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Santos

SANTOS LTD (QNTBU)

WEST MEREENIE #14

DRILLING PROGRAMME

ONSHORE

PROGRAMME NO:
DLG99-003

Distribution:

Drilling Rig	-	4 Copies
OD&E (S. Ford)	-	1 Copy
Halliburton Australia P/L (D. Gugielmo-Bris)	-	1 Copy
Op's Geology (Adel)	-	1 Copy
Drilling Team Leader	-	1 Copy
Drilling Engineer	-	1 Copy
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Prepared by:

Darren Greer
Drilling Engineer

DRILLING GROUP
Santos Ltd.
(ACN 007 550 923)
60 Edward Street
BRISBANE QLD 4000

March 1999

PR99-133

Santos QNTBU Drilling Department

EMERGENCY PHONE NUMBER
24 HOURS/DAY

Well Name: West Mereenie #14 **Latitude:** 23° 58'24.9" S **Longitude** 131° 30'42.9" E

1. **MEREENIE FIELD SUPERINTENDENT : Phone (08) 8950 3700**

If unavailable and urgent assistance is required contact:

• Mereenie Production	:	Phone	(08) 8950 3710 or (08) 8950 3707
• Mereenie Base Camp	:	Phone	(08) 8950 3706
		Radio	Mereenie Channel 1 or 2
• Santos, Alice Springs	:	Phone	(08) 8952 5700

Refer to Page 33 of the QNTBU Safety Handbook (August 1997)

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APPENDICES

1 PRELIMINARY INFORMATION

1.1 INTRODUCTION

West Mereenie-14 will be drilled by MJV Rig #1 to target the Pacoota Sandstone (primarily the P1 and P3) with the Stairway Sandstone as a secondary target. The well is in OL 4 and is located approximately 350m North East of Mereenie-1. West Mereenie-14 has been designed as a vertical (crestal) gas well.

The drilling programme has been prepared in accordance with the QNTBU DQMS and the Northern Territory Petroleum Regulations. Drilling operations shall be conducted according to the drilling programme, however, due to the nature of the drilling process, specific procedures may have to change in response to well conditions. Any significant deviation from this programme will require prior discussion and approval from the Drilling Engineering Department of the Brisbane office. Any changes shall be documented on DQMS form F-203. All forms shall be completed by the drilling supervisor as completely as possible. For a listing of applicable forms relating to particular jobs refer to DOM 14.1.2.

The procedures and recommendations of the Mereenie Air Drilling Safety Study (1999 Revision) must be observed during all air drilling operations.

1.2 WELL DATA

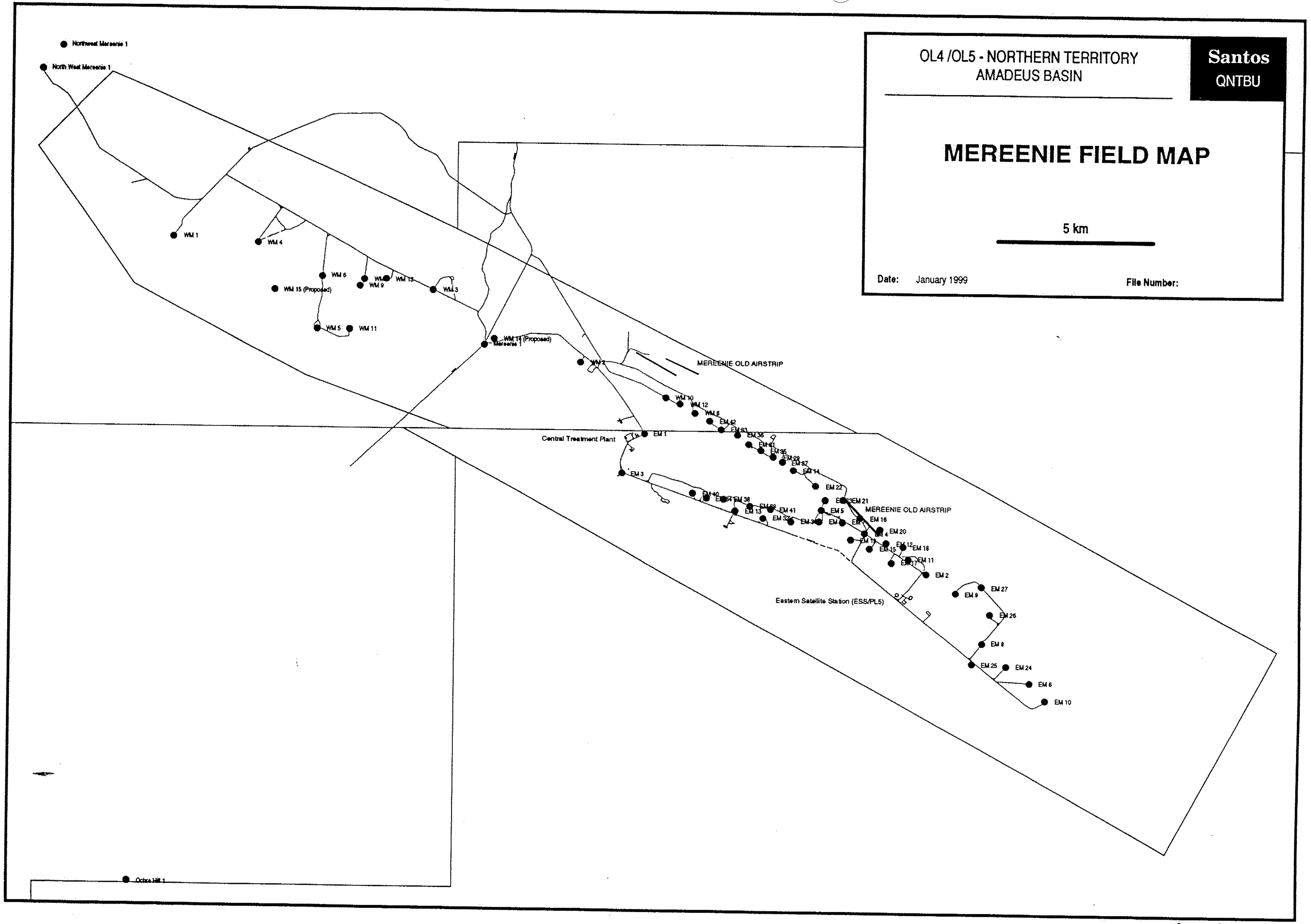
NAME	:	**WEST MEREENIE #14**
DESIGNATION	:	Gas Appraisal
LOCATION	:	
LATITUDE	:	23° 58' 24.9" S
LONGITUDE	:	131° 30' 42.9" E
ELEVATION	:	GL 770m
		RT 775.8m
PERMIT	:	PL 4 NORTHERN TERRITORY
OPERATOR	:	MOONIE OIL PTY LTD
BASIN / FIELD	:	MEREENIE

PARTICIPANTS

*Moonie Oil NL	21.00 %
*Transoil NL	9.00 %
*Petromin NL	7.50 %
*Santos Exploration Pty Ltd	6.25 %
*Canso Resources Ltd	15.00 %
*Farmout Drillers Ltd	6.25 %
(* Santos Group = 65%)	
Magellan Petroleum NT Pty Ltd	20.00%
United Oil & Gas Co NT Pty Ltd	15.00%

RIG	Mereenie Joint Venture Partners Rig #1 OIME SL750
PROPOSED T.D.	Surface hole : 550 m RT (1804 ft) 8 1/2" Production hole: 1464 m RT (4803 ft)
BHST (EST)	140 °F at TD
ESTIMATED SPUD DATE	6 April 1999

1.3 LOCATION MAP


OL4 /OL5 - NORTHERN TERRITORY
AMADEUS BASIN
Santos
QNTBU
MEREENIE FIELD MAP
5 km
Date: January 1999
File Number:
Northwest Mereenie 1
North West Mereenie 1
WM 1
WM 4
WM 6
WM 9
WM 13
WM 3
WM 15 (Proposed)
WM 5
WM 11
WM 14 (Proposed)
Mereenie 1
WM 2
MEREENIE OLD AIRSTRIP
WM 10
WM 12
WM 8
EM 42
Central Treatment Plant
EM 1
EM 3
EM 40
EM 38
EM 13
EM 41
EM 22
EM 21
EM 5
EM 16
EM 20
EM 18
EM 11
EM 2
EM 27
EM 9
EM 26
EM 8
EM 25
EM 24
EM 6
EM 10
Eastern Satellite Station (ESS/PL5)
Ochre Hill 1

2 FORMATION DATA

2.1 FORMATION TOPS

FORMATION	DEPTH RT (m)	DEPTH TVD (m)
Mereenie Sandstone	5.8	5.8
Carmichael Sandstone	391	391
Upper Stokes Siltstone	465	465
♦Upper Stairway Sandstone	779	779
♦Middle Stairway Sandstone	841	841
♦Lower Stairway Sandstone (LS2)	950	950
♦Lower Stairway Sandstone (LS1)	1005	1005
Horn Valley Siltstone	1035	1035
Pacoota Sandstone P1	1110	1110
*Pacoota Sandstone P1-80	1132	1132
*Pacoota Sandstone P1-280	1310	1310
Pacoota Sandstone P2	1213	1213
Pacoota Sandstone P3	1277	1277
*Pacoota Sandstone P3-120	1310	1310
*Pacoota Sandstone P3-190	1340	1340
Pacoota Sandstone P4	1364	1364
TOTAL DEPTH	**1464**	**1464**

* Primary Objective

♦ Secondary Objective

Note: RT tops are rounded to nearest metre.

2.2 TEMPERATURE DATA

The static Bottom Hole Temperature (BHT) expected is 140°F.

2.3 FORMATION STRENGTH DATA

After drilling out the shoetrack of the surface casing string a LOT/FIT must be carried out according to procedures detailed in **DOM 9.6**. Expected formation strengths and resultant kick tolerances are detailed in the following table.

Should less than the minimum specified strength be obtained, the Drilling Engineer responsible for the well must be informed and permission obtained before drilling ahead.

Casing String	Expected EMW / Kick Tolerance (ppg) / (bbl)	Minimum EMW / Kick Tolerance (ppg) / (bbl)
Surface	See Note	16.4 / 30

Note:

A leak-off far in excess of 16.4 ppg is expected. In this instance there is no requirement to continue the test until leak-off occurs.

3 DRILLING PROGNOSIS

3.1 DRILLING PROGNOSIS

(Refer to D.O.M. DQMS-M-04 Section: 4.4.3)

1. Survey Location and perform environmental study of location and access road. Clear and build location to suit drilling rig plan. Construct cellar as required. Move in and rig up MJV 1 drilling rig and associated equipment including air-drilling package. **(Refer to D.O.M. DQMS-M-04 Sections: 7.3.5, 8.7.1 & 8.9.3)**.

2. Ensure Pre-spud checklist (DQMS F-199) is completed before spudding

3. Air drill rat hole, mouse hole and pilot hole with Impax bit and SD12 air hammer. Ensure pilot hole is straight

Item	Reference
Air Drilling Programme	Sections 5.1 - 5.2, 5.4 - 5.7
Air Hammer Drilling Procedure	Section 5.3

4. Drill 17-1/2" hole to approximately 31 m (100 ft) with 17 1/2" hole opener and SD12 Hammer. Ensure hole is straight.

5. Blow the hole clean, clear cellar, POOH and run 16" conductor using weld-on pad-eyes and wireline sling for running and landing.

6. Cement the 16" conductor annulus to cellar floor level with approximately 80 sacks of 15.8 ppg Class 'G' cement slurry with 2% calcium chloride. Ensure conductor is held straight while WOC.

7. WOC until samples are hard - approximately 4 to 6 hours.

8. Nipple up rotating head housing and blooie line etc. Ensure rotating head is properly aligned.
9. Make up 13-9/16" hammer bit on the T1120 hammer. RIH and drill ahead utilising four compressors and two boosters to achieve

approx. 3200 cfm air. Ensure that mist is introduced before intersecting the top of the water producing section at approximately 130 metres to avoid tight hole problems. Water encroachment from the Mereenie sandstone is expected to drown the hammer at some stage. When this happens, layout hammer and pick up 13½" insert bit and drill ahead to approximately 75 m into the Upper Stokes Siltstone (to approximately 550 m).

Item	Reference
Air Drilling Programme	Section 5.1- 5.2, 5.4 - 5.7
Air Hammer Drilling Procedure	Section 5.3

10. Circulate approximately 1.5 hole volumes (Note: circulation may not be possible because of losses into the Mereenie Sandstone). Run a multishot survey. Pick up the 8" monel drill collar and run a multishot survey on the way in on the wiper trip at 13½" T.D. Recover Multishot on wireline; spot Hi Vis pill on bottom. Strap out of hole.

11. Run 10¾" 40.5 lb/ft, K-55, STC surface casing with a cement basket at ±30 m KB as per section 4.5.1 of this programme following the running procedure detailed in **DOM 7.5.2.** Attach centralisers as detailed in section 4.5.

12. Tag bottom, pull up 1 metre (ensuring that the casing is landed at the correct depth for casing head installation), and circulate through casing for minimum of 1.5 casing volumes. No returns are anticipated.

13. Cement 10¾" surface casing. Pressure test casing immediately after plug bumps. Perform a top-up job using Class "G" neat cement with 1% CaCl2. Ensure cement is left at surface. Complete and submit the Casing & Cementation Report Form **DQMS-F-221.**

Item	Reference
Specific Job Details	Section 6.3
Tested Slurry Recipe	**DQMS-F-205**
Calculation Procedure	**DOM 8.8**
Mud & spacer corrosion treatment	**DOM 8.7.2**
Cementation Procedure	**DOM 8.9.1, 8.9.2 & 8.9.4**

Casing Pressure Test	Section 6.1

Request for cement test DQMS F-204 to be initiated by Santos Rig Representative (or D.E) and cement contractor to complete cement test report DQMS F-205.

Note: Ensure cementers obtain mixwater sample to be used on production casing cement job and send to Adelaide for cement tests. (Refer to D.O.M. DQMS-M-04 Section : 8.6)

14. WOC approximately 8-10 hours or until surface samples are set hard. Install casing bowl. A screw-on bowl will be used. Ensure bolt holes are oriented correctly for the installation of BOP and Blooie line.

15. Nipple up BOP's, connect blooie line, choke manifold and associated equipment.

16. Test BOP's and associated equipment as per section 6.1.5

17. Make up 9-7/8" BHA as detailed in section 4.2. RIH, drill out plug, cement and floats using water.

Item	Reference
Bit & Hydraulics	Section 4.3
BHA	Section 4.2
Drilling fluids	Section 4.1
Survey Programme	Section 4.4
Air Drilling Procedures	Sections 5.1 - 5.8
Potential Problems	Section 9
Tripping Procedures	Appendix 3

Tripping procedures detailed in draft DOM sections 4.4.4 and 4.4.5, included as Appendix 2, must be followed on all trips.

18. Drill ahead with water to ±3m below the casing shoe. Perform a formation integrity test as per section 2.3 and **DOM 9.6**. Record and plot the results using **DQMS F-214 form**.

19. Displace water with air and blow hole dry.

20. Drill ahead 9-7/8" hole into the Stairway Sandstone. During the first bit trip following penetration of the Upper Stairway Sandstone change to an 8-1/2" BHA as detailed in section 4.2.

21. Introduce mist pump prior to drilling the lower Stairway, at the latest. Drill through the Stairway, flow well and establish rate if gas encountered. If gas is encountered it should be measured through the choke manifold so any produced gas can be flared. Since this is a south flank well, the Stairway is likely to be over-pressured. Experience from previous wells drilled in the field with the Stairway over-pressured indicates that a mud weight of 10.8 ppg to 11 ppg will be sufficient to control the gas flow.

22. Drill ahead into the Pacoota Sandstone. Introduce the mist pump prior to encountering gas. Once gas is encountered, measure flow rates. Incremental gas flows, as indicated by significant changes in the size of the flare, as drilling proceeds, should also be measured. If gas is encountered it should be measured through the choke manifold so any produced gas can be flared.

23. If gas flow rates allow, continue to mist drill 8-1/2" hole. If gas flow rates exceed approx. 5mmcfd, mist drilling may continue if it is deemed by the Santos Rig Representative in consultation with the Drilling Engineer to be safe to do so. **DQMS F-203** (Change of Control Form) must be filled out and signed by the Team Leader (Drilling) prior to drilling with over 5mmcfd. (Refer to the Mereenie Air Drilling Safety Study).

NOTE:

Due to this higher level of gas flow during the drilling operations, the Wellsite Supervisor has to ensure that either he, or the contractor's Toolpusher, is supervising the operation at all times during this period, and both should ensure that sufficient rest cycles are managed accordingly.

The well must be killed prior to any trips including bit trips

24. Kill well with NaCl/polymer mud system when required. The dynamic kill method is the preferred method to kill the well. The well must be killed prior to any trips.

25. Drill ahead to TD at 1464m MD (1464m TVD). Mud-up if the well is drilled to TD with Air/Mist.

26. Condition hole for logs.

27. Strap out of hole to run logs.

28. Evaluate the well as detailed in section 9 of this programme.

Item	Reference
Wireline Logging Programme	Section 8.1; **DOM 9.2**
DST Programme	Section 8.2; **DOM 9.5**

29. Make a wiper trip and condition hole for casing.

30. Pull wear bushing and change pipe rams to 7". Rig up to run production casing **(DOM 7.4.4)**.

31. Run 7" production casing, external casing packer (ECP) and the pressure actuated cementing (PAC) valve as detailed in section 6.2 of this programme following the running procedure detailed in **DOM 7.5.2.** Attach centralisers as per section 6.1.1.

32. Carry out first stage cement job as detailed in section 6.4.

33. Inflate ECP and open PAC valve as detailed in section 6.4.

34. Carry out second stage cement job as detailed in section 6.4 Complete and submit the Casing & Cementation Report Form **DQMS-F-221.**

35. Flush BOPs and braden-head immediately following the second stage cement job.

Item	Reference
Specific Job Details (Cement)	Section 6.4
ECP & PAC Valve Running Details	Section 6.2
Tested Slurry Recipe	**DQMS-F-205**
Calculation Procedure	**DOM 8.8**
Cementation Procedure	**DOM 8.9.1, 8.9.2 & 8.9.4**
Casing Pressure Test	Section 6.1
Well Suspension Guidelines	**DOM 11.3.1 & 11.4**

36. Raise BOP's and set slips. Nipple down BOP's.

37. Rough cut 7" casing **at least 0.61m (2 ft)** from the flange and weld on a cap to the stub (leaving breather holes). Leave with greased ring gasket in the groove. Complete Suspended Well Status diagram and fax to the Brisbane office for inclusion in the well file

38. Dump and clean tanks and release rig.

39. Move rig off location.

3.2 DRILLING CHRONOLOGY

		Days	Total Days
1.	Drill 17-1/2" hole to 30m.	1.0	1.0
2.	Run and cement 16" conductor. Install Rotating Head and Blooie line etc.	1.0	2.0
3.	Drill surface hole to 550m. Run Magnetic Multishot Survey.	4.0	6.0
4.	Run and cement 10-3/4" casing.	1.0	7.0
5.	WOC. Install and test BOP's. FIT.	2.5	9.5
6.	Air drill 9-7/8" & 8-1/2" hole to approx. 1220m MD. with surveys.	3.6	13.1
7.	Drill 8-1/2" to hole to TD at approx. 1464m.	6.0	19.1
8.	Run Logs.	0.7	19.8
9.	DSTs.	2.2	22
10.	Run and cement production casing.	1.5	23.5
11.	Suspend well.	0.5	24
12.	**TOTAL**	**24 DAYS**	

WELL NAME WEST MEREENIE 14

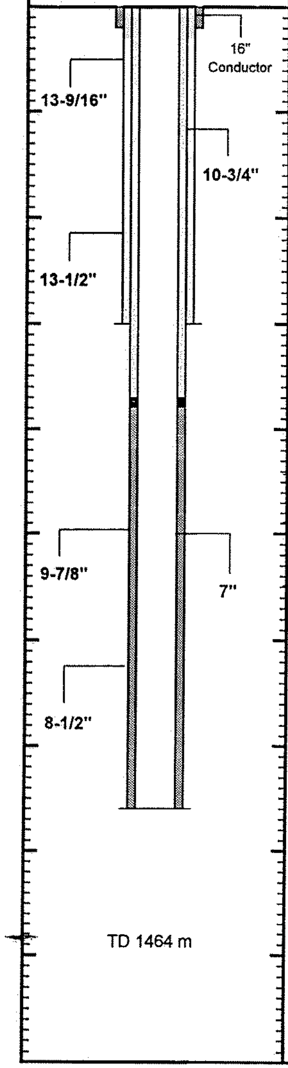
LATITUDE	23° 58' 24.9" S
LONGITUDE	131° 30' 42.9" E
SEISMIC REF.	
ELEVATION	G.L. 770 RT. 775.8

CONTRACTOR/RIG No.	ODE / MJV Rig 1
TYPE	OIME SL-750
AFE No.	2AM-233902

SANTOS LIMITED (QNTBU)

PREDICTED TIME - DEPTH CURVE

WELL SECTION



LITHOLOGY: FORMATION	R.T. TVD (m)
Mereenie Sandstone	
Carmichael Sandstone	391
Stokes Siltstone	465
Upper Stairway	779
Middle Stairway	841
Lower Stairway (LS2	950
Lower Stairway (LS1	1005
Horn Valley Siltstone	1035
Pacoota Sandston	1110
P1-80	1132
P1-280	1190
P2	1213
P3	1277
P3-120	1310
P3-190	1340
P4	1364

REMARKS

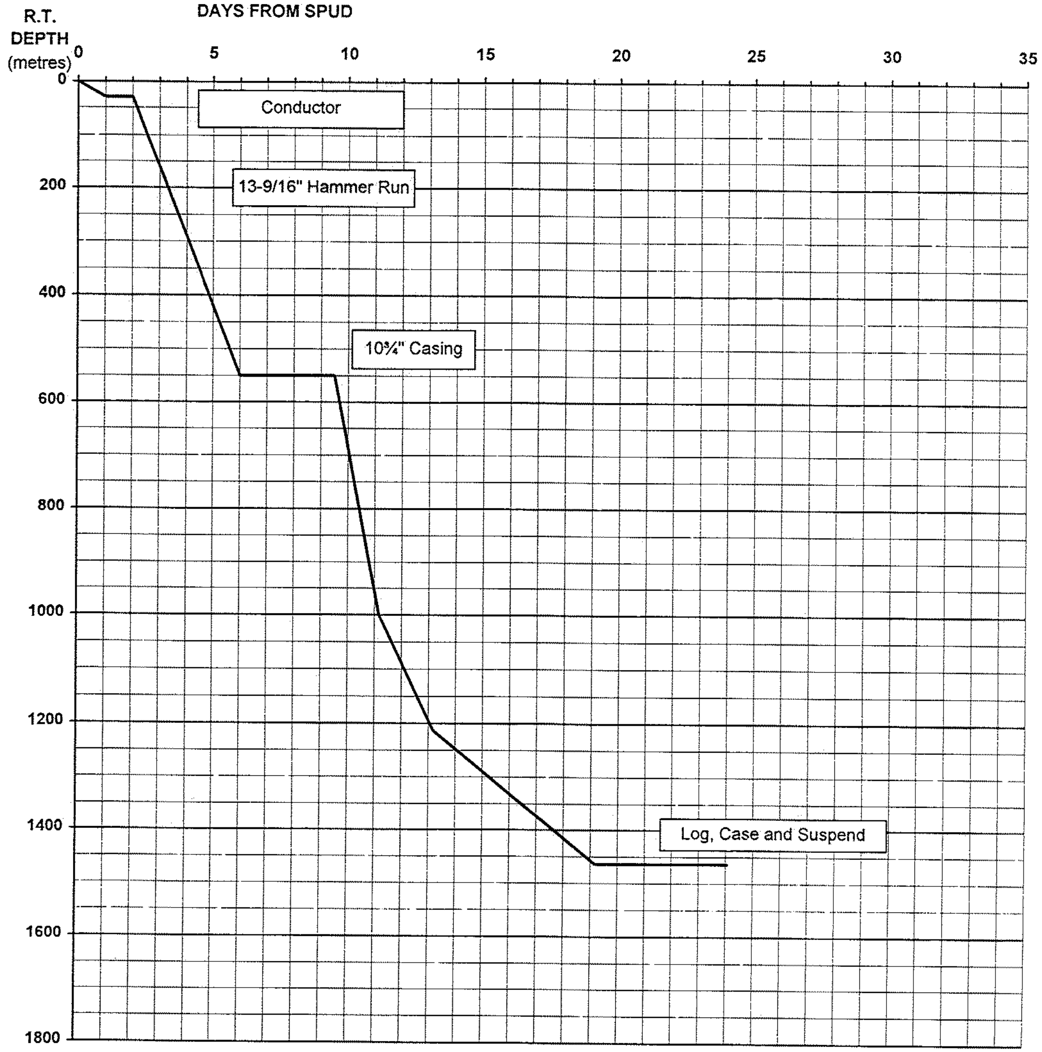
A 13-9/16" hole will be drilled to ±350m followed by a 13-1/2" hole drilled to 550m. At this point 10-3/4" casing is to be run and cemented

A 9-7/8" / 8 1/2" hole will then be drilled to a true vertical depth of 1464 metres. 7" casing including an ECP and stage cementing tool (PAC valve) will then be run after drilling to TD and evaluating the well.

