EXPLORATION OPPORTUNITY

SOUTHERN EROMANGA BASIN

AREA F

DATA PACKAGE BROCHURE

DEPARTMENT OF MINES AND ENERGY

SOUTH AUSTRALIA

April, 1989
SOUTHERN EROMANGA BASIN
EXPLORATION OPPORTUNITY

DATA PACKAGE BROCHURE - AREA F

ENVELOPE 8084
SR27/2/95

Prepared by
OIL, GAS & COAL DIVISION

DEPARTMENT OF MINES & ENERGY
SOUTH AUSTRALIA

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EXPLORATION OPPORTUNITY - AREA F
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Applications are invited by 31st September, 1989 for a Petroleum Exploration Licence (PEL) in the southern Eromanga Basin over AREA F, or part thereof, shown on Figure 1 and 2. It is not necessary to apply for the whole area. Area F covers 15,103 km$^2$ of the southern Eromanga Basin. The area is one of 7 covering portions of the Mesozoic Eromanga and Simpson Desert Basins, Permian Pedirka and Arckaringa Basins and the Cambrian Arrowie Basin (Fig. 1) which came available following the relinquishment in early 1989 of 88,406 km$^2$ of the Pedirka Sector and 4,589 km$^2$ of the Arrowie Sector of PELs 5 and 6, plus the relinquishment of PEL31 (held from 1985 until late 1988).

A data package has been prepared for each of the 7 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 F are listed in the bibliography.

A brief review of the geology and hydrocarbon potential of Area F is set out below, together with a detailed breakdown of the data package contents, a bibliography and licence application information. An order form is provided at the back 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.
2. GEOLOGICAL SUMMARY

2.1 Introduction

A vast portion of the southwestern Eromanga Basin is yet to be adequately explored for petroleum. Applications are now invited for all or part of an area of 15,103 km², comprising 7,551.5 km² of former Petroleum Exploration Licence (PEL) 31 surrendered on 22/11/88 and 7,551.5 km² of PRL 5 & 6 (Lake Eyre and Mulka Blocks) relinquished on 27/2/89. A number of structural leads offering significant potential for oil discovery are indicated on the available seismic data and remain to be fully evaluated.

A data package has been compiled and contains a selection of Landsat, NOAA night thermal imagery, soil geochemical and geophysical survey data. A total of 300 kms of seismic data was acquired in the area in 1985 by Adelaide Petroleum NL. No petroleum exploration wells have been drilled in the area. A number of deep artesian bores provide an insight into the stratigraphy of the region and relevant geological maps and drillhole data have been included in the data package.

A portion of the Lake Eyre National Park extends into the northwestern corner of Area F (Fig. 3). Access under the Petroleum Act is permitted into the Park under the conditions set out in Section 5 of this brochure.

Applications for petroleum exploration licences covering the area will close on 30th September, 1989. Any enquiries should be directed to:
Bob Laws, Director of Oil, Gas & Coal Division,
Department of Mines and Energy,
PO Box 151,
EASTWOOD SA 5063

2.2 Geological setting
i) Stratigraphy

Economic basement in Area F is inferred to be metamorphosed Adelaidean/Proterozoic age sediments, which outcrop in the northern Flinders Ranges approximately 25 km to the south (Fig. 4). The following stratigraphic wells or water bores have been drilled to intersect basement in Area F:

. Frome Broken Hill Group Kopperamanna 1 (1948-49), TD 993 m. Well was re-logged by SADME in 1970.
. SADME Clayton 2 (1980), TD 555 m deepened to 568 m in 1983.
. SADME Mooloorna 1 (1983), TD 618 m.

SADME Clayton 2 water bore encountered basement of deeply weathered silts and dolomitic sandstones that had undergone low grade metamorphism (Rogers, 1984). No proof exists in the area for the occurrence of Cambro-Ordovician carbonates and clastics of the Warburton and/or Arrowie Basins, although a connection between the two basins has been postulated (Oil, Gas & Coal Division, 1988). No Permian or Triassic age sediments have been encountered in water bores or inferred from the limited seismic in the area. It is likely that Eromanga Basin sediments were deposited unconformably on a weathered and faulted basement surface (Fig. 5).

