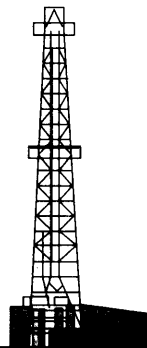




NAYLOR 1

Well Completion Report



Santos

**PEP 154, OTWAY BASIN
VICTORIA**

SANTOS – BEACH

COMPILED FOR
SANTOS LIMITED
ACN 007 550 923

30 NOV 2001

NAYLOR 1

WELL COMPLETION REPORT

Petroleum Development

Prepared by:
D.ADDERLEY
July 2001

NAYLOR 1 WCR

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LOCATION MAP

Santos

Exploration & Development

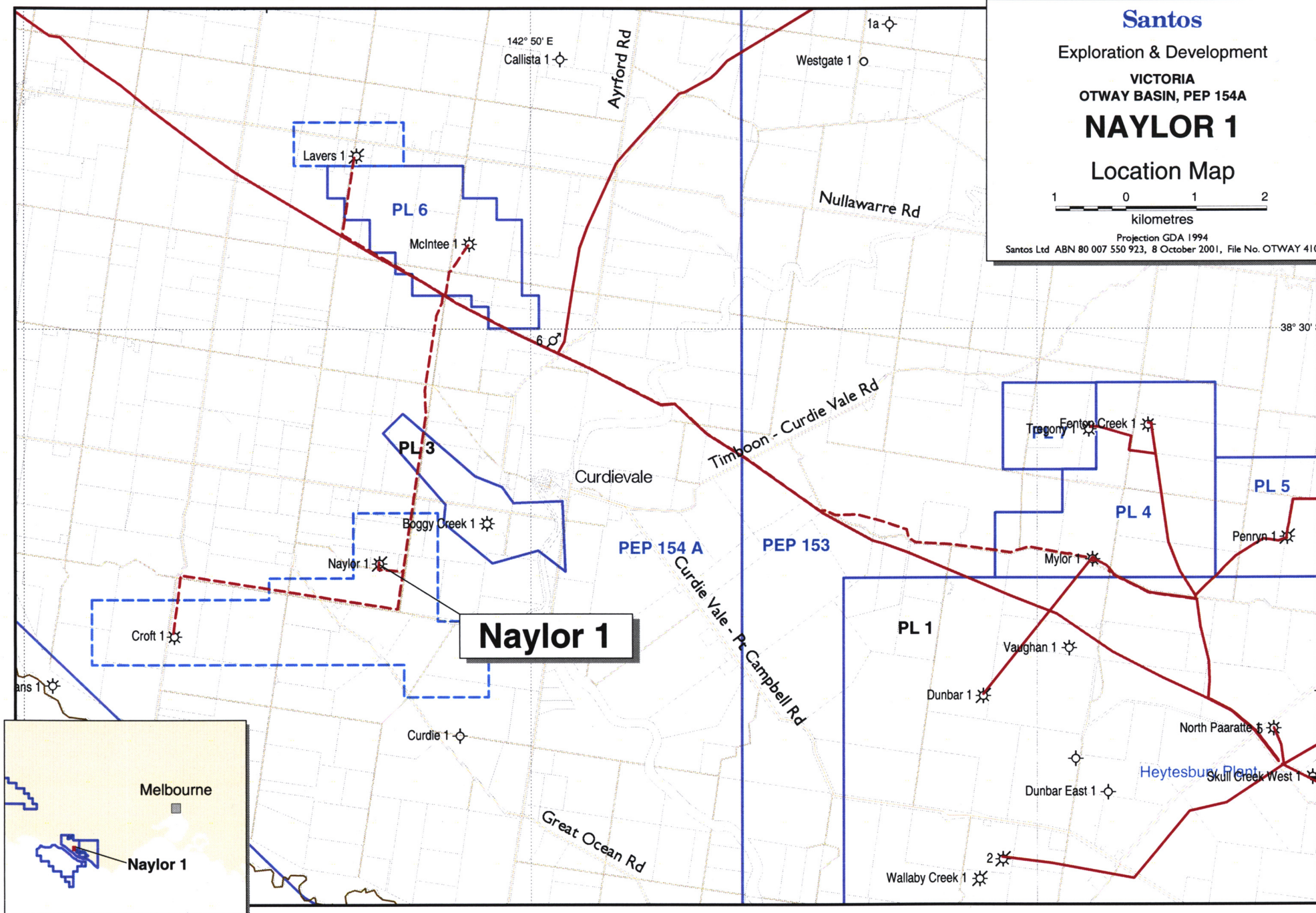
VICTORIA
OTWAY BASIN, PEP 154A

NAYLOR 1

Location Map

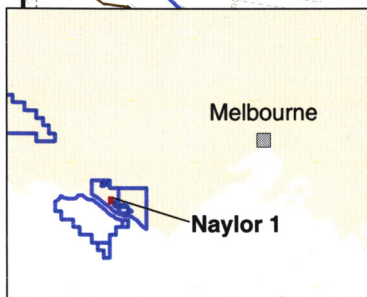


Projection GDA 1994
Santos Ltd ABN 80 007 550 923, 8 October 2001, File No. OTWAY 410



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908040 006



WELL DATA CARD

WELL: NAYLOR 1	WELL CATEGORY: GAS	SPUD: 10/05/01 1000hrs TD REACHED: 15/05/01 1700hrs		
	WELL INTENT: EXP	RIG RELEASED: 19/05/01 2000hrs CMPLT:		
		RIG: OD&E 30		
LAT: 38° 31' 47.26" S LONG: 142° 48' 30.43" E (GDA94)		STATUS: C&S GAS WELL		
SEISMIC STATION: INLINE 2200 CURDIEVALE 3D CDP 10225		REMARKS:		
ELEVATION GND: 46.4 M RT: 51.09 M (Final)				
BLOCK/LICENCE: PEP 154				
TD 2143 M (Logr Ext) 2157 M (Drlr)				
PBTD M (Logr) 2191 M (Drlr)				
TYPE STRUCTURE: TILTED FAULT BLOCK		CASING SIZE	SHOE DEPTH	TYPE
TYPE COMPLETION: 3 ½" MONOBORE		7 5/8"	483m (D&L)	26.4 LB/FT L-80
ZONE(S): WAARRE SANDSTONE		3 ½"	2152m (D)	9.2 LB/FT 13CR95

AGE	FORMATION OR ZONE TOPS	DEPTH (M)		THICKNESS TVD (M)	HIGH (H) LOW (L)
		LOGGERS	TVD SS		
EARLY – MID MIOCENE	GELLIBRAND MARL	126.5	-75.4	336.5	NP
L OLIGOCENE – E MIOCENE	CLIFTON FORMATION	463	-411.9	14.5	5.9M H
LATE EOCENE	NARRAWATURK MARL	477.5	-426.4	74	NP
MID – LATE EOCENE	MEPUNGA FORMATION	551.5	-500.4	84.5	31.4M H
EARLY – MID EOCENE	DILWYN FORMATION	636	-584.9	249	75.9M H
L PALEOCENE – E EOCENE	PEMBER MUDSTONE	885	-833.9	62	54.9M H
EARLY – LATE PALEOCENE	PEBBLE POINT FORMATION	947	-895.9	58.5	9.1M L
L SENONIAN – E PALEOCENE	MASSACRE SHALE	1005.5	-954.4	21.5	NP
LATE SENONIAN	TIMBOON SANDSTONE	1027	-975.9	113	NP
LATE SENONIAN	PAARATTE FORMATION	1140	-1088.9	392	100.9M H
LATE SENONIAN	SKULL CREEK FORMATION	1532	-1480.9	181	2.1M L
LATE SENONIAN	NULLAWARRE FORMATION	1713	-1661.9	8	NP
LATE SENONIAN	BELFAST FORMATION	1721	-1669.9	286	8.1M L
LATE SENONIAN	FLAXMANS FORMATION	2007	-1955.9	21.5	6.9M H
LATE SENONIAN	WAARRE UNIT C	2028.5	-1977.4	27.5	30.6M L
LATE SENONIAN	WAARRE UNIT B	2056	-2004.9	16	NP
LATE SENONIAN	WAARRE UNIT A	2072	-2020.9	40	NP
EARLY NEOCOMIAN	EUMERALLA FORMATION	2112	-2060.9	31	45.1M L
	TOTAL DEPTH	2157			

[illegible]

LOG	SUITE/ RUN	INTERVAL	BHT/TIME/ REMARKS	LOG	SUITE/ RUN	INTERVAL	BHT/TIME/ REMARKS
GR	1	2139-Surface		PDS	2	2142-1950m	
LCS		2131-483m		CNS		2139-1950m	
		2131-1950m	Waveform sonic	RFS	3	2029-2110m	
DLL		2137-483m		SCG	4		Abandoned
MLL		2142-483m					
SLL		2142-483m					
CAL		2142-483m					
SP		2142-483m					

[illegible]

SUMMARY:

Naylor 1 is situated in South Western Victoria in the onshore portion of the Otway Basin (Port Campbell Embayment). It is located in the PEP 154 licence (90% Santos (operator) and 10% Beach Petroleum N.L.), and sited at CDP 10225, inline 2200, on the Curdievale 3D Seismic Survey. It lies approximately 10 km north west of the town of Peterborough, 1.6 km south west of the Boggy Creek CO₂ field and 9.8 km west of the Wallaby Creek Gas Field. The Naylor structure is situated within the Port Campbell Embayment and the productive Waarre Sandstone play fairway.

The Naylor Prospect is a tilted-fault block closure defined by 3D seismic.

Gas shows of up to 1400/230 units were detected while drilling in the 'unit C' the Waarre Formation (reservoir), and 1500/200 units in the 'unit A'.

One suite of wireline logging was carried out by Reeves Logging after reaching total depth, and consisted of the following: Run 1: GR-CSS-DLS-MLL; Run 2: PDS-CNS; Run 3: RFS; Run 4: SCG.

Log analysis of Naylor 1 has identified the following:

25.5 metres of net pay, average porosity of 17.2%, with a water saturation of 11% in the Waarre "C" Sandstone.

16.1 metres of net pay, average porosity of 13.8%, with a water saturation of 32% in the Waarre "B" Sandstone.

9.7 metres of net pay, average porosity of 13.8%, with a water saturation of 33% in the Waarre "A" Sandstone.

Naylor 1 reached a total depth of 2157m (Drlr), 2143m (Logr Ext), and has been cased with 3.5" production tubing.

As a result of the gas pay discovered in the Waarre Units "C" and "A", Naylor 1 was cased as a potential gas producer.

AUTHOR: D. Adderley

DATE: JULY 2001

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WELL HISTORY

1. GENERAL DATA

Well Name:	Naylor 1
Well Classification:	Gas Exploration (Wildcat)
Interest Holders:	Santos Ltd (90%) Beach Petroleum (10%)
Participating Interests:	Santos Ltd (90%) Beach Petroleum (10%)
Operator	Santos
Block/Licence	PEP 154, Onshore Otway Basin, Victoria
Surface Location	Latitude: 38° 31' 47.26" South Longitude: 142° 48' 30.43" East
Surveyed Elevation	Ground Level: 46.40m Rotary Table: 51.09m
Seismic Survey	CURDIEVALE 3D
Seismic Location	CDP 10225, LINE 2200
Total Depth	Driller: 2157m Logger Ext: 2143.0m
Completion	6 joints of 3.5" 9.3 ppf L80 New NK3SB and 162 joints of 3.5" 9.3 ppf J55 New NK3SB Tubing, set at 1623m
Status	Completed Gas Well.

2. DRILLING DATA

Date Drilling Commenced	1000 hours, 10 th May 2001
Date Drilling Completed	1700 hours, 15 th May 2001
Date Rig Released	2000 hours, 19 th May 2001
Contractor	Oil Drilling & Exploration Pty Ltd (OD&E)
Rig	OD&E 30
Rig Specifications	Refer to Appendix XIII

3. DRILLING SUMMARY

(a) Drilling Summary:

Naylor 1 was spudded at 1000 hours on the 10th May 2001. Tables I and II summarise the casing, cementing and mud systems used in this well. A more comprehensive summary is appended to this report (Appendix XI: (Drilling - Final Well Report)).

TABLE I: CASING, HOLE, AND CEMENT DETAILS

BIT SIZE	DEPTH	CSG SIZE	CSG DEPTH	JNTS	CSG TYPE	CEMENT
9.875"	485m	7 5/8"	483m (D&L)	41	26.4 lb/ft L-80	Lead: 78 bbls of Slurry (153 sacks Class G cement) @ 11.5 ppg + 5% bwoc of D020 + 1.5% bwoc of S001 CaCl ₂ + 0.01 gal (sax of D047). Tail: 18 bbls of slurry (86 sacks Class G) @ 15.6 ppg + 0.5 gal/sx of D145A + 0.5 bwoc of S001 CaCl ₂ + 0.01 gal/sax of D047.
6.75"	2157 (D) 2143 (L)	3 1/2"	2152m (D)			Lead: 209 bbls of slurry (416 sacks Class G cement) @ 11.5 ppg + 5% Bentonite + 0.04% D081 retarder + 0.01 gps D047 antifoam. Tail: 25 bbls of Slurry (121 sacks Class G cement) @ 15.8 ppg + 0.03 gps of D081 + 0.01 gps D047 + 0.05 gps of D080.

TABLE II: SUMMARY OF MUD SYSTEMS

MUD TYPE	INTERVAL (m)
Spud Mud (Gel/Water) KCL/PHPA	Surface – 485m 485m – 2157m

(b) Lost Time:

Lost time at Naylor 1 – Please refer to Appendix XI (Drilling - Final Well Report,: Time Breakdown Data).

(c) Water Supply:

No water analysis was done.

(d) Mudlogging:

Mudlogging services were provided by Geoservices Ltd. Samples were collected, washed, and described at 15m intervals from the surface to 990m, 3m intervals from 990m to 2157m (T.D.). All samples were checked for oil shows using ultraviolet fluorescence. Gas levels were monitored from the surface casing shoe to TD using a total gas detector and other parameters monitored include rate of penetration, weight on hook and mud pit levels.

(e) Testing:

No DST's were conducted in Naylor 1.

(f) Coring:

No cores were cut in Naylor 1.

(g) Electric Logging:

One suite of wireline logs was run in Naylor 1, as detailed below:

TABLE III: ELECTRIC LOG SUMMARY

LOG	SUITE/ RUN	INTERVAL (m)	BHT/TIME/ REMARKS	LOG	SUITE/ RUN	INTERVAL (m)	BHT/TIME/ REMARKS
GR	1/1	2139-surface	75°C/9:10hrs	PDS (RHOB)	1/2	2142-1950	81°C/13:50hrs
CSS (comp- ensated sonic)	1/1	2131-483	75°C/9:10hrs	CNS (NPHI)	1/2	2139-1950	81°C/13:50hrs
CSS (wave- form sonic)	1/1	2131-1950	75°C/9:10hrs	RFS (MDT)	1/3	20 points (2029m-2110m)	81.5°C/5:30hrs
DLS	1/1	2137-483	75°C/9:10hrs	SCG (SWC)	1/4	Abandoned	-
MLL	1/1	2142-483	75°C/9:10hrs				-

*Logger Contractor - REEVES

(h) Geothermal Gradient:

A measured static bottom hole temperature of 96°C at 2157m is calculated. This gives a geothermal gradient of 3.53°C/100m. An ambient temperature of 20°C was employed. Data used for calculations is as follows:

75.0°C at 2142.0m after 9.1 hours from Logging Run 1, Suite 1.

81°C at 2142.0m after 13.5 hours from Logging Run 2, Suite 1.

81.5°C at 2110.0m after 5.3 hours from Logging Run 3, Suite 1.

(i) Hole Deviation

The Lavers 1 well is a vertical hole. Directional surveys indicate a maximum deviation from vertical of 8.0° inclination 149°T at 2014m

(j) Velocity Survey:

No velocity survey was run in Naylor 1.

(k) Completion Summary:

Naylor 1 was cased and suspended.

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GEOLOGY

1. PRE-DRILLING SUMMARY (after Well Proposal)

Naylor 1 is proposed as an Otway Basin gas exploration well to be located in the PEP 154 licence, approximately 10 km north west of the town of Peterborough, 1.6 km south west of the Boggy Creek CO₂ field and 9.8 km west of the Wallaby Creek gas field. The Naylor structure is situated within the Port Campbell Embayment and the productive Waarre Sandstone play fairway.

The PEP 154 Licence is held 90% Santos (operator) and 10% Beach Petroleum N.L. The Naylor Structure is a tilted-fault block closure defined by the Curdievale 3D seismic. The well is expected to intersect a Waarre Sandstone reservoir with mean average net pay of 39.4 m.

Naylor 1 is contingent on the results of Croft 1. Given success at Croft 1, Naylor 1 is an attractive project with a mean prognosed success case of 5.86 BCF sales gas (13.78 BCF OGIP) and a current Pc (probability of commercial success) of 42%, resulting in expected mean reserves of 2.5 BCF sales gas. Pc would increase significantly if hydrocarbons were discovered at Croft 1.

2. DRILLING RATIONALE (after Well Proposal)

GEOLOGICAL RISK ASSESSMENT

Play Analysis

The Naylor Prospect is mapped as a tilted-fault block closure with the primary reservoir being the Waarre Sandstone; both vertical and cross-fault seal are provided by a thick Belfast Mudstone. Structures are charged from mature source beds located within the underlying Eumeralla and / or Crayfish Group, with migration directly into the reservoir or via fault conduits. The play has proven successful in the nearby Mylor, Fenton Creek, North Paaratte, Wallaby Creek and Iona gas fields as well as the Boggy Creek CO₂ field. Naylor as with each of these fields exhibits a strong amplitude anomaly at the Waarre Sandstone horizon, which is interpreted as being indicative of a well-developed, gas saturated reservoir.

3.2 Trap (Pcl = 95%)

Interpretation and mapping of the Naylor prospect was based on the Curdievale 3D survey, which was recorded in early 2000. The Curdievale 3D data quality is good over the Naylor structure.

Several migrated volumes including migrated stacks with and without spectral whitening and both near and far offset migrated stacks were generated and used for interpretation. Due to better horizon continuity and amplitude preservation the migrated stack volume without spectral whitening was used for horizon interpretation. Far and near offset volumes were used for amplitude extraction and AVO analysis.

A coherency cube (similarity volume) was also generated and used in conjunction with other volumes for fault interpretation.

Well ties were performed for Boggy Creek 1, Callista 1 and Curdie 1. The Curdie 1 ties however may not be valid for the Waarre, as the well appears to have penetrated a fault plane at this level.

Figure 9 (not shown) shows an arbitrary line through Boggy Creek 1 to the proposed Naylor 1 and Croft 1 locations. Figures 10 and 11 (not shown) are strike and dip lines respectively through the proposed Naylor 1 location.

Main mapping was carried out at near top Waarre Sandstone, which is the primary target reservoir. The Waarre sand package has a distinctive characteristic and therefore a high degree of consistency was maintained on mapping this unit.

The top Belfast Mudstone was interpreted on a selected grid in order to evaluate adequately its seal efficiency over the Naylor structure.

The Naylor structure is a relatively complex tilted fault block structure located between Boggy Creek 1, Curdie 1 and the proposed Croft 1. The extended Naylor structural closure area partially relies on downthrown side fault seal where Waarre reservoir juxtaposes the Eumerella Formation. Similar seal potential has already proven to be efficient at Boggy Creek. A strong amplitude event is prominent within the Waarre sand unit over the Naylor prospect. Similar events over all gas fields within the Port Campbell region suggest that the amplitude anomaly is likely related to the presence of gas in these structures. Furthermore, near and far-offset volumes were also used to evaluate the AVO response over the Naylor structure. Figure 13 (not shown) is a line over the Naylor structure from the near and far offset volume. It clearly shows that the amplitude within the Waarre sand unit is much brighter in the far offset compared to the near offset. Figures 14, 15 and 16 (not shown) are displays of amplitudes extracted from within the Waarre sand unit. Figure 16 (not shown) is particularly encouraging as amplitudes from far offset minus near offset clearly indicate an AVO anomaly coincident with the Naylor structure.

The location for the proposed Naylor 1 well was selected on inline 2200 CDP 10225. This location is at a near crestal position, and about 50 metres away from the main fault at the Waarre sand level.

Depth conversion for the prognosis was performed using Curdie 1 velocities.

3.3 Reservoir (Prs = 95%)

The Waarre Sandstone reservoir was deposited as the initial post-rift sequence at the commencement of the Turonian time under non-marine to marginal marine conditions. The section is sub-divided into three sub-units – Waarre “A”, “B” & “C”. The lower A unit represents a basal transgressive systems tract (TST) characterised by flooding of an incised valley with sediments deposited under marginal marine / estuarine conditions. The basal portion of Unit A is represented by either sand (as in Curdie 1) or shale (Boggy Creek 1 and Callista 1). This section is overlain by the widespread predominantly argillaceous Unit B, which was deposited under estuarine conditions. Unit C followed and is characterised by initial estuarine / deltaic conditions succeeded by high-energy sands. As the transgression develops the valley system is flooded with the Flaxmans Formation and Belfast Mudstone.

The Waarre Sandstone thickens to the south in the Port Campbell Embayment. The proximity to the Boggy Creek Field where good reservoir is encountered provides high confidence that similar good reservoir will be found in Naylor 1. Nearby in the water-wet Curdie 1, the Waarre Sandstone has an average porosity of 12% and a maximum porosity of 17% from logs. This reduced porosity could be a result of the Waarre sands not having early hydrocarbon emplacement, and thus being subject to increased diagenesis from the nearby fault and greater depth of burial. The strong amplitude anomaly associated with the Naylor prospect is likely to be an indication of good porosity.

A review of the local wells shows some variability in Waarre sand quality. In Boggy Creek 1 a maximum core permeability of 10.1 Darcies and average core permeabilities of 4.5 Darcies were measured. Drill stem tests confirmed the potential of the reservoir with test rates of 4.5 MMCFD. Howmains 1 represents an interfluvial environment where the Waarre sand appears to be shalier and did not develop the same reservoir quality as at many adjacent locations. No log porosity estimate can be generated for Flaxmans 1, due to the poor Waarre coverage by the sonic log and its spurious nature.

3.4 Seal (Psl = 95%)

All Otway Basin successes in the Port Campbell Embayment area have been from high-side, tilted fault or horst blocks. The ultimate top seal to Waarre reservoirs is the marine Belfast Mudstone. While a potential waste or "thief" zone (the Flaxmans Formation) exists between the Waarre sands and the Belfast seal, the unit was deposited under transitional marine conditions and generally acts as a seal.

A review of the cross-fault seal in proposed Naylor 1 suggests that leakage will not occur as the bounding fault displacement (~160ms) is considerably less than the thickness of the Belfast Mudstone (+260ms).

3.5 Charge (Pch = 50%)

Hydrocarbons are produced in the Port Campbell Embayment with the Eumeralla Formation and/or the Crayfish Group being the source beds. Analysis of the condensates and oils from the area suggest a non-marine origin with both algal and higher land plant components (Type III Kerogen). Maturation studies indicate that the top of the hydrocarbon window lies at about 2500m (SS). Thus mature Eumeralla source units which underlie the local gas fields are most likely to charge directly into the overlying structures through source-reservoir juxtaposition or via fault conduits. This model is proposed for Naylor 1, which is positioned in a similar setting to the nearby existing gas fields.

With many of the structures being present prior to the Belfast deposition, the timing of generation and migration does not appear to be a major issue. The charge risk incorporates the risk of CO₂ displacement (see discussion below).

3.5 CO₂ Issues

The distribution of CO₂ within the Port Campbell area appears to be related to the introduction of a restricted CO₂ volume at a number of locations and its subsequent migration. The CO₂ is considered to be from a mantle source and is likely to have occurred in conjunction with the emplacement of an igneous body during the Miocene.

A review of the high-resolution aeromagnetic data has been undertaken in an effort to understand the distribution of deep-seated faulting, believed to be the conduit for CO₂ migration and the emplacement of igneous bodies. The results of the study indicate the presence of an intrusive marginal to the coast and proximal to a major NNE-SSW lineament. This lineament appears to be coincident with major faulting identified on the seismic and is seen as a likely conduit for the Langley and Grumby CO₂. While an intrusive is not identified at nearby Boggy Creek, a similar trending lineament is mapped through the Boggy Creek well location.

Given the location of Naylor with respect to Boggy Creek (1.6km to NE) and the imprecision of the aeromagnetic tool, it is difficult to accurately predict whether CO₂ poses a major risk to the prospect. A factor (50%) has been included in the charge risk for the prospect with respect to CO₂. The drilling of Naylor 1 is contingent upon the success Croft 1 which would see considerably reduced the risk if CO₂ is present.

3. RESULTS OF DRILLING

(a) Stratigraphy

The following table lists the formations intersected in Naylor 1, together with sub-sea elevations and thicknesses. All depths are Logger's Depths.

TABLE IV: STRATIGRAPHY IN THE NAYLOR 1 WELL

AGE	FORMATIONS	DEPTH (m)	THICK. (m)	ELEV. (m)
	HEYTESBURY GRP			
MIDDLE-LATE MIOCENE	PORT CAMPBELL LIMESTONE	Surface	126.5	51.1
EARLY MIOCENE	GELLIBRAND MARL	126.5	336.5	-75.4
E-L OLIGOCENE – E AQUITANIAN	CLIFTON FM <u>NIRRANDA GRP</u>	463	14.5	-411.9
LATE EOCENE	NARRAWATURK MARL	477.5	74	-426.4
MIDDLE EOCENE	MEPUNGA FM	551.5	84.5	-500.4
EARLY – MIDDLE EOCENE	DILWYN FM	636	249	-584.9
L PALEOCENE – EARLY EOCENE	PEMBER FM	885	62	-833.9
E-L PALEOCENE	PEBBLE PT FM <u>SHERBROOK GRP</u>	947	58.5	-895.9
L SENONIAN-E PALEOCENE	MASSACRE SHALE	1005.5	21.5	-954.4
LATE SENONIAN	TIMBOON SANDSTONE	1027	113	-975.9
LATE SENONIAN	PAARATTE FM	1140	392	-1088.9
LATE SENONIAN	SKULL CK MUDSTONE	1532	181	-1480.9
LATE SENONIAN	NULLAWARRE	1713	8	-1661.9
LATE SENONIAN	BELFAST MUDSTONE	1721	286	-1669.9
LATE SENONIAN	FLAXMAN FM	2007	21.5	-1955.9
LATE SENONIAN	WAARRE FM	2028.5	83.5	-1977.4
LATE SENONIAN	UNIT C	2028.5	27.5	-1977.4
LATE SENONIAN	UNIT B	2056	16	-2004.9
LATE SENONIAN	UNIT A	2072	40	-2020.9
EARLY NEOCOMIAN	EUMERALLA FM	2112	31	-2060.9
	TD	2143		

Samples were collected, washed, and described at 15m intervals from the surface to 990m, 3m intervals from 990m to total depth at 2157m.

A brief summary of the formations penetrated in Naylor 1, their ages and interpreted environments of deposition follows:- (For more detailed lithological descriptions refer to Appendix I). For specific relationships between the units, refer to the stratigraphic column in Appendix IX)

Total depth for Naylor 1 was reached at 2157m (D), 2143m (L), in the Early Cretaceous **Eumeralla Formation**, of the **Otway Group**. The well intersected 31m of the Eumeralla, the top coming in at 2112m (maximum recorded thickness in the Otway Basin is 2743m, in the Fergusons Hill-1 well). The formation consists of interbedded sandstone and siltstone. The sandstones are off-white, commonly light grey to pale green. Quartz grains are dominantly fine to occasionally medium-sized. They are subangular to subrounded, moderately well sorted, contain common weak calcareous cement, and have a common to abundant white argillaceous matrix. Characteristically, the Eumeralla contains a high percentage of volcanic rock fragments (38-53%--Abele *et al*, 1995). In Naylor 1 there are trace carbonaceous flakes in part, and the sandstone varies from friable to occasionally moderately hard, but only exhibits a poor porosity. No oil fluorescence was observed.

The siltstone comprises approximately 10% of the section drilled and is medium to dark grey. It is moderately to very silty in parts, has rare coaly detritus, and is locally micro-micaceous. The siltstone is firm to moderately hard and is sub blocky to sub fissile.

The Eumeralla was deposited in a low-energy fluvial environment, probably in a major braided stream system where there was an abundant supply of sand-sized volcanic detritus. The landscape also included occasional high energy streams, lakes and channel tracts. The source of the volcanic material is unknown, but due to results from age dating, it appears that volcanism was contemporaneous with sedimentation (Foster and Hodgson, 1995). In the eastern portion of the Otway Basin the Eumeralla has been dated to be Aptian to Albian.

