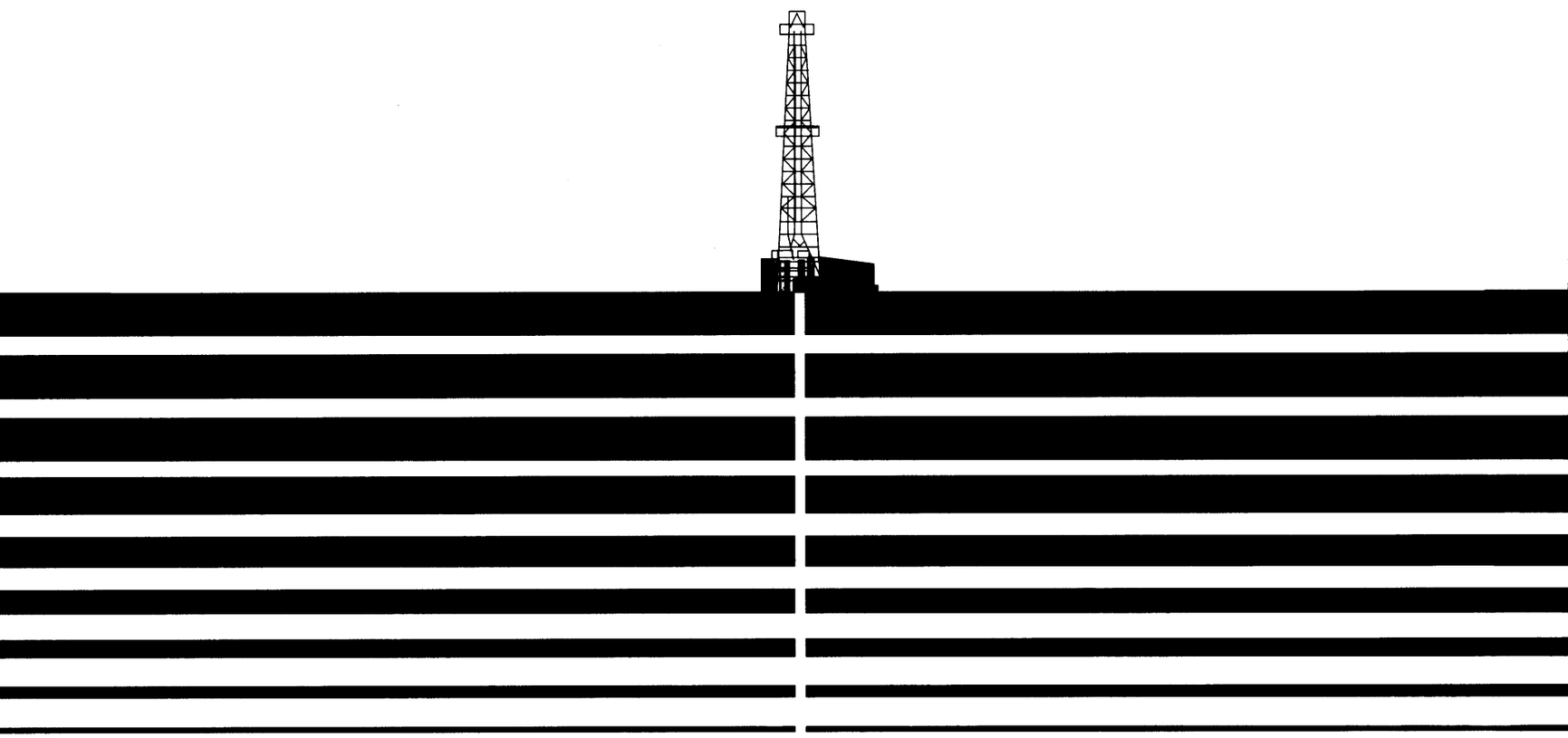
(PAGE 1 OF 116)

908031 001

LAVERS 1

Well Completion Report



Santos

PEP 154, OTWAY BASIN
VICTORIA

A.B.N. 80 007 550 923

SANTOS – BEACH

COMPILED FOR

SANTOS LIMITED

ACN 007 550 923

LAVERS 1

WELL COMPLETION REPORT

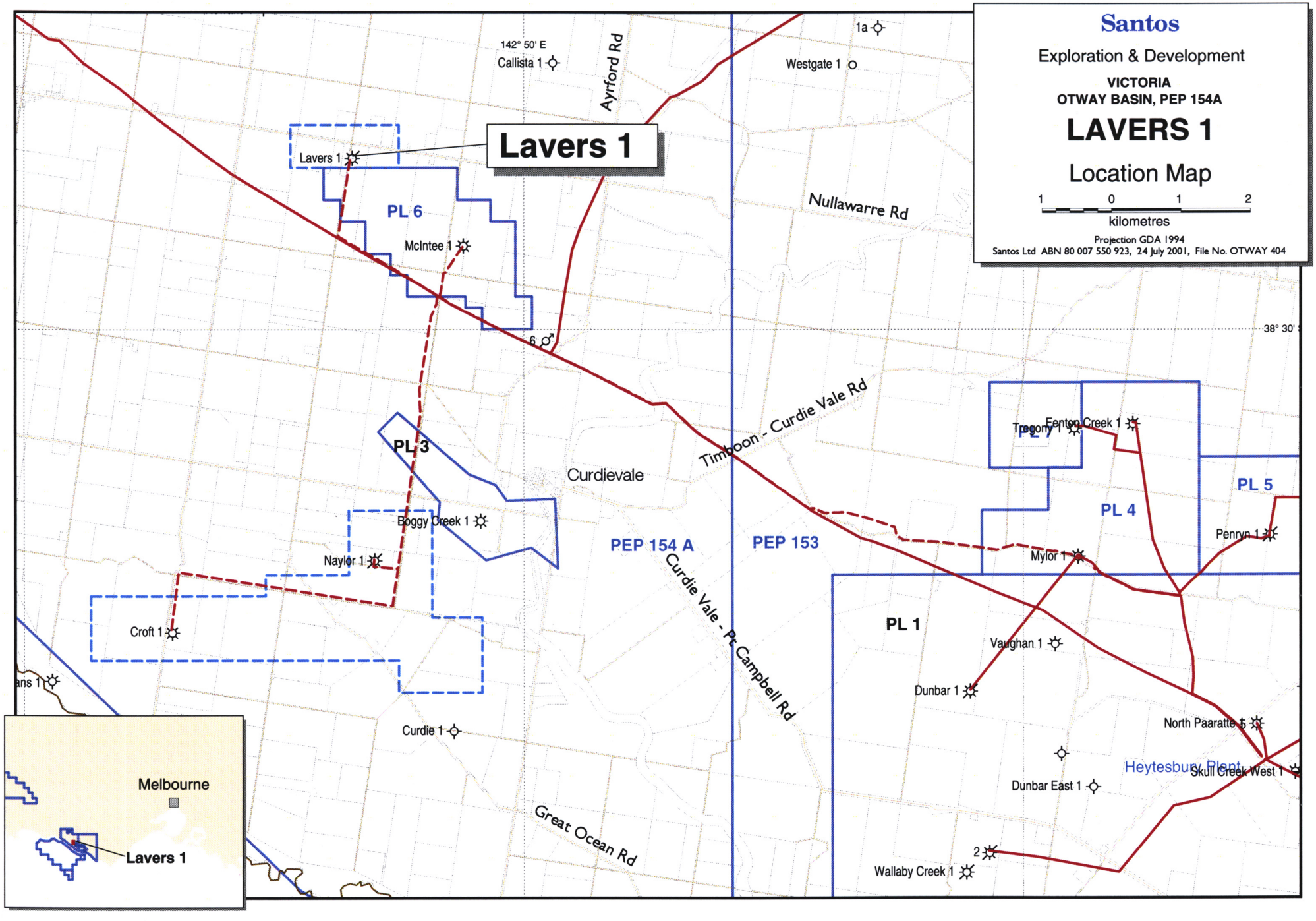
Prepared by:
D.ADDERLEY
July 2001

LAVERS 1 WCR

TABLE OF CONTENTS

Note: Strikethrough of an Appendix name in Table of Contents (ie. ~~III Log Evaluation~~) denotes data not acquired.

LOCATION MAP


Santos
Exploration & Development
VICTORIA
OTWAY BASIN, PEP 154A
LAVERS 1
Location Map
1 0 1 2
kilometres
Projection GDA 1994
Santos Ltd ABN 80 007 550 923, 24 July 2001, File No. OTWAY 404
Lavers 1
142° 50' E
Callista 1
Ayrford Rd
1a
Westgate 1
Nullawarre Rd
PL 6
McIntee 1
6
38° 30'
Timboon - Curdie Vale Rd
PL 3
Curdievale
Boggy Creek 1
Naylor 1
Croft 1
Curdie 1
PEP 154 A
PEP 153
Curdie Vale - Pt Campbell Rd
PL 7
Tregony 1
Fenton Creek 1
PL 4
PL 5
Penryn 1
Mylor 1
PL 1
Vaughan 1
Dunbar 1
North Paaratte 5
Heytesbury Plant
Skull Creek West 1
Dunbar East 1
2
Wallaby Creek 1
Great Ocean Rd
Melbourne
Lavers 1

9080031 005

908031 006

WELL DATA CARD

REVISION 1 (11/11/96)

