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PERMIT OP238

PEDIRKA/SIMPSON DESERT/
WESTERN EROMANGA BASINS

NORTHERN TERRITORY
BEJAH SURVEY 1986
SEISMIC INTERPRETATION REPORT

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June 1987

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SUMMARY

Following the acquisition of 263 line kilometres of new seismic data, an interpretation incorporating all available data within and around Permit OP238 has been undertaken. The interpretation has resulted not only in the further definition of the various prospects and leads within the permit, but in a better understanding of the structural history of the study area, and its relationship to the surrounding region.

The regional geology of the region, however, is not as well understood. This is in part due to the paucity of well control but sufficient data exists for such parameters as degree and timing of oil maturity and source/reservoir/seal quality and distribution to be estimated. Such estimates are essential if the geological risk associated with any prospect is to be determined.

It is recommended that prior to any drilling commitment, a comprehensive geological study be carried out so that the numerous prospects and leads within the permit can be appropriately ranked with reference to location, size and geological risk. As an additional aid in prospect assessment, direct hydrocarbon detection should be attempted via geochemical soil sampling and Landsat image enhancement.

The distribution and prospectivity of the pre-Permian sequence within the OP238 region is also poorly understood. It is recommended that a combined gravity/magnetics study, properly integrated with the available well and seismic data, be carried out.

Following the geological and geophysical work recommended, further detailed seismic data should be acquired over those prospects warranting further attention

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1. Introduction

The Bejah Seismic Survey, consisting of 263 line kilometres of 12 and 24-fold vibroseis data, was shot by the OP238 Joint Venture to fulfill the following objectives:

(a) to further define the Colson Anticline-in particular to investigate the possibility of the existence of closure updip from the Colson#1 well (24-fold data)

(b) to detail the Bejah Prospect (24-fold data)

(c) to investigate several promising structural leads present within OP238 (12-fold data).

The survey was carried out in January/February 1986 by Norpac International Crew NV05 and processed in Sydney by Hosking Geophysical (Australia). A limited amount of in-field processing was carried out by Norpac to ensure that adequate data had been acquired over the Colson and Bejah Prospects before the crew was demobilised. Separate acquisition and processing reports have been supplied by the relevant contractors.

The new data has been integrated with pre-existing data and data traded with neighbouring permitees. This report describes the interpretation of this combined data set.

AGE		STRATIGRAPHY	DOMINANT LITHOLOGY	HYDROCARBONS
CARBONIFEROUS-DEVONIAN		SANTO SANDSTONE	Sandstone, Conglomerate	
	FINKE GROUP *	HORSHOE BEND SHALE *	Siltstone, Shale	
		LANGRA FORMATION *	Conglomeratic Sandstone	
		POLLY CONGLOMERATE *	Sandstone, Conglomerate	
		PERTNJARA GROUP	Conglomerate, Sandstone Siltstone, Shale	
DEVONIAN-SILURIAN		MEREENIE SANDSTONE *	Sandstone with large cross-beds	
ORDOVICIAN	LARAPINTA GROUP *	CARMICHAEL SANDSTONE	Sandstone, Siltstone Shale	
		STOKES FORMATION	Siltstone, Shale Limestone	
		STAIRWAY SANDSTONE	Sandstone, Siltstone	☼ PALM VALLEY, MEREENIE ◆ Tempe Vale, Mt Winter, BMR API 1
		HORN VALLEY SILTSTONE	Siltstone, Shale Limestone	☼ PALM VALLEY
		PACOOTA SANDSTONE	Sandstone & silty Sandstone	☼ PALM VALLEY, MEREENIE, W. Walker ● MEREENIE ◆ E. Johnny's Ck, Tempe Vale, Mt Winter
CAMBRIAN	PERTAOORTA GROUP *	GOYDER FORMATION	silty Sandstone, Siltstone, Limestone	◆ Alice, Tempe Vale ☼ West Walker
		JAY CREEK LIMESTONE	Interbedded Siltstone & algal Limestone	
		HUGH RIVER SHALE	Shale, Siltstone Dolomite at base	
		SHANNON FORMATION	Interbedded Limestone, Shale Siltstone, some Dolomite	
		GILES CREEK DOLOMITE	Thick-bedded Dolomite Limestone, Shale, Siltstone	◆ Alice
		CHANDLER LIMESTONE	Limestone, Dolomite	◆ Alice, Wallaby ☼ Orange
		TODD RIVER DOLOMITE *	Dolomite, Sandstone Siltstone	
		ARUMBERA SANDSTONE	Sandstone, Siltstone Conglomeratic Sandstone	☼ Dingo, Orange 2 ☼ Wallaby
UPPER PROTEROZOIC *		PERTATATAKA FORMATION	Siltstone, Shale, Conglomerate Dolomite, Limestone, Sandstone	
		AREYONGA FORMATION	Siltstone, Dolomite Conglomerate, Sandstone	☼ Ooraminna
		BITTER SPRINGS FORMATION	Dolomite, Limestone, Siltstone Sandstone, Shale Basic Volcanics	◆ Finke, Mt Winter
		HEAVITREE QUARTZITE	Sandstone, conglomeratic in places, some Shale	
PRE-CAMBRIAN		ARUNTA COMPLEX	Gneiss, Schist, Quartzite	