RUN 1
PEX: HALS, MCFL, TLD, CNL from TD to 10 above Upper Stairway. GR from TD to surface.

RUN 2
FMS/FMI TD to 10m above the top of the Upper Stairway Sandstone.

DSTs
2 x post logging inflate straddle DSTs



4 ENGINEERING REQUIREMENTS

4.1 DRILLING FLUIDS PROGRAMME

SANTOS LTD

WEST MEREENIE-14

AMADEUS BASIN, NT

DRILLING FLUID PROGRAM

Prepared by : Peter
McNaughton
Date : February
1999
Revision : 1

"All information, recommendations and suggestions herein concerning our products are based on tests and data believed to be reliable. However, it is the user's responsibility to determine the safety, toxicity and suitability for their own use of the products described herein."

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INTRODUCTION

The drilling fluid recommendations for West Mereenie-14 are based on information provided by Santos and Baroid's experience on recent Mereenie wells, including similar wells which encountered significant geopressure in the Stairway Formation.

The program assumes that the following fluids will be required:

- 11 ppg NaCl/Polymer kill mud for trips when air drilling in $9^7/_8$" hole
- 10.8 - 11 ppg 5% NaCl/Polymer mud to drill the $8^1/_2$" interval below ~ 1,270 m

This vertical well will be drilled with Air/Mist/Foam and occasionally Stiff Foam to ~ 1,270 m in the Pacoota P2 Formation. Drilling will then continue in $8^1/_2$" hole to TD at ~1,464 m with mud. Estimated duration is 28 days.

The Lower Stairway Formation is expected to contain gas at a pore pressure gradient > 12 ppg, however experience has shown that due to extremely low permeability, a mud density of 10.8 - 11 ppg is usually adequate for trips, running casing and logging. Recent wells containing high pressure in the Stairway Formation include East Mereenie 39, 40 and 41. The closest offset wells are Mereenie 1 and West Mereenie 2 and 3.

Kill mud at 11 ppg containing 1% NaCl should be displaced into the hole prior to trips when drilling with air. The kill mud salinity should be increased to 5% NaCl once the Pacoota sands are penetrated. This mud should be recovered when the well is blown dry after each trip and subsequently converted to a weighted 5% NaCl/Polymer mud to drill the lower hole section.

The hole will be displaced to a 10.8 - 11 ppg 5% NaCl/Polymer system once gas flow rates become excessive. $8^1/_2$" hole will then be drilled with weighted mud to TD at ~1,464 m. Logs and two DST's are programmed at TD.

Penetration rates will be very low when drilling with weighted mud, hence as much as possible of the $9^7/_8$" / $8^1/_2$" interval will be drilled with air. In this case, care must be taken to ensure sufficient 11 ppg kill mud is kept available at all times to completely displace the well and allow circulation.

The proposed mud system is designed to help protect the sensitive Pacoota sands while providing adequate inhibition against clay swelling in the Horn Valley Siltstone. Recent wells have achieved these objectives with a 5% NaCl/PHPA/Polymer mud system with tight filtration control. In this well, the use of EZ-MUD PHPA will be omitted in favour of additional DEXTRID to further retard filtrate invasion and minimise damage due to dislodgment and migration of illite filaments within the pore throats.

A small quantity (8 - 10 ppb) of prehydrated AQUAGEL will be used to supplement Barite suspension in both the drilling and kill fluids. Static and dynamic filtration testing in the Baroid Perth laboratory has demonstrated that a fluid containing prehydrated Bentonite and Barite provides the most cost-effective formulation in this interval.

Up to 5 ppb of BAROFIBRE Regular (sized cellulose fibre) may be used to prevent seepage losses in the target sands.

INTERVAL 1

$13^1/_2$" Hole	:	**30 m to 700 m**	**(670 m to drill)**
		Set $10^3/_4$" Casing at 700 m	
Drilling Fluid		**Air/Mist/Foam**	

Introduction

This interval will be drilled with air, mist and foam. Due to the possibility of water flows in this interval, Foam is usually required. If water flows become excessive, adequate hole cleaning may be obtained with the following Stiff Foam formulation.

Recommended Formulation

a. Foam

Soda Ash	:	0.1	ppb	
QUIK-FOAM	:	5.5	ppb	(2.0 - 2.5 lt/bbl)
BARACOR 1635L	:	0.6	ppb	(0.3 - 0.5 lt/bbl)

b. Stiff Foam

Soda Ash	:	0.1	ppb	
QUIK-FOAM	:	5.5	ppb	(2.0 - 2.5 lt/bbl)
EZ MUD L	:	1.0	ppb	(0.5 - 0.6 lt/bbl)
BARACOR 1635L	:	0.6	ppb	(0.3 - 0.5 lt/bbl)

- Check the make up water for salinity and hardness. Add Soda Ash to reduce hardness to minimise QUIK-FOAM and EZ MUD usage.

Maintenance

- Oxygen corrosion rates are high when using air. Monitor corrosion rates with corrosion rings in the drill string. Keep the fluid alkaline with Soda Ash or Caustic Soda and add BARACOR 1635L liquid oxygen scavenger to the injection fluid mix to control corrosion rates.

- If carbonate scale deposition occurs, add STABILITE scale inhibitor at 0.1 - 0.2 ppb to the injection fluid mix. Note that STABILITE will significantly thin any clay based fluids.

- It is likely that the hole will be allowed to water in prior to running casing. A high-vis pill of Lime-flocculated pre-hydrated AQUAGEL may be spotted on bottom prior to running the $10^3/_4$" casing.

INTERVAL 2

$9^{7}/_{8}$" Hole **700 m to ~ 1,270 m** **(570 m to drill)**

Drilling Fluid : Air/Mist/Foam
11 ppg Kill Mud (Prior to trips)

Introduction

Air should be able to be used for most of this interval. Some Foam may be required if water flows are encountered. It is likely that the Lower Stairway Formation will contain geopressures above 12 ppg EMW, although very low permeabilities allow the use of lower mud weights. A kill mud density of 11 ppg is recommended, based on previous similar wells.

Kill mud containing 1% NaCl should be pre-mixed in the pits to displace the hole prior to bit trips. Once the Pacoota sands are penetrated, the kill mud salinity should be increased to 5% NaCl.

No logs or DST's are planned in this section. Depending on the quantities of gas encountered while drilling, it is planned to cease air drilling in the Middle Stairway Formation at ~ 900 m. At this depth, the well will be displaced with weighted 5% NaCl/Polymer mud, as described in the $8^{1}/_{2}$" interval.

Recommended Formulation

a. Foam and Stiff Foam

Formulate as for the previous interval.

b. 11 ppg Kill Mud (1% NaCl)

Freshwater	:	0.81	bbl	
Caustic Soda	:	0.15	ppb	
AQUAGEL	:	10	ppb	
(allow to yield at least 8 hrs before continuing)				
PAC-R	:	0.5	ppb	
XCD-Polymer	:	0.25	ppb	
Salt (1% NaCl)	:	3	ppb	(above Pacoota sands)
" (5% NaCl)	:	15	ppb	(once Pacoota sands are penetrated)
Barite	:	~ 165	ppb	(to 11 ppg)

This formulation will provide a low cost, easily mixed Salt/Polymer fluid which will suspend barite. This formulation has been used successfully on previous recent Mereenie wells.

- Note that the rheology should be checked before adding barite. An initial gel strength > 4 lb/100ft^2 is required to prevent barite settling.

Maintenance

- Once the gas bearing Stairway Formation is exposed, the entire hole should be displaced to 11 ppg kill mud prior to trips. If possible, the hole should be blown dry before displacing. After each trip, displace the kill mud out of the hole with water before unloading the hole to air. Recover the kill mud for subsequent reuse.

- Monitor and control corrosion rates as for the previous interval.
- When gas influx rates become excessive (ca. 1,270 m), the well will be displaced to weighted 5% NaCl/Polymer mud derived from salvaged kill mud. Drilling will then continue to TD in $8^1/_2$" hole.

INTERVAL 3

$8^1/_2$" Hole	**:**	**~1,270 m to 1,464 m (TD) (~194 m to drill)** **Set 7" Casing at TD**
Drilling Fluid	**:**	**5% NaCl/Polymer**

Introduction

Gas influx rates are likely to become excessive in the Pacoota P2 Formation at ~ 1,270 m. The hole will then be displaced to a 10.8 - 11 ppg 5% NaCl/Polymer system prior to a bit trip. $8^1/_2$" hole will then be drilled with weighted mud to TD at ~1,464 m. Logs and two DST's are programmed at TD.

A weighted 5% NaCl/Polymer system will be pre-mixed in the reserve pits ready for displacement. The fluid density must be sufficient to kill the well and control gas pressures on this part of the structure. From experience on recent pressured offset wells, this is likely to be ± 11.0 ppg. Sufficient Barite must be kept on site for this purpose.

Recent Mereenie wells have recorded a good hole caliper through the interval drilled with NaCl/EZ-MUD/Polymer fluid. To improve reservoir protection and gas deliverability, this interval will not use EZ-MUD (PHPA). Hole stability should not be affected provided adequate rheology and hydraulics are maintained.

Target Properties

Density	:	10.8 - 11.0	ppg (dependant on formation pressure)
Yield Point	:	15 - 30	lb/100ft^2
Initial Gel	:	> 4	lb/100ft^2 (for barite suspension)
API Filtrate	:	< 4.0	ml/30 min
pH	:	8.5 - 9.0	
NaCl	:	5 %	by wt soln

Recommended Formulation (in order of addition)

Fresh water	:	0.89	bbl
Soda Ash	:	0.1	ppb
AQUAGEL	:	8	ppb
BARACIDE	:	0.05	ppb
PAC-R	:	0.5	ppb
DEXTRID	:	5	ppb
Salt, Flossy Fine	:	16.5	ppb
XCD-Polymer	:	0.7 - 1	ppb
Caustic Soda	:	0.1	ppb (to pH 9.0 max.)
Barite	:	125	ppb
BAROFIBRE	:	5.0	ppb (when required)

- When mixing the initial system, AQUAGEL can be added directly to fresh water. If extra AQUAGEL is required during drilling it must be pre-hydrated in fresh water.

- Salvaged 11 ppg 1 - 5% NaCl kill mud should be reused to prepare 5% NaCl/Polymer mud for drilling.

Maintenance

- It may not be possible to blow the hole dry safely prior to displacing mud into the hole. A drill-water cushion (up to 100 bbls) should be pumped ahead of the mud to minimise foam contamination. Every effort should be made to dump the water cushion and to control surging to prevent foaming and minimise losses.

- Penetration rates will be very low when drilling with weighted mud. It is possible that at least some of the $8^1/_2$" interval may be drilled with air. In this case, care must be taken to ensure sufficient 11 ppg kill mud is kept available at all times to completely displace the well and allow circulation.

- The proposed mud system is designed to help protect the sensitive Pacoota sands while providing adequate inhibition against clay swelling in the Horn Valley Siltstone. Recent wells have achieved these objectives with a 5% NaCl/EZ-MUD/Polymer mud system with tight filtration control. In this well, the use of EZ-MUD PHPA will be omitted in favour of additional DEXTRID to further retard filtrate invasion and minimise damage due to dislodgment and migration of illite filaments within the pore throats.

- A small quantity (8 - 10 ppb) of prehydrated AQUAGEL will be used to supplement Barite suspension, along with XCD-Polymer or BARAZAN-D PLUS (xanthan gum).

- PAC-R and DEXTRID should be used in conjunction with the AQUAGEL to control filtration.

- Laboratory testing on Pacoota core at UNSW shows that formation damage is likely if:

- The salinity drops below the "Critical Salt Concentration" (4.5% by wt. NaCl)
- High flow rates (filtrate spurt loss) occur in the pore throats

The fluid design has considered these key properties.

- Static and dynamic filtration testing in the Baroid Perth laboratory has demonstrated that a fluid containing prehydrated Bentonite and Barite provides the most cost-effective formulation in this interval. As this interval will be perforated, Barite may be used as the primary weighting agent without concern about pore throat plugging in the near wellbore area.

- To reduce fluid and particle invasion into the target Pacoota sands, sized cellulose fibre such as BAROFIBRE or Fluid Seal has been added to the mud prior to entering the target on recent wells.

- Up to 5 ppb of BAROFIBRE Regular may also be used to prevent seepage losses in the target sands.

- With only a short interval to be drilled with mud on this well, excessive fine solids build up should not become a problem. As the system is expected to be weighted, primary solids control will rely heavily on running the finest practical shaker screens. The desilter should be used intermittently only to control excessive weight.

- The mud should be treated with 0.5 to 0.75 ppb BARACOR-129 oxygen scavenger to maintain a sulphite residual above 50 mg/l.

- Before each trip and at the end of the well, the pipe should be treated with a 1:6 mix of BARAFILM : Diesel to reduce atmospheric corrosion.

4.2 BHA PROGRAMME

Hole Size	Depths	BHA
Conductor Pilot 12¼"	0-30m	12-1/4" Hammer bit SD12 Air hammer 1 x 12" Square DC 2 x 8" DC
17-7/8" (Hole Opener)	0-30m	17-7/8" Hole Opener SD12 Air Hammer 17-1/2" Stab. 1 x 12" Square DC 2 x 8" DC
13-9/16"	30-300m (approx)	13-9/16" Hammer Bit (Drillquip with Teflon insert splines) T1120 Air Hammer 1 x 12" Square DC 6 x 8" DC 6 x 7" DC 12 x 6.5" DC 6 x HWDP
13½ "	300-550m	Bit Bit Sub 8" Monel 8" DC 13-1/2" Stab. 2 x 8" DC 8" Shock Sub 2 x 8" DC 9 x 7" DC 7 x 6-1/2" DC 6 x HWDP (Total usable weight 55,000 lb in water, BF=0.85 , SF=0.85)
9-7/8"	550 – 790m (approx)	**Packed Hole Assembly** Bit Bit Sub 9-7/8" Stab. Monel 9-7/8" Stab. 7" DC 9-7/8" Stab. 10 x 7" DC 9 x 6-1/2" DC Jars 6-1/2" DC 6 x HWDP (available weight 43 lb in mud; BF=0.83 (mud); SF=.85) (Assumes 6 ½ " DC weight = 87.6 lb/ft, 7" DC wt: 109.7 lb/ft)

8-1/2"	790 – TD	**Packed Hole Assembly** Bit 8-1/2" Near Bit Stab. Monel 8-1/2" Stab. 6-1/2" DC 8-1/2" Stab. 24 x 6-1/2" DC Jars 6-1/2" DC 6 x HWDP (available weight 48lb in mud; BF=0.83 (mud); SF=.85) (Assumes 6 ½ " DC weight = 87.6 lb/ft)

BHA's may be slightly altered in consultation with the Drilling Engineer without the use DQMS F203.

4.3 BITS & HYDRAULICS PROGRAMME

Santos

BIT AND HYDRAULICS GUIDELINES

WELL: WEST MEREENIE 14

Santos

ANTICIPATED BIT PERFORMANCE											RECOMMENDED HYDRAULICS									
BIT No.	SIZE (inch)	TYPE	IADC CODE	DEPTH IN (m)	DEPTH OUT(m)	METRE	HOURS	AVG ROP	WEIGHT ON BIT	R.P.M.	FLOW RATE	NOZZLES (32 nds)			PRESSURE PSI (Estimate)	ANN VEL DP	ANN VEL DC	JET VEL	HHP AT BIT	% AT BIT
1	12.5	IMPAX		0	30	30	2	17	5	20 - 25	2400cfm	Open			200	AIR	DRILLING			
2	17.88	H/O		0	30	30	10	3	5	20 - 25	3200cfm	Open			200	AIR	DRILLING			
3	13.56	Drillquip		30	300	270	20	13.5	5 - 10	20	3200cfm	Open			330	AIR	DRILLING			
4	13.50	ATJ55	6.3.7	300	500	200	35	5.7	25-60	50 - 80	3200cfm	Open			400	AIR	DRILLING			
5	13.50	ATJ11H	4.3.7	500	550	50	8	6.3	40-60	50-80	3200cfm	Open			450	AIR	DRILLING			
6	9.875	ATM11H	4.3.7	550	800	250	15	16.7	30-50	50-100	> 1600 cfm	Open			250	AIR	DRILLING			
7	8.5	F5OD	6.2.7	800	1050	250	15	16.7	30-50	50-100	> 1600 cfm	Open			260	AIR	DRILLING			
8	8.5	F5OD	6.2.7	1050	1195	145	15	9.7	30-50	50-100	> 1600 cfm	Open			280	AIR	DRILLING			
9	8.5	F5OD	6.2.7	1195	1300	105	15	7.0	40-50	50-100	> 1600 cfm	Open			400	AIR	DRILLING			
10	8.5	F5OD	6.2.7	1300	1380	80	15	5.3	40-50	50-100	> 1600 cfm	Open			400	AIR	DRILLING			
11	8.5	F5OD	6.2.7	1380	1430	50	18	2.8	40-50	50-100	300	12	12	12	1250	29	43/75	88	122	66
12	8.5	HP65DKP	6.4.7	1430	1464	34	14	2.4	40-50	50-100	300	12	12	12	1250	29	43/75	88	122	66

Note: Drilling may be converted from air/mist drilling to mud drilling at a point earlier than bit #11 if gas flow rates become excessive.

4.4 SURVEY PROGRAMME

	13½" Hole	Production Hole
Maximum Deflection		Maximum deviation is to be 8°. The maximum allowable rate of change is to be 1½° / 100 ft.
Survey Instrument	Totco (A Magnetic Multi-Shot survey will be run at surface hole TD)	Magnetic Single-Shot
Survey Frequency	Surveys to be run at approximately every 150 ft until TD of surface hole.	Surveys should be taken every 150-200 m where deviation is less than 3° and every 75 m for deviation greater than 3°.

Remarks - West Mereenie 14 has been designed as a vertical gas well. The well is located near the crest of the structure and as a result excessive naturally induced deviation is not expected.

5 AIR DRILLING PROGRAMME

5.1 AIR DRILLING

Refer to Mereenie Air Drilling Project Safety Study and Air Drilling Procedure Manual. Compliance is mandatory. Utilise DQMS change control document to implement change.

Ensure the Safety Induction program is conducted and all wellsite personnel are deemed competent prior to commencement of air drilling operations.

Air will be the major circulating medium for drilling most of this well. Water based drilling fluids will be used when required for the use of down hole motors for direction/inclination control, logging and casing runs, and for drilling the main target formation. Air, including mist, foam and stiff foam where required, will be used to drill all other hole sections.

Special note should be made of the following general observations while air drilling :

One of the most important aspects in air drilling is constant monitoring of drilling pressure. A minimum of two chart type pressure recorders is required to properly monitor air pressure. One pressure recorder should be on the rig floor, and the second recorder should be immediately downstream of the air compressors. These gauges will allow easy calculation of air volume output at any time. This is very important because should pressure change without corresponding change in air volume, trouble is indicated.

It is absolutely necessary to have air circulating around the bit before drilling is started. This prevents initial cuttings build-up which is a significant cause of stuck pipe, and prolongs bit life by cooling bearings and cleaning cuttings from the bit. Because air, unlike mud, is compressible, a period of time is required to establish air circulation around the bit after a connection is made. Circulation around the bit is established if there are returns coming from the blooie line or the air pressure has reached the normal drilling pressure. Drilling should not begin after a connection until one of these two conditions are met.

In order to prevent the drill string from becoming stuck as a result of pulling into and packing dry drill cuttings, never pull on the string without air circulation. The air will keep the cuttings moving and allow them work past the drill string.

5.2 AIR REQUIREMENTS

The minimum air volume requirements for the 13 1/2" hole is ±2800 scfm at 735m. The minimum air volume requirement for the 9 7/8" by 8 1/2" hole at 1500m is ±1600 scfm for a vertical well.