WELL: LAVERS 1	**WELL CATEGORY:** EXP (WILD) **WELL INTENT:** GAS	**SPUD:** 26/04/01 1100 hrs **TD REACHED:** 1/5/01 2030hrs
		RIG RELEASED: 05/05/01 1500 hrs **CMPLT:**
LAT: 38° 28' 44.77" S	**LONG:** 142° 48' 12.62" E **(AGD84)**	**RIG:** OD&E 30
LAT: 38° 28' 39.45" S	**LONG:** 142° 48' 17.46" E **(GDA94)**	**STATUS:** CASED AND SUSPENDED GAS WELL
SEISMIC STATION: INLINE 2490 C'vale 3D CDP 10163		**REMARKS:**
ELEVATION GND: 63.86m	**RT:** 68.55 m	
BLOCK/LICENCE: PEP 154		
TD 1608 m (Logr Ext)	1627 m (Drlr)	
PBTD m (Logr)	1563 m (Drlr)	
TYPE STRUCTURE: TILTED FAULT BLOCK		
TYPE COMPLETION: 3 ½ " MONOBORE		
ZONE(S): WAARRE FORMATION		

CASING SIZE	SHOE DEPTH	TYPE
7 5/8"	425m	26.4 lb/ft
3 ½"	1623m	9.3 lb/ft

AGE	FORMATION OR ZONE TOPS	DEPTH (m)		THICKNESS	HIGH (H)
		LOGGERS	TVD SS	TVD (m)	LOW (L)
EARLY – MID MIOCENE	GELLIBRAND MARL	209	140	353	N/P
L OLIGOCENE – E MIOCENE	CLIFTON FM	562	493	16	20.5mL
LATE EOCENE	NARRAWATURK MARL	577	509	51	N/P
MIDDLE – LATE EOCENE	MEPUNGA FM	628	560	89	N/P
EARLY – MIDDLE EOCENE	DILWYN FM	717	649	265	N/P
L PALEOCENE – E EOCENE	PEMBER MUDSTONE	982	914	53	N/P
EARLY – LATE PALEOCENE	PEBBLE POINT FM	1035	966	41	5.5mL
L SENONIAN – E PALEOCENE	MASSACRE SHALE	1075	1007	34	N/P
LATE SENONIAN	TIMBOON SANDSTONE	1109	1040	108	N/P
LATE SENONIAN	PAARATTE GP	1217	1148	89	153.5mL
LATE SENONIAN	SKULL CREEK MUDSTONE	1305	1237	90	94mL
LATE SENONIAN	NULLAWARRE	1395	1326	51	76.5mL
LATE SENONIAN	BELFAST MUDSTONE	1446	1377	77	40.5mL
LATE SENONIAN	FLAXMANS FM	1522	1454	21	54mL
LATE SENONIAN	WAARRE SANDSTONE	1543	1474	39	60.5mL
LATE SENONIAN	WAARRE C	1543	1474	20	N/P
LATE SENONIAN	WAARRE B	1563	1495	9	N/P
LATE SENONIAN	WAARRE A	1572	1503	11	N/P
EARLY NEOCOMIAN	EUMERELLA FM	1582	1514	47+	54mL
	TD				

PRELIMINARY LOG INTERPRETATION (Interval Averages)					
INTERVAL (m)	Ø %	Sw %	INTERVAL (m)	Ø %	Sw %
Waarre C SST	20.8	45%			
(10.5m of pay)					

PERFORATIONS (4 shots/m)	
FORMATION	INTERVAL

CORES				
FORM	NO.	INTERVAL	CUT	REC
NIL				

LOG	SUITE/ RUN	INTERVAL	BHT/TIME/ REMARKS
GR	1	1597m - Surface	59°C / 9 hrs / 1608m
LCS		1597m – 425m	
		1608m – 1450m	Waveform Sonic
DLS		1602m – 425m	
MLL		1607m – 425m	
PDS	2	1605m – 1450m	64°C / 16.75 hrs / 1608m
CNS		1602m – 1450m	

LOG	SUITE/ RUN	INTERVAL	BHT/TIME/ REMARKS
RFS	3	1590m – 1543m	63.5°C / 6 hrs / 1543m
SCG	4	1600m – 1535m	Side Wall Cores 24 shot gun

FORMATION TESTS										
NO.	INTERVAL (ft)	FORMATION	FLOW (mins)	SHUT IN (mins)	BOTTOM GAUGE IP/FP (psia)	SIP	MAX SURF PRESS (psia)	FLUID TO SURF (mins)	TC/ BC	REMARKS
										NO TESTS CONDUCTED

SUMMARY:

Lavers 1 is situated in SouthWestern 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 10163, inline 2490, on the Curdievale 3D Seismic Survey. It lies approximately 13 km north of the town of Peterborough, 5.6 km NNW of the Boggy Creek CO_2 field and 10 km west of the producing Mylor and Fenton Creek Gas Fields (Santos 100%). The Lavers structure is situated within the Port Campbell Embayment and the productive Waarre Sandstone play fairway.

The Lavers Prospect is a tilted-fault block closure within the greater McIntee Structural Complex and defined by 3D seismic.

Gas shows of up to 5000/100 units were detected while drilling in the 'unit C' the Waarre Formation (reservoir), and 3000/150 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-LCS-DLS-MLL; Run 2: PDS-CNS; Run 3: RFS; Run 4: SCG.

Log analysis of Lavers 1 has identified a total of:
10.5 metres of pay, average porosity of 20.8% and an average water saturation of 45%.

Lavers 1 reached a total depth of 1627m (Drlr), 1608m (Logr Ext), and has been cased with 3.5" production tubing.

As a result of the gas pay discovered in the Waarre C Sandstone, Lavers 1 was cased as a potential gas producer.

AUTHOR: D. Adderley | **DATE**: JULY 2001

WELL HISTORY

1. GENERAL DATA

Well Name:	Lavers 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° 28' 39.45" South Longitude: 142° 48' 17.46" East
Surveyed Elevation	Ground Level: 63.86m Rotary Table: 68.55m
Seismic Survey	CURDIEVALE 3D
Seismic Location	CDP 10163, LINE 2490
Total Depth	Driller: 1627.0m Logger Ext: 1608.0m
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	1100 hours, 26th April 2001
Date Drilling Completed	2030 hours, 1st May 2001
Date Rig Released	1500 hours, 5th 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:

Lavers 1 was spudded at 1100 hours on the 26th April 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 XII: (Drilling - Final Well Report).

TABLE I: CASING, HOLE, AND CEMENT DETAILS

BIT SIZE	DEPTH	CSG SIZE	CSG DEPTH	JNTS	CSG TYPE	CEMENT
9.875"	428m	7 5/8"	424.4m	36	26.4ppf L80 BT&C	156sx, 80 bbls Class 'G' Plus 94sx, 20bbls "G" tail
6.75"	1627m	3 1/2"	1623m	6	9.3ppf L80 New NK3SB	285sx, 145 bbls Class 'G' Plus 120sx, 25bbls Class 'G' tail
				162	9.3ppf J55 New NK3SB	

TABLE II: SUMMARY OF MUD SYSTEMS

MUD TYPE	INTERVAL (m)
Spud Mud (Gel/Water)	Surface – 428
KCL/PHPA	428 - 1627

(b) Lost Time:

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

(c) Water Supply:

Rig water for Lavers 1 was supplied from Heatley's Camp Bore.

(d) Mudlogging:

Mudlogging services were provided by Geoservices Ltd. Samples were collected, washed, and described at 15m intervals from the surface to 975m and at 3m intervals from 978m to total depth at 1627m. 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 Lavers 1.

(f) Coring:

No cores were cut in Lavers 1.

(g) Electric Logging:

One suite of wireline logs was run in Lavers 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	1597-Surface	59°C/9.0hrs	PDS (RHOB)	1/2	1605-1450	64°C/16.45hrs
LCS (comp-ensated sonic)	1/1	1597-425	59°C/9.0hrs	CNS (NPHI)	1/2	1602-1450	64°C/16.45hrs
LCS (wave-Form sonic)	1/1	1608-1450	59°C/9.0hrs	RFS (MDT)	1/3	20 points (1590m-1543m)	63.5°C/6.0hrs
DLS	1/1	1602-425	59°C/9.0hrs	SCG (SWC)	1/4	24/24 recovered (1600m-1535m)	-
MLL	1/1	1607-425	59°C/9.0hrs				

*Logger Contractor - REEVES

(h) Geothermal Gradient:

A measured static bottom hole temperature of 70°C at 1608m is calculated. This gives a geothermal gradient of 3.10°C/100m. An ambient temperature of 20°C was employed. Data used for calculations is as follows:

59°C at 1608m after 9.0 hours from Logging Run 1, Suite 1.
64.0°C at 1608m after 16.75 hours from Logging Run 2, Suite 1.
63.5°C at 1589m after 6.0 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 2.2° inclination 180°T at 1610m, with a maximum off set of 9.3m @ 170° (true).

(j) Velocity Survey:

No velocity survey was run in Lavers 1.

(k) Completion Summary:

Lavers 1 was cased and suspended.

GEOLOGY

1. PRE-DRILLING SUMMARY (after Well Proposal)

Lavers 1 is proposed as an Otway Basin gas exploration well to be located in the PEP 154 licence (90% Santos (operator) and 10% Beach Petroleum N.L), It lies approximately 13 km north of the town of Peterborough, 5.6 km NNW of the Boggy Creek CO_2 field and 10 km west of the producing Mylor and Fenton Creek Gas Fields (Santos 100%). The Lavers structure is situated within the Port Campbell Embayment and the productive Waarre Sandstone play fairway.

The Lavers Prospect is a tilted-fault closure within the greater McIntee Structural Complex and defined by 3D seismic. The well is expected to intersect a Waarre Sandstone reservoir with mean average net pay of 15.8m. The prospect exhibits a strong amplitude anomaly coincident with structural closure similar to other wells in the area which have proven to be gas filled.

