

CUISINIER 14
WELL COMPLETION REPORT

COMPILED FOR
SANTOS LIMITED
(A.B.N. 80 007 550 923)

Prepared By:
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June, 2014

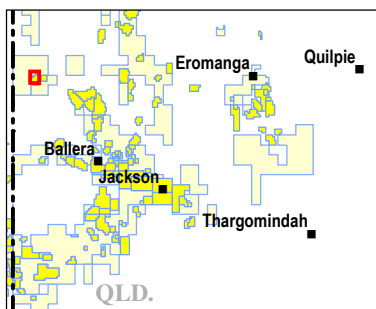
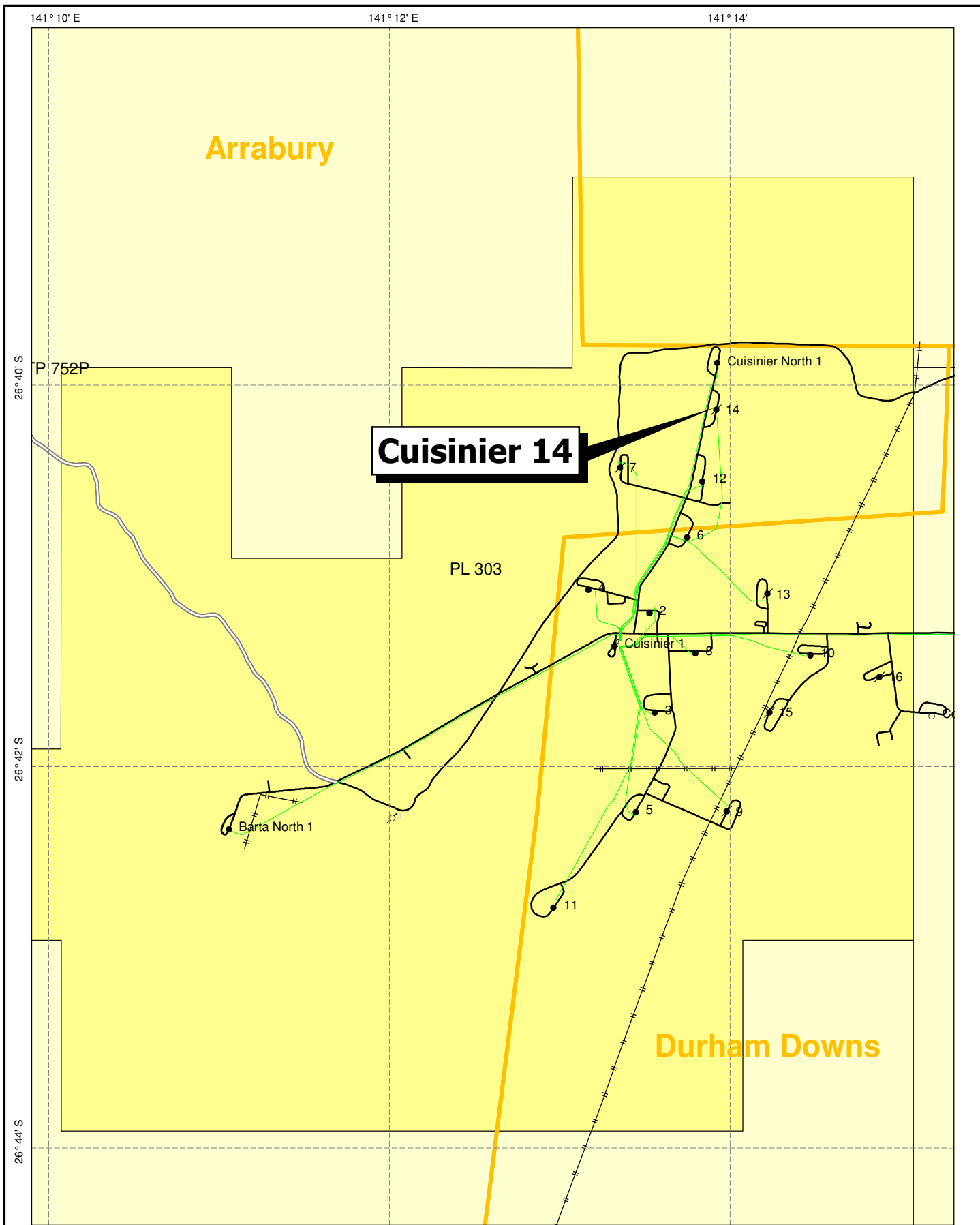
CUISINIER 14

WELL COMPLETION REPORT

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LOCATION MAP



- Gas Pipeline
- Oil Pipeline
- Water Pipeline

Tenements Production

- Santos Production Permit
- Santos Exploration Permit
- Pastoral Boundary

Santos

PL 303 - Queensland

Cuisinier 14 Location Map



Kilometers
Scale: 1:50,000

September 2014, File No. ATP752 12



WELL DATA CARD

AGE	FORMATION OR ZONE TOPS	DEPTH (m)		THICKNESS	HIGH (H)
		MDRT	TVDSS	TVD (m)	LOW (L)
L. CRETACEOUS TO RECENT	SURFICIAL DEPOSITS & WINTON FM.	5.3	+109.9	885.0	-
EARLY CRETACEOUS	MACKUNDA FORMATION	890.3	-775.1	193.6	37.1 m L
EARLY CRETACEOUS	ALLARU MUDSTONE	1084.0	-968.8	157.0	96.8 m L
EARLY CRETACEOUS	TOOLEBUC FORMATION	1241.0	-1125.8	44.6	16.8 m L
EARLY CRETACEOUS	WALLUMBILLA FORMATION	1285.6	-1170.4	271.7	22.5 m L
EARLY CRETACEOUS	CADNA-OWIE FORMATION	1557.6	-1442.1	75.6	4.1 m L
EARLY CRETACEOUS	MURTA FORMATION	1633.4	-1517.7	53.2	0.3 m H
EARLY CRETACEOUS	MURTA DC70	1641.1	-1525.4	-	0.4 m L
EARLY CRETACEOUS	MURTA DC50	1659.5	-1543.8	-	3.2 m H
EARLY CRETACEOUS	McKINLAY MEMBER	1686.6	-1570.8	10.2	1.2 m H
L. JURASSIC TO E. CRET.	NAMUR SANDSTONE	1696.8	-1581.0	67.2+	2.0 m H
	TOTAL DEPTH	1764.0	-1649.2		

LOG INTERPRETATION (PHIE>10%, SWT<70%)					PERFORATIONS (5 spf, 60° phase)				
FORMATION	INTERVAL (m)	NET PAY (m)	Ø _E %	SW _T %	FORMATION		INTERVAL (m)		
Murta DC70	1641 - 1659	2.4	12.1	56	Murta DC70		1639.9 – 1648.9		
					CORES CUT				
					FM.	NO.	INTERVAL (m)	CUT	REC.
							No Cores Cut.		

LOG	SUITE / RUN	INTERVAL (m)	BHT / TIME / REMARKS	LOG	SUITE / RUN	INTERVAL (m)	BHT / TIME / REMARKS
Grandslam + WGI			220°F / 19.3 hrs after last circulation	RCI - GR			230°F / 32.4 hrs after last circulation
GR	1 / 1	1723 - 16		RCI	1 / 2	1725.6 - 431.6	17 tests: 9 valid, 6 curtailed,
RTEX	1 / 1	1759 - 367		GR	1 / 2	1725.6 - 431.6	2 seal failure.
MLL	1 / 1	1753 - 367					1 PVT sample – Murta
MAC	1 / 1	1742 - 367	Inline Dipole mode TD-1500m				DC70 Oil.
ZDL	1 / 1	1728 - 367					
CN	1 / 1	1725 - 367	Erratic readings – high counts				
SP	1 / 1	1720 - 367					
WGI	1 / 1	1733 - 367					

[illegible]

SUMMARY

Location

Cuisinier 14 is an oil development well located on the northern flank of the Cuisinier field, west of the Cook Oil field in Queensland. The field is located at the northern extent of the Eromanga Basin. The well is located 472m south of Cuisinier North 1, and 682m north of Cuisinier 12.

Objectives

The 2014 Cuisinier Development Program targeted crude oil from the Murta DC70 and DC50 sandstones. Four vertical wells were designed in the north and east flanks of the four-way dip closure anticline. Cuisinier 14 is located on the northern flank between Cuisinier North 1 and Cuisinier 12. The scope of the project was to:

- Drill a vertical 8 1/2" borehole targeting the Murta DC70 & DC50 sands to a total depth of -1642 mSS.
- Evaluate with standard suite of open-hole logs and RCI (pressure testing) and if justified, run and cement 5 1/2" casing to TD.
- Determine the extent of permeable sands seen at Cuisinier North 1.
- Appraise the eastern extension of the channel B sands east of Cuisinier 10.

Results of Drilling

Cuisinier 14 was spudded at 04:00 hours on 26th March, 2014. A 9 7/8" surface hole was drilled to 369m where a string of 9 5/8" casing (36 ppf, K55, BTC) was run and cemented with the shoe at 367m (D). The BOPs were installed and pressure tested. A 8 1/2" drilling assembly with Pathfinder survey MWD was run in hole to mill out cement and shoe track plus 3m of new formation. A LOT was conducted at 372m which resulted in 14.1 PPG EMW at 330 psi. Production hole was then drilled to 1623m, at which point the well was control drilled through the Murta Member to 1696m with WOP ~ 5klbs, RPM 140 and pump rate 350gpm. Total depth of 1764m (D) was reached at 19:00 hours on 30th March, 2014.

While drilling, directional surveys (MWD-Pathfinder) were taken approximately 200m every 3-5 stands to ensure that the well intersected the primary objective within the specified 30m radius. At total depth, it is estimated that the well was offset by 21.9m at an azimuth of 185°T.

After POOH and performing a wiper trip to the surface casing shoe (back reaming over tight spots), running back in and circulating the hole clean, the BHA was then POOH to surface and broken down. Wireline logs were rigged up and ran as follows:

Run 1: GR-RTEX-MLL-MAC-ZDL-CN-SP-WGI (Grand Slam).

Run 2: RCI-GR.

Run 1 was rigged up and run in hole, however, telemetry issues were encountered at 1080m. The tools were pulled to surface and a faulty cable head connector (conductor 2) was discovered. The cable head was repaired and Run 1 was re-commenced. At 1760m, 4 metres before TD, the tools string began losing tension and was thus pulled up. Therefore, TD was not tagged. The MAC tool was run in inline dipole mode from TD to the Cadna-Owie, and in DT mode to casing shoe.

Run 2, RCI-GR was rigged up and run, with a total of 17 points, 9 valid, 6 curtailed and 2 seal failure. 1 PVT sample was taken in the Murta DC70 sand (expected oil) and sent to the laboratory for analysis. A total of 24.2L was pumped through tool before oil leg was encountered in optical analyser.

Formation tops ranged from 96.8m low (Allaru Mudstone) to 2.0m high (Namur Sandstone) to prognosis. The primary objective Murta Member DC70 was intersected close to prognosis.

One fair oil show was observed while drilling through the Murta Member target sand. The DC70 is interpreted to contain 2.4m of net oil pay with 12.1% effective porosity and 56% water saturation.

Status

As log analysis indicates >2m net pay, Cuisinier 14 was cased and suspended as a future oil producer. A string of 5.5", K-55, BTC production casing was run to 1764m and set at 1760m. The well was drilled to program without serious incident, and took a total of 8.6 days (spud to rig release), 2.3 shorter than the AFE proposal. Saxon 188 was released at 18:00 hours on 3rd April, 2014. Completion operations was undertaken in July with a string of 165 joints of 2 7/8", 6.5 lb/ft, J55, EUE tubing. Perforations were performed over the interval 1639.9m to 1648.9m.

TIME vs DEPTH CURVE

Well: Cuisinier 14
Date: 7/04/2014
Operator: Santos
Rig: Saxon 188
Location: COOPER BASIN
AFE: 5436028

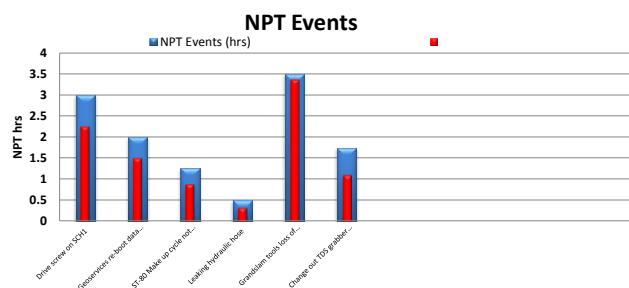
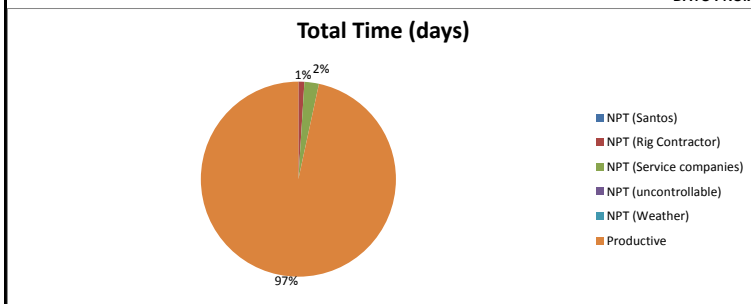
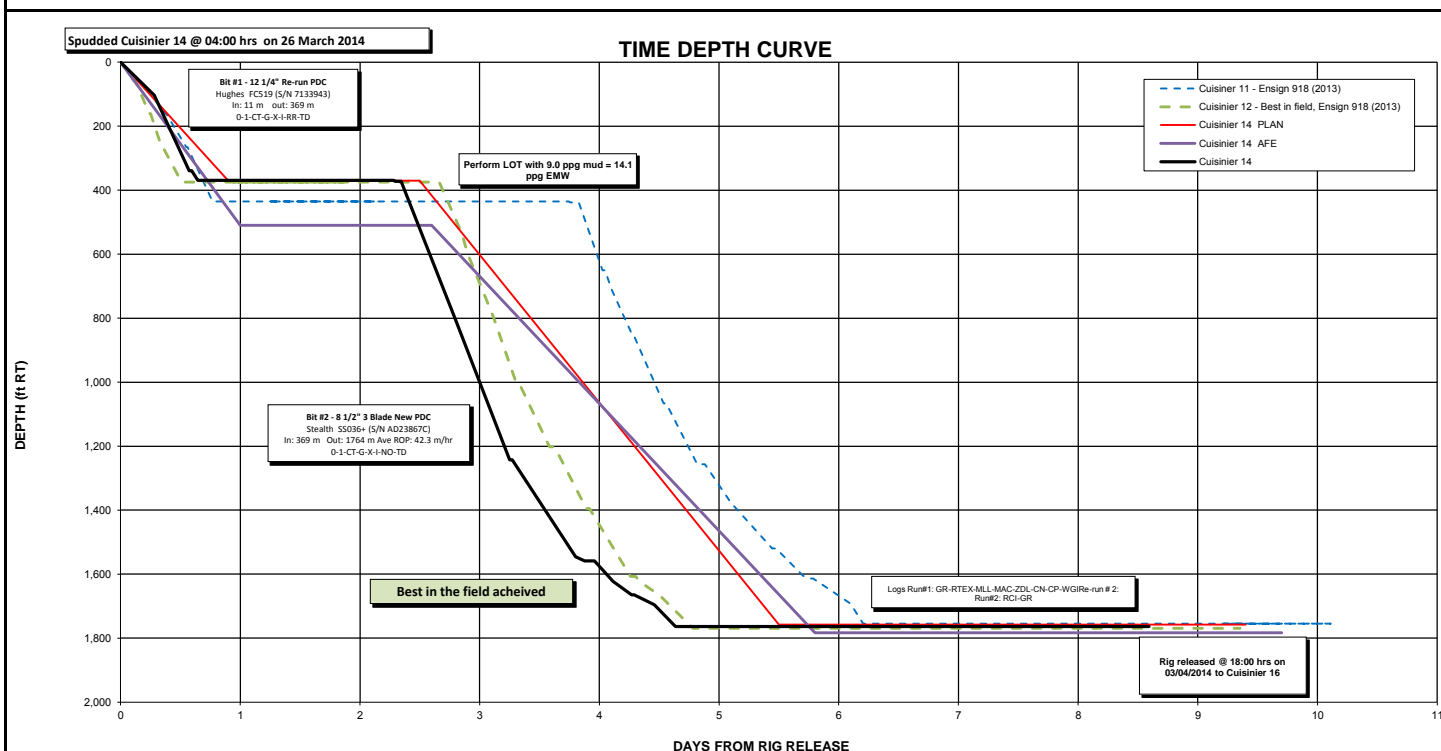
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Operations Summary (24 hours through midnight):

Rig Released to Cuisinier 16 at 18:00 hrs on 03/04/2014.

06:00 Update:

Forecast:



Drilling Performance							
	AFE	Cum Actual	Estimated Final	Target	Actual	Target	Actual
Total Days	12.2 Days	14.8 Days	14.8 Days	LTI	0	0	0
Spud To TD (Days)	5.8 Days	4.6 Days	4.6 Days	ADI	0	0	0
Spud To Rig Release (Days)	10.9 Days	8.6 Days	8.6 Days	MTI	0	0	0
Measured Depth (m)	1758 m	1764 m		FAC	0	0	0
				NMI	0	0	0
				Contained Spills		0	0
				Uncontained Spills		0	0

Comments on Costs/NPT:

Scope Change: AFE considered infield rig move for Cuisinier 14, 2.5 days. Actual rig move from Toobunyah 11 was 510Km - 6.1 Days.

WELL HISTORY

1. **GENERAL DATA**

Well Name:	Cuisinier 14
Well Classification:	Oil Appraisal
Block Participation:	Santos QNT Pty Ltd 54.64% Bengal Energy (Australia) Pty Ltd 30.36% Bridgeport (Cooper Basin) 15.0%
Block / License:	Barta Block / PL 303 (Queensland)
Operator:	SANTOS Limited
Surveyed Surface Location:	Latitude: 26° 40' 07.86" South Longitude: 141° 13' 55.20" East (GDA 94) Easting: 523 085.02 Northing: 7 050 220.76 (MGA 94)
Surveyed Elevation:	Ground Level: 109.88 m Rotary Table: 115.18 m (Australian Height Datum)
Seismic Location:	Cuisinier 3D CPSAN12C Inline: 2545, Crossline: 10036
Total Depth:	Driller's Depth: 1764.0 m MD Logger (extrapolated): 1765.0 m MD
Status:	Single Completion Oil Well (SCO)

2. **DRILLING DATA**

Date Drilling Commenced:	04:00 hours, 26 th March, 2014
Date Drilling Completed:	19:00 hours, 30 th March, 2014
Date Rig Released:	18:00 hours, 3 rd April, 2014
Contractor:	Saxon
Drilling Rig:	188
Rig specifications:	Refer to Appendix 11

3. **DRILLING SUMMARY**

(a) **Drilling Summary**

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Logging operations are summarised in Table VI below. Detailed logging reports are presented in Appendix 3 of this report.

Formation tops ranged from 96.8m low (Allaru Mudstone) to 2.0m high (Namur Sandstone) to prognosis. The primary objective Murta Member DC70 was intersected 0.4m low to prognosis.

One fair oil show was observed while drilling through the Murta Member target sand. The DC70 is interpreted to contain 2.4m of net oil pay with 12.1% effective porosity and 56% water saturation.

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Completion operations was undertaken in July with a string of 165 joints of 2 7/8", 6.5 lb/ft, J55, EUE tubing. Perforations were performed over the interval 1639.9m to 1648.9m.

TABLE I: CASING, HOLE AND CEMENT DETAILS

HOLE SIZE	DEPTH	CASING SIZE	CASING DEPTH	NO JOINTS	CASING TYPE	CEMENT
12.25"	369m (D)	9 5/8"	367m (D)	37	36lb/ft K55 BTC	<u>Lead</u> : 89.5 bbls class G cement @ 11.8 ppg slurry. <u>Tail</u> : 34 bbls class G cement @ 15.8 ppg slurry.
8 1/2"	1764m (D)	5 1/2"	1760m (D)	155	15.5lb/ft K55 BTC	<u>Lead</u> : 207 bbls class G cement @ 11.8 ppg slurry. <u>Tail</u> : 30.5 bbls class G cement @ 15.8 ppg slurry.

TABLE II: SUMMARY OF MUD SYSTEMS

The average mud properties for the surface and production holes were as follows:

HOLE SECTION	12 1/4"	8 1/2"	8 1/2"
Interval (ft)	Surface - 369m	367m - 1097m	1097m - 1764m
Mud Type	4KPP	4KPP	4PHB / 3KPO
Mud Weight (ppg)	8.7 - 9.1	8.8 - 8.9	9.0 - 9.1
Funnel Viscosity (sec/qt)	40 - 42	40	43 - 55
PV (cps)	9 - 11	9	11 - 17
YP (lb/100ft ²)	18	17 - 18	17 - 20
pH	9.0	9.5	6.0 - 9.0
API Fluid Loss	10.0	8.0	5.5 - 6.0
Chlorides (ppm)	26000 - 28000	26000 - 28000	23000 - 26000
KCl (%)	4.0 - 5.0	4.0	3.0 - 3.5

(b) Lost Time

The well was drilled to program without serious incident, and took a total of 8.6 days (spud to rig release), 2.3 shorter than the AFE proposal. Lost time incidents are recorded in the table III below.

TABLE III: SUMMARY OF NON-PRODUCTIVE TIME INCIDENTS

OPERATION	TIME LOST (hrs)	% OF LOST TIME
Drive screw on SCH1	3.0	25
Geoservices re-boot data system	2.0	17
ST-80 Make up cycle not completing.	1.25	10
Leaking hydraulic hose	0.5	4
Grandslam tools loss of communication	3.5	29
Change out TDS grabber box dies	1.75	15
Total Non-Productive Time	12.0	

(c) Rig Water Supply

The drilling make up water was sourced from the Fork Tree Bore for surface hole and production hole.

TABLE IV: DRILLING MAKE-UP WATER

Source	Fork Tree Bore
Depths used	Spud - TD
Chlorides	250 mg/l
Ph	8.5
Total hardness	80 mg/l
Pm/Mf	0.18/1.6 cc

(d) Mudlogging Services

Geoservices Australia Pty. Ltd. (A Schlumberger Company) provided Mudlogging services. Samples were collected at different sample rates throughout the well (see below). All samples were checked for oil shows under an ultraviolet fluorescence box. During drilling operations ditch gas levels were monitored using a GeoFast FID Total Gas Analyser and Chromatographic Analysis was performed using a GeoFast FID Gas Chromatograph (Fast Cycle). Total gas was monitored in gas units (1 unit = 200 ppm methane equivalent in air) and the Chromatograph was calibrated to measure ppm (parts per million) concentrations of the alkane gases methane, ethane, propane, butane and pentane. Geoservices provided sensors to monitor and record H₂S, weight on hook/weight on bit, draw-works (hook height, ROP, depth), pit levels, trip tank, stand pipe pressure, well head pressure, pump strokes, drill-string revs per minute, torque and flow out.

TABLE V: MUDLOGGING SAMPLING INTERVALS

Sample Interval (m)	From (m)	To (m)
15	spud	1550
10	1550	1623
3	1623	1700
10	1700	1764 (TD)

(e) Testing

No Drill Stem Testing was conducted.

(f) Coring

No Full Hole or Sidewall Cores were cut.

(g) Electric Logging

One suite of wireline logs were conducted during Cuisinier 14:

Run 1: GR-RTEX-MLL-MAC-ZDL-CN-SP-WGI (Grand Slam).

Run 2: RCI-GR.

Run 1 was rigged up and run in hole, however, telemetry issues were encountered at 1080m. Tools were pulled to surface and a faulty cable head connector (conductor 2) was discovered. The cable head was repaired and Run 1 was re-commenced. At 1760m, 4 metres before TD, the tools string began losing tension and was thus pulled up. Therefore, TD was not tagged. The MAC tool was run in inline dipole mode from TD to the Cadna-Owie, and in DT mode to casing shoe.

Run 3, RCI-GR was rigged up and run, with a total of 17 points, 9 valid, 6 curtailed and 2 seal failure. 1 PVT sample were taken in the Murta DC70 sand (expected oil) and sent to the laboratory for analysis. A total of 24.2L was pumped through tool before oil leg was encountered in optical analyser.

Logging operations are summarised in Table VI below. Detailed logging reports are presented in Appendix 3 of this report.

Table VI: SUMMARY OF WIRELINE LOGGING

LOG	SUITE / RUN	INTERVAL (m)	BHT / TIME / REMARKS
Grandslam+WGI	1 / 1		
GR		1723m - 16m	220 degF / 19.3 hours after last circ.
RTEX		1759m - 367m	
MLL		1753m - 367m	
MAC		1742m - 367m	
ZDL		1728m - 367m	
CN		1725m - 367m	
SP		1720m - 367m	
WGI		1733m - 367m	
RCI-GR	1 / 2		230 degF / 32.4 hours after last circ.
RCI		1725.6m - 431.6m	9 valid, 6 curtailed, 2 no seal.
GR		1725.6m - 431.6m	1 PVT sample – Murta DC70 – Oil.

(h) Geothermal Gradient

An extrapolated static bottom hole temperature of 238.4°F 1764m (total depth) and a geothermal gradient of 9.6°F/100m was calculated from the downhole temperatures recorded during logging operations (Refer to Table VII below). The result is lower than the prognosed static BHT of 250°F. Geothermal gradient data is summarised in Appendix 4.

Table VII: SUMMARY OF TEMPERATURE DATA POINTS

	Log Type	Max Recorded Temp (°F)	Depth Recorded (m)	Time Since Circulation (hrs)	Total Depth (m)	Estimated BHT (°F)
Run 1	G-Slam	220.0	1709	19.3	1760	224.5
Run 2	RCI	230.0	1690	32.4	1760	236.6

(i) **Hole Deviation**

Cuisinier 14 was designed as a vertical well. While drilling, directional surveys (MWD-Pathfinder) were taken approximately 200m (every 3-5 stands) to ensure that the well intersected the primary objective within the specified 30m radius. At total depth, it is estimated that the well was offset by 21.9m at an azimuth of 185°T.

For further deviation data refer to Appendix 9.

(j) **Velocity Survey**

No Velocity Survey was conducted.

GEOLOGY

1. PRE- DRILLING SUMMARY

The 2014 Cuisinier Development Program targeted crude oil from the Murta DC70 and DC50 sandstones. Four vertical wells were designed in the North and East flanks of the four-way dip closure anticline. Cuisinier 14 is located on the northern flank between Cuisinier North 1 and Cuisinier 12.

SCOPE

- Drill a vertical 8 1/2" borehole targeting the Murta DC70 and DC50 sands to a total depth of -1642 mSS.
- Evaluate with standard suite of open-hole logs and RCI, SWC and if justified, run and cement 5 1/2" casing to TD.
- Determine the extent of permeable sands seen at Cuisinier North 1.
- Appraise the eastern extension of the channel B sands east of Cuisinier 10.

BACKGROUND

The Cuisinier field is located due west of the developed Cook oil field. The first well in the field targeted the Hutton Sandstone after its success in the Cook wells, however, intersected oil pay in the overlying Murta channel sands. Since then, wells have been designed to exploit these channel sands.

Cuisinier 14 is a development well targeting the Murta DC70 reservoir. The well is located within an area of high seismic amplitude at the Murta DC70 depth, 5m updip from Cuisinier North 1. The critical risk to project success is reservoir quality.

DRILLING RATIONALE

Cuisinier 14 was designed and drilled as an 8 1/2" vertical well from surface casing to total depth. Deviation target sub surface tolerance was to be maintained within a 30m radius at the Murta primary target.

Casing criteria was based on notionally 2m net oil pay. If successful, a string of 5 1/2" 15.5 lb/ft K55 BTC production casing was to be run to total depth, then connected to the Cuisinier MPV.

The well was programmed to reach total depth ~ 1758m MD, which was slightly shallower than actual total depth of 1764 MD.

2. RESULTS OF DRILLING

(a) Stratigraphy

TABLE VIII: SUMMARY OF STRATIGRAPHY

(RT: 115.2ft)

AGE	FORMATION OR ZONE TOPS	DEPTH (m)		THICKNESS TVD (m)
		(MD)	TVD SS	
RECENT TO LATE CRET.	SURF. DEPOSITS / WINTON FM.	5.3	+109.9	885.0
EARLY CRETACEOUS	MACKUNDA FORMATION	890.3	-775.1	193.6
EARLY CRETACEOUS	ALLARU MUDSTONE	1084.0	-968.8	157.0
EARLY CRETACEOUS	TOOLEBUC FORMATION	1241.0	-1125.8	44.6
EARLY CRETACEOUS	WALLUMBILLA FORMATION	1285.6	-1170.4	271.7
EARLY CRETACEOUS	CADNA-OWIE FORMATION	1557.6	-1442.1	75.6
EARLY CRETACEOUS	MURTA FORMATION	1633.4	-1517.7	53.2
EARLY CRETACEOUS	DC70	1641.1	-1525.4	-
EARLY CRETACEOUS	DC50	1659.5	-1543.8	-
EARLY CRETACEOUS	McKINLAY MEMBER	1686.6	-1570.8	10.2
L. JURASSIC TO E. CRET.	NAMUR SANDSTONE	1696.8	-1581.0	67.2+
	TOTAL DEPTH	1764.0	-1649.2	

The following is a brief summary of stratigraphy and depositional environments intersected. Detailed lithological descriptions are found in Appendix 1.

Total depth for Cuisinier 14 was reached at 1764.0m (-1649.2m TVDSS), 67.2m TVD into the **NAMUR SANDSTONE (Late Jurassic to Early Cretaceous)** consists of predominantly sandstone with interbedded, moderately to poorly developed siltstone within the basal part of the sequence. The sandstone is generally fine to medium grained. The member is sequence of stacked channel sandstones deposited under medium to high energy braided fluvial conditions, punctuated with periods of lower energy overbank to floodplain siltstone deposition.

The **MURTA MEMBER**, which belongs to the **MOOGA FORMATION (Early Cretaceous)** conformably overlies the Namur Sandstone. The formation was deposited in a predominantly low energy lacustrine environment, with some evidence of fluvial and deltaic influences. It consists of siltstone with interbedded poorly developed sandstone stringers. The sandstones are off white, light grey, translucent to transparent, predominantly very fine to fine and occasionally medium and coarse grained, subrounded to subangular and moderate to poorly sorted, strong calcareous cement, off white light grey argillaceous matrix, predominantly fine grained aggregates, friable with poor visual and inferred porosity. The lower section is predominantly sandstone with siltstone interbeds. Siltstones are consistent with lacustrine deposition, sandstones are interpreted to have been deposited in a coastal deltaic system concurrent with a gradual marine transgression.

The **CADNA-OWIE FORMATION (Early Cretaceous)** conformably overlies the Murta Member and is an interbedded and interlaminated sandstone/siltstone sequence. The formation was deposited in a predominantly lacustrine environment, with a shallow marine influence within the upper (sandier) section of the formation (Wyandra Sandstone Member equivalent). The sandstones are pale grey to off white, clear to translucent in part, very fine to fine grained, with moderately strong siliceous/calcareous cement, common off white argillaceous matrix, trace micromica and carbonaceous specks, and poor visual and inferred porosity. The siltstones are medium to dark grey, commonly dark grey brown, argillaceous to arenaceous, grading to a very fine grained sandstone in part, and commonly micromicaceous, with trace lithics and carbonaceous specks. The formation represents a transitional period during the onset of a regional marine transgression.

The sediments overlying the Cadna-Owie Formation were deposited largely under a shallow marine transgressive depositional environment during the Early Cretaceous.

The **WALLUMBILLA FORMATION (Early Cretaceous)** consists of a massive sequence of siltstone/shale with minor interbedded limestone and calcareous sandstone. It represents a continuation of shallow to moderately deep open marine deposition and conformably overlies the Cadna-Owie Formation. Glauconite is common in the basal sandstones and siltstones with disseminated pyrite dominates within the top half of the sequence, indicating a trend towards reducing conditions during moderately deep water deposition at that time.

The **TOOLEBUC FORMATION (Early Cretaceous)** conformably overlies the Wallumbilla Formation and is a relatively thin unit of dark grey/black to brown, argillaceous siltstone and claystone. It is thought to have been formed in a relatively deep water, low energy, restricted marine environment under anoxic conditions. It often contains micro-fossils and evidence of disseminated of nodular pyrites.

The **ALLARU MUDSTONE (Early Cretaceous)** conformably overlies the Toolebuc Formation and consists of massive siltstone and claystone with rare sandy interbeds. The sediments are indicative of a relatively low energy, shallow marine environment of deposition.

The **MACKUNDA FORMATION (Early Cretaceous)** unconformably overlies the Cadna-Owie Formation. It consists of sandstone with interbedded siltstone, deposited in a marginal marine environment. The sandstones are pale to medium grey, off white, occasionally medium brown grey, dominantly fine grained, occasionally very fine and medium grained, with weak to rare strong calcareous cement, trace to locally common pale grey argillaceous matrix, common lithics and glauconite specks, trace carbonaceous inclusions, and very poor to tight visual porosity. The siltstones are medium grey brown to medium brown, argillaceous, with common carbonaceous specks and microlaminations.

The Mackunda Formation is overlain by **UNDIFFERENTIATED SURFICIAL DEPOSITS AND WINTON FORMATION (Recent to Late Cretaceous)**. The unit consists of a dominantly non marine (lacustrine) sequence of interbedded and interlaminated siltstones, sandstones, claystones and locally minor coals. Minor marine incursions are indicated by the occasional limestone and glauconite. These sediments are in turn overlain by interbedded and interlaminated silts, clays, and sands of fluvial to (finally) aeolian origin.

For further details concerning the formations encountered, refer to Appendix 1 (a) of this report.

(b) Geophysical Prognosis

The depth prognosis and well results for Cuisinier 14 are tabled below. All depths quoted in table IX are loggers depths.

TABLE IX: ACTUAL VERSUS PROGNOSED FORMATION TOPS

FORMATION	PROG DEPTH (m/subsea)	ACTUAL DEPTH (m/subsea)	H/L to PROG (m)	PROG THICK (m)	ACTUAL THICK (m)	THICK DIFF (m)
MACKUNDA FORMATION	-738	-775.1	37.1 L	134	193.6	+59.6
ALLARU MUDSTONE	-872	-968.8	96.8 L	237	157.0	-80
TOOLEBUC FORMATION	-1109	-1125.8	16.8 L	39	44.6	+5.6
WALLUMBILLA FORMATION	-1148	-1170.4	22.5 L	290	271.7	-18.3
CADNA-OWIE FORMATION	-1438	-1442.1	4.1 L	80	75.6	-4.4
MURTA FORMATION	-1518	-1517.7	0.3 H	54	53.2	-0.8
MURTA DC70	-1525	-1525.4	0.4 L	-	-	-
MURTA DC50	-1547	-1543.8	3.2 H	-	-	-
McKINLAY MEMBER	-1572	-1570.8	1.2 H	11	10.2	-0.8
NAMUR SANDSTONE	-1583	-1581.0	2.0 H	60+	67.2+	
TOTAL DEPTH	-1643	-1649.2	6.2 L			

(c) Hydrocarbon Summary

During drilling operations, ditch gas levels and chromatographic analysis were carried out using a Geoservices GFF (GeoFast FID) gas detector, incorporating a Total Gas analyser and a chromatograph. Total gas was monitored in units (where 1 unit = 200ppm methane equivalent in air) and the chromatograph was calibrated to measure ppm (parts per million) concentrations of the alkane gases methane, ethane, propane, butane and pentane. All gas values in this report are expressed in gas units and gas composition is expressed as a percentage ratio of the components methane (C1) through pentane (C5) (e.g. 80/10/6/2/2% denotes a composition of 80% methane, 10% ethane, 6% propane, 2% butane and 2% pentane). Ditch cuttings were tested for hydrocarbon fluorescence by using a Geoservices field fluoroscope. The findings have been summarised in the section below.

TABLE X: HYDROCARBON SHOWS

INTERVAL	LITHOLOGY	GAS - Peaks
	MURTA DC70 1641.1 MDmRT (-1525.4 TVDmSS)	
1642.5m – 1648m ROP: 4.1 – 8.4 AVE: 6.5 min/m	FLUORESCENCE: 40% decreasing to trace, dull to moderately bright, pale yellow green, spotted to patchy, very slow blooming to instant diffuse cut, thick film to thin ring residue. SANDSTONE: clear to translucent, rare frosted, common off-white, very fine to fine, moderately sorted, sub-angular to sub-rounded, moderate siliceous cement, rare calcareous cement, common off-white argillaceous matrix, trace lithics, predominantly friable to moderately hard, occasional loose, tight visual porosity, very poor inferred porosity.	94 U / 26 U BG 52/4/8/15/21% Max gas at 1648m

TABLE XI: SUMMARY OF HYDROCARBON SHOWS

Formation	From (metres)	To (metres)	Total Gas (Units)	C1/C2/C3/C4/C5 (%)	Fluorescence / Comments
Surficial / Winton	5.3	890	Nil – 300 U	100% C1 – 99/1/Tr/Tr/Tr%	No Shows.
Mackunda Fm.	890	1084	70 – 100 U	99/1/Tr/Tr/Tr%	No Shows.
Allaru Mudstone	1084	1241	40 – 100 U	96/2/1/1/Tr - 92/3/3/2/Tr%	No Shows.
Toolebuc Fm.	1241	1286	40 – 200 U	88/4/4/3/1%	No Shows.
Wallumbilla Fm.	1286	1558	20 – 80 U	85/3/3/4/2 – 75/5/7/7/6%	No Shows.
Cadna-Owie Fm.	1558	1633	10 – 35 U	77/3/6/6/8 -	No Shows. Elevated C5 due to Micro Flow*.
Murta Fm.	1633	1687	13 – 94 U	52/4/8/15/21 – 64/2/4/7/21%	40% decreasing to trace fluorescence. 94/26 U. Elevated C5 due to Micro Flow*.
McKinlay Mbr.	1687	1697	20 – 40 U68/2/3/3/24	64/2/4/8/22%	No Shows. Elevated C5 due to Micro Flow*.
Namur Sst.	1697	1764	14 – 20 U	74/2/4/4/16%	No Shows. Elevated C5 due to Micro Flow*.

*Micro Flow is a mud additive by Rheochem that reduces formation damage by preventing invasion.

(d) Pay Summary

Petrophysical analysis on open hole wireline logs has revealed ~ 2.4m of conventional net oil pay in the Murta DC70 Sandstone.

TABLE XII: SUMMARY OF CONVENTIONAL PAY, AVERAGE POROSITY AND SW VALUES

FORMATION	SAND INTERVAL (m)	GROSS SAND (m)	NET SAND (m)	NET PAY (m)	AVG PHIEp (%)	AVG SW (%)
Murta DC70	1641 – 1659	6.0	2.4	2.4	12.1	56

3. SUMMARY

Cuisinier 14 is an oil development well located on the northern flank of the Cuisinier field, west of the Cook Oil field in Queensland. The field is located at the northern extent of the Eromanga Basin. The well is located 472m south of Cuisinier North 1, and 682m north of Cuisinier 12.

The 2014 Cuisinier Development Program targeted crude oil from the Murta DC70 and DC50 sandstones. Four vertical wells were designed in the north and east flanks of the four-way dip closure anticline. Cuisinier 14 is located on the northern flank between Cuisinier North 1 and Cuisinier 12. The scope of the project was to:

- Drill a vertical 8 1/2" borehole targeting the Murta DC70 & DC50 sands to a total depth of -1642 mSS.
- Evaluate with standard suite of open-hole logs and RCI (pressure testing) and if justified, run and cement 5 1/2" casing to TD.
- Determine the extent of permeable sands seen at Cuisinier North 1.
- Appraise the eastern extension of the channel B sands east of Cuisinier 10.

Cuisinier 14 was spudded at 04:00 hours on 26th March, 2014. A 9 7/8" surface hole was drilled to 369m where a string of 9 5/8" casing (36 ppf, K55, BTC) was run and cemented with the shoe at 367m (D). The BOPs were installed and pressure tested. A 8 1/2" drilling assembly with Pathfinder survey MWD was run in hole to mill out cement and shoe track plus 3m of new formation. A LOT was conducted at 372m which resulted in 14.1 PPG EMW at 330 psi. Production hole was then drilled to 1623m, at which point the well was control drilled through the Murta Member to 1696m with WOP ~ 5klbs, RPM 140 and pump rate 350gpm. Total depth of 1764m (D) was reached at 19:00 hours on 30th March, 2014.

While drilling, directional surveys (MWD-Pathfinder) were taken approximately 200m every 3-5 stands to ensure that the well intersected the primary objective within the specified 30m radius. At total depth, it is estimated that the well was offset by 21.9m at an azimuth of 185°T.

After POOH and performing a wiper trip to the surface casing shoe (back reaming over tight spots), running back in and circulating the hole clean, the BHA was then POOH to surface and broken down. Wireline logs were rigged up and ran as follows:

Run 1: GR-RTEX-MLL-MAC-ZDL-CN-SP-WGI (Grand Slam).

Run 2: RCI-GR.

Run 1 was rigged up and run in hole, however, telemetry issues were encountered at 1080m. The tools were pulled to surface and a faulty cable head connector (conductor 2) was discovered. The cable head was repaired and Run 1 was re-commenced. At 1760m, 4 metres before TD, the tools string began losing tension and was thus pulled up. Therefore, TD was not tagged. The MAC tool was run in inline dipole mode from TD to the Cadna-Owie, and in DT mode to casing shoe.

Run 2, RCI-GR was rigged up and run, with a total of 17 points, 9 valid, 6 curtailed and 2 seal failure. 1 PVT sample was taken in the Murta DC70 sand (expected oil) and sent to the laboratory for analysis. A total of 24.2L was pumped through tool before oil leg was encountered in optical analyser.

Formation tops ranged from 96.8m low (Allaru Mudstone) to 2.0m high (Namur Sandstone) to prognosis. The primary objective Murta Member DC70 was intersected close to prognosis.

One fair oil show was observed while drilling through the Murta Member target sand. The DC70 is interpreted to contain 2.4m of net oil pay with 12.1% effective porosity and 56% water saturation.

As log analysis indicates >2m net pay, Cuisinier 14 was cased and suspended as a future oil producer. A string of 5.5", K-55, BTC production casing was run to 1764m and set at 1760m. The well was drilled to program without serious incident, and took a total of 8.6 days (spud to rig release), 2.3 shorter than the AFE proposal. Saxon 188 was released at 18:00 hours on 3rd April, 2014. Completion operations was undertaken in July with a string of 165 joints of 2 7/8", 6.5 lb/ft, J55, EUE tubing. Perforations were performed over the interval 1639.9m to 1648.9m.

4. **REFERENCES**

Shaban A., Santos LTD. 2014, *Cuisinier 13-16 Campaign Drilling Proposal*, Unpublished.

Day J., Santos LTD. 2014, *Cuisinier 14 Pre-Spud Meeting*, Unpublished.

APPENDIX 1: LITHOLOGICAL DESCRIPTIONS

APPENDIX 1 (a): CUTTINGS DESCRIPTIONS

CUTTINGS DESCRIPTIONS

All Samples were washed and described at 15m to the Cadna-Owie Formation, 10m samples to TD with 3m samples over controlled drilling.