* Penetrated in the OP 238 / EP 2 region

EASTERN AMADEUS BASIN
SIMPSON DESERT REGION
PRE-CARBONIFEROUS STRATIGRAPHY

Figure 2

PED238-2/2602/02

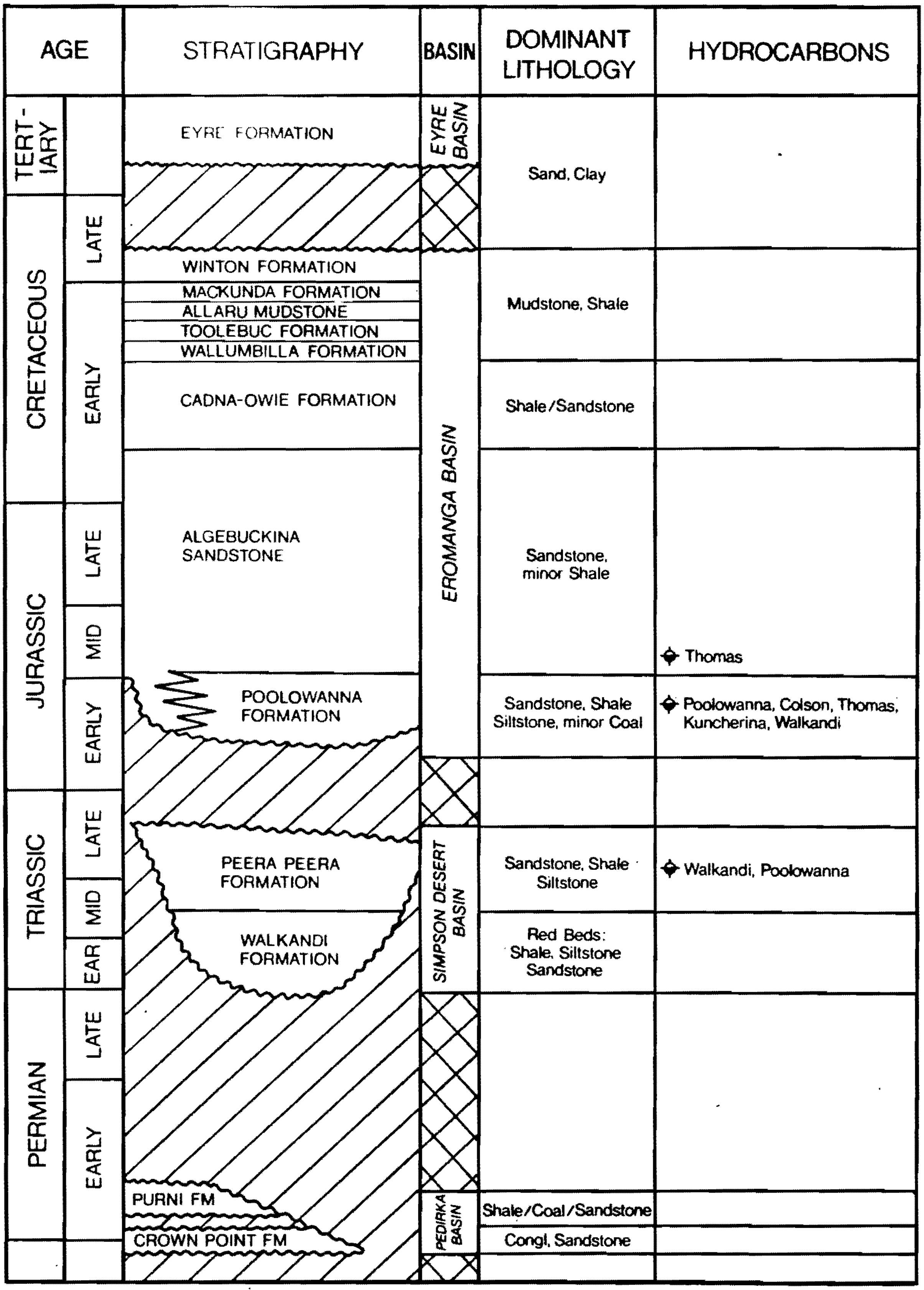

Figure 3 **SIMPSON DESERT REGION POST CARBONIFEROUS STRATIGRAPHY**

PED 238-2/2609/01

2.Seismic to Well Ties and Horizons Mapped

Appendix I contains a summary for each well to which a seismic tie was made. Figure 1 shows the location of these wells.

Seismic to well ties were made at Colson#1, McDills#1 and Hale River#1 by converting formation tops (metres below seismic datum=+91 MASL) to two-way times (seconds below seismic datum) using the velocity survey data and transposing these times onto the seismic sections. The nearest event satisfying the phase/amplitude criteria for the formation boundary picked was then mapped. Synthetic seismograms were also used to check the ties at Colson#1 and Hale River#1. Regional seismic ties were also made to Thomas#1 and Mokari#1 by use of formation tops and estimated interval velocities.

The events picked on all seismic lines are listed below. Time structure maps were produced for those highlighted (*). Figure 3 relates the events to geologic age.

(a) Top Cadna-Owie Formation (*)
(b) Near Top Poolowanna Formation (*)
(c) Base Jurassic Unconformity
(d) Top Permian Unconformity
(e) Top Crown Point Formation
(f) Base Permian Unconformity

The Top Cadna-Owie Formation event is mapped with a high degree of confidence over the whole area. The Near Top Poolowanna Formation reflection is also mapped with confidence where the Poolowanna Formation is greater than 100 metres thick. Where it is less than 100 metres thick (approaching the basin margins) the Poolowanna Formation commences to change facies and merge with the Algebuckina Sandstone and the limit of shaly Poolowanna Formation is difficult to locate. It should be noted that within the depocentres (Madigan and Poolowanna Troughs), the Near Top Poolowanna Formation event originates from within the Basal Algebuckina Formation shales. These shales disappear on the margins of the troughs, generally where the two-way time thickness of the interval between the Near Top Poolowanna Event and the Base Jurassic Unconformity Event is less than 60 milliseconds. Beyond this point the event mapped coincides with the top of the Poolowanna Formation.

The remaining events are all picked in a rather subjective manner since over much of the area the Triassic and Permian formation thicknesses are beyond seismic resolution. In addition, the base of the Permian section is rarely discernable as a clear unconformity.

Strong events can be seen within the pre-Permian sequence on lines S86BT-01, -02, and -03. A tentative tie was made to Mcdills#1 and the events are interpreted to be from sediments of the Finke Group (Devonian-Carboniferous cf.Figure 2). To date, no attempt has been made to map the structure, thickness or limit of the pre-Permian sediments within OP238. This should be done in conjunction with a combined gravity/magnetics study.

3. Structural Interpretation

3.1 Structural Trends Mapped

A number of major structural trends have been mapped in the OP238 area (enclosures 1A,1B,1C,2A,2B,2C,7 and 8 and figure 1). Of these,the Dalhousie-McDills Trend is the most prominent. This down-to-the-west reverse faulted high trends northeast-southwest over a distance of over 250 kilometres. The southern culmination of the trend outcrops in South Australia as the Dalhousie Anticline. North of this feature the high plunges and loses surface expression and is mapped totally from subsurface data. Regional dip is to the north to the northern border of OP238, where a saddle has been mapped. North of this point, a high with strong south plunge is present. No seismic lines have been shot north of latitude 24 degrees 30 minutes and therefore the northern end of the trend is inadequately defined. Dip reversals observed on Line AB shot in the 1960's have been confirmed by the new lines shot over the McDills Trend (S86MT-01A, -01B, -02, -04, -06 and -08). A series of en-echelon anticlines have been mapped, the largest closures being developed at the northern end of the trend before the regional dip reverses. The Witcherrie#1 and Mt Crispe#1 wells were drilled on the flanks of the Dalhousie Anticline and the McDills#1 well was drilled near the crest of a separate culmination on the trend. No shows of significance were encountered. However, all of these wells were drilled in locations with considerably less section than is present within OP238. In particular, no Poolowanna Formation or Triassic sediments were encountered in these wells, whereas these prospective sediments are interpreted to be present downdip within OP238. The Dalhousie-McDills Trend is flanked by significant synclines which have been depocentres from Permian through Cretaceous times (enclosures 3,4,5,6 and 7).

The Border Trend is sub-parallel to the Dalhousie-McDills Trend and like it culminates south of OP238, the dip within the permit being predominantly to the north. The high, like the Dalhousie-McDills Trend, is asymmetric due to the presence of reverse faulting. In the case of the Border Trend, throw is down-to-the-east. Prior to the 1986 survey, closures were interpreted to be present on the northern end of the trend where it broadens and meets the south dipping Hale River Area high. Lines S86BT-01, -02 and -03 were shot over one of these features (Simpson Prospect) and confirmed that closure is present.

No well has yet been drilled on the Border Trend. Mokari#1 was drilled on a small high flanking the Border Trend but without success. However, no Triassic and only thin Poolowanna Formation sediments were present. The northern end of the trend, within OP238, has considerably more section present, and unlike Mokari#1 is flanked to the west by the Madigan Trough, which contains a thick untested pre-Permian and Permian to Cretaceous sequence.

The East Border Trend runs north-south along the eastern border of OP238 and continues further south at least as far as latitude 26 degrees 30 minutes. It consists of at least two en echelon down-to-the-east reverse faulted anticlines, the most southern of which was tested by the Erabena#1 well. Several separate culminations are present within OP238. Lines S86BT-04 and -05 were shot over the largest of these and confirmed that critical north dip is present, and that the east bounding fault dies northwards, disappearing betweent lines 3E and S86BT-05. The series of closures now mapped are now known collectively as the East Border Prospect (parts 1, 2 and 3).

The Border and East Border Trends tend to intersect in/abut an area known as the Hale River High which is located within the centre of the northern portion of OP238. This area is of generally low relief and several divergent trends have been mapped. The faults and associated highs strike predominantly in a northwest-southeast direction and tend to merge with the East Border Trend. However the alignment of another series of highs suggests the continuation of the Border Trend to the north. The lack of significant pre-Permian section in Hale River#1, the presence of a bouguer gravity high, and the structural complexity of the Hale River Area indicate that it is a southern extension of the Arunta Block which bounds the Northern Amadeus Basin.

The Hale River High is bounded to the southwest, south and southeast by a steeply dipping margin which is abutted by several highs which may have significant closure, depending on the presence of critical north dip. Significantly more section than that penetrated by Hale River#1 should be present over these highs.

The area between the Border and East Border Trends in the southeastern portion of OP238 is dominated by a series of predominantly north-south trending anticlines, of which the Colson and Bejah Highs and an unnamed high approximately midway between them, are the most prominant. Detailed shooting was carried out over the Bejah Prospect in 1986 (lines S86B-01, -02, -03, -4, -04A, -05 and -09). Closure has been confirmed and a culmination mapped.

