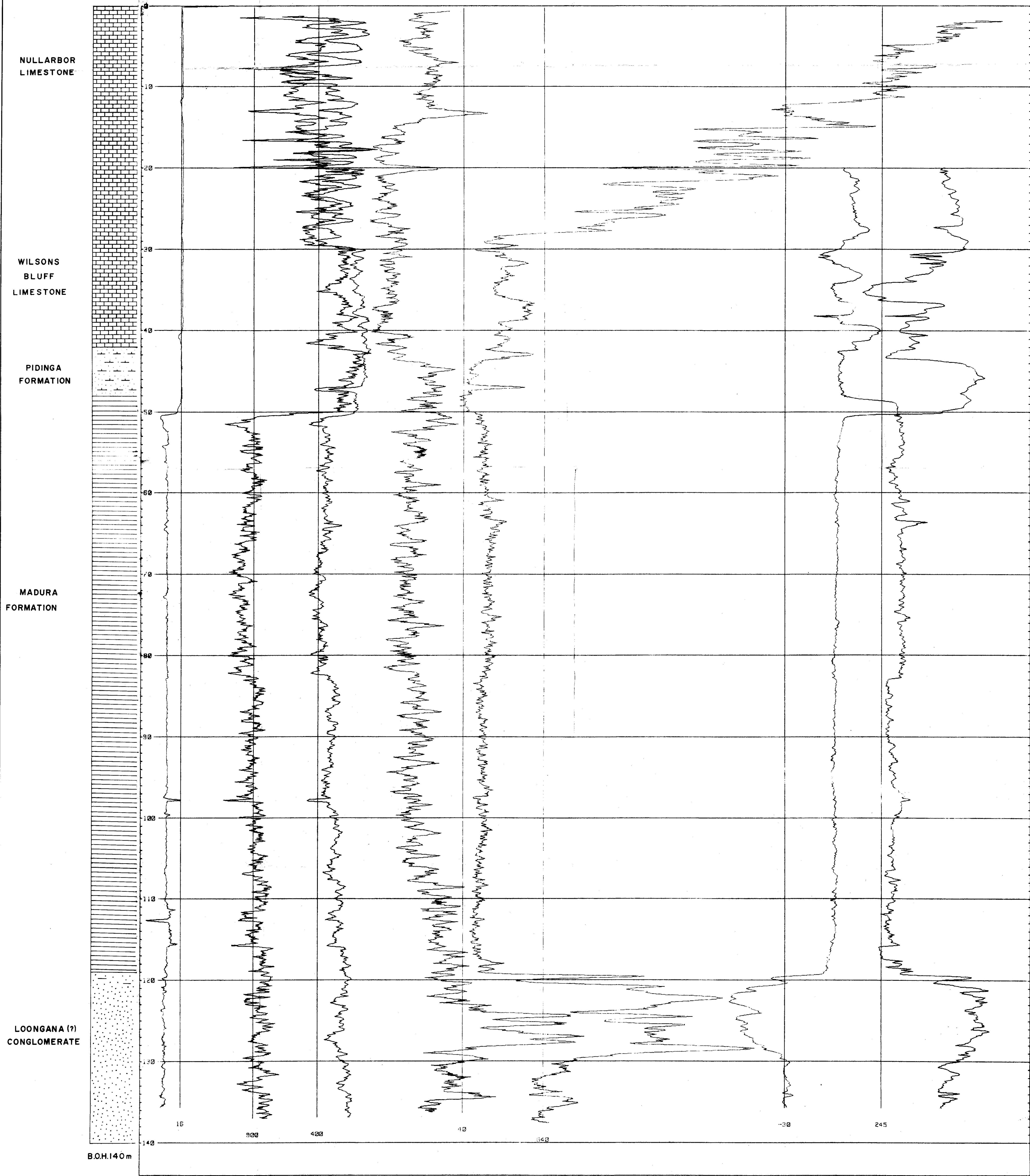
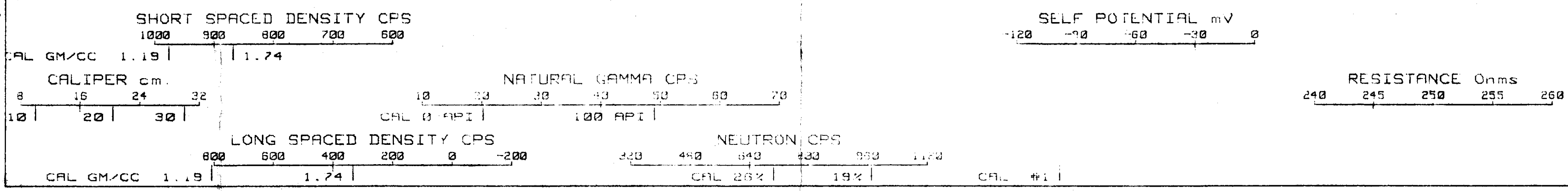
C.R.A.E.
HUGHES S.A.

LOGGING SPEEDS:
DENSITY PROBE 5 M/MIN
NEUTRON PROBE 5 M/MIN
DATUM ABOVE GROUND LEVEL 0.03 M.
CASING DEPTH: 50 M
TIMEBASE: 200 MS
OPERATOR: M.O'NEILL
DATA LOG VER: 54012.11
DATA PLOT VER: 55101.25

PLOTTING SCALE: 1:200
PLOTING 1 Point IN 1.2
FILTERING:
SHORT DENSITY: 1.5
LONG DENSITY: 1.5
CALIPER: 1.5
NATURAL GAMMA: 1.5
NEUTRON: 1.5
SELF POTENTIAL: 1.5
RESISTANCE: 1.5
SONIC: 1.5

BOREHOLE NO. 81EPR4

DEPTH LOGGED 127.62 M.
DATE LOGGED 22/03/81
DATE PROCESSED 22/03/81



APPROX. OIL YIELD
LITRES / TONNE

< 0.5
0.5 - 1.5

1.5 - 5.0
1.5 - 5.0
0.5 - 1.5
1.5 - 5.0
0.5 - 1.5
0.5 - 1.5
0.5 - 1.5



PTY LTD

COMPUTERISED BOREHOLE LOGGING

C.R.A.E.
HUGHES S.A.

LOGGING SPEEDS:
DENSITY PROBE 5 M/MIN
NEUTRON PROBE 5 M/MIN
DATA ABOVE GROUND LEVEL 110 M.
CASING DEPTH: 64 m.
TIME BASE: 1000 ms
OPERATOR: M. O'NEILL
DATA LOG VER: 510.1.11
DATA PLOT VER: 310.1.26

PLOTTING SCALE: 1:200
PLOTTER: Point IN 10
FILTERING:
SHORT DENSITY: 1.5
LONG DENSITY: 1.5
CALIPER: 1.2
NATURAL GAMMA: 15
NEUTRON: 1.5
SELF POTENTIAL: 4
RESISTANCE: 1.5
SONIC: 2

BOREHOLE NO. 81EPR6
DEPTH LOGGED 155.80 M.
DATE LOGGED 23/02/81
DATE PROCESSED 23/03/81

SHORT SPACED DENSITY CPS
CAL GM/CC 1.19 1.24
CALIPER cm. 10 24 32
10 20 30

NATURAL GAMMA CPS
CAL 0 API 100 API 10 20 30 40 50 60 70

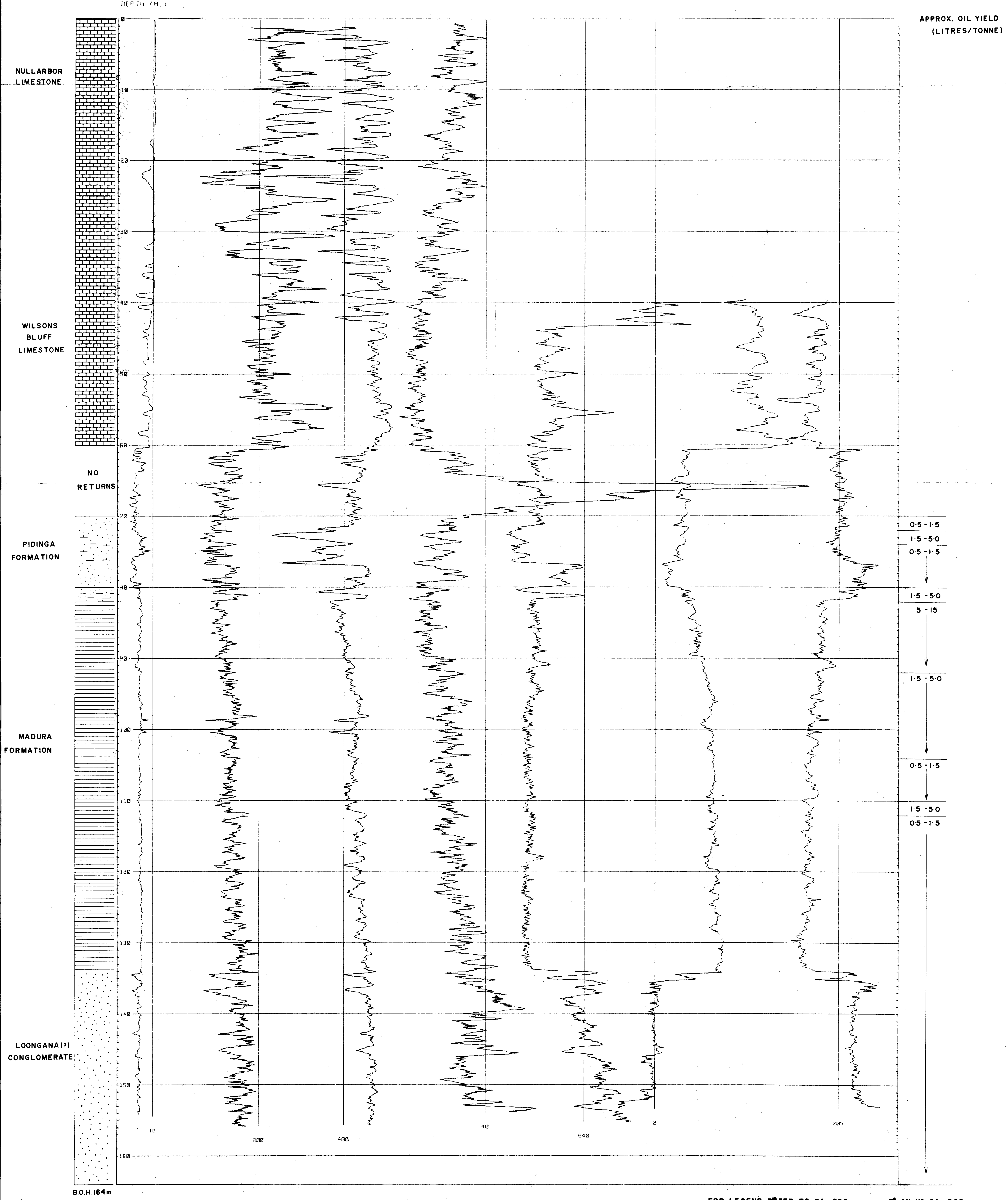
LONG SPACED DENSITY CPS
CAL GM/CC 1.19 1.24
1000 800 600 400 200 0

NEUTRON CPS
CAL 26% 19%
320 440 560 680 800 960

SELF POTENTIAL mV
-50 -40 -30 -20 -10 0 10 20

RESISTANCE Ohms
195 200 205 210 215 220

CAL #1



BOH 164m

C.R.A.E.
HUGHES S.A. EL 730

```

LOGGING SPEEDS-
      DENSITY PROBE 5 MIN/IN
      NEUTRON PROBE 5 MIN/IN
DATA RATE ABOVE GROUND LEVEL 0.00 M.
CASING DEPTH 54.0
TIMEBASE 100 MS
OPERATOR M.C. NEAL
DATE LOG VER# 880601
DATA PL# 1 VER# 10.0

```

```

PLOTTING SPEED 1-200
PLOTTING 1 PPM IN 12
FILTERING :
SHORT DENSITY 1.05
LONG DENSITY 1.05
CALIPER 1.00
NATURAL GAMMA 1.00
EUTRON 1.00
SELF POTENTIAL 1.00
RESISTANCE 1.00
DIP 1.00

```

BOREHOLE NO. 81EPR7

DEPTH LOGGED 151.10 M.

DATE PROCESSED 01/04/81

SHORT SPACED DENSITY CPS

	1000	500	500
PL GM/CC	1.19		1.74

CALIPER 6 in.

NATURAL GAMMA SPECTRA

LONG SPACED DENSITY APP

09L GM/CC 1.1.9

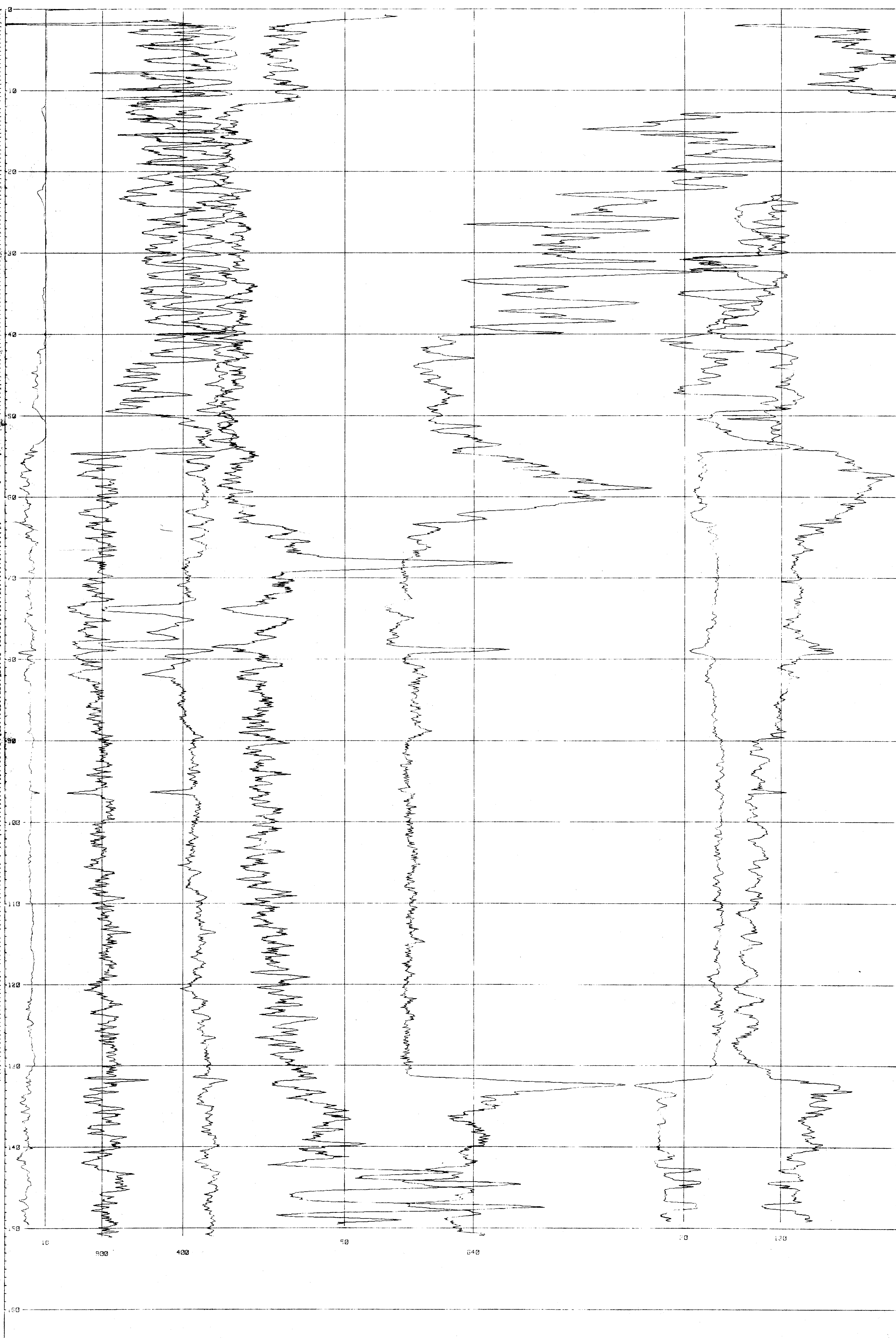
NEUTRON CPS
010 000

SELF POTENTIAL mV

1000

RESISTANCE Ohms	
112	135
142	145

DEPTH (M.)

