

**CBM 93-003**

**EP 93**

**WELL COMPLETION REPORT  
Interpretive  
Northern Territory**

**9<sup>th</sup> -26<sup>th</sup> January 2010  
Central Petroleum Limited**

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## 1.0 Introduction and Summary

CBM 93-003 was the second coal bed methane exploration well of the Central Petroleum Limited 2009/2010 Pedirka Basin drilling programme.

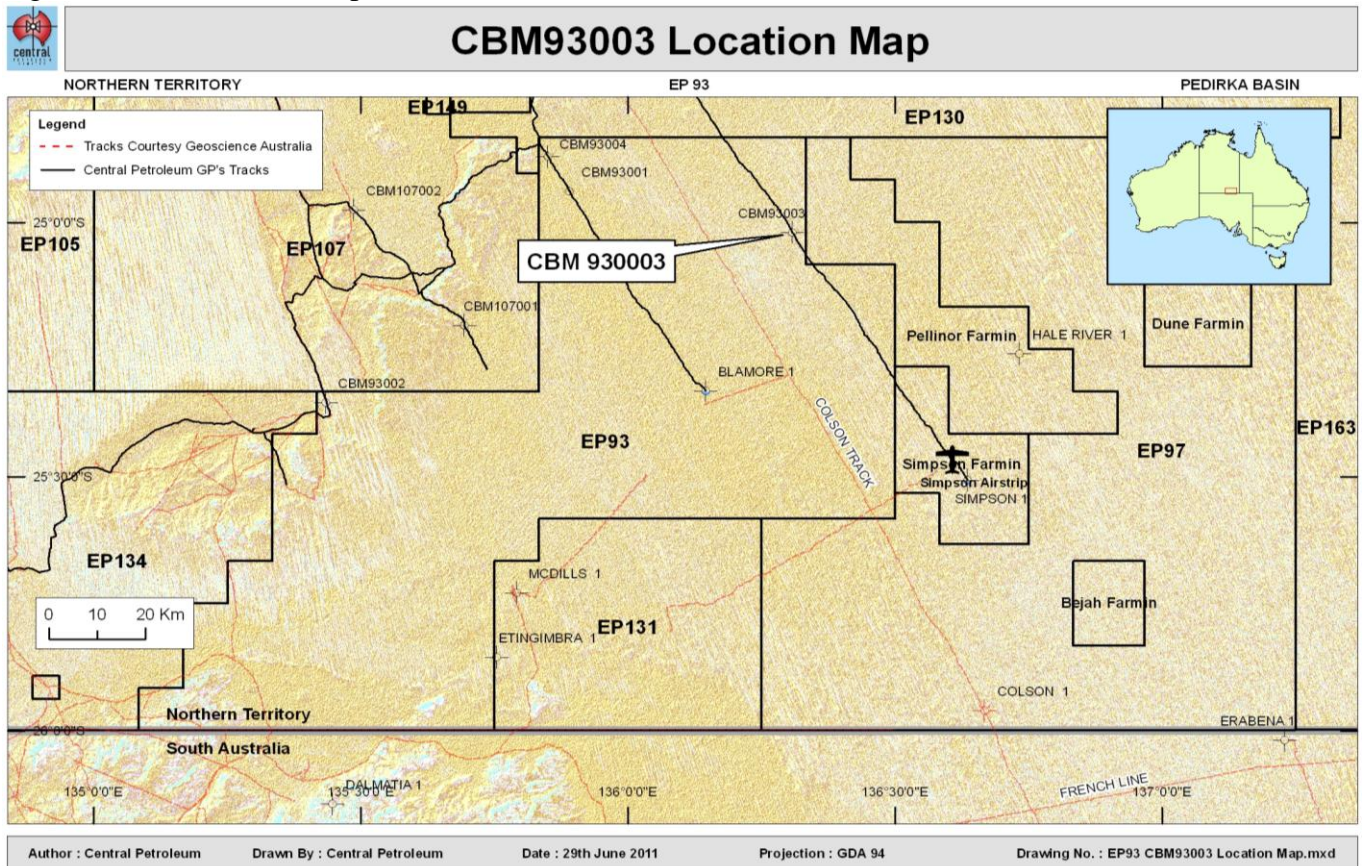
It was spudded on 9<sup>th</sup> January 2010 and after setting surface and intermediate casing strings was fully cored from 544 to 897m, Total Depth. The well was drilled using Wallis Drilling, Rig D 39 heavy duty core rig. The wireline retrievable core system used a split inner core barrel.

The well was located on a prominent fold structure known as the Hector Trend some distance to the east of wells with known substantial net Coal seam thickness (Figure 1). It was 40km NNE of Blamore-1 and 310km SE of Alice Springs In permit EP93.

The well demonstrated a very substantial facies variation in the Purni Formation with only 3.1m net thickness of Coal intersected with the thickest coal of this total being 1.2m thick.

The predominant facies drilled in the Purni Formation consisted of sandstone and conglomerate, probably representing a fan shed from the Hale River Block (Ambrose, 2011).

Figure 1: Well location Map



The well reached total depth (TD) of 897m (Wireline Depth 900m) on 26<sup>th</sup> January 2010. Following wireline logging the well was plugged and abandoned. The rig was released 28<sup>th</sup> January 2010.