An additional two lines were shot over the crest of the Colson Anticline (S86B-06 and -07). The subsequent mappping shows that Colson#1 was drilled very close to the crest of this feature.

The southeastern corner of OP238 forms the northern tip of the Poolowanna Trough, a significant Triassic-Cretaceous depocentre centred to the south, which is also dominated by north-south trending structural highs. The Poolowanna#1 well was drilled on one of these anticlines and recovered 1676 metres of fluid including 50% 37 degrees API oil from the Poolowanna Formation. A subsequent appraisal well did not reproduce these results, but seismic lines shot after Poolowanna#2 was completed show it to have been drilled downdip from Poolowanna#1. In addition, the reservoir sands intersected in Poolowanna#1 were absent in Poolowanna#2 by facies change. Colson#1, drilled within OP238 near the crest of the Colson Anticline, recorded a residual hydrocarbon show upon drilling into the first porous sand of the Pooolowanna Formation. Scattered fluorescence was evident throughout the next 60 metres of section. Wells drilled in 1985 to the south of OP238 on trend with the Bejah High (Oolarinna#1, Killumi#1) did not record significant shows, although both were apparently valid structural tests. Killumi#1 reached total depth within the Peera Peera Formation because of severe circulation problems, so that the Permian section was not tested in this well.

Regionally, it can be seen from the Top Cadna-Owie Formation Structure map (enclosure 7), that a tilt to the southeast has been imposed on the OP238 area. This is a result of progressive subsidence of the Poolowanna Trough. In addition it can be seen (enclosures 7 and 8) that northwest-southeast oriented trends intersect and offset the main structural trends which tend to be north-south to northeast-southwest oriented. En echelon anticlines are present in the areas of strongest offset.

3.2 Structural History

The regional features observed above, in addition to the predominence of reverse faulting in association with the main structural trends, suggest the existence of compression and one or more deep seated strike-slip or wrench faults. A recent paper (Kuang,1985) suggests that much of the structuring in the Cooper-Eromanga Basin can be explained in terms of compression and wrenching. Although at this time a detailed model cannot be put forward to explain the structuring observed in the Pedirka/Simpson Desert/Western Eromanga Basin Region it is evident that compression and wrenching have been involved in the structural evolution of the area.

For convenience, the discussion below is centred around the six regional (1/250,000) maps (enclosures 3 to 8).

(a) Pre-Permian and Permian Structure (enclosure 3-Permian Time Thickness Map)

Little is known about pre-Permian deposition or structuring in the OP238 area. Well control is sparse and the seismic data poor below the Permian reflectors. McDills#1, Mt Crispe#1 and Witcherrie#1 each encountered a significant pre-Permian section, although they were all drilled on the prominent Dalhousie-McDills Trend. This suggests that this and other sub-parallel trends had little or no expression prior to Carboniferous/Permian times. However, many of the highs expressed on the Permian and younger reflectors are the result of reactivation of pre-Permian faults.

The lack of significant pre-Permian section at Hale River#1 indicates that this area was a structural entity during the pre-Permian. This is confirmed by bouguer gravity contours, which show the Hale River Area as a gravity high connected to the gravity high associated with the Arunta Block to the northwest. This gravity high swings southwards east of Hale River#1 suggesting a closing off of the pre-Permian (Amadeus equivalent) basin. A speculative limit of thick pre-Permian sediments was drawn on the basis of well control and the gravity contours on the gravity map included in the report on the 1985 Colson Seismic Survey. No further work has been carried out on the pre-Permian sequence. A combined gravity/magnetics/seismic study should be carried out to address this problem.

The accumulation of Permian sediments in the Simpson Desert Area is known as the Pedirka Basin. On the basis of the time thickness map and well control it appears that two significant depocentres were present-one located in the western part of OP238 and flanking the Dalhousie-McDills Trend (Madigan and Mt Daer/Casuarina Troughs), and the other centred south of the Purni#1 and Mokari#1 wells in South Australia. The eastern limit of Permian sediments has been mapped from seismic data and using well control but is only reliable south of latitude 25 degrees 40 minutes where the pinchout edge is preserved. Elsewhere the Pedirka Basin is bounded by a truncation edge which is difficult to pick on seismic data, especially where Triassic sediments are also present.

The main structural trends described above (secion 3.1) were initiated prior to or during Permian deposition, with significant growth occurring on faults along the Dalhousie-McDills Trend and Border Trend and minor fault movement associated with the Colson Anticline and neighbouring highs. The Bejah High was present as the western edge of a major platform which limited Permian deposition. The Hale River Area remained high, although Permian sediments were deposited.

(b) Triassic Structure (enclosure 4-Triassic Time Thickness Map)

The accumulation of Triassic sediments in the Simpson Desert Area, being bounded above and below by unconformities, is known as the Simpson Desert Basin. Triassic sediments are absent at Hale River#1 and McDills#1, and at Colson#1 they are only 34 metres thick. They are beyond seismic resolution over much of the OP238 permit area. The mapped Triassic edge is therefore highly conjectural.

Of most significance is the change in sediment distribution between Permian and Triassic times. Whereas the main Permian depocentres were in the west, the thickest Triassic sediments were deposited to the southeast where no Permian sediments were deposited. This change in sediment distribution marks the initiation of the Poolowanna Trough. The Madigan and Mt Daer/Casuarina Troughs continued to be significant depocentres. A hinge line developed coincident with the Border Trend, which appears to have extended through to the Hale River Area.

The Dalhousie-McDills Trend and Hale River High continued to be prominent features during Triassic deposition, as evidenced by the lack of Triassic sediments in the McDills#1 and Hale River#1 wells, although this could be partly due to truncation at the Base Jurassic Unconformity. The other major trends (Border, East Border, Colson, Bejah) also exhibit growth during the Triassic.

(c) Lower Jurassic Structure (enclosure 5-Basal Algebuckina+Poolowanna Formation Time Thickness)

Eromanga Basin deposition was initiated during the Lower Jurassic by deposition of the fluviatile Poolowanna Formation. As for the Triassic, two main depocentres were present-the older Madigan/Mt Daer/Casuarina Trough to the west and the developing Poolowanna Trough to the east. These were separated by a northeast-southweast oriented hinge line. Since the Basal Algebuckina Formation shales and the Poolowanna Formation are absent at McDills#1 and Hale River#1 it is evident that these features were prominent during Poolowanna Formation deposition. Similarly, the culmination of the Border Trend is interpreted to have no Poolowanna Formation present.

(d) Middle Jurassic to Cretaceous Structure (enclosure 6-Cadna-Owie Fm+Algebuckina Sandstone Time Thickness Map)

Significant structural growth occurred during this period. Every major trend exhibits Algebuckina Sandstone thinning (enclosure 6). In particular, the Dalhousie-McDills Trend is strongly expressed-the Algebuckina Sandstone is missing fom the most northerly culmination mapped. The northwest-southeast fault trends of the Hale River Area were active at this time. In addition, the time thickness contours tend to trend northwest-southeast. This suggests that the older structural trends that originally controlled Permian deposition were reactivated at this time. The western and eastern depocentres and associated hinge line remained as structural entities during Algebuckina Sandstone deposition. The maximum thickness of Cadna-Owie Formation + Algebuckina Sandstone has been mapped in the Madigan Trough-indicating renewed subsidence of this feature during the Middle Jurassic to Cretaceous.

An unconformity has been identified within the upper part of the Algebuckina Sandstone in the Colson Area. No attempt has been made to map this unconformity over the study area but it is of obvious importance in that it dates the age of the structural growth discussed above.