APPROX. OIL YIELD
(LITRES/TONNE)

5 - 1 - 5

5 - 5.0

- 15

5 - 50

$$5 - 1.5$$

5 - 5.0

$$\begin{array}{r} 5 - 1.5 \\ \hline 5 - 5.0 \end{array}$$

1

1

5 - 5.0

5 - 1.5

5-1.5

$$\begin{array}{r} 5 - 5.0 \\ | \end{array}$$
$$\begin{array}{r} 515 \\ \hline 550 \end{array}$$
$$\begin{array}{r} 5 - 1.5 \\ \hline \end{array}$$

5-1.5

1

↓

5-50

5 - 5.0

4032(2)-8

GEOEX
PTY LTD

COMPUTERISED BOREHOLE LOGGING

C.R.A.E.
HUGHES S.A. EL 730

LOGGING SPEEDS
DENSITY PROBE 5.44 MIN
NEUTRON PROBE 5.44 MIN
DATUM ABOVE GROUND LEVEL 20.00
CASING DEPTH 56.00
TIME/SEG 200.00
OPERATOR M. O'NEILL
DATA LOG VER 580.00
DATA PLOT VER 580.00

PLOTTING SCALE 1:200
PLOTTING 1.00 MIN
FILT/AVG 1
SHORT DENSITY 1.00
LONG DENSITY 1.00
CALIPER 1.00
NATURAL GAMMA 1.00
NEUTRON 1.00
RESISTANCE 1.00
POTENTIAL 1.00

BOREHOLE NO 3.1.1PR8
DEPTH LOGGED 152.00 M
DATE LOGGED 02/04/81
DATE PROCESSED 04/04/81

SHORT SPACED DENSITY CPS
1000 800 600 400 200

CALIPER cm
1.0 0.5 0.25 0.1

NATURAL GAMMA CPS
100 80 60 40 20

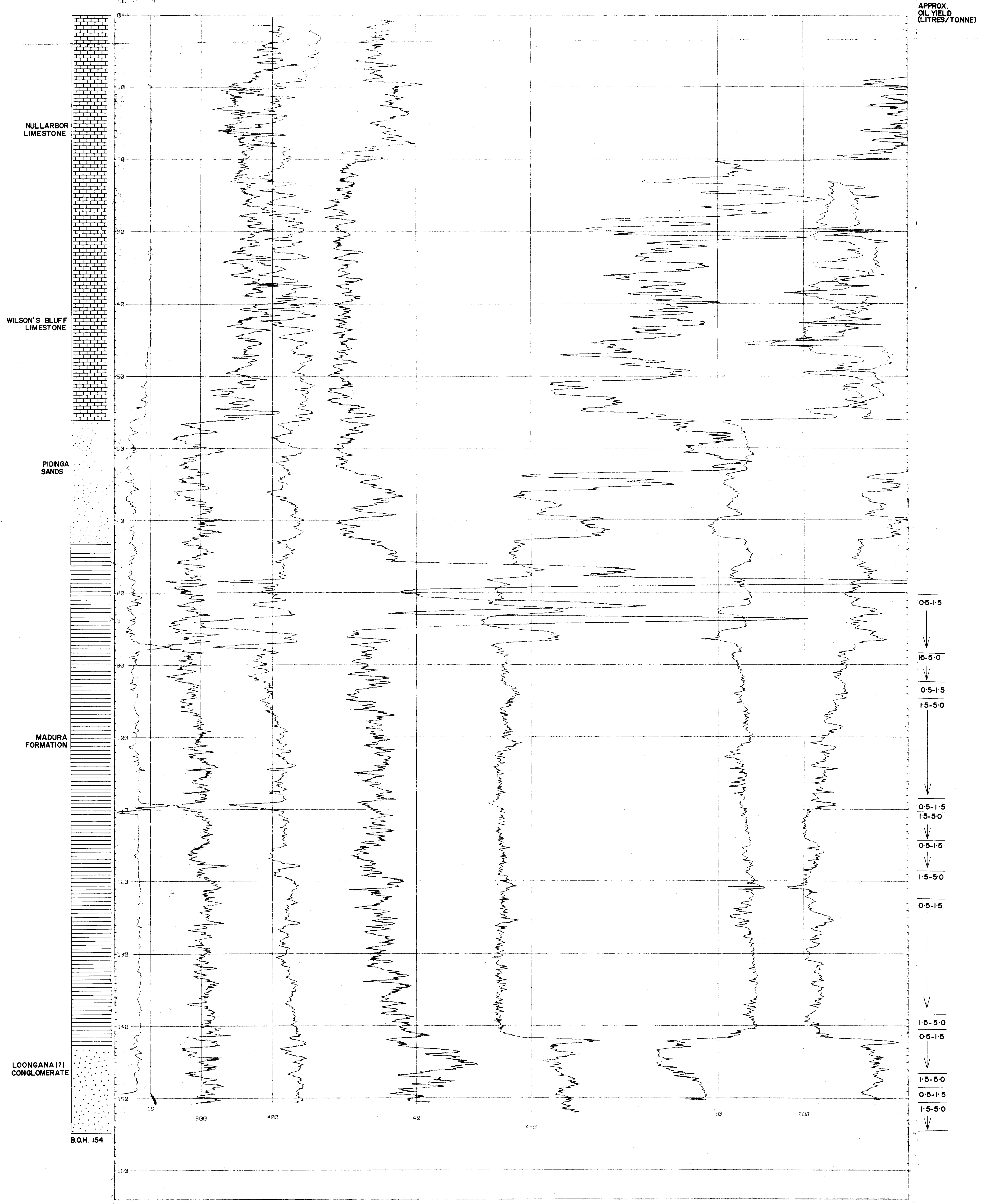
LONG SPACED DENSITY CPS
1000 800 600 400 200

NEUTRON CPS
100 80 60 40 20

RESISTANCE Ohms
100 200 300 400

POTENTIAL mV
50 100 150 200 250

DEPTH (m)
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150



C.R.A.E.
HUGHES S.A. EL 730

```

LOGGING SPEEDS:
      DENSITY PROBE  5 MIN/N
      NEUTRON PROBE  1 MIN/N
      DATUM ABOVE GROUND LEVEL  0.00 MI
      CASING DEPTH: 58 FT
      TIMEBASE: 200 MS
      OPERATOR: MLO,NELLS
      DATA LOG VER: 3002.01
      DATA PLOT VER: 3001.00

```

PLATTING SCALE - 1:100	
PLATTING 1 POINT IN 10	
PLATTING 1	
SHORT DIMENSION	15
LONG DIMENSION	15
COLOR	15
NATURE	15
RELATION	15
SELF POSITION	15
RELATION	15
SONIC	15

BOREHOLE NO. 31EPR9

DEPTH LOGGEL 163.64 M.

DATE LOGGED 06/04/81

DATE PROCESSED 06/04/01

SHORT SPACED DENSITY CPS

RL GM/CC	1.19	1.74
----------	------	------

NATURAL GAMMA CPS

LONG SPACED DENSITY CPS

NLUFON CPS
441 648

SELF POTENTIAL mV

RESISTANCE Ohm

DEPTH (M.)

NULLARBOR
LIMESTONE

WILSONS
BLUFF
LIMESTONE

PIDINGA(?)
FORMATION

MADURA
FORMATION

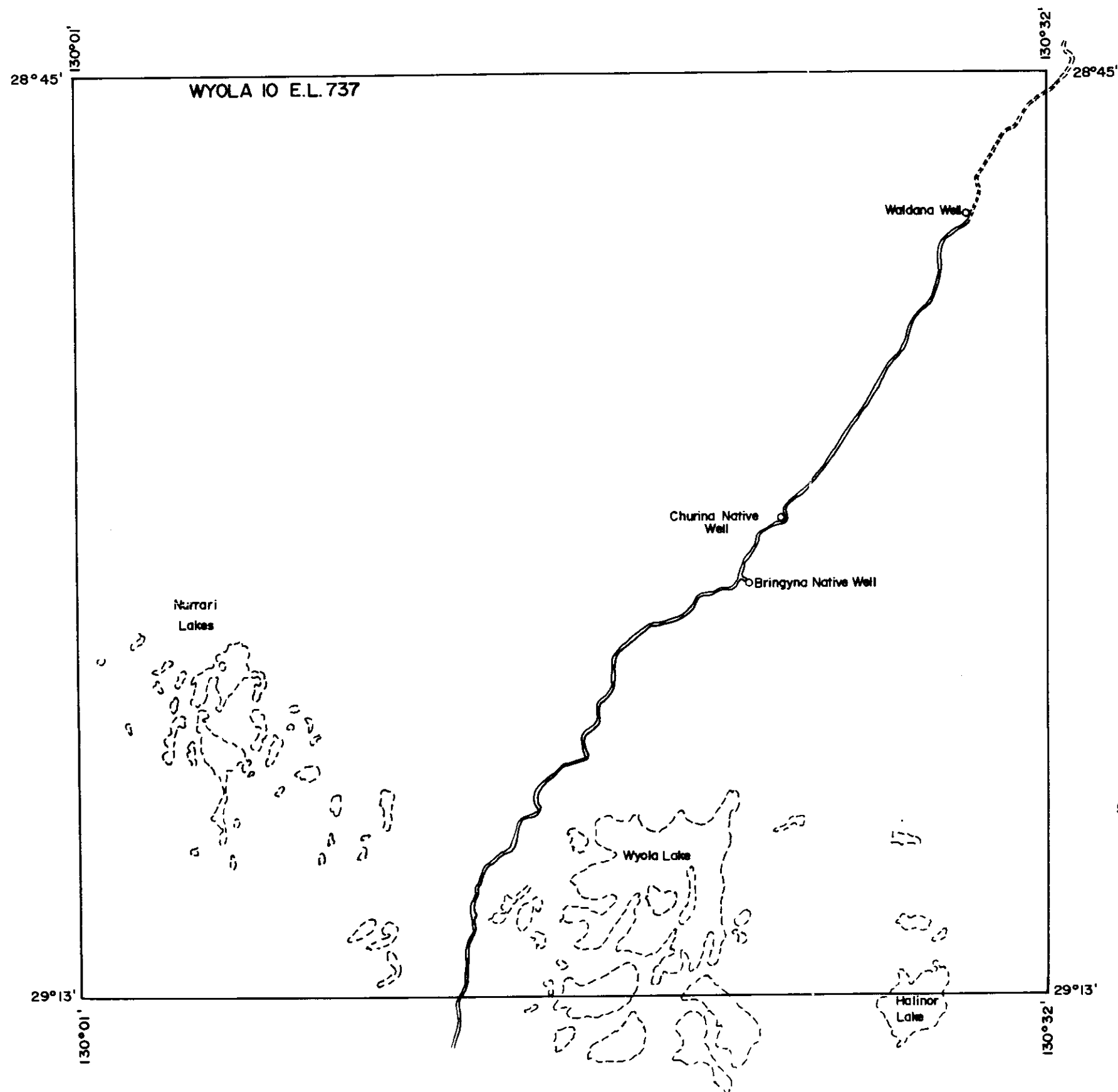
LOONGANA(?)
CONGLOMERATE

B.O.H.165 m

APPROX. OIL YIELD
(LITRES / TONNE)

5-15
21
48
18
15-5-0
0-5-15
↓
15-5-0
0-5-15

$$\begin{array}{r} 1.5 - 5.0 \\ 0.5 - 1.5 \\ \downarrow \\ 1.5 - 5.0 \end{array}$$



4032627-10

CRA EXPLORATION PTY. LIMITED

EUCLA BASIN
WYOLA 10 E.L. 737
LOCATION PLAN

Ref. Wyola Sh 52-7, Noorina Sh 52-3, Wells Sh 52-14, Maurice 52-8

Scale 1:250,000

Drawn D.D.

Author D.L.A

Report No. 10362

Date JULY 1981

Plan No. SAA 881

130°25'
29°00' +

139°05'
29°00' +

REFERENCE

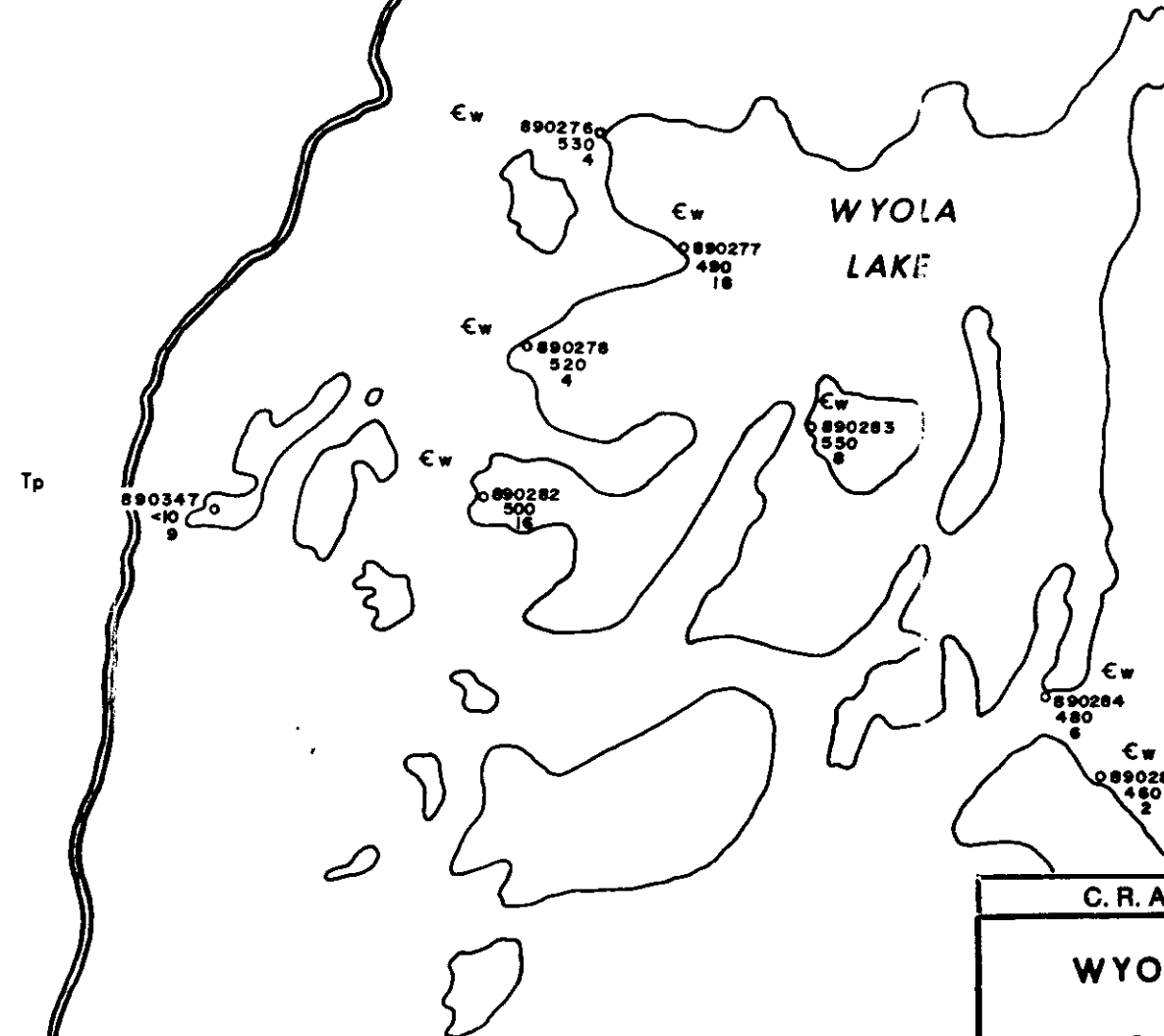
890297 Sample Site Number (1980
Helicopter Survey).

