DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

Rept.Bk.No. 79/38

A SUMMARY OF GEOPHYSICAL EXPLORATION OF THE EASTERN AND WESTERN OFFICER BASINS IN SOUTH AUSTRALIA 1954 TO 1978

GEOLOGICAL SURVEY

By

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G.S. NO. 6156
D.M. NO. 152/78

DEPARTMENT OF MINES - SOUTH AUSTRALIA

BIBLIOGRAPHY INDEX

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DEPARTMENT OF MINES AND ENERGY

SOUTH AUSTRALIA

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A SUMMARY OF GEOPHYSICAL EXPLORATION OF THE EASTERN AND WESTERN OFFICER BASINS IN SOUTH AUSTRALIA 1954 TO 1978

ABSTRACT

This report is a chronological record of geophysical surveys carried out in the Eastern and Western Officer Basins in South Australia from 1954 to 1978. It contains references to all known works related to the geophysical surveys in the region.

SUMMARY OF GEOPHYSICAL SURVEYS

Most of the Officer Basin in South Australia is blanketed by Recent sands which form the seif dunes of the Great Victoria Desert, and only limited outcrops of basin sediments and older rocks are exposed. As a consequence, exploration of the basins has been primarily geophysical, and in fact their existence was first established by an aeromagnetic survey flown by the Bureau of Mineral Resources in 1954 and confirmed by a single ground traverse of gravity and magnetic observations conducted by the South Australian Department of Mines in 1960. A further reconnaissance type survey was carried out for the licence holders of O.E.L. 28 in 1962 by a contract seismic crew along the limited tracks existing at that time. Interpretation of these data again indicated the presence of an east-west trending basin with a considerable thickness of in-filling sediments.

During 1964 and 1965, an aeromagnetic survey was flown with flight lines oriented north-south in groups of three

with 2.4 km between lines and 16 km between groups. Contours of interpreted depths to magnetic basement showed for the first time the general shape of the basins, their basement configuration and, within the limits of resolution of the survey, the presence of internal structures. Maximum depth estimates of up to 4 500 m were derived.

In 1965 and 1966, a seismic survey was undertaken in the Western Officer Basin and one well, Birksgate No. 1, was drilled on a seismic target.

Also in 1966, a combined seismic and gravity survey was carried out by the South Australia Department of Mines over a north-south line extending north from Emu, with the intention of checking sedimentary thickness and investigating an apparent magnetic feature, the Munyarai structure, in the Eastern Officer Basin. In general, an interpreted basement reflector coincided closely with magnetic basement and a reversal of dip was observed over the supposed structure. A detailed seismic survey employing the weight dropping technique was then undertaken in 1967 over the Munyarai structure, and a well, Munyarai No. 1, drilled on the seismically defined target.

During 1968 helicopter gravity surveys were conducted in the east of the area on a 6.4 km grid to determine the boundary between the Arckaringa Basin and the Eastern Officer Basin. These results helped to establish the southeastern margin of the latter basin. In 1970, a further helicopter gravity survey was carried out over the eastern sector of the Eastern Officer Basin with a background coverage of stations on a 7.2 km grid and more closely spaced stations at intervals of .8 and 1.2 km on lines 3.6 km apart. A number of anomalies were detected and interpreted as originating from a variety of structural features within the basin. In the same year, a reconnaissance

gravity survey was undertaken by the Bureau of Mineral Resources over a large part of the basins on a 7 km grid.

Two lines of seismic data were obtained in 1972 over the eastern end of the Eastern Officer Basin extending into the northwestern Arckaringa Basin. Part of the terms of reference of the survey was to test the existence of the bounding fault interpreted from 1968 gravity results and determine its location and size, if applicable.

In 1972, 1973 and 1974, seismic and gravity traverses were established by the South Australian Department of Mines over part of the northern margin of the Eastern Officer Basin and tied to the Munyarai well in the central part of the basin. A long north-south section was also shot almost completely traversing the basin about 60 km east of the 1966 line. A continuous line source was used and results over much of the survey area were fair to good. The maximum thickness of sediments estimated from the seismic data is between 8 500 and 10 000 m. In late 1974, a detailed seismic survey over the Munyarai structure was carried out for the licence holder of P.E.L. 12 also using a continuous line source, with fair to good data resulting.