(e) Recent Structuring (enclosure 7-Top Cadna-Owie Formation Structure Map)

The Eromanga Basin was subjected to Tertiary east-west compressional phases of tectonism as severe as any of the preceeding structural episodes. They resulted in the rejuvenation of many of the older structures and associated faults and the removal of a significant amount (up to 700 metres) of Cretaceous sediment over some structures. These late phases of structuring are exhibited on the Top Cadna-Owie Formation structure map by significant fault throw on the mapped horizon (eg.Dalhousie-McDills, Border and East Border Trends, Hale River Area), offset of the mapped closure from the palaeoclosure as a result of tilting (eg.McDills High, Colson Anticline) and changes in the relative prominence of some highs (eg.Erabena High). A general overprinting of north-south trends is also evident in the contours. On seismic sections the late structuring is evidenced by concordance of the very shallow horizons with the deeper events and the presence of crestal collapse faults concentrated in the Cretaceous marine sequence above the Cadna-Owie Formation and typically soling out into the marine shale (eg.Erabena structure). The existence of at least two phases of Tertiary structuring is clearly seen on some seismic lines (eg. S85C-06) which show truncation of events at the Base Tertiary Unconformity and structuring of the unconformity itself.

The regional tilting to the southeast continued into the Tertiary and the Poolowanna Trough became the major depocentre. The western depocentre and the hinge line are expressed on the Top Cadna-Owie Formation structure map (enclosure 7) but lose prominence relative to their expression on the Cadna-Owie Fm+Algebuckina Sandstone Time Thickness Map (enclosure 6).

4. Prospects and Leads

The prospects and leads discussed below are identified on the prospect summary map (enclosure 9). They have been divided into groups according to the structural province in which they occur.

4.1 Madigan Trough (leads A to H)

The Madigan Trough is located in the northwestern corner of OP238. It has been a major depocentre since at least the Permian and most likely before that during deposition of the Amadeus Basin sequence that was partly penetrated in McDills#1. A thick Permian sequence (possibly 1000 metres) is interpreted to be present. Up to 200 metres of Triassic sediments and 200 metres of Lower Jurassic Poolowanna Formation and Basal Algebuckina Formation are also present. These latter formations constitute the primary targets in the OP238 area.

Closures A to F comprise a series of en echelon anticlines developed at the northern end of the McDills Trend, a reverse faulted anticline with periods of growth extending from the Permian through to the Tertiary. The development of closures A to F is interpreted to be related to strike-slip movement along the McDills Trend fault(s).

Leads G and H are one-line anomalies flanking the Madigan Trough and are likely to be smaller than currently mapped, but they do warrant further attention.

At near Top Poolowanna Formation level, closure B is the largest mapped on the McDills Trend. Maximum vertical relief is 45 metres, with a maximum area of closure of 23 square kilometres. Depth to the primary target is estimated at 1560 metres and possible well total depth (top of pre-Permian) is estimated at 2450 metres. At closure B, the thickness of the Basal Algebuckina plus Poolowanna Formation is estimated at 180 metres, the Triassic section at 90 metres, and the Permian section at 600 metres. Further seismic data is required to mature this and any other of the Madigan Trough leads for drilling.

4.2 Border Trend (Simpson Prospect and leads I to P)

The Border Trend extends through the central part of OP238. It separates the Madigan Trough to the northwest from the Poolowanna Trough to the southeast, and has acted as a hinge line throughout the subsidence of the Poolowanna Trough since the Triassic. As such, traps located along the Border Trend are ideally located to recieve hydrocarbons which may have migrated from either depocentre. Permian, Triassic and basal Jurassic sediments are interpreted to be present over the central part of the trend within OP238. The Poolowanna Formation is thinner than at Colson#1 and this may cause problems with lack of seal, although 37 metres of shale was present at the top of the Poolowanna Formation in that well.

Seismic lines S86BT-01, S86BT-02 and S86BT-03 were shot over the Simpson Prospect on the Border Trend in 1986. However, seismic control over this prospect remains inadequate. In particular, closure to the northwest is not proven. As mapped at Top Poolowanna Formation level, the prospect has a maximum vertical relief of 44 metres and maximum area of closure of 42 square kilometres. Depth to the primary target is estimated at 1715 metres and possible well total depth (top pre-Permian) is estimated at 2100 metres. The thickness of the Poolowanna Formation is estimated at 60 metres, the Triassic at 60 metres, and the Permian at 260 metres.

4.3 Colson Trend (Colson Anticline crest and leads AA to EE)

The Colson Anticline flanks the Border Trend and is located on the northwestern margin of the Poolowanna Trough. The crest of this high has been detailed by the 1985 Colson and 1986 Bejah seismic surveys. Interpretation of this data has shown that Colson#1, which encountered oil shows within the Poolowanna Formation, was drilled very close to the crest of the structure at Poolowanna Formation level. A small Poolowanna Formation accumulation (1 million barrels maximum) could be present updip from Colson#1.

It is possible that the absence of a significant accumulation at the crest of the Colson Anticline is due to lack of seal at the top of the Poolowanna Formation. Rapid facies variations in the Poolowanna Formation occur over the Poolowanna Anticline to the southeast. A clean sand which flowed oil in Poolowanna#1 was not encountered 2.5 kilometres to the south in Poolowanna#2.

The reflection from the top of the Poolowanna Formation exhibits considerable variation in quality over the Colson Anticline and this may be an indication of lithology changes similar to those experienced in the Poolowanna area.

Separate closures, which may have a continuous Poolowanna seal, are present downdip from Colson#1. The largest of these has been mapped immediately to the east of the main high (lead EE). Maximum vertical relief on this high is 45 metres, and the maximum area of closure is 24 square kilometres. Depth to the primary target is estimated at 2040 metres, and possible well total depth (top of pre-Permian) is 2500 metres. The thickness of the Poolowanna Formation is estimated at 80 metres, the Triassic at 135 metres, and the Permian at 260 metres. Further seismic would be required to mature this prospect for drilling.

4.4 Bejah Trend and Adjacent Leads (FF to OO)

Several north-south trending highs have been mapped at the northern end of the Poolowanna Trough within OP238. Of these, the Bejah Prospect has been most fully explored, and is considered to be (seismically) mature for drilling. The Permian Purni Formation pinches out over the Bejah High, providing a possible migration route into the younger sequences for hydrocarbons generated from Permian sediments in the syncline to the west of the high.

Approximately 150 metres of Basal Algebuckina plus Poolowanna Formation and 160 metres of Triassic sediments are present in the Bejah area. Permian sediments are restricted to the area west of the Bejah Trend.

The main part of the Bejah Prospect has a vertical relief of 60 metres and an area of closure of 25 square kilometres. Depth to the primary target is 2125 metres and depth to a possible well total depth is 2500 metres.

4.5 East Border Trend (East Border Prospect and leads PP,QQ,RR)

The north-south oriented East Border Trend extends through the extreme eastern portion of OP238 and several closures have been mapped on trend with Erabena#1. This well was drilled by Delhi Petroleum P/L in 1981 on the largest of the anticlines developed along the East Border Trend in South Australia. Only minor shows were encountered. Interpretation of traded seismic data over the Erabena High has shown that the well was located at the crest of the structure at Poolowanna Formation level and was therefore a valid test. At Top Cadna-Owie Formation level, the well location is only slightly downdip from the crest.

The East Border Trend has been a positive feature since the Permian or earlier, and has suffered several periods of reactivation. The most recent of these was in the Tertiary, when east-west compression caused the faults bounding the trend to the east to be reactivated. The amount of throw on these faults varies along the trend, indicating possible strike-slip fault movement and a variable degree of reactivation along trend. The Erabena High as currently mapped is substantially the product of Tertiary structuring and this, along with dependence upon fault seal, may explain the lack of an accumulation in this large trap. However, the style of the closures developed along trend in OP238 is very similar to the Erabena structure and the results in Erabena#1 must therefore detract from the prospectivity of the closures mapped in OP238.

Seismic lines S86BT-04 and S86BT-05 were shot in 1986 to further define a large closure which had been mapped from the existing seismic data. In particular, north dip needed to be proven. The new data has shown north dip to be present (S86BT-04) and has also shown that the east bounding fault does not extend far beyond line 3E, since there is no indication of it on line S86BT-05. The East Border Prospect is currently mapped as a large high, partly fault bounded to the east, with at least three culminations (parts 1,2 and 3). The largest of these (part 1) has a vertical relief of 58 metres and an area of closure of 26 square kilometres. Depth to the primary target is estimated at 1950 metres and possible well total depth (top pre-Permian) is 2430 metres. Approximately 270 metres of Basal Algebuckina plus Poolowanna Formation and 200 metres of Triassic sediments are interpreted to be present. Permian sediments are expected to be absent in this area.

