



**DRILLING FLUID SUMMARY**

**FOR : CENTRAL PETROLEUM**

**WELL : CBM 107-002**

**PEDIRKA BASIN**

**NORTHERN TERRITORY**

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Date : May 2010

Operator : Central Petroleum  
Well : CBM 107-002  
Rig : Wallis Delta 39  
Spud : 1<sup>st</sup> May 2010



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## 1. SUMMARY OF OPERATIONS

CBM 107-002 was located some 300k east of Alice Springs in the south eastern corner of Northern Territory. The well was designed to test gas potential of the Purni Coal Measures of the Pedirka Basin by coring and testing the coals using injection and fall of equipment.

The drill water used was sourced from a nearby bore (NTGNR17966). The water was relatively fresh and had the following properties:

pH : 8.5  
Alkalinity : 0.0 / 0.23  
Chlorides : 2700 mg/L  
Hardness : 800 mg/L

**HOLE SIZE : 12¼"**  
**MUD TYPE : Aus Gel spud mud**  
**CASING : 10" set at 17.5 meters**

The drilling crew prepared the Spud mud prior to the arrival of the RMN engineer. 240 bbl of AUS GEL (11 ppb) – CR 650 (0.14 ppb) mud was prepared and stored in the Sump 1 and the Tanks.

The CBM 107 – 002 was spudded on the 1 May 2010 at 11:30 hrs. The spud mud was used to drill out 8.5" hole to 17.5m and then to widen it with a blade bit to 12.25". A PVC 10" casing was then ran in and cemented in place.

**HOLE SIZE : 8½"**  
**MUD TYPE : Gel / KCL / Polymer**  
**INTERVAL : 17.5 metres – 240.6 metres.**  
**CASING : 236.75 m**

While waiting on cement the volume of the mud was increased to fill the entire Sump 1. Simultaneously the mud was viscosified using PAC R to improve the rheology and filtration characteristics of the mud. The pH was maintained using Soda Ash.

An 8 ½ " bit and BHA was run into the hole and drilling resumed using the same fluid. KCl was added into the mud once clays were drilled. KCl premixes were used thereafter to maintain volume and PAC R was used for fluid loss control and building the Yield Point. CR 650 was also used intermittently to provide viscosity. Viscosity was maintained in the range of 30-36secs/quart for this section. KCl was maintained within a 2-3% range.

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As the hole deepened, the mud weight was allowed to rise to keep a stable hole in the Maccunda and Bulldog shale formations for running casing at the end of the interval. Yield Point remained low for an 8 ½" hole due to PAC R lack of shear thinning. The driller reported that the hole was cleaning well and calculations indicated a laminar flow throughout the bore hole. PAC was required for Filtration loss control as well as Yield Point building.

The hole was drilled to 240 m without any hole instability or cleaning problems usually associated with these formations. The hole was circulated clean and a wiper trip to surface pulled finding no fill on bottom. After pumping a high vis pill (PAC R), the hole was circulated clean and the pipe was pulled to run casing.

7" casing was run to the depth of 236.75 m and cemented with no cement returns to surface. The mud displaced from the hole has been retained in the sump. Remedial top up job was then successfully conducted.

**HOLE SIZE** : 6 1/8"  
**MUD TYPE** : Gel – KCl – Polymer  
**INTERVAL** : 240.6 metres – 278.2 metres.  
**CASING** : 278.2 m

While waiting on cement the mud was conditioned for the use in the HQ cored section. To that end a second sump was brought into line. The weir connection between sumps allowed for better settling of the cuttings. This provided for a lower solid content in the mud and helped to control the mud weight. The total active volume was increased to 540 bbl as a result of utilising the longer system. The mud was viscosified using CR 650 as programmed, and the KCl level was brought to 4 %wt. A corrosion inhibitor was added to prevent damage to the rig equipment. The pH was controlled with Soda Ash.

The HQ drilling assembly was run in the hole. The shoe track and the cement had been cored out. At 243.9 m a leak off test has been conducted. The equivalent mud weight obtained was 10.4 ppg. The coring then continued until 249 m. At that depth the pipe became stuck in the loose sands of the Algebuckina Sandstone. The client decided to pull the HQ string, and the 4.5" VAM casing out of the hole and return to the 6.125" rotary drilling.