4300 Barium p.p.m.

530 Arsenic p.p.m.

Tertiary Tp Pidinga Formation.

Cambrian Ew Wana Beds.



4032(2)-11



29°13' +
139°05'

BOUNDARY OF E.L. 737

C. R. A. EXPLORATION PTY. LIMITED

WYOLA LAKES, E.L. 737

Ba - As ANOMALY

Ref. : WYOLA SH52-7.

Scale : 1 : 100,000.

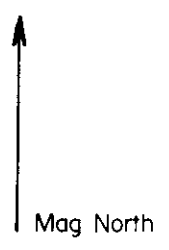
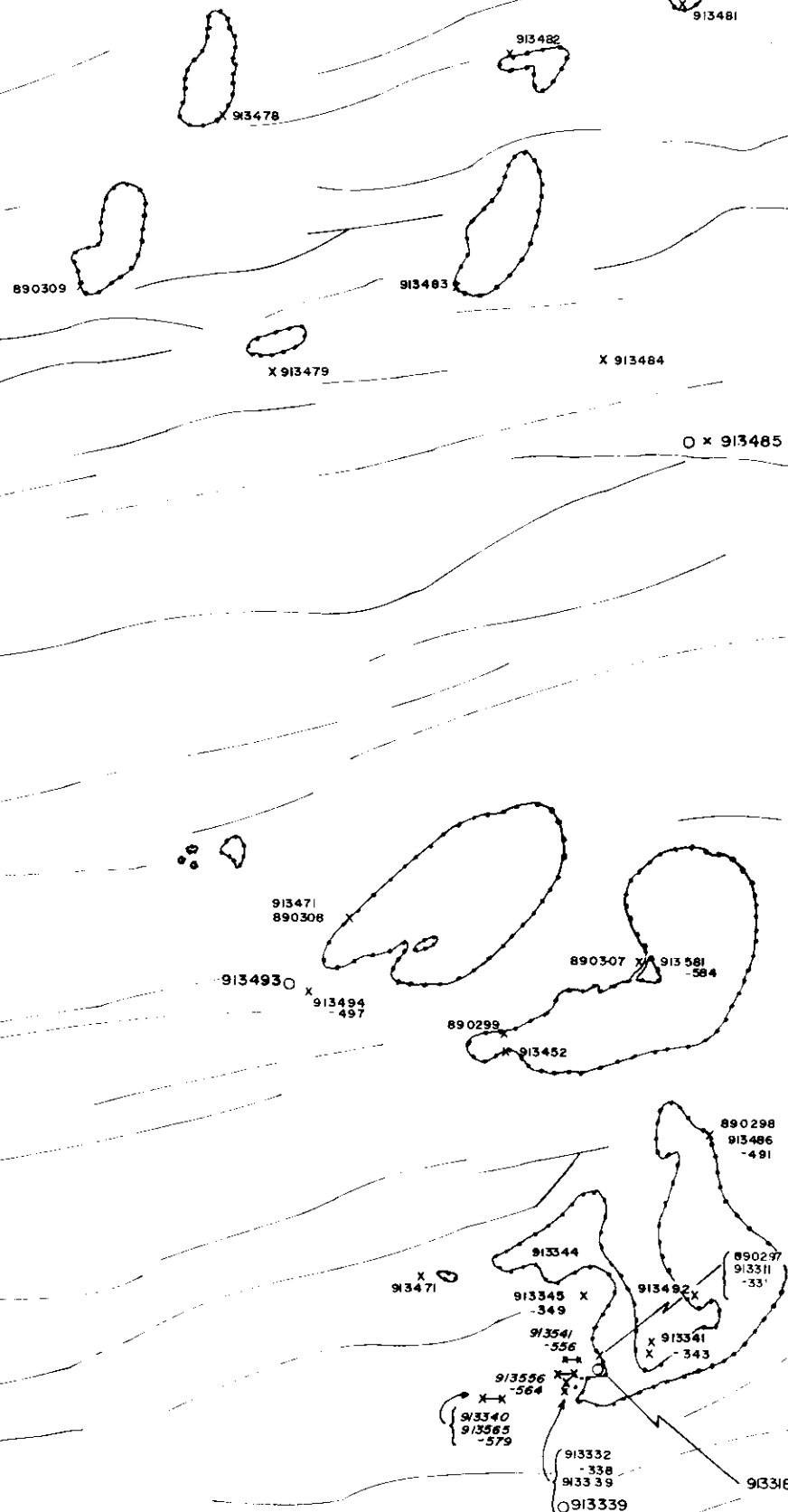
Drawn : S.J.B.

Author : D.L.A.

Report No. : 10362

Date : JAN., 1981.

Plan No. : SAs 663.



REFERENCE

- X 890297 1980 Survey rock chip sample site
- X 913332 1981 Survey rock chip sample site
- O 913339 1981 Survey 10# + 40# stream sample

4032(27)12

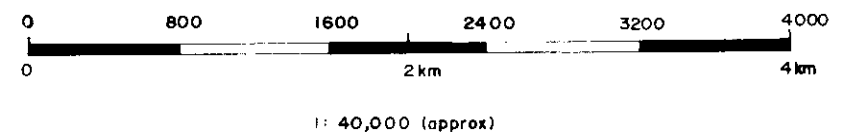
This map is based on blow ups of
1:86,500 Lands Dept. Photos
(Wyola Run 4/043)

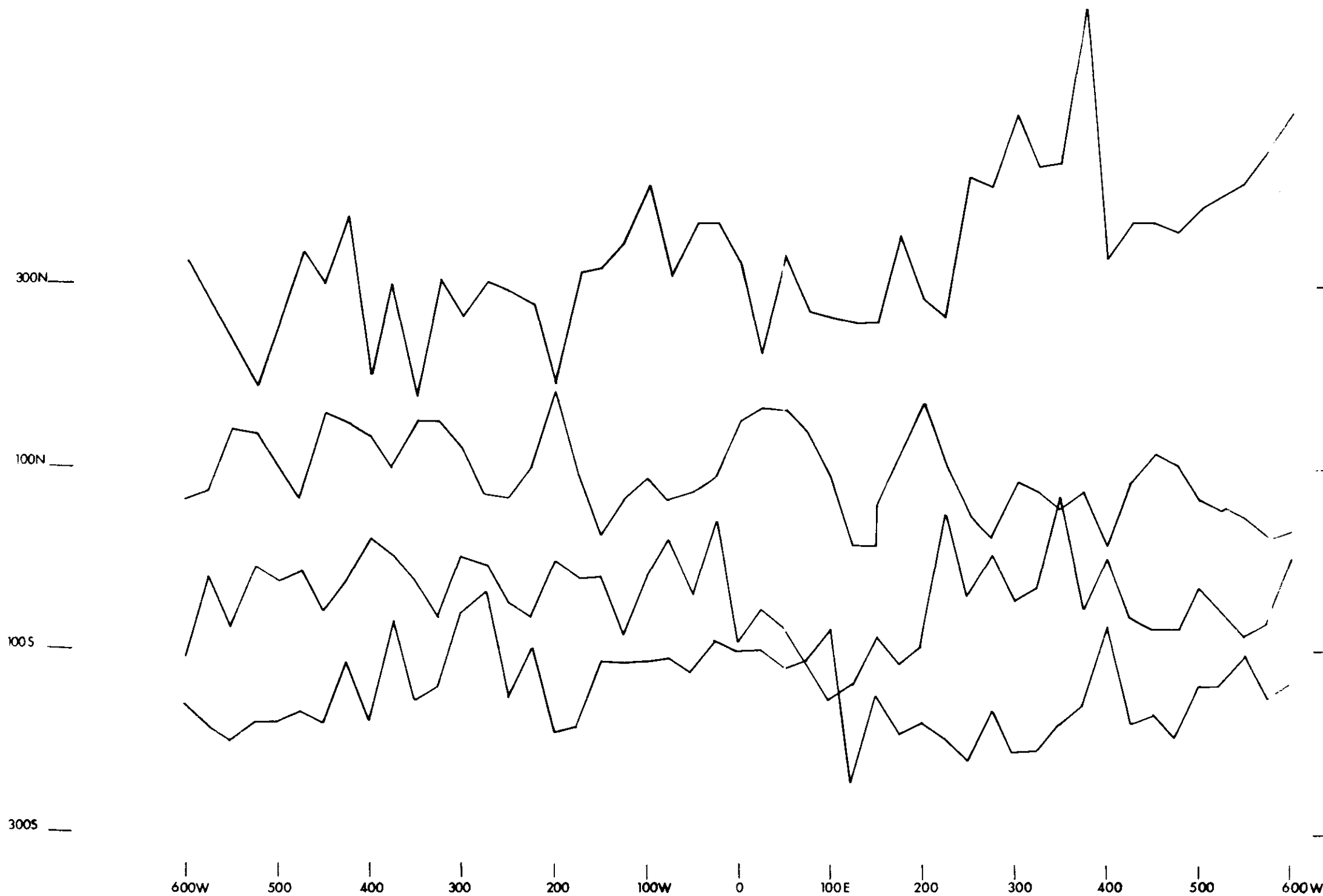
C.R.A. EXPLORATION PTY. LIMITED

WYOLA LAKES E.L.737
ROCK CHIP, AUGER AND
STREAM SEDIMENT SAMPLE LOCATIONS
1980 and 1981 SURVEYS

REF. WYOLA 1:250,000 SH 52-7

Scale 1:40,000 (approx)	Drawn D.D.
Author D.L.A.	Report no. 10362
Date May 1981	Plan no. SAc 770





Vertical Scale
1cm = 10 gammas

4032(2)-13

0 100 200 300 m

SCALE 1:5000

C. R. A. EXPLORATION PTY. LIMITED

WYOLA LAKES E.L. 737
GROUND MAGNETICS TRAVERSES
ANOMALY 793297

Ref. WYOLA SH52-7

Scale 1:5000

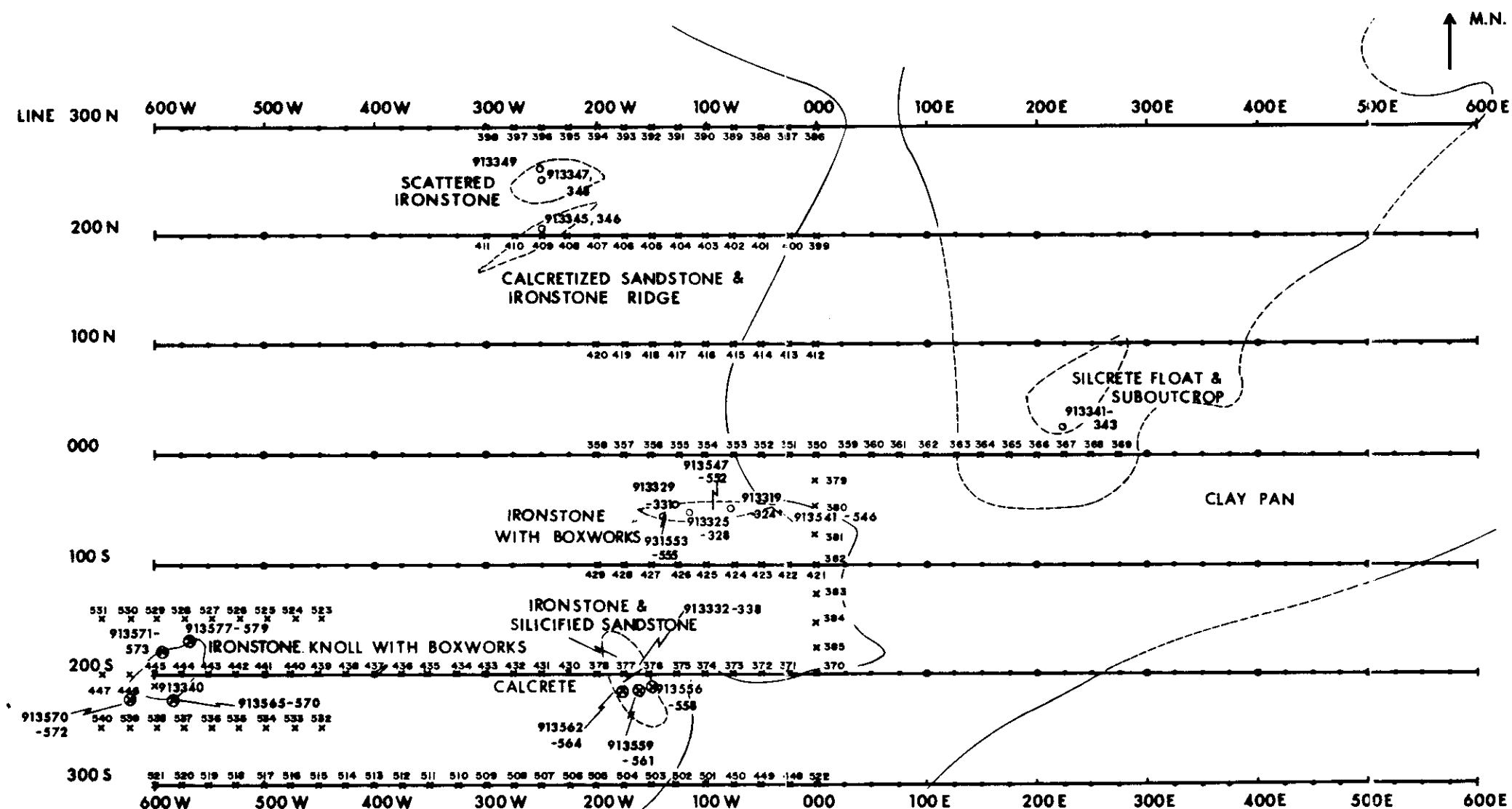
Author DLA

Date JULY 1981

Drawn D.D.