The Eromanga Basin sequence in the area is relatively thin (maximum thickness 800 m in the northern part of the area)
Figure 4. Geological summary, Area F
<table>
<thead>
<tr>
<th>AGE</th>
<th>ROCK UNIT</th>
<th>LITHO.</th>
<th>DEPOSITIONAL ENVIRONMENT</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>TERTIARY</td>
<td>UNDIFFERENTIATED SEDIMENTS OF LAKE EYRE BASIN</td>
<td>Non-marine</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LATE CRETACEOUS</td>
<td>WINTON FORMATION</td>
<td>Non-marine to marginal marine</td>
<td>Outcrops extensively in Area F</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MACKUNDA FORMATION</td>
<td>Marine</td>
<td></td>
<td>Regional seal</td>
</tr>
<tr>
<td></td>
<td>OODNADATTA FORMATION</td>
<td>Marine</td>
<td></td>
<td>Regional seal</td>
</tr>
<tr>
<td></td>
<td>COORIKIANA SANDSTONE</td>
<td>Regressive marine shoreface</td>
<td>Lenticular sand</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MARREE SUBGROUP</td>
<td>Open marine, transgressive</td>
<td>Regional seal</td>
<td></td>
</tr>
<tr>
<td></td>
<td>BULLDOG SHALE</td>
<td>Non-marine to marginal marine</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>CADNA-OWIE FORMATION</td>
<td>Non-marine to marginal marine</td>
<td>Upper sands form aquifer Basal shales may provide seal for Algebuckina</td>
<td></td>
</tr>
<tr>
<td>LATE JURASSIC</td>
<td>ALGEBUCKINA SANDSTONE</td>
<td>Braided fluvial. Minor paralic facies near basin margin</td>
<td>Excellent reservoir properties Main aquifer of basin</td>
<td></td>
</tr>
<tr>
<td>E-MM JUR.</td>
<td>ADELAIDEAN/ PROTEROZOIC</td>
<td>Metasediments</td>
<td></td>
<td>Deeply weathered unconformity surface</td>
</tr>
</tbody>
</table>

Figure 5. Stratigraphic column, Area F.
and the stratigraphic units increase in thickness towards the basin centre to the northeast. The onset of the Early-Mid Jurassic saw deposition of fine-coarse grained, poor-moderately well sorted cross-bedded sandstones, with rare and discontinuous siltstone/mudstone interbeds, of the Algebuckina Sandstone. The unit was not deposited over the crests of basement highs (e.g. the Cooryaninna Dome). Lemon and Alley (1988) describe a paralic facies developed in the upper part of the Algebuckina Sandstone at nearby Trinity Well, where it outcrops against the edge of the Flinders Ranges and was mapped as the Village Well Formation (Forbes, 1986). Good to very good quality source rocks of the Birkhead Formation form a lateral equivalent to the Algebuckina Sandstone, and are predicted to occur in the northeastern corner of the block (Fig. 4).

The base of the Cretaceous is marked by a marine transgression over the entire Eromanga Basin (Moore and Pitt, 1986). In the area, Early Cretaceous Cadna-owie Formation overlies the Algebuckina Sandstone. The unit consists of a coarsening upwards sequence of shallow marine to non-marine (in places) sandstones. The uppermost porous and permeable unit is an important aquifer over much of the Eromanga Basin. The top of the unit corresponds to the "C seismic horizon" - a distinctive reflector, identified over the entire Basin. The Cadna-owie Formation also outcrops against the Flinders Ranges, where it was mapped as the Pelican Well Formation (Forbes, 1986).

The younger Cretaceous sediments all outcrop over the area (Williams, 1976, Forbes et al, 1965, Forbes, 1974 and Krieg, in prep.) and were intersected in New Kopperamanna Bore (Townsend, 1971), Muloorina 1 (Forbes, 1984) and Clayton 2 (Smith et al., 1985). The Cadna-owie Formation is conformably
overlain by the Bulldog Shale, a dark-grey fossiliferous shale, with limestone concretions (Moore and Pitt, 1986). The Bulldog Shale is overlain by the Coorikiana Sandstone and equivalents which consist of coarsening upward transgressive marine shoreface sands. Conformably above the Coorikiana Sandstone is the Oodnadatta Formation, consisting of marine siltstone, with minor sandstone development, which is overlain by the Mackunda Formation. The Late Cretaceous Winton Formation conformably overlies the Mackunda Formation.