The Late Cretaceous **Sherbrook Group** unconformably overlies the Early Cretaceous Eumeralla in the Otway Basin. The **Waarre Formation** makes up the oldest formation of the group and is dated to be Turonian in age (Partridge, 1997). The formation was divided up into 4 units by Buffin (1989), however the youngest, "Unit D", is generally called the Flaxmans Formation, after Flaxmans-1, by Bain (1961). Of the approximate 54.1m of good 'clean' sand in the Waarre, 51.3m is expressed as net pay (see Appendix IV for Log Analysis). The sandstone is off-white, clear to translucent, fine to coarse, but dominantly medium. The grains are subangular to subrounded, poor to moderately sorted, contains a weak to moderate silica and calcareous cement. There is trace to common white argillaceous matrix throughout. The sandstone is loose to friable, has a poor visible porosity, and no fluorescence. The siltstone is medium to dark grey and medium brown-grey, has common carbonaceous material. It is firm to moderately hard and sub-blocky to occasionally sub fissile. Claystone in this formation is off white to pale brown, commonly argillaceous and contains common very fine quartz grains, it is commonly calcareous and is soft to amorphous.

The sandstone packages are from 3 to 15m thick and are generally blocky in shape, although the Waarre B sand package exhibits a fining upward signature. The basal Waarre is interpreted to be shallow marine to marginal marine. After the transgression in the lower part of the Waarre, the formation became more regressive, depositing the best reservoir sands in the lower coastal and delta areas.

The Waarre Formation was transgressed by another flooding event (conformably overlain) by the **Flaxmans Formation**. In the Naylor 1 well it was intersected at 2007m (-1955.9m SS), and is 21.5m thick. It consists of a coarsening upward package of approximately equal amounts of sandstone and claystone. The siltstone is pale to medium grey, has common glauconite, with a trace of muscovite flakes, and common disseminated pyrite. The sandstone is translucent, brown/grey, dominantly medium and occasionally very coarse grained, minor fine. It is very poorly sorted, angular to subangular, has a weak siliceous cement and trace off white argillaceous matrix. The sand is loose and exhibits good inferred porosity. The Flaxmans is dated as being Turonian (Partridge, 1997) in age, and is defined as the initial sediments of the major marine transgression to the overlying Belfast Mudstone. Both the Flaxmans and Belfast are considered part of the regional seal and side seal for the Waarre Formation.

The **Belfast Mudstone** conformably overlies the Flaxmans Formation. It was penetrated at 1721m (-1669.9m SS), and is 286m thick. The siltstone is pale to medium grey and pale brownish grey, minor arenaceous, has minor to localised common glauconite fragments, and minor disseminated pyrite increasing with depth. It is very soft to firm, occasionally moderately hard, sub blocky to sub fissile. The sandstone is off white, very fine to fine, well sorted, with a weak siliceous and calcareous cement and minor to common argillaceous matrix. Firm to friable and is loose in part, with a poor to very poor porosity. The Belfast has been dated as Turonian to Campanian (Abele *et al.*, 1995), but Partridge (1997) considered it to be only Coniacian to Santonian. It was deposited below storm wave base in low-energy marine conditions, in a pro-delta environment.

The **Nullawarre Greensand** conformably overlies the Belfast with a top intersected at 1713m (-1661.9m SS), and is 8m thick. It is predominantly made up of a light to medium green, in part yellow, medium to coarse, trace very coarse-grained sandstone. The sandstone is subangular to subrounded, moderately to well sorted, with weak silica cement (including occasional quartz overgrowths), rare off white argillaceous matrix, common glauconite especially at the top, and trace nodular and disseminated pyrite. The sandstone is loose and exhibits fair-good porosity. No shows were registered.

The Nullawarre is regarded as being Santonian to Campanian in age and a marine deposit formed above storm wave base. It may be a sheet sand, which accumulated on the upper part of the shelf (Abele *et al*, 1995).

In this locality, the **Skull Creek Mudstone**, (often considered part of the Paaratte Formation), conformably overlies the Nullawarre Greensand. The top of the mudstone was encountered at 1532m (-1480.9m SS), and is 181m thick. It comprises a pale to medium grey and pale to medium brown siltstone. The siltstone is argillaceous, micro micaceous in part, with minor carbonaceous specks. It is soft to very soft, occasionally dispersive, amorphous and sub blocky. The sandstone is pale grey, clear to translucent, very fine to fine, moderately well sorted, with minor off white argillaceous matrix, and poor visual porosity. A pro-delta environment of deposition is interpreted for the Skull Creek and an age of Santonian has been attributed to it.

The top of the youngest formation of the Sherbrook Group, the **Paaratte Formation**, was intersected at 1140m, (-1088.9m SS). The formation is 392m thick and is made up sandstone with interbedded siltstone. The sandstone is light to medium grey, opaque. Quartz grains are predominantly coarse, ranging from fine to very coarse, are angular to subrounded, and poorly sorted. There is weak to strong pyrite and silica cement throughout the section. Rare to trace pale grey argillaceous matrix occurs in this formation. The sandstone is dominantly loose and exhibits poor to fair porosity. No fluorescence was noted.

The minor interbedded siltstone is medium to dark brown, commonly argillaceous, common to trace carbonaceous specks, very soft to firm, in part very dispersive and sub-blocky to amorphous.

The Paaratte Formation was deposited in a deltaic environment, in this case, presumably delta plain, and has been dated to be Santonian to Maastrichtian in age in the Otway Basin.

Unconformably overlying the Paaratte Formation is the oldest unit in the **Wangerrip Group**, the **Pebble Point Formation**. At Naylor 1, the Pebble Point is 58.5m thick, from 947m (-895.9m SS) to 1005.5m, and consists of interbedded sandstone, siltstone and claystone. The claystone is pale brown/grey and pale orange/yellow, rare silty, and is commonly dispersive and amorphous. The sandstone is brown, clear to translucent, fine to coarse, sub angular to subrounded, poorly sorted with weak siliceous cement, occasional to common brown silty matrix. Occasional nodular pyrite. The sand is dominantly loose, and poor visible and inferred porosity with no fluorescence.

The environment of deposition for the Pebble Point is interpreted to be shallow water, near-shore, restricted marine with periodic influxes of coarse detrital material. Various megafossils and microfossils have been identified in the formation that indicate a Palaeocene age (Abele *et al*, 1995).

Conformably overlying the Pebble Point is the **Pember Mudstone**, between 885m (-833.9m SS) and 947m, thus is 62m thick. This claystone is medium to dark brown and is occasionally pale brown, it has trace carbonaceous flecks and lithics, it is dispersive to very soft, and is amorphous. The sandstone in this section is clear to off white, occasionally light brown, with medium to occasionally coarse grains that are round to subrounded and subangular in part. There is a trace of calcareous cement and trace brown argillaceous matrix, the grains are loose and firm to moderately hard in part. There is a poor to fair inferred porosity and poor visual porosity with no fluorescence.

The Pember Mudstone was deposited in a marine environment where there was restricted circulation and low energy conditions, probably below or close to storm wave base. It has been given an age of Late Paleocene to Early Eocene (Abele *et al.*, 1995) as a result of enclosed palynomorphs.

The **Dilwyn Formation** conformably overlies the Pember Mudstone at this location, and was encountered between 636m (-584.9m SS) and 885m (-833.9m thick). The section consists predominantly of sandstone with minor interbedded siltstone and claystone. The sandstone is a light brown, opaque to translucent, medium to very coarse, rounded to subrounded, poorly sorted with weak to moderate calcareous cement. It contains common minor pyrite nodules and trace glauconite. The sand is loose and firm to moderately hard in part, with porosity ranging from poor to fair. The claystone is light to dark brown. It is silty in part with trace fossil fragments. It is soft to dispersive and amorphous. Siltstone is grey to greyish brown, commonly arenaceous with minor carbonaceous specks. The siltstone is dispersive and soft, and is subblocky to amorphous.

Both macrofossils and microfossils from the Dilwyn have been dated to be Early Eocene. The environment of deposition is interpreted to be shallow marine, with the cleaner sandy portions representing shore-face deposits of a coastal barrier system and the interbedded section possibly back beach lagoonal sediments, with some breaching occurring. Another interpretation is that the Dilwyn could have formed in a lower delta plain area with the sands, distributary channels and mouth bars, and the clays, the inter-distributary bay fills (Abele *et al.*, 1995).

The Dilwyn Formation is the youngest unit of the **Wangerrip Group**, and is disconformably overlain by the **Mepunga Formation**, the oldest formation of the **Nirranda Group**. In the Naylor 1 well the Mepunga was intersected at 551.5m (-500.4m SS) and is 84.5m thick. The sandstone is off white to light brown, and is very fine to fine, subangular to subrounded, moderately sorted, with moderate calcareous cement, brown to off white argillaceous and silty matrix, and abundant brown-stained quartz grains, decreasing to common with depth. There is trace fossil fragments, the sand is generally friable to loose, and has a poor, visible porosity with no fluorescence.

The claystone is medium to dark brown, it is calcareous, with a trace to rare carbonaceous specks and is very soft to soft, amorphous.

According to dating of forams, molluscs and palynomorphs discovered within the Mepunga, an age of Late Eocene has been given. The sandstones have been interpreted as being deposited in beach and near-shore locations as barrier islands, whereas the claystone is regarded as estuarine and some as deep lagoonal in origin (Abele *et al.*, 1995).

The **Narrawaturk Marl** overlies the Mepunga Formation with a conformable contact. The marl was encountered at 477.5m (-426.4m SS), and is 74m thick. The formation is made up of a medium brown to medium olive grey, and medium green grey marl. It contains abundant fossil fragments, including fenestrate bryozoa, forams, shell fragments, echinoid spines and sponge spicules. It has a trace pyrite, trace to common very fine, clear quartz grains, rare glauconite and is very soft, sticky and sub-blocky.

The fossil fragments have been dated to be Late Eocene to Early Oligocene. The marl was deposited in an open marine environment, mostly below storm wave base.

The Narrawaturk represents the youngest formation of the Nirranda Group, and overlying it with a regional disconformity is the **Clifton Formation**, the oldest unit of the **Heytesbury Group**. The Clifton is a 14.5m thick formation of calcarenite, found from 463m (-411.9m SS) to 477.5m in the Naylor 1 well. The Sandstone is orange to reddish brown, and very iron oxide rich. It is very fine to medium, coarse in part, poorly sorted and subangular to subrounded grains. With weak calcareous

cement and common orange to reddish brown argillaceous matrix, grading to LIMESTONE in part. It is friable to loose in part, with poor porosity and no fluorescence.

Fossils found within the calcarenite have been dated to be Late Oligocene, and it is thought to represent a shallow marine unit, a carbonate sand, deposited above fair weather base under fairly energetic conditions (Abele *et al*, 1995).

The Clifton Formation grades vertically, and in places laterally into the **Gellibrand Marl**. Here, the marl is 336.5m thick, from 126.5m (-75.4m SS) to 463m. It is a pale to medium grey Marl, that is strongly calcareous, with common fossil fragments including bryozoa, forams, shell fragments, echinoid spines and sponge spicules. There are occasional pyrite nodules, and it is very soft to dispersive and amorphous in part.

The Early to Middle Miocene Gellibrand Marl was deposited in low-energy, continental shelf environment, with a minimum water depth of 60m, due to the presence of glauconite (Abele *et al*, 1995).

The Naylor 1 well spudded into the **Port Campbell Limestone**, the topmost formation of the Heytesbury Group, (overlying the Gellibrand with a transitional contact), appearing from spud to 126.5m in depth. The calcarenite is off white to pale grey, clear, crystalline, occasional shell fragments, and is friable to brittle.

The Port Campbell Limestone is Middle to Late Miocene in age and was deposited in a moderate-energy, continental shelf environment, above fair weather wave base.

For further details concerning the formations encountered in Naylor 1, refer to **Appendix I** of this report.

(b) Stratigraphic Prognosis (after Well Proposal)

The geological section penetrated was within tolerance to prognosis. Formation tops ranged from 100.9m low to 45.1m high. The primary objective, the Waarre Formation, was 30.6m high.

Actual versus predicted formation tops and thicknesses for Naylor 1 are tabled below (all depths quoted are Logger's Depths):

TABLE V: ACTUAL VERSUS PREDICTED DEPTHS AND THICKNESSES NAYLOR 1

FORMATION	PROG SS DEPTH	ACTUAL SS DEPTH	DEPTH DIFF	PROG THICK	ACTUAL THICK	THICK DIFF
Port Campbell Lst		51.1m			126.5m	
Gellibrand Marl		-75.4m			336.5m	
Clifton Fm	-406m	-411.9m	5.9mL		14.5m	
Narrawaturk Marl		-426.4m			74m	
Mepunga Fm	-469m	-500.4m	31.4mL	40m	84.5m	+44.5m
Dilwyn Fm	-509m	-584.9m	75.9mL	270m	249m	-21m
Pember Mdst	-779m	-833.9m	54.9mL	126m	62m	-64m
Pebble Point Fm	-905m	-895.9m	9.1mH		58.5m	
Massacre Shale		-954.4m			21.5m	
Timboon Sandstone		-975.9m			113m	
Paaratte Fm	-988m	-1088.9m	100.9mL	495m	392m	-103m
Skull Creek Mdst	-1483m	-1480.9m	2.1mH		181m	
Nullawarre Greensand		-1661.9m			8m	
Belfast Mdst	-1678m	-1669.9m	8.1mH	271m	286m	+15m
Flaxmans Fm	-1949m	-1955.9m	6.9mL	59m	21.5m	-37.5m
Waarre Fm	-2008m	-1977.4m	30.6mH		77.5m	
Waarre C		-1977.4m			27.5m	
Waarre B		-2004.9m			16m	
Waarre A		-2020.9m			40m	
Eumeralla Fm	-2106m	-2060.9m	45.1mH		31m	
TD	-2141m					

(c) Hydrocarbon Summary

Total gas was recorded from the surface to total depth (2157m RT) using a FID total gas detector run by Geoservices Ltd. One unit of gas is equal to 200 ppm methane equivalent. Chromatographic analysis was determined using a FID chromatograph and these values are quoted as percentages (C1-C4). Ditch cuttings were washed, described and checked for fluorescence using ultraviolet light.

Surface to the top of the Paaratte Formation (spud to 1011m)

No gas was recorded through the Port Campbell Limestone, Gellibrand Marl, Clifton Formation, Mepunga Formation, Dilwyn Formation, Pember Mudstone or Pebble Point Formation. No hydrocarbon fluorescence in the drill cuttings was recorded within these formations

Paaratte Formation (1011m to 1525m)

Nil to less than 1% total gas was recorded in this formation. The trace gas that was observed was 100% C1. No hydrocarbon fluorescence in the drill cuttings was recorded within this formation.

Skull Creek Mudstone (1525m to 1721m)

There was less than 1% total gas that was 100% C1 at the top of the Skull Creek Mudstone which steadily increased to 12 units with a back ground level of 3 units at the bottom of the formation. The

gas breakdown in the lower portion of the Skull Creek was C1=97%, C2=3%. No hydrocarbon fluorescence was recorded within this formation.

Belfast Mudstone (1721m to 2006m)

Gas levels increased steadily from 12 units to 100 units through this formation. Gas ratios were C1=97%, C2=2%, C3=1% at the top of the formation, and were C1=92%, C2=7%, C3=1% towards the bottom. There were no significant gas peaks above background gas levels throughout the Belfast Mudstone. No hydrocarbon fluorescence was recorded within this formation.

Flaxmans Formation (2006m to 2026m)

Total gas was steady with a background level of 90 units and a maximum peak of 100 units. There was an increase in the heavier gasses, breakdowns were C1=91%, C2=7%, C3=2%, C4=trace. No hydrocarbon fluorescence was recorded within this formation.

Waarre Formation (2026m to 2119m)

Waarre Unit "C" (2026m to 2054m)

The primary objective of the Naylor 1 well was the Waarre Sandstone. This Unit yielded significant gas values in the top sand associated with excellent reservoir qualities. At the wellsite, during the drilling it was assessed that it would likely flow gas at economic recovery rates. The gas peak at the top of the Waarre "C" which reached a level of 1400 units had a chromatograph gas ratio of C1=93%, C2=4%, C3=2%, C4=1%. The background gas level in this section was 100 units. No oil fluorescence was observed at the well site.

Log analysis data indicate a total column of 25.5m of pay (2029m to 2056.5m) an average porosity calculated be 17.2% and an average water saturation of 11%. Mudlog gas peaks, log evaluation, combined with RFS tests indicate that the Waarre Unit "C" has good potential at this location.

Waarre Unit "B" (2054m to 2069m)

As a result of no sandstone development being observed in the Waarre "B" there were no significant gas shows recorded. Total gas varied between 200 and 300 units, and the gas ratios were C1=90%, C2=7%, C3=3%, C4=trace. No oil fluorescence was observed at the well site.

Waarre Unit "A" (2069m to 2119m)

The Waarre "A" consists of two pay sands, the first having a gas peak of 1300 units and a gas breakdown of C1=94, C2=4, C3=2, C4=trace. The second having a peak of 1500 units and a breakdown of C1=95%, C2=4%, C3=1%, C4=trace. This unit had a background gas level of 200 units. No oil fluorescence was observed in this unit.

Log analysis data indicate the first column of pay to be 16.1m (2072m to 2090.5m) with an average porosity calculated be 13.8% and an average water saturation of 32%. The second column is 9.7m (2101m to 2112m) with an average porosity calculated to be 13.8% and an average water saturation of 33%. Mudlog gas peaks, log evaluation, combined with RFS tests indicate that the Waarre Unit "A" has good potential at this location.

Eumeralla Formation (2119m to 2157m T.D.)

Total gas levels started off at 150 units and dropped down to 90 units at total depth. Background gas levels were 140 units. Gas ratios were C1=93%, C2=4%, C3=2%, C4=1%. No oil fluorescence was observed in this unit.

The Naylor 1 well has been classed as a new field gas discovery and has been cased and suspended as a future gas producer.

4. SUMMARY

Naylor 1 has been drilled as an Otway Basin gas exploration well located in the PEP 154 licence, approximately 10 km north west of the town of Peterborough, 1.6 km south west of the Boggy Creek CO₂ field and 9.8 km west of the Wallaby Creek gas field. The Naylor structure is situated within the Port Campbell Embayment and the productive Waarre Sandstone play fairway.

The primary objective of Naylor 1 was the Late Cretaceous Waarre Sandstone which was mapped as a tilted-fault block closure.

Drilling of Naylor 1 was terminated 38m into the Eumeralla Formation. Most formation tops came in close to prognosis. The Paaratte, Pember and Dilwyn Formations all came in more than 50m low, the Eumeralla was 45.1m high. The top of the primary objective, the Waarre, was 30.6m high (at – 1977.4mSS).

Wireline logging at total depth of 2157m consisted of the following: Run 1: GR-CSS-DLS-MLL; Run 2: PDS-CNS, Run 3: RFS; Run 4: SCG. No full hole cores were cut in Naylor 1.

Log analysis data indicate the following:

- 25.5m of net pay, average porosity of 17.2% with a water saturation of 11% in the Waarre 'C' Sandstone.
- 16.1m of net pay, average porosity of 17.3% with a water saturation of 32% in the Waarre 'B' Sandstone.
- 9.7m of net pay, average porosity of 11% with a water saturation of 33% in the Waarre 'A' Sandstone.

The Naylor 1 well has established the presence of hydrocarbons reservoired in the Waarre Formation at this location within PEP 154.

Naylor 1 has been cased and suspended as a future gas producer.

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APPENDIX I: LITHOLOGICAL DESCRIPTIONS



APPENDIX I (a): CUTTINGS

LITHOLOGICAL DESCRIPTIONS

Ditch cuttings were collected, washed, described, and checked for fluorescence at 15m intervals from the surface to 990m, 3m intervals from 990m to total depth at 2157m (drillers depths).

HEYTESBURY GROUP**Port Campbell Limestone (Middle to Late Miocene)****138m thick****SPUD-138m**

Spud-138m CALCARENITE: off white to pale grey, clear, crystalline, occasional shell fragments, friable to brittle.

Gellibrand Marl (Early to Middle Miocene)**322m thick****138-460m**

138-460m MARL: pale to medium grey, rare greyish green, strongly calcareous, common fossil fragments, occasional pyrite nodules, very soft to dispersive, amorphous in part.

LIMESTONE: off white to very pale brown, clear, common fossil, crystalline, friable to brittle.

Clifton Formation (Late Oligocene to Early Miocene)**56m thick****460-526m**

460-526m SANDSTONE: orange to redish brown, common Fe stained, very fine to medium, coarse in part, poor sorted, subangular to subrounded, weak calcareous cement, common orange to redish brown, argillaceous matrix, grading to LIMESTONE in part, minor fossil Fe oxide replacement, friable to minor loose, poor visual and inferred porosity, no fluorescence.

CLAYSTONE: medium to occasional dark brown, calcareous, trace to rare carbonaceous specks, minor fossil, very soft to soft, amorphous.

NIRRANDA GROUP**Mepunga Formation (Late Eocene)****42m thick****526m-568m**

526-568m SANDSTONE: off white to light brown, very fine to fine, moderately well sorted, subangular to subrounded, moderately calcareous cement, brown to off white argillaceous matrix, trace fossil, friable to loose, poor visual and inferred porosity, no fluorescence.

CLAYSTONE: medium to dark brown, calcareous, trace to rare carbonaceous specks, minor fossil, very soft to soft, amorphous.

WANGERRIP GROUP**Dilwyn Formation (Palaeocene to Eocene)****268m thick****568-836m**

568-615m: SANDSTONE: medium to dark brn, fine to medium, moderately sorted, moderate calcareous cement, trace brown argillaceous matrix, trace glauconite, loose, friable to moderately strong aggregates, poor inferred and visual porosity, no fluorescence.

CLAYSTONE: light to dark brown, pale grey, silty in part, trace fossil fragments, soft to dispersive, amorphous.

615-646m SANDSTONE: light brown, opaque to translucent, occasional Fe stained, predominantly medium, occasional coarse to very coarse, moderately poorly sorted, rounded to subrounded, weak siliceous and occasional calcareous cement, trace glauconite, loose, poor to fair inferred porosity, no fluorescence.

CLAYSTONE: light to dark brown, pale grey, silty in part, trace fossil fragments, soft to dispersive, amorphous.

646-836m SANDSTONE: light brown, opaque to translucent, occasional Fe stained, medium to very coarse, poorly sorted, rounded to subrounded, weak to mod calcareous cement, minor pyrite nodules, trace glauconite, loose, firm to moderately hard in part, poor to fair inferred porosity, poor visual porosity, no fluorescence.

CLAYSTONE: light to dark brown, pale grey, silty in part, trace fossil fragments, soft to dispersive, amorphous.

SILTSTONE: grey to greyish brown, arenaceous, argillaceous in part, calcareous, minor carbonaceous specks, dispersive, soft, subblocky to amorphous.

Pember Mudstone (Palaeocene to Early Eocene)**116m thick****836-952m**

836-952m CLAYSTONE: medium to dark brown, occasional pale brown, trace carbonaceous specks, trace lithics, dispersive, very soft, amorphous.

SANDSTONE: clear to off white, occasional light brown, medium to occasional coarse, rounded to subrounded, subangular in part, trace calcareous cement, trace brown argillaceous matrix, loose, firm to moderately hard in part, poor to fair inferred porosity, poor visual porosity, no fluorescence.

Pebble Point Formation (Late Palaeocene)**59m thick****952-1011m**

952-1011m: SANDSTONE: brown, clear to translucent, fine to coarse, poor sorted, subangular to subrounded, weak siliceous cement, occasional to common brown silty matrix, occasional pyrite nodules, loose, poor inferred and visual porosity, no fluorescence.

CLAYSTONE: pale brown grey, pale orange yellow, rare silty, dispersive, amorphous.

SILTSTONE: medium to dark brown, occasional brown grey, common argillaceous, grading to CLAYSTONE in part, occasional carbonaceous specks and lithics, firm to occasional moderately hard, subblocky to subfissile

HERBROOK GROUP

Paaratte Formation (Senonian)

514m thick

1011-1525m

1011-1071m CLAYSTONE: pale brown grey, pale orange yellow, rare silty, dispersive, amorphous.

SANDSTONE: opaque, translucent, off white, pale grey, medium to very coarse, poor sorted, subrounded to angular, weak siliceous cement, rare matrix, loose, poor to fair inferred and visual porosity, no flour.

SILTSTONE: m to dark brown, m grey in part, commonly argillaceous, occasional carbonaceous specks, firm to very soft, dispersive, amorphous.

1071-1261m SANDSTONE: opaque, translucent, pale grey, m to very coarse, poor sorted, subrounded to subangular, weak siliceous cement, rare matrix, loose, friable to firm in aggregates, fair inferred porosity, poor to fair visual porosity, no fluorescence.

SILTSTONE: medium to dark brown, light to medium grey in part, commonly argillaceous, trace arenaceous, occasional carbonaceous specks, firm to very soft, dispersive, amorphous.

SANDSTONE: light to medium grey, very fine to fine, rare medium, moderately sorted, subangular to subrounded, trace light grey argillaceous matrix, trace pyrite nodules, trace glauconite, tight to poor visual and inferred porosity, no fluorescence.

1261-1410m SILTSTONE: medium to dark brown, light to medium grey in part, commonly argillaceous, trace arenaceous, occasional carbonaceous specks, firm to very soft, dispersive, amorphous.

SANDSTONE: light to medium grey, opaque, medium to coarse, very coarse in part, poor sorted, subangular to rounded, weak to moderately siliceous cement, trace pyrite nodules, loose, firm aggregates, fair inferred porosity, poor to fair visual porosity, no fluorescence.

SILTSTONE: light to medium grey, light to medium brown, arenaceous, argillaceous in part, trace carbonaceous specks, soft to firm, subblocky to amorphous.

1410-1525m SANDSTONE: clear to translucent, off white to pale grey, fine to very coarse, poor sorted, angular to subrounded, weak calcareous cement, occasional strongly pyritic cement, loose, rare friable, poor visual and inferred porosity, no fluorescence.

SILTSTONE: medium to dark grey, greyish brown, argillaceous, occasional to common localised carbonaceous specks, very soft to dispersive, amorphous.

Skull Creek Mudstone (Campanian)

196m thick

1525-1721m

1525-1560m SANDSTONE: pale grey, clear to trsnl, very fine to medium, moderately sorted, subangular to subrounded, weak siliceous cement, minor off white argillaceous matrix, loose, friable in part, poor visual porosity, no fluorescence.

SILTSTONE: pale grey, pale brown, off white, argillaceous, occasional carbonaceous specks, very soft to soft, occasional dispersive, amorphous, subblocky.

1560-1721m SANDSTONE: (20%-0%) pale grey, clear to translucent, very fine to fine, moderately well-sorted, subangular to subrounded, weak siliceous cement, minor off white argillaceous matrix, trace glauconite, trace pyrite nodules, loose, friable in part, poor visual porosity, no fluorescence.

SILTSTONE: (100-80%) pale grey, pale to medium brown, rare dark brown, argillaceous, minor carbonaceous specks, micro micaceous in part, very soft to soft, occasional dispersive, amorphous, sub blocky.

Belfast Mudstone (Coniacian to Santonian)

285m thick

1721-2006m

1721-1920m SILTSTONE: (100%) pale to medium grey, pale to medium brown, pale brownish grey, minor arenaceous, argillaceous in part, minor to localised common glauconite fragments, trace echinoid spines, minor disseminated pyrite increasing with depth, very soft to firm, occasional moderately hard, sub blocky to sub fissile, occasional amorphous.

SANDSTONE: (Trace) off white, very fine to fine, well sorted, subangular to subrounded, weak siliceous and calcareous cement, occasional to common off white argillaceous matrix, trace lithics, firm to friable, loose in part, poor to very poor inferred and visual porosity, no fluorescence.

1920-2006m SILTSTONE: (95-5%) light to medium grey/brown, medium grey, minor arenaceous in part increasing with depth, commonly argillaceous, minor to localised common dark green glauconite nodules, trace echinoid spines, minor disseminated pyrite increasing with depth, very soft to firm, occasional moderately hard, sub blocky to sub fissile, occasional amorphous.

SANDSTONE: (5%-Trace) off white, very fine to fine, well sorted, subangular to subrounded, weak siliceous and calcareous cement, occasional to common off white/pale grey argillaceous matrix, trace glauconite, firm to friable, loose in part, poor to very poor inferred and visual porosity, no fluorescence.

Flaxmans Formation (Turonian)

20m thick

2006-2026m

2006-2026m SANDSTONE: (70-20%) translucent, brown/grey, very fine to fine grain size, moderately well sorted, sub angular to sub rounded, minor weak siliceous cement, trace off white/grey argillaceous matrix, minor to common glauconite nodules, common disseminated pyrite in part, friable, loose, poor visible porosity, poor inferred porosity, no fluorescence.

SILTSTONE: (80-30%) pale to medium grey, commonly argillaceous, common very fine arenaceous in part, commonly micromicaceous and minor muscovite flakes, common dark green glauconite grains, common disseminated pyrite, firm to moderately hard, sub blocky to blocky.