No upper limit has been established for air drilling; i.e., in general, there is no such thing as too much air available. On the other hand, the reason air drilling fails is very often insufficient air volume to clean the hole efficiently under a varied range of drilling conditions. A good rule of thumb to indicate whether enough air is being used is to stop drilling, and measure the time required for the dust to stop or clean-up at the end of the blooie line. The time required to clean the hole should not greatly exceed one minute per 1,000 ft of depth. A sure way to know what air volume is being pumped is to actually measure the air output at drilling pressures. This is done by holding back pressure on the compressor (100 - 200 psi) and measuring the output volume with an orifice well tester (flow prover).

When formation water production cannot be dried up or hydrocarbons are encountered, foam or mist drilling is necessary. Mist drilling will require approximately 30% to 40% more air than dusting. Standpipe pressure will be greater. Mist drilling pressure will range from 200 - 400 psi as compared to 100 - 300 for dust drilling. The additional air volume and pressure are required because of the weight of the water being lifted.

Drill cuttings not removed fall back and bridge when connections are made. When this condition exists, several things can be done :

1) Add more air volume.

2) Sweep the hole with a foam slug just prior to making a connection. An increase in foam concentration will create a stiffer foam which can better clean the hole and remove the heavier drill cuttings and;

3) Always blow the hole until the return mist and air are clean prior to making connections. These procedures can eliminate a stuck drill string.

5.3 AIR HAMMER DRILLING PROCEDURE

1) Examine hammer to make sure no foreign material has been placed in the barrel.

2) Work the piston by hand to make sure its moves freely.

3) Be sure the piston has been installed right side up.

4) Remove the driver sub from the hammer.

5) Place the driver sub on the bit, making sure it slides freely up and down on the bit splines.

6) Install bit retainer rings on bit.

7) Dope the driver sub and make up on hammer.

8) Check the backhead sub to be sure it has been made up.

9) Test fire the hammer by placing the bit on a block of wood, and turning the air on slowly.

10) When running in hole pour one litre of oil per every ten stands down drill pipe, if oil has not previously been used.

11) Extreme care should be taken when approaching bottom. The Kelly should be picked up 10 - 30 metres off bottom to avoid plugging the bit.

12) When first approaching bottom, an off bottom air pressure reading should be taken. Wait until this pressure has been established before engaging the hammer.

13) The rotary table should be engaged before approaching bottom.

14) Engage the hammer slowly. Do not attempt to put the required weight on the bit all at once.

15) Rotary speed and weight on bit should be adjusted to allow the bit to run smoothly. This will vary in all cases.

16) After drilling a Kelly down the bit should never be allowed to drill off before picking up off bottom. If the weight on bit is allowed to get too low, the bit will tend to bounce and the possibility of shanking is increased.

17) In response to two bit shanking incidents in 1997, the drill pipe should be slugged with hammer oil on each connection. The oil injection pump should also be utilised.

5.4 AIR DRILLING PROGRAMME

13 1/2" Hole and 9 7/8" by 8 1/2" Hole

Note : Do not obstruct the driller's view of the air package. No one apart from the driller is to signal the air package operator, except in an emergency.

1. Driller signals air package operator to throttle up compressors and booster and ensures flow through standpipe, bleed-off, primary and secondary jets.

2. Use air compressors and booster to unload drilling fluid from the hole. Trip out adequate stands of drillpipe so as the booster pressure overcomes hydrostatic pressure of drilling fluid in hole. Stage in from there to total depth. Blow hole dry with the maximum air available in order to clean any scale from the drill string.

3. Drill new hole based on Bit & Hydraulics programme (Section 4).

- Mist pump is to be brought on line in 1st gear **only when directed by the Santos Representative onsite.** The following guidelines are recommended for misting:

- Normal injection rate of 7-33 BPH. Confirm gear outputs of pumping unit with air package operator well before commencing job.

MISTING FLUID MAKE UP	
FOAMER	1/2 - 2 gallon per 10 barrel tank
INHIBITOR	1/2 - 2 gallon per 10 bbl tank
CAUSTIC	To a pH of ±9

5. At kelly down, circulate hole sufficiently to ensure cuttings to surface. (This will only be a few minutes.)

6. The following sequence is suggested for trouble free operation whilst making connections:

   - Driller pulls back to tool joint and sets slips.
   - Driller signals air package operator to shut off air. Air package operator acknowledges driller, shuts down misting pump and diverts air to primary jet.
   - Roughneck (Lead Floorman) opens standpipe valve and bleeds off air from drill pipe to blooie line via secondary jet.
   - Watch standpipe gauge and continue to bleed off air pressure until gauge drops to zero. (This could take a few minutes and will take longer as we drill deeper.)
   - Break connection. Crew to stand clear as driller backs-out and pops connection.
   - Stab into new single in mouse hole and make-up single as normal.
   - Once connection is made and torqued up and slips

pulled, roughneck (Lead Floorman) to close secondary jet bleed line.

- Driller signals to air package operator to bring air on line.

- Air package operator acknowledges signal and diverts air back to standpipe and brings misting pump on line.

- Driller, once returns are seen at the end of the blooie line, can lower pipe to bottom of hole and commence rotation but, should not start drilling new hole until circulating pressure is back to normal, and good continuous returns are seen at the end of the blooie line.

6. Monitor standpipe pressure and airflow rate to ensure drilling optimisation. This includes ensuring good returns at the blooie line, making sure standpipe pressure does not fluctuate, and watching for any changes in the 'normal' operations.

7. If there are any changes in 'normal' operations, driller will immediately alert air package operator and the Santos representative. Some easily identified changes in 'normal' operations are:

SYMPTOM	PROBLEM	SOLUTION
Slowly increasing pressure.	Poor hole cleaning	• pick off bottom and work pipe for a few minutes • increase misting rate (if in use) The two solutions are only after advising Santos Representative onsite.
Sharp increase in pressure and then stabilisation.	Well kicking	• stop rotating • pickup until tool joint is clear of rotating table • advise the Santos Representative onsite.
Rapid increase in pressure.	Bit or float plugged	• back surge via secondary jet • trip for bit
Slowly decreasing pressure	Loss in airpack capacity	• check with airpack operator
	Washout in drill string	• advise the Santos Representative onsite.
Rapid decrease in pressure.	Twist-off	• stop drilling and advise the Santos Representative onsite.

8. At total depth in the 13 1/2" hole, circulate hole clean.

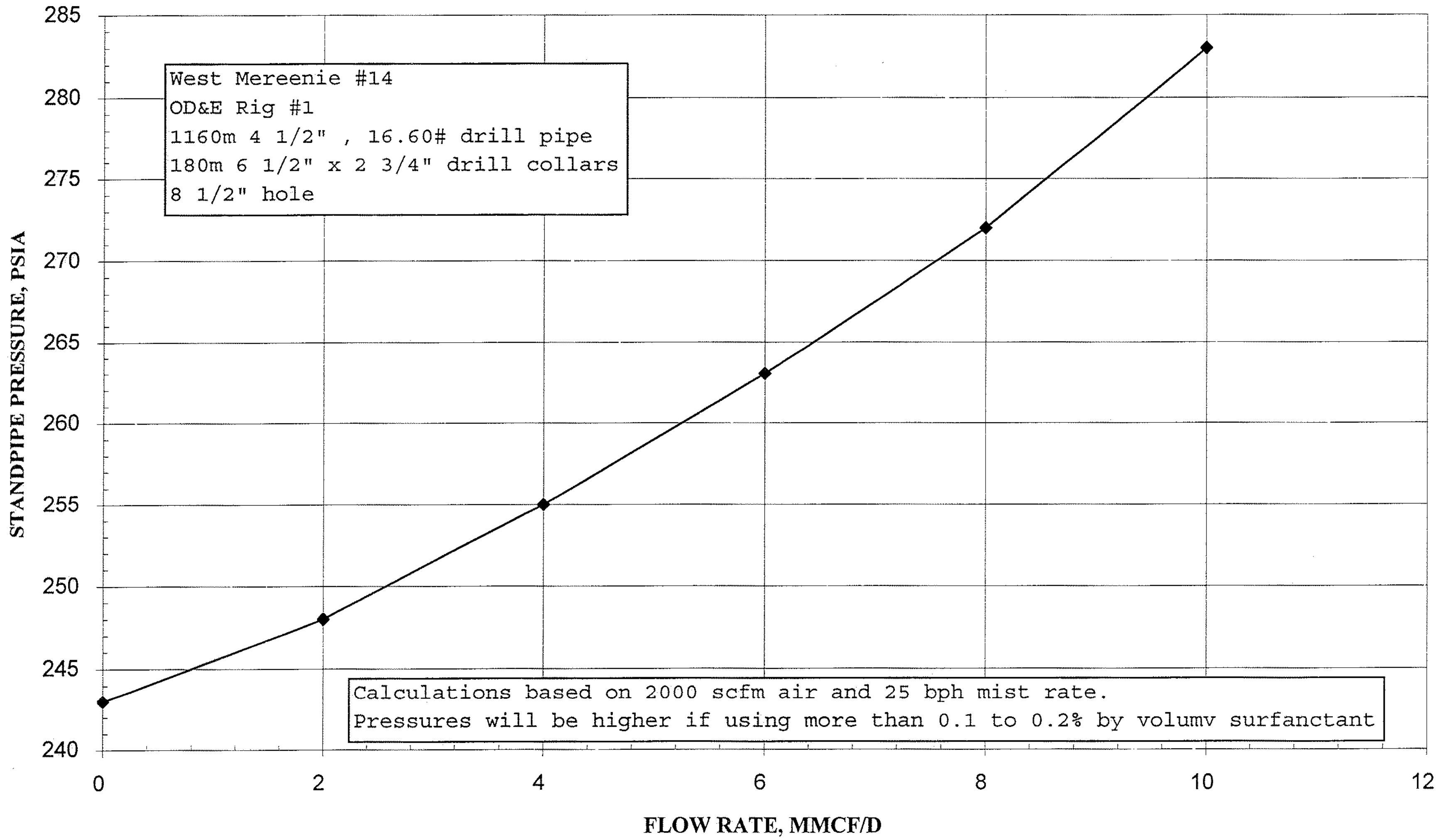
9. Kill the well with water.

10. The well must be killed prior to tripping while drilling the production hole.

11. On the first bit trip after the penetration of the Upper Stairway Sandstone the hole size will be reduced to 8-1/2"

5.5 AIR PRESSURE CHART

AIR PRESSURE CHART
Standpipe Pressure vs. Open Flow



5.6 OPEN FLOW TEST PROCEDURES

1. Stop rotating and pull drill string off bottom to clear kelly bushing.

2. Ensure flare line is alight.

3. Prior to closing pipe rams, check to make sure choke manifold is fully opened and operational. Open 3-1/8" side gate valve. Open HCR valve.

4. Shut down misting pump and divert air to primary jet. Idle back air compressors.

5. Monitor gas concentrations using mud loggers, until levels reach near 100% gas.

6. Driller closes upper pipe rams, and advises Santos representative that flow test is under way.

7. Record pressures using gauge mounted on choke manifold until flow stabilises. Santos representative to direct choke setting to obtain significant flow data.

8. On completion of flow test, open the well through the adjustable choke until pressure reaches 100 psi. Open fully through the manifold and 3" blow down line to reduce annular pressure below 50 psi.

9. Open pipe rams.

10. Throttle up air compressors and mist pump to volumes prior to testing then divert air into standpipe.

11. Close HCR valve on the choke line.

12. Driller observes standpipe pressure and blooie line returns and when all is returned to previous operational levels, resumes drilling.

5.7 PROCEDURE TO UNLOAD THE HOLE

1. Trip in the hole to near the float collar or bottom of the hole. Install the rotating head rubber.

2. If the drilling fluid is to be saved, displace the hole to water. If the drilling fluid is not to be saved, do not displace the hole to water.

3. Bring one mud pump on line at 1.5 to 2.0 bpm.

4. Bring one compressor and one booster on line.

5. Run the mist pump at approximately 10 barrels per hour.

6. As air is circulated around the bit, standpipe pressure will fall and the mud pump volume can be reduced.

7. After getting air back at the blooie line, the mud pump can be turned off and additional compressors added to the standpipe until the air volume is equivalent to that required to drill.

5.8 PROCEDURE TO CHANGE STRIPPER RUBBER

1. Shut down rotary. Pick up until tool joint clears rotary table.
2. Divert air package to primary jet. Open standpipe and bleed off drill pipe pressure
3. **Advise Santos Representative.**

PROCEDURE USING ANNULAR TO DIVERT GAS FLOW
(Preferred Method)

4. Open choke line to vent well through the choke manifold.
5. Close annular preventer and bleed closing pressure to ±500 psi.
6. Unlock stripper rubber clamp. Pull table bushings.

7. Strip one joint of drill pipe through the annular preventer and rotating head rubber should come with tool joint. If not, use winch line to pull stripper rubber out of rotating head.

8. Replace bushings, set drill pipe in slips, break out kelly.

9. Replace with new rubber. Stab joint of drill pipe into new rubber and make connection.

10. Pull slips and table bushings. Lower stripper rubber into rotating head and lock stripper rubber clamp. Reinstall table bushings.

11. Open annular preventer and close choke line.

PROCEDURE USING PRIMARY JET TO DIVERT GAS FLOW

12. Unlock stripper rubber clamp. Pull table bushings.

13. Pull one joint of drill pipe and rotating head rubber should come with tool joint.

14. Replace bushings, set drill pipe in slips, break out kelly.

15. Replace with new rubber. Stab joint of drill pipe into new rubber and make connection.

16. Pull slips and table bushings. Lower stripper rubber into rotating head and lock stripper rubber clamp. Reinstall table bushings.

5.9 PROCEDURE FOR WIRELINE OPERATIONS

The well will be killed prior to running any open hole logs. The well will not be logged while flowing.

6 CASING & CEMENTING PROGRAMME

6.1 CASING PROGRAMME

Prepare casing as per DOM, Sections: 7.1 to 7.4 prior to running casing.

16" Conductor (0 - 31m)

Conductor pipe should be run using weld-on pad-eyes and a wireline sling. Joints should be welded together. A pre-fabricated cement shoe should be used

Hole and conductor should be filled with water before cementing to minimise buoyancy of string.

Conductor should be cemented back to surface (cellar floor).

Approximately 80 sacks of Class 'G' cement with 2% calcium chloride mixed at 15.8 ppg should be used.

Surface Casing

Size (in)	Depth (m)	ID (in)	Drift ID (in)	Wt. (lb/ft)	Grade	Thread	Burst (psi)	Collapse (psi)	Min. Tensile (1,000lb)
10-3/4	550	10.050	9.894	40.5	K-55	STC	3,130	1,580	450

1. One joint shoe track with float shoe and float collar. **(DOM 7.3.6)**
2. M/U torque – STC 4500ft.lb optimum
3. Casing Test Pressure – 2500 psi (80% of Surface casing burst pressure)
4. Casing collar is to be spaced and landed such that the installation of the BOP stack does not require modification. A screw on bowl will be used.

Production Casing

Size (in)	From (m)	To (m)	ID (in)	Drift ID (in)	Wt. (lb/ft)	Grade	Thread	Burst (psi)	Collapse (psi)	Min. Tensile (1,000lb)
7	Surface	12	6.276	6.151	26	K-55	BTC	4,980	4,320	415
7	12	798	6.366	6.151	23	K-55	BTC	4,360	3,270	341
7	**External Casing Packer (ECP) and PAC Valve with cross-overs (See Section 5.1.3)**									
7	798	TD	6.276	6.151	26	K-55	BTC/LTC	4,980	4,320	401
Note	1. One joint shoe track with float shoe (Hallib.) and landing collar (Baker). **(DOM 7.3.6)** 2. A marker joint for perforating and production logging control is to be located a minimum of 20' but not more than 50' above each pay zone, The weight and grade of these marker joints shall be the same or greater than the casing string at that depth. 3. M/U torque – *(26lb/ft)* LTC 4010 ft.lb optimum. 4. Casing Test Pressure – Once the Baker Closing Plug has been landed the casing should be pressure tested to 3480 psi (80% of 7" 23lb/ft K55 burst pressure).									

6.1.1 CENTRALISER PLACEMENT

Casing String	Centraliser Placement
10-3/4" Surface Casing	10ft from float shoe First two casing couplings Over coupling of every third joint Top centraliser on first coupling below surface **Cement Basket to be run at approx. 30m**
7" Production Casing	10ft from float shoe First two casing couplings Over coupling of every third joint to surface One over every coupling from 50ft below to 50ft above all reservoir sections First two casing couplings on both sides of the ECP

6.2 ECP & PAC VALVE PLACEMENT

The ECP is to be located in the production casing string above the top of the Upper Stairway Sandstone. The placement of the ECP shall be determined from the Caliper logs. The PAC Valve is to be located above the ECP. See Appendix 1 for ECP and PAC valve diagrams.

Cross-overs will be supplied with the ECP and PAC Valve. The PAC valve will be supplied complete with the cross-overs fitted (due to NSCC premium connection type).

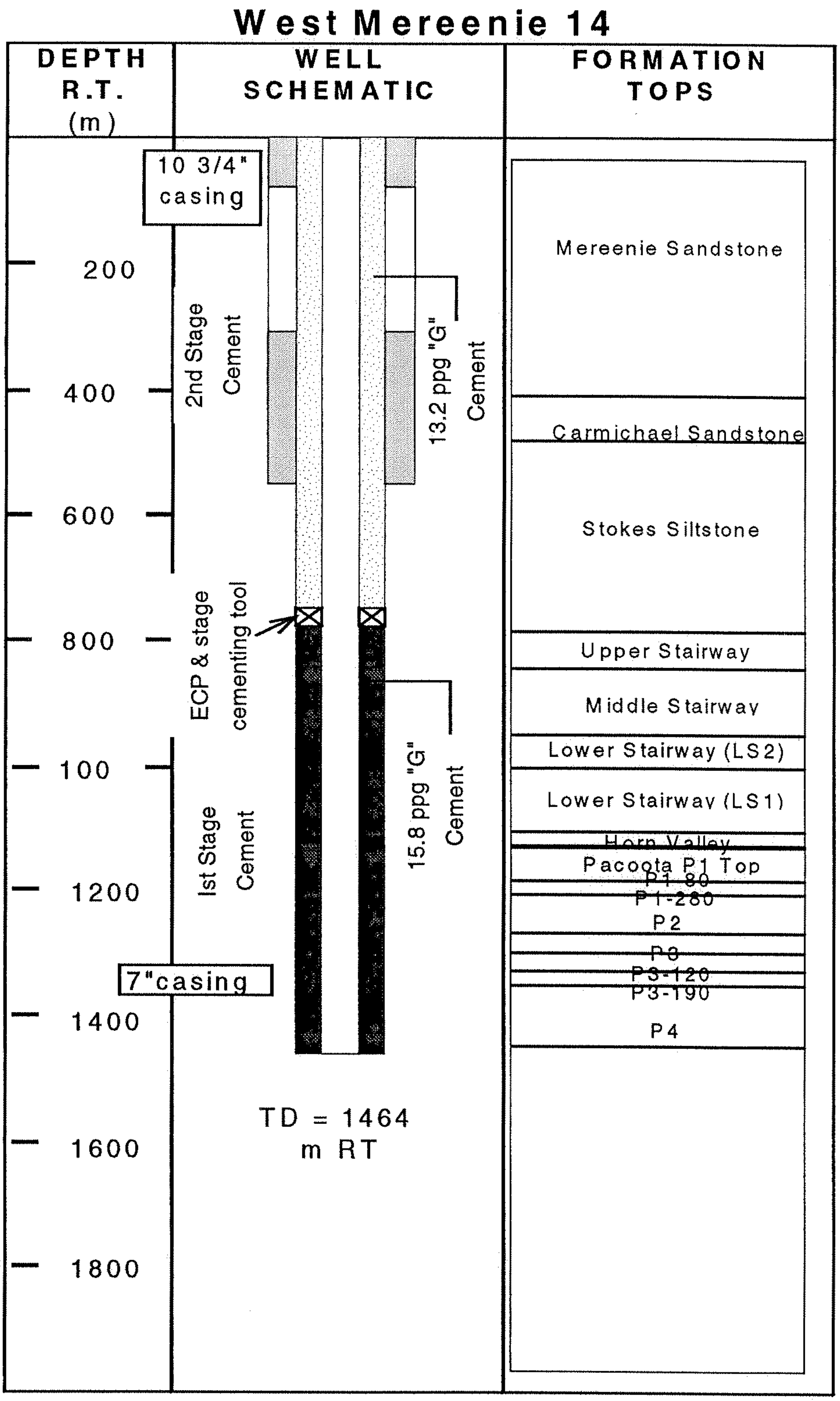
Configuration:

- 7" 23 lb/ft Casing (BTC)
- Cross-over (BTC box , NSCC pin)
- PAC Valve (NSCC)
- Cross-over (NSCC box, LTC pin)
- ECP (LTC)
- Cross-over (LTC box, BTC pin)
- 7" 26 lb/ft Casing (BTC)

Ensure that the running order is clearly marked on all components including crossovers prior to running the production casing.

(See Appendix 1)

6.2.1 WELL SCHEMATIC



6.3 CEMENTING PROGRAMME

The slurry recipes presented are to be used as a guide for calculation purposes only. Laboratory tested recipes will be advised prior to the job and detailed on Cement Test Report Form **DQMS-F-205**.

See Appendix 2 for the Halliburton Cementing Programme and Pressure Simulation.