Report No. 10362

Plan No. SA9880



4032(2)-14

REFERENCE

- x 358 Auger sample sites
- All numbers are prefixed with 913----
- Total field magnetic reading. All values prefixed with 57----
- o 913319 Rock chip sample sites



C. R. A. EXPLORATION PTY. LIMITED

E.L. 737, WYOLA LAKES
GROUND MAGNETICS AND
AUGER GRID; ANOMALY 793297

Ref. WYOLA SH 52-7

Scale 1: 5,000

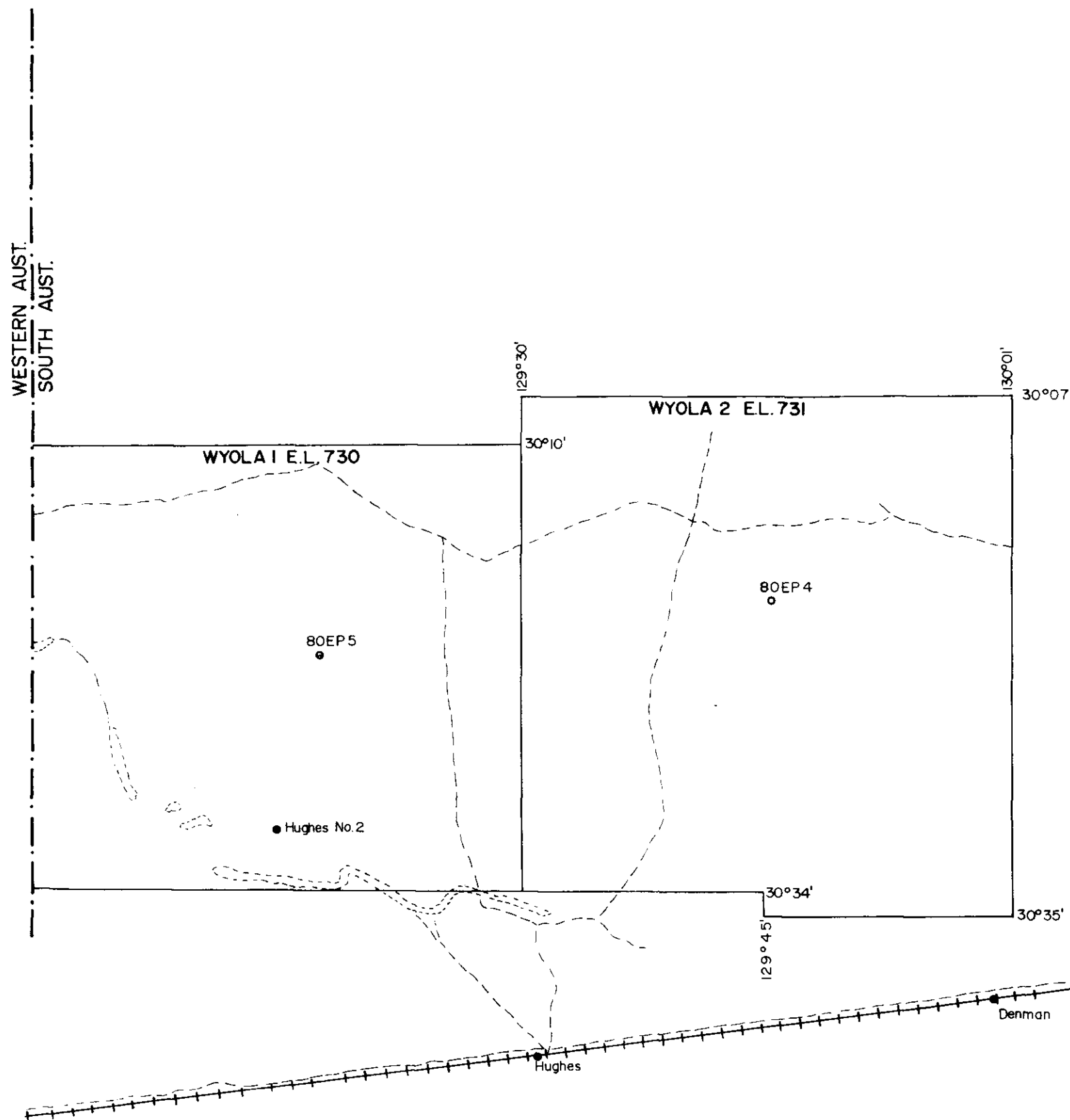
Drawn S.W.

Author D.L.A.

Report No. 10362

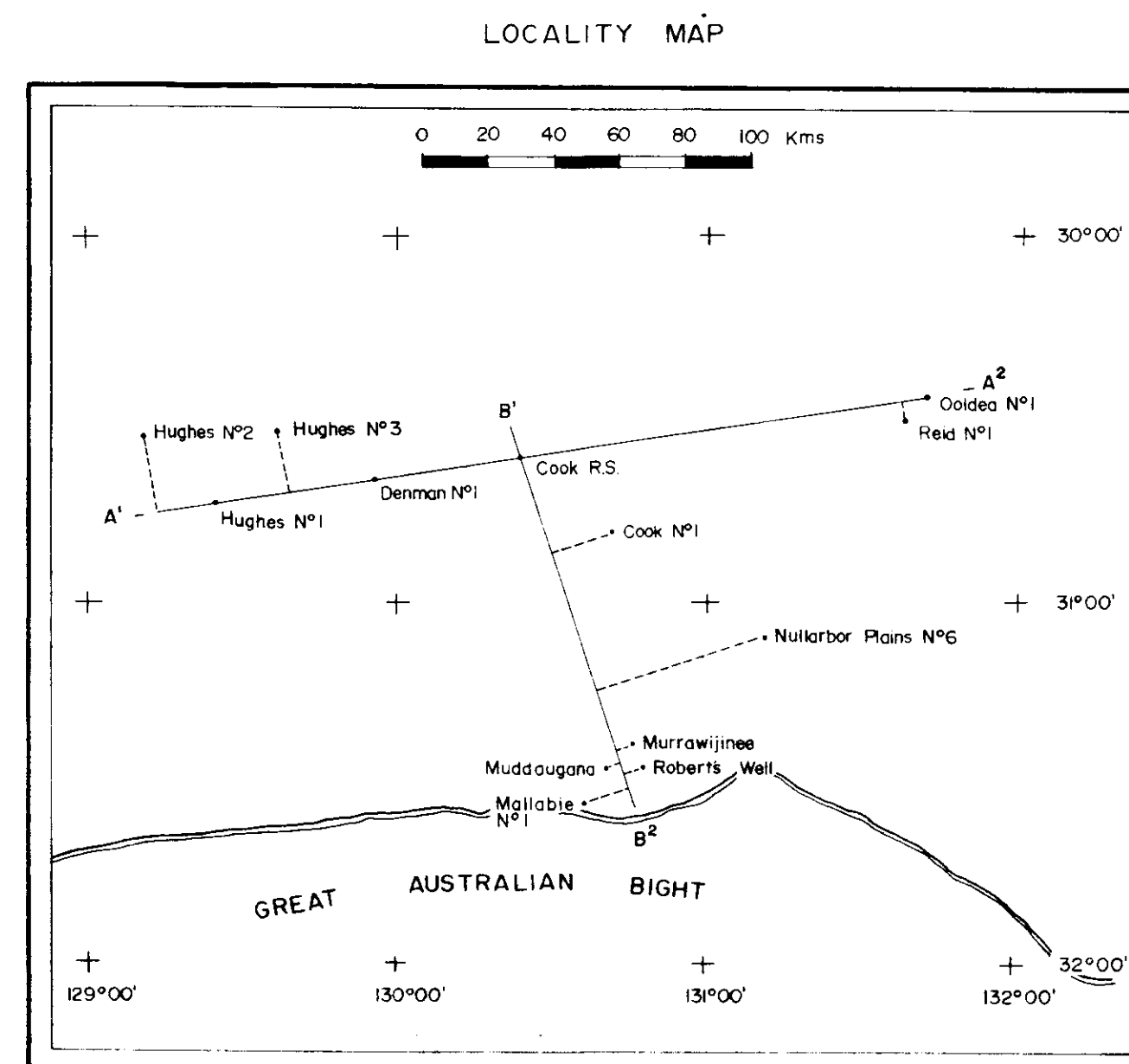
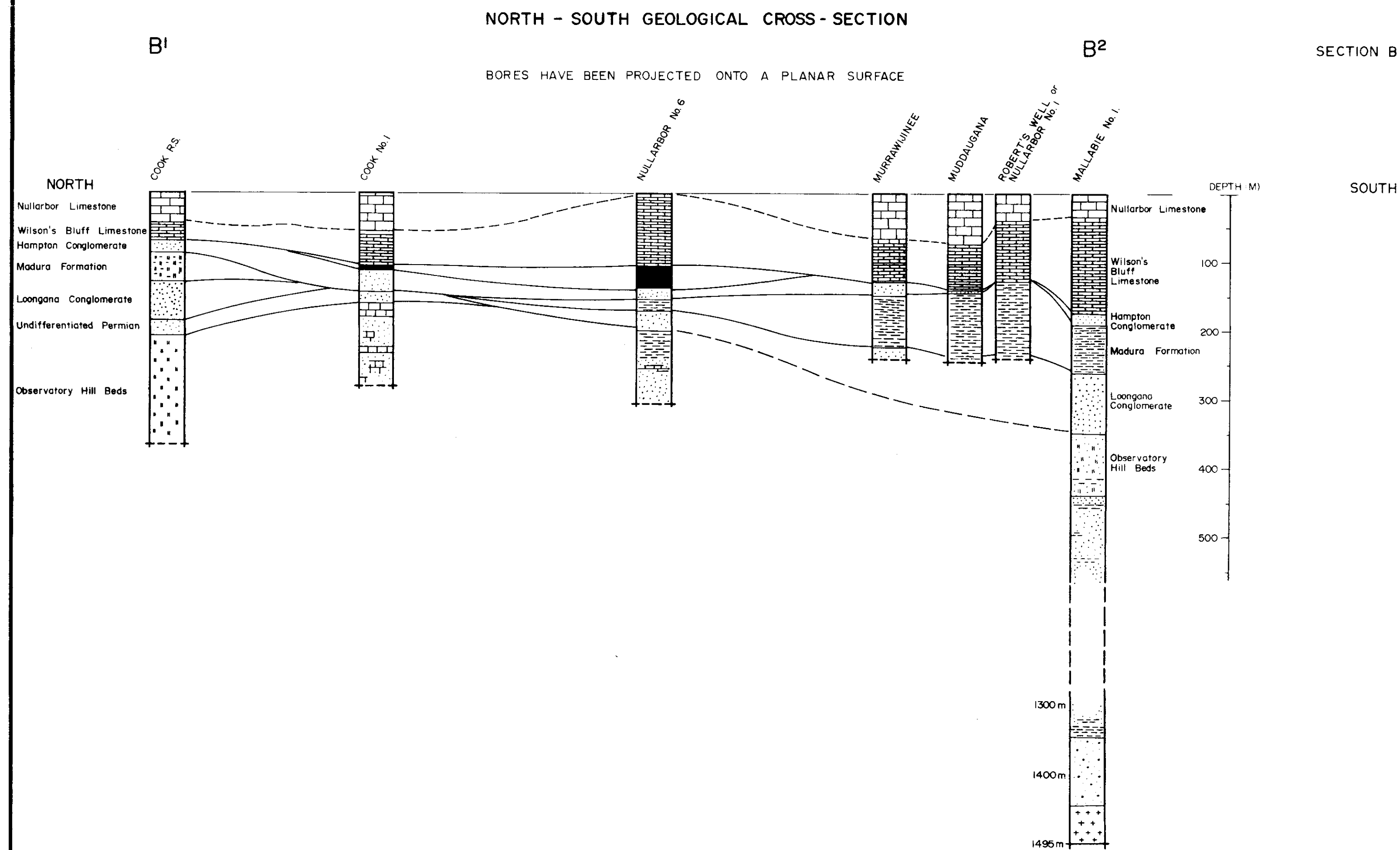
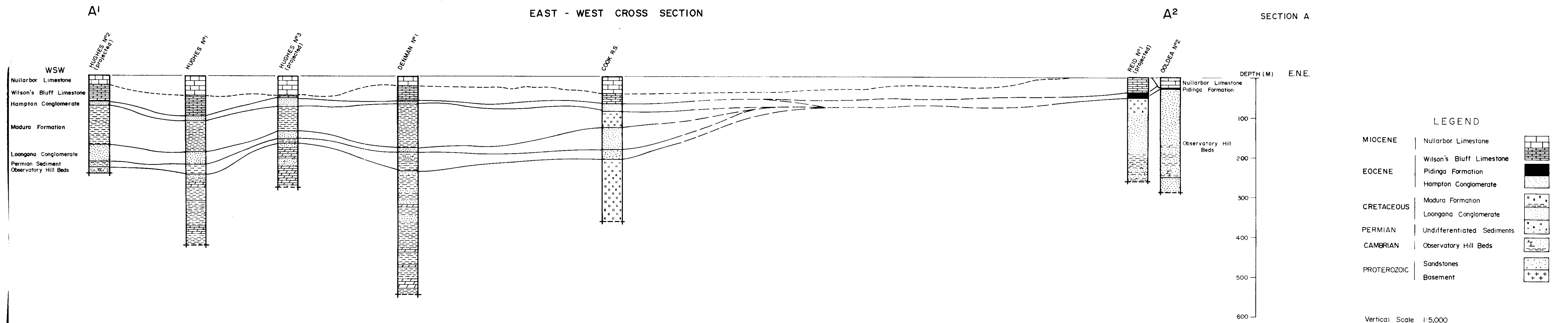
Date MAY 1981

Plan No. SA 772



4032(37)-1

CRA EXPLORATION PTY. LIMITED	
EUCLA BASIN	
WYOLA 1 E.L. 730 & WYOLA 2 E.L. 731	
LOCATION PLAN	
REF. COOK SH 52-11	
Scale 1:500,000	Drawn DD.
Author DLA.	Report No. 10362
Date JULY 1981	Plan No. SAa 882



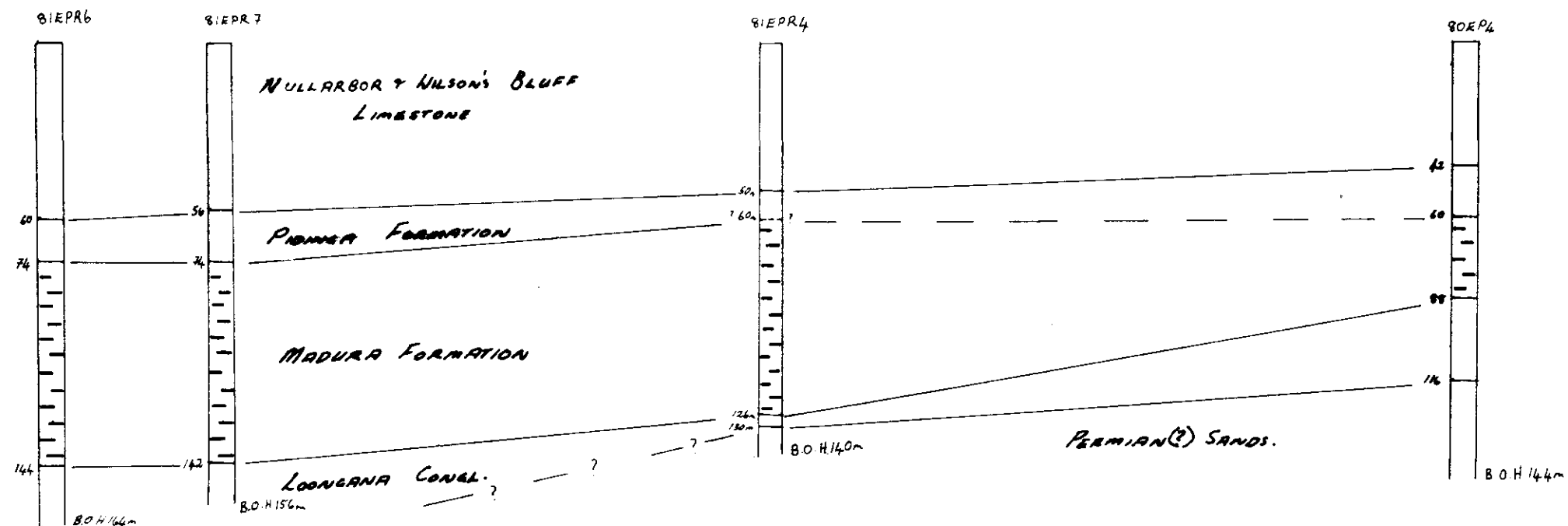
4032 (3)-2

1:250,000 References: Cook SH52-11, Oldeia SH52-12, Coompana SH52-15, Nullarbor SH52-16