4.6 Hale River High Flanks (leads Q to X)

The Hale River High, which is mapped as the northern culmination of the Border Trend, is the most structurally complex portion of OP238. Both northwest-southeast and northeast-southwest trending faults have been mapped in this area and are seen to bound the high to the west,south and east. The flanks of the Hale River High form an area of rapidly thickening section-Poolowanna Formation and Triassic sedimiments are interpreted to be present immediately downdip from Hale River#1. This well was drilled on a high mapped from reflections interpreted at that time to be from pre-Permian (Amadeus Basin) targets and reached total depth in Proterozoic volcanics after penetrating Cretaceous-Jurassic, Lower Permian and thin Carboniferous-Devonian sediments. No shows were encountered.

Several large fault traps and numerous four-way dip closures have been mapped downdip from the Hale River High. The largest fault trap (lead S) is located on the western flank of the high. The Poolowanna Formation and Triassic sediments are interpreted to be restricted to the downthrown side of the fault which bounds the structure to the east. Closure is not present at Top Cadna-Owie Formation level, since the fault does not cut this horizon over its full length. This is a high risk play, but potential reserves are large. The maximum vertical closure mapped is 133 metres, and maximum area of closure is 48 square kilometres. Depth to the primary target is 1235 metres and possible well total depth is 1500 metres. Approximately 50 metres of Poolowanna Formation and 50 metres of Triassic sediments could be present at this location. Permian sediments are estimated to be 130 metres thick.

4.7 Hale River High (leads Y and Z)

As discussed above, Hale River#1 was drilled to test pre-Permian targets. The current mapping shows that the well was not near the crest of any significant structure at Permian or younger levels. A large, four-way dip closed high has been mapped just north of the well (lead Y). Maximum vertical relief on this high at Top Cadna-Owie Formation level is 55 metres and maximum area of closure is 60 square kilometres. Depth to the top of the Cadna-Owie Formation is estimated at 745 metres and possible well total depth (top pre-Permian) is estimated at 1450 metres. In this area the Cadna-Owie Formation/Algebuckina Sandstone interval is approximately 430 metres thick, and the Permian approximately 110 metres thick. The Poolowanna Formation and Triassic sediments are absent.

5.Conclusions and Recommendations

Interpretation of the 1986 Bejah Seismic Survey and previously acquired data has resulted in the recognition of 48 prospects and leads within OP238. These prospects and leads have been divided into groups according to the structural province in which they occur. An attempt has been made to rank these groups of prospects with reference to the probability of accumulations being present and the potential size of such accumulations.

It is concluded that the Madigan Trough prospects should be rated highly, mainly on the basis the existence of thick untested sediments and a favourable structural history. However,it is evident that at present it is not possible to adequately assess the geological risk associated with any prospect within OP238. This prevents a rational and detailed risk analysis of the permit from being undertaken. The size, geometry, orientation and regional setting of the various prospects and leads is reasonably well defined. The structural history of the area has been partly determined. It is recommended that the following work be undertaken so that a more complete assessment of the prospectivity of the permit may be made.

(a) construction of sand/shale ratio/facies maps (using well control, the time thickness maps compiled from seismic data, and seismic stratigraphy where possible).

(b) source rock study-a more complete compilation of the published material and possibly some in-house analysis.

(c) seismic geohistory analysis/burial history/maturation modelling to determine when each possible source rock became mature for oil generation, where the hydrocarbons were generated, the regional dip at that time, the palaeoclosure at the prospects at that time.

(d) gravity/magnetics modelling and seismic assessment of the nature and distribution of pre-Permian basement and basins.

(e) Landsat image enhancement and photogeology as an aid in assessing regional structure (integrated with the gravity/magnetics/seismic interpretation). Landsat image enhancement as an aid in direct hydrocarbon detection through tonal anomalies.

(f) geochemical soil sampling over prospects.
(g) seismic data trades with neighbouring permit holders to enable a better understanding of the region.

It is recommended that when this work is complete then a comparative study be undertaken with the productive Eastern Eromanga/Cooper Basins to determine if there are substantial similarities and/or differences in structural history, geothermal history, sedimentation patterns, groundwater flow and other factors which may have implications for the prospectivity of the Pedirka/Simpson Desert/Western Eromanga Basins. After this study the prospects and leads should be ranked and further seismic data acquired over those most highly rated.

Darryl Kingsley
Consultant
June 1987

APPENDIX I

WELL SUMMARIES

WELL	YEAR	DATA AVAILABLE
McDills-1	1965	basic data,stratigraphic table,velocity survey,logs
Hale River-1	1966	basic data,stratigraphic table,velocity survey,logs*
Colson-1	1978	basic data,stratigraphic table,velocity survey,logs*
Mokari-1	1966	basic data,stratigraphic table,logs
Thomas-1	1981	basic data,stratigraphic table,composite log

* = synthetic seismogram generated

KEY TO SHOW CODES

FIRST DIGIT	SECOND DIGIT
OIL SHOWS	GAS SHOWS
0=No shows.	0=No shows.
1=Fluorescence-no cut.Dead oil stain. Asphalt or bitumen observed in core and/or cuttings.	No equivalent gas show code.
2=Live oil in core and/or fluor'cence with cut in sidewall core or cuttings.	2=Anomalous gas show recorded on mud log.
3=Oil cut mud/water recovered on DST. (oil present but reservoir tight or wet).	3=Gas cut mud and/or water recovered on DST.
4=Clean oil recovered in test string after DST.No flow to surface.	4=Gas to surface at a rate too small to measure.
5=Oil to surface.	5=Gas to surface.

Blank show codes indicate that no information regarding shows is available.

WELL:**MCDILLS-1**

BASIN:Onshore Eromanga

STATE:Northern Territory

OPERATOR:Amerada Petroleum Corporation Australia Limited

YEAR COMPLETED:1965

STATUS:Completed Water Well

LATITUDE:25.7305 LONGITUDE:135.7903 (Decimal Degrees)

SEISMIC LOCATION

1590'/485m SE of SP119 Line D of the Andado Seismic Survey (1963).

RT ELEVATION (DRILLING DATUM):126 metres

GROUND ELEVATION:121 metres

TOTAL DEPTH:3205 metres

LOGS RUN

Induction-Electric+Acoustic Velocity-Gamma Ray+FORXO-Caliper+Dipmeter+Penetration Rate+Hotwire Gas Log.

HYDROCARBONS

Gas show from 1365'/416m to 1380'/421m in the lower part of the Wallumbilla Formation. Induction Log run to check the lithology of the reservoir with negative results.

DRILL STEM TESTS

1.No Drill Stem Tests

2.No temperature survey. Smyth & Saxby (APEA 1981) calculated an uncorrected geothermal gradient of 29 degrees Celsius/kilometre.

3.BMR (1980) uncorrected geothermal gradient = 29.4 deg C/km.

STRUCTURE

Four-way dip closure on Dalhousie-McDills Trend (northeast-southwest trending anticline with associated down-to-the-west reverse fault).

DATA SOURCE

Well Completion Report (S/N 65/4156)

VELOCITY SURVEY WAS RUN

COMMENTS

1.Completed as a water well with perforations from 1950'/594m to 1955'/596m flowing at an estimated 50 barrels per hour from the Algebuckina Sandstone.

2.Top Wallumbilla Formation pick is questionable-the log character of the cretaceous section is unlike that in other wells in the area. No Toolebuc Formation interpreted.