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**2.0 General Data**

Table 1: CBM 93-003 Well Index Sheet

<b>WELL NAME:</b> CBM 93-003		<b>CLASSIFICATION:</b> Coal Bed Methane Exploration			
<b>OPERATOR:</b> Central Petroleum Limited					
<b>Location:</b> Latitude: 25° 00' 58.877" S Longitude: 136° 18' 26.427" E GDA 94 Zone 53		<b>Rig Details:</b> Rig Name: Wallis D 39 Contractor: Wallis Drilling Rig Type: Land – Core Rig		<b>Dates:</b> Spud Date: 9th Jan 2010 TD Date: 26th Jan 2010 Rig Released: 28th Jan 2010	
<b>Basin:</b> Pedirka  <b>Permit:</b> EP 93		<b>Depths:</b> <b>Surface Elevation (AHD):</b> 153m <b>Rig Floor, DF (AHD):</b> 154 <b>Total Depth:</b> 897m (driller), 900.8m (logger)			<b>Status:</b> Plugged and Abandoned.
<b>Casing/Liner Details:</b> <b>Size</b> <b>Depth</b> 10" conductor      15m 7" (177mm)      245m 4 ½" (114mm)      543 m* *corrected post drill		<b>Hole Size -Mud Details:</b> 8.5" hole to 248.5m– Gel, KCL, Polymer 6.13" (6 1/8") hole to 544m – Gel, KCL, Polymer 3.78" core s hole to TD - Gel, KCl, CR 650			<b>Trajectory:</b>  Vertical
<b>Coring Details:</b> The well was continuously cored from 544m to 897m.		<b>Sidewall Cores:</b> Nil		<b>Cuttings:</b> Interval                      Sample Rate 15m to 544m                      6m	
<b>FORMATION</b>	<b>MD (m)</b>	<b>Subsea (MD)</b>	<b>Isopach (m)</b>	<b>TWT (msec)</b>	<b>Comments</b>
Holocene-Quaternary	1	+153	23	-	Cretaceous  Early Cretaceous Late to Middle Jurassic Permian Top Coal 656.2m Gross coal 3.1m Base Coal 834.6m TD Wireline 900.8m
Eyre Formation	-		-	-	
Winton-Oodnadatta Fm	23	+131	258	-	
Undif.	281	-127	81	-	
Bulldog Shale	362	-208	12	-	
Cadna Owie Formation	374	-220	15.	-	
Murta Member				-	
Algebuckina Sandstone	389.3	-235.3	194.3	-	
Purni Formation	583.3	-430.3	313.3+	-	
Purni Fm late Permian?	583.3	-430.3		-	
Purni Fm Early Permian	594	-440	303+	-	
Total Depth	897	-743			
<b>LOGGING</b>					
<b>Date</b>	<b>Depth (m)</b>		<b>Description</b>		
	<b>From</b>	<b>To</b>			
26th Jan 2010	895.5	5	1. DLL-SLL-Sonic-Neutron-Density-GR-SP-Calliper ( GR sonic only above 546m casing shoe		
27 <sup>th</sup> Jan 2010	890	50	2. VELOCITY SURVEY, SGS Aust, 23 levels.		
<b>Well Track:</b> Vertical Well					
<b>Well Testing:</b> No well tests conducted					

**CBM 93-003 Well Completion Report (Interpretive)**

**Well Name:** CBM 93-003

**Well Classification:** Coal Bed Methane Exploration

**Interest Holders:** Central Petroleum Limited, Operator (80%)  
British Gas (20%)

**Petroleum License:** EP 93

**Location:** Latitude: 25° 00' 58.877" South  
Longitude: 136° 18' 26.427" East  
Australian Map Grid Zone GDA 94 Zone 53  
7232574 N 631913 E

**Ground Level (GL):** 153m Datum

**Kelly Bushing (KB):** 154asl - Datum

**Total Depth (KB):** 897m

**Drilling Contractor:** Wallis Drilling

**Drilling Rig:** Rig # 39 (See Rig Specifications in Appendix 10)

**Contractors:**

Drilling Fluids: RMN Drilling Fluids

Coring: Wallis Drilling

Mud Logging: Weatherford

Wireline Logging: Weatherford

Cementing: Viking

Earth Works: Crown Point Pastoral

DST Testing: Weatherford

**Spud Date:** 9<sup>th</sup> January 2010

**Total Depth Reached:** 26<sup>th</sup> January 2010

**Rig Released:** 28<sup>th</sup> January 2010

**Well Status:** Plugged and Abandoned

## **3.0 Drilling**

### **3.1 Summary of Drilling and Related Operations**

CBM 93-003 was spudded at 1030 hours on the 9<sup>th</sup> January 2010, with the drilling of the 12 ¼” conductor hole to a depth of 15m. The 10” conductor was run and cemented at 15m within surficial Quaternary sandstone.

The 8 ½” surface hole was drilled to a depth of 248.5m without incident within Cretaceous claystones.

7” casing was run and cemented to a depth of 245.4m.

After nipple up and testing of the BOP drilling of the 6 ⅛” hole commenced, drilling through the remainder of the Cretaceous claystone and then the underlying sandstones comprising aquifers below the top of the Cadna Owie Formation intersected at 362m, with the main Great Artesian Basin aquifer, the Algebuckina Sandstone, intersected from 389.3m. The objective of this intermediate hole was to case and seal off the aquifer section prior to coring the primary objective Purni Formation Coal Measures.

6 ⅛” hole was drilled to a depth of 544m.

4 ½” casing was run to a depth of 538.3m, however this was later determined to be an error with one joint of casing run that was missing from the casing tally. This was confirmed by the wireline logs that indicated the casing shoe to be at 546m, though to confuse things further wireline log depths were approximately 2m deeper than drill depths based on correlation with core data and total depth (TD driller 897m ; wireline 900.77m) and other correlation.

Wireline log depth of 546m was adopted in reports for the depth of the 4 ½” casing, though it should be noted that the TD of the 6 1/8” hole of 544m was not adjusted.

HQ 3.78” coring commenced with the drilling out of the 4 ½” shoe track and casing shoe, then 3m of new hole to 547m before conducting a Formation Integrity Test, formation broke down at 13ppg mud weight equivalent.

Wireline retrievable coring proceeded without significant incident to total depth of 897m. A total of 75 core runs were made with generally 100% recovery, though some lost core in less consolidated sandstone occurred in the shallowest part of the well.