HALLIBURTON

SANTOS QNTBU - MEREENIE 99A

Prepared by David Gugielmo
Date : 15/2/99 Revision 2
USD/AUD 0.64

12 1/4" Hole and Casing Data

Hole size	13 1/2	In.	Casing Size	10 3/4	In.
Shoe Depth (TMD)	1,800	Ft.	Shoe Depth (TVD)	1,800	Ft.
Surface Temperature	80	Deg.F.	Gradient	1.65	Deg.F./100 Ft.
BHST	110	Deg.F.	BHCT	93	Deg.F.
Casing Weight	40.5	Lbs/Ft.	Casing ID	10.050	In.
Previous casing shoe	0	Ft.	Previous casing ID	0.000	In.
Shoe height	40	Ft.	Sump height	10.0	Ft.
Mud Weight in Hole	9.2	PPG	Dispacement Mud Weig	9.2	PPG

Single Slurry

Top of single slurry	780	Ft.	Cement Excess		0 %	
Total single slurry	403	CuFt.	Equivalent to --->		72 Bbls.	
ABC Class 'G' Cement			350	Sacks	100 sack top-up	
Spherelite	0.0	%	0	Lbs.	Extender (Ceramic)	
Bentonite	0.0	%	0	Lbs.	Extender (Powder)	
Calcium Chloride	1.00	%	329	Lbs.	Accelerator	
NF-5	0.010	Gals/Sk	4	Gallons	Liquid Defoamer	
Mixing Water (Fresh)	5.00	Gals/Sk	Density		15.8 PPG	
Yield	1.15	CuFt/Sk	Thickening Time		<> 2:30 Hrs:Mins	
Fluid Loss	N/C	cc.	Free Water		N/C %	

Chemical Requirements and Cost Estimate

Description	Unit Cost	Quantity	Unit	Unit Price AUD	Total
Class G Cement	USD	19	tonne	401.60	7,630.40
Calcium Chloride		329	Lbs.	0.51	167.99
NF-5		4	Gals.	83.87	293.89
Surface Casing Service Fee		1	Each	2,855.00	2,855.00
Bulk Cement handling		350	CuFt.	2.90	1,016.20
Monthly Equipment standby rental		3	months	1,500.00	4,500.00
Personnel Charge		10	days	1,140.00	11,400.00
10 3/4" Float 8rd Shoe	638.94	1	Each	998.34	998.34
10 3/4" Float 8rd Collar	832.85	1	Each	1,301.33	1,301.33
10 3/4" Top Plug	240.72	1	Each	376.13	376.13
10 3/4" Limit Clamp	27	3	Each	42.19	126.56
10 3/4" Centraliser	72	10	Each	112.50	1,125.00
		Estimated Job Cost		AUD$	36,818.08

8 1/2" Hole and Casing Data

Hole size	8 1/2	In.	Casing Size	7	In.
Shoe Depth (TMD)	4,810	Ft.	Shoe Depth (TVD)	4,810	Ft.
Surface Temperature	80	Deg.F.	Gradient	1.65	Deg.F./100 Ft.
BHST	159	Deg.F.	BHCT	124	Deg.F.
Casing Weight	26.0	Lbs/Ft.	Casing ID	6.276	In.
Previous casing shoe	1,800	Ft.	Previous casing ID	10.050	In.
Shoe height	40	Ft.	Sump height	10.0	Ft.
Mud Weight in Hole	11.0	PPG	Dispacement Mud Weig	8.4	PPG

Stage Two Slurry to Surface

Top of stage two slurry	0	Ft.	Cement Excess		10 %	
Total stage two slurry	722	CuFt.	Equivalent to --->		129 Bbls.	
ABC Class 'G' Cement	9 7/8	Hole	403	Sacks		
Bentonite	2.3	% (BWOW	872	Lbs.	Extender (Powder)	
HR-5	0.00	% (BWOC)	0	Lbs.	Retarder	
CFR-3	0.00	% (BWOC)	0	Lbs.	Retarder	
NF-5	0.010	Gals/Sk	4	Gallons	Liquid Defoamer	
Mixing Water (Fresh)	9.73	Gals/Sk	Density		13.2 PPG	
Yield	1.79	CuFt/Sk	Thickening Time		<> 4:15 Hrs:Mins	
Fluid Loss	N/C	cc.	Free Water		N/C %	

Stage One Slurry

Top of stage one. ECP Dept	2,526	Ft.	Cement Excess		10 %	
Total stage one slurry	332	CuFt.	Equivalent to --->		59 Bbls.	
ABC Class 'G' Cement			286	Sacks		
Halad-413	0.40	%	75	Lbs.	Fluid Loss Reducer	
Gas Stop	0.40	%	75	Lbs.	Fluid Loss Reducer	
HR-5	0.30	%	57	Lbs.	Retarder	
NF-5	0.010	Gals/Sk	3	Gallons	Liquid Defoamer	
Mixing Water (Fresh)	5.11	Gals/Sk	Density		15.8 PPG	
Yield	1.16	CuFt/Sk	Thickening Time		<> 3:45 Hrs:Mins	
Fluid Loss	<> 50	cc.	Free Water		0.0 %	

Chemical Requirements and Cost Estimate

Description	Quantity	Unit	Unit Price	Total
ABC Class 'G' Cement	30	Tonne	401.60	12,048.00
Halad 413	75	Lbs.	43.62	3,291.13
Bentonite	872	Lbs.	0.00	0.00
HR-5	57	Lbs.	6.37	360.46
CFR-3	0	Lbs.	7.21	0.00
NF-5	7	Gals.	83.87	589.83
Gas Stop	75	Lbs.	34.42	2,596.99
Personnel Charge	10	Days	1,140.00	11,400.00
Production Casing Cementing	1	Each	4,450.00	4,450.00
Lump Sum Mob/Demob to Roma	1	each	9,250.00	9,250.00
Bulk Service Charge	689	CuFt.	2.90	1,998.29
7" Float Shoe	1	Each	770.83	770.83
7" Float Collar	1	Each	1,180.86	1,180.86
7" Centraliser	30	Each	80.00	2,400.00
7" Limit Clamp	1	Each	17.43	17.43
Top Plug	1	Each	106.40	106.40
Bottom Plug	1	Each	174.00	174.00
		Estimated Cost	AUD$	50,634.23

PROPOSAL NUMBER: 8064/00/B/CM/98

6.4 SURFACE CASING CEMENT DETAILS

(Refer to D.O.M. DQMS-M-04 Figure: 8.6)

Surface casing is to be cemented with approximately 300 sx Class 'G' cement.

Cement Properties	
Surface	
Cement Class:	Class "G"
Estimated Amount :	300 sx.
Slurry Weight:	15.8ppg
Slurry Yield:	1.15 ft^3/sx
Additives:	
Mixwater:	5.0 gal/sx + 2 ltr/10 bbl Biocide
Thickening Time:	2.5 hours +

- Displace cement with water and bump plug with 500 psi over final displacing pressure. Do not reciprocate pipe during displacement.
- Check to see if float is holding.
- If float holds, bleed off casing and rig out cementers.
- If float does not hold, rebump plug and hold 500 psi on casing for four hours. Release pressure. Run a 100 sx top up cement job, ensure cement at surface.
- WOC for a total eight to ten hours or until the surface samples have hardened prior to slackening off casing.
- Back off landing joint and install casing bowl. Nipple up BOP's

Note: The DQMS F-220 and DQMS F-221 forms are to be completed by the Santos Rig Representative.

6.5 PRODUCTION CASING CEMENTING DETAILS

(Refer to D.O.M. DQMS-M-04 Section: 8.9.5)

Any changes will be detailed and forwarded after logging.

Pre-flush brine

(Refer to D.O.M. DQMS-M-04 Section: 8.5.3)

Mix approx. 20 bbls preflush brine. Water in pre-Flush to have same NaCl concentration as the drilling mud.

Add SAPP at 5 kg/bbl.

Cement Details

(Refer to D.O.M. DQMS-M-04 Figure: 8.6)

Cement Properties Stage One Slurry	Class "G"
Estimated Amount	290 sx
Slurry Weight	15.8 ppg
Slurry Yield	1.16 cuft/sx
Additives	0.4% Halad 413
	0.4% GasStop
	0.01 gal/10 bbl NF-5
	0.3% HR - 5
Water requirements	5.11gals/sx
Thickening Time	3:45 hours (est.)

Cement Properties Stage Two Slurry	Class "G"
Estimated Amount	410 sx
Slurry Weight	13.2 ppg
Slurry Yield	1.79 cuft/sx
Additives	2.3% Bentonite
	0.01 gal/10 bbl NF-5
Water requirements	9.73gals/sx
Thickening Time	4:15 hours (est.)

* **Centraliser positions, cement additives and cement quantities will be confirmed by Brisbane Office prior to cement jobs.**

Estimated BHST: 140 °F (estimated)

NOTES:

a) Do **not** reciprocate the casing at any stage during the displacement or cementation.

b) Prior to cementing operations, all lines are to be pressure tested to 2000 psi for 5 minutes. Use a 'Tee' piece to allow installation and testing of lines to both the rig pump and the cement unit prior to circulating.

c) Pump pre-flush and spacer. Mix and pump first stage cement.

d) Drop Baker Opening Plug and displace cement first stage cement with fresh water (mud if sufficient water not available

e) Inflate ECP and open PAC Valve **(formal instructions including PAC valve and ECP opening pressures will be forwarded prior to job).**

f) Pump pre-flush and spacer. Mix and pump second stage cement.

g) Drop Baker closing plug and displace second stage cement with water (mud if sufficient water not available).

h) Lift BOP's and set slips.

i) Mud removal efficiency is reduced significantly after 5 minutes of static gelation time between circulating and cementing. **Every effort must be made to have a smooth and prompt transition from circulating to cementing to displacement**. Measures to be considered are,

j) Hold safety meetings while circulating.

k) Monitor pump pressure and volumes to ensure that the plug is not over displaced.

l) The volume of returns is to be recorded from the start of cementing to the finish of displacement and reported along with cement and displacement volumes.

m) The casing and cementing report **DQMS F-220** is to be completed by the Santos Rig Representative.

n) Samples of dry cement and mixwater must be collected during the job and retained until the bond log has been evaluated. If a poor bond is observed, laboratory tests may be run on the collected samples.

7 WELLHEAD AND WELL CONTROL EQUIPMENT

7.1.1 WELLHEAD

SECTION A: Bradenhead
13-5/8" 3000#
13-3/8" API LTC thread bottom

Crossover Swage: 13-3/8" LTC Pin x 10-3/4" STC Pin
13-3/8" OD x 10.05" ID.
24" Long

7.1.2 BOP CONFIGURATION

The BOP configuration during drilling shall be as follows:

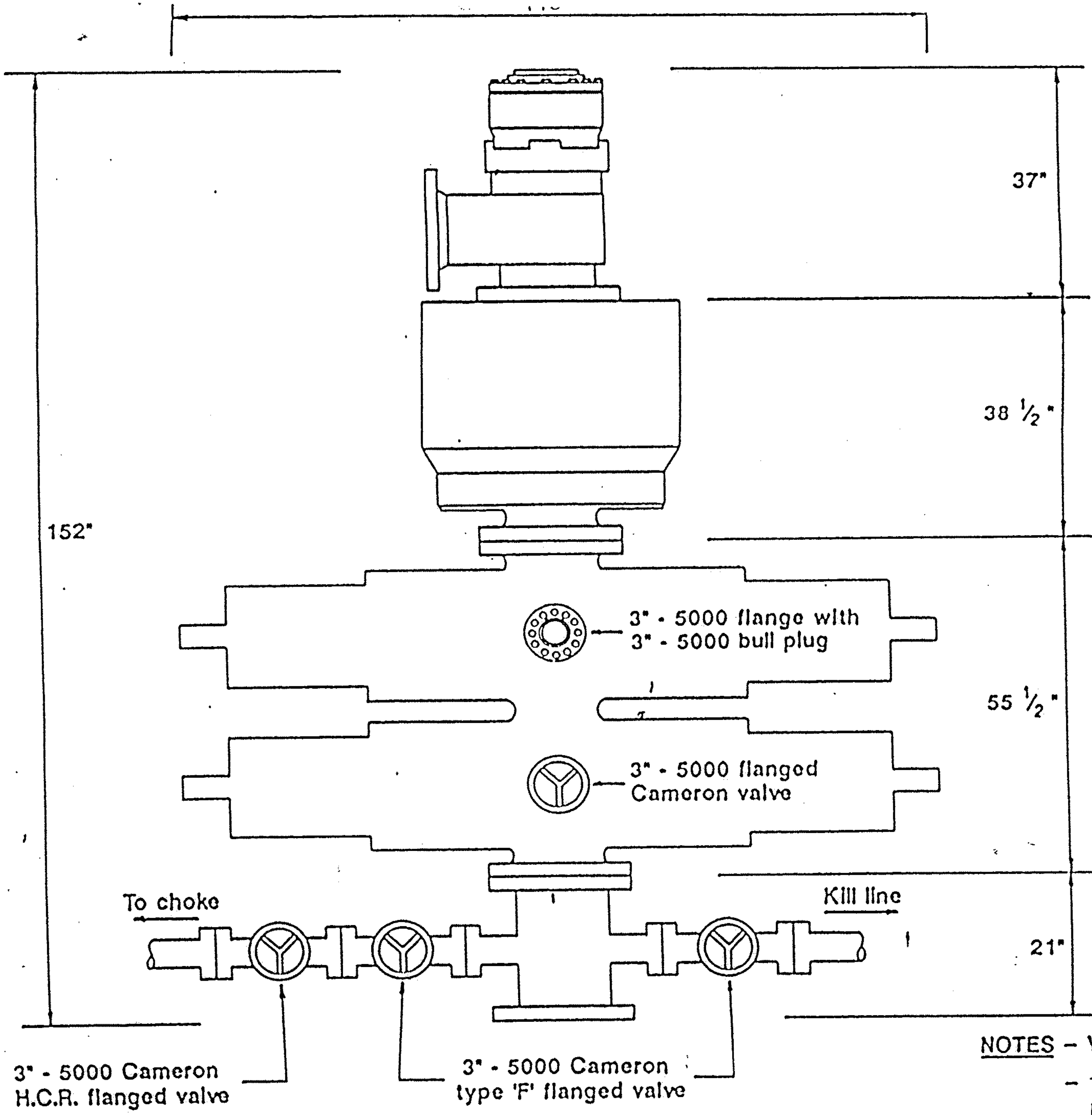
BOP Component	Description	Dressed
Annular BOP	Cameron - Type "D" 13.5/8" - 5000psi	
Double Ram BOP	Cameron Type "U" double gate unit 13.5/8" - 5000psi	Top: Pipe rams Bott: Blind rams
Drilling spool	13.5/8" 5000psi	3" 5000psi choke 3" 5000psi kill
Wellhead	Cameron 13-5/8" 3K	

In the event that the electric driven pump (or the electric motor) on the Koomey unit fails, the well must be killed and shut in. The Drilling Engineer or Drilling Team Leader must then be advised of the malfunction.

7.1.3 BOP DIAGRAM

MJV SL-750 WELLHEAD

Author: R.Goosem
Drawn: ; TDL



Williams rotating B.O.P. 13 5/8" - 3000 flange with 7 1/16" - 3000 flanged side outlet

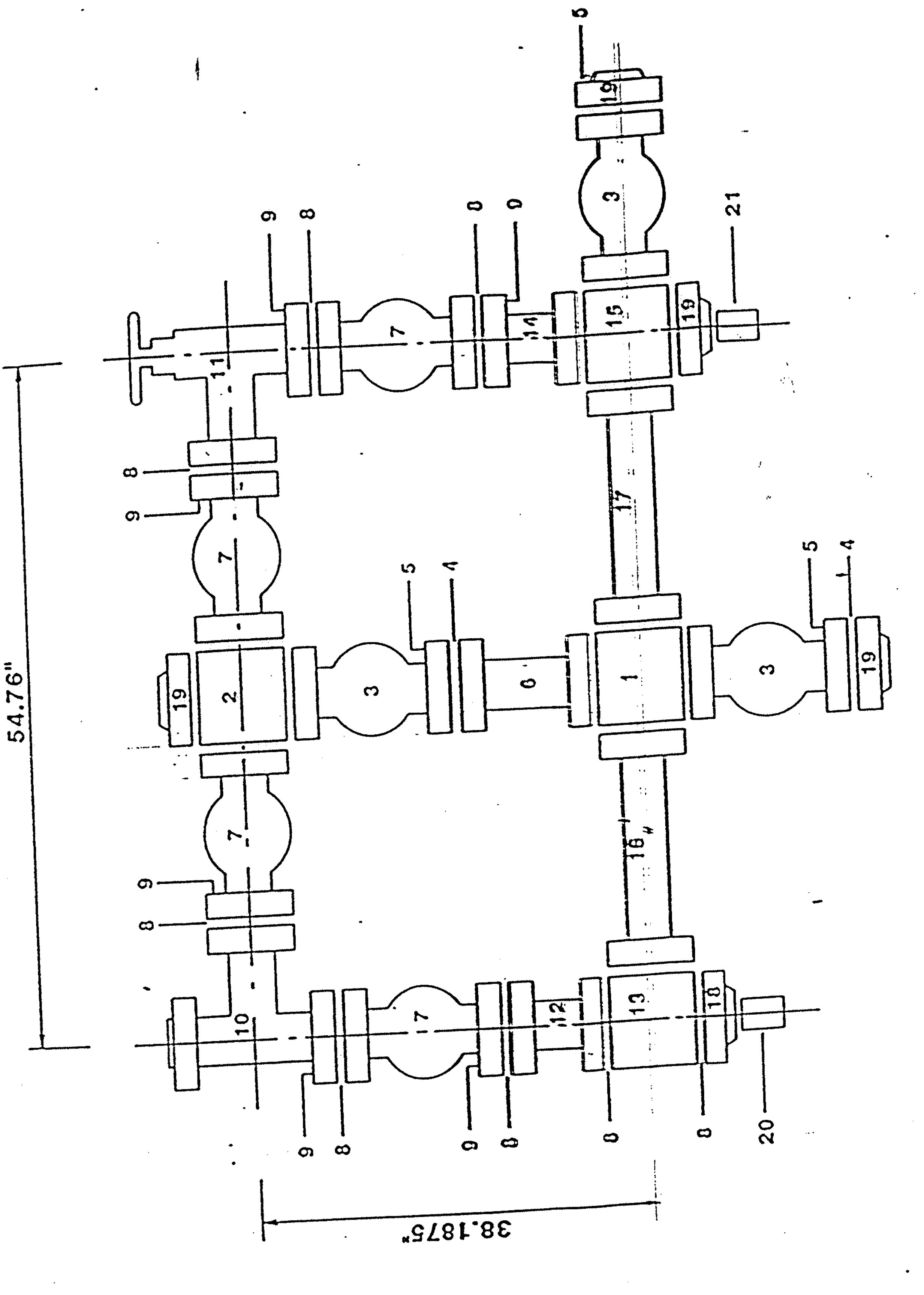
Cameron type 'D' super trim annular preventer 13 5/8" - 3000 studded top by 13 5/8" - 5000 flanged bottom

Cameron type 'U' double gate B.O.P. 13 5/8" bore. 13 5/8" - 5000 flanged top and bottom and 4 x 3" - 5000 flanged outlets.
NOTE : 2 x 3" - 5000 flanged outlets on reve side (catwalk side) plugged off with 3" - 500 bull plugs

Drilling spool 13 5/8" - 5000 flanged top and bottom with 2 x 3" - 5000 flanged outl

NOTES – View from drawworks
– 14' 3" (171") clearance between bottom of rotary beam and ground level

7.1.4 CHOKE MANIFOLD DIAGRAM & DETAILS



Author:	R.Goosem	MJV SL-750
Drawn:	TDL	CHOKE & KILL MANIFOLD 5000# WP
Date:	August 1991	

CHOKE AND KILL MANIFOLD - DETAILS:

ITEM No.	Quantity	DESCRIPTION
1	1	**CROSS**, studded 3-1/8" x 3-1/8" x 3-1/8" x 3-1/8" 5000 # WP. tapped 1/2" NPT top.
2	1	**CROSS**, studded 3-1/8" x 3-1/8" x 2-1/16" x 2-1/16" 5000 # WP. tapped 1/2" NPT top.
3	3	**VALVE**, gate Cameron 3" x 3-1/8" 5000 # WP. - flanged.
4	13	**RING GASKET**, steel R-35
5	3	**STUD & NUT**, sets for 3-1/8" 5000 # WP flange
6	1	**SPOOL**, Spacer. 3-1/8" x 3-1/8" 5000 # WP flange x flange. Height = 9"
7	4	**VALVE**, gate Cameron 2" x 2-1/16" 5000 # WP. - flanged.
8	11	**RING GASKET**, steel R-24
9	6	**STUD & NUT**, sets for 2-1/16" 5000 # WP flange
10	1	**CHOKE**, "Swaco" Hydraulic, 2-1/16" 5000# WP, flanged inlet and outlet.
11	1	**CHOKE**, Adjustable, Type "CH-2" McEvoy 2-1/16" 5000 # WP. Flanged inlet and outlet.
12	1	**SPOOL**, Spacer. 2-1/16" x 2-1/16" 5000 # WP Flange x flange. Height = 10.5"
13	1	**TEE**, Studded 2-1/16" x 2-1/16" 5000 # WP.
14	1	**SPOOL**, Adaptor. 3-1/8" x 2-1/16" 5000 # WP. Flange x flange. Height = 9.5"
15	1	**CROSS**, Studded, 3-1/8" x 3-1/8" x 3-1/8" x 3-1/8" 5000 # WP.
16	1	**SPOOL**, Adaptor, 3-1/8" x 3-1/8" 5000 # WP. Flange x flange. Height = 17.005"
17	1	**SPOOL**, Spacer. 3-1/8" x 3-1/8" 5000 # WP. Flange x flange. Height = 16.005"
18	1	**Flange**, Companion. 2-1/16" 5000 # WP x 2" LP.
19	4	**Flange**, Companion. 3-1/8" 5000 # WP x 3" LP.
20	1	**BULL PLUG**, solid 2" LP
21	1	**BULL PLUG**, solid 3" LP

7.1.5 BOP TESTING

(DOM 10.3.4 & 10.5)

All the provisions of the BOP Tests section of the Drilling Operations Manual shall be adhered to.

Item	Low / High Test Pressure (psi)
Annular	200/1000
Rams	200/2200
Choke manifold	200/2200
Safety valves	200/2200
Casing	200/2200

- Routine BOP test frequency shall be 7 days, or on the first bit trip after this period has elapsed.
- The Contractor is responsible for maintaining an auditable record of pressure tests for all equipment **including safety valves**.
- Emergency engine shut down equipment shall be functioned every 7 days while drilling below the surface casing shoe.

8 EVALUATION

8.1 LOGGING PROGRAMME

Wireline logs will be run at production hole total depth only. Responsibilities and procedures for the running of logs are detailed in **DOM 9.2.**

Log Type	Log Interval
PEX (HALS, MCFL, TLD CNL)	TD to 10m above Upper Stairway
GR	TD to Surface
FMS or FMI	TD to 10m above Upper Stairway

8.2 DRILL STEM TESTING

All Drill Stem Tests shall be carried out in accordance with the practices and procedures detailed in **DOM 9.5.** See Appendix 5 for the DQMS test tool layout. The following DSTs have been programmed for West Mereenie-14 (DST Request Form required - to be completed by Project Leader).

Formation	Timing	Type
Pacoota Sandstone (2 tests)	Post Logging	Inflate Straddle

Note:

- The standard test duration shall not exceed 6 hours and 40 minutes on bottom without prior approval of the Team Leader (Drilling). The Reservoir Engineering / Exploration Departments are free to alter the flow / shut in times as required, so long as total time does not exceed the specified duration.
- All depths will be confirmed by the Wellsite Geologist under instructions from Operations Geology.
- See Appendix 5 for the DQMS standard DST equipment layout.

