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EL 562

BUNABIE ROCKHOLE, NULLARBOR PLAIN [AREA 3 OF 3]

FIRST AND FINAL QUARTERLY PROGRESS REPORT FOR THE PERIOD 6/12/79 TO 5/3/80

Submitted by

A.O. (Australia) Pty Ltd
1980

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PRIMARY INDUSTRIES AND RESOURCES SA

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TENEMENT: EXPLORATION LICENCE No. 562

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DEPARTMENT OF MINES AND ENERGY SOUTH AUSTRALIA 1980

QUARTERLY REPORT E.L. 562

6th December, 1979

to

5th March, 1980

Submitted to: Department of Mines & Energy
SOUTH AUSTRALIA.

A.O. (Australia) Pty. Ltd.
131 Elizabeth Street,
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April, 1980.

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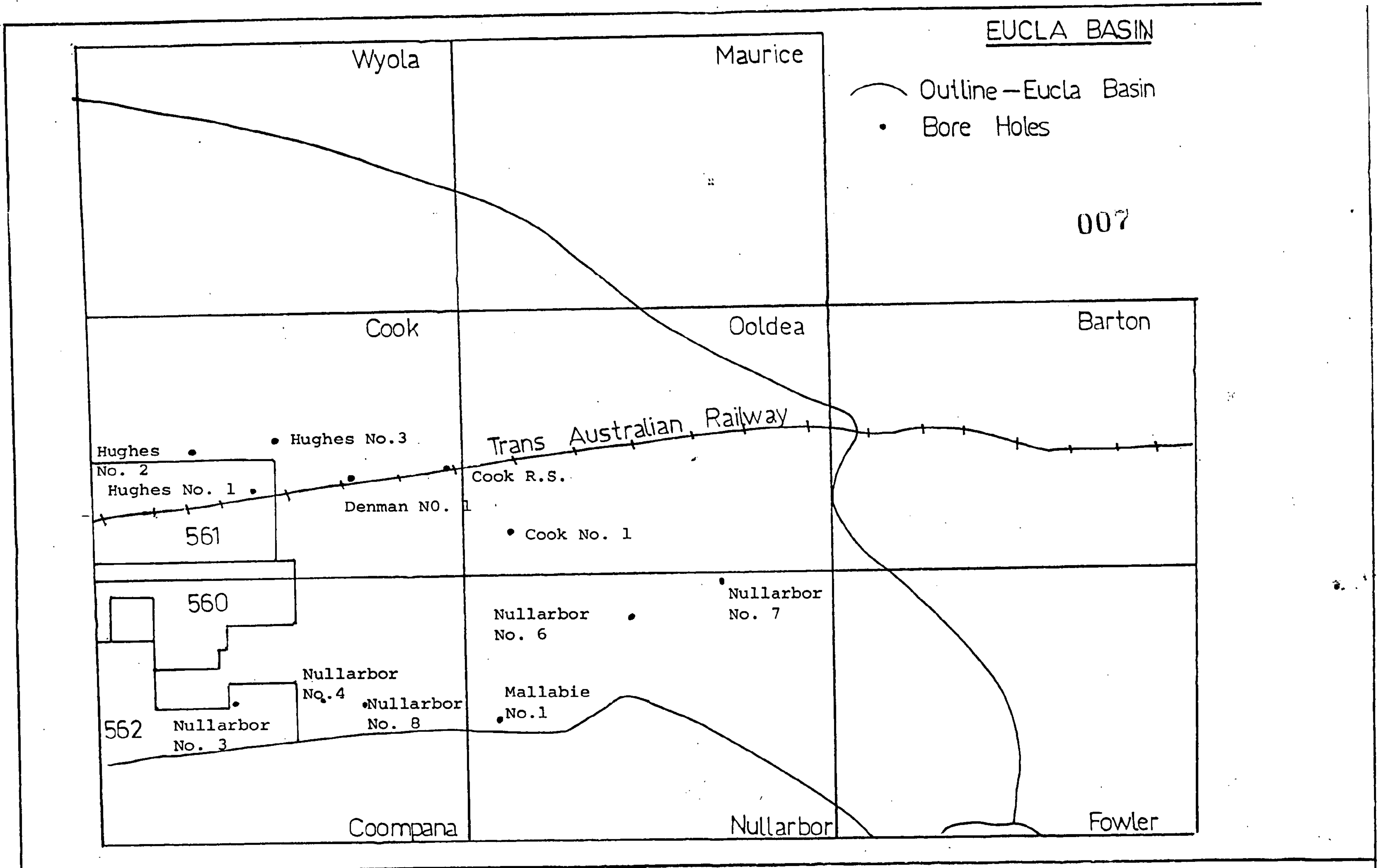

FIGURE 1

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EXPLORATION LICENCE 562

BUNABIE ROCKHOLE AREA

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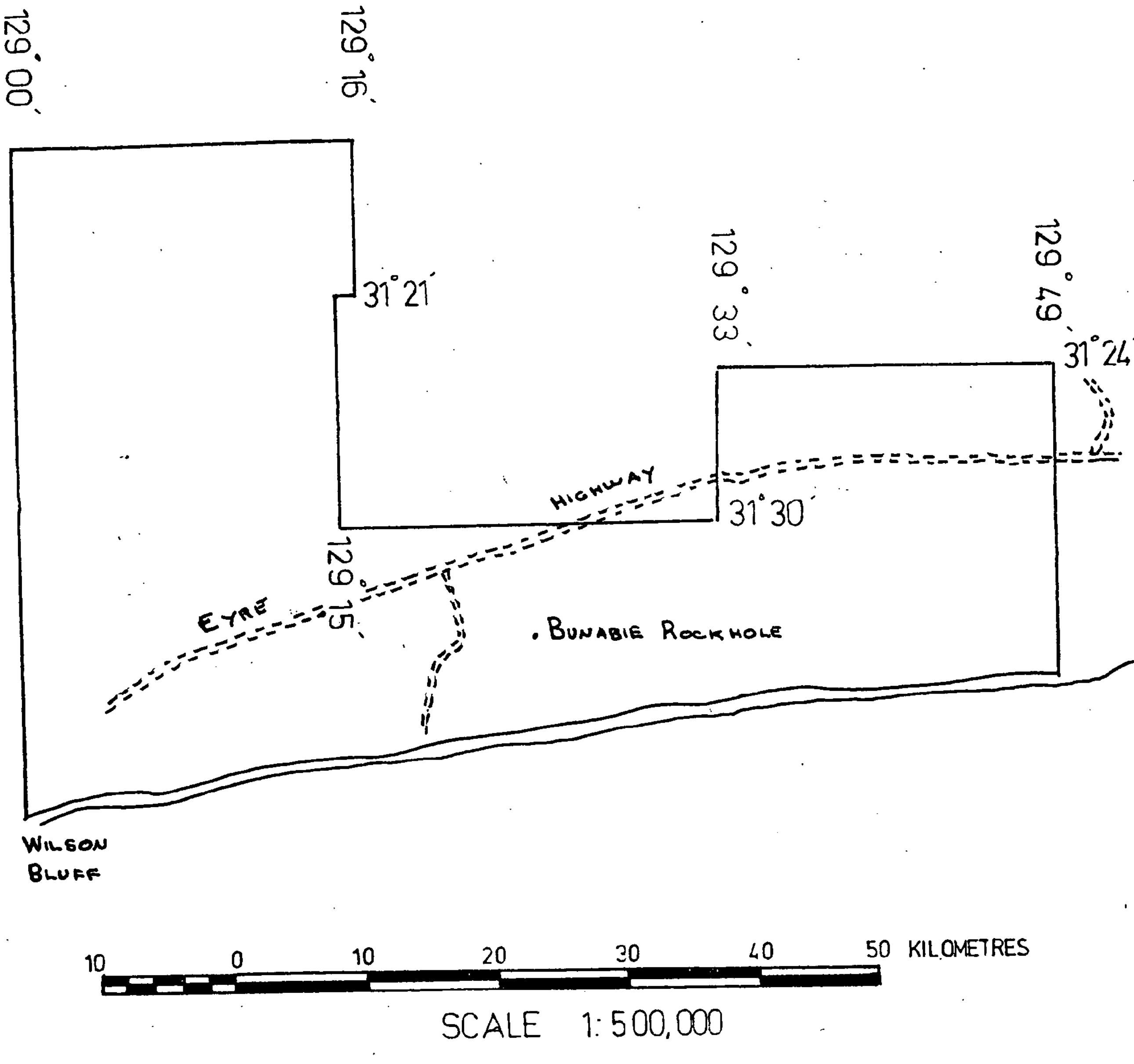

FIGURE 2

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TECTONIC SETTING OF THE EUCLA BASIN