C.R.A. EXPLORATION PTY. LTD.	
EUCLA BASIN, S.A.	
CROSS - SECTIONS A ¹ - A ² , B ¹ - B ²	
Geol. : R.M.	Scale : 1:500,000
Drawn : J.C.R. / D.R.W.	Report N° : 10362
Date : April, 1980	Plan N° : SAg 426

W

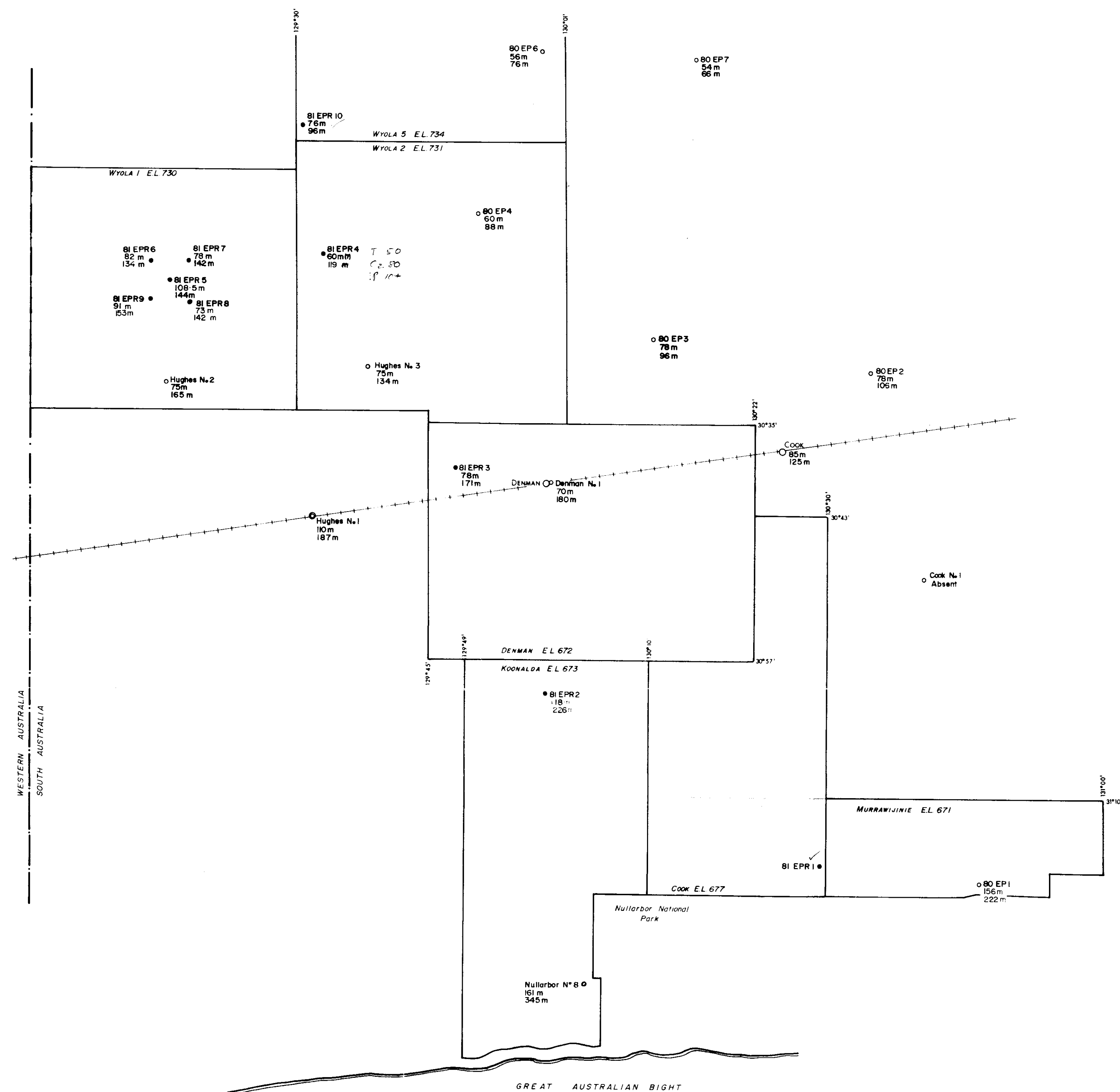
E



4032(3)-3

NO ACCURATE REDUCED
LEVELS AVAILABLE.

C. R. A. EXPLORATION PTY. LIMITED	
WYOLA E.L.s 730, 731	
E - W FENCE DIAGRAM	
Ref. COOK SH52-II	
Scale HORIZ. 1:250,000 VERT. 1:300	Drawn D.L.A.
Author D.L.A.	Report No. 10362
Date APRIL 1981	Plan No. SA 734

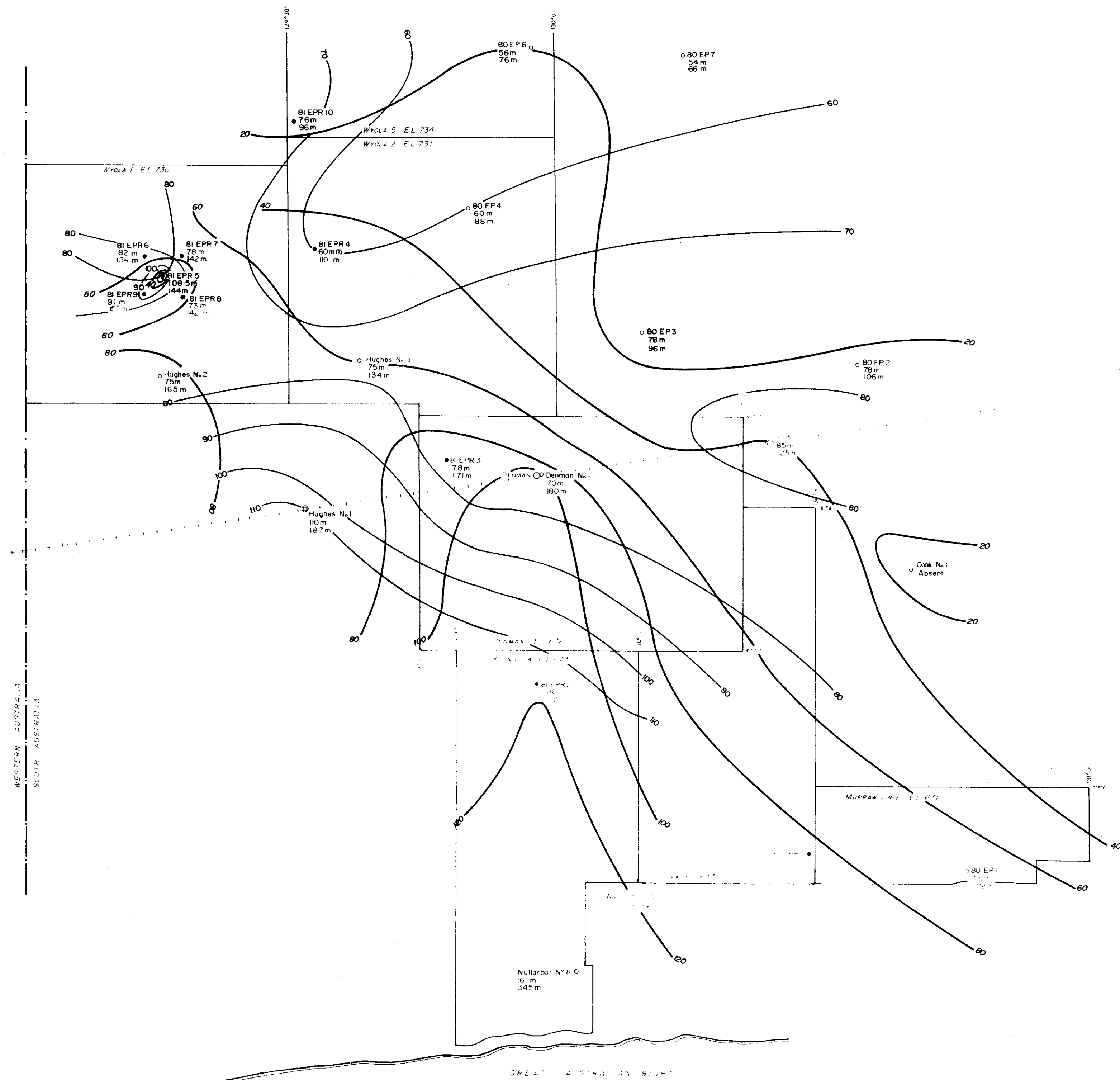


- 80 EP 2 1980 C.R.A.E. Percussion Drill Hole
- 81 EPR 7 1981 C.R.A.E. Percussion / Rotary Mud Drill Hole showing depth to top and bottom of Madura Formation
- Cook No. 1 Non - C.R.A.E. Drill Holes

4032(3)-4



C.R.A. EXPLORATION PTY. LTD.			
WYOLA AREA			
DRILL HOLE SUMMARY PLAN			
SHEET REF COOK SH-52-II, COOMPANA SH-15, NULLARBOR SH-16			
Geol: D. L. A	Date: APRIL 1981	Report No.: K0362	
Drawn: J.C.R.	Scale: 1:500,000	Plan No. SA0 737	



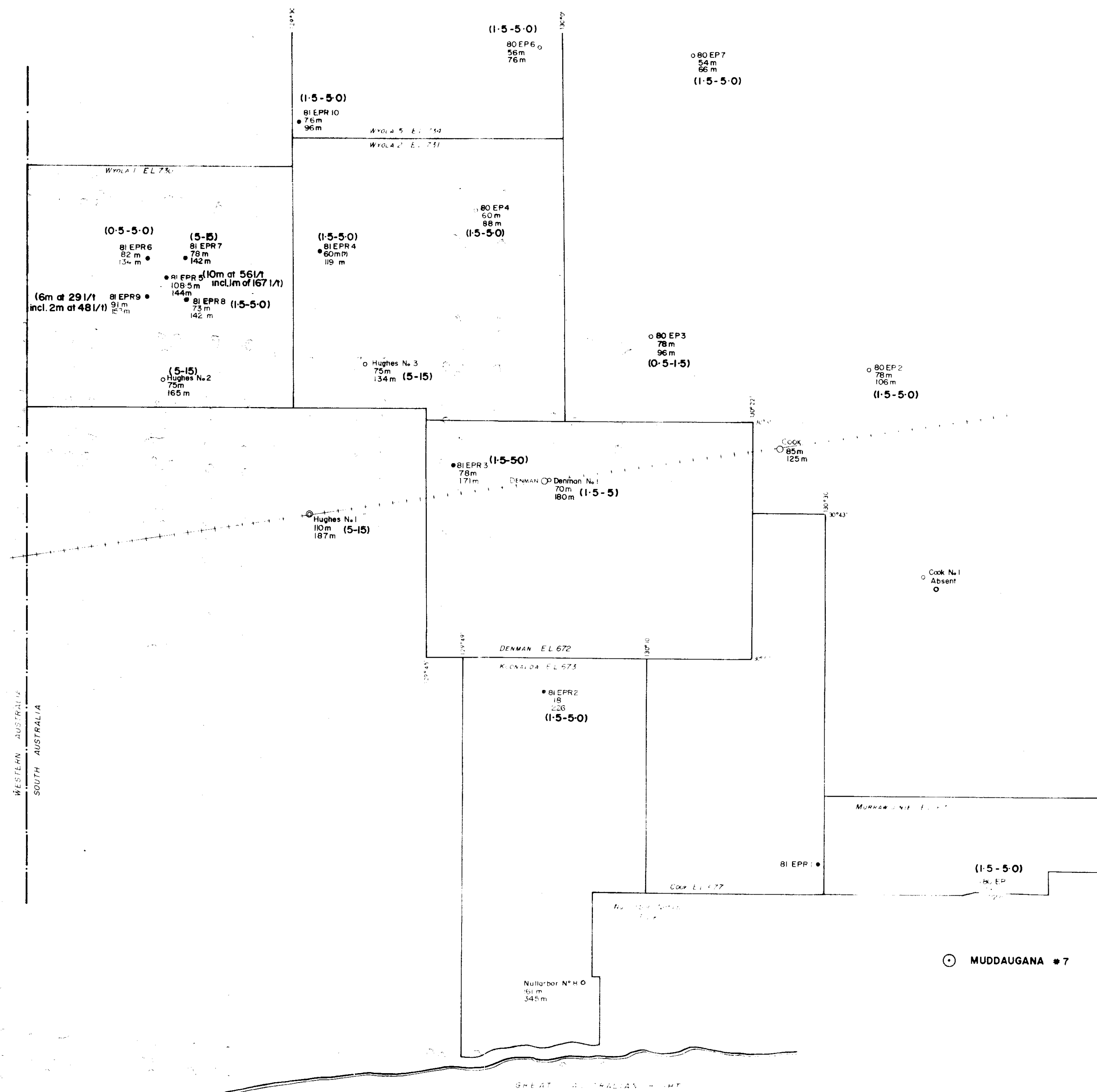
— 40 Depth to top of Madura Formation (below surface level) Contour interval 10 metres.
 — 20 Isopachs of Madura Formation 20 metre contour intervals.

