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T/14P part IX\*

REPORT 701/12

of M	A.O.	C.G.	E.O.	D.S.M.E
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QUARTERLY REPORT

ON

T.14P

BASS BASIN, TASMANIA

FOR

THE CUE MINERALS N.L.

CONSORTIUM

INDEX1. INTRODUCTION2. OPERATIONS PERFORMED

2.10 BCS 81 Seismic Survey: Processing

2.20 Burial and Thermal Geohistory Studies

3. OPERATIONS PLANNED

3.10 Interpretation BCS 81 Survey

3.20 Wharf Investigation Bass Strait

3.30 Rig Investigation

4. EXPENDITURE5. APPENDICES5.10 BCS 81 Marine Seismic Survey. Navigation  
(Report under Seperate Cover)5.20 Burial and Thermal Geohistory Study  
(Report under Seperate Cover) (Refer OR-136B)6. ILLUSTRATION ACCOMPANYING REPORT

Cue 701/17 BCS 81

1. INTRODUCTION

This report presents the operations carried out and planned in connection with T.14P during the period April 10, 1981 to July 9, 1981. The main involvement during this period has been the completion of the Burial and Thermal Geohistory Study outlined in the last quarterly report.

The marine seismic survey, BCS 81 totalling 550.375 km has been processed, final sections having been received from G.S.I. after the end of the quarter on July 29, 1981. Interpretation of these will commence during the next quarter.

## 2. OPERATIONS PERFORMED

### 2.10 Data Processing: BBC 81 Seismic Survey

Parameters for data processing were selected in the last quarter and were as follows: Record section at 96 trace 48 fold with Velscans 1 every 2.5 km, no velocity filtering was carried out on the 25 lines of the survey and sections has a 32ms gapped convolution, played out to 5 sec record length.

The final sections were received on the 29th July along with the post plots for line location. Interpretation will commence in the next quarter. Data quality appears good. The post plot map for the survey 701/17 is included in Section 6. of this report.

### 2.20 Burial and Thermal Geohistory Study of the Bass Basin

A Burial and Thermal Geohistory Analysis of the Bass Basin which was conducted in two stages was completed during the quarter. The two areas covered in the study were:

<u>STAGE</u>	<u>DESCRIPTION</u>
I	Preparation of Geohistory diagrams (with reports) for each well included in study
II	Basin-wide time series analysis of thermal values, paleostructure and basement subsidence rates for the Bass Basin. Assessment of favourable areas for hydrocarbon generation and entrapment.

The following are brief extracts from the report which is appended (under separate cover) in full to this quarterly report. (Section 5.20)

GENERAL SUMMARY

A. BURIAL AND THERMAL GEOHISTORY ANALYSIS of the following thirteen wells in the Bass Basin was carried out by Paltech Pty. Ltd. during the period March - July 1981.

AROO - 1  
BASS - 1  
BASS - 2  
BASS - 3  
CORMORANT - 1  
DONDU - 1  
DURROON - 1  
NANGKERO - 1  
NARIMBA - 1  
PELICAN - 1  
POONBOON - 1  
TAROOK - 1  
TOOLKA - 1

The study indicated the following:-

- \*The prime exploration target (for mature source, seal and reservoir) is the Lower Eastern View Coal Measures (earliest Eocene and older).
- \*If adequate migration paths for hydrocarbons do not exist the most favourable exploration areas are the Deep Basin and the high heat flow Northeast and Southwest Flanks of the Deep Basin.
- \*If adequate migration paths do exist the most favourable exploration areas are, besides those areas specified above, but especially, the Northeast and Southwest Basin Margins, adjacent to the high heat flow areas.

\*Less than 50% of the wells drilled in the Bass Basin have adequately tested the structure, having terminated above or only just within the predicted mature zone.

\*Future assessment of smaller areas of the Bass Basin will require the collection of standardised thermal maturation data, rather than from a wide diversity of studies as was used here.

B. THERMAL, MATURATION, POTENTIAL GENERATION AND MIGRATION OF HYDROCARBONS IN THE BASS BASIN

The assessment of any petroleum resource or play is usually considered to depend on the following factors:-

1. Reservoir present
2. Source rocks present
3. Thermal history favourable
4. Effective trap and seal
5. Timing of structure right
6. Protection from flushing

Factor 2 has been favourably assessed by Nicholas et al (1980) in "Petroleum Potential of the Bass Basin" by E. Nicholas, K. L. Lockwood, A. R. Martin, and K. S. Jackson. PESA - Symposium November 1980.

