

**PETROLEUM  
EXPLORATION OPPORTUNITY**

**SOUTHEASTERN ARCKARINGA BASIN**

**AREA E**

**DATA PACKAGE BROCHURE**

**DEPARTMENT OF  
MINES AND ENERGY**

**SOUTH AUSTRALIA**

**May, 1989**

PETROLEUM EXPLORATION OPPORTUNITY  
SOUTHEASTERN ARCKARINGA BASIN

DATA PACKAGE BROCHURE - AREA E

ENVELOPE 8083  
SR27/2/94

Prepared by  
OIL, GAS & COAL DIVISION

DEPARTMENT OF MINES & ENERGY  
SOUTH AUSTRALIA

MAY, 1989

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PETROLEUM EXPLORATION OPPORTUNITY  
SOUTHEASTERN ARCKARINGA BASIN  
DATA PACKAGE BROCHURE - AREA E

1. STATEMENT OF INTENT

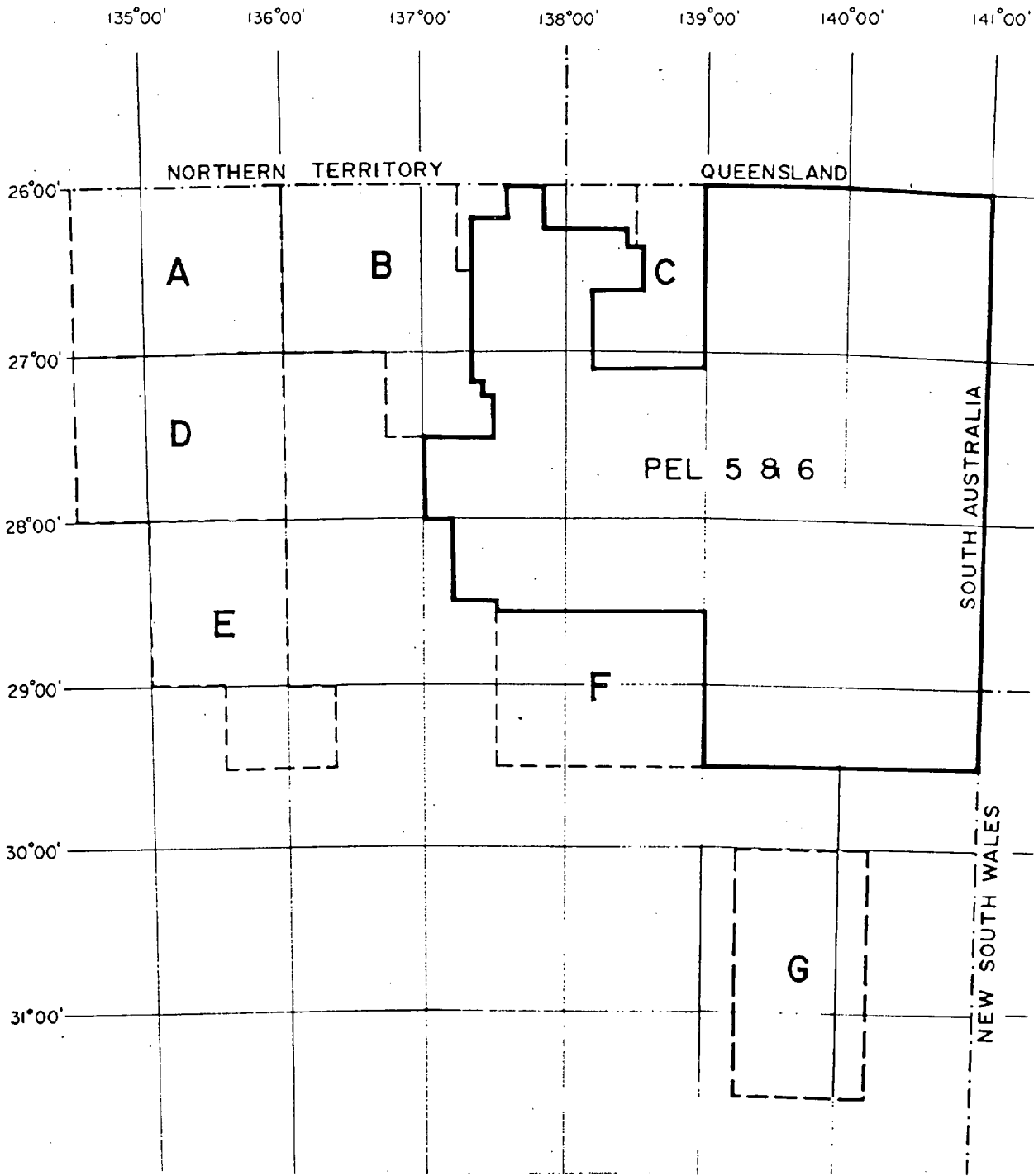
Applications are invited by 31st September, 1989 for a Petroleum Exploration Licence (PEL) over all or part of AREA E which covers 15,327 km<sup>2</sup> of the southeastern Arckaringa Basin. The area is one of seven covering portions of the Mesozoic Eromanga and Simpson Desert Basins, Permian Pedirka and Arckaringa Basins and the Cambrian Arrowie and sub-Arckaringa Basins (Figs. 1 and 2) which came available following the relinquishment in early 1989 of 88,406 km<sup>2</sup> of the Pedirka Sector and 4,589 km<sup>2</sup> of the Arrowie Sector of PELs 5 and 6, plus the relinquishment of PEL 31 (held from 1985 until late 1988). Several of these areas incorporate parks or reserves (Fig. 3).

A data package has been prepared for each of the seven areas which contains a selection of regional gravity and magnetic data, seismic sections, well completion reports from petroleum, mineral and stratigraphic wells and relevant geological maps. This selection forms the basis for assessment of each area and is not intended to be totally comprehensive.

References to all relevant petroleum exploration work carried out to date in Area E are listed in the bibliography.

A brief review of the geology and hydrocarbon potential of Area E is set out below (Section 2), together with a detailed breakdown and costing of the data package (Section 3) a bibliography, (Section 4) and licence application information


(Section 5). An order form is provided at the rear of this brochure. Please note that the orders received prior to May 31st 1989 will receive preference. Packages will be supplied promptly after that date.

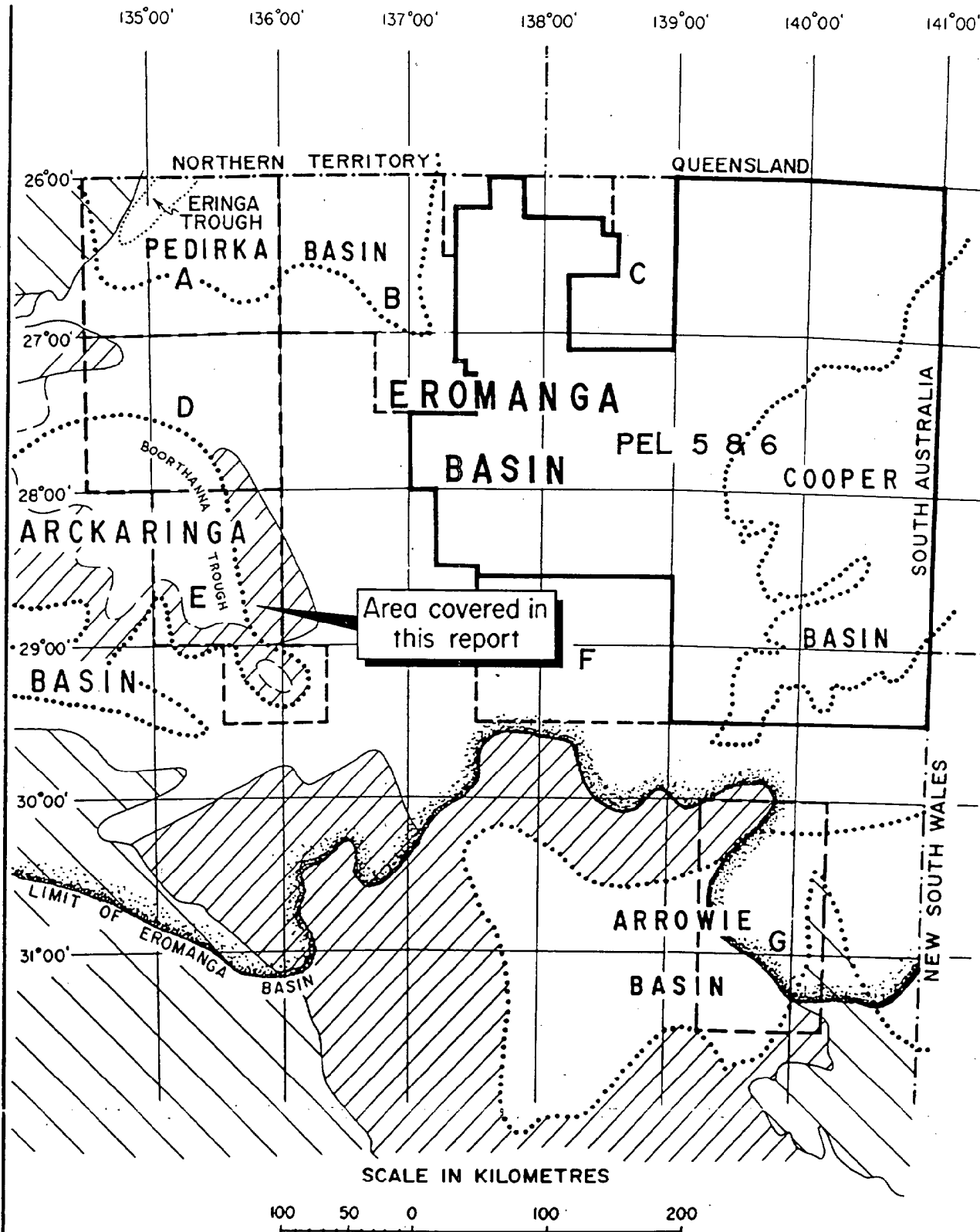


SCALE IN KILOMETRES



Figure 1

	<b>DEPARTMENT OF MINES AND ENERGY SOUTH AUSTRALIA</b>		COMPILED R. Frears	C D O      DATE
	<b>AREAS AVAILABLE FOR APPLICATION</b>		DRAWN E. Catabio	SCALE As shown
			DATE Jan '89	PLAN NUMBER
			CHECKED	