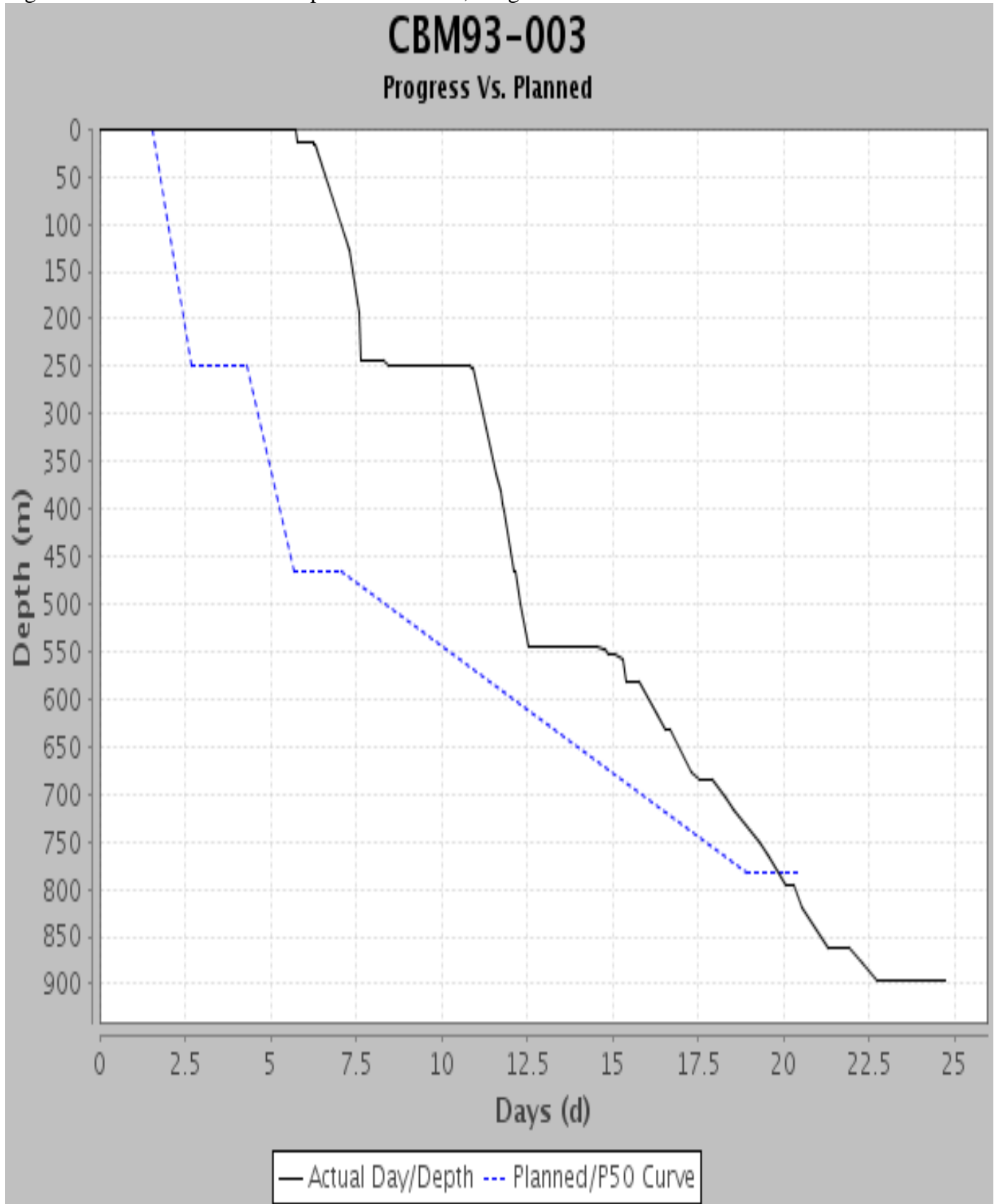
No significant coal seams were intersected and thus no Water Injection Falloff tests were conducted.

Total depth was reached on the 26<sup>th</sup> January 2010; a combination wireline log suite was run followed by a Velocity Survey.

The well was then plugged and abandoned and the rig was released on 28<sup>th</sup> January 2010.

Figure 2 displays predicted versus actual drilling time versus depth.

