Simpson No.1

WELL COMPLETION REPORT

EP 97

Northern Territory

Central Petroleum Limited

WELL COMPLETION REPORT

TABLE OF CONTENTS

Tables

Figures

Appendices

1. Daily Drilling Reports and Engineering Data
2. Daily Geological Reports
3. Sample Descriptions
4. Final Wireline Logs, Baker Atlas; Field Logs and Wireline Log Analysis
5 Vertical Seismic Profile – Results and Contractor Report
6. Rock Eval Pyrolysis and Vitrinite Reflectance Results
7. Palynology
8. Drilling Fluid Recap, RMN Pty Ltd
9. Mudlogging Reports and Data, Baker Hughes Inteq.
10. Rig Specifications, Hunt Rig 2
11. Final Well Coordinates

Enclosures

1. Composite Log
2. Mud Log
3. Log Correlation, Datum “C” Horizon, Blamore No.1, CBM 93-01, Simpson No.1 and Colson No.1

WELL INDEX SHEET

WELL NAME : Simpson No.1 **OPERATOR :** Central Petroleum Limited	**CLASSIFICATION :** Wildcat

Location:	**Rig Details**	**Dates**
Latitude 25° 30' 27.324" South Longitude 136° 38' 07.908" East MGA 94 Zone 53	**Rig Name:** Hunt Rig 2 **Contractor:** Hunt Energy **Rig Type:** Mac Model-400 (500 Hp)	**Spud Date:** 1st October 2008 **TD Date:** 18th October 2008 **Rig Released:** 22nd October 2008

Basin: Pedirka – Simpson Desert **Permit:** EP 97	**Depths** **Surface Elevation (AHD):** 49m **Rig Datum, KB (AHD):** 53.3m **Total Depth:** 2165m	**Status** Plugged and Abandoned

Casing/Liner Details		**Mud Details**	**Trajectory:**
Size (inches)	**Depth (m)**	**Mud Type**	
16" Conductor	13.5 m	12 ¼"hole section - Gel Polymer-KCl	Vertical
9 5/8"	795m	8 ½" hole section - KCl-PHPA-Pac-R	

Coring Details			**Sidewall Cores**		**Cuttings**	
No	**Interval**	**Recovery**	**Shot**	**Recovered**	**Interval**	**Sample Rate**
					15m to 1170m	10m
					1170m to 1830m	5m
					1830m to 2165m	3m

FORMATION	**MD (m)**	**Isopach (m)**	**SubSea (MD)**	**TWT (msec)**	**Comments**
Namba Formation	4.3	48.7	+49	-	**Quaternary**
Eyre Formation	53	64	+0.3	-0.4	**Tertiary**
Winton Formation	117	444	-63.7	100	**Cretaceous**
MacKunda Formation	561	144	-507.7	549	
Oodnadatta Formation	705	306	-651.7	684	
Bulldog Shale	1011	143	-957.7	948	
Cadna-Owie Formation	1154	15	-1100.7	1059	
Murta Member	1169	20.6	-1115.7	1069	**Early Cretaceous**
Algebuckina Sandstone	1189.6	458.4	-1136.3	1083	**Late to Middle Jurassic**
Poolowanna Formation (C. 2)	1648	48	-1594.7	1330	**Early Jurassic**
Poolowanna Formation (C. 1)	1696	39	-1642.7	1354	Trace Residual Oil at Base
Walkandi Formation	1735	99	-1681.7	1375	**Triassic** Residual Oil Shows at Top
Purni Formation	1834	135	-1780.7	1423	**Permian**
Tirrawarra Sandstone (Equ.)	1969	31	-1915.7	1485	
Crown Point Formation	2000	75	-1946.7	1500	
Warburton Group	2075	90+	-2021.7	1533	
Total Depth	2165		-2111.7		

LOGGING

Date	**Depth (m)**		**Description**
	From	**To**	
20-10-08	12.5m	2161.5m	MLL-DLL-XMAC-ZDL-CN-GR

Well Track

Depth	**Latitude**	**Longitude**	**Vertical Well**

Well Testing; No drill stem tests conducted

Date	**Method**	**Interval**	**Description**
None			

1. Introduction and Summary

The Simpson-1 well was drilled by Central Petroleum Ltd in Exploration Permit 97 in the Pedirka Basin, Northern Territory. The well was spudded at 1230hrs 1 October 2008 and reached TD of 2165m at 0500hrs 18 October 2008 when the Warburton formation was penetrated.

Simpson-1 was drilled to test the Algebuckina, Poolowanna, Tirrawarra, Purni, Crown Point and top Warburton formations. All these formations were intersected, there were indications of prior oil entrapment within the lower part of the Poolowanna Formation and the upper part of the Triassic Walkandi Formation, a formation not prognosed prior to drilling, but nevertheless not unexpected. The geologic prognosis for this well was based on seismic data, the Colson-1 well and later updated with the results from Blamore-1.

Orange brown staining of sandstone grains with up to 60% of sand grains stained in the uppermost sandstone of the Walkandi Formation. Lesser but similar staining of sand grains was detected in the lower part of the Poolowanna Formation. The staining had the appearance of residual oil, in fact dead oil The most abundant staining in the Walkandi sandstone could represent the lower part of an oil column subsequently spilled during Tertiary epeirogenesis.

As expected the Permian Purni Formation coal measures were thin, with only one significant coal seam intersected, this not yielding a strong gas peak likely because of its proximity to the top Permian unconformity. The most significant gas show was 65 units, the highest gas peak recorded while drilling thin sands in the Oodnadatta Formation at shallow depth. This is likely biogenic gas, with high methane percentage, possibly generated in the early Tertiary (?).

The well was plugged and abandoned. The rig was released 0800hrs 21 October 2008. The rig was released and moved to Kulgera for temporary storage.

2. General Data

Well Name	Simpson No.1
Well Classification	Wildcat,
Interest Holders	Central Petroleum Limited (Operator) 60% Petroleum Exploration Australia (PXA) 20% Rawson Resources NL 20%
Petroleum License	EP 97, Northern Territory
Location :	Latitude 25° 30' 27.324" South Longitude 136° 38' 07.908" East Australian Map Grid Zone GDA 94
Ground Level (GL)	49.0m asl
Kelly Bushing (KB)	53.3m asl - Datum
Total Depth (KB)	2165m

Drilling Contractor: Hunt Energy Limited

Drilling Rig: Hunt Rig 2 (See Rig Specifications in Appendix No. 10)

Contractors:

Drilling Fluids	RMN Drilling Fluids
Mud Logging	Baker Inteq
Wireline Logging	Baker Atlas
Cementing	Halliburton
Earth Works	R&M Dehne

Spud Date:	1st October 2008
Total Depth Reached:	18th October 2008
Rig Released:	21st October 2008
Well Status:	Plugged and Abandoned

3.0 Drilling

3.1 Summary of Drilling and Related Operations

Drilling 12 ¼" Hole

Hunt Rig 2 was raised on the 29th September 2008. Drilling of the 24" conductor hole to 13.5m and the running and cementing of the 16" conductor pipe were carried out without incident, these considered pre spud activities.

Simpson No.1 spudded at 1230 hours on the 1st October 2008 with a 12 ½" drill bit. Drilling proceeded through 266m with no problems. From 266m to 279m, the bit started torquing up due to balling. The bit was pulled out of the hole, cleaned and rerun. The hole was circulated clean and drilling continued to a depth of 804m, this picked as casing point.

A wiper trip was run prior to running 9 5/8" casing. On returning in the hole during this trip tight hole was encountered at 453m and there Kelly was picked up to ream about this depth. Tight spots were also encountered from 761m to 765m and 778m to 783m, and bottom hole fill was drilled out 786m to 804m. After conditioning the mud, the drill string was pulled out with overpull of 5 to 15k.

The drilling programme called for setting casing at 1025m, 100m below the top of the Bulldog Shale predicted top 925m. Top of the Bulldog Shale was mistakenly picked at 705m during drilling. This was subsequently determined to be the top of the Oodnadatta Formation, the upper part of which is prone to caving. Wireline logs recorded at Total Depth demonstrated caved hole in the Oodnadatta Formation particularly above 975m with in gauge hole through the actual Bulldog Shale, the top of which was subsequently determined to be at 1011m (based on revised stratigraphy).

9 5/8" Casing

9 5/8" casing was run on 4th October 2008. The casing was run to bottom without difficulty, however on pulling off bottom to make up the landing joint the casing could not be moved. Circulation was then established and the pipe worked, pulling up to 150k this without movement. Circulation was good (300gpm) and after 15 minutes cavings were observed at the surface. A 35bbl diesel pill was pumped around the shoe but this did not free the casing. A second pill of SAPP was pumped slowly around the shoe while working the pipe but again the casing could not be moved. As circulation was still good, it was decided to cement the casing in place rather than continuing to fight to free it.

The 9 5/8" casing was cemented in place at 795m with 208 bbls of 11.8ppg lead slurry and 19.6 bbls of 15.8ppg tail slurry. Six barrels of cement returned to surface before the plug bumped.