A number of sites were occupied in 1976 on the northern margin of the Eastern Officer Basin at which magneto-telluric observations were made and which revealed information on changes in sub-surface porosity of the basin sediments, and on the postulated overthrust from the north.

Finally, in 1978 the semi-detailed helicopter gravity work was extended further to the east. This was followed by a similar extension of seismic investigations, together with a re-shoot of an early line south of the Everard Ranges over the overthrust in the hope of obtaining a better quality section.

Gravity values were also read at the levelled seismic stations.

The location of the above surveys is shown on drawings 78-270 and 78-277 (EVERARD and GILES 1:250 000 sheet areas - Seismic shot point locations plans); 78-327 (Exploration Licence boundaries and Seismic line locations); 78-333 (Magnetic surveys) and 78-339 (Gravity surveys), and references are appended. Some references on surveys marginal to the basin to the east and southeast are included.

B.E. Milton
Supervising Geophysicist

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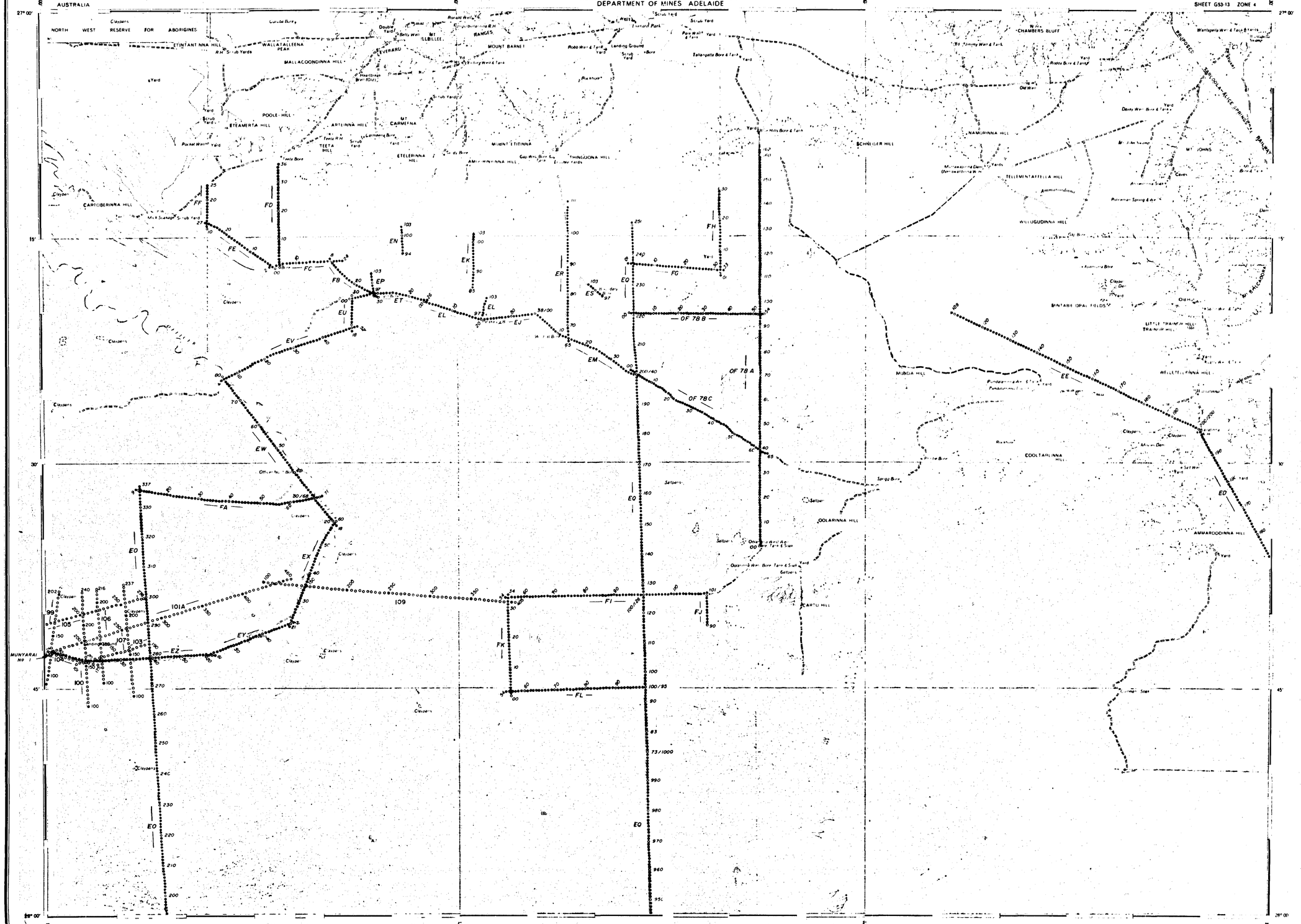
EVERARD