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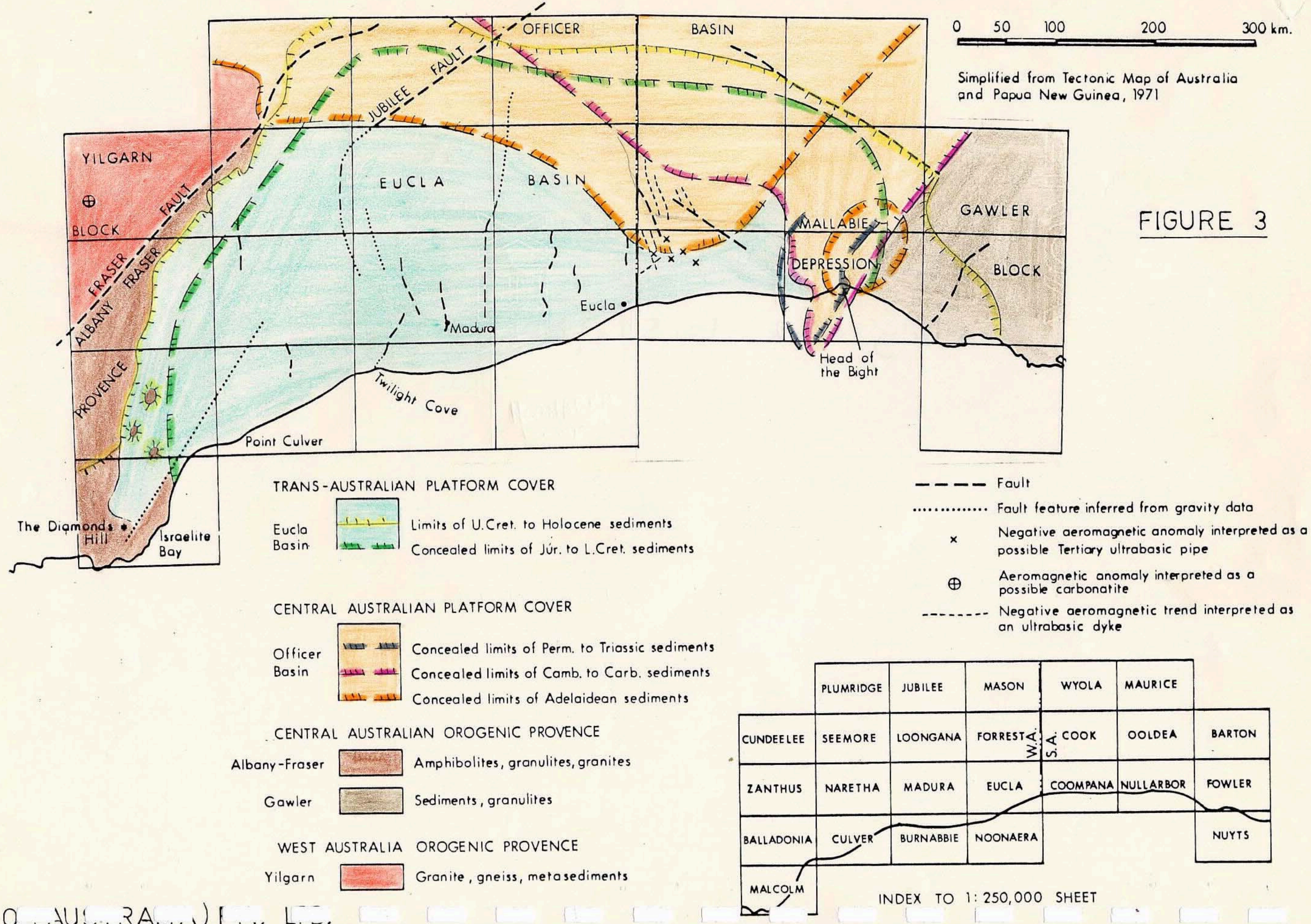

FIGURE 3

1.00 INTRODUCTION

Attention was drawn to the Eucla Basin as an area of possible kimberlite activity by reference in Bardet (1977) to the occurrence of small, good quality diamonds in the "Nullarbor Basin" in South Australia.

A detailed study of the geology and structure of the Eucla Basin revealed similarities to major kimberlite provinces. Consideration of possible ages for kimberlitic intrusion, the age and thickness of the cover rocks, the presence of favourable structural elements, together with the inferred presence of Tertiary ultrabasic pipes led to the recommendation that the Eucla Basin warranted exploration for kimberlite.

Three exploration licences in the Eucla Basin were granted to A.O. (Australia) Pty. Ltd. by the South Australian Department of Mines and Energy on 6th December, 1979, to be valid for a period of one year. These licences are located in the Coompana and Cook 1:250,000 sheet areas and are referred to as the Nullarbor Plain (560), Hughes (561) and Bunabie Rockhole (562) exploration licences. They cover areas of 2345, 3051 and 2104 square kilometres respectively and their location within the Eucla Basin is illustrated in Figure 1.

This report reviews relevant aspects of the geology and tectonic setting of the Eucla Basin and details exploration carried out in E.L. 562 during the period 6th December, 1979 to 5th March, 1980. Figure 2 gives an outline of the licence.

2.00 TECTONIC SETTING OF THE EUCLA BASIN

The Eucla Basin adjoins the Great Australian Bight. One-third of the basin lies in South Australia and two-thirds in Western Australia - the onshore extent being approximately 70,000 and 54,000 square kilometres respectively.

The Eucla Basin, which evolved by subsidence of the Pre-cambrian basement during the Mesozoic era, is a broad structure representing a gentle epeirogenic downwarp on the southern continental margin of Australia. The basin formed a shallow marine embayment at intervals from the Early Cretaceous to Middle Miocene. The tectonic setting of the basin, simplified from the Tectonic Map of Australia and Papua New Guinea - 1971 is shown in Figure 3.

The basin is bounded by the Gawler Block to the east, the Albany-Fraser Province to the west, the Officer Basin to the north and it extends to the edge of the continental shelf of the Great Australian Bight. Lambourn (1977) has suggested that the Gawler Craton does not extend west of the Head of the Bight and that to the west of this location, the Eucla Basin may be underlain by the Albany-Fraser Mobile Belt. Before and possibly during the Proterotoic, the basement was tectonically deformed, enabling the accumulation of Proterozoic sediments and volcanics in deep basement troughs. One such prominent trough is the Mallabie Depression interpreted as containing up to 2,500 metres of sediment. The northern extension of this trough, up to 2,000 metres thick and running north-south across the Ooldea 1:250,000 sheet has been outlined by aeromagnetics, as has a further trough (3,000+ metres) extending northwest from the Coompana sheet into the Cook sheet.

In the Jubilee sheet area of Western Australia a gravity survey of Bazhaw and Jackson (1965) revealed a northeasterly trending linear anomaly interpreted as a fault with a throw of perhaps as much as 1,800 to 2,400 metres (refer to Figure 3). The postulated fault, termed the Jubilee Fault does not cut Tertiary sediments but probably throws Proterozoic sedimentary rocks down against Precambrian crystalline basement.

Faulting in the Eucla Basin appears to be either deep-seated in origin and associated with the formation of basement troughs, or relatively younger features, possibly post-dating periods of epeirogenic downwarping.

A number of large scale, deep seated faults have been interpreted in, or along the margins of the Eucla Basin and a number of gravity features which may represent large scale, concealed, possibly Pre-Tertiary faults have been shown in Figure 3.

Lowry (1970) has pointed to evidence of the existence of numerous faults with movement during the Miocene or Pliocene up to 120 kilometres long the displacements up to 60 metres in the Western Australian portion of the basin. One such example is the fault trending north and northwest of Madura.

There are several features of the tectonic setting of the Eucla Basin which are considered similar to those of the major kimberlite provinces and these are listed below:

(a) basement consisting of metamorphic and gravite rocks which have undergone deformation

(b) cratonization of the basement in Precambrian times

(c) presence of deep-seated fractures and linears which may act as channelways for later kimberlitic intrusion

(d) epeirogenic movements during the history of the basin and related faulting

(e) an indication, from aeromagnetic data, of a young phase of ultrabasic intrusion in the form of pipes and dykes (discussed further in Section 4.00).

3.00 GEOLOGY OF THE EUCLA BASIN

3.10 General

The stratigraphic relations of the various units of the Eucla Basin are represented diagrammatically in Table 1. The main point of interest with regard to stratigraphy of the basin is the cumulative thickness of sediment above possible Australian kimberlitic intervals in order to determine in which areas of the basin, kimberlites, if present would outcrop or approach the surface.

Few of the Australian kimberlite occurrences have been accurately dated. The Terowie kimberlites in South Australia and the Meredith Breccia Pipe in Victoria are believed to be Jurassic in age (Day et. al. - 1979) while the Newer Volcanics (including the Bullenmerri kimberlite occurrence) in Victoria range in age from 4.5 m.y. to Recent according to Irving and Green (1976).

As the cumulative thickness of post-Jurassic sediments within the Eucla Basin is of major interest, the various lithological descriptions given in the sub-sections to follow are brief.

3.20 Precambrian

Proterozoic granite and metamorphic rocks form the basement of the Eucla Basin on the east (the Gawler Block) and on the west (the Albany-Fraser Province). Four hundred and twenty-five metres of Proterozoic sediments and volcanics have been encountered in Mallabie No.1 (Youngs - 1974). Other basement troughs indicated by aeromagnetic surveys may contain Precambrian sequences.

3.30 Palaeozoic

Probable Cambrian sediments underlie much of the Eucla Basin in South Australia and appear to be restricted to a Palaeozoic deep trough (Youngs - 1974). Mallabie No.1 well intersected 480 metres of Cambrian sandstone, while Denman No.1 in the northern part of the basin registered over 300 metres of sandstones, shales and dolomites (refer to Figures 1 and 4).

Approximately 80 metres of Permian strata have been identified in South Australian wells Mallabie 1 and Nullarbor 8 (see Figures 1 and 5).

3.40 Mesozoic

Lower Cretaceous sedimentation began with the deposition of a discontinuous basal conglomeratic sandstone, the Loongana Sandstone, conformably overlain by the Madura Formation consisting of glaucontic and carbonaceous sandstone and shale. These sediments are not known to outcrop in the Eucla Basin. Bore-hole data indicates the thickest onshore development of Cretaceous sediments centres around Madura in W.A. where 357+ metres have been recorded. Elsewhere the Cretaceous sequence usually varies in the thickness from 100-200 metres.