Heat flow computer production of a burial and thermal geohistory diagram involves calculation of the present day heat flow based on sea bottom temperature, bottom hole temperature and thermal conductivities of the rock sequence.

The Bass Basin has for the purposes of this study been divided into four (4) heat flow regimes. [above or below 1.50 hfu (heat flow units)].

Heat Flow 1.50 h.f.u.		Heat Flow 1.50 h.f.u.	
Area	Well	Area	Well
NE Flank	Dondu-1 Bass -1	NE Slope (incl. S.E. Slope & N. Slope	Toolka-1 Cormorant-1 Bass - 2 Durroon - 1.
SW Flank	Pelican - 1 Narimba - 1 Bass - 3	Deep Basin	Aroo - 1 Tarook - 1 Poonboon - 1 Nangkerro - 1

Thus the high heat flow regimes are seen to flank the deep basin, and this differentiation of the Basin into areas is similar to that based on geothermal gradients presented by Nicholas et al (1980) but suggests symmetry of thermal properties exists in the Basin.

DEPTH TO MATURE ZONE:

The study found that most of the gas and condensate shows are found beneath the  $R_o = 0.6\%$  level, including the major PELICAN-1 discovery. In some cases, shows are found above this level, probably due to the influence of volcanics.

The zone beneath the  $R_o = 0.6\%$  level is here considered to be the mature zone for hydrocarbon generation.

If we assume that T.D. should be at least 500 metres below the top of the mature zone\*to adequately test a prospect (ignoring problems of closure) the following wells were terminated at too shallow a depth.

Area	Poorly Tested Prospects	Expressed as % of wells in area
NE Flank	Bass - 1	50%
SW Flank	Bass - 3	33%
NE Slope	Toolka - 1 Cormorant - 1	50%
Deep Basin	Tarook - 1 Poonboon - 1 Nangkero - 1 Aroo - 1 **	100%

\* To allow for lack of vertical migration.

\*\* Considered inadequate because of volcanics in mature zone. Only 58 metres of the predicted mature zone was tested above the volcanics at 3138m (sub sea).

Thus the data presented above supports Nicholas et als (1980) conclusion that much of the Bass Basin has been inadequately tested at depth. The thermal history of the Bass Basin is favourable for hydrocarbon generation.

POTENTIAL GENERATION AND MIGRATION OF HYDROCARBONS IN THE BASS BASIN

The Burial and Geohistory study to date, has indicated that the Upper Eastern View Coal Measures [Upper EVCM refers to the interval above the intra-M. diversus zone unconformity (~52.5-50 m.y.)], in the wells drilled to date, is above the transitionally mature zone ( $0.5 < R_o < 0.6$ ) or in rare cases within it (PELICAN - 1, NARIMBA - 1 and BASS - 1).

For the purpose of the study the main exploration target was selected as the Lower EVCM (especially that interval between the Cretaceous/Tertiary (K/T) boundary and the intra-M. diversus zone unconformity).

A potential migration path refers to a difference in depth of a particular horizon between two wells which would allow migration of hydrocarbons up dip as though no structures existed between the wells at the time. There is no doubt such structures did exist, but an assessment of their effect on hydrocarbon migration could only be gained from very detailed seismic analysis which was beyond the scope of the present study, as was the existence of cap rock to facilitate the migration necessary.

Potential migration was considered only from mature source zones ( $R_o > 0.60$ ). Structurally high points within the Basin capable of forming traps of hydrocarbons following potential migration paths were termed potential traps. Based on computer predicted results the following wells were potential traps at one time or another in the last 20 m.y. - TOOLKA - 1, POONBOON - 1, NARIMBA - 1, BASS - 2, BASS - 3 and PELICAN - 1.

In terms of the petroleum play assessment factors referred to at the start of this Section, the timing of structure is right in the Bass Basin. The study has shown that, depending on existence of migration paths, some traps may not have been fully effective during the last 20 m.y.