Drilling 8 1/2" Hole

After the blowout preventer was nippled up, drilling of the 8 ½" hole commenced on the 7th October 2008. Three metres of new hole were drilled to 807m whereupon a formation integrity test was carried out. With 8.7 lb/gal of mud in the hole a maximum pressure of 725 psi was recorded that translates to an equivalent mud weight of 14.0 lb/gal with no leak off.

Drilling progress was fast to 1047m. At this point pump pressure dropped dramatically. Tripping out of hole found a washed out section of drill pipe at 585m and a second at 595m. A third joint was laid out as a precaution based on visual inspection. No cavings were observed at bottoms up after this trip.

Drilling proceeded and no problems were encountered down to 1798m at which point the drilling rate slowed. The bit was pulled and replaced on 11th October. On running in the hole pipe had to be worked through a tight spots from 1581m to 1666m (lower Algebuckina) and 1704m to 1798m (Poolowanna Formation Cycle 1 and Walkandi Formation). Bit 3, a PDC bit, drilled only 8.5 hours before pressure loss forced it to be pulled again. No washouts were found but the float equipment was rebuilt. The same bit was run into the hole and drilled from 1899 to 1923m at which point the rate of penetration died and when pulled the bit was found to be very seriously undergauge and somewhat pointed. The formations intersected were quite abrasive and future drilling in the area should take this into account; bits available on site should include some with better gauge protection than those available at the Simpson – 1 rig-site.

The new bit run in the hole was an IADC 517 tricone bit but it had to be pulled again when it plugged up on the way into the hole. After cleaning out the jets it was returned into the hole. The hole had to be reamed at 1014m and again from several intervals between 1373m and 1923m. Drilling continued from 1923m but at 2075m the rate of penetration slowed up significantly (Top of Warburton Group). The bit was changed out once again going from an IADC 517 to 617, however rate of penetration remained slow. This bit drilled to TD at 2165m at 0500 hrs on 18th October 2008.

Baker Atlas ran a VSP as the first log in the well. It encountered a bridge at 930m, but the tool was worked through this bridge. The log was obtained on 19th October 2008.

Delay in running the GSlam logs first off was due to a logistical error resulting from a decision by Baker Atlas to demobilize the logging tools to Moomba following the logging of CBM 93-01. A clean out trip was carried out immediately before the GSlam logs were eventually run.

The GSlam logs, MLL-DLL-XMAC-ZDL-CN-GR, were run in the hole reaching a depth of 2161.5m and logged the well without problems on 20th October 2008.

No moveable hydrocarbons were detected in the well and consequently it was decided to plug and abandon Simpson - 1.

Abandonment plugs were set from 1665m to 1725m, 765m to 825m over the 9 5/8" casing shoe and from 5m to 20m at surface on 20 October 2008. The rig was released at 0800hrs on 21st October, 2008.

Simpson - 1 was the last of three wells drilled in the Central Petroleum Limited Pedirka Basin drilling programme.

3.2 Particulars of Drilling

3.2.1 Equipment installed in or on the well.

Other than casing no equipment was installed in or on the well.

3.2.2 Casing and equipment installed in or on the well including details of abandonment.

Conductor Casing - 16" conductor pipe was set at 13.5m.

Surface Casing – 9 5/8" casing was set at 795m (wireline depth 794.2m).

Abandonment Details

Simpson #1 was plugged and abandoned on 21st October, 2008. An open hole plug was set at 1665m to 1725m to isolate the Algebuckina Sandstone aquifer. A second plug was set across the 9 5/8" shoe from 765m to 825m leaving 30m of cement above and below the casing shoe. A 15m surface plug was set from 5m to 20m. A wellbore schematic of the wellbore in its current state is included as Figure No. 4

3.2.3 Cementing operations carried out

The following cementing operations were performed:

Conductor Casing – A 24" hole was augered to 13.5m. The 16" conductor pipe was cemented in place with 1400kg (70sxsX20kg) of Class A cement and 1sx of calcium chloride on 30 September, 2008.

Surface Casing – On 5 October, 2008, 9 5/8" 36ppf BTC K-55 R3 casing was cemented in a 12 ¼" hole at a depth of 795m. An 11.8ppg lead slurry consisting of 208bbls Class G cement was pumped. This was followed by a 15.8 ppg tail slurry consisting of 19.6bbls. Displacement was with 196bbls water. Six barrels of cement were returned to surface when the plug bumped. Casing was pressure tested to 2000psig. No operations occurred over the next 8.5hrs while cement cured to an adequate hardness.

Plug and Abandonment: See section 3.2.2 above.

3.2.4 Bit Records

A record of drilling bits utilized is tabled below:

TABLE 1 Bit Record

Bit #	Size	Manufacturer	Type	IADC	Jets	Meterage (m)	Hrs
1	12.25"	Stealth	JST 11XC	117	3X16,14	791	44
2	8.5"	Stealth	JTC 44DP	447	3X12	994	71
3	8.5"	Stealth	M57 PDC		5X13	24	6
4	8.5"	Stealth	JTC51	517	2X13,12	154	28.5
5	8.5"	Stealth	JTC61	617	3X12	88	38.5

3.2.5 Deviation Surveys

Deviation surveys were taken using a TOTCO survey tool with a 0-8° range with a single shot survey barrel. Survey results were:

TABLE 2 Deviation Surveys

Depth (m)	Deviation(deg)
40	MR
58.8	MR
105.2	3/4
254	MR
267	MR
432	MR
433	1 1/8
595	MR
604	1
756	MR
888	2 1/4
1030	2
1185	1 1/2
1345	1 1/4
1496	1 1/4
1693	1
1846	1
2077	MR
2147	MR

MR = Miss Run

3.2.6 Drilling Fluids

12 ¼" Top Hole, 13.5m to 804m.

Aus Gel Spud Mud with KCl brine addition from 95m increasing to 5% KCl with depth.

8 ½" Hole, 804m to 2165m (Total Depth)

KCl /PHPA/ Pac-R.

Mud weight was kept between 8.9ppg and 9.2ppg throughout the well. Further detail on Drilling Fluid composition, performance and usage can be found in the Drilling Fluid Recap located in Appendix No.8. A detailed daily record of drilling fluid properties is summarised in Section 5 and in daily reports supplied by RMN Pty Ltd within this document.

3.2.7 Drill Stem Testing

No drill stem tests were carried out during the course of the well.

3.2.8 Lost Time

A total of 37 hrs were tallied as lost time. Sixty-four percent of this was associated with stuck 9 5/8" casing, sixteen percent was due to tight hole conditions, twelve percent was due to a washout in the drill pipe, five percent due to rig repair and three percent was lost while an accident was being investigated. A detailed breakdown is located in the Appendix No.1.

3.2.9 Water Supply

Water for drilling purposes was taken from a water bore drilled close to the location. This well, Simpson Bore, produced water at a rate of 5 l/hr. Water was produced from the Tertiary Eyre Formation. The water was not potable for human consumption. Water was produced to a turkey's nest then pumped to the rig. No problems were encountered with the well.

4.0 Logging, Sampling and Testing

4.1 Cuttings Samples Collected

10m interval washed and dried cuttings samples were collected from 15m to 1170m.
5m interval washed and dried cuttings samples were collected from 1170m to 1830m.
3m interval washed and dried cuttings samples were collected from 1830m to 2165m (TD).

Selected samples were collected for source rock analysis and palynological analysis. Descriptions of the washed and dried cuttings samples are located in Appendix No.3.

4.2 Cores

No cores were cut or sidewall cores collected in the well.

4.3 Mudlogging

Standard mudlogging services were provided by Baker Inteq for the duration of the well. The mudlog for the well is included as Enclosure No.2 of this report. Mudlogging reports and data provided by Baker Inteq and are included in this document as Appendix No.9.

4.4 Wireline Logging

Wire logging services were provided by Baker Atlas. One log run was recorded at total depth of 2165m (Driller). This was the GSlam run, which combines all basic logging tools, specifically:

Micro Laterolog; Dual Laterolog: Multiple Array Acoustilog; Compensated Z-Density: Compensated Neutron Log; Gamma Ray Log; TTRM Sub.

Logs reached a depth of 2161.5m. Log data was recorded from 2160.8m to 12.5m.
9 5/8" casing shoe was at 794.2m this compared with 795m drillers depth. Maximum bottom hole temperature was 100° C, 11 hours since last circulation.

Final wireline log data, field logs and log analysis are included within Appendix No.4.

4.5 Vertical Seismic Profile

A Vertical Seismic Profile was recorded by Baker Atlas. This survey was carried out prior the running of the GSlam electric logs. Results and contractor report are located in Appendix No.5.