The risk of major CO_2 is considered to be low as structurally Lavers is quite different to Boggy Creek structure (90% CO_2), which lies within a "shattered" zone, believed to provide the conduit for the migration of CO_2. Spill from Boggy Creek is likely to be to the northeast, away from Lavers 1.

The Lavers prospect is relatively small and drilling is contingent upon success at McIntee 1. It has a mean prognosed success case of 2.2 BCF sales gas (4.92 BCF OGIP) and a Pc (probability of commercial success) of 33%, resulting in expected mean reserves of 0.74 BCF sales gas. Success at McIntee 1 would see the Pc increasing to about 50% with a resultant expected mean reserves of about 1.1 BCF.

2. DRILLING RATIONALE (after Well Proposal)

GEOLOGICAL RISK ASSESSMENT

Play Analysis

The Lavers Prospect is mapped as a tilted fault-block closure with the primary reservoir the Waarre Sandstone. Vertical seal is provided by the Belfast Mudstone with the critical cross-fault seal against the Skull Creek Mudstone due to large fault throw on the southwest bounding fault. The spill-point of the structure will depend on the effectiveness of shale smear where there is juxtaposition of Waarre reservoir against the Nullawaarre Greensand. 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 to the east in Skull Creek Gas Field although at that location the Nullawaarre Greensand is absent and the Skull Creek Mudstone lies directly upon the Belfast Mudstone. Lavers exhibits a strong amplitude anomaly at the Waarre Sandstone horizon, which is interpreted as being a well-developed gas-saturated reservoir.

Trap (Pcl = 85%)

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

Several migrated volumes including migrated stacks with and without spectral whitening, 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.

Main mapping was carried out at near top Waarre Sandstone, which is the primary target reservoir. The Waarre sand package has a distinctive seismic characteristic and therefore a high degree of consistency was maintained with mapping of this unit. Well ties were performed for Boggy Creek 1 and Callista 1.

The Lavers prospect is a relatively small tilted fault block structure within a much broader McIntee Structural Complex situated southwest of Callista 1 and southeast of Rowans 1. Three independent structural closures are present within the greater McIntee Structural Complex which are separated by shallow troughs and faulting. The McIntee Structural Complex forms a major NW-SE trending horst block. The southern margin fault dies out just south of McIntee prospect but extends north-westerly beyond the Curdievale surveyed area. The throw of this fault increases towards the northwest and as a result the Waarre sand reservoir in the footwall is in juxtaposition with the Belfast Mudstone in the hanging wall to the southeast, and with the Skull Creek Formation to the northwest within the Lavers structural closure. Such a situation could provide a critical side-seal problem along the fault plane where Waarre sand is juxtaposed against the Nullawarre Sandstone somewhere between McIntee and Lavers prospects.

The top Belfast Mudstone was interpreted over the McIntee Structural Complex on and a time-interval map for the Belfast to Waarre section was generated.

A strong amplitude event is present within the Waarre sand unit over the Lavers 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 amplitude anomaly over Lavers structure. (Figure 13 – not shown) is particularly encouraging as the display of the far-offset amplitude minus the near-offset amplitude clearly indicates an AVO anomaly over the Lavers structure.

The location for the proposed Lavers 1 was selected on inline 2490 CDP 10163. This location is at a near-crestal position and is within the highest expression of amplitude.

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

Reservoir (Prs= 80%)

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 divided into three sub-units – Waarre "A", "B" & "C". The lower A unit represents a basal transgressive systems tract (TST) characterised by the flooding of an incised valley with sediments deposited under marginal marine / estuarine conditions. The basal portion of Unit A is represented by either shale (as in Callista 1 or Boggy Creek 1 - interflue?) or sand (Curdie 1). This section was overlain by the widespread predominantly argillaceous Unit B, deposited under estuarine conditions. Unit C followed and is characterised by initial estuarine/deltaic conditions succeeded by high energy sands as the transgression pushed sediments up the valley system. The Waarre Sandstone thins to the north and in the Callista 1 and Rowans 1 wells to the north, the section appears to be relatively shaley (based on the gamma ray log) with only a thin well developed section at the top of unit C. To the south at Boggy Creek 1, a thick well-developed Waarre sand was penetrated. Between Callista 1 and Lavers there is significant change in the seismic character at the top Waarre level. This possibly is indicative of better sand development at the Lavers location.

There are no secondary targets in this well although the Heathfield Sandstone Member of the Eumeralla is considered to have some (albeit minor) potential. It is not proposed to investigate this unit in Lavers 1, as it lies some 200m into the Eumeralla and when tested at other locations has proved to be tight.

Seal (Psl = 60%)

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

Cross-fault seal is considered the key risk for prospects within the Port Campbell Embayment area. For structures where the fault throw is greater than the thickness of the overlying Belfast Mudstone there is considerable risk that cross-fault seal will leak due to Waarre sands being juxtaposed against sands of the Nullawarre Greensand. If the throw is great enough, the reservoir could however be juxtaposed against the Skull Creek Mudstone and this appears evident at Lavers 1.

The Lavers structure is controlled primarily by two faults lying to the southwest and south of the prospect. The fault to the south demonstrates relatively minor offset at Belfast level and is regarded as unlikely to leak. The seal across the southwest bounding fault appears to be more problematic as the fault demonstrates both growth during the time of Belfast deposition and potential Waarre/Nullawarre sand juxtaposition in the southern portion of the structure.

Figures 18 & 19 (not shown) illustrate the issues relating to the southern bounding fault. Between fault cuts 5 & 7 cross-fault seal may rely on shale smear from within the Skull Creek Mudstone as the Waarre reservoir would be juxtaposed against the basal Parratte Formation. Alternatively the Parratte Formation may also provide seal although this is a higher risk.

The appearance within the proximal hanging wall zone of high angle reflectors may indicate the presence of shale smear along the fault zone that would provide additional confidence in fault seal. The presence of the higher amplitudes and AVO anomaly over the prospect (if reflecting the presence of gas as seems likely) provide corroboration of seal validity.

Charge (Pch = 90%)

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. Thus mature Eumeralla source units that 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 Lavers 1.

The formation of the Lavers structure commenced at the time of Belfast Mudstone deposition in the Late Cretaceous although its current configuration was not completed until the end of the Eocene. Generation and migration commenced in the Late Cretaceous and has continued through until the present day.

CO2 Issues

The distribution of CO_2 within the Port Campbell area appears to be related to the introduction of a restricted CO_2 volume at a number of locations and its subsequent migration. The CO_2 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 high-resolution aeromagnetic data has been undertaken in an effort to understand the distribution of deep-seated faulting, believed to be the conduit for CO_2 migration and the location of

igneous bodies. The preliminary 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 co-incident with major faulting identified on the seismic and is seen as a likely conduit for the Langley and Grumby CO_2. While an intrusive is not identified at nearby Boggy Creek, a similar trending lineament is mapped through the Boggy Creek well location.

3. RESULTS OF DRILLING

(a) Stratigraphy

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

TABLE IV: STRATIGRAPHY IN THE LAVERS 1 WELL

AGE	FORMATIONS	DEPTH (m)	THICK. (m)	ELEV. (m)
	HEYTESBURY GRP			
MIDDLE-LATE MIOCENE	PORT CAMPBELL LIMESTONE	Surface	209	69
EARLY MIOCENE	GELLIBRAND MARL	209	353	-140
E-L OLIGOCENE – E AQUITANIAN	CLIFTON FM NIRRANDA GRP	562	15	-493
LATE EOCENE	NARRAWATURK MARL	577	51	-509
MIDDLE EOCENE	MEPUNGA FM	628	89	-560
EARLY – MIDDLE EOCENE	DILWYN FM	717	265	-649
L PALEOCENE – EARLY EOCENE	PEMBER FM	982	53	-914
E-L PALEOCENE	PEBBLE PT FM SHERBROOK GRP	1035	40	-966
L SENONIAN-E PALEOCENE	MASSACRE SHALE	1075	34	-1007
LATE SENONIAN	TIMBOON SANDSTONE	1109	108	-1040
LATE SENONIAN	PAARATTE FM	1217	88	-1148
LATE SENONIAN	SKULL CK MUDSTONE	1305	90	-1237
LATE SENONIAN	NULLAWARRE	1395	51	-1326
LATE SENONIAN	BELFAST MUDSTONE	1446	76	-1377
LATE SENONIAN	FLAXMAN FM	1522	21	-1454
LATE SENONIAN	WAARRE FM	1543	39	-1474
LATE SENONIAN	UNIT C	*1543*	*20*	-1474
LATE SENONIAN	UNIT B	*1563*	*9*	-1495
LATE SENONIAN	UNIT A	*1572*	*10*	-1503
EARLY NEOCOMIAN	EUMERALLA FM	1582	47+	-1514

Samples were collected, washed, and described at 10m intervals from the surface to 975m and 3m intervals from 978m to a total depth of 1627m.

A brief summary of the formations penetrated in Lavers 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 Lavers 1 was reached at 1627m (D), 1608m (L), in the Early Cretaceous **Eumeralla Formation,** of the **Otway Group**. The well intersected 47m of the Eumeralla, the top coming in at 1582m (maximum recorded thickness in the Otway Basin is 2743m, in the Fergusons Hill-1 well). The formation consists of interbedded argillaceous sandstone and silty claystone. The sandstones are translucent to off-white, commonly light-dark grey and medium bluish grey. Quartz grains are dominantly medium-sized with rare coarse-very coarse grains. They are angular to subangular, poorly to moderately sorted, better sorted toward the base, contain weak to moderate silica cement, and have a common to abundant white argillaceous matrix. In part the sandstone is matrix supported, increasing with depth. Characteristically, the Eumeralla contains a high percentage of volcanic rock fragments (38-53%--Abele *et al*, 1995) and in Lavers 1 there is trace nodular pyrite, and the sandstone varies from loose to friable, but only exhibits a poor to fair porosity. No oil fluorescence was observed.