MAJOR PREDICTED HYDROCARBON EXPLORATION PLAYS (LOWER EVCM TARGET)  
IN THE BASS BASIN

Assessment of favourable "plays" for hydrocarbon exploration in the Bass Basin depends on one critical factor - migration. The report summarises the studies into migration effecting hydrocarbon plays as follows:-

If migration paths are available, the most favourable plays are indicated to be:

LOCATION	TRAPS	TARGET
Bass-2 Area	Off structure	Lower EVCM
Toolka-1 Area	Structural	" "
NE & SW Basin Margins (adjacent to high heat flow areas)	Structural and/or Stratigraphic	" "
Damala Nose	?Structural	" "

The major requirement for such plays is adequate protection from flushing.

If long distance migration paths are not available the most favourable plays are:-

LOCATION	TRAPS	TARGET	MINIMUM T.D.
NE Flank	Structural	Upper & Lower EVCM	3000m
SW Flank	Structural	Upper & Lower EVCM	3000m
Deep Basin	Structural	Lower EVCM	3500m

Once again protection from flushing is necessary, more so for the NE and SE Flanks than the Deep Basin.

Assessment of Upper EVCM "plays" has not been attempted in the studies, since in all the wells examined, the Upper EVCM was considered immature for hydrocarbon generation. However, the presence of a small oil show in CORMORANT - 1 in the Upper EVCM suggests that the Upper EVCM in deeper areas surrounding the "positive" structures drilled (e.g. AROO - 1) may be responsible for generating hydrocarbons such as the oil show in CORMORANT - 1.

The findings from this study will be incorporated with the seismic interpretation of the BCS 81 survey to produce target zones for further seismic, and more importantly drilling.

### 3. OPERATIONS PLANNED

#### 3.10 Interpretation BCS 81 Survey

Continued development of a synthetic seismogram programme will be continued and two-way time maps of interesting horizons on a 1:100,000 scale are planned. These will be prepared in preliminary form during the next quarter and integrated with the work from the Burial and Thermal Geohistory study.

Geological interpretation will continue on formation picking and development of a depositional model.

#### 3.20 Review of Wharf Facilities : Bass Strait

The Company is undertaking a review of wharf and base facilities for operating its offshore programmes from either Geelong or Devonport. Details of these investigations should be available for the next quarter.

#### 3.30 Investigation of Rig Availability

The Company commenced early in the year detailed investigations into obtaining suitable drilling vessels. These will be continued and further reported on in the next quarter.

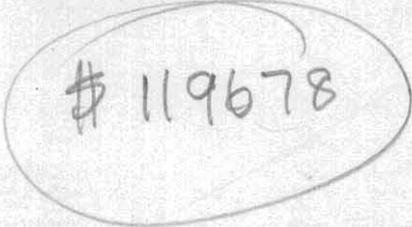
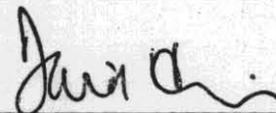
4. EXPENDITURE

CUE MINERALS N.L.PERMIT TAS. T.14PQUARTERLY REPORT - EXPENDITURE

QUARTER ENDING: July 9, 1981

LEASE FEES (RENTAL)	OFFICE OVERHEAD	OFFICE STUDIES	FIELD WORK		
			GEOLOGICAL	GEOPHYSICAL	DRILLING
	12,500	20,000	5,000	82,178	