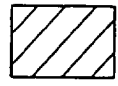
Area covered in this report

SCALE IN KILOMETRES



LEGEND

Shallow or outcropping Proterozoic rocks (mainly Adelaidean)



Crystalline basement...

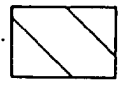
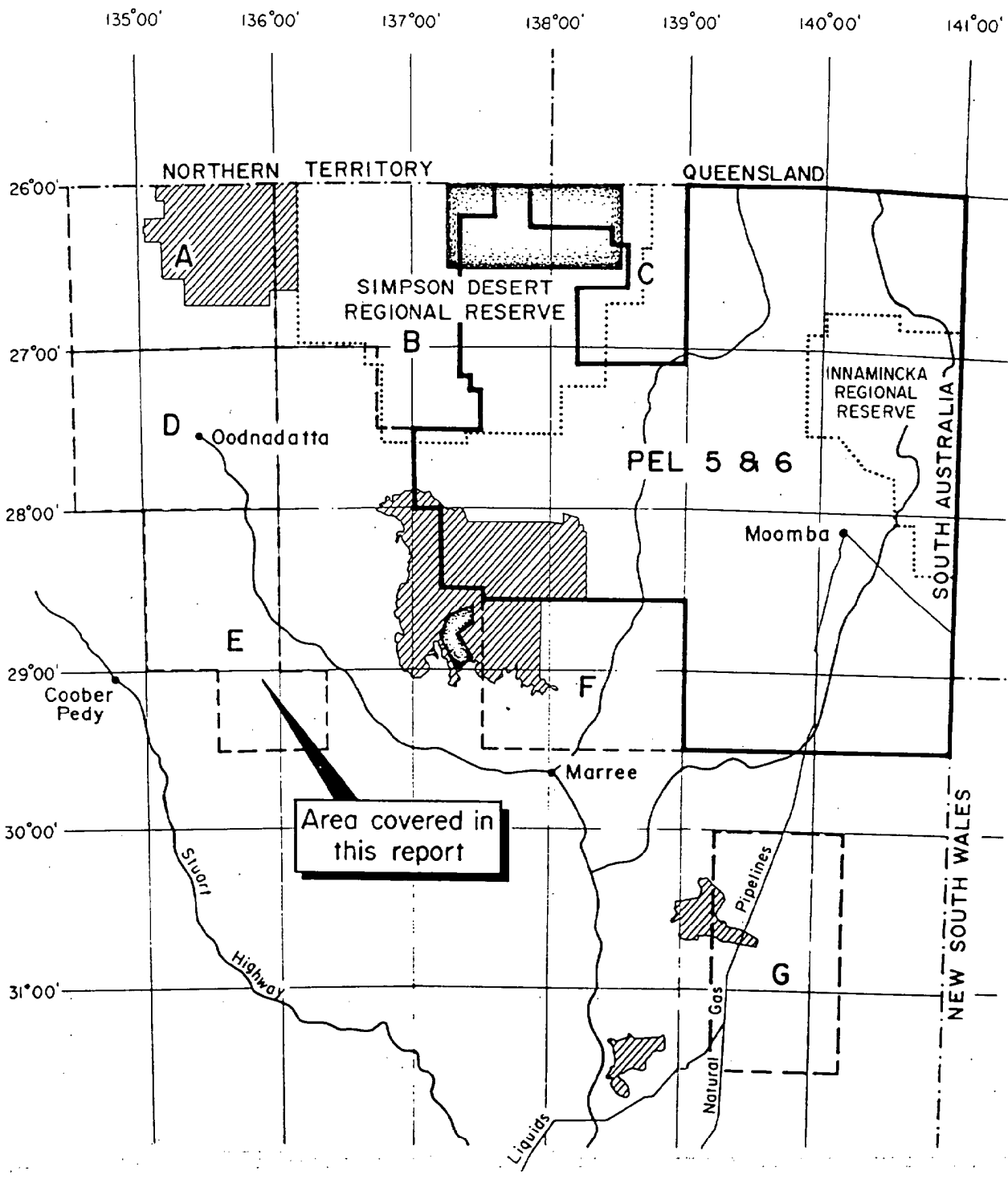


Figure 2

 <b>DEPARTMENT OF MINES AND ENERGY</b> <b>SOUTH AUSTRALIA</b>	COMPILED R. Frears	C D O    DATE
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	DATE Jan. '89	PLAN NUMBER
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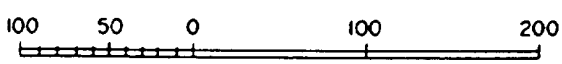
**NORTHEASTERN SOUTH AUSTRALIA**  
**SEDIMENTARY BASINS**





Area covered in this report

SCALE IN KILOMETRES



National Park

Conservation Park

Figure 3

 <b>DEPARTMENT OF MINES AND ENERGY</b> <b>SOUTH AUSTRALIA</b>	COMPILED R. Frears	C.D.O. DATE
	DRAWN E. Calabio	SCALE As shown
	DATE Jan. '89	PLAN NUMBER
	CHECKED	

# NORTHEASTERN SOUTH AUSTRALIA PARKS and RESERVES

## 2. GEOLOGICAL SUMMARY

### 2.1 Geological Setting

The Early Permian intracratonic Arckaringa Basin (Fig. 2) is composed of a central platform area of gently undulating shallow crystalline basement surrounded by peripheral depressions. It was established by downfaulting along the marginal depressions, principally the Boorthanna and Phillipson Troughs which contain up to 1,300 m of Permian sediments, underlain unconformably by 880 metres or more of unmetamorphosed Early Palaeozoic rocks or by Precambrian metasediments. Eromanga Basin sediments unconformably overlie the Permian sequence in most areas varying in thickness from zero to about 200 m in Area E.

The eastern edge of Area E corresponds to the eastern margin of the Arckaringa Basin and is marked in part by the Peake and Denison Ranges comprising four north-trending inliers (Fig. 4). They comprise a core of crystalline rocks overlain by folded and metamorphosed Late Precambrian sediments of the Adelaide Geosyncline and dissected by Early Palaeozoic intrusives.

Graben development was probably initiated in the Early Palaeozoic, marking the start of a Cambrian-Devonian depositional phase during which the adjacent Officer and Warburton Basins developed. In the Boorthanna Trough a shallow marine clastic/carbonate sequence, the Cootanoorina Formation is now presumed to be of Cambrian age. Harris and McGowran (1973) initially determined a Devonian age for part of the sequence, however subsequent examinations have been unable to verify this. Substantial mineral and petroleum exploration by Comalco Aluminium Limited in the Officer Basin