Figure 2: CBM 93-003 Time Depth Drill Curves, Progress versus Planned



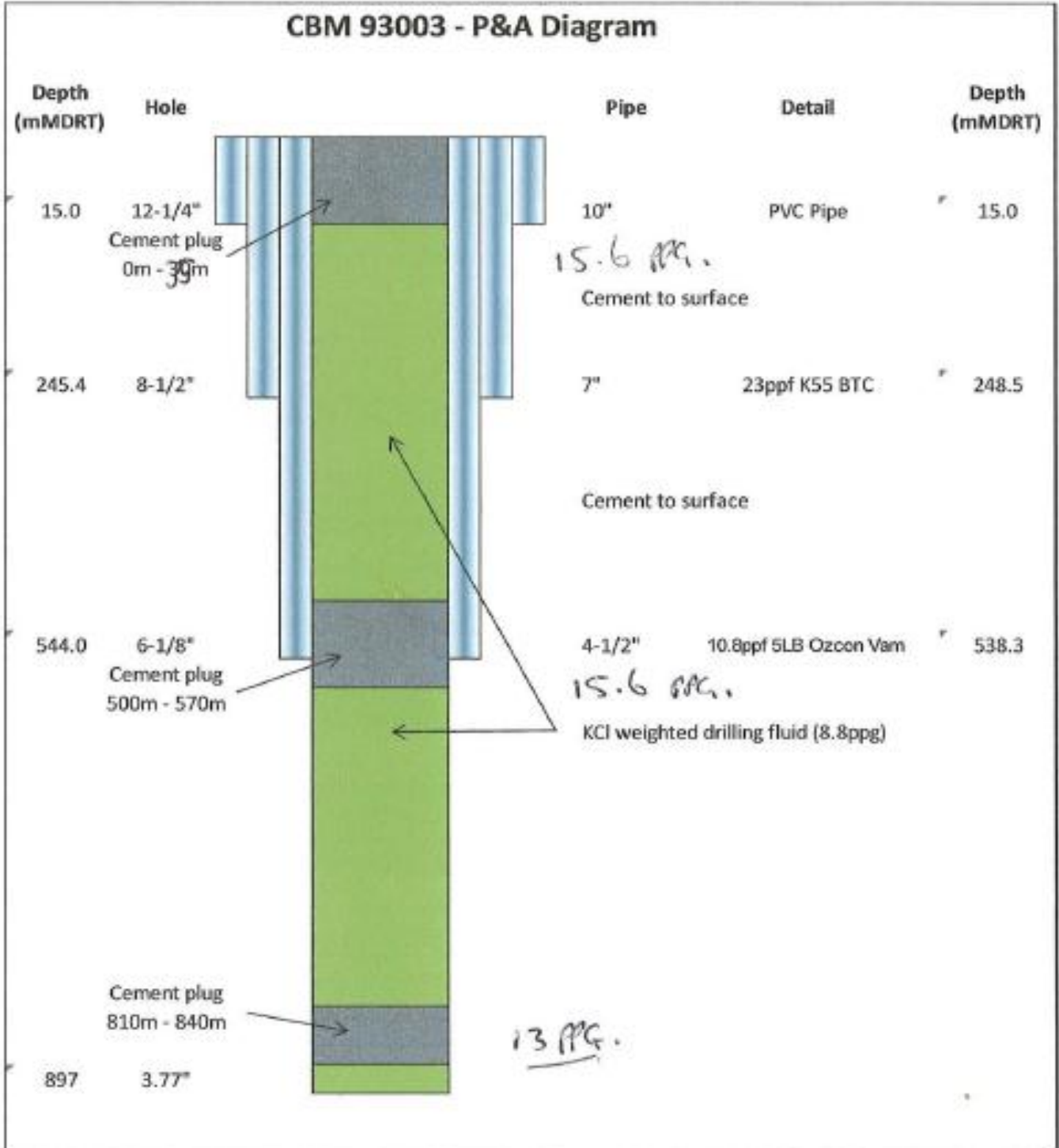


### 3.2 Particulars of Drilling

#### 3.2.1 Particulars of the equipment installed in or on the well

The following figure is a well schematic showing casing depths and cement plugs run on abandonment of CBM 93-003.

Figure 3: CBM 93-003 P&A schematic



## **CBM 93-003 Well Completion Report (Interpretive)**

### **3.2.2 Casing and equipment installed on the well including details of abandonment.**

Conductor – 10” PVC conductor was run and cemented to 15m.

7” Surface Casing was run to 245.4m being the containment string set in the claystones of the Cretaceous.

4 ½” Intermediate Casing was set at 543m to case off the Algebuckina Sandstone.

After reaching Total Depth of 897m the well was plugged and abandoned.

### **3.2.3 Cementing operations carried out**

Cementing of the 10” conductor to 15m, 7” containment casing to 245m and 4 ½” intermediate casing to 543m were successfully carried out according to the drilling programme.

CBM 93-003 was plugged and abandoned with three plugs as follows:

Plug No.1: 30m to cover coals at 830m. Mix and pump 1.5bbl 13ppg slurry; Pull back and flush pipe. Pull back to 580m.

Plug No.2: 30m above and below shoe at 546m. Mix and pump 3.5bbl 15.6 ppg slurry from 580m. Pull back and flush pipe. Wait on cement. RIH and tag cement at 507m.

Plug No.3: Pull back to 50m and set surface cement plug

### **3.2.4 Bit Records**

Comprehensive details of bit records and drilling parameters are contained within Appendix#3 of this report, the IDS Final Well Report.

### **3.2.5 Deviation Surveys**

No Deviation Surveys were carried out.

### **3.2.6 Drilling Fluids**

Freshwater mud systems were used to drill the CBM 93-003.

Simple water based Gel Polymer mud was used during conventional rotary drilling to 544m with KCl Polymer utilized from this depth to TD. Details of the drilling fluids are contained in Appendix 10 Drilling Fluid Recap and daily parameters detailed in Table 2 below are extracted from this report.

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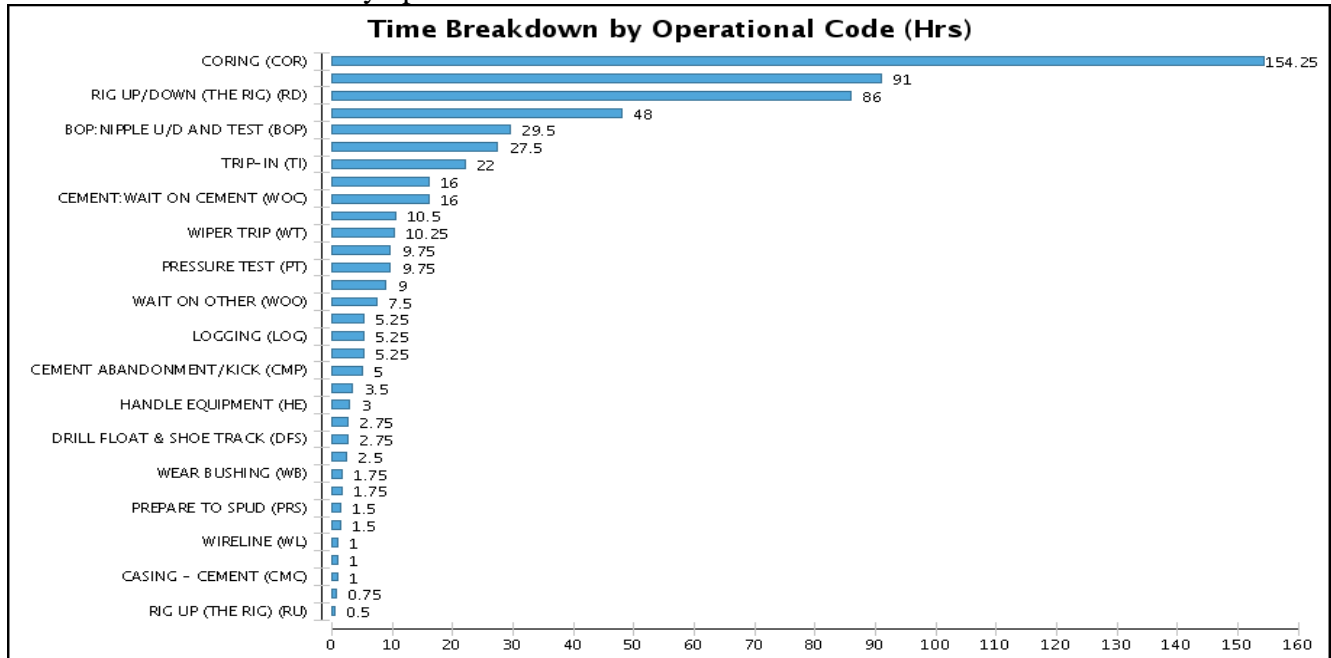
Table 2: Summary of drilling fluid parameters