SURFICIAL DEPOSITS / WINTON FORMATION

RECENT to LATE CRETACEOUS

From 5.3 m to 890.3 m MD

Thickness: 885.0 m TVD

5.3m – 75m	<p>INTERBEDDED CLAYSTONE AND SILTSTONE:</p> <p><u>SILTSTONE</u>: Medium to dark grey brown, common arenaceous, common argillaceous, common carbonaceous specks, common micromicaceous, minor lithics, soft, sub blocky to sub fissile.</p> <p><u>CLAYSTONE</u>: light grey, orange, red, pale tan, argillaceous, lithics, dispersive to very soft, amorphous.</p>
75m – 168m	<p>MASSIVE SILTSTONE:</p> <p><u>SILTSTONE</u>: light grey green, common argillaceous, arenaceous grading to very fine SANDSTONE in parts, minor glauconite, firm to soft, sub blocky to sub fissile.</p>
168m – 307m	<p>SILTSTONE WITH OCCASIONAL SANDSTONE:</p> <p><u>SILTSTONE</u>: light grey brown, light grey green, dominantly argillaceous, minor arenaceous, rare carbonaceous specks, rare glauconite, soft to moderately hard, sub blocky.</p> <p><u>SANDSTONE</u>: clear-translucent, green, very fine to medium, well sorted, sub-angular to sub-rounded, weak siliceous cement, abundant grey green argillaceous matrix, minor glauconite, rare carbonaceous specks, trace lithics, friable, tight visual porosity, no fluorescence.</p>
307m – 369m	<p>SILTSTONE WITH OCCASIONAL LIMESTONE:</p> <p><u>SILTSTONE</u>: pale medium grey, pale grey brown, dominantly argillaceous, abundant arenaceous grading to very fine SANDSTONE in parts, rare to minor carbonaceous specks and laminations, minor glauconite, trace lithics, soft to firm, sub-blocky.</p> <p><u>LIMESTONE</u>: green grey, pale yellow grey, off-white to white, micritic to sparitic, arenaceous, argillaceous in parts, microcrystalline to crystalline, hard.</p>
369m – 424m	<p>SILTSTONE WITH MINOR SANDSTONE AND LIMESTONE:</p> <p><u>SILTSTONE</u> (95-100%): light grey, light green grey, arenaceous grading to very fine SANDSTONE in parts, minor argillaceous, minor glauconite, rare carbonaceous specks, soft to firm, sub-blocky.</p> <p><u>SANDSTONE</u> (0-5%): translucent, milky, green, very fine, well sorted, sub-rounded to sub-angular, weak siliceous cement, minor off-white argillaceous matrix, minor glauconite, rare carbonaceous specks, trace lithics, loose, tight inferred porosity, no fluorescence.</p> <p><u>LIMESTONE</u> (0-5%): yellow grey, green, white, off-white, micritic to sparitic, arenaceous, rare glauconite, rare carbonaceous specks, micro-crystalline to crystalline, hard.</p>
424m – 473m	<p>SILTSTONE WITH MINOR SANDSTONE AND COAL:</p> <p><u>SILTSTONE</u>: light grey brown, light green grey, arenaceous grading to very fine SANDSTONE in parts, minor argillaceous, minor glauconite, rare carbonaceous specks, soft to firm, sub-blocky.</p> <p><u>SANDSTONE</u>: clear to translucent, off-white to light grey, very fine grading to arenaceous SILTSTONE, well sorted, sub-rounded, weak siliceous cement, nil visible matrix, loose, unconsolidated, occasional friable, very poor visual and inferred porosity, no fluorescence.</p> <p><u>COAL</u>: black, very dark grey, sub-vitreous to silty, rare earthy, brittle, fissile, hackly to uneven fractures.</p>

473m – 510m	<p>SILTSTONE WITH MINOR SANDSTONE AND LIMESTONE:</p> <p><u>SILTSTONE</u>: pale grey green, pale brown grey, pale grey, dominantly arenaceous, abundant argillaceous, minor carbonaceous specks and laminations, trace carbonaceous flecks, firm to very soft, sub-blocky to occasional sub-fissile.</p> <p><u>SANDSTONE</u>: clear to translucent, off-white to light grey, very fine grading to arenaceous SILTSTONE, well sorted, sub-rounded, weak siliceous cement, nil visible matrix, loose, unconsolidated, occasional friable, very poor visual and inferred porosity, no fluorescence.</p> <p><u>LIMESTONE</u>: medium to light brown, brown grey, white, lutitic to micritic, argillaceous, cryptocrystalline, hard.</p>
510m – 650m	<p>INTERBEDDED SILTSTONE AND SANDSTONE:</p> <p><u>SILTSTONE</u>: pale grey green, pale brown grey, pale grey, dominantly arenaceous, abundant argillaceous, minor carbonaceous specks and laminations, trace carbonaceous flecks, firm to very soft, sub-blocky to occasional sub-fissile.</p> <p><u>SANDSTONE</u>: clear to translucent, off-white to light grey, very fine grading to arenaceous SILTSTONE, well sorted, sub-rounded, weak siliceous cement, nil visible matrix, loose, unconsolidated, occasional friable, very poor visual and inferred porosity, no fluorescence.</p>
650m - 780m	<p>INTERBEDDED SILTSTONE AND SANDSTONE WITH MINOR LIMESTONE:</p> <p><u>SILTSTONE</u>: pale brown, pale grey, medium brown, arenaceous grading to very fine SANDSTONE in parts, minor to rare carbonaceous specks and laminations, trace glauconite, trace micromicaceous, trace lithics, very soft, firm, sub-blocky.</p> <p><u>SANDSTONE</u>: clear to translucent, pale grey, very fine, very well sorted, sub-rounded to sub-angular, weak siliceous cement, minor moderate to strong calcareous cement, minor off-white argillaceous matrix, rare carbonaceous specks, trace glauconite, unconsolidated to friable, loose, very poor visual and inferred porosity, no fluorescence.</p> <p><u>LIMESTONE</u>: light green grey, occasional tan to off-white, argillaceous to arenaceous, rare lutitic, firm to hard.</p>
780m – 890.3m	<p>SANDSTONE WITH MINOR SILTSTONE AND LIMESTONE:</p> <p><u>SANDSTONE</u>: light grey to grey green, off white, translucent to clear, very fine to fine, minor medium, well sorted, sub-rounded to sub-angular, weak to moderate calcite cement, light grey argillaceous matrix, minor to trace glauconite, minor carbonaceous specks, friable to moderately hard, trace to soft, poor visual porosity, no fluorescence.</p> <p><u>SILTSTONE</u>: light to medium grey, grey brown, arenaceous, common carbonaceous specks and laminations, soft to firm, sub-blocky to sub-fissile.</p> <p><u>LIMESTONE</u>: light green grey, occasionally tan to off white, argillaceous, arenaceous, rare lutitic, firm to moderately hard.</p>

MACKUNDA FORMATION

LATE CRETACEOUS

From 890.3 m to 1084.0 m MD

Thickness: 193.6 m TVD

890.3m – 860m	<p>SANDSTONE INTERBEDED WITH LESSER SILTSTONE AND MINOR LIMESTONE:</p> <p><u>SANDSTONE</u>: off white, pale green, light grey, very fine to medium, moderately well sorted, sub-rounded to sub-angular, weak calcareous cement, light grey argillaceous matrix, common glauconite, moderately hard, poor visual porosity, no fluorescence.</p> <p><u>SILTSTONE</u>: light to medium grey, tan, arenaceous, trace argillaceous, trace lithics, soft, sub-blocky.</p> <p><u>LIMESTONE</u>: tan to off white, argillaceous, arenaceous, rare lutitic, firm to moderately hard.</p>
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860m – 983m	<p>SANDSTONE INTERBEDDED WITH SILTSTONE:</p> <p><u>SANDSTONE</u>: off white to light grey, pale green, occasionally light brown, very fine to fine, moderately well sorted, sub-round to sub-angular, weak to moderately strong calcite cement, occasional off white argillaceous matrix, rare to common glauconite, rare carbonaceous specks, friable to moderately hard aggregates, very poor visual porosity, no fluorescence.</p> <p><u>SILTSTONE</u>: light to medium grey, brown grey in part, argillaceous, arenaceous, grading to very fine SANDSTONE in part, rare micro mica, rare carbonaceous specks and laminations, firm to moderately hard, sub-blocky to blocky.</p>
983m – 992m	<p>INTERBEDDED SANDSTONE AND SILTSTONE.</p> <p><u>SANDSTONE</u>: light grey to off-white, clear to pale green, light grey brown, very fine to fine, grading to arenaceous SILTSTONE in parts, well sorted, sub-rounded to sub-angular, moderate calcareous cement, trace off-white argillaceous matrix, rare carbonaceous specks, friable to moderately hard, very poor visual porosity, no fluorescence.</p> <p><u>SILTSTONE</u>: light grey to grey brown, argillaceous, arenaceous grading to very fine SANDSTONE in parts, rare to common carbonaceous specks and flecks, soft to firm, occasional moderately hard, sub-blocky, occasional blocky.</p>
992m – 1084.0m	<p>DOMINANT SILTSTONE WITH OCCASIONAL SANDSTONE INTERBEDS.</p> <p><u>SILTSTONE</u>: light to medium grey brown, arenaceous, occasional grading to very fine SANDSTONE, occasional argillaceous, occasional carbonaceous specks, occasional micaceous, firm to occasional moderately hard, sub-blocky to blocky.</p> <p><u>SANDSTONE</u>: light grey to grey green, clear to translucent, very fine, grading to arenaceous SILTSTONE, well sorted, sub-rounded to sub-angular, weak to moderate calcareous cement, common off-white to light grey argillaceous matrix, common carbonaceous specks, rare lithics, soft to friable, rare loose, very poor visual porosity, poor inferred porosity, no fluorescence.</p>

ALLARU MUDSTONE

EARLY CRETACEOUS

From 1084.0 m to 1241.0 m MD

Thickness: 157.0 m TVD

1084m – 1217m	<p>MASSIVE SILTSTONE WITH MINOR LIMESTONE:</p> <p><u>SILTSTONE</u>: light to medium grey brown, occasional medium to dark grey, argillaceous to arenaceous, common carbonaceous specks, firm to moderately hard, sub-blocky to blocky.</p> <p><u>LIMESTONE</u>: very light brown, tan, orange in parts, lutitic to sparitic, argillaceous, rare crystalline, firm to hard.</p>
1217m – 1241m	<p>MASSIVE SILTSTONE WITH MINOR LIMESTONE:</p> <p><u>SILTSTONE</u>: medium grey, dominantly argillaceous, trace arenaceous, common inoceramus, rare carbonaceous specks, rare lithics, firm, sub-blocky to sub-fissile.</p> <p><u>LIMESTONE</u>: tan, off-white, yellow grey, sparitic to lutitic, crystalline to cryptocrystalline, friable to moderately hard.</p>

TOOLEBUC FORMATION

EARLY CRETACEOUS

From 1241.0 to 1285.6 m MD

Thickness: 44.6 m TVD

1241m – 1285.6m	<p>MASSIVE SILTSTONE WITH MINOR LIMESTONE:</p> <p><u>SILTSTONE</u>: medium grey, dominantly argillaceous, trace arenaceous, common inoceramus, rare carbonaceous specks, rare lithics, firm, sub-blocky to sub-fissile.</p> <p><u>LIMESTONE</u>: tan, off-white, yellow grey, sparitic to lutitic, crystalline to cryptocrystalline, friable to moderately hard.</p>
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WALLUMBILLA FORMATION

EARLY CRETACEOUS

From 1285.6 m to 1557.6 m MD

Thickness: 271.7 m TVD

- 1285.6m – 1300m **MASSIVE SILTSTONE WITH MINOR LIMESTONE:**
SILTSTONE: medium to occasional dark grey, dominantly argillaceous to arenaceous, common carbonaceous specks, rare nodular pyrite, firm to moderately hard, sub-blocky to blocky.
LIMESTONE: tan, off-white, yellow grey, sparitic to lutitic, crystalline to cryptocrystalline, friable to moderately hard.
- 1300m – 1390m **MASSIVE SILTSTONE WITH TRACE LIMESTONE:**
SILTSTONE: medium grey, occasional pale grey, argillaceous, rare micro-micaceous, trace carbonaceous specks, moderately hard to firm, occasional soft, sub-fissile to sub-blocky.
LIMESTONE: very light brown to tan, lutitic, argillaceous, hard.
- 1390m – 1500m **SILTSTONE WITH MINOR SANDSTONE AND LIMESTONE:**
SILTSTONE: medium grey, occasional pale grey, argillaceous, rare micro-micaceous, trace carbonaceous specks, moderately hard to firm, occasional soft, sub-fissile to sub-blocky.
SANDSTONE: grey, off-white, clear to translucent, green, very fine, very well sorted, sub-rounded to sub-angular, weak to strong siliceous and calcareous cement, minor off-white argillaceous matrix, abundant glauconite, trace to rare disseminated pyrite, friable to moderately hard, occasional hard, tight visible porosity, no fluorescence.
LIMESTONE: tan, pale brown, lutitic, argillaceous, hard.
- 1500m – 1557.6m **MASSIVE SILTSTONE:**
SILTSTONE: medium dark grey, medium dark grey blue, argillaceous, arenaceous, rare to minor micro mica, locally abundant glauconite, trace disseminated pyrite, moderately hard to very hard, firm in part, rare soft, sub blocky to sub fissile.

CADNA-OWIE FORMATION

EARLY CRETACEOUS

From 1557.6 m to 1633.4 m MD

Thickness: 75.6 m TVD

- 1557.6m – 1570m **INTERBEDDED SANDSTONE, SILTSTONE AND MINOR LIMESTONE.**
SANDSTONE: light grey, off white, trace pale green grey, clear, translucent, very fine to fine, occasionally medium, moderately well sorted, sub rounded to sub angular, weak to moderately strong calcareous cement, trace off white to light brown argillaceous matrix, trace to common, carbonaceous specks and laminations, rare glauconite, friable to moderately hard, occasionally hard, poor visual porosity, no fluorescence.
SILTSTONE: medium to light brown, medium dark grey in part, argillaceous, trace carbonaceous specks, very soft to soft, occasionally firm, sub blocky.
LIMESTONE: off white, tan, light brown, sparitic to lutitic, arenaceous, cryptocrystalline.
- 1570m – 1610m **DOMINANT SANDSTONE WITH OCCASIONAL SILTSTONE INTERBEDS.**
SANDSTONE: light grey, off white, clear, translucent, very fine, grading to arenaceous
SILTSTONE in part, very well sorted, sub rounded to sub angular, trace weak to moderately strong calcareous cement, rare to common of white argillaceous matrix, trace carbonaceous specks, friable to moderately hard, tight to very poor visual porosity, no fluorescence.
SILTSTONE: medium dark grey brown, argillaceous, arenaceous, grading to very fine
SANDSTONE in part, trace micro mica, trace carbonaceous specks, rare carbonaceous flecks, moderately hard to hard, sub blocky, occasionally sub fissile.

1610m – 1633.4m **DOMINANT SILTSTONE INTERBEDDED WITH OCCASIONAL SANDSTONE AND TRACE LIMESTONE.**
SILTSTONE: light grey to medium brown, minor dark grey, argillaceous, occasionally arenaceous, trace micro mica, rare carbonaceous specks, firm to moderately hard, common soft, sub fissile to sub blocky.
SANDSTONE: light grey to off white, very fine, grading to arenaceous SILTSTONE, sub angular to sub rounded, moderate calcareous cement, rare light grey argillaceous matrix, minor glauconite, moderately hard, tight visual porosity, no fluorescence.
LIMESTONE: medium dark brown, lutitic, argillaceous, hard.

MOOGA FORMATION – MURTA MEMBER

EARLY CRETACEOUS

From 1633.4 m to 1686.6 m MD

Thickness: 53.2 m TVD

1633.4m – 1642.5m **SILTSTONE WITH INTERBEDDED SANDSTONE.**
SILTSTONE: light grey, medium grey brown, trace argillaceous, dominantly arenaceous, grading to very fine SANDSTONE, trace micro mica, trace to occasional carbonaceous specks, occasional arenaceous laminations, firm to moderately hard, sub blocky to sub fissile.
SANDSTONE: light grey to brown, of white, very fine, rare fine, grading to arenaceous SILTSTONE, well sorted, sub angular to sub rounded, moderately calcareous and siliceous cement, common light grey argillaceous matrix, friable, tight visual porosity, no fluorescence.

1642.5m – 1648m **SANDSTONE WITH MINOR INTERBEDS OF SILTSTONE.**
SANDSTONE: clear to translucent, rare frosted, common off-white, very fine to fine, moderately sorted, sub-angular to sub-rounded, moderate siliceous cement, rare calcareous cement, common off-white argillaceous matrix, trace lithics, predominantly friable to moderately hard, occasional loose, tight visual porosity, very poor inferred porosity. Fluorescence (see show description)
SILTSTONE: medium dark grey, grey brown, argillaceous to arenaceous, trace carbonaceous laminations, firm to moderately hard, sub fissile to sub blocky.

1648m – 1662m **INTERBEDDED SANDSTONE AND SILTSTONE.**
SANDSTONE: off white, light grey, clear, translucent, opaque, dominantly very fine, fine in part, grading to arenaceous SILTSTONE, moderately well sorted, sub angular to sub rounded, trace weak to moderate siliceous cement, common white kaolinitic matrix, rare carbonaceous specks, moderately hard, occasionally friable, very poor visual porosity. no fluorescence.
SILTSTONE: medium dark grey, brown grey, occasionally dark grey, dominantly arenaceous, grading to very fine SANDSTONE, occasionally argillaceous, trace carbonaceous specks, rare carbonaceous flecks, trace arenaceous lams, trace disseminated pyrite, moderately hard to hard, sub blocky to sub fissile.

1662m – 1686.6m **INTERBEDDED SANDSTONE, SILTSTONE AND OCCASIONAL LIMESTONE.**
SANDSTONE: off white, light grey, clear, translucent, opaque, predominantly very fine, fine in part, grading to arenaceous SILTSTONE, moderately well sorted, sub angular to sub rounded, trace weak to moderate siliceous cement, common white kaolinitic matrix, rare carbonaceous specks, moderately hard, occasionally friable, very poor visual porosity, no fluorescence.
SILTSTONE: grey brown, occasional to common dark grey, argillaceous to arenaceous, occasionally carbonaceous, rare carbonaceous specks, firm to hard, sub blocky.
LIMESTONE: tan to light brown, lutitic to cryptocrystalline, argillaceous, moderately hard.

MOOGA FORMATION: McKINLAY MEMBER

EARLY CRETACEOUS

From 1686.6 m to 1696.8 m MD

Thickness: 10.2 m TVD

1686.6m –
1696.8m

INTERBEDDED SANDSTONE AND SILTSTONE:

SANDSTONE: clear to translucent, frosted in parts, occasional off-white, fine, dominantly medium, moderately sorted, sub-angular to sub-rounded, weak to strong siliceous cement, rare moderate calcareous cement in parts, common off-white argillaceous matrix, friable to moderately hard, occasional loose, very poor visual porosity, poor inferred porosity, no fluorescence.

SILTSTONE: medium dark grey, grey brown, occasional light brown, minor argillaceous, dominantly arenaceous grading to very fine SANDSTONE, siliceous, trace micromicaceous, trace carbonaceous specks, occasional arenaceous laminations, firm to moderately hard, sub-blocky.

NAMUR SANDSTONE

LATE JURASSIC TO EARLY CRETACEOUS

From 1696.8 m to 1764.0 m MD (T.D.)

Thickness: 67.2 m+ TVD

1696.8m – 1764m
(T.D.)

SANDSTONE WITH MINOR SILTSTONE:

SANDSTONE: clear to translucent, dominantly fine to moderate, occasional coarse, moderately sorted, weak to moderate siliceous cement, weak to moderate siliceous cement, trace off-white argillaceous matrix, loose, rare friable aggregates, poor visual porosity, poor to fair inferred porosity, no fluorescence.

SILTSTONE: tan, pale brown, occasional medium grey, arenaceous grading to very fine SANDSTONE, rare argillaceous, abundant mica in parts, dominantly hard, occasional moderately hard, sub-blocky.

APPENDIX 2: HYDROCARBON SHOW REPORTS

SANTOS LIMITED

OIL SHOW EVALUATION REPORT

WELL:	CUISINIER 14
INTERVAL:	1642.5 m – 1648 m
FORMATION:	Murta Member (DC70 Sand)

GEOLOGIST: L.Maxwell / J.Nankivell
DATE: 31/03/2014

C1 ppm	5k	10k	20k	30k	40k	50k	100k	150k	200k	>250k
C2+ ppm	500	750	1k	2k	3k	4k	5k	7.5k	10k	>15k
Porosity Ø	Tight			Poor		Fair		Good		Good++
% with Fluorescence	Trace	10	20	30	40	50	60	70	80	>90
Fluorescence Appearance	Trace		Spotted			Streaked		Patchy		Solid
Brightness of Fluorescence	Very Dull		Dull		Dim			Bright		Glowing
Type of Cut	Trace	Very Slow Crush	Crush	Instant Crush	Very Slow Streaming	Slow Streaming	Moderate Streaming	Streaming	Fast Streaming	Instant
Residue on Spot Plate	Trace	Heavy Trace	Very Thin Ring	Thin Ring	Thick Ring	Very Thick Ring	Thin Film	Thin Film+	Thick Film	Solid
Show Rating	Trace		Poor		Fair		Good			Good+++
Comments:	<p><u>SANDSTONE</u>: clear to translucent, rare frosted, common off-white, very fine to fine, moderately sorted, sub-angular to sub-rounded, moderate siliceous cement, rare calcareous cement, common off-white argillaceous matrix, trace lithics, predominantly friable to moderately hard, occasional loose, tight visual porosity, very poor inferred porosity.</p> <p><u>FLUORESCENCE</u>: 1642.5-1648m: 40% decreasing to trace, dull to moderately bright, pale yellow green, spotted to patchy, very slow blooming to instant diffuse cut, thick film to thin ring residue.</p>									

APPENDIX 3: WIRELINE LOGGING DATA

APPENDIX 3(a): LOG INTERPRETATION REPORT

PETROPHYSICAL FORMATION EVALUATION

Well Name: Cuisinier 14

Basin: Eromanga Basin

**Rig Release: 3rd April 2014
(end of Drilling Operations)**

Report Location: \\adefp01\Tech_Servs\PETRO\General\Documents\Log Analysis

WES Location: \data\wesoa\cuisinier_14_14043.cgm

Cuisinier 14

Cuisinier 14 was drilled as a Murta oil development well on the northern flank of the Cuisinier Structure. The well was targeting the extension of the permeable DC70 sands that had been penetrated at nearby Cuisinier North 1. This possible sand extension had been identified from a high seismic amplitude response around the location of Cuisinier 14. Approximately 2.7 m (P50) of net pay was predicted in the DC70 reservoir prior to spud.

Well evaluation was analysed from 1557.6 m to 1723 m covering the Cadna-owie Formation, Murta Formation (including the DC70 and DC50 units), McKinlay Member and Namur Sandstone. Cuisinier 14 open hole log analysis has identified a total of 2.4 m of conventional oil pay in the Murta DC70 at an average total porosity of 15.7 % and an average S_w of 56 %.

Cuisinier 14 was subsequently cased and suspended as a future Murta oil producer.

Unless otherwise specified, all depths mentioned below are MD depths referenced to the drill floor.

Logs Acquired

OPEN HOLE:

TYPE OF LOG	FROM	TO	TIME SINCE LAST CIRC	COMMENTS / REPEAT SECTION	BHT
Run 1: GR-RTEX-MLL-MAC-ZDL-CN-SP-WGI-ORIT GR RTEX MLL MAC ZDL CN SP WGI ORIT	0	1080 m		Lost telemetry with tools. POOH to repair cable head.	
Run 2: GR-RTEX-MLL-MAC-ZDL-CN-SP-WGI-ORT GR RTEX MLL MAC ZDL CN SP WGI ORIT	1723 m 1759 m 1753 m 1742 m 1728 m 1725 m 1720 m 1733 m 1733 m	16 m 367 m 367 m 367 m 367 m 367 m 367 m 367 m 367 m	19.3 hrs	Main run tied into downlog. CN tool gave erratic readings. MAC run in dipole mode from 1742 m to 1500 m.	104.4 °C @ 1709 m
Run 3: RCI-GR	1642.2 m	1705.5 m	32.4 hrs	9 valid, 6 curtailed, 2 no seal. 1 PVT sample obtained	110.0 °C @ 1690.1 m

Mud Parameters

Run 1

Mud Type	3 KPO
Mud Density	9.2 lb/g
KCl	4.0
Rm	0.110 ohmm @ 77.23 degf
Rmf	0.107 ohmm @ 77.02 degf
Rmc	0.221 ohmm @ 76.00 degf

Remarks

Run 1

- Run 1 was not completed - whilst conducting downlog telemetry was lost at 1080m. Tools pulled to surface, found faulty connection and the cable head was repaired.

Run 2

- Casing shoe found on downlog at 367m, shift of + 0.7 m applied to downlog.
- Main log tied in to downlog by applying correction of + 0.9 m at TD.
- When approaching TD, tool string was losing tension at 1760 m, the decision was made to pull up and not tag TD.
- Erratic CN readings observed during both downlog and main pass.
- MAC run in inline dipole mode from 1742 m to 1500 m. Switched to monopole from 1500 to casing shoe.
- Minor loss of sonic data when changing from dipole to monopole, spliced in from downlog (1473-1487m).
- All logs passed after log verification including CN.

Run 3

- Stopped at casing shoe for pressure stabilisation.

Other Remarks

- Baker Livewire was not functioning during Run 1
- Upon receiving the mud samples, Baker Hughes did not advise the WSG that a good reading was not obtained, therefore, another sample had to be prepared thus leaving no filtrate to be taken back to town. A substitute filtrate sample was prepared from a mud sample from the mud tanks.

Log Processing

- Cuisinier 14 was evaluated using Multimin, a module of Geolog.
- The GR was corrected for borehole size, mud weight, salinity, tool position and size.
- The CN was corrected for borehole size, mud weight, salinity, tool position and size and temperature. However due to erroneous readings the neutron tool was not used for the interpretation.
- RMLL was corrected for borehole size and mud characteristics.
- No corrections were applied to ZDNC, as corrections for borehole size and mud weight had been applied in the field.
- Permeability was estimated using Coates free fluid equation and facies based classification.

Interpretation Parameters for Multimin Method

The primary models used in the analysis of the formations intersected during the drilling of the Cuisinier 14 well are itemised as follows:

Analysis Interval	Multimin Model Utilised	Rw at 75° F	m	n	C	X
Cadna-owie Formation	c14_cadn_no_neutron	2.3	2.0	2.0	50	1.5
Murta Formation	c14_murt_no_neutron	2.3	2.0	2.0	50	1.5
Murta DC70	c14_murt_dc70_no_neutron	2.3	Variable (1.75 baseline)	2.02	530	1.0
Murta DC50	c14_murt_dc50_no_neutron	2.3	Variable (1.75 baseline)	2.02	300	1.2
McKinlay Member	c14_mcki_no_neutron	2.3	2.0	2.0	50	1.5
Namur Sandstone	c14_namu_no_neutron	2.3	2.0	2.0	50	1.5

Permeability was also calculated using a facies based classification approach. The Facimage module in geolog was used to classify various Efacies based on wireline data which tied to the cored intervals in Cuisinier 4 and 7. Multiple regressions were undertaken to develop a relationship between the independent logs GR, PE, CNC and RHOB and the dependent overburden klinkenberg corrected permeability values for two distinct facies types; channel and shoreline facies from the cored intervals.

The relationship can be defined as:

Kint_shoreline: $10^{*(19.3807+0.00919299*(GR)-6.27266*(CNC)-7.24406*(ZDNC)-0.773094*(PE))}$

Kint_channel: $10^{*(7.08294-0.0565867*(GR)-2.08262*(CNC)-1.9242*(ZDNC)+0.799761*(PE))}$

As the CN/CNC log was erratic throughout the well the neutron curve was predicted using offset wells with CN/CNC a similar GR profile. The wells that were used were: C1,3,4,8,9,12 & 15. The relationship based on multiple regression can be defined as:

$$\text{DC70: NPHI_COR} = (0.38647 + 0.0008986 * (\text{GR_COR}) - 0.122063 * (\text{ZDNC}) + 0.020027 * (\text{PE}))$$

$$\text{DC50: NPHI_COR} = (0.374924 + 0.0568471 * (\text{PE}) - 0.12756 * (\text{ZDNC}) + 0.000151893 * (\text{GR_COR}))$$

The parameters used in the listed analysis models for the Cuisinier 14 well are summarised as follows:-

c14_cadn_no_neutron.model					
Mineral	ρ_b (g/cc)	<i>DT</i> (us/f)	<i>U</i> (b/cc)	<i>GR</i> (Gapi)	<i>CEC</i>
Quartz	2.65	50.4	5.04	25	
Orthoclase	2.57	53.49	8.71	280	
Illite	2.78	85.34	11.12	245	0.1
Kaolinite	2.62	85.34	5.38	120	0.08

c14_murt_no_neutron.model					
Mineral	ρ_b (g/cc)	<i>DT</i> (us/f)	<i>U</i> (b/cc)	<i>GR</i> (Gapi)	<i>CEC</i>
Quartz	2.65	50.4	5.04	10	
Illite	2.78	85.34	11.12	288	0.1
Kaolinite	2.62	85.34	5.38	83	0.08

c14_murt_no_neutron.model					
Mineral	ρ_b (g/cc)	<i>DT</i> (us/f)	<i>U</i> (b/cc)	<i>GR</i> (Gapi)	<i>CEC</i>
Quartz	2.65	50.4	5.04	10	
Illite	2.78	85.34	11.12	288	0.1
Kaolinite	2.62	85.34	5.38	83	0.08

c14_murt_dc70_no_neutron.model					
Mineral	ρ_b (g/cc)	<i>DT</i> (us/f)	<i>U</i> (b/cc)	<i>GR</i> (Gapi)	<i>CEC</i>
Quartz	2.65	50.4	5.04	18	
Illite	2.75	85.34	11.12	240	0.14
Kaolinite	2.633	85.34	5.38	104	0.12

c14_murt_dc50_no_neutron.model					
Mineral	ρ_b (g/cc)	DT (us/f)	U (b/cc)	GR (Gapi)	CEC
Quartz	2.65	50.4	5.04	20	
Calcite	2.71	47.79	14.13	11	
Illite	2.75	85.34	11.12	220	0.14
Kaolinite	2.633	85.34	5.38	104	0.12

c14_mcki_no_neutron.model					
Mineral	ρ_b (g/cc)	DT (us/f)	U (b/cc)	GR (Gapi)	CEC
Quartz	2.65	50.4	5.04	30	
Calcite	2.71	47.79	14.13	11	
Illite	2.75	85.34	11.12	160	0.12
Kaolinite	2.62	85.34	5.38	104	0.08

c14_namu_no_neutron.model					
Mineral	ρ_b (g/cc)	DT (us/f)	U (b/cc)	GR (Gapi)	CEC
Quartz	2.65	50.4	5.04	27	
Calcite	2.71	47.79	14.13	11	
Illite	2.75	85.34	11.12	230	0.12
Kaolinite	2.62	85.34	5.38	190	0.08

Pay Summary

The definitions of ‘sand’ and ‘non-conventional (HIP) pay’ as utilised in this analysis are as follows:

- Gross sand is defined where PHIE>2%.
- Net sand is defined as any interval where PHIE >10%.
- Net pay is any interval where PHIE > 10% and SWT< 70%.
- Net pay in Cuisinier 14 well is expressed in MD.

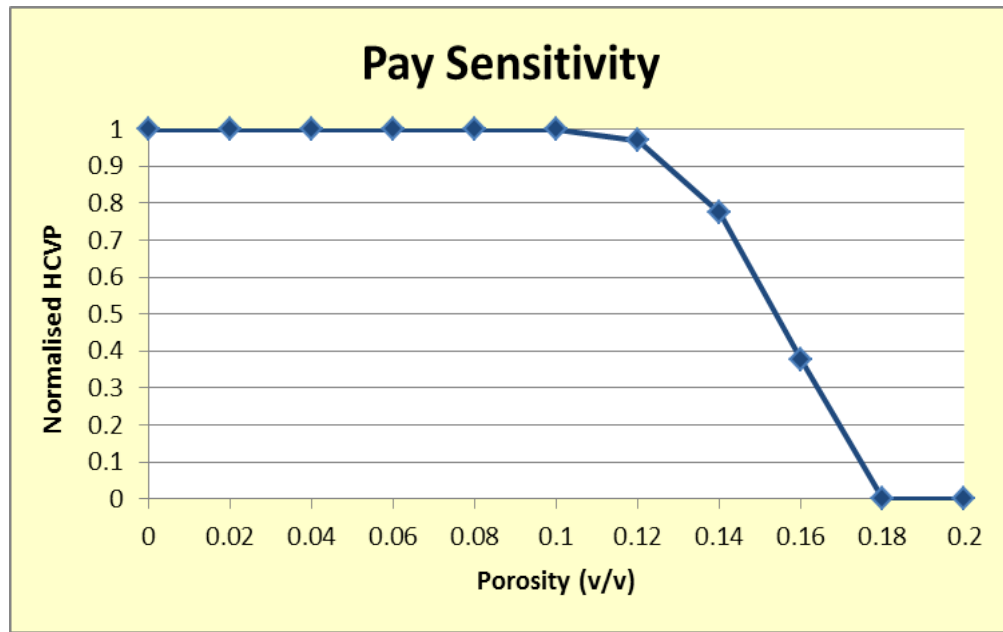
Following are tabulations of pay intervals interpreted in the Cuisinier 14 well.

FORMATION	SAND	SAND INTERVAL (metres)	GROSS SAND (m)	NET SAND (m)	AVG PHITs (%)	AVG PHIEs (%)	NET PAY (m)	AVG PHIT (%)	AVG p PHIE (%)	WT.AVG p SW (%)
CADNA-OWIE FORMATION	CADNA-OWIE	1558 - 1633	75.1	4.6	15.8	11.6	0	-	-	-
MURTA FORMATION	MURTA	1633 - 1641	1.1	0	-	-	0	-	-	-
MURTA DC70	DC70	1641 - 1659	6	2.4	15.7	12.1	2.4	15.7	12.1	56
MURTA DC50	DC50	1660 - 1687	4.5	0	-	-	0	-	-	-
MCKINLAY MEMBER	MCKINLAY	1687 - 1697	0.9	0	-	-	0	-	-	-
NAMUR SANDSTONE	NAMUR	1697 - 1761	25.8	14.6	15.5	12.9	0	-	-	-

Pay Sensitivity Plots

Pay Sensitivity data and plots have been produced at 2% porosity increments and are included as follows:

Murta DC70



Conclusions

Cuisinier 14 open hole log analysis has identified a total of 2.4 m of conventional oil pay in the Murta DC70 at an average total porosity of 15.7 % and an average S_w of 56 %. Cuisinier 14 was subsequently cased and suspended as a future Murta oil producer.

Cuisinier 14 analysis results have been graphically presented in the well evaluation summary (WES) plot: /data/wesoa/Cuisinier_14_14043.cgm.

APPENDICES 1

Interpretation Procedures for Multimin Method

The GEOLOG Multimin Probabilistic method was used in the section with all logs. This method focuses wireline logging tools response to the environment being logged. Response equations for predicting each measurement in the logging suite are posed in terms of summing all the volumes of minerals and fluids that influenced each sensor. These volumes were adjusted to give the optimum or most probable match of the measured and predicted readings across the suite of measurements being modelled. From this most likely solution, the volumes of minerals were derived, as were the fluid volumes and hence, porosity and fluid saturations of the modelled formation.

In general, the tool response equation can be defined as:

$$tool = (toola.xwa)(vxwa) + (toola.xga)(vxga) + (toola.xoi)(vxoi) + \sum_{i=1}^{nm} (toola.i)(v.i) + \sum_{i=1}^{nclays} ((toola_{cl}.i)(1 - \phi_{cl}.i) + (toola.xbw)(\phi_{cl}.i)(v_{cl}.i))$$

Where		
<i>tool</i>	=	Input log such as ρ_b , ϕ_N , <i>DT</i> and etc.
<i>toola.xwa</i>	=	The response parameter for flushed fluid
<i>vxwa</i>	=	Volume of flushed fluid
<i>toola.xga</i>	=	The response parameter for gas
<i>vxga</i>	=	Volume of gas
<i>toola.xoi</i>	=	The response parameter for oil
<i>vxoi</i>	=	Volume of oil
<i>nm</i>	=	Number of formation minerals, excluding clay
<i>toola.i</i>	=	The response parameter for mineral <i>i</i>
<i>v.i</i>	=	The volume of mineral <i>i</i>
<i>nclays</i>	=	The number of clays in the formation
<i>toola_{cl}.i</i>	=	The dry clay response parameter for clay <i>i</i>
$\phi_{cl}.i$	=	Clay <i>i</i> porosity
<i>tools.xbw</i>	=	The response parameter for bound water
<i>v_{cl}.i</i>	=	The volume of clay <i>i</i>

The complete Multimin models are enclosed in Appendices 2.

APPENDICES 2

MULTIMIN REPORT

```
*****
*                                     *
*          MULTIMIN REPORT          *
*                                     *
*   Project : petro_pfama_m         *
*   User id  : pfama                 *
*   Date    : 02-Jun-2014 18:40:18 *
*                                     *
*****
```

MULTIMIN REPORT for well CUISINIER_14 interval CADNA-OWIE FORMATION (1557.60 - 1633.35 metres)
Reported by pfama on 02-Jun-2014 at 18:40
Analysed by pfama on 23-May-2014 at 13:32

MODEL	TYPE	NAME	COND#	CUTOFF	EXPRESSION
Primary		C14_CADN_NO_NEUTRON	3.479	10.0	

FORMATION FLUID PARAMETERS
Fluid properties option = DEPTH
Oil Gravity Degrees API = 30.00 dapi
Gas specific gravity = 0.650
Rws = 2.3000 @ 75.00 degF
Rmfs = 0.1070 @ 77.02 degF

BOREHOLE PARAMETERS
Mud base = WATER
Mud density = 9.200 lb/g
KCl concentration of mud = 4.00 %
SHT = 75.00 degF
BHT = 220.00 degF
Rms = 0.1100 @ 77.23 degF
Rmcs = 0.221 @ 76.00 degF
Total depth = - metres

DATA SOURCES:
Input set: EVAL

PRIMARY MODEL C14_CADN_NO_NEUTRON:

C14_CADN_NO_NEUTRON CONDUCTIVITY EQUATION METHODS
Unflushed conductivity: DUAL-WATER NONLINEAR
Flushed conductivity: DUAL-WATER NONLINEAR
Cementation factor M = M_EXP
Saturation exponent N = 2.000
Linear dual-water W = 2.00
Clay bound water expansion enabled
Beta dilution enabled

COMPONENT	QUARTZ	ORTHOCL	ILLITE	KAOLIN	XBNDWAT	XFREWAT	UBNDWAT	UFREWAT
ERROR OF PREDICTION	0.0746	0.0582	0.0823	0.1362	0.0112	0.0265	0.0199	0.0356

EQUATION	METHOD	LOG	UNCERTAINTY	UNITS	QUARTZ	ORTHOCL	ILLITE	KAOLIN	XBNDWAT
Formation density	LINEAR	RHO_COR	RHO_COR_UNC	G/C3	2.650	2.570	2.780	2.620	0.995
Sonic transit time	LINEAR	DT	DT_UNC	US/F	50.4	53.5	85.3	85.3	189.0
Photoelectric absorption	LINEAR	U	U_UNC	B/C3	5.04	8.71	11.12	5.38	0.65
Total gamma	LINEAR	GR_COR	GR_COR_UNC	GAPI	25.0	280.0	245.0	120.0	0.0
Unflushed conductivity	DUAL-WATER NONLINEAR	CT	0.0319I	MH/M	0.00	0.00	0.00	0.00	0.00
Flushed conductivity	DUAL-WATER NONLINEAR	CXO	0.1463I	MH/M	0.00	0.00	0.00	0.00	33.43

XFREWAT	UBNDWAT	UFREWAT
0.995	0.000	0.000
189.0	0.0	0.0
0.65	0.00	0.00
19.2	0.0	0.0
0.00	7.60	1.25
26.20	0.00	0.00

CONSTRAINT	VALUE	TYPE	UNCERTAINTY	QUARTZ	ORTHOCL	ILLITE	KAOLIN	XBNDWAT	XFREWAT	UBNDWAT	UFREWAT
<PROG UNITY>	1.000	Tool	0.0100	1.000	1.000	1.000	1.000	0.000	0.000	1.000	1.000
<PROG POROSITY>	0.000	Tool	0.0100	0.000	0.000	0.000	0.000	1.000	1.000	-1.000	-1.000
<PROG X BNDWAT>	0.000	Tool	0.0100	0.000	0.000	0.066	0.049	-1.000	0.000	0.000	0.000
<PROG U BNDWAT>	0.000	Tool	0.0100	0.000	0.000	0.265	0.200	0.000	0.000	-1.000	0.000

PRIMARY MODEL C14_CADN_NO_NEUTRON (continued):

PROPERTIES and BOUNDS	QUARTZ	ORTHOCL	ILLITE	KAOLIN	XBNDWAT	XFREWAT	UBNDWAT	UFREWAT
Mineral grain density	2.650	2.570	2.780	2.620	-	-	-	-
Mineral cation exchange capacity	-	-	0.100	0.080	-	-	-	-
Lower Bound	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Upper Bound	1.000	1.000	1.000	1.000	0.500	0.500	0.500	0.500

MULTIMIN REPORT for well CUISINIER_14 interval MURTA FORMATION (1633.42 - 1641.04 metres)
Reported by pfama on 02-Jun-2014 at 18:40
Analysed by pfama on 23-May-2014 at 13:32

Project petro_pfama_m

MODEL	TYPE	NAME	COND#	CUTOFF	EXPRESSION
Primary		C14_CADN_NO_NEUTRON	3.479	10.0	
Secondary		C14_MURT_NO_NEUTRON	3.439	10.0	depth>1635

FORMATION FLUID PARAMETERS
Fluid properties option = DEPTH
Oil Gravity Degrees API = 30.00 dapi
Gas specific gravity = 0.650
Rws = 2.3000 @ 75.00 degF
Rmfs = 0.1070 @ 77.02 degF

BOREHOLE PARAMETERS
Mud base = WATER
Mud density = 9.200 lb/g
KCl concentration of mud = 4.00 %
SHT = 75.00 degF
BHT = 220.00 degF
Rms = 0.1100 @ 77.23 degF
Rmcs = 0.221 @ 76.00 degF
Total depth = - metres

DATA SOURCES:
Input set: EVAL

PRIMARY MODEL C14_CADN_NO_NEUTRON:

C14_CADN_NO_NEUTRON CONDUCTIVITY EQUATION METHODS
Unflushed conductivity: DUAL-WATER NONLINEAR
Flushed conductivity: DUAL-WATER NONLINEAR
Cementation factor M = M_EXP
Saturation exponent N = 2.000
Linear dual-water W = 2.00
Clay bound water expansion enabled
Beta dilution enabled

COMPONENT	QUARTZ	ORTHOCL	ILLITE	KAOLIN	XBNDWAT	XFREWAT	UBNDWAT	UFREWAT
ERROR OF PREDICTION	0.0746	0.0582	0.0823	0.1362	0.0112	0.0265	0.0199	0.0356

EQUATION	METHOD	LOG	UNCERTAINTY	UNITS	QUARTZ	ORTHOCL	ILLITE	KAOLIN	XBNDWAT
Formation density	LINEAR	RHO_COR	RHO_COR_UNC	G/C3	2.650	2.570	2.780	2.620	0.995
Sonic transit time	LINEAR	DT	DT_UNC	US/F	50.4	53.5	85.3	85.3	189.0
Photoelectric absorption	LINEAR	U	U_UNC	B/C3	5.04	8.71	11.12	5.38	0.65
Total gamma	LINEAR	GR_COR	GR_COR_UNC	GAPI	25.0	280.0	245.0	120.0	0.0
Unflushed conductivity	DUAL-WATER NONLINEAR	CT	0.0322I	MH/M	0.00	0.00	0.00	0.00	0.00
Flushed conductivity	DUAL-WATER NONLINEAR	CXO	0.1475I	MH/M	0.00	0.00	0.00	0.00	33.43

XFREWAT	UBNDWAT	UFREWAT
0.995	0.000	0.000
189.0	0.0	0.0
0.65	0.00	0.00
19.2	0.0	0.0
0.00	7.60	1.25
26.20	0.00	0.00

CONSTRAINT	VALUE	TYPE	UNCERTAINTY	QUARTZ	ORTHOCL	ILLITE	KAOLIN	XBNDWAT	XFREWAT	UBNDWAT	UFREWAT
<PROG UNITY>	1.000	Tool	0.0100	1.000	1.000	1.000	1.000	0.000	0.000	1.000	1.000
<PROG POROSITY>	0.000	Tool	0.0100	0.000	0.000	0.000	0.000	1.000	1.000	-1.000	-1.000
<PROG X BNDWAT>	0.000	Tool	0.0100	0.000	0.000	0.066	0.049	-1.000	0.000	0.000	0.000
<PROG U BNDWAT>	0.000	Tool	0.0100	0.000	0.000	0.265	0.200	0.000	0.000	-1.000	0.000

PRIMARY MODEL C14_CADN_NO_NEUTRON (continued):

PROPERTIES and BOUNDS	QUARTZ	ORTHOCL	ILLITE	KAOLIN	XBNDWAT	XFREWAT	UBNDWAT	UFREWAT
Mineral grain density	2.650	2.570	2.780	2.620	-	-	-	-
Mineral cation exchange capacity	-	-	0.100	0.080	-	-	-	-
Lower Bound	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Upper Bound	1.000	1.000	1.000	1.000	0.500	0.500	0.500	0.500

SECONDARY MODEL C14_MURT_NO_NEUTRON:

C14_MURT_NO_NEUTRON CONDUCTIVITY EQUATION METHODS
Unflushed conductivity: DUAL-WATER NONLINEAR
Flushed conductivity: DUAL-WATER NONLINEAR
Cementation factor M = M_EXP
Saturation exponent N = 2.000
Linear dual-water W = 2.00
Clay bound water expansion enabled
Beta dilution enabled

COMPONENT	QUARTZ	ILLITE	KAOLIN	XBNDWAT	XFREWAT	UBNDWAT	UFREWAT
ERROR OF PREDICTION	0.0935	0.0428	0.1428	0.0113	0.0287	0.0199	0.0381

EQUATION	METHOD	LOG	UNCERTAINTY	UNITS	QUARTZ	ILLITE	KAOLIN	XBNDWAT	XFREWAT
Formation density	LINEAR	RHO_COR	RHO_COR_UNC	G/C3	2.650	2.780	2.620	0.986	0.986
Sonic transit time	LINEAR	DT	DT_UNC	US/F	50.4	85.3	85.3	189.0	189.0
Photoelectric absorption	LINEAR	U	U_UNC	B/C3	5.04	11.12	5.38	0.60	0.60
Total gamma	LINEAR	GR_COR	GR_COR_UNC	GAPI	10.0	288.0	83.0	0.0	16.8
Unflushed conductivity	DUAL-WATER NONLINEAR	CT	0.0322I	MH/M	0.00	0.00	0.00	0.00	0.00
Flushed conductivity	DUAL-WATER NONLINEAR	CXO	0.1475I	MH/M	0.00	0.00	0.00	33.43	21.98

UBNDWAT	UFREWAT
0.000	0.000
0.0	0.0
0.00	0.00
0.0	0.0
7.60	1.25
0.00	0.00

CONSTRAINT	VALUE	TYPE	UNCERTAINTY	QUARTZ	ILLITE	KAOLIN	XBNDWAT	XFREWAT	UBNDWAT	UFREWAT
<PROG UNITY>	1.000	Tool	0.0100	1.000	1.000	1.000	0.000	0.000	1.000	1.000
<PROG POROSITY>	0.000	Tool	0.0100	0.000	0.000	0.000	1.000	1.000	-1.000	-1.000
<PROG X BNDWAT>	0.000	Tool	0.0100	0.000	0.066	0.049	-1.000	0.000	0.000	0.000
<PROG U BNDWAT>	0.000	Tool	0.0100	0.000	0.265	0.200	0.000	0.000	-1.000	0.000