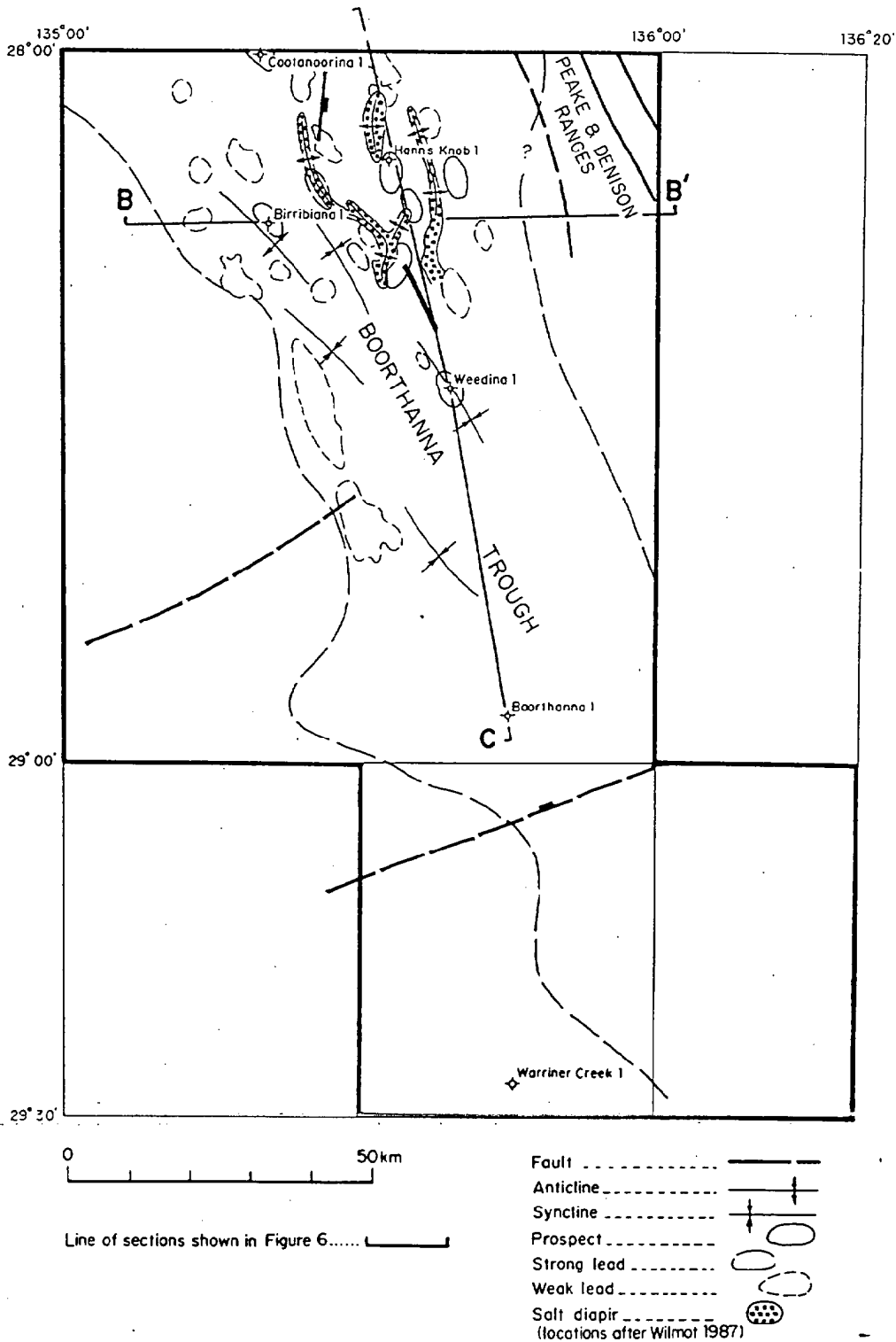


Figure 4 Geological summary showing leads & prospects, Area E

during the period 1980-89 led to a revision of the stratigraphy of the Officer Basin (Brewer et al, 1987) and enabled correlation with units below the Arckaringa Basin. Comalco consider the Cootanoorina Formation to be a lateral extension of the Early Cambrian age Ouldburra Formation of the Officer Basin, however, it also has a similar lithofacies sequence to the Kalladeina Formation of the Warburton Basin which is of Middle to Late Cambrian age.

The main period of tectonic activity commenced in Late Carboniferous or Early Permian times. Faulting is assumed to be synchronous with deposition. Three Permo-Carboniferous formations are present in the subsurface. Proglacial diamictites and outwash sands of the Boorthanna Formation are overlain by the Stuart Range Formation, a fine-grained clastic-rich shallow marine sequence. This is in turn overlain by coal swamp and associated facies of the Mount Toondina Formation (Fig. 5). There is no preserved record in the Arckaringa Basin of Middle or Late Permian sediments.

Diapirism is evident in the Arckaringa Basin as indicated by seismic reflection, gravity and outcrop data. Extensional tectonics and differential loading are postulated as the driving mechanisms for initial diapiric movement and subsequent growth with Adelaidean age salt as the source (Jones, 1988). Jones suggested that diapiric activity occurred during the Adelaidean and Cambrian with some reactivation caused by tectonic activity during the Tertiary. Outcrop evidence to support diapirism occurs at Mount Toondina where Permian sediments form a piercement structure (Freytag, 1967; Wopfner, 1977). Mount Toondina is located immediately north of Area E and within Area D. Two drillholes sited on this structure, Toondina-1 (total depth [TD] 93 m) and -2 (TD 93 m) were completed in 1963 but did not penetrate below the

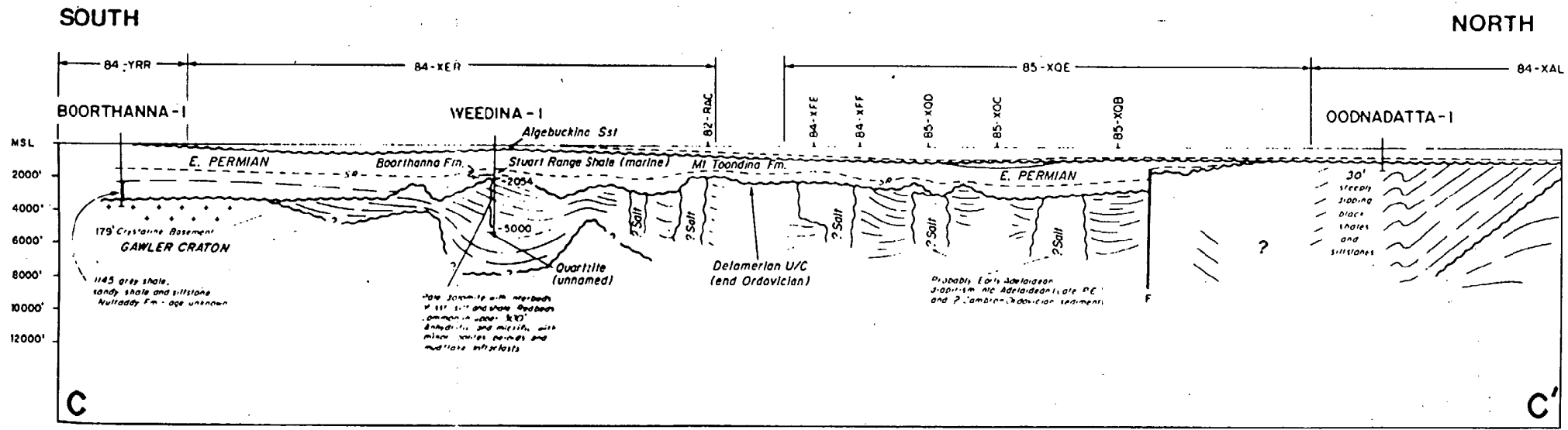
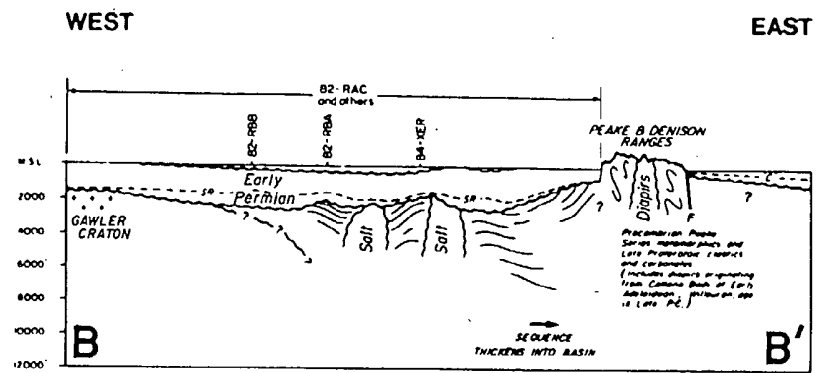
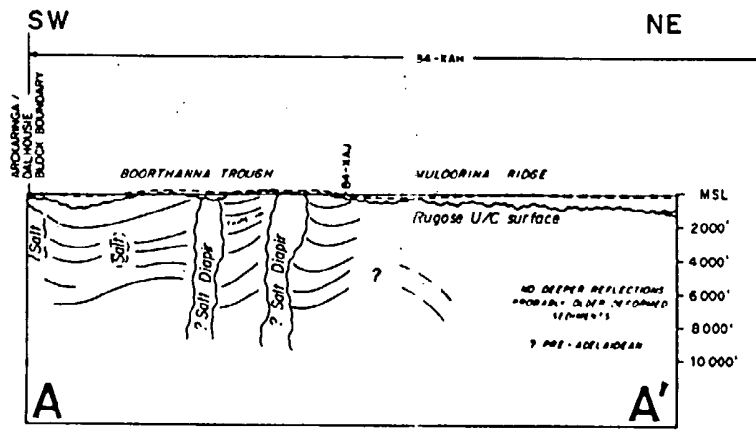
AGE	ROCK UNIT		LITHO.	DEPOSITIONAL ENVIRONMENT	COMMENTS	
	◆ OIL SHOW	⚡ SOURCE ROCK				
CAINO-ZOIC				Non-marine		
EARLY CRETACEOUS	MARREE SUBGROUP	OODNADATTA FORMATION		Marine	Regional seal (O.F.). Lenticular to continuous, generally low porosity (C.S.). Restricted to eastern portion of Arckaringa Basin (O.F., C.S.).	
		COORIKIANA SANDSTONE		Regressive marine shoreface.		
		BULLDOG SHALE		Open marine transgressive.	Regional seal.	
		MT. ANNA SANDSTONE MEMBER	CADNA-OWIE FORMATION		Non-marine to marginal marine.	Regional sand sheet, variable porosity (C.F.). Reservoir relies on overlying marine shale seal (A.S.). Generally water saturated (C.F., A.S.).
(EARLY) - LATE JURASSIC	ALGEBUCKINA SANDSTONE			Braided fluvialite.		
PERMIAN	EARLY	MT. TOONDINA FORMATION	600 m	Lacustrine, meandering fluvial and back swamp.	Generally low porosity. Immature but could provide good source rock at depth.	
		STUART RANGE FORMATION	490 m		Marginal marine	Could provide excellent seal. Mostly immature but could provide good source rock at depth. Oil shale potential.
		BOORTHANNA FORMATION	420 m		Shallow marine - fluvial periglacial.	Reservoir sands may be developed in Boorthanna Formation. Hydrocarbon charge also possible from underlying carbonates.
LATE CARB.	BOORTHANNA TROUGH					
EARLY MID CAMBRIAN	OFFICER BASIN	WALLATINNA FM.			Carbonates mostly require secondary porosity enhancement. Hydrocarbon charge is possible from both Cambrian and Precambrian sources. The Parakeelya Member of the O.H.F. is self sourcing and sealing. Thin but extensive.	
		OBSERVATORY HILL FM.				
		COULDBURRA RELIEF SST.				
ADELAIDEAN	UNDIFFERENTIATED	RODDA BEDS		Slope and basin (R.B.).	Laminated dolomitic siltstones. Lean but extensive source beds (R.B.)	
		MURNAROO FM.		Braided fluvial to shallow marine (M.F.)	Excellent reservoir at shallow depth. Predominantly structural traps (M.F.)	
		UNDIFFERENTIATED	In excess of 29 km of sediments are recorded in the Peake and Denison Ranges.			
PRE-ADELAIDEAN	CRYSTALLINE BASEMENT				Intrusives, volcanics and metamorphic complexes.	