Eromanga Basin sediments are unconformably overlain by Tertiary-Recent age sediments of the Lake Eyre Basin.

ii) Structure

The structure of the area is not well understood. Available data include SADME 1:250 000 geological maps (Forbes et al. 1965, Williams, 1976, Forbes, 1974 and Krieg, in prep.) limited seismic, gravity and aeromagnetic surveys (Figs. 7 to 9) and interpretation of Landsat and NOAA night thermal imagery and air photographs (Russell, 1988).

The structural grain of the area has been influenced by two northwesterly orientated features - the Norwest Fault and the Lake Blanche Lineament (Fig. 4). The latter is interpreted by Veevers and Powell (1984) to have been a dextral continent-ocean transform fault during plate divergence in the latest Precambrian-Early Cambrian. Russell (1980) interprets basement fault relationships in the area by applying a dextral wrench couple with west-southwest to east-northeast orientated regional compression. Current surface expression of structures in the area is a result of reactivation during the Early Tertiary under east-west compressional stress (Kuang, 1985).
Figure 6. Exploration leads map former PEL 31
Other important structures in the area (Fig. 4) include the Cooryaninna Dome (the southernmost extension of the Birdsville Track Ridge) and the Muloorina Ridge - a northeasterly orientated gravity high. Muloorina 1 water bore, located on the ridge, reached TD in Adelaideran siltstone, resembling Tapley Hill Formation (Forbes, 1984). The Muloorina Ridge is inferred to consist predominantly of Adelaideran sediments.

Adelaide Petroleum (1987) identified two possible trap types: 4 way dip closure of Cadna-owie Formation sands in anticlines associated with basement horsts, and stratigraphic traps where the Algebuckina Sandstone onlaps basement (Figure 6).

2.3 Hydrocarbon potential

i) Hydrocarbon Source Rocks

No known Cambro-Ordovician, Permian or Jurassic source rocks have yet been encountered by drilling in this area. The Permian Cooper Basin margin lies some 25 km to the east, while the limit of Jurassic Birkhead Formation source rocks occurs in the north eastern part of the area. Oil shows were recorded in SANTOS Mulapula 1 (18km north of Area F, see Fig. 4) from the Namur Sandstone Member (Algebuckina Sandstone equivalent), and a trace of oil was recovered on testing. The nearest oil field is Wancooowa, approximately 90 km to the northeast (Fig. 4). Long distance migration of oil from the Cooper/Eromanga Basin source rock kitchens (Patchawarra, Nappamerri and Tennapera Troughs) was investigated by McKirdy and Willink, 1988, Habermehl, 1988 and Habermehl et al., 1989.
ii) Reservoirs

The Algebuckina Sandstone and Cadna-owie Formation are important aquifers over the area, with good porosities and permeabilities. Clayton 2 water bore recorded a flow of water of 25 litres per second from the Algebuckina (Smith et al., 1985).

iii) Seals

The most likely reservoir/seal associations in the area are the Cadna-owie/Algebuckina or Coorikiana Sandstone reservoirs overlain by the Bulldog Shale or Oodnadatta Formation respectively. Both shales form regional seals.
2.4 Geophysical surveys

i) Seismic surveys.