Date	Mud Type	Depth	Weight	Vis	PV	YP	Gels		Filtrate		Solids			MBT	pH	PI	MI	Cl-	Ca++	K+	KCl
							10 sec	10 min	API	Cake	Solids	Water	Sand								
9-Jan-10	Gel Polymer	15	8.50	32	9	3	1	2			0.7	99.3			8.5	0.05	0.10	7,500	840		
		15	8.50	52	10	8	4	8	15.0	1	0.7	99.3	tr		8.5	0.05	0.10	7,500	280		
10-Jan-10	Gel Polymer	65	8.50	44	11	8	2	4	15.0	1	0.9	99.1	tr		8.8	0.10	0.15	7,500	380	5,404.0	1.0
		127	8.80	39	10	9	2	4	15.0	1	1.0	99.0	tr		8.8	0.10	0.15	7,500	280	10,808.0	2.0
11-Jan-10	Gel Polymer	209	8.80	45	12	8	2	4	15.0	1	2.2	97.8	tr	5.0	8.5	0.10	0.15	9,000	220	12,969.8	2.4
		243	9.00	44	11	8	2	4	15.0	1	3.8	96.4	tr	5.0	8.8	0.10	0.15	10,500	180	14,500.8	2.7
12-Jan-10	Gel Polymer																				
		249	9.00	44	11	8	2	4	15.0	1	3.5	96.5	tr	5.0	8.8	0.10	0.15	11,000	180	15,131.2	2.8
13-Jan-10	Gel Polymer																				
		249	9.00	42	11	7	2	4	15.0	1	3.5	96.5	tr	5.0	8.8	0.10	0.15	11,000	180	15,131.2	2.8
14-Jan-10	Gel Polymer	252	8.80	43	11	8	2	4	15.0	1	2.1	97.9	tr	7.5	11.0	0.15	0.20	12,000	1280	18,212.0	3.0
		314	9.20	44	12	8	2	4	12.0	1	2.8	97.4	tr	7.5	11.0	0.20	0.30	70,000	680	64,848.0	12.0
15-Jan-10	Gel Polymer	389	9.20	45	11	9	2	5	11.5	1	2.7	97.3	0.3	7.5	10.0	0.20	0.30	85,000	480	62,148.0	11.5
		500	9.30	45	11	9	2	5	11.0	1	3.4	96.8	0.3	7.5	10.0	0.20	0.30	62,000	280	62,148.0	11.5
16-Jan-10	Gel Polymer																				
		544	9.30	45	11	9	2	5	11.0	1	3.1	96.9	tr	7.5	9.8	0.20	0.30	83,000	280	64,848.0	12.0
17-Jan-10	KCL - Polymer																				
		544	9.20	40	10	8	1	4	12.0	1	2.8	97.4	tr	5.0	9.5	0.10	0.25	50,000	380	58,742.0	10.5
18-Jan-10	KCL - Polymer	553	8.80	38	10	7	1	3	12.5	1	0.8	99.2	tr	5.0	11.0	0.20	0.30	32,000	620	37,828.0	7.0
		577	8.90	40	11	8	1	3	12.0	1	1.4	98.6	tr	5.0	10.0	0.20	0.35	35,000	480	40,530.0	7.5
19-Jan-10	KCL - Polymer	588	8.90	41	10	7	1	2	12.0	1	1.8	98.4	tr	2.5	10.5	0.25	0.35	40,000	380	41,810.8	7.7
		618	8.90	39	9	8	1	2	12.0	1	1.5	98.5	tr	2.5	10.5	0.25	0.35	39,000	120	41,810.8	7.7
20-Jan-10	KCL - Polymer	643	8.90	40	10	7	1	2	12.0	1	1.5	98.5	tr	2.5	10.5	0.25	0.35	39,000	120	41,810.8	7.7
		678	8.90	40	10	7	1	2	12.0	1	1.5	98.5	tr	2.5	10.5	0.25	0.35	39,000	120	41,810.8	7.7
21-Jan-10	KCL - Polymer																				
		702	8.90	41	9	8	1	2	12.0	1	1.5	98.5	tr	2.50	10.5	0.25	0.35	39,000	180	41,810.8	7.7
22-Jan-10	KCL - Polymer	729	8.90	38	9	7	1	2	12.0	1	1.5	98.5	tr	2.5	10.0	0.20	0.30	37,000	180	41,070.4	7.8
		752	8.80	39	10	8	1	2	12.0	1	0.7	99.3	tr	2.5	10.0	0.20	0.30	37,000	220	41,070.4	7.8

**3.2.7 Lost time**

A breakdown of operational time and is summarized in Table 3 below. Further detail is contained in Appendix 3.

Table 3: Time breakdown by operation



**3.2.8 Water Supply**

Water for drilling was taken from nearby Bravo Bore. This was also utilized for drinking after passing it through an osmosis machine.