600m Maximum known thickness

SADME S20710

## ARCKARINGA BASIN Stratigraphic column

Figure 5



Figures from Allender et al. 1987 Location of cross sections shown on Figure 4.

Figure 6. Regional cross sections Areas D and E

Permian sequence. Two other attempts have been made to drill a diapir but results were inconclusive. They were mineral drillholes Todmorden-1 (TD) 400 m and -2 (TD 406 m) completed in 1986 and located within Area D (Allchurch, 1988). Diapirs are located on figure 4 and shown in cross section on figure 6.

Four petroleum exploration wells have been drilled in the Boorthanna Trough. SADM Cootanoorina-1 drilled in 1967 (TD 948 m) and Pexa Weedina-1 drilled in 1970 (TD 1,625 m) found no hydrocarbons in the Permian section, but minor gas shows (Cootanoorina-1) and bituminous material (Weedina-1) were recorded from the underlying ?Cambrian sequence. Weedina-1 intersected 883 m of carbonate sequence. In 1986-87 Delhi drilled two exploration wells, Birribiana-1 (TD 1,427 m) and Hanns Knob-1 (TD 1,537 m), in the Boorthanna Trough. The wells were dry, however low levels of ditch gas were recorded in Birribiana-1. Both wells terminated in previously unknown pre-Permian sequences. Birribiana-1 in dolerite and Hanns Knob-1 in a sandstone quartzite and siltstone sequence, dolomitic in places and containing rare anhydrite. There are two deep mineral drillholes in Area E. Boorthanna-1 drilled in 1970 (TD 1,226 m) intersected 1,113 m of Permian sediments before terminating in a volcanic sequence. Warriner Creek-1 drilled in 1977 (TD 464 m) intersected 217 m of Permian sediments and 128 m of possible Ouldburra Formation equivalent before terminating in crystalline basement.

## 2.2 Hydrocarbon potential

### i) Source rocks

Low total organic carbon content (TOC) values on six Early Palaeozoic sediment samples suggests that the facies intersected to date would provide poor source rocks if mature.

Basal Stuart Range Formation and Boorthanna Formation range from immature to mature. The Mount Toondina Formation and much of the Stuart Range Formation, while immature where sampled, have high TOC values indicating that they could be good source rocks at depth. They are predicted to be oil-prone. The top of the Permian sequence occurs at about 25 to 200 m KB in Area E and extends to about 1,200 m KB maximum. A maximum thickness of 1,100 m Permian is expected in Area E. The basal Permian section in the deeper parts of the Boorthanna Trough are expected to be within the oil window. A Proterozoic volcanic sequence intersected at 1,159 m in mineral drillhole Boorthanna-1 suggests that Permian sediments may thermally be more mature in this southern part of the Boorthanna Trough.

The Jurassic-Cretaceous Eromanga Basin sequence is thin, shallow and expected to be immature throughout the area in traditional terms. However in Santos well Oodnadatta-1<sup>1</sup> (TD 403 m) oil shows were recorded in the Early Cretaceous sequence. The well was drilled in 1957 and is located north of Area E and within Area D.

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<sup>1</sup> S. Aust. Dept Mines and Energy open file Envelopes 62, 111 and 260 (unpubl.).



Long distance migration of hydrocarbons is possible in laterally extensive Palaeozoic and Mesozoic units. Stratigraphic and structural traps are likely to occur. Leads and prospects for Area E are shown on figure 4.

ii) Reservoirs and seals

Secondary vugular porosity and minor open partings along stylolites are observed in the Early Palaeozoic sequence of Cootanoorina-1. However, in Weedina-1, porosity in this sequence is low. Parts of the Boorthanna Formation consist of moderately porous and permeable sandstones. The overlying Stuart Range Formation could provide an excellent seal. Sandstones in the Mount Toondina Formation and the Early Cretaceous Coorikiana Sandstone generally exhibit low porosity. The Cadna-owie Formation (sandy facies) and Algebuckina Sandstone could provide excellent petroleum reservoirs with the Cadna-owie Formation (shaley facies) providing a local seal and the Bulldog Shale a regional seal. The Oodnadatta Formation also provides a regional seal.

iii) Diapirs

Diapirs occur in the area and are potentially interesting targets. Increased understanding of these structures and the associated pre-Permian units may help delineate further prospects.

### 2.3 Previous exploration

Well data, petrophysically logged wells, seismic lines, magnetic surveys and gravity surveys relevant to Area E are detailed in Tables 1-5 and Figures 7-9.

Table 1: Well details Area E

Well	Company/ Authority	Tenement Number	Location		Elevation * Ground + KB/RT (m)	Total Depth (m)	Date Spudded	Date Drilling Completed	Well Completion Report (SADME Ref)
			Latitude	Longitude					
Birribiana-1	Santos	PEL 5 & 6	28°14'55"	135°20'51"	314.9' 329.4+	1427.1	19/11/86	01/12/86	Env. 7034/8
Boorthanna-1	Occidental	SML 329	28°56'04"	135°45'18"	111.6' 115.3+	1226.4	13/01/70	27/01/70	Env. 1313
Cootanoorina-1	SADME	n/a	28°00'30"	135°20'00"	106.2' 108.3+	948.2	29/04/67	15/08/67	Rep. 65/04; RI 40
Hanns Knob-1	Santos	PEL 5 & 6	28°09'07"	135°32'54"	226.9' 281.4+	1536.8	29/12/86	15/01/87	Env. 7043/6
Warriner Ck-1	Kennecott	EL 345	29°27'36"	135°45'54"	46.5'	464.3	1/11/77	28/11/77	Env. 3137
Weedina-1	Pexa	PEL 5 & 6	28°28'31"	135°39'20"	96.7' 100.3+	1625.3	26/02/70	26/03/70	Env. 1374, 1365

Table 2: Petrophysically logged wells Area E

Well	Logger	Date Logged	Interval Logged (m)								SADME Reference	Digital Tape Available
			Sonic	Gamma	Spont. Potential	Resist.	Density	Neutron	Calliper	Other		
Birribiana-1	Schlumb.	Dec. 86	5- 1425	5- 1426	23- 1423	23- 1423	219- 1426	219- 1426	5- 1426	MSFL, dipmeter, velocity, sidewall cores.	Log sepi index 7034/4	Yes
Boorthanna-1	SADM	Jan. 70	-	0- 1226	223- 1226	223- 1226	-	0- 1226	-	Temperature	Geophys. log nos. 1182-86	Yes
Cootanoorina-1	SADM	Jun. 67	-	0- 948	190- 931	190- 931	-	0- 431	-	Temperature, velocity	Geophys. log nos. 20/419	Yes
Hanns Knob-1	Schlumb.	Dec. 86/ Jan. 87	13- 1533	13- 1537	13- 1533	13- 1533	208- 1537	208- 1537	13- 1004	MSFL, dipmeter, velocity, sidewall cores.	Log sepi index 7043/4	Yes
Weedina-1	Schlumb.	Mar. 70	244- 1622	0- 1622	244- 1624	244- 1624	244- 1625	-	248- 1625	-	Oil, gas & coal division	DT,G only