MCDILLS-1 STRATIGRAPHIC TABLE
(Depths are in metres)

AGE	FORMATION	D(RT)	D(SS)	LITHOLOGY	SHOWS
TERTIARY/QUATERNARY	SURFACE SANDS	5	121	SANDSTONE	00
<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<UNCONFORMITY>>>					
U-L.CRETACEOUS	WINTON	31	95	MUDSTONE	00
LOWER CRETACEOUS	WALLUMBILLA	363	-237	MUDSTONE/MNR LST	02
U.JURASSIC-L.CRET	CADNA-OWIE	437	-312	SST/MDST/SLST	00
M-U.JURASSIC	ALGEBUCKINA	463	-337	SANDSTONE	00
<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<UNCONFORMITY>>>					
LOWER PERMIAN	PURNI	718	-592	SST/SHALE/SLST/LIG	00
LOWER PERMIAN	CROWN POINT	868	-742	SST/CGLT SST	00
<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<UNCONFORMITY>>>					
PRE-PERMIAN	BASEMENT	910	-785	SST/CGL SHALE/SLST	00
U.DEVONIAN-CARB.	IDRACOWRA SANDSTONE	910	-785	SST/CGL SHALE/SLST	00
U.DEVONIAN-CARB.	HORSHOE BEND SHALE	1155	-1030	SHALE/SLST/SST	00
U.DEVONIAN-CARB.	LANGRA SANDSTONE	1241	-1115	SST/SHALE	00
U.DEVONIAN-CARB.	POLLY CONGLOMERATE	1768	-1642	CGLT/SST/SHALE	00
DEVONIAN?	MEREENIE SANDSTONE	2161	-2035	SST/TR SHALE	00
DEVONIAN?	UNNAMED UNIT	2502	-2377	SST/TR SHALE	00
LOWER CAMBRIAN	TODD RIVER DOLOMITE	2749	-2624	DOL/LST/SHALE/ANHYD	00
	TOTAL DEPTH	3205	-3079		

MCDILLS-1 FORMATION TOPS

A.Reflection times and velocities were computed using the depth/time/velocity table from the velocity survey and supplied shallow velocities.
B.Velocities supplied were:
Velocity at datum=3618 FT/S
C.Datum for measurements=300 FT AMSL.Negative times and depths are above datum.
D.Units are metres and metres/second.

FM	FORMATION NAME	DEPTH	OWT	TWT	VAVE	LITHOLOGY
1	SURFACE SANDS	-29	-.0266	-.0531	1103	
		Interval Velocity=1103 M/S				SANDSTONE
2	WINTON	-3	-3.1E-03	-6.1E-03	1103	
		Interval Velocity=1910 M/S				MUDSTONE
3	WALLUMBILLA	329	.1707	.3414	1925	
		Interval Velocity=1949 M/S				MUDSTONE/MNR LST
4	CADNA-OWIE	403	.209	.418	1929	
		Interval Velocity=2783 M/S				SST/MDST/SLST
5	ALGEBUCKINA	429	.2181	.4362	1965	
		Interval Velocity=2871 M/S				SANDSTONE
6	PURNI	684	.3069	.6139	2227	
		Interval Velocity=3079 M/S				SST/SHALE/SLST/LIG
7	CROWN POINT	834	.3557	.7115	2344	
		Interval Velocity=3228 M/S				SST/CGLT SST
8	BASEMENT	876	.3688	.7377	2376	
		Interval Velocity=3228 M/S				SST/CGL SHALE/SLST
9	IDRACOWRA SANDSTONE	876	.3688	.7377	2376	
		Interval Velocity=3484 M/S				SST/CGL SHALE/SLST
10	HORSHOE BEND SHALE	1121	.4391	.8782	2553	
		Interval Velocity=3363 M/S				SHALE/SLST/SST
11	LANGRA SANDSTONE	1206	.4645	.929	2597	
		Interval Velocity=3801 M/S				SST/SHALE
12	POLLY CONGLOMERATE	1734	.6032	1.2064	2874	
		Interval Velocity=4147 M/S				CGLT/SST/SHALE
13	MEREENIE SANDSTONE	2127	.698	1.396	3047	
		Interval Velocity=4577 M/S				SST/TR SHALE
14	UNNAMED UNIT	2468	.7726	1.5452	3195	
		Interval Velocity=4598 M/S				SST/TR SHALE
15	TODD RIVER DOLOMITE	2715	.8263	1.6526	3286	
		Interval Velocity=4951 M/S				DOL/LST/SHALE/ANHYD
	TOTAL DEPTH	3171	.9184	1.8367	3453	

WELL:**HALE RIVER-1**

BASIN:Onshore Eromanga

STATE:Northern Territory

OPERATOR:Amerada Petroleum Corporation Australia Limited

YEAR COMPLETED:1966

STATUS:Plugged and abandoned

LATITUDE:25.2633 LONGITUDE:136.7267 (Decimal Degrees)

SEISMIC LOCATION

Shotpoint 217 Line 2Z of the Simpson Desert 'A' Seismic Survey (1965).

RT ELEVATION (DRILLING DATUM):125 metres

GROUND ELEVATION:120 metres

TOTAL DEPTH:1732 metres

LOGS RUN

Induction-Electric+Acoustic Velocity-Gamma Ray+FORXO-Caliper.Penetration Rate Log.Hotwire Gas Log.

HYDROCARBONS

No indications of hydrocarbons encountered.

DRILL STEM TESTS

1.No drill stem tests run.

2.Geothermal gradient=42.7 degrees Celsius/kilometre (Pitt 1982).

3.Uncorrected geothermal gradient=35.1 degrees C/km (BMR 1980).

STRUCTURE

Mapped as a 'large pre-Permian anticlinal feature'.Possibly some minor closure at Permian and Top Cadna-Owie Formation levels.

DATA SOURCE

Well Completion Report (S/N 66/4227).

VELOCITY SURVEY WAS RUN

COMMENTS

Formation tops for the Cadna-Owie and deeper formations are as revised by O.Nugent (1985).

HALE RIVER-1 STRATIGRAPHIC TABLE
(Depths are in metres)

AGE	FORMATION	D(RT)	D(SS)	LITHOLOGY	SHOWS
TERTIARY/QUATERNARY	DUNE SAND	5	120	SAND	00
<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<UNCONFORMITY>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>					
L-U.CRETACEOUS	WINTON	61	64	SHALE/LST	00
LOWER CRETACEOUS	TOOLEBUC	642	-517	SHALE/LST	00
LOWER CRETACEOUS	WALLUMBILLA	678	-553	SHALE/SLST/SST/LST	00
U.JURASSIC-L.CRET	CADNA-OWIE	840	-714	SST/SHALE	00
M-U.JURASSIC	ALGEBUCKINA	876	-751	SST/MNR SHALE & COAL	00
<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<UNCONFORMITY>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>					
LOWER PERMIAN	PURNI	1266	-1141	SST/COAL/LIG/SLST/SH	00
LOWER PERMIAN	CROWN POINT	1350	-1225	SST/SH/SLST	00
<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<UNCONFORMITY>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>					
PRE-PERMIAN	BASEMENT	1387	-1262	SHALE/SST	00
DEVONIAN-CARB.	FINKE?	1387	-1262	SHALE/SST	00
<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<UNCONFORMITY>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>					
PROTEROZOIC?	VOLCANICS & SEDS	1434	-1309	CLYST/VOLC CGLT/TUFF	00
	TOTAL DEPTH	1732	-1607		

HALE RIVER-1 FORMATION TOPS

A.Reflection times and velocities were computed using the depth/time/velocity table from the velocity survey and supplied shallow velocities.
B.Velocities supplied were:
Velocity at datum=3357 FT/S
C.Datum for measurements=300 FT AMSL.Negative times and depths are above datum.
D.Units are metres and metres/second.