4.6 Drill Stem Testing

No drill stem tests were conducted in the Simpson No.1 well

5. Geology

5.1 Regional Geological Setting and Prospect Description

The Pedirka area occupies the Simpson Desert and encompasses four vertically stacked sedimentary basins, namely the Palaeozoic Warburton Basin, the Permo-Carboniferous Pedirka Basin, the Triassic Simpson Basin, and the Jurassic-Cretaceous Eromanga Basin. The basins are superimposed to some extent and over wide areas reflect a structural footprint controlled by Palaeozoic structuring and palaeo-depositional facies.

The Simpson Prospect was mapped as a dip closure on the Simpson Nose which is a multi-crested structure plunging towards the southern Madigan Trough. The structure as mapped prior to drilling, is subtle at the top Algebuckina Sandstone reservoir as indicated by pre-drill “C” horizon mapping (Figure No.6), but amplitude increases at the Permian, (Figure No.7). Remapping of the Simpson Structure is planned utilising the VSP and well data obtained is planned.

The structure has major Palaeozoic structural control at depth where a Devonian-Carboniferous carbonate platform is defined by major bounding normal faults (Erec Prospect). Younger Permo-Mesozoic targets (Simpson Prospect) are draped over the earlier platform with the structure dominated by the Erec Fault on the eastern margin of the platform.

The stratigraphic section encountered in Simpson-1 is very similar to that encountered in Colson-1, 50 km to the south. This is true for the Jurassic- Cretaceous section which is similar to that seen to the south and a full section is recorded – i.e. Winton Formation, Oodnadatta Formation, Bulldog Shale, Cadna-Owie Formation, Murta Member, Algebuckina Sandstone and Poolowanna Formation.

As at Colson-1, Cycle-1 of the Poolowanna Formation was present with the claystones at the top of the formation providing good seal and potential source rocks. Significantly some orange-brown staining of sandstone grains, indicated to be probable residual oil (dead oil) was described in the lower part of the Cycle-1 sandstone in the Poolowanna Formation in Simpson-1 with abundant orange brown staining noted through the upper part of the Triassic Walkandi Formation. The presence of this staining suggests that oil at least migrated though this zone, however it is plausible that there was a 15m thick oil column through this interval later remobilised during late stage Tertiary epeirogenesis. Source rocks, in particular the Poolowanna Formation and Purni Formation coals are indicted to be mature for oil generation immediately west of the well location within the Madigan Trough.

Similar staining was observed in the Poolowanna Formation stratigraphic level in Colson -1, where based on the increase in fluorescent cut, the staining was concluded to be residual oil stain. The historic oil discovery was made in this formation by the Poolowanna-1 well in South Australia.

The Triassic Walkandi Formation disconformably underlies the Poolowanna Formation and is in turn unconformably underlain by Purni Formation. The latter is similar to that in Colson-1, both sequences being deposited close to the basin margin.

In Simpson -1, one 7 m coal is present with a major part of the upper part of the Purni Formation being eroded. The lower part of the Purni Formation is sandstone predominant and in the Simpson-1 well is highly indurated. The Tirrawarra Sandstone equivalent conformably underlies the Purni Formation, improved porosity is demonstrated however is still poor in Simpson-1.

The Crown Point Formation comprises an upward fining cycle (75 m thick) with generally medium sandstones at the base with fair porosity; this correlates with a conglomeratic sandstone intersected in Colson-1.

A sequence of red brown to grey brown silty shales mark the top of the Warburton Basin section which lies in sharp contact with well sorted ?aeolian sandstones with very poor porosity. The main stratigraphic component of the underlying carbonate platform, believed to be of Devonian –Carboniferous age, was not intersected.

5.2 Well Stratigraphy

A summary of Pedirka Basin stratigraphy is included within this report as Figure 9 Table 3 below is a summary of formation tops intersected by Simpson-1. Description of individual formations is included in this section and following these is Table 4, a comparison between prognosed and actual depths of formations intersected in the well.

TABLE 3 Simpson No.1 Formation Tops
Elevations: KB 53.3m GL 49m

Formation Top	TOP Depth KB (m)	TOP Depth GL(m)	Isopach (m)	Comment
Holocene/Quaternary				
Namba Formation	**4.3**	**+49**	**48.7**	
Tertiary				
Eyre Formation	**53**	**+0.3**	**64**	
Cretaceous				
Winton Formation	**117**	**-63.7**	**444**	
MacKunda Formation	**561**	**-507.7**	**144**	
Oodnadatta Formation	**705**	**-651.7**	**306**	
Bulldog Shale	**1011**	**-957.7**	**143**	
Cadna Owie Formation	**1154**	**-1100.7**	**15**	
Murta Member	**1169**	**-1115.7**	**20.6**	Early Cretaceous`- Late Jurassic
Jurassic				
Algebuckina Sandstone	**1189.6**	**-1136.3**	**458.4**	Late to Middle Jurassic
Birkhead Equivalent	1366	-1312.7	34	
Base Birkhead Equivalent	1400	-1346.7		
Poolowanna Formation Cycle 2	**1648**	**-1594.7**	**48**	
Cycle 1	**1696**	**-1642.7**	**39**	
Triassic				
Walkandi Formation	**1735**	**-1681.7**	**99**	
Permian				
Purni Formation	**1834**	**-1780.7**	**135**	
Upper Purni	1834	-1780.7	54	
Lower Purni	1888	-1834.7	81	
Tirrawarra Sandstone (Equivalent)	**1969**	**-1915.7**	**31**	
Crown Point Formation	**2000**	**-1946.7**	**75**	
Warburton Basin	**2075**	**-2021.7**	**90+**	
TOTAL DEPTH	**2165**	**-2111.7**		

5.2.1 Quaternary/ Recent

5.2.1.1 Surficial & Namba Formation 4.3m to 53m

Simpson No.1 was drilled in an interdune corridor with dunes approximately 5 - 8m above the drilling pad, flanking the location to the east and west. The red coloured dune sandstone and limited interdune claystone at the surface persisted with depth. Red-brown, dispersive claystone close to the surface gave way to red brown sandstone becoming pale yellow to pale red with depth, loose, fine to predominantly medium to very coarse, poorly sorted, subangular to rounded, occasionally to commonly iron stained, very argillaceous with occasional to abundant calcareous nodules.

5.2.2 Tertiary

5.2.2.1 Eyre Formation 53m to 117m

The top Eyre Formation was picked at 53m being a negative drill break where a slow drilling hard silcrete horizon was intersected, this consisting of pale to medium yellow brown sandstone/silcrete, siliceous and hard, very fine to very coarse. Also slow drilling below 60m was a siltstone, white to very light grey, hard to very hard, sandy with abundant siliceous matrix, not dissimilar to a "silcrete" horizon intersected in the CBM 93-01 well.

Softer sediments were indicated by faster drilling from 80m with siltstone, white to very light grey, becoming soft; claystone, very light grey to medium brown yellow, soft dispersive and sandstone, light yellow brown to light red, unconsolidated mainly medium but variably fine to very coarse grained.

Drill rate slowed towards the base of the formation, then picking up again in the Winton Formation below.

5.2.3 Cretaceous

The Cretaceous stratigraphy used to subdivide the lithological units intersected in the Simpson No.1 well is based on the "new stratigraphy" in a paper titled Cretaceous of the Southwestern Eromanga Basin, Moore P.S. and Pitt G.M., 1982. Figure 10, is a summary of Cretaceous stratigraphic nomenclature adapted from this paper pertinent to the Simpson Desert Area held by Central Petroleum Limited. Figure11 is a correlation of Cretaceous Formations above the Cadna-Owie in the recently drilled wells, Simpson No.1, Blamore No.1, CBM 93-01, and pre-existing well Colson No.1.

5.2.3.1 Winton Formation 117m to 561m

The Winton Formation is regarded as a non-marine sequence of Early to Late Cretaceous age (Moore P.S & Pitt G.M, 1982). There is some evidence from the Simpson No.1 intersection, and to a lesser extent other recent wells, Blamore No.1 and CBM 93-01 that if the presence of glauconite is to be taken as an indicator of marine environments, then some marginal marine sedimentation has occurred within the Winton Formation in this part of the Eromanga Basin.

The top of the Winton Formation, which is a prominent erosional unconformity, was picked at 117m based on drill rate with succeeding

samples being medium grey argillaceous claystone which was described as glauconitic.

Succeeding samples show the Winton Formation to be claystone predominant with sandstone having a relatively significant representation at the top of the sequence, but declining to a minor component in deeper samples.

Claystone was described as mid grey, mid greenish grey to mid brown-grey with depth; soft dispersive to blocky with depth, rare to common glauconite grains, occasional carbonaceous specks and rare carbonaceous laminae are present at depth. Subordinate sandstone was described as light grey, mid greenish grey with depth, predominantly fine, becoming very fine with depth, angular to subround, rare to common glauconite, abundant dispersive argillaceous matrix, rare lithic grains, with very poor porosity.

From 470m to 530m 5% Coal was present in the samples, described as very dark grey-brown to brownish black, lignitic to argillaceous, hackly to planar fracture, blocky, soft to very firm. A trace of limestone, yellow to brownish grey, lutitic was also noted through this interval.