## **4.0 Logging, Sampling and Testing**

### **4.1 Cuttings Samples Collected**

Cuttings samples were collected at 6m intervals from 15 -544m. Lithological descriptions are included in Appendix 4.

### **4.2 Cores**

Conventional (HQ) core was cut from 544 - 897m and descriptions are included in Appendix 4  
The following table is a list of cores taken except for the core from 544-546.3m which was cut prior to casing and there was no core recovered over that interval.

Table 4: CBM 93-003 Core recovery list

Run No.	Depth	Driller's Depth	Meters Cored	Meters Recovered	Lost Core
0	546.30	546.30			
1	547.30	547.30	1.00	0.00	1.00
2	552.30	552.30	5.00	0.88	4.12
3	553.60	553.60	1.30	0.00	1.30
4	553.60	553.60	0.00	0.00	0.00
5	553.60	553.60	0.00	0.00	0.00
6	558.00	558.00	4.40	1.25	3.15
7	564.00	564.00	6.00	5.82	0.18
8	570.00	570.00	6.00	4.20	1.80
9	574.80	574.80	4.80	3.30	1.50
10	577.50	577.50	2.70	1.90	0.80
11	582.00	582.00	4.50	0.00	4.50
12	586.00	586.00	4.00	4.00	0.00
13	591.00	591.00	5.00	3.05	1.95
14	596.30	596.30	5.30	5.30	0.00
15	597.80	597.80	1.50	1.25	0.25
16	601.80	601.80	4.00	3.80	0.20
17	605.80	605.80	4.00	3.50	0.50
18	609.90	609.90	4.10	3.80	0.30
19	614.80	614.80	4.90	4.90	0.00
20	616.20	616.80	2.00	1.40	0.00
21	621.00	621.00	4.20	4.65	0.15

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Run No.	Depth	Driller's Depth	Meters Cored	Meters Recovered	Lost Core
22	627.00	627.00	6.00	6.00	0.00
23	633.00	633.00	6.00	6.00	0.00
24	637.08	637.00	4.00	4.08	0.00
25	641.94	642.00	5.00	4.86	0.00
26	646.78	646.80	4.80	4.84	0.00
27	650.88	651.00	4.20	4.10	0.00
28	656.98	657.00	6.00	6.10	0.00
29	663.00	663.00	6.00	6.02	0.00
30	669.00	669.00	6.00	6.00	0.00
31	675.00	675.00	6.00	6.00	0.00
32	681.00	681.00	6.00	6.00	0.00
33	685.25	685.30	4.30	4.25	0.05
34	685.50	685.50	0.20	0.10	0.10
35	685.60	685.60	0.10	0.10	0.00
36	687.00	687.00	1.40	1.40	0.00
37	692.95	693.00	6.00	5.95	0.00
38	699.00	699.00	6.00	6.05	0.00
39	700.15	700.20	1.20	1.15	0.00
40	705.00	705.00	4.80	4.85	0.00
41	710.60	710.60	5.60	5.60	0.00
42	715.50	715.50	4.90	4.90	0.00
43	720.00	720.00	4.50	4.50	0.00
44	726.00	726.00	6.00	6.00	0.00
45	729.80	730.00	4.00	3.80	0.00
46	735.00	735.00	5.00	5.20	0.00
47	741.00	741.00	6.00	6.00	0.00
48	747.00	747.00	6.00	6.00	0.00
49	753.00	753.00	6.00	5.90	0.00
50	759.00	759.00	6.10	6.10	0.00
51	765.00	765.00	6.00	6.00	0.00

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Run No.	Depth	Driller's Depth	Meters Cored	Meters Recovered	Lost Core
52	771.12	771.00	6.00	6.10	0.00
53	771.30	771.30	0.30	0.30	0.00
54	777.00	777.00	5.70	5.70	0.00
55	783.00	783.00	6.00	5.90	0.00
56	789.00	789.00	6.00	6.00	0.00
57	795.00	795.00	6.00	6.00	0.00
58	801.00	801.00	6.00	6.00	0.00
59	807.00	807.00	6.00	6.00	0.00
60	813.00	813.00	6.00	6.00	0.00
61	819.00	819.00	6.00	6.05	0.00
62	825.00	825.00	6.00	6.05	0.00
63	831.10	831.00	6.00	6.00	0.00
64	837.10	837.00	6.00	6.00	0.00
65	843.17	843.00	6.00	6.07	0.00
66	848.92	849.00	6.00	5.75	0.00
67	855.00	855.00	6.00	6.08	0.00
68	860.90	861.00	6.00	5.90	0.00
69	867.00	867.00	6.00	6.10	0.00
70	873.00	873.00	6.00	6.00	0.00
71	879.00	879.00	6.00	6.00	0.00
72	883.00	883.00	4.00	4.00	0.00
73	887.90	888.00	5.00	4.90	0.00
74	894.00	894.00	6.00	6.10	0.00
75	897.00	897.00	3.00	3.00	0.00

### 4.3 Mudlogging

Standard mudlogging services were provided by Weatherford for the duration of the well. The mudlog is included in Appendix 9.

### 4.4 Wireline Logging

Weatherford provided wireline logging services. One logging run was conducted at TD. The DLL-SLL-sonic-Neutron-density-GR-SP\_Calliper was run from 895.5m to casing shoe and the Gamma Ray was subsequently logged to surface. Wireline logs, data a brief petrophysical analysis are presented in Appendix 7.

#### **4.5 Vertical Seismic Profile**

A velocity survey was conducted by SGS Australia Pty Ltd using the Weatherford wireline, over the interval 50 - 890m and in all, 23 levels were shot. A summary and results are included in Appendix 8.

#### **4.6 Drill Stem Testing**

No well tests were conducted on CBM 93-003.