The siltstone comprises only 15% of the section drilled and is light to medium grey, medium brown grey. It has minor very fine carbonaceous specks. The siltstone is soft to firm and moderately hard in part, dominantly sub blocky.

The Eumeralla was deposited in a low-energy fluviatile 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). There is a total of 10.5m of pay in the Waarre "C" Sandstone (see Appendix III for Log Analysis). The sandstone is off-white to light pale grey and clear to translucent, fine to medium occasionally coarse. The grains are subangular to subrounded, moderately to poorly sorted, contains a weak to moderate silica cement. There is trace to common white argillaceous matrix throughout. The sandstone is loose to friable, and occasionally moderately hard, has a poor to fair visible porosity, and no fluorescence. The siltstone is medium brown and pale brown-grey, has common glauconite, with a trace of carbonaceous material. It is soft to firm, occasionally moderately hard and sub-blocky to blocky.

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 Lavers 1 well it was intersected at 1522m (-1454m SS), thus is 21m thick. It consists of predominantly sandstone with some siltstone. The siltstone is medium to dark brown grey, has common glauconite. The sandstone is clear to translucent, fine to medium. It is poorly sorted, subangular to subrounded, has a weak siliceous cement and minor off white argillaceous matrix. The sand contains abundant glauconite pellets, is loose and exhibits poor 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 1446m (-1377m SS), and is 76m thick. The siltstone is brown/grey, occasionally grading to CLAYSTONE, has common glauconite. It is dominantly firm, occasionally soft and sub-blocky. The sandstone is clear to translucent, off white in part, fine to medium and occasionally coarse, with a weak siliceous cement and minor argillaceous matrix. It contains abundant glauconite, is dominantly loose, and exhibits fair to good 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 1395m (-1326m SS), and is 51m thick. It is predominantly made up of clear to translucent and orange brown, medium to coarse-grained sandstone. The sandstone is subrounded to rounded, poorly sorted, with weak silica cement, minor off white argillaceous matrix, common glauconite nodules, and common nodular 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 1305m (-1237m SS), and is 90m thick. It comprises a dark brownish-grey and pale brown, siltstone and clear to translucent sandstone. The siltstone has common carbonaceous specks, micro-mica, and glauconite. It is firm, dominantly sub-blocky to blocky. The sandstone is pale grey, clear to translucent, medium to coarse, occasionally very fine and very coarse, poorly sorted, with rare white argillaceous matrix, and poor to fair 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 1217m, (-1148m SS). The formation is 88m thick and is made up of thin (1-5m) to fairly thick (10-35m), sandstone packages, which are interbedded with siltstone. The sandstone is pale grey and off-white. Quartz grains are predominantly coarse to medium, are angular to subrounded, and very poorly sorted, .There is weak silica cement and strong calcareous cement throughout the section. Minor off white argillaceous matrix occurs in this formation. The sandstone is dominantly loose and exhibits good to very poor porosity. No fluorescence was noted.

The minor thinly interbedded siltstone is medium to dark grey to brownish-grey, commonly argillaceous, common to localised abundant carbonaceous specks, trace micro micaceous, soft to firm, minor dispersive and sub-blocky.

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 Lavers 1, the Pebble Point is 40m thick, from 1035m (-966m SS) to 1075m, and consists of interbedded sandstone and minor siltstone. Siltstone is medium brown and dark grey/brown. It is firm, sub-blocky to blocky. The sandstone is translucent stained brown, fine to medium, subrounded to rounded, very poorly sorted with minor pyrite nodules and abundant olive-brown argillaceous and silty matrix (matrix supported). There are common orange iron oxide stained quartz grains, and trace nodular pyrite. The sand is dominantly loose with some moderately hard aggregates, and good inferred porosity, 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 982m (-914m SS) and 1035m, thus is 53m thick. This claystone is medium brown/grey, with common lithics, occasional nodular pyrite and it is soft, dispersive and amorphous.

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 717m (-649m SS) and 982m (265m thick). The section consists predominantly of sandstone with minor interbedded claystone. The sandstone is a clear to translucent pale brown staining, medium to course becoming coarse to very coarse with depth, subangular to subrounded, moderately to poorly sorted in part with weak calcareous cement. Trace nodular pyrite. The sand is loose with generally good porosity. The claystone is mainly brown/grey, slightly calcareous, rare glauconite and lithic specks, soft and dispersive, commonly amorphous and minor sub-blocky.

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 **Narrawaturk Marl** overlies the Mepunga Formation with a conformable contact. The marl was encountered at 577m (-509m SS), and is 51m thick. The formation is made up of a medium grey to brown grey, and dark brown/grey in part marl, with trace glauconite and fossil fragments and is soft to firm, amorphous to 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 15m thick formation of calcarenite, found from 562m (-493m SS) to 577m in the Lavers 1 well. The limestone is orange to red brown, with common fossil fragments, abundant Fe oxide trace, crypto-crystalline. The limestone is loose, friable to brittle in part.

The Marl is predominantly light grey to grey, with minor foraminifera and coral fragments, containing a trace of glauconite, and is soft to firm. Sub-blocky. Sandstone is orange to red brown with Fe staining common. Grain size is very fine to fine and is poorly sorted. Commonly sub angular to sub-rounded with a weak calcareous cement. Abundant orange red brown argillaceous matrix. Friable, loose in part poor to fair porosity.

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 353m thick, from 209m (-140m SS) to 562m. It is a medium to light grey occasionally light brown and dark grey. Common to abundant fossil fragments including bryozoa, forams, shell fragments, echinoid spines and sponge spicules. Soft to dispersive, firm to dispersive, amorphous to occasionally sub-blocky.

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 Lavers 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 209m in depth. The calcarenite is white to light grey, off white, fine to medium grains. It contains minor fossil fragments with rare glauconite and lithic specks, loose, friable to brittle in part.

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 Lavers 1, refer to **Appendix I** of this report.

(b) Stratigraphic Prognosis (after Well Proposal)

The geological section penetrated was within tolerance to prognosis. All formation tops were lower than prognosed and ranged from 5m low to 153m low. The primary objective, the Waarre Formation, was 60m low.

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

TABLE V: ACTUAL VERSUS PREDICTED DEPTHS AND THICKNESSES LAVERS 1

FORMATION	PROG SS DEPTH	ACTUAL SS DEPTH	DEPTH DIFF	PROG THICK	ACTUAL THICK	THICK DIFF
Port Campbell Lst	-	-69	-	-	71m	-
Gellibrand Marl	-	-140m	-	-	353m	-
Clifton Fm	-475m	-493m	18mL	-	16m	-
Narrawaturk Marl	-	-509m	-	-	51m	-
Mepunga Fm	-	-560m	-	-	89m	-
Dilwyn Fm	-	-649m	-	-	265m	-
Pember Mdst	-	-914m	-	-	53m	-
Pebble Point Fm	-961m	-966m	5mL	-	41m	-
Massacre Shale	-	-1007m	-	-	34m	-
Timboon Sandstone	-	-1040m	-	-	108m	-
Paaratte Fm	-995m	-1148m	153mL	148m	89m	-59m
Skull Creek Mdst	-1143m	-1237m	94mL	107m	90m	-17m
Nullawarre Greensand	-1250m	-1326m	76mL	87m	51m	-36m
Belfast Mdst	-1337m	-1377m	40mL	63m	77m	+14m
Flaxmans Fm	-1400m	-1454m	54mL	14m	21m	+7m
Waarre Fm	-1414m	-1474m	60mL	-	39m	-
Waarre C	-	-1474m	-	-	20m	-
Waarre B	-	-1495m	-	-	9m	-
Waarre A	-	-1503m	-	-	11m	-
Eumeralla Fm	-1460m	-1514m	54mL	-	-	-
TD	-1490m	-1539m				

(c) Hydrocarbon Summary

Total gas was recorded from the surface to total depth (1627m 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. (Depths quoted are Drillers Depths)

Surface to base of the Skull Creek Formation (spud to 1330m)

Nil to 1 unit of gas was detected through the Port Campbell Limestone, Gellibrand Marl, Clifton Formation, Narrawaturk Marl, and in the upper section of the Skull Creek Mudstone. The majority of the gas was 100% C1, with occasional trace amounts of C2. No hydrocarbon fluorescence in the drill cuttings was recorded within these formations. No CO2 was detected in these formations.

Base of the Skull Creek Mudstone and Nullawarre Formation (1330m to 1445m)

The lower parts of the Skull Creek Mudstone saw gas levels rise from nil to 30 units, with heavier gasses coming in at this point C1=80%, C2=13%, C3=6%, C4=1%. In the Nullawarre Formation gas levels varied from 4 to 40 units. Gas ratios in this section were C1=92%, C2=6%, C3=2%, C4=trace. No hydrocarbon fluorescence was observed in these formations. No CO2 was recorded in the Skull Creek Mudstone. The Nullawarre Formation showed a level of 0.02% CO2.

Belfast Mudstone (1445m to 1522m)

Total gas levels rose steadily through this section from 15 units to a maximum background level of 100 units, and a maximum peak of three hundred units. In the lower part of the Belfast Mudstone the gas ratios were C1=93%, C2=5%, C3=2%, C4=trace%. No hydrocarbon fluorescence was observed in this formation. 0.02% CO2 was recorded in this formation.