5.2.3.2 MacKunda Formation 561m to 705m

The MacKunda Formation is considered a marginal marine sequence of Early Cretaceous age (Moore P.S. & Pitt G.M., 1982), is conformable and gradational with the overlying Winton Formation. During drilling this interval was picked as the Oodnadatta Formation, with the succeeding Bulldog Shale also being picked high to prognosis.

The top of the MacKunda Formation was re-picked at 561m for this report; this based more on the presence of sandstone in the claystone predominant sequence, ("slightly more sandy aspect", Moore & Pitt, 1982) rather than evidence of marginal marine deposition.

Sandstone, 40% in samples, was present at the top of the formation to 620m, and absent below this depth. The Sandstone was described as very light grey to light olive grey, firm to very firm, very fine to fine, well sorted, angular to subangular, minor calcareous cement, abundant argillaceous and calcareous matrix, common glauconite grains, occasional carbonaceous grains and microlaminae, trace to common mica flakes, feldspar and lithic grains.
Claystone predominantly mid grey to mid brown-grey, soft moderately dispersive to firm and blocky, very slightly calcareous, rare carbonaceous specks and rare to locally abundant very fine glauconite grains.

5.2.3.3 Oodnadatta Formation 705m to 1011 m

The top of the Oodnadatta Formation was picked at 635m being the midpoint of the ten metre sample to 710m. The criteria used to pick the top of the Oodnadatta Formation (post drilling) was the first appearance of Inceramus "prisms", long elongate irregularly facetted spine like columns, being the aragonite components of fossil Inoceramus shells.

The Oodnadatta Formation is almost entirely 100% claystone. Other than the appearance of Inoceramus, there is little to distinguish this claystone from

that described for the overlying MacKunda Formation with the same applying to sandstone present in small amounts between 740m to 770m.

Below 770m the formation is a uniform claystone, medium to dark grey, predominantly non calcareous, glauconite grains are absent

No distinct Toolebuc Formation was recognized while drilling the well and no typical gamma ray spike was present on elogs.

.

5.2.3.4 Bulldog Shale 1011m to 1154 m

The top of the Bulldog Shale is put at 1011m. The Bulldog Shale is siltier than the overlying Oodnadatta Formation, with siltstone being recorded as the predominant lithology in the upper part of the Bulldog Shale in Simpson - 1. Rare to occasional glauconite and a trace of pyrite was present in samples both at the base of the Oodnadatta Formation and top Bulldog Shale. The claystone and argillaceous siltstone was medium to dark grey.

The actual depth pick for the top Bulldog was based on a shift in the sonic log, indicating slightly faster travel times below 1011m, presumably related to an increase in the percentage of silt. This can be correlated well with the Colson No.1 well. It is clear from the caliper log that the Bulldog Shale a more stable formation with the hole in gauge below 1011m, this contrasts with the overlying Oodnadatta Formation hole which is more rugose, particularly the upper part.

5.2.3.4 Cadna-Owie Formation 1154mm to 1169 m

The top of the Cadna Owie Formation was picked at 1154m using the sonic log which kicks to the right, reflecting faster sonic velocity of the sandstone predominant Cadna Owie Formation, this being an obvious regional event.

The Cadna Owie consisted of sandstone, off white to light brown-grey, very fine to fine, rare medium to coarse grains, generally moderately well sorted, subangular to subround, calcareous cement, abundant white argillaceous matrix, rare very fine glauconite grains, friable to hard, very poor visual porosity. This is typical but contrasts with the more porous sands intersected at this level in the Blamore No.1 and CBM 93-01 wells.

5.2.4 Jurassic

5.2.4.1 Murta Member 1169m to 1184m

The Murta Member, more generally known and best developed in the Eromanga Basin sequence overlying the Southern Cooper Basin, extends some distance from this depocentre into the Pedirka Basin and was 20.6m thick in the Simpson No.1 well based on log correlation. The Murta Member is interpreted to consist of lacustrine sediments (Ambrose et al, 1982).

The Murta Member in Simpson No.1 consists of argillaceous siltstone described as brown-grey to light grey-brown, argillaceous, and very finely arenaceous in part, common to abundant very fine mica flakes, slightly to moderately micromicaceous, soft, blocky to sub-blocky. Minor sandstone, apparently thin beds was described as sandstone, off white to light brown-

grey, very fine, well sorted, subangular to subround, calcareous cement, and abundant white argillaceous matrix, occasional to common lithic grains occasional very fine mica flakes, friable to moderately hard with very poor visual porosity.

The Murta Member and Namur Member, members of the Mooga Formation are stratigraphic units used to the east of the Pedirka Basin (Ambrose et al 1982). In the Pedirka Basin the sequence of braided stream sandstones underlying the “Murta” are described as the Algebuckina Sandstone, with the Namur being incorporated in the upper part of this unit. The Murta silty shales appear to be a seal to the Algebuckina Sandstone based on a residual oil column indicated to be present below the base Murta in Blamore -1.

5.2.4.1 Algebuckina Sandstone 1184m to 1648m

The Algebuckina Sandstone incorporates the Namur, Westbourne, Adori, Birkhead and Hutton stratigraphic units that are recognizable eastwards in the Eromanga Basin sequence overlying the Cooper Basin; these units amalgamating into one sandstone pile in the northern part of the Pedirka Basin. In Simpson No.1, as in Blamore No.1 a Birkhead Formation Equivalent is recognized with possible Hutton sandstone underlying this unit (see Enclosure No.3).

The top of the Algebuckina Sandstone is clearly defined on logs ,the upper part of the Algebuckina Sandstone was described as, sandstone, very light brown-grey to very light grey, fine to very coarse, predominantly med to coarse, poorly sorted, angular to rounded, predominantly subangular to subround, occasional quartz overgrowths, minor white argillaceous matrix, loose, very good inferred porosity. Very minor siltstone, light yellow brown sucrosic and medium brown grey argillaceous, occur as occasional thin beds.

Birkhead Formation (Equivalent)

An interval 1366m to 1400m had a series of thin claystones and a trace of coal. On logs the top claystone is reasonably well developed and about 7m thick. Small scale oil production has been achieved from quite similar Birkhead Northwest of the southern Cooper Basin.

The Claystone is light to medium olive grey, soft, dispersive, trace carbonaceous, some more dark firmer. Sandstone is very light brown-grey to very light grey, loose, fine to medium , trace coarse, moderately well sorted, angular to sub-angular, trace sub-round, trace quartz overgrowth, minor white argillaceous matrix, very rare mica flakes.

Lower Algebuckina Sandstone (possible Hutton Equivalent)

The sandstone below 1400m has traces of garnet, an accessory mineral present in the Hutton Sandstone elsewhere. The sandstone is light grey, loose to inferred hard, fine to coarse, predominantly coarse, moderately well sorted, angular to subangular, rare rounded grains, abundant quartz overgrowths, minor to moderate white argillaceous and in part siliceous matrix, rare to common pink to brownish orange garnet grains, rare mica flakes, traces of molybdenite as deformed “squamous” grains and rare lithic grains. In general there is increasing evidence of siliceous cementation, with depth however sandstones are obviously porous with good drilling rates.

Between 1565m to 1575m abundant well rounded frosted grains, suggested to be of aeolian origin were present in the sandstone cuttings samples. This occurrence is coincident with a very fast drill break between 1568m to 1573m. These rounded grains declined as a percentage to rare occasionally common with depth.

A marked change in formation water salinity is observed. The change was observed at 1470m, with calculated salinity of 7000ppm NaCl equivalent above this depth increasing to 22,000ppm NaCl equivalent below this depth; see wireline log analysis in Appendix No.4.

. 5.2.4.1 Poolowanna Formation Cycle 2 1648m to 1696m

This stratigraphic unit was picked from wireline logs by correlation with the Colson No.1 well. There was no obvious difference in the cuttings descriptions of the sandstone from the overlying sequence, although at the base of the sequence grey, dull yellow and red discoloured very coarse quartz grains were noted at depth in the sample collected at 1695m. Such grains are more typically seen in the Purni Formation, their likely provenance?

Within this sandstone predominant sequence minor amounts of claystone were also seen in the samples, this described as light to medium grey, light to medium olive grey, soft, dispersive, olive grey coloured are slightly to very carbonaceous, these associated with a trace of coal, black, moderately hard to hard, subvitreous to vitreous, angular fractured, trace conchoidal fracture.

5.2.4.2 Poolowanna Formation - Cycle 1 1696m to 1735m

Cycle 1 of the Poolowanna Formation was a primary objective of the Simpson No.1 well, being the sequence that produced oil in the Poolowanna No.1 well.

The top of the Poolowanna Formation was picked at 1696m of wireline logs. The upper part of the formation from 1696m to 1727m consisted of predominantly claystone. The claystone was light olive grey, soft dispersive, occasionally carbonaceous, rare to trace rounded, fine tan siderite/dolomite nodules. A lesser amount of firm to moderately hard, dark grey claystone was present in samples these hard to discriminate from Cretaceous cavings.