9 POTENTIAL PROBLEMS & CHALLENGES

Hammer Shanking (Surface Hole)

During the previous Mereenie drilling program the 13-9/16" hammer bit was shanked on more than one occasion resulting in fishing operations. To prevent this occurring on East Mereenie 42 Teflon plates have been included on the splines of hammer bit to limit metal to metal contact. The BHA has also been modified to include the square drill collar for additional BHA stability.

Extra care must be taken to ensure that the weight on bit is not left to drill off as this may lead to bit shanking.

Additionally, the pipe should be 'slugged' with hammer oil on each connection in addition to the oil being introduced into the air stream via the oil injection pump.

Stuck Pipe (Surface Hole)

Stuck pipe was experience while drilling surface hole on West Mereenie-13 and lengthy fishing operations were required. The cause of this stuck pipe incident remains unknown. To reduce the risk of stuck pipe incidents mist/foam must be introduced at an early stage in the surface hole. Additionally, the hole must be blown completely clean prior to making connections.

10 WELL CONTROL

10.1 HARD SHUT-IN

Santos has adopted the hard shut-in method since publication of the DQMS. Consequently, all references to use of the soft shut-in method in the DQMS should be ignored. The choke should be maintained in the closed position while drilling & tripping.

10.2 TRIPPING

The Rig Representative must ensure that **ALL** trips are conducted according to procedures detailed in the Draft DOM Sections 4.4.4 and 4.4.5 included as Appendix 2 to this programme.

Drillpipe must be strapped out of the hole before testing or logging.

10.3 DRILLS

The Santos Rig Representative must initiate and supervise Well Control Drills. The Well control drills shall only be conducted when they do not complicate ongoing operations. The Santos Rig Representative must be confident that the crews are adequately trained and prepared to implement well control procedures correctly **(DOM 10.6.2)**.

10.4 ROUTINE DAILY PRECAUTIONS

The Santos Rig Representative must ensure that the routine daily precautions as detailed in **DOM 10.6.3** are carried out as specified.

All well control data must be recorded as specified. Notably, a Pre kick sheet shall be completed and updated every 24 hours or 500 ft drilled for all bit runs below the surface casing **(DOM 10.6.4.5).**

10.5 SCR'S

Slow pump rates are to be taken at least once per tour and after any mud weight changes or BHA changes. The results of these are to be reported in the tour book. The latest slow pump rates and pressures are to be reported daily **(DOM 10.6.3.1).**

10.6 MINIMUM CHEMICAL STOCK REQUIREMENTS

A minimum of 800 x 25kg sacks of barite and sufficient LCM to make one 60bbls lost circulation pill must be held on site. (**DOM 6.3.5**)

11 GENERAL DATA

11.1 SUSPENSION

At least 0.62m (2 ft) of 7" casing stick-up must be left above the braden head (top flange) to allow the work-over rig to install the required pack-off and adaptor flange. A cap is to welded onto the casing stub (with breather holes) and the flange greased with the gasket left in the groove.

11.2 ABANDONMENT

Well abandonment requirements and guidelines are detailed in **DOM 11.3.2 and DOM 11.5.**

In addition to the requirements detailed in **DOM 11.3.2** special note should be made of the requirement that saline water sands be isolated from any fresh water sands above to prevent contamination of artesian potable water supplies.

Well abandonment shall be carried out according to the procedure detailed in **DOM 11.5**.

11.3 REPORTING PROCEDURES

1. Morning reports are to be filled out completely using the DIMS system, if available and faxed in to Brisbane Office each week day morning by 07:30 hrs. Weekend schedules will be advised each Friday. DIMs reports should be emailed (from the Mereenie field office or gas plant) twice a week if possible.

2. Copies of wireline logs, drill stem test reports, samples of formation fluids and accident reports are to be faxed to Brisbane as soon as possible.

3. All reports for the well should be forwarded to the Brisbane Office immediately on completion of the well. Reports include:
   a) Tour Sheets
   b) Geolograph records
   c) Field service tickets
   d) Wireline survey discs
   e) Drilling bit records
   f) Casing Tally Sheets
   g) Cementing Reports
   h) DST Reports
   i) Any Other Reports, as appropriate

4. Brisbane office staff will forward copies of the faxed Daily Drilling Report to the NTDME and Magellan.

Morning Reports Drilling

For all Santos Ltd (QNTBU) drilling operations, the reporting period shall be midnight to midnight, with an 0600 depth and operation.
Day 1 - 00:00 to Day 2 - 00:00, Use report date of day one i.e. The date on the report will refer to the date the activities occurred. Daily reports and comments are required during move, rig up and rig down operations, or until Santos Ltd (QNTBU) obligations as Operator are terminated.

11.4 LIST OF SERVICES

DRILLING	MJV Rig #1
MUD	Baroid
MUD LOGGING	Collin Higgins & Assoc.
OPEN HOLE LOGGING	Schlumberger
DST	Baker Oil Tool
ECP & PAC VALVE	Baker Oil Tools
CEMENT / CEMENTING SERVICES	Halliburton
LEASE CONSTRUCTION	Santos – Mereenie Field Services

11.5 TELEPHONE CONTACTS

BRISBANE OFFICE	:	Phone	(07) 3228 6666	
(9th Floor)	:	Fax	(07) 3228 6570	
MOOMBA OFFICE	:	Phone	(08) 8224 7406	(4406)
	:	Fax	(08) 8224 7450	(4450)
ALICE SPRINGS	:	Phone	(08) 8952 5700	
OFFICE	:	Fax	(08) 8952 5978	
MEREENIE OFFICE	:	Phone	(08) 8950 3700	
	:	Fax	(08) 8950 3722	
Brett Darley	:	Office	(07) 3228 6557	(6557)
Acting Team Leader	:	Home	(07) 3357 3936	
		Mobile	(0419) 914 141	
Darren Greer	:	Office	(07) 3228 6502	(6502)
Drilling Engineer	:	Home	(07) 3209 6275	
	:	Mobile	(0419) 393 911	
B. BOTTROFF	:	Office	(07) 3228 6512	(6512)
Drilling Engineer	:	Home	(07) 3379 1314	
& **DQMS** Inquiries				
C. SCHMICKL	:	Office	(07) 3228-6810	(6810)
Drilling Engineer	:	Home	(07) 3870-2045	
DIMS Inquiries				

11.6 LIST OF CONTRACTORS

RIG CONTRACTOR:

OD&E PTY LIMITED
S.A
Contact: Neil Dean
15-17 Westport Road
Elizabeth West SA

Tel: (08) 8255 3011
Fax: (08) 8252 0272

AIR DRILLING EQUIPMENT:

OILTOOLS
W.A
Contact: Steve Hodgson
284 Welshpool Road
Welshpool WA

Tel: (08) 9356 1277
Fax: (08) 9356 1003

CEMENTING:

HALLIBURTON AUSTRALIA
QLD (Roma Office)
Contact: Paul Larkins

Tel: (07) 4622 4588
Fax: (07) 4622 3674

DRILLING FLUIDS:

BAROID AUSTRALIA PTY LTD
W.A
Contact: Peter McNaughton
53-55 Bannister Road
Canning Vale WA

Tel: (08) 9455 8300
Fax: (08) 9455 5300

DRILL STEM TESTING:

BAKER OIL TOOLS
S.A
Contact Tim McMillan
23 Regency Park SA

Tel: (08) 8243 2966
Fax: (08) 8379 2651

ECP & PAC VALVE:

BAKER OIL TOOLS
W.A
Contact: Colin Ingram
1-5 Bell Street
Canning Vale WA

Tel: (08) 9455 0143
Fax: (08) 9455 0943

WIRELINE LOGGING:

SCHLUMBERGER
QLD
Contact: Lee Swager

Tel: (07) 3881 3170
Mobile: 0417 751 903

MUD LOGGING:

COLIN HIGGINS & ASSOC.
W.A
Contact: Colin Higgins

Tel: (08) 9364 6165
Fax: (08) 9364 6165

Prepared by: --

Darren Greer: **Drilling Engineer**

Agreed by: --

Karl Biederstadt: **Project Leader**

Approved by: --

Brett Darley: **Team Leader (Acting)**

Drilling Services

Dwaine Nygrin: **Chief Drilling Superintendent**

Drilling Services

APPENDIX 1

ECP & PAC VALVE INFORMATION

PROPOSED LINER HANGER COMPLETION

CUSTOMER: SANTOS

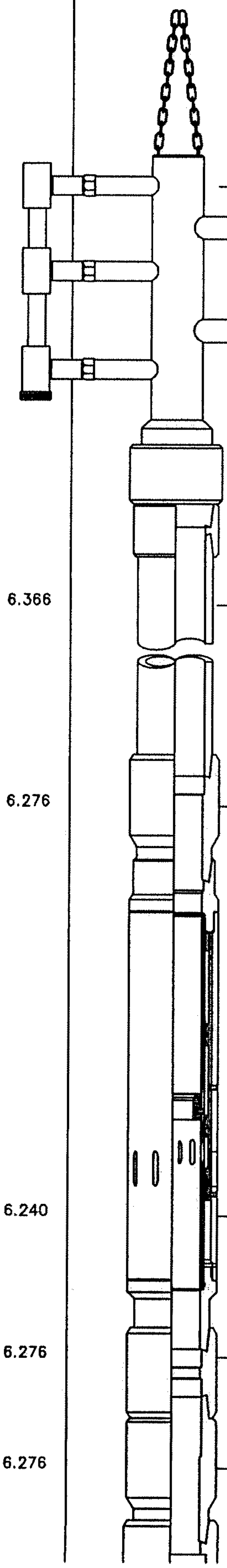
COUNTRY: AUSTRALIA FIELD: MEREENIE

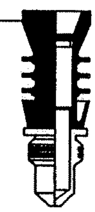
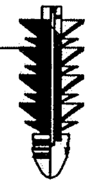
QUOTATION NO. AXX00XX-99 WELL NO. 14

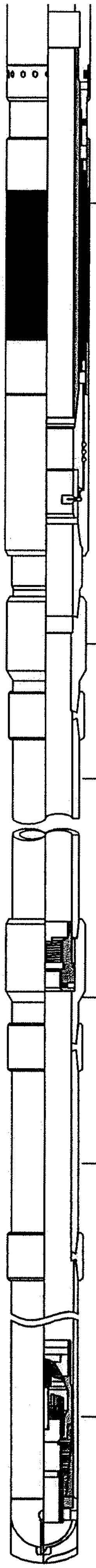
DRAWING NO. SA004-1
APPROVED BY: C.INGRAM
DRAWN BY: B. MOFFAT
DATE: 24/2/99

BAKER HUGHES

Baker Oil Tools



MAX. OD	MIN. ID	DESCRIPTION	SETTING ACCESSORIES
		(1) CEMENTING HEAD	
4.818		BAKER CLOSING PLUG f/ PAC VALVE SIZE: f/ 7" 26 # CASING MATERIAL: NITRILE/ALUMINIUM PRODUCT NO: 04-64249-02	(10) 
7.656	6.366	CASING SIZE: 7" 23 # THREADS: 7" 23 # BTC BOX x PIN MATERIAL: 80 ksi MYS	
7.656	6.276	(2) CROSSOVER SUB SIZE: 7" THREADS: 7" 26 # BTC BOX x 7" 26 # NSSCC PIN MATERIAL: 80 ksi MYS PRODUCT NO: 299-89	
4.080		BAKER OPENING PLUG f/ PAC VALVE SIZE: f/ 7" 26 # CASING MATERIAL: NITRILE/ALUMINIUM PRODUCT NO: 04-64248-01	(11) 
8.030	6.240	(3) BAKER PAC VALVE SIZE: 7" THREADS: 7" 26 # NSSCC BOX x PIN MATERIAL: 80 ksi MYS PRODUCT NO: 301-12	
7.656	6.276	(4) COUPLING SIZE: 7" THREADS: 7" 26 # NSSCC BOX x 7" 26# BTC BOX MATERIAL: 80 ksi MYS PRODUCT NO: 299-89	
7.000	6.276	(5) CROSSOVER NIPPLE SIZE: 7" THREADS: 7" 26 # BTC PIN x 7" 23 # 8 Rnd PIN MATERIAL: 80 ksi MYS PRODUCT NO: 299-89	



8.030	6.366	(6) BAKER "RDX" EXTERNAL CASING PACKER SIZE: 7" 23# THREADS: 7" 23# 8Rnd BOX x 7" 26# BTC PIN MATERIAL: K-55 PRODUCT NO: 301-07 3.5 ft. ELEMENT LENGTH
7.656	6.276	(7) CROSSOVER SUB (SUPPLIED BY CUSTOMER) SIZE: 7" THREADS: 7" 23 # 8 Rnd PIN x 7" 26# BTC PIN MATERIAL: K-55 PRODUCT NO: 299-89
7.656	6.366	CASING SIZE: 7" 23 # THREADS: 7" 23 # BTC BOX x PIN MATERIAL: 80 ksi MYS
7.656	6.276	(8) BAKER TYPE 1 LANDING COLLAR SIZE: 7" 23-26 # THREADS: 7" 26 # BTC BOX x PIN MATERIAL: 80 ksi MYS PRODUCT NO: 274-10
7.656	6.366	CASING 1 JOINT SIZE: 7" 23 # THREADS: 7" 23 # BTC BOX x PIN MATERIAL: 80 ksi MYS
-	-	(9) FLOAT SHOE (CUSTOMER SUPPLIED) SIZE: 7" THREADS: BTC BOX MATERIAL: PRODUCT NO:

APPENDIX 2

CEMENT PROGRAM

SANTOS QNTBU - MEREENIE 99A

HALLIBURTON

Prepared by David Gugielmo
Date : 15/2/99 Revision 2
USD/AUD 0.64

12 1/4" Hole and Casing Data

Hole size	13 1/2 In.	Casing Size	10 3/4 In.
Shoe Depth (TMD)	1,800 Ft.	Shoe Depth (TVD)	1,800 Ft.
Surface Temperature	80 Deg.F.	Gradient	1.65 Deg.F./100 Ft.
BHST	110 Deg.F.	BHCT	93 Deg.F.
Casing Weight	40.5 Lbs/Ft.	Casing ID	10.050 In.
Previous casing shoe	0 Ft.	Previous casing ID	0.000 In.
Shoe height	40 Ft.	Sump height	10.0 Ft.
Mud Weight in Hole	9.2 PPG	Dispacement Mud Weig	9.2 PPG

Single Slurry

Top of single slurry	780 Ft.	Cement Excess	0 %	
Total single slurry	403 CuFt.	Equivalent to --->	72 Bbls.	
ABC Class 'G' Cement		**350 Sacks**	**100 sack top-up**	
Spherelite	0.0 %	0 Lbs.	Extender (Ceramic)	
Bentonite	0.0 %	0 Lbs.	Extender (Powder)	
Calcium Chloride	1.00 %	329 Lbs.	Accelerator	
NF-5	0.010 Gals/Sk	4 Gallons	Liquid Defoamer	
Mixing Water (Fresh)	5.00 Gals/Sk	Density	15.8 PPG	
Yield	1.15 CuFt/Sk	Thickening Time	<> 2:30 Hrs:Mins	
Fluid Loss	N/C cc.	Free Water	N/C %	

Chemical Requirements and Cost Estimate

Description	Unit Cost	Quantity	Unit	Unit Price AUD	Total
Class G Cement	USD	19	tonne	401.60	7,630.40
Calcium Chloride		329	Lbs.	0.51	167.99
NF-5		4	Gals.	83.87	293.89
Surface Casing Service Fee		1	Each	2,855.00	2,855.00
Bulk Cement handling		350	CuFt.	2.90	1,016.20
Monthly Equipment standby rental		3	months	1,500.00	4,500.00
Personnel Charge		10	days	1,140.00	11,400.00
10 3/4" Float 8rd Shoe	638.94	1	Each	998.34	998.34
10 3/4" Float 8rd Collar	832.85	1	Each	1,301.33	1,301.33
10 3/4" Top Plug	240.72	1	Each	376.13	376.13
10 3/4" Limit Clamp	27	3	Each	42.19	126.56
10 3/4" Centraliser	72	10	Each	112.50	1,125.00
		Estimated Job Cost		AUD$	36,818.08

8 1/2" Hole and Casing Data

Hole size	8 1/2 In.	Casing Size	7 In.
Shoe Depth (TMD)	4,810 Ft.	Shoe Depth (TVD)	4,810 Ft.
Surface Temperature	80 Deg.F.	Gradient	1.65 Deg.F./100 Ft.
BHST	159 Deg.F.	BHCT	124 Deg.F.
Casing Weight	26.0 Lbs/Ft.	Casing ID	6.276 In.
Previous casing shoe	1,800 Ft.	Previous casing ID	10.050 In.
Shoe height	40 Ft.	Sump height	10.0 Ft.
Mud Weight in Hole	11.0 PPG	Dispacement Mud Weig	8.4 PPG

Stage Two Slurry to Surface

Top of stage two slurry	0 Ft.	Cement Excess	10 %
Total stage two slurry	722 CuFt.	Equivalent to --->	129 Bbls.
ABC Class 'G' Cement	9 7/8 Hole	403 Sacks	
Bentonite	2.3 % (BWOW	872 Lbs.	Extender (Powder)
HR-5	0.00 % (BWOC)	0 Lbs.	Retarder
CFR-3	0.00 % (BWOC)	0 Lbs.	Retarder
NF-5	0.010 Gals/Sk	4 Gallons	Liquid Defoamer
Mixing Water (Fresh)	9.73 Gals/Sk	Density	13.2 PPG
Yield	1.79 CuFt/Sk	Thickening Time	<> 4:15 Hrs:Mins
Fluid Loss	N/C cc.	Free Water	N/C %