Flaxmans Formation (1522m to 1542m)

From a background level of 100 units the total gas levels dramatically rose to a maximum peak of 5000 units at the base of the formation. Gas ratios continued the same as they were in the Belfast Mudstone C1=93%, C2=5%, C3=2%, C4=trace%. No hydrocarbon fluorescence was observed in this formation. 0.02% CO2 was recorded in this formation.

Waarre Formation (1542m to 1582m)

Waarre Unit "C" (1542m to 1563m)
The primary objective of the Lavers 1 well was the Waarre Unit "C". This Unit yielded significant gas values in the top sand associated with excellent reservoir qualities. At the wellsite, during the drilling it was assessed as being gas saturated, and 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 5000 units had a chromatograph gas ratio of C1=89%, C2=7%, C3=3%, C4=1%. As did a second gas peak which reached a level of nearly 2000 units, which was just below the first peak. These peaks occurred between 1542m and 1558m. The background gas level in this section was 100 units. No oil fluorescence was observed at the well site. 0.02% CO2 was recorded in this unit.

Log analysis data indicate a total column of 10.5m of pay. This interval has an average porosity calculated be 20.8% and an average water saturation of 45%. A sample was recovered at 1548.5m (analysis contained in Appendix VII). Mudlog gas peaks, log evaluation, combined with RFS tests indicate that the Waarre Unit "C" has good potential at this location.

Waarre Unit "B" (1563m to 1571m)
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 400 units, and the gas ratios were C1=88%, C2=8%, C3=3%, C4=1%. No oil fluorescence was observed at the well site. 0.03% CO2 was recorded in this unit.

Waarre Unit "A" (1571 to 1582m)
The Waarre "A" is interpreted to be water bearing and as such not prospective. Despite this a gas peak of over 3000 units was observed towards the base of this unit. Background gas levels were 200 units. The gas ratios were C1=82%, C2=8%, C3=6%, C4=4%. No oil fluorescence was observed at the well site. 0.02% CO2 was recorded in this unit.

Eumeralla Formation (1582m to 1608m T.D.)

Several gas peaks, of up to 400 units at 1603m, were observed in this formation, the background gas levels were constant at 60 units. The chromatograph gas ratios contained less heavies in this formation and were C1=92%, C2=5%, C3=2%, C4=1%. Once again no oil fluorescence was observed in this formation. 0.02% CO2 was recorded in this formation.

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

4. SUMMARY

Lavers 1 has been drilled as a Wildcat (WCNF) gas exploration well within PEP 154, at CDP 10163, Inline 2490, located on the Waarre 3D Seismic Survey. The Lavers structure is situated within the Port Campbell Embayment and the productive Waarre Sandstone play fairway of the Otway Basin, in southern Victoria. The Lavers prospect is a tilted-fault closure within the greater McIntee Structural Complex and is defined by 3D seismic.

The primary and only objective of Lavers 1 was the Late Cretaceous Waarre Formation of the Sherbrook Group.

Drilling of Lavers 1 was terminated 47m into the Eumeralla Formation. Formation tops younger than the Pebble Point Formation (5m low) were intersected close to prognosis, however deeper formations were intersected considerably lower than prognosed. The top of the primary objective, the Waarre, was 60m low (at –1474mSS).

Wireline logging at total depth of 1608m consisted of the following: Run 1: GR-LCS-DLS-MLL; Run 2: PDS-CNS, Run 3: RFS; Run 4: SCG. No full hole cores were cut in Lavers 1.

Log analysis data indicate the following:

- 10.5m of net pay, average porosity of 20.8% with a water saturation of 45% in the Waarre 'C' Sandstone.

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

Lavers 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 10m intervals from the surface to 975m and at 3m intervals from 978m to total depth at 1627m (drillers depths).

HEYTESBURY GROUP

Port Campbell Limestone (Middle to Late Miocene)

212m thick
SPUD-212m

Spud-212m — CALCARENITE: white, off white to buff, light grey in parts, fine to medium calcarenite, microcrystalline, minor shell fragments and coral, rare glauconite and lithic specks in parts, dominantly loose, friable to brittle in parts.

Gellibrand Marl (Early to Middle Miocene)

350m thick
212-562m

212-562m — MARL: predominantly medium grey, light grey to rare light brown and dark grey, calcareous, abundant to common fossil and coral fragments, dominantly soft to dispersive, trace to rare firm, amorphous to occasional subblocky.

LIMESTONE: white, off white to buff, light grey to light brown in parts, fine to medium calcarenite, microcrystalline, minor shell fragments and coral, rare glauconite and lithic specks in parts, dominantly loose, friable in parts.

Clifton Formation (Late Oligocene tp Early Miocene)

34m thick
562-596m

562-596m — LIMESTONE: predominantly orange to red brown, minor off white to dark brown, fine to medium calcarenite in part, abundant fossil fragments, crypto-crystalline, abundant Fe oxide, commonly loose, friable to brittle in parts.

MARL: predominantly light grey to grey, minor yellow brown to medium brown grey, minor foraminifera and coral fragments, trace glauconite, soft to firm, subblocky.

SANDSTONE: orange to red brown, Fe staining dominant, very fine to coarse, poorly sorted, subangular to subrounded, weak calcareous cement, abundant orange red brown argillaceous matrix, common Fe oxide fossil replacement, predominantly friable, occasionally loose, fair inferred porosity, poor to fair visual porosity, no fluorescence.

NIRRANDA GROUP

Narrawaturk Marl (Late Eocene to Early Oligocene)

35m thick
596-631m

596-631m — MARL: medium grey to brown grey, dark brown grey in part, moderately calcareous, trace glauconite, soft to firm, amorphous to subblocky.

SANDSTONE: translucent to light brown, medium brown in part, medium to coarse, moderately well sorted, angular to subangular, weak calcareous cement, common Fe oxide fossil replacement, rare disseminated pyrite, loose, fair to good inferred porosity, no fluorescence.

WANGERRIP GROUP
Dilwyn Formation (Palaeocene to Eocene)
347m thick
631-978m

631-978m: SANDSTONE: clear to translucent, predominantly light to medium brown staining, predominantly medium to coarse, becoming coarse to very coarse with depth, moderately to poorly sorted in part, subangular to subrounded, rounded in part, weak calcareous cement, trace to locally common Fe oxide staining, trace nodular pyrite in part, loose, generally good inferred porosity, no fluorescence.

CLAYSTONE: predominantly brown grey, trace blue grey to off white, slightly calcareous, rare glauconite and lithics specks, soft and dispersive, dominantly amorphous, minor subblocky.

Pember Mudstone (Palaeocene to Early Eocene)
57m thick
978-1035m

978-1035m CLAYSTONE: medium brown grey to dark brown, slightly calcareous in part, common microscopic lithics and carbonaceous specks, occasional nodular pyrite, soft, dispersive, amorphous.

SANDSTONE: clear to translucent, frosty in part, medium to very coarse, moderately poorly sorted, clean, occasional nodular pyrite, loose, fair inferred porosity, no fluorescence.

Pebble Point Formation (Late Palaeocene)
54m thick
1035-1089m

1035-1056m: SANDSTONE: translucent stained brown, tan orange, fine to very coarse, predominantly fine grading to medium, moderately poorly sorted, subrounded to rounded, occasionally subangular, clean, trace nodular pyrite, loose, good inferred porosity, no fluorescence.

SILTSTONE: medium brown to dark grey brown, tan, very fine arenaceous grading to argillaceous in part, trace lithics, firm, subblocky to blocky.

1056-1089m: SANDSTONE: (100-85%) translucent stained brown, tan orange, fine to very coarse, predominantly fine grading to medium, moderately poorly sorted, subrounded to rounded, occasionally subangular, clean, trace nodular pyrite, loose, good inferred porosity, no fluorescence.

SILTSTONE: (15-0%) medium brown to dark grey brown, tan, very fine arenaceous grading to argillaceous in part, trace lithics, firm, subblocky to blocky.

SHERBROOK GROUP
Paaratte Formation (Senonian)
157m thick
1089-1246m

1089-1246m SANDSTONE 1: (100-70%) clear to translucent, trace frosted to smoky, dominantly medium, minor coarse, moderately well sorted, angular to subrounded, weak siliceous cement, common quartz overgrowths, trace very coarse quartz shards, loose and clean, fair to good inferred porosity, no fluorescence.

SANDSTONE 2: (90-65%) increasing with depth, light translucent, common light grey, dominantly medium to coarse, minor very fine to fine and very coarse, poor sorted, angular to subrounded, dominantly weak siliceous cement, common strong calcareous cement in part, minor white argillaceous matrix, trace quartz overgrowths and very coarse quartz shards, trace to common nodular pyrite, dominantly loose, minor to localised common friable to moderately hard aggregates, good inferred and very poor visual porosity, no fluorescence.

SILTSTONE: (35-0%) light to dark grey and brown grey, dominantly argillaceous grading to CLAYSTONE in part, minor arenaceous, common to localised abundant carbonaceous material, trace micro micaceous, soft to firm, minor dispersive, dominantly sub blocky.

Skull Creek Mudstone (Campanian)
114m thick
1246-1360m

1246-1304m SANDSTONE: (85-10%) clear, translucent, frosted, dominantly medium to coarse, common very coarse, moderately poorly sorted, sub angular to sub rounded, occasionally angular, trace weak calcareous cement, common weak siliceous cement, (common quartz overgrowths and shards), rare argillaceous matrix, dominantly clean, trace nodular pyrite, loose, poor to fair inferred porosity, no fluorescence.

SILTSTONE: (65-15%) light to dark grey and grey brown, dominantly argillaceous grading to CLAYSTONE in part, minor very fine arenaceous, common to locally abundant carbonaceous specks and flecks, trace micro micaceous, soft to firm, minor dispersive, dominantly sub blocky.