**TABLE 1: Seismic Surveys**

<table>
<thead>
<tr>
<th>Survey Name</th>
<th>Operator</th>
<th>Year</th>
<th>SADME Reference</th>
<th>Line No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lake Gregory Seismic and Gravity Survey</td>
<td>Ashburton Oil NL.</td>
<td>1969</td>
<td>Env. 1319</td>
<td>70-LAA1 70-LAB1 70-LAA2 70-LAB2 70-LAA3 70-LAC</td>
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<tr>
<td>Christmas Creek Seismic Survey</td>
<td>Delhi Petroleum</td>
<td>1982</td>
<td>Env. 5064</td>
<td>82-RBF 82-RBG 82-RBH</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Env. 4879</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Env. 5058</td>
<td></td>
</tr>
<tr>
<td>Hogarth Seismic Survey</td>
<td>Delhi Petroleum</td>
<td>1984</td>
<td>Env. 5561</td>
<td>84-TZT 84-XAA 84-TZW 84-TZX</td>
</tr>
<tr>
<td>Morphett Seismic Survey</td>
<td>Delhi Petroleum</td>
<td>1985</td>
<td>Env. 5995</td>
<td>85-ZKH</td>
</tr>
<tr>
<td>Curchimurka-Marree Seismic Survey</td>
<td>Adelaide Petroleum</td>
<td>1985</td>
<td>Env. 6576</td>
<td>85-CU02 85-MA05</td>
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<td></td>
<td></td>
<td></td>
<td>SR 27/4/672</td>
<td>85-CU03 85-MA06</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>85-MA04 84-MA07</td>
</tr>
<tr>
<td>Boopoochee Seismic Survey</td>
<td>SADME</td>
<td>1985</td>
<td>DME 221/85</td>
<td>EB85-03</td>
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Figure 7. Seismic line locations, Area F.
ii) Gravity surveys.

<table>
<thead>
<tr>
<th>Survey Name</th>
<th>Reference</th>
<th>Year</th>
<th>Survey Type</th>
<th>Status</th>
<th>Survey Code</th>
<th>By</th>
<th>For</th>
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</thead>
<tbody>
<tr>
<td>Birdsville Track To Oodnadatta Gravity Survey</td>
<td>Rept Book #52/065</td>
<td>1960</td>
<td>Road</td>
<td>Not Processed</td>
<td>60E4</td>
<td>SADME</td>
<td>SACME</td>
</tr>
<tr>
<td>Dalhousie Gravity Survey</td>
<td>Env 327,345,333 BMR Record 6340</td>
<td>1963</td>
<td>Helicopter</td>
<td>Processed</td>
<td>6340</td>
<td>Wongela</td>
<td>French Petroleum Co.</td>
</tr>
<tr>
<td>Strzelecki Ck, Lake Gregory Gravity Survey</td>
<td>Env 510</td>
<td>1964</td>
<td>Helicopter</td>
<td>Processed</td>
<td>6431</td>
<td>Wongela</td>
<td>Delta Petroleum</td>
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<tr>
<td>Gason-Kopperamanna</td>
<td>SADME Folder</td>
<td>1964</td>
<td>Seismic Lines 1200' Int</td>
<td>-</td>
<td>64E2</td>
<td>SADME</td>
<td>SACME</td>
</tr>
<tr>
<td>Andamooka - Billa Kalina, Curdimurka Lake Eyre</td>
<td>SADME Gravity File RB69/39</td>
<td>1969</td>
<td>Helicopter</td>
<td>Processed</td>
<td>69E3</td>
<td>SADME</td>
<td>SACME</td>
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<tr>
<td>Lake Gregory S/S</td>
<td>Env 1121 1319</td>
<td>1969</td>
<td>Seismic 1/4 mile</td>
<td>Processed</td>
<td>6904</td>
<td>United Geophysical</td>
<td>Ashburton Oil</td>
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<td>Curdimurka Gravity Survey</td>
<td>SADME Gravity File</td>
<td>1977</td>
<td>Road 500m/km</td>
<td>Processed</td>
<td>77E4</td>
<td>SADME</td>
<td>SACME</td>
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<td>Lake Eyre Gravity Survey</td>
<td>SADME Gravity File</td>
<td>1982</td>
<td>Seismic Line</td>
<td>Processed</td>
<td>82E3</td>
<td>SADME</td>
<td>SACME</td>
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</table>
Birdsville Track to Oodnadatta gravity survey (1960)

Dalhousie gravity survey (1963)

Strzelecki Creek – Lake Gregory gravity survey (1964)

Gason – Kopperamanna gravity survey (1964)


Lake Gregory gravity survey (1969)

Curdimurka gravity survey (1977)

Lake Eyre gravity survey (1982)

Figure 8. Gravity surveys, Area F
iii) Aeromagnetic surveys.