3.50 Cainozoic

Tertiary marine sediments were deposited during the Eocene (Hampton Sandstone conformably overlain by the Wilson Bluff

Limestone) and during the Lower Miocene (the Abrakurrie Limestone unconformably overlain by the Nullarbor Limestone). The Hampton Sandstone is a thin discontinuous sandstone, the Wilson Bluff and Abrakurrie Limestones, bryozoan limestones while the Nullarbor Limestone is a foraminiferal and algal calcarenite. Maximum development of the Tertiary sediments centred on Madura W.A. where 349 metres have been intersected. Elsewhere the Tertiary sequence varies between 100-200 metres.

In the South Australian portion of the basin, Quaternary aeolianites cover the Nullarbor Limestone in the area of the Head of the Bight. Superficial deposits are rare elsewhere in the South Australian section of the basin (Youngs - 1974).

During the late Tertiary and Quaternary kankar developed over a wide area of the Western Australian portion of the basin. The Roe Calcarenite (usual thickness less than 1.5 metres) was deposited during the Quaternary as were colluvial, lacustrine and dune (both coastal and desert) deposits.

3.60 Thickness of Tertiary and Cretaceous Covers

Figures 4 and 5 illustrate known depths below the present ground surface to the base of the Cretaceous and Tertiary in northern and southern wells in the South Australian section of the basin. Assuming that any kimberlites present are detectable by aeromagnetics under a cover of up to 50 metres, it would appear from Figures 4 and 5, that no kimberlites equivalent in age to the Terowie and Meredith occurrences which could be related to epeirogenic movements in the Eucla Basin would be detected - except perhaps at the margins of the basin if the sedimentary sequence thins considerably.

Possible Tertiary volcanic plugs and dykes are present in the Coompana and Cook sheets (refer to Section 4.00). If this represents a phase of kimberlitic activity within the Eucla Basin, then kimberlites would probably be detected by aeromagnetics only if they were post-Eocene in age (refer to Figures 4 and 5).

4.00 PREVIOUS INVESTIGATIONS

Airborne magnetic and radiometric surveys were undertaken by the B.M.R. in the Cook-Ooldea-Barton sheets and Coompana-Nullarbor-Fowler sheets during 1970 and 1972-73 respectively. The onshore portion of the surveys was covered by east-west flight lines spaced 1.5 kilometres apart and elevated 150 metres above ground level. The surveys were interpreted by Waller et. al.(1972) and Lambourn (1977). Plan 1 is a compilation of the magnetic interpretations for the Coompana and Cook sheets on which has been plotted the boundaries of Exploration Licences 560, 561 and 562.

Magnetic contours in the north of the Coompana sheet are dominated by an intense, broad regional negative anomaly (outlined as 'C' on Plan 1). Depth estimates by Lambourn on filtered data show the regional negative has an intra-basement, reversely magnetised triangular source at a maximum depth of nine kilometres. Further depth estimates indicate that the basement forms a broad trough over the regional negative and superimposed upon and to the south and west of this trough are groups of further negative anomalies (outlined as 'PM1' to 'PM5' inclusive). Depth estimates by Lambourn on these latter anomalies indicate suprabasement sources of remanently magnetised magnetite-rich material within 200 metres of surface. He interpreted the anomalies as four pipes or plugs and one sill of possible Tertiary age.

Associated with these negative anomalies are northwest and northeast negative trends which are interpreted as reversely magnetised dykes that have intruded faults or joints in the shallow basement. Lambourn postulated that a common source for these interpreted igneous intrusive features seems likely and that they may originate from the interpreted intra-basement source. In the central section of the Nullarbor sheet, a remanently magnetised source within the basement was interpreted by Lambourn in the deepest part of the Mallabie Depression.

Waller et.al. (1972) delineated intense, northwest-trending, negative, magnetic anomaly lineations in the western portion of the Cook sheet and considered the anomalies to be due to remanently magnetised basic to ultrabasic intrusive rocks in the basement.

5.00 EXPLORATION CARRIED OUT

5.10 Introduction

A number of factors have led to the consideration and subsequently investigation of the Eucla Basin area as a possible kimberlitic province. These factors include:

(a) the occurrence as noted by Bardet (op.cit.) of good quality diamonds within the area

(b) the similarity in tectonic setting between the Eucla Basin area and major kimberlitic provinces

(c) an indication, from the study of previous aeromagnetic data, of a young phase of ultra basic intrusion in the form of pipes and dykes

(d) the concentration of garnet - rich sands in the Point Culver and Israelite Bay areas W.A., garnet being one of the kimberlitic indicator minerals

(e) the location of a possible carbonatite in an area just outside the Eucla Basin.

Factors (b) and (c) have been previously considered in Sections 2.00 and 4.00 respectively.

Garnet is one of a number of minerals which are indicators of kimberlitic activity. Concentrations of garnet rich sands are known at Point Culver and Israelite Bay in the Western Australian section of the Eucla Basin. Garnet - bearing metamorphic rocks are present in the basin and outcrop near Israelite Bay. However no outcropping basement has been recorded within 70 kilometres of Point Culver.

The possible carbonatite has been located on the Cundeelee 1:250,000 sheet and was detected as a magnetic anomaly, roughly circular in shape and approximately 8 kilometres in diameter.

(refer to Figure 3). The anomaly occurs outside the Eucla Basin in an area where Phanerozoic sediments cover the Yilgarn Block.

The anomaly consists of concentric rings or positive and negative anomalies. Bunting and Van de Graff (1977) consider that the anomaly has characteristics of an intrusive plug and that its lack of directionality indicates it is a late feature. The possible causes suggested by these writers are carbonatite, alkali gabbro, anorthosite or an ultramafic body. An exploratory bore by an unnamed mineral exploration company reportedly penetrated Permian sediments to a depth of approximately 230 metres but was abandoned without reaching basement.

Exploration by A.O. (Australia) Pty. Ltd. in the Eucla Basin has centred on its three exploration licences, 560, 561 and 562. An integrated program was carried out with work in any one licence undertaken in conjunction with the two remaining tenements.

Exploration to date has included the following phases:

(a) air photo study to delineate possible kimberlitic features

(b) ground examination and loam sampling of air photo anomalies

(c) selective computer modelling of B.M.R. aeromagnetic data

(d) computer processing of digital tapes of the Coompana-Nullarbor-Fowler survey and examination of analogue profiles produced

(e) ground magnetic surveys and modelling of data

(f) loam sampling ground magnetic anomalies.

5.20 Photogeological Study and Follow-Up Proceedures

Kimberlite pipes and associated lamproite intrusive bodies are known to produce discernable airphoto features. Kimberlite pipes often occur as slight depressions with subtle tonal or vegetational anomalies. Lamproite dykes usually associated with kimberlitic activity are recognized as linear features or occasionally as prominently outcropping ridges often with associated vegetational anomalies.

Worldwide distribution of kimberlite pipes suggests that they commonly occur in clusters, often aligned along linear features and associated with dyke-like bodies.

The characteristics outlined above were applied to a regional airphoto study of the 1:50,000 black and white enlargements of the Cook, Coompana, Mason, Forrest and Eucla/Noonaera sheets. Fourteen airphoto features were identified within E.L. 562 and subject to ground examination and loam sampling. The location of the anomalies is given in Plan 2.

No intrusive features were located on the ground and loam sampling proved negative. Sampling details are provided in Table 2.

Of the airphoto features examined, BA11 was selected for follow-up by ground magnetics as no explanation of the circular airphoto feature was apparent on the ground.

A north-south traverse, 3.35 km in length was conducted over the anomaly using a Geometrics G816 Proton Precession Magnetometer. Fifty metre interval readings were taken with no significant field variation being noted. A complete listing of magnetic data is given in Appendix 1.

5.30 Assessment - Aeromagnetic Survey

5.31 Modelling

The negative magnetic anomalies located in the Coompana and Cook sheets, which were interpreted by Lambourn (1977) and Waller et.al. (1972) as indicative of possible Tertiary ultrabasic intrusives were considered by A.O. (Australia) Pty. Ltd. as initial exploration targets within the region. Accordingly a study based on the data presented in B.M.R. Records 1972/3 and 1972/60 was commissioned with the Geophysics Department of Macquarie University. The results are discussed below and more fully reported in Appendix 2.

The modelling study suggested that the five negative anomalies on the Coompana sheet interpreted by Lambourn as occurring within 200 metres of surface, may in fact lie approximately 100 metres below ground level. The modelling also indicated a magnetic susceptibility of 0.003 c.g.s. units which is within the upper part of the serpentinite/gabbro susceptibility range.

Computer modelling of the negative, magnetic anomaly lineations in the Cook sheet indicated steeply dipping dyke-like structures composed of reversely magnetised material of intensity less than 0.001 c.g.s. units. The depth to the top of these bodies remains unresolved. Modelling indicates a depth of 450 metres, but the gradients of the anomalies suggest a much shallower depth.

5.32 Computer Processing of Digital Data

The size of the inferred basic intrusives on the Coompana sheet is too large for the bodies to be kimberlites, but it was considered by A.O. (Australia) Pty. Ltd. that they may represent related alkali ultrabasic rocks, in particular carbonatites which often occur in association with kimberlites.

The total magnetic intensity profiles and contours produced from the aeromagnetic survey of the Cook-Ooldea-Barton and Coompana-Nullarbor-Fowler sheets were initially examined by A.O. (Australia) Pty. Ltd. with a view to the location of negative anomalies which may represent kimberlite pipes. It was found however, that as the magnetic response of kimberlite pipe is often subtle, the scale of the T.M.I. maps did not allow these types of responses to be discerned. In order to better establish whether kimberlite pipes are present in the region, the digital tapes of the Coompana-Nullarbor-Fowler airborne magnetic survey were copies and computer processed to produce analogue profiles at a horizontal scale of 1:100,000 and a vertical scale of 1cm = 20γ. These scales are suited to the detection of kimberlite-type responses. The computer processing was undertaken by Engineering Computer Services Pty. Ltd. of Bowral, N.S.W..