• BO EP 2 1980 C.R.A.E. Percussion Drill Hole
 • 81 EPR 7 1981 C.R.A.E. Percussion / Rotary Mud Drill Hole showing depth to top and bottom of Madura Formation
 • Cook No. 1 Non - C.R.A.E. Drill Holes

4032(3)-5

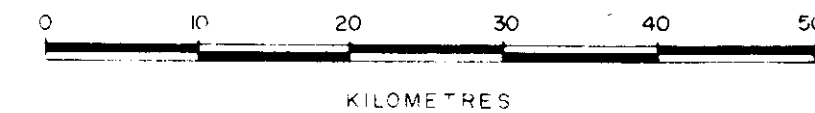


C.R.A. EXPLORATION PTY. LTD.			
WYOLA AREA ISOPACH MAP OF THE CRETACEOUS MADURA FORMATION			
SHEET REF. COOK 1032(3)-5, COOK 1032(3)-6, COOK 1032(3)-7, COOK 1032(3)-8			
Geol. D.L.A.	Date JUNE 1981	Report No. 1031/2	
Drawn: J.C.R.	Scale 1:500,000	Plan No. 5Aa 755	



- 80 EP 2 1980 C.R.A.E. Percussion Drill Hole
- BI EPR 7 1981 C.R.A.E. Percussion / Rotary Mud Drill Hole showing depth to top and bottom of Madura Formation
- Cook No. 1 Non - C.R.A.E. Drill Holes
- (5-15) Maximum assay of the approximate oil yield (litres/tonne) Madura & Pidinga formations

4032(3)-7



C.R.A. EXPLORATION PTY. LTD.			
WYOLA AREA SUMMARY ASSAY RESULTS			
SHEET REF. COOK SH 52-11, COOMPANA SH-15, NULLARBOR SH-16			
Geol: D.L.A.	Date: JUNE 1981	Report No. 10362	
Drawn: D.D.	Scale: 1:500,000	Plan No. SAG 869	

PLAN N° SA 870
REPORT N° 10362



PTY LTD

COMPUTERISED BOREHOLE LOGGING

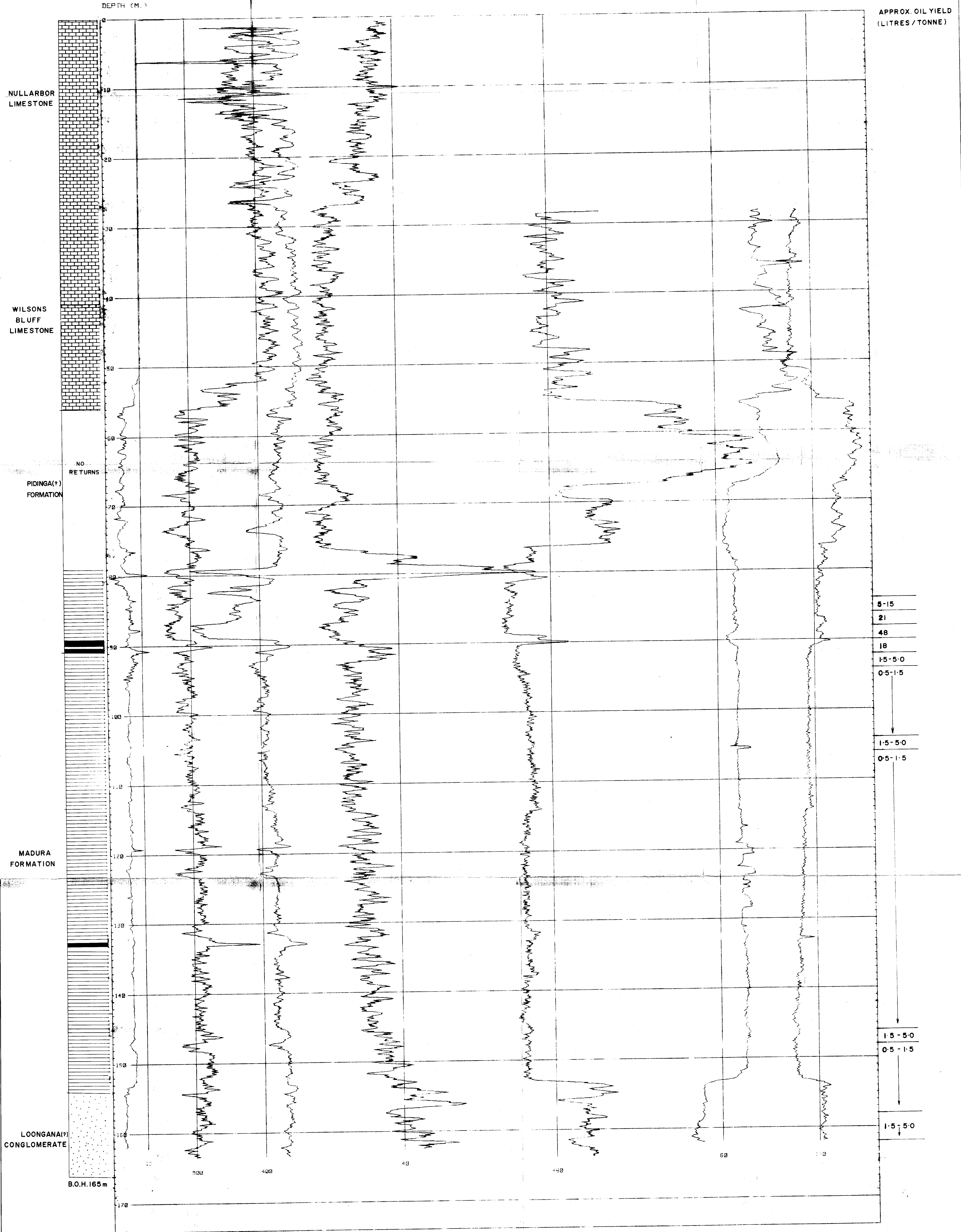
LOGGING SPEEDS:
DENS. BY PROBE 5 MIN
NEUTRON PROBE 10 MIN
DIPLOM. ABOVE GROUND 10 MIN
CIRCUIT 10 MIN
TEMPERATURE 10 MIN
DIPLOM. VERY NOISEY
DIPLOM. VERY NOISEY

PLOTTING SCALES:
SHORT SPACED DENSITY 1000
LONG SPACED DENSITY 1000
CALIPER 1000
NATURAL GAMMA 1000
NEUTRON 1000
RESISTANCE 1000
NON

BOREHOLE NO. 21EPR9
DEPTH LOGGED 165.64 m
DATE LOGGED 08/24/81
DATE PROCESSED 08/24/81

U.R.A.L.
HUGHES S.A. EL 730

SHORT SPACED DENSITY CFS
CALIPER cm
LONG SPACED DENSITY CFS
NATURAL GAMMA CFS
NEUTRON CFS
RESISTANCE OHM



GEOEX
PTY LTD

COMPUTERISED BOREHOLE LOGGING

C.R.A.E.
HUGHES S.A. EL 230

LOGGING SPEEDS:
DENSITY PROBE 5 MIN
NEUTRON PROBE 5 MIN
DATING ABOVE GROUND LEVEL 0.10 M.
CABLES DENSITY 54 M.
TIMEBASE 1000 MS
OPERATOR: M. J. NIELSEN
DATA LOG: VERY THOROUGH
DATA PLOT: VERY THOROUGH

PLOTTING SCALE: 1:200
PLOTS: 1 PLOT IN 12
FILTERING:
SHORT DENSITY: 1.5
LONG DENSITY: 1.5
CALIPER: 1.5
NATURAL GAMMA: 1.5
NEUTRON: 1.5
SELF POTENTIAL: 1.5
RESISTANCE: 1.5

BOREHOLE NO: 81EP27

DEPTH LOGGED: 151.10 M.

DATE LOGGED: 01/04/81

DATE PROCESSED: 01/04/81

SHORT SPACED DENSITY CPS
1000 900 800 700 600

CALIPER cm.
1.5 1.74

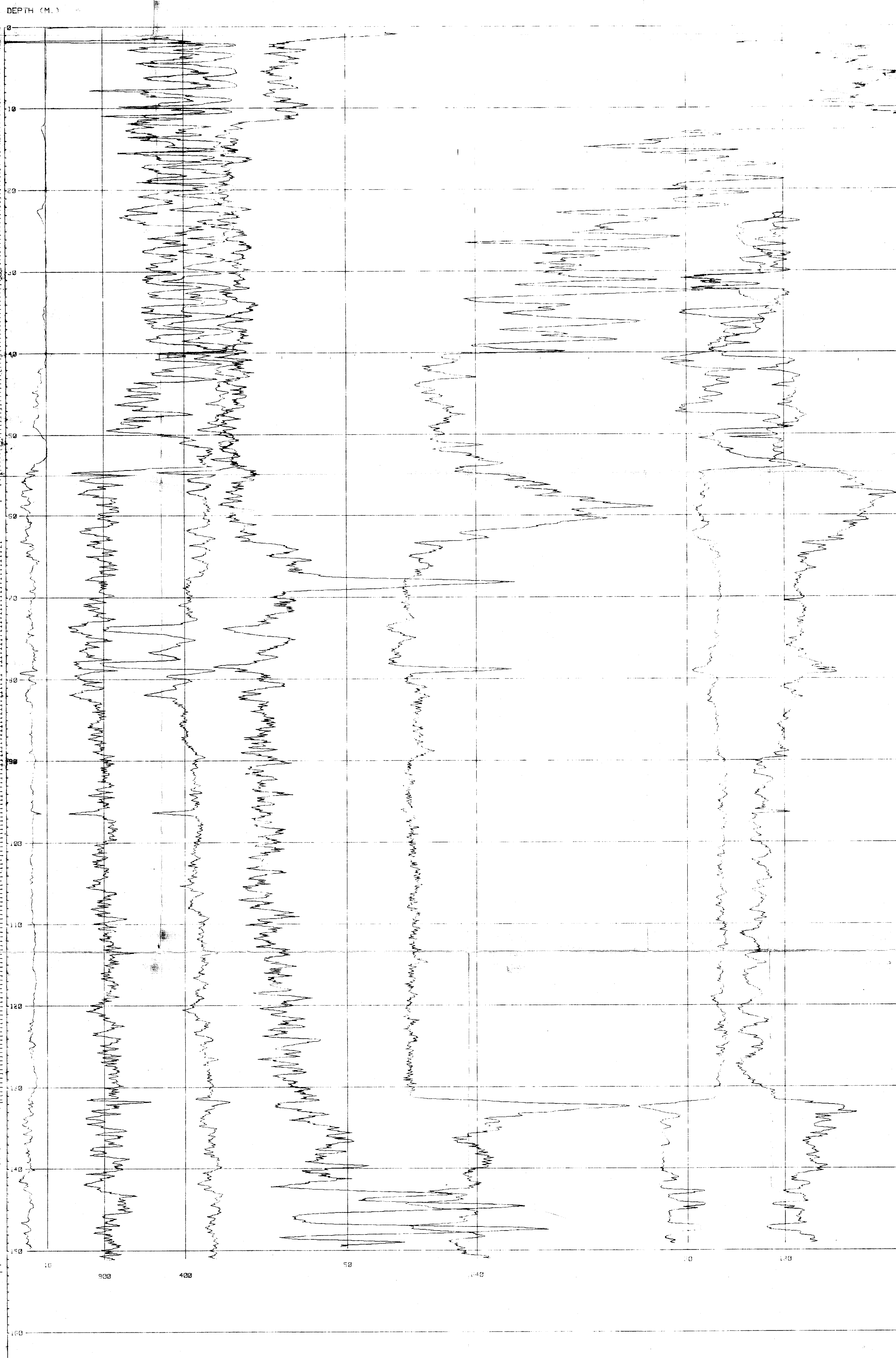
LONG SPACED DENSITY CPS
1000 900 800 700 600

CAL GM/CC 1.19 1.74

NATURAL GAMMA CPS
100 90 80 70 60 50 40 30 20 10 0

NEUTRON CPS
100 90 80 70 60 50 40 30 20 10 0

SELF POTENTIAL mV
100 0 100 200 300 400 500 600 700 800 900 1000



0.5-1.5
1.5-5.0
5-15
1.5-5.0
0.5-1.5
1.5-5.0
0.5-1.5
1.5-5.0
0.5-1.5
1.5-5.0
0.5-1.5
1.5-5.0
0.5-1.5
1.5-5.0
0.5-1.5
1.5-5.0
0.5-1.5
1.5-5.0

B.O.H. 152 m

GEOEX
PTY LTD COMPUTERISED BOREHOLE LOGGING

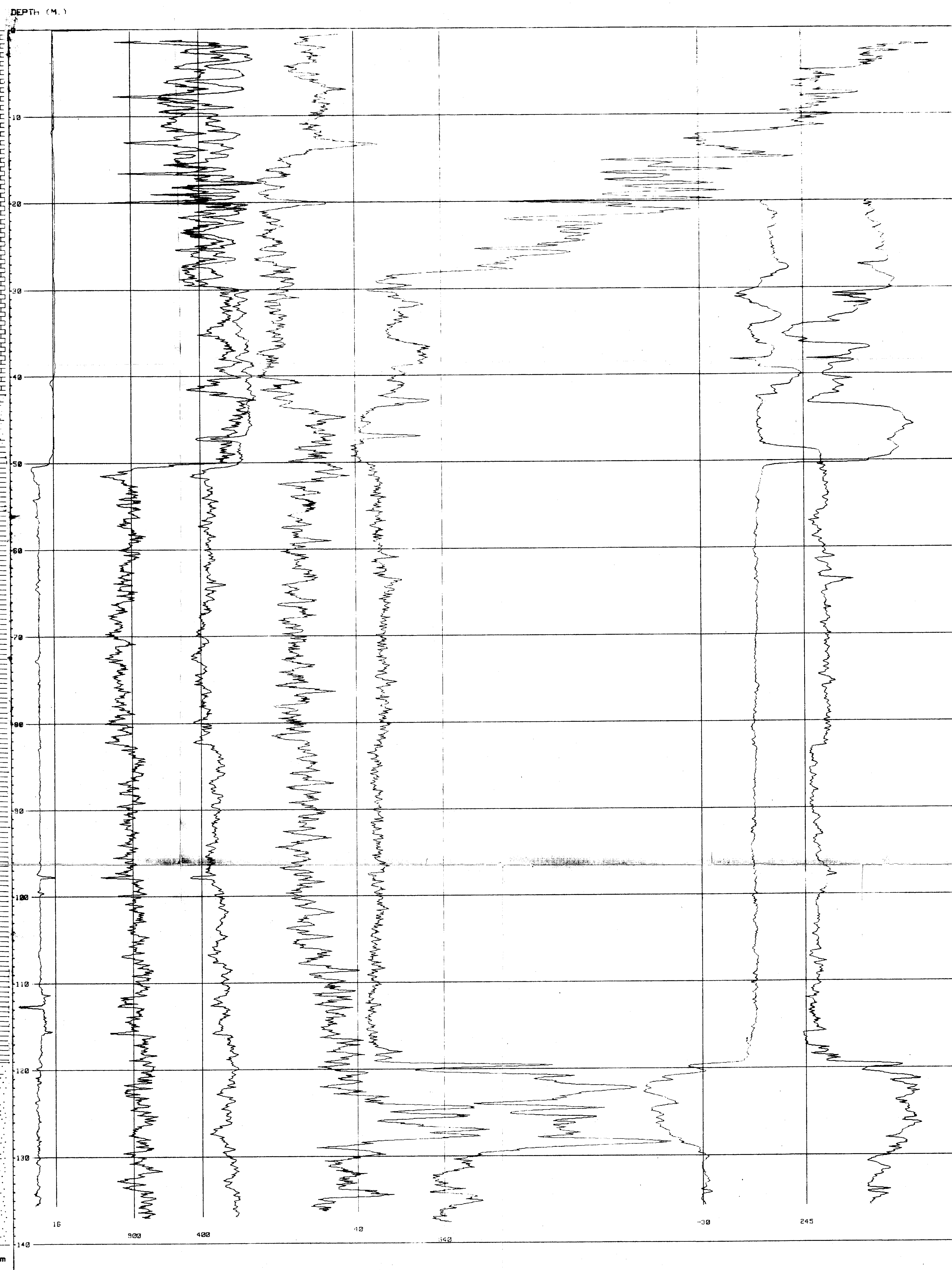
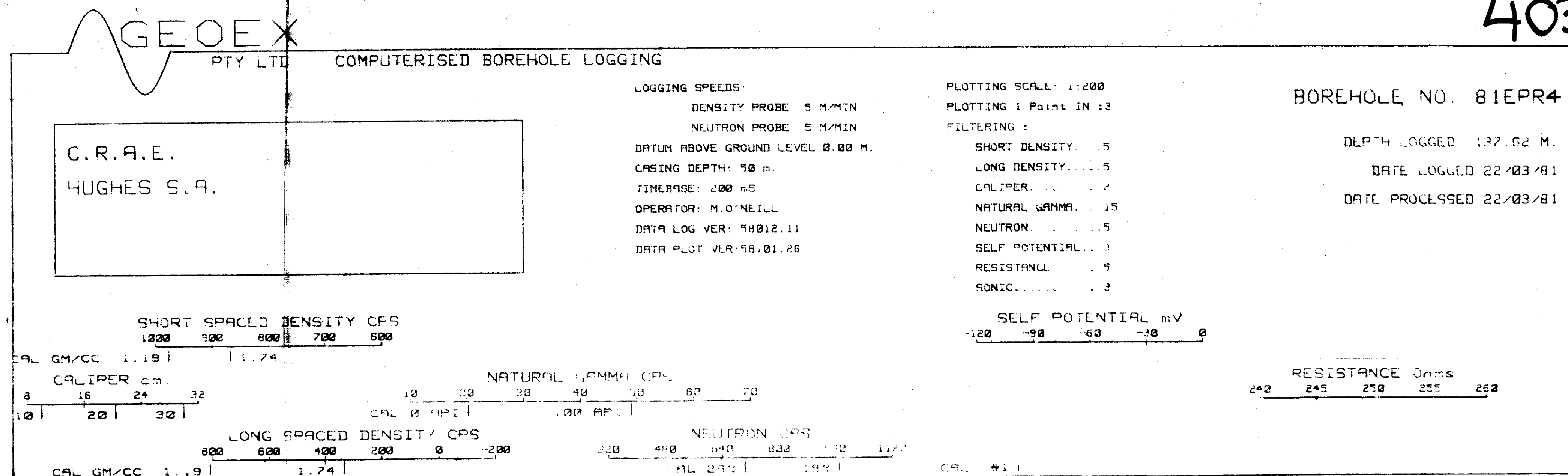
C.R.A.E.
HUGHES S.A.