**TABLE 3**

<table>
<thead>
<tr>
<th>Survey</th>
<th>SADME Reference</th>
<th>Date</th>
<th>Survey Type</th>
<th>Status</th>
<th>Survey Code</th>
<th>By</th>
<th>For</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Oochnadatta Aeromagnetic Survey</td>
<td>Env 202, 166, 167</td>
<td>1961/62</td>
<td>Airborne Lines E/W 3.0 km Interval 460m flight height</td>
<td>----</td>
<td>61SA02</td>
<td>Aero Service Corporation</td>
<td>Delhi</td>
</tr>
<tr>
<td>2. Kopperamanna Frame Airborne Survey</td>
<td>Published Maps BMR Record #1965/1</td>
<td>1963</td>
<td>Airborne Lines E/W 3.2 km interval 460m flight height</td>
<td>----</td>
<td>63SA01</td>
<td>Adastra</td>
<td>BMR/SADME</td>
</tr>
<tr>
<td>3. Central S. Aust. Curdimurka Area</td>
<td>Published maps</td>
<td>1966</td>
<td>Airborne Lines E/W 3.2km interval 460m flight height</td>
<td>----</td>
<td>66SA05</td>
<td>BMR</td>
<td>SADME</td>
</tr>
</tbody>
</table>
Figure 9. Magnetic surveys, Area F
3. **Data Package Contents**

If you wish to purchase the data package for Area F (contents are listed below), please complete the order form at the rear of the 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 no extra cost. The cost of the data package is $Aust 1,725 including freight costs.

All geological reports are to be supplied as microfiche copies. Seismic sections, shotpoint location maps and depth structure maps will be supplied as sepia copies.

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

Mr V Hilditch
Technical Information Services
(08) 274 7523

3.1 **Geological Data**

i) **Geological Reports**


  Analabs Perth, 1988. Analytical data on selected oils from the southwestern Eromanga Basin. SADME Env. 6116 (unpubl.).
CSIRO Division of Water Resources, 1988. Hydrochemistry of groundwater and associated gases in and around PEL31. SADME Env. 6116 (unpubl.).

Forbes, B.G., 1984. Notes on the Mesozoic sequence and pre-Mesozoic basement, SADME Muloorina 1 water well. SADME RB84/68 (unpubl.).

Habermehl, M.A., 1988. Groundwater movement, hydrochemistry and the potential migration of hydrocarbons in the area SA PEL31 and its environs in the Great Artesian Basin of South Australia. SADME Env. 6116 (unpubl.).


RECON Exploration (Aust.) Pty. Ltd., 1987. PEL31 - South Australia. Hydrocarbon microseepage geochemical survey. SADME Env. 6116 (unpubl.).

Rogers, P.A., 1984. Deepening of Clayton No. 2 well. SADME RB84/43 (unpubl.).

Russell, R., 1985. Notes to accompany the Landsat interpretation of PEL31, Curdimurka Block. SADME Env. 6116 (unpubl.).

Russell, R., 1985. Notes to accompany the Landsat interpretation of PEL31, Marree Block. SADME Env. 6116 (unpubl.).

Russell, R., 1988. Remote sensing interpretation in PEL31 Marree Block, South Australia. SADME Env. 6116 (unpubl.).

ii) **Published geological maps**

1:250 000 Geological series.
MARREE and explanatory notes.
KOPPERAMANNA and explanatory notes.
LAKE EYRE and explanatory notes.
CURDIMURKA (available only as a preliminary paper print).

iii) **Well completion reports**

No petroleum exploration wells have been drilled in the area. On proclamation of new Regulations under the Petroleum Act (anticipated by mid 1989) a number of wells near Area F will come on open file (including Mulapula, Weena, Jennet and Wancoochia). All companies purchasing a copy of the data package for Area F will be contacted by Information Services Branch on proclamation of the Petroleum Regulations to determine if they wish to obtain copies of these reports.