An extensive study of the detailed profiles disclosed no smaller scale response indicative of possible kimberlitic intrusion. However a number of the less intense, larger scale negative anomalies were found to have magnetic field gradients comparable to the major anomalies (for which modelling had been previously carried out) indicating similar, shallower depths.

5.40 Ground Magnetic Surveys

The most promising airborne magnetic anomalies selected for initial ground magnetic follow-up within the Eucla Basin licences were located in E.L. 560. A survey of these anomalies was carried out and was designed to:

(a) accurately locate the position and extent of the anomalies

(b) allow more accurate determination of the geometry of the causative body

(c) locate any small scale negative features which may be associated with the larger anomalies, but not apparent on the aeromagnetic data.

The results, as detailed in a separate report on Exploration Licence 560 indicated that:

(a) the anomalies are not the result of the combined effects of a cluster of near surface bodies

(b) that a significant thickness of magnetically 'quiet' material overlies the bodies.

No evidence of any near surface 'offshoots' from the main bodies was found.

Ground magnetic surveying within E.L. 561 was restricted to the follow-up of airphoto anomaly BA11, the results of which have been discussed previously in sub-section 5.20.

6.00 CONCLUSION

An extensive study of computer-processed analogue profiles from digital data of the B.M.R. Coompana-Nullarbor-Fowler aeromagnetic survey has failed to locate responses in E.L. 562 indicative of kimberlite intrusion.

Field examination and loam sampling of fourteen airphoto anomalies in E.L. 562, similar in character to known kimberlite or lamproite intrusions gave negative results. Magnetic ground traversing of one of the airphoto anomalies did not give significant results.

The existence of discrete, negative, magnetic bodies at depths of 200 metres has been confirmed by ground magnetic surveying in E.L. 560 to the north of E.L. 562. Although these anomalies may have economic potential in terms of carbonatites, skarn or Cu-U basement high type deposits, exploration undertaken to date in the Eucla Basin licences for kimberlites has not been encouraging.

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APPENDIX 1.

GROUND MAGNETIC DATA E.L. 562

AIRPHOTO ANOMALY BA11

Traverse	Station	Reading	Traverse	Station	Reading
N-S 1	00	58665	N-S 1	1300	58616
	50	661		1350	610
	100	652		1400	622
	150	672		1450	630
	200	657		1500	621
	250	630		1550	623
	300	640		1600	634
	350	647		1650	633
	400	644		1700	627
	450	645		1750	639
	500	631		1800	634
	550	633		1850	625
	600	633		1900	625
	650	636		1950	627
	700	623		2000	625
	750	629		2050	639
	800	633		2100	625
	850	636		2150	634
	900	626		2200	629
	950	641		2250	636
	1000	635		2300	635
	1050	637		2350	652
	1100	649		2400	647
	1150	639		2450	634
	1200	626		2500	602
	1250	625			

APPENDIX 2.

INTERPRETATION OF MAGNETIC ANOMALIES ON THE COOMPANA AND COOK - 1:250,000 SHEETS

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COOMPANA

Of the five areas selected for interpretation the most easterly one (centred at 129°40'E, 31°17'S) was selected for initial interpretation due to its isolated nature (Fig. A). A long profile was drawn through the centre of the anomaly in a direction N30°W and N150°E for a total distance of 50 kms. The positions of all contour intersections were plotted against distance along the profile. A smooth regional was estimated and subtracted from the data to give the profile for interpretation. The gradients at the NW and SE sides of the prominent negative anomalies are respectively 3000γ/3000m and 3000γ/2500m indicating a depth of the order of 2 kms on the basis of Peters method. The nature of the model is however more complex and the Peters estimates do not give realistic estimates.

A computer model interpretation for a simple two-dimensional body (Fig. B) was carried out using a non-linear optimisation procedure. The advantage of the program is that initial estimates of depth, width, magnetisation are varied to best fit the data. Intermediate solutions are available to indicate the direction the optimisation has taken. One or two runs are normally required with this program in comparison with the much higher number for a non-iterative program. The solution for this anomaly is given on the accompanying computer plot and shows that the steep gradients have been well modelled together with the central section between the two steep gradients. The deeper parts of the model are very poorly determined and the extension down to 100 kms should be ignored. In practise the best determined parameters are the depths to the upper surface and the positions of the upper corners of the border.

The depths of the upper corners of the model give 0.239 and 0.309 kms for the NW and SE edges of the body respectively. The flight altitude is .160 kms which needs to be subtracted from the above giving 80 metres and 150 metres respectively. The magnetisation is surprisingly high with a value of 0.003 c.g.s. units and reversely magnetised - hence the dominant negative anomaly.

The form of the anomaly is approximately circular and hence the two dimensional interpretation may be inadequate, but for the purposes of this investigation it is thought that the depths would be reasonably reliable. Small positive features appear to the NW and SE of the anomaly have not been modelled and are possibly due to smaller areas of normal magnetisation. The geological significance of these is difficult to ascertain.

The western most anomaly (located at 129°10'E, 31°10'S) is of a very similar pattern and it is thought that this is due to a very similar type of body.

The next anomaly investigated is the dual peaked anomaly located at 129°30'E, 31°10'S. The form of this anomaly on the computer contoured map is odd and it is thought that the anomaly is only identified on two flight lines with missing data in between. It is difficult therefore to place much credence to the plotted shape of the anomaly and the indicated gradients of the anomaly contours. A north-south profile through the eastern peak (Fig. C) shows that the anomaly is in fact a positive anomaly with a central negative anomaly. The steep gradients on the north and south of the negative are purely a function of the contouring algorithm and the original data location and may not reflect the true nature. However the actual gradients are probably steeper than indicated on the map and hence it is assumed that the depth to this body is much the same as for the first anomaly to the south east.

The northernmost anomaly (located at 129°20'E 31°00'S) is situated along a boundary between two magnetic regions - to the west appears to be reasonably magnetic basement whereas to the east is a large smooth negative anomaly probably due to a deep sediment filled basin. An east-west profile through the maximum amplitude of the anomaly (Fig. D) shows that the gradients to the west of the negative peak are very steep (2000γ/2000m) and similar to those observed for the first anomaly. On that basis it is interpreted that this body and the similar body to the south (129°20'E, 31°10'S) are both shallow features of the order of 100 metres below ground level.

COOK

The southwestern corner of this map sheet show a series of linear negative anomalies which trend in a direction of N20-30°W. They appear to be truncated to the south by a large circular negative anomaly the origin of which is not clear. The westernmost of the linear anomalies extends for most of the length of the map the northern part being at a very subdued amplitude.

Line 155 of the stacked profile plots was chosen for primary interpretation as it appeared to be representative of the anomalies. The nature of the anomalies changes slowly along their strike and hence these are truly two-dimensional features - in contrast with the near circular anomalies of the Coompana sheet. The line was digitised at 1 km intervals and the data then modelled by the non-linear program (Fig. E). A set of three bodies were chosen to represent the three main negative peaks. The two west bodies effectively modelled the field although the peak of the western anomaly was not obtained. The gradients however appear to be closely modelled. The easternmost model was unduly influenced by adjacent anomalies and did not model the observed field well. This is a short anomaly and is probably unimportant. The two models to the west of the profile are thus composed of steeply dipping dyke-like structures composed of reversely magnetised material of intensity less than 0.001 c.g.s. units. They appear to be more deeply buried than the Coompana anomalies from the computer model (which give depths of the order of 550 metres below ground level). The gradients of the anomalies appear to be just as steep indicating a much shallower depth.