SECONDARY MODEL C14_MURT_NO_NEUTRON (continued):

PROPERTIES and BOUNDS	QUARTZ	ILLITE	KAOLIN	XBNDWAT	XFREWAT	UBNDWAT	UFREWAT
Mineral grain density	2.650	2.780	2.620	-	-	-	-
Mineral cation exchange capacity	-	0.100	0.080	-	-	-	-
Lower Bound	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Upper Bound	1.000	1.000	1.000	0.500	0.500	0.500	0.500

MULTIMIN REPORT for well CUISINIER_14 interval MURTA DC70 (1641.12 - 1659.48 metres)
Reported by pfama on 02-Jun-2014 at 18:40
Analysed by pfama on 23-May-2014 at 13:32

Project petro_pfama_m

MODEL	TYPE	NAME	COND#	CUTOFF	EXPRESSION
Primary		C14_MURT_DC70_NO_NEUTRON	3.793	10.0	

FORMATION FLUID PARAMETERS
Fluid properties option = DEPTH
Oil Gravity Degrees API = 30.00 dapi
Gas specific gravity = 0.650
Rws = 2.3000 @ 75.00 degF
Rmfs = 0.1070 @ 77.02 degF

BOREHOLE PARAMETERS
Mud base = WATER
Mud density = 9.200 lb/g
KCl concentration of mud = 4.00 %
SHT = 75.00 degF
BHT = 220.00 degF
Rms = 0.1100 @ 77.23 degF
Rmcs = 0.221 @ 76.00 degF
Total depth = - metres

DATA SOURCES:
Input set: EVAL

PRIMARY MODEL C14_MURT_DC70_NO_NEUTRON:

C14_MURT_DC70_NO_NEUTRON CONDUCTIVITY EQUATION METHODS
Unflushed conductivity: DUAL-WATER NONLINEAR
Flushed conductivity: DUAL-WATER NONLINEAR
Cementation factor M = M_EXP_WETCLAY
Saturation exponent N = 2.020
Linear dual-water W = 2.00
Clay bound water expansion enabled
Beta dilution enabled

COMPONENT	QUARTZ	ILLITE	KAOLIN	XOIL	XBNDWAT	XFREWAT	UOIL	UBNDWAT	UFREWAT
ERROR OF PREDICTION	0.1199	0.0660	0.1860	0.0344	0.0133	0.0343	0.0575	0.0364	0.0948

EQUATION	METHOD	LOG	UNCERTAINTY	UNITS	QUARTZ	ILLITE	KAOLIN	XOIL	XBNDWAT
Formation density	LINEAR	RHO_COR	RHO_COR_UNC	G/C3	2.650	2.750	2.633	0.670	0.992
Sonic transit time	LINEAR	DT	DT_UNC	US/F	50.4	85.3	85.3	189.0	189.0
Photoelectric absorption	LINEAR	U	U_UNC	B/C3	5.04	11.12	5.38	0.10	0.65
Total gamma	LINEAR	GR_COR	GR_COR_UNC	GAPI	18.0	240.0	104.0	0.0	0.0
Unflushed conductivity	DUAL-WATER NONLINEAR	CT	0.0323I	MH/M	0.00	0.00	0.00	0.00	0.00
Flushed conductivity	DUAL-WATER NONLINEAR	CXO	0.1479I	MH/M	0.00	0.00	0.00	0.00	35.29

XFREWAT	UOIL	UBNDWAT	UFREWAT
0.992	0.000	0.000	0.000
189.0	0.0	0.0	0.0
0.65	0.00	0.00	0.00
19.2	0.0	0.0	0.0
0.00	0.00	7.92	1.30
27.20	0.00	0.00	0.00

CONSTRAINT	VALUE	TYPE	UNCERTAINTY	QUARTZ	ILLITE	KAOLIN	XOIL	XBNDWAT	XFREWAT	UOIL	UBNDWAT	UFREWAT
<PROG UNITY>	1.000	Tool	0.0100	1.000	1.000	1.000	0.000	0.000	0.000	1.000	1.000	1.000
<PROG POROSITY>	0.000	Tool	0.0100	0.000	0.000	0.000	1.000	1.000	1.000	-1.000	-1.000	-1.000
<PROG X BNDWAT>	0.000	Tool	0.0100	0.000	0.090	0.074	0.000	-1.000	0.000	0.000	0.000	0.000
<PROG U BNDWAT>	0.000	Tool	0.0100	0.000	0.370	0.304	0.000	0.000	0.000	0.000	-1.000	0.000
<PROG WATER MUD>	0.000	<=	-	0.000	0.000	0.000	0.000	1.000	1.000	0.000	-1.000	-1.000

PRIMARY MODEL C14_MURT_DC70_NO_NEUTRON (continued):

PROPERTIES and BOUNDS	QUARTZ	ILLITE	KAOLIN	XOIL	XBNDWAT	XFREWAT	UOIL	UBNDWAT	UFREWAT
Mineral grain density	2.650	2.750	2.633	-	-	-	-	-	-
Mineral cation exchange capacity	-	0.140	0.120	-	-	-	-	-	-
Lower Bound	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Upper Bound	1.000	1.000	1.000	0.500	0.500	0.500	0.500	0.500	0.500

MULTIMIN REPORT for well CUISINIER_14 interval MURTA DC50 (1659.56 - 1686.53 metres)
Reported by pfama on 02-Jun-2014 at 18:40
Analysed by pfama on 23-May-2014 at 13:32

Project petro_pfama_m

MODEL	TYPE	NAME	COND#	CUTOFF	EXPRESSION
Primary		C14_MURT_DC50_NO_NEUTRON	4.967	10.0	

FORMATION FLUID PARAMETERS
Fluid properties option = DEPTH
Oil Gravity Degrees API = 30.00 dapi
Gas specific gravity = 0.650
Rws = 2.3000 @ 75.00 degF
Rmfs = 0.1070 @ 77.02 degF

BOREHOLE PARAMETERS
Mud base = WATER
Mud density = 9.200 lb/g
KCl concentration of mud = 4.00 %
SHT = 75.00 degF
BHT = 220.00 degF
Rms = 0.1100 @ 77.23 degF
Rmcs = 0.221 @ 76.00 degF
Total depth = - metres

DATA SOURCES:
Input set: EVAL

PRIMARY MODEL C14_MURT_DC50_NO_NEUTRON:

C14_MURT_DC50_NO_NEUTRON CONDUCTIVITY EQUATION METHODS
Unflushed conductivity: DUAL-WATER NONLINEAR
Flushed conductivity: DUAL-WATER NONLINEAR
Cementation factor M = M_EXP_WETCLAY
Saturation exponent N = 2.020
Linear dual-water W = 2.00
Clay bound water expansion enabled
Beta dilution enabled

COMPONENT	QUARTZ	CALCITE	ILLITE	KAOLIN	XOIL	XBNDWAT	XFREWAT	UOIL	UBNDWAT	UFREWAT
ERROR OF PREDICTION	0.5011	0.1486	0.2670	0.6406	0.0386	0.0240	0.0418	0.1182	0.0908	0.2264

EQUATION	METHOD	LOG	UNCERTAINTY	UNITS	QUARTZ	CALCITE	ILLITE	KAOLIN	XOIL
Formation density	LINEAR	RHO_COR	RHO_COR_UNC	G/C3	2.650	2.710	2.750	2.633	0.668
Sonic transit time	LINEAR	DT	DT_UNC	US/F	50.4	47.8	85.3	85.3	189.0
Photoelectric absorption	LINEAR	U	U_UNC	B/C3	5.04	14.13	11.12	5.38	0.10
Total gamma	LINEAR	GR_COR	GR_COR_UNC	GAPI	20.0	11.0	220.0	104.0	0.0
Unflushed conductivity	DUAL-WATER NONLINEAR	CT	0.0324I	MH/M	0.00	0.00	0.00	0.00	0.00
Flushed conductivity	DUAL-WATER NONLINEAR	CXO	0.1485I	MH/M	0.00	0.00	0.00	0.00	0.00

XBNDWAT	XFREWAT	UOIL	UBNDWAT	UFREWAT
0.991	0.991	0.000	0.000	0.000
189.0	189.0	0.0	0.0	0.0
0.65	0.65	0.00	0.00	0.00
0.0	19.2	0.0	0.0	0.0
0.00	0.00	0.00	7.99	1.31
35.70	27.43	0.00	0.00	0.00

CONSTRAINT	VALUE	TYPE	UNCERTAINTY	QUARTZ	CALCITE	ILLITE	KAOLIN	XOIL	XBNDWAT	XFREWAT	UOIL	UBNDWAT
<PROG UNITY>	1.000	Tool	0.0100	1.000	1.000	1.000	1.000	0.000	0.000	0.000	1.000	1.000
<PROG POROSITY>	0.000	Tool	0.0100	0.000	0.000	0.000	0.000	1.000	1.000	1.000	-1.000	-1.000
<PROG X BNDWAT>	0.000	Tool	0.0100	0.000	0.000	0.096	0.073	0.000	-1.000	0.000	0.000	0.000
<PROG U BNDWAT>	0.000	Tool	0.0100	0.000	0.000	0.397	0.304	0.000	0.000	0.000	0.000	-1.000
<PROG WATER MUD>	0.000	<=	-	0.000	0.000	0.000	0.000	0.000	1.000	1.000	0.000	-1.000

PRIMARY MODEL C14_MURT_DC50_NO_NEUTRON (continued):

UFREWAT
1.000
-1.000
0.000
0.000
-1.000

PROPERTIES and BOUNDS	QUARTZ	CALCITE	ILLITE	KAOLIN	XOIL	XBNDWAT	XFREWAT	UOIL	UBNDWAT	UFREWAT
Mineral grain density	2.650	2.710	2.750	2.633	-	-	-	-	-	-
Mineral cation exchange capacity	-	-	0.150	0.120	-	-	-	-	-	-
Lower Bound	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Upper Bound	1.000	1.000	1.000	1.000	0.500	0.500	0.500	0.500	0.500	0.500

MULTIMIN REPORT for well CUISINIER_14 interval MCKINLAY MEMBER (1686.61 - 1696.75 metres)

Reported by pfama on 02-Jun-2014 at 18:40

Analysed by pfama on 23-May-2014 at 13:32

Project petro_pfama_m

MODEL	TYPE	NAME	COND#	CUTOFF	EXPRESSION
Primary		C14_MCKI_NO_NEUTRON	4.228	10.0	

FORMATION FLUID PARAMETERS
Fluid properties option = DEPTH
Oil Gravity Degrees API = 30.00 dapi
Gas specific gravity = 0.650
Rws = 2.3000 @ 75.00 degF
Rmfs = 0.1070 @ 77.02 degF

BOREHOLE PARAMETERS
Mud base = WATER
Mud density = 9.200 lb/g
KCl concentration of mud = 4.00 %
SHT = 75.00 degF
BHT = 220.00 degF
Rms = 0.1100 @ 77.23 degF
Rmcs = 0.221 @ 76.00 degF
Total depth = - metres

DATA SOURCES:

Input set: EVAL

PRIMARY MODEL C14_MCKI_NO_NEUTRON:

C14_MCKI_NO_NEUTRON CONDUCTIVITY EQUATION METHODS
Unflushed conductivity: DUAL-WATER NONLINEAR
Flushed conductivity: DUAL-WATER NONLINEAR
Cementation factor M = 2.000
Saturation exponent N = 2.000
Linear dual-water W = 2.00
Clay bound water expansion enabled
Beta dilution enabled

COMPONENT	QUARTZ	CALCITE	ILLITE	KAOLIN	XBNDWAT	XFREWAT	UBNDWAT	UFREWAT
ERROR OF PREDICTION	0.2041	0.0997	0.1670	0.2886	0.0106	0.0288	0.0156	0.0341

EQUATION	METHOD	LOG	UNCERTAINTY	UNITS	QUARTZ	CALCITE	ILLITE	KAOLIN	XBNDWAT
Formation density	LINEAR	RHO_COR	RHO_COR_UNC	G/C3	2.650	2.710	2.750	2.620	0.989
Sonic transit time	LINEAR	DT	DT_UNC	US/F	50.4	47.8	85.3	85.3	189.0
Photoelectric absorption	LINEAR	U	U_UNC	B/C3	5.04	14.13	11.12	5.38	0.65
Total gamma	LINEAR	GR_COR	GR_COR_UNC	GAPI	30.0	11.0	160.0	104.0	0.0
Unflushed conductivity	DUAL-WATER NONLINEAR	CT	0.0325I	MH/M	0.00	0.00	0.00	0.00	0.00
Flushed conductivity	DUAL-WATER NONLINEAR	CXO	0.1490I	MH/M	0.00	0.00	0.00	0.00	36.54

XFREWAT	UBNDWAT	UFREWAT
0.989	0.000	0.000
189.0	0.0	0.0
0.65	0.00	0.00
19.2	0.0	0.0
0.00	8.13	1.33
27.88	0.00	0.00

CONSTRAINT	VALUE	TYPE	UNCERTAINTY	QUARTZ	CALCITE	ILLITE	KAOLIN	XBNDWAT	XFREWAT	UBNDWAT	UFREWAT
<PROG UNITY>	1.000	Tool	0.0100	1.000	1.000	1.000	1.000	0.000	0.000	1.000	1.000
<PROG POROSITY>	0.000	Tool	0.0100	0.000	0.000	0.000	0.000	1.000	1.000	-1.000	-1.000
<PROG X BNDWAT>	0.000	Tool	0.0100	0.000	0.000	0.076	0.048	-1.000	0.000	0.000	0.000
<PROG U BNDWAT>	0.000	Tool	0.0100	0.000	0.000	0.319	0.202	0.000	0.000	-1.000	0.000

PRIMARY MODEL C14_MCKI_NO_NEUTRON (continued):

PROPERTIES and BOUNDS	QUARTZ	CALCITE	ILLITE	KAOLIN	XBNDWAT	XFREWAT	UBNDWAT	UFREWAT
Mineral grain density	2.650	2.710	2.750	2.620	-	-	-	-
Mineral cation exchange capacity	-	-	0.120	0.080	-	-	-	-
Lower Bound	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Upper Bound	1.000	1.000	1.000	1.000	0.500	0.500	0.500	0.500

MULTIMIN REPORT for well CUISINIER_14 interval NAMUR SANDSTONE (1696.82 - 1728.22 metres)

Reported by pfama on 02-Jun-2014 at 18:40
Analysed by pfama on 23-May-2014 at 13:32

Project petro_pfama_m

MODEL	TYPE	NAME	COND#	CUTOFF	EXPRESSION
Primary		C14_NAMU_NO_NEUTRON	4.329	10.0	

FORMATION FLUID PARAMETERS
Fluid properties option = DEPTH
Oil Gravity Degrees API = 30.00 dapi
Gas specific gravity = 0.650
Rws = 2.3000 @ 75.00 degF
Rmfs = 0.1070 @ 77.02 degF

BOREHOLE PARAMETERS
Mud base = WATER
Mud density = 9.200 lb/g
KCl concentration of mud = 4.00 %
SHT = 75.00 degF
BHT = 220.00 degF
Rms = 0.1100 @ 77.23 degF
Rmcs = 0.221 @ 76.00 degF
Total depth = - metres

DATA SOURCES:

Input set: EVAL

PRIMARY MODEL C14_NAMU_NO_NEUTRON:

C14_NAMU_NO_NEUTRON CONDUCTIVITY EQUATION METHODS
Unflushed conductivity: DUAL-WATER NONLINEAR
Flushed conductivity: DUAL-WATER NONLINEAR
Cementation factor M = 2.000
Saturation exponent N = 2.000
Linear dual-water W = 2.00
Clay bound water expansion enabled
Beta dilution enabled

COMPONENT	QUARTZ	CALCITE	ILLITE	KAOLIN	XBNDWAT	XFREWAT	UBNDWAT	UFREWAT
ERROR OF PREDICTION	0.2033	0.1419	0.2276	0.2997	0.0105	0.0184	0.0141	0.0195

EQUATION	METHOD	LOG	UNCERTAINTY	UNITS	QUARTZ	CALCITE	ILLITE	KAOLIN	XBNDWAT
Formation density	LINEAR	RHO_COR	RHO_COR_UNC	G/C3	2.650	2.710	2.750	2.620	0.980
Sonic transit time	LINEAR	DT	DT_UNC	US/F	50.4	47.8	85.3	85.3	189.0
Photoelectric absorption	LINEAR	U	U_UNC	B/C3	5.04	14.13	11.12	5.38	0.60
Total gamma	LINEAR	GR_COR	GR_COR_UNC	GAPI	27.0	11.0	230.0	190.0	0.0
Unflushed conductivity	DUAL-WATER NONLINEAR	CT	0.0327I	MH/M	0.00	0.00	0.00	0.00	0.00
Flushed conductivity	DUAL-WATER NONLINEAR	CXO	0.1496I	MH/M	0.00	0.00	0.00	0.00	36.54

XFREWAT	UBNDWAT	UFREWAT
0.980	0.000	0.000
189.0	0.0	0.0
0.60	0.00	0.00
16.8	0.0	0.0
0.00	8.13	1.33
23.39	0.00	0.00

CONSTRAINT	VALUE	TYPE	UNCERTAINTY	QUARTZ	CALCITE	ILLITE	KAOLIN	XBNDWAT	XFREWAT	UBNDWAT	UFREWAT
<PROG UNITY>	1.000	Tool	0.0100	1.000	1.000	1.000	1.000	0.000	0.000	1.000	1.000
<PROG POROSITY>	0.000	Tool	0.0100	0.000	0.000	0.000	0.000	1.000	1.000	-1.000	-1.000
<PROG X BNDWAT>	0.000	Tool	0.0100	0.000	0.000	0.076	0.048	-1.000	0.000	0.000	0.000
<PROG U BNDWAT>	0.000	Tool	0.0100	0.000	0.000	0.319	0.202	0.000	0.000	-1.000	0.000

PRIMARY MODEL C14_NAMU_NO_NEUTRON (continued):

PROPERTIES and BOUNDS	QUARTZ	CALCITE	ILLITE	KAOLIN	XBNDWAT	XFREWAT	UBNDWAT	UFREWAT
Mineral grain density	2.650	2.710	2.750	2.620	-	-	-	-
Mineral cation exchange capacity	-	-	0.120	0.080	-	-	-	-
Lower Bound	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Upper Bound	1.000	1.000	1.000	1.000	0.500	0.500	0.500	0.500

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*          MULTIMIN REPORT          *
*                                     *
*      *** End of Report ***        *
*                                     *
*   Project : petro_pfama_m         *
*   User id  : pfama                 *
*   Date    : 02-Jun-2014 18:40:19 *
*   Pages   : 20                     *
*                                     *
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APPENDIX 3(b): FIELD ELECTRIC LOG REPORT

Santos

FIELD ELECTRIC LOG REPORT

WELL:	Cuisinier 14	GEOLOGIST:	Lewis Maxwell
LOGGING ENGINEER:	M. Christain A. AbuShloua E. Parker		James Nankivell
RUN NO:	1-2		
DRILLER DEPTH:	1764m	LOGGER'S DEPTH:	TD not tagged
ARRIVED ON SITE:	9/03/2014		
ACTUAL LOG TIME:	13.50 hrs	LOST TIME LOGGER'S:	3.5 hrs
TOTAL TIME:	28.15 hrs	LOST TIME OTHERS:	0.0 hrs

TYPE OF LOG	Grand Slam	Grand Slam	RCI-GR
TIME CIRC STOPPED	18:20 hrs 31-March-14	18:20 hrs 31-March-14	18:20 hrs 31-March-14
TIME TOOL RIG UP	05:15 hrs 01-Apr-14	09:30 hrs 01-Apr-14	17:15 hrs 01-Apr-14
TIME RUN IN HOLE	07:30 hrs 01-Apr-14	12:30 hrs 01-Apr-14	20:15 hrs 01-Apr-14
TIME ON BOTTOM/ START LOG	POOH	15:30 hrs 01-Apr-14	22:15 hrs 01-Apr-14
TIME TOOL RIG DOWN	09:30 hrs 01-Apr-14	17:30 hrs 01-Apr-14	09:15 hrs 02-Apr-14
TOTAL TIME	4:15	8:00	16:00

TYPE OF LOG	FROM	TO	TIME SINCE LAST CIRC	COMMENTS/REPEAT SECTION	BHT
<u>Run 1: GR-RTEX-MLL-MAC-ZDL-CN-SP-WGI</u> GR RTEX MLL MAC ZDL CN SP WGI	0	1080m		Lost telemetry with tools POOH to repair cable head.	
<u>Run 2: GR-RTEX-MLL-MAC-ZDL-CN-SP-WGI</u> GR RTEX MLL MAC ZDL CN SP WGI	1723m 1759m 1753m 1742m 1728m 1725m 1720m 1733m	16m 367m 367m 367m 367m 367m 367m 367m	19.3 hrs	Main run tied into downlog. CN tool gave erratic readings.	220 °F at 1760m
<u>Run 3: RCI-GR</u>	1642.2m	1705.5m	32.40 hrs	9 good, 6 curtailed, 2 no seal 1 PVT sample obtained	230 °F at 1690.1m

MUD DATA					
MUD SYSTEM:	3KPO	MW:	9.2		
Rm:	0.221 Ohm.M @ 76° F	FV	55		
Rmf:	0.107 Ohm.M @ 77.02° F	PV/YP:	19/20		
Rmc:	0.110 Ohm.M @ 77.23° F	FL:	6	pH:	6.0

REMARKS / RECOMMENDATIONS:

- 1) Baker Livewire was not functioning during Run 1
- 2) Upon receiving the mud samples, Baker did not advise WSG that a good reading was not obtained, therefore, another sample had to be prepared thus leaving no filtrate to be taken back to town. A substitute filtrate sample was prepared from a mud sample from the mud tanks, however, this will not be as accurate.

Run 1: GR-RTEX-MLL-MAC-ZDL-CN-SP-WGI

- 1) Run 1 was not completed - Whilst conducting downlog, lost telemetry at 1080m. Tools pulled to surface, found faulty connection (conductor 2). Repaired cable head.

Run 2: GR-RTEX-MLL-MAC-ZDL-CN-SP-WGI

- 1) Casing shoe found on downlog at 366.3m. Depth shift of +0.7m applied to Downlog once on bottom.
- 2) Erratic CN readings observed during both downlog and main pass.
- 3) Short correlation pass conducted just off TD against corrected Downlog. (+0.9m shift required)
- 4) When approaching TD, tool string was losing tension at 1760m, decision made to pull up and not tag TD.
- 5) MAC run in Inline Dipole mode from 1760m to 1500m. Switched to Dt rom 1500 to casing shoe.
- 6) Minor loss of sonic data when changing from Dipole to Dt, spliced in from downlog (1473-1487m)

Run 3: RCI-GR

- 1) Livewire was working for this run
- 2) Stopped at casing shoe for pressure stabilisation. At this point the engineer was required to fix the Dt issue in the Rush LAS for Run 1
- 3) Livewire stopped working shortly after the commencement of the PVT sample collection. Baker Engineer was able to reconnect Livewire.
- 4) Decision was made by the Santos reservoir engineer to not obtain the PVT samples for points at 1653.7m and 1699.2m after collection of PVT sample 1 at 1646.5m

LOST TIME BREAKDOWN:**Total: 3.5hrs lost time loggers**

Run 1: GR-RTEX-MLL-MAC-ZDL-CN-SP-WGI, **3.5hrs lost time loggers**. At 0900hrs 01/04/2014 Telemetry malfunction occurred at 1085m and tools were pulled to surface. The cable head was found to contain a faulty conductor connector. After repairs the run was re-commenced and arrived at 1085m at 1230hrs.

WELLSITE LOG QUALITY CONTRL CHECKS

LOF		Y	MUD SAMPLE RES	Y	TOOL NO./CODE CHECK	Y
OFFSET WELL DATA		Y	CABLE DATA CARD	Y	LOG SEQUENCE CONFIRM	Y

LOG TYPE	Grand Slam	RCI		COMMENTS	
Casing Check	Y				
Scale Check	Y	Y			
Depth Casing Total	N	N/A		Tied in to drillers shoe depth 367m	
Calibration OK	Y	Y		CN passed post-log calibration	
Repeatability	Y	Y			
Logging Speed	10m/min	N/A			
Offset well repeatability	Y				
Noisy/Missing Data	Y	N		CN showing high values	
Rm Measurement	Y			See "Remarks/Reccomendations"	
LLS/LLD/Check	Y				
PERF/RHOB Check					
Caliper Check	Y	N/A		Run 1: Caliper shows large washouts	
Log Header/Tail	Y	Y		below shoe.	
Comments					
Print/Film Quality	Y	Y			

COMMENTS: Total of 3.5hrs lost time loggers, attributable to a faulty connector in the cable head causing a loss of telemetry during run 1.

ENGINEERS COMMENTS (If this report has not been discussed with the Engineer state reason)

APPENDIX 3(c): FORMATION PRESSURE RESULTS

Santos

RCI PRESSURE SURVEY

Well: CUISINIER 14
 Witness: L. Maxwell/J. Nankivell
 Engineer: M. Christain

RT: 115.2 Feet
 Time last circ : 08:20 31/03/2014'
 Rmf: 0.159ohhm.m @ 75°F

Gauge Type : Quartz 213372 No strain gauge
 Probe/Packer Type : Standard
 Drawdown: variable

Page : 1
 Date : 01/02-04-2014

Note: Depths from Suite 1 / Run 1 / Trip 2: Grand Slam Rush log

Test	Time	FORMATION	SAND	DEPTH Proposed MD m	DEPTH Actual MD m	DEPTH TVD m	DEPTH SUBSEA m	TEST RESULTS							INTERPRETATION						COMMENTS		File
								HYDRO BEFORE PSIA	INITIAL RAWDOWN PSIA	FINAL BUILD UP PSIA	FORM PRESS PSIA	HYDRO AFTER PSIA	TEMP Deg F	D/D MOB MD/CP	TYPE D/D	TEST TIME mins	RATE CHANGE PSI/MIN	TYPE BUILD UP	HAMBER CC	DEPL SC	FLUID TYPE		
	22:16	CORRELATION #1															DPTL					+1.2m	
1	23:04	Murta Mbr	DC70	1642.2	1642.2	1641.7	-1526.5	2584.8	1150.0	2500.0		2584.0	218.60		N	18.0	9.0	slow	3cc	SC		Curtailed	3
2	23:28	Murta Mbr	DC70	1643.0	1643.0	1642.5	-1527.3	2585.8	1069.0	2550.2	2550.2	2585.2	219.9	3.90	N	14.5	0.6	slow	3cc	SC		Good Test	4
3	23:48	Murta Mbr	DC70	1643.8	1643.7	1643.2	-1528.0	2587.4	1097.0	2350.0		2586.4	220.4		N	15.0	32.0	slow	3cc	SC?		Curtailed	5
4	00:12	Murta Mbr	DC70	1644.7	1644.7	1644.2	-1529.0	2588.4	1213.2	2330.7	2330.7	2587.9	221.0	7.10	N	15.0	<0.2	slow	5cc/3cc			Good Test	6
5	00:36	Murta Mbr	DC70	1645.6	1645.6	1645.1	-1529.9	2590.1	1229.8	2304.5	2304.5	2589.2	221.6	7.30	N	7.0	<0.2	good	5cc/3cc			Good Test	7
6	00:47	Murta Mbr	DC70	1646.0	1646.0	1645.5	-1530.3	2590.5	1390.8	2324.1	2324.1	2589.6	221.7	8.50	N	15.0	<0.2	slow	5cc/3cc			Good Test	8
7	1:19	Murta Mbr	DC70	1646.5	1646.5	1646.0	-1530.8	2591.3	1566.9	2304.8	2304.8	2590.4	222.2	12.40	N	10.8	<0.2	good	5cc/3cc			Good Test	9
8	1:25	Murta Mbr	DC70	1647.0	1647.0	1646.5	-1530.8	2592.0	230.0	320.0		2590.9	222.3		N	5.8	N/A	slow	5cc	tight		Curtailed	
9	1:44	Murta Mbr	DC70	1647.1	1647.1	1646.6	-1531.4	2592.0	715.0	1380.0		2591.3	222.4		N	6.0	31.0	slow	3cc	tight		Curtailed	11
10	2:03	Murta Mbr	DC70	1647.5	1647.5	1647.0	-1531.8	2592.8	1042.6	2362.6	2362.6	2591.9	222.9	5.50	N	12.8	<0.2	slow	3/3cc			Good Test	12
11	2:22	Murta Mbr	DC60	1653.7	1653.7	1653.2	-1538.0	2602.2				2601.7	222.9			6.0			3cc			Seal Failures	13
12	2:36	Murta Mbr	DC60	1656.7	1656.7	1656.2	-1541.0	2607.0				2606.6	223.1			5.0			3cc			Seal Failures	14
13	2:46	Murta Mbr	DC50	1665.5	1665.5	1665.0	-1549.8	2620.9	737.0	2240.0		2620.2	223.3		N	7.0	20.0	slow	3cc	tight		Curtailed	15
		CORRELATION #2																				+0.3m	16
14	3:16	Murta Mbr	DC50	1671.5	1671.5	1671.0	-1555.8	2629.0	496.0	2070.0		2628.6	226.8		N	10.0	92.0	slow	3cc	tight		Curtailed	18
15	3:39	Namur	Sandstone	1699.2	1699.20	1698.7	-1583.5	2672.7	624.4	2429.6	2429.6	2672.0	227.2	7.60	N	10.3	<0.2	good	10/5cc			Good Test	19
16	3:54	Namur	Sandstone	1705.5	1705.50	1705.0	-1589.8	2682.9	1335.7	2443.9	2443.9	2682.1	228.2	8.00	N	12.3	<0.2	good	5/3cc			Good Test	20
		CORRELATION #3																				No Shift	21
17	6:29	Murta Mbr	DC70	1646.5	1646.50	1646.00	#####	2590.2	1679.6	2304.9	2304.9	2584.7	226.0	27.1	N	7.00	<0.2	good	3cc			Good Test. Time test started: 04:25 hrs. Time cleaning up: 112 mins/1.9 hrs. Litres pumped: 24.3 litres. Fluid type: oil. Sample tank: #1.	22

Expected Temp Gradient:	0.057	deg C/m
Expected Water Gradient:	1.40	psi/m
Mud Weight :	9.20	ppg
Mud Gradient:	0.48	psi/ft
Stabilisation Criteria:	0.20	psi/min

* - Denotes Estimates

Normal Drawdown : Pressure does not drop to zero
 Limited Drawdown : Pressure drops to zero
 Build Up types: Immediate, Rapid, Good, Slow.

Tests Requested	18
Total Tests	17
Good Tests	9
Curtailed Tests	6
Seal Failures	2
Correlation Passes :	3
PVT Samples:	1

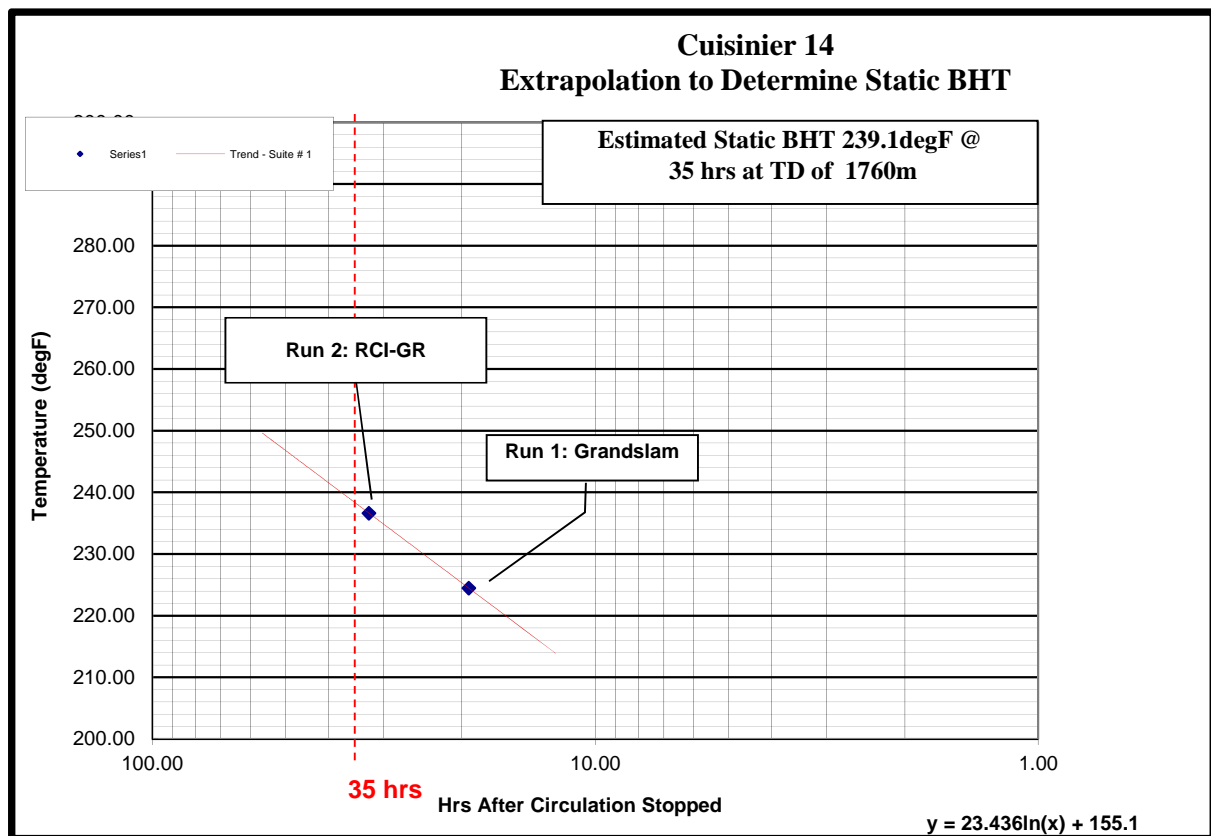
PVT Sample Summary

	Depth	Formation	Recovery	Sample #	ank Serial #	Status
1	1646.5m	Murta	Oil	1	10099570	Not Opened at surface
2	-	-	-	-	-	Cancelled
3	-	-	-	-	-	Cancelled

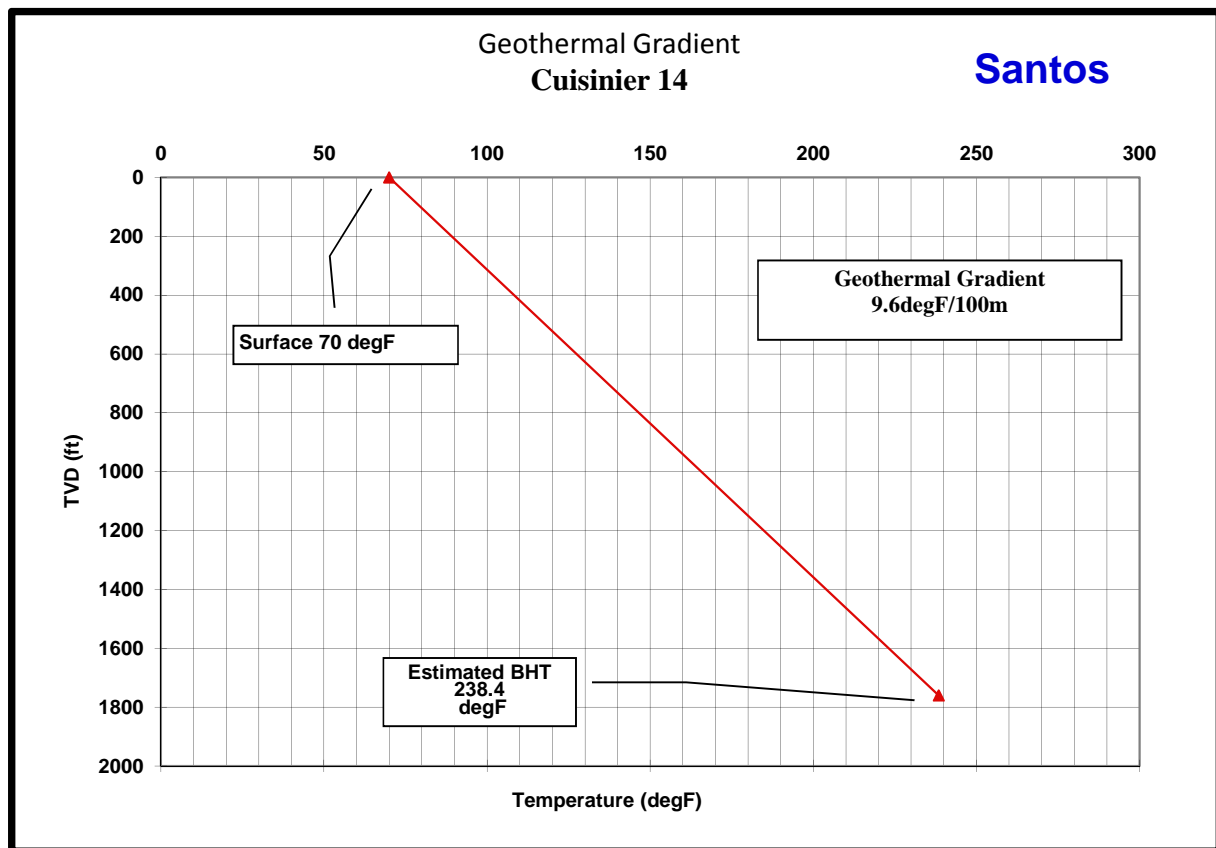
APPENDIX 4: GEOTHERMAL GRADIENT

An extrapolated static bottom hole temperature of 238.4°F 1764m (total depth) and a geothermal gradient of 9.6°F/100m was calculated from the downhole temperatures recorded during logging operations (Refer to Table VII below). The result is lower than the prognosed static BHT of 250°F.

	Max Recorded Temp (degF)	Depth Recorded (m)	Time Since Circulation. (hrs)	Total Depth (m)	Estimated BHT (degF)
Run 1	220	1709	19.30	1760	224.48
Run 2	230	1690.1	32.40	1760	236.62



STATIC BHT @ 35 hrs	238.4	°F	@	1760	m
SURFACE TEMP.	70	°F	@	0	m
Geothermal Gradient for Suite 1		9.57		°F/100m	



APPENDIX 5: DRILL STEM TEST DATA

No Drill Stem Tests were run on Cuisinier 14.

APPENDIX 6: HYDROCARBON ANALYSIS



--- PVT Analyses and Sampling of Reservoir Fluids ---
ACN 164 512 823 ABN 12 164 512 823

45 Woodforde Road T: +61 8 8364 1500
PO Box 410 M: 0419 788 522
Magill SA 5072 F: +61 8 8364 2581
AUSTRALIA E: adelaide@petrolab.net

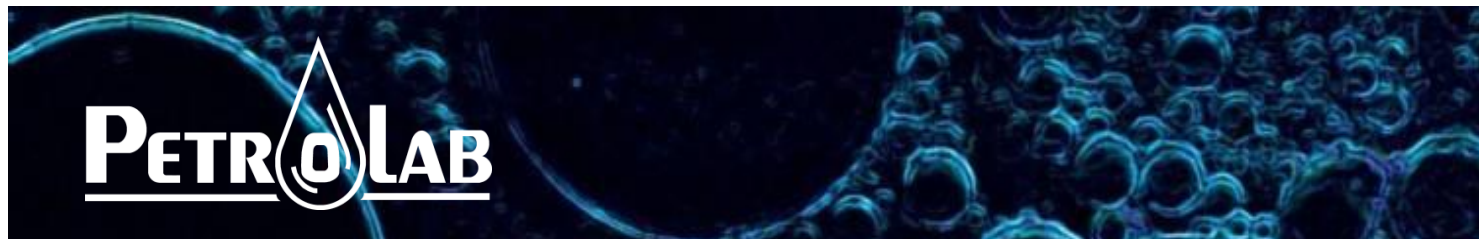
PRELIMINARY COMPOSITIONAL REPORT

Client :
Santos Limited
Well :
Cuisinier # 14
Formation :
Murta

Date :
May 08, 2014
File ID :
S - 14065

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Sampling Details	1
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Validity Check	
L-1013	2
Compositional Analyses	
L-1013	3 - 6
Stock Tank Water Analyses	7



BOTTOM HOLE SAMPLING & TRANSFER DETAILS

Sampled by Baker Hughes on March, 2014

Sample ID	RCI Chamber S/N	Depth Sampled (m MD)	Transferred to Petrolab Cylinder S/N	Reservoir Fluid Recovered		Formation Pressure (psig)	Formation Temp. (°F)	Comments
				Oil Volume (cc)	Water Volume (cc)			
1	10099570	1646.5	L-1013	365	135	2290.2	226	*

* remaining water volume from RCI tools was flashed off for standard 10-ion water analyses

RESULTS | BOTTOM HOLE SAMPLE VALIDITY CHECK

Saturation Pressure : 110 psig @ 19.7 °C

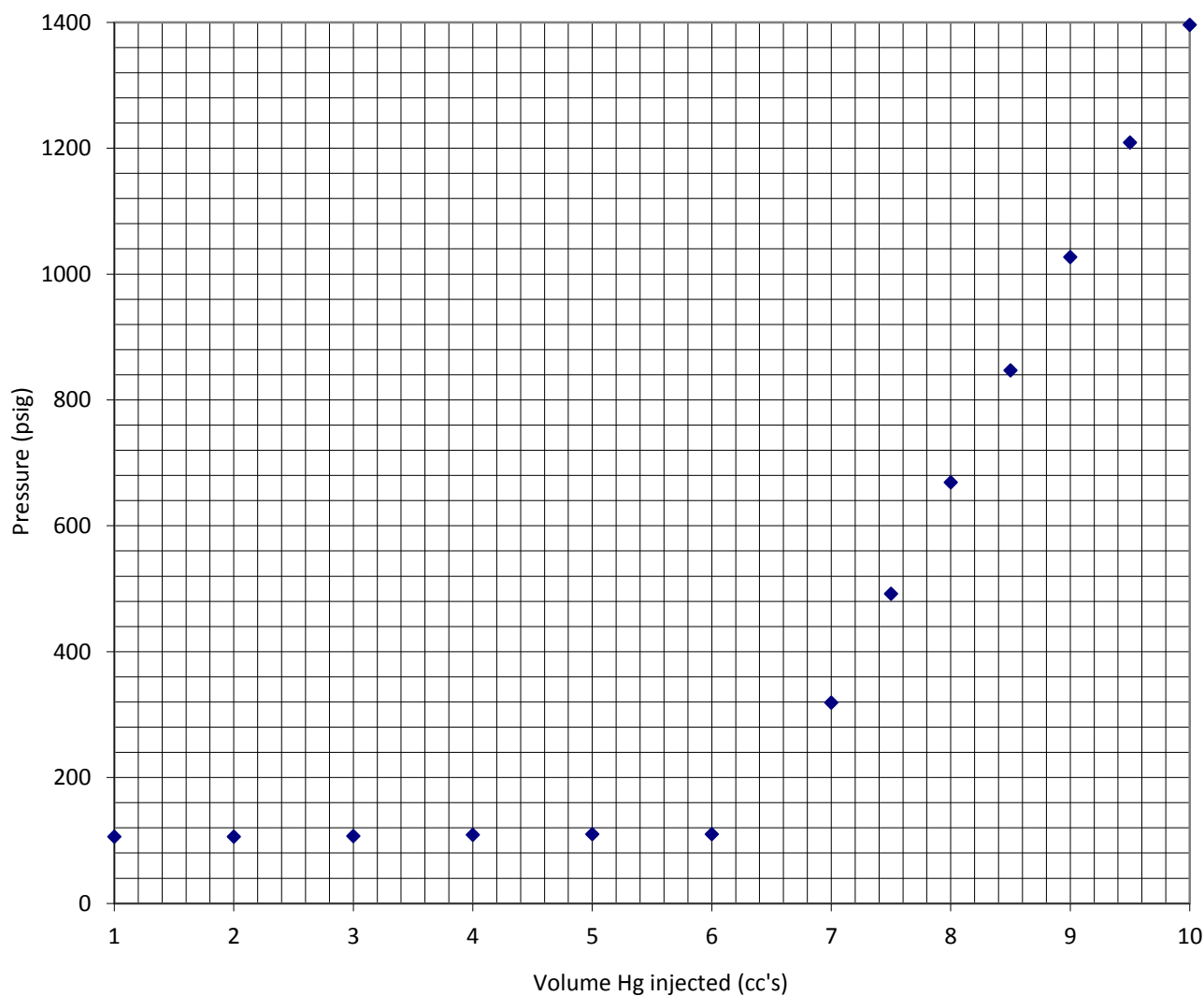
Sample Details:

Sample # 1
 RCI Chamber S/N # 10099570
 Opening Pressure 78 psig @ 21.4 °C
 Transferred to Cylinder # L-1013
 Transfer Pressure 5000 psig
 Sample Volume 365 cc

Sampling Conditions:

Date Sampled 01/04/2014
 Time Sampled 06:29
 Depth Sampled 1646.5 m MD
 Formation Murta Fm
 Formation Pressure 2290.2 psig
 Formation Temperature 107.8 °C

Volume (cc's)	Pressure (psig)
1.0	106
2.0	106
3.0	107
4.0	109
5.0	110
6.0	110
7.0	319
7.5	492
8.0	669
8.5	847
9.0	1027
9.5	1209
10.0	1396



RESULTS | FINGERPRINT ANALYSIS BY CAPILLARY GAS CHROMATOGRAPHY

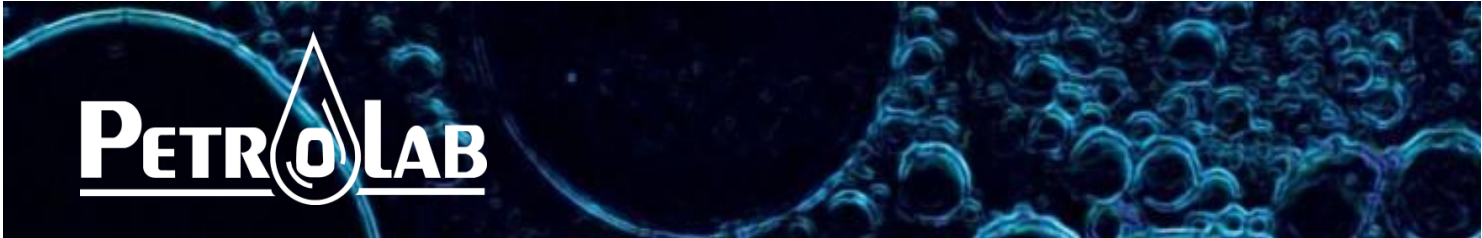
Using Stock Tank Oil from Atmospheric Flash of Sample in Cylinder # : **L-1013**

Component		MW* (g/mol)	Density* (g/cc)	Wt %	Mol %
Hexanes minus	C ₆₋	65	0.603	4.57	9.32
Hexanes	C ₆	87	0.685	8.71	13.23
Heptanes	C ₇	97	0.722	15.83	21.56
Octanes	C ₈	110	0.745	10.25	12.31
Nonanes	C ₉	121	0.764	8.33	9.09
Decanes	C ₁₀	136	0.778	7.63	7.41
Undecanes	C ₁₁	147	0.789	5.57	5.01
Dodecanes	C ₁₂	161	0.800	4.34	3.56
Tridecanes	C ₁₃	175	0.811	4.29	3.24
Tetradecanes	C ₁₄	190	0.822	3.55	2.47
Pentadecanes	C ₁₅	206	0.832	3.56	2.28
Hexadecanes	C ₁₆	222	0.839	3.02	1.80
Heptadecanes	C ₁₇	237	0.847	2.70	1.51
Octadecanes	C ₁₈	251	0.852	2.14	1.13
Nonadecanes	C ₁₉	263	0.857	1.70	0.85
Eicosanes	C ₂₀	275	0.862	1.63	0.78
Heneicosanes	C ₂₁	291	0.867	1.45	0.66
Docosanes	C ₂₂	305	0.872	1.29	0.56
Tricosanes	C ₂₃	318	0.877	1.16	0.48
Tetracosanes	C ₂₄	331	0.881	1.01	0.40
Pentacosanes	C ₂₅	345	0.885	0.85	0.33
Hexacosanes	C ₂₆	359	0.889	0.77	0.29
Heptacosanes	C ₂₇	374	0.893	0.63	0.22
Octacosanes	C ₂₈	388	0.896	0.67	0.23
Nonacosanes	C ₂₉	402	0.899	0.61	0.20
triacontanes	C ₃₀	416	0.902	0.51	0.16
Hentriacontanes	C ₃₁	430	0.906	0.57	0.17
Dotriacontanes	C ₃₂	444	0.909	0.53	0.16
Trtriacontanes	C ₃₃	458	0.912	0.60	0.17
Tetratriacontanes	C ₃₄	472	0.914	0.75	0.21
Pentatriacontanes Plus	C ₃₅₊	493	0.920	<u>0.78</u>	<u>0.21</u>
				Σ 100.00	Σ 100.00

Fingerprint Properties :

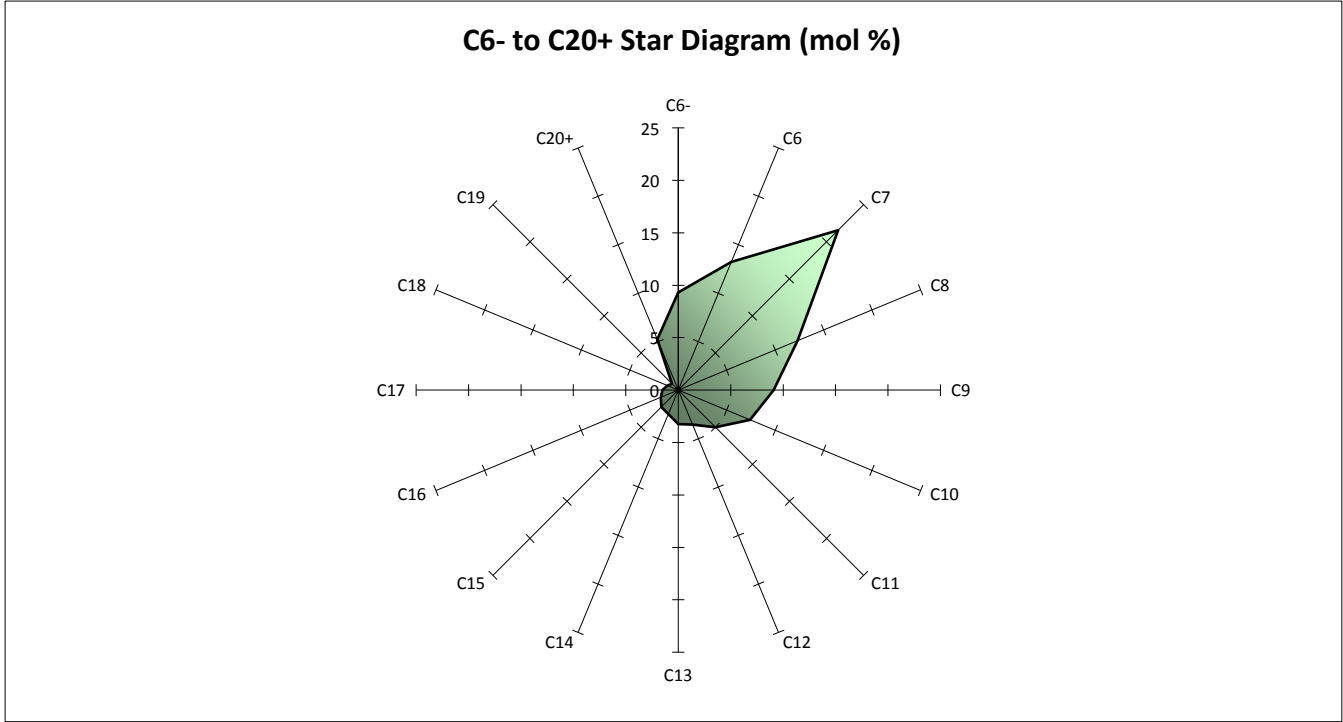
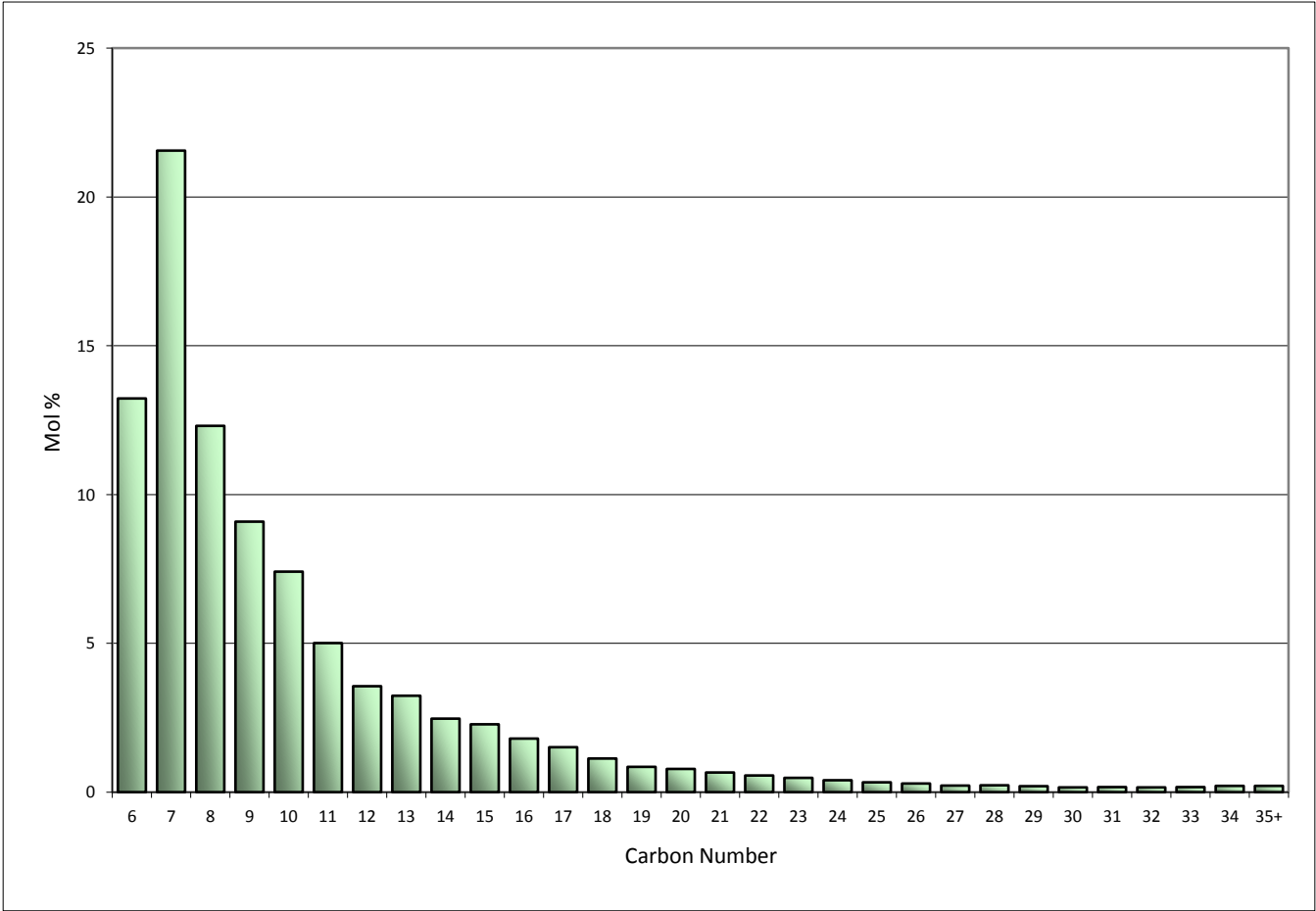
	Calculated*	Measured
Molecular Weight (g/mol)	132.2	--
Density (g/cc) @ 60 °F	0.7697	0.7694

* Based on generalized properties as published by Katz & Firoozabadi (1978)



RESULTS | FINGERPRINT ANALYSIS BY CAPILLARY GAS CHROMATOGRAPHY

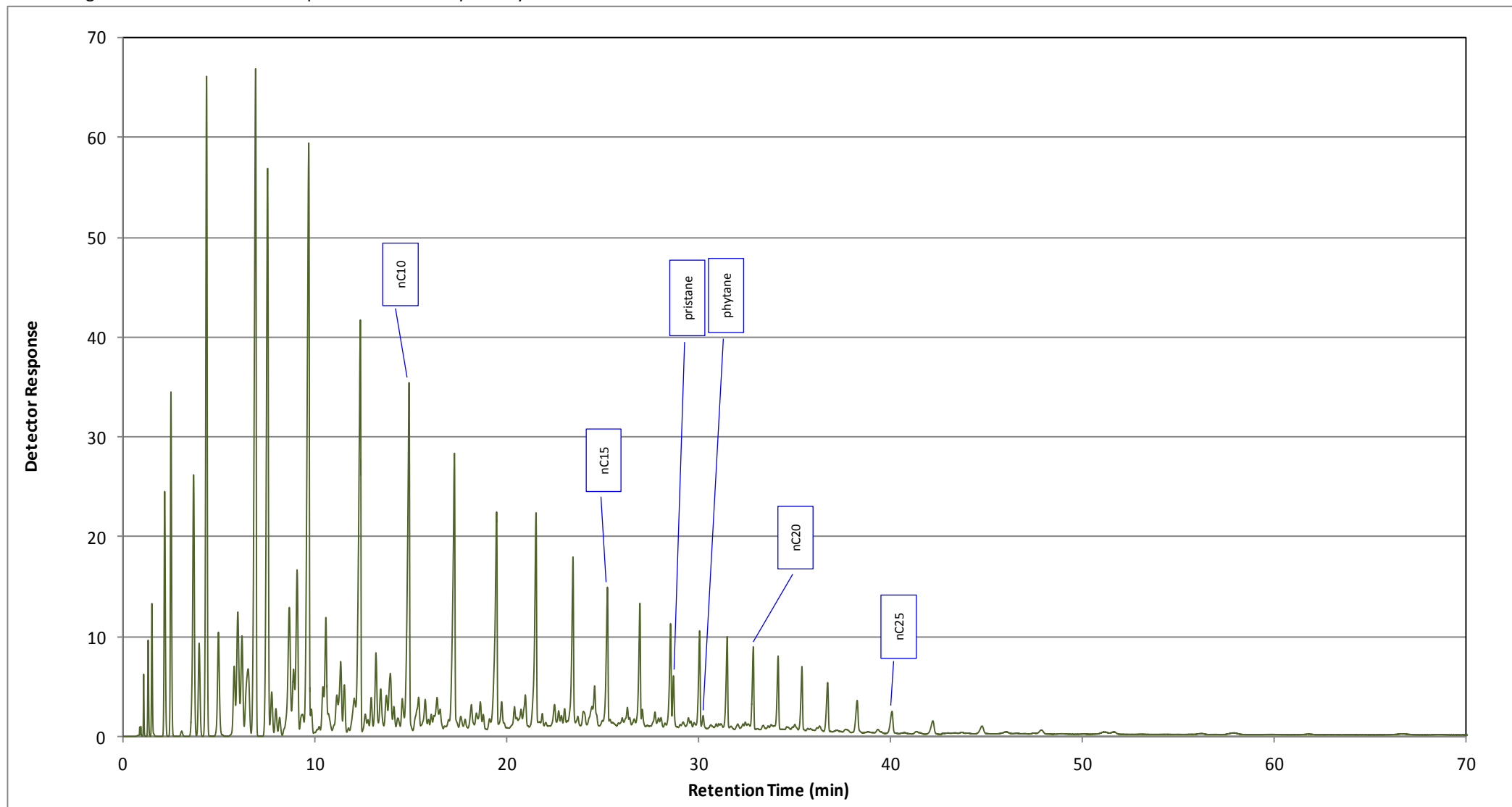
Using Stock Tank Oil from Atmospheric Flash of Sample in Cylinder # : **L-1013**





RESULTS | FINGERPRINT ANALYSIS BY CAPILLARY GAS CHROMATOGRAPHY

Using Stock Tank Oil from Atmospheric Flash of Sample in Cylinder # : **L-1013**



RESULTS | COMPOSITIONAL ANALYSES OF BOTTOMHOLE RESERVOIR FLUID

Cylinder # :

L-1013

Component		Stock Tank Liquid Mol %	Stock Tank Gas Mol %	Reservoir Fluid Mol %
Hydrogen Sulphide	H_2S	0.00	0.00	0.00
Carbon Dioxide	CO_2	0.11	7.17	0.40
Nitrogen	N_2	0.01	7.38	0.32
Methane	C_1	0.36	61.89	2.94
Ethane	C_2	0.14	4.07	0.31
Propane	C_3	0.68	5.31	0.88
Iso-Butane	iC_4	1.07	3.26	1.16
N-Butane	nC_4	1.38	2.93	1.45
Iso-Pentane	iC_5	2.74	2.18	2.72
N-Pentane	nC_5	3.25	2.01	3.20
Hexanes	C_6	13.17	2.26	12.71
Heptanes	C_7	21.47	1.15	20.59
Octanes	C_8	12.25	0.27	11.75
Nonanes	C_9	9.05	0.10	8.68
Decanes	C_{10}	7.38	0.02	7.07
Undecanes	C_{11}	4.98	0.00	4.78
Dodecanes Plus	C_{12+}	<u>21.96</u>	<u>0.00</u>	<u>21.04</u>
		Σ 100.00	Σ 100.00	Σ 100.00

Ratios :

Molar Ratio	0.9582	0.0418	1.0000
Mass Ratio	0.9905	0.0095	1.0000
Liquid Ratio (bbl/bbl)	1.0000 stb	--	1.0966 res bbl @ PT*
Gas Liquid Ratio (scf/bbl)	1.0000 stb	34 scf	--

Stream Properties :

Molecular Weight (g/mol)	130.5	28.78	126.29
Density (g/cc)	0.7695 @ 60 °F	--	0.7085 @ PT*
Gravity	52.2 ° API	0.999 (Air = 1)	--
Gross Heating Value (BTU/scf)	--	1401	--

Hexanes Plus (C6+) Properties :

Mol %	90.25	3.80	86.64
Molecular Weight (g/mol)	137.8	90.4	137.7
Density (g/cc) @ 60 °F	0.7806	0.6758	0.7804
API Gravity	49.6	77.7	49.6

Heptanes Plus (C7+) Properties :

Mol %	77.09	1.54	73.93
Molecular Weight (g/mol)	147.0	99.9	146.9
Density (g/cc) @ 60 °F	0.7914	0.6890	0.7913
API Gravity	47.1	73.7	47.1

Dodecanes Plus (C12+) Properties :

Mol %	21.96	0.00	21.04
Molecular Weight (g/mol)	234.1	--	234.1
Density (g/cc) @ 60 °F	0.8470	--	0.8470
API Gravity	35.4	--	35.4

* at reservoir conditions of P = 2290.2 psig, T = 226 °F (107.8 °C)

APPENDIX 7: WATER ANALYSIS

RESULTS | STOCK TANK WATER ANALYSIS

Using Water Sample in Cylinder # :

EX RCI-10099570

Depth : 1646.5m MD

Water Properties :

Resistivity @ 25°C	(Ω.m)	0.185
Conductivity (E.C) @ 25°C	(μS/cm)	54000
pH		6.3
Density @ 25°C	(g/cc)	1.0259
Total Alkalinity as CaCO ₃	(mg/L)	610

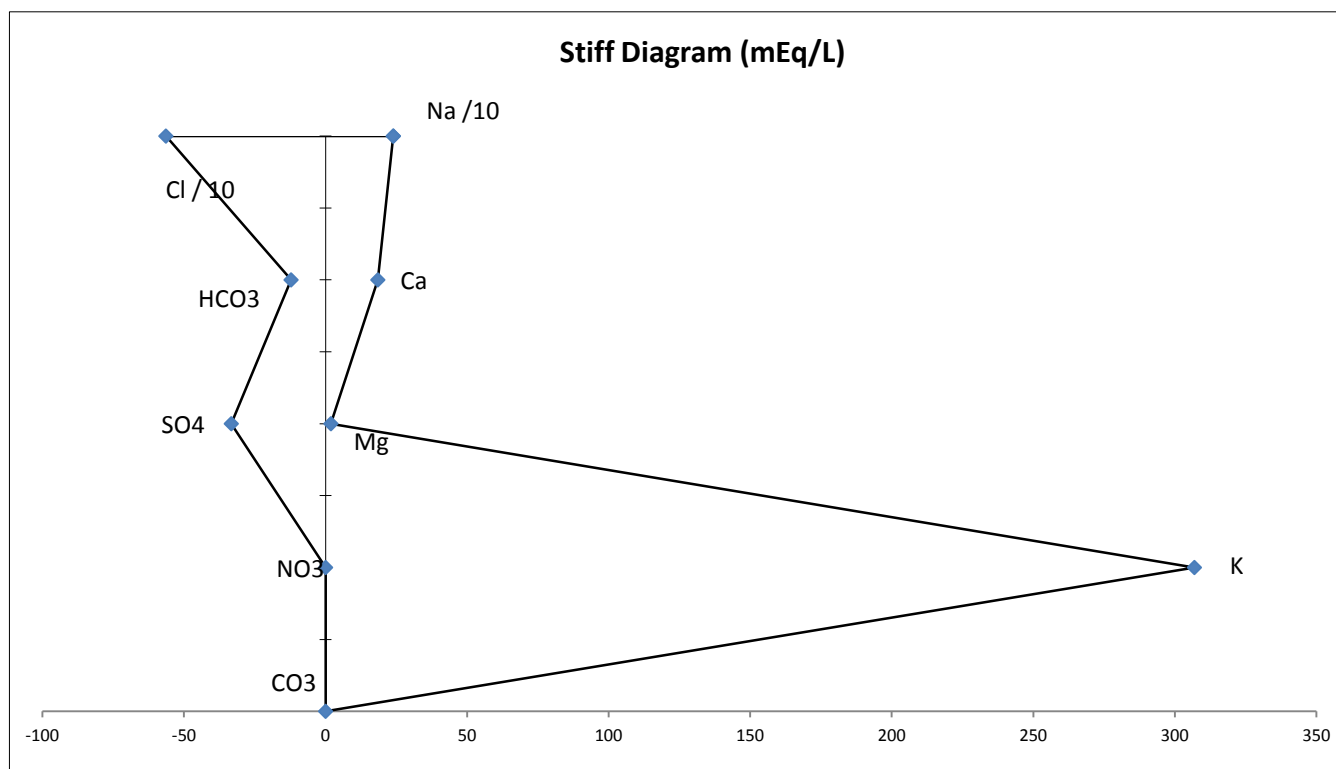
Total Dissolved Solids	(mg/L)	
Calculated (HCO ₃ =CO ₃)	39859	
From Conductivity	34182	
Salinity	36100	

Hardness	(mg/L)	
Carbonates	610	
Non-Carbonates	409	
Total	1019	

Water Ion Composition :

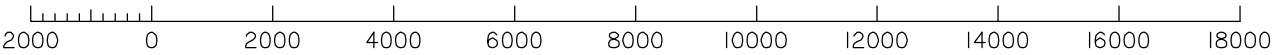
Cations		(mg/L)	(mEq/L)
Calcium	Ca	370	18.5
Magnesium	Mg	23	1.9
Sodium	Na	5500	239.2
Potassium	K	12000	306.9

Anions		(mg/L)	(mEq/L)
Hydroxide	OH	0	0.0
Carbonate	CO ₃	0	0.0
Bi-Carbonate	HCO ₃	744	12.19
Sulphate	SO ₄	1600	33.3
Chloride	Cl	20000	564.2
Nitrate	NO ₃	< 0.1	0.0



APPENDIX 8: WELL LOCATION SURVEY

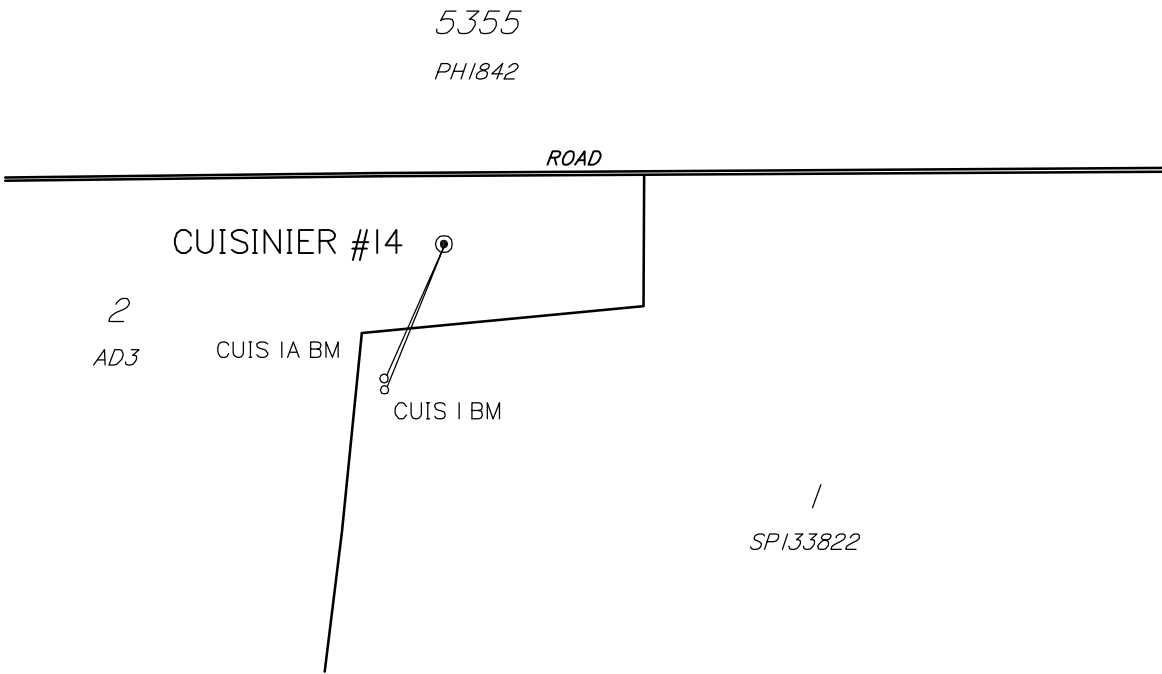
Scale 1:125000 – Lengths are in Metres.



GEOGRAPHIC CO-ORDINATES (GDA-94)			
STN	DESCRIPTION	LATITUDE	LONGITUDE
3	CUISINIER #14	S 26°40'07.8623"	E 141°13'55.2007"

DERIVED M.G.A. CO-ORDINATES (GDA-94)				
STN	DESCRIPTION	EASTING	NORTHING	ZONE
1	CUIS IA BM	522 076.060	7 048 041.600	54
2	CUIS I BM	522 046.812	7 047 910.181	54
3	CUISINIER #14	523 085.020	7 050 220.759	54

ORIGIN OF CO-ORDINATES – MGA ZONE 54			
STN	EASTING	NORTHING	HEIGHT AHD
11181	504 624.163	7 041 604.692	85.389

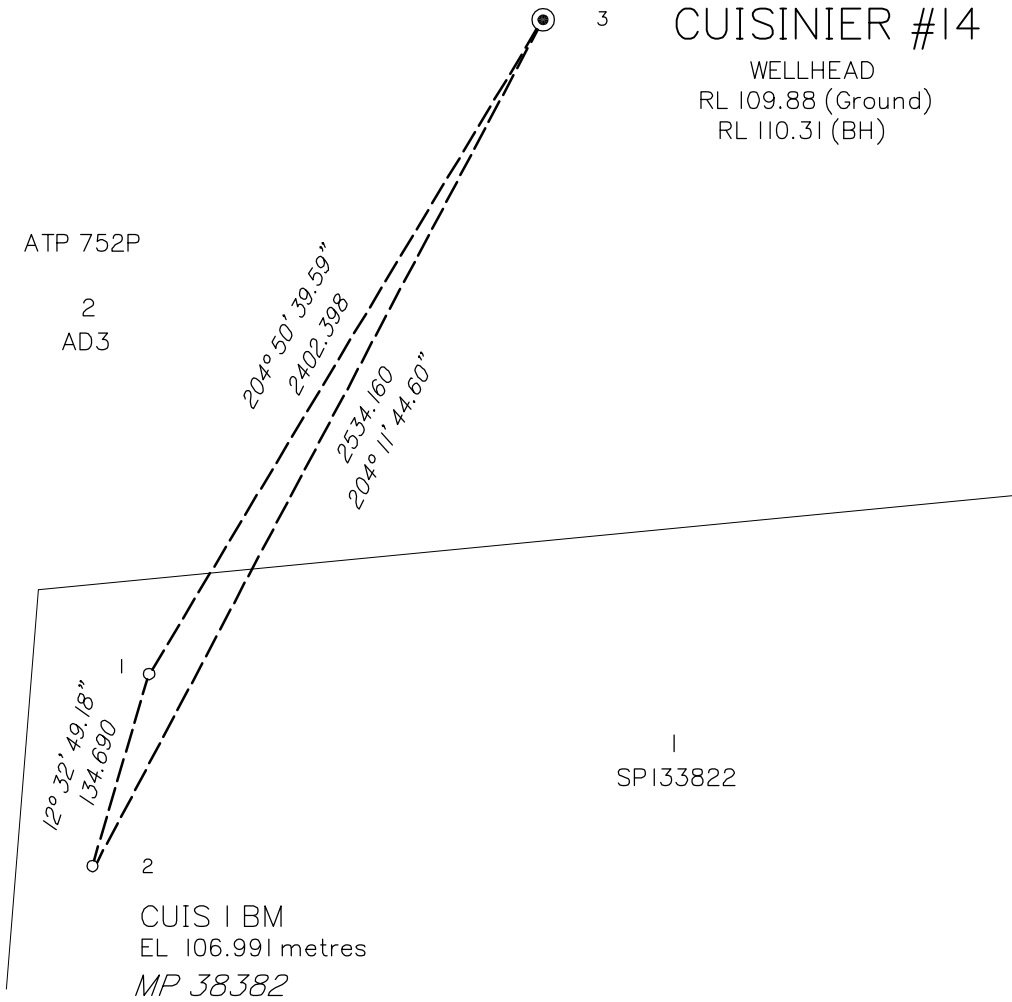


DISTANCES ARE GROUND.

Bench Marks are deep
driven Iron Star Pickets
with Witness posts

Co-ordinates and Levels obtained by
Static GPS traverse from PSM 11181

DIAGRAM
Not to Scale



I, Giuseppe D'Aloia hereby certify that I have/the Company has surveyed the location of the petroleum well as shown on this plan, that the survey was performed in accordance with the Petroleum and Gas (Production and Safety) Act 2004 and associated Regulations and Standards and achieves the accuracies of the Standards and the survey was completed on 6/04/2014.

0 50mm 100mm 150mm State copyright reserved.

MINING RESOURCES
CUISINIER #14

SCALE:

Mining District:
QUILPIE

MP44227

PARISH: COLILY COUNTY: PENDER
LOCALITY: DURHAM LOCAL AUTHORITY: BULLOO SHIRE

Drawn by: SL Meridian: MGA
18096MRP14

Field Notes:
NO

Signature of Surveyor

28/04/2014
Date

Catalogued: Examined: Registered:
Chief Surveyor

APPENDIX 9: DEVIATION DATA

Cuisinier 14

RT= 115.1 metres

Minimum Curvature Method

Correction, Cooper Basin Add 8 deg

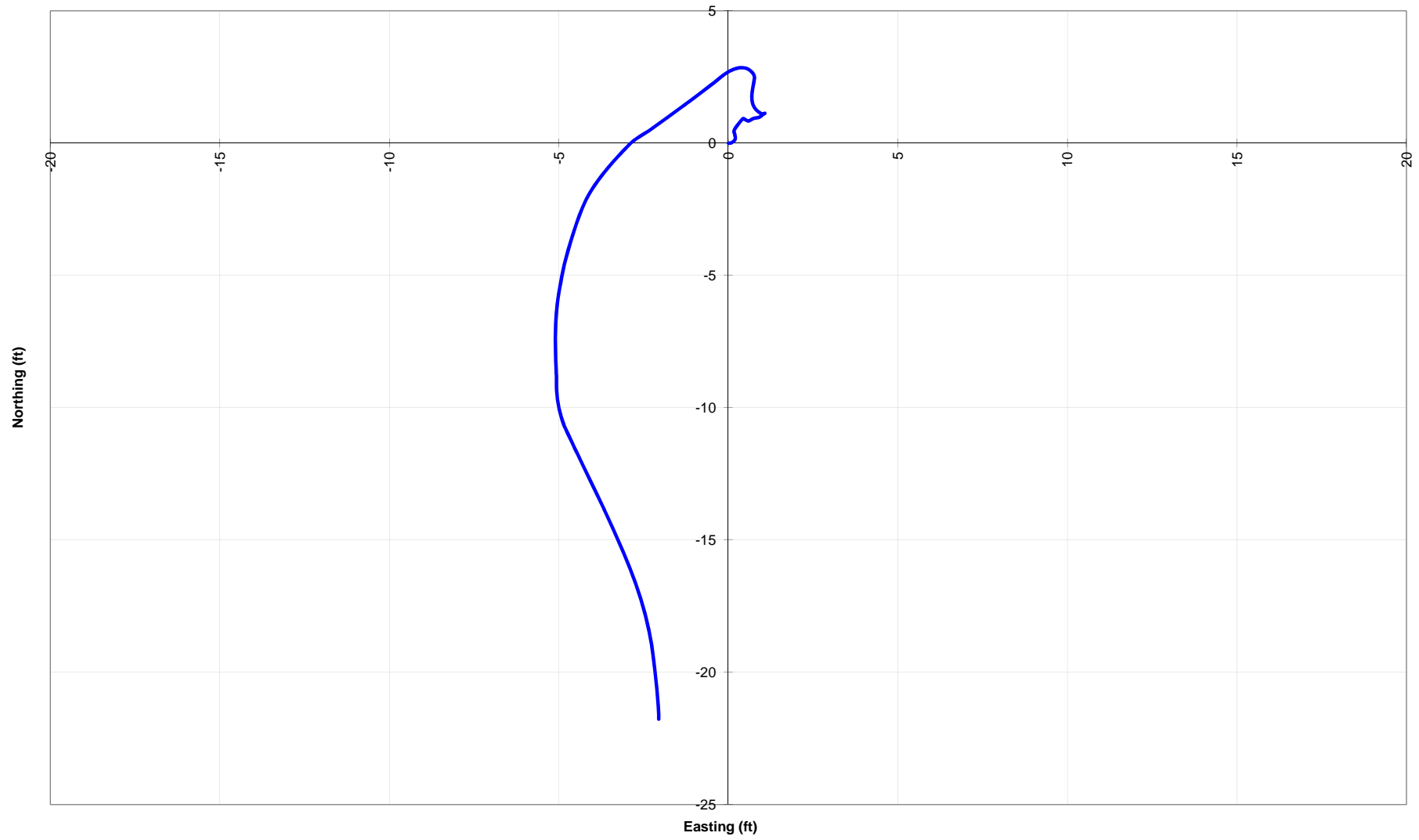
MWD Surveys

(OFFSET)

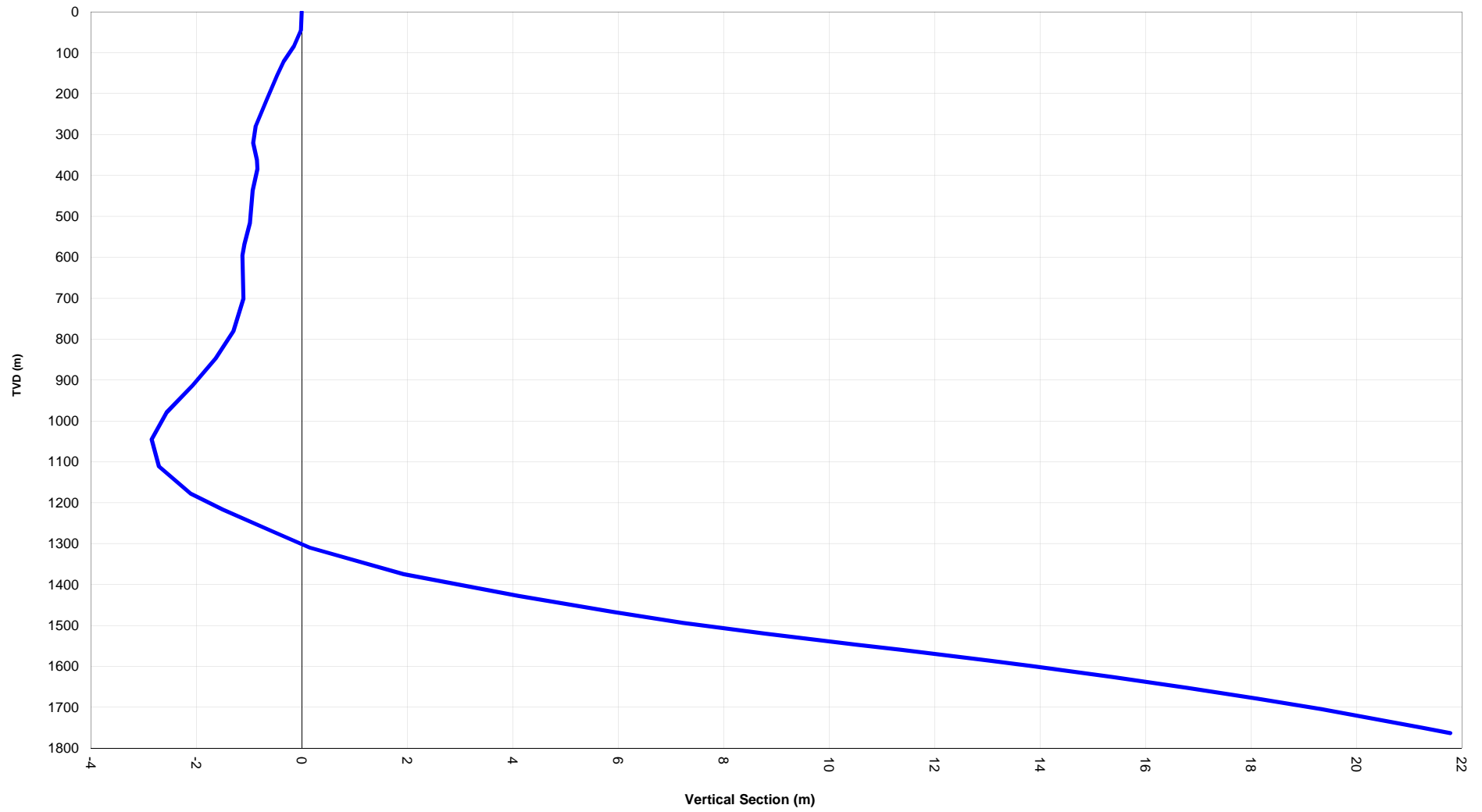
DEPTH	INCLIN	AZIM	TVD	TVD	Northing	Easting	Dog Leg	DELTA V	DELTA N	DELTA E	L	F	Q	Vert	Vert	Displ	Direction
m	deg	deg	m	S/S m	north	east	°/100'	m	m	m			DEG	Sect	Plane		True
0	0.0	32	0	-115.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0
44.53	0.26	81.27	44.53	-70.57	0.02	0.10	0.58	44.53	0.02	0.10	44.53	1.00	0.00	-0.02	0.02	0.1	81
84.20	0.35	5.24	84.20	-30.90	0.15	0.20	0.96	39.67	0.13	0.10	39.67	1.00	0.01	-0.15	0.15	0.2	53
121.10	0.26	342.04	121.10	6.00	0.34	0.18	0.41	36.90	0.19	-0.02	36.90	1.00	0.00	-0.34	-0.34	0.4	28
154.80	0.18	6.30	154.80	39.70	0.47	0.17	0.36	33.70	0.13	-0.02	33.70	1.00	0.00	-0.47	0.47	0.5	20
213.40	0.26	38.11	213.40	98.30	0.66	0.26	0.24	58.60	0.20	0.09	58.60	1.00	0.00	-0.66	0.66	0.7	21
279.40	0.18	22.65	279.40	164.30	0.88	0.39	0.15	66.00	0.21	0.13	66.00	1.00	0.00	-0.88	0.88	1.0	24
320.70	0.09	112.12	320.70	205.60	0.92	0.45	0.48	41.30	0.05	0.06	41.30	1.00	0.00	-0.92	0.92	1.0	26
362.20	0.26	131.89	362.20	247.10	0.85	0.55	0.43	41.50	-0.08	0.10	41.50	1.00	0.00	-0.85	0.85	1.0	33
384.26	0.18	42.51	384.26	269.16	0.84	0.61	1.42	22.06	-0.01	0.06	22.06	1.00	0.01	-0.84	0.84	1.0	36
436.67	0.18	69.93	436.67	321.57	0.93	0.74	0.16	52.41	0.09	0.13	52.41	1.00	0.00	-0.93	0.93	1.2	39
515.88	0.09	80.57	515.88	400.78	0.98	0.92	0.12	79.21	0.05	0.18	79.21	1.00	0.00	-0.98	0.98	1.3	43
567.63	0.26	33.46	567.63	452.53	1.09	1.02	0.40	51.75	0.10	0.10	51.75	1.00	0.00	-1.09	1.09	1.5	43
595.36	0.09	124.25	595.36	480.26	1.13	1.08	1.00	27.73	0.04	0.05	27.73	1.00	0.00	-1.13	1.13	1.6	44
701.29	0.18	279.11	701.29	586.19	1.11	0.98	0.25	105.93	-0.02	-0.10	105.93	1.00	0.00	-1.11	-1.11	1.5	42
780.68	0.26	339.76	780.68	665.58	1.30	0.79	0.29	79.39	0.19	-0.19	79.39	1.00	0.00	-1.30	-1.30	1.5	32
847.15	0.35	345.64	847.15	732.04	1.63	0.69	0.14	66.47	0.34	-0.10	66.47	1.00	0.00	-1.63	-1.63	1.8	23
913.05	0.44	17.28	913.04	797.94	2.07	0.72	0.35	65.90	0.44	0.03	65.90	1.00	0.00	-2.07	2.07	2.2	19
979.18	0.44	351.36	979.17	864.07	2.56	0.75	0.30	66.13	0.49	0.04	66.13	1.00	0.00	-2.56	-2.56	2.7	16
1045.19	0.44	277.00	1045.18	930.08	2.85	0.47	0.80	66.01	0.28	-0.29	66.01	1.00	0.01	-2.85	-2.85	2.9	9
1111.35	0.44	228.93	1111.34	996.24	2.71	0.02	0.54	66.16	-0.14	-0.44	66.16	1.00	0.01	-2.71	2.71	2.7	0
1177.59	1.06	224.79	1177.57	1062.47	2.11	-0.60	0.94	66.23	-0.60	-0.62	66.24	1.00	0.01	-2.11	2.11	2.2	344
1217.13	1.49	226.9	1217.10	1102.00	1.50	-1.23	1.09	39.53	-0.61	-0.63	39.54	1.00	0.01	-1.50	1.50	1.9	320
1269.92	1.49	226.9	1269.87	1154.77	0.56	-2.24	0.00	52.77	-0.94	-1.00	52.79	1.00	0.00	-0.56	0.56	2.3	284
1309.80	1.49	226.9	1309.74	1194.64	-0.15	-2.99	0.00	39.87	-0.71	-0.76	39.88	1.00	0.00	0.15	-0.15	3.0	267
1374.82	2.3	202	1374.73	1259.63	-1.93	-4.11	1.72	64.99	-1.78	-1.11	65.02	1.00	0.02	1.93	-1.93	4.5	245
1427.84	2.6	191	1427.70	1312.60	-4.11	-4.74	1.16	52.97	-2.18	-0.63	53.02	1.00	0.01	4.11	-4.11	6.3	229
1467.21	2.6	187	1467.03	1351.93	-5.90	-5.03	0.38	39.33	-1.79	-0.29	39.37	1.00	0.00	5.90	-5.90	7.7	220
1493.98	3.1	180	1493.76	1378.66	-7.23	-5.10	2.16	26.74	-1.33	-0.08	26.77	1.00	0.01	7.23	-7.23	8.8	215
1520.41	3.7	178	1520.15	1405.05	-8.79	-5.07	2.34	26.38	-1.56	0.03	26.43	1.00	0.01	8.79	-8.79	10.1	210
1533.76	3.7	178	1533.47	1418.37	-9.65	-5.05	0.01	13.32	-0.86	0.03	13.35	1.00	0.00	9.65	-9.65	10.9	208
1546.96	4.0	162	1546.64	1431.54	-10.50	-4.89	8.26	13.17	-0.86	0.15	13.20	1.00	0.02	10.50	-10.50	11.6	205
1560.30	4.0	160	1559.95	1444.85	-11.37	-4.59	1.37	13.31	-0.87	0.30	13.34	1.00	0.00	11.37	-11.37	12.3	202
1586.54	3.8	159	1586.13	1471.03	-13.03	-3.97	0.69	26.18	-1.66	0.62	26.24	1.00	0.00	13.03	-13.03	13.6	197
1600.08	3.6	160	1599.64	1484.54	-13.85	-3.66	1.27	13.51	-0.82	0.31	13.54	1.00	0.00	13.85	-13.85	14.3	195
1626.56	3.4	162	1626.07	1510.97	-15.38	-3.13	0.85	26.43	-1.53	0.54	26.48	1.00	0.00	15.38	-15.38	15.7	191
1652.88	3.0	164	1652.35	1537.25	-16.79	-2.69	1.73	26.28	-1.41	0.43	26.32	1.00	0.01	16.79	-16.79	17.0	189
1679.26	2.9	171	1678.69	1563.59	-18.11	-2.40	1.46	26.35	-1.32	0.29	26.38	1.00	0.01	18.11	-18.11	18.3	188
1705.20	2.6	172	1704.60	1589.50	-19.33	-2.22	1.36	25.91	-1.22	0.18	25.94	1.00	0.01	19.33	-19.33	19.5	187
1751.05	2.3	179	1750.41	1635.31	-21.26	-2.07	0.83	45.81	-1.93	0.16	45.85	1.00	0.01	21.26	-21.26	21.4	186
1764.00	2.3	179	1763.35	1648.25	-21.78	-2.06	0.01	12.94	-0.52	0.01	12.95	1.00	0.00	21.78	-21.78	21.9	185

Cuisinier 14

Plan View



Cuisinier 14
Vertical Section @ 180 Deg



APPENDIX 10: DRILLING - FINAL WELL REPORT



Cuisinier 14

19 Mar 2014 - 03 Apr 2014

Field - Cuisinier

Final Well Report

Santos Ltd

Report Compiler: Alex Fawcett

Date of Issue: 24 Sep 2014

Well Name: Cuisinier 14	Operating Co: Santos Ltd	Rig: Saxon 188
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Section 1 - Well Summary

Well Objective Development well targeting the Murta DC70 reservoir.

Country	Australia
Field	Cuisinier
Block	ATP 752P Barta
Well	Cuisinier 14
Well Type	Development
Operating Company	Santos Ltd
Rig	Saxon 188

License	PL303/QLD
Latitude	26 ° 40 ' 7.86" N
Longitude	141 ° 13 ' 55.20" E
RT to GL	5.30 m
GL Elevation	109.88 m
Planned TD	1,758 m
Actual TD	1,764 m

Spud Date	26/03/2014 04:00
TD Reached	30/03/2014 19:00
Rig Released	3/04/2014 18:00
Total Days Since Spud	4.63
Total Days on Operations	14.75

Well Name: Cuisinier 14	Operating Co: Santos Ltd	Rig: Saxon 188
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Section 2 - Well History

No.	Date	Depth (m)	Operations
1	20-Mar-2014	0.00	Scope down & lower mast. Split mast & pin on mast trailer. Remove drawworks & load sub-base ready to load out. Load out 2 x water tanks, 1 x mud skid, 1 x 8 man sleeper. Wait on daylight / crews. 100% Rigged Down. 15% Rig Moved.
2	21-Mar-2014	0.00	Loaded out centre rig pieces & rig site offices to Cuisinier 14. Rigged Down = 100%, Rig Moved = 50%, Rig Spotted = 10%
3	22-Mar-2014	0.00	Continue rig move operations from Toobunyah 11 to Cuisinier 14. Rigged Down = 100%, Rig Moved = 70%, Rig Spotted = 55%, Rigged Up = 15%.
4	23-Mar-2014	0.00	Continue rig move operations from Toobunyah 11 to Cuisinier 14. Load out Main Camp. Rig Moved = 97%, Rig Spotted = 85%, Rigged Up = 20%.
5	24-Mar-2014	0.00	Conduct general rig up of rig package. Raise & scope Mast. Prepare cuttings bin. Final loads arrive on location @ 18:00 hrs - Mud pumps x 2. Spot 1 x Mud pump. 100% Rig Moved. 98% Spotted. 50% Rigged Up.
6	25-Mar-2014	0.00	Wait on crews untill 03:00 hrs. Spot last load @ 07:30 hrs, release Mansells. Change out Kelly hose & test to 3000 psi. Rig up & function test cutting's bin. Conduct interlock checks. Commence to make up 12-1/4" BHA. 95% Rigged Up.
7	26-Mar-2014	369.00	Complete rig up. Spud well @ 04:00 hrs. Drill 12-1/4" Surface hole to TD @ 369m. Circulate hole clean & POOH to 24 m. Good hole.
8	27-Mar-2014	369.00	Lay out 12-1/4" BHA from 24 m to surface. Rig up & RIH 9-5/8" Casing to 367.36 m. Circulate casing & cement as per program. Bump plug & test to 2500 psi. Floats hold. Land out casing. Nipple up BOP & test.
9	28-Mar-2014	807.00	Make up 8-1/2" Production BHA & RIH to 9-5/8" Shoe. Slip & cut. Conduct power choke drill. Drill out shoe track & new hole to 372 m. Circulate & conduct L.O.T. Max pressure = 350 psi. EMW = 14.1 ppg. Drill 8-1/2" Production hole from 372 m to 807 m.
10	29-Mar-2014	1,546.00	Drill 8-1/2" Production hole from 807 m to 1546 m. Average ROP = 31.44 m/hr. Rig service conducted.
11	30-Mar-2014	1,764.00	Drill ahead 8-1/2" Production hole from 1546 m to TD @ 1764 m. Circulate hole clean. Wiper trip from 1764 m to 1136 m. Rig service conducted.
12	31-Mar-2014	1,764.00	POOH / Back ream tight hole from 1136 m to 9-5/8" Shoe. Slip drill line & rig service. RIH / Ream tight hole to TD @ 1764 m. Circulate & condition mud. Spot 35 bbl logging pill on btm. POOH to log from 1764 m to 714 m. Total 1.75 hrs rig related NPT.
13	01-Apr-2014	1,764.00	POOH to run wireline logs from 714 m to surface. Rig up Baker & run log #1 - Grandslam. POOH & trouble shoot loss of communication with tool string (3.5 hrs). RIH and complete Grandslam run. Make up RCI-GR tool's & run log #2.
14	02-Apr-2014	1,764.00	Baker Hughes completed run #2: RCI-GR 15 points tested and 1 fluid sample. Daily rig service. Change out TDS grabber dies. Rig up and run 5-1/2" production casing to 1459m at midnight.
15	03-Apr-2014	1,764.00	Ran 5-1/2" casing per tally. Circulated hole clean. Performed production casing cement job per program. Land hanger and pressure tested seals. Nipple down BOPs & associated equipment. GE Install tubing spool & test. Rig Release to Cuisinier 16 18:00.

Well Name: Cuisinier 14	Operating Co: Santos Ltd	Rig: Saxon 188
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Section 3 - BHA Summary

1	ROTARY DRILLING ASSEMBLY	Depth In : 12.00 (m)	Depth Out : 369.00 (m)	
Drill 12-1/4" Surface hole		Date In : 26-03-2014 04:00	Date Out : 27-03-2014 01:15	
Component		O.D. (in)	Jts	Length (m)
Polycrystalline Diamond Bit			1	0.39
Bit Sub		6.500	1	1.23
Cross Over		6.812	1	0.99
MWD Tool		6.750	1	9.26
Cross Over		6.750	1	0.86
Float Sub		6.540	1	0.80
Non-Mag Drill Collar		6.500	1	9.49
Integral Blade Stabilizer		8.000	1	1.37
Drill Collar		6.500	5	46.85
Cross Over		6.562	1	1.13
Drilling Jar		6.500	1	9.20
Cross Over		6.562	1	1.13
Drill Collar		6.500	2	18.78
Cross Over		5.812	1	1.11
Heavy Weight Drill Pipe		5.125	6	78.97
Total Length :			181.56	
BHA Comment				

2	ROTARY DRILLING ASSEMBLY	Depth In : 369.00 (m)	Depth Out : 1,764.00 (m)	
Drill 8-1/2" Production hole		Date In : 28-03-2014 00:01	Date Out : 01-04-2014 04:30	
Component		O.D. (in)	Jts	Length (m)
Polycrystalline Diamond Bit		8.500	1	0.22
Near Bit Stabilizer		6.500	1	1.27
Pony Drill Collar		6.750	1	2.93
Integral Blade Stabilizer		6.500	1	1.77
Cross Over		6.812	1	0.99
MWD Tool		6.812	1	9.26
Cross Over		6.812	1	0.86
Integral Blade Stabilizer		6.500	1	1.77
Non-Mag Drill Collar		6.500	1	9.49
Drill Collar		6.500	5	46.85
Cross Over		6.562	1	1.13
Drilling Jar		6.500	1	9.20
Cross Over		6.562	1	1.13
Drill Collar		6.500	2	18.78
Cross Over		6.500	1	1.11
Heavy Weight Drill Pipe		4.000	6	78.97
Total Length :				185.73
BHA Comment				

Well Name: Cuisinier 14

Operating Co: Santos Ltd

Rig: Saxon 188

Section 4 - Mud Record

Date - Time	Mud Type	Depth (m)	Temp (°f)	Density (ppg)	Viscosity (s/qt)	PV (cP)	YP (lbf/100f^2)	Gels 10s/10m/30m (lbf/100f^2)	API FL (cc/30m)	HTHP FL (cc/30m)	Solids (%)	Sand (%)	MBT	PH	CL (mg/L)	Hard (mg/L)	KCl (%)
26/03/2014 19:00	KCL/POLY MER	352	115	9.10	40.00	11	18.00	6 / 9 / 12	10.0		3.20	0.30	12.5	9.0	28,000	400.0	5.0
27/03/2014 13:00	KCL/POLY MER	369		9.10	40.00	11	18.00	6 / 10 / 12	10.0		3.40	0.30	12.5	9.0	28,000	500.0	4.0
28/03/2014 21:13	KCL/POLY MER	606		8.93	40.00	9	18.00	5 / 9 / 11	8.0	30.0	2.00	0.10	10.0	9.5	26,000	500.0	4.0
29/03/2014 20:55	KCL/POLY MER	1,464	145	9.10	55.00	16	19.00	5 / 10 / 12	6.0	29.0	3.80	0.10	15.0	9.0	24,000	280.0	3.2
30/03/2014 19:00	KCL/POLY MER	1,764	145	9.10	47.00	16	18.00	5 / 9 / 11	6.0	28.0	3.90	0.10	12.5	9.0	23,000	280.0	3.2
31/03/2014 19:00	KCL/POLY MER	1,764	142	9.20	55.00	19	20.00	6 / 11 / 13	6.0		4.30	0.10	17.5	9.0	26,000	360.0	4.0
1/04/2014 19:00	KCL/POLY MER	1,764		9.20	59.00	19	20.00	6 / 11 / 13	6.0	28.0	4.30	0.10	17.5	9.0	26,000	360.0	4.0
2/04/2014 18:00	KCL/POLY MER	1,764		9.20	58.00	19	20.00	6 / 11 / 13	6.0	28.6	4.30	0.10	17.5	9.0	26,000	360.0	4.0
3/04/2014 05:00	KCL/POLY MER	1,764	118	9.10	49.00	20	16.00	5 / 8 / 10	6.2	0.0	3.70	0.10	17.5	9.0	24,000	320.0	4.0

Well Name: Cuisinier 14	Operating Co: Santos Ltd	Rig: Saxon 188
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Section 5 - Casing Summary

Report No :	1	Report Date :	27 March 2014				Hole Size (in) :	12.250
Casing Name :	SURFACE CASING		Suspension Point :			-		
Top Depth MD/TVD (m) :	-1.19 / -1.19		Total Length (m) :			368.55		
Shoe Depth MD/TVD (m)	367.36 / 367.36		Top of Cement MD/TVD (m) :			5.30 / 5.30		
	No. Joints	O.D. (in)	I.D. (in)	Length (m)	Weight (ppf)	Grade	MD Top (m)	MD Base (m)
Running Tool	1	9.625	9.000	6.56	36.00	K-55	-1.19	5.37
Hanger	1	9.625	9.000	3.03	36.00	K-55	5.37	8.40
Casing Joint	32	9.625	9.000	348.00	36.00	K-55	8.40	356.40
Float Collar	1	9.625	9.000	0.32	36.00	K-55	356.40	356.72
Shoe Track	1	9.625	5.001	10.20	36.00	K-55	356.72	366.92
Shoe	1	9.625		0.44	36.00	K-55	366.92	367.36

Report No :	2	Report Date :	02 April 2014				Hole Size (in) :	8.500
Casing Name :	PRODUCTION CASING #1		Suspension Point :			SURFACE CASING		
Top Depth MD/TVD (m) :	-1.21 / -1.21		Total Length (m) :			1,761.92		
Shoe Depth MD/TVD (m)	1,760.71 / 1,760.03		Top of Cement MD/TVD (m) :			217.00 / 217.00		
	No. Joints	O.D. (in)	I.D. (in)	Length (m)	Weight (ppf)	Grade	MD Top (m)	MD Base (m)
Landing Joint	1	5.500		6.31			-1.21	5.10
Casing Hanger	1	5.500		3.13			5.10	8.23
Casing Joints	139	5.500	4.959	1,619.88	15.50	K-55	8.23	1,628.11
Marker Joint A	1	5.500	4.950	3.01	15.50	K-55	1,628.11	1,631.12
Casing Joints	10	5.500	4.950	117.06	15.50	K-55	1,631.12	1,748.18
Float Collar	1	6.000		0.30			1,748.18	1,748.48
Shoe Track	1	5.500	4.950	11.83	15.50	K-55	1,748.48	1,760.31
Shoe	1	6.000		0.40			1,760.31	1,760.71

Well Name: Cuisinier 14	Operating Co: Santos Ltd	Rig: Saxon 188
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Section 6 - Cement Summary

Cement 9-5/8" surface casing		Hole Size (in) : 12.25	Start : 27/03/2014,11:45	Job End: 27/03/2014,12:20
Stage No: 1 of 1	Top (m) MD/TVD :	5.30 / 5.30	Base (m) MD/TVD :	367.36 / 367.36
Top Plug Used ? : Y	Bottom Plug Used ? : Y	Plug Bumped ? : Y	Float Held ? : Y	
Pressure Held (psi) : 2,500	Held Duration (mins) : 10	Bump Pressure (psi) : 400	Cement Returns (bbls) : 35	
Stage Slurry Descriptions				
Fluid Type :	SPACER	Slurry Density (ppg) :	8.30	Yield (cu.ft/sk) : 0.00
Fluid Class :		Slurry Volume (bbl) :		Cement Used (sacks): 0.00
Fluid Description:		Excess (%)		Vol. Water Used (bbl) :
Mud Type :		PV (cp) : YP (lb/100ft2) :		Water Source :
Slurry Additives				
Additive Name	Type	Concentration	Amount	
Fluid Type :	LEAD	Slurry Density (ppg) :	11.80	Yield (cu.ft/sk) : 2.76
Fluid Class :	ABC CLASSG	Slurry Volume (bbl) :	89.47	Cement Used (sacks): 182.00
Fluid Description:	EconoChem	Excess (%)	75.00	Vol. Water Used (bbl) : 71.84
Mud Type :	N/A	PV (cp) : YP (lb/100ft2) :		Water Source : Fork Tree Bore
Slurry Additives				
Additive Name	Type	Concentration	Amount	
Bentonite	EXTENDER	12.00 % BWOC	2,154.00 lbs	
D Air 3000	DEFOAMER	0.10 % BWOC	18.00 lbs	
HR-5	RETARDER	0.10 % BWOC	18.00 lbs	
Fluid Type :	TAIL	Slurry Density (ppg) :	15.80	Yield (cu.ft/sk) : 1.16
Fluid Class :	ABC CLASSG	Slurry Volume (bbl) :	33.99	Cement Used (sacks): 164.50
Fluid Description:	HalCem	Excess (%)	75.00	Vol. Water Used (bbl) : 20.00
Mud Type :	N/A	PV (cp) : YP (lb/100ft2) :		Water Source : Fork Tree Bore
Slurry Additives				
Additive Name	Type	Concentration	Amount	
D Air 3000	DEFOAMER	0.10 % BWOC	15.00 lbs	
Fluid Type :	DISPLACEMENT	Slurry Density (ppg) :	8.30	Yield (cu.ft/sk) : 0.00
Fluid Class :		Slurry Volume (bbl) :		Cement Used (sacks): 0.00
Fluid Description:		Excess (%)		Vol. Water Used (bbl) : 91.00
Mud Type :		PV (cp) : YP (lb/100ft2) :		Water Source :
Slurry Additives				
Additive Name	Type	Concentration	Amount	

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5-1/2" production casing cement jpl Hole Size (in) : 8.50		Start : 03/04/2014,07:02	Job End: 03/04/2014,09:05
Stage No: 1 of 1	Top (m) MD/TVD : 217.00 / 217.00	Base (m) MD/TVD : 1,764.00 / 1,764.00	
Top Plug Used ? : Y	Bottom Plug Used ? : Y	Plug Bumped ? : Y	Float Held ? : Y
Pressure Held (psi) : 2,500	Held Duration (mins) : 10	Bump Pressure (psi) : 950	Cement Returns (bbls) : 0

Stage Slurry Descriptions			
Fluid Type : SPACER	Slurry Density (ppg) : 9.50	Yield (cu.ft/sk) : 0.00	
Fluid Class :	Slurry Volume (bbl) : 40.00	Cement Used (sacks): 0.00	
Fluid Description:	Excess (%)	Vol. Water Used (bbl) :	
Mud Type :	PV (cp) : YP (lb/100ft2) :	Water Source : fork tree bore	

Slurry Additives			
Additive Name	Type	Concentration	Amount
water			

Fluid Type : LEAD	Slurry Density (ppg) : 11.80	Yield (cu.ft/sk) : 2.82	
Fluid Class : ABC CLASSG	Slurry Volume (bbl) : 206.93	Cement Used (sacks): 412.00	
Fluid Description: EconoCem	Excess (%) 10.00	Vol. Water Used (bbl) : 0.00	
Mud Type : N/A	PV (cp) : YP (lb/100ft2) :	Water Source : fork tree bore	

Slurry Additives			
Additive Name	Type	Concentration	Amount
Halad 344	FLUID LOSS	0.75 % BWOC	295.00 lbs
SCR 100	RETARDER	0.45 % BWOC	177.00
D Air 3000	DEFOAMER	0.10 % BWOC	39.00 lbs
Bentonite	EXTENDER	14.00 % BWOC	5,514.00 lbs
HR-5	RETARDER	0.70 % BWOC	177.00 lbs

Fluid Type : TAIL	Slurry Density (ppg) : 15.60	Yield (cu.ft/sk) : 1.57	
Fluid Class : ABC CLASSG	Slurry Volume (bbl) : 30.48	Cement Used (sacks): 109.00	
Fluid Description: HalCem	Excess (%) 10.00	Vol. Water Used (bbl) : 17.20	
Mud Type : N/A	PV (cp) : YP (lb/100ft2) :	Water Source : fork tree bore	

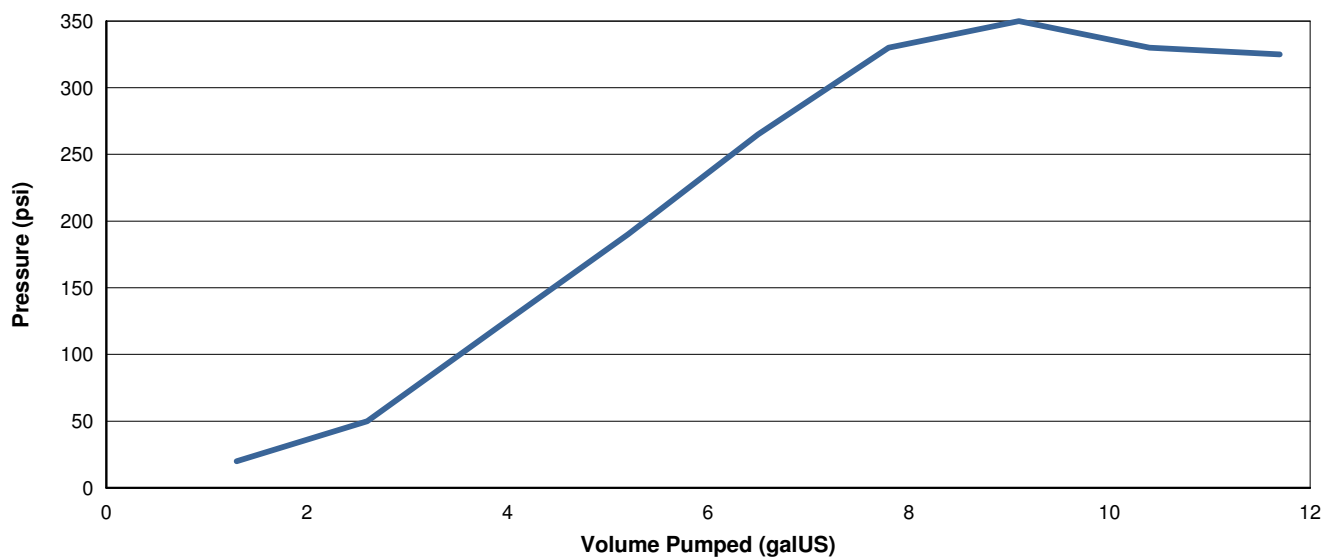
Slurry Additives			
Additive Name	Type	Concentration	Amount
Halad 344	FLUID LOSS	0.30 % BWOC	31.00 lbs
SILICA FLOUR	STRENGTHENER	35.00 % BWOC	3,586.00 lbs
Halad 413	FLUID LOSS	0.60 % BWOC	61.00 lbs
SA 541	SUSPENDER	0.15 % BWOC	15.00 lbs
D Air 3000	DEFOAMER	0.10 % BWOC	10.00 lbs
HR-5	RETARDER	0.15 % BWOC	15.00 lbs

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Section 7 - LOT Summary

Leak Off Test			
Wellbore No.: OH		Wellbore Name: Cuisinier 14	
Date of Test: 28/03/2014	Test Type: LOT	Section: Surface Hole	Casing Size (in): 9.625
Test Depth (m): 372.00	AMW (ppg): 8.80	Leak Off Pressure (psi): 330	Vol Pumped (galUS): 12
Shoe Depth (m): 367.36	EMW (ppg): 14.00	BH Pressure (psi): 887.93	Vol Returned (galUS): 6
Volume (gal)	Pressure (psi)	Bottom Hole Pressure (psi)	
1.30	20.00	577.93	
2.60	50.00	607.93	
3.90	120.00	677.93	
5.20	190.00	747.93	
6.50	265.00	822.93	
7.80	330.00	887.93	
9.10	350.00	907.93	
10.40	330.00	887.93	
11.70	325.00	882.93	

Leak Off Test



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Section 8 - Activity Detail

Day :	20-Mar-2014		Days on Well : 1.00			Days from Spud : 1.00		
Phase	Task	Activity	Depth (m)	From	To	Dur'n (hrs)	Class	Activity
MOVE	RIGD	RD	0.00	0:00	9:45	9.75	P	Saxon Rig 188 released from Toobunyah #11 @ 24:00 hrs. 19th March 2014. Rig down @ Toobunyah #11 location: Prepare rig floor, sub-base, carrier & mast for transport. Lay over mast & secure to carrier @ 02:00 hrs. Install BOP onto transport skid. Rig down Doghouse & prepare to lower. Lower Shakers & MGS. Conduct general rig down & stow of equipment, cables & lines. Prepare all packages to load out. Rigged down 30% - Moved 3%. .
MOVE	MOB	MOB	0.00	9:45	21:00	11.25	P	Mansell rig move package arrived onsite @ 09:45 hrs. Total Mansell equipment onsite & in travel: 7 x road trains. 2 x Floats. 1 x Winch truck. 1 x long trailer. 1 x Mast trailer (Saxon). No FEL. (3 x road trains & 2 x floats due next day). Toobunyah #11 location operations: Hold PJSM with mansell & saxon personnel. Position mast trailer. Transfer mast from subbase to mast transport trailer as per saxon work instructions. Secure mast for transport. Remove drawworks skid & load for next day transport. Remove subbase & load for next day transport. Remove rig matting ready for load out. Load out 2 x water tanks, 1 x mud skid, 1 x 8 man sleeper from main camp, 2 x trailer of tubulars & pipe racks. Cuisinier 14 location operations: Unload assorted forklift loads to side of lease. 100% Rigged Down. 15% Rig Moved. (10 x loads). 0% Rig spotted or rigged up.
MOVE	MOB	WOD	0.00	21:00	0:00	3.00	P	Crews break tour. Wait on daylight.
Day :	21-Mar-2014		Days on Well : 2.00			Days from Spud : 2.00		
Phase	Task	Activity	Depth (m)	From	To	Dur'n (hrs)	Class	Activity
MOVE	MOB	WOD	0.00	0:00	5:30	5.50	P	Wait on daylight.

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MOVE	MOB	MOB	0.00	5:30	19:00	13.50	P	<p>Hold PJSM with all personnel at Toobunyah 11.</p> <p>Toobunyah 11 operations:</p> <p>Load out mini camp (office, 2 x sleepers & gen skid). Load out, Mast, Drawworks, Sub-base & 1 x Gen skids – Departed mid morning. Load out, VFD & Dog house – Departed Midday (wait on drivers from crew change). 3 x Road trains arrive from Moomba @ 14:45 hrs. Load out, Koomey / junk skid & 1 x trailer of misc equipment – Departed 14:50. Load out, White house, RST office / Flare tank – Departed 16:00. Load out, 3 x pipe bin, Santos brine tank, spare fuel skid & Centrifuge – Departed 17:30. Moved 2 x Mud pumps & Active tank to camp lease. Veolia pumped out waste oil. Back loaded 2 x pipe racks to Tarbat. Started some lease clean up.</p> <p>Cuisinier 14 operations:</p> <p>Mansells spot rig matting, 2 x water tanks, rig site office & accommodation. Rig Personnel travel to Cuisinier 14, arrive on location @ 17:30 hrs. Rig up & power up rig site office & accomodation.</p> <p>Rigged Down = 100% Rig Moved = 50% Rig Spotted = 10%</p>
MOVE	MOB	WOD	0.00	19:00	0:00	5.00	P	Wait on daylight.
Day :		22-Mar-2014		Days on Well : 3.00		Days from Spud : 3.00		
Phase	Task	Activity	Depth (m)	From	To	Dur'n (hrs)	Class	Activity
MOVE	MOB	WOD	0.00	0:00	6:00	6.00	P	Wait on daylight.
MOVE	MOB	MOB	0.00	6:00	18:00	12.00	P	<p>Hold PJSM for rig moving operations.</p> <p>Toobunyah 11 operations:</p> <p>Continued loading out equipment. Moved remaining float loads (Premix tank, 1 x Gen, 2 x Mud Pumps) to main camp lease. Completed rig lease clean up of Toobunyah 11. Prepared main camp for next day load out.</p> <p>Cuisinier 14 operations:</p> <p>Install pontoons on subbase. Complete spot matting over hole centre. Spot subbase over hole centre. Install drawworks skid. Spot daytank/doghouse, brine tank, VFD shack, 1 x generator, Koomey / sub skid, santos fuel tank. Dress lease with forklift equipment. Mast ready to install from transport trailer at 14:00 hrs. Replacement for leaking mast trailer ram arrived @ 16:00 hrs & installed same.</p> <p>Arrived on Cuisinier lease:</p> <p>VFD shack, dog house, koomey / sub skid, flare tank, santos fuel tank, 3 x pipe bins, tradesmen/RSTC office, white house, centrifuge, 1 x junk load, brine tank.</p> <p>Unload 2 x trailers of pre-spud, 1 x trailer of mud chems. Transfer 2 x water containers from rig lease to camp lease, Tolls fill 6,000 ltr at rig camp & 17,000 ltr at main camp lease.</p> <p>Rig/Camps Moved = 70%. Rig/Camps Spotted = 55%. Rigged up = 10%.</p>
MOVE	MOB	MOB	0.00	18:00	0:00	6.00	P	Wait on daylight.

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Day :		23-Mar-2014		Days on Well : 4.00		Days from Spud : 4.00		
Phase	Task	Activity	Depth (m)	From	To	Dur'n (hrs)	Class	Activity
MOVE	MOB	WOD	0.00	0:00	5:30	5.50	P	Wait on daylight.
MOVE	MOB	MOB	0.00	5:30	19:00	13.50	P	<p>Hold PJSM for rig moving operations.</p> <p>Toobunyah 11 operations: Rig down & power down main camp. Load out Main Camp. Load out smoko shack, 1 x Generator, Premix Tank. Complete lease clean up @ Toobunyah location.</p> <p>Cuisinier 14 operations: Hold test weight on mast trailer raising rams overnight.</p> <p>Hold Safety Meeting, review risks, exclusion zones & suspended load precautions for mast installation from mast trailer. Install mast & pin Mast to subbase as per Saxon procedure by 09:30 hrs - no problems. Commence general rig up whilst wait on trucks.</p> <p>Arrived @ 12:00hrs: 2 x mud tanks (Shaker & Suction), (Sent back floats asap to Toobunyah for 2x mud pumps). Frac tank, geoservice shack, rig matting & pipe racks, 1 x double of misc gear.</p> <p>Spot Shaker tank, Suction tank & BOP skid.</p> <p>Arrived @ 15:30 hrs Catwalk/Vdoor on 60' trailer.</p> <p>Arrived @ 18:00 hrs, 1x premix tank & 1 x generator & Saxon FEL.</p> <p>Remaining to be onsite (@ Toobunyah) =2 mud pumps.</p> <p>Commenced arriving @ 16:00 hrs, Main camp, spot by 18:00hrs, rig up & power up same by 18:30hrs.</p> <p>Rig Moved = 97%. Camps Moved = 100%. Rig / Camps Spotted = 85%. Rigged up = 20%.</p>
MOVE	MOB	WOD	0.00	19:00	0:00	5.00	P	Wait on daylight.
Day :		24-Mar-2014		Days on Well : 5.00		Days from Spud : 5.00		
Phase	Task	Activity	Depth (m)	From	To	Dur'n (hrs)	Class	Activity
MOVE	RIGU	RU	0.00	0:00	6:00	6.00	P	Wait on daylight.

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MOVE	RIGU	RU	0.00	6:00	20:00	14.00	P	<p>Hold PTSM with rig crew & Mansell's prior to spotting any loads & rig up.</p> <p>Unload 2 x pre-spud mud chemical trailers.</p> <p>Prepare Mast to raise, conduct DROPS inspection.</p> <p>Spot matting, Catwalk, Generator, 2 x Pipe bins, Centrifuge, Geoservices shack & premix tank.</p> <p>Rig up Mud tanks & raise shakers. Run Electrical cables, air & fluid lines.</p> <p>Change out pivot bushing on MGS & raise same.</p> <p>Commence install HCR valve / choke line & test stump to BOP.</p> <p>Geoservices rig up unit.</p> <p>Spot & rig up cuttings bin, adjust & shim etc - ok.</p> <p>Perform Drops/Mast pre raise inspection.</p> <p>Raise mast @ 14:15 hrs.</p> <p>Hold Weekly Safety Meeting & Pre Spud Campaign brief from 16:00 hrs to 16:45 hrs. Then crews break tour.</p> <p>Telescope mast @ 17:00 hrs. Commence rig up rig floor.</p> <p>2 x Mud pumps arrive onsite @ 18:00 hrs. Hold PJSM, then spot Mud Pump #1 to 19:00 hrs. (will spot MP2 next day).</p> <p>100% Rig Moved. 98% Spotted. 50% Rigged Up.</p>
MOVE	RIGU	WOPE	0.00	20:00	0:00	4.00	P	Wait on drilling crew (rest break).
Day :		25-Mar-2014		Days on Well : 6.00		Days from Spud : 6.00		
Phase	Task	Activity	Depth (m)	From	To	Dur'n (hrs)	Class	Activity
MOVE	RIGU	RU	0.00	0:00	3:00	3.00	P	Wait on drilling crew (rest break).
MOVE	RIGU	RU	0.00	3:00	6:00	3.00	P	<p>Hold PTSM with on-coming crew.</p> <p>Rig up water lines to Mud tanks. Take on mix water to mud tanks & prepare chemical to mix.</p> <p>Complete nipple up HCR valve / choke line & test stump to BOP.</p> <p>Spot casing bolsters & prepare to unload Production casing.</p> <p>Conduct general rig up of rig floor & work through pre-spud checks.</p> <p>Install Flare line from MGS to Flare tank.</p> <p>98% Spotted. 60% Rigged Up.</p>
MOVE	RIGU	RU	0.00	6:00	18:00	12.00	P	<p>Hold PJSM, Spot Mud Pump 2, adjust & position centrifuge to cuttings bin. Last Load spotted @ 07:30 hrs. Release Mansells winch truck & FEL.</p> <p>Hold PJSM, install large Exclusion Zone, change out worn/damaged kelly hose, whilst 50% of crew continue rig up.</p> <p>Prepare & tally BHA on racks.</p> <p>Pathfinder Rep change out MWD battery with new.</p> <p>Rig up mud pumps. Commence mixing mud @ 11:00 hrs.</p> <p>Test run cuttings tipper with 3/4 full load of water, take & test run tipper at cuttings pit. Minor leak, made a new pin for one corner of gate.</p> <p>Hold a Muster Drill. Function remote & rig floor ESDs - ok.</p> <p>Pressure test Kelly hose / surface lines to 200 psi / 5 mins & 3000 psi / 15 mins - ok.</p> <p>100% Spotted. 80% Rigged Up.</p>

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MOVE	RIGU	RU	0.00	18:00	0:00	6.00	P	Halliburton spot cement unit into position. Continue mixing spud mud. Rig up handling equipment on drill floor. Continue work through Santos / Saxon pre spud & drillers checklists. Function test TDS, pipe arm & ST-80 confirm all operational. Conduct ST-80 torque checks & confirm correct. Complete Omron interlock Checks. Dig trench & run MWD cable. Rig up worm drive pump from cuttings bin to shakers. Commence pressure test BOP / Choke manifold to 200 / 2500 psi, 5 / 10 mins. Prepare to pick up BHA. 95% Rigged Up.
Day :		26-Mar-2014	Days on Well : 7.00			Days from Spud : 0.83		
Phase	Task	Activity	Depth (m)	From	To	Dur'n (hrs)	Class	Activity
MOVE	RIGU	RU	0.00	0:00	4:00	4.00	P	Complete pressure test BOP / Choke manifold to 200 / 2500 psi, 5 / 10 mins. Make up BHA with 12-1/4" PDC bit, Bit sub, Cross over's & MWD. RIH & break circulation. Function test circulating system & 2 x Flyte pump @ 680 gpm. Continue circulate to shear active mud system. While shear active mud system, complete final rig up, conduct pre-spud Hazard hunt, close out pre-spud inspections & sign off's. 100 % rigged up.
SURF1	DRILL	DRL	103.00	4:00	10:45	6.75	P	Spud Well "Cuisinier #14" @ 04:00 hrs. Drill ahead 12 1/4" Surface Hole from 12m to 103 m. End DCs. Average ROP w/ Drill Collar connections = 13.5 mtr/hr. 250-600 GPM, 150-750 PSI, 50-150 RPM, 2-10k WOB, 1-2k Torque. Intermittent Calcareous Sandstone stringers noted from 13m to 23m.
SURF1	DRILL	DRL	339.00	10:45	17:45	7.00	P	Drill ahead 12 1/4" Surface Hole from 103 m to 339 m. Average ROP = 33.71 mtr/hr. 700 GPM, 1200 PSI, 50-160 RPM, 1-4k WOB, 2-3k Torque. Hard stringer @ 308mtrs (20k / 50rpm). Record MWD survey every 3rd connection. Last survey @ 327 m, Inc - 0.09°, Azm - 112.12.
SURF1	DRILL	RIGSER	339.00	18:00	18:30	0.50	P	Service rig while Electrician fault find TDS blower motor fault. Found water in cable plugs from rain storm. Dry out plugs & wrap with shrink wrap to prevent water from getting in from passing storms. Circulate hole clean @ 700 gpm then reduce to 300 gpm and continue to circulate while fault find.
SURF1	DRILL	DRL	369.00	18:30	19:45	1.25	P	Drill ahead 12 1/4" Surface Hole from 339 m to 369 m. Average ROP = 24 mtr/hr. 700 GPM, 1200 PSI, 150-160 RPM, 1-5k WOB, 2-3k Torque. Hard stringer @ 350mtrs (15k / 50rpm). Record MWD TD survey @ 362 m, Inc - 0.26°, Azm - 131.89. Geoservices confirm formation: 345 m - 80% Slitstone & 20% Linstone. 360 m - 80% Slitstone & 20% Linstone. TD - 369 m - 90% Slitstone & 10% Linstone. P/up Wt 69k - S/off Wt 68k - Str W.t 69k.
SURF1	DRILL	CIR	369.00	19:45	20:45	1.00	P	Pump 2 x 10 bbl Hi-Vis sweeps & circulate hole clean @ 700 GPM.

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SURF1	DRILL	POOH	369.00	20:45	0:00	3.25	P	Flow check, well static. POOH from 369 m to 24 m. Good hole noted. Break out stab & gauge = 1/16 under gauge.
Day :		27-Mar-2014		Days on Well : 8.00		Days from Spud : 1.83		
Phase	Task	Activity	Depth (m)	From	To	Dur'n (hrs)	Class	Activity
SURF1	DRILL	POOH	369.00	0:00	1:15	1.25	P	POOH from 24 m to surface. Flush MWD with 2 Bbl fresh water. Break out bit & gauge same. 0-1-CT-G-X-I-(CT-RR)-TD.
SURF1	DRILL	POOH	369.00	1:15	1:30	0.25	P	Clean & clear rig floor of excess drilling equipment. Remove Drill pipe elevators.
SURF1	CASE	CSHNDL	369.00	1:30	2:45	1.25	P	Clean out cellar, install & level casing support base. Rig up Casing handling equipment - Bail arm extensions & casing Elevators. Rig up Power tong & function test.
SURF1	CASE	CSHNDL	369.00	2:45	4:15	1.50	P	Hold PJSM with all personnel involved in casing run. Makeup 9-5/8" Casing shoe track & test floats. (Crossed connection on Float collar while making up connection. Backed connection out & checked / cleaned thread - "Ok")
SURF1	CASE	CSHNDL	369.00	4:45	8:00	3.25	P	RIH with 9 5/8" K-55 36 lb/ft Surface Casing from surface to 359 m. Fill every jnt. Last 3 x Full length jnts, Epoxy coated, touched up w/ brush. Very good hole conditions.
SURF1	CASE	WASH	369.00	8:00	8:30	0.50	P	Wash down spare full length jnt & tag btm @ 369 m. No fill. Lay out wash down joint.
SURF1	CASE	CSHNDL	369.00	8:30	10:15	1.75	P	Pick up / Make up & RIH SCH-1 wellhead made up to pup jnt & running tool. (Face side outlet towards sump).
SURF1	CASE	CIR	369.00	10:15	10:45	0.50	P	Circulate casing at 367 m setting depth w/ 370 gpm @ 60 psi.
SURF1	CEMT	RU	369.00	10:45	11:15	0.50	P	Hold PJSM for cementing. Witness load bottom & top cement plugs. Install 2 stage cement head & assoc lines. Chain down casing 2" below setting depth.
SURF1	CEMT	CMT	369.00	11:15	13:00	1.75	P	Halliburton pump 35 bbls water. Pressure test surface lines to 3000 psi - solid. Drop btm plug w/ 5 bbls water. Mix & pump 89.5 bbls of Lead cement slurry @ 11.8 ppg (2.76 cft/sk) & 34 bbls of Tail cement slurry @ 15.8 ppg (1.16 cft/sk). Drop top plug & displace with 91 bbls of water (92 bbls flex counter). Bump plug w/ 400 psi. Pressure up & test casing to 2500 psi - ok. Bled back 1.25 bbls with floats holding. Good returns thru out cement job. 35 bbls cement to surface. 74 klbs hook load prior to cement. 72 klbs post.
SURF1	CEMT	RD	369.00	13:00	14:00	1.00	P	Hold PJSM. Then commence filling cuttings dump truck w/ cement & water returns from cement job & cleaning cellar/shakers.
SURF1	CEMT	NU	369.00	14:00	15:00	1.00	P	Land casing in cellar landing base w/ 48 klbs casing wt. Remove cement head @ 14:30 hrs. Lay out running tool.
SURF1	BOPSUR	NU	369.00	15:00	18:00	3.00	N	Land out BOP on SCH1 Well head and attempt to torque up SCH1 Drilling Adaptor. Note Alignment nose drive screw on SCH1 Drilling Adaptor seized. Remove BOP, Inspect Drive screw & trouble shoot. Contact G.E for advice on issue. As per G.E, remove the Lockring & work Drive screws free. Unable to remove lockring without potentially damaging compression ring. Free up drive screw - ok. Clean same.
SURF1	BOPSUR	NU	369.00	18:00	20:15	2.25	P	Install side outlet valve on casing head. Land BOP and engage lock ring on drilling adaptor, torque up drive screws to 500 ft/lbs in 100 ft/lbs increments. No issues with Drive screws noted. *Continue clean & dispose of cement water returns.

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SURF1	BOPSUR	TSTPRS	369.00	20:15	22:30	2.25	P	<p>Make up Combo tool & pressure test BOP's:</p> <p>All pressure tests, 200 / 2500 psi, 5 / 10 mins.</p> <p>1) Well head connection, Annular, Inner Kill valve, Inner Choke valve & MP Eq valve.</p> <p>2) Well head connection, Pipe Rams, Inner Kill valve, Inner Choke valve & 4" Stand pipe valve.</p> <p>3) Well head connection, Kelly cock, Inner Kill valve & Inner Choke valve.</p> <p>Recover Combo tool break out & reverse to run Wear bushing.</p> <p>Off line pressure tests:</p> <p>1) Blind rams, 2 x 4" MP valves, Kelly cock, Kelly hose & Inner Choke valve - 200 / 3000 psi, 5 / 10 mins. (Test Kelly hose after change out).</p> <p>All tests below 200 / 2500 psi, 5 / 10 mins.</p> <p>2) Blind rams, 2" Kill valve, Choke manifold valves #8, 11 & 12.</p> <p>3) Blind rams, Check valve, Choke manifold valves #7, 8, 9, 10 & 12.</p> <p>4) Blind rams, Outter Kill valve, Choke manifold valves #4, 5 & 6.</p> <p>5) Blind rams, Inner Kill valve, Choke manifold valves #1, 2, 3 & 4.</p> <p>6) Blind rams, Outter Choke valve & Inner Kill valve.</p> <p>7) TIW.</p> <p>8) Grey valve.</p>
SURF1	BOPSUR	NU	369.00	22:30	23:15	0.75	P	Install Bell nipple, fill up line, Flow line & centre BOP stack.
SURF1	BOPSUR	WEAR	369.00	23:15	23:45	0.50	P	Run & set wear bushing (engage 2 x lock screws). Break out Combo tool.
SURF1	BOPSUR	ACCTST	369.00	23:45	0:00	0.25	P	Conduct Koomey drawdown test. Layout single. Complete well control readiness check list.
Day :		28-Mar-2014		Days on Well : 9.00		Days from Spud : 2.83		
Phase	Task	Activity	Depth (m)	From	To	Dur'n (hrs)	Class	Activity
SURF1	DRILL	BHPULD	369.00	0:00	2:15	2.25	P	<p>Make up 8-1/2 Production BHA with PDC Bit (Stealth - SS036+), NBS, 2 x string Stab's, MWD & NMDC. Install float and Totco ring. Check venturi sleeve in MWD.</p> <p>RIH BHA to 77 m.</p>
SURF1	DRILL	RIGSER	369.00	2:15	2:45	0.50	P	Rig service while rig crew recover drift that had been placed in the Drilling Jar and become lodged in the Mandrel recess.
SURF1	DRILL	BHPULD	369.00	2:45	4:00	1.25	P	<p>RIH BHA from 77 m to 186 m.</p> <p>Shallow test MWD @ 440 gpm, 650 psi.</p> <p>Fill MGS & Flare tank with water.</p>
SURF1	DRILL	RIH	369.00	4:00	4:45	0.75	P	RIH with 8-1/2" Production BHA on drill pipe from 186 m to 330 m. Hold trip drill with crew.
SURF1	DRILL	RIGSC	369.00	4:45	6:00	1.25	P	<p>Hold PJSM – Slip & cut drilling line.</p> <p>Calibrate block height, set block high / low points, crown saver & function test.</p>
SURF1	DRILL	SAFED	369.00	6:00	6:45	0.75	P	<p>Hold PJSM w/- crew.</p> <p>Close Annular & line up through Choke manifold to MGS.</p> <p>Close choke & apply 300 psi to the Annular.</p> <p>Conduct power choke drill with Driller, AD & Derrickman each operating the choke to conduct a controlled pump start up maintaining constraint casing pressure.</p> <p>Confirm Flow show and all gauges correspond, Pason & Geoservices.</p> <p>Stop pumping & verify no pressure, open Annular.</p> <p>Line up all well control equipment for drilling / hard shut in.</p>
SURF1	DRILL	WASH	369.00	6:45	7:00	0.25	P	Wash down & tag top of cement plugs @ 356 m.

Well Name: Cuisinier 14	Operating Co: Santos Ltd	Rig: Saxon 188
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SURF1	DRILL	DRLCMT	369.00	7:00	10:45	3.75	P	Drill cement plugs, float (3 hrs), & shoe @ 367.3 m. Displace water to 8.8 ppg mud @ 364 m. (Max 20k wob, flow 220-320, rpm 10-60).
SURF1	DRILL	CLNRIG	369.00	10:45	11:30	0.75	P	Dispose of excess displacement / cement drill water in cuttings bin. Emph to an acceptable level in cuttings bin for drilling operations to commence. Take on 80 bbls cement contaminated water to a premix tank for treatment & reuse. Continue displace & wash rathole to 369 m.
PROD1	DRILL	DRL	372.00	11:30	11:45	0.25	P	Drill 3 m of new 8½" production hole to 372 m.
PROD1	DRILL	CIR	372.00	11:45	12:00	0.25	P	Circulate even mud weight @ 8.8 ppg. (Confirm formation in btms up sample)
PROD1	DRILL	LOTFIT	372.00	12:00	13:00	1.00	P	Hold PJSM with crew. Lay down single & table rack 2nd jnt. Perform LOT down drill string. Shoe depth = 367 m. Test mud weight = 8.8 ppg. Leak off pressure = 330 psi. EMW = 14.1 ppg.
PROD1	DRILL	DRL	807.00	13:00	0:00	11.00	P	Drill 8½" production hole from 372 m to 807 m. Average ROP = 39.54 mtr/hr. 500 GPM, 1050-1244 PSI, 50-165 RPM, 2-5k WOB, 1-2k Torque. Stage up parameters to optimum when stabs / collars out of the casing shoe. Record MWD survey every 4th connection. Last survey @ 780 m, Inc - 0.26°, Azm - 339.76. No sweeps required. P/up wt 92k - S/off wt 90k - Str wt 91k.
Day :		29-Mar-2014		Days on Well : 10.00		Days from Spud : 3.83		
Phase	Task	Activity	Depth (m)	From	To	Dur'n (hrs)	Class	Activity
PROD1	DRILL	DRL	1,243.00	0:00	10:45	10.75	P	Drill 8½" production hole from 807 m to 1243 m. Average ROP = 40.5 mtr/hr. 500 GPM, 1244-1800 PSI, 165 RPM, 2-5k WOB, 2-4 k ft/lbs Torque. Record MWD survey every 4th connection. Last survey @ 1217 m, Inc - 1.49°, Azm - 226.90. No sweeps required. P/up wt 99k - S/off wt 97k - Str wt 98k.
PROD1	DRILL	RIGSER	1,243.00	10:45	11:15	0.50	P	Daily rig service.
PROD1	DRILL	DRL	1,546.00	11:15	0:00	12.75	P	Drill 8½" production hole from 1243 m to 1546 m. (Drilling torque increasing from 1230 m) Average ROP = 23.76 mtr/hr. 450 GPM, 1550- PSI, 100-150 RPM, 4-10k WOB, 3-7 k ft/lbs Torque. Record MWD survey every 4th connection. Last survey @ 1533 m, Inc - 3.96°, Azm - 165.64. Geoservices drop Carbide bom @ 1507 m & report hole 2% over gauge. Pump & spot 3 bbl LCM & conduct flow check each connection from 1500 m. Add Microflow to active system from 1500 m. P/up wt 130k - S/off wt 124k - Str wt 126k.
Day :		30-Mar-2014		Days on Well : 11.00		Days from Spud : 4.83		
Phase	Task	Activity	Depth (m)	From	To	Dur'n (hrs)	Class	Activity

Well Name: Cuisinier 14	Operating Co: Santos Ltd	Rig: Saxon 188
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PROD1	DRILL	DRL	1,559.00	0:00	1:45	1.75	P	Drill ahead 8 1/2" Production hole from 1546 m to 1559 m. Average ROP = 7.42 m/hr. 500 gpm, 2040 psi, 150 rpm, 2-4k wob, 1-3k Torque. Record MWD survey each connection due to hole deviation. Last survey @ 1546 m - Inc 3.96° - Azm 162.22°. Spot 4 bbl LCM & conduct flow check on each connection.
PROD1	DRILL	CIR	1,559.00	1:45	2:45	1.00	P	Geoservices re-boot data system due to system not interrupting / recording drilling data correctly. Re-boot system a second time due to first re-boot not working. Confirm with drill floor that system parameters correct. Circulate @ 500 gpm until hole clean then reduce to 200 gpm & work pipe.
PROD1	DRILL	DRL	1,623.00	2:45	6:30	3.75	P	Drill ahead 8 1/2" Production hole from 1559 m to 1623 m. Average ROP = 17 m/hr. 350 gpm, 1224 psi, 120-150 rpm, 2-8k wob, 2-5k Torque. Record MWD survey every 2nd connection due to hole deviation. Last survey @ 1600 m - Inc 3.61° - Azm 159.67°. Spot 4 bbl LCM & conduct flow check on each connection. P/up wt = 130k - S/off wt = 126k - R.T wt = 129k. **Note: Slightly reduce ROP/WOB as concerned about deviation / logging dog legs. Did not ream/wash connections more than once throughout well.
PROD1	DRILL	DRLCNE	1,665.00	6:30	10:15	3.75	P	Control Drill for Evaluation from 1623 m to 1665 m. 350 gpm, 1150 psi, 140 rpm, 5k wob, 1-4k Torque. Spot 4 bbl LCM & conduct flow check on each connection.
PROD1	DRILL	RIGSER	1,665.00	10:15	10:45	0.50	P	Daily rig service.
PROD1	DRILL	DRLCNE	1,696.00	10:45	14:45	4.00	P	Control Drill for Evaluation from 1665 m to 1696 m. 350 gpm, 1150 psi, 140 rpm, 5k wob, 1-4k Torque. Spot 4 bbl LCM & conduct flow check on each connection.
PROD1	DRILL	DRL	1,764.00	14:45	19:00	4.25	P	Drill ahead 8 1/2" Production hole from 1696 m to TD @ 1764 m. WSG report last show @ 1648 m. Average ROP = 16 m/hr. 400 gpm, 1380 psi, 120-140 rpm, 8-13k wob, 2-5k Torque. Record MWD survey every 2nd connection. TD survey @ 1751.05 m - Inc 2.29° - Azm 178.83°. Final departure = Spot 4 bbl LCM & conduct flow check on each connection. P/up wt = 138k - S/off wt = 134k - R.T wt = 137k.
PROD1	DRILL	CIR	1,764.00	19:00	20:45	1.75	P	Pump 2 x 5 bbl Hi-Vis sweep's, rotate & work the string while circulate hole clean. 400 gpm, 1425 psi, 140 RPM. Record SCR's with 9.1 ppg prior to POOH.
PROD1	DRILL	FLWCHK	1,764.00	20:45	21:00	0.25	P	Flow check well over trip tank, well static.
PROD1	DRILL	POOH	1,764.00	21:00	0:00	3.00	P	POOH for wiper trip from 1764 m to 1136 m. 10-15k excess hole drag from 1764 m to 1700 m. Work through without issue. Intermittent 5-10 excess drag noted from 1700 m to 1136 m.
Day :		31-Mar-2014	Days on Well : 12.00			Days from Spud : 5.83		
Phase	Task	Activity	Depth (m)	From	To	Dur'n (hrs)	Class	Activity
PROD1	DRILL	POOH	1,764.00	0:00	1:00	1.00	P	POOH for wiper trip from 1136 m to 981 m. Intermittent 5-10 excess drag noted from 1136 m to 981 m. 15-25 excess drag @ 981m - Unable to work through.
PROD1	DRILL	REAMBK	1,764.00	1:00	2:45	1.75	P	Make up TDS & back ream from 981 m to 868 m. (Muckunda FM). 400 gpm, 120 rpm & 2-5k torque.

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PROD1	DRILL	WIPER	1,764.00	2:45	4:45	2.00	P	POOH for wiper trip from 868 m to 550 m. 5-20 excess drag noted from 868 m to 550 m, work pipe through a second time to ensure area clean. 15-25k drag @ 641m - Back ream from 641 m to 633 m. 15-25k drag @ 602 m - Back ream from 602 m to 593 m. 15-25k drag @ 568 m - Back ream from 578 m to 567 m. 400 gpm, 120 rpm & 2-5k torque.
PROD1	DRILL	REAM	1,764.00	4:45	7:00	2.25	P	Back ream from 550 m to 367 m (casing shoe) due to consistant hole drag @ 15-20k. 400 gpm, 120 rpm & 2-5k torque. Circulate btms up inside the casing shoe to clear annulus.
PROD1	DRILL	RIGSER	1,764.00	7:00	7:30	0.50	P	Daily rig service.
PROD1	DRILL	RIGSC	1,764.00	7:30	8:15	0.75	P	Hold PJSM. Slip drilling line. (circ over trip tank, av static drink rate = 1.0 bbl/hr.
PROD1	DRILL	WIPER	1,764.00	8:15	14:30	6.25	P	RIH on wiper trip from 367 m (shoe) to 1694 m. Ream tight spot @ ± 450 m. Ream tight spot @ ± 520 m. Work thru tight spot @ ± 1000 m. Ream tight spot @ 1250 m & 1270 m. *Overall hole conditions pretty good.
PROD1	DRILL	RIGREP	1,764.00	14:30	15:45	1.25	N	ST-80 Make up cycle not completing. Raise PTW. Troubleshoot. Replace make/break solenoid, retest - ok. (No evidence of damage or cable damage). *Pre-cautionary conduct ST-80 interlocks & conduct torque verification checklist - all ok.
PROD1	DRILL	WIPER	1,764.00	15:45	16:30	0.75	P	RIH on wiper trip from 1694 m to 1764 m TD. Wash & ream drag from 1720 m to btm.
PROD1	DRILL	CIR	1,764.00	16:30	18:15	1.75	P	Circulate hole clean & condition mud. (Add light/low vis premix, & top up to 4% KCL to the system). Spot balanced 40 bbl (3.5% EvoLube/Friction reducer) Logging Pill on btm.
PROD1	DRILL	FLWCHK	1,764.00	18:15	18:30	0.25	P	Flow check well over trip tank, well static.
PROD1	DRILL	POOH	1,764.00	18:30	21:45	3.25	P	POOH to run wire line logs from 1764m to 1254 m. Flow check above pay zones @ 1531 m - Well static. Tight spot @ 1709-1708 m. Work through with 20/25k over pull / slack off. Work thought area several times to ensure clear. Good hole conditions above 1708 m.
PROD1	DRILL	RIGREP	1,764.00	21:45	22:15	0.50	N	Change out leaking hydraulic hose on hydraulic Elevators. Periodically rotate pipe to ensure free & monitor well over trip tank. Leaking oil contained on rig floor drip pan, moped up & disposed of.
PROD1	DRILL	POOH	1,764.00	22:15	0:00	1.75	P	Continue POOH to run wire line logs from 1254 m to 714 m - Good hole condition.
Day :		01-Apr-2014		Days on Well : 13.00			Days from Spud : 6.83	
Phase	Task	Activity	Depth (m)	From	To	Dur'n (hrs)	Class	Activity
PROD1	DRILL	POOH	1,764.00	0:00	2:00	2.00	P	POOH to runwire line logs from 714 m to 9-5/8" casing shoe @ 367 m - Good hole condition. Flow check over trip tank, well static. Continue POOH to 185 m.
PROD1	DRILL	BHPULD	1,764.00	2:00	4:30	2.50	P	Continue POOH BHA from 185 m to surface. Flush MWD with fresh water. Break out 2 x stab's, NBS (3 x 1/16th) & Bit - Gauge same. Bit gauge - 0-1-CT-G-X-I-(NO/RR)-TD.
PROD1	DRILL	BHPULD	1,764.00	4:30	5:00	0.50	P	Clean rig floor & clear excess equipment. Change out Air union on Bell nipple riser.

Well Name: Cuisinier 14	Operating Co: Santos Ltd	Rig: Saxon 188
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PROD1	EVAL	LOG	1,764.00	5:00	5:30	0.50	P	Hold PJSM with crews & Baker Hughes. Rig up wire line sheaves & logging equipment on rig floor. Monitor well over trip tank.
PROD1	EVAL	LOG	1,764.00	5:30	9:00	3.50	P	Baker Hughes pickup tool string for run #1 - Grandslam. Make up GR-RTEX-MLL-MAC-ZDL-CN-CP-WGI. RIH @ 07:30 hrs. Perform checks inside casing & pass shoe @ 08:15 hrs. Continue RIH wireline to 1085 m, when telemetry failed then all communication was lost with grandslam tools. Average drink rate = 0.5 bbls/hr.
PROD1	EVAL	LOG	1,764.00	9:00	12:30	3.50	N	POOH Grandslam wireline logging tools from 1085 m to surface. Troubleshoot cable head connection. Found 1 x loose/faulty pin connection (Conductor 2). RIH Run 2 (1 RR) Grandslam to 1085 m. Average drink rate = 0.4 bbls/hr. Off line operations: Clean solids from Degaser tank & Pre-mix #1.
PROD1	EVAL	LOG	1,764.00	12:30	17:30	5.00	P	Baker continue Grandslam logging Run 2 from 1085 m. Tools near btm @ 1760m (4m from TD), became sticky, did not go to btm. Log well up from 1760 m @ 13:40 hrs. Tools at surface @ 15:30 hrs. Tools layed out @ 17:30 hrs. Average drink rate = 0.5 bbls/hr. Off line operations: Inspect MP#2 fluid end. Clean solids from Pre-mix #1.
PROD1	EVAL	LOG	1,764.00	17:30	0:00	6.50	P	Hold PJSM with crew & Baker Hughes. Baker Hughes pickup tool string for run #2 - RCI-GR. RIH @ 20:15 hrs. Record first point @ 21:15 hrs. 4 x points tested @ 00:00 hrs. Average drink rate = 0.5 bbls/hr. Off line operations: Inspect MP#1 fluid end. Clean solids from Settling tank.
Day :		02-Apr-2014		Days on Well : 14.00		Days from Spud : 7.83		
Phase	Task	Activity	Depth (m)	From	To	Dur'n (hrs)	Class	Activity
PROD1	EVAL	LOG	1,764.00	0:00	9:45	9.75	P	Baker Hughes continue run #2 - RCI-GR. 15 points tested. Take fluid sample @ 1646 m. Decision made by GEOPS to not take 2nd sample & end logging programme. Average drink rate = 0.61 bbls/hr. Off line operations: Clean solids from Active & Pill tanks).
RUNPRO	CASE	RIGSER	1,764.00	9:45	10:15	0.50	P	Daily rig service. Whilst hold PJSM, raise PTW for change out TDS grabber box dies.
RUNPRO	CASE	RIGREP	1,764.00	10:15	12:00	1.75	N	Change out TDS grabber box dies.
RUNPRO	CASE	WEAR	1,764.00	12:00	12:45	0.75	P	Pick up & make up combination tool to jnt of drill pipe. Retrieve wear bushing.
RUNPRO	CASE	RU	1,764.00	12:45	14:30	1.75	P	Rig up to run 5½" prod casing. Rig in casing tong, casing fill line, elevator bail extensions & elevator inserts, handling gear. For well control: Make up IBOP to btm of safety drill pipe joint, have 4" elevator inserts ready for install, have x/over installed on FOSV on rig floor.

Well Name: Cuisinier 14	Operating Co: Santos Ltd	Rig: Saxon 188
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RUNPRO	CASE	CSHNDL	1,764.00	14:30	0:00	9.50	P	Hold PJSM with rig crew for casing run. Make up single jnt Float & Shoe track, haliweld connections, test fill flow paths. Continue RIH 124 jnts of 5½" (15.5 lb/ft K-55 BTC) casing from surface to 1459m. No issues. Marker joint placed @ 1616.6 m. (Murta @ 1631 m).
Day :		03-Apr-2014		Days on Well : 14.75		Days from Spud : 8.59		
Phase	Task	Activity	Depth (m)	From	To	Dur'n (hrs)	Class	Activity
RUNPRO	CASE	CSHNDL	1,764.00	0:00	2:00	2.00	P	Run 150 jnts of 5-1/2" production casing from 1459 m to 1755.6 m.
RUNPRO	CASE	CIR	1,764.00	2:00	2:15	0.25	P	Make up circulating swedge and wash down jnt 151. Tag bottom at 1764 m. No Fill. P/up 102 kip S/off 101 kip
RUNPRO	CASE	CIR	1,764.00	2:15	4:15	2.00	P	Circulate hole clean with 2 x hole volumes while reciprocating csg with 340 gpm at 280psi. (Condition mud, reduce Vis/Yield from dehydrated state)
RUNPRO	CASE	CSHNDL	1,764.00	4:15	5:30	1.25	P	Hold PJSM with GE tech & drill crew for hanger installation Lay out jnt 151. Make up 5-1/2" hanger / running tool. Install master bushing. Run in hole and set mater bushing in wellhead. GE instal lock screws and confirm engaged.
RUNPRO	CASE	CIR	1,764.00	5:30	6:30	1.00	P	Continue circulate @ 300 gpm with hanger installed whilst cementers rig up. Pump 40bbls of Tuned Spacer V at 10.2ppg. Witness load 2 x plugs into cement head. Hold PJSM for cementing operations.
RUNPRO	CEMT	RU	1,764.00	6:30	7:00	0.50	P	Rig up 2 stage cement head, manifold & lines.
RUNPRO	CEMT	CMT	1,764.00	7:00	9:00	2.00	P	Halliburton pump 5 bbls water. Pressure test surface to 3500 psi / 5mins - ok. Drop bottom plug with 5 bbls water. Mix&pump 207 bbls of Lead slurry @ 11.8 ppg. (6 bpm) Mix&pump 30.5 bbls of HTB Tail slurry @ 15.6ppg. (1-3bpm) Flush lines with water to cellar. Drop top plug. Displace with 137.5 bbls (tubs) / 138.5 bbls (flex) of 9.1 ppg (3% KCL) brine. (6.5 bpm) Bump plug with 950 psi @ 3 bpm. Pressure test casing to 2500 psi after 10mins = 2750 psi. Bleed back 1.0 bbl with floats holding. Theoretical bouyed casing weight = 77 k lbs, String wt prior to cementing = 112 klbs - 28 klbs Blk = 84 k. String wt prior to set hanger = 89 klbs - 28 klbs Blk = 61 k. 380 bbls mud & ± 15 bbls Tuned Spacer to surface.
RUNPRO	CEMT	TSTPRS	1,764.00	9:00	11:30	2.50	P	Flow check well 15 mins, very slowly dropping. Flush BOP mud cross with water. Drain stack & apply 2 ltrs oil down csg. 09:30 hrs. Land off casing hanger with 61 k lbs casing wt. Flush BOPs & choke manifold with water. 10:15 hrs. Pressure test casing hanger seals to 200 psi / 5 mins & 3000 psi / 10 mins - solid test. 11:00 hrs. Remove cement head. Retrieve left hand thread running tool & lay out same - ok. *Transfer 320 bbls of mud to "Cuisinier 16" frac tank.

Well Name: Cuisinier 14	Operating Co: Santos Ltd	Rig: Saxon 188
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RUNPRO	BOPSUR	ND	1,764.00	11:30	18:00	6.50	P	<p>Hold PJSM.</p> <p>Pick up drill pipe safety joint & remove IBOP/grey valve.</p> <p>De-pressurize koomey lines.</p> <p>Nipple down BOPs & associated equipment.</p> <p>GE Install tubing spool & test same - ok.</p> <p>Clean out cuttings bin w/ cuttings tipper truck & vac.</p> <p>*Transfer approx. 320 bbls of mud to "Cuisinier 16" rear sump. (via Tolls water hauler)</p> <p>*Transfer approx. 320 bbls of water to "Cuisinier 16" rear sump. (via Tolls water hauler).</p> <p>*****RIG RELEASE from "CUISINIER 14" @ 18:00 hrs*****</p> <p>25% Rigged Down & 5% Rig Moved prior to rig release.</p> <p>(1 x Mansell Road train & forklift onsite from 02/04/14).</p>
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SANTOS Ltd.
Santos Centre
60 Flinders Street
Adelaide, SA, 5000

Cuisinier #14 Cementing Operations Post Job Report

Prepared for **Alex Shaban**

Friday, 9 May 2014

Submitted by **Troy Saunders**
Halliburton Australia Pty Ltd

HALLIBURTON



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Friday, 9 May 2014

Alex Shaban
Santos Ltd. Cementing Operations
60 Flinders Street,
Adelaide, SA, 5000

Alex,

Re: Cuisinier #14 Cement PJR

Included for your review is a copy of the Post Job Report (PJR) of the Cuisinier #14 cementing operations. The PJR includes job logs, charts and lab reports (where applicable).

I trust this PJR meets the requirements of Santos and with insight and reflection provides sufficient detail for future reference.

Yours sincerely,

Troy Saunders
Technical Representative

1. Summary of Operations

The Cuisinier #14 well was cemented with a 9 5/8in surface casing and a 5 1/2in production casing.

The 9 5/8in surface casing was cemented on 28 March 2014, with 40bbls of freshwater spacer, followed by 89.5bbls of 11.8ppg lead slurry and 34bbls of 15.8ppg tail slurry. Please see Section 2.0 & 4.0 for more details.

The 5 1/2in production casing was cemented on 03 April 2014, with 40bbls of Tuned Spacer V mixed at 10.5ppg followed by 10bbls of freshwater, 207bbls of 11.8ppg lead slurry and 30.5bbls of 15.6ppg tail slurry. Please see Section 3.0 & 5.0 for more details.

1.1. Lessons Learnt

No lessons learnt were observed.

1.2. Blending & Bond log Details

All jobs were pre-hydrated at rig location during the job.

Well Logging details	Comments
Good / Bad Bond	

2. Laboratory Reports

Surface Casing

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Australasia, Jandakot

Lab Results- Lead**Job Information**

Request/Slurry	2115340/1	Rig Name	Saxon 188	Date	11/MAR/2014
Submitted By	Troy Saunders	Job Type	Surface Casing	Bulk Plant	Moomba
Customer	Santos	Location	Cooper Basin	Well	Cuisinier 13-16

Well Information

Casing/Liner Size	9.625 in / 244.475 mm	Depth MD	370 m / 1213 ft	BHST	48°C / 118°F
Hole Size	12.5 in / 317.5 mm	Depth TVD	370 m / 1213 ft	BHCT	36°C / 97°F
Pressure	56 bar / 810 psi				

Drilling Fluid Information

Mud Supplier Name	AMC	Mud Trade Name		Density	8.8 lbm/gal
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Cement Information - Lead Design

<u>Conc</u>	<u>UOM</u>	<u>Cement/Additive</u>	<u>Sample Type</u>	<u>Sample Date</u>	<u>Lot No.</u>	Cement Properties	
		EconoCem				Slurry Density	11.800 lbm/gal
100	% BWOC	ABC Class G	Lab	26.02.14		Slurry Yield	2.76 ft3/sack
16.59	gal/sack	Drill water	Lab	15.12.13		Water Requirement	16.59 gal/sack
12	% BWOC	Bentonite OCMA - PB	Chemicals	12.02.14		Total Mix Fluid	16.59 gal/sack
0.1	% BWOC	HR-5 (PB)	Chemicals	05.12.13			
0.1	% BWOC	D-Air 3000	Chemicals	17.10.13			
						Water Source	Drill water
						Water Chloride	500 ppm

Pilot Test Results Request ID 2115340/1**Mixability (0 - 5) - 0 is not mixable****12/Mar/2014**

Mixability rating (0 - 5)	Avg rpm mixing under load	Blend addition time (sec)
4	12000	19

Mix Rheology**13/Mar/2014**

Temp (°F)	300	200	100	6	3	Foam Quality	Cond Time (min)
80	63	57	48	39	23	0	0

Mix Rheology**13/Mar/2014**

Temp (°F)	300	200	100	6	3	Foam Quality	Cond Time (min)
80	63	53	48	38	24	0	0

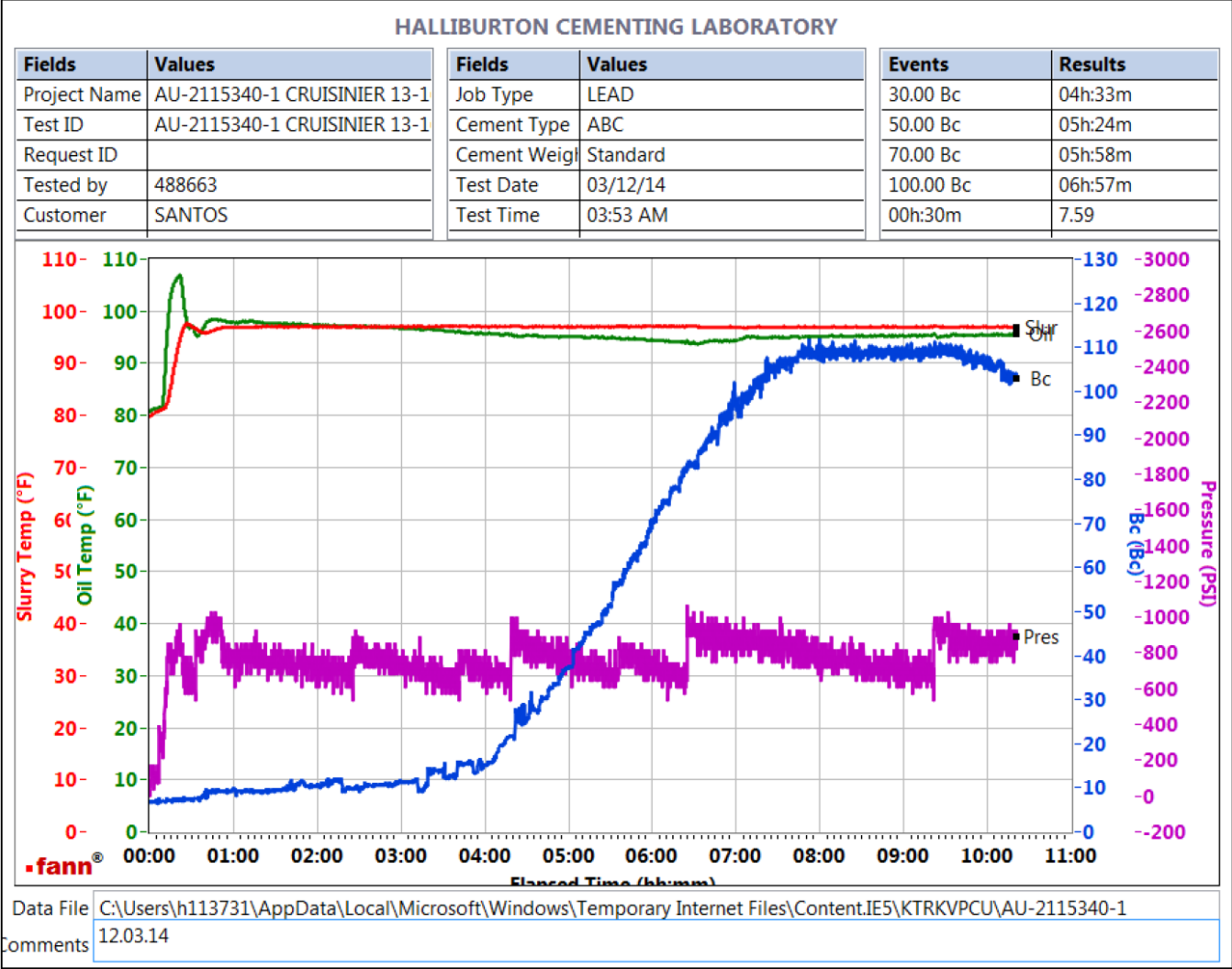
API Rheology**13/Mar/2014**

Temp (°F)	300	200	100	6	3	PV/YP
95	60	56	52	29	19	38.13 / 29.15

Thickening Time**13/Mar/2014**

Temp (°F)	Pressure (psi)	Reached in (min)	Start BC	30 Bc (hh:mm)	50 Bc (hh:mm)	70 Bc (hh:mm)
97	810	20	6	4:33	5:24	5:58

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Australasia, Jandakot

Lab Results- Tail**Job Information**

Request/Slurry	2115341/1	Rig Name	Saxon 188	Date	11/MAR/2014
Submitted By	Troy Saunders	Job Type	Surface Casing	Bulk Plant	Moomba
Customer	Santos	Location	Cooper Basin	Well	Cuisinier 13-16

Well Information

Casing/Liner Size	9.625 in / 244.475 mm	Depth MD	370 m / 1213 ft	BHST	48°C / 118°F
Hole Size	12.25 in / 311.15 mm	Depth TVD	370 m / 1213 ft	BHCT	36°C / 97°F
Pressure	56 bar / 810 psi				

Drilling Fluid Information

Mud Supplier Name	AMC	Mud Trade Name		Density	8.8 lbm/gal
--------------------------	-----	-----------------------	--	----------------	-------------

Cement Information - Tail Design

<u>Conc</u>	<u>UOM</u>	<u>Cement/Additive</u>	<u>Sample Type</u>	<u>Sample Date</u>	<u>Lot No.</u>	Cement Properties	
		HalCem				Slurry Density	15.800 lbm/gal
100	% BWOC	ABC Class G	Lab	26.02.14		Slurry Yield	1.16 ft3/sack
5.11	gal/sack	Drill water	Lab	15.12.13		Water Requirement	5.11 gal/sack
0.1	% BWOC	D-Air 3000	Chemicals	17.10.13		Total Mix Fluid	5.11 gal/sack

Water Source	Drill water
Water Chloride	500 ppm

Pilot Test Results Request ID 2115341/1**Mixability (0 - 5) - 0 is not mixable** 12/Mar/2014

Mixability rating (0 - 5)	Avg rpm mixing under load	Blend addition time (sec)
4	12000	18

Mix Rheology 17/Mar/2014

Temp (°F)	300	200	100	6	3	Foam Quality	Cond Time (min)
80	64	55	44	19	14	0	0

Mix Rheology 17/Mar/2014

Temp (°F)	300	200	100	6	3	Foam Quality	Cond Time (min)
80	64	58	45	26	15	0	0

API Rheology 17/Mar/2014

Temp (°F)	300	200	100	6	3	Cond Time (min)	PV/YP
97	75	65	54	18	13	30	62.25 / 20.71

Thickening Time 13/Mar/2014

Temp (°F)	Pressure (psi)	Reached in (min)	Start BC	30 Bc (hh:mm)	50 Bc (hh:mm)	70 Bc (hh:mm)
97	810	18	15	3:10	3:56	4:12

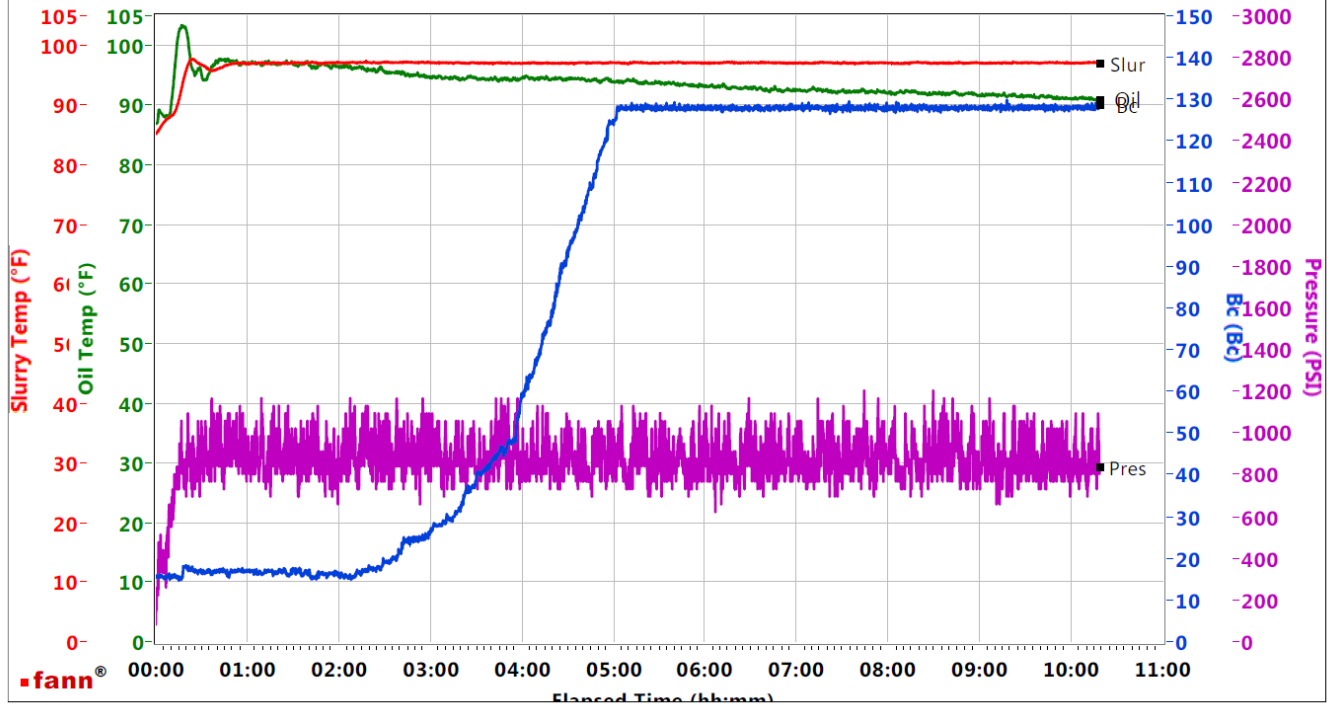
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HALLIBURTON CEMENT LABORATORY JANDAKOT

Fields	Values
Project Name	AU-2115341-1 CUISINIER 13-16
Test ID	AU-2115341-1 CUISINIER 13-16
Request ID	
Tested by	488663
Customer	SANTOS

Fields	Values
Job Type	TAIL
Cement Type	ABC
Cement Weight	Standard
Test Date	03/12/14
Test Time	04:24 AM

Events	Results
30.00 Bc	03h:10m
50.00 Bc	03h:56m
70.00 Bc	04h:12m
100.00 Bc	04h:36m
00h:30m	16.91



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Comments 12.04.14

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3. Laboratory Reports

Production Casing

HALLIBURTON

Australasia, Jandakot

Lab Results- Lead

Job Information

Request/Slurry	2115343/4	Rig Name	Saxon 188	Date	11/MAR/2014
Submitted By	Troy Saunders	Job Type	Production Casing	Bulk Plant	Moomba
Customer	Santos	Location	Cooper Basin	Well	Cuisinier 13-16

Well Information

Casing/Liner Size	5.5 in / 139.7 mm	Depth MD	1755 m / 5757 ft	BHST	127°C / 261°F
Hole Size	8.5 in / 215.9 mm	Depth TVD	1755 m / 5757 ft	BHCT	93°C / 199°F
Pressure	248 bar / 3598 psi				

Drilling Fluid Information

Mud Supplier Name	AMC	Mud Trade Name		Density	9 lbm/gal
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Cement Information - Lead Design

Conc	UOM	Cement/Additive	Sample Type	Sample Date	Lot No.	Cement Properties		
		EconoCem				Slurry Density	11.800	lbm/gal
100	% BWOC	ABC Class G	Bulk Blend	05.03.14		Slurry Yield	2.82	ft3/sack
16.82	gal/sack	Drill water	Lab	15.12.13		Water Requirement	16.82	gal/sack
14	% BWOC	Bentonite OCMA - PB	Chemicals	12.02.14		Total Mix Fluid	16.82	gal/sack
0.45	% BWOC	SCR-100 (PB)	Chemicals	11.12.13				
0.75	% BWOC	HALAD-344 (PB)	Chemicals	11.12.13				
0.1	% BWOC	D-Air 3000	Chemicals	17.10.13				
						Water Source	Drill water	
						Water Chloride	500	ppm

Pilot Test Results Request ID 2115343/4**Mixability (0 - 5) - 0 is not mixable 20/Mar/2014**

Mixability rating (0 - 5)	Avg rpm mixing under load	Blend addition time (sec)
4	12000	19

Mix Rheology 26/Mar/2014

Temp (°F)	300	200	100	6	3	Foam Quality	Cond Time (min)
80	24	17	10	3	2	0	0

Mix Rheology 26/Mar/2014

Temp (°F)	300	200	100	6	3	Foam Quality	Cond Time (min)
80	24	17	9	1	1	0	0

API Rheology 26/Mar/2014

Temp (°F)	300	200	100	6	3	Cond Time (min)	PV/YP
180	14	10	7	2	2	30	12.32 / 2

Free Fluid API 10B-2 / ISO 10426-2 26/Mar/2014

Con. Temp (F)	Con. Pr. (psi)	Cond. Time (min)	Static T. (F)	Static time (min)	Incl. (deg)	% Fluid
190	0	30	190	120	45	1

API Fluid Loss 26/Mar/2014

Test Temp (°F)	Test Pressure (psi)	Test Time (min)	ISO FL (cc/30 min)	Meas. Vol.	Conditioning time (min)
190	1000	30	94	47	30

Thickening Time 20/Mar/2014

Temp (°F)	Pressure (psi)	Batch Mix (min)	Reached in (min)	Start BC	30 Bc (hh:mm)	50 Bc (hh:mm)	70 Bc (hh:mm)
199	3596	0	27	4	5:15	5:15	5:27

These are draft results and have not been approved for final use.

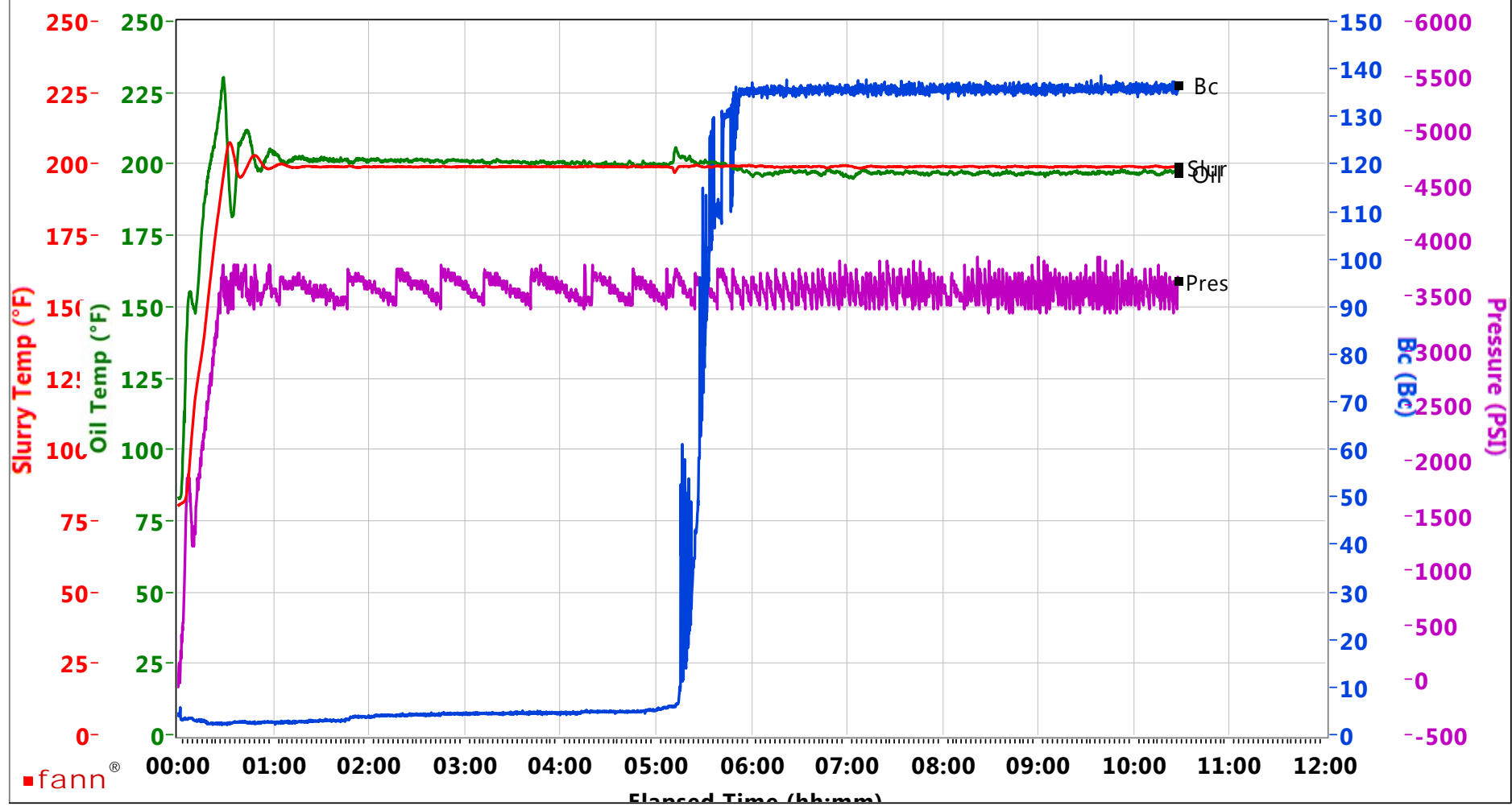
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Halliburton Australia Cementing Laboratory

Fields	Values
Project Name	AU-2115343-4 CUISINIER 13-16
Test ID	AU-2115343-4 CUISINIER 13-16
Request ID	
Tested by	488663
Customer	SANTOS

Fields	Values
Job Type	LEAD
Cement Type	ABC
Cement Weight	Standard
Test Date	03/19/14
Test Time	06:51 AM

Events	Results
30.00 Bc	05h:15m
50.00 Bc	05h:15m
70.00 Bc	05h:27m
100.00 Bc	05h:29m
00h:30m	2.40



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Comments 19.03.14

HALLIBURTON

Australasia, Jandakot

Lab Results- Tail

Job Information

Request/Slurry	2115345/1	Rig Name	Saxon 188	Date	11/MAR/2014
Submitted By	Troy Saunders	Job Type	Production Casing	Bulk Plant	Moomba
Customer	Santos	Location	Cooper Basin	Well	Cuisinier 13-16

Well Information

Casing/Liner Size	5.5 in / 139.7 mm	Depth MD	1755 m / 5757 ft	BHST	127°C / 261°F
Hole Size	8.5 in / 215.9 mm	Depth TVD	1755 m / 5757 ft	BHCT	93°C / 199°F
Pressure	248 bar / 3598 psi				

Drilling Fluid Information

Mud Supplier Name	AMC	Mud Trade Name		Density	9 lbm/gal
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Cement Information - Tail Design

Conc	UOM	Cement/Additive	Sample Type	Sample Date	Lot No.	Cement Properties		
		HalCem				Slurry Density	15.600	lbm/gal
6.62	gal/sack	Drill water	Lab	12.12.13		Slurry Yield	1.57	ft3/sack
		HTB		24.02.14		Water Requirement	6.62	gal/sack
100	% BWOC	ABC Class G	Bulk Blend	24.02.14		Total Mix Fluid	6.62	gal/sack
35	% BWOC	Silica Flour	Bulk Blend	24.02.14				
0.15	% BWOC	HR-5 (PB)	Chemicals	05.12.13				
0.3	% BWOC	HALAD-344 (PB)	Chemicals	11.12.13				
0.6	% BWOC	HALAD-413 (PB)	Bulk Blend	09.11.13				
0.15	% BWOC	SA-541 (PB)	Chemicals	25.09.13		Water Source	Drill water	
0.1	% BWOC	D-Air 3000	Chemicals	17.10.13		Water Chloride	500	ppm

Pilot Test Results Request ID 2115345/1**Mixability (0 - 5) - 0 is not mixable** 13/Mar/2014

Mixability rating (0 - 5)	Avg rpm mixing under load	Blend addition time (sec)
4	12000	16

Mix Rheology 14/Mar/2014

Temp (°F)	300	200	100	6	3	Foam Quality	Cond Time (min)
80	154	112	65	7	4	0	0

Mix Rheology 14/Mar/2014

Temp (°F)	300	200	100	6	3	Foam Quality	Cond Time (min)
80	154	112	64	6	4	0	0

API Rheology 14/Mar/2014

Temp (°F)	300	200	100	6	3	Cond Time (min)	PV/YP
180	130	100	64	11	7	30	124.9 / 11.95

Free Fluid API 10B-2 / ISO 10426-2 14/Mar/2014

Con. Temp (F)	Con. Pr. (psi)	Cond. Time (min)	Static T. (F)	Static time (min)	Incl. (deg)	% Fluid
190	0	30	190	120	45	0.5

API Fluid Loss 14/Mar/2014

Test Temp (°F)	Test Pressure (psi)	Test Time (min)	ISO FL (cc/30 min)	Meas. Vol.	Conditioning time (min)
190	1000	30	56	28	30

Thickening Time 13/Mar/2014

Temp (°F)	Pressure (psi)	Reached in (min)	Start BC	30 Bc (hh:mm)	50 Bc (hh:mm)	70 Bc (hh:mm)
199	3598	26	27	5:03	5:24	5:26

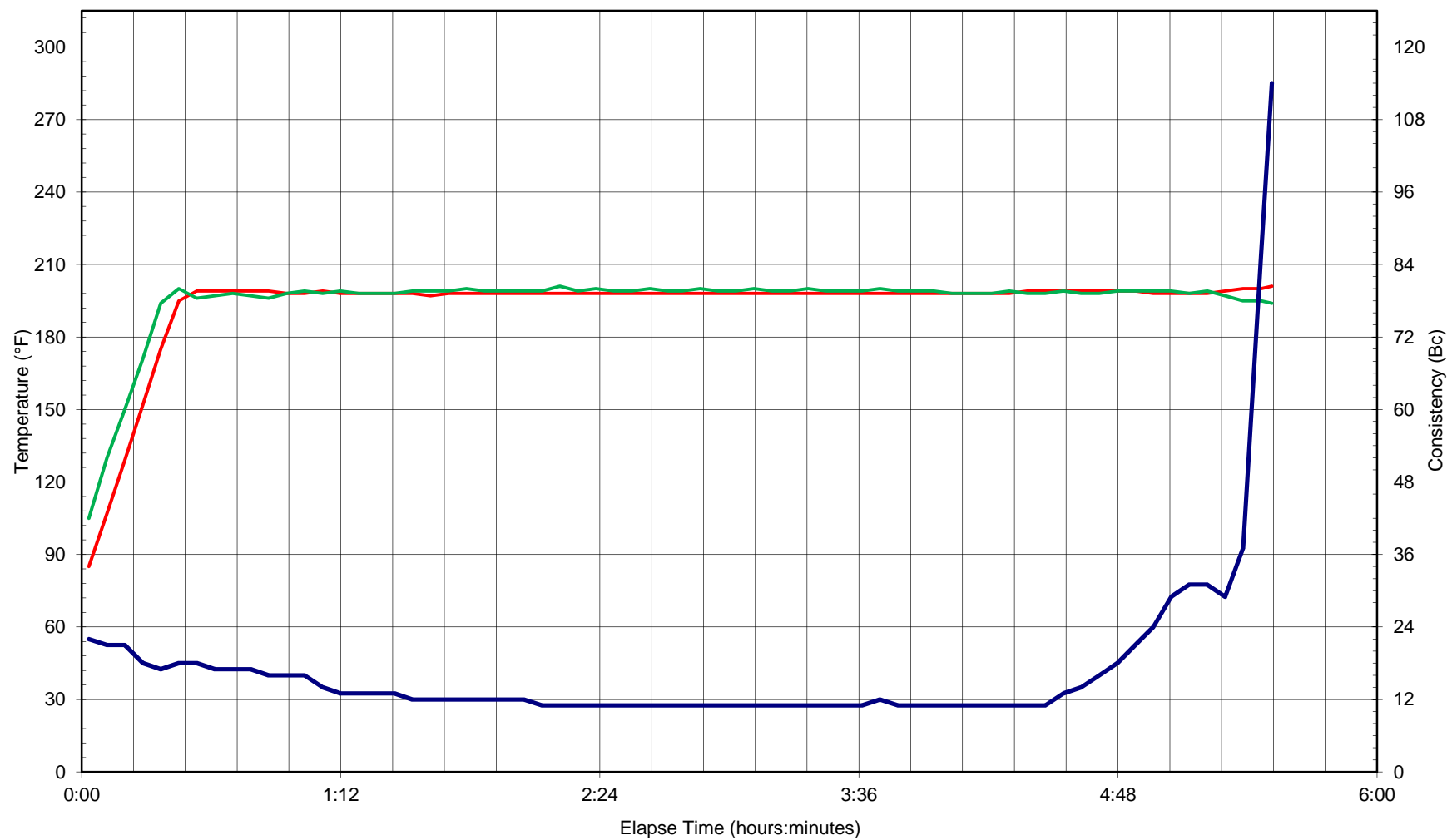
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Test Type: 5.5" PRODUCTION
Test Date: 13-Mar-2014
Test Time: 09:47:27 AM

HALLIBURTON ENERGY SERVICES

Cement Laboratory Test Data
AU-2115345-CUISNIER3-16



UCA Comp. Strength										20/Mar/2014	
End Temp (°F)	Pressure (psi)	50 psi (hh:mm)	500 psi (hh:mm)	8 hr CS (psi)	12 hr CS (psi)	16 hr CS (psi)	24 hr CS (psi)	End CS (psi)	End Time (hrs)		
261	3000	3:27	4:28	1474	1828	1993	2033	1973	44.3		

These are draft results and have not been approved for final use.

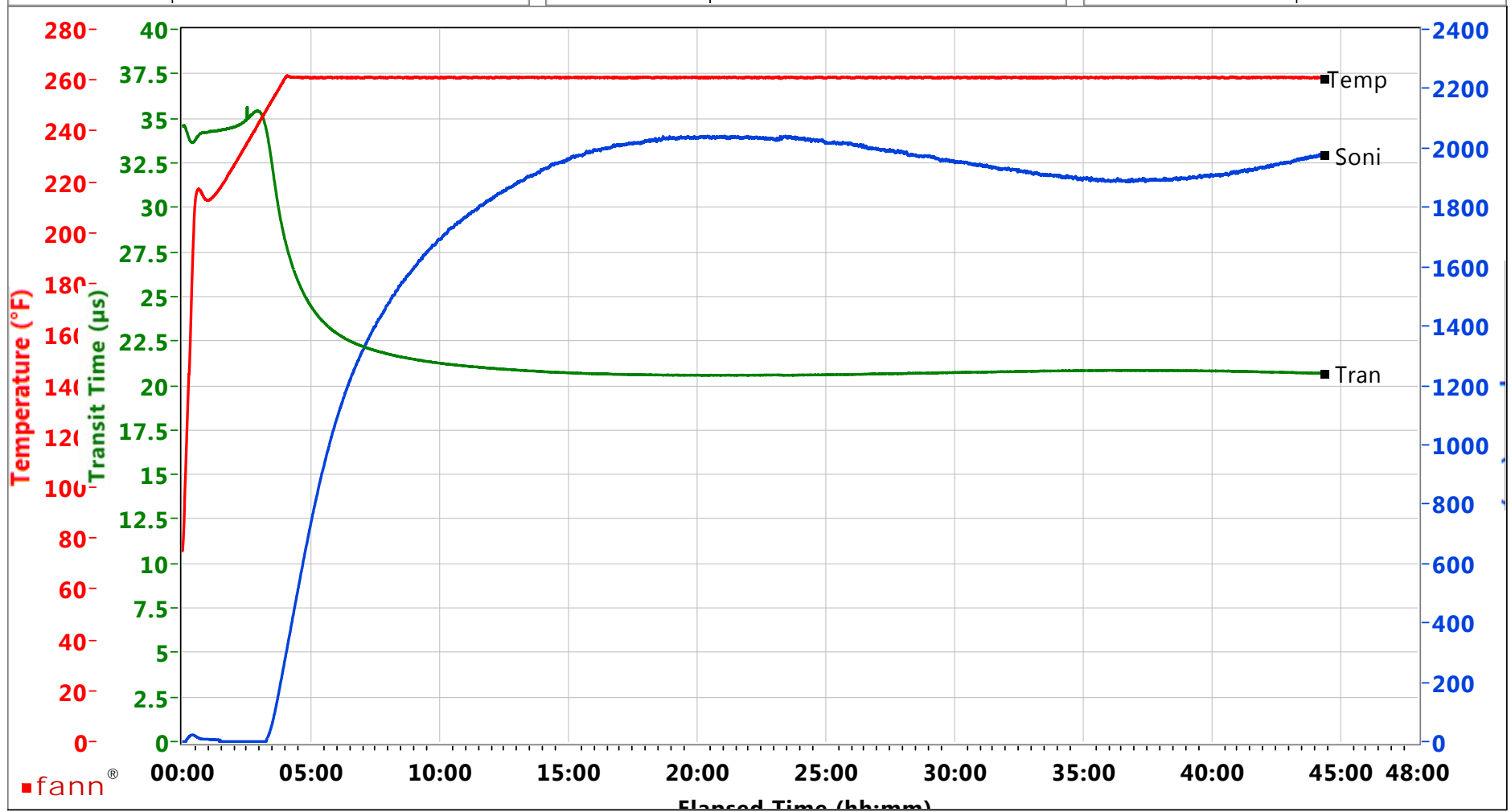
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Halliburton Cement Laboratory Australia

Fields	Values
Project Name	AU-2115345-1 CUISINIER 13-16
Test ID	AU-2115345-1 CUISINIER 13-16
Request ID	
Tested by	539720
Customer	Santos

Fields	Values
Job Type	PRODUCTION CASING
Cement Type	HTB
Cement Weight	Standard
Test Date	3/18/2014
Test Time	12:39 PM

Events	Results
50.00 PSI	03h:27m
100.00 PSI	03h:36m
500.00 PSI	04h:28m
1000.00 PSI	05h:42m
08h:00m	1474.24



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Comments 18-3-14

4. Summary, EJCS & Job Logs

Surface Casing

Santos Limited

POST JOB REPORT
CEMENTING/PUMPING

Well : Cuisinier #14

Rig: Saxon #188

SURFACE CASING 7521

Prepared for Andrew Muckersie

28-March-2014

Prepared by Damien Boxall

HALLIBURTON

The Future is Working Together.

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HALLIBURTON		CUSTOMER Santos Limited		Start Date mm/dd/yy 25-Mar-14		End Date mm/dd/yy 28-Mar-14	
Cementing Services Post Job Report Summary							
WELL Name & Number Cuisinier #14		RIG Name & Number Saxon #188		HES REP Damien Boxall		CUSTOMER REP Andrew Muckersie	
JOB PURPOSE CODE SURFACE CASING 7521		Casing Size 9 5/8		SALES ORDER No.		CUSTOMER PO No.	
WELL CATEGORY 01 Development	WELL TYPE 01 OIL	TECHNOLOGY 01 None	COUNTRY Australia	BASE OF OPS Moomba	BDA Perth		

PERSONNEL

SAP#	PERSONNEL	HOURS	SAP#	PERSONNEL	HOURS	SAP#	PERSONNEL	HOURS
535418	Damien Boxall	81	548977	Barry Wimbhurst	81	413978	Stephan Vianello	3

EQUIPMENT

SAP#	PUMPING / MIXING	HOURS	SAP#	BULK/COMPRESSORS	HOURS	SAP#	VEHICLES/OTHER	HOURS
10025184	75 TC4 - 78543	81	10048620	78245 BULKER	81	11816384	SY98CS - DOLLY	81
						BUDGET	LANDCRUISER - S367AOM	81
						11991431	MACK - SB07FQ	81

FLOAT AND CASING EQUIPMENT

FLOAT EQUIPMENT	QTY	PLUGS	QTY	OTHER	QTY
9.625in Float Shoe	1	9.625in TOP Plug	1		
9.625in Float Collar	1	9.625in BOTTOM Plug	1		

WELL PROFILE

WELL COMPONENT	SIZE (in)	WEIGHT (ppf)	GRADE	THREAD	TOP (MD) (ft)	END (MD) (ft)	END (TVD) (ft)	EXCESS %	LENGTH (ft)
PREVIOUS CSG									
OPEN HOLE	12.25					1213	1213		
NEW CASING	9 5/8	36	K-55	Buttress			1202.62		

FLUID SUMMARY (Refer to Lab Reports for full details)

DETAIL		UOM	FLUID												TOTAL
			1	2	3	4	5	6	7	8	9	10	11	12	
			Spacer	Lead	Tail	Displace									
PROPERTIES	Volume	bbls		89.50	34.00	91.00									214.5
	Density	ppg	8.33	11.80	15.80	8.33									NA
	Yield	cuft/sk		2.76	1.16										NA
	Water Requirement	gal/sk		16.59	5.11										NA
	Total Fluid Req	gal/sk		16.59	5.11										NA
CMT	ABC Class 'G'	sk		191.0	164.0										355.0
	HTB	sk													0.0
H2O		bbls													0.0
		bbls													0.0
CHEMICAL	Bentonite	lbs		2154.0											2154.0
	HR-5	lbs		18.0											18.0
	D-Air 3000	lbs		18.0	15.0										33.0
	D-Air 3000L	gals			1.0										1.0
															0.0

HALLIBURTON				CUSTOMER Santos Limited		Start Date mm/dd/yy 25-Mar-14		End Date mm/dd/yy 28-Mar-14	
Cementing Services Post Job Report - JOB LOGS									
WELL Name & Number Cuisinier #14			RIG Name & Number Saxon #188			HES REP Damien Boxall		CUSTOMER REP Andrew Muckersie	
JOB PURPOSE CODE SURFACE CASING 7521					SALES ORDER No.			CUSTOMER PO No.	
JOB LOGS									
DATE DD-MM-YYYY	TIME HRS:MIN	VOLUME (bbls)	PRESSURE (psi)	Op-HRS-Stby 0 0		RATE (bpm)	JOB DESCRIPTION REMARKS/DETAILS		
25-Mar-14	6:00						Safety Meeting		
	6:30						Depart Base		
	13:00						Arrive Location		
	15:00						Spot Equipment		
26-Mar-14	8:00						Rig Up & Run up Equipment		
	9:00						Test Kickouts		
	13:00						Standby for job		
27-Mar-13	6:30						Called to rig		
	10:30						Rig Up Floor		
	11:00						Load Plugs		
	11:40						Safety Meeting		
	11:50						Head up Plugs Loaded		
	11:55	35				5.5	Spacer		
	12:02		3000				Pressure Test Service Iron		
	12:09						Drop Bottom Plug		
	12:10	5				5	Spacer		
	12:15	89.5				5	Lead Slurry		
	12:30	34				4	Tail Slurry		
	12:48						Drop Top Plug		
	12:50	91				5	Displace		
	13:16		400				Bump Plug		
	13:17		2500				Pressure Test Casing		
	13:28	1.25					Monitor Returns		
	13:40						Rig Down		
	14:50						Wash Up		
28-Mar-14	6:00						Depart Location		
	13:00						Arrive Base		

HALLIBURTON		CUSTOMER Santos Limited	Start Date mm/dd/yy 25-Mar-14	End Date mm/dd/yy 28-Mar-14
Cementing Services Post Job Report - KPI				
WELL Name & Number Cuisinier #14	RIG Name & Number Saxon #188	HES REP Damien Boxall	CUSTOMER REP Andrew Muckersie	
JOB PURPOSE CODE SURFACE CASING 7521		SALES ORDER No.	CUSTOMER PO No.	
KEY PERFORMANCE INDICATORS				

TYPE OF JOB (Cementing or Non-Cementing):

Select the job type (Cementing or Non-Cementing)

TOTAL OPERATING TIME (hrs)

Rig up/ Pumping/ Rig Down

HSE INCIDENT, ACCIDENT, INJURY:

This should be recordable incidents only

WAS THE JOB PURPOSE ACHIEVED?

This will be dictated by the customer

TOTAL TIME PUMPING (hrs)

Total number of hours pumping fluid on this job

NON -PRODUCTIVE RIG TIME:

As a result of Halliburton cementing PSL

NUMBER OF JSA'S PERFORMED:

NUMBER OF UNPLANNED SHUTDOWNS (After starting to pump)

TYPE OF RIG (CLASSIFICATION) JOB WAS PERFORMED ON:

WAS THIS A PRIMARY CEMENT JOB (YES / NO)

Primary cement job = Casing job, Liner Job, tie back

DID WE RUN WIPER PLUGS?

WAS THIS A PLUG OR SQUEEZE JOB?

WAS THIS A PRIMARY OR REMEDIAL JOB?

Remedial = Repeated attempts or corrections of initial cement job

MIXING DENSITY OF JOB STAYED IN DESIGNED RANGE *percentage*

Density defined as +/- 0.2ppg. Calculation: Total bbls cement mixed at designed density divided by total bbls of cement multiplied by 100

WAS AUTOMATED DENSITY CONTROL USED

JOB WAS PUMPED AT DESIGNED PUMP RATE *percentage*

Pump rate ranged defined as +/- bpm. Calculation : total bbls of fluid pumped at the designed rate divided by total bbls of fluid pumped multiplied by 100

NUMBER OF REMEDIAL SQUEEZE JOBS REQUIRED - HES

Number of remedial squeeze jobs required after primary job performed by HES

NUMBER OF REMEDIAL AQUEEZE JOBS REQUIRED - COMPETITION

Number of remedial squeeze jobs required after primary job performed by competition

NUMBER OF REMEDIAL PLUG JOBS REQUIRED - HES

Number of remedial plug jobs required after primary plug pumped by HES

ANY REASON FOR UNPLANNED SHUTDOWNS (After starting to pump)

Add details in job logs

ANY REASON FOR NON-PRODUCTIVE RIG TIME (Cementing PSL responsibility):

Add details in job logs

Sales Order #:	0	Line Item:	10
Customer:	Santos Limited	Job Type (BOM):	SURFACE CASING 7521
Customer	Andrew Muckersie	API / UWI: (Leave Blank if unknown)	
Well Name:	Cuisinier #14	Well Number:	
Well Type:	01 OIL	Well Country:	Australia
H2S Present:	No/Yes	Well State:	Perth

Dear Customer,

We hope that you were satisfied with the service quality of this job performed by Halliburton. It is the aim of our management and service personnel to deliver equipment and service of a standard unmatched in the service sector of the energy industry.

Please take the time to let us know if our performance met with your satisfaction. Please be as critical as possible to ensure we constantly improve our service. Your comments are of great value to us and are intended for the exclusive use of Halliburton.

CATEGORY	CUSTOMER SATISFACTION RESPONSE	
Survey Conducted Date	The date the survey was conducted	28/03/2014
Survey Interviewer	The survey interviewer is the person who initiated the survey.	Damien Boxall
Customer Participation	Did the customer participate in this survey? (Y/N)	
Customer Representative	Enter the Customer representative name	Andrew Muckersie
HSE	Was our HSE performance satisfactory? Circle Y or N	
Equipment	Were you satisfied with our Equipment? Circle Y or N	
Personnel	Were you satisfied with our people? Circle Y or N	
Customer Comment		
CUSTOMER SIGNATURE		

HALLIBURTON		CUSTOMER Santos Limited	Start Date mm/dd/yy 25-Mar-14	End Date mm/dd/yy 28-Mar-14
HSE checksheet				
WELL Name & Number Cuisinier #14	RIG Name & Number Saxon #188	HES REP Damien Boxall	CUSTOMER REP Andrew Muckersie	
JOB PURPOSE CODE SURFACE CASING 7521		SALES ORDER No.	CUSTOMER PO No.	
ATTENDEES				
Andrew Muckersie	Damien Boxall	Barry Wimhurst	Stephan Vianello	
HAZARDS FOUND AT JOB SITE				

MARK BOXES WITH AN (X) OR LEAVE BLANK IF NOT APPLICABLE

☐ **Electrical** Discuss location of electrical lines and power sources in relation to equipment and lines

☐ **Hydraulic Leaks** - Discussed procedures to follow for leaks

☐ **Chemicals** Discuss harmful substances on the job site (eg. H2S, flammable gasses, drilling fluids, additives well bore fluids, Radioactive). Ask for MSDS sheets when necessary Discuss possible exposures to substances such as dust, acids, alkalines, vapours, and Flammable/combustibles

☐ **Communication** Discuss radios, hand signals etc.

☐ **Noise** Discuss noise levels from equipment. Avoid placing high noise producing equipment next to work stations when possible. Avoid areas of high noise if possible or use appropriate hearing protection

☐ **Ignition sources** Discuss possible ignition sources (eg. engines, electrical equipment, open flames, smoking etc.)

☐ **Lifting** Discuss proper lifting techniques and ways to eliminate or reduce heavy lifting such as; forklifts, cranes, and sharing the load.

☐ **Radiation** Discuss radiation hazards introduced to the site.

☐ **Walking / Working Surfaces** Discuss the terrain where the rig up and job will occur (eg. Boards, limestone, mud, stairways, walkways, the derrick, and the rig floor Discuss the dangers in walking on cementing equipment, especially on HT400 pumps

☐ **Wellbore fluids or Gasses** Discuss shale shaker, Frac tanks, return lines, and vent lines.

☐ **Slipping and tripping** Discuss tripping hazards (eg. equipment and lines on the ground and rig floor, suction hoses and vent lines)

☐ **Falling** Discuss job procedures requiring work at heights greater than 1.8m

☐ **Environment** Discuss environmental conditions (eg. heat, cold, ice snow, rain, wind, dust, visibility etc.)

☐ **Overhead** Discuss overhead hazards (eg. guy wires, hazards while on rig floor or under the rig floor). Discuss equipment rigged up overhead such as DME above the rig floor, lubricators, chains, pulleys.

☐ **Pressure** Discuss pressure hazards such as DME and bulk tanks

HAZARD CONTROLS

☐ **Personal protective equipment** Discuss required PPE such as respirators, head protection, hearing protection, protective footwear, hand and skin protection, and fall protection

☐ **Physical barriers** Discuss items such as hose covers, line tie-downs, guards, railings, and inert gas blankets.

☐ **Spill control** Discuss measures used for reporting and containing spills.

☐ **Ignition source controls** Discuss control measures for ignition sources such as the use of spark arresters, emergency shutdown procedures, and NO SMOKING rules.

☐ **Safety equipment** Discuss safety items such as pop-off valves, fire extinguishers, and communication devices.

☐ **Emergency Shut Down Procedures** Discuss when, how and what to shut down in the event of an emergency.

☐ **Recovery Procedures** Discuss how to return to normal operating procedures after an emergency.

☐ **Fire fighting** Discuss fire fighting responsibilities with the appropriate personnel (trained & equipped personnel only)

☐ **First Aid Station** point out the location of the first aid lot and who is responsible for administering first aid.

☐ **High Pressure Manifolding** Clearly mark all high pressure manifolding after rigging it up and before commencing any pumping. Possible marking may include: Yellow tape, signs, roping off the area, orange cones etc.

☐ **Environment** Discuss control measures for environmental factors such as temperature, wind, ice, rain, snow, etc.

☐ **Injury and Accident Procedures** Discuss personnel responsibilities and procedures in the event of an injury or accident.

☐ **Vents** Discuss vent lines for Frac tanks and bulk tanks.

HALLIBURTON		CUSTOMER Santos Limited	Start Date mm/dd/yy 25-Mar-14	End Date mm/dd/yy 28-Mar-14
HSE checksheet				
WELL Name & Number Cuisinier #14	RIG Name & Number Saxon #188	HES REP Damien Boxall	CUSTOMER REP Andrew Muckersie	
JOB PURPOSE CODE SURFACE CASING 7521		SALES ORDER No.	CUSTOMER PO No.	
PERSONELL RESPONSIBILITES				

Discuss individual roles and responsibilities for all of the above. Determine the level of understanding by asking questions, performing skill checks or other forms of evaluation, depending upon the hazards of the process (eg. Opening and closing of valves, the correct use of communication devices, the correct use of specific PPE such as fall protection, and an understanding of equipment and procedures.

EMERGENCY PROCEDURES

TOTAL EVACUATION AREA!!

CONTACT DETAILS

Ambulance / EMS:	_____	First Aid Responders on this site (names):	_____
Doctor:	_____		_____
Supervisor: Halliburton	_____	Hospital:	_____
Fire Department	_____	Police:	_____
Information Centre:	_____	National Poisons and Hazardous Chemicals	_____

HALLIBURTON		CUSTOMER Santos Limited	Start Date mm/dd/yy 25-Mar-14	End Date mm/dd/yy 28-Mar-14
PREJOB CHECKSHEET				
WELL Name & Number Cuisinier #14	RIG Name & Number Saxon #188	HES REP Damien Boxall	CUSTOMER REP Andrew Muckersie	
JOB PURPOSE CODE SURFACE CASING 7521		SALES ORDER No.	CUSTOMER PO No.	
HSE				

JSA's reviewed

Correct PPE onsite

VOLUMES

		TARGET RATE	
Spacers	<input type="text" value="40.0"/> bbls	<input type="text" value="5.0"/> bpm	
Lead slurry	<input type="text" value="89.5"/> bbls	<input type="text" value="5.0"/> bpm	
Tail Slurry	<input type="text" value="34.0"/> bbls	<input type="text" value="4.0"/> bpm	
Displacement	<input type="text" value="91.0"/> bbls	<input type="text" value="5.0"/> bpm	Fluid <input type="text" value="Mix Water"/>
Top Up Job	<input type="text" value="0.0"/> bbls		
Max Rate Allowed	<input type="text" value="6.0"/> bpm		
Mix Water <input type="text" value="Bore"/>	pH <input type="text" value="8.0"/>	Chlorides <input type="text" value="500.0"/>	

PRESSURE

Surface Lines test psi
The surface line test should be at least the max allowable pressure for the job

Casing Pressure test psi

Max pressure allowed psi **CHECK CASING GRADE!**

Kickouts/PRV set to max pressure allowed ***CRITICAL***

Expected Bump Pressure psi

DATA RECORDING

Unipro / Chart recorder Functional & ON ***CRITICAL***

Is the Rig Displacing? Can we monitor Pressure?

Previous Jobs Downloaded

WELL CONDITIONS - CONTINGENCY PLAN

Are lost returns expected?	
Note Thickening Times (hrs) for slurries if unexpected situation arises.	
Adequate mix water & displacement fluid?	
Personnel injury contingency plan discussed?	
Unusual pressures, collapsed casing pressure discussed?	

HSE Rep: _____ Company Rep: _____

5. Summary, EJCS & Job Logs

Production Casing

Santos Limited

POST JOB REPORT
CEMENTING/PUMPING

Well : Crusinier # 14

Rig: Saxon # 188

PRODUCTION CASING 7523

Prepared for Andrew Muckersie

03-April-2014

Prepared by Scott Redding

HALLIBURTON

The Future is Working Together.

Notice: Although the information contained in this report is based on sound engineering practices, the copyright owner(s) does (do) not accept any responsibility whatsoever, in negligence or otherwise, for any loss or damage arising from the use of the information given in this report

HALLIBURTON			CUSTOMER Santos Limited	Start Date mm/dd/yy 02-Apr-14	End Date mm/dd/yy 03-Apr-14
Cementing Services Post Job Report Summary					
WELL Name & Number Crusinier # 14		RIG Name & Number Saxon # 188		HES REP Scott Redding	CUSTOMER REP Andrew Muckersie
JOB PURPOSE CODE PRODUCTION CASING 7523		Casing Size 5 1/2		SALES ORDER No.	CUSTOMER PO No.
WELL CATEGORY 01 Development	WELL TYPE 01 OIL	TECHNOLOGY 01 None	COUNTRY Australia	BASE OF OPS Moomba	BDA Perth

PERSONNEL

SAP#	PERSONNEL	HOURS	SAP#	PERSONNEL	HOURS	SAP#	PERSONNEL	HOURS
488759	Scott Redding	28	551969	Cillie Du Plooy	28	373336	Brendan Harding	4
514294	Dan Wandel	28						

EQUIPMENT

SAP#	PUMPING / MIXING	HOURS	SAP#	BULK/COMPRESSORS	HOURS	SAP#	VEHICLES/OTHER	HOURS
10025184	75 TC4 - 78543	28	12107178	JANET - SY88DM	28	23	LANDCRUISER - SO18AHN	28
			11850541	TAPOUT - SY60CV	28	11557328	KW DAY CAB - SB65EE	28
						11534231	MACK - WAN544	28
						10330266	YCV997 - DOLLY	28

FLOAT AND CASING EQUIPMENT

FLOAT EQUIPMENT	QTY	PLUGS	QTY	OTHER	QTY
5.5in Float Shoe	1	5.5in TOP Plug	1	WELD-A Kit	1
5.5in Float Collar	1	5.5in BOTTOM Plug	1	5.5in Stop Collar	1
				5.5in Centralizer	20

WELL PROFILE

WELL COMPONENT	SIZE (in)	WEIGHT (ppf)	GRADE	THREAD	TOP (MD) (ft)	END (MD) (ft)	END (TVD) (ft)	EXCESS %	LENGTH (ft)
PREVIOUS CSG	9 5/8	36	K-55	Buttress	0	1214	1214		1214
OPEN HOLE	8 1/2				0	1764	1764	20%	1764
NEW CASING	5 1/2	15.5	K-55	Buttress	0	1760	1760		1760

FLUID SUMMARY (Refer to Lab Reports for full details)

DETAIL		UOM	FLUID												TOTAL
			1 Spacer	2 Lead	3 Tail	4 Displace	5	6	7	8	9	10	11	12	
PROPERTIES	Volume	bbbls	10.00	204.00	43.50	136.10									393.6
	Density	ppg		11.80	15.60										NA
	Yield	cuft/sk		2.81	1.57										NA
	Water Requirement	gal/sk		16.82	6.62										NA
	Total Fluid Req	gal/sk		16.82	6.62										NA
CMT	ABC Class 'G'	sk		419.0											419.0
	HTB	sk			109.0										109.0
H2O		bbbls													0.0
		bbbls													0.0
CHEMICAL	Bentonite	lbs		5514.0											5514.0
	HR-5	lbs			15.0										15.0
	D-Air 3000	lbs		39.0	10.0										49.0
	SCR-100	lbs		177.0											177.0
	HALAD-344	lbs		295.0	31.0										326.0
	HALAD-413	lbs			61.0										61.0
	SA-541	lbs			15.0										15.0
															0.0

HALLIBURTON				CUSTOMER Santos Limited		Start Date mm/dd/yy 02-Apr-14		End Date mm/dd/yy 03-Apr-14	
Cementing Services Post Job Report - JOB LOGS									
WELL Name & Number Crusinier # 14			RIG Name & Number Saxon # 188			HES REP Scott Redding		CUSTOMER REP Andrew Muckersie	
JOB PURPOSE CODE PRODUCTION CASING 7523					SALES ORDER No.			CUSTOMER PO No.	
JOB LOGS									
DATE DD-MM-YYYY	TIME HRS:MIN	VOLUME (bbls)	PRESSURE (psi)	Op-HRS-Stby 0 0		RATE (bpm)	JOB DESCRIPTION REMARKS/DETAILS		
02-Apr-14	13:00						Safety Meeting		
	13:05						Depart Base		
	18:00						Arrive Location		
	19:00						Spot Equipment		
	19:10						Rig Up & Run up Equipment		
	21:10						Test Kickouts		
	22:00						Standby for job		
03-Apr-14	5:00						Called to rig		
	5:30						Rig Up Floor		
	5:35						Load Plugs		
	6:30						Safety Meeting		
	6:40						Head up Plugs Loaded		
	6:50	5				6	Spacer		
	6:55		3000				Pressure Test Service Iron		
	7:02						Drop Bottom Plug		
	7:03	5				6	Spacer		
	7:05	207				5	Lead Slurry		
	7:45	30.5				3	Tail Slurry		
	8:30						Drop Top Plug		
	8:31	137.5				6	Displace		
	8:55		950				Bump Plug		
	8:56		2500				Pressure Test Casing		
	9:06	1					Monitor Returns		
	9:10						Rig Down		
	10:00						Wash Up		
	12:00						Depart Location		
	17:00						Arrive Base		

HALLIBURTON		CUSTOMER Santos Limited	Start Date mm/dd/yy 2-Apr-14	End Date mm/dd/yy 3-Apr-14
Cementing Services Post Job Report - KPI				
WELL Name & Number Crusnier # 14	RIG Name & Number Saxon # 188	HES REP Scott Redding	CUSTOMER REP Andrew Muckersie	
JOB PURPOSE CODE PRODUCTION CASING 7523		SALES ORDER No.	CUSTOMER PO No.	
KEY PERFORMANCE INDICATORS				

TYPE OF JOB (Cementing or Non-Cementing):

Select the job type (Cementing or Non-Cementing)

TOTAL OPERATING TIME (hrs)

Rig up/ Pumping/ Rig Down

HSE INCIDENT, ACCIDENT, INJURY:

This should be recordable incidents only

WAS THE JOB PURPOSE ACHIEVED?

This will be dictated by the customer

TOTAL TIME PUMPING (hrs)

Total number of hours pumping fluid on this job

NON -PRODUCTIVE RIG TIME:

As a result of Halliburton cementing PSL

NUMBER OF JSA'S PERFORMED:

NUMBER OF UNPLANNED SHUTDOWNS (After starting to pump)

TYPE OF RIG (CLASSIFICATION) JOB WAS PERFORMED ON:

WAS THIS A PRIMARY CEMENT JOB (YES / NO)

Primary cement job = Casing job, Liner Job, tie back

DID WE RUN WIPER PLUGS?

WAS THIS A PLUG OR SQUEEZE JOB?

WAS THIS A PRIMARY OR REMEDIAL JOB?

Remedial = Repeated attempts or corrections of initial cement job

MIXING DENSITY OF JOB STAYED IN DESIGNED RANGE *percentage*

Density defined as +/- 0.2ppg. Calculation: Total bbls cement mixed at designed density divided by total bbls of cement multiplied by 100

WAS AUTOMATED DENSITY CONTROL USED

JOB WAS PUMPED AT DESIGNED PUMP RATE *percentage*

Pump rate ranged defined as +/- bpm. Calculation : total bbls of fluid pumped at the designed rate divided by total bbls of fluid pumped multiplied by 100

NUMBER OF REMEDIAL SQUEEZE JOBS REQUIRED - HES

Number of remedial squeeze jobs required after primary job performed by HES

NUMBER OF REMEDIAL AQUEEZE JOBS REQUIRED - COMPETITION

Number of remedial squeeze jobs required after primary job performed by competition

NUMBER OF REMEDIAL PLUG JOBS REQUIRED - HES

Number of remedial plug jobs required after primary plug pumped by HES

ANY REASON FOR UNPLANNED SHUTDOWNS (After starting to pump)

Add details in job logs

ANY REASON FOR NON-PRODUCTIVE RIG TIME (Cementing PSL responsibility):

Add details in job logs

Sales Order #:	0	Line Item:	10
Customer:	Santos Limited	Job Type (BOM):	PRODUCTION CASING
Customer	Andrew Muckersie	API / UWI: (Leave Blank if unknown)	
Well Name:	Crusinier # 14	Well Number:	
Well Type:	01 OIL	Well Country:	Australia
H2S Present:	No/Yes	Well State:	Perth

Dear Customer,

We hope that you were satisfied with the service quality of this job performed by Halliburton. It is the aim of our management and service personnel to deliver equipment and service of a standard unmatched in the service sector of the energy industry.

Please take the time to let us know if our performance met with your satisfaction. Please be as critical as possible to ensure we constantly improve our service. Your comments are of great value to us and are intended for the exclusive use of Halliburton.

CATEGORY	CUSTOMER SATISFACTION RESPONSE	
Survey Conducted Date	The date the survey was conducted	3/04/2014
Survey Interviewer	The survey interviewer is the person who initiated the survey.	Scott Redding
Customer Participation	Did the customer participate in this survey? (Y/N)	Yes
Customer Representative	Enter the Customer representative name	Andrew Muckersie
HSE	Was our HSE performance satisfactory? Circle Y or N	Yes
Equipment	Were you satisfied with our Equipment? Circle Y or N	Yes
Personnel	Were you satisfied with our people? Circle Y or N	Yes
Customer Comment	Scott & Crew Performed Very Well. Appreciate The Extra Effort Of A Late Rig Up And Early Start Of CMT Job. Thanks	
CUSTOMER SIGNATURE	Andrew Muckersie	

HALLIBURTON		CUSTOMER Santos Limited	Start Date mm/dd/yy 2-Apr-14	End Date mm/dd/yy 3-Apr-14
HSE checksheet				
WELL Name & Number Crusinier # 14	RIG Name & Number Saxon # 188	HES REP Scott Redding	CUSTOMER REP Andrew Muckersie	
JOB PURPOSE CODE PRODUCTION CASING 7523		SALES ORDER No.	CUSTOMER PO No.	
ATTENDEES				
Andrew Muckersie	Scott Redding	Cillie Du Plooy	Brendan Harding	
HAZARDS FOUND AT JOB SITE				

MARK BOXES WITH AN (X) OR LEAVE BLANK IF NOT APPLICABLE

- | | |
|--|---|
| <input checked="" type="checkbox"/> Electrical Discuss location of electrical lines and power sources in relation to equipment and lines | <input checked="" type="checkbox"/> Radiation Discuss radiation hazards introduced to the site. |
| <input checked="" type="checkbox"/> Hydraulic Leaks - Discussed procedures to follow for leaks | <input checked="" type="checkbox"/> Walking / Working Surfaces Discuss the terrain where the rig up and job will occur (eg. Boards, limestone, mud, stairways, walkways, the derrick, and the rig floor Discuss the dangers in walking on cementing equipment, especially on HT400 pumps |
| <input checked="" type="checkbox"/> Chemicals Discuss harmful substances on the job site (eg. H2S, flammable gasses, drilling fluids, additives well bore fluids, Radioactive). Ask for MSDS sheets when necessary Discuss possible exposures to substances such as dust, acids, alkalines, vapours, and Flammable/combustibles | <input checked="" type="checkbox"/> Wellbore fluids or Gasses Discuss shale shaker, Frac tanks, return lines, and vent lines. |
| <input checked="" type="checkbox"/> Communication Discuss radios, hand signals etc. | <input checked="" type="checkbox"/> Slipping and tripping Discuss tripping hazards (eg. equipment and lines on the ground and rig floor, suction hoses and vent lines) |
| <input checked="" type="checkbox"/> Noise Discuss noise levels from equipment. Avoid placing high noise producing equipment next to work stations when possible. Avoid areas of high noise if possible or use appropriate hearing protection | <input checked="" type="checkbox"/> Falling Discuss job procedures requiring work at heights greater than 1.8m |
| <input checked="" type="checkbox"/> Ignition sources Discuss possible ignition sources (eg. engines, electrical equipment, open flames, smoking etc.) | <input checked="" type="checkbox"/> Environment Discuss environmental conditions (eg. heat, cold, ice snow, rain, wind, dust, visibility etc.) |
| <input checked="" type="checkbox"/> Lifting Discuss proper lifting techniques and ways to eliminate or reduce heavy lifting such as; forklifts, cranes, and sharing the load. | <input checked="" type="checkbox"/> Overhead Discuss overhead hazards (eg. guy wires, hazards while on rig floor or under the rig floor). Discuss equipment rigged up overhead such as DME above the rig floor, lubricators, chains, pulleys. |
| | <input checked="" type="checkbox"/> Pressure Discuss pressure hazards such as DME and bulk tanks |

HAZARD CONTROLS

- | | |
|--|---|
| <input checked="" type="checkbox"/> Personal protective equipment Discuss required PPE such as respirators, head protection, hearing protection, protective footwear, hand and skin protection, and fall protection | <input checked="" type="checkbox"/> Recovery Procedures Discuss how to return to normal operating procedures after an emergency. |
| <input checked="" type="checkbox"/> Physical barriers Discuss items such as hose covers, line tie-downs, guards, railings, and inert gas blankets. | <input checked="" type="checkbox"/> Fire fighting Discuss fire fighting responsibilities with the appropriate personnel (trained & equipped personnel only) |
| <input checked="" type="checkbox"/> Spill control Discuss measures used for reporting and containing spills. | <input checked="" type="checkbox"/> First Aid Station point out the location of the first aid lot and who is responsible for administering first aid. |
| <input checked="" type="checkbox"/> Ignition source controls Discuss control measures for ignition sources such as the use of spark arresters, emergency shutdown procedures, and NO SMOKING rules. | <input checked="" type="checkbox"/> High Pressure Manifolding Clearly mark all high pressure manifolding after rigging it up and before commencing any pumping. Possible marking may include: Yellow tape, signs, roping off the area, orange cones etc. |
| <input checked="" type="checkbox"/> Safety equipment Discuss safety items such as pop-off valves, fire extinguishers, and communication devices. | <input checked="" type="checkbox"/> Environment Discuss control measures for environmental factors such as temperature, wind, ice, rain, snow, etc. |
| <input checked="" type="checkbox"/> Emergency Shut Down Procedures Discuss when, how and what to shut down in the event of an emergency. | <input checked="" type="checkbox"/> Injury and Accident Procedures Discuss personnel responsibilities and procedures in the event of an injury or accident. |
| | <input type="checkbox"/> Vents Discuss vent lines for Frac tanks and bulk tanks. |

HALLIBURTON		CUSTOMER Santos Limited	Start Date mm/dd/yy 2-Apr-14	End Date mm/dd/yy 3-Apr-14
HSE checksheet				
WELL Name & Number Crusinier # 14	RIG Name & Number Saxon # 188	HES REP Scott Redding	CUSTOMER REP Andrew Muckersie	
JOB PURPOSE CODE PRODUCTION CASING 7523		SALES ORDER No.	CUSTOMER PO No.	
PERSONELL RESPONSIBILITES				

Discuss individual roles and responsibilities for all of the above. Determine the level of understanding by asking questions, performing skill checks or other forms of evaluation, depending upon the hazards of the process (eg. Opening and closing of valves, the correct use of communication devices, the correct use of specific PPE such as fall protection, and an understanding of equipment and procedures.

EMERGENCY PROCEDURES

TOTAL EVACUATION AREA!!

CONTACT DETAILS

Ambulance / EMS:	_____	First Aid Responders on this site (names):	_____
Doctor:	_____		_____
Supervisor: Halliburton	_____	Hospital:	_____
Fire Department	_____	Police:	_____
Information Centre:	_____	National Poisons and Hazardous Chemicals	_____

HALLIBURTON		CUSTOMER Santos Limited	Start Date mm/dd/yy 2-Apr-14	End Date mm/dd/yy 3-Apr-14
PREJOB CHECKSHEET				
WELL Name & Number Crusinier # 14	RIG Name & Number Saxon # 188	HES REP Scott Redding	CUSTOMER REP Andrew Muckersie	
JOB PURPOSE CODE PRODUCTION CASING 7523		SALES ORDER No.	CUSTOMER PO No.	
HSE				

JSA's reviewed

Correct PPE onsite

VOLUMES

		TARGET RATE		
Spacers	<input type="text" value="10.0"/> bbls	<input type="text" value="6.0"/> bpm		
Lead slurry	<input type="text" value="207.0"/> bbls	<input type="text" value="5.0"/> bpm		
Tail Slurry	<input type="text" value="30.0"/> bbls	<input type="text" value="4.0"/> bpm		
Displacement	<input type="text" value="140.0"/> bbls	<input type="text" value="6.0"/> bpm	Fluid	<input type="text" value="Brine"/>
Top Up Job	<input type="text" value="0.0"/> bbls			
Max Rate Allowed	<input type="text" value="6.0"/> bpm			
Mix Water	<input type="text" value="Evap Pond"/>	pH	<input type="text" value="8.0"/>	Chlorides <input type="text" value="400.0"/>

PRESSURE

Surface Lines test psi
The surface line test should be at least the max allowable pressure for the job

Casing Pressure test psi

Max pressure allowed psi **CHECK CASING GRADE!**

Kickouts/PRV set to max pressure allowed ***CRITICAL***

Expected Bump Pressure psi

DATA RECORDING

Unipro / Chart recorder Functional & ON ***CRITICAL***

Is the Rig Displacing? Can we monitor Pressure?

Previous Jobs Downloaded

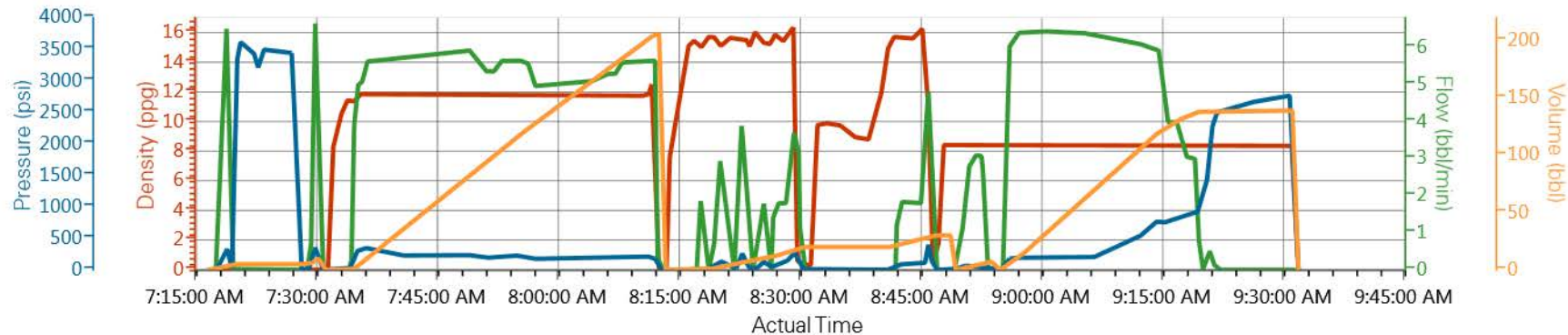
WELL CONDITIONS - CONTINGENCY PLAN

Are lost returns expected?	No
Note Thickening Times (hrs) for slurries if unexpected situation arises.	4.0 hrs
Adequate mix water & displacement fluid?	Yes
Personnel injury contingency plan discussed?	Yes
Unusual pressures, collapsed casing pressure discussed?	Yes

HSE Rep: _____

Company Rep: _____

Cruisinier # 14 Production 5 1/2



Recirc Density (ppg)

Comb Pump Rate (bbl/min)

DS Pump Press (psi)

Comb Pump Total (bbl)

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APPENDIX 11: RIG SPECIFICATIONS

EQUIPMENT LIST

	Saxon Rigs 185 – 188 Equipment List
GENERAL	Saxon ATS 320 AC hydraulic drilling rig rated to a nominal depth of 2600m and with a rated capacity of 320,000 lbs.
RIG SKIDDING SYSTEM	<p>Oil Country Engineering “Padmaster” self propelled walking substructure section, x/y skidding capable. Capable of skidding substructure either north/south or east/west (depending on how the skid rails and rollers are aligned) with mast up.</p> <p>Inner pontoon beams installed under outer pontoon beams with integral skidding rams and pull in two directions. Spare inner pontoon beam and hydraulic ram provided for when skidding rig sideways.</p> <p>Skidding Clearance:</p> <p>3’-0” (0.9m) Max. under catwalk (3 ft wide open section)</p> <p>6’-0” (1.83m) Max under draw-works section. 9 ft-2in (2.8m) wide open section.</p> <p>Ancillary buildings & tanks skid using hydraulic winch assisted, in-line Bi-directional Pull with roller matting. Winches are DP Manufacturing Model 20BCX5L2G hydraulic winches rated 20,000 lbs pull, fitted with 3/4” cable. Capable of skidding with tanks full. Note – roller configuration does not allow buildings and tanks to skid sideways.</p>
DRAWWORKS OR HOISTING CAPACITY	<p>Alta-Rig Model ARS-1208, 1250 HP Drawworks powered by AmeriMex 1150 HP AC Induction Motor. Drawworks has 24” diameter x 32” length drum with 1” Lebus grooving, AC Induction primary brake and Svendborg hydraulic calliper fail-safe secondary / park brake.</p> <p>Maximum rated hook load (with 8 lines strung) of 400,000lbs (limited to 320,000lbs) & maximum single line pull of 50,000 lbs.</p> <p><u>Crown Saver / Floor Saver</u></p> <p>Twin stop crown and floor savers (proximity switches) incorporated into PLC system. Capable of override to enable lower/higher limits if required.</p> <p><u>Pull Down System</u></p> <p>Cable and sheave type pull down system capable of 17,000 lbs pull down. Cables run over sheaves attached to the top drive and are dead ended to pad eyes in the substructure below rig floor level.</p> <p>Pull down utilises two Rotzler TH3.CC.0.0 tugger winches (each rated 7250 lbs single line pull at 2500 psi hydraulic pressure) mounted under the rig floor.</p> <p>Draw works skid accommodates draw works assembly, rig HPU, two service winches and survey winch.</p>
SUBSTRUCTURE:	<p>Oil Country Engineering, Elevating Step Down substructure accommodating removable mast and drawworks units.</p> <p>Substructure comes with a set of pontoons for use when skidding system is not in use.</p> <p>Substructure hydraulically raised to working height. Rig Floor Working Height is 17’-6” (5.2m) to Ground Level. Floor is retained by pins, at this height.</p> <p>Substructure Width: 14’-0” (4.3m)</p> <p>2 x Mousehole in floor for BOP pressure testing offline and making up short joints off well centre. Mousehole closest to well centre is fitted with an above ground, adjustable sock.</p> <p>Substructure incorporates rotary table rated 320,000lbs – refer Rotary Table section below.</p> <p>Maximum (non-operating) rig floor height: 19’-0” (5.79 m) to GL</p> <p>Draw works skid and mast are installed onto and removed from substructure during rig moves without the requirement to utilise cranes. Mast and draw works skid can be moved</p>

	<p>as one piece for in-field moves. Mast and drawworks can also be moved as separate loads for highway moves as required.</p> <p>Substructure accommodates the diesel powered HPU used for rigging up, and a 750 litre hydraulic fluid tank to run all of the hydraulics systems on the rig</p>
DRILLERS CONTROL PANEL	<p>Omron Control System with Auto Driller</p> <p>All drilling controls inside climate controlled doghouse with cyber chair setup and 4 HMI screens</p> <p>Control panel includes auto-driller functions: WOB, ROP & Torque.</p>
DOG HOUSE	<p>Climate controlled, Oilfield Skid Style building with integrated control panel and “cyber chair” which can operate all drilling functions on the rig. Doghouse is located outside the hazardous area as defined by API RP 505</p> <p>Driller’s station mounted on sliding extendable platform with glass enclosure and electric wipers on all windows.</p> <p>Doghouse has 2 exits and includes an enclosed storage area with sub-rack, shelves and tool board at one end.</p> <p>Doghouse has hydraulic lift capabilities for rig up / rig down and is transported, telescoped down, inside the water tank.</p>
DAY TANK	<p>440 bbls (70,000 L) capacity water tank with two (2) Halco space-saver (or equiv.) 3x2x13 centrifugal pumps powered by 10 HP electric motors, capable of delivering up to 200 gpm each.</p> <p>Tank includes 4” Outlet with butterfly valve and camlok fitting, located nearest casing racks for tie-in to cementing unit (No hammer union in place) and high and low level alarms tied back to doghouse.</p> <p>Tool shed incorporated into other end of the water tank skid – refer Tool Shed section for details.</p>
MATTING	<p>Lougheed timber/steel matting - 23 sheets of roller matting, each 40’-11” X 9’-7” and weighing 7000 lbs, and 10 sheets of standard matting, each 40’-0” X 8’-0” weighing 4000 lbs, for centre section.</p> <p>20 additional standard sheets supplied to be shared amongst the 4 rigs for leap-frogging the centre section (substructure) between wells.</p> <p>Lift shackles on the standard matting are to be certified as lifting points. (Saxon to arrange).</p>
MAST:	<p>Oil Country Engineering, Telescopic Single Mast, designed and built & certified to API 4F standards.</p> <p>Mast is 90’-0” high with a Static Hook Load Capacity of 320,000 lbs with 8 lines strung.</p> <p>20’-0” clearance below the crown bumper block with Range 3 tubular and 3 feet of stick up.</p> <p>Mast fitted with wooden bumper blocks under the crown.</p> <p><u>Mast hoisting limits:</u></p> <p>Drillers Maximum: 80% Mast rating (256,000 lbs)</p> <p>Rig Manager Maximum: 90% Mast rating (288,000 lbs)</p> <p>Supt Maximum: 100% Mast rating (320,000 lbs)</p>
RIG LIGHTING:	<p>General Rig Lighting to provide adequate illumination all around rig.</p> <p>Two (2) lighting towers per rig - skid mounted (with fork pockets). Towers are self powered and also come with 150 feet of cable to run off the rig power. For use only outside hazardous zoned areas.</p>
RIG EMERGENCY LIGHTING:	<p>Emergency Lighting, with sufficient power supply to last 2 hours under own power, at all critical evacuation routes and well control stations including at Generator & Drive Houses, Accumulator Unit and Muster Points.</p>

EMERGENCY SHUT DOWN:	Separate wireless, magnetic-mount, Emergency Shutdown Units at Command Centre and Drillers Console (includes Engine Air & Fuel Shut-offs).
ROTARY TABLE:	HongHua ZP205 hydraulically driven rotary table, rated at 700,000 lbs (static) and fitted with one piece master bushing and types 1, 2 & 3 insert shells. Opening size is 20-1/2". Rotation speed is limited to 35 RPM maximum. Supplied with bushing handling tools
TOP DRIVE:	<p>Tesco Model 250-EMI-400 AC top drive with load rating of 250 ton (500,000 lbs), rated power of 400 hp and integral swivel. Maximum speed 175 RPM, maximum continuous torque of 24,000 ft-lbs at 0–90 RPM, 12,800 ft-lbs torque at 175 RPM, 32,000 ft-lbs make up / break out torque and maximum reverse torque: 10,000 ft.lbs. Top drive quill in 2-1/2" ID and NC50 pin down connection.</p> <p>Track & Top Drive integral to mast with no requirement to remove during rig up and down or rig move.</p> <p>Top drive includes elevator link tilt, 360 degree pipe handler rotation, back up grabber to suit 3" to 8-3/4" diameter tubular, hydraulically operated 5000 psi mud saver valve, manual lower Kelly cock and 3"1002 Wireline entry point in gooseneck .</p> <p><u>Saxon policy is not to cement through top drive.</u></p>
SWIVEL:	Integral with top drive
ELEVATOR LINKS:	<p>1 set of 96" standard bails rated at 250 ton</p> <p>1 set 48" extension bails with integral links rated at 250 ton</p>
TRAVELLING BLOCK & HOOK:	Tesco 500,000 lbs rated, Split travelling Block with Four (4) steel 30" Sheaves grooved for 1" line, and Becket
CROWN BLOCK:	Oil Country Engineering, 8 line, 5 Sheave, Split Crown Block rated to 320,000 lbs comprising two (2) 36" diameter steel cluster sheaves, one (1) 36" diameter steel crossover sheave, one (1) 42" diameter steel fastline sheave & one (1) 24" diameter steel deadline sheave, all grooved for 1" diameter drilling line.
COMPRESSORS:	<p>DevAir Product No. TAPV-5052-03MS, 5HP electric, 175 psi rated reciprocating compressor with 120 gallon receiver (200 psi max allowable working pressure) located in Generator house 1</p> <p>Atlas Copco Model GA -22P, 30hp, screw type, electrically powered, compressor rated 120 cfm at 120 psi MAWP, with 120 Gallon receiver (200 psi max allowable working pressure) located in Generator house 2.</p> <p>Compressor pressure relief valve set at 120 psi</p>
CATWALK, PIPE RACKS & PIPE BINS :	<p>Axiom Range III, self levelling, Power Catwalk, with indexing and kicker system.</p> <p>Skate latch capable of pushing/pulling tubulars from 2-3/8" to 9-5/8" diameter. Skate capable of lifting (maximum) 8" drill collar.WLL of pipe trough/skate is 6000 lbs (limited by skate cable rating)</p> <p>8000 lb SWL of catwalk - clearly marked on catwalk frame</p> <p><u>Pipe Bins/Racks</u></p> <p>Three (3) Axiom Oilfield Solutions Model R3-AUS, Range III Hydraulic Pipe Tubs equipped with hydraulic lift device for automatic pipe handling and with rated connection beams between each tub.</p> <p>WLL of hydraulic pipe tubs: 80,000 lbs</p> <p><u>Pipe Racks</u></p> <p>1 set 20ft self levelling, fold away, pipe/casing racks integral on the off-drillers side of the power catwalk.</p> <p>WLL of hydraulic pipe racks: 50,000 lbs</p> <p>WLL hydraulic casing racks: 50,000 lbs</p>

<p>DRILLSTRING HANDLING TOOLS:</p>	<p>Iron Roughneck</p> <p>NOV Model ST-80CL hydraulic torque wrench with integral back-up tong, for tubular sizes up to 8 1/2" dia. Torque Capacity: 80,000 ft-lbs (break-out), 60,000 ft-lbs (make-up).</p> <p>Unit retractable to back of mast with all controls located inside doghouse control room.</p> <p>Hydraulic Actuated Slips</p> <p>Hydraulic actuated slip puller c/w API drillpipe and drill collar slips – Varco DCSL slips, Varco DCSS slips, Varco CMS-XL slips.</p> <p>Slips available to runs 2-3/8", 2-7/8" and 3-1/2" tubular</p> <p>Manual Tongs</p> <p>Blohm and Voss BV-65 tongs with integral safety handles. Tong rated for 65,000 ft-lbs. Tong lever length 36". Maximum opening 18-5/8". Available jaws for 3-1/2" to 17" tubulars.</p> <p>Max line pull at cylinder: 27,000 lbs (with 2150 psi system pressure). Line pull limited to 22,400 lbs (3/4" cable).</p> <p><u>Drillpipe Elevators</u></p> <p>Blohm & Voss Model VES -CL-250 centre latch elevators, 250 ton rated, hydraulically actuated with inserts for to suit 4" drillpipe.</p> <p>Inserts available to run 2 3/8" tubing, 2-7/8" tubing, 3-1/2" casing & 3 1/2" drillpipe.</p>
<p>DRILL STRING DRIFTS:</p>	<p>1 x 2-1/4" drift for 4-3/4" drill collars</p> <p>1 x 2-13/16" drift for 6-1/2" and 8" drill collars</p> <p>1 x 2-9/16" drift for drill pipe and HWDP</p>
<p>CASING HANDLING TOOLS:</p>	<p><u>Casing Power Tong</u></p> <p>Farr Canada Type LW-9625 Lightweight Hydraulic Casing Power Tong, run from rigs HPU. Size range from 2-7/8" to 9-5/8". Max. torque: 12,000 ft-lbs (16.2 kN-m) and max. speed 78 RPM.</p> <p><u>Hydraulic Actuated Slips</u></p> <p>Hydraulic actuated slip puller c/w API casing slips to suit 4 1/2", 5 1/2", 7" & 9 5/8" Casing</p> <p><u>Casing Elevators</u></p> <p>Blohm and Voss 150 ton rated manual casing elevators for 9-5/8" and 7" Casing.</p> <p>Blohm & Voss Model VES -CL-250 centre latch elevators, 250 ton rated, hydraulically actuated with inserts for to suit 2-7/8", 3-1/2", 4-1/2" & 5-1/2" Casing & Tubing.</p> <p><u>Casing Thread Protectors</u></p> <p>Klampon type casing thread protectors (three of each size) for 5 1/2", 7" & 9 5/8" casing</p> <p><u>Casing Running Tool</u></p> <p>Refer below</p>
<p>CASING RUNNING TOOL</p>	<p>Two (2) Tesco Internal CDS Tools shared between all 4 rigs.</p> <p>Size Range for casing running, 7" – 9-5/8"</p> <p>Load Rating: 1,000,000 lbs</p> <p>Maximum Speed: 200 RPM</p> <p>Maximum Continuous Torque: 40,000 ft-lbs</p> <p>Supplied with (1 set) 9-5/8" x 36.0 lb/ft, (1 set) 7" x 23 lb/ft & (1 set) 7" x 26-29 lb/ft Grapples</p>

HAND TOOLS:	<p>Full complement of hand tools</p> <p>One (1) x Enerpac hydraulic torque wrench per rig , with sockets for 2-13/16" (x 1) and 2-15/16" (x 1) per rig, capable of making up to 4000 ft.lbs</p>
SERVICE WINCH:	<p>Two (2) Rotzler TH3.CC.0.0, hydraulic tugger winches, rated at 7250 lbs at 2500 psi hydraulic pressure, with remote tethers for running at ground level. Winches can be controlled from the dog house, rig floor and remotely. Winches are complete with line spoolers.</p>
MANRIDING WINCH:	<p>One (1) crown mounted, Tirak Model XE 301 P, dedicated electric man riding winch, limited at 340 lbs (154 kgs)</p>
MUD PUMPS:	<p>Two (2) HongHua (Emsco Style), HHF-1000, 1000 hp, triplex mud pumps each powered by an AmeriMex 1150hp AC induction motor. Each pump is fitted with external lube & liner wash pump assemblies, Suction & HP pulsation dampeners and HP relief valve (routed to mud tank). Mix pumps are manifolded together.</p> <p>Max Circ. Pressure Rating: 5000 psi Supplied Liner Size: 5" & 6 ½" Rated Stroke: 140 SPM Max. Liner Size: 6 ¾"</p> <p><i>*Note: Maximum pressure rating limited to 85% of manufacturers max.</i></p>
MUD TANKS:	<p>2 Tanks (Premix and Active) with total volume of 767 bbls (122 m3)</p> <p><u>Active Mud Tank</u></p> <p>Active Mud Tank is a 4 compartment tank c/w roof and mix area with a total combined volume of 395 bbls (63.0m3) comprising Degasser Tank 106 bbls (17.0m3), Settling Tank 120 bbls (19.2m3), Suction Tank 120 bbls (19.2m3) & Pill Tank 48 bbls (7.6m3)</p> <p>Sew Euro-Drive Paddle type agitators installed in each compartment</p> <p>Vortex Ventures Model V-VE-U-6 Shear Mixer, Mixing Hopper and three (3) mix / charge pumps, mounted on active tank skid base at mud pump end of the skid.</p> <p><u>Premix Mud Tank</u></p> <p>Premix Mud Tank is a 2 compartment tank c/w roof and mix area with a total combined volume of 372 bbls (59.4m3) comprising Mix Tank #1: 186 bbls (29.7m3) and Mix Tank #2: 186 bbls (29.7m3).</p> <p>Sew Euro-Drive Paddle type agitators installed in each compartment</p> <p>Vortex Ventures Model V-VE-U-6 Shear Mixer, Mixing Hopper and two (2) mix / charge pumps, mounted on tank skid base at mud pump end of the skid.</p> <p>This tank includes Mud Checking Station: Includes Stainless Steel Wash Basin, Mud Test Kit and table mounted on top of the tank.</p> <p><u>Both Tanks are / have:</u></p> <p>Steel shell mud tanks c/w chamfered corners to facilitate easy cleaning.</p> <p>Hydraulically raised roofs over premix and active tanks.</p> <p>360 deg. mud guns installed in all compartments complete with Radial Eductors to provide shearing capabilities.</p> <p>Suction bridge gate valves operated from tank top</p> <p>Corkscrew raising and lowering skimmer mechanism with winding handle for tank level control</p> <p>Full length mud trough with dump gates</p> <p>Tank interiors coated to prevent corrosion</p> <p>Fibreglass grating on tank top with access hatches.</p> <p>Portable tripod available for man retrieval from compartments</p>

	<p>Tank hatches large enough to accommodate stretcher</p> <p>Air union connections between tanks</p> <p>Electrical classification adherent to API 505 standards c/w regulatory approval for QLD Operations.</p> <p>All tank compartments have dump valves installed.</p> <p>One station of the Guardian communication system located at mud mixing areas.</p> <p><u>Shaker/Degasser/Trip Tank Skid</u></p> <p>Type: Hydraulically raised shaker platform with two integrated shakers and sand trap compartment, sand trap comes with manual arctic dump that dumps straight to shale bin. Poorboy degasser and choke manifold to be installed on skid deck.</p> <p><u>Shale Tank/Centrifuge Lift Skid</u></p> <p>Custom shale tank with sloped sides to accommodate loader bucket. Built incorporating a centrifuge lift system at one end of the skid.</p> <p>Centrifuge is a Derrick DE-1000 FHD with one Max 2000 Model M2L01-SX Progressive Cavity Pump powered by 10hp electric motor & suction line. Able to draw fluid from far end of shale bin. Centrifuge discharge is back into shale tank.</p>
TRIP TANK:	<p>24bbl (3.8m³) tank included on the shaker/degasser, with Badger 3x2 hole fill pump powered by 10 HP electric motor. Tank surface area to accommodate 0.25bbl/in volume increments.</p> <p>Connected to Pason PVT system visible from drillers console.</p>
MIXING PUMPS:	<p>Three (3) Badger 5x6x11 Mix/Charge Pumps each powered by 50 HP electric motor, mounted in the mix area on Active mud tank.</p> <p>Two (2) Badger 5x6x11 Mix/Charge Pumps each powered by 50 HP electric motor, mounted in the mix area on Premix mud tank</p>
WATER STORAGE TANKS:	To be supplied by Santos as required.
PVT AND GAS DETECTION SYSTEM:	<p>Type: Pason System with installed monitoring devices as per clients requirements. Imperial Units used except depth which shall display both imperial & metric units.</p> <p>Pason supply Fixed Gas Detection sensor at Shaker Box with alarm read out in Doghouse.</p>
SHALE SHAKER:	<p>Two (2) Derrick FLC-504 Shale Shakers mounted on hydraulically raised shaker platform complete with sand trap with manual arctic dump that dumps sand trap contents straight to shale bin. Shaker header boxes have support and bracing for ditch magnets in each possum belly</p> <p>Shaker screens sizes to be agreed upon as required between Santos and Saxon and sufficient inventory to be kept onsite and reviewed regularly.</p>
DEGASSER:	Derrick Vac-Flo 500 (500 GPM capacity) Vacuum Degasser, mounted on and hydraulically retractable into, degasser compartment of the active tank for transportation.
DESILTER:	Not offered
DESANDER:	Not offered
CENTRIFUGES:	Derrick DE-1000 FHD Centrifuge mounted on elevated platform at the end of the Shale Tank/Centrifuge Skid, c/w Electric powered variable speed Progressive Cavity Feed Pump, and supplied with sufficient hoses for drawing fluid from active mud tank and to discharge back to the trough in the active tank.
MUD GAS SEPARATOR:	36" diameter, 15 ft length, closed bottom "Poorboy" degasser with hydraulic lift and lower, designed in accordance with ASME & NACE standards. Degasser Fluid Seal is 11'-0" (3.4m) and maximum engineered gas capacity is 2.68 mmscfd of gas. Inlet line is 4" expanded to 8" diameter and vent outlet line is 12" reduced to 8" diameter adjacent to the degasser.

SEPARATOR VENT LINE:	150 ft of 8" diameter vent line supplied with hammer union connections.
HP MUD LINES AND STANDPIPE:	<p>Pipe Grade: 4" XXH ASTM A106 Gr.B</p> <p>Discharge Line: 4" NPS manifold from pumps c/w welded fittings.</p> <p>Rated Working Pressure: 5,000 psi (34,470 kPa) c/w x-ray and pressure test</p> <p>Hoses: All HP hoses are API 7K compliant with integral fig. 602 hammer unions up to 6" dia.</p> <p>HP Unions: All high pressure unions to be minimum 5000 psi (34,470 kPa) rated.</p> <p>2" lines to have mandatory 1502 connection to prevent potential mismatch between connections</p>
STANDPIPE MANIFOLD:	<p>5000 psi working pressure steel standpipe with 5 x outlets below the rig floor and 3 x outlet above the rig floor, all outlets fitted with 2" 1502 connections.</p> <p>Air drilling manifold to be contained on separate air drilling skid.</p>
RISER AND FLOWLINE:	<p>11" x 3000 <u>LOW PRESSURE</u> flange to 12" aero union riser section (13" long) fitted with 2" fill up line inlet.</p> <p>12"/16" diameter plain steel pipe riser from aero union above to under floor catchpan bottom aero union. Cut length to suit.</p> <p>Under floor steel catchpan 60" X 29" X 16" deep with 16" bottom aero union for riser and 10" aero union side outlet to flow line..</p> <p>10 " diameter Steel Flowline with 1 x 2" inlet for jetting, going between side outlet aero union on underfloor catchment pan and shaker inlet aero union..</p> <p>Capable of Riserless drilling with cellar pumps and hosing for returns back to shakers.</p> <p>Crossover supplied for shaker air union to run cellar pump straight into shaker manifold.</p>
GENERATORS:	<p><u>Power Generation System</u></p> <p>Building Type #1: Generator Combination</p> <p>Building Type #2: Generator/Fuel Storage Combination</p> <p>Building Type #3: AC /VFD Combination</p> <p><u>Generators</u></p> <p>Three (3) Caterpillar C32 diesel driven generator packages.</p> <p>Generators are 600 Volt, 60 Hz, 3 Phase, with Power Rating 910 kw, 0.8 power factor, 638 KVA. Generators are load shared with Woodward controllers.</p> <p>Diesel engines are HP Rating - 1250 HP & Max RPM - 1800 RPM. Engines are Tier II certified for emissions control & rated for 50° ambient operating temperature. Fitted with hospital grade mufflers complete with spark arrestors. Engines have remote wireless shut-down capabilities</p> <p><u>AC/VFD Drive</u></p> <p>AC Drive Functions are Drawworks, Top Drive, Mud Pumps #1 & #2</p> <p>AC Drives (4) are Yaskowa (660V/1000HP) Sine wave PWM (OOM G5M, High Horsepower, Modular VFD) Split phase for reduce HP limiting, Complete Dynamic Brake chopper units built in. 2 x Converter modules and 2 x Converter module feed bays tied into Gen line up (DC ground fault equipped)</p> <p>MCC's are Allan Bradley Freedom Series with opt. device net control</p> <p>Generator Bays are Woodward / Basler easy gen control system complete with automatic sync system and breaker control. Unit will also be equipped with ground fault detection designed to be used with VFD load</p>

HYDRAULIC POWER UNIT:	<p>Main Hydraulic Power Unit to power all rig functions (with redundancy) Is located on the draw works skid</p> <p>HPU is AC electric powered complete with pump drive gearbox. Electric motors are Class 1 Div 2 rated.</p>
PORTABLE HYDRAULIC POWER UNIT	<p>Diesel HPU permanently mounted inside the substructure. Portable HPU's available 1 per mast transport trailer.</p>
BACK UP HYDRAULIC POWER UNIT:	<p>Auxiliary diesel engine powered HPU installed in substructure for rig up only. This unit is to be locked out and tagged out once well is spudded.</p>
ACCUMULATOR SYSTEM:	<p><u>Accumulator System</u></p> <p>Control Technology, 154 US gallon (14 X 11 Gallon bottles), 7 station Accumulator Unit, rated, designed, built and monogrammed to API 16D standards, with PLC control for remote operation, 310 US gallon vented fluid reservoir & 3000 psi system pressure rating.</p> <p>Accumulator has Two 20HP Bear BX10 (10 gpm) triplex pumps with separate power sources & nitrogen backup system comprising 4 x 50 litre (at 2200 psi) bottles.</p> <p>Accumulator is located on the combined Accumulator/ Junk Bin skid and is more than 15m away from well centre.</p> <p><u>Accumulator Remote Panel</u></p> <p>One (1), located in doghouse – Refer below.</p> <p><u>BOP Control Hoses</u></p> <p>All BOP control hoses are co-flex type fire sheeted construction.</p>
BOP's:	<p>T3 Energy Model 7082, 11" X 5000 psi Annular BOP. 11" X 5000 psi API flanged bottom connection (R-54) & studded 11" 5000 psi connection (R-54) on top. Designed and built to API 16A standards</p> <p>T3 Energy Model 6011i, 11" X 5000 psi Double Ram BOP. 11" X 5000 psi API studded top and bottom connections (R-54). Four outlets on ram body, 3-1/8" X 5000 psi, two below bottom ram and two below upper ram for use as choke and kill outlets as required. Designed and built to API 16A standard. Supplied 4" pipe ram set, blind ram set, 5-1/2" casing ram set, 7" casing ram set, two VBR sets (2-7/8" to 5")</p>
BOP CONTROL PANEL:	<p>One (1) Electric over hydraulic, PLC type, remote BOP control station, located in doghouse. Comprises a touchscreen at the drillers console showing BOP configuration, open close positions, manifold pressure, accumulator pressure annular closing pressure.</p> <p>Doghouse controls duplicate the function of the manual controls on the accumulator.</p>
BOP HANDLING SYSTEM:	<p><u>Overhead Trolley System</u></p> <p>Trolley lift & roll system, designed and engineered to overhead handling safety factors, rated & sized to suit BOP stack weight. SWL limits stencilled onto trolleys & beams.</p> <p><u>BOP Transport Skid</u></p> <p>Hydraulically tilting BOP transport skid supplied to transport BOP stack in one piece. <u>Note BOP must have banjo box in the stack to be transported in this skid.</u> Transport skid includes test stump with 4" Full Hole box machined into base and 3/4" NPT test port on the side of the flange.</p>
BOP TEST STUMP:	<p>Test stump is integral with the BOP handler and has 3/4" NPT test port on the side of the flange of the stump. Suitable for conducting off line BOP pressure tests.</p>
PRESSURE TESTING UNIT FOR BOP PRESSURE TESTS	<p>Consolidated Pressure Control Model CPC10-KTP (Digital), Skid mounted mobile test unit rated to maximum testing pressure of 10,000 psi. Unit fitted with two pressure gauges (0-2000psi & 0-10000psi) and an electronic recorder.</p>

PRESSURE TESTING UNIT FOR FIT/LOT TESTING:	As above.
DRILLING ADAPTORS:	11" x 5,000 psi x 11" x 5,000 psi drilling spool, 24" long, with two 3-1/8" x 5,000 psi side outlets. 11" x 5,000 psi x 11" x 5,000 psi air drilling spool (Banjo Box), 24" long, with one 3-1/8" x 5,000 psi equalisation line side outlet and one 7-1/16" x 5,000 psi blooie line side outlet
CHOKE MANIFOLD:	Cameron Single Gut Choke manifold, Designed and built to API 6A/API 16C Specifications. Size: 3 -1/8" (79mm) x 3-1/8" (79mm). Pressure Rating: 5,000 psi (34,470 kPa)
REMOTE CHOKE CONTROL PANEL:	Pason remote choke control panel located in doghouse with casing pressure gauge, drill pipe pressure gauge, pump stroke counter, choke position gauge
FLARE LINE:	150 feet of standard 3" flare line with hammer unions
FLARE BOX:	Steel flare tank c/w remote ignite feature with vent line and flare connections. Flare line to be run straight from choke manifold
CHOKE LINE VALVES:	One Manual gate valve & One HCR valve, both 3 -1/8" X 5,000 psi rating. One Co-flex type hose with integral 3-1/8" X 5k flange end connections – 25ft long.
KILL LINE VALVES:	Two Manual gate valves & One check valve, each 2 -1/16" X 5,000 psi rating. One Co-flex type hose with integral 1502 hammer union connections – 10ft long.
TDS KELLY COCK:	Hi-Kal hydraulically operated 5000 psi ball valve
KELLY COCK (LOWER):	One (1) Hi-Kal manual 5000 psi FOSV with NC50 threaded connections.
DRILL PIPE SAFETY VALVES:	<u>IBOP</u> One (1) Hi-Kalibre Inside BOP – 5-1/4" OD X 2-1/4" ID X 19-1/2" S/S length, NC40 box X NC40 pin, 10,000 psi WP, Inside Dart Style, with end cap, per rig, with two spare units shared across four rigs <u>FOSV</u> One (1) Hi-Kalibre Model 3090 – 5-1/4" OD X 2-1/4" ID X 19-1/2" S/S length, NC40 box X NC40 pin, 10,000 psi WP, Single Ball Lower Valve, with lifting handle, per rig, with two spare units shared across four rigs
CEMENTING STANDPIPE:	Not Offered
FLOAT VALVES:	Type: Baker plunger 2R, 4R and 5R valves Number: two (2) of each type float supplied per rig.
CUP TESTER:	Cameron Style "F" Type Cup Tester with cups for 7"X 23#, 7" X 26# & 9-5/8" X 36# casing
DRILLSTRING CIRCULATING HEADS:	Circulating Sub – 2" fig 1502 X NC 40 pin (5-1/4" OD X 2-1/4" ID X 18" OAL) with 7" tong length. Cementing Sub – NC40 box to NC 40 pin (5-1/4" OD X 2-1/4" ID X 36" OAL) with 2" fig 1502 thread half side port.

DRILL PIPE:	<p>182 Joints (2400 Meters) of 4"OD, 2-9/16"ID, 15.7 lb/ft, Range 3, Grade S-135 drill pipe with CDS40 connections (5-1/8" OD), box tong length 12" & pin tong length 9".</p> <p>Minimum / Optimum / Maximum make up torque: of 22,400 ft.lbs / 23,700 ft.lbs / 24,900 ft.lbs</p> <p>Drillpipe has Arnco 350XT hard banding and TK34 internal plastic coating, and is fitted with pin + box thread protectors.</p>
PUP JOINTS:	Two (2) x 5 ft, two (2) x 10 ft & two (2) x 15 ft, 4" OD Drill Pipe Pup Joints, 2-9/16"ID, 15.7 lbs/ft, Grade S135 with NC40 Connections (5-1/4" OD).
HEVI-WEIGHT DRILL PIPE:	<p>Twenty (20) Joints 4"OD, Range 3, HWDP, 2-9/16"ID, 28.95 lbs/ft, with CDS40 Connections (5-1/8" OD).</p> <p>Box tong length & pin tong length are both 24"</p> <p>Minimum / Optimum / Maximum make up torque 19,000 / 20,100 / 21,100 ft.lbs</p>
DRILL COLLARS:	<p>Three (3) x 8" Spiral Drill Collars, 2-13/16" ID, 143 lbs/ft, Range 2 with 6-5/8" Reg connections. Collars are slip grooved, and fitted with pin and box thread protectors.</p> <p>Fifteen (15) x 6 1/2" Spiral Drill Collars, 2-13/16" ID, 88 lbs/ft, Range 2 with NC46 connections. Collars are slip grooved, and fitted with pin and box thread protectors.</p> <p>Twenty (20) x 4 3/4" Slick Drill Collars, 2-1/4" ID, 46 lbs/ft, Range 2 with NC38 connections. Collars are slip grooved, and fitted with pin and box thread protectors.</p>
PONY DRILL COLLARS	<p>One (1) x 10 ft x 4 3/4" Slick Pony Drill Collar per rig, 2-1/4" ID, 46 lbs/ft, with NC38 connections. Collars are slip grooved, and fitted with pin and box thread protectors.</p> <p>Two (2) x spare pony drill collars as above held a spares for the four rigs.</p>
MONEL DRILL COLLARS:	<p>One (1) 6 1/2" Slick Non-Mag Drill Collars, with NC46 Connections, 2-13/16" ID, Range II, slip grooved, fitted with pin and box thread protectors.</p> <p>One (1) 4-3/4" Slick Non-Mag Drill Collars, with NC38 Connections, 2-11/16" ID, Range II, slip grooved, fitted with pin and box thread protectors.</p>
MUD SAVER:	"Katch Kan" type manual mud bucket with seals to suit all tubular sizes.
FISHING EQUIPMENT:	Not required.
SUBSTITUTES:	<p><u>Crossover Subs</u></p> <p>One (1) x NC46 box x 6 5/8 Reg pin cross over sub, 8" OD x 2 13/16" ID x 6 1/2" OD x 48" OAL, with bore back box & stress relief pin.</p> <p>Two (2) x CDS40 box x NC46 pin crossover sub, 5 1/4" OD x 2 1/4" ID x 6 1/2" O.D. x 48" OAL with stress relief pin.</p> <p>Four (4) x NC50 pin x CDS40 pin TD saver sub, 6 5/8" OD x 2 1/4" ID x 14" S/S length.</p> <p>One (1) x NC38 box x NC46 pin crossover sub, 5" OD x 2 1/4" ID x 6 1/2" OD x 48" OAL, with bore back box and stress relief pin.</p> <p>Two (2) x CDS40 box x NC38 pin crossover sub, 5 1/4" OD x 2 1/4" ID x 36" OAL, with stress relief pin.</p> <p>One (1) x NC38 box x NC40 pin crossover sub, 5 1/4" OD x 2 1/4" ID x 36" OAL, with bore back box and stress relief pin.</p> <p>One (1) x NC38 pin x pin crossover sub, 5" OD x 2 1/4" ID x 20" OAL, with stress relief pin.</p> <p><u>Bit Subs.</u></p> <p>One (1) x 6 5/8 Reg box x 6 5/8 Reg box bit sub, 8" OD x 2 13/16" ID x 36" OAL, with 6R float bore and bore back box.</p> <p>One (1) x NC46 box x 6 5/8 Reg box bit sub, 6 1/2" OD x 2 13/16 ID x 8" OD X 48" OAL, with 6R float bore and bore back box.</p>

	<p>One (1) x NC46 box x 4 1/2 Reg box bit sub, 6 1/2" OD x 2 1/4" ID x 36" OAL, with 4R float bore and bore back box.</p> <p>One (1) x NC38 box x 3 1/2 Reg box bit sub, 5" OD x 2" ID x 36" OAL, with 3R float bore and bore back box.</p> <p><u>Float Subs</u></p> <p>One (1) x 6 5/8 Reg box x 6 5/8 Reg pin float sub, 8" OD x 2 13/16" ID x 36" OAL , with stress relief pin and 6R float bore.</p> <p>One (1) x NC46 box x NC46 pin float sub, 6 1/2" OD x 2 1/4" ID x 36" OAL, with stress relief pin and 4R float bore.</p> <p>One (1) x NC38 box x NC38 pin float sub, 5" OD x 2" ID x 36" OAL with stress relief pin and 3R float bore.</p> <p><u>Casing Subs</u></p> <p>One (1) x NC40 box x 9-5/8" BTC pin casing sub, 5 1/4" OD x 3 1/4" ID x 10 1/4" OD x 20" S/S length, 15" box tong length and hollow pin.</p> <p>One (1) x NC40 box x 7" BTC pin casing sub, 5 1/4" OD x 2 13/16" ID x 7 3/4" OD x 20" S/S length, 15" box tong length and hollow pin.</p> <p>One (1) x NC40 box x 5-1/2" BTC pin casing sub, 5 1/4" OD x 2 13/16" I.D. x 6 1/4" O.D. x 20" S/S length, 15" box tong length and hollow pin.</p> <p><u>Drill Collar Pick Up Subs</u></p> <p>One (1) x 6-5/8" Reg box x 6-5/8" Reg pin, drill collar pick up sub, 8" OD x 2 13/16" ID x 60" OAL with 4" shank, 12" box & 10" pin tong length.</p> <p>One (1) x NC46 box x NC46 pin drill collar pick up sub, 6-1/2" OD x 2-1/4" ID x 6-1/2" OD x 60" OAL, with 4" shank, 12" box & 10" pin tong length.</p> <p>Three (3) x NC40 box x NC46 pin drill collar pick up sub, 5-1/4" OD x 2-1/4" ID x 6-1/2" OD x 42" OAL, with 4" shank, 8" box & 9" pin tong length.</p> <p>One (1) x NC40 box x NC38 pin drill collar pick up sub, 5-1/4" OD x 2-1/4" ID x 5" OD x 42" OAL, with 4" shank, 8" box & 9" pin tong length.</p> <p><u>Additional Drill Collar Pick Up Subs</u></p> <p>Two (2) x 6-5/8" Reg box x 6-5/8" Reg pin, drill collar pick up sub, 8" OD x 2 13/16" ID x 60" OAL with 4" shank, 12" box & 10" pin tong length.</p> <p>Thirteen (13) x NC40 box x NC46 pin drill collar pick up sub, 5-1/4" OD x 2-1/4" ID x 6-1/2" OD x 42" OAL, with 4" shank, 8" box & 9" pin tong length.</p> <p>Twenty (20) x NC40 box x NC38 pin drill collar pick up sub, 5-1/4" OD x 2-1/4" ID x 5" OD x 42" OAL, with 4" shank, 8" box & 9" pin tong length.</p> <p><u>Lifting Caps</u></p> <p>One (1) x Certified 6-5/8" Reg cast steel protector for box end, with lift bail. Load tested to 15,300 lbs.</p> <p>One (1) x Certified 6-5/8" Reg cast steel protector for pin end, with lift bail. Load tested to 15,300 lbs.</p> <p>One (1) x Certified NC46 cast steel protector for box end, with lift bail. Load tested to 9,400 lbs.</p> <p>One (1) x Certified NC40 cast steel protector for box end, with lift bail. Load tested to 5,700 lbs.</p> <p>One (1) x Certified NC38 cast steel protector for box end, with lift bail. Load tested to 5,000 lbs.</p> <p>One (1) x Certified NC50 cast steel protector for box end, with lift bail. Load tested to 11,000 lbs.</p> <p>One (1) x Certified 4-1/2" Reg cast steel protector for pin end, with lift bail. Load tested to 9,400 lbs.</p> <p>One (1) x Certified 3-1/2" Reg cast steel protector for pin end, with lift bail. Load tested to 3,500 lbs.</p>
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	<u>Kelly Blowdown Sub</u> One (1) x 2" LP box x NC40 box, kelly blow down sub, 5" OD x 2" ID x 7" S/S length.
BIT BREAKERS:	Tri-cone bit breakers for 12-1/4", 8-1/2" and 6-1/8" bits.
SAFETY CLAMPS (DOG COLLARS):	1 x Small, 1 x Large c/w 1 x Pneumatic Actuator to suit tubular sizes 4-1/2" to 9-5/8".
RIG INSTRUMENTATION, CCTV & RECORDING SYSTEM:	OMRON, and Pason instrumentation systems. Eight (8) camera CCTV system with two pan tilt and zoom cameras fitted on the Doghouse to cover the entire wellsite, one fixed camera on the off drillers side of the mast to cover the shakers, one fixed camera on the drillers side of the mast for looking up the mast, one fixed camera covering the mud pumps, one fixed camera covering the cellar area, one fixed camera covering the inside of the drivehouse (VFD shack) and one fixed camera covering the generator area. Pason recording system monitoring parameters in accordance with Exhibit E of the Contract.
MUD TESTING EQUIPMENT:	Mud testing kit supplied with Mud Balance, Marsh Funnel, 1000ml measuring cup, stop watch, filter press, thermometer and indicator paper.
PORTABLE GAS DETECTION EQUIPMENT:	Two (2) BW Honeywell Gas Alert Quattro Portable Gas Detectors measuring H ₂ S, CO, LEL & O ₂ . Complete with Bump tester, spare battery packs & chargers.
FIRE EXTINGUISHERS:	One set to comply with all Australian national and regional fire regulations.
EYE WASH STATIONS & CHEMICAL SHOWER:	Eye Wash Facilities located at the Rig Floor, Shale Shaker, Active Mixing Station(s), Mud Pump area, workshop, generators, drive house, tool pushers shack Chemical Shower: One (1) located by mixing area with uninterrupted continuous circulating water supply.
SAFETY EQUIPMENT:	One (1) Complete Set of Safety Signs in English, includes "Magna Board" Wind Socks. One (1) Confined Space Rescue Kit with tripod & winch. One (1) Man at Height Rescue Kit. One (1) High Voltage Rescue Kit
MAST SAFETY EQUIPMENT:	Three (3) harnesses for man-riding and climbing Two (2) inertia reels on the mast ladder. One (1) inertia reel for the man-riding winch Two (2) Double Hook Climbing Harnesses.
FIRST AID EQUIPMENT:	Folding Stretcher w/ Spine Board Rigid plastic type stretcher for man rescue in mud tanks One (1) Set of Sterilized Burnsheets: One (1) Complete Set First Aid Kit for each vehicle, wellsite and camp first aid rooms One (1) Defibrillator Unit One (1) Oxy Viva type resuscitation kit including spare oxygen bottles
BREATHING APPARATUS:	Four (4) MSA Model SIGMA ACSm Positive Pressure Demand SCBA sets fitted with 30 minute bottles. Complete with 4 spare bottles.

TOOL HOUSE / STOREROOM:	40 foot onsite container skid with air conditioning for rubber goods storage. Refer Wellsite Unit 5 in "Rig Accommodation" below.
GARBAGE COMPACTOR:	One garbage compactor mounted on wellsite support skid.
CELLAR PUMP:	Two (2) Flyght, Model 3127.181-3557, electric submersible 6", 650 GPM pumps complete with start/stop controls at cellar & rig floor Comes with 5 x 10 meter hoses for cement discharge to sump, 1 x 5 meter hose from pump, 1 x 5 meter hose to shakers and 1 Y shaped union with valves for switching between shakers and sump dump
WATER PUMP:	Not supplied – sump pumps as below will be used for this duty as required.
SUMP PUMPS:	Two (2) Flyght, 3127.181-1389 Model CS3127MT, electric submersible 4", 650 GPM pumps complete with start/stop controls at cellar & rig floor Comes with 2 x 100 ft (4" dia.) lay flat hose, cam-lok connections and pontoon for floating pump in turkey nest.
FUEL TANK:	Transtank model T30, 188 bbls (30,000 L), steel dual walled/self banded fuel tank installed on generator combination building. Tank is removable from the skid deck and is overfill protected with mechanical shutoff & alarm. Tank fitted with 24" diameter access hatch and a banded pump bay housing with fuel pumps and filters. Tank built in accordance with AS/NZ 1940 standards.
WASTE OIL:	Double skin, nominal 1,250 litre capacity waste oil tank mounted on the end of the accumulator skid. Tank constructed in accordance with AS/NZ 1940 standards and fitted with outlet for vacuum truck.
JUNK BIN & SUBS RACK	Separate junk bin and subs rack compartments are located on the accumulator/junk bin skid.
HIGH PRESSURE WASHER:	Two (2) UDOR Model MDK water transfer pumps (non intrinsically safe), rated 4 GPM at 4,000 psi. One (1) permanently mounted on the Accumulator Building with wand and hose sufficient to reach to the end of casing racks. One (1) permanently mounted in Mud Pump Building #1.
DEVIATION RECORDER:	Not Supplied. Santos to supply if necessary.
WIRELINE SURVEY UNIT:	Grayco Model FW-12-20-1, hydraulic powered Survey Winch installed on draw works skid c/w 10,000ft of 0.092 inch steel plough line.
WELDING EQUIPMENT:	One (1) skid mounted, forklift loadable, electric buzz box welder per rig . One additional diesel skid mounted unit for shared use amongst all four rigs.
MINI VAC UNIT	Swift Model SVESK – 150 Rig Vacuum System. 150 US gal capacity, capable of 29"mercury (max) and 18" mercury (continuous) vacuum, powered by EX rated electric motor.
RIG INTERNAL COMMUNICATIONS SYSTEM:	Ten station, Guardian Telecom rig communication system, rated as suitable for Class 1 Zone 2 service. The rig is setup with hard lined phones and the rig offices have wireless communication to any phone located around the rig site. System includes a Public Address Function with remote speakers located around the rig. The rig floor to and from the dog house has hands free communications. The driller can

	<p>speak to the rig floor via boom mike on the cyber chair and also select to hear what is being said over the speaker located behind him.</p>
UHF RADIOS:	<p>UHF Radios: (4) Four UHF Portable hand held Radios (intrinsically safe) + (5) Fixed Radios. Base mount units in rig managers office, rig managers vehicle, crew wagon, camp kitchen and forklift.</p>
COMMUNICATIONS SYSTEM:	<p>Rig phone system connected to V-Sat satellite communications system.</p> <p>Camp phone systems connected to 3G Cellular system.</p> <p>3 x hand carried satellite phone</p>
TRANSPORT EQUIPMENT AND MOTOR VEHICLES:	<p>One (1) John Deere Model 544K, 4WD, wheeled loader c/w Flashing Lights, Reverse Beeper, Forks, Bucket, Pipe Grapple & Stinger.</p> <p>Special Features: Front end loading, automatic air shut off</p> <p>One (1) 4x4 Pickup Utility Vehicle equipped with in vehicle monitoring system and UHF radio.</p> <p>One (1) 4x4 Crew Wagon Vehicle with forward facing seats and side entry door equipped with in vehicle monitoring system and UHF radio.</p>
RIG ACCOMMODATION	<p>Wellsite Unit #1: Command Center with 3 separate offices (Rig Manager/Santos DRR/Mud Engineer& Geologist)</p> <p>Wellsite Unit #2: Triple Sleeper Living Quarters each room with en-suite bathroom (Rig Manager / Santos DRR / Santos VIP).</p> <p>Wellsite Unit #3: First Aid/Crib Room Trailer with Bathroom/Toilet facilities.</p> <p>Wellsite Unit #4: 50Hz/240V, 85 KW Generator with sound enclosure, 5000 litre double skinned fuel tank & Sewage Processing Unit.</p> <p>Wellsite Unit #5: Parts Storage/Workshop</p> <p><u>All units are skid mounted</u></p>
SEPTIC SYSTEM:	<p>OzKleen SK10 wellsite sewerage processing unit.</p>

CAMP SPECIFICATION FOR ALL RIGS

	Saxon Inventory and Specification
GENERAL:	<p>38 bed camp complete with kitchen dining capability for 38 persons.</p> <p>Camp modules are built compliant to all Australian Standards. Construction suitable for heavy duty oilfield use. All modules built by EMAC.</p> <p>Camp comprises:</p> <p>Four (4) Crew Quarters Skids</p> <p>One (1) Crew Quarters/ Female Quarters Skid</p> <p>One (1) Linen store/Dry Store/Freezer/Coolroom Skid</p> <p>One (1) Kitchen / First Aid Room Skid</p> <p>One (1) Diner/Rec Room/Laundry Skid</p> <p>One (1) Main Camp Support Skid</p> <p>One (1) Camp SPU/Water Tank Skid.</p>
POWER GENERATION SYSTEM:	<p>Two (2) x Cummins 140kw, 240V, generators housed in a sound attenuated enclosure on the utilities skid.</p> <p>Fielder 14,000L double skinned fuel tank</p>
AIR CONDITIONING SYSTEM:	Independent AC control inside each module
KITCHEN / DINING FACILITIES:	Sufficient seating for 18 people. Kitchen facilities sufficient to cater up to 38 people.
FOOD STORAGE FACILITIES:	One camp module consisting of linen storage, dry storage, cold room and freezer.
LAUNDRY FACILITIES:	Industrial grade washer/dryer in separate laundry room located in dining module
BEDROOM FACILITIES:	19 separate sleeping rooms with 2 beds in each (38 people)
RECREATION FACILITIES:	<p>Recreation room combined with dining area c/w large screen TV & DVD Player.</p> <p>Shade cloth supplied for outside cover.</p>
FOOD WASTE COMPACTOR:	<p>Waste bins supplied</p> <p>Elephants foot carton baler - Model LG 0.8</p>
POTABLE & SHOWER WATER STORAGE:	Two 20,000L water tanks located on camp support skids. Water tanks to be shade covered.
FIRE EXTINGUISHERS:	Fire extinguishers supplied and located as per AUS regulations for building codes.
FIRST AID ROOM:	First aid room supplied and located opposite end of kitchen in same module.
FIRST AID EQUIPMENT:	<p>First Aid Kit compliant with appropriate regulations for specific location and use.</p> <p>Defibrillator unit.</p>

CAMP COMMUNICATION SYSTEM:	V-Sat system provided. UHF Radio in Camp Kitchen
SEPTIC SYSTEM:	One SK50 sewage treatment unit. Compliant with EPA regulations.
ADDITIONAL ABLUTION FACILITIES:	Separate bathroom with outside access for personnel not assigned a room. Female quarters supplied with separate bathroom.

ENCLOSURE I: COMPOSITE LOG

ENCLOSURE II: MUDLOG

ENCLOSURE III: DEPTH STRUCTURE MAP

ENCLOSURE IV: WELL EVALUATION SUMMARY (WES) PLOT