The mud designed for the coring operation was isolated in the sumps 2 and 3. Sump 1 was lined up with the tank 1 and new Gel based mud was mixed with AUS – GEL at 15 ppb. Further AUS – GEL was added while drilling bringing the theoretical concentration to 22 ppb.

The mud system relies on the portable Robin pumps for transferring mud between the well head, sumps, and the tanks. As those pumps wore out over time there was no means available to agitate the sump. The gel then began to settle out.

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While drilling the bit became blocked and the driller unblocked it by moving the string rapidly up and down. This has swabbed the formation further lowering the viscosity. The string was pulled back into the casing and the water influx circulated out.

The mud was then reconditioned with polymers and salt bringing up the viscosity and mud weight. The 6.125" bit was then brought back to bottom and the rotary drilling continued to the depth of 278.2 m.

Following the addition of Xanthan Gum D the yield point dramatically improved. The lower Yield Point in the Gel mud was possibly to some KCl still retained in the system from the previous operations. This even though the AUS – GEL was mixed and hydrated in fresh water and then added to the system. In such a small diameter hole the cleaning was effective and the flow was laminar through out the hole.

The KCl was kept lower than programmed, just over 2%, so that AUS – GEL would not flocculate out. The swelling clays were already isolated behind the 7" casing and control of the loose sands became a priority.

A 10 bbl high viscosity AUS – GEL pill prepared and spotted on the bottom. The aim of it was to hold the loose sands in place while the tubulars were out of the hole. The 4.5" VAM casing was then run in hole without problems and cemented. The water spacer returned to surface and was directed into the flare pit. While pressure testing the casing parted 8 stands below the well head. The cement behind the parted section was immediately flushed out and the loose casing extracted out of the hole.

It was decided not to carry over the KCl/Polymer mud from the previous section due to concerns about PAC R affecting the injectivity testing of the coals. The Gel – KCl – Polymer mud was isolated in the Sump 1 and the mud in the tanks was dumped in the same. The sumps 2 and 3 were brought back into line and fresh KCl – Polymer (CR 650 only) mud was prepared in the tanks in anticipation of the coring operations.

**HOLE SIZE** : 3-7/8"  
**MUD TYPE** : KCL- Polymer  
**INTERVAL** : 278 metres – TD

The missing casing was reinserted into the hole and the coring assembly run in to the bottom. Geologist indicated that there may still be loose sands in the early coring stages. As a precaution the mud was kept viscous with CR 650 by maintaining the funnel viscosity over 35 s/qt. The old mud from the rotary section was also kept to be made available in case of any hole problems.

The Mud Engineer was released at this stage.

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## 2. OBSERVATIONS, RECOMMENDATIONS AND WELL ANALYSIS

Lessons that could be carried over from this well include:

- The installing of the hopper by the crew has provided both quick and efficient way to mix polymers. Without it the mudding up was quite difficult.
- The Spud mud needs to have adequate viscosity from the Gel and polymer. The CR 650 spud mud prepared by the crew had too low Yield Point that could not be adequately remedied due to short drilling time and slow mixing time.
- The Gel only mud settles out in the sump without agitation. Therefore if agitation is not available the mud has to be polymer based.
- The pills supporting the well bore should be Gel based as the Bentonite provides the Gel strength that keeps the sands in place. Lack of agitation is then not an issue as only a limited batch is prepared at a time.
- Top hole Maccunda and bulldog shale formations behaved very stably due to the KCl concentration.
- The Algebuckina Sandstone can be troublesome and easily swabbed. A coring mud may not be able to support the loose sands. A thicker filter cake forming mud should be used in this section.
- With low original Gel concentration Xan – Bore would be a better chemical to provide higher Yield Point than PAC R.
- The Funnel Viscosities of about 36 s/qt provided good cleaning hole capacity with a laminar flow regime throughout the well bore.