Table 3: Seismic surveys Area E

Survey Name	Operator	Contract	Year	SADME Reference
	SADM	SADM	1964,68	RB 58/120, 59/104, 59/149
Lake Conway - ARC seismic and gravity survey	Pexa	United Geophysical Corporation	1970	Env. 1236, 1718
Peake Creek - ARC seismic and gravity survey	Pexa	United Geophysical Corporation	1970	Env. 1495, 1718
Christmas Creek - ARC seismic survey	Delhi	Geophysical Exploration Services Pty Ltd	1982	Env. 5064
Hogarth - ARC seismic survey	Delhi	Norpac International Incorporated, Seiscom Delta United (Australia) Pty Ltd	1984	Env. 5561 (Interpretive report vol. 10)
Morphett - ARC seismic survey	Delhi	Norpac International Incorporated	1985	Env. 5995 (interpretive report vol. 9-10)

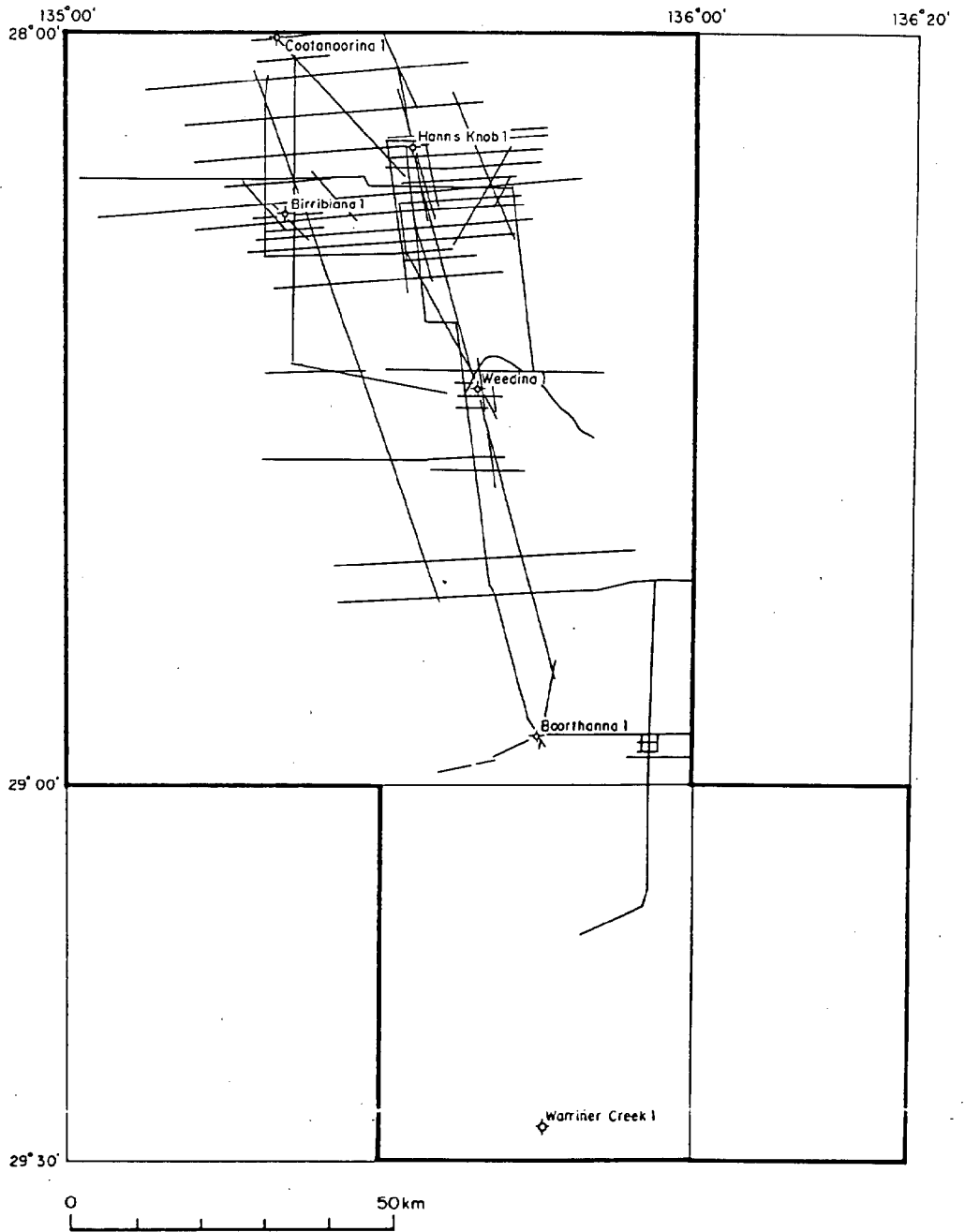
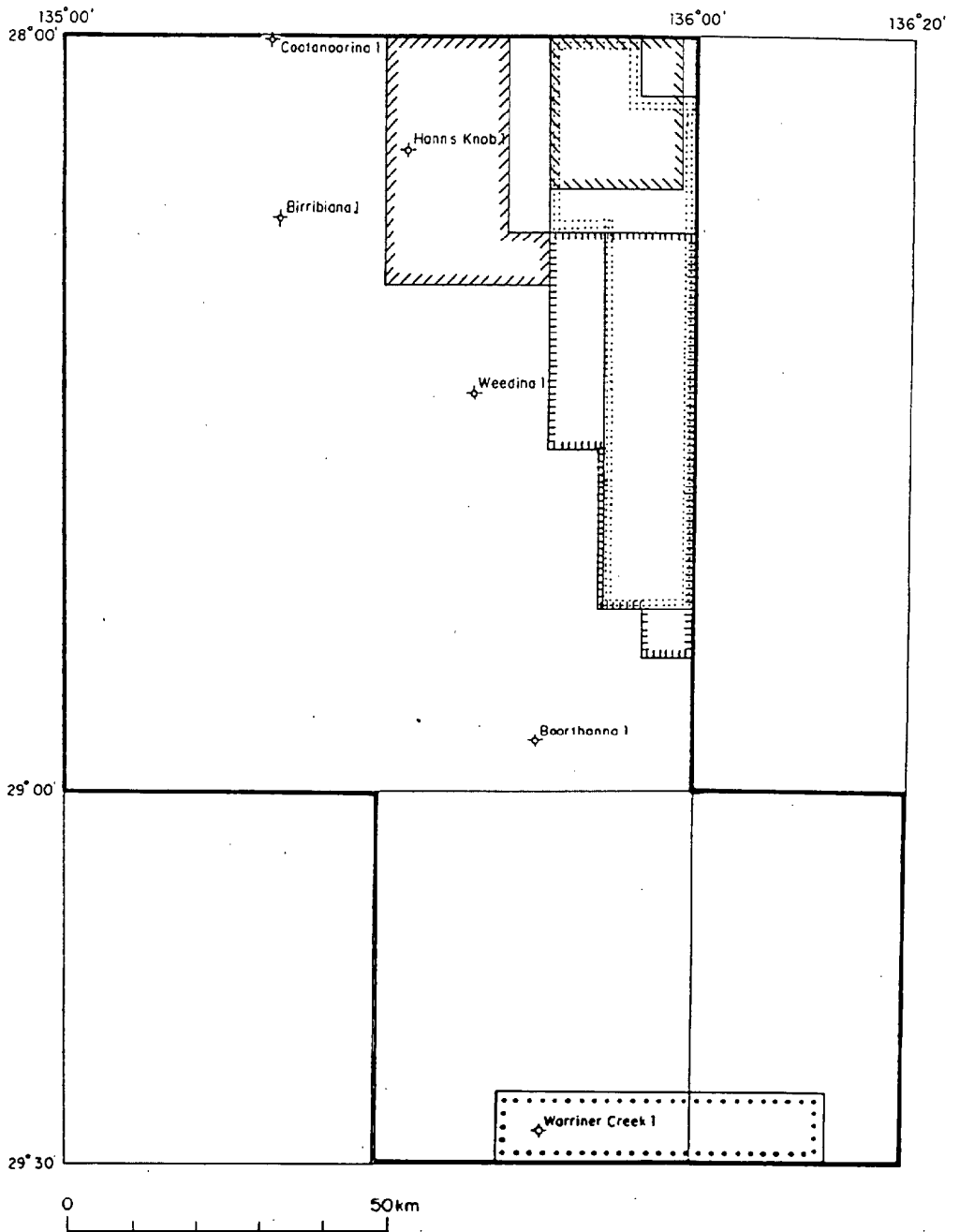


Figure 7. Seismic line locations, Area E

Table 4: Magnetic surveys Area E

Survey Name	Year	SADME Reference	Survey Type	Status	Survey Code	Surveyed	
						By	For
Oodnadatta aeromagnetic survey	1961/62	Env. 12,202	Airborne Lines E-W Interval 8.0 km Flight height 460 m	Analogue	61SA02	Aero Service Corpn	Delhi
Peake & Denison Ranges SML 270	1969	Env. 1015	Airborne Lines E-W Interval 400 m Flight height 100 m	Analogue	69SA02	Austral Exploration Services	Aust. Mining Corporation
Mt Kingston aeromagnetic survey ELs 491, 899 & 1187	1980	Env. 3562	Airborne Lines E-W Interval 150 m Flight height 60 m	Digital	80SA30	Geox Pty Ltd	Pacific Exploration Consultants Gem Exploration & Minerals Ltd
Nilpinna-Edwards Ck airborne survey ELs 571 & 968	1981	Env. 3771	Airborne Lines N-S Interval 300 m	Digital	81SA07	Geo-metrics	Ashton Mining Ltd
Nilpinna aeromagnetic survey ELs 1010, 1029 & 1133	1983	Env. 4858	Airborne Lines E-W Interval 300 m Flight height 80 m	Digital	83SA05	Aerodata McPhar	BHP
Mt Purvis aeromagnetic survey EL 345	1977	Env. 3137	Airborne Lines E-W Interval 500 m Flight height 100 m	Digital	77SA05	Geo-metrics	Kennecott



Oodnadatta aeromagnetic survey - - - - -

Peake and Denison Ranges aeromagnetic survey-SML 270 .....