Thin beds of coal and coaly claystone are present as traces in the samples, and evident on wireline logs. The coal was evident in samples as a trace throughout the interval, consisting of thin laminae and angular and rounded fragments, seemed almost detrital, with the 1720m sample more obvious bedded coal, being predominantly coal from thin stringers at sample depth described as, coal, black, moderately hard to hard, moderately bright to bright, grainy speckled texture in part, reflective fracture surfaces common, trace showing vegetative structure, trace conchoidal fracture. Sandstone, very fine sucrosic in the upper part as a minor component, with fine to medium, loose to friable towards the base about 1724m. Relatively slow drilling was experienced throughout Poolowanna Cycle 1 to a depth of 1727m.

There was a drilling break at 1727m to 1735m, a sandstone that appeared to be fining up throughout (a continuem of the gross fining upward profile of Cycle 1 as a whole), fine to medium at the top, fine to coarse at the base,

subangular to angular throughout. At the top (grab sample 1727m) the colour was light grey. Some orange brown staining of the sandstone grains, likely residual (dead) oil stain, associated with orange stained kaolin clay in the cuttings sample collected at 1735m, see Section 5.3 below.

5.2.5 Triassic

The upper part of the Triassic sequence intersected by Simpson-1 appears to correlate well with the Triassic Walkandi Formation intersection in Blamore-1. The interval 1735m to 1795m has a greater percentage of claystone while the interval 1795m to 1834m is predominantly sandstone, respectively appearing to correlate with the informal Upper Wilkandi and Lower Wilkandi units described in the Blamore-1 well completion report. The unit is not all that dissimilar from the Peera Peera interval in the Colson No.1 well, however such comparison is cursory at this stage but worthy of further consideration; it should be noted that the Peera Peera is relatively carbonaceous, however so was the Lower Wilkandi in Blamore No.1 where a thin coal tentatively dated Mid Triassic, possibly late Triassic.

Evidence from palynological assessment of four samples collected from 1765m to 1785m is contradictory giving a Late Albian age, however clearly this age relates to the presence of Cretaceous cavings in the samples. Rare "recycled" Permian species were also noted. The absence of any distinctive Triassic forms is not surprising given that the period is noted for volcanogenic episodes hostile for living organisms. The report on palynology is included in Appendix No.7.

5.2.5.1 Wilkandi Formation 1735m to 1834m

Upper Walkandi 1735m to 1795m

The top of the Walkandi Formation is marked by a 2m claystone in Simpson-1, with negative drill break from 1735m. On wireline logs, the claystone was represented by a moderately high gamma ray spike. A significant shift of the sonic and resistivity curves below 1735m indicates an unconformity.

Sandstone in the 1735m to 1740m cuttings sample, was described as orange brown, with 60% of sand grains demonstrating stain, these predominantly coarse to very coarse. The colouration of the sandstone grains and the pattern of staining, patchy blebs present rather than uniform coloration, suggests they represent residual oil stain, in particular dead oil stain, see Section 5.3 below.

Further evidence that the Triassic was intersected can be seen on the spectral gamma ray log where the "claystones" of the Walkandi Formation have very low potassium levels and high Thorium levels. Given that the Triassic age is noted for its volcanism it would appear possible that the Walkandi "claystones" are in fact highly tuffaceous. To a lesser degree this is also true of claystones in Poolowanna Cycle 1; presumably some Walkandi clays were eroded into this formation.

A moderately thick claystone is present from 1741m to 1748m. This claystone was described as very light to light yellow-brown and light to mid grey-brown, soft, dispersive, blocky to sub-blocky. At rig site the Walkandi Formation was identified based on this colouration and tended to be

confirmed with minor mid to dark red-brown colouration noted in a deeper sample (1765m to 1770m).

Claystone beds alternated with subordinate sandstone beds from 1748m to a depth of 1795m. The sandstone at the top of the interval was described as very light grey to very light orange-grey, common brown staining of grains at the top declining with depth, fine to very coarse, poorly sorted, angular, abundant quartz overgrowths, common broken grains, siliceous cement, generally loose, hard in aggregate, more siliceous than the overlying Jurassic. Towards the base of the interval abundant white argillaceous matrix and abundant siliceous matrix, some very hard aggregates were noted.

Lower Walkandi 1795m to 1836m

The interval 1795m – 1834m is suggested to correlate with the informal Lower Walkandi unit referred to in the Blamore No.1 well completion report.

There is a distinct change in the wireline log characteristics of the sandstone that predominates through the interval; a significant decline of porosity is evident.

The sandstone as described in cuttings was sandstone; off white to very light grey and very light brown-grey, very fine to very coarse, very poorly sorted, angular, abundant quartz overgrowths, abundant siliceous cement, minor to abundant white argillaceous matrix, abundant siliceous matrix in part, generally as loose broken grains, common transverse grain fractures and sutured grain boundaries hard to very hard in aggregate, tight to very poor visual porosity. This reflecting more porosity reduction rather than facies change.

Thin claystone and siltstone beds are evident on gamma on logs and described in cuttings as light yellow, medium brown grey, medium brown red, dull purple, all colours consistent with the Wilkandi Formation.

.

5.2.6 Permian

Facies changes plus significant erosion of the Top of the Purni Formation is a feature of the Permo-Triassic unconformity with only a thin coal measure sequence intersected in the Simpson-1 well compared to the very thick intersections in recently drilled Blamore-1 and CBM 93-01 wells.

5.2.6.1 Purni Formation 1834m to 1969m

The Purni Formation is divided into two informal stratigraphic units as used in the Blamore No.1 well completion report. The Upper Purni contains significant coal beds and the Lower Purni is sandstone predominant and lacks significant coal. In Simpson No.1 the Upper Purni was picked between 1834m to 1888 with the Lower Purni picked from 1888m to 1969m

Upper Purni 1834m to 1888m

The top of the Purni Formation, Upper Purni was picked from wireline logs at 1834m with log character changing at this depth; in particular there is an increase in gamma ray typical of Purni Formation sandstone.

The Upper Purni comprises finer grained sandstone than the overlying basal part of the Walkandi Formation. The sandstone was described as fine to medium grained, rare coarse grains, while still angular in general, common to abundant rounded frosted quartz grains were noted in sample descriptions. Although the sandstone grains were generally loose in the samples, minor to moderate quartz overgrowths, siliceous cement, moderate to abundant white siliceous and argillaceous matrix, are evidence of induration. Below 1848m white, very fine, tight, sandstone aggregates and siltstone, white to light brown grey, generally arenaceous, moderately argillaceous, were present in the samples. Rare to abundant silicified dolomite nodules (referred to as siderite nodules in other Purni intersections, Blamore No.1 and CBM 93-01) were noted in the sample descriptions.

The first and only significant coal was intersected 1868m to 1875m and comprises: Coal, very dark grey to black, earthy to subvitreous, hackly to rarely subconchoidal fracture, occasional planar fracture, and firm to very firm, sub-blocky to subfissile.

The lower part of the Upper Purni, 1875m to 1888m comprised mainly siltstone, light to medium grey and grey brown, less argillaceous in the upper part, with some sandstone beds indicted by cuttings and wireline logs, more argillaceous towards the base, generally carbonaceous throughout.

Lower Purni 1888m to 1969m

The Lower Purni is used to describe the sandstone predominate sequence that underlies the coal measures comprising the upper Purni. The sandstones comprising the Lower Purni are similar in character to Upper Purni sandstones being fining upwards alluvial sands, generally angular, immature, from very fine to very coarse grained, a stacked series of alluvial sands. In cuttings the sandstone is increasingly siliceous with aggregates, described as hard to very hard with abundant argillaceous (kaolin) and siliceous matrix, common transverse grain fractures and sutured grain boundaries, coarse grains commonly loose, angular or broken grains and rare rounded grains. Rare to occasional interstitial chlorite was present. Below 1935m the sandstone was described as “protoquartzite”, indicative of substantial silicification.

5.2.6.2 Tirrawarra Sandstone 1969m to 2000m

The Tirrawarra Sandstone was inferred to be present as a distinct unit by Ambrose (2008), with this interval being previously regarded as part of the Crown Point Formation in pre-existing wells to the south.

The top of the formation was picked at 1969m from wireline logs. Minor claystone beds were present in the upper part, 1969m to 1990m, with increased porosity demonstrated by faster drill rates in the sandstones between these clay beds and as demonstrated by drill rate, less cementation and the appearance of more rounded sand grains. The thin claystone beds were medium to dark grey, brown grey and olive grey, moderately hard, carbonaceous, silty in part; grading to siltstone. The sandstone (initially only 30% of the sample with cuttings from the Lower Purni predominating) was less cemented, predominantly medium grained, subangular to subrounded, occasionally well rounded, common quartz overgrowths but lacking siliceous cementation.

From 1990m to 2000m, there is a distinct basal sandstone, with loose, well sorted medium quartz grains in sample, while fractured angular grains were present, rounded grains were common, considered of aeolian origin.