The following stratigraphic or water wells have been drilled in Area F:
- From Broken Hill Group Kopperamanna 1 (1948-49), TD 993m. Well was re-logged by SADME in 1970.
- SADME Clayton 2 (1980), TD 555 m deepended to 568 m in 1983.
- SADME Muloorina 1 (1983), TD 618 m.

Microfiche copies of reports relevant to these wells have been included in the Data Package.
3.2 Geophysical data

i) Seismic data.
   . Seismic line location map.
     A computer generated 1:250 000 scale seismic line location map will be included in package.
   . Seismic shot point location map.
     Computer generated shot point location maps at 1:100 000 scale.
   . Seismic depth structure maps (1:250 000 scale):
     Adelaide Petroleum NL 1985 - Curdimurka/Marree Seismic: Surface geology, water wells bores and structure at Top Algebuckina.
     Adelaide Petroleum NL 1987. Marree Block:

# Depth contours top Algebuckina, bore data plus seismic interpretation.
# TW Time contours basement event, aeromag plus seismic intrepretation.
# Seismic time isopach Algebuckina Sandstone.
# Seismic time isopach Cadna-owie Formation.

   . Seismic sections.
   Sections will be supplied as sepia copies.
Boopeechee Seismic Survey
Survey, 1985  
Curdimurka-Marree  85-CU02  85-MA05
Seismic survey, 1985  85-CU03  85-MA06
  85-MA04  85-MA07
Hogarth Seismic  84-TZX  84-XAA
Survey, 1984  84-TZT  84-TZW
Christmas Creek Seismic  82-RBH  82-RBG
Survey, 1982  82-RBF
Morphett Seismic
Survey, 1985  85-2KH
Lake Gregory Seismic  70-LAA1  70-LAB1
Gravity Survey, 1969  70-LAA2  70-LAB2
  70-LAA3  70-LAC

ii) Gravity maps.

1:250,000 Station Locations  Published  Plan #

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<th>Location</th>
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<td>Lake Eyre</td>
<td>1979</td>
<td>71-408</td>
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<tr>
<td>Kopperamanna</td>
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<td>Prelim</td>
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<tr>
<td>Maree</td>
<td>----</td>
<td>Prelim</td>
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<td>Curdimurka</td>
<td>1971</td>
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1:250,000 Bouguer Gravity Contours  Published  Plan #

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<td>71-409</td>
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<td>86-456</td>
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<td>Curdimurka</td>
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<pre><code>                              |       | 80-119  |
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iii) Magnetic maps.

1:250,000 total magnetic intensity contours.

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<td>Lake Eyre</td>
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<td>Koperamanna</td>
<td>1966</td>
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<tr>
<td>Marree</td>
<td>1966</td>
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<tr>
<td>Curdimurka</td>
<td>1968</td>
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4. BIBLIOGRAPHY

4.1 Published References


4.2 Unpublished References

References marked * are included in the data package. Copies of other unpublished references are available on request.


Alley, N.F., 1987. Palynological dating and correlation of Late Jurassic and Early Cretaceous sediments around part of the southern margin of the Eromanga Basin. SADME RB87/59 (unpubl.).

*Analabs, Perth, 1988. Analytical data on selected oils from the southwestern Eromanga Basin. SADME Env. 6116 (unpubl.).

Beer, B., 1985. Adelaide Petroleum final field operations report Curdimurka/Marree seismic survey. SADME Env. 6576 (unpubl.).

Cockshell, C.D., 1986. Bopeechee seismic survey, operations and processing report. SADME RB86/065 (unpubl.).

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*CSIRO Division of Water Resources, 1988. Hydrochemistry of groundwater and associated gases in and around PEL31. SADME Env. 6116 (unpubl.).
Farrand, M.G., 1983. Petrography of two fine-grained rocks from Muloorina 1 water bore, CURDIMURKA area. SADME RB83/103 (unpubl.).

Forbes, B.G., 1984. Notes on the Mesozoic sequence and pre-Mesozoic basement, SADME Muloorina 1 water well. SADME RB84/68 (unpubl.).


Gatti, G.R., 1986. PEL31 Curdimurka/Marree seismic survey interpretation report. SADME Env. 6576 (unpubl.).