Waarre Formation (Turonian)

93m thick
2026-2119m

908040 032

2026-2054m

WAARRE 'UNIT C'

SANDSTONE: (90-20%) clear, translucent, pale grey, off white, medium to very coarse grain size, minor fine, very poorly sorted, angular to sub angular, trace sub rounded grains, common weak siliceous cement, trace pyritic cement, trace off white argillaceous matrix preserved under grain contacts, loose, good inferred porosity, no fluorescence.

SILTSTONE: (80-10%) pale to medium grey, pale brown/grey, argillaceous, common very fine arenaceous in part, commonly micromicaceous, common very fine carbonaceous specks and minor carbonaceous laminations, trace glauconite nodules, firm to moderately hard, sub blocky, occasionally sub fissile.

2054-2069m

WAARRE 'UNIT B'

SILTSTONE: (90-30%) pale brown/grey, pale grey, medium grey, commonly argillaceous, very fine arenaceous in part, commonly micromicaceous, common fine carbonaceous specks and material occasionally in laminations, trace glauconite nodules, soft to firm, subblocky, trace sub fissile.

SANDSTONE: (20-0%) off white, clear to translucent, fine to medium, trace coarse grained, poor sorting, angular, strongly calcareous, rare glauconite, minor lithic fragments, firm to loose, poor visible porosity, poor inferred porosity, no fluorescence

CLAYSTONE (30-10%) pale brown/grey, medium brown/grey, rare light grey, very argillaceous, silty in part, calcareous in part, soft to occasionally firm, sub blocky.

2069-2119m

WAARRE 'UNIT A'

SANDSTONE: (90-10%) off white, clear, translucent, fine to coarse grain size, predominantly medium, poor to moderately sorted, sub angular to sub rounded, minor weak siliceous cement, common off white argillaceous matrix in part (generally associated with fine grain size) overall increasing in abundance with depth, loose, friable, fair to trace good inferred porosity (depositional rounding visible on some grains), poor visual porosity, (high kaolin matrix clay porosity) no fluorescence.

SILTSTONE: (70-10%) medium dark grey, medium grey/brown, argillaceous, very fine arenaceous in part, commonly micromicaceous, common fine carbonaceous specks, firm to moderately hard, sub blocky, occasionally sub fissile.

CLAYSTONE: (60-0%) off white, pale brown, very argillaceous, common very fine to fine quartz grains entrained in the CLAYSTONE, the quartz grains are sub rounded and commonly have an orange/yellow iron staining, commonly calcareous, soft to amorphous.

Eumeralla Formation (Late Albian)

(38+m)

2119-2157m TD

2119-2157m

SANDSTONE: (100%) off white, light grey/pale green, minor clear, translucent, fine to medium grain size, predominantly fine upper, moderately well sorted, sub angular to sub rounded, common weak calcareous cement, common to locally abundant, off white argillaceous matrix, common to locally abundant volcanic lithics, predominantly green/grey in colour, predominantly friable, minor loose, poor inferred porosity, poor visual porosity, no fluorescence.



APPENDIX I (b): SIDE WALL CORES

Side Wall Coring was abandoned.



APPENDIX II: HYDROCARBON SHOW REPORTS

No oil shows were seen in Naylor 1

908040 035



APPENDIX III: WIRELINE LOGGING REPORTS

908040 036



APPENDIX III (a): LOGGING ORDER FORM

Santos

A.C.N. 007 550 923

908040 037

REVISION 1.0
(DATE: 22/11/96)

LOGGING ORDER

COMPANY: SANTOS LTD & BEACH PETROLEUM N.L.

WELL: NAYLOR # 1 FIELD: WILDCAT

RIG: OD & E 30 STATE: VIC

LOCATION: INLINE 2200, CDP 10225
CURDIEVALE 3D BLOCK: PEP 154

LATITUDE: 38 31 52.61S LONGITUDE: 142 48 25.57E

ELEVATIONS: GL: 46.41M RT: 51.11M DF: 4.7

9 7/8" HOLE: 485m 7 5/8" CSG: 483m WT: 26.4LB/FT

6 3/4" HOLE: 2157m TD 3 1/2" CSG: m WT: 9.3LB/FT

TD (Drlr.): 2157m TD TD (Logr.): 2143m

MUD SYSTEM: KCl /PHPA/Polymer CIRCULATION STOPPED: HRS ON

WT: 9.2 VISC: 42 PV/YP: 14/12 PH: 9.0 FLUID LOSS: 5 CHL: 24,000

GEOLOGIST: TIM CONROY

INFORMATION GIVEN ABOVE IS TO BE USED ON LOG HEADING SHEETS.

HOLE CONDITIONS: (TIGHT SPOTS, DEVIATION, COALS, BARITE IN MUD, ETC)

NO TIGHT SPOTS NOTED.

KCl% X.X%.

NO HOLE PROBLEMS ENCOUNTERED DURING THE DRILLING OF THE WELL.

MAXIMUM HOLE DEVIATION 8.0° AT 2014M.

INTERNAL DIAMETER OF 7 5/8" CASING IS 6.969"

DRILL STEM TESTS/CORED INTERVALS:

NO DRILL STEM TESTS OR FULL HOLE CORES ARE PLANNED FOR THIS WELL

COMMENTS: (TO BE INCLUDED IN REMARKS SECTION ON HEADER SHEET)

KCL 4.8%

INTERNAL DIAMETER OF 7 5/8" CASING IS 6.969"

STATE ON LOG WHAT ENVIRONMENTAL CORRECTIONS HAVE BEEN APPLIED.

LOGS:

PROGRAM CONFIRMED WITH OPERATIONS GEOLOGIST AT 16:30HRS HOURS ON 15/05/2001

PROGRAM VARIES FROM PRE-SPUD NOTES:

YES: ☐NO: ☒

LOG	INTERVAL	REPEAT SECTION
RUN 1 – COMBO GR-DLS-MRS-LCS	GR - TD TO SURFACE	AQUIRE RUNNING IN HOLE
	DLS / LCS – TD TO SURFACE CASING SHOE ARRAY SONIC TD TO 1950M MSFL - TD TO SURFACE CASING SHOE	AQUIRE RUNNING IN HOLE
RUN 2		
PDS (RHOB)	TD TO 1950M	
CNS (NPHI)	TD TO 1950M	AQUIRE RUNNING IN HOLE
RUN 3		
20 RFS (with 1 Sample)	20 POINTS	TIE IN EVERY 50M
RUN 4 (NOT RUN) 1 SCG (24 BULLETS)	TBA POST RUNS 1 & 2	NOT RUN DUE TO HOLE CONDITIONS

REMARKS:(ALL OPERATIONS ARE TO CONFORM TO CURRENT REEVES
AND SANTOS OPERATING PROCEDURES)

1. TENSION CURVE - TO BE DISPLAYED ON LOG FROM T.D. TO CASING SHOE.
2. ALL CALIBRATIONS IN CASING MUST BE VERSUS DEPTH. (IF HOLE CONDITIONS PERMIT).
3. SONIC WAVEFORMS TO BE RECORDED OVER ENTIRE WAARRE SANDSTONE SECTION.
4. ALL ZONES OF SONIC CYCLE SKIPPING OR POOR QUALITY DATA TO BE REPEATED AND NOTED IN REMARKS SECTION.
5. REPEAT SECTION NOT TO BE RUN IN 6 3/4" HOLES, COMPARE DOWN LOG FOR REPEAT ANALYSIS.
6. REPEAT SECTION TO BE LOGGED PRIOR TO MAIN LOG OVER INTERVAL OF INTEREST. (IF HOLE CONDITIONS ALLOW). CONFIRM REPEAT SECTION INTERVAL WITH OPERATIONS GEOLOGIST.
7. ALL THERMOMETER READINGS TO BE RECORDED ON LOG
8. ALL SCALES AND PRESENTATIONS TO CONFIRM TO STANDARDS UNLESS OTHERWISE ADVISED.
9. THE FIELD/EDIT TAPE MUST BE A MERGED COPY OF ALL LOGS RUN. SEPARATE TAPES ARE ONLY ACCEPTABLE AS AN INTERIM MEASURE.
10. ANY CHANGE FROM STANDARD PROCEDURES/SCALES TO BE NOTED IN REMARKS SECTION.
11. RM, RMF, RMC AND BHT MUST BE ANNOTATED ON FAXED LOGS. FAXED LOGS SHOULD ALSO INDICATE IF ON DEPTH OR NOT.
12. LOG DATA IS TO BE TRANSMITTED AS SOON AS POSSIBLE AFTER ACQUISITION. IF ANY DELAYS ARE LIKELY OR IF DATA TRANSMISSION WILL ADVERSELY EFFECT THE OPERATION THEN THE OPERATIONS GEOLOGIST MUST BE IMMEDIATELY INFORMED.



13. THE OPERATIONS GEOLOGIST MUST BE INFORMED IMMEDIATELY OF ANY TOOL OR HOLE PROBLEMS, LOST TIME OR ANY OTHER EVENT WHICH MAY AFFECT THE LOGGING OPERATIONS.



APPENDIX III (b): FIELD ELECTRIC LOG REPORT

SANTOS LIMITED

908040 041

FIELD ELECTRIC LOG REPORT

WELL: NAYLOR I GEOLOGIST: TIM CONROY
 LOGGING ENGINEER: J. CASALEGNO M.BARNES
 RUN NO.: 1 TO 3 DATE LOGGED: 16-17/5/01
 DRILLERS DEPTH: 2157M LOGGERS DEPTH: 2143M
 ARRIVED ON SITE: 11:30 15/5/01
 ACTUAL LOG TIME: HRS LOST TIME LOGGER: -
 TOTAL TIME: HRS LOST TIME OTHER: -

TYPE OF LOG	GR-DLS-MRS-LCS	GR-PDS-CNS	GR-RFS	GR-SCG
TIME CIRC. STOPPED	0:30HRS 16/5/01	0:30HRS 16/5/01	3:20HRS 17/5/01	3:20 HRS 17/5/01
TIME TOOL RIG UP	0.75HR	0.5HR	1HR	0.5HR
TIME TOOL RIH	0.75HR	1HR	2.5HR	1HR
TIME TOOL RIG DOWN	0.25HR	0.75HR	2.75HR	0.5HR
TOTAL TIME	7HRS	5.25HR	16.25HRS	3HRS

TYPE OF LOG	FROM	TO	REPEAT SECTION	TIME SINCE LAST CIRCULATION	BHT
RUN 1					
GR	2142M	SURFACE	DOWNLOG	9:1HRS	75°C
LCS	2142M	483M	DOWNLOG	9:1HRS	75°C
DLS	2142M	483M	DOWNLOG	9:1HRS	75°C
MRS	2142M	483M	DOWNLOG	9:1HRS	75°C
RUN 2					
GR	2142M	1950M	DOWNLOG	13:50HRS	81°C
PDS	2142M	1950M	-	13:50HRS	81°C
CNS	2142M	1950M	DOWNLOG	13:50HRS	81°C
RUN 3					
GR-RFS	2110M	2029M	-	5:3HRS	81.5°C
RUN 4	-	-	-	-	-
(ABANDONNED)					
SCG-GR					

MUD SYSTEM: KCL/PHPA/POLYMER

WEIGHT: 9.2 PPG

HOLE CONDITIONS:

HOLE BRIDGED OFF TWICE AT 2000M, BELFAST/FLAXMANS BOUNDARY.
 DRILL PIPE USED TO BREAK BRIDGE. 10HR WIPER TRIP WAS NEEDED TO
 OPEN THE HOLE UP FOR THE RERUNNING OF THR RFS-GR. THE SCG-GR
 COULD NOT GET DEEPER THAN 2000M DUE TO ANOTHER BRIDGE. IT WAS
 DECIDED TO ABANDON THE SIDE WALL CORING AS IT WAS NOT CRITICAL
 AND ANOTHER WIPER TRIP WOULD HAVE BEEN NECESSARY.

REMARKS / RECOMMENDATIONS

GOOD LOGGING JOB. GOOD TO MODERATE PRESSURES FROM RFS AND SAMPLE. THE
 PRESSURES TOOK QUITE A WHILE TO BUILD UP AND DIDN'T PLOT WELL ON A STRIGHT
 LINE. PERHAPS THERE WAS SLIGHT BLOCKING OF THE SNORKEL.

WELLSITE LOG QUALITY CONTROL CHECKS

LOG ORDER FORM	Y	MUD SAMPLE RESISTIVITY	Y	TOO
OFFSET WELL DATA	Y	CABLE DATA CARD	Y	LOG SE

LOG TYPE	LCS	GR	CAL	DLS	MLL	PDS	CNS	RFS	
CASING CHECK	Y		Y						
SCALE CHECK	Y		Y	Y	Y	Y	Y	Y	
DEPTH Casing Total	Y	Y	Y	Y		Y			
CALIBRATIONS OK	Y	Y	Y	Y	Y	Y	Y	Y	
REPEATABILITY	Y	Y	Y	Y	Y	Y	Y	Y	
LOGGING SPEED	Y	Y	Y	Y	Y	Y	Y	Y	
OFFSET WELL Repeatability	Y	Y	Y	Y	Y	Y	Y	Y	
NOISY / MISSING DATA	Y	N	N	N	N	N	N	N	
CURVES/LOGS Depth Matched	Y	Y	Y	Y	Y	Y			
Rm MEASUREMENT				Y	Y				
LLS / LLD / CHECK				Y	Y				
PERF / RHOB CHECK						Y	Y		
LOG HEADER / TAIL	Y	Y	Y	Y	Y	Y	Y	Y	
PRINT/FILM QUALITY	Y	Y	Y	Y	Y	Y	Y	Y	

COMMENTS:

GOOD LOGGING JOB. TOOLS WORKED WELL. GOOD TO MODERATE PRESSURES RECORDED FROM THE RFS.

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

GOOD LOGGING JOB.



APPENDIX IV: LOG EVALUATION

NAYLOR 1 - LOG ANALYSIS

Naylor 1 wireline logs were analysed over the Waarre Sandstone (2028.5-2118m) interval. Gas pay was identified in the Waarre C & A Sandstones. Naylor 1 was cased as a potential gas producer.

A 9 7/8" surface hole was drilled to 485 metres and 7 5/8" casing set at 483 meters. A 6 3/4" hole was then drilled with KCl/PHPA mud to 2192 metres (D). Wireline logging was carried out by Reeves (as described below). Twenty Repeat Formation Sampler (RFS) pressure points were attempted (16 valid, 3 curtailed, 1 supercharged).

**UNLESS OTHERWISE SPECIFIED, ALL DEPTHS MENTIONED BELOW ARE
LOGGER'S DEPTHS REFERENCED TO THE DRILL FLOOR.**

Pay Summary

Waarre C	Gas Pay 25.5m , Ave Porosity 17.2%, Ave S _w 11%
Waarre A	Gas Pay 25.8m , Ave Porosity 13.6%, Ave S _w 33%

Note: Net gas pay assumes a 5% porosity cut-off and a 65% water saturation cut-off

Logs Acquired

Run 1	GR	2139-Surface
	CSS (Long Spaced Compensated Sonic Sonde)	2131-483m
	(Waveform Sonic)	2131-1950m
	DLS (Dual Laterolog Sonde)	2137-483m
	MLL (Microlog)	2142-483m
Run 2	PDS (Compensated Density Sonde)	2142-1950m
	CNS (Compensated Neutron Sonde)	2139-1950m
Run 3	RFS	2029-2110m
Run 4	SCG	Abandoned

Mud Parameters

Mud Type	KCl/polymer
Mud Density	9.2ppg
KCl	4.8%
Rm	0.16 ohmm @ 19.6°C
Rmf	0.21 ohmm @ 19.6°C
Rmc	0.21 ohmm @ 22°C
MRT	81.5°C from Run 4 at 1756m

Remarks

- The laterolog and sonic was run with 1 inch stand-offs.

Log Processing

- Regional salinity data was used to derive the R_w used for this analysis.
- A BHT of 82°C was used for the analysis (Gradient of 38°C/km).

Interpretation Procedures and Parameters

An interpretation over the Waarre Sandstone intervals was conducted using a combination of gas corrected density-neutron cross-plot porosity (PHIX) and sonic porosity (SPHI) from sonic. A gamma-ray derived volume of shale was calculated with water saturations computed using a pseudo-Archie Equation (Parameters used for the interpretation are detailed in Table 1).

- The GR from Run 1 was corrected for environmental effects such as mud-weight, KCl and borehole size using measurements made from the MLL caliper.
- Borehole corrections for the Dual Laterolog SLL and DLL curves using 1.5" stand-offs were applied (Table 1). These are ratios illustrated in the Reeves charts Lat-1 and Lat-2 respectively.
- The borehole corrected deep resistivity curve (DLL_BC) was further corrected for shoulder effects (DLLc).
- The invasion corrected R_T was derived using the following tornado chart emulation relationship:

$$R_T = (1.59 * DLLc - 0.59 * SLL_BC)$$

where:

DLLc = Deep resistivity response borehole and shoulder bed corrected.

SLL_BC = Shallow resistivity response borehole corrected.

- Density porosity was calculated over the Waarre Sandstones:

$$DPHI = (2.65 - DEN) / (1.65)$$

where:

DEN = Bulk Density in g/cc.

- Cross-plot porosity was determined:

$$PHIX = (DPHI + NPRL_ss) / 2$$

where:

NPRL_ss = Environmentally corrected neutron porosity in sandstone units.

- A Hunt-Raymer sonic porosity curve was calculated:

$$SPHI = (DTC2 - 55.5 / DTC2) * 0.58$$

where:

DTC2 = 3-4ft Compensated Sonic (μ s/ft).

- PHIT was primarily produced from the minimum value of DPHI and PHIX with some editing to SPHI and porosity interpreted from the MLL.

- A shale corrected porosity (PHIE to be used in the pseudo-Archie equation) was calculated as follows:

if $V_{sh} < V_{shSt}$ PHIE = PHIT

elseif $V_{shSt} < V_{sh} < V_{shCO}$... PHIE = a proportional percentile correction
from PHIT to $(PHIT - (V_{sh} * PHI_{sh}))$

elseif $V_{sh} > V_{shCO}$ PHIE = $PHIT - (V_{sh} * PHI_{sh})$

where: V_{shSt} = The start of the sliding scale V_{sh} correction.
 V_{shCO} = Shale volume cut-off.
 V_{sh} = Shale volume.
 $PHIT$ = Combination of density/neutron and sonic porosity.
 PHI_{sh} = Apparent shale porosity.

- Limited SCAL data from Mylor indicate that the cementation exponent "m" for the Waarre sandstones has a range between 1.67 and 1.84 and varies with porosity. Given this range, it was appropriate to use a variable cementation exponent "m" for the use in calculating S_w . The derivation of "m" was porosity based and results in "m" decreasing as porosity increases. The variable "m" relationship is given as;

$$MEXP = (-0.2413 * \log_{10} PHIE) + 2.4657$$

- Limited SCAL data from Mylor indicate that the saturation exponent "n" for the Waarre sandstones has a range between 1.52 and 1.78 and varies with porosity and shaleness. A pseudo saturation exponent "n" has been used in the Archie equation. This is to take into account the impact of micro-porosity inherent in shaly sandstones. It is postulated that shale intergranular micro-porosity increases the surface area (conductivity) of the rock, and therefore "n" needs to be adjusted to compensate for the extra conductivity in shaly sandstones.

Clean sand "n" = 1.85 Shaly sand "n" = 1.50

Shaly sand is defined where the shale volume is greater than a cut-off of 40%. Saturation exponent is gradational between the two end-points above.

- Water saturations were calculated using a pseudo-Archie equation.

$$SW = n \sqrt[n]{\frac{aR_w}{\phi^m R_t}}$$

where: R_w = Resistivity of formation water at formation temperature.
 R_t = True resistivity, i.e. resistivity of the non-invaded reservoir (i.e. LLD corrected for borehole, invasion and resistive shoulder beds).
 $PHIT$ = Input as shale corrected PHIE (derived above).
 a = Porosity coefficient (default = 1).
 m = Cementation factor or exponent from the variable "m" relationship.
 n = Saturation exponent from the "n" relationship derived above.

Conclusions

1. Naylor 1 log analysis identified a total of 51.3 metres of pay in the Waarre Sandstones.
2. The Waarre C sandstone contains 25.5 metres of pay. This interval has an average porosity of 17.2% and an average water saturation of 11%.
3. Sandstone development was not observed in the Waarre B.
4. The Waarre A sandstone contains 25.8 metres of pay. This interval has an average porosity of 13.6% and an average water saturation of 33%.
5. Formation pressure points indicated that the Waarre C, upper and lower Waarre A sandstones are each a separate gas accumulation, with a preliminary interpretation suggesting separate water pressure systems associated with each interval. The Waarre C sandstones have a reservoir pressure of 2827psi. The upper Waarre A sandstones have a reservoir pressure of 2928psi while the lower sandstones are at a pressure of 2973psi.
6. Conventional pay, porosity and water saturations for Naylor 1 are tabulated in Table 2.
7. Naylor 1 was cased as a future gas producer.

Attached is the well evaluation summary (WES) plot for Naylor 1 (01.108)
wes/wessa/Naylor_01.108_waarre.wes

TABLE 1
Log Analysis Parameters

PARAMETERS	WAARRE C SANDSTONE	WAARRE A SANDSTONE
R _w (ohmm) @ 25°C	0.3	0.3
a	1	1
m	Variable	Variable
n	Variable	Variable
Borehole cor RD	0.8	0.9
Borehole cor RS	0.85	0.88
RD Shoulder Corr.	1.2	0.8
GR matrix (API)	35	35
GR shale (API)	120	130
VSHST	0	0
VSHCO	0.4	0.6
PHISH	0.13	0.15

TABLE 2
Conventional Pay Summary

FORMATION SAND	SAND INTERVAL	NET PAY (m)	NET SAND (m)	AVG Porosity (wt%)	AVG Sw (wt %)
WAARRE C	2029 -2056.5	25.5	25.8	17.2	11
WAARRE A UPPER	2072 -2090.5	16.1	17.3	13.8	32
WAARRE A LOWER	2101 -2112	9.7	11	13.8	33

PE605297

This is an enclosure indicator page.
The enclosure PE605297 is enclosed within the
container PE908040 at this location in this
document.

The enclosure PE605297 has the following characteristics:

ITEM_BARCODE = PE605297
CONTAINER_BARCODE = PE908040
NAME = Naylor-1 Well Evaluation Summary Log
BASIN = OTWAY
ONSHORE? = Y
DATA_TYPE = WELL
DATA_SUB_TYPE = WELL_LOG
DESCRIPTION = Naylor-1 Well Evaluation Summary Log,
Scale 1:200, Enclosure from Appendix
IV: Log Evaluation contained within
"Naylor-1 Well Completion Report"
[PE908040].
REMARKS =
DATE_WRITTEN = 31-JUL-2001
DATE_PROCESSED =
DATE_RECEIVED = 30-NOV-2001
RECEIVED_FROM = Santos Ltd
WELL_NAME = Naylor-1
CONTRACTOR =
AUTHOR =
ORIGINATOR = Santos Ltd
TOP_DEPTH =
BOTTOM_DEPTH =
ROW_CREATED_BY = DN07_SW

(Inserted by DNRE - Vic Govt Mines Dept)



APPENDIX V: PRESSURE SURVEY

**SANTOS LIMITED
PRESSURE SURVEY**

WELL: NAYLOR 1 K.B.: 51.11M TOOL AND GAUGE TYPE: HP AND STRAIN PAGE: 1 OF 2
 WITNESS: TIM CONROY TIME SINCE LAST CIRC.: 5.5 HOURS PROBE / PACKER TYPE: NORMAL/6 3/4" PROFILE DATE: 17/05/01

TEST	FORMATION UNIT SANDS	DEPTH K.B.	DEPTH S.S.	EXPECT. FORM PRESS.	EXPECT. TEMP.	FILE NO.	TEST RESULTS					INTERPRETATION			COMMENTS (FLUID TYPE)
							HYDR. BEFORE PSI	FORM. PRESS PSI	HYDR. AFTER PSI	TEMP. °F/°C	DRAW.D. MOBILITY MD/CP	TYPE D/D	TYPE BUILDUP	DEPLET -S/C	
1	WAARRE C	2029	1977.9	2800	70		3236.2	2846.6	3235.1	73.7	N/A	S/C	SLOW	S/C	TIGHT SUPER CHARGED
2	WAARRE C	2029.5	1978.4	2800	70		3235.8	2823.8	3236.4	74.63	N/A	N	MOD	N	GOOD TEST STABLE
3	WAARRE C	2031	1979.9	2800	70		3238.4	2825.9	3238.9	74.7	N/A	N	SLOW	N	PRESSURE UNSTABLE
4	WAARRE C	2034	1982.9	2800	70		3243.1	2826.6	3243.5	75.7	N/A	N	SLOW	N	PRESSURE UNSTABLE
5	WAARRE C	2040	1988.9	2800	70		3252.5	2826.4	3251.8	76.2	N/A	N	SLOW	N	PRESSURE UNSTABLE
5A	WAARRE C	2040	1988.9	2800	70		3252.5	2825.3	3251.8	76.2	N/A	N	SLOW	N	PRESSURE UNSTABLE SEG SAMPLE
6	WAARRE C	2043	1991.9	2800	70		3255.9	2825.6	3256.9	76.6	N/A	N	SLOW	N	PRESSURE UNSTABLE
6B	WAARRE C	2043.2	1992.1	2800	70		3256.4	2825.6	3256	77.1	N/A	N	SLOW	N	PRESSURE UNSTABLE
7	WAARRE C	2046	1994.9	2800	70		3260.1	2826.9	3259.6	77.1	N/A	N	MOD	N	GOOD TEST STABLE
8	WAARRE C	2047	1995.9	2800	70		3260.9	2828.3	3263.2	77.6	N/A	N	SLOW	N	PRESSURE UNSTABLE
9	WAARRE C	2049	1997.9	2800	70		3266.1	2828.1	3265.2	77.6	N/A	N	SLOW	N	PRESSURE UNSTABLE
10	WAARRE C	2053	2001.9	2800	70		3271.2	2828.9	3270.9	78.1	N/A	N	SLOW	N	PRESSURE UNSTABLE
11	WAARRE C	2054	2002.9	2800	70		3272.1	2829.1	3271.6	78.5	N/A	N	SLOW	N	PRESSURE UNSTABLE
12	WAARRE A	2074	2022.9	2900	70		3305.5	2929.3	3304.5	79.1	N/A	N	SLOW	N	PRESSURE UNSTABLE

ANTICIPATED GEOTHERMAL GRADIENT: 0.025 °C/M DRAWDOWN
 ANTICIPATED WATER GRADIENT: 0.433 PSI/FT BUILD UP
 MUD WEIGHT / GRADIENT: 9.2 PPG

NORMAL : PRESSURE DOES NOT DROP TO ZERO
 LIMITED : PRESSURE DROPS TO ZERO
 TYPES : IMMEDIATE - RAPID - GOOD - SLOW

**SANTOS LIMITED
PRESSURE SURVEY**

WELL: NAYLOR 1 K.B.: 51.11M TOOL AND GAUGE TYPE: HP AND STRAIN PAGE: 2 OF 2
WITNESS: TIM CONROY TIME SINCE LAST CIRC.: 5.5 HOURS PROBE / PACKER TYPE: NORMAL / 6 3/4" PROFILE DATE: 17/5/01

TEST	FORMATION UNIT SANDS	DEPTH K.B.	DEPTH S.S.	EXPECT. FORM PRESS.	EXPECT. TEMP.	FILE NO.	TEST RESULTS					INTERPRETATION			COMMENTS (FLUID TYPE)
							HYDR. BEFORE	FORM. PRESS	HYDR. AFTER	TEMP. °F/°C	DRAW D. MOBILITY	TYPE D/D	TYPE BUILDUP	DEPLET -S/C	
		FT/M	FT/M	PSIG	°C		PSI	PSI	PSI		MD/CP				
13	WAARRE A	2076	2024.9	2900	75		3307.4	2930.3	3308.2	79.6	N/A	N	SLOW	N	PRESSURE UNSTABLE
14	WAARRE A	2078	2026.9	2900	75		3311.6	2928	3310.9	79.6	N/A	N	MOD		GOOD TEST STABLE
15	WAARRE A	2081	2029.9	2900	75		3315.6	-	3316	79.6	N/A	N	VERY SLOW	N	CURTAILED
-	WAARRE A	2083	2031.9	2900	75		-	-	-	-	-	-	-	-	NOT ATTEMPTED
16	WAARRE A	2088.5	2037.4	2900	75		3327	-	3327.1	79.6	N/A	N	VERY SLOW	N	CURTAILED
17	WAARRE A	2101.5	2050.4	2900	75		3346.9	2975.3	3347.6	80.6	N/A	N	SLOW	N	PRESSURE UNSTABLE
18	WAARRE A	2105	2053.9	2900	75		3353.3	2969.7	3352.5	80.8	N/A	N	SLOW	N	PRESSURE UNSTABLE
19	WAARRE A	2108	2056.9	2900	75		3356.6	2970.5	3356.3	81	N/A	N	SLOW	N	PRESSURE UNSTABLE
20	WAARRE A	2110	2058.9	2900	75		3362.9	1940.6	3364	81.5	N/A	N	VERY SLOW	N	CURTAILED

ANTICIPATED GEOTHERMAL GRADIENT: 0.025 °C/M

ANTICIPATED WATER GRADIENT: 0.433 PSI/FT

MUD WEIGHT / GRADIENT: 9.2 PPG

DRAWDOWN

BUILD UP

NORMAL : PRESSURE DOES NOT DROP TO ZERO

LIMITED : PRESSURE DROPS TO ZERO

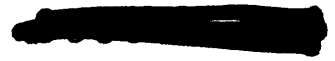
TYPES : IMMEDIATE - RAPID - GOOD - SLOW

RFS PRESSURES NOT STABILISING WELL. MINOR DIFFERENCES BETWEEN BEFORE AND AFTER HYDROSTATIC. HOLE IS CONTINUALLY BEING CHECKED FOR FLUID LEVEL AND APPEARS FINE. SEGREGATED SAMPLE TAKEN AT 2040M RT. BOTTOM TWO CHAMBERS APPEARED TO HAVE FILLED. THERE WAS NO PRESSURE DROP ON THE OPENING OF THE THIRD CHAMBER. POTENTIALLY BLOCKED. PRESSURE UNSTABLE IN THE COMMENTS COLUMN HIGHLIGHTS THAT THE FORMATION PRESSURES NEVER SEEM TO FULLY STABILISE EVEN AFTER 20 MINUTES. COULD BE PARTIAL BLOCKING, HOWEVER THE HYDROSTATIC BUILDS UP STRAIGHT AFTER A TEST. NOTE THAT CIRCULATION WAS STOPPED ONLY 5.5 HOURS BEFORE THE FIRST PRESSURE TEST. IN GOOD PERMEABLE WAARRE SAND WITH A GOOD MUDCAKE THIS SHOULD NOT CAUSE A PROBLEM. OF SUPERCHARGING. LAVERS 1 ACHIEVED GOOD PRESSURE DATA STRAIGHT AFTER A WIPER TRIP. WAARRE C AND WAARRE A SANDS SEEM TO BE IN PRESSURE ISOLATION.