While there is a definitive porosity increase in the Tirrawarra Sandstone Equivalent compared to the Lower Purni, log analysis suggests porosity of approximately 12% for this basal sandstone.

5.2.6.3 Crown Point Formation 2000m to 2075m

The top of the Crown Point Formation is marked by a claystone, intersected from 2000m to 2012m, which appears to directly correlate with a similar claystone intersected at this stratigraphic level in the Colson No.1 well.

The claystone was described as light to dark grey, soft dispersive to very firm blocky and subfissile, non calcareous, slightly carbonaceous, and in part light to medium olive and brown grey and rare pyrite.

The interval 2012m to 2056.5m is indicated on wireline logs to have more argillaceous lithologies than the sandstone predominant cuttings samples would indicate. In general the interval is an upward fining sequence as indicated by gamma ray and resistivity profiles not inconsistent with existing interpretation of a glacial outwash environment of deposition for this upper part of the Crown Point Formation. Overall this shaley upper interval can be regarded as a "seal predominant sequence".

From 2056.5m to 2075m sandstone is evident on wireline logs. Its blocky appearance suggests it to be two stacked channel sandstone sequences. The sand is clean, with fair porosity as indicated by wireline log data and also drilled faster, up to 18 m/hr, than the overlying section. Fair porosity is indicated from wireline log data, and at lesser depth of burial such sandstones could have good porosity.

Cuttings descriptions of the Crown Point Formation sandstones are similar throughout. The sandstone was described as very light grey to very light brownish pink and very light greenish grey, fine to medium with occasional very coarse grains, moderately to poorly sorted, angular, rare to abundant fine to medium well rounded grains, generally abundant quartz overgrowths, abundant siliceous cement, common transverse grain fractures, commonly welded texture, minor white kaolin matrix in part, siliceous matrix in part, arkosic in part (possibly as lithics), chloritic matrix in part, dark grey, light grey brown and light greenish grey siliceous siltstone lithic grains and occasional mica flakes.

5.2.7 Devonian-Carboniferous

5.2.7.1 Warburton Group 2075m to 2165m (Total Depth)

The top of the Warburton Group was picked at 2075m from wireline logs. The upper part of the Warburton to a depth of 2113.5m is indicated to be very slow drilling siltstone and claystone. The siltstone was described as very light to mid grey, light brown-grey, rarely light greenish grey, quartzose, sucrosic, micromicaceous, occasional disseminated pyrite, moderately hard to hard, sub-blocky. Claystone was medium to dark red-brown, micromicaceous, moderately hard to hard, subfissile. A temporary increase in rate of penetration about 2083m resulted from circulating a freshwater pill down

hole. Caving of zones 2075m to 2082m, and 2099 to 2102m resulted in spurious resistivity log responses.

Sandstone logged from cuttings are not representative of drilled formation, merely minor amounts from up hole, with clays largely washed out of samples and slow drilling yielding a limited cuttings. A thin tight sandstone bed is evident on logs about 2106m.

From 2113.5m cuttings, drill rate and wireline logs, indicate that low porosity sandstone was drilled. Due to low rate of penetration, less than 5 m/hr sandstone samples were mixed with sandstone cuttings from up hole. One three metre sandstone from 2142m drilled at rates of 8-10 m/hr. The cuttings samples were described as sandstone, very light grey to rarely very light brownish pink and very light greenish grey, fine to medium with occasional very coarse grains, moderately to poorly sorted, angular, generally abundant quartz overgrowths, abundant siliceous cement, common transverse grain fractures, commonly welded texture, minor white kaolin matrix in part, siliceous matrix in part, rarely arkosic(?), chloritic matrix in part, rare silicified siltstone lithic grains and rare to occasional mica flakes.

Below 2151m 30-50% claystone was present in the samples, described as claystone, mid to dark red-brown, minor light to mid grey, light grey-brown and light greenish grey, occasionally pale yellow-brown, micromicaceous, sub-phyllitic, moderately hard to hard, subfissile to fissile. The claystone was not discernable on the resistivity log curves being the only logs reading at this depth. The well reached Total depth of 2165m in the Warburton Group.

TABLE 4 PROGNOSED V ACTUAL FORMATION DEPTHS
Elevations: KB 53.3m GL 49m

Formation Tops	Prognosed Depths		Final Depths		Difference High / Low To Prog (m)
	(mKB)	(mSS)	(mKB)	(mSS)	
Surficial & Namba Fm	4.3	49.3	4.3	49	
Eyre Fm			53	0.3	
Winton Fm			117	-64	
Oodnadatta Fm	664.3	-611.3	705	-651.7	
Toolebuc Fm			absent		
Bulldog Shale	925.3	-872.3	1011	-957.7	- 85.7
Cadna-owie Fm	1213.3	-1160.3	1154	-1100.7	+59.3
Murta Fm					
Algebuckina Sandstone	1235.3	-1182.3	1189.6	-1136.3	+45.7
Poolowanna Formation Cycle 1	1427.3	-1374.3	1696	-1642.7	+268.7
Peera Peera Formation					
Walkandi Formation			1735	-1642.7	
Purni Formation	1625.3	-1572.3	1834	-1780.7	+208.7
Tirrawarra Sandstone Equivalent	1750.3	-1697.3	1969	-1915.7	+218.7
Crown Point Formation	1817.3	-1764.3	2000	-1946.7	+182.7
Warburton Basin	1949.3	--1896.3	2075	-2021.7	+125.7
TD	1979.0	-1926.0	2165	-2111.7	

5.3 Hydrocarbon Shows

5.3.1 Gas Shows

Mudgas readings recorded in Simpson-1 were generally low throughout with the exception methane shows from 633m to 775m in the lower part of the MacKunda Formation and upper part of the Oodnadatta Formation with 5 to 15 units of background gas recorded, with three gas peaks from 740m to 775m, the highest being 65units, predominantly methane gas from a depth of 757m. It is likely that the gas detected has a biogenic origin like, probably generated in the earlier part of the Tertiary.

The only other gas reading of significance was 3.6units of gas from the only significant Purni Formation coal intersected 1868m to 1875m. The chromatographic breakdown of this peak was, C1 1975ppm, C2 185ppm, C3 146ppm, iC4 88ppm, nC4 24ppm.

5.3.2 Top Walkandi Formation Residual Oil Shows and Residual Oil Shows in the lower part of the Poolowanna Formation, Cycle 1

The upper part of Poolowanna Formation from 1695m to 1727m drilled relatively slowly, generally a consistent 10 m/hr and predominantly claystone with a series of thin coals that are clearly seen on wireline logs, with minor thin beds of poor quality sandstone towards the base. No oil shows or residual oil (dead oil) staining was seen, fluorescent cut was pale white.

A drilling break at the base of the lowest claystone at 1727m (1726.5m, mudlog) was marked with the drill rate increasing to over 30 m/hr, with wireline log porosity of about 20%.

A grab sample from 1727m did not show obvious indication of oil or stain, pale white cut fluorescence was present. In the 1725m to 1735m samples some brown staining of sand grains is reported, this associated with orange stained kaolin clay. The brown staining of sand grains was considered to be likely dead oil stain.

Main Residual Oil Show – Walkandi Formation

The top of the Walkandi Formation was picked at 1735m. A two metre claystone is present at the top. From wireline logs a porous streak was intersected between 1737m to 1741m, with the claystone drilling slowly and the sand break drilling to 20 m/hr. Log derived porosity is lower than the overlying Poolowanna, however still appears to be greater than 15% for sands in the Upper Walkandi.

The sample from this sand 1735m to 1740m was very striking in colouration. It was described as medium orange grey sandstone, with “common brown iron staining”, really should have been described as abundant, with 60% of sand grains demonstrating obvious stain, with the pattern of staining suggesting dead oil. No visual fluorescence was detected in this sample.

Common brown staining of quartz grains in subsequent samples, 1740m to 1745m and 1745m to 1750m although from logs the interval 1741m to 1748m is a claystone. Brown staining of grains is not specifically reported in descriptions, however the sandstone colouration reported, very light grey to very light orange grey, suggests some residual oil stain is present.

Geochemical Assessment Zone 1720m to 1750m

Preliminary analysis of samples the zone was carried out by Geoscience Australia. This consisted of extract analysis and Rockeval analysis of five cuttings samples.

The results of these analyses are tabled below.