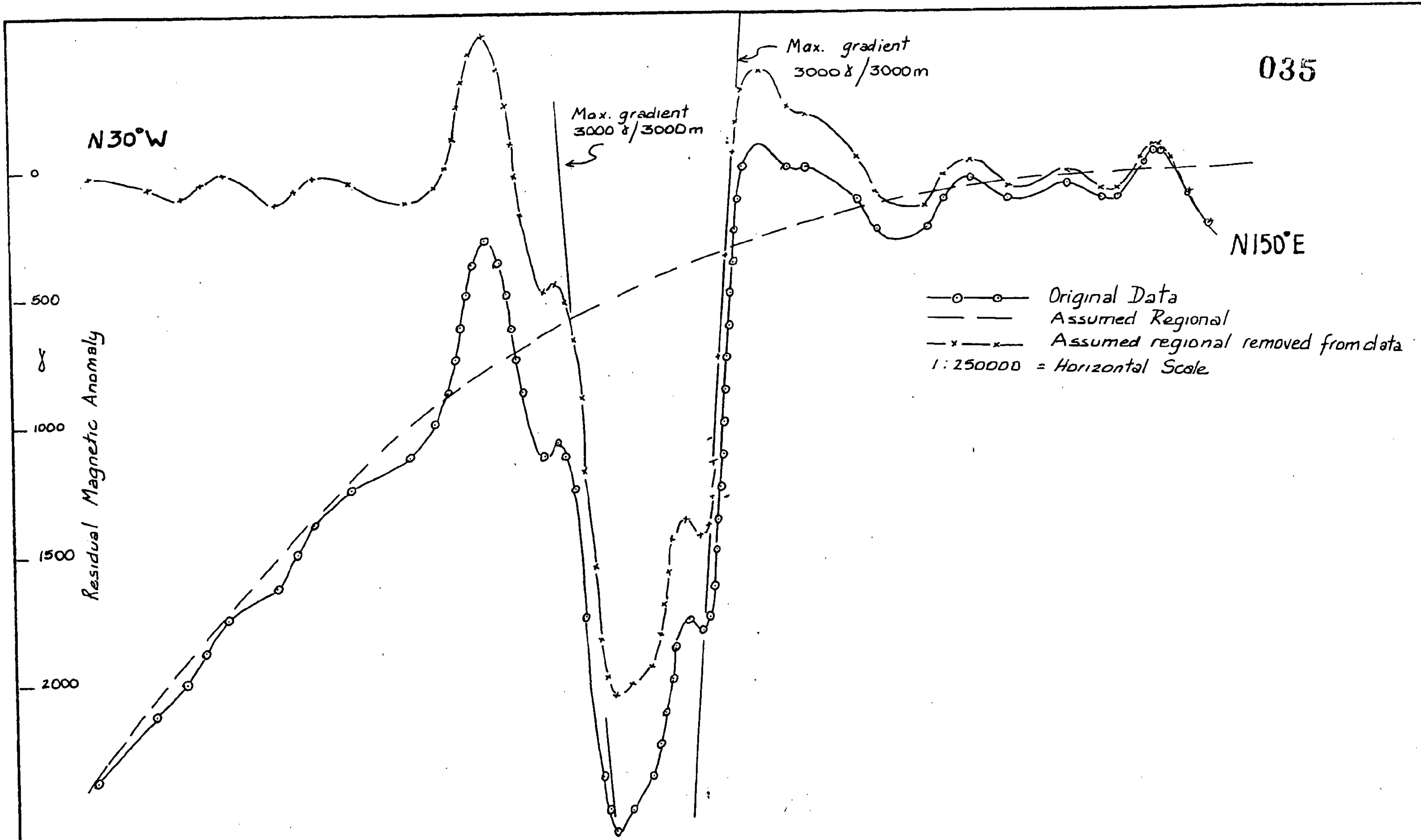

FIGURE A

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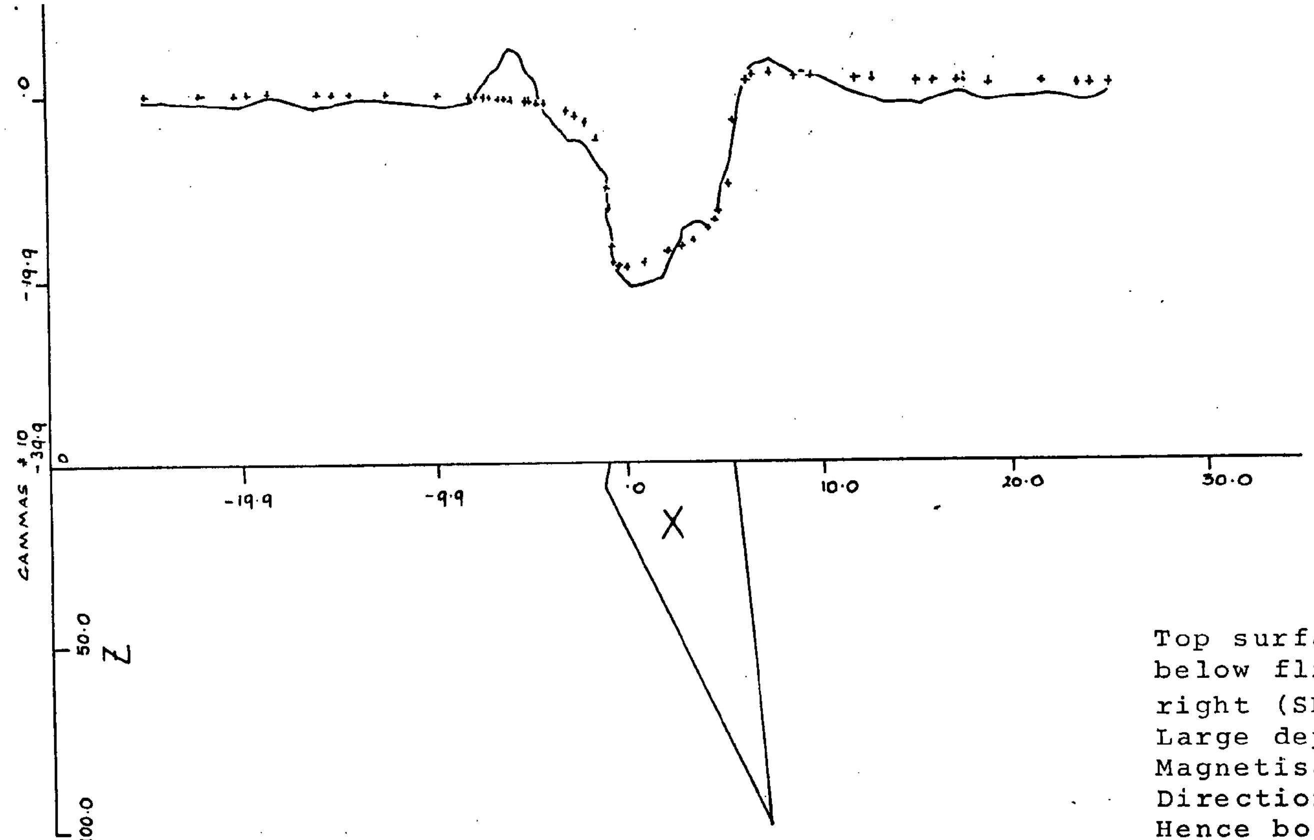
APRIL 1980



Top surface is at .239 & .309 kms below flight level at left(NW) and right (SE) ends of the body respectively. Large depth extent meaningless. Magnetisation <u>high</u> 0.003 c.g.s. Direction of magnetisation is reversed Hence body is very shallow- about 100 metres below ground. Magnetisation is strong and reversely magnetised.

A.O.(AUSTRALIA) PTY. LTD.

FIGURE B

APRIL 1980

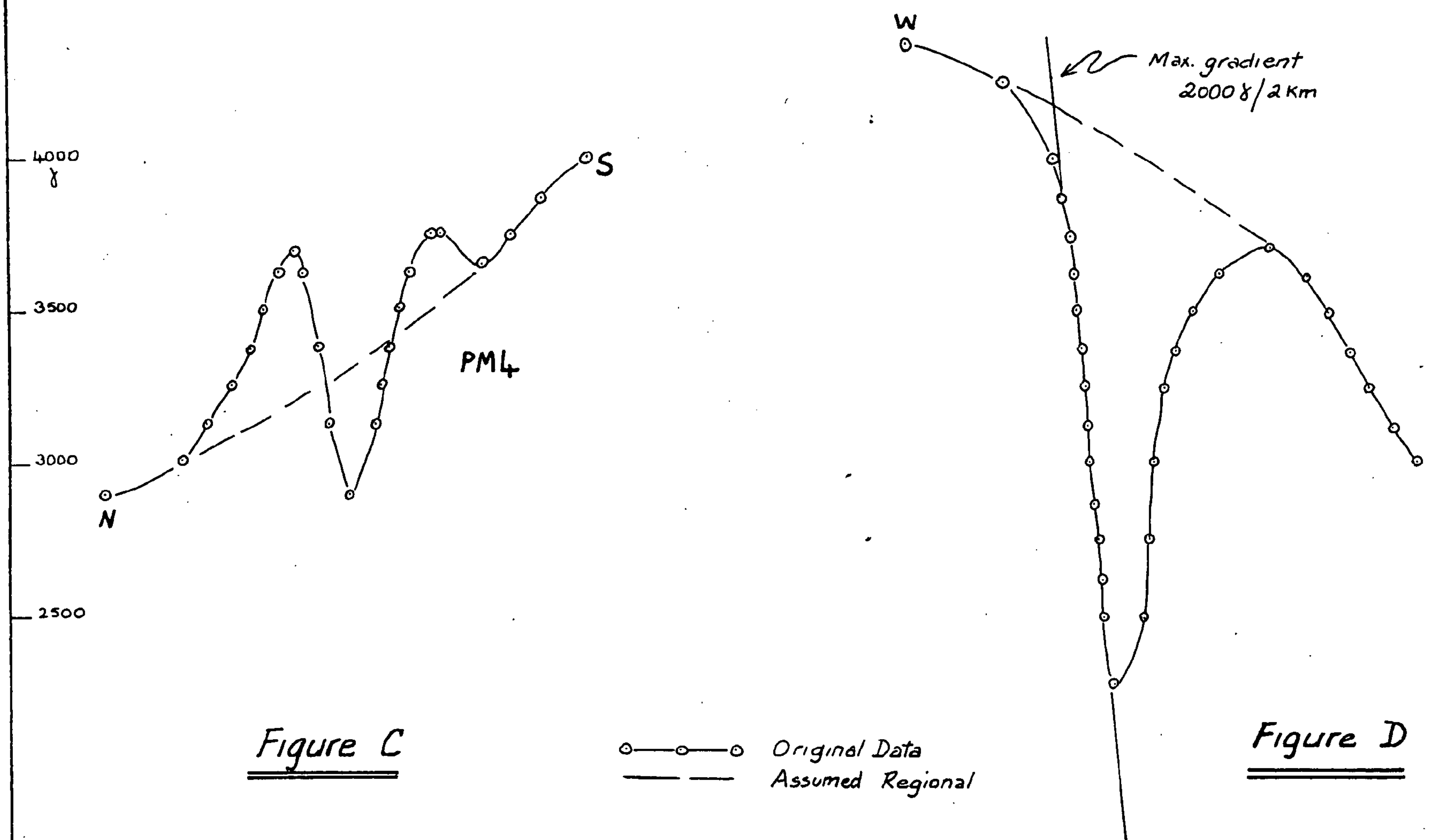
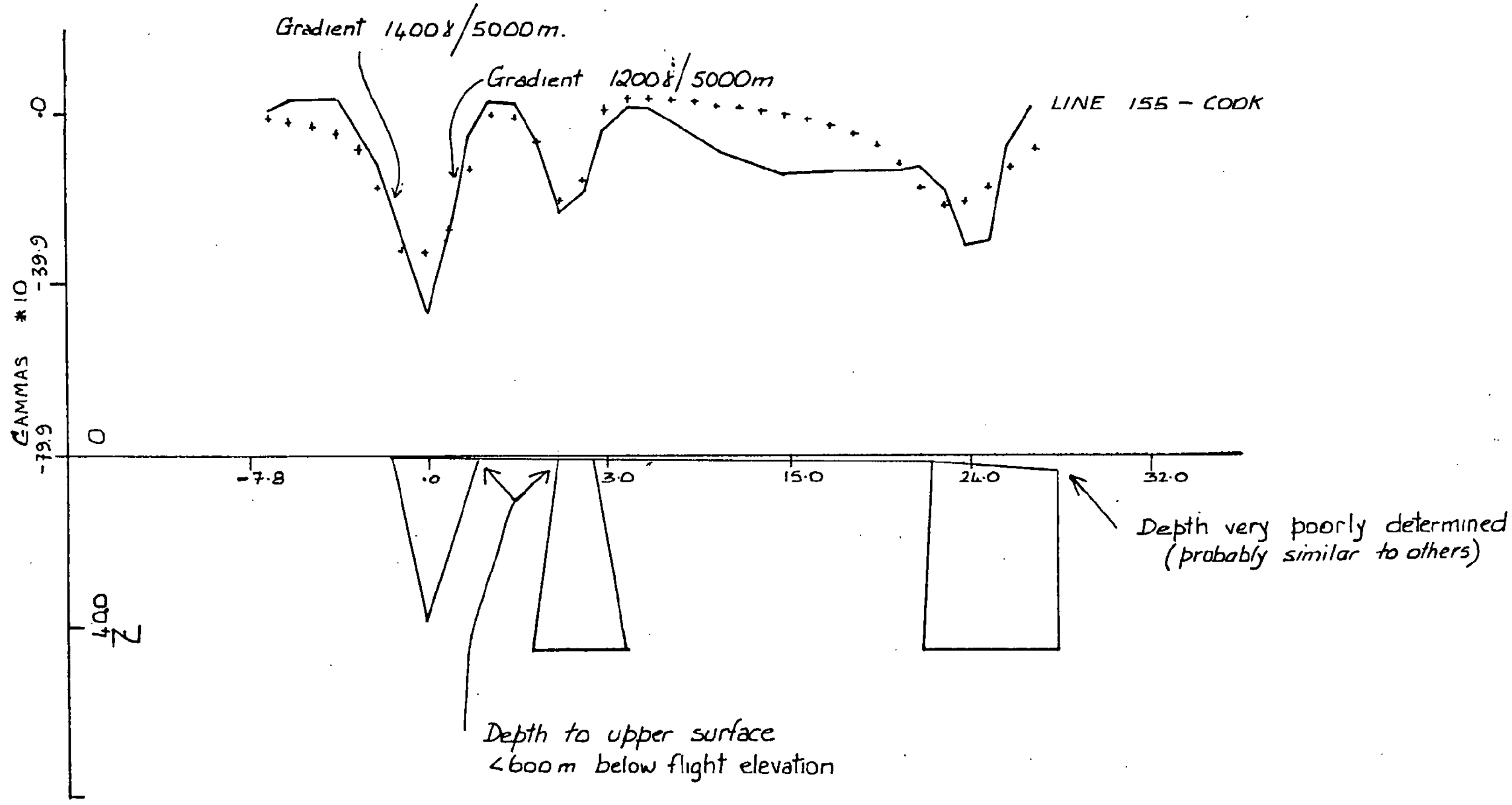