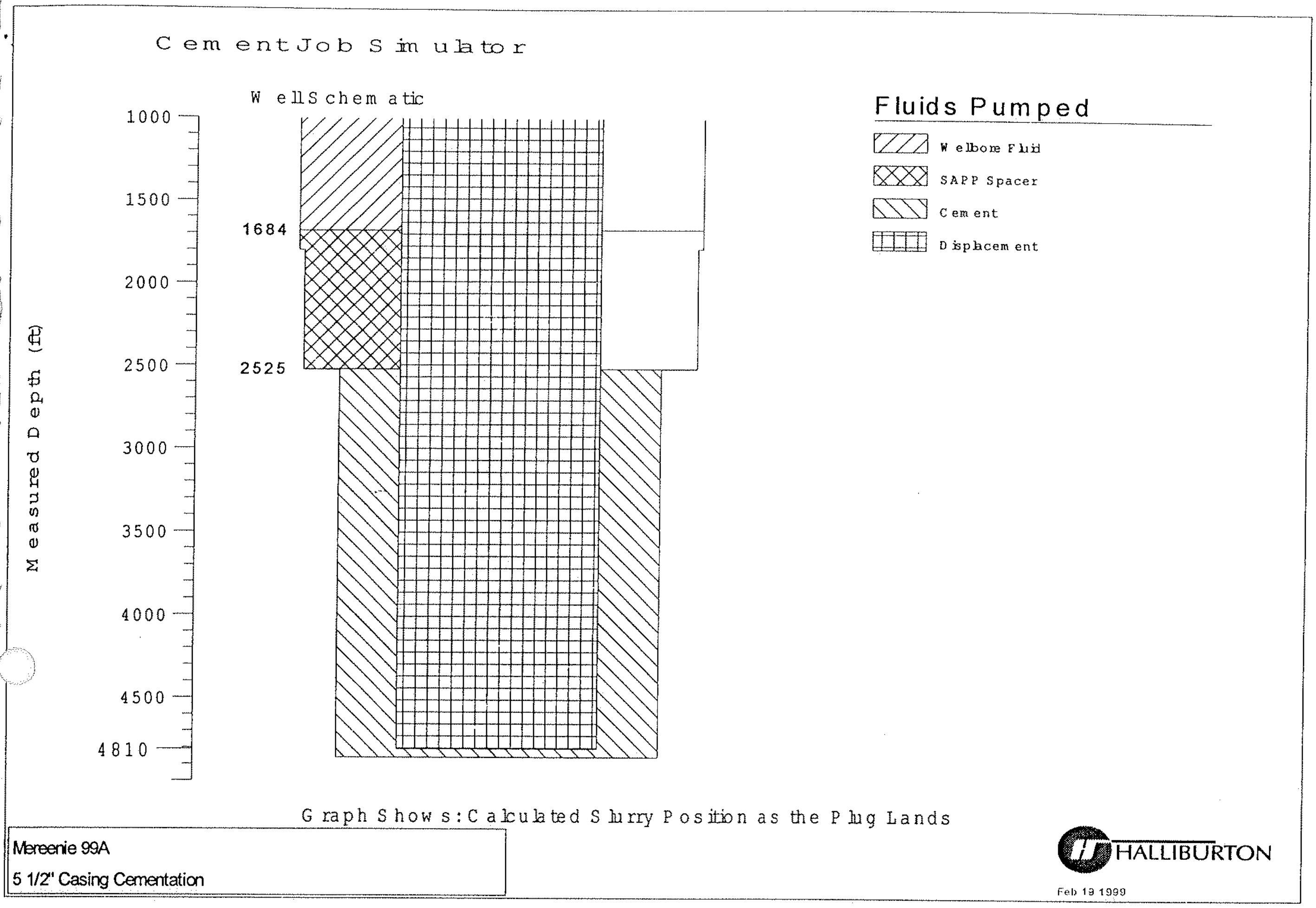
Stage One Slurry

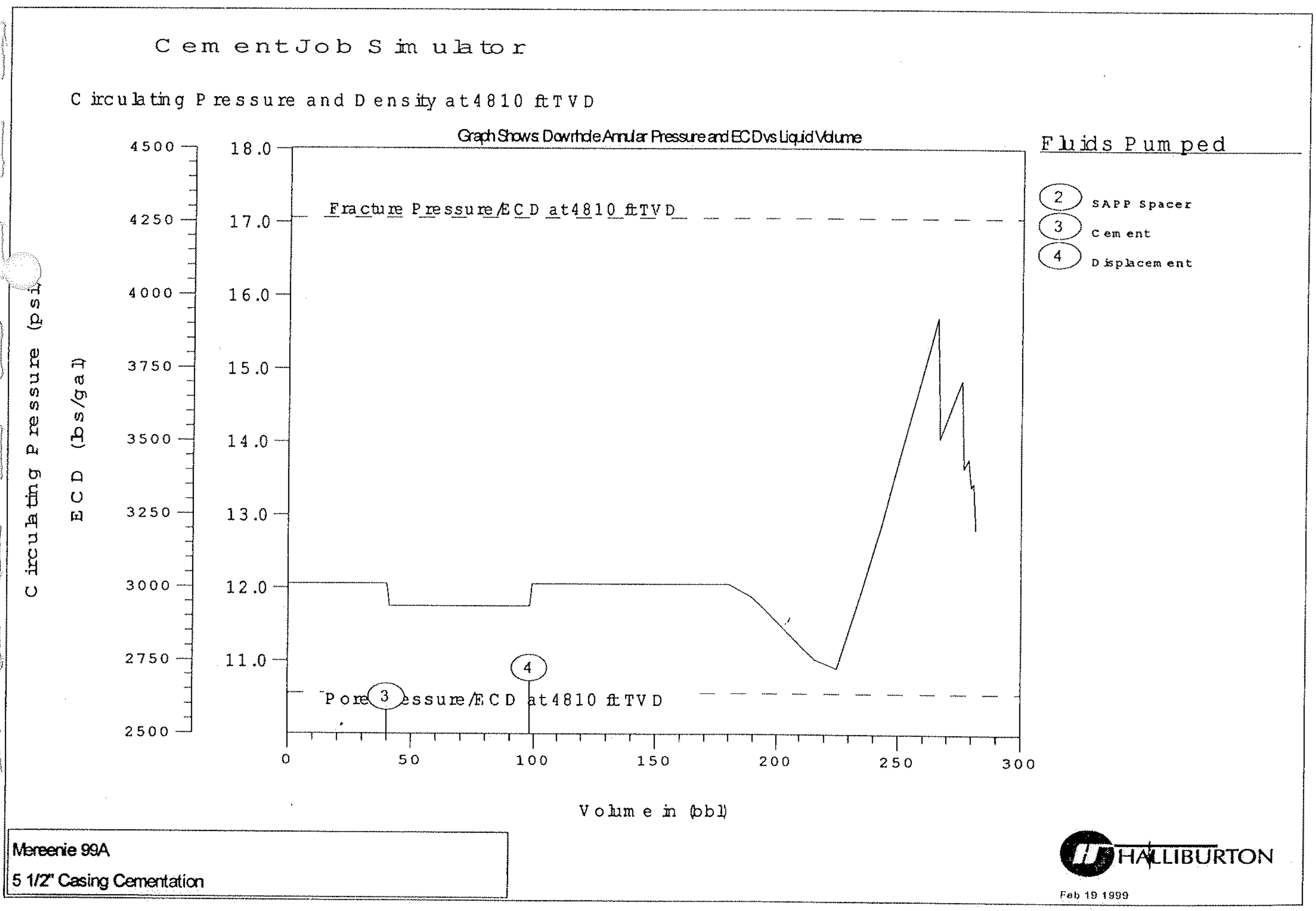
Top of stage one. ECP Dept	2,526 Ft.	Cement Excess	10 %
Total stage one slurry	332 CuFt.	Equivalent to --->	59 Bbls.
ABC Class 'G' Cement		286 Sacks	
Halad-413	0.40 %	75 Lbs.	Fluid Loss Reducer
Gas Stop	0.40 %	75 Lbs.	Fluid Loss Reducer
HR-5	0.30 %	57 Lbs.	Retarder
NF-5	0.010 Gals/Sk	3 Gallons	Liquid Defoamer
Mixing Water (Fresh)	5.11 Gals/Sk	Density	15.8 PPG
Yield	1.16 CuFt/Sk	Thickening Time	<> 3:45 Hrs:Mins
Fluid Loss	<> 50 cc.	Free Water	0.0 %

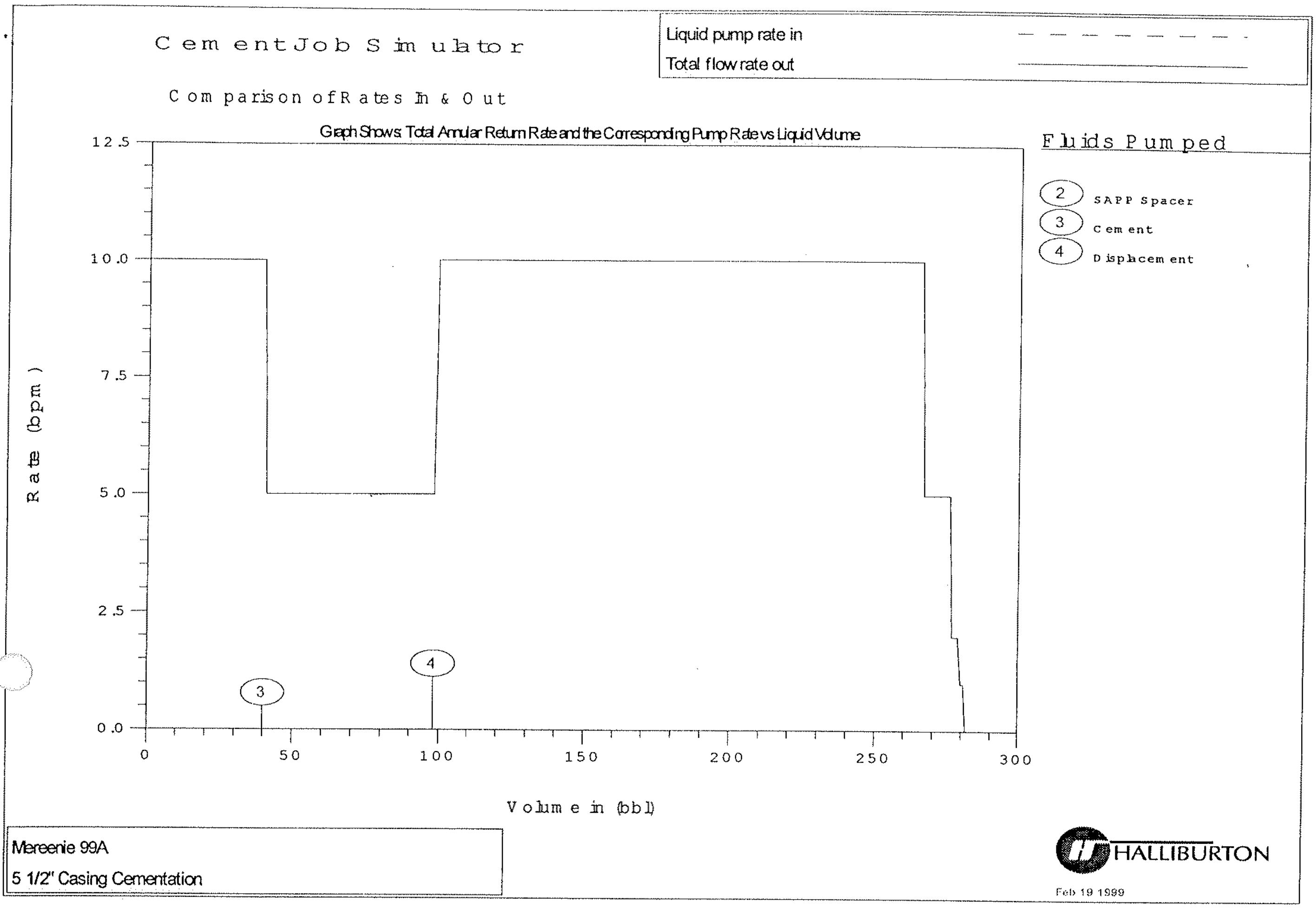
Chemical Requirements and Cost Estimate

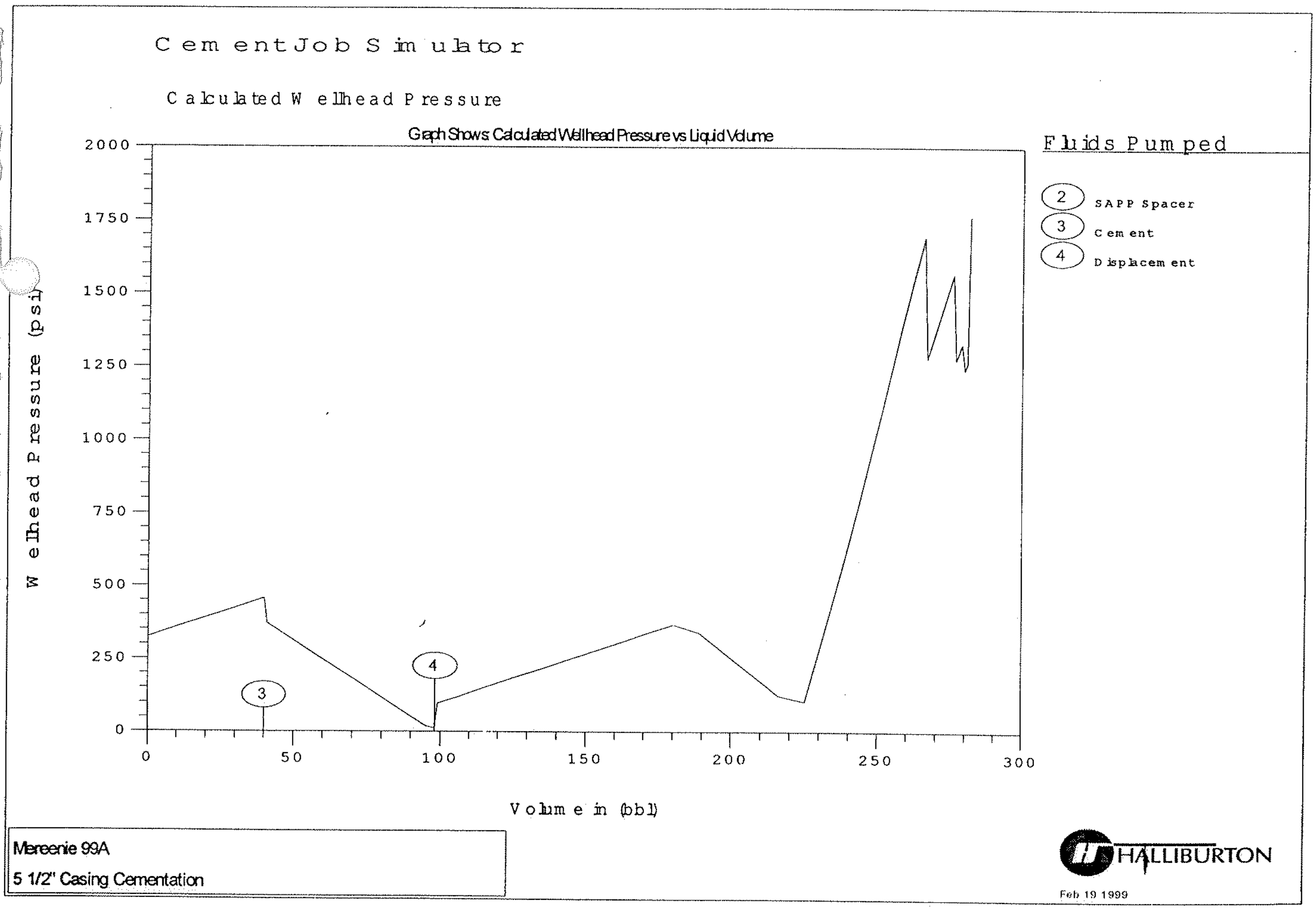
Description	Quantity	Unit	Unit Price	Total
ABC Class 'G' Cement	30	Tonne	401.60	12,048.00
Halad 413	75	Lbs.	43.62	3,291.13
Bentonite	872	Lbs.	0.00	0.00
HR-5	57	Lbs.	6.37	360.46
CFR-3	0	Lbs.	7.21	0.00
NF-5	7	Gals.	83.87	589.83
Gas Stop	75	Lbs.	34.42	2,596.99
Personnel Charge	10	Days	1,140.00	11,400.00
Production Casing Cementing	1	Each	4,450.00	4,450.00
Lump Sum Mob/Demob to Roma	1	each	9,250.00	9,250.00
Bulk Service Charge	689	CuFt.	2.90	1,998.29
7" Float Shoe	1	Each	770.83	770.83
7" Float Collar	1	Each	1,180.86	1,180.86
7" Centraliser	30	Each	80.00	2,400.00
7" Limit Clamp	1	Each	17.43	17.43
Top Plug	1	Each	106.40	106.40
Bottom Plug	1	Each	174.00	174.00
	Estimated Cost		AUD$	50,634.23

PROPOSAL NUMBER: 8064/00/B/CM/98


Cement Job Simulator
Well Schematic
Fluids Pumped
Wellbore Fluid
SAPP Spacer
Cement
Displacement
1000
1500
1684
2000
2500
2525
3000
3500
4000
4500
4810
Measured Depth (ft)
Graph Shows: Calculated Slurry Position as the Plug Lands
Mereenie 99A
5 1/2" Casing Cementation
HALLIBURTON
Feb 19 1999


Cement Job Simulator
Circulating Pressure and Density at 4810 ft TVD
Graph Shows: Downhole Annular Pressure and ECD vs Liquid Volume
Fluids Pumped
2 SAPP Spacer
3 Cement
4 Displacement
Fracture Pressure/ECD at 4810 ft TVD
Pore Pressure/ECD at 4810 ft TVD
Circulating Pressure (psi)
ECD (lbs/gal)
4500
4250
4000
3750
3500
3250
3000
2750
2500
18.0
17.0
16.0
15.0
14.0
13.0
12.0
11.0
0
50
100
150
200
250
300
Volume in (bbl)
Mereenie 99A
5 1/2" Casing Cementation
HALLIBURTON
Feb 19 1999


Cement Job Simulator
Comparison of Rates In & Out
Liquid pump rate in
Total flow rate out
Graph Shows Total Annular Return Rate and the Corresponding Pump Rate vs Liquid Volume
12.5
10.0
7.5
5.0
2.5
0.0
Rate (bpm)
0
50
100
150
200
250
300
Volume in (bbl)
3
4
Fluids Pumped
2 SAPP Spacer
3 Cement
4 Displacement
Mereenie 99A
5 1/2" Casing Cementation
HALLIBURTON
Feb 19 1999


Cement Job Simulator
Calculated Wellhead Pressure
Graph Shows Calculated Wellhead Pressure vs Liquid Volume
2000
1750
1500
1250
1000
750
500
250
0
Wellhead Pressure (psi)
0
50
100
150
200
250
300
Volume in (bbl)
3
4
Fluids Pumped
2 SAPP Spacer
3 Cement
4 Displacement
Mereenie 99A
5 1/2" Casing Cementation
HALLIBURTON
Feb 19 1999

APPENDIX 3

DRAFT DOM SECTION 4.4.4
TRIPPING PRACTICES

DRAFT DOM SECTION 4.4.5
TRIPPING PROCEDURE

TRIPPING PROCEDURES
(To be displayed in Doghouse)

4.4.4 Tripping Practices

a) A minimum of one complete circulation shall be performed prior to any trip out of the hole. When circulating to condition mud, a circulating rate of 50 - 75% of the normal circulating rate shall be used.

b) A trip sheet shall be filled out by the Driller and Mud Logging Contractor for each trip in/out of the hole. All variances from expected fill/return shall be investigated. The trip tank shall be used on all trips.

c) The time spent with the pipe out of the hole shall be minimised wherever possible. Operations such as routine BOP testing, repairs and slipping and cutting of the drill-line shall be performed with pipe at the casing shoe whenever possible.

d) Check trips may be required in the following cases:

e) During logging when hole conditions deteriorate and become sticky.

f) Before RFT/MDT tools are run.

g) Before running casing if hole indications during logging indicate that this is necessary.

Notes:

i) In all of the above cases, the BHA must be as short as possible.
ii) In upper hole sections, the BHA should include full gauge stabilisers and be at least equal in stiffness to the casing string if required.
iii) Monel DCs shall not be run in check trips

e) When the condition of the hole is unknown due to a major change in parameters, a short trip shall be made. The procedure is as follows:

1. After circulating bottoms up flow check for 15 minutes. Slowly pull 10-15 stands while using the trip tank to ensure that the hole is taking the correct quantity of mud. Check for flow. Run back to bottom, check for fill and check for flow again.

2. Circulate bottoms up and condition the mud. Check the mud returns for gas and salinity. Increase the mud weight if there are signs of an influx.

f) Slow trip speeds while running drill collars (and BHAs) past coal seams is essential to the stability of the seams.

g) The majority of the world's blowouts occur while tripping in normally pressured areas. The main reasons are swabbing in a kick, failure to keep the hole full, or breaking down the formation due to excessive trip speed.

The term ‘swabbing’ on a rig generally refers to the bit and/or stabilisers acting as a swab or piston and actually lifting the full mud column. This typically occurs with tight or sticky hole when the bit, stabilisers, or collars become packed with wallcake leaving a very restricted passage for the mud. This situation is readily noticeable as the mud level in the annulus tends to rise with the pipe rather than fall. In addition, since the drillstring is picking up all or a portion of the weight of the mud column above, the string weight shows an increase.

Swab pressures actually occur every time the pipe is moved as a result of the viscous drag of the mud. The factors affecting the magnitude of these pressures for a given hole/pipe combination are mud rheology and pipe speed.

The swab situation is more insidious since the influx may occur in very small increments and may not become evident until the influx has migrated almost to surface after a period of hours. By the time this happens, the pipe is a long way off bottom and well control becomes extremely difficult and may become impossible. There are many instances of the drill string being blown out of the hole in these situations.

It is a fundamental fact of life on the wellsite that the hole must be kept full at all times. All too often complacency creeps into operations, corners start to be cut and drillers don't want to ‘waste time’ filling in trip sheets.

Hole filling should be a continuous operation performed with the trip tank, NOT WITH THE MUD PUMP. In order to fill the hole on a continuous basis a heavy slug must be pumped to allow the pipe to be pulled dry. Pulling wet pipe slows the operation and the loss of mud can make volume accounting difficult.

A trip sheet **must** be filled out for every trip including short wiper trips.

To minimise the risk of influxes occurring and to maximise the speed of detection when they do occur, it is imperative that safe trip procedures are strictly followed.

As always the golden rule is “if in doubt, stop and check”. Do not blunder along into a disaster.

When tripping, ensure that the pipe is not set too high in the slips. Setting the pipe high can result in bending the pipe in the slip area.

The maximum height to avoid bending can be calculated. The procedure is shown below for two cases. Case 1 is for the make-up and break-out tongs at 90 degrees to each other; Case 2 is for the make-up and break-out tongs at 180 degrees to each other.

Case 1

$$H_{max} = \frac{0.53 \times Ym \times L \times (I/C)}{T}$$

Case 2

$$H_{max} = \frac{0.38 \times Ym \times L \times (I/C)}{T}$$

Where:

Hmax = Height of tool joint shoulder above slips - ft
Ym = The minimum tensile yield stress of the pipe - psi
L = Length of tong arm - ft
P = Line pull - lb
T = Make up torque applied to tool joint (P x L) = lb.ft
I/C = Section modulus of the pipe - cu.in (See table)

Pipe OD Ins	Nominal Wt - lb/ft	I/C - cu.in
2 3/8	4.85	0.66
	6.65	0.87
2 7/8	6.85	1.12
	10.40	1.60
3 1/2	9.50	1.96
	13.30	2.57
	15.50	2.92
4	11.85	2.70
	14.00	3.22
	15.70	3.58
4 1/2	13.75	3.59
	16.60	4.27
	20.00	5.17
	22.82	5.68
5	16.25	4.86
	19.50	5.71
	25.60	7.25

4.4.5 Tripping Procedure

1. While circulating prior to tripping, prepare a heavy slug in the pill tank and prepare the trip sheet.

   The volume of heavy slug required is calculated as follows:

   Slug Volume = (Drop length x pipe capacity x Mud wt) / (Slug wt - Mud wt)

   Example: Volume of 12.0 ppg slug required to produce a level 300 ft down in 4 ½" pipe with 9.2 ppg mud in the hole is (300 x 0.01422 x 9.2) / (12.0 - 9.2) = 14 bbls.

2. Fill the trip tank to the highest recording level using mud from the suction tank. Do not fill the tank by diverting returns - this will allow cuttings to settle. Record the initial volume in the tank.

3. Shut down the pump and flow check. If the hole is stable, pump the slug and break out and set back the kelly.

4. When the levels have equalised and annulus flow has stopped, switch the returns to the trip tank.

5. Pull the first 5 - 10 stands without continuously filling the hole to allow the level to be visually monitored for piston type swabbing. Wiper rubbers are not to be installed until at least these 5 - 10 stands have been pulled without indication of swabbing.

   Remember that bottom hole pressure is reduced by the swab pressure plus the loss of hydrostatic head due to the lower fluid level in the annulus.

6. Start the trip tank pump and run continuously while pulling the remaining pipe. Record the volume pumped every 12 joints. For 4 ½" 16.6 ppf Grade E pipe with 4" IF tool joints the metal displacement is 0.006377 bbl/ft. The hole should therefore take at least 4.0 bbls every 20 joints of drill pipe.

7. If the hole does not take the full calculated fill, flow check. If the well is flowing the BOP must be closed immediately and the pipe stripped back to bottom if possible.

   Under no circumstances must an attempt be made to 'outrun the kick' by running quickly back to bottom without closing the BOP. The situation will deteriorate rapidly and a blow out is almost inevitable.

   If the well is not flowing then the reason for the discrepancy must be determined before pulling any further pipe. If there is any doubt, the pipe should be run back to bottom and the hole circulated. Monitor returns while running in.

8. When the trip tank has to be refilled, stop the trip and wait for the tank to fill. Do not trip and fill simultaneously. Take the opportunity to flow check the hole.

9. The crew should develop the habit of watching the hole level while tripping.

10. Perform a flow check with the bit at the casing shoe, and prior to pulling the collars across the BOP rams.

11. If tight hole is experienced, the annulus level must be closely monitored for piston type swabbing. When working the tight hole, work up cautiously ensuring that the pipe can always be run back down. Be aware that if an influx occurs in a tight hole situation, any flow will tend to be directed inside the drill pipe. If the flow occurs with the pipe high in the mast, it may very quickly become very difficult to install the stab valve.

    If the tight hole cannot be safely worked through, do not hesitate to pick up the kelly and circulate/ream the hole.

12. While running in the hole the procedure should be reversed so that the volume of mud returns are monitored.

13. The block line must not be slipped with pipe out of the hole or with collars across the BOP. The pipe should be run back to the shoe and the stab valve installed.