TABLE 5
Preliminary Extract Analysis, Lower Poolowanna – Upper Walkandi

Well Name	TOP m	BASE m	AGSO No	extraction (g)	EOM (mg)	Sats (mg)	Aroms (mg)	Sats/Arom	ppm HC
Simpson 1	1720	1725	1980464	22.30	62.1	11.5	8.4	1.4	892.4
Simpson 1	1725	1730	1980465	22.32	41.3	6.2	5.4	1.1	519.7
Simpson 1	1730	1735	1980466	22.53	29.8	0.8	1.3	0.6	93.2
Simpson 1	1735	1740	1980467	20.38	29.7	0.8	3.1	0.3	191.4
Simpson 1	1740	1745	1980468	22.01	20.8	2.2	2.5	0.9	213.5
Simpson 1	1745	1750	1980469	23.05	11.7	1.4	1.7	0.8	134.5

TABLE 6
Preliminary Rockeval Results, Lower Poolowanna – Upper Walkandi

Sample	Tmax	S1	S2	S3	PI	TOC	HI	OI	Depth,m
1980464	429	0.23	5.94	0.35	0.04	3.2	186	11	1725
1980465	428	0.15	2.82	0.5	0.05	1.57	179	32	1730
1980466	429	0.08	1.31	0.54	0.06	0.83	158	65	1735
1980467	438	0.04	0.34	0.29	0.1	0.27	125	106	1740
1980468	441	0.03	0.91	0.43	0.03	0.72	126	60	1745
1980469	437	0.04	0.57	0.27	0.06	0.46	125	59	1750

The top sample (1720 – 1725m) had the highest yield of extractable hydrocarbon with the gas chromatic trace coupled with Rockeval data generally consistent with a marginally immature to marginally mature source rock or initial locally derived migrated oil. This sample is from the lower part of the seal predominant section of the Poolowanna, with the porous Poolowanna Sandstone intersected from 1727m. There is not indication from the results that live reservoired oil was present in the lower part of the Poolowanna Formation.

The sample demonstrating greatest orange-brown stain of sandstone grains, probable dead oil stain was the1735m – 1740m sample. Analysis numbers for this sample are consistent with lower TOC, the sample having the greatest percentage of sand grains. Trace fragments of caved Poolowanna

coal were likely present in the sample, considered contamination. Detailed analysis of the longer chain molecules, say C17 plus may be more pertinent as results tabled are influenced by the presence of cuttings of other lithologies present in the sample and a dead oil stain of this nature is liable to comprise very long chain molecules.

At this time geochemical analysis has not conclusively proved that the stain on the sand grains is dead oil, indeed a conclusive answer could be elusive.

5.4 Porosity and Permeability

A wireline log interpretation report by Mike Walker is included within Appendix No.4. Minor changes in formation tops were made subsequent to the writing of this report, although not affecting the substance of the report.

5.4.1 Cadna Owie Formation and Murta Member

Sandstones from 1154m to 1189.6m, incorporating the Cadna-Owie Formation and Murta Member were generally thin and not obviously porous on wireline logs. The top sand of the Cadna-Owie Formation was very fine to fine grained with abundant kaolin matrix, this contrasting with the more porous sand intersections at this level in the Blamore-1 and CBM 93-01 wells.

The Murta Member is considered a good seal of the top Algebuckina reservoir.

5.4.2 Algebuckina Sandstone

The upper part of the Algebuckina Sandstone to a depth of 1366m is porous as to be expected, with an average log derived porosity of 21.4% and maximum porosity up to 25%.

The sandstones within the interval 1366m to 1400m, the Birkhead Formation Equivalent, have an average porosity of 24%. Thinner sandstone beds towards the top of the formation are less porous, are more finely interbedded but should flow oil if a suitable trap is located. The seal is thin in Simpson No.1 but not dissimilar to recent Birkhead discovery northwest of the Cooper Basin, nevertheless is a secondary objective in the region.

The lower part of the Algebuckina sequence, a possible Hutton Sandstone equivalent, 1400m to 1648m has an average log derived porosity of 19.3% with porosity commonly greater than 20% particularly in the upper part and with some horizons in the lower part showing the effects of greater silicification.

5.4.3 Poolowanna Formation

The average log derived porosity of the Poolowanna Formation, Cycle 1 & 2 sandstones was calculated at 18.3%, however thicker sandstone beds exhibit porosity of 20%, particularly the Upper Cycle 2 interval from 1648m to 1696m that is not dissimilar to the Algebuckina Sandstone.

The Poolowanna Formation Cycle 1 is a primary objective reservoir in the region, given that upper part is a regional seal.

In Simpson No.1 the claystone predominant upper part of Poolowanna Formation Cycle 1 1696m to 1727m has minor thin sandstones towards the base that are not obviously porous; overall the interval can be regarded as a sealing horizon.

Sandstones intersected 1727m to 1735m underlying this seal have an average porosity of 20%.

5.4.4 Walkandi Formation

The porosity of sandstones in the Walkandi Formation is significantly lower than the overlying Jurassic sandstones**,** the change occurring at the unconformity surface at the top of the Walkandi. Average log derived porosity of 13.7% was calculated for the Walkandi Formation as a whole.

Fair porosity is present in sandstones of the Upper Walkandi, 1735m to 1795m, generally greater than 15%, in sandstones between reasonably thick claystone beds. These claystone beds have very high Thorium content as indicated by the spectral gamma ray log.

The sandstone prone Lower Walkandi intersected between1795m to 1836m showed increasing evidence of silicification from cuttings samples with logs indicting porosity decline from 14% to 12% towards the base of the interval.

5.4.5 Purni Formation

Sandstone porosities in the Purni Formation were poor, with log derived porosity of 10% or less. Cuttings samples indicated pervasive siliceous cementation.

5.4.6 Tirrawarra Sandstone Equivalent

Cuttings samples tended demonstrated sandstone with significantly less siliceous cementation. The basal sandstone from 1990m to 2000m consisted of common to abundant round quartz grains. Log derived porosity through the Tirrawarra was not good, with the basal sand demonstrating the best reservoir quality, however only averaging a log derived porosity of 11.4%.

5.4.7 Crown Point Formation

Argillaceous lithologies with lesser poor quality sandstone predominate from 2000m to 2056.5m.

From 2056.5m to 2075m fair porosity sandstone was intersected with an average log derived porosity of 13%, probable maximum porosity slightly more than 15%. This sandstone drilled at reasonable drill rate up to 20 m/hr indicating less siliceous cementation than overlying Permian sandstones.

5.4.8 Warburton Group

A thick claystone occurs at the top of the Warburton Group from 2074.5m to 2113.5m. Sandstone is the predominant lithology below 2113.5m. Drill rates

through the Warburton Group sandstones were low, generally below 5 m/hr, with log porosity averaging only 7%.

5.5 Source Rock Quality

5.5.1 Poolowanna Formation

From results tabled in Section 5.3.2 the Poolowanna Formation is immature to marginally mature for oil generation in Simpson-1. The ratio of saturates to aromatics suggests a fraction of early mature oil is present, however suggests no oil sands were intersected.

The gas chromatic trace is generally consistent with marginally mature oil (*n*-alkane odd over even ratio is >> 1; eg *n*-C 25 – *n*-C 24 is >>1) derived from a terrestrial, land plant source rock i.e.> C 22 *n*- alkanes with an odd over even ratio >>1. The pristine/phytane ratio is >>1 which is also consistent with an oxic depositional environment. This encourages the idea of more extensive oil generation in the axis of the Madigan Trough where the Poolowanna Formation is 430m deeper than at Simpson 1.

The main results of interest are the first two analyses collected from the base of the seal predominant section, where claystone and tighter sandstone predominate, though traces of coal fragments were present. Results from these samples suggest gas generation and some oil generation can be expected with greater source maturity; these samples however represent only the lower lesser organic rich part of the section.

5.5.2 Purni Formation

Rockeval Pyrolysis was carried out on two samples of Purni Formation coal cuttings and vitrinite reflectance measurement was made by Keiraville Konsultants P/L on a coal cuttings sample from 1875m. Results of these analyses are included in Appendix No.6

The results of Conclusions from Rock Eval Pyrolysis data (REP data) from the one Purni Formation coal is summarised in the following points:

I. Tmax data is a reliable maturity indicator where the S 2 peak is > 0.5 which is the case in Simpson-1 where S 2 lies between 11.25 and 145.51 mg/g. Tmax values are consistent with the VR0 data and lie in the range of 438 ° F (indicating maturity for wet gas and oil).

II. Hydrogen indices for the high TOC coals (TOC = 55-65%) coals range between 138 and 146. These two samples are likely to be gas prone. Data from nearby wells indicate that coals from near the base of the Purni Formation are more likely to be oil prone while coals in the upper section are more likely to be gas prone as is the case with this sample.

III. A plot of hydrogen index against Tmax (Van Krevelan Diagram) reveals the coal samples are Type 2 – Type 3 with a VRo=0.67.

In terms a source rock maturity, a vitrinite reflectance value of VRo=0.67 was recorded for the Purni Formation coal cuttings sample from 1875m, identical to that suggested by the Rockeval Pyrolysis data. This gives encouragement

for the notion that more deeply buried coals in the Madigan Trough have generated significant volumes of oil.

6. Implications for Hydrocarbon Exploration

The Simpson -1 well was only the second exploration well to be drilled in this region since Etingimbra-1 in 1990; the main implications of the well are discussed below:
The most significant result of the well in terms of hydrocarbon exploration was the presence of orange-brown staining of quartz grains towards the base of the Poolowanna Formation and with strong brown staining of sand grains in the topmost sandstone within the upper part of the Triassic Walkandi Formation. The show appears to be similar to that encountered in the Poolowanna Formation Cycle 1 in Colson-1, 50 km to the south, and also at the Algebuckina-Murta Member interface in Blamore -1, 55 km to the northwest.