Mt Kingston aeromagnetic survey - EL 491,899,1187 - - - - -

Nilpinna - Edwards Creek airborne survey- EL 571,968 - - - - -

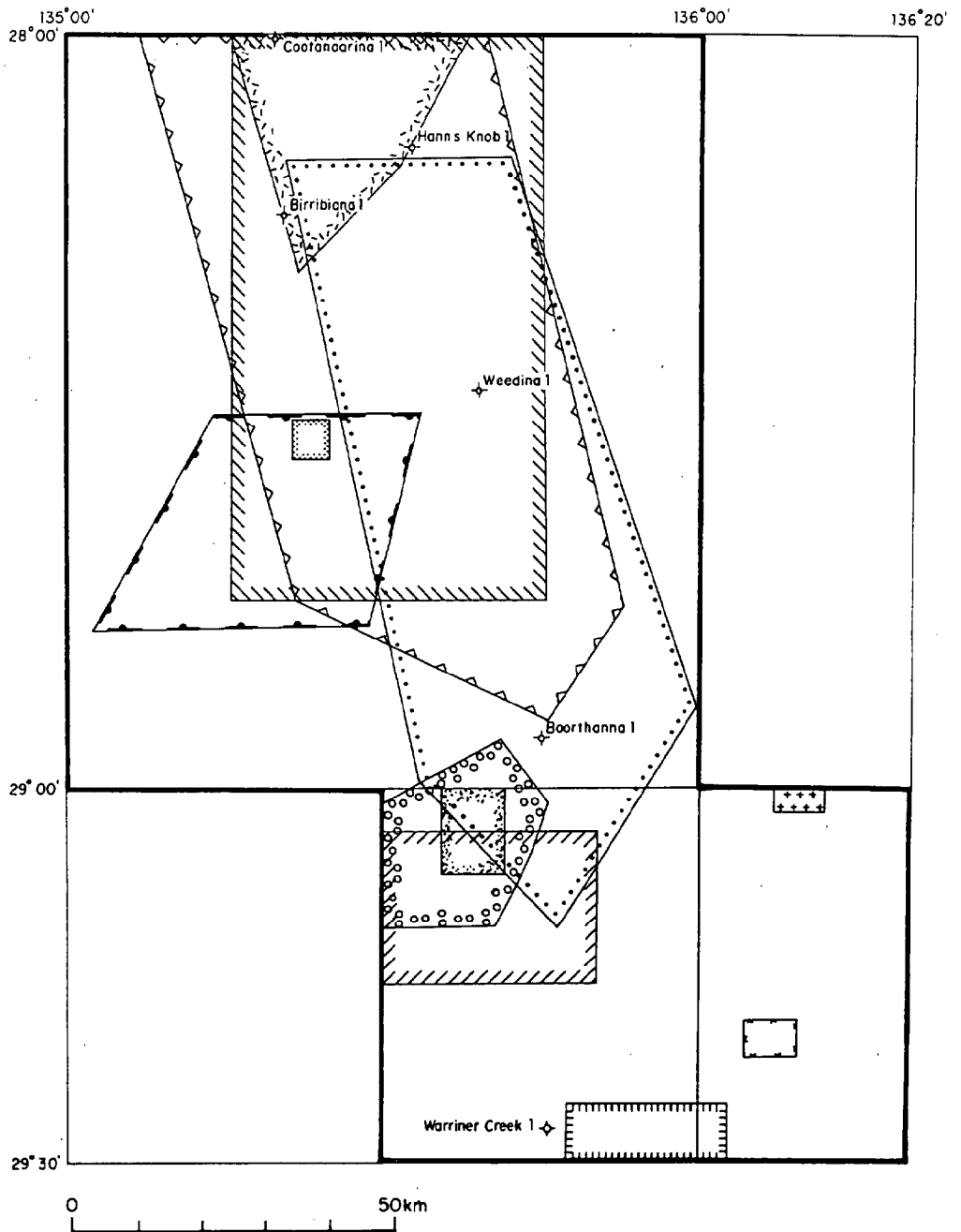
Nilpinna aeromagnetic survey - EL 1010,1029,1133 - - - - -

Mt Purvis aeromagnetic survey - EL 345 - - - - -

Figure 8- Magnetic surveys, Area E

Table 5: Gravity surveys Area E

Survey Name	Year	SADME Reference	Survey Type	Status	Survey Code	Surveyed	
						By	For
Oodnadatta gravity survey 1968	1968	-	Helicopter	Processed	68E2	SADME	SADME
Boorthanna Trough gravity survey	1968	-	Seismic lines Interval 1,200 ft	Processed	68B0	SADME	SADME
Lake Conway seismic & gravity survey	1970	Env. 1236	Seismic lines Interval 0.5 mile	Processed	70O4	United Geophysical	Pexa
Peak Creek seismic & gravity survey	1970	Env. 1495, 1371; BMR Rec. 7046	Seismic lines Interval 0.25 mile	Processed	70O5	United Geophysical	Pexa
William Creek gravity survey EL 341	1977	Env. 3092	Grid Interval 250 m	Not processed	77O0	Solo	Newmont
Cadaree Hill EL 340	1977	Env. 3091	Grid Interval 250 m	Not processed	77PO	Solo	Newmont
Codna Hill	1977	Env. 3056	Grid Interval 250 m	Not processed	77?	Solo	Newmont
Murangoona EL 581	1980	Env. 3747	Grid/road	Not processed	80P3	Solo	BHP
Birthday Hill EL 303	1977	Env. 2981	Grid	Not processed	77P6	Solo	Newmont



- Oodnadatta gravity survey 1968 -----
- Boorthanna Trough gravity survey ..... (dotted)
- Lake Conway seismic and gravity survey --- (diagonal hatching)
- Peak Creek seismic and gravity survey --- (zigzag)
- William Creek gravity survey EL 341 ----- (plus signs)
- Cadaree Hill EL 340 ----- (dotted)
- Birthday Hill EL 303 ----- (dotted)
- Cadna Hill ----- (dotted)
- Murangoona EL 581 ----- (circles)
- Compeera Hill south gravity survey ----- (dotted)
- Compeera Hill south gravity survey ----- (diagonal hatching)
- Wirrangula Hill EL 924 ----- (dotted)
- Hogarth seismic survey PEL 5 & 6 ----- (triangles)

Figure 9. Gravity surveys, Area E



Survey Name	Year	SADME Reference	Survey Type	Status	Survey Code	Surveyed	
						By	For
Compeera Hill South gravity survey	1980	Env. 3873	Grid	Not processed	80O8 80O9	Solo	Aquitaine
Wirrangula Hill EL 924	1981	Env. 4562	Grid	Not processed	81P4	Solo	CRA
Hogarth seismic survey PELs 5 & 6	1984	-	Seismic lines	Processed	84E1 85E0	SADME	SADME

### 3. DATA PACKAGE CONTENTS

If you wish to purchase the data package for Area E, please complete and mail the order form at the rear of this brochure. Orders received before May 31st will receive preference. Additional reports as listed in the bibliography can be ordered, and will be included in the package at extra cost. The cost of the data package is \$Aust 3,110 including freight cost.

Items marked \* are to be supplied as microfiche copies. Seismic sections, seismic line and shot point location maps, selected seismic horizon contour maps and petrophysical well logs will be supplied as sepia copies. The remaining data are to be supplied as paper copies.

The SADME person for any enquiries relating to the data package is:

Mr Vic Hilditch  
Technical Information Services  
(08) 274 7523

#### 3.1 Geological data

##### 3.1.1 Geological maps, 1:250 000 scale geological atlas series

Billakalina (published with explanatory notes, 1981)  
Warrina (preliminary, 1972)

## 3.1.2 Wells

## i) Well completion reports

- \* Birribiana-1 (SADME Env. 7034/6)
- \* Boorthanna-1 (SADME Env. 1313)
- \* Cootanoorina-1 (SADME report 65/04; Rep. Invest. 40)
- \* Hanns Knob-1 (SADME Env. 7043/6)
- \* Warriner Creek-1 (SADME Env. 3137)
- \* Weedina-1 (SADME Env. 1374, 1365)  
(Rep. Invest. 40 to be supplied as a paper copy.)

## ii) Petrophysical logs, 1:240 scale or nearest equivalent

Birribiana-1: sonic, gamma, dual laterolog, microspherically focused log, SP, density, neutron, caliper and composite (SADME log sepia index 7034/4).

Boorthanna-1: gamma, 16" normal resistivity, 6' lateral resistivity, SP and neutron-neutron (SADME geophysics log nos. 1182-86).