Figure C

Figure D

A.D. (AUSTRALIA) PTY. LTD.

APRIL 1980

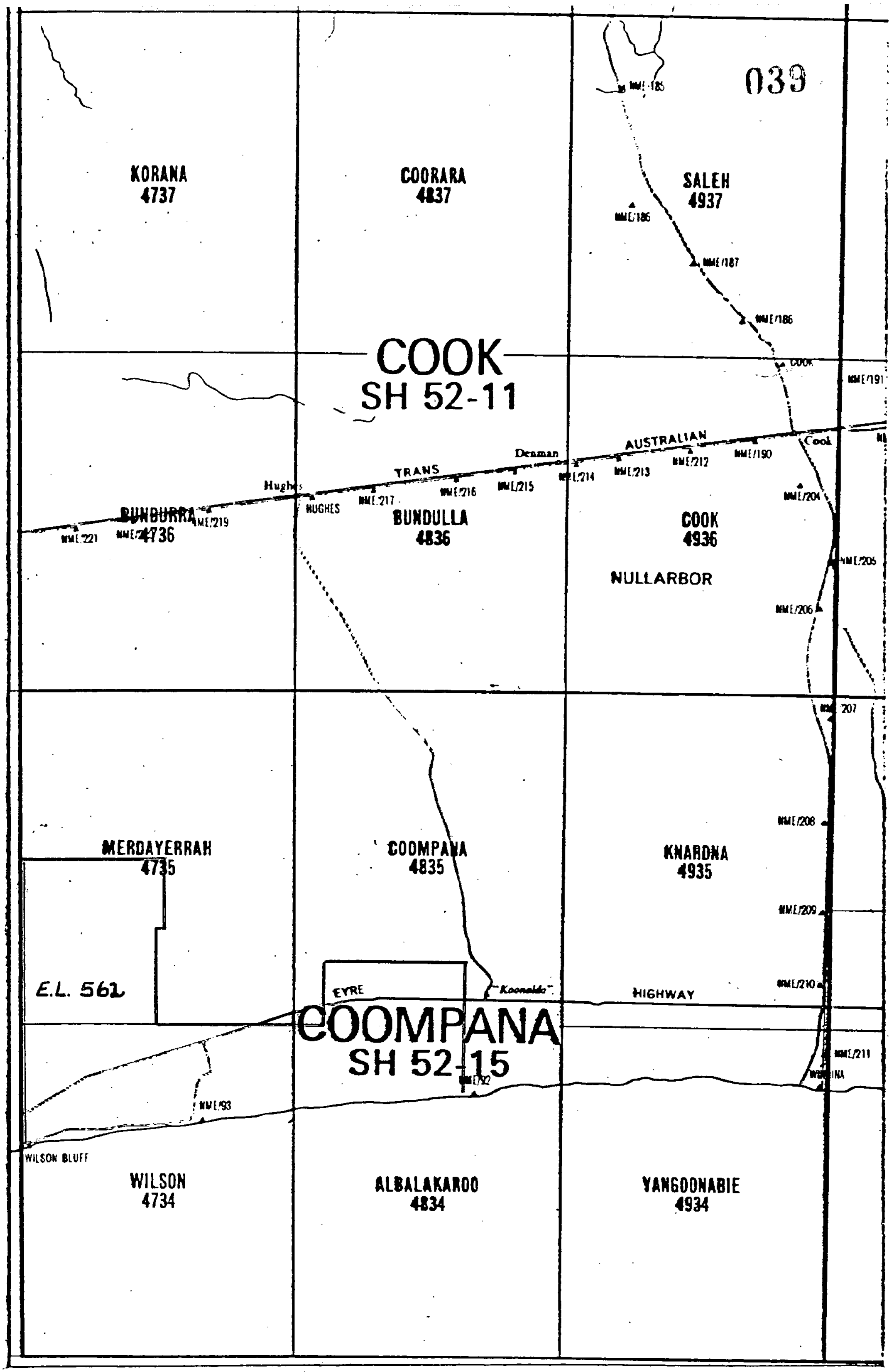


INTENSITY OF MAGNETISATION 0.0007
REVERSE POLARITY MAGNETISATION

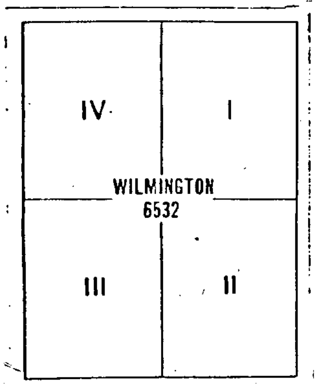
Figure E

A.O (Australia) Pty. Ltd.