CLAYSTONE: (40-0%) dominantly dark brown/grey, minor light grey, trace to common carbonaceous specks, soft and dispersive, amorphous to sub blocky.

1304-1330m SANDSTONE: (65-10%) clear, translucent, common pale grey, dominantly medium to coarse, minor very fine and very coarse, poorly sorted, sub angular to sub rounded, occasionally angular, trace weak calcareous cement, common weak to occasionally strong siliceous cement, (common quartz overgrowths and shards), minor off white argillaceous matrix, trace to common nodular pyrite, common loose to friable in part, fair inferred porosity, poor visual porosity, no fluorescence.

SILTSTONE: (70-15%) light to dark grey and grey brown, commonly dirty looking, dominantly argillaceous grading to CLAYSTONE in part, minor very fine arenaceous in part, common to locally abundant carbonaceous specks and flecks, trace micro micaceous, minor dark green glauconite nodules, minor disseminated pyrite, common forams and echinoid spines, commonly very calcareous, trace coral, soft to firm, minor dispersive, dominantly sub blocky.

CLAYSTONE: (55-10%) predominantly pale grey, occasionally medium grey, trace to common carbonaceous specks, soft and dispersive, amorphous to sub blocky.

1330-1360m SANDSTONE: (40-10%) clear, translucent, common pale grey, dominantly medium to coarse, minor very fine and very coarse, poorly sorted, sub angular to sub rounded, occasionally angular, common weak calcareous cement, common weak to occasionally strong siliceous cement, common gluaconite, minor off white argillaceous matrix, trace to common disseminated pyrite, common loose to friable in part, fair inferred porosity, poor visual porosity, no fluorescence.

SILTSTONE: (90-60%) dark grey/brown, pale brown, commonly dirty looking, common carbonaceous specks and flecks, trace micromicaceous, minor dark green glauconite nodules, minor disseminated pyrite, minor forams and echinoid spines, commonly very calcareous, firm, dominantly sub blocky to blocky.

<u>Nullawarre Greensand</u> (Late Santonian)
81m thick
1360-1441m

1360-1441m SANDSTONE: (100-95%) clear, translucent, common orange/brown in part, fine to coarse, dominantly medium to coarse, poorly sorted, sub rounded to minor rounded, predominantly sub angular to sub rounded, minor weak siliceous cement, minor off white argillaceous matrix, trace to common nodular pyrite, common flat grain boundaries, common dark green glauconite nodules, commonly loose, fair to good inferred porosity, no fluorescence.

SILTSTONE: (5-0%) pale brown to medium brown grey, green grey, medium grey in part, commonly dirty looking, dominantly argillaceous, minor very fine arenaceous in part, common to locally abundant glauconite nodules, trace micromicaceous specks, trace disseminated pyrite, soft to firm, dominantly sub blocky, minor sub blocky.

<u>Belfast Mudstone</u> (Coniacian to Santonian)
77m thick
1441-1518m

1441-1518m SILTSTONE: (5-0%) medium brown/grey, medium grey, dominantly argillaceous, occasionally grading to CLAYSTONE, minor very fine arenaceous in part, common to locally abundant glauconite nodules, trace micromicaceous, occasional pyrite nodules, soft to firm, occasionally moderately hard, dominantly sub blocky, minor blocky.

SANDSTONE: (100-95%) clear, translucent, off white, fine to medium, occasionally coarse, trace very coarse, poorly sorted, sub angular to sub rounded, predominantly sub angular to sub rounded, common weak siliceous cement, trace pyrite cement, minor off white argillaceous matrix, common flat grain boundaries, occasional iron

stained grains, minor dark green glauconite nodules, commonly loose, fair to good inferred porosity, no fluorescence.

Flaxmans Formation (Turonian)
15m thick
1518-1533m

1518-1533m SANDSTONE: (85-70%) clear, translucent, fine to medium, poorly sorted, sub angular to sub rounded, minor weak siliceous cement, minor off white argillaceous matrix, common flat grain boundaries, common dark green glauconite nodules, commonly loose, poor inferred porosity, no fluorescence.

SILTSTONE: (30-15%) medium brown grey, medium green/grey, dominantly argillaceous, trace arenaceous in part, with inclusions of fine to medium quartz, common to locally abundant glauconite nodules, common very fine carbonaceous specks, trace micromicaceous specks, firm to moderately hard, dominantly sub blocky to blocky, minor sub fissile.

Waarre Formation (Turonian)
57m thick
1533-1590m

1533-1558m WAARRE 'UNIT C'
SANDSTONE: (100-85%) clear, translucent, pale grey, off white, fine to medium, occasionally coarse, poorly sorted, sub angular to sub rounded, common weak siliceous cement, trace to minor off white argillaceous matrix, dominantly loose, good inferred porosity (14-17%), porosity and permeability visible around single grains, no fluorescence.

SILTSTONE: (15-0%) pale brown/grey, occasionally pale green/grey, trace medium green, dominantly argillaceous, minor very fine arenaceous in part, common to locally abundant glauconite nodules, minor very fine carbonaceous specks, soft to firm, dominantly sub blocky to blocky.

1558-1570m WAARRE 'UNIT B'
SANDSTONE: (100-85%) clear, translucent, pale grey, off white, fine to medium, occasionally coarse, poorly sorted, sub angular to sub rounded, common weak siliceous cement, trace to minor off white argillaceous matrix, dominantly loose, poor inferred, no fluorescence.

SILTSTONE: (15-0%) pale brown/grey, occasionally pale green/brown, minor medium grey/green, dominantly argillaceous, minor very fine arenaceous, common to locally abundant glauconite nodules, minor very fine carbonaceous specks, minor micromicaceous, soft to firm, sub blocky to blocky.

1570-1590m WAARRE 'UNIT A'
SANDSTONE: (100%) clear, translucent, pale grey, off white, fine to medium, occasionally coarse, poorly sorted, sub angular to sub rounded, common weak siliceous cement, common off white kaolin matrix, dominantly loose, minor friable, poor inferred porosity, poor visual porosity, no fluorescence.

SILTSTONE: (10-0%) medium brown, minor brown/grey, dominantly argillaceous, trace arenaceous in part, common to locally abundant glauconite nodules, locally common very fine carbonaceous specks, trace micromicaceous specks, firm to moderately hard, dominantly sub blocky to blocky, occasionally sub fissile.

Eumeralla Formation (Late Albian)
(37+m)
1590-1627m TD

1590-1627 SANDSTONE: (100-85%) off white. pale grey, pale to dark green, occasionally blue green, minor clear, translucent, fine to medium, generally moderately well sorted, sub angular to sub rounded, minor weak siliceous cement, common moderately weak siliceous cement, locally abundant off white argillaceous matrix, trace nodular pyrite, predominantly loose, friable aggregates, poor inferred, no fluorescence.

SILTSTONE: (15-0%) light to medium grey, medium brown grey, minor very fine arenaceous, dominantly argillaceous, minor very fine carbonaceous specks, soft to firm, trace moderately hard, dominantly sub blocky.

APPENDIX I (b): SIDE WALL CORES

SANTOS LIMITED
SIDEWALL CORE DESCRIPTION

WELL: LAVERS 1 **DATE:** 03/05/01 **PAGE:** 1 OF 1

GUN NO.: ONE **SHOTS FIRED:** 24 **SHOTS BOUGHT:** 24

GEOLOGIST: TIM CONROY

CORE NO.	DEPTH	REC.	PALYN. RES. REJECT	LITH.	COLOUR	GRAIN SIZE	HYDR. INDIC. (Y/N)	SUPPLEMENTARY INFORMATION
1	1602.5	Y	PALYN	SST	pale gy, pale grey/blue,off white,	fine to medium	N	SANDSTONE: off white-light grey, fine grained, poorly-moderately sorted, sub-angular to sub rounded, slightly calc, minor to common silty-argillaceous matrix, common volcanic lithics, friable, poor visual porosity, no fluorescence.
2	1595.5	Y	PALYN	SST	pale gy, pale grey/blue,off white EUMA	fine, trace medium	N	SANDSTONE: off white-light grey, fine grained, poorly-moderately sorted, sub-angular to sub rounded, slightly calc, common silty-argillaceous matrix, common volcanic lithics, friable, tight to poor visual porosity, no fluorescence.
3	1587	Y	PALYN	SST	pale gy, pale grey/blue,off white EUMA	fine, occ medium	N	SANDSTONE: off white-light grey, fine grained, poorly-moderately sorted, sub-angular to sub rounded, slightly calc, common silty-argillaceous matrix, common volcanic lithics, friable, tight to poor visual porosity, no fluorescence.
4	1584	Y	PALYN	SST	pale gy, off white EUMA	fine to medium	N	SANDSTONE: off white-light grey, fine grained, poorly-moderately sorted, sub-angular to sub rounded, slightly calc, common silty-argillaceous matrix, common volcanic lithics, friable, poor visual porosit no fluorescence.
5	1581	Y	PALYN	SLTST tr SST	med olive grey, off white SST WAR A	very fine	N	SILTSTONE: medium olive grey, common very fine arenaceous, micromicaceous, common very fine carbonaceous specks, su blocky. SANDSTONE(stringer) off white, very fin well sorted, sub angular to sub rounded, minor siliceous cement, common off white argillaceous matrix, fraiable, very poor porosity, no fluorescence.
6	1577	Y	PALYN	CLYST	pale olive grey WAR A	CLYST	N	CLAYSTONE: pale olive grey, non calcareous, rare arenaceous, very argillaceous, microcarbonaceous, micromicaceous, sticky, blocky.
7	1574.5	Y	PALYN	SST	off white WAR A	fine to medium trace coarse	N	SANDSTONE: off white, fine to medium grained, trace coarse grained, poorly sorted sub-angular to sub rounded, common weak silica cement, common off white silty matri common volcanic lithics, friable, fair visua porosity, no fluorescence.
8	1572	Y	RES	SST	off white WAR A	predom fine to minor medium	N	SANDSTONE: off white, fine to medium grained, poor to moderately sorted, sub-angular to sub rounded, common weak silic cement, common off white silty matrix, common volcanic lithics, friable, fair to occasionally good visual porosity, no fluorescence.