Krieg, G.W., 1984. Progress report on mapping of the Mesozoic and Quaternary of the Curdimurka region. SADME RB84/12 (unpubl.).

Kwitko, G., 1986. Coal exploration drilling in the Clayton area, Marree. SADME RB86/085 (unpubl.).


Norpac International inc., 1985. Curdimurka/Marree seismic survey data acquisition report for Adelaide Petroleum NL. SADME Env. 6576 (unpubl.).

*RECON Exploration (Aust.) Pty. Ltd., 1987. PEL31 - South Australia. Hydrocarbon microseepage geochemical survey. SADME Env. 6116 (unpubl.).


*Rogers, P.A., 1984. Deepening of Clayton No. 2 well. SADME RB84/43 (unpubl.).

*Russell, R., 1985. Notes to accompany the Landsat interpretation of PEL31, Curdimurka Block. SADME Env. 6116 (unpubl.).

*Russell, R., 1988. Remote sensing interpretation in PEL 31 Curdimurka Block, South Australia. SADME Env. 6116 (unpubl.).

*Russell, R., 1988. Remote sensing interpretation in PEL 31 Marree Block, South Australia. SADME Env. 6116 (unpubl.).

4.3 SAMREF

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 access 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 4. 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 4: 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.

<table>
<thead>
<tr>
<th>ONSHORE PETROLEUM EXPLORATION</th>
<th>Petroleum Act Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Title of Tenement</strong></td>
<td>Petroleum Exploration Licence (P.E.L.).</td>
</tr>
<tr>
<td><strong>Who Can Apply</strong></td>
<td>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.</td>
</tr>
<tr>
<td></td>
<td>6(1)</td>
</tr>
<tr>
<td><strong>When Application Can be Made</strong></td>
<td>Initial Licence - At any time over any area not already under licence.</td>
</tr>
<tr>
<td></td>
<td>6(1a)</td>
</tr>
<tr>
<td></td>
<td>Renewal of Licence - not less than 3 months before existing licence is due to expire.</td>
</tr>
<tr>
<td></td>
<td>18(5b)</td>
</tr>
<tr>
<td><strong>Maximum Area</strong></td>
<td>26 000 sq. km.</td>
</tr>
<tr>
<td></td>
<td>15(1)</td>
</tr>
<tr>
<td><strong>Application Fee</strong></td>
<td>For initial application - $400</td>
</tr>
<tr>
<td></td>
<td>7(2)</td>
</tr>
<tr>
<td></td>
<td>For each renewal - $400</td>
</tr>
<tr>
<td></td>
<td>7(2)</td>
</tr>
<tr>
<td><strong>Bond (to ensure compliance with licence conditions)</strong></td>
<td>$4 000 minimum. Amount required is specified in letter of offer. Bond may be in the form of cash, cheque or bank guarantee.</td>
</tr>
<tr>
<td></td>
<td>13(1)</td>
</tr>
<tr>
<td><strong>Term of Licence</strong></td>
<td>Initial Term - 5 years.</td>
</tr>
<tr>
<td></td>
<td>15(2)</td>
</tr>
<tr>
<td></td>
<td>Each Renewal (to a maximum of 3) - 5 years.</td>
</tr>
<tr>
<td></td>
<td>15(2)</td>
</tr>
<tr>
<td><strong>Annual Rental Payable</strong></td>
<td>Initial 5 Year licence term - 16 c/sq. km.</td>
</tr>
<tr>
<td></td>
<td>18c(a)</td>
</tr>
<tr>
<td></td>
<td>First Renewal (2nd 5 Year licence term) - 24 c/sq. km.</td>
</tr>
<tr>
<td></td>
<td>18c(b)</td>
</tr>
<tr>
<td></td>
<td>Second Renewal (3rd 5 Year licence term) - 32 c/sq. km.</td>
</tr>
<tr>
<td></td>
<td>18c(c)</td>
</tr>
<tr>
<td></td>
<td>Third &amp; Final Renewal (4th 5 Year licence term) - 40 c/sq. km.</td>
</tr>
<tr>
<td></td>
<td>18c(d)</td>
</tr>
<tr>
<td><strong>Minimum Work Commitments</strong></td>
<td>As negotiated with applicant after application (which must contain a proposed 5 year work program) has been received.</td>
</tr>
<tr>
<td><strong>Minimum Expenditure Commitments</strong></td>
<td>Initial 5 Year licence term - first two years - $16 per sq. km. per year</td>
</tr>
<tr>
<td></td>
<td>17(1)(a)</td>
</tr>
<tr>
<td></td>
<td>- last three years - $24 per sq. km. per year.</td>
</tr>
<tr>
<td></td>
<td>17(1)(b)</td>
</tr>
<tr>
<td></td>
<td>First Renewal (2nd 5 Year licence term) - $62 per sq. km. per year.</td>
</tr>
<tr>
<td></td>
<td>18a(1)(a)</td>
</tr>
<tr>
<td></td>
<td>Second Renewal (3rd 5 Year licence term) - $80 per sq. km. per year.</td>
</tr>
<tr>
<td></td>
<td>18a(1)(b)</td>
</tr>
</tbody>
</table>
Third & Final Renewal (4th 5 Year licence term) - $34 per sq. km. per year. 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
50c 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:
(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.
(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).
(4) particulars of the technical qualifications and expertise available to the applicant party/parties (e.g. qualifications and experience of employees, consultants retained etc.).
(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).
(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(3)