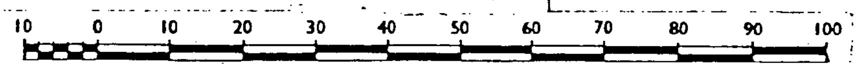
April 1980



1:50 000 MAP REFERENCE



SCALE 1:1,000,000



KILOMETRES

EXPLORATION LICENCE:	562		
MAP IDENTIFICATION:	Merdayerrah	4735	II, III
	Coompana	4835	II, III
	Wilson	4734	I, IV
	Albalakaroo	4834	I, IV

KEYWORDS:

Kimberlite potential
Loam Sampling
Air Photo Anomalies
Ground Magnetics
Assessment Aeromagnetics

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STRATIGRAPHIC CORRELATION CHART, EUCLA BASIN

TABLE 1

WESTERN AUSTRALIA			Minimum & Maximum thicknesses (metres)	SOUTH AUSTRALIA		International Units		
North	Southwest	Madura Area		Mallabie Area	Central to Northern Area			
Residual clay, sand & kankar, eolian sands	Residual clay & kankar; recrystallized limestone; eolian sands	Roe Calcarenite & eolian sand	0-15+	Aeolianites		QUATERNARY	1.8 m.y.	Newer Volcanics (Vic) including Bullenmerri Kimberlite occurrence
						PLIOCENE	5 m.y.	
						UPPER & MIDDLE MIOCENE		
COLVILLE LIMESTONE	NULLARBOR LIMESTONE	NULLARBOR LIMESTONE	3-53	NULLARBOR LIMESTONE	NULLARBOR LIMESTONE	LOWER MIOCENE (TERTIARY)		
		Mullamullang Limestone Mbr.	0-18					
		ABRAKURRIE LIMESTONE	0-91			OLIGOCENE	37 m.y.	
	TOOLINNA LIMESTONE	WILSON BLUFF LIMESTONE	6-300	WILSON BLUFF LIMESTONE	WILSON BLUFF LIMESTONE	UPPER EOCENE		
		HAMPTON SANDSTONE	0-85+	HAMPTON SANDSTONE	HAMPTON SANDSTONE	MIDDLE EOCENE		
						LOWER EOCENE TO PALEOCENE	70 m.y.	
MADURA FORMATION	MADURA FORMATION	MADURA FORMATION	0-357+	MADURA FORMATION	MADURA FORMATION	CRETACEOUS		
LOONGANA SANDSTONE	LOONGANA SANDSTONE	LOONGANA SANDSTONE	0-71	LOONGANA SANDSTONE	LOONGANA SANDSTONE		135 m.y.	Terowie Kimberlites (S.A.)
						JURASSIC	163 m.y.	MEREDITH BRECCIA PIPE (VIC) KIMBERLITE
						TRIASSIC TO UPPER PERMIAN	200 m.y.	
WILKINSON RANGE BEDS			0-88	Claystone, sands & silts		LOWER PERMIAN		
						CARBONIFEROUS TO ORDOVICIAN	280 m.y.	
				Sandstone & Shale	Siltstone	CAMBRIAN		
ILMA BEDS	Granite, gneiss, schist & quartzite	Granite		Feldspar porphyry & sandstone		UPPER PROTEROZOIC	570 m.y.	
						LOWER PROTEROZOIC & ARCHAEAN		

TABLE 2: LOAM SAMPLING AIRPHOTO ANOMALIES - E.L. 562

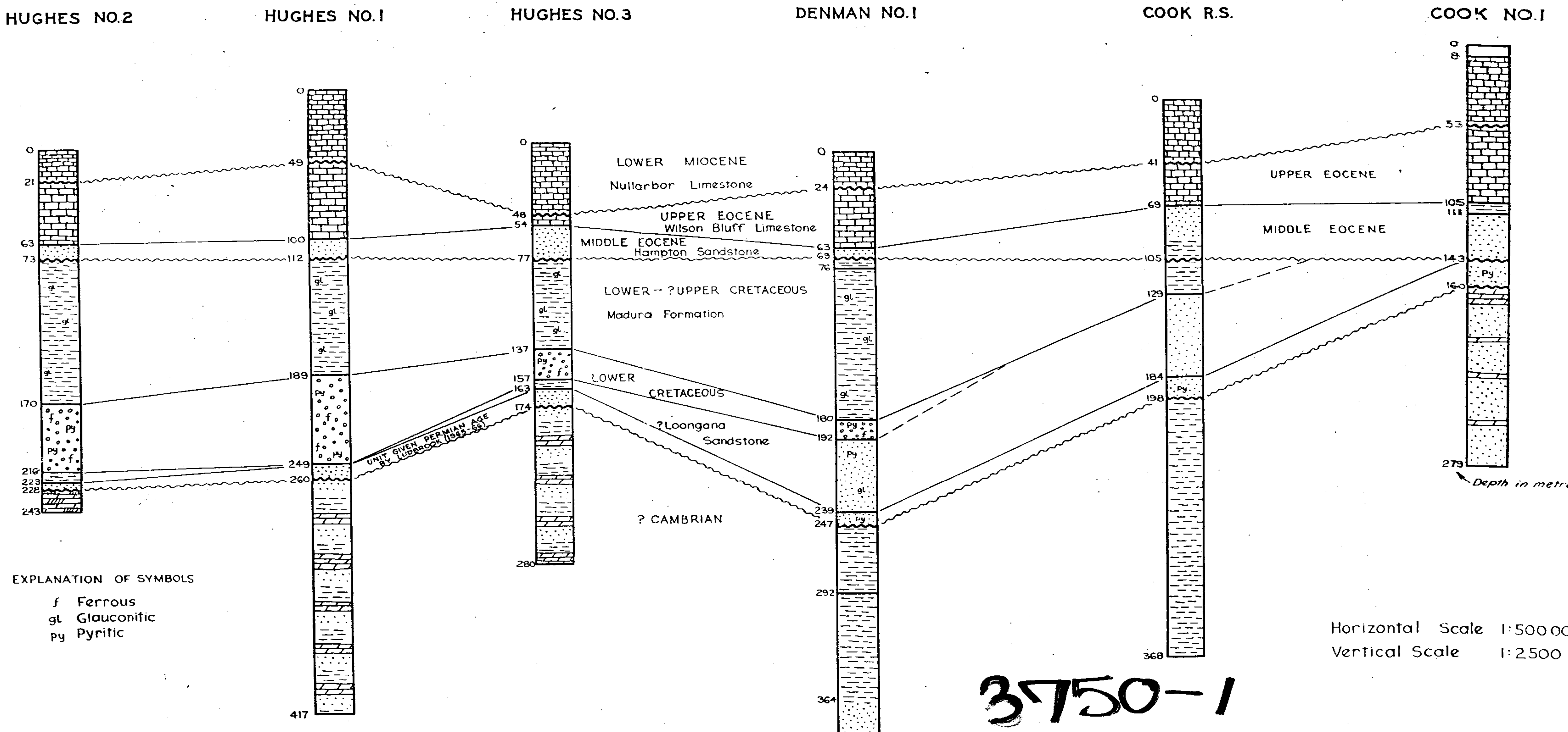
ANOMALY NO.	PHOTO LOCATION		LABORATORY RESULTS		
	Film No.	Photo No.	Observed to...mesh	Indicator Minerals	Comments
BA1	2216	68	40	NIL	Small heavy mineral content.
BA2	"	"	40	NIL	"
BA3	"	"	40	NIL	"
BA4	"	64	40	NIL	"
BA5	"	108	40	NIL	"
BA6	"	"	40	NIL	"
BA7	"	112	40	NIL	"
BA8	"	"	40	NIL	"
BA9	"	116	40	NIL	"
BA10	"	"	40	NIL	"
BA11	"	"	40	NIL	"
BA12	"	124	40	NIL	"
BA13	"	120	40	NIL	"
BA14	"	56	40	NIL	"

SAMPLINE DETAILS:

DATE:	December, 1979
DEPTH:	Surface sample
QUANTITY:	25 kg
CONDITION:	Dry, included large proportions of fine calcareous dust and chert fragments.
CONTAINER:	Calico bags protected by heavy duty plastic bags.

LABORATORY DETAILS:

NAME OF LABORATORY:	Ashton Mining N.L. 100 Jersey St., JOLIMONT. 6014
DATE SAMPLES OBSERVED:	January, 1980.



LOCALITY PLAN

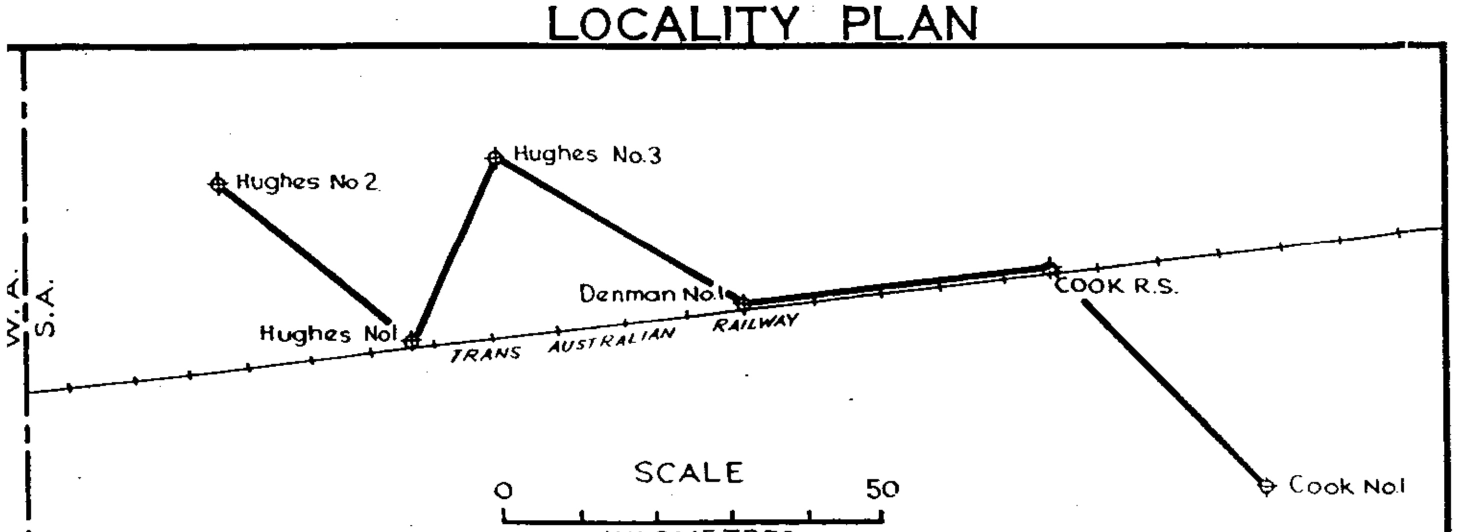


FIGURE 4

DEPARTMENT OF MINES — SOUTH AUSTRALIA			
ONSHORE EUCLA BASIN — S.A.			
SECTION THROUGH NORTHERN WELLS			
PETROLEUM GEOLOGY SECTION	B.C. Youngs GEOLOGIST	Drn. B.C.Y.	SCALE: 1:2500 Vertical
		Tcd. A.F.	74-102 A+D
		Ckd.	
Director of Mines		Exd.	DATE: JANUARY 1974