GEOLOGICAL SURVEY OF SOUTH AUSTRALIA
DEPARTMENT OF MINES ADELAIDE

SHEET G53-13 ZONE 4

AUSTRALIA

NORTH WEST RESERVE FOR ABORIGINES



SEISMIC SURVEY REFERENCE

SADME

EO 1966 – Report 64/27
Reflection 1200' shot point interval
100' trace interval
Refraction 7200' spread
300' trace interval

ED – FL 1972 – 74
Reflection 1200' shot point interval
100' & 200' trace interval
Refraction – Various spread arrays

OF 78 A – C 1978
Reflection 300 m shot point interval
50 m trace interval

NAMCO

CONTINENTAL 1967 – Env. 829
Reflection – Weight dropping, 40 drop pattern
1200' trace interval

SHELL

EVERARD 1974 – Env. 2509
Reflection – Geoflex 0–450–2750 m
100 m group interval
36 Elt. in line pattern

INDEX TO ADJOINING SHEETS

WOODROFFE	ALBERGA	ABMINGA
LINDSAY	EVERARD	MINTINNA
WELLS	GILES	MURLOCOCOPPIE

SCALE

MILES 2 1 0 2 4 6 8 10 12 14 16 18 20 MILES

KILOMETRES 5 4 3 2 1 0 5 10 15 20 25 KILOMETRES

LOCALITY

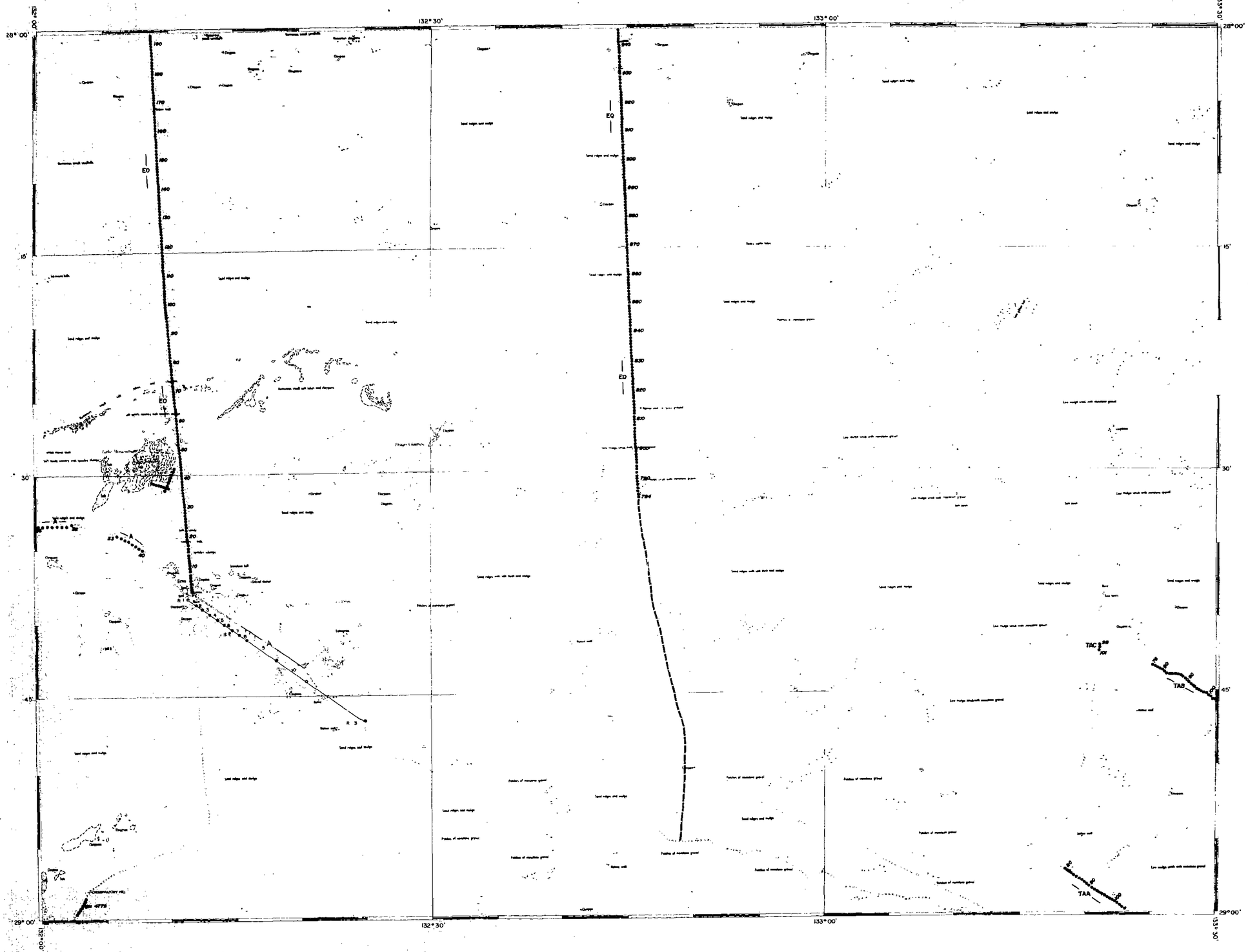
EVERARD

Compiled from the Division of National Mapping Topographic Base Map Compilation By
Cartographic Division S.A. Department of Mines Adelaide

SEISMIC SHOTPOINT PLAN
78-270

GILES

DEPARTMENT OF MINES ADELAIDE



REFERENCE