## 5. FLUID PROPERTIES SUMMARY

Date								Gels		Filtrate		Solids											
	Mud Type	Temp	Depth	Weight	Vis	PV	YP	10 sec	10 min	API	Cake	Solids	Water	Sand	MBT	pH	Pf	Mf	Cl-	Ca++	K+	KCl	
1-May-10	Gel - Polymer	24	18	8.40	36	2	1	1	1	29.0	1	0.3	99.7		2.0	8.5	0.08	0.25	3,100	560			
2-May-10	Gel - Polymer	30	87	8.65	37	6	1	1	1	16.0	1	1.3	98.7	1.0	8.8	9.0	0.06	0.12	14,000	1240	15,131.2	2.8	
3-May-10	Gel - Polymer	32	241	8.80	34	7	1	1	1	16.0	2	2.4	97.6	0.2	16.3	8.5	0.06	0.12	14,000	1600	15,131.2	2.8	
4-May-10	KCl - Polymer	-	241	8.65	33	3		1	1	19.0	1	0.9	99.1	0.0	6.3	8.7	0.11	0.27	20,000	800	22,156.4	4.1	
5-May-10	KCl - Polymer	-	241	8.65	35	3	1	1	1	20.0	1	0.9	99.1	0.0	7.5	9.8	0.07	0.16	19,000	1040	21,075.6	3.9	
6-May-10	KCl - Polymer	25	247	8.65	32	2	1	1	1	22.0	1	1.0	99.0	0.0	6.3	9.9	0.07	0.17	18,000	1160	19,994.8	3.7	
7-May-10	Gel - Polymer	-	249	8.75	41	16	3	2	3	11.0	1	2.2	97.8	2.5	20.0	9.5	0.08	0.15	10,000	800	11,348.4	2.1	
8-May-10	Gel - Polymer	25	278	8.75	42	12	7	3	4	11.5	1	1.8	98.2	1.0	12.5	9.0	0.08	0.18	16,000	880	17,833.2	3.3	
9-May-10	Gel - Polymer		278	8.80	37	7	7	2	3	11.5	1	2.2	97.8	1.0	12.5	9.0	0.07	0.18	16,000	840	17,833.2	3.3	
10-May-10	Gel - Polymer	24	288	8.55	35	3	1	1	1	16.5	1	0.4	99.6	Tr	2.5	9.5	0.04	0.32	16,000	1000	17,833.2	3.3	





















Any opinion and/or recommendation, expressed orally or written herein, has been prepared carefully and may be used if the user so elects, however, no representation or warranty is made by ourselves or our agents as to its correctness or completeness, and no liability is assumed for any damages resulting from the use of same.



# DRILLING FLUID REPORT



Report #	9	Date :	9-May-2010
Rig No	D 39	Spud :	1-May-2010
Depth	278	to	278 Metres

OPERATOR	Central Petroleum	CONTRACTOR	Wallis Drilling Contractors
REPORT FOR	Guy Holmes	REPORT FOR	
WELL NAME AND No	CBM 107-002	FIELD	EP 107
		LOCATION	Pedrika Basin
		STATE	Northern Territory

DRILLING ASSEMBLY			JET SIZE			CASING			MUD VOLUME (BBL)			CIRCULATION DATA						
BIT SIZE	TYPE		5	5	5	10	SURFACE SET @	57 17	ft M	HOLE 15	PITS 311	PUMP SIZE		CIRCULATION				
3.78	Coring HQ		5	5	5							4	X 4.5	Inches	psi			
DRILL PIPE SIZE	TYPE #	Length Mtrs				7	INTERMEDIATE SET @	777 237	ft M	TOTAL CIRCULATING VOL. 900		PUMP MODEL FMC		ASSUMED EFF 97 %		BOTTOMS UP (min) min		
DRILL PIPE SIZE	TYPE HW	Length Mtrs				4 1/2	PRODUCTION. or LINER Set @	916 279	ft M	IN STORAGE 574		BBL/STK 0.0291		STK / MIN		TOTAL CIRC. TIME (min) min		
DRILL COLLAR SIZE ( " )		Length Mtrs				MUD TYPE Gel - Polymer						BBL/MIN		GAL / MIN		ANN VEL. (ft/min)	DP DCs	Lam Lam