FM	FORMATION NAME	DEPTH	OWT	TWT	VAVE	LITHOLOGY
1	DUNE SAND	-29	-.0283	-.0566	1023	
		Interval Velocity=1217 M/S				SAND
2	WINTON	27	.0178	.0356	1524	
		Interval Velocity=1993 M/S				SHALE/LST
3	TOOLEBUC	608	.3092	.6185	1966	
		Interval Velocity=2260 M/S				SHALE/LST
4	WALLUMBILLA	644	.3252	.6504	1980	
		Interval Velocity=2282 M/S				SHALE/SLST/SST/LST
5	CADNA-OWIE	806	.3961	.7922	2034	
		Interval Velocity=3458 M/S				SST/SHALE
6	ALGEBUCKINA	842	.4066	.8133	2071	
		Interval Velocity=3459 M/S				SST/MNR SHALE & COAL
7	PURNI	1233	.5194	1.0389	2373	
		Interval Velocity=3605 M/S				SST/COAL/LIG/SLST/SH
8	CROWN POINT	1316	.5427	1.0854	2426	
		Interval Velocity=3605 M/S				SST/SH/SLST
9	BASEMENT	1353	.5528	1.1057	2447	
		Interval Velocity=3605 M/S				SHALE/SST
10	FINKE?	1353	.5528	1.1057	2447	
		Interval Velocity=3497 M/S				SHALE/SST
11	VOLCANICS & SEDS	1400	.5663	1.1326	2472	
		Interval Velocity=3887 M/S				CLYST/VOLC CGLT/TUFF
	TOTAL DEPTH	1698	.6431	1.2861	2641	

WELL:COLSON-1

BASIN:Onshore Eromanga

STATE:Northern Territory

OPERATOR:North Broken Hill Limited

YEAR COMPLETED:1978

STATUS:Plugged and Abandoned

LATITUDE:25.9625 LONGITUDE:136.6667 (Decimal Degrees)

SEISMIC LOCATION

Shotpoint 270 Line S85C-06 of the Colson Seismic Survey.Shotpoint 256 Line 84-WMM of the Hogarth Seismic Survey.Near shotpoint 111.5 Line B4 of the Three Corners Survey (1971).

RT ELEVATION (DRILLING DATUM):91 metres

GROUND ELEVATION:84 metres

TOTAL DEPTH:2432 metres

LOGS RUN

BHC Sonic-GR+DLL(Sim)-CAL-SP(Run 1).BHC Sonic-GR+DLL-MSFL-SP-CAL+FDC-CNL-CAL(Run 2).Pen Rate+Hotwire Gas.Deviation Survey.

HYDROCARBONS

1.Interval of residual hydrocarbon staining from 6541'/1994m to 6570'/2002m in top of Poolowanna sands (shale from 6410'/1953m to 6528'/1990m).Consisted of brown staining with no associated gas or fluorescence.

2.Dried cuttings gave fair cream-white cut in trichloroethane.Scattered traces of fluorescence seen while drilling the next 200'/61m of section but no drill stem tests attempted.

3.Log 'show' at 7898-7922 ft.No gas detector-chromatograph or visual show.

DRILL STEM TESTS

1.No drill stem tests.

2.Bottom hole temperatures were recorded at 4433' and 7974'. Geothermal gradients in degrees C/km are 38.8 (Pitt 1982) and 37.1 (Kanstler 1979).

STRUCTURE

Four-way dip closed anticline trending approximately north-south on northwestern margin of the Poolowanna Trough.

DATA SOURCE

Well Completion Report.

VELOCITY SURVEY WAS RUN

COMMENTS

1.BMR log interpretation suggested 3 possible hydrocarbon bearing zones (a)5802-5810 ft-zone too tight (b)6520-6534 ft -possibly oil productive (c)7900-7920 ft-possible water with a trace of oil.

2.Log interpretations by J.Bowler and O.Nugent do not support the BMR interpretation of possible oil production.

COLSON-1 STRATIGRAPHIC TABLE
(Depths are in metres)

AGE	FORMATION	D(RT)	D(SS)	LITHOLOGY	SHOWS
TERTIARY/QUATERNARY	EYRE	7	84	SAND & CLAY	00
<<<<<<<<<<<<<<<<<<<<<<<<<<<<UNCONFORMITY>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>					
L-U CRETACEOUS	WINTON	176	-85	SST/MUDSTONE	00
LOWER CRETACEOUS	ALLARU	668	-577	MUDSTONE	00
LOWER CRETACEOUS	TOOLEBUC	1067	-976	MUDSTONE/CARBONATE	00
LOWER CRETACEOUS	TOOLEBUC GAMMA MKR	1087	-996	MUDSTONE/CARBONATE	00
LOWER CRETACEOUS	WALLUMBILLA	1112	-1022	MUDSTONE	00
U.JURASSIC-L.CRET	CADNA-OWIE	1330	-1239	SHALE/SST	00
M-U.JURASSIC	ALGEBUCKINA	1372	-1281	SST	00
L-M.JURASSIC	POOLOWANNA	1954	-1863	SST/SHALE/COAL	00
L-M.JURASSIC	POOLOWANNA B	1954	-1863	SST/SHALE/COAL	00
L-M.JURASSIC	POOLOWANNA A	1990	-1899	SST/SHALE	20
<<<<<<<<<<<<<<<<<<<<<<<<<<<<<UNCONFORMITY>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>					
M-U.TRIASSIC	PEERA PEERA	2063	-1972	SST/SHALE	00
<<<<<<<<<<<<<<<<<<<<<<<<<<<<<UNCONFORMITY>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>					
LOWER PERMIAN	PURNI	2097	-2006	SHALE/COAL/SST	00
LOWER PERMIAN	PURNI C	2097	-2006	SHALE/COAL/SST	00
LOWER PERMIAN	PURNI B	2196	-2105	SST/SHALE	00
LOWER PERMIAN	PURNI A	2231	-2140	SST/SHALE	00
LOWER PERMIAN	CROWN POINT	2285	-2194	CONGLOMERATIC SST	00
<<<<<<<<<<<<<<<<<<<<<<<<<<<<<UNCONFORMITY>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>					
PRE-PERMIAN	BASEMENT	2386	-2295	PHYLL SHALE/SST	00
	TOTAL DEPTH	2432	-2341		

COLSON-1 FORMATION TOPS

A.Reflection times and velocities were computed using the depth/time/velocity table from the velocity survey and supplied shallow velocities.
B.Velocities supplied were:
Velocity at datum=5965 FT/S
C.Datum for measurements=300 FT AMSL.Negative times and depths are above datum.
D.Units are metres and metres/second.

FM	FORMATION NAME	DEPTH	OWT	TWT	VAVE	LITHOLOGY
1	EYRE	8	4.1E-03	8.3E-03	1818	
		Interval Velocity=1915 M/S				SAND & CLAY
2	WINTON	177	.0924	.1848	1911	
		Interval Velocity=2079 M/S				SST/MUDSTONE
3	ALLARU	669	.3291	.6582	2032	
		Interval Velocity=2365 M/S				MUDSTONE
4	TOOLEBUC	1067	.4977	.9954	2144	
		Interval Velocity=2814 M/S				MUDSTONE/CARBONATE
5	TOOLEBUC GAMMA MKR	1088	.5049	1.0098	2154	
		Interval Velocity=2586 M/S				MUDSTONE/CARBONATE
6	WALLUMBILLA	1113	.5147	1.0295	2162	
		Interval Velocity=2591 M/S				MUDSTONE
7	CADNA-OWIE	1331	.5987	1.1974	2222	
		Interval Velocity=2869 M/S				SHALE/SST
8	ALGEBUCKINA	1373	.6134	1.2268	2238	
		Interval Velocity=3967 M/S				SST
9	POOLOWANNA	1955	.7601	1.5202	2571	
		Interval Velocity=4516 M/S				SST/SHALE/COAL
10	POOLOWANNA B	1955	.7601	1.5202	2571	
		Interval Velocity=4516 M/S				SST/SHALE/COAL
11	POOLOWANNA A	1991	.768	1.5361	2592	
		Interval Velocity=4516 M/S				SST/SHALE
12	PEERA PEERA	2064	.7842	1.5685	2631	
		Interval Velocity=4734 M/S				SST/SHALE
13	PURNI	2098	.7914	1.5828	2650	
		Interval Velocity=4734 M/S				SHALE/COAL/SST
14	PURNI C	2098	.7914	1.5828	2650	
		Interval Velocity=3603 M/S				SHALE/COAL/SST
15	PURNI B	2197	.8189	1.6378	2682	
		Interval Velocity=4395 M/S				SST/SHALE
16	PURNI A	2232	.8268	1.6537	2699	
		Interval Velocity=4395 M/S				SST/SHALE
17	CROWN POINT	2286	.8391	1.6783	2724	
		Interval Velocity=4959 M/S				CONGLOMERATIC SST
18	BASEMENT	2387	.8595	1.719	2777	
		Interval Velocity=4965 M/S				PHYLL SHALE/SST
	TOTAL DEPTH	2433	.8689	1.7377	2800	

WELL:**MOKARI-1**

BASIN:Onshore Eromanga

STATE:South Australia

OPERATOR:French Petroleum Company (Australia) Pty. Ltd.