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)
<table>
<thead>
<tr>
<th>Environmental Conditions</th>
<th>Thesea will be outlined in the letter of offer attached to the licence.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surrenders</td>
<td>The Act requires the licensee to:</td>
</tr>
<tr>
<td>(Partial or Whole of Licence)</td>
<td>(1) apply to the Minister for permission to surrender</td>
</tr>
<tr>
<td></td>
<td>(2) give three months notice in writing</td>
</tr>
<tr>
<td></td>
<td>(3) pay all outstanding fees</td>
</tr>
<tr>
<td></td>
<td>(4) pay all outstanding monies and wages to workmen and employees.</td>
</tr>
<tr>
<td></td>
<td>38(1)</td>
</tr>
<tr>
<td></td>
<td>38(1)(a)</td>
</tr>
<tr>
<td></td>
<td>38(1)(b)</td>
</tr>
<tr>
<td></td>
<td>38(1)(c)</td>
</tr>
<tr>
<td>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.</td>
<td>38(2a)</td>
</tr>
<tr>
<td>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.</td>
<td>38(2b)</td>
</tr>
<tr>
<td>Surrenders are effective from the end of the appropriate year of the term of the licence (unless specified otherwise).</td>
<td></td>
</tr>
<tr>
<td>Required Notice for Approval to Undertake Work in Licence Area</td>
<td>Three months notice is required to arrange necessary clearances with other Government Agencies. This is carried out by DME on the licensee's behalf.</td>
</tr>
<tr>
<td>Required Notice of Entry to Landholders</td>
<td>No risk of damage to land or improvements thereon - 14 days.</td>
</tr>
<tr>
<td></td>
<td>Risk of damage to land or improvements thereon - 28 days.</td>
</tr>
<tr>
<td>Gazettals</td>
<td>Gazettals occur on:</td>
</tr>
<tr>
<td></td>
<td>(1) Grant of Licence</td>
</tr>
<tr>
<td></td>
<td>(2) Surrender of Licence</td>
</tr>
<tr>
<td></td>
<td>(3) Cancellation of Licence</td>
</tr>
<tr>
<td></td>
<td>6(2)</td>
</tr>
<tr>
<td></td>
<td>71(1)</td>
</tr>
<tr>
<td>Suspension and Cancellation</td>
<td>The Act provides for suspension and/or cancellation for failure to comply with licence conditions.</td>
</tr>
<tr>
<td></td>
<td>87a(1)</td>
</tr>
</tbody>
</table>

N.B. All monetary amounts are subject to review.
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 F Data Package

Please provide the Area F data package as specified in Section 3 at a cost of $1,725 (including handling and freight).

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

Please enclose a cheque for $1,725 made out to:
S.A. Dept. Mines & Energy, account No. 86G25144/076

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