9	1570	Y	RES	SST	off white WAR A	very fine to fine	N	SANDSTONE: off white, fine grained, moderately well sorted, sub-angular to sub rounded, common weak silica cement, common off white silty matrix, minor lithics friable to occasionally moderately hard, minor carbonaceous laminations, fair to occasionally good visual porosity, no fluorescence.
10	1567	Y	PALYN	SST SLTST	medium olive grey WAR B	very fine SLTST	N	SANDSTONE: medium olive grey, very fine grain size, occasionally grading to SLTST, moderately well sorted, sub angular to sub rounded, minor weak siliceous cement, common off white silty matrix, common carbonaceous material, friable, poor visual porosity, no fluorescence.
11	1564	Y	PALYN	SST SLTST	medium olive grey WAR B	very fine SLTST	N	SANDSTONE: medium olive grey, very fine grain size, occasionally grading to SLTST, moderately well sorted, sub angular to sub rounded, minor weak siliceous cement, common off white silty matrix, common carbonaceous material, friable, poor visual porosity, no fluorescence.
12	1561	Y	RES	SST	off white WAR C	fine to medium	N	SANDSTONE: off white, fine to medium grained, poor to moderately sorted, sub-angular to occasionally sub rounded, common weak silica cement, common off white kaolin matrix, friable, fair to good visual porosity, no fluorescence.
13	1558.7	Y	PALYN	SST	pale brown, off white WAR C	very fine	N	SANDSTONE: pale brown/ grey, off white, very fine grained, moderately well sorted, sub-angular to occasionally sub rounded, common weak silica cement, common off white & pale brown silty matrix, common lithics and common very fine carbonaceous specks, friable, poor visual porosity, no fluorescence.
14	1557.5	Y	PALYN	SST	off white, minor pale brown WAR C	very fine to fine	N	SANDSTONE: off white, minor pale grey/brown, very fine to fine grained, poor to moderately well sorted, sub-angular to occasionally sub rounded, common weak silica cement, common off white & pale brown silty matrix, common lithics and common carbonaceous specks and material, friable, poor visual porosity, no fluorescence
15	1555.5	Y	RES	SST	off white WAR C	fine to medium	Y from logs + mudlog	SANDSTONE: off white, fine to medium grained, poor to predominantly moderately well sorted, sub-angular to occasionally sub rounded, common weak silica cement, common off white kaolin matrix, trace glauconite, friable, excellent visual porosity and permeability, no fluorescence.
16	1552.5	Y	RES	SST	off white WAR C	very fine to fine	Y	SANDSTONE: off white, very fine to fine grained, moderately well sorted, sub-angular to occasionally sub rounded, common weak silica cement, common off white kaolin matrix, trace glauconite, friable, trace lithics, poor to fair visual porosity, no fluorescence.
17	1548.5	Y	RES	SST	off white WAR C	fine to medium	Y from logs + mudlog	SANDSTONE: off white, fine to medium grained, poor to predominantly moderately well sorted, sub-angular to occasionally sub rounded, common weak silica cement, common off white kaolin matrix, trace glauconite, minor isolated carbonaceous material, friable, excellent visual porosity and permeability, no fluorescence.

18	1544	Y	RES	SST	off white WAR C	fine to medium	Y from logs + mudlog	SANDSTONE: off white, fine to medium grained, predominantly fine grained, moderately well sorted, sub-angular to occasionally sub rounded, common weak silica cement, common off white kaolin matrix, trace glauconite, minor isolated carbonaceous material, friable, excellent visual porosity and permeability, no fluorescence.
19	1540	Y	PALYN	CLYST	pale olive medium grey WAR C	CLYST	N	CLAYSTONE: pale olive medium grey, ve argillaceous, trace arenaceous in part, microcarbonaceous, micromicaceous, trace glauconite nodules, sticky, blocky.
20	1536.5	Y	PALYN	SLTST	mottled medium grey off white FLAX	SLTST	N	SILTSTONE: motteled medium grey and o white, common very fine arenaceous, gradi to very fine SST, micromicaceous, commor very fine carbonaceous specks and carbonaceous laminations, common disseminated pyrite, sub blocky.
21	1527.5	Y	PALYN	SLTST	dark to medium grey FLAX	SLTST	N	SILTSTONE: dark to medium, common ve fine to fine arenaceous in part, commonly very argillaceous, micromicaceous, minor glauconite, pyrite, sub blocky.
22	1520.5	Y	PALYN	CLYST	medium grey BELF	CLYST	N	CLAYSTONE: medium grey, very argillaceous, trace arenaceous in part, common dark green glauconite grains, micromicaceous, waxy lustre, sticky, blocky
23	1508	Y	PALYN	CLYST	medium grey BELF	CLYST	N	CLAYSTONE: medium grey, very argillaceous, abundant dark green glauconit grains, micromicaceous, waxy lustre, sticky, blocky.
24	1504	Y	PALYN	CLYST	medium grey BELF	CLYST	N	CLAYSTONE: medium grey, very argillaceous, abundant dark green glauconit grains, micromicaceous, waxy lustre, sticky, blocky.

COMMENTS:
100% SIDEWALL CORE RECOVERY. VERY GOOD SAMPLING ACHIEVED.

APPENDIX II: HYDROCARBON SHOW REPORTS

HYDROCARBON SHOW SUMMARY		
INTERVAL	**LITHOLOGY**	**GAS**
1330m-1358m ROP:0.65-11.0 Ave: 1.4min/m	**WAARRE 'UNIT C'** SANDSTONE: (100-85%) clear, translucent, pale grey, off white, fine to medium, occasionally coarse, poorly sorted, sub angular to sub rounded, common weak siliceous cement, trace to minor off white argillaceous matrix, dominantly loose, good inferred porosity (14-17%), porosity and permeability visible around single grains, no fluorescence.	TOTAL GAS *5000/100 89/7/3/1 0.02% CO2
1330m-1358m ROP:0.65-11.0 Ave: 1.4min/m	**WAARRE 'UNIT A'** SANDSTONE: (100%) clear, translucent, pale grey, off white, fine to medium, occasionally coarse, poorly sorted, sub angular to sub rounded, common weak siliceous cement, common off white kaolin matrix, dominantly loose, minor friable, poor inferred porosity, poor visual porosity, no fluorescence.	TOTAL GAS 3000/150 0.02% CO2

*- Gas readings anomalously high

APPENDIX III: LOG EVALUATION

LAVERS 1 - LOG ANALYSIS

Lavers 1 wireline logs were analysed over the Waarre Sandstone (1542-1598m) interval. Gas pay was identified in the Waarre C Sandstone. Lavers 1 was cased as a potential gas producer.

A 9 7/8" surface hole was drilled to 428 metres and 7 5/8" casing set at 424 meters. A 6 3/4" hole was then drilled with KCl/PHPA mud to 1627 metres (D). Wireline logging was carried out by Reeves as described below. Eighteen Repeat Formation Sampler (RFS) pressure points were attempted (15 valid, 1 no seal, 2 supercharged).

UNLESS OTHERWISE SPECIFIED, ALL DEPTHS MENTIONED BELOW ARE WIRELINE MEASURED DEPTH REFERENCED TO THE DRILL FLOOR.

Pay Summary

Waarre C	Gas Pay **10.5m**, Ave Porosity 20.8%, Ave S_w 45%

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

Logs Acquired

Run 1	GR	1597-Surface
	LCS (Long Spaced Compensated Sonic Sonde)	1597-425m
	(Waveform Sonic)	1608-1450m
	DLS (Dual Laterolog Sonde)	1602-425m
	MLL (Micro Resistivity Sonde)	1607-425m
Run 2	PDS (Compensated Density Sonde)	1605-1450m
	CNS (Compensated Neutron Sonde)	1602-1450m
Run 3	RFS	1590-1543m
Run 4	SCG (Side wall cores)	1600-1535m (24 shot gun)

Mud Parameters

Mud Type	KCl/PHPA
Mud Density	9.3ppg
KCl	4.2%
Rm	0.22 ohmm @ 15.4°C
Rmf	0.21 ohmm @ 15.3°C
Rmc	0.43 ohmm @ 15.8°C
MRT	63.5°C from Run 3 at 1590m

Remarks

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

Log Processing

- Regional salinity data in water sands was used to derive the R_w used for this analysis.
- A BHT of 65°C was used for the analysis (Gradient of 25°C/km).

Interpretation Procedures and Parameters

An interpretation over the Waarre Sandstone interval 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:

  $R_T = (1.59*DLL_C - 0.59*SLL\_BC)$
  where:
  DLL_C = Deep resistivity response borehole and shoulder bed corrected.
  SLL_BC = Shallow resistivity response borehole corrected.

- Density porosity was calculated over the Waarre Sandstone:

  $DPHI = (2.65 - DEN) / (1.65)$
  where:
  DEN= Bulk Density in g/cc.