APPENDIX VI: DRILL STEM TEST DATA

No Drill Stem Tests were conducted in Naylor 1



APPENDIX VII: HYDROCARBON ANALYSIS

RFS sample gas analysis



908040 054

Amdel Limited
A.C.N. 008 127 802

Petroleum Services
PO Box 338
Torrensville Plaza SA 5031

Telephone: (08) 8416 5240
Fax: (08) 8234 2933

22 June 2001

Santos Limited
GPO Box 2319
ADELAIDE SA 5001

Attention: Andy Pietsch

REPORT LQ10494

CLIENT REFERENCE: 539489-78

WELL NAME/RE: Naylor-1

MATERIAL: Pressurised Gas & Liquid

WORK REQUIRED: Compositional analysis

AUTHOR'S NAME: Diane Cass

Please direct technical enquiries regarding this work, to the signatory below, under whose supervision the work was carried out. This report relates specifically to the sample or samples submitted for testing.

Brian L Watson
Manager
Petroleum Services

bw.jh

G:\Secretary\petroleum\Docs-01\10494.doc

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AMDEL PETROLEUM SERVICES

Method GL-02-03

Client: SANTOS Ltd

908040 055

Page 1 of 3

Report # LQ10494

Sample: NAYLOR-1
RFS Pressure Sample
Opening Pressure 12700kPag

COMPOSITIONAL ANALYSIS OF RECOMBINED SEPARATOR FLUID

Component	Flashed Stock Tank Liquid Mol %	Flashed Stock Tank Gas Mol %	Recomb. Sep. Liquid Mol %
Nitrogen	-----	6.40	6.52
Carbon Dioxide	-----	1.00	1.02
Methane	-----	82.80	84.33
Ethane	0.00	4.54	4.62
Propane	0.03	1.97	2.01
I-Butane	0.19	0.40	0.41
N-Butane	0.82	0.50	0.51
I-Pentane	1.66	0.13	0.13
N-Pentane	2.52	0.11	0.11
Hexanes	14.87	0.16	0.17
Heptanes	26.77	0.08	0.10
Octanes plus	53.14	0.03	0.07
TOTAL	100.00	98.12	100.00

RATIOS

Molar ratio	0.0007	0.9993	1.0000
Mass Ratio	0.0043	0.9957	1.0000
Gas Liquid Ratio	1.00 bbl @ SC	1273869.4 SCF	-----

STREAM PROPERTIES

Molecular Weight	116.0	18.7	19.1
Density obs(g/cc)	0.7653 @ 15°C	-----	-----
API-Gas Density	53.32 API @60°F	0.646 (air=1)	-----
GHV (BTU/scf)	-----	1021	-----

OCTANE PLUS PROPERTIES

Mol %	53.14	0.03	0.07
Molecular Weight	137.5	114.2	127.0
Density (g/cc)	0.8125 @ 15°C	-----	-----
API @ 60°F	42.60	-----	-----

LABORATORY FLASH SEPARATION DETAILS

Separation Temperature	20	°C
Flash Gas Volume	1621.20	litres
Stabilised Liquid Volume	7	ml
Liquid Density	0.7697	g/ml

Approved Signatory

Drane Cass

Method GL-02-03

Client: SANTOS Ltd

Report # LQ10494

Sample: NAYLOR-1

RFS Pressure Sample

Opening Pressure 12700kPag

908040 056

Boiling Point Range (Deg.C)	Component	Weight%	Mol%
-88.6	Ethane	0.00	0.00
-42.1	Propane	0.01	0.03
-11.7	I-Butane	0.10	0.19
-0.5	N-Butane	0.41	0.82
27.9	I-Pentane	1.03	1.66
36.1	N-Pentane	1.57	2.52
36.1-68.9	C-6	10.47	14.22
80.0	Benzene	0.44	0.65
68.9-98.3	C-7	12.39	14.33
100.9	Methylcyclohexane	10.54	12.44
110.6	Toluene	1.68	2.11
98.3-125.6	C-8	13.53	13.73
136.1-144.4	Ethylbenz+Xylenes	2.98	3.25
125.6-150.6	C-9	11.25	10.16
150.6-173.9	C-10	11.80	9.61
173.9-196.1	C-11	6.88	5.10
196.1-215.0	C-12	5.01	3.41
215.0-235.0	C-13	4.20	2.64
235.0-252.2	C-14	2.51	1.47
252.2-270.6	C-15	1.67	0.91
270.6-287.8	C-16	0.69	0.35
287.8-302.8	C-17	0.39	0.19
302.8-317.2	C-18	0.30	0.14
317.2-330.0	C-19	0.10	0.04
330.0-344.4	C-20	0.03	0.01
344.4-357.2	C-21	0.02	0.01
357.2-369.4	C-22	0.01	0.00
369.4-380.0	C-23	0.01	0.00
380.0-391.1	C-24	0.00	0.00
391.1-401.7	C-25	0.00	0.00
401.7-412.2	C-26	0.00	0.00
412.2-422.2	C-27	0.00	0.00
>422.2	C-28+	0.00	0.00
Total		100.00	100.00

(0.00 = LESS THAN 0.01%)

The above boiling point ranges refer to the normal paraffin hydrocarbon boiling in that range. Aromatics, branched hydrocarbons, naphthenes and olefins may have higher or lower carbon numbers but are grouped and reported according to their boiling points.

Oil Parameters:

Density of Oil @ 20.0 °C	0.7697	
Specific Gravity @ 15.6 °C	0.7656	
API Gravity	53.32	
Specific Gravity of C8+ fraction	0.8128	(calc)
Average molecular weight of C8+ fraction	138	

AMDEL PETROLEUM SERVICES

Method GL-02-03

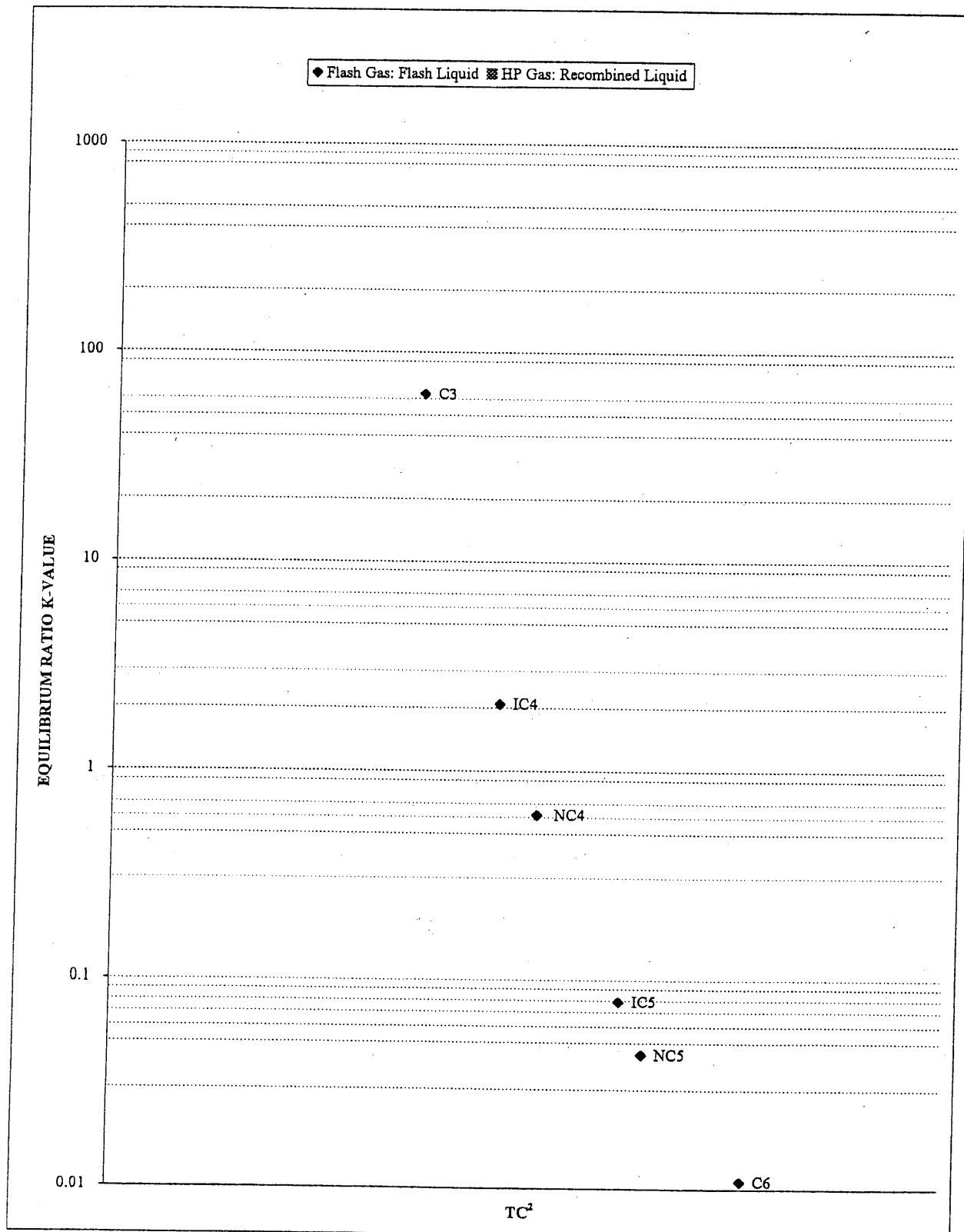
Client: SANTOS Ltd

908040 057

Page 3 of 3

Report # LQ10494

Sample: NAYLOR-1
RFS Pressure Sample
Opening Pressure 12700kPag



Client: SANTOS Ltd

Report # LQ10494

Sample: NAYLOR-1
RFS Pressure Sample
Opening Pressure 12700kPag

908040 058

Full Well Stream

Separator Gas 0.000 MMSCF
Stock Tank Oil Rate 0.000 BBLs

Flash Gas Moles	67.392	Av Mol Wt	18.70
Flash Liquid Moles	0.046		116.02
Recombination Moles	67.438		

Molar Shrinkage Factor 0.001

Full Well Stream	0	Moles Liquid	#DIV/0!
Molar ratio	0	Moles Gas	#DIV/0!

	Flash Gas Mol%	Flash Liquid Mol%	Recomb. Liquid Mol%	HP Gas Mol%	Full Well Stream Mol%
Nitrogen	6.40	-----	6.52	0.00	#DIV/0!
Carbon Dioxide	1.00	-----	1.02	0.00	#DIV/0!
Methane	82.80	-----	84.34	0.00	#DIV/0!
Ethane	4.54	0.00	4.62	0.00	#DIV/0!
Propane	1.97	0.03	2.01	0.00	#DIV/0!
I-Butane	0.40	0.19	0.41	0.00	#DIV/0!
N-Butane	0.50	0.82	0.51	0.00	#DIV/0!
I-Pentane	0.13	1.66	0.13	0.00	#DIV/0!
N-Pentane	0.11	2.52	0.11	0.00	#DIV/0!
Hexanes	0.16	14.87	0.17	0.00	#DIV/0!
Heptanes	0.08	26.77	0.10	0.00	#DIV/0!
Octanes plus	0.03	53.14	0.06	0.00	#DIV/0!
	98.12	100.00	100.00	0.00	#DIV/0!
Av.Mol.Weight	18.70	116.02	19.12	0.00	#DIV/0!

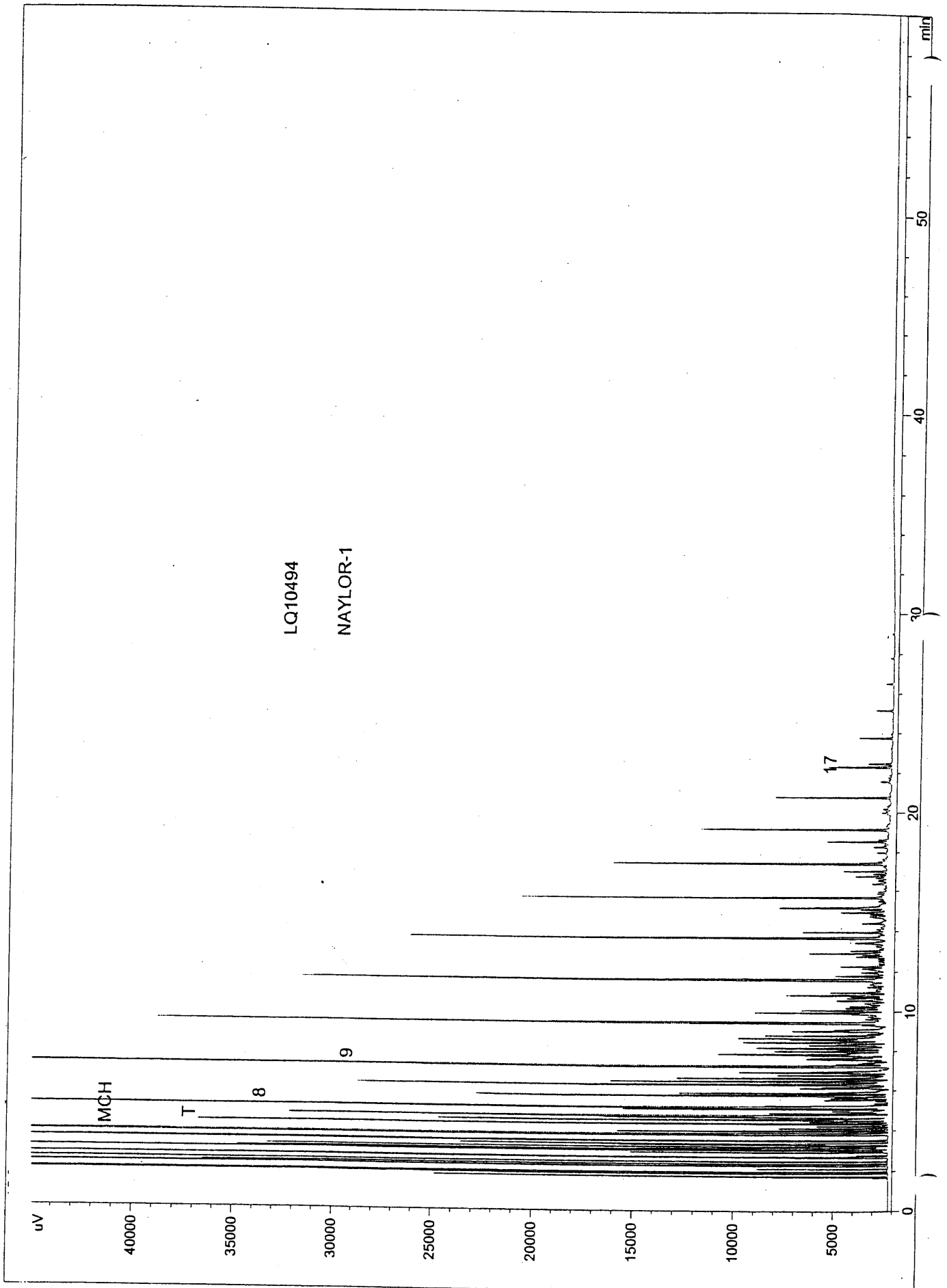
K Factors

Flash Gas/
Flash Liquid

HP Gas/
Recombined Liquid

	Ratio	Ratio
C1	-----	0.00
C2	-----	0.00
C3	62.45	0.00
IC4	2.07	0.00
NC4	0.61	0.00
IC5	0.08	0.00
NC5	0.04	0.00
C6	0.01	0.00
C7	0.00	0.00

908040 059



908040 060

APPENDIX VIII: WATER ANALYSIS

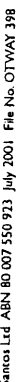
No water Analysis was conducted on Naylor 1

~~SECRET~~
908040 061

APPENDIX IX: PALYNOLOGICAL ANALYSIS

Sidewall Core run was abandoned

Santos



~~XXXXXXXXXX~~
908040 063

APPENDIX X: GEOTHERMAL GRADIENT

Assumed surface temperature = 20°C.

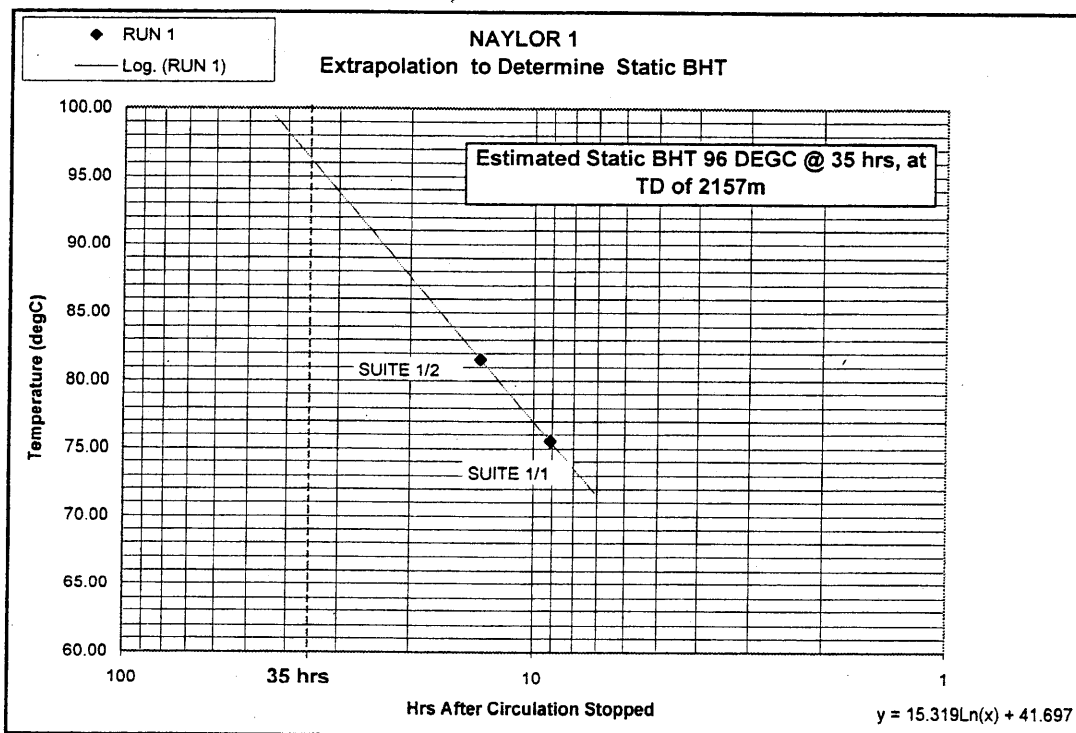
Calculated BHT @ 2157m = 96°C.

Geothermal Gradient = 3.53°C/100m.

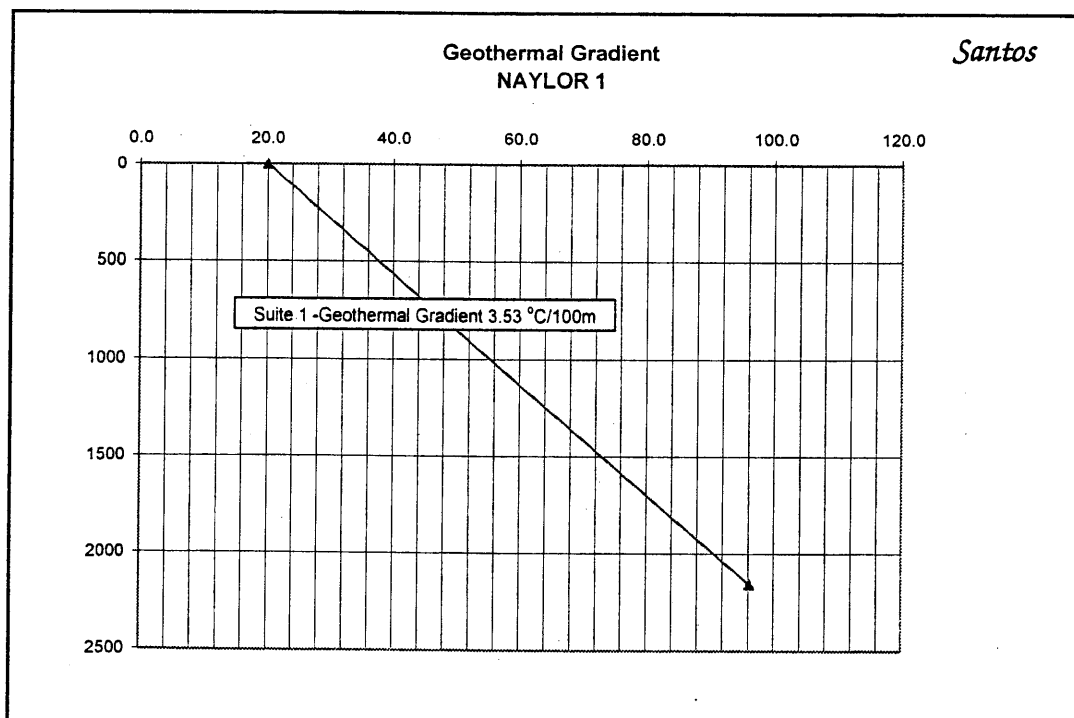
908040 064

	Max Recorded Temp (degC)	Depth Recorded (m)	Time Since Circulation. (hrs)	Total Depth (m)	Estimated BHT (degC)
Run 1	75	2142	9.1	2157	75.53
Run 2	81	2142	13.5	2157	81.57
Run 3	81.5	2110	5.3	2157	83.32

(post wiper trip)



STATIC BHT @ 35 hrs	96.2	°C	@	2157	m
SURFACE TEMP.	20	°C	@	0	m
Geothermal Gradient for Suite 1	3.53	°C/100 m			




908040 065

APPENDIX XI: WELL LOCATION SURVEY

VICTORIA GAS WELL LOCATION

908040 066

REFERENCE MARKS SKETCH PLAN EXPLORATION LICENCE PEP 154

Well Name NAYLOR # 1

Map

Spheroid GDA94

Latitude S 38°31'47.26"

Longitude E 142°48'30.43"

Convergence 1°07'36"

Scale Factor 0.99989847

MGA 94

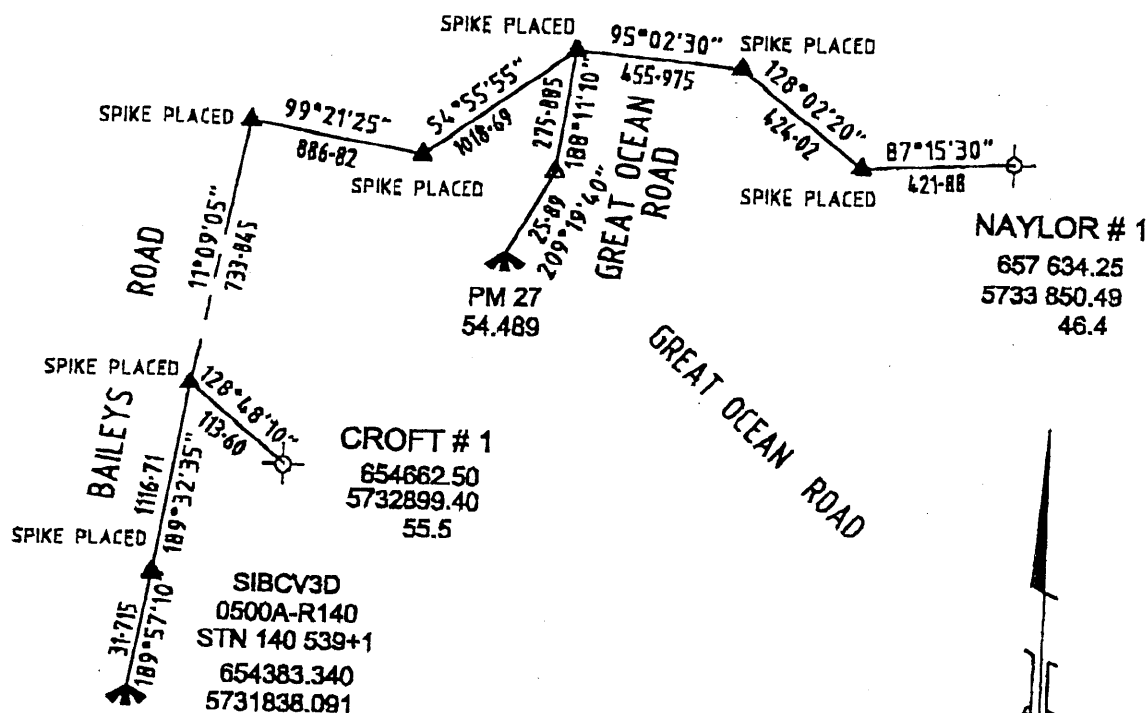
ZONE 54

Measurement units (metres)

Easting 657 634.25

Northing 5733 850.49

Elevation 46.4 (AHD)



NOTES : This sketch plan is not to scale.

Distances shown are computed grid distances.

Bearings shown are computed grid bearings.

DATUM : The origin of coordinates was Land Victoria's Survey Mark Enquiry Service (SMES) AGD66 (AMG Zone 54) then transformed to GDA94 (MGA Zone 54) using GDAIt software.

Height datum is to AHD originating from SMES.

Estimated Horizontal error is less than +/- 1.0 metre.

Estimated Vertical error is less than +/- 0.2 metre.