The aforementioned results indicate that oil has probably migrated to the Simpson structure from the Madigan Trough and as expected, oil shows occur at the first reservoir – seal interface in the Jurassic section i.e. the sand – shale interface in Cycle-1 of the early Jurassic Poolowanna Formation.

The orange-brown staining was intersected in the basal Poolowanna Formation (Cycle-1 sandstone) continuing downwards, through the top Triassic Unconformity, into tighter sandstones of the uppermost Walkandi Formation.The shows were originally described as iron staining but the fact that they occurred at the primary reservoir/seal interface in Cycle 1 of the Poolowanna Formation (and extend downwards into the top Walkandi Formation) was causal for further geochemical analysis which explored the notion of oil staining.

Dr. C. Boreham (Geoscience Australia) examined the geochemistry of the extracts and concluded the results were inconsistent with oil staining but more appropriate for an immature to marginally mature source rock extract. He interpreted a terrestrial, land plant source (Poolowanna Formation shale) consistent with an oxic depositional environment. His overall interpretation is that local generation from these source rocks resulted in initial migration and then ‘oil coating’ of the reservoir sands.

These comments relate more to the lower part of the Poolowanna Formation seal section, the top two samples evaluated. Preliminary results assessing samples assessing the orange-brown staining of sand grains described in cuttings towards in the lower part of the basal sandstone of the Poolowanna Formation, and particularly strong staining in the upper sandstone of the Walkandi Formation, are less clear at this time as these results are contaminated to a lesser or greater degree by minor amounts of Poolowanna coal cavings and claystones containing lighter hydrocarbon compounds mostly lighter than C17, whereas bitumen staining would likely comprise longer chain hydrocarbons.

There are several resultant implications. Firstly, the aforementioned data of sample analysis of Poolowanna Formation seal, base about 1727m, is consistent with thermal/basin modeling described in Ambrose et al (2002) which suggested that maturity of the Poolowanna Formation shales was marginal – early mature on the flanks of the Madigan Trough and mid-late mature in the axis of the Madigan Trough. It is likely the Poolowanna shales have expelled oil from the axis of the Trough but migration barriers have, at least in part, inhibited lateral migration to the basin margins. However, this is not to exclude the notion that basin margin traps are

prospective, rather that they have proven migration pathways from more deeply buried source kitchens than was the case at Simpson-1.

The presence of oil shows is encouraging for updip closures on the Simpson nose and also the Simpson East Prospect which has both Mesozoic targets and Palaeozoic carbonate platform targets at the crest of the structure.

The complete absence of shows in the lower Permian clastics (Crown Point Formation, Tirrawarra Sandstone) suggests either 1) the main generative depocentre was too distant from the Simpson Nose to allow effective migration (30 km away), or 2) migration pathways were disrupted by faulting etc, or 3) there was insufficient hydrocarbon generation in the depocentre to the northeast.

As expected, the Purni Formation was quite thin and only one coal seam of 7 m was intersected at a depth of 1800 m which is likely too deep to be commercialised as a coal-bed-methane project.

The well has downgraded the potential of the eastern margin of the Madigan Trough to some extent although the Madigan Prospect has merit as it is closer to the potential source kitchen, has more robust 'C-P' thinning and has more robust closure at the main target i.e. the top Algebuckina Sandstone. Further seismic mapping is required to establish the presence/absence of the Poolowanna Formation over this prospect. In addition, deep faulting marking the edge of the Madigan Trough may have tapped hydrocarbons migrating upwards from the Palaeozoic.

Thus, as supported by the presence of Jurassic oil shows, the eastern margin of the Madigan Trough is still believed to be prospective using the exploration axioms which preceded the drilling of Simpson-1. At Jurassic levels it may be that Tertiary epeirogenesis led to spillage updip. The Simpson East Prospect thus becomes an attractive target and additional seismic will be acquired in 2009-2010. The lack of shows in the Permian at Simpson may point to the prospectivity of basinal 4 way dip closures such as Guinevere and Vivien which occur much closer to the proposed generative petroleum kitchen in the northern Madigan Trough.

The first reservoir – seal interface in the Warburton Basin sequence comprises tight aeolinite sandstone capped by a thick shale seal 38 m thick.

7. Conclusions

1/ No live oil shows, significant gas shows or hydrocarbon saturation were detected in reservoirs intersected in the Simpson No.1 well. Gas shows from three thin sands the Oodnadatta Formation between 633m to 775m, maximum peak 65units gas. The gas had a high percentage of methane, is likely to be biogenic generated gas, probably generated with the down warp of the Tertiary Eyre Basin.

2/ Probable dead oil shows were detected in the lower part of the Poolowanna Formation and Upper part of the Walkandi Formation. Similar shows in were recorded Colson No.1 in the Poolowanna Formation and live oil was discovered in this formation in the Poolowanna No.1 well both indicating generation from Poolowanna Formation source rocks in the northern Poolowanna Trough.

3/ Based on the inferred depth of the Poolowanna Formation in the Madigan Trough and maturity data from Simpson No.1 it is likely that the Poolowanna Formation is mature for oil generation over an extensive area within this trough where this formation is estimated to be 430m deeper.

4/ Similarly, measured maturity of the Purni Formation coal seam intersected being a vitrinite reflectance value of Ro=0.67 at depth 1875m indicates that the Purni Formation coal measures are substantially mature for oil generation in the central Madigan Trough where the top of the Permian is estimated at greater than 2400m, lowermost coals perhaps at about 2800m (Figure 8)

5/ A review of the Simpson structure seismic data is proposed in order to further consider why the well failed to intersect live oil zones and to reassess other structures in the region.

6/ Running of surface casing caused the main lost time incident, approximately one day, during Simpson No.1 drilling. In particular running the casing to bottom was achieved, however on pulling up to insert the landing joint the pipe was found to be stuck, probably as a result of cavings from the Winton Formation lodging around the casing. Casing was cemented where stuck. A similar incident occurred in Blamore No.1. Future drilling programmes should address this issue.

7/ It was proposed to set 9 5/8" surface casing within the Bulldog Shale however formation tops were picked high, with the casing point picked at 804m, later determined to be 100m into the Oodnadatta Formation, mistakenly picked as Bulldog Shale while drilling. The Bulldog Shale was intersected in the 8 ½" hole at 1011m. Caliper logs recorded a Total Depth indicated that substantial caving above 860m within the Oodnadatta Formation with lesser caved zones within the Oodnadatta below this depth. There was an incident when running the VSP when the wireline hung up at 940m, however was eventually worked through the bridge encountered. The Bulldog Shale was in gauge throughout. Future drilling programmes should probably aim to set casing at the top of the Bulldog Shale.

8.0 References

Ambrose, G., Suttill, R. & Lavering, I. ,1982, a review of the Early Cretaceous Murta Member in the southern Eromanga Basin, in Moore & Mount, compilers, 1982: Eromanga Basin Symposium, summary papers. Geol. Soc. Aust. & Pet. Explr. Soc. Aust., Adelaide.

Ambrose GJ, Deighton I, Eadinton PJ and Boreham CJ, 2002. New petroleum models in the Pedirka Basin, Northern Territory, Australia. The AAPEA Journal pp 127-143

Ambrose, G., 2007, The Petroleum Geology of the Simpson Desert Area: The Eromanga, Simpson and Pedirka Basins, paper presented at the Northern Territory AGES symposium 2007.

Ambrose,G.J, Liu,K., Deighton,I., Eadington,P.J. and Boreham,C.J.,2002. New Petroleum Models in the Pedirka Basin, Northern Territory, Australia. AAPEA Journal Vol.41, part 1, pp 139- 163.

Ambrose, G.J., Scardigno, M., and Hill, A.T. Petroleum geology of Middle-Late Triassic and Early Jurassic sequences in the Simpson Basin and northern Eromanga Basin of Central Australia. APPEA Journal Vol.47, pp 127-143

Middleton, M.F., Barker, C.E and Heugh, J. 2005, The geology of the western part of the Pedirka Basin, Australia. Central Australian Basins Symposium, Alice Springs, 16-18th August 2005, Handbook 16

Moore, P.S. & Pitt, G.M. 1982, Cretaceous of the southwestern Eromanga Basin: stratigraphy, facies variations and petroleum potential, in Moore & Mount, compilers, 1982: Eromanga Basin Symposium, summary papers. Geol. Soc. Aust. & Pet. Explr. Soc. Aust., Adelaide.

New, D., 1988, Mt. Hammersley No.1 Well Completion Report, Appendix V, Palynalogy Report, Santos.

Price, P.L., 1977. Palynalogy Report No.13/103, Mines Administration Pty Ltd, Appendix 2, in Poolowanna No.1 Well Completion Report, Delhi Petroleum Oil Corporation, 1978