- Cross-plot porosity was determined:

  PHIX= (2 x DPHI+NPRL_ss)/3
  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 (μs/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 Vsh < VshSt..... PHIE = PHIT

elseif VshSt < Vsh < VshCO... PHIE = a proportional percentile correction from PHIT to (PHIT – (Vsh * PHIsh))

elseif Vsh > VshCO ..... PHIE = PHIT - (Vsh * PHIsh)

where:
- VshSt = The start of the sliding scale Vsh correction.
- VshCO = Shale volume cut-off.
- Vsh = Shale volume.
- PHIT = Combination of density/neutron and sonic porosity.
- PHIsh = 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;

$$MEXP = (-0.2413 * Log10\ PHIE) + 2.4657$$

- 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 60%. Saturation exponent is gradational between the two end-points above.

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

$$SW = \sqrt[n]{\frac{aRw}{\phi^m Rt}}$$

where:
- R_w = Resistivity of formation water at formation temperature.
- RT = 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. Lavers 1 log analysis identified a total of 10.5 metres of pay in the Waarre C Sandstone. This interval has an average porosity of 20.8% and an average water saturation of 45%.

2. Sandstone development was not observed in the Waarre B.

3. The Waarre A sandstone is interpreted to be water bearing.

4. Formation pressure points in the Waarre C sandstones indicated a reservoir pressure of around 2132 psi with a gas gradient of 0.07 psi/ft.

5. Low bulk density and high sonic transit time would indicate gas-bearing sands down to 1553m. RFT data indicate a FWL at 1553 m and a water gradient of 0.43psi/ft.

6. Lavers 1 was cased as a future gas producer.

Attached is the well evaluation summary (WES) plot for Lavers 1 (01.107)
wes/wessa/lavers_01.107_waarre.wes

TABLE 1
Log Analysis Parameters

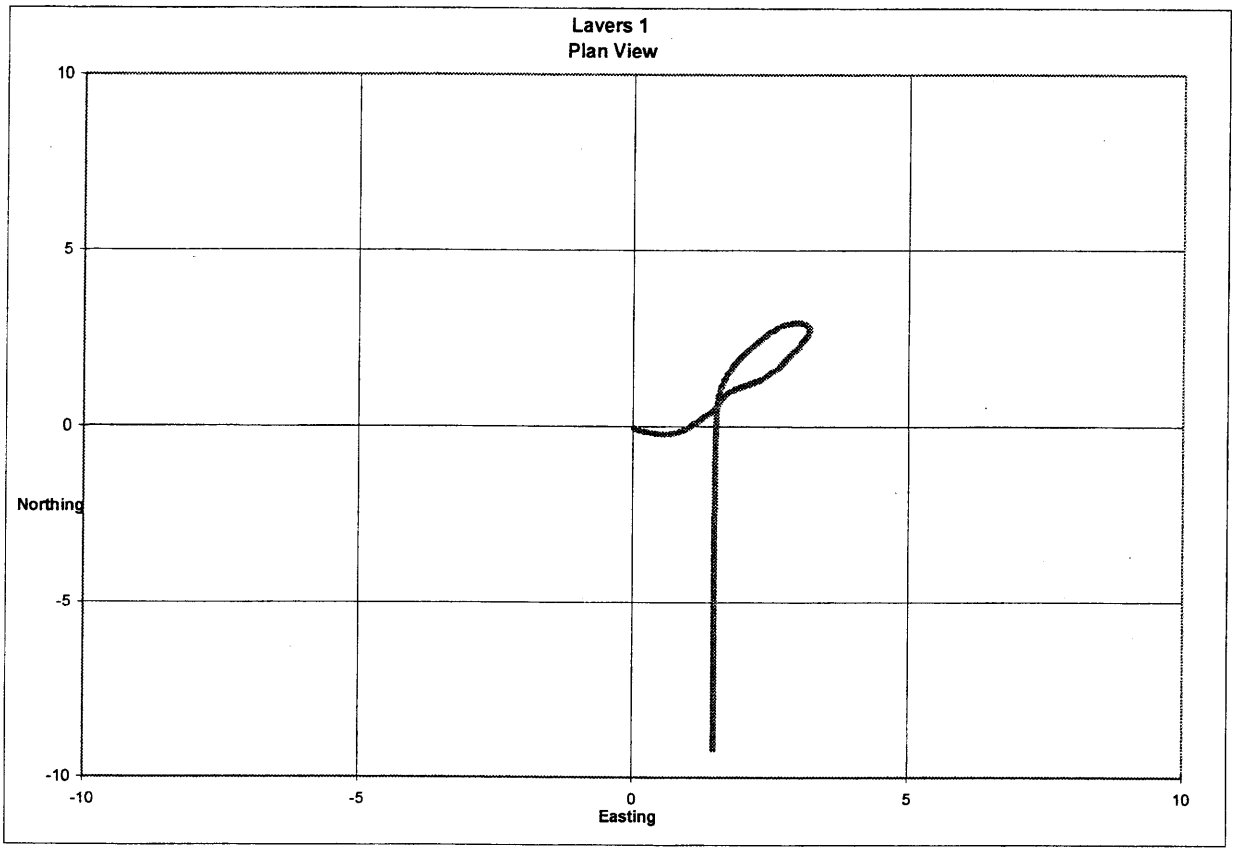
PARAMETERS	WAARRE C SANDSTONE	WAARRE A SANDSTONE
R_w (ohmm) @ 25°C	0.3	0.3
a	1	1
m	Variable	Variable
n	Variable	Variable
Borehole cor RD	0.95	0.95
Borehole cor RS	0.95	0.95
RD Shoulder Corr.	1.0	1.0
GR matrix (API)	50	45
GR shale (API)	120	120
VSHST	0	0
VSHCO	0.4	0.6
PHISH	0.13	0.2

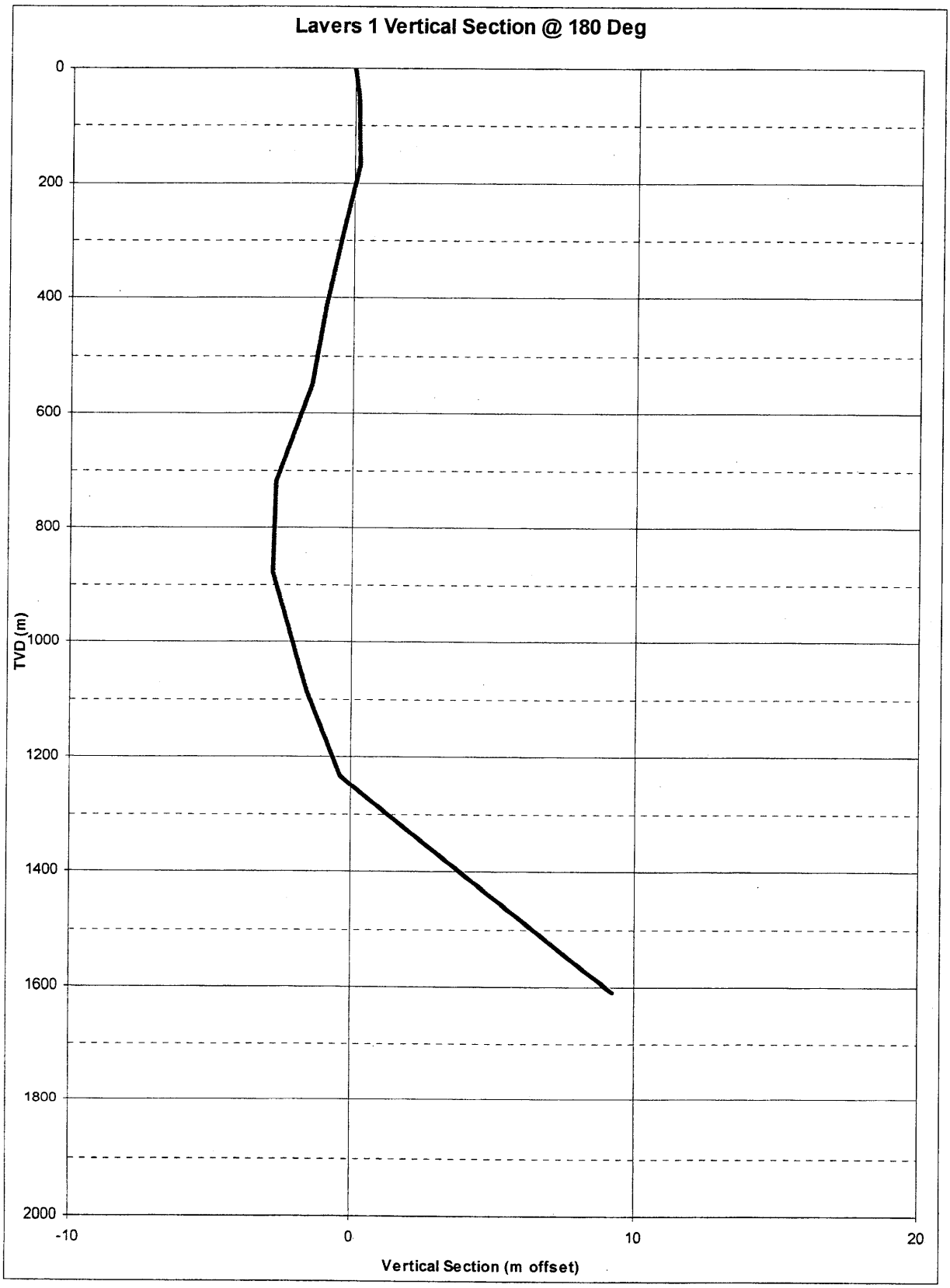
APPENDIX IV: DEVIATION DATA

Lavers 1 **Rt=** 68.2 m **Minimum Curvature Method**

Enter Azimuth 180

DEPTH m	INCLIN DEG	Azimuth DEG	TVD m	TVD S/S m	