ENV. 224 MABEL CK. A

NAMCO 1962

REFLECTION	1320'	S.P. INT.
	110'	T. INT.
REFRACTION	110'	T. INT.

REP. 64/27 EQ, EQ

SADM 1966-74

REFLECTION	1200'	S.P. INT.
	100'	T. INT.
REFRACTION	7200'	SPREAD
	300'	T. INT.

TAA-C SADM 1976 REP 76/153

REFRACTION VAR. SPREADS

ASSOCIATED 1:250 000 SHEETS

LINDSAY	EVERARD	WINTINNA
WELLS	GILES	MURLOOCOPPIE
MAURICE	TALLARINGA	COOBER PEDY

SCALE

MILES 0 2 4 6 8 10 12 14 16 18 20 MILES

KILOMETRES 5 0 5 10 15 20 25 KILOMETRES

Deposited in Dept. of Mines

Chief Survey Drafting Officer

Date.....

ONE MILE ENLARGEMENTS

ANKANA	CAPPAROO	TALTEROO
WERRILAH	WILARI	MAMALLA
YARAKAI	MOTEPA	PULTERA
KOONUNDA	TARLINA	ALINYA

SHOTPOINT LINE REFERENCE
SHOTPOINT LOCATION
HIGHWAY
MAIN ROAD
SECONDARY ROAD
TRACK
RAILWAY
DISUSED RAILWAY
BOUNDARY FENCE
VERMIN PROOF FENCE
EPHEMERAL STREAM
CLAYPANS
TRIANGULATION STATIONS
HORIZONTAL CONTROL
IDENTIFIED POINT
WATER FEATURES
BORE
SPRING
WATERHOLE
WELL
EARTH TANK OR DAM
STRATIGRAPHIC BORE
MINE
MINERAL OCCURRENCE
COPPER Cu
LEAD Pb
COBALT Co
NICKEL Ni
MANGANESE
IRON
BARYTES
ASBESTOS

EQ

Base compilation derived from Division of National Mapping published maps, and adapted by mean adjustment to the Australian Map Grid.