Date of Survey : 21 / 12 / 2000

Paul Crowe Surveyor ABN 58521601183 "Ambleside" 192 Korot Street Warrnambool 3280 Ph. (03) 5561 1500	REF 998
--	----------------

Date 16 / 7 / 2001

Paul Crowe
LICENSED SURVEYOR


908040 067

APPENDIX XII: DRILLING – FINAL WELL REPORT



SANTOS

FINAL WELL REPORT

NAYLOR #1

Drilling Supervisor(s)	: W. Westman
Drilling Engineer(s)	: G. Coker
Report Author	: G. Coker / T. Robertson <i>GR</i>
Report Supervisor	: D. New
Date of Issue	: 7th July 2001

908040 068

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Time vs Depth Curve	
Activity Annotations Report	
Section 2 – Well History	
Well History Report	
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BHA Summary	
Bit Summary with Formation	
FIT/LOT Report	
Section 4 – Casing and Cementing	
Casing and Cementing Report/s	
Wellhead Installation Report	
Section 5 – Time Breakdown Data	
Overview	
Trouble Time Breakdown	
Section 6 – Survey Data	
Survey Report	

908040 070

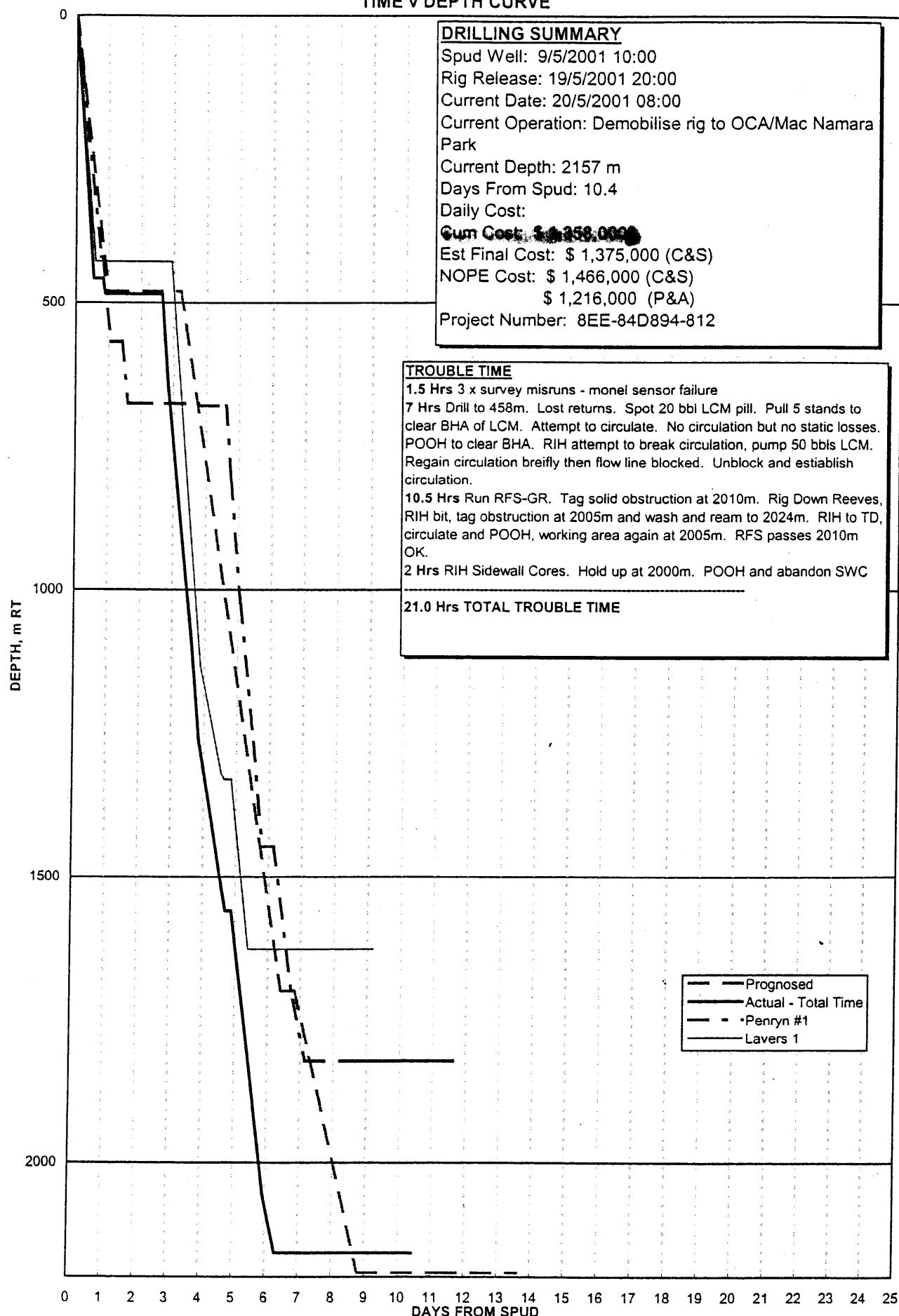
Section 1.0

Well Summary

- Time vs Depth Curve**
- Activity Annotations Report**

908040 071

NAYLOR #1
TIME v DEPTH CURVE



NAYLOR #1

Drilling Co.: OD&E

Rig: OD&E #30

RT above GL: 4 m Lat : 38 deg 52 min 61.00 sec Spud Date: 09/05/2001 Release Date: 19/05/2001
GL above MSL : 46 m Long : 142 deg 48 min 25.57 sec Spud Time: 10:00:00 Release Time: 20:00:00

ACTIVITY ANNOTATIONS**DATE : 18 May, 2001****REPORT NUMBER :14****Comment****Solution**

A. Gledhill 1 x camp water.
Ryans 2 x semi. Backload mud, jars, and tubulars.

DATE : 19 May, 2001**REPORT NUMBER :15****Comment****Solution**

"P" seal in wellhead adaptor flange would not hold teflon grease and would not test satisfactorily. It was found to be damaged on removal but due to lack of spares it was trimmed and reinstalled. It tested satisfactorily but should not be put into service.

Change out "P" seal before perforating well.

908040 073

Section 2.0

Well History

- IDS Well History Report

NAYLOR #1

Drilling Co.: OD&E

Rig: OD&E #30

RT above GL: 4 m Lat : 38 deg 52 min 61.00 sec Spud Date: 09/05/2001 Release Date: 19/05/2001
 GL above MSL : 46 m Long : 142 deg 48 min 25.57 sec Spud Time: 10:00:00 Release Time: 20:00:00

Well History

#	DATE	DEPTH	WELL HISTORY (24 Hr Summary)
1	05/05/2001		Prepare to move rig from Lavers #1 to Naylor #1.
2	06/05/2001	0	Disassemble rig 100% and prepare to move. Rig 10% moved. No incidents or accidents.
3	07/05/2001	0	Mud transferred to Naylor 2 loads. Premium Casing equipment and Dowell 1 load. Tubulars 1 load. Accomodation 3 loads.
4	08/05/2001	0	1 load of 7-5/8" csg from Ryans transport. Alan Gledhill hauling water 2 loads to rig 1 to accomodation. Dowell on location. Baroid and Geoservices on location.
5	09/05/2001	458	1 x truck ex-Adelaide w/ 7-5/8" float equipment and xmas tree. A. Gledhill 3 x loads drill water.
6	10/05/2001	485	Run surface casing and cement.
7	11/05/2001	488	Nipple up and pressure test BOP. LOT. Drill Ahead.
8	12/05/2001	1,087	Drill ahead. Alan Gledhill 1 x camp water. 2 x drill water.
9	13/05/2001	1,560	Drill ahead.
10	14/05/2001	1,896	Wiper trip. Drill ahead.
11	15/05/2001	2,157	Drill to TD. Wiper trip.
12	16/05/2001	2,157	Log. Wiper trip.
13	17/05/2001	2,157	Wiper trip to clear obstruction at top of Flaxmans formation 2000m. Complete logging program. Abandon SWC when hole bridged again at 2000m
14	18/05/2001	2,157	L/d Pipe. Run casing.
15	19/05/2001	2,143	Run and cement casing. N/u wellhead. Test wellhead. Release rig.

908040 075

NAYLOR #1

Drilling Co.: OD&E

Rig: OD&E #30

RT above GL: 4 m Lat : 38 deg 52 min 61.00 sec Spud Date: 09/05/2001 Release Date: 19/05/2001
 GL above MSL : 46 m Long : 142 deg 48 min 25.57 sec Spud Time: 10:00:00 Release Time: 20:00:00

ACTIVITY REPORT

Date : 05/05/2001					Progress : 0	Depth @ 24:00 hrs :0
Depth	Phase	Class	Operation	Hrs	Activity	
0	PS	P	RIG DOWN (THE RIG)	2.00	Prepare to lower derrick. Pack mud tanks and secure shakers.	
0	PS	P	RIG DOWN (THE RIG)	1.00	Lower derrick. Strip derrick for move. Pack equipment for move.	
Date : 06/05/2001					Progress : 0	Depth @ 24:00 hrs :0
Depth	Phase	Class	Operation	Hrs	Activity	
0	PS	P	RIG DOWN (THE RIG)	6.50	Wait on daylight. Both crews on daylight tour.	
0	PS	P	RIG DOWN (THE RIG)	8.00	Strip out drilling line. Rig down pumps and tanks. Pull and pack electrical cables. Drain water tank. Split derrick for move.	
0	PS	P	RIG DOWN (THE RIG)	4.00	Rig down doghouse and water tank. Lift draw-works from sub base. Lift sub base from matting. P/u matting and move to Naylor. Rig completely broken down. 10% moved.	
0	PS	P	RIG DOWN (THE RIG)	5.50	Shut down at sunset.	
Date : 07/05/2001					Progress : 0	Depth @ 24:00 hrs :0
Depth	Phase	Class	Operation	Hrs	Activity	
0	PS	P	RIG DOWN (THE RIG)	6.50	Wait on daylight.	
0	PS	P	RIG MOVE (THE RIG)	12.00	Load out rig. Spot sub base on matting. Spot mud tanks. Place drawworks on sub. Spot generators and SCR shack. Spot mud tanks. Spot toilet and accomodation blocks. Spot Geoservices and pipe bins.	
0	PS	P	RIG MOVE (THE RIG)	5.50	Wait on Daylight.	
Date : 08/05/2001					Progress : 0	Depth @ 24:00 hrs :0
Depth	Phase	Class	Operation	Hrs	Activity	
0	PS	P	WAIT ON	6.50	Wait on Daylight.	
0	PS	P	RIG UP (THE RIG)	14.50	Dress mast and reeve drill line. Raise mast. Raise doghouse. R/u geoservices. Fill water tanks and mud pits. Install v-door and catwalks.	
0	PS	P	RIG UP (THE RIG)	3.00	Day tour crew go in. Graveyard tour coming on at midnight. Break tour.	
Date : 09/05/2001					Progress : 458	Depth @ 24:00 hrs :458
Depth	Phase	Class	Operation	Hrs	Activity	
0	PS	P	RIG UP (THE RIG)	10.00	P/u kelly. Drill rathole and mousehole. String geograph and survey line. Prepare BHA. Install conductor barrel. Load racks with casing.	
43	SH	P	DRILLING AHEAD	1.00	Spud well. Drill to 43m.	
30	SH	TP	SURVEY	0.50	Run survey at 31m. Misrun. Monel sensor did not trip.	
98	SH	P	DRILLING AHEAD	1.50	Drill 9-7/8" hole 43m - 98m.	
30	SH	P	SURVEY	0.50	Survey @ 80m. ¼° at N50W.	
192	SH	P	DRILLING AHEAD	2.50	Drill 9-7/8" hole 98m - 192m.	
192	SH	P	SURVEY	0.50	Survey @ 174m. ¼° @ N80E.	
192	SH	P	DRILLING AHEAD	3.00	Drill 9-7/8" hole 192m - 346m.	
346	SH	TP	SURVEY	0.50	Survey @ 398m. Misrun.	
376	SH	P	DRILLING AHEAD	0.50	Drill 9-7/8" hole 346m - 376m.	
376	SH	TP	SURVEY	0.50	Survey @ 359m. Misrun. Change out monel sensor for timer.	
395	SH	P	DRILLING AHEAD	0.50	Drill 9-7/8" hole 376m - 395m.	
395	SH	P	SURVEY	0.50	Survey @ 377m. ¼° @ N37W.	

908040 076

NAYLOR #1

Drilling Co.: OD&E

Rig: OD&E #30

RT above GL: 4 m Lat : 38 deg 52 min 61.00 sec Spud Date: 09/05/2001 Release Date: 19/05/2001
GL above MSL : 46 m Long : 142 deg 48 min 25.57 sec Spud Time: 10:00:00 Release Time: 20:00:00

ACTIVITY REPORT

Date : 09/05/2001

Progress : 458

Depth @ 24:00 hrs :458

Depth	Phase	Class	Operation	Hrs	Activity
458	SH	P	DRILLING AHEAD	1.00	Drill ahead 395m - 458m. Lost returns at 458m.
458	SH	TP	LOST CIRCULATION	0.50	Hole standing full at flowline. Work pipe and prepare 20bbls medium LCM at 13ppb.
458	SH	TP	LOST CIRCULATION	0.50	Spot LCM across bottom of hole. Regain partial circulation. Displace LCM from drill string. Work pipe and observe well. Fluid standing at flowline.

Date : 10/05/2001

Progress : 27

Depth @ 24:00 hrs :485

Depth	Phase	Class	Operation	Hrs	Activity
458	SH	TP	LOST CIRCULATION	0.50	Work pipe slowly. Observe well. Fluid static at flowline.
458	SH	TP	LOST CIRCULATION	0.50	Pull 5stds wiper trip to clear BHA.
458	SH	TP	LOST CIRCULATION	0.50	Work pipe and attempt to circulate. Hole standing full. No circulation.
458	SH	TP	WIPER TRIP	1.00	POOH. Wiper trip to clear BHA.
458	SH	TP	WIPER TRIP	0.50	Clean mud from BHA. Prepare 50 bbls LCM at 25ppb.
458	SH	TP	WIPER TRIP	1.00	RIH 5 stds. Attempt to break circulation.
458	SH	TP	WIPER TRIP	0.50	POOH 2 stds and attempt to break circulation.
458	SH	TP	WIPER TRIP	1.50	RIH to 458m. Pump 50 bbls LCM. Regained circulation. Flowline plugged. Continue to circulate. Jet cellar. Clear flowline.
485	SH	P	DRILLING AHEAD	1.00	Drill 9-7/8" hole 458m - 485m.
485	SC	P	CIRCULATE & CONDITION	0.50	Circulate bottoms up.
485	SC	P	SURVEY	0.50	Survey @ 473m. 0.12° N45W.
485	SC	P	CIRCULATE & CONDITION	0.50	Spot 25bbls LCM on bottom.
485	SC	P	TRIP-OUT	3.00	POOH. SLM pipe. L/d Drill collars.
485	SC	P	RUN CASING	5.75	R/u and run 7-5/8" csg.
485	SC	P	CIRCULATE CASING	0.50	Circulate clean. Csg cap x 2.
485	SC	P	CEMENT CASING	0.25	Head up Dowell. Hold pre-job meeting.
485	SC	P	CEMENT CASING	0.25	Pump 40 bbls water spacer.
485	SC	P	CEMENT CASING	0.50	Pressure test lines 300/4kpsi. Drop bottom plug. Mix and pump 78 bbls lead "G" cmt at 11.5 ppg. Followed by 18 bbls Tail "G" cmt at 15.6ppg. Drop top plug.
485	SC	P	CEMENT CASING	0.25	Drop top plug. Displace w/ 71 bbls old mud. Cement returns visible, (5 to 10bbls), at end of displacement. Bump plug w/ 1900 psi 10 mins.
485	SC	P	WAIT ON CEMENT	4.00	Wait on cement.
485	SC	P	N/U & TEST BOP's	1.00	R/d Dowell cement head. Back out landing jt and collar.

Date : 11/05/2001

Progress : 0

Depth @ 24:00 hrs :488

Depth	Phase	Class	Operation	Hrs	Activity
488	SC	P	CIRCULATE & CONDITION	1.00	Circulate until shakers clean.
485	SC	P	N/U & TEST BOP's	0.50	N/u bradenhead.
485	SC	P	N/U & TEST BOP's	9.00	Nipple up BOP and choke manifold. Nipple up bell nipple and flowline. Function test BOP.
485	SC	P	N/U & TEST BOP's	4.50	Pressure test casing / BOP/ Choke m'fold / FOBV / Kill line 300psi / 2500psi 10 mins. Pump through degasser and flare line OK.
485	SC	P	N/U & TEST BOP's	0.50	Run Wear Bushing.
485	SC	P	N/U & TEST BOP's	1.50	P/u assy and clean out 2m fill from mousehole. Re-install mousehole.
485	SC	P	TRIP-IN	2.50	M/u BHA and RIH.
485	SC	P	TRIP-IN	1.50	L/d excess drill pipe from mast
485	PH	P	DRILL FLOAT / SHOE TRAC	2.75	Tag cement at 430m. Ream out shoe track.
488	PH	P	DRILLING AHEAD	0.25	Drill 6-3/4" hole 485m - 488m.

NAYLOR #1

Drilling Co.: OD&E

Rig: OD&E #30

RT above GL: 4 m Lat : 38 deg 52 min 61.00 sec Spud Date: 09/05/2001 Release Date: 19/05/2001
 GL above MSL : 46 m Long : 142 deg 48 min 25.57 sec Spud Time: 10:00:00 Release Time: 20:00:00

ACTIVITY REPORT

Date : 12/05/2001

Progress : 599

Depth @ 24:00 hrs :1,087

Depth	Phase	Class	Operation	Hrs	Activity
488	PH	P	CIRCULATE & CONDITION	0.50	Circulate clean.
488	PH	P	LOT / FIT	1.00	Conduct LOT. Equivalent to 18.0ppg.
646	PH	P	DRILLING AHEAD	4.50	Drill 6-3/4" hole 488m - 646m.
646	PH	P	SURVEY	0.50	Survey @ 635m, 1/4°, N85E.
799	PH	P	DRILLING AHEAD	4.00	Drill 6-3/4" hole 646m - 799m.
799	PH	P	SURVEY	0.50	Survey @ 787m, 1/4° N20E.
952	PH	P	DRILLING AHEAD	6.00	Drill 6-3/4" hole 799m - 952m.
952	PH	P	SURVEY	0.50	Survey @ 934m, 3/4° N16W.
1,087	PH	P	DRILLING AHEAD	6.50	Drill 6-3/4" hole 952m - 1087

Date : 13/05/2001

Progress : 425

Depth @ 24:00 hrs :1,531

Depth	Phase	Class	Operation	Hrs	Activity
1,106	PH	P	DRILLING AHEAD	0.50	Drill 6-3/4" hole 1087m - 1106m.
1,106	PH	P	SURVEY	0.50	Survey @ 1099m, 1/2° N85W.
1,261	PH	P	DRILLING AHEAD	4.50	Drill 6-3/4" hole 1106m - 1261m.
1,261	PH	P	SURVEY	0.50	Run survey @ 1254m, 3/4° S55W. Service rig.
1,425	PH	P	DRILLING AHEAD	7.50	Drill 6-3/4" hole 1261m - 1425m
1,425	PH	P	SURVEY	0.50	Survey @ 1406m, 1/2° S02E.
1,531	PH	P	DRILLING AHEAD	10.00	Drill 6-3/4" hole 1425m - 1531m.

Date : 14/05/2001

Progress : 365

Depth @ 24:00 hrs :1,896

Depth	Phase	Class	Operation	Hrs	Activity
1,531	PH	P	DRILLING AHEAD	2.50	Drill 6-3/4" hole 1531m - 1560m.
1,560	PH	P	CIRCULATE & CONDITION	0.50	Circulate bottoms up.
1,560	PH	P	SURVEY	0.50	Survey @ 1553m, 1/2° S23E.
1,560	PH	P	WIPER TRIP	1.50	Wiper trip to csg shoe. Overpull 10 - 40 klbs 1200m - 900m.
1,560	PH	P	SLIP/CUT DRILL LINE	0.50	Slip 33' drlg line.
1,560	PH	P	WIPER TRIP	1.00	RIH w/ drlg assy to 1538m.
1,560	PH	P	BREAK CIRCULATION	0.50	Wash to bottom 1538m - 1560m. No fill.
1,714	PH	P	DRILLING AHEAD	8.00	Drill 6-3/4" hole 1560m - 1714m.
1,714	PH	P	SURVEY	0.50	Survey @ 1695, 2° S33E.
1,867	PH	P	CIRCULATE SAMPLE	7.50	Drill 6-3/4" hole 1714m - 1867m
1,867	PH	P	SURVEY	0.50	Survey @ 1848m, 4-3/4° S43E
1,896	PH	P	DRILLING AHEAD	0.50	Drill 6-3/4" hole 1867m - 1896m.

Date : 15/05/2001

Progress : 136

Depth @ 24:00 hrs :2,157

Depth	Phase	Class	Operation	Hrs	Activity
2,021	PH	P	DRILLING AHEAD	6.50	Drill 6-3/4" hole 1896m - 2021m.
2,011	PH	P	SURVEY	0.50	Survey @ 2014m, 8° S55E.
2,089	PH	P	DRILLING AHEAD	4.50	Drill 6-3/4" hole 2021m - 2089m.
2,089	PH	P	SURVEY	0.50	Survey @ 2070m, 7° S70E.
2,157	PH	P	DRILLING AHEAD	5.00	Drill 6-3/4" hole 2089m - 2157m.
2,157	PH	P	CIRCULATE & CONDITION	1.50	Circulate clean. Flowcheck. Pump slug.
2,157	EP	P	WIPER TRIP	4.50	POOH to shoe. 10 - 30klbs overpull. RIH to 2116m.
2,157	EP	P	BREAK CIRCULATION	0.50	Wash to bottom. 2116m - 2157m.
2,157	EP	P	CIRCULATE & CONDITION	0.50	Circulate clean.

908040 078

NAYLOR #1

Drilling Co.: OD&E

Rig: OD&E #30

RT above GL: 4 m Lat : 38 deg 52 min 61.00 sec Spud Date: 09/05/2001 Release Date: 19/05/2001
GL above MSL : 46 m Long : 142 deg 48 min 25.57 sec Spud Time: 10:00:00 Release Time: 20:00:00

ACTIVITY REPORT

Date : 16/05/2001					Progress : 0	Depth @ 24:00 hrs :2,157
Depth	Phase	Class	Operation	Hrs	Activity	
2,157	EP	P	CIRCULATE & CONDITION	0.50	Circulate and condition hole.	
2,157	EP	P	SURVEY	0.50	Drop survey.	
2,157	EP	P	TRIP-OUT	4.50	Slug pipe. POOH. SLM pipe.	
2,157	EP	P	TRIP-OUT	0.50	L/d stabilizers, pony collar, and NMDC. Recover survey, 5° @ S73E.	
2,157	EP	P	LOGGING	14.00	R/u Reeves. RIH w/ Log #1 GR-DLS-MRS-LCS. Log # 2 GR-PDS-CNS. Log #3 RFS-GR. Solid obstruction at 2010m. POOH. R/d Reeves.	
2,157	EP	TP	WIPER TRIP	3.00	RIH w/ drlg assy. Wiper trip.	
2,157	EP	TP	SLIP/CUT DRILL LINE	1.00	Slip 33' drlg line.	

Date : 17/05/2001					Progress : 0	Depth @ 24:00 hrs :2,157
Depth	Phase	Class	Operation	Hrs	Activity	
2,157	EP	TP	WIPER TRIP	1.50	RIH. Tag obstruction at 2005m.	
2,157	EP	TP	WIPER TRIP	0.50	Wash and ream obstruction 2005m - 2024m.	
2,157	EP	TP	WIPER TRIP	0.50	RIH to 2157m.	
2,157	EP	TP	CIRCULATE & CONDITION	1.00	Circulate hole clean.	
2,157	EP	TP	WIPER TRIP	3.00	POOH. Work area at 2005m.	
2,157	EP	P	LOGGING	11.00	R/u Reeves. Run RFS-GR.	
2,157	EP	P	LOGGING	2.00	Download sample chambers and L/d RFS-GR.	
2,157	EP	P	LOGGING	0.50	Hold safety meeting and secure radio silence.	
2,157	EP	TP	LOGGING	2.00	Reeves RIH w/ SWC-GR. Held up at 2000m. POOH. Abandon SWC run.	
2,157	EP	P	LOGGING	0.50	R/d Reeves.	
2,157	EP	P	WIPER TRIP	1.50	RIH w/ drlg assy.	

Date : 18/05/2001					Progress : 0	Depth @ 24:00 hrs :2,157
Depth	Phase	Class	Operation	Hrs	Activity	
2,157	EP	P	WIPER TRIP	3.00	RIH w/ drlg assy. Work through obstruction at 2000m until clean.	
2,157	EP	P	CIRCULATE & CONDITION	2.00	Circulate and condition mud.	
2,157	PC	P	LAY DOWN PIPE	9.00	POOH L/d pipe. Work any area that shows overpull. Break kelly conns.	
2,157	PC	P	RUN CASING	1.00	Pull wear bushing.	
2,157	PC	P	RUN CASING	9.00	R/u Premium and run 3½' casing.	

Date : 19/05/2001					Progress : 0	Depth @ 24:00 hrs :2,157
Depth	Phase	Class	Operation	Hrs	Activity	
2,157	PC	P	RUN CASING	2.50	Run casing.	
2,157	PC	P	BREAK CIRCULATION	0.50	Break circulation and wash to bottom. 3m fill.	
2,157	PC	P	CIRCULATE CASING	1.50	Circulate and condition mud. Cool hole.	
2,157	PC	P	CEMENT CASING	0.50	Head up Dowell. Pump 40 bbls SAPP spacer. 10 bbls water. Test lines 4Kpsi. Drop top plug.	
2,157	PC	P	CEMENT CASING	1.00	Mix and pump 211bbls lead cmt at 11.5 ppg followed by 25 bbls tail cmt at 15.8ppg.	
2,157	PC	P	CEMENT CASING	0.50	Wash out surface lines. Drop top plug and ball. Displace w/ 61.5 bbls 2% KCl brine. Bump plug w/ 2000psi. Test csg 2500psi 10 mins. Floats OK.	
2,157	PC	P	WAIT ON CEMENT	4.00	Wait on cement.	
2,157	PC	P	WELL-HEAD	0.50	Set csg slips w/ 40klbs tension.	
2,157	PC	P	N/U & TEST BOP's	4.00	Nipple down BOP. Rough cut csg.	

908040 079

NAYLOR #1

Drilling Co.: OD&E

Rig: OD&E #30

RT above GL: 4 m Lat : 38 deg 52 min 61.00 sec Spud Date: 09/05/2001 Release Date: 19/05/2001
GL above MSL : 46 m Long : 142 deg 48 min 25.57 sec Spud Time: 10:00:00 Release Time: 20:00:00

ACTIVITY REPORT

Date : 19/05/2001

Progress : 0

Depth @ 24:00 hrs : 2,157

Depth	Phase	Class	Operation	Hrs	Activity
2,157	PC	P	WELL-HEAD	2.00	Dress csg stump as per wood. N/u xmas tree adaptor flange. Attempt to energize packing and test cavity 5000psi. " P" seal leaking. Would not hold plastic packing pressure or test pressure. Nipple down xmas tree and flange.
2,157	PC	P	WELL-HEAD	3.00	Trim ragged edges from "P" seal. No spares on hand. Re-install flange and tree. Test flange and "P" seal. Test flange. Held 5000 psi 10 mins. NB. NO CONFIDENCE IN SEAL. Test xmas tree 5000 psi 10 mins. Release rig.

908040 080

Section 3.0

Drilling Data

- **Mud Record**
- **BHA Summary**
- **Bit Summary by Formation**
- **FIT/LOT Report**

NAYLOR #1

Drilling Co.: OD&E

Rig: OD&E #30

Mud Co.: BAROID

RT above GL : 4 m
GL above MSL : 46 m

Lat : 38 deg 52 min 61.00 sec
Long : 142 deg 48 min 25.57 sec

Spud Date: 09/05/2001
Spud Time: 10:00
Release Date: 19/05/2001
Release Time: 20:00

Total Cost: \$ 31,214

MUD RECAP

R#	DATE	TYPE	DEPTH	TMP F	MW ppg	VIS secs /qt	PV cps	YP lbs/ 100ft2	Gel10s lbs/ 100ft2	Gel10m lbs/ 100ft2	F.L. API (cm3/ 30min)	F.L. hthp (cm3/ 30min)	Sols %	Sand %	MBT %	PH	Cl ppm	HARD /Ca ppm	KCI %	DAILY \$
5	09/05/2001	Gel	297	0	8.8	41	7	24		15	0.0	0.0								112
6	10/05/2001	Gel	485	0	8.7	30	3	4		2	0.0	0.0								112
7	11/05/2001	Gel	485	0	8.7	30	3	4		2	0.0	0.0								3,921
8	12/05/2001	Gel	996	23	8.8	39	9	8		2	6.6	0.0	2.4	.01			19,000	160	4	6,318
9	13/05/2001	Gel	1,503	27	9.0	41	11	11		2	6.4	0.0	4	.8	1.0	9.0	17,000	240	3	6,482
10	14/05/2001	Gel	1,820	28	9.1	38	10	10		2	5.5	0.0	3.8	.5	1.0	9.0	21,000	160	4	4,763
11	15/05/2001	Gel	2,157	0	9.2	42	14	12		2	5.0	0.0	4.6	.8	2.0	9.5	24,000	200	5	9,269
12	16/05/2001	PHPA	2,157	0	9.2	42	14	12		2	5.0	0.0	4.6	.8	2.0	9.5	24,000	200	5	0
13	17/05/2001	PHPA	2,157	0	9.2	42	14	12		2	5.0	0.0	4.6	.8	2.0	9.0	24,000	240	5	237

908040 081

NAYLOR #1

Drilling Co.: OD&E

Rig: OD&E #30

RT above GL 4 m
GL above MSL 46 m

Lat : 38 deg 52 min 61.00 sec
Long : 142 deg 48 min 25.57 sec

Spud Date: 09/05/2001
Release Date: 19/05/2001
Spud Time: 10:00
Release Time: 20:00

BHA SUMMARY

#	Length (m)	Weight (k-lbs)	Weight blw/Jars (k-lbs)	String Weight (k-lbs)	Pick-Up Weight (k-lbs)	Slack-Off Weight (k-lbs)	Torque Max (ft-lbs)	Torque on bottom (ft-lbs)	Torque off bottom (ft-lbs)	BHA DESCRIPTION
1	151	34500	34500	82	82	82	200	200	120	Bit, Bit sub, 6 1/2" NMDC, Stab, 11 x 6 1/2" DC, XO, 4 x HWDP.
2	239	34500	34500	82	82	82	200	200	120	Bit, NB Stab, Pony DC, Stab, NMDC, Stab, 16 x 4 1/2" DC, Jar, 3 x 4 1/2" DC, 4 x HWDP.