#### **4.7 Coal Desorption Sampling**

Weatherford conducted coal desorption analysis on selected samples. Three samples in all were taken and desorbed. These were from 716.95 – 717.44m, 821.33 – 821.83m and 828.8 – 829.8m. Results are included in Appendix 5.

## **5.0 Geology and Formation Evaluation**

### **5.1 Regional Geological Setting and Discussion of the Prospect**

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.

This well targeted the early Permian Purni Formation coal sequence on the western rampart of the Pedirka Basin named the Andado Shelf. At this location the Algebuckina Sandstone disconformably overlies the Purni Formation, as the Triassic sequence (Walkandi Formation) and possibly the early Jurassic Poolowanna Formation onlap the shelf downflank from the well. The stratigraphic section is very similar to that encountered in Simpson-1, 5 km to the southeast. This is true for the Jurassic-Cretaceous section and a full section is recorded – i.e. Winton Formation, Oodnadatta Formation, Bulldog Shale, Cadna Owie Formation, Murta Member and Algebuckina Sandstone. The Poolowanna Formation was thin in Blamore-1 and absent in CBM 93-001 but may be present downflank in the Eringa Trough and also further east in the Madigan Trough.

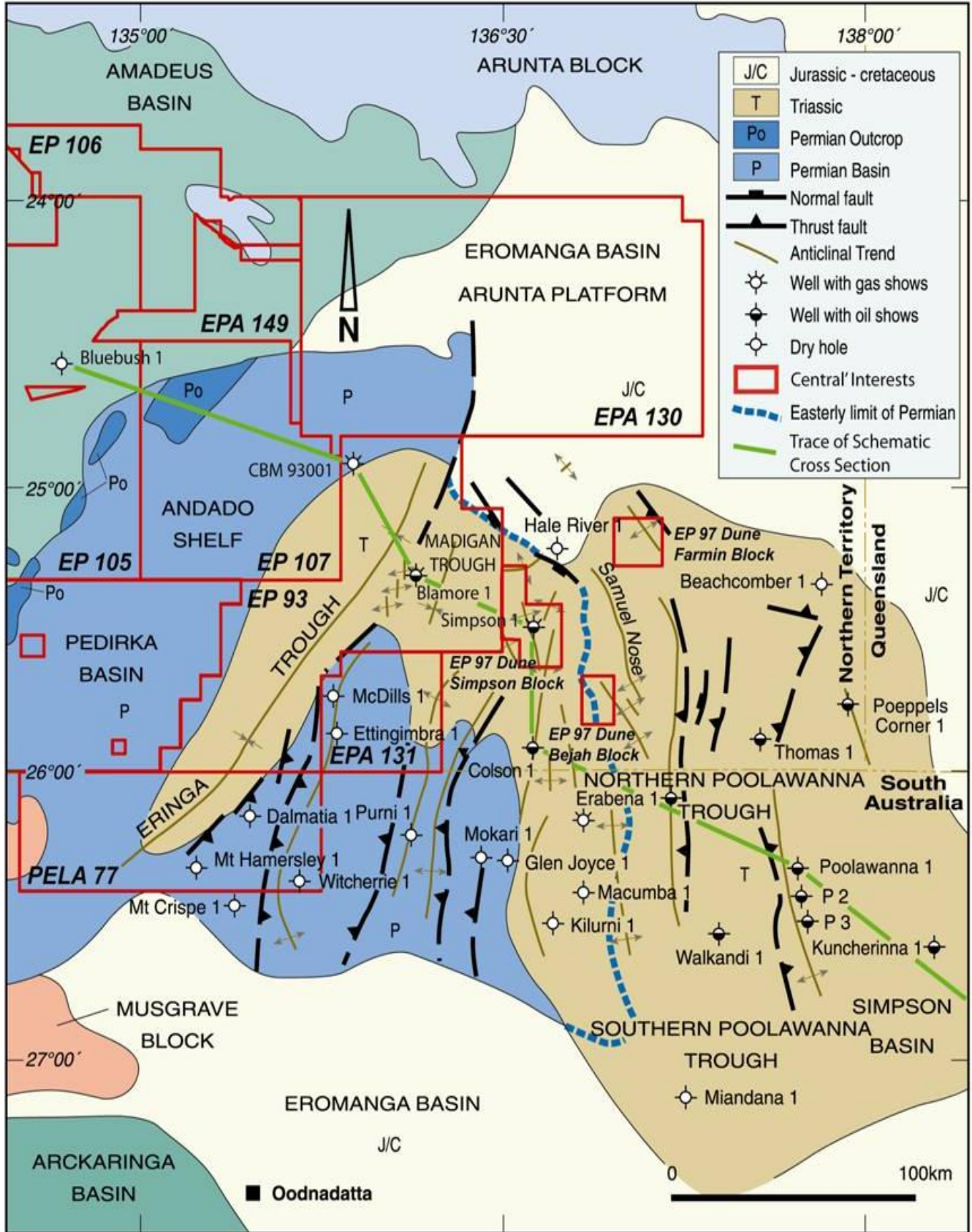
The CBM 93-003 well is located on the edge of the Hale River Block and geologically appears to have intersected a more basin ward alluvial facies with very minor coal compared to Blamore and other Eringa Trough wells. The nearest well to this location is Blamore-1 which was located 40 km to the south-southeast and intersected 111 m of net coal. Ambrose (2011) has divided the coal sequence on a regional basis into 3 units, namely Units A, B and C. All 3 units were intersected in CBM 107-001 which intersected a total of 134 m of coal with significant coal developments in all three units.

The sequence subdivision appears, based on limited data, to be valid on a regional scale and thick individual coal seams do have wide lateral continuity although they appear to split and condense fairly rapidly. The thicker coal seams on the Andado Shelf were deposited in high latitudes on Arctic style coal mire where periodic freezing, dry-out phases, fires and refreezing took place. Maceral content is variable between mainly vitrinite (woody organic matter) and inertinite (charcoal). Oil prone liptinites average 5-10% and where mature these coals would provide good oil source rocks.