Cootanoorina-1: gamma, 16" and 64" normal resistivity, 6' lateral resistivity, SP, point resistivity and neutron-neutron. (SADME geophysics log nos. 20 a-g, 419, 419a).

Hanns Knob-1: sonic, gamma, dual laterolog, microspherically focused log, SP, density, neutron, caliper and composite. (SADME log sepia index 7043/4).

Weedina-1: sonic, gamma, laterolog 7, proximity log, microlog, density, caliper and composite. (SADME Oil, Gas and Coal Division.)

Digital tapes, LIS format, of log data are available from the Department at an additional cost of \$35/tape plus \$30/well (normally 10 wells per tape). Digital log data is listed in Table 3.

### 3.1.3 Reports

#### i) PELs 5 and 6 Arckaringa farmout block - general reports

\*Amdel, 1986. Analysis of borehole samples for residual hydrocarbons, Mulka and Arckaringa Blocks, Eromanga Basin. SADME Env. 4878 (unpubl.).

\*Analabs, 1987. Hydrocarbon characterisation study Warriner Creek-1 and bore NB/SR-12 Arckaringa Block. SADME Env. 4878 (unpubl.).

\*Cook, A.C., 1981. The organic petrology of samples from a selected group of wells in or near the Arckaringa Basin. SADME Env. 4878 (unpubl.).

\*Jones, M.J. 1987. Review of palynology, Arckaringa Basin (NB/SR-12, Birribiana-1 and Hanns Knob-1). SADME Env. 4878 (unpubl.).

\*Moore, P.S. 1983. Block prospectivity summary Arckaringa Block. SADME Env. 4878 (unpubl.).

\*Santos Ltd. 1988. Arckaringa Block acreage assessment report. SADME Env. 4878 (unpubl.).

#### (ii) Other

\*Hibburt, J. 1984. A review of exploration in the Arckaringa Basin 1987-1983. SADME report 84/1 (unpubl.).

### 3.2 Geophysical Data

#### 3.2.1 PELs 5 and 6 Arckaringa farmout block-geophysical interpretation reports.

\*Allender, J.F., Taylor, B.W. and Gilby, A.R. 1987. Geophysical interpretation report 1984 Hogarth-ARC. PELs 5 and 6 Arckaringa Block. SADME Env. 5561(10) (unpubl.).

\*Wilmot, J.G., 1987. Geophysical interpretation report 1985 Morphett-ARC. PELs 5 and 6 Arckaringa Block. SADME Env. 5995(9-10) (unpubl.).

#### 3.2.2 Regional Bouguer gravity contour maps, 1:250 000 scale

Billakalina (1984), plan no. 71-411.

Warrina (1971), plan no. 71-591.

Both plans are based on a density of 1.90 gm/cm<sup>3</sup>.

(Gravity station values maps are available but are not included in this data package.)

#### 3.2.3 Total magnetic intensity maps, 1:250 000 scale

Billakalina (1984), plan no. 84-319.

Warrina (1984), plan no. 84-325.

(1:100 000 sheets 6040, 6041 and 6140 published in 1985, are available, but are not included in this data package.)

### 3.2.4 Seismic data

- i) Seismic line location base maps at 1:250 000 scale
- ii) Seismic shot point location base maps at 1:100 000 scale
- iii) Selected seismic sections  
Compressed sections to be supplied where available. The selected sections are illustrated on figure 10.

#### Christmas Creek - ARC seismic survey, 1982.

82-RAA  
82-RAB  
82-RAC  
82-RAD  
82-RAE  
82-RAF  
82-RAG  
82-RAH  
82-RAJ  
82-RAK  
82-RAY  
82-RAZ  
82-RBA  
82-RBB

#### Hogarth-ARC seismic survey, 1984.

84-XEQ  
84-XER  
84-XES  
84-XET  
84-XEW  
84-XEX  
84-XEY  
84-XFA  
84-XFB  
84-XFC  
84-XFD  
84-XFE  
84-XFF

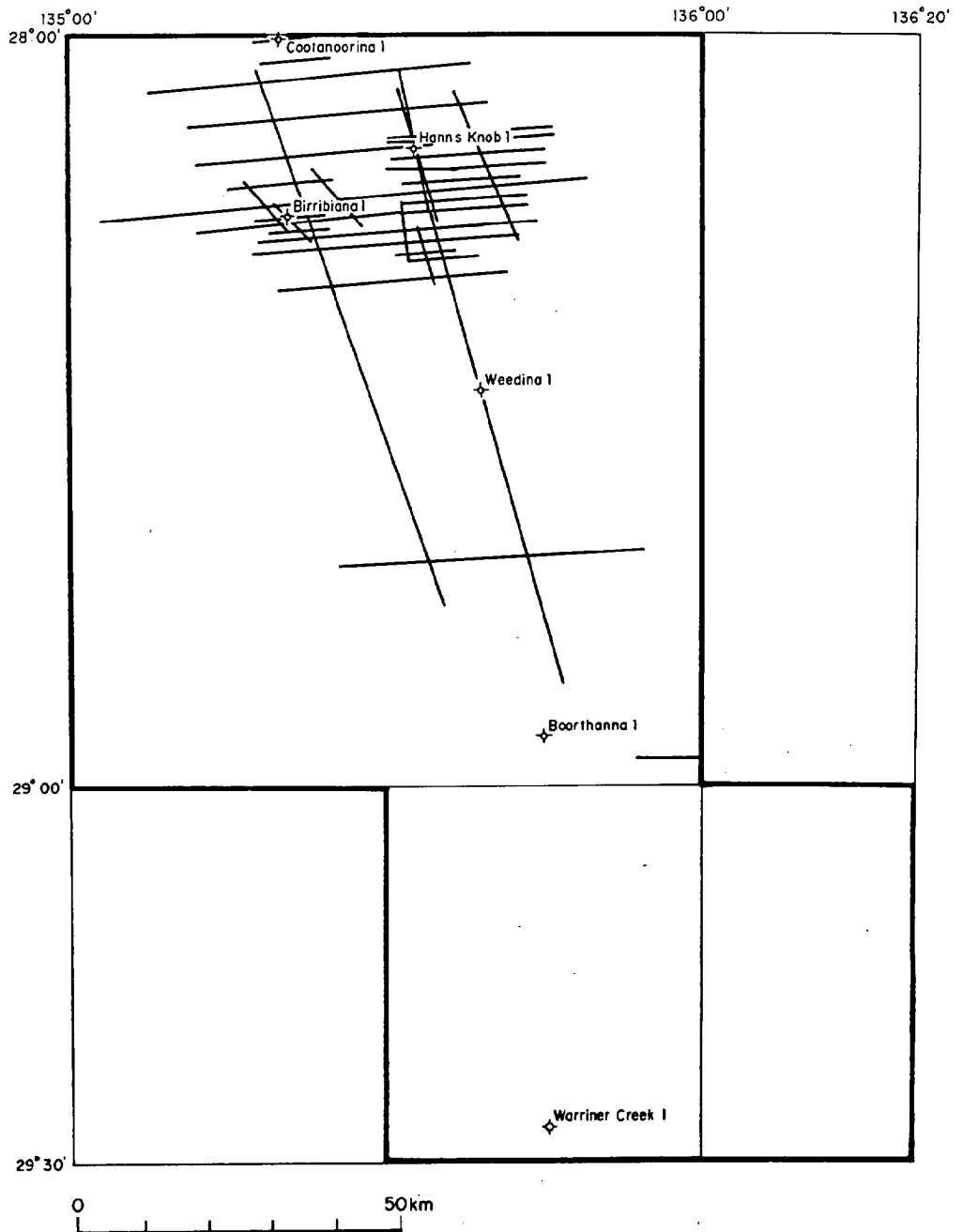


Figure 10 Seismic data included in data package, Area E

## Morphett-ARC seismic survey, 1985.

85-XQE  
85-XQF  
85-YQS  
85-YRB  
85-YRC  
85-YRD  
85-YRE  
85-YRF  
85-YRG  
85-YRH  
85-YRJ  
85-YRK  
85-YRL  
85-YRM  
85-YRN  
85-YRP  
85-YRQ  
85-YRR

## iv) Selected seismic horizon contour maps

The maps listed below are contained in Wilmot (1987)<sup>1</sup> and Allender et al. (1987)<sup>2</sup> which are included in the data package.

<sup>1</sup>Top Stuart Range Formation time structure, 1:50 000 scale, enclosures M-ARC-NTH-1, M-ARC-CENT-2 and M-ARC-STH-3.

<sup>1</sup>Base Stuart Range Formation time structure, 1:50 000 scale, enclosures M-ARC-NTH-4, M-ARC-CENT-5 and M-ARC-STH-6.

<sup>1</sup>Delamerian unconformity time structure, 1:50 000 scale, enclosures M-ARC-NTH-7, M-ARC-CENT-8 and M-ARC-STH-9.

<sup>1</sup>Stuart Range Formation time interval, 1:50 000 scale, enclosures M-ARC-NTH-10 and M-ARC-CENT-11.



<sup>1</sup>Base Stuart Range Formation to Delamerian unconformity time structure, 1:50 000 scale, enclosures M-ARC-TH-12 and M-ARC-CENT-13.