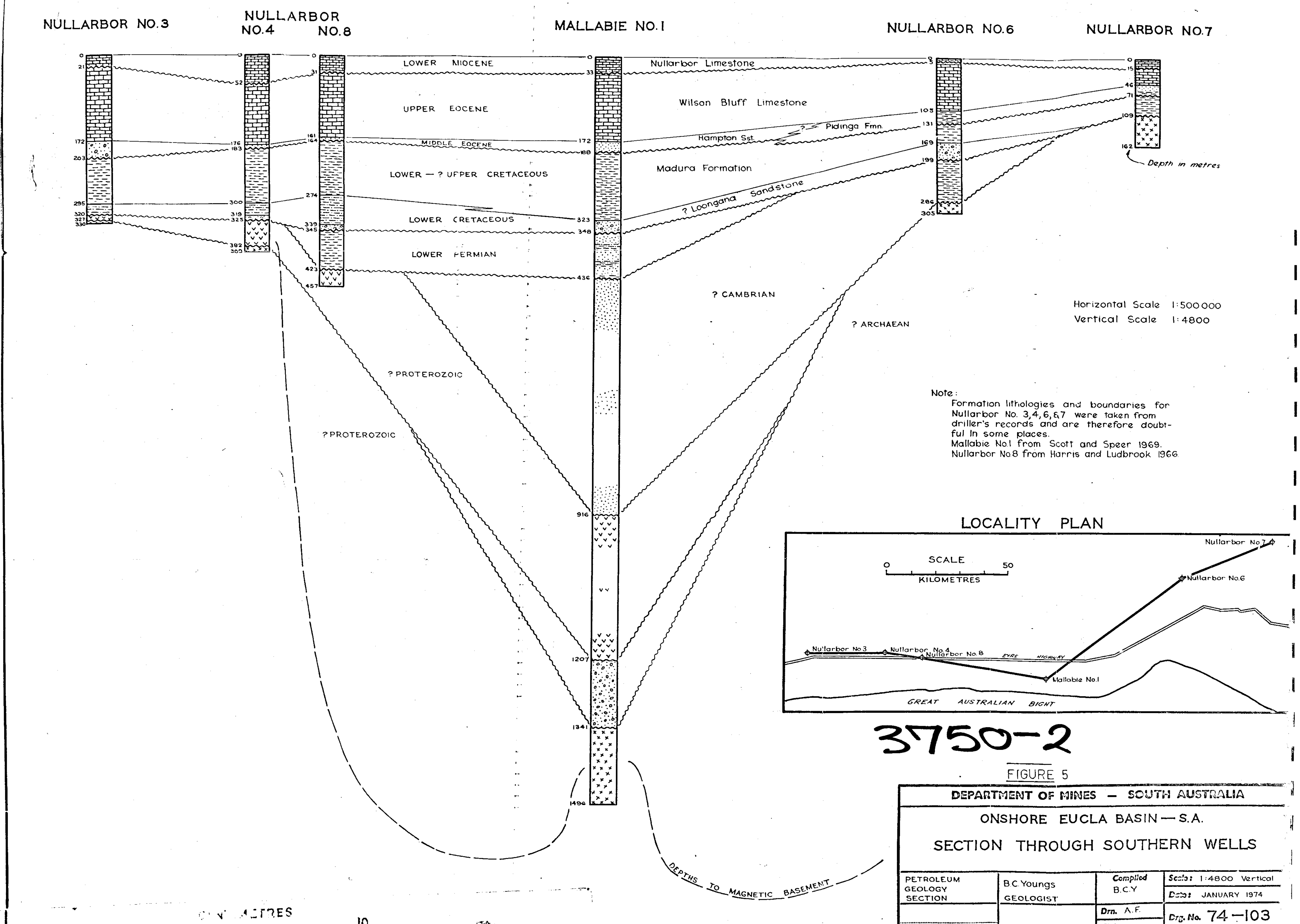


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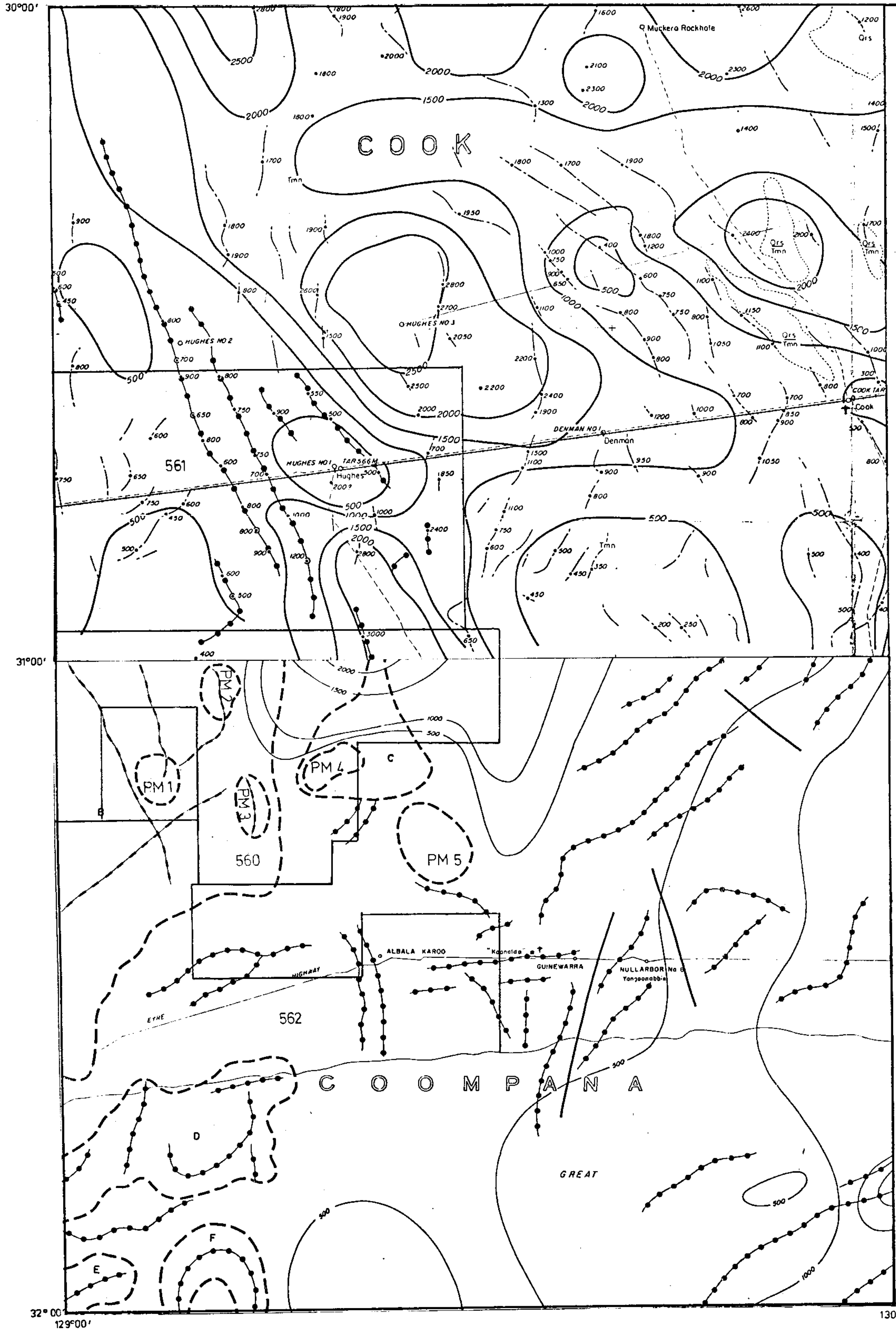
FIGURE 5

DEPARTMENT OF MINES — SOUTH AUSTRALIA

ONSHORE EUCLA BASIN — S.A.

SECTION THROUGH SOUTHERN WELLS

PETROLEUM GEOLOGY SECTION	B.C. Youngs GEOLOGIST	Compiled B.C.Y	Scale: 1:4800 Vertical
			Date: JANUARY 1974
		Drn. A.F.	Drg. No. 74—103 A+D
Director of Mines		Ckd.	



PLAN 1

Magnetic Interpretation

(ADAPTED FROM BMR RECORDS 1977/52 & 1972/60)

COOK LEGEND

GEOPHYSICAL LEGEND

- 3 Magnetic basement zone
- Positive magnetic trend
- Negative magnetic trend
- 1000 500 Magnetic basement depth contour (depth in metres below assumed ground level)
- 1000 Point of depth estimate

TOPOGRAPHICAL LEGEND

- Cook Named place
- Road or track
- Hughes Railway and siding
- State boundary
- Salt Lake
- Aerodrome or landing ground

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COOMPANA LEGEND

MAGNETIC

- Positive magnetic trend
- Negative magnetic trend
- Inferred fault
- 500 Basement contour (metres). Datum ground level onshore, sea level offshore
- H Interpreted area of more basic basement
- G Interpreted magnetic anomaly source reversely magnetised

TOPOGRAPHY

- Highway or main road
- Road or track
- Shoreline
- Lake
- Well or borehole
- Building(s)
- Named place
- "Nullarbor" Homestead
- Airport or airfield