SEISMIC SHOTPOINT PLAN

78-277

MUSGRAVE BLOCK

OFFICER BASIN

EUCLA BASIN

ARCKARINGA BASIN

GAWLER PLATFORM

BRIKSGATE No 1

OFFICER No 1

MARLA No 1

MUNYARAI No 1

MANYA No 1

EMU No 1

KARKARO No 1

MURNAROO No 1

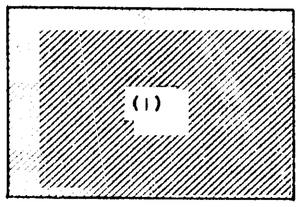
WALLIRA No 2

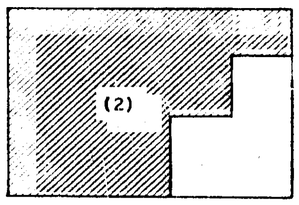
WALLIRA WEST No 1

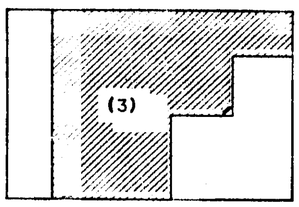
NAMCO 'A' LINE

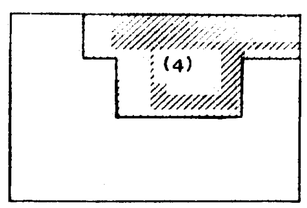
NAMCO 'B' LINE

Approximate Northern Limit of Miocene Nullarbor Limestone

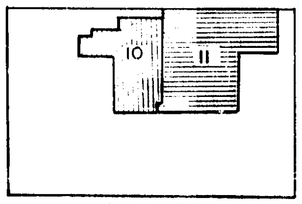




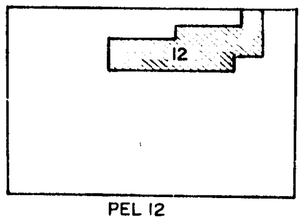




SEQUENTIAL BOUNDARIES OF OEL 28



PEL 10 & 11



PEL 12

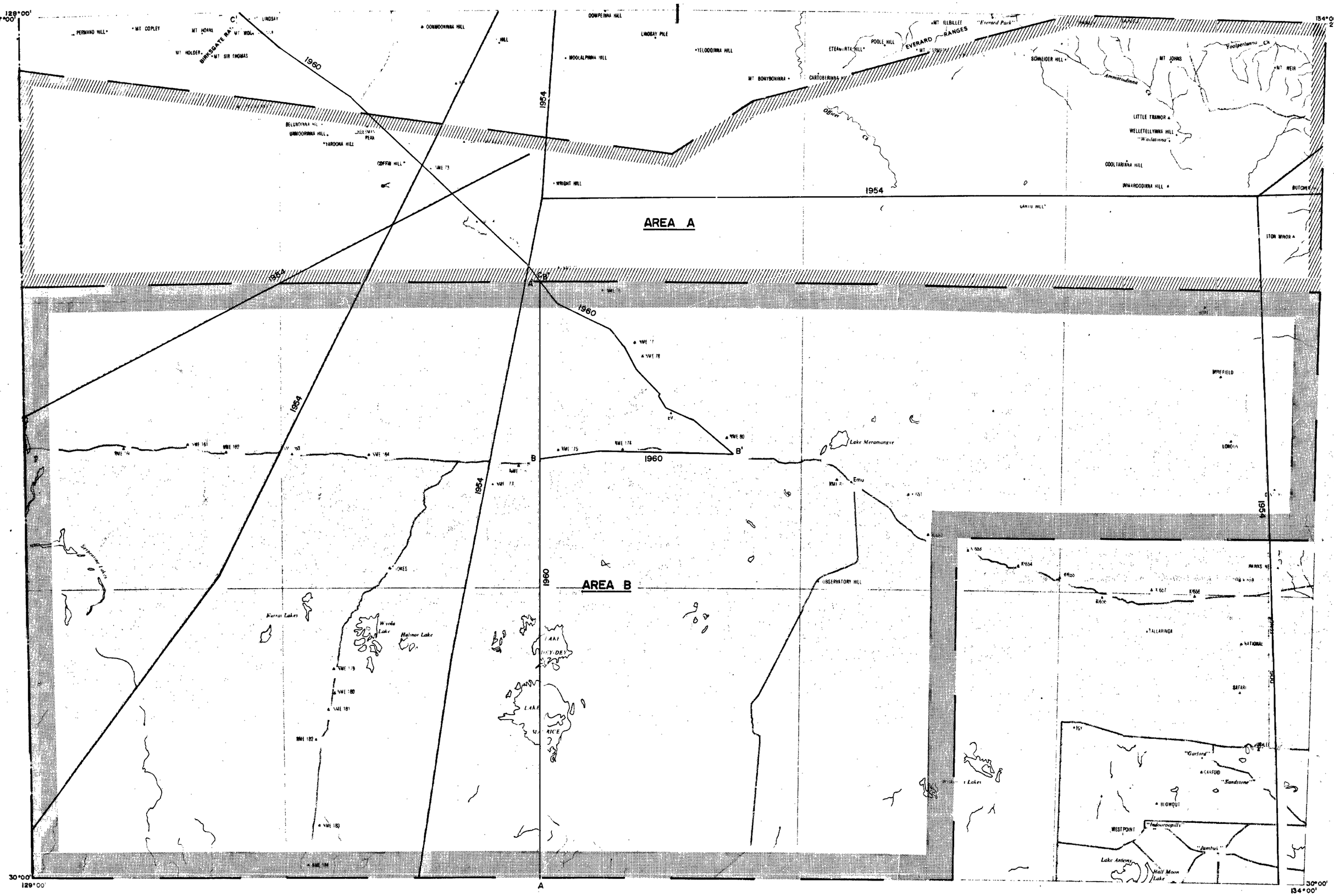
LEGEND

OEL 28 (1)
OEL 28 (2)
OEL 28 (3)
OEL 28 (4)
PEL 10
PEL 11
PEL 12

SCALE 1:1,000,000

KILOMETRES 20 0 20 40 60 80 100 KILOMETRES

DEPARTMENT OF MINES & ENERGY — SOUTH AUSTRALIA				
OFFICER BASIN EXPLORATION LICENCE BOUNDARIES & SEISMIC LINE LOCATION				
			SCALE 1:1,000,000	PLAN NUMBER 78-327
			DATE 7·4·78	