<sup>1</sup>Pre-Permian unit D1 to D6 time structure, 1:50 000 scale, enclosures M-ARC-COOT-14 to 16 and M-ARC-HANNS-17 to 20.

<sup>1</sup>Time structure top Stuart Range Formation, 1:100 000 scale, enclosure M-ARC-BLK-21.

<sup>1</sup>Time structure base Stuart Range Formation, 1:100 000 scale, enclosure M-ARC-BLK-22.

<sup>1</sup>Time structure Delamerian unconformity, 1:100 000 scale, enclosure M-ARC-BLK-23.

<sup>2</sup>Time structure contours Delamerian unconformity showing location of salt diapirs, 1:100 000 scale, ARC 2, enclosure 12.

## 4. BIBLIOGRAPHY

4.1 General

This bibliography encompasses the entire Arckaringa Basin area as well as including pertinent references from surrounding basins.

References marked \* are included in the data package. Copies of other unpublished references are available on request. It is assumed most companies will have access to published material.

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- \*Allender, J. F., Taylor, B. W. and Gilby, A. R., 1987. Geophysical interpretation report 1984 Hogarth-ARC. PELs 5 and 6 Arckaringa Block. SADME Env. 5561(10) (unpubl.).
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#### 4.2 SAMREF bibliographic data base

Comprehensive information is available in the Department's SAMREF bibliographic database. SAMREF is available for public access either at this Department, or through ARID (Australian Resources Industry Database), forming part of GEOPAC on INFO-ONE International. Prior to November 1, 1988, INFO-ONE International was known as CLIRS Information Services. With this change of name, there is now a lower price schedule applying to membership and annual fees and connect times rates. New access menus have also been provided to facilitate use by casual and inexperienced users. INFO-ONE International is available Australia-wide and overseas and can be accessed online by computer.

The South Australian Department of Mines and Energy is progressively adding abstracts to the SAMREF database on INFO-ONE International, including:

- . company reports released since 1983
- . Departmental reports and publications released since 1981 and
- . some pre-1961 revised company and Departmental reports.

Other references are only available at the Department in Adelaide.

## 5. LICENCE APPLICATION PROCEDURES

Petroleum exploration and development in South Australia are administered under the Petroleum Act, 1940 (onshore) and the Petroleum (Submerged Lands) Acts, 1967 of the Commonwealth and 1982 of the State (offshore). Vacant onshore areas are continuously available for licence applications, whereas offshore permits are open to application only after gazettal of areas by the Commonwealth and State Governments.

There is no set form for making an application other than by a written request addressed to the Director-General, Department of Mines and Energy. Application guidelines, licence conditions, obligations, etc. for onshore petroleum exploration are summarised in Table 6.

In summary, all applications should be signed under seal and include a \$400 application fee (cheques should be made out to SADME), a proposed program cost for each year of the initial 5 year licence term, evidence of the applicant's financial ability to undertake such a program and the technical qualifications and expertise of personnel available to the applicant to undertake the program. For any enquiries relating to licence applications contact:

Mr. Bob Laws  
Director, Oil, Gas and Coal Division  
Phone (08) 274 7612

Table 6 : Onshore petroleum exploration guidelines

## PETROLEUM ACT, 1940

Note: The area to which this Act applies covers all of onshore South Australia exclusive of Commonwealth Lands; it extends south to the State Territorial Sea Baseline and includes the waters of Spencer and St Vincent Gulfs.

	ONSHORE PETROLEUM EXPLORATION	Petroleum Act Reference
Title of Tenement	Petroleum Exploration Licence (P.E.L.)	
Who Can Apply	An individual, a body corporate (i.e. a company) or an unincorporated association of persons and bodies corporate (i.e. a joint venture involving several persons and/or companies). Where application is made on behalf of a company, the application must be made under the company seal.	6(1) 41(b) & (c)
When Application Can be Made	Initial Licence - At any time over any area not already under licence Renewal of Licence - not less than 3 months before existing licence is due to expire	6(1a) 18(5b)
Maximum Area	26 000 sq km.	15(1)
Application Fee	For initial application - \$400 For each renewal - \$400	7(2) 7(2)
Bond (to ensure compliance with licence conditions)	\$4 000 minimum. Amount required is specified in letter of offer. Bond may be in the form of cash, cheque or bank guarantee.	13(1)
Term of Licence	Initial Term - 5 years Each Renewal (to a maximum of 3) - 5 years	15(2) 15(2)
Annual Rental Payable	Initial 5 Year licence term - 16 ¢/sq km First Renewal (2nd 5 Year licence term) - 24 ¢/sq km Second Renewal (3rd 5 Year licence term) - 32 ¢/sq km Third & Final Renewal (4th 5 Year licence term) - 40 ¢/sq km.	18c(a) 18c(b) 18c(c) 18c(d)
Minimum Work Commitments	As negotiated with applicant after application (which must contain a proposed 5 year work program) has been received.	
Minimum Expenditure Commitments	Initial 5 Year licence term - first two years - \$16 per sq km per year - last three years - \$24 per sq km per year First Renewal (2nd 5 Year licence term) - \$62 per sq km per year Second Renewal (3rd 5 Year licence term) - \$80 per sq km per year Third & Final Renewal (4th 5 Year licence term) - \$94 per sq km per year	17(1)(a) 17(1)(b) 18a(1)(a) 18a(1)(b) 18a(1)(c)
Area to be Relinquished on each Renewal	25% of original licence area. This is in addition to any areas voluntarily surrendered during each 5 Year licence term.	18(2)
Fee for Minister's Consent to Dealings in Licence	\$400 per transaction (document)	42(3)

Fee for Inspection of Register	\$2	Reg.7(1)
Fee for Copy or Extract from Register	50¢ per page	Reg.7(2)
Method of Application	Letter of application addressed to the Director-General, Department of Mines and Energy (there is no prescribed form). Attached to the application should be:	7(1)
	(1) full names and addresses of the party/parties making the application, including (where applicable) the percentage interests of the various parties.	
	(2) two copies of a map and description of the area being applied for.	7(3)
	(3) a table showing the work intended to be carried out, and the estimated cost of that work, during each year of the five year licence term. (Expenditure estimates should satisfy the minimum expenditure commitments set out in Sections 17 and 18)	7(3a)
	(4) particulars of the technical qualifications and expertise available to the applicant party/parties (e.g. qualifications and experience of employees, consultants retained etc.)	7(4)
	(5) particulars of the financial resources available to the applicant party/parties to carry out the proposed terms and conditions of the licence. (In the case of a company application, this is generally supplied in the form of a copy of the company's most recent Annual Report).	7(4)
	(6) the \$400 application fee. Where the application is made on behalf of a company, the application must be made under the company seal.	7(2)
		41(b) &(c)
Penalty for Non-Payment of Annual Rental Fees	All fees are payable in advance. If fees are not paid by the due date, a fine of 10% is imposed and in addition, interest accrues at the rate of 6% per annum. If any fee is in arrears for 3 months or more, the licence may be cancelled.	83(1) &(2)
Licence Variations	Only on application by the licensee, the Minister may at any time during the term of the licence, vary or revoke a condition of the licence or attach new conditions to the licence.	17(3)
Environmental Conditions	These will be outlined in the letter of offer attached to the licence.	
Surrenders (Partial or Whole of Licence)	The Act requires the licensee to:	
	(1) apply to the Minister for permission to surrender.	38(1)
	(2) give three months notice in writing.	38(1)(a)
	(3) pay all outstanding fees.	38(1)(b)
	(4) pay all outstanding monies and wages to workmen and employees.	38(1)(c)
	Surrenders are only permitted if the licensee has fulfilled all the terms and conditions of the licence up to and including the year in which the application	

	to surrender is lodged.	38(2a)
	Licensees are required to lodge all outstanding data on their licences and carry out the cleanup and rehabilitation of their licence areas (where necessary) as a condition of surrender.	
	Surrenders are effective from the end of the appropriate year of the term of the licence (unless specified otherwise).	38(2b)
Required Notice for Approval to Undertake Work in Licence Area	Three months notice is required to arrange necessary clearances with other Government Agencies. This is carried out by DME on the licensee's behalf.	
Required Notice of Entry to Landholders	No risk of damage to land or improvements thereon - 14 days.	51(1)
	Risk of damage to land or improvements thereon - 28 days.	51(1)
Gazettals	Gazettals occur on:	
	(1) Grant of Licence	6(2)
	(2) Surrender of Licence	
	(3) Cancellation of Licence	71(1)
Suspension and Cancellation	The Act provides for suspension and/or cancellation for failure to comply with licence conditions.	87a(1)

N.B. All monetary amounts are subject to review.

March 1989

SR 27/2/94

To the Director-General  
South Australian Department of Mines  
and Energy  
PO Box 151  
EASTWOOD SA 5063

ATTENTION: Oil, Gas and Coal Division

Dear Sir/Madam,

Re: Area E Data Package

Please provide the Area E data package as specified in  
Section 3.

Company .....  
Address ..... Postcode.....  
Contact .....  
Telephone ..... Telex .....  
Facsimile .....

Please enclose a cheque for \$Aust 3,110, made out to: Dept.  
Mines and Energy, account # 86G25 144/076.

Date ..... Signed .....