YEAR COMPLETED:1966

STATUS:Plugged and abandoned

LATITUDE:26.3183 LONGITUDE:136.4394 (Decimal Degrees)

SEISMIC LOCATION

Shotpoint 112 Line WAA of the Beal Hill Seismic Survey (1974).Shotpoint 975 Line AK of the Poolowanna Seismic and Gravity Survey (1965).

RT ELEVATION (DRILLING DATUM):72 metres

GROUND ELEVATION:68 metres

TOTAL DEPTH:2386 metres

LOGS RUN

Electrical Survey+Laterolog+Microlog-Caliper+Sonic Log+Gamma Ray Log+Penetration Rate Log+Gas Log

HYDROCARBONS

1.Weak gas shows detected in the Poolowanna Formation.

2.Very weak gas shows at top of Crown Point Formation.

DRILL STEM TESTS

1.DST-1 (5739-5826 ft) on weak gas shows in the Poolowanna Fm-flowed water to surface at 1654 BWPD.

2.DST-2 (6468-6557 ft) technically successful but dry test.

3.DST-3 (6593-6693 ft) within Purni Fm-flowed water to surface at 1654 BWPD.

4.DST-4 (7011-7131 ft) recovered in one hour 360 ft of mud and 366 ft of heavily mud cut salt water.

5.No temperature survey. Pitt (1982) computed a geothermal gradient of 30.3 deg C/km.

6.BMR (1980) uncorrected geothermal gradient=25.1 deggrees C/km. Smyth & Saxby (1981) uncorrected geothermal gradient=23 deg C/km.

STRUCTURE

Small four-way dip closed high flanking the Border Trend.

DATA SOURCE

Well Completion Report (S/N 66/4194).

VELOCITY SURVEY NOT RUN

COMMENTS

1.Absolute dating from core#6 (7826 ft) shows an age of 475(+-25)Ma (Ordovician).

2.Owen Nugent picks the Top Poolowanna Formation at 5793 ft KB.

3.The Well Completion Report picked (ft KB) Tambo=Allaru(2031) Toolebuc(3098) Roma=Wallumbilla(3207).

MOKARI-1 STRATIGRAPHIC TABLE
(Depths are in metres)

AGE	FORMATION	D(RT)	D(SS)	LITHOLOGY	SHOWS
TERTIARY/QUATERNARY	UNDIFFERENTIATED	4	68		00
<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<UNCONFORMITY>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>					
L-U.CRETACEOUS	WINTON	164	-92	SST/MUDSTONE	00
LOWER CRETACEOUS	MACKUNDA	780	-708	MUDSTONE	00
LOWER CRETACEOUS	TOOLEBUC	969	-897	MUDSTONE	00
LOWER CRETACEOUS	WALLUMBILLA	977	-906	MUDSTONE	00
U.JURASSIC-L.CRET	CADNA-OWIE	1193	-1121	SHALE/SST	00
MID-UPPER JURASSIC	ALGEBUCKINA	1241	-1169	SANDSTONE	00
LOWER JURASSIC	POOLOWANNA	1748	-1676	SST/SHALE	02
<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<UNCONFORMITY>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>					
LOWER PERMIAN	PURNI	1803	-1731	SHALE/COAL/SST	00
LOWER PERMIAN	CROWN POINT	2152	-2081	CONGLOMERATIC SST	02
<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<UNCONFORMITY>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>					
PRE-PERMIAN	BASEMENT	2254	-2182	SHALE	00
	TOTAL DEPTH	2386	-2314		

WELL:**THOMAS-1**

BASIN:Onshore Eromanga

STATE:Northern Territory

OPERATOR:Beach Petroleum N.L.

YEAR COMPLETED:1981

STATUS:Plugged and abandoned

LATITUDE:25.8579 LONGITUDE:137.6401 (Decimal Degrees)

SEISMIC LOCATION

Shotpoint 439 Line 72-5 of the Poeppel's Corner Seismic Survey (1972).

RT ELEVATION (DRILLING DATUM):40 metres

GROUND ELEVATION:37 metres

TOTAL DEPTH:2613 metres

LOGS RUN

DLL-SP+BHC SONIC-GR-CAL+DLL-MSFL-SP-CAL+BHC
SONIC-GR+FDC/CNL-GR-CAL+HDT(SCHLUMBERGER).

HYDROCARBONS

1.Basal Algebuckina-trace of dull orange fluorescence with fair cut.No associated mud gas shows.

2.Lower Poolowanna-residual oil stain and dull orange fluorescence with fair cut.No associated mud gas shows.

3.Peera Peera-minor fluorescence.

DRILL STEM TESTS

1.DST-1 (2182.5-2216M) in the Poolowanna Beds recovered mud+water of 4500 ppm salinity.

2.DST-2 (2185-2204M) in the Poolowanna Beds recovered mud+gas cut water.

STRUCTURE

Reverse faulted anticline-closure probably fault dependent.

DATA SOURCE

Composite well log and scout information.

VELOCITY SURVEY WAS RUN

COMMENTS

The original Top Poolowanna Formation pick by Beach was at 2075 metres (KB).This and other formation tops picked by Beach have been revised by O.Nugent/B.Davies/A.Ryall and the revised tops are used here.

THOMAS-1 STRATIGRAPHIC TABLE
(Depths are in metres)

AGE	FORMATION	D(RT)	D(SS)	LITHOLOGY	SHOWS
TERTIARY/QUATERNARY	EYRE	7	33	SAND/SST/CLAY/GYP	00
<<<<<<UNCONFORMITY>>>>>>					
L-U.CRETACEOUS	WINTON	181	-141	SST/MDST/SLST/COAL	00
LOWER CRETACEOUS	ALLARU	804	-764	MDST/SLST/SST	00
LOWER CRETACEOUS	TOOLEBUC	1105	-1065	SH/LST/THIN COAL	00
LOWER CRETACEOUS	TOOLEBUC GAMMA MKR	1135	-1095	SH/LST/THIN COAL	00
LOWER CRETACEOUS	WALLUMBILLA	1153	-1113	SH/SLST/LST/SST	00
U.JURASSIC-L.CRET	CADNA-OWIE	1395	-1355	SST/SLST/SHALE	00
M-U.JURASSIC	ALGEBUCKINA	1438	-1398	SST/SLST/SHALE	00
M.JURASSIC	BASAL ALGEBUCKINA B	2003	-1963	SST/SHALE/COAL	20
M.JURASSIC	BASAL ALGEBUCKINA A	2075	-2035	SST/SHALE/COAL	20
L-M.JURASSIC	POOLOWANNA	2164	-2124	SST/SHALE/COAL	20
L-M.JURASSIC	POOLOWANNA B	2164	-2124	SST/SHALE/COAL	20
L-M.JURASSIC	POOLOWANNA A	2225	-2185	SST/SHALE/COAL	20
<<<<<<UNCONFORMITY>>>>>>					
M-U.TRIASSIC	PEERA PEERA	2268	-2228	SHALE/SLST/SST	20
LOWER TRIASSIC	WALKANDI	2363	-2323	SHALE/SLST/SST	00
<<<<<<UNCONFORMITY>>>>>>					
PRE-PERMIAN	BASEMENT	2460	-2420	SLST/SST/DOL.SLST	00
	TOTAL DEPTH	2613	-2572		