128°00'
27°00'
134°00'
27°00'
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AREA A
AREA B
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1960
1964
A
A'
B
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C
C'
PERMANO HILL
MT COPLEY
MT HOARE
MT HOLDER
BIRKSGATE RA
MT SIR THOMAS
DOMPEINNA HILL
LINDSAY PILE
YELOODINNA HILL
MOOLALPINNA HILL
MT BONYBONINNA
CARTOBERINNA HILL
ETEAWIRTA HILL
POOLE HILL
MT ILLBILLEE
"Everard Park"
EVERARD RANGES
SCHNEIDER HILL
MT JOHNS
Yooperlunna Ck
MT WEIR
Ammarodinna Ck
LITTLE TRAINOR
WELLETELLYINNA HILL
"Wadatinna"
COOLTARINNA HILL
INNAROODINNA HILL
BUTCHER HILL
ITON MINOR
Officer Ck
WRIGHT HILL
BELUNDINNA HILL
UMMOORINNA HILL
YAROONA HILL
COFFIN HILL
TRIG 73
CAMEL HILL
NME 17
NME 78
NME 80
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NME 183
NME 184
Lake Meramangye
Emu
OBSERVATORY HILL
Serpentine Lakes
Murrat Lakes
Wynda Lake
Halmar Lake
LAKE YOUNGHUSBAND