908040 082

NAYLOR #1

Drilling Co.: OD&E

Rig: OD&E #30

RT above GL : 4 m
GL above MSL : 46 m

Spud Date: 09/05/2001
Spud Time: 10:00

Release Date: 19/05/2001
Release Time: 20:00

BIT SUMMARY BY FORMATION

DATE	BIT#	SIZE in	MFR	TYPE	IADC	JETS	SER #	IN ft	OUT ft	MTRG	On Bit HRS	FORMATION	TOP@ m	ROP f/hr	WOB k-lbs	RPM	TRQ 1000 ft-lb	SPP psi	FLW gpm	MW ppg	I	O1	D	L	B	G	O2	R						
10-05-01	RR1	9.88	SMITH	FGSS+2 C		2x22	LY9255	0	485	485	11.0	Undifferentiated	0	214.3	2.1	65	0.156	67	31	8.8	1	1	WT	A	E	I		WT	TD					
15-05-01	2	6.75	OTHER	SDL419		4x11	SID0282	485	2,157	1,672	66.0	GELLIBRAND MARL BELFAST BELFAST NARAWATUR K DILWYN PEMBER PEBBLE POINT PAARATTE SKULL CREEK WAARRE C WAARRE B WAARRE A EUMERELLA	138 271 271 526 568 836 952 1,039 1,534 2,026 2,054 2,069 2,119	184.1 277.4 480.0 600.0 578.6 511.1 485.7 525.7 366.7 250.0 150.0 333.3 252.6	4.6 2.8 6.0 3.8 1.7 3.4 3.3 2.1 1.6 2.2 2.5 1.9 4.5	79 100 116 121 124 129 133 135 135 131 134 135 141	0.164 0.415 0.943 0.945 0.957 0.931 0.949 0.932 0.941 0.911 0.944 0.922 0.956	159 487 874 921 1007 1046 1037 1140 1302 1335 1362 1380 1402															CT	TD

908040 083

NAYLOR #1

Drilling Co.: OD&E

Rig: OD&E #30

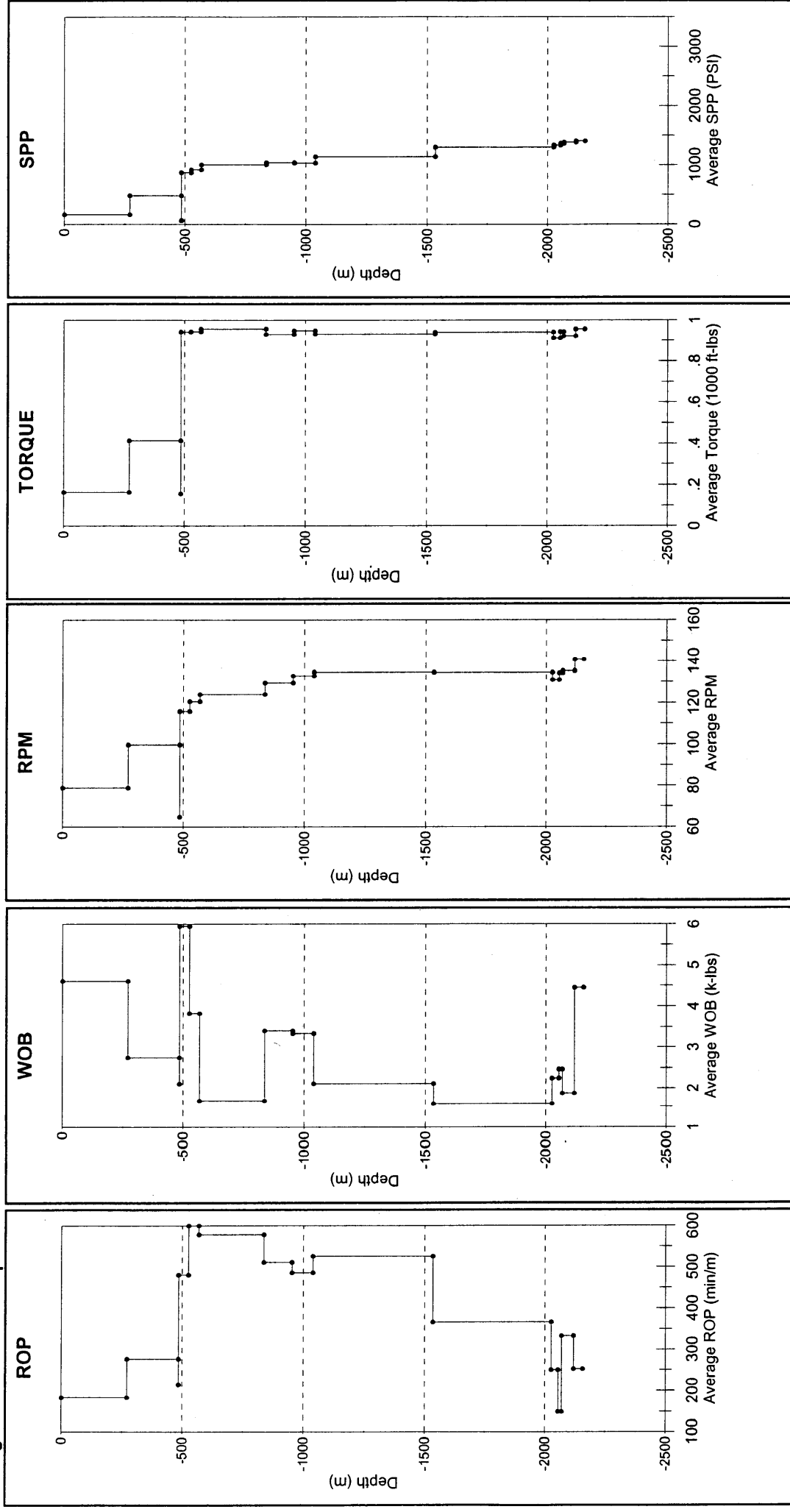
RT above GL : 4 m
GL above MSL : 46 m
Lat : 38 deg 52 min 61.00 sec
Long : 142 deg 48 min 25.57 sec

Spud Date: 09/05/2001
Spud Time: 10:00

Release Date: 19/05/2001
Release Time: 20:00

BIT SUMMARY BY FORMATION

Drilling Parameters vs Depth :



908040 084

NAYLOR #1

Drilling Co.: OD&E

Rig : OD&E #30

RT above GL : 4 mtrs
 GL above MSL : 46 mtrs

Spud Date: 09/05/2001
 Spud Time: 10:00:00

Release Date: 19/05/2001
 Release Time: 20:00:00

Lat : 38 deg 52 min 61.00 sec
 Long : 142 deg 48 min 25.57 sec

BIT RECORD

DATE	BIT#	SIZE "	IADC	SER	MFR	TYPE	JETS	D.IN mtrs	D.OUT mtrs	MTRG	HRS IADC	SPP psi	FLW gpm	WOB k-lbs	RPM	MW ppg	TFA sq.in	VEL mps	HHP /sq"	ROP m/hr	I O1	D	L	B	G	O2	R
10/05/2001	RR1	9.88		LY9255	SMITH	FGSS+2C	2x22	0	485	485	11.0	61	31	0.3	6	8.8	0.743	74	1.96	44.1	1	WT	A	E	I	WT	TD
15/05/2001	2	6.75		SID0282	OTHER	SDL419	4x11	485	2,157	1,672	79.8	900	280	5.0	110	9.0	0.371	74	2.19	21.0	6	WT	N	X	I	CT	TD

908040 085

Santos

Santos Ltd

A.C.N. 007 550 923

LEAK-OFF / F.I.T REPORT**FORM****Well Name:****NAYLOR #1****DQMS F-214****REPORT BY:**

WJ Westman

CASING SIZE:

7-5/8"

DATE:

12/05/2001

A. MUD WEIGHT:

8.6

MW(ppg)

C. HOLE DEPTH:

1597

D. SHOE DEPTH:

1591

(ft)

E. LEAK OFF PRESSURE (GRAPH):

780

(ft)

F. EQUIVALENT DENSITY:

(Pressure. (D))/(Shoe Depth*0.052))+Mud Weight

18.0

(ppg EMW)

G. STABILIZED PRESSURE.:

780

(psi)

H. VOLUME PUMPED:

5

(bbl)

I. VOLUME REGAINED:

4.5

(bbl)

J. BURST PRESSURE OF CASING

6020

(psi)

K. MINIMUM REQUIRED LEAK-OFF

13.8

(ppg EMW)

L. MAXIMUM ALLOWABLE PRESSURE

5308.5048

(psi)

M TEST UNIT TYPE

P.Low

Vol (bbl)	Pr (psi)
0	0
0.25	14
0.5	30
0.75	50
1	70
1.25	90
1.5	110
1.75	130
2	160
2.25	190
2.5	235
2.75	300
3	385
3.25	450
3.5	515
3.75	585
4	645
4.25	695
4.5	740
4.75	780
5	785
5.25	790

CASING TEST (MIN. VOL. LINE)

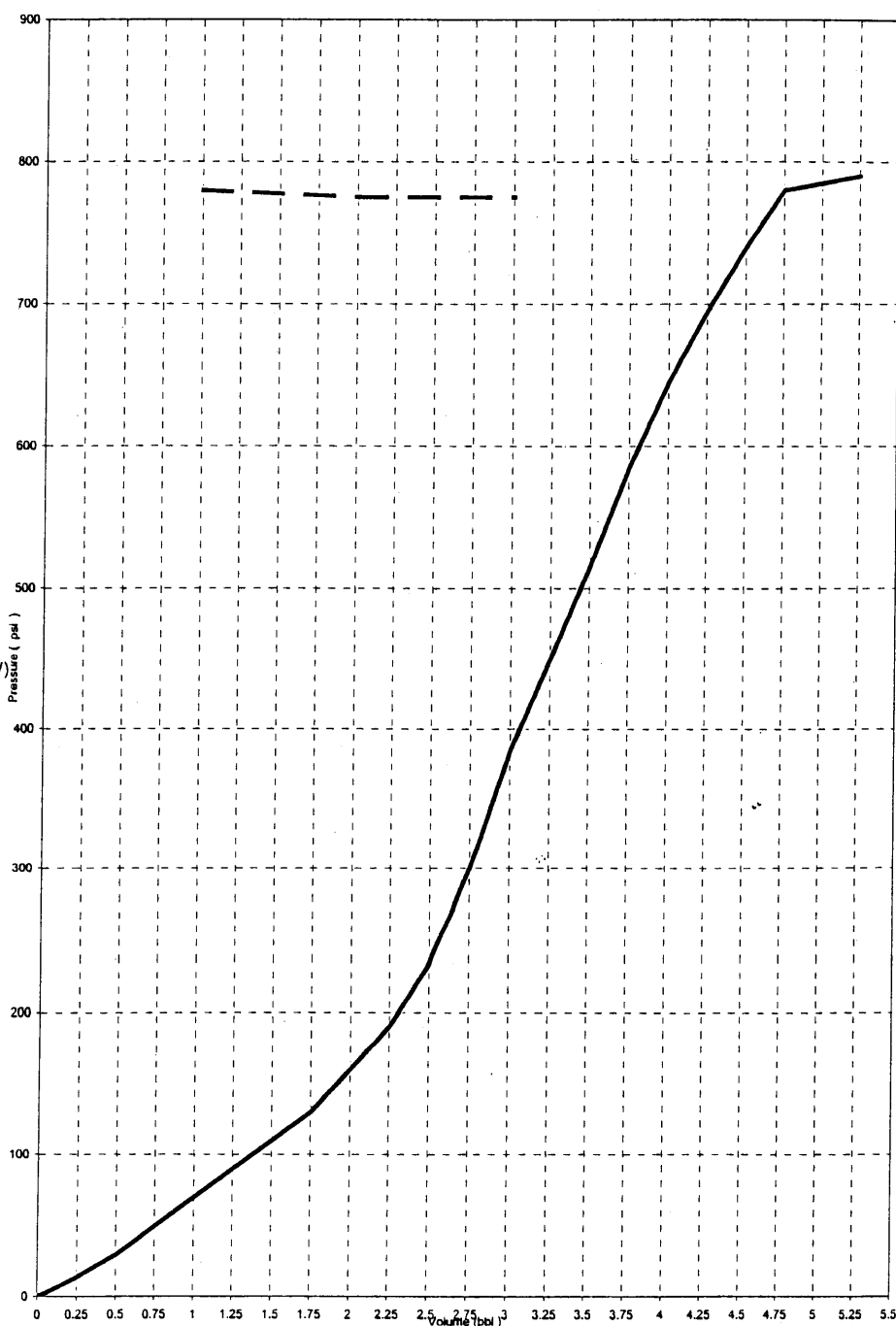
0	0

MINIMUM LEAK OFF (ppg EMW)

	430
	430

PLOT AFTER PUMP STOPPED

Minutes	Pressure
1	780
2	775
3	775



Section 4.0

Casing and Cementing

- **Casing and Cementing Reports**
- **Wellhead Installation Report or**
- **Plug and Abandonment Report**

908040 088

<h1 style="margin:0;">Santos</h1> <p style="font-size: small; margin: 5px 0;">Santos Ltd A.C.N. 007 550 923</p>	<h2 style="margin:0;">CASING AND CEMENTING REPORT</h2>	<h2 style="margin:0;">FORM</h2>
	Well Name: NAYLOR #1	DQMS F-220 Rev.2

Casing type:	X Surface casing	Intermediate Casing	Production Casing	Completion tubing
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Originated by: GEOFF COKER	Checked by: GEOFF COKER	Date: 28-Jun-01
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Hole Size: 9-7/8"	T.D.: 485m MD	Date: 5/11/01	Contractor: Schlumberger
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PRE-FLUSH 40 bbls. @ 8.4 ppg.	SPACER 0 bbls @ 0 ppg.
-------------------------------	------------------------

Additives: Water Source: CROFT #1 Water Bore	Water Source:
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CEMENT Mixwater: 61.6 bbls LEAD SLURRY: 153 sacks Class G Slurry Yield: 2.87 cu.ft./sack Mixwater Req't: 17.575 gal./sack Actual Slurry Pumped: 78 bbls @ 11.5 ppg Planned TOC: 0 m RT @ 55 % o/g hole Actual est. TOC: 0 m RT @ % o/g hole TAIL SLURRY: 86 sacks Class G Slurry Yield: 1.19 cu.ft./sack Mixwater Req't: 5.239 gal./sack Actual Slurry Pumped: 18 bbls @ 15.6 ppg Planned top tail: 392 m RT @ 20 % o/g hole Actual est. top tail: 392 m RT @ % o/g hole	ADDITIVES <table style="width:100%; border-collapse: collapse;"> <tr> <th style="width:60%;">Product</th> <th style="width:20%;">% or gps</th> <th style="width:20%;">Product</th> <th style="width:20%;">% or gps</th> </tr> <tr> <td>D 020</td> <td>5% BWOC</td> <td></td> <td></td> </tr> <tr> <td>S001 CaCl2</td> <td>1.5% BWOC</td> <td></td> <td></td> </tr> <tr> <td>D047</td> <td>0.01 gal/sx</td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>D145A</td> <td>.05 gal/sx</td> <td></td> <td></td> </tr> <tr> <td>S001 CaCl</td> <td>0.5% bwoc</td> <td></td> <td></td> </tr> <tr> <td>D047</td> <td>.01 gal/sx</td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> </tr> </table>	Product	% or gps	Product	% or gps	D 020	5% BWOC			S001 CaCl2	1.5% BWOC			D047	0.01 gal/sx							D145A	.05 gal/sx			S001 CaCl	0.5% bwoc			D047	.01 gal/sx						
Product	% or gps	Product	% or gps																																		
D 020	5% BWOC																																				
S001 CaCl2	1.5% BWOC																																				
D047	0.01 gal/sx																																				
D145A	.05 gal/sx																																				
S001 CaCl	0.5% bwoc																																				
D047	.01 gal/sx																																				

DISPLACEMENT Fluid: Mud @ 8.8 ppg Theoretical Displ.: 70.9 bbl. Actual Displ. 71 bbl @ 5.5 bpm Displaced via RIG PUMP	Bumped plug with 500 psi Pressure Tested to: 1900 psi Bleed back: 0.75 bbls
--	---

ACTIVITY	Date/Time	Returns to Surface: 157 bbls mud	10 bbls cmt.
Start Running csg.	10-May-01 11:30	Reciprocate / Rotate Casing:	Reciprocate till plug bump.
Casing on Bottom	10-May-01 17:15	Top Up Job run: Yes / No	No sx class
Start Circulation	10-May-01 17:15	Plug Set Make / Type:	Weatherford Model-303 (FS), Model-402NP (FC)
Start Pressure Test	10-May-01 18:15	Centraliser Placement, type/depth:	Weatherford 479m,470m,455m,435m,412m, BSK & Cent 29m.
Pump Preflush	10-May-01 18:00		
Start Mixing		Remarks:	
Finish Mixing	10-May-01 18:45		
Start Displacing	10-May-01 18:45		
Stop Displ./Bump	10-May-01 18:50		
Press. test	10-May-01 19:00		

No. JOINTS	SIZE OD	WT lb/ft	GRADE	THREAD	METER	FROM	TO
Stick Up at RT (Enter as negative number-do not include stretch, RT = 0)					-1.27	-1.27	0.00
Rotary table to top of Bradenhead (Enter for surface casing only)					5.01	0.00	5.01
Bradenhead : WG-22-L, 7-5/8"BTC x 9-5/8"BTC x 11"5K (Enter for surface casing only)					0.72	5.01	5.73
Rotary table to top of cut jt (Enter for int. or production casing only)							
39 Jts	7-5/8"	26.4	L80	BTC	452.14	5.73	457.87
					0.00	457.87	457.87
					0.00	457.87	457.87
					0.00	457.87	457.87
					0.00	457.87	457.87
					0.00	457.87	457.87
Float Collar	W'ford Model-402NP			BTC	0.40	457.87	458.27
2 Jts	7-5/8"	26.4	L80	BTC	23.29	458.27	481.56
Float Shoe	W'ford Model-303			BTC	0.44	481.56	482.00
Total Jts Run	41						
Total Jts On Location	41						
Jts not run	0						

Theoretical Bouyed wt of casing(klb): 35.5	Bradenhead Height above GL 0.00
Actual wt of casing (last joint run-block wt, klb)	Casing wt just prior to landing csg/
Landing WT (after cementing and pressure bleed off)	setting slips (indicator wt - blocks = wt)

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<h1 style="margin:0;">Santos</h1> <p style="margin:0;">Santos Ltd</p> <p style="margin:0;">A.C.N. 007 550 923</p>	<h2 style="margin:0;">CASING AND CEMENTING REPORT</h2>	<h2 style="margin:0;">FORM</h2>
	Well Name: Naylor #1	DQMS F-220 Rev.2

Casing type:	<input type="checkbox"/> Surface casing	<input type="checkbox"/> Intermediate Casing	<input checked="" type="checkbox"/> Production Casing	<input type="checkbox"/> Completion tubing
--------------	---	--	---	--

Originated by: WJ Westman	Checked by: Geoff Coker	Date: 28/06/2001
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Hole Size: 6 3/4"	T.D.: 2157	Date: 19/05/2001	Contractor: Schlumberger	
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PRE-FLUSH 40 bbls. @ 8.6 ppg. Additives: SAPP 8 ppb Water Source: Croft Bore	SPACE 10 bbls @ 8.3 ppg. Water Source: Croft Bore
---	---

CEMENT Mixwater: _____ LEAD SLURRY: 416 sacks Clas G Slurry Yield: 2.85 cu.ft./sack Mixwater Req't: 21.02 gal./sack Actual Slurry Pumped: 209 bbls @ 11.5 ppg Planned TOC: 1076 ft RT @ 20 % o/g hole Actual est. TOC: Surface ft RT @ 0.05 % o/g hole TAIL SLURRY: 121 sacks Clas G Slurry Yield: 1.15 cu.ft./sack Mixwater Req't: 6.48 gal./sack Actual Slurry Pumped: 25 bbls @ 15.8 ppg Planned top tail: 6447 ft RT @ 20 % o/g hole Actual est. top tail: 6308 ft RT @ 0.01 % o/g hole	ADDITIVES <table style="width:100%;"> <tr> <th>Product</th> <th>% or gps</th> <th>Product</th> <th>% or gps</th> </tr> <tr> <td>Bentonite</td> <td>5%</td> <td></td> <td></td> </tr> <tr> <td>DO81 Retarder</td> <td>0.04%</td> <td></td> <td></td> </tr> <tr> <td>DO47 Antifoam</td> <td>0.01gps</td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>D081</td> <td>0.03 gps</td> <td></td> <td></td> </tr> <tr> <td>D047</td> <td>0.01 gps</td> <td></td> <td></td> </tr> <tr> <td>D080</td> <td>0.05 gps</td> <td></td> <td></td> </tr> </table>	Product	% or gps	Product	% or gps	Bentonite	5%			DO81 Retarder	0.04%			DO47 Antifoam	0.01gps							D081	0.03 gps			D047	0.01 gps			D080	0.05 gps		
Product	% or gps	Product	% or gps																														
Bentonite	5%																																
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DO47 Antifoam	0.01gps																																
D081	0.03 gps																																
D047	0.01 gps																																
D080	0.05 gps																																

DISPLACEMENT	Fluid: 2% KCl @ 8.4 ppg	
Theoretical Displ.:	61.5 bbl.	Bumped plug with 1900 psi
Actual Displ.	61.5 bbl @ 6 bpm	Pressure Tested to: 2500 psi
Displaced via	RIG / CEMENT PUMP	Bleed back: 0.5 bbls

ACTIVITY	Date/Time	Returns to Surface: Full bbls mud Nil bbls cmt.
Start Running csg.	16:00	Reciprocate / Rotate Casing: No
Casing on Bottom	02:30	Top Up Job run: Yes / No No sx class
Start Circulation	03:00	Plug Set Make / Type:
Start Pressure Test	04:30	Centraliser Placement, type/depth: Bow spring
Pump Preflush	04:15	2153, 214
Start Mixing	04:30	Remarks: Full returns throughout job. Floats held.
Finish Mixing	06:10	No cement seen at surface.
Start Displacing	06:10	
Stop Displ./Bump	06:20	
Press. test	06:25	

No. JOINTS	SIZE OD	WT lb/ft	GRADE	THREAD	FEET	FROM	TO
Stick Up at RT (Enter as negative number-do not include stretch, RT = 0)					-2	-2.00	0.00
Rotary table to top of Bradenhead (Enter for surface casing only)					0	0.00	0.00
Bradenhead (description and rating) / Tubing Hanger or slip and seal (Enter for surface casing only)					0	0.00	0.00
Rotary table to top of cut jt (Enter for int. or production casing only)					15.4	0.00	15.40
1 Cut Jt	3.5	9.2	13Cr95	Fox	22.9	15.40	38.30
157	3.5	9.2	13Cr95	Fox	6454.43	38.30	6492.73
					0	6492.73	6492.73
1 marker	3.5	9.2	13Cr95	Fox	14	6492.73	6506.73
					0		
					0		
15	3.5	9.2	13Cr95	Fox	568.27	6506.73	7075.00
Float Collar (Make/Type)					1.18	7075.00	7076.18
1	3.5	9.2	13Cr95	Fox	40.58	7076.18	7116.76
Float Shoe (Make/Type)					1.35		1.35
Total Jts Run	174						
Total Jts On Location							
Jts not run							

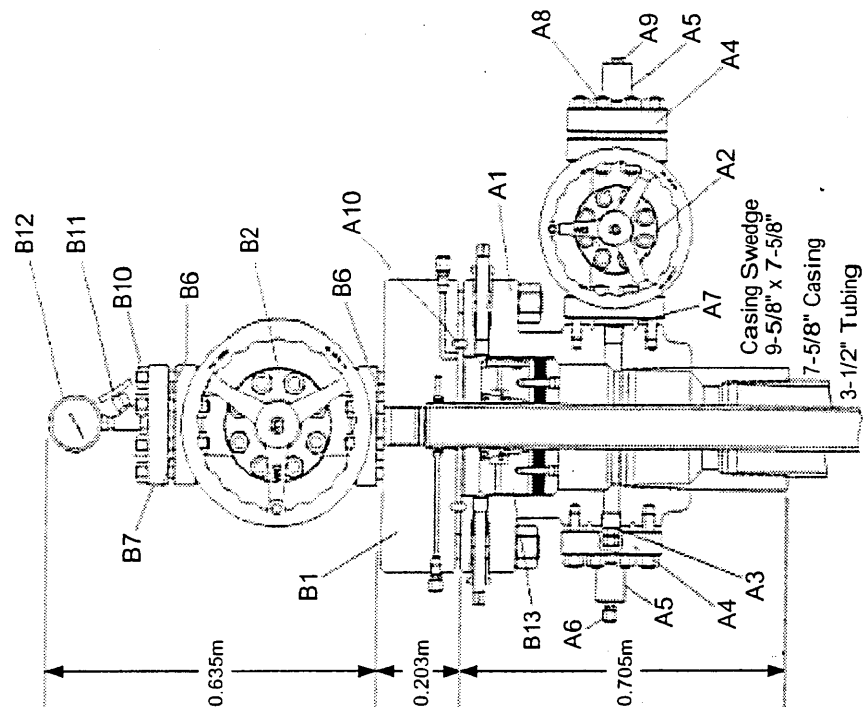
Theoretical Bouyed wt of casing(klb): 56,000	Bradenhead Height above GL 0.02
Actual wt of casing (last joint run-block wt, klb) 46,000	Casing wt just prior to landing csg/ 44000.00
Landing WT (after cementing and pressure bleed off) 40,000	setting slips (indicator wt - blocks = wt)

FORM**DQMS F-130****WELLHEAD INSTALLATION REPORT****2 STRING MONOBORE (7-5/8" SURFACE CASING)****Santos**

Well : Naylor #1

Supervisor : WJ Westman

Date : 19-May-2001



COMPONENT	DESCRIPTION	No USED
A1. Casing Head	11" 5k x 7-5/8" 5k w/ BTC Thread (WG-22-L)	1
A2. Gate Valve	2-1/16" 5k Model 2200	1
A3. Plug	1-1/2" line pipe w/ 1-1/4" hex	1
A4. Companion Flange	2-1/16" 5k x 2" line pipe	2
A5. Bull Plug	2" line pipe tapped w/ 1/2" NPT	2
A6. Test Fitting	1/2" NPT	1
A7. Ring Gasket	RX-24 Stainless Steel	3
A8. Studs	7/8" x 6-1/4" long w/ nuts	8
A9. Pipe Plug	1/2" NPT male	1
A10. Ring Gasket	RX-54 Stainless Steel	1
B13. Slip & Seal Assy	WG-22 11" x 3-1/2"	1
B1. Adaptor Flange	WG-A4-P 11" 5k w/ 3-1/2" P seal & 3-1/8" 5k w/ 3" H BPV	1
B2. Gate Valve	Model 2200 3-1/8" 5k CC Trim	1
B6. Ring Gasket	RX-35 Stainless Steel	2
B7. Blind Flange	3-1/8" 5k tapped 1/2" NPT	1
B10. Studs	7-1/4" x 1-1/8" w/ nuts	8
B11. Needle Valve	1/2" NPT 5k Stainless Steel	1
B12. Pressure Gauge	1/2" NPT 0-5000psi	1
	NB: "P" SEAL TESTED BUT KNOWN TO BE DAMAGED!!!	
	CHANGE "P" SEAL AND RE-TEST BEFORE PERFORMING.	
Notes:	Tubing stub cut off 2-7/8" above top flange on bradenthead.	