The well intersected a gross 3.19m (net 1.2m of coal, 1m cutoff), a similar result to Simpson-1 (6m coal) and following the same structural trend as Simpson-1. This location therefore defines the north easterly limit of the main coal accumulation in the Pedirka Basin.



Figure 4: Pedirka Basin Structural Elements



## 5.2 Lithology and Formation Tops

Table 5: CBM 93-003 Formation Tops, predicted vs actual depths

Formation Tops	Prognosed Depths		Final Depths		Difference High / Low (m)
	(mKB)	(mSS)	(mKB)	(mSS)	
Surficial & Namba Fm	1	+153	1	+153	
Eyre Fm	np		np		
Winton - Oodnadatta Fm	np		23	+131	
Undiff	np		281	-127	
Bulldog Shale	np		362	-208	
Cadna-Owie Fm	383	-230	374	-220	10H
Murta Fm	np				
Algebuckina Sandstone	np		389.3	-235.3	
Poolowanna Formation	np		np		
Purni Fm (L. Permian)	513	-360	583.3	-450.3	+90L
Purni (E. Permian)	np		594	-440	
TD	780	-630	897	-743	

Two stratigraphic levels were predicted in the well proposal, the Cadna-Owie Formation and the Top Purni Formation. These were encountered 9m high and 90m low respectively.

### 5.2.1 Holocene/Quaternary: 1m to 23m

This interval consists of sandstone, red to orange brown, occasionally white, light yellow grey when drill washed, loose, medium to very coarse and granular, subangular to subround, with trace silcrete, in part very fine sandy. Minor soft, grey claystone is also present.

### 5.2.2 Winton Formation to base Oodnadatta Formation, Undifferentiated: 35m to 353m

(The Cretaceous stratigraphy used to subdivide the lithological units intersected in the CBM 93-004 well is based on the paper entitled *Cretaceous of the Southwestern Eromanga Basin*, Moore P.S. and Pitt G.M., 1982.)

The Winton Formation is a non-marine sequence of Early to Late Cretaceous age. The sequence is predominantly soft medium dark grey claystone with common fine to medium, rarely coarse grains and specks of carbonaceous fragments and coal, slightly micaceous, sometimes slightly calcareous, with traces of black glauconite grains and traces of pyrite.

Elongate needle like “prisms” of *Inoceramus* shells were observed from 176m.

### 5.2.3 Undifferentiated: 281m to 362m

This interval comprised mostly glauconitic claystone, medium dark gray, with traces of coaly specks and trace to good trace very fine black glauconite grains, slightly calcareous, slightly micaceous.

**5.2.4 Bulldog Shale: 362m to 374m**

The top of the Bulldog Shale was picked at 362m from cuttings descriptions, where medium to dark greenish grey claystone grades to siltstone and thin sandstone is present. This is white, loose, and fine to coarse.

**5.2.5 Cadna Owie Formation: 374m to 389m**

The top is recognised by a drilling break and onset of sandstone. The sandstone is light grey, loose, fine to very coarse, predominantly coarse well sorted, subangular to well rounded, generally translucent, trace dull yellow stained, trace kaolin adhering to grains, trace very fine to fine aggregates, friable with kaolin matrix, trace coal grains, no fluorescence

The Murta Member is unrecognised in this well, although a tentative pick is noted on the composite log at 374m.

**5.2.6 Algebuckina Sandstone: 389m to 583m**

The Algebuckina Sandstone is a series of stacked braided fluvial sandstone beds, generally very coarse at the base, and fining upward to medium grained.

The sandstones are typically light or medium grey, loose, medium to very coarse and subangular to angular. Rounded grains in the upper part may represent contamination from the Cadna Owie, or may be in situ in the upward coarsening sequence above 441m. Accessories include muscovite and traces of pyrite in the lower part. Between 441 and 457m includes siltstone, dark grey, soft to firm, grading in part to claystone but otherwise sandy, and grading downward to very fine loose clean sandstone.

**5.2.7 Purni Formation (Permian): 583m to 897m Total Depth**

The Permian part of the sequence in CBM 93-004 consists of stacked upward fining sequences of coarse to medium sandstones grading upwards to coals. The entire interval is identified with the Purni Formation and correlates well to similar intervals in Blamore-1 and CBM 93-001.

Comprehensive descriptions of the Purni Formation are available in the Completion Report for CBM 93-001, where cores alternated with cuttings in the upper part, and the rock types and sequence are very similar at CBM 93-004.

Palynological analysis suggests the upper part of the sequence is inconclusive as it is essentially barren of fossil material. Below 657m an early Permian age with a lacustrine depositional environment is assigned. A Palynology report is included in Appendix 4.

Coal was observed in the Purni Formation over the following intervals:-

Table 6: CBM 93-003 Coal intersections

Interval (core depth)	thickness	Log depth
656.2-656.24m	0.04m	Not observable
692.64-692.66m	0.02m	Not observable
716.95-717.44m	0.49m	719.7-720.19m
752.27-752.3m	0.03m	Not observable
820.23-820.5m	0.27m	Not observable

## **CBM 93-003 Well Completion Report (Interpretive)**

821.33-822m	0.67m	824.5-825.17m
822.25-822.34m	0.09m	Not observable
828.76-829.98	1.22m	832.1-833.32m
830.39-830.75m	0.36m	834-834.36m
Gross thickness	3.19m	

Lithological descriptions of cuttings and core are included in Appendix 4.

### **5.3 Hydrocarbon Indications and Sample Analysis**

#### **5.3.1 Hydrocarbon Shows**

No hydrocarbon shows were detected in the well. Very minor background gas was recorded whilst drilling (Appendix 9).

#### **5.3.2 Source Rock analysis**

Several Core samples and coal samples were selected for Rockeval, maceral analysis and Vitriite reflectance. Results are included in Appendix 6.

## **6.0 References**

Ambrose, G., 2011: Pedirka Basin Coal Geoscience -2011, CPL internal report.