LOGGING SPEEDS:
DENSITY PROBE 5 M/MIN
NEUTRON PROBE 5 M/MIN
DATA ABOVE GROUND LEVEL 1.0 M.
CRASING DEPTH 0.1 M.
TIMEBASE 200 NS
OPERATOR M. J. NEILL
DATA LOG VER: 8/01/11
DATA PLOT VER: 8/01/12

PLOTTING SCALE: 1:200
PLOTTING 1 Point IN 12
FILTERING:
SHORT DENSITY 1.5
LONG DENSITY 5
CALIPER 1.2
NATURAL GAMMA 15
NEUTRON 5
SELF POTENTIAL 15
RESISTANCE 15
SONIC 3

BOREHOLE NO. 81EPR6
DEPTH LOGGED 155.00 M.
DATE LOGGED 20/03/11
DATE PROCESSED 20/03/11

SHORT SPACED DENSITY CPS
CAL GM/CC 1.19 1.24
CALIPER cm. 16 24 32
NATURAL GAMMA CPS
CAL 0.00 1.00 2.00
LONG SPACED DENSITY CPS
CAL GM/CC 1.19 1.24
NEUTRON CPS
CAL 262 131
RESISTANCE Ohms 195 200 205 210 215



80EP4

DATE: 30/11/80

LOGGED BY: G. COLLINS

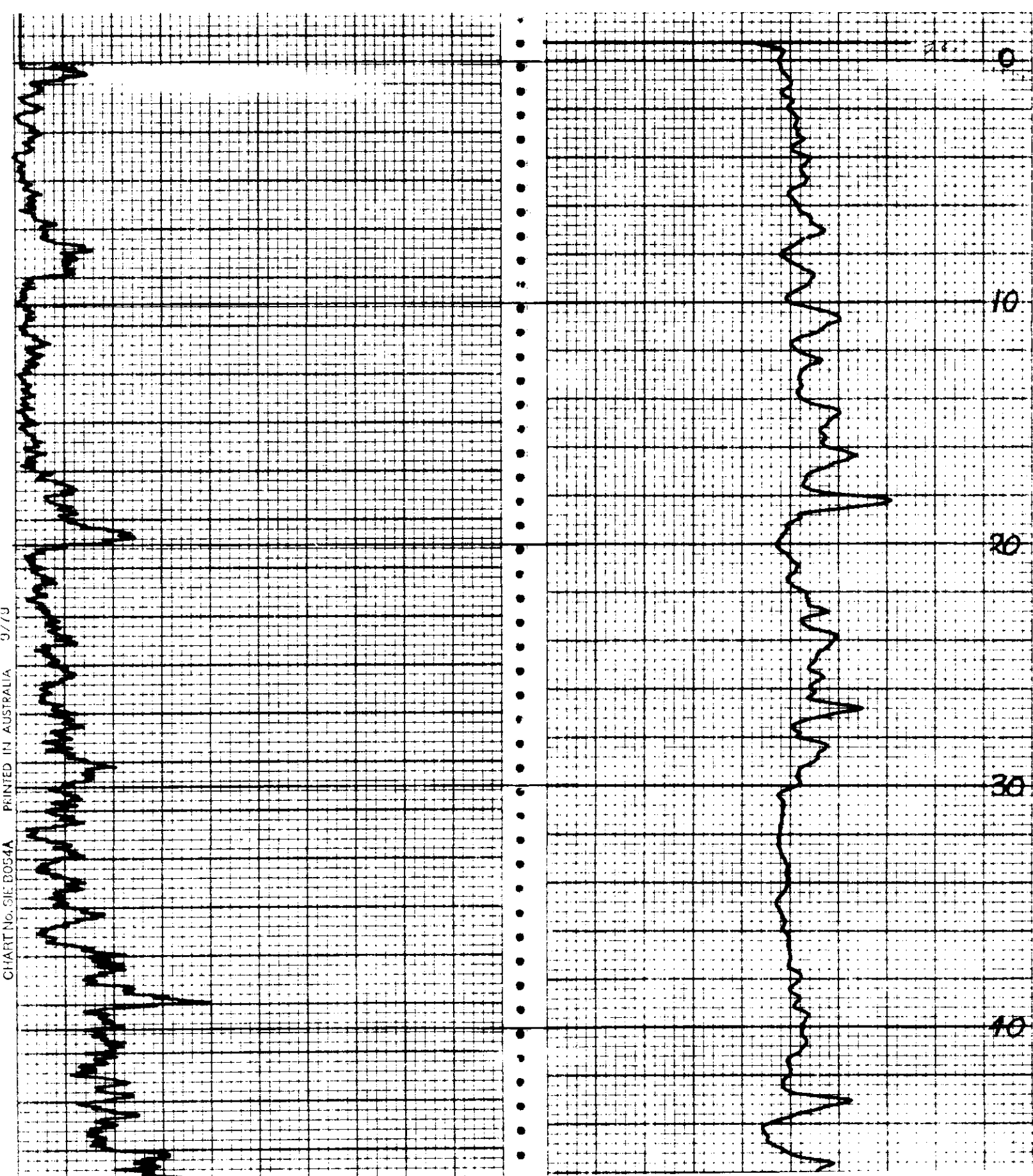
LOGGING SPEED 5m/min

CASING: 620 metres

NATURAL GAMMA
50 cps full scale
Time Constant = 2
Depth logged: 86.8 metres

DENSITY
2500 cps full scale
Time Constant = 2
Depth logged: 85.7 metres
Source - crystal spacing 45 cm

CRA EXPLORATION PTY. LIMITED PROJECT EUCLA BASIN JOINT VENTURE
PERCUSSION DRILL CORE LOG
COORDINATES 30°35'S, 129°51'E AZIMUTH DRILLERS DIAMOND DRILLING P/L. COMMENCED 28/11/80 DEPTH 144m HOLE NO 80EP4
RL COLLAR INCLINATION DRILL TYPE INGERSOLL RAND TH3 COMPLETED 30/11/80 CASING LEFT SPEC. NO. 1



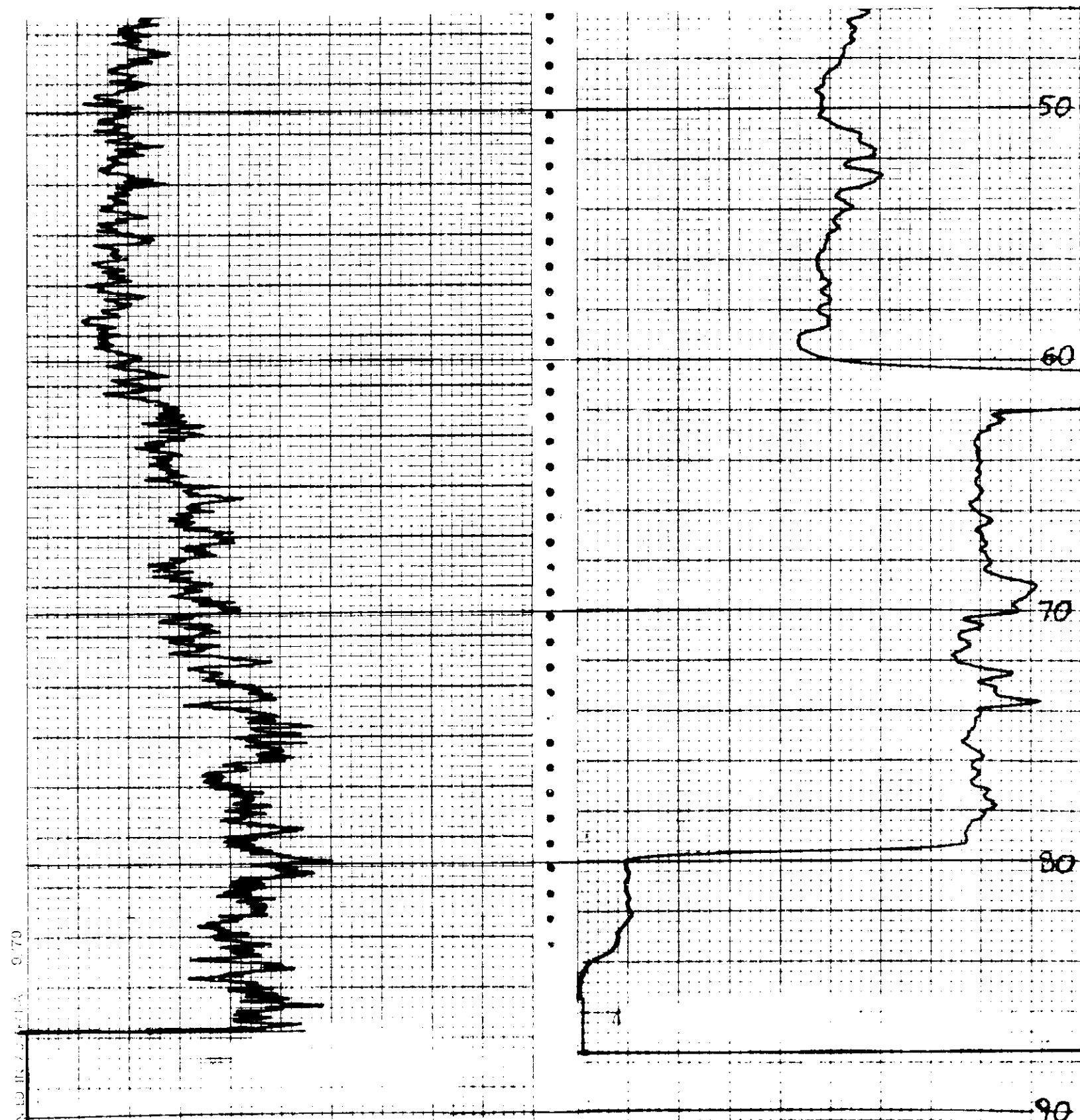
DEPTH FROM (m)	TO (m)	REC %	HOLE DIAM	GRAPHIC LOG	CUTTINGS DESCRIPTION	SPECIAL FEATURES WEATH. ALTERATION, FRACTURING, LEAKING MINERALIZATION	SAMPLE FROM NO. M	TO M	ASSAY VALUES
0	2				Calcrete & buff brown crystalline limestone		880666	0	
2	4				Buff brown & grey hard crystalline limestone	tr. manganese staining	667	2	
4	6				As above		668	4	
6	8				As above		669	6	
8	10				As above		880670	8	
10	12				Grey hard crystalline limestone + red brown silt		671	10	
12	14				As above		672	12	
14	16				Grey & buff brown, hard, crystalline limestone		673	14	
16	18				As above		674	16	
18	20				As above		675	18	
20	22				Grey hard crystalline limestone + red brown silt	tr. manganese staining	676	20	
22	24				Grey and honey brown hard crystalline limestone + pale greenish-brown clayey silt		677	22	
24	26				As above		678	24	
26	28				As above		679	26	
28	30				As above. Clayey silt becoming deep green	glaucanitic	880680	28	
30	32				As above		681	30	
32	34				As above		682	32	
34	36				Minor hard grey crystalline limestone + grey green soft limestone: Wilsons Bluff?		683	34	
36	38				Grey-green and pale brown soft clayey limestone		684	36	
38	40				As above	Water 39m	685	38	
40	42				As above		686	40	
42	44				Pale grey-brown clays with minor sands. Some green glauconitic clays.	calcareous → 60m.	687	42	
44	46				Stiff pale grey-brown clays + stiff orange brown silty clays	Minor red iron staining	688	44	

SUMMARY AND
SPECIAL COMMENTS

Nullarbor & Wilsons Bluff Limestone, Pidinga at base
Saint: 10-15 cps Mag. Susc.: (5-30) x 10⁻⁵ cps

LOGGED BY D.L. ANDREWS DATE 28/11/80
SHEET 1 OF 4

4032(3)-14a



C R A EXPLORATION PTY LIMITED										PROJECT EUCLA BASIN JOINT VENTURE									
PERCUSSION DRILL CORE LOG																			
CO-ORDINATES lat 30°13', long 129°15'					AZIMUTH					DRILLERS DIAMOND DRILLING P/L					COMMENCED 28/11/80				
RL COLLAR					INCLINATION					DRILL TYPE INGERSOLL RAND TH3					COMPLETED 30/11/80				
															DEPTH 144m				
															HOLE No. 80 EP 4				
															CASING LEFT				
															DPO No(s)				
DEPTH		REC %	HOLE DIAM	GRAPHIC LOG	CUTTINGS DESCRIPTION	SPECIAL FEATURES		SAMPLE No	FROM (M)	TO (M)	CON (%)	ASSAY VALUES							
FROM (M)	TO (M)					WEATH. ALTERATION, FRACTURING VEINING, MINERALIZATION													
46	48				Pale grey-brown clays (30%) + red brown fine gr. silty sands (5%) + black carbonaceous clays (65%)	Possibly lignitic.		890689	46	48									
48	50				Black, carbonaceous, fine grained silts & clays.			690	48	50									
50	52				As above, becoming sandy at base.	Sint: 15-20 cps		691	50	52									
52	54				Black carbonaceous clays & fine gr. ~~silts~~ sands	Mag. Succ: (10-30) x 10 ⁻⁵		692	52	54									
54	56				Dark grey & pale brown fine grained sands, minor carbonaceous clay (contamination??)	poss. soil interference		693	54	56									
56	58				Dark grey & pale brown fine grained silty sands, slightly micaceous			694	56	58									
58	60				As above			695	58	60									
60	62				Black, very fine grained muds, some hard chips	Madura noncalc.		696	60	62									
62	64				showing poorly developed partings, non micaceous, uniform.			697	62	64									
64	66				As above. Very fine grained soft to moderately hard black shales.			698	64	66									
66	68				As above			699	66	68									
68	70				As above	Sint: 15 cps		890700	68	70									
70	72				As above	Mag. Succ: (5-20) x 10 ⁻⁵		701	70	72									
72	74				As above			702	72	74									
74	76				As above			703	74	76									
76	78				As above			704	76	78									
78	80				As above			705	78	80									
80	82				As above			706	80	82									
82	84				As above			707	82	84									
84	86				As above			708	84	86									
86	88				As above			709	86	88									
88	90				Black to dark grey clays + coarse grained blue-grey quartz. Yellow brown f'spar (tr) sands.	Loongana Cgl.		890710	88	90									
90	92				As above	grey-green noncalcareous.		711	90	92									

SUMMARY AND SPECIAL COMMENTS

Pidinga → Madura → Loongana

No sign of oil shales.