Section 5.0

Time Breakdown Data

- Overview**
- Trouble Time Breakdown**

Well : NAYLOR #1

Drilling Co : OD&E

Rig : OD&E #30

RT above GL: 4 m Lat : 38 deg 52 min 61.00 sec Spud Date: 09/05/2001 Release Date: 19/05/2001
GL above MSL : 46 m Long : 142 deg 48 min 25.57 sec Spud Time: 10:00:00 Release Time: 20:00:00

TIME BREAKDOWN DATABASE - single well overview

Spud date : 09/05/2001
TD Depth : 2,157.0
Final Depth : 2,157.0
Total Time (hrs) - Spud/Release : 250.00
Total Time (hrs) - Rig Move : 0.00
Total NPT (hrs) : 21.00

Time-Breakdown : Times by Class and Operation

Class	Hrs
PROGRAMMED EVENT	229.0
TROUBLE - DURING PROGRAM	21.0

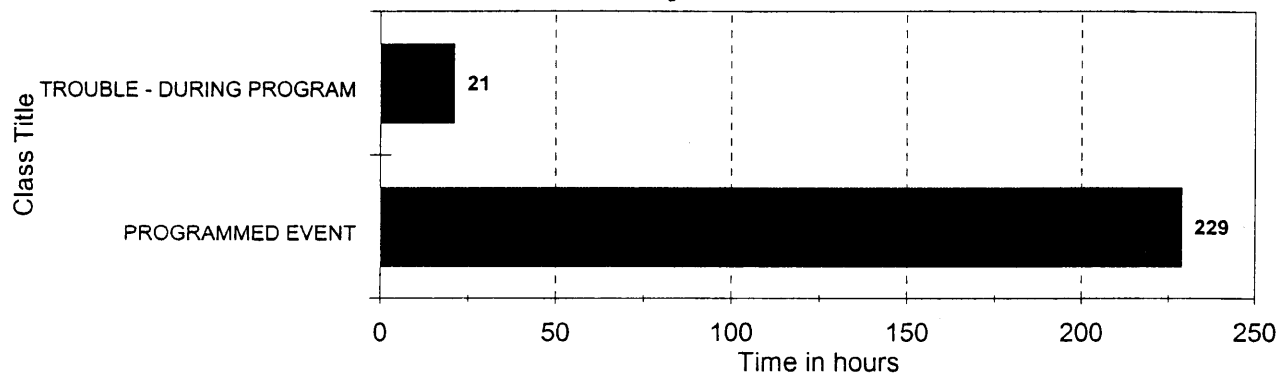
Operation	Hrs
DRILLING AHEAD	81.8
TOT. CSG/CMT	34.3
LOGGING	30.0
WIPER TRIP	24.5
N/U & TEST BOP's	21.0
TOT. TRIPPING	12.0
SURVEY	9.5
LAY DOWN PIPE	9.0
CIRCULATE & CONDITION MUD	8.5
CIRCULATE SAMPLE	7.5
WELL-HEAD	5.5
LOST CIRCULATION	2.5
BREAK CIRCULATION	1.5
SLIP/CUT DRILL LINE	1.5
LOT / FIT	1.0

TIME BREAKDOWN DATABASE - single well overview

WELL : NAYLOR #1

Pacesetter : none selected

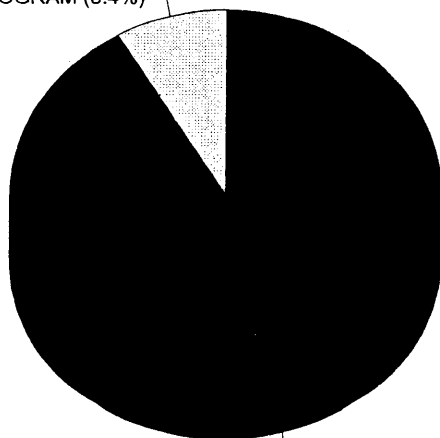
Time Breakdown by Class Codes



Time Analysis by Class Codes

Class	Hrs
PROGRAMMED EVENT	229.0
TROUBLE - DURING PRO	21.0

TROUBLE - DURING PROGRAM (8.4%)



PROGRAMMED EVENT (91.6%)

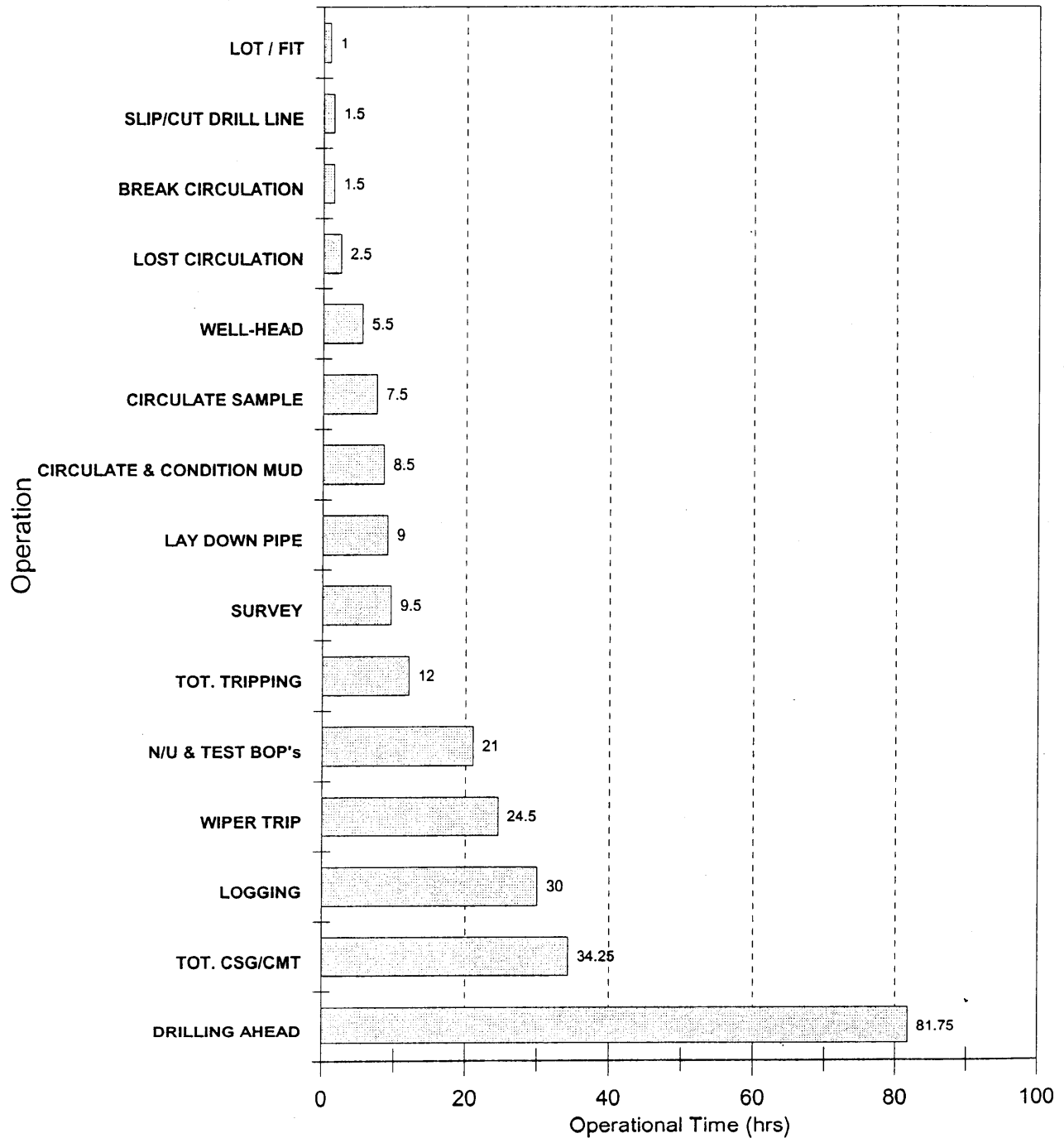
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TIME BREAKDOWN DATABASE - single well overview

WELL : NAYLOR #1

Pacesetter : none selected

Time Breakdown by Operational Code

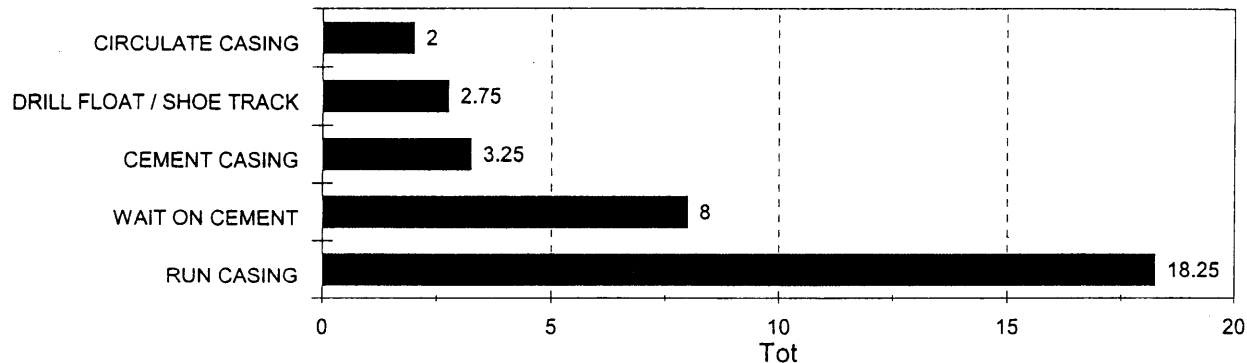


TIME BREAKDOWN DATABASE - single well overview

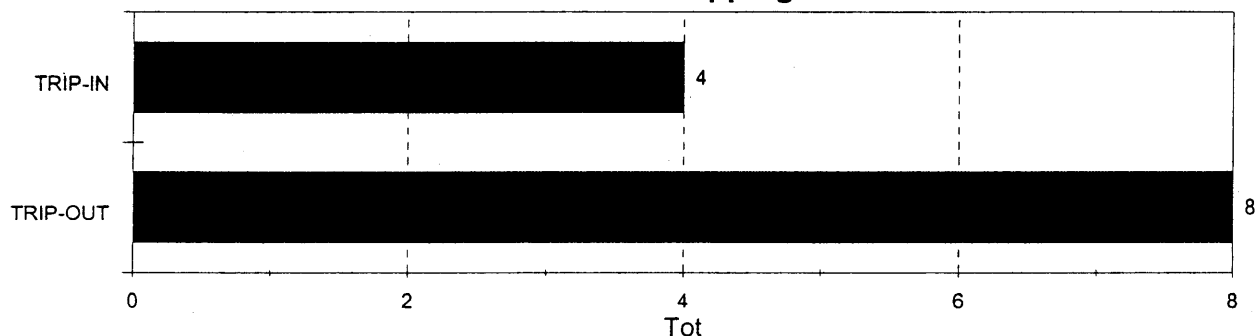
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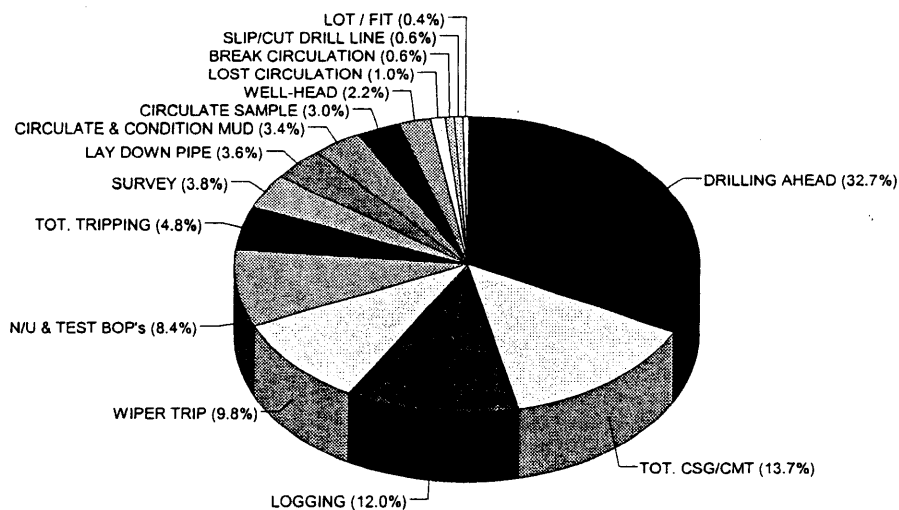
Breakdown of Total Csg & Cmtng Time



Breakdown of Total Tripping Time



Time Analysis by Operational Codes

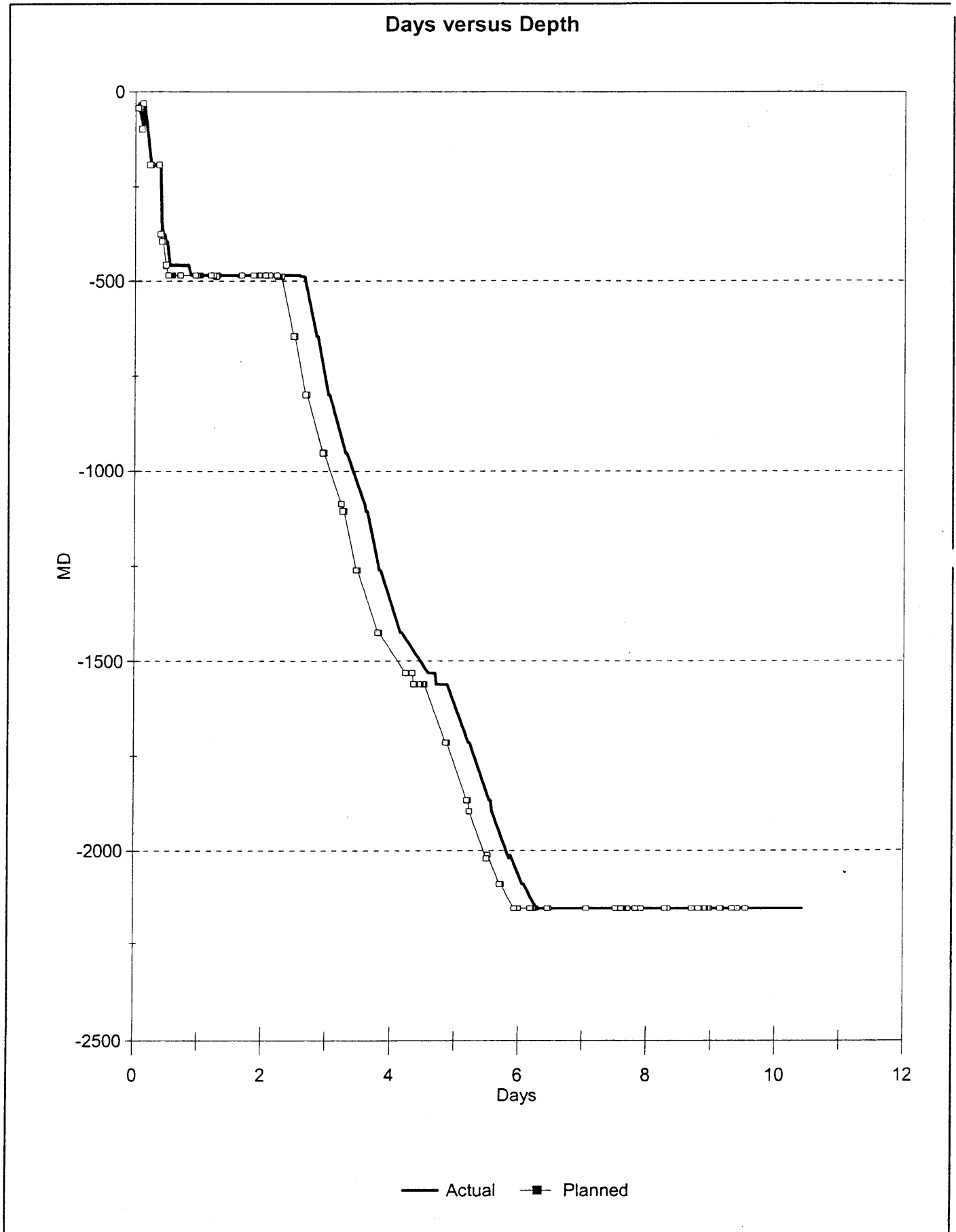


Operation	hrs
DRILLING AHEAD	81.8
TOT. CSG/CMT	34.3
LOGGING	30.0
WIPER TRIP	24.5
N/U & TEST BOP's	21.0
TOT. TRIPPING	12.0
SURVEY	9.5
LAY DOWN PIPE	9.0
CIRCULATE & CONDIT	8.5
CIRCULATE SAMPLE	7.5
WELL-HEAD	5.5
LOST CIRCULATION	2.5
BREAK CIRCULATION	1.5
SLIP/CUT DRILL LINE	1.5
LOT / FIT	1.0

TIME BREAKDOWN DATABASE - single well overview

WELL : NAYLOR #1

Pacesetter : none selected



RT above GL: 4 m Lat : 38 deg 52 min 61.00 sec Spud Date: 09/05/2001 Release Date: 19/05/2001
 GL above MSL: 46 m Long : 142 deg 48 min 25.57 sec Spud Time: 10:00:00 Release Time: 20:00:00

TIME BREAKDOWN DATABASE Non-Productive Time Analysis (NPT)

(Pre-Spud time excluded)

Total Time on Well (hrs) 250.0 (days) 10.42 Spud Date : 09/05/2001
 Total Trouble Time (hrs) 21.0 (days) 0.88 Total Depth : 2,157
 Trouble Time (%) 8.40 Final Depth : 2,157

Total NPT Hours per Phase

PHASE	HOURS
SURFACE HOLE	8.5
EVALUATION PROD. HOLE	12.5

NPT during programmed time

DATE	PHS	OPERATION	NPT hrs	DEPTH m	DESCRIPTION OF PROGRAMMED TROUBLE TIME
09/05/2001	SH	SURVEY	0.5	30	Run survey at 31m. Misrun. Monel sensor did not trip.
09/05/2001	SH	SURVEY	0.5	346	Survey @ 398m. Misrun.
09/05/2001	SH	SURVEY	0.5	376	Survey @ 359m. Misrun. Change out monel sensor for timer.
09/05/2001	SH	LOST CIRCULATION	0.5	458	Hole standing full at flowline. Work pipe and prepare 20bbls medium LCM at 13ppb.
09/05/2001	SH	LOST CIRCULATION	0.5	458	Spot LCM across bottom of hole. Regain partial circulation. Displace LCM from drill string. Work pipe and observe well. Fluid standing at flowline.
10/05/2001	SH	LOST CIRCULATION	0.5	458	Work pipe slowly. Observe well. Fluid static at flowline.
10/05/2001	SH	LOST CIRCULATION	0.5	458	Pull 5stds wiper trip to clear BHA.
10/05/2001	SH	LOST CIRCULATION	0.5	458	Work pipe and attempt to circulate. Hole standing full. No circulation.
10/05/2001	SH	WIPER TRIP	1.0	458	POOH. Wiper trip to clear BHA.
10/05/2001	SH	WIPER TRIP	0.5	458	Clean mud from BHA. Prepare 50 bbls LCM at 25ppb.
10/05/2001	SH	WIPER TRIP	1.0	458	RIH 5 stds. Attempt to break circulation.
10/05/2001	SH	WIPER TRIP	0.5	458	POOH 2 stds and attempt to break circulation.
10/05/2001	SH	WIPER TRIP	1.5	458	RIH to 458m. Pump 50 bbls LCM. Regained circulation. Flowline plugged. Continue to circulate. Jet cellar. Clear flowline.
16/05/2001	EP	WIPER TRIP	3.0	2,157	RIH w/ drlg Assy. Wiper trip.
16/05/2001	EP	SLIP/CUT DRILL LINE	1.0	2,157	Slip 33' drlg line.
17/05/2001	EP	WIPER TRIP	1.5	2,157	RIH. Tag obstruction at 2005m.
17/05/2001	EP	WIPER TRIP	0.5	2,157	Wash and ream obstruction 2005m - 2024m.
17/05/2001	EP	WIPER TRIP	0.5	2,157	RIH to 2157m.
17/05/2001	EP	CIRCULATE & CONDITION MUD	1.0	2,157	Circulate hole clean.
17/05/2001	EP	WIPER TRIP	3.0	2,157	POOH. Work area at 2005m.
17/05/2001	EP	LOGGING	2.0	2,157	Reeves RIH w/ SWC-GR. Held up at 2000m. POOH. Abandon SWC run.

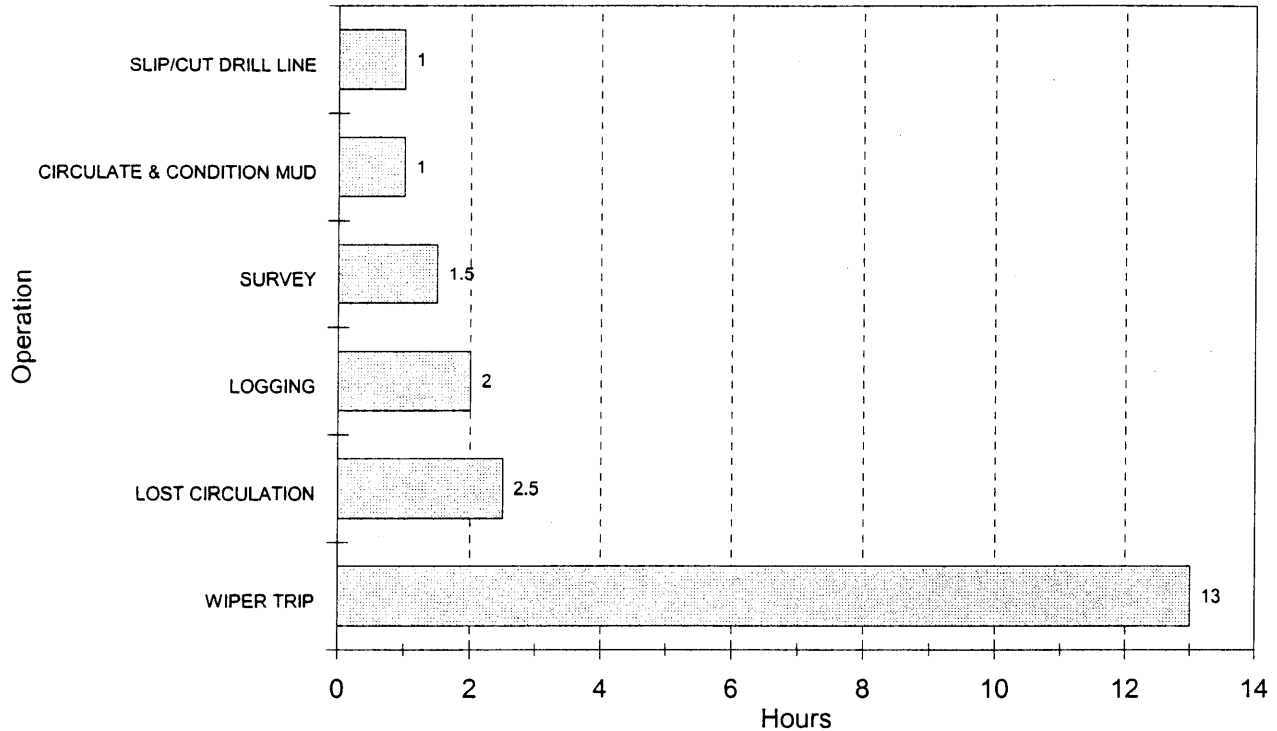
NPT during unprogrammed time

DATE	PHS	OPERATION	NPT hrs	DEPTH m	DESCRIPTION OF UNPROGRAMMED TROUBLE TIME
			0.0		No Trouble Time Present

RT above GL: 4 m Lat : 38 deg 52 min 61.00 sec Spud Date: 09/05/2001 Release Date: 19/05/2001
 GL above MSL: 46 m Long : 142 deg 48 min 25.57 sec Spud Time: 10:00:00 Release Time: 20:00:00

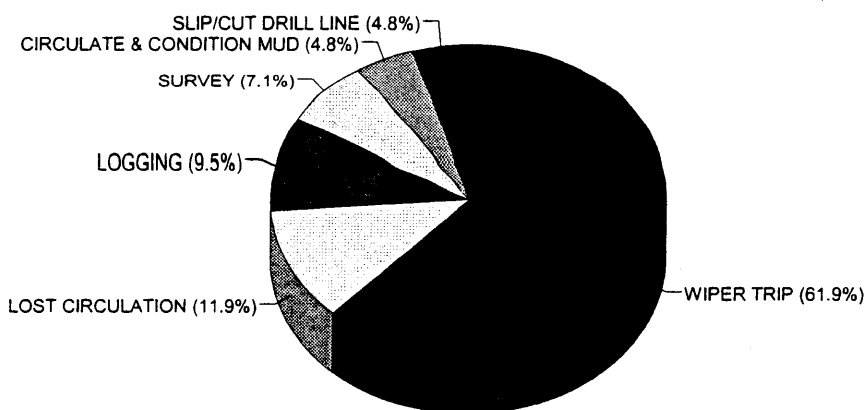
TIME BREAKDOWN DATABASE Non-Productive Time Analysis (NPT) (Pre-Spud time excluded)

Trouble Drilling by Operational Code



Trouble Drilling by Operational Code

OPERATION	HRS
WIPER TRIP	13.0
LOST CIRCULATION	2.5
LOGGING	2.0
SURVEY	1.5
CIRCULATE & CONDITION MUD	1.0
SLIP/CUT DRILL LINE	1.0



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Section 6.0

Survey Data

- IDS Survey Report

NAYLOR #1

Drilling Co.: OD&E

Rig: OD&E #30

RT above GL: 4 m Lat : 38 deg 52 min 61.00 sec Spud Date: 09/05/2001 Release Date: 19/05/2001
 GL above MSL : 46 m Long : 142 deg 48 min 25.57 sec Spud Time: 10:00:00 Release Time: 20:00:00

Magnetic Declination (degs): 12.00

Projection:

DEVIATION SURVEY

MD (m)	TVD (m)	INCL (deg)	AZIMUTH (deg)	CORRECT. AZ (deg)	DOGLEG (deg/30m)	'V' SECT (m)	N/S (m)	E/W (m)	CLOSURE (m)
80	80	0.20	310	322	0.3	0	0	-0	0
174	174	0.20	80	92	0.4	0	0	-0	0
377	377	0.20	323	335	0.2	1	1	0	1
473	473	0.12	315	327	0.1	1	1	0	1
635	635	1.25	85	97	0.8	1	1	2	2
787	787	0.30	20	32	0.8	1	1	4	4
934	934	0.70	286	298	0.5	2	2	3	3
1,099	1,099	0.50	355	7	0.4	3	3	2	4
1,254	1,254	0.70	235	247	0.7	3	3	1	3
1,420	1,420	0.50	178	190	0.4	2	2	0	2
1,553	1,553	0.50	157	169	0.1	1	1	0	1
1,695	1,695	2.00	147	159	1.1	-2	-2	1	2
1,848	1,848	4.75	137	149	1.8	-10	-10	6	11
2,014	2,013	8.00	125	137	2.1	-24	-24	17	30
2,070	2,068	6.90	110	122	4.0	-29	-29	23	37
2,150	2,148	5.00	107	119	2.4	-33	-33	30	45

NAYLOR #1

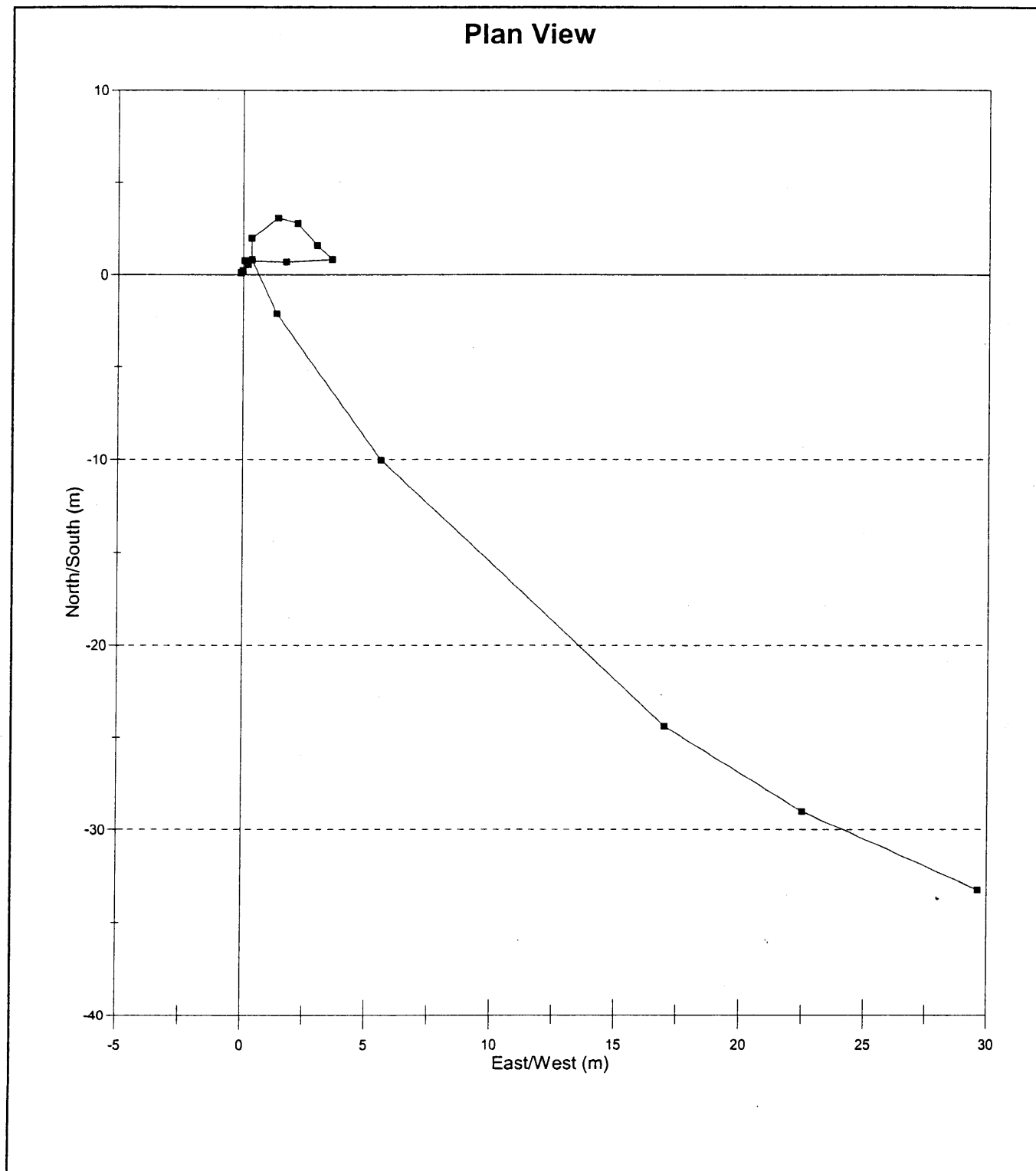
Drilling Co.: OD&E

Rig: OD&E #30

RT above GL: 4 m Lat : 38 deg 52 min 61.00 sec Spud Date: 09/05/2001 Release Date: 19/05/2001
GL above MSL : 46 m Long : 142 deg 48 min 25.57 sec Spud Time: 10:00:00 Release Time: 20:00:00
Magnetic Declination (degs): 12.00
Projection:

908040 101

DEVIATION SURVEY



908040 102

NAYLOR #1

Drilling Co.: OD&E

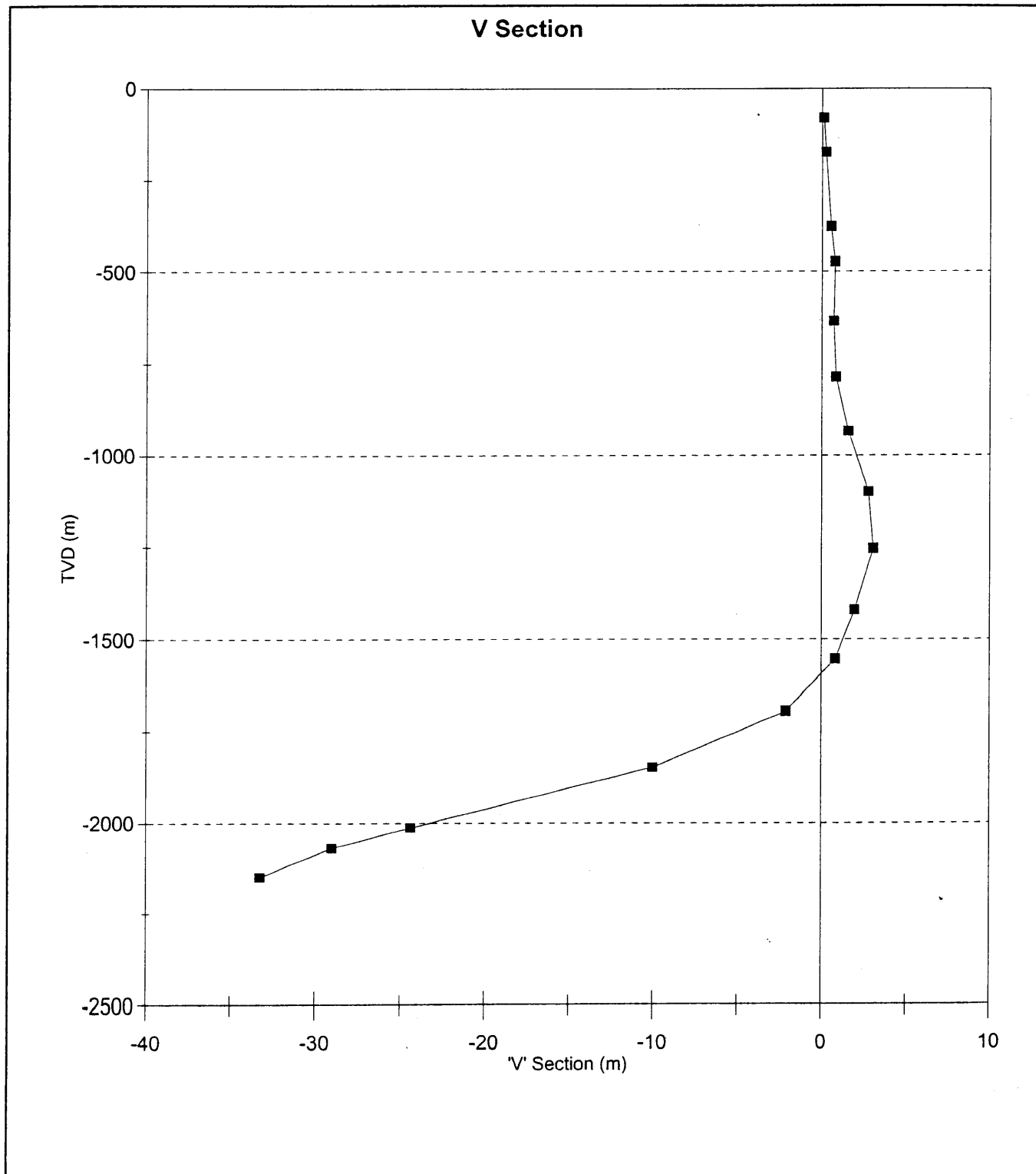
Rig: OD&E #30

RT above GL: 4 m Lat : 38 deg 52 min 61.00 sec Spud Date: 09/05/2001 Release Date: 19/05/2001
GL above MSL : 46 m Long : 142 deg 48 min 25.57 sec Spud Time: 10:00:00 Release Time: 20:00:00

Magnetic Declination (deg): 12.00

Projection:

DEVIATION SURVEY




908040 103

APPENDIX XIII: RIG SPECIFICATIONS


Rig Inventory for RIG # 30

DRAWWORKS	:	Ideco Hydair H-725-D double drum with V-80 Parmac hydromatic brake, Martin Decker satellite automatic drilling control. Max. single line pull - 50,000 lbs. Main drum grooved for 1-1/8" drilling line.
SUBSTRUCTURE	:	One piece substructure 14' high x 13'6" wide x 50' long with 12' BOP clearance. Setback area loading: 250,000 lbs Casing area loading: 275,000 lbs
ENGINES	:	Four (4) Caterpillar Model 3412 PCTA diesel engines.
BRAKE	:	V-80 Parmac hydromatic brake,
MAST	:	Dreco Model #: M12713-510 Floor Mounted Cantilever Mast designed in accordance with API Specification 4E Drilling & Well Servicing Structures. Hook load Gross Nominal Capacity - 510,000 lbs with:- 10 lines strung - 365,000 lbs 8 lines strung - 340,000 lbs Clear working height of 127'. Base width of 13'6". Adjustable racking board with capacity for i) 108 stands of 4.1/2" drill pipe, ii) 10 stands of 6.1/2" drill collars, iii) 3 stands of 8" drill collars Designed to withstand an API windload of 84 mph with pipe racked and 100 mph with no pipe racked.
CATHEADS	:	One (1) Foster Model 37 make-up spinning cathead mounted on drillers side. One (1) Foster Model 24 break-out cathead mounted off drillers side.
TRAVELLING BLOCK/HOOK	:	One (1) 667 Crosby McKissick 250 ton combination block hook Web Wilson. 250 ton Hydra hook Unit 5 - 36" sheaves.
WINCHES	:	One (1) Ingersol Rand HU-40 with 5/8" wireline. Capacity 2,000 lb. One (1) ANSI B30.7 with 3/8" wire capacity 4000lbs @ 70 fpm
SWIVEL	:	One (1) Oilwell PC-300 ton swivel
RIG LIGHTING	:	Explosive proof fluorescent. As per approved State Specifications.
KELLY DRIVE	:	One (1) 27 HDP Varco kelly drive bushing.
MUD PUMPS	:	Two (2) Gardner Denver mud pumps Model PZH-8 each driven by 750 HP EMD D-79 motors. 8" stroke with liner size 6" through to 5". 6" liner maximum pressure 2387 psi 5.1/2" liner maximum pressure 2841 psi 5" liner maximum pressure 3437 psi 6" liner maximum volume 412 gpm 5.1/2" liner maximum volume 345 gpm 5" liner maximum volume 280 gpm
MIXING PUMP	:	Two (2) Mission Magnum 5" x 6" x 14" centrifugal pump complete with 50 HP, 600 Volt, 60 Hz, 3 phase explosion proof electric motors.
MUD AGITATORS	:	Five (5) Geolograph/Pioneer 40TD - 15" 'Pitbull' mud agitators with 15 HP, 60 Volt, 60 HZ, 3 phase electric motors.

LINEAR MOTION SHALE SHAKERS	:	Two (2) DFE SCR-01 Linear motion shale shakers.
DEGASSER	:	48" Dia Poor Boy Degasser
DESILTER	:	One (1) DFE - Harrisburg style 12 cone desilter 12 x 5" cones. Approximate output of 960 gpm. Driven by Mission Magnum 5" x 6" x 11" centrifugal pump complete with 50 hp 600 volt 60 Hz 3 phase explosion proof motor.
GENERATORS	:	Four (4) Brown Boveri 600 volt, 600 Kw, 750 kva, 3 phase, 60 HZ AC generators. Powered by four (4) Cat 3412 PCTA diesel engines.
BOP's & ACCUMULATOR	:	One (1) Wagner Model 20-160 3 BND 160 gallon accumulator consisting of: Sixteen (16) 11 gallon bladder type bottles One (1) 20 HP electric driven triplex pump 600 volts, 60 HZ, 3 phase motor and controls.
BOP's & ACCUMULATOR (Cont'd)	:	One (1) Wagner Model A 60 auxiliary air pump 4.5 gals/minute. One (1) Wagner Model UM2SCB5S mounted hydraulic control panel with five (5) 1" stainless steel fitted selector valves and two (2) stripping controls and pressure reducing valves. Three (3) 4" hydraulic readout gauges:- one for annular pressure- one for accumulator pressure one for manifold pressure. One (1) Stewart & Stevenson 5 station remote drillers control with air cable umbilical with three pressure gauges, increase and decrease control for annular pressure. One (1) Shaffer 13.5/8" x 3,000 psi spherical annular BOP, One (1) Shaffer 13.5/8" x 5,000 psi LWS studded, double gate autolock B.O.P.
KELLY COCK (UPPER)	:	Two (2) Upper Kelly Cock 7.3/4" OD with 6.5/8" API connections (1 x M&M, 1 x Hydril).
KELLY COCK (LOWER)	:	Three (3) M&M Lower Kelly Cocks 6.1/2" OD with 4" IF connections
DRILL PIPE SAFETY VALVE	:	One (1) Hydril 6.1/2" stabbing valve (4" IF). One (1) Gray inside BOP with 4.3/4" OD and 2.1/4" ID with 3.1/2" IF connections c/w releasing tool and thread protectors.
AIR COMPRESSORS AND RECEIVERS	:	Two (2) LeRoi Dresser Model 660A air compressor packages c/w 10 HP motors rated at 600 Volts, 60 HZ, 3 phase. Receivers each 120 gallon capacity and fitted with relief valves.
POWER TONGS	:	One (1) Farr 13.5/8" - 5.1/2" hydraulic casing tongs c/w hydraulic power pack and hoses and torque gauge assembly. One (1) Foster hydraulic kelly spinner with 6.5/8" LH connection.
TORQUE WRENCH	:	Yutani c/w drive sockets 1 1/8" through to 2 3/8"
SPOOLS	:	One (1) set double studded adaptor flanges to mate 13.5/8" 5,000 psi. API BOP flange to following wellhead flange 13.5/8" x 3,000 series, 11" x 3,000 series, 11" x 5,000 series 7.1/16" x 3,000 series, 7.1/16" x 5,000 series 4 1/16" 5000 x 3 1/16" 5000 3 1/16" 5000 x 2 1/16" 5000

SPOOLS (Cont'd)	:	1 double studded adaptor flange 4 1/16" 5K x 3 1/16" 5K 1 double studded adaptor flange 3 1/16" 5K x 2 1/16" 5K 1 only 14" - BOP mud cross (drilling spool) 13.5/8" 5,000 x 13.5/8" 5,000 BX160. with 2 x 3 1/16" 5K outlets. 1 only BOP spacer spool 13 5/8" 3,000 x 13 5/8" 3,000 1 only BOP spacer .spool 11" 3,000 x 13.5/8" 5,000 .
ROTARY TABLE	:	One (1) Oilwell A 20.1/2" rotary table torque tube driven from drawworks complete with Varco MASTER bushings and Insert Bowls.
MUD TANKS	:	SHAKER Active No 1. 277 BBL Desilter 73 BBL Sand Trap 50 BBL Trip Tank 29 BBL Total <u>429 BBL</u> SUCTION Active No 2 174 BBL Pre-Mix 146 BBL Pill Tank 63 BBL Total <u>383 BBL</u>
TRIP TANK	:	Trip Tank <u>29 BBL</u> One (1) Mission Magnum 2" x 3" centrifugal pump complete with 20 HP, 600 Volts, 60 HZ, 3 phase explosion proof motors
KILL LINE VALVE	:	2 x 3 1/8" Cameron FL 5K gate valves
CHOKE LINE VALVES	:	1 x 4 1/16 Cameron FC 5K hydraulic operated gate valve 1 x 4 1/16 5K manual gate valve
CHOKE MANIFOLD	:	One (1) McEvoy choke and kill manifold 3" 5,000 psi with hydraulic Swaco "super" choke.
DRILL PIPE	:	240 joints (2270 m) - 3.1/2" 13.30lb/ft drill pipe Grade 'G' 105 with 3 1/2" IF conn
PUP JOINTS	:	One (1) - 10' (3.65 m) 3.1/2" OD Grade 'G' with 3.1/2" IF conn
HEVI-WATE DRILL PIPE	:	6 joints of 3.1/2" H.W.D.P. with 3.1/2" IF conn
DRILL COLLARS	:	12 x 6.1/2" OD drill collars (113 m) with 4" IF conn 24 x 4 3/4" O.D. drill collars (227 m) with 3.1/2" IF conn 1 x 4.3/4" OD Pony Drill Collar
KELLIES	:	Two (2) Square Kelly drive 4.1/4" x 40' complete with Scabbard and 55 ft x 3 1/2" kelly hose
FISHING TOOLS	:	One (1) only 8.1/8" Bowen series 150 FS overshot One (1) 5.3/4" SH Bowen 150 Overshot c/w grapples and packoffs to fish contractors downhole equipment. One (1) only Reverse circulating junk basket 4" IF box One (1) only 6.1/2" OD Griffith Fishing Jars One (1) only 4 3/4" O.D. Bowen Type "Z" Fishing Jar One (1) only Bumper Sub 6.1/2" OD 4" IF pin & box. One (1) 5" R.C.J.B. One (1) 5" Junk Sub with 4.3/4" OD x 1.1/2" ID.
WIRELINE SURVEY UNIT	:	Gearmatic hydraulic drive Model 5 c/w .092" line

SUBSTITUTES	:	<p>Two (2) Bit Sub - 7.5/8" reg x 6.5/8" reg double box. Two (2) Bit Subs - 6.5/8" reg double box. Two (2) Bit Sub - 6.5/8" reg box. x 4 1/2" IF box Two (2) Bit Subs - 4 1/2" reg x 4" IF double box. Two (2) 4.3/4" bit subs (36" long) with 3.1/2" IF box x 3.1/2" reg box bored for float. One (1) Float Sub 6.5/8" reg box (FC) x 6.5/8" reg pin Two (2) XO Sub - 4" IF box x 4 1/2" IF pin. Two (2) XO Sub - 4 1/2" IF box x 4" IF pin. One (1) XO Sub - 4 1/2" reg x 4" IF double pin. Two (2) XO Sub - 6.5/8" reg pin x 4" IF box. One (1) Junk Sub - 6.5/8" reg pin x 6.5/8" reg box One (1) Junk Sub - 4 1/2" reg box x 4 1/2" reg pin. One (1) XO Sub - 4 1/2" IF box x 4" IF box. Two (2) Kelly Saver Subs c/w rubber 4" IF pin & box. Two (2) Kelly Saver Subs 4" IF pin & box One (1) Kelly Saver Subs 4 1/2" IF pin & box. Two (2) 4 IF box x 3.1/2" IF pin Saver Subs. One (1) Circulating Subs - 4" IF x 2" 1502 hammer union. One (1) Circulating Subs - 4" IF x 2" 602 hammer union. Eleven (11) Lifting Subs - 18" Taper 4 1/2" pick up neck and 4" IF pin. Eight (8) Lift Subs with 3.1/2" OD D.P. neck and 3.1/2" IF pin connections.</p>
HANDLING TOOLS	:	<p>2 only 4 1/2" BJ 250 ton 18 degree taper D/P elevators. 1 only 3 1/2" BJ 200 ton 18 degree taper D/P elevators. 1 only 3.1/2" BJ type MGG 18° centre latch Elevators. 1 only 4 1/2" Varco SDXL D/P slips. 1 only 4 1/2" Varco SDML D/P slips 2 only 8" - 6 1/2" DCS-R drill collar slips. 1 only 3.1/2" Varco SDML Slips 1 only 4.3/4" Varco DCS-S Drill Collar Slips</p>
CASING RUNNING TOOLS	:	<p>1 only 13.3/8" Webb Wilson 150 ton side door elevator. 1 only 13.3/8" single joint P.U. elevators. 1 only 9.5/8" Webb Wilson 150 ton side door elevators. 1 only 9.5/8 single joint P.U. elevator. 1 only 7" BJ 150 ton side door elevators. 1 only 7" single joint P.U. elevators. 1 only 5 1/2" BJ 200 ton S11 1 only 2.7/8" BJ 100 ton tubing elevator. 1 only 2.3/8" BJ 100 ton tubing elevator. (all P.U. elevators c/w slings & swivel) 1 only 13.3/8" Varco CMS-XL casing slips 1 only 9.5/8" Varco CMS-XL casing slips. 1 only 7" Varco CMS-XL casing slips. 1 only 3.1/2" Varco SDML tubing slips.</p>
CASING / TUBING DRIFTS	:	<p>9 5/8, 7", 5 1/2", 3 1/2"</p>
THREAD PROTECTORS	:	<p>9 5/8, 7".</p>
KELLY SPINNER	:	<p>One (1) Foster hydraulic kelly spinner with 6.5/8" LH connection.</p>
PIPE SPINNER	:	<p>One (1) International 850H hydraulic pipe spinner</p>
WELDING EQUIPMENT	:	<p>1 - Miller 400 amp welding machine. 1 - oxy acetylene set.</p>
DOGHOUSE	:	<p>1 Doghouse 5m x 2.4m x 2.3m</p>
GENERATOR HOUSE	:	<p>Ross Hill SCR</p>


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UTILITY HOUSE	:	1 Utility and Mechanics House
CATWALKS	:	2 catwalks total 18.6m long x 1.6m wide x 1.08m high
PIPE RACKS	:	8 - 9m tumble racks.
DAY FUEL TANK	:	1 only 19,000 ltrs
WATER/FUEL TANK	:	WATER 1 only 320 bbls. 1 only brake cooling tank 80 bbl FUEL 1 only 27,500 litres
OIL STORAGE	:	drums
DRILLING RATE RECORDER	:	1 only 6 pen Pioneer Geolograph drill sentry recorder to record: weight (D) penetration (feet) pump pressure (0-6,000 psi) electric rotary torque rotary speed (rpm) pump spm (with selector switch)
DEVIATION RECORDER	:	1 set Totco 'Double Shot' deviation instrument 0□-8□.
INSTRUMENTS & INDICATORS	:	1 only Martin Decker Sealtitle. 1 only Martin Decker Deadline type. 1 only drillers console including the following equipment. Martin Decker Weight Indicator type'D' Electric rotary torque gauge. MD Totco Mud Watch Instrumentation c/w display and alarms. Rotary rpm gauge
MUD TESTING	:	1 set Baroid mud testing laboratory (standard kit
RATHOLE DRILLER	:	One (1) fabricated rotary table chain driven.
MUD SAVER	:	Okeh unit
CELLAR PUMP	:	Cellar jet from No 1 pump
WATER PUMP	:	Three (3) Mission Magnum 2" x 3" centrifugal pumps c/w 20 HP, 600 Volts, 60 HZ, 3 phase explosion proof motors
FIRE EXTINGUISHERS	:	Dry Chemical Rig 22 Camp 20 CO2 Rig 3 Camp 0 Foam Rig 1 Camp 1
PIPE BINS	:	5 units
CUP TESTER	:	Two (2) Grey Cup Tester c/w test cups for 9.5/8" & 13.3/8".
DRILLING LINE	:	5,000' 1.1/8" - E.I.P.S

TRANSPORT EQUIPMENT AND MOTOR VEHICLES

One (1) International 530 Forklift
 One (1) Tray Top Utility
 One (1) Crew Bus

CAMP EQUIPMENT

Four (4) x 8-Man Bunkhouses (12 man emergency)
 One (1) x Recreation/Canteen unit
 One (1) x Ablution/Laundry/Freezer unit
 One (1) x Kitchen/Cooler/Diner unit
 One (1) x Toolpushers unit
 One (1) x Meeting / Smoko unit
 One (1) x Combined Water/Fuel Tank unit
 Two (2) x CAT 3304PC generator sets each 106 kVa, 86 KW, 50 HZ.

NOTE: At Contractor's discretion any of the foregoing items may be replaced by equipment of equivalent or greater capacity.


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ENCLOSURE I: 1 : 200 COMPOSITE LOG

908040 111

PE605298

This is an enclosure indicator page.
The enclosure PE605298 is enclosed within the
container PE908040 at this location in this
document.

The enclosure PE605298 has the following characteristics:

- ITEM_BARCODE = PE605298
- CONTAINER_BARCODE = PE908040
 - NAME = Encl.1 Naylor-1 Composite Well Log
 - BASIN = OTWAY
 - ONSHORE? = Y
 - DATA_TYPE = WELL
 - DATA_SUB_TYPE = COMPOSITE_LOG
 - DESCRIPTION = Encl.1 Naylor-1 Composite Well Log,
Scale 1:200, W1318, PEP154. Enclosure 1
contained within "Naylor-1 Well
Completion Report" [PE908040].
- REMARKS =
- DATE_WRITTEN = 27-NOV-2001
- DATE_PROCESSED =
- DATE_RECEIVED = 30-NOV-2001
- RECEIVED_FROM = Santos Ltd
 - WELL_NAME = Naylor-1
- CONTRACTOR =
- AUTHOR =
- ORIGINATOR = Santos Ltd
- TOP_DEPTH =
- BOTTOM_DEPTH =
- ROW_CREATED_BY = DN07_SW

(Inserted by DNRE - Vic Govt Mines Dept)

ENCLOSURE II: 1 : 500 MUDLOG


PE605299

This is an enclosure indicator page.
The enclosure PE605299 is enclosed within the
container PE908040 at this location in this
document.

The enclosure PE605299 has the following characteristics:

ITEM_BARCODE = PE605299
CONTAINER_BARCODE = PE908040
NAME = Encl.2 Naylor-1 Mud Log
BASIN = OTWAY
ONSHORE? = Y
DATA_TYPE = WELL
DATA_SUB_TYPE = MUD_LOG
DESCRIPTION = Encl.2 Naylor-1 Mud Log, Scale 1:500,
by Geoservices Logging, for Santos Ltd,
W1318, PEP154. Enclosure 2 contained
within "Naylor-1 Well Completion
Report" [PE908040]
REMARKS =
DATE_WRITTEN =
DATE_PROCESSED =
DATE_RECEIVED = 30-NOV-2001
RECEIVED_FROM = Santos Ltd
WELL_NAME = Naylor-1
CONTRACTOR = Santos Ltd
AUTHOR =
ORIGINATOR = Santos Ltd
TOP_DEPTH = 0
BOTTOM_DEPTH = 2225
ROW_CREATED_BY = DN07_SW

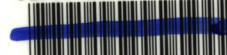
(Inserted by DNRE - Vic Govt Mines Dept)


908040 112

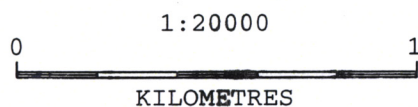
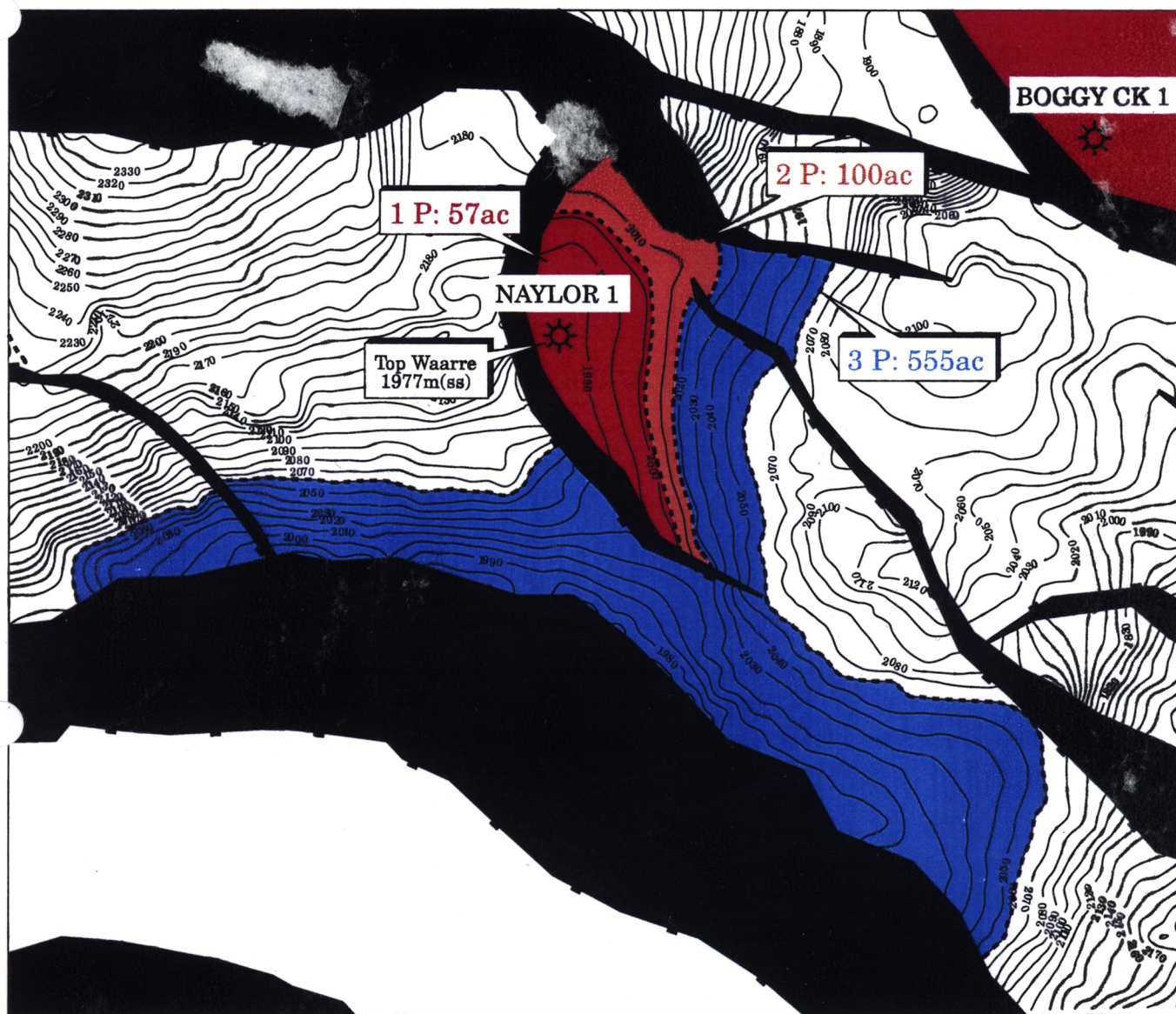
ENCLOSURE III: STRUCTURE MAPS

NAYLOR

DEPT. NAT. RES & ENV



PE908041



UNIVERSAL TRANSVERSE MERCATOR PROJECTION
G.R.S. 1980 SPHEROID
CENTRAL MERIDIAN 141 00 00 E
Mapsheet datum: "GDA94"



Santos

DEPTH

Near Top Waarre Sand

May 2001

M.Majedi

(Horizon : cv_war_pk)

(based on ave.vel.of 2622m/s from Naylor_1)

Date : July 27, 2001	Author :	ENCL
Contour Interval : 5m	Drafted :	
Datum : G.R.S. 1980	File No. :	