SIGNED: \_\_\_\_\_



\$ 119678

5. APPENDICES

5.10

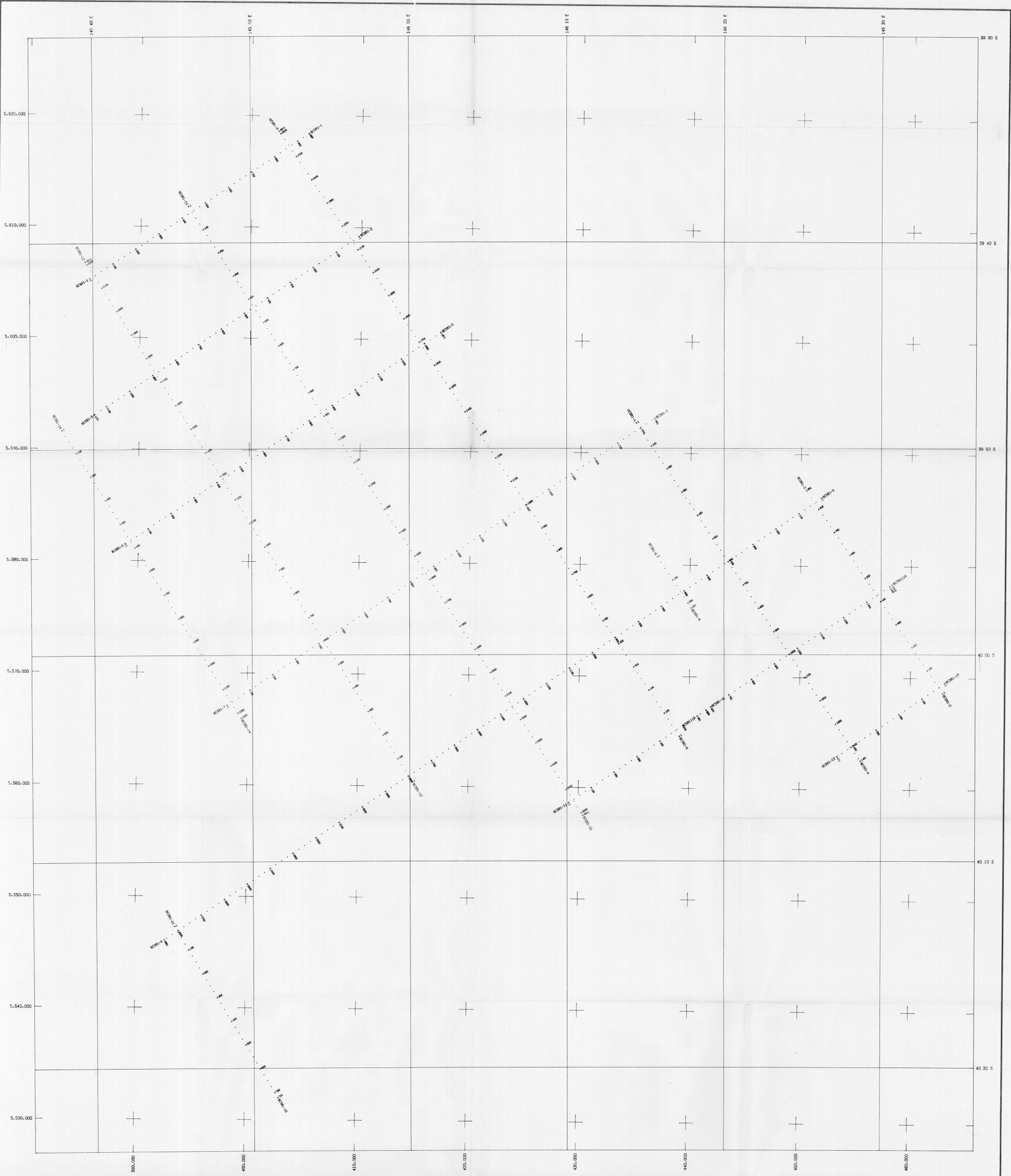
BCS 81 SEISMIC SURVEY -  
NAVIGATION REPORT

(Under Seperate Cover)

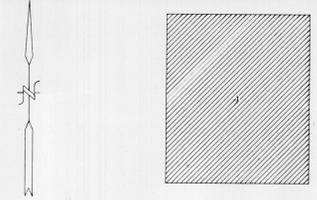
5.20 BURIAL AND THERMAL GEOHISTORY STUDY  
(Under Seperate Cover)

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6. ILLUSTRATION ACCOMPANYING REPORT



ELLIPSOID: AUSTRALIAN  
 SEMI-MAJOR AXES: 6378160.000  
 SEMI-MINOR AXES: 6356774.719  
 PROJECTION: UNIVERSAL TRANSVERSE MERCATOR  
 U.T.M. ZONE: 55  
 ORIGIN LATITUDE: 00 00 00.00 N  
 CENTRE MERIDIAN: 147 00 00.00 E  
 ORIGIN SCALE FACTOR: 0.9996000  
 FALSE NORTHING: 10000000.00  
 FALSE EASTING: 5000000.00  
 PROJECTION UNITS: METERS  
 POSITION MAPPED: AIRGUN



POSITION MAP  
 CUE MINERALS  
 BASS STRAIT  
 SURVEY BY  
 GEOPHYSICAL SERVICE INC.  
 SCALE 1:100,000 *OR-136*