SAMPLE FROM			MUD PROPERTIES			MUD PROPERTY SPECIFICATIONS		
TIME SAMPLE TAKEN			Pit	Pit		Mud Weight	API Filtrate	HPHT Filtrate
DEPTH (ft) - (m)				16:00		Plastic Vis	Yield Point	pH
FLOWLINE TEMPERATURE				278		KCl	PHPA	Sulphites
WEIGHT				8.80	1.056	<b>OBSERVATIONS</b> During the cementing of VAM casing the cement water spacer was directed into the flare pit upon reaching the surface. The crew transferred the mud from the tanks into sump 1 to clean the tanks. Sump 1 was filled and some mud was spilled into sumps 2 and 3. New mud for the coring operation was mixed in the tanks 1 and 2 using CR 650 and KCl.		
FUNNEL VISCOSITY (sec/qt) API @					37			
PLASTIC VISCOSITY cP @					7			
YIELD POINT (lb/100ft <sup>2</sup> )					7			
GEL STRENGTHS (lb/100ft <sup>2</sup> ) 10 sec/10 min					2.3			
RHEOLOGY 0 600 / 0 300					21 14			
RHEOLOGY 0 200 / 0 100					11 7			
RHEOLOGY 0 6 / 0 3					2 1			
FILTRATE API (cc's/30 min)					11.5			
HPHT FILTRATE (cc's/30 min) @								
CAKE THICKNESS API : HPHT (32nd in)					1	<b>OPERATIONS SUMMARY</b> The 4.5" VAM casing has been RIH trouble free to 279.2 m. It was then cemented in place. During pressure test the casing has parted. The cement behind the parted section was flushed to the surface and parted casing retrieved. New section of casing has been RIH. RIH HQ coring bit.		
SOLIDS CONTENT (% by Volume)					2.2			
LIQUID CONTENT (% by Volume) OIL/WATER					97.8			
SAND CONTENT (% by Vol.)					1.00			
METHYLENE BLUE CAPACITY (ppb equiv.)					12.5			
pH					9.0			
ALKALINITY MUD (Pm)					0			
ALKALINITY FILTRATE (Pf / Mf)					0.07 0.18			
CHLORIDE (mg/L)					16,000			
TOTAL HARDNESS AS CALCIUM (mg/L)					840			
SULPHITE (mg/L)								
K+ (mg/L)					17,325			
KCl (% by Wt.)					3.3			
PHPA (ppb)								
ECD (ppg)					8.80			

Mud Accounting (bbls)							Solids Control Equipment								
FLUID BUILT & RECEIVED		FLUID DISPOSED		SUMMARY				Type	Hrs		Cones	Hrs		Size	Hrs
Premix (drill water)	96	Desander		INITIAL VOLUME	637	Centrifuge				Desander			Shaker #1		
Premix (recirc from sump)		Desilter		+ FLUID RECEIVED	289	Degasser				Desilter			Shaker #2		
Drill Water		Downhole	27			- FLUID LOST	27								
Direct Recirc Sump	193	Dumped		+ FLUID IN STORAGE	574										
Other (eg Diesel)		Other						Overflow (ppg)		Underflow (ppg)			Output (Gal/Min.)		
TOTAL RECEIVED		TOTAL LOST		FINAL VOLUME		Desander				0					
						Desilter				0					
Product	Price	Start	Received	Used	Close	Cost	Solids Analysis			Bit Hydraulics & Pressure Data					
Potassium Chloride	\$ 33.00	516		24	492	\$ 792.00		%	PPB	Jet Velocity					
							High Grav solids			Impact force					
							Total LGS	2.2	20.8	HHP					
							Bentonite	1.3	11.7	HSI					
							Drilled Solids	0.9	8.2	Bit Press Loss					
							Salt	1.0	9.3	CSG Seat Frac Press					
							n @ 16:00 Hrs	0.58		Equiv. Mud Wt.					
							K @ 16:00 Hrs	1.87		Max Pressure @ Shoe :					