LAKE RICE
MYRTLE FIELD
LONDON
TALLARINGA
NATIONAL
SAFARI
"Garford"
GARFORD
"Sandstone"
BLOWOUT
WESTPOINT
"Indarroopilly"
"Jumbuk"
Lake Antony
Half Moon Lake
Lakes
HAWKS NEST
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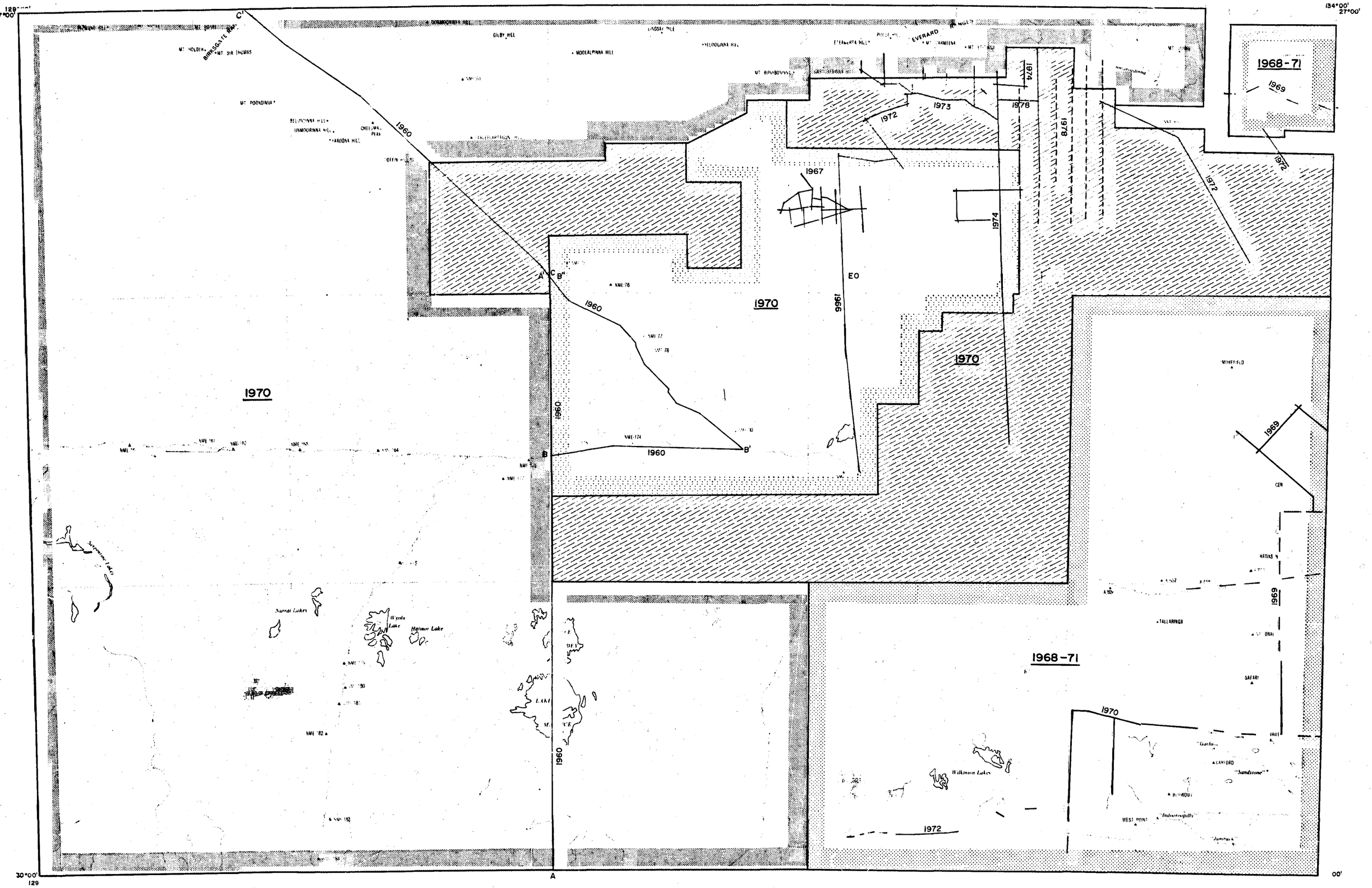

LEGEND

1960	Mumme traverse (ground) AA' BB'B'' CC' A:2 mile int., B:5·8 mile int., C:6·4 mile int.	
1966	Moorcroft EO:1200 ft int.	
1967	Raitt & Bowman 1200 ft int.	
1968-71	Hall & Townsend. Gerdes & Taylor. 6·4km x 6·4km grid	
1970	Nettleton N-S lines 3·6km apart, Stn. int. 0·8 & 1·2km	
	Helicopter grid 7·2km x 7·2km	
1970	Pettifer & Fraser, Helicopter grid 7km x 7km	
1969-74	S.A.D.M.E. 1200ft int. (ground) coverage of seismic lines	
1978	"	
1978	White, N-S lines 6km apart, 1km station interval	

DEPARTMENT OF MINES & ENERGY— SOUTH AUSTRALIA

OFFICER BASIN GRAVITY SURVEYS

SCALE : 1:1,000,000

DATE : 17-4-78

PLAN NUMBER 78-339

Job Nº 668