LOGGED BY D.L. ANDRENS

DATE 28/11/80

SHEET 2 OF 4

4032(3)-14b

C.R.A. EXPLORATION PTY LIMITED

PROJECT EUCLA BASIN JOINT VENTURE

PERCUSSION DRILL CORE LOG

CO-ORDINATES lat. 30°15', long. 129°51' AZIMUTH _____ DRILLERS DIAMOND DRILLING P/L. COMMENCED 28/11/80 DEPTH 144m HOLE No. 80 EP 4
RL COLLAR _____ INCLINATION _____ DRILL TYPE INGERSOLL RAND TH3 COMPLETED 30/11/80 CASING LEFT _____ DPO Note: _____

DEPTH		REC	HOLE	GRAPHIC	CUTTINGS DESCRIPTION	SPECIAL FEATURES WEATH., ALTERATION, FRACTURING VEINING, MINERALIZATION	SAMPLE No.	FROM (m)	TO (m)	CONF (%)	ASSAY VALUES			
PREVIOUS	THIS	%	DIAM.	LOG										
92	94				Coarse grained, rounded-sub angular sands. Quartz grains - blue grey-smokey. Some iron staining.		890712	92	94					
94	96				As above		713	94	96					
96	98				As above Minor thin, ferruginised bands.		714	96	98					
98	100				Med to coarse grained, rounded to sub angular sands. Quartz - blue grey. Some angular feldspar.		716	98	100					
100	102				As above		716	100	102					
102	104				As above		717	102	104					
104	106				As above		718	104	106					
106	108				As above		719	106	108					
108	110				As above		890720	108	110					
110	112				As above		721	110	112					
112	114				As above		722	112	114					
114	116				As above		723	114	116					
116	118				As above		724	116	118					
118	120				Dark grey and brown fine grained sands & silts. Micaceous. Carbonaceous.	Permian?	725	118	120					
120	122				Dark grey (30%) & light grey/off white (60%) fine grained sands and silts.	noncalcareous → 144m Bad contam? from Madura	726	120	122					
122	124				As above		727	122	124					
124	126				As above		728	124	126					
126	128				As above		729	126	128					
128	130				As above		890730	128	130					
130	132				As above		731	130	132					
132	134				Dark grey brown sands & silts		732	132	134					
134	136				As above		733	134	136					
136	138				light grey fine grained sands and silts		734	136	138					

CORE #7
PLAN No. 0-000

SUMMARY AND SPECIAL COMMENTS Loongana Conglomerate → Permian Sands

LOGGED BY D.L. ANDREWS DATE 30/11/80

SHEET 3 OF 4

4032(3)-14c

PROJECT EUCLA BASIN JOINT VENTURE

[illegible]

LOGGED BY D.L. ANDREWS DATE 30/11/80
SHEET 4 OF 4

4032(37)-14d

80EP5

DATE: 2/12/80

LOGGED BY: G COLLINS

LOGGING SPEED: 5m/min

CASING: 64.5 metres

NATURAL GAMMA

50 cps full scale

Time Constant = 2

Depth logged: 85.6 metres

DENSITY

5000 cps full scale

Time Constant = 2

Depth logged: 84.5 metres

Source - crystal spacing: 45 cm

NEUTRON

1000 cps full scale

Time Constant = 5

Depth logged: 31.5 metres

CRA EXPLORATION PTY LIMITED

PROJECT: EUCLA BASIN JOINT VENTURE

PERCUSSION DRILL CORE LOG

CO-ORDINATES lat. 30°07' long. 129°17' AZIMUTH: — DRILLERS: DIAMOND DRILLING P/L. COMMENCED: 6/12/80 DEPTH: 108m HOLE No. 80 EP. 5
RL COLLAR: — INCLINATION: — DRILL TYPE: JIGSOL BAND TH3. COMPLETED: 8/12/80 CASING LEFT: 84m DPO No(s): —

DEPTH FROM (m)	TO (m)	REC %	NEUT DPM	GRAPHIC LOG	CUTTINGS DESCRIPTION	SPECIAL FEATURES WEATH. ALTERATION, FRACTURING VEINING, MINERALIZATION	SAMPLE No.	FROM (m)	TO (m)	CON (%)	ASSAY VALUES			
0	0				Red dirt + calcarete		800863	0	2					
	2				Calcrete - brown & speckled		864	2	4					
	4				Brown calcarete & hard grey crystalline limestone		865	4	6					
	6				Pale grey & pale brownish pink, hard, crystalline limestone		866	6	8					
	8				As above		867	8	10					
10	10				As above	fossiliferous Brachiopod fragments?	868	10	12					
	12				As above	crystalline calcite	869	12	14					
	14				As above + very fine grained red brown mud (dried)		800870	14	16					
	16				As above		871	16	18					
	18				As above		872	18	20					
20	20				Grey & pale brown hard limestone, crystalline		873	20	22					
	22				As above		874	22	24					
	24				As above		875	24	26					
	26				Greenish brown marls and limestone, possible oxidised glauconite present		876	26	28					
	28				Off white & pale brown hard crystalline limestone		877	28	30					
30	30				As above		878	30	32					
	32				As above		879	32	34					
	34				Green brown limestone, soft and clayey		800880	34	36					
	36				As above		881	36	38					
	38				As above trans to 800883		882	38	40					
40	40				Pale grey & honey brown hard limestone crystalline	Fossiliferous Brachiopods	883	40	42					
	42				As above		884	42	44					
	44				As above		885	44	46					
	46													

SUMMARY AND
SPECIAL COMMENTS

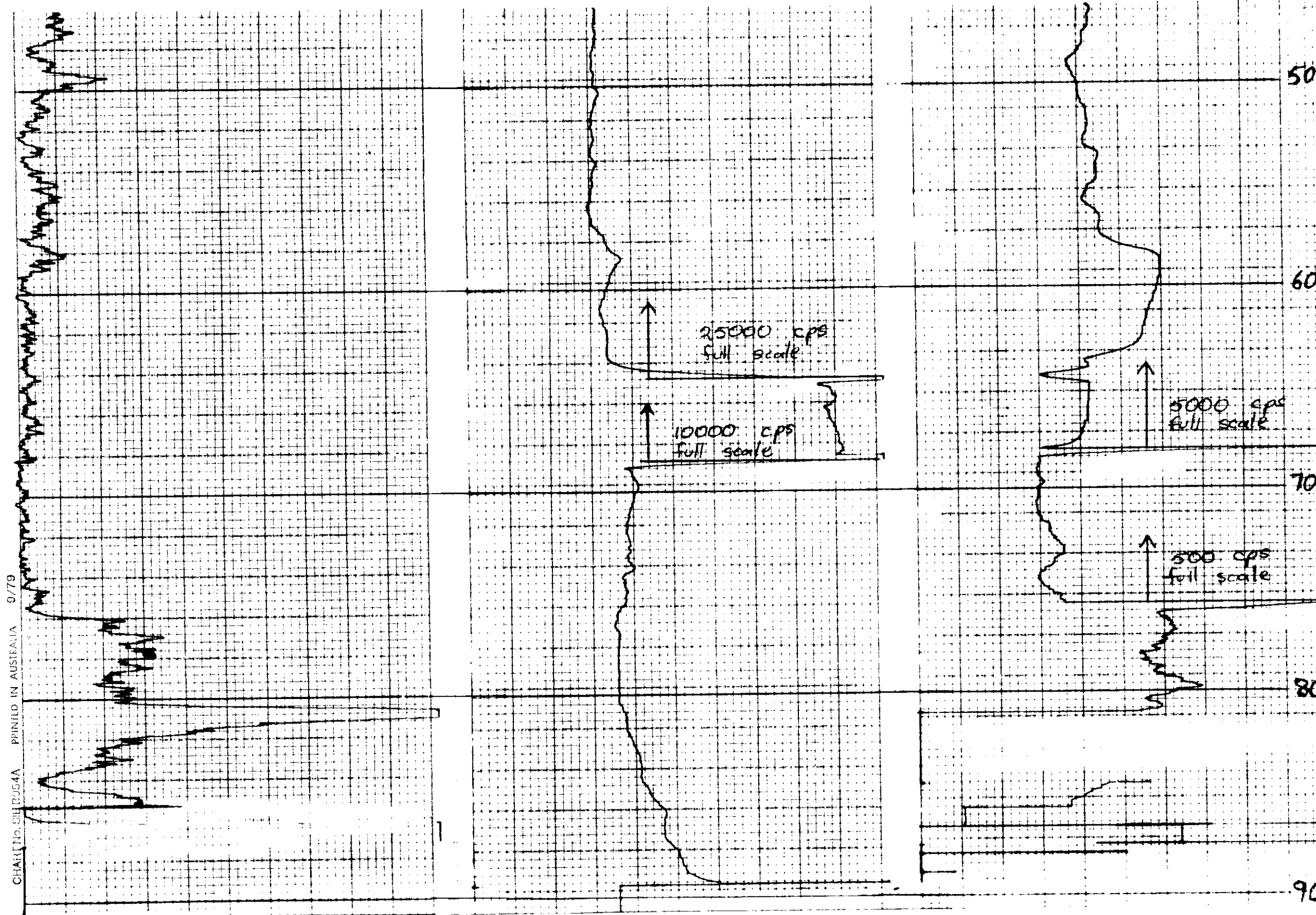
Scans: 1 - 2 p.s. - 108m

1st core at 34m, Nilsons Buff Lst. - 60m

LOGGED BY: D.L. ANDREWS DATE: 8/12/80

SHEET: 1 OF 4

4032(37)-15a



CHARTING SHEET 9/79
PRINTED IN AUSTRALIA

CRA EXPLORATION PTY LIMITED						PROJECT EUCLA BASIN JOINT VENTURE								
PERCUSSION DRILL CORE LOG														
CO-ORDINATES Lat. 30° 57', Long. 123° 13'			AZIMUTH -			DRILLERS DIAMOND DRILLING P/L			COMMENCED 9/12/80					
RL COLLAR			INCLINATION -			DRILL TYPE INGERSOLL RAND TH3			COMPLETED 8/12/80					
									DEPTH 108m					
									HOLE No. 80 EP 5					
									CASING LEFT 84m					
									DPO No(s)					
DEPTH		REC %	HOLE DIAM	GRAPHIC LOG	CUTTINGS DESCRIPTION	SPECIAL FEATURES WEATH. ALTERATION, FRACTURING VEINING, MINERALIZATION	SAMPLE No	FROM (M)	TO (M)	CON (%)	ASSAY VALUES			
46	48				Pale brown bryozoal limestone, soft, minor iron staining.		880886	46	48					
48	50				As above		887	48	50					
50	52				As above		888	50	52					
52	54				As above		889	52	54					
54	56				Off white & pale brown, soft, bryozoal limestone		890890	54	56					
56	58				As above		891	56	58					
58	60				As above + minor yellow brown silty clay.		892	58	60					
60	62				Minor limestone + olive & brown fine grained sands with rounded coarse gr. quartz gravel.	Fe stained, glauconitic	893	60	62					
62	64				Yellow brown medium grained sands, rounded, iron stained. Gradually becoming coarse grained to 70m.	tr. carbonaceous Calcareous.	894	62	64					
64	66				As above	" " "	895	64	66					
66	68				As above	" " "	896	66	68					
68	70				As above	" " "	897	68	70					
70	72				Yellow-brown, medium to coarse sands, rounded.	" " "	898	70	72					
72	74				Fe stained	tr. calcareous	899	72	74					
74	76				As above	" " "	890900	74	76					
76	78				As above + minor olive clays, stiff.	tr. lignitic	901	76	78					
78	80				As above + minor black carbonaceous/lignitic clays.	" " "	902	78	80					
80	82				Dark grey carbonaceous clayey silt. Minor black fine grained clasts < 1cm	" " "	903	80	82					
82	84				As above. Clay content increasing.	" " "	904	82	84					
84	86				As above	" " "	905	84	86					
86	88				As above	" " "	906	86	88					
88	90				Black, very fine grained, stiff clays.	non-calcareous	907	88	90					
90	92				As above	" " "	908	90	92					

4032637-15

4032637-15b

PERCUSSION DRILL CORE LOG

CO-ORDINATES lat. 30°07', long. 129°17'

AZIMUTH

DRILLERS DIAMOND DRILLING P/L

COMMENCED 6/12/80

DEPTH 168m

HOLE No. 80 EP 5

RL COLLAR

INCLINATION

DRILL TYPE INGERSOLL RAND TH3

COMPLETED 8/12/80

ASING LEFT 84m

DPO No(s)

DEPTH		REC %	HOLE DIAM	GRAPHIC LOG	CUTTINGS DESCRIPTION	SPECIAL FEATURES WEATH., ALTERATION, FRACTURING VEINING, MINERALIZATION	SAMPLE No.	FROM (m)	TO (m)	CON (%)	ASSAY VALUES			
FROM (m)	TO (m)													
92	94				Black silty clay, micaceous, laminated, "greasy"		820909	92	94					
94	96				non-calcareous									
94	96				As above		810	94	96					
96	98				As above		911	96	98					
98	100				As above. Rare angular sand grains (qtz)		912	98	100					
100	102				Black fine grained muds, fine to medium grained		913	100	102					
100	102				sands. Carbonaceous. Non-calcareous.									
102	104						914	102	104					
104	106						915	104	106					
106	108						916	106	108					
108	110						917	108	110					
110	112						918	110	112					
112	114				As above		919	112	114					
114	116						820320	114	116					
116	118						921	116	118					
118	120						922	118	120					
120	122						923	120	122					
122	124						924	122	124					
124	126						925	124	126					
126	128						926	126	128					
128	130						927	128	130					
130	132				Black muds and medium grained sands +	tr. pyritic.	928	130	132					
132	134				dark grey, fine grained mudstone. Non-calcareous.									
132	134				As above. Less sandy.	pyrite aggregates <0.5mm	929	132	134					
134	136				As above		820930	134	136					
136	138				As above	lignitic	931	136	138					

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CO-ORDINATES lat. 30°07', long. 129°17' AZIMUTH - DRILLERS DIAMOND DRILLING P/L
RL COLLAR - INCLINATION - DRILL TYPE NGERSOL RAND TH3

COMMENCED 6/12/80 DEPTH 168m HOLE No. 80 EP 5
COMPLETED 8/12/80 CASING LEFT 64 m DPO No(s) _____

Abandoned due to no returns from 168 m

4Q32 (3)-15d