14. Trip sheets must be retained and filed.

APPENDIX 4

OFFSET WELL DATA

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DRILLING RECORD - EAST MEREENIE 42

RIG EQUIPMENT

Draworks:	OIME SL750 Pump No.1: F-800 Pump No.2: F-800
DP Size:	250 joints of 4 1/2" 16.6l bs/ft , Grade E with 4 1/2" IF connections.
DC Size:	14 x 4 1/2" HWDP, 2x 12 3/4" square DC,s, 2 3/4" ID, 6x 8" DC,s, 12x7" DC,s , 26x6 1/2" DC,s

MUD COMPANY: BAROID AUSTRALIA		
DRILLING FLUID TYPE	INTERVAL	
AIR MIST / FOAM	0	1504
SALT / PHPA / POLYMER	1504	1627

LATITUDE:	23° 59' 48.34" S	CONTRACTOR:	O D & E
LONGITUDE:	131° 34' 50.53" E	RIG NO:	MJV #1
R.T. ELEVATION:	740.0 m	DATE SPUDDED:	04-Jul-97
G.L. ELEVATION:	745.8 m	DATE RIG RELEASED:	06-Aug-97
TOTAL DEPTH (m):	1627 (Drill.)		

CASING AND CEMENTING

Depth (m KB)	Size (in.)	Weight (lb/ft)	Grade	Coupling	Cement (sx)	Cement Top (m K.B.)
743.5	10 3/4	40.5	K55	STC	310 + 52 Top up	SURFACE
1622.4	7	23/26	K55	LTC	546	800

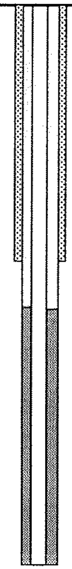
SURVEY DATA

Depth	Deg.	Depth	Deg.	Depth	Deg.	Depth	Deg.	Depth	Deg.
0.0	0	727.1	5.75	1158.1	37.5	1439.0	38		
13.0	0.4	787.0	8.9	1167.0	37.2	1458.3	38.6		
71.0	0.8	863.8	14.8	1187.0	36.2	1477.6	38.4		
126.5	0.95	902.3	18.4	1217.5	36.5	1477.6	38.4		
209.5	0.65	940.8	21.7	1246.3	37	1496.8	38.4		
323.0	0.95	979.3	25.9	1265.6	37	1535.9	38.6		
438.5	0.6	1017.9	30.4	1294.3	37.2	1593.7	37.3		
534.0	0.8	1056.4	34.9	1323.4	38.3	1625.9	37.3		
611.7	2	1094.9	37.8	1361.5	38.5				
669.0	3.75	1114.1	39	1410.0	38.5				

MUD PROPERTIES

Depth (m KB)	Density (ppg)	Viscosity (secs/qt)	W.L. (cc/30m)	pH	Cl (ppm)	P.V.	Y.P.	Gels (1/10)	% Solids
1254	8.9	44	3.6	9.4	32	14	14	2/4	0.6
1427	8.8	44	4.8	9.4	34	14	16	3/4	0.9
1505	8.9	47	4.8	9.4	39	19	14	4/5	1.4
1578	8.9	41	4.3	9.0	33	11	11	2/3	1.9
1618	8.9	42	3.4	9.2	33	12	14	3/4	1.9
1628	9.0	41	3.8	9.6	37	13	12	2/3	1.6

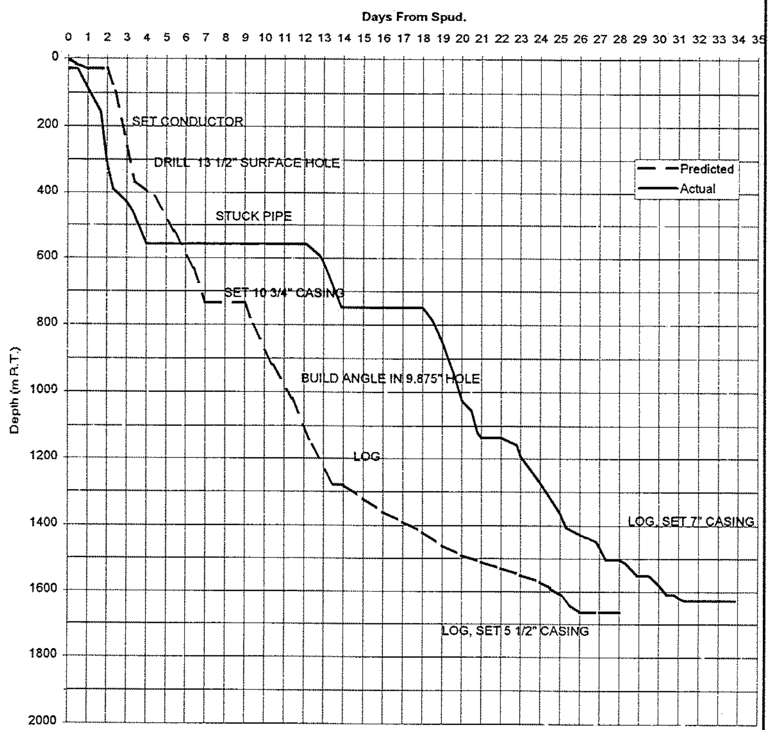
WELL SECTION



TD 1628 m R.T.

FORMATION

- MEREENIE SST
- CARMICHAEL
- UPPER STOKES
- LOWER STOKES
- UPPER STAIRWAY
- MID STAIRWAY
- L. STAIRWAY 2
- L. STAIRWAY 1
- HORN VALLEY
- PACOOTA P1
- PACOOTA P2
- PACOOTA P3
- PACOOTA P4



TRIP (No.)	BIT (No.)	Size (in.)	Type	Jets	Depth Out(m)	Mtrs.	Hrs	ROP (m/hr)	CUMM Hrs	WOB (lb)	RPM	Condition I	O	D	L	B	G	O	R	Pressure (Psi)	Gal/Min	Remarks
1	1	13.56	Impax	ports	389	351.2	22	16.0	22.0	10000	25	50 % wear on shank								240	3200cfm	
2	2.00	13.5	ATJ M55	open	558	169	29	5.8	51.0	45000	60	4	4	FC	A	E	1	BT	BC	300	3200cfm	
3	3.00	13.5	ATJ-11H	open	748	190	28.5	6.7	79.5	45000	60	3	3	LT	A	E	1	WT	TD	320	3200cfm	
4	4.00	9.875	ATJ-11H	open	1025	277	18	15.4	97.5	40000	75	3	6	WT	A	5	I	BT	HR	260	2400cfm	
5	5.00	9.875	MF30D	open	1136	111	10	11.1	107.5	40000	65	2	4	WT	H	E	I	CT	LOG	260	2400cfm	
6	6	9.875	F40D	open	1194	58	5	11.6	112.5	40000	65	3	5	RG	G	E	I	FC	BHA	260	2400cfm	
7	7.00	8.5	F5OD	open	1331	137	12.5	11.0	125.0	25,000	90	3	6	BT	G	E	I	WT	BHA	280	2400cfm	
8	7RR1	8.5	F5OD	open	1427	96	12	8.0	137.0	35,000	70	3	6	WT	G	E	1	FC	BC	350	3200cfm	
9	9.00	8.5	F5OD	open	1504	77	8.5	9.1	145.5	35000	70	3	6	BT	G	E	1	WT	BHA	350	3200cfm	
10	10.00	8.5	F5OD	3x13	1552	48	18	2.7	163.5	48,000	55	4	6	BT	H	E	3	WT	HR	850	305	
11	11.00	8.5	F5ODL	3x13	1610	58	21.5	2.7	185.0	48,000	55	3	5	BT	H	E	1	WT	HR	1000	320	
12	12.00	8.5	F5ODPR	3/13/14	1627.5	17.5	6.5	2.7	191.5	48,000	55	2	8	LT	G	E	1	BT	TD	1000	320	

03/03/1999

Santos

SANTOS DRILLING BIT SUMMARY

WELL:	EAST MEREENIE 42	23° 59' 48.34" S		**Contractor:**	O D & E
Spud Date:	04-Jul-97	131° 34' 50.53" E		**Rig No.:**	MJV #1
Release Date:	06-Aug-97	F-800		**Rig:**	OIME SL750

BIT DATA										OVERALL BIT PERFORMANCE					INTERVAL	DRILLING PARAMETERS						MUD			DULL CONDITION							
TRIP	BIT				IADC	SERIAL	JETS			DEPTH						WOB						WT			CUT. STRUCT.							
No.	No.	SIZE	MAKE	TYPE	CODE	No.	#1	#2	#3	IN	OUT	METERS	HRS	ROP	FORMATION	Min	Max	RPM	DEV	PSI	GPM	ppb	YP	PV	I	O	DC	LOC	B/S	G	ODC	POH
1	1	13.560	Smith	Impax		KJ7216		ports		38	389	351	22.0	16.0	MEREENIE SANDSTONE	7000	10000	25	1°	240	3200cfm						50 % wear on shank					
2	2	13.500	Hughes	ATJ M55	637	B73PX		open		389	558	169	29.0	5.8	MEREENIE SANDSTONE	45000	45000	60	0.75°	300	3200cfm				4	4	FC	A	E	1	BT	BC
3	3	13.500	Hughes	ATJ-11H	437	K76PW		open		558	748	190	28.5	6.7	MER SST/ CARM / UPPER STOKES	45000	45000	60	2.25°	320	3200cfm				3	3	LT	A	E	1	WT	TD
4	4	9.875	Hughes	ATJ-11H	437	H00XU		open		748	1025	277	18.0	15.4	UPR & LWR STK / UPR STAIRWAY	15000	40000	75	21°	260	2400cfm				3	6	WT	A	5	I	BT	HR
5	5	9.875	Smith	MF30D	537G	LE1703		open		1025	1136	111	10.0	11.1	PR STAIRWAY / MIDDLE STAIRWAY	35000	40000	65	37.8°	260	2400cfm				2	4	WT	H	E	I	CT	LOG
6	6	9.875	Smith	F40D	547G	LE9337		open		1136	1194	58	5.0	11.6	IDDLE STAIRWAY / LWR STAIRWAY	35000	40000	65	37.2°	260	2400cfm				3	5	RG	G	E	I	FC	BHA
7	7	8.500	Smith	F5OD	627G	LF8804		open		1194	1331	137	12.5	11.0	WR STAIRWAY / HORN VALLEY / P	25000	25000	90	37°	280	2400cfm				3	6	BT	G	E	1	WT	BHA
8	7RR1	8.500	Smith	F5OD	627G	LF8804		open		1331	1427	96	12.0	8.0	P1 & P2 PACOOTA SANDSTONE	30000	35000	70	38.5°	350	3200cfm				3	6	WT	G	E	1	FC	BC
9	9	8.500	Smith	F5OD	627G	LF8817		open		1427	1504	77	8.5	9.1	P2 & P3 PACOOTA SANDSTONE	30000	35000	70	38°	350	3200cfm				3	6	BT	G	E	1	WT	BHA
10	10	8.500	Smith	F5OD	627G	LF8816	13	13	13	1504	1552	48	18.0	2.7	P3 PACOOTA SANDSTONE	45000	48000	55	38°	850	305	8.8	14.0	12.0	4	6	BT	H	E	3	WT	HR
11	11	8.500	SMITH	F5ODL	627G	LF6409	13	13	14	1552	1610	58	21.5	2.7	P3 & P4 PACOOTA SANDSTONE	48000	48000	55	37.3°	1000	320	8.9	14.0	11.0	3	5	BT	H	E	1	WT	HR
12	12	8.500	Smith	F5ODPR	627G	LC1421	13	14	13	1610	1628	18	6.5	2.7	P4 PACOOTA SANDSTONE	48000	48000	55	38°	1000	320	9.0	14.0	11.0	2	8	LT	G	E	1	BT	TD

03/03/1999

Drilling Summary

MJV Rig #1 was audited by Tri-Ocean prior to spudding East Mereenie 42. There was approximately 6 weeks of equipment upgrading conducted prior to the start of this drilling campaign, to ensure compliance with regulatory requirements. In addition, all contractors crew participated in a 2.5 day 'Ice-Breaker' Induction Course held in Adelaide in late May 1997. Conductor (16") was run and cemented to approximately 30m by Gorey & Co. prior to spudding.

Well East Mereenie 42 was spudded at 2030hrs 4 July 1997. A 13.9/16" Impax hammer bit was run on a 12" Mission SD-12 hammer to a depth of 389m where excessive formation water caused hammer drowning. The bit and hammer were laid out and 13.1/2" hole was conventionally air/foam drilled. At 558m the bit was pulled due high torque. The bit was changed, and tight hole was experienced on the trip back to bottom. While working tight hole at approximately 466m at 1100hrs on 8 July, the pipe became stuck. Schlumberger was called to conduct a free point / back off. The drillstring was backed off at a drill collar, and the hole was reamed back to the top of the fish with a 13.5" bit. A fishing assembly including jar and accelerator was run and suucessfully latched onto the fish. After 4 hours of jarring, the fish was freed. Drilling the remainder of the 13.5" section began again at 1400hrs on 16 July 1997. Section TD of 748m was reached 2100hrs on 17 July 1998.
Section drilling time was 79.5 hours.

A wiper trip was made with a magnetic multishot installed prior to rigging down the rotating head and cutting off the riser - hole deviation was 6 degrees. 10.3/4" 40.5lb/ft K55 STC casing was run and cemented in place with 310 sacks at 743.5m. A 52 sack top-up job was performed. Wellhead A section was installed and the BOPs nippled up and tested. A 9.7/8" 60ft build assembly was RIH and the rotating head was installed prior to drilling the shoetrack. The FIT was conducted to 16.2ppg without leak-off.

The production hole was drilled according to the standard format, with the build-up and start of the tangent section being completed in 9.7/8" hole size, before changing over to 8.1/2" hole size for improved ROP and improved cement bond around the 7" production casing. The 9.7/8" hole was air mist drilled in 3 bit runs while performing magnetic single shot surveys, with Schlumberger running the SHDT-GR-AMS intermediate logging run at 1136m. A 9.7/8" drop assembly was run after post logging target revision to the hole size section TD of 1194m.

The 8.1/2" hole was drilled in 7 bit runs (6 bits) to casing point at 1628m. A flow test was carried out at 1405m giving 614psi flowing on a ½" choke (1186 psi build up). Air drilling was continued to 1504m, before changing over to 8.9ppg mud for drilling. Section drilling time was 112.0 hours (9.7/8" - 33hrs; 8.1/2" - 79hrs).

Schlumberger logged: #1 Platform Express (DLL-MSFL-LDL-CNL-CAL-GR).

A wiper trip was made prior to running casing. The 7" 23/26# K55 LTC casing was run to 1622.4m and cemented in place with 546 sacks. The well was suspended with a cap welded over the 7"casing.

The rig was released at 2359hrs 6 August 1997, 33.9 days from spud (28 days programmed).

Santos

DRILLING RECORD - WEST MEREENIE 12

RIG EQUIPMENT

Draworks:	OIME SL750 Pump No.1: F-800 Pump No.2: F-800
DP Size:	250 joints of 4 1/2" 16.6l bs/ft , Grade E with 4 1/2" IF connections.
DC Size:	14 x 4 1/2" HWDP, 2x 12 3/4" square DC,s, 2 3/4" ID, 6x 8" DC,s, 12x7" DC,s , 26x6 1/2" DC,s

MUD COMPANY: BAROID AUSTRALIA		
DRILLING FLUID TYPE	INTERVAL	
AIR MIST / FOAM	0	1556
SALT / PHPA / POLYMER	1556	1658

LATITUDE:	23° 59' 48.34" S	CONTRACTOR:	O D & E
LONGITUDE:	131° 34' 50.53" E	RIG NO:	MJV #1
R.T. ELEVATION:	740.0 m	DATE SPUDDED:	14-Aug-97
G.L. ELEVATION:	745.8 m	DATE RIG RELEASED:	06-Sep-97
TOTAL DEPTH (m):	1658 (Drill.)		

CASING AND CEMENTING

Depth (m RT)	Size (in.)	Weight (lb/ft)	Grade	Coupling	Cement (sx)	Cement Top (m RT)
745	10 3/4"	40.5	K55	STC	306 + 88 top-up	SURFACE
1655	7	23/26	K55	LTC	710	800

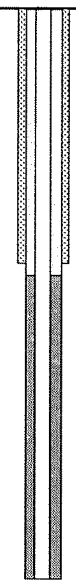
SURVEY DATA

Depth	Deg.	Depth	Deg.	Depth	Deg.	Depth	Deg.	Depth	Deg.
0.0	0	633.8	3.4	1049.6	34.9	1324.8	39.4		
32.3	0.5	720.3	6.2	1097.9	37.4	1353.7	41.4		
60.6	0.9	781.0	9.2	1136.6	37.0	1394.8	42		
118.6	1	819.1	12.5	1174.9	37.0	1433.3	42.5		
203.5	1.1	857.7	17	1213.4	37.6	1482.6	42.2		
287.6	1.2	896.2	21.5	1242.2	38.4	1536.7	41.8		
403.0	0.8	934.7	26.5	1271.2	38.0	1584.8	39.5		
460.7	1.3	973.2	30.5	1288.4	37.5	1632.0	39		
518.4	1.9	1011.7	35.5	1305.0	38.0	1658.3	39		
576.1	2.58								

MUD PROPERTIES

Depth (m KB)	Density (ppg)	Viscosity (secs/qt)	W.L. (cc/30m)	pH	Cl (ppm)	P.V.	Y.P.	Gels (1/10)	% Solids
1297	8.8	44	5.7	9.5	26	15	8	2/4	1.8
1394	8.8	43	5.9	9.4	26	13	9	2/3	2.0
1518	8.7	44	5.5	9.3	27	11	11	2/3	2.0
1577	8.8	44	5.3	9.2	28	10	10	3/4	1.7
1617	8.8	41	4.8	8.9	30	12	10	2/3	1.5
1657	8.9	40	4.7	9.3	28	12	12	2/3	1.8

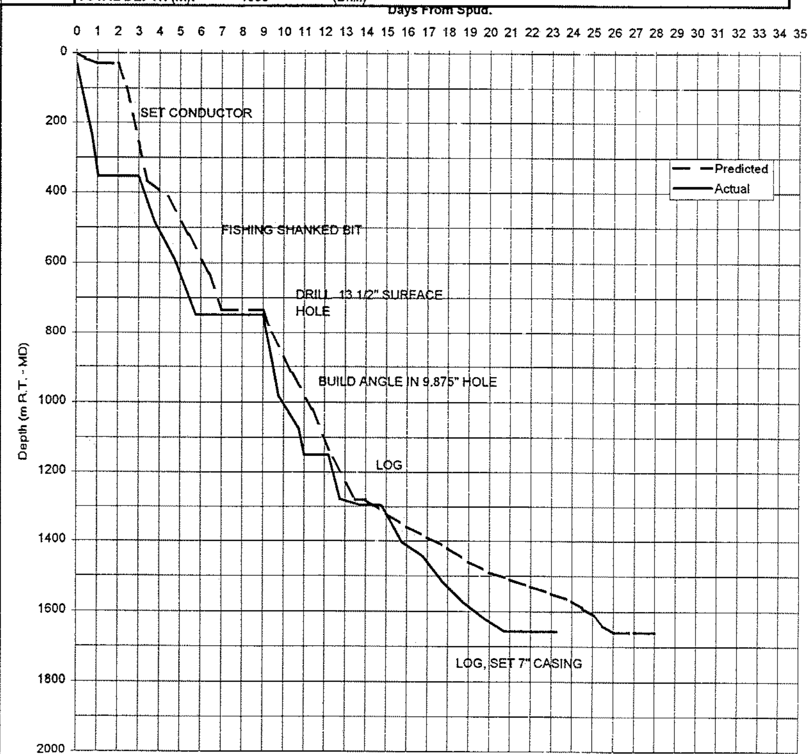
WELL SECTION



TD 1658 m

FORMATION

- PARKE SILT/ST
- MEREENIE SST
- CARMICHAEL
- UPPER STOKES
- LOWER STOKES
- UPPER STAIRWAY
- MID STAIRWAY
- L. STAIRWAY 2
- HORN VALLEY
- PACOOTA P1
- PACOOTA P2
- PACOOTA P3
- PACOOTA P4



TRIP (No.)	BIT (No.)	Size (in.)	Type	Jets	Depth Out(m)	Mtrs.	Hrs	ROP (m/hr)	CUMM Hrs	WOB (lb)	RPM	Condition I	O	D	L	B	G	O	R	Pressure (Psi)	Gal/Min	Remarks
1	1	13.5	Impax	ports	355	318	18	17.7	18	0	25	shanked								240	3200cfm	
2	2	13.5	ATJ 55	open	593	238	37.5	6.3	56	50000	60	6	6	BT	G	6	I	WT	HR	270	3200cfm	
3	3	13.5	ATJ11H	open	749	156	15	10.4	71	40000	0	2	2	WT	A	E	I	NO	CP	420	3200cfm	
4	4	9.875	ATJ11H	open	1028	279	17	16.4	88	28000	0	4	4	BT	H	E	I	WT	TQ	290	2400cfm	
5	5	9.875	MF3OD	open	1150	122	13	9.4	101	34000	0	3	6	WT	G	E	I	BT	LOG	300	2400cfm	
6	6	9.875	MF3OD	open	1278	128	10	12.8	111	42000	0	3	8	RG	G	E	8	LT	BHA	310	2400cfm	
7	7	9.875	F3OD	open	1295	17	1.5	11.3	112	40000	0	2	3	RG	G	E	I	NO	BHA	200	2400cfm	
8	8	9.875	MF3OD	open	1295	0	0	Ream	112	5000	70	1	2	NO	H	E	I	NO	BHA	200	2400cfm	
9	8RR1	9.875	MF3OD	open	1360	65	4.5	14.4	117	40000	50	2	3	WT	A	E	I	N	BHA	300	3200cfm	
10	9	8.5	HP61DCD	open	1442	82	8	10.3	125	35000	70	4	8	RG	G	F	8	WT	TQ	300	2400cfm	
11	10	8.5	F5-ODPR	open	1518	76	8	9.5	133	45000	65	5	7	FC	A	E	1	RG	TQ	350	3200cfm	
12	11	8.5	F5-ODR	open	1576	58	15	3.9	148	48000	50	4	5	WT	A	E	I	N	PR	350	3200cfm	
13	12	8.5	F5-ODPR	3x14	1637	61	26	2.3	174	48000	55	3	8	LT	G	E	6	WT	TQ	750	300	
14	13	8.5	5-DODPD	3x14	1657	20	7.5	2.7	181	48000	55	3	5	BT	G	E	I	WT	TD	750	300	

03/03/1999

Santos

SANTOS DRILLING BIT SUMMARY

WELL:	WEST MEREENIE 12	23° 59' 48.34" S	**Contractor:** O D & E
Spud Date:	14-Aug-97	131° 34' 50.53" E	**Rig No.:** MJV #1
Release Date:	06-Sep-97	F-800	**Rig:** OIME SL750

BIT DATA										OVERALL BIT PERFORMANCE					INTERVAL	DRILLING PARAMETERS						MUD			DULL CONDITION							
TRIP	BIT				IADC	SERIAL	JETS			DEPTH						WOB						WT			CUT. STRUCT.							
No.	No.	SIZE	MAKE	TYPE	CODE	No.	#1	#2	#3	IN	OUT	M	HRS	ROP	FORMATION	Min	Max	RPM	DEV	PSI	GPM	ppb	YP	PV	I	O	DC	LOC	B/S	G	ODC	POH
1	1	13.500	Smith	Impax		KJ7237		ports		37	355	318	18.0	17.7	Mereenie Sandstone	0	0	25	1.2°	240	3200cfm				shanked							
2	2	13.500	Hughes	ATJ 55	637	B 41 PX		open		355	593	238	37.5	6.3	Mereenie Sandstone	45000	50000	60	2.8°	270	3200cfm				6	6	BT	G	6	1	WT	HR
3	3	13.500	Hughes	ATJ11H	437	B34437		open		593	749	156	15.0	10.4	Upper Stokes Siltstone	40000	40000	0	7.1°	420	3200cfm				2	2	WT	A	E	I	NO	CP
4	4	9.875	Hughes	ATJ11H	437	F50XG		open		749	1028	279	17.0	16.4	Upper Stairway Sandstone	28000	28000	0	35.5°	290	2400cfm				4	4	BT	H	E	I	WT	TQ
5	5	9.875	Smith	MF3OD	537G	LE1705		open		1028	1150	122	13.0	9.4	Middle Stairway Sandstone	34000	34000	0	37°	300	2400cfm				3	6	WT	G	E	I	BT	LOG
6	6	9.875	Smith	MF3OD	537G	LE1704		open		1150	1278	128	10.0	12.8	Horn Valley Siltstone	33000	42000	0	38°	310	2400cfm				3	8	RG	G	E	8	LT	BHA
7	7	9.875	Smith	F3OD	537G	LE8439		open		1278	1295	17	1.5	11.3	Horn Valley Siltstone	40000	40000	0	37.5°	200	2400cfm				2	3	RG	G	E	1	NO	BHA
8	8	9.875	Smith	MF3OD	537G	LE1708		open		1295	1295	0	0.0	Ream	Horn Valley Siltstone	2000	5000	70	37.5°	200	2400cfm				1	2	NO	H	E	I	NO	BHA
9	8RR1	9.875	Smith	MF3OD	537G	LE1708		open		1295	1360	65	4.5	14.4	Pacoota Sandstone P1	40000	40000	50	42°	300	3200cfm				2	3	WT	A	E	I	N	BHA
10	9	8.500	Reed	EHP61DCDL	617	DX6384		open		1360	1442	82	8.0	10.3	Pacoota Sandstone P1	35000	35000	70	42°	300	2400cfm				4	8	RG	G	F	8	WT	TQ
11	10	8.500	Smith	F5-ODPR	627	LC8176		open		1442	1518	76	8.0	9.5	Pacoota Sandstone P2	45000	45000	65	42°	350	3200cfm				5	7	FC	A	E	1	RG	TQ
12	11	8.500	Smith	F5-ODR	627	LM2412		open		1518	1576	58	15.0	3.9	Pacoota Sandstone P3	48000	48000	50	39.5°	350	3200cfm				4	5	WT	A	E	I	N	PR
13	12	8.500	Smith	F5-ODPR	627	LM2469	14	14	14	1576	1637	61	26.0	2.3	Pacoota Sandstone P3	48000	48000	55	39°	750	300	8.9	11	12	3	8	LT	G	E	6	WT	TQ
14	13	8.500	Smith	F5-DODPD	627	LM2684	14	14	14	1637	1657	20	7.5	2.7	Pacoota Sandstone P4	48000	48000	55	39°	750	300	8.9	12	12	3	5	BT	G	E	I	WT	TD

03/03/1999

Drilling Summary

Conductor (16") was run and cemented to approximately 30m by Gorey & Co. prior to spudding.

Well West Mereenie 12 was spudded at 0600 hrs 14 August 1997. A 13.9/16" Impax hammer bit was run on a 12" Mission SD-12 hammer to a depth of 355m where the hammer quit digging. The Impax bit had shanked, leaving the bottom section of the bit in the hole. A Taper Tap fishing tool was run without success. A Box Tap fishing tool was then run, and successfully latched onto the fish. The fish was retrieved and layed out. A 13.1/2" conventional insert bit was then run, and the hole was air/foam drilled to a section TD of 749m. Section TD was reached @ 2100hrs on 19 August 1997.
Section drilling time was 71 hours.

A wiper trip was made with a magnetic multishot installed prior to rigging down the rotating head and cutting off the riser - hole deviation was 7 degrees. 10.3/4" 40.5lb/ft K55 STC casing was run and cemented in place with 306 sacks at 745m. A 88 sack top-up job was performed. Wellhead A section was installed and the BOPs nippled up and tested. A 9.7/8" 60ft build assembly was RIH and the rotating head was installed prior to drilling the shoetrack. The FIT was conducted to 16.2ppg without leak-off.

The production hole was drilled according to the standard format, with the build-up and start of the tangent section being completed in 9.7/8" hole size, before changing over to 8.1/2" hole size for improved ROP and improved cement bond around the 7" production casing. The 9.7/8" hole was air mist drilled in 5 bit runs while performing magnetic single shot surveys, with Schlumberger running the SHDT-GR-AMS intermediate logging run at 1150m. A 9.7/8" build assembly was run after post logging target revision to the hole size section TD of 1360m.

The 8.1/2" hole was drilled utilising 5 bit to a well TD of 1658m. A flow test was carried out at 1431m with a result of 3.35 mmcfd. Air drilling was continued to 1556m, before changing over to 8.9ppg mud for drilling. Section drilling time was 110.5 hours (9.7/8" - 46hrs; 8.1/2" - 64.5hrs).

Schlumberger logged: #1 Platform Express (DLL-MSFL-LDL-CNL-CAL-GR).

A wiper trip was made prior to running casing. The 7" 23/26# K55 LTC casing was run to 1655m and cemented in place with 710 sacks. The well was suspended with a cap welded over the 7"casing.

The rig was released at 1200 hrs 06 September 1997, 23.25 days from spud (28 days programmed).

APPENDIX 5

DST EQUIPMENT

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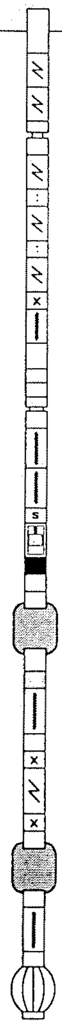
EXAMPLE
DST #1 - Patchawarra (7593' - 7699' KB)



No.	Tool	Length	KB Depth
1	Pup Joint	20.05	-18.04
73	Stands DP	181.21	2.01
3	DC's	91.97	7048.02
	D/Jars	9.09	7139.99
11	DC's	336.43	7149.08
	B.O Sub	1.30	7485.51
1	DC's	29.91	7486.81
	D.B Sub	1.00	7516.72
1	DC's	30.69	7517.72
	X/O	0.75	7548.41
	Fluid Rec.	4.50	7549.16
	Hydraulic Tool	4.90	7553.66
	Sampler & Sub	3.40	7558.56
	Square Valve	0.00	
	Jars	7.35	7561.96
	Rec Hgr	4.50	7569.31
	EMP Hgr	0.00	
	Safety Jt	1.98	7573.81
	Pump	7.80	7575.79
	Screen	3.80	7583.59
	Deflate	0.00	
	Packer	5.61	7587.39
	Flow Ports	3.96	7593.00
	Recorder	8.80	7596.96
	Spacing	0.00	
	X/O	1.05	7605.76
2	DC's	61.80	7606.81
	X/O	1.00	7668.61
	Spacing	28.00	7669.61
	Top Packer	1.8	7697.61
	Packer	5.99	7699.41
	Spacing	2.00	7705.40
	Drag Spring	7.23	7707.40
		Total Depth:	7714.63 ft

RKB

Test Interval

7593 to 7699 ft Driller's Depth
7593 to 7699 ft Schlumberger's Depth

Tool Measurements

Total tool length below bottom packer:	76.61 ft
Total tool length to top of Blow out sub:	229.12 ft
Total String Length:	7732.67 ft
Stick Up (above KB):	18.04 ft

Figure 9.9 - Standard Test String Configurations - Inflate

9.5.2.3 DST Scheduling

1. Drill Stem Tests shall not be commenced (i.e. tools shall not be opened) during hours of darkness without the prior approval of CDE.

2. The test string shall not be pulled out of the hole during hours of darkness unless the pipe has been reverse circulated beforehand.

9.5.2.4 Test Duration

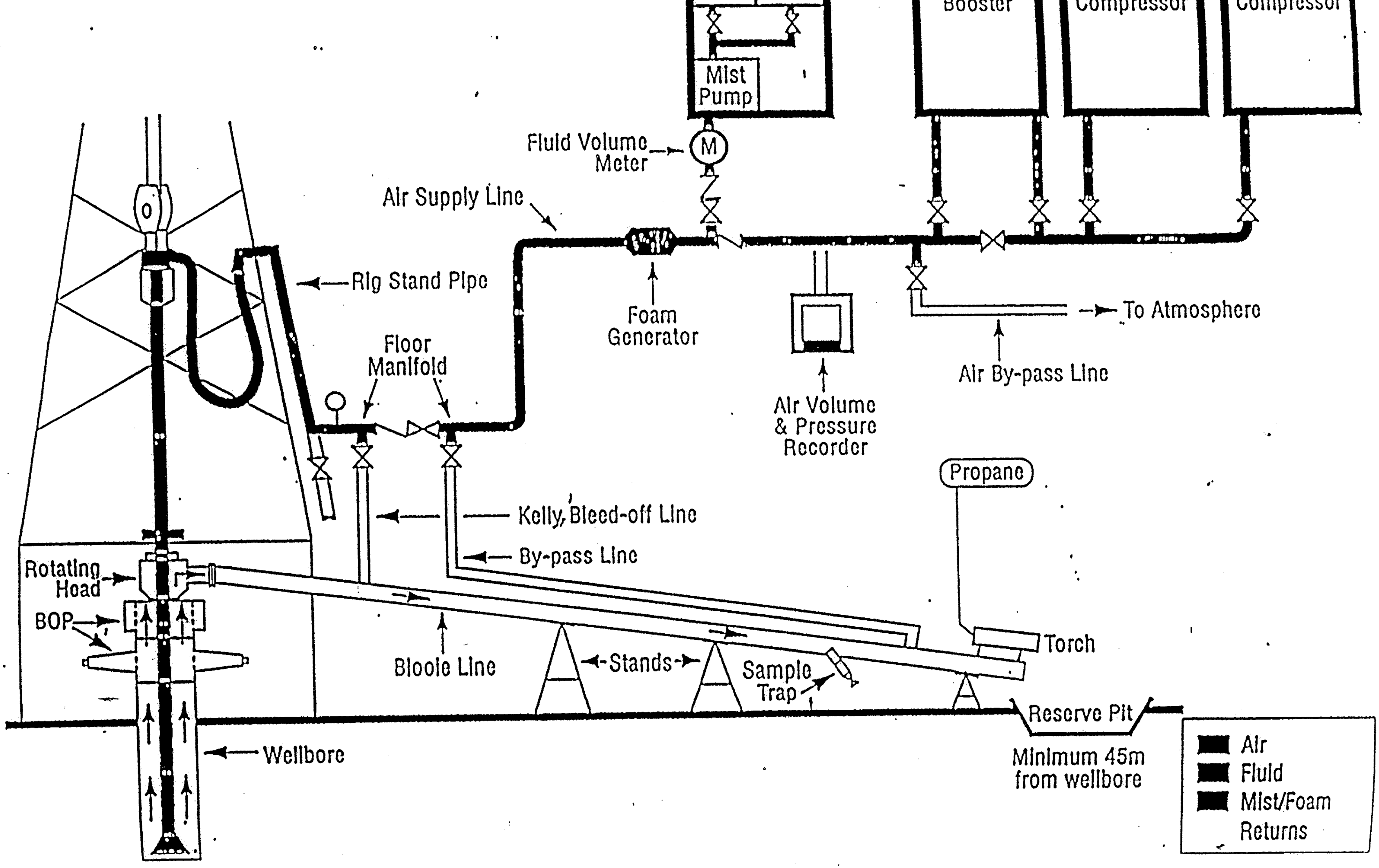
A standard test sequence shall be performed for all wells unless specifically altered by Reservoir Engineering or Exploration / Development personnel. The standard sequence is as follows:

a) 5 mins pre-flow
b) 30 mins shut-in
c) 60 mins flow
d) 120 mins shut-in

APPENDIX 6

AIR/MIST DRILLING LAYOUT

MIST OR FOAM DRILLING LAYOUT



APPENDIX 7

CERTIFICATE OF INSURANCE

Dirk van Elst
State Manager

J&H Marsh & McLennan Pty Ltd
ACN 004 651 512
12 Pirie Street, Adelaide SA 5000
GPO Box 1498, Adelaide SA 5001
(08) 8212 5481 Fax: (08) 8212 6168
Dirk.Vanelst@marshmc.com

29 April 1998

J&H MARSH & McLENNAN

To Whom it may Concern - Confirmation of Cover

We confirm that we have arranged the following insurance on behalf of Santos Ltd.

Operators Extra Expense

Insured:	SANTOS LIMITED and/or any Parent, Subsidiary, Affiliated, Interrelated, Controlled or managed Company or Joint Venture or Associated Participating Company, now existing or hereafter formed or acquired, and/or Mortgagors, Lessors and other interested parties, and/or any company for whom the Insured has assumed responsibility to insure and/or as more fully described in the wording.
Insurer:	Various Lloyds' and other European Underwriters
Period:	From 31 March 1998 LST To 31 March 1999 @ 4:00pm LST
Interest Insured:	Offshore/Onshore Operators Extra Expense including Control of Well, Cost of Redrilling, Extra Expense, Seepage and Pollution, Clean-Up and Containment, Removal of Debris/Wreck, Underground Blowout, Making Wells Safe, Evacuation Expenses & Contingent Joint Venture Liability.
Territorial Limits:	Worldwide or as stated in the individual Sections of the Policy.
Sum Insured (100% Int.):	A$100,000,000 any one occurrence

This certificate is issued subject to the terms, conditions, exclusions and endorsements of the policy. **A copy of the policy is available for inspection** in this office if required.

This Certificate of Insurance neither affirmatively nor negatively amends, extends or alters the coverage afforded by the policy issued.

Yours faithfully

Dirk van Elst

Dirk van Elst
State Manager

J&H Marsh & McLennan Pty Ltd
ACN 004 651 512
12 Pirie Street, Adelaide SA 5000
GPO Box 1498, Adelaide SA 5001
(08) 8212 5481 Fax: (08) 8212 6168
Dirk.Vanelst@marshmc.com

4 May 1998

J&H MARSH &
McLENNAN

To Whom it may Concern - Confirmation of Cover

We confirm that we have arranged the following insurance on behalf of Santos Ltd.

Onshore/Offshore Third Party Liabilities

Insured: SANTOS LIMITED and/or any Parent, Subsidiary, Affiliated, Interrelated, Controlled or managed Company or Joint Venture or Associated Participating Company, now existing or hereafter formed or acquired, and/or Mortgagors, Lessors and other interested parties, and/or any company for whom the Insured has assumed responsibility to insure and/or as more fully described in the wording.

Insurer: GIO Insurance Ltd

Period: From 31 March 1998 LST
To 31 March 1999 @ 4:00pm LST

Interest Insured:
- **Offshore**
  Offshore liabilities arising out of the Insured's operations including Charterer's Liabilities and Onshore USA/Canada Liabilities.
- **Onshore**
  Third party liabilities onshore (excluding USA and Canada).

Territorial Limits: Worldwide or as stated in the individual Sections of the Policy.

Sum Insured:
- **Offshore**
  US$20,000,000 each and every occurrence
- **Onshore**
  US$20,000,000 each and every occurrence

Conditions: Based on expiring wordings, all as per the policy and including Contractors Liability to a limit of $17,000,000 each and every occurrence.

This certificate is issued subject to the terms, conditions, exclusions and endorsements of the policy. **A copy of the policy is available for inspection** in this office if required.

This Certificate of Insurance neither affirmatively nor negatively amends, extends or alters the coverage afforded by the policy issued.

Yours faithfully

Dirk van Elst

APPENDIX 8

CASING DESIGN SUMMARY
&
KICK TOLERANCE CALCULATIONS

Surface Casing Design
West Mereenie 14

10-3/4" 40.5 lb/ft STC

Burst Strength, psi	3130
Fract Grad at shoe (ppg EMW)	27.0
TVD of shoe	1804
Influx gradient (psi/ft)	0.110
Mud weight while running casing	2.15
Collapse Strength, psi	1580
Casing / BOP Test Pressure	2200

Casing wt (lb/ft) =	40.5
Joint / body strength *=	450000
ID of casing =	10.05
Buoyancy Factor =	0.9672

*Whichever is the least

Burst Safety Factor - Gas To Surface (BSF-GTS):

$$BSF = \frac{\text{Burst Design Pressure (BDP), psi}}{(.052 \times \text{Frac. Grad.} \times TVD) - (\text{Influx Grad.} \times TVD)} = \frac{3,130}{2,334}$$

BSF = 1.34

Burst Safety Factor - Pressure Test (BSF-PT):

$$BSF = \frac{\text{Burst Design Pressure (BDP), psi}}{\text{BOP Test} + (.052 \times \text{Mud Wt} \times TVD) - (0.445 \times TVD)} = \frac{3,130}{1,599}$$

BSF = 1.96

Collapse Safety Factor (CSF):

$$CSF = \frac{\text{Collapse Design Pressure (CDP), psi}}{(0.052 \times \text{Mud Wt.} \times TVD) - (\text{Influx Grad.} \times TVD)} = \frac{1,580}{3}$$

BSF = 486.57

Tension Safety Factor - Running (TSFr):

$$TSFr = \frac{\text{Joint Strength, lbs.}}{\text{Casing Wt. (lb/ft)} \times MD \times \text{Bouyancy Factor}} = \frac{450,000}{70,664}$$

TSFr = 6.37

Tension Safety Factor - Pressure (TSFp):

$$TSFp = \frac{\text{Joint Strength, lbs.}}{(\text{Csg Wt. (lb/ft)} \times MD \times BF) + (\pi/4 \times ID^2 \times \text{Casing / BOP Test Pressure})} = \frac{450,000}{245,184}$$

TSFp = 1.84

Assumptions:

Burst: GTS assumes leak-off pressure at the shoe with a gas gradient to surface.
PT assumes BOP test (based on GTS) at surface, mud weight inside & formation water outside the casin

Collapse: Assumes gas gradient in the casing and mud weight outside the casing.

Tension: Running assumes buoyed weight of the casing.
Pressure assumes buoyed weight plus casing / BOP test pressure applied to the casing ID.

PRODUCTION CASING DESIGN

WELL: **West Mereenie 14**

CASING DATA

Casing Size:	7	in.
Casing Depth:	4803	feet
Packer Depth:	2555	feet

SAFETY FACTORS

Collapse:	1.0
Burst:	1.1
Tension:	1.6

FLUID DATA

Mud Weight:	11	ppg
Gas Gradient:	0.08	psi/ft (1.54ppg)
Formation Pressure:	0.64	psi/ft (12.31ppg)

PACKER FLUID

Mid-Perf Depth:	3117	feet
BHT:	150	F
Safety Factor:	150	50psi Oilwell / 150 psi Gas Well
Packer Fluid:	13.35	ppg

CASING DESIGN

					SAFETY FACTORS					
Size (in.)	Grade	Wn (lbm/ft)	Depth (ft)	Length (ft)	Collapse	Burst	Tension			Biaxial
							Running	Cementing	Pressure	
7	K55	26	0		N/A	1.9	2.2	3.6	2.6	N/A
		26	39	39	194.1	1.8	2.2	3.7	2.6	170.2
7	K55	23	39		146.6	1.6	2.0	3.1	2.2	128.7
		23	2555	2516	2.2	1.3	3.0	6.6	3.5	2.1
7	K55	26	2555		3.0	1.5	3.0	7.8	4.2	2.8
		26	4803	2248	1.6	1.5	5.5		10.7	1.6

KICK TOLERANCE CALCULATIONS

WELL NAME	West Mereenie 14					
Well Depth	**4803**	**1464**	Hole Size	**8.5**	inches	
Casing Depth	**1804.0**	**550**	Casing Size	**10.75**	inches	ID = 10.040 in
Fracture grad.	**16.4**	**ppg**	Casing Weight	**40.5**	lb/ft	
Current mud weight	**11.0**	ppg	HWDP Size	**4.5**	inches	
Estimated Formation Grad.	**8.5**	**ppg**	DP Size	**4.5**	inches	
Est Friction Pressure	**0**	**psi**	DC Size	**6.25**	inches	
Choke Operator error	**0**	**psi**				
Influx Gradient	**0.1**	**psi/ft**				
Collar Length	**800**	**ft**				
HWDP Length	**180**	**ft**				
BOP/Wellhead rating	**3000**	**psi**				
Casing Burst Rating	**3500**	**psi**				

	Ann.Cap. bbl/ft	Length ft	Ann.Cap. bbls
DC/Open Hole	0.0322	800	25.8
HWDP/Open Hole	0.0505	180	9.1
DP/ Open Hole	0.0505	2019	102.0
DP/ Casing	0.0782	1804	141.2
Totals		4803	278.0

Current LOP	502	psi
Estimated formation pressure	2123	psi
Mud Hydrostatic pressure at TD	2747	psi
Max. BHP	2747	psi
Max Influx length	1064	ft
Max Influx Volume @Shoe	53.7	bbls
Max Influx volume @ TD	39.1	bbls
Max Influx Shoe Vol @ BHP	30.0	bbls

Max Allow. Ann. Surf.Press 502 psi

KICK TOLERANCE 30.0 BBL

NOTES :
- Assumes the well is vertical
- Assumes influx is a gas obeying gas law regardless of the influx gradient used.
- Influx gradient used to calculate maximum influx length only.
- Volume adjustment from shoe to TD uses P1*V1 = P2*V2 and ignores T & Z.
- Assumes all BHA is outside the casing shoe
- In certain specific development areas known to have essentially gas free crude, the lesser of TD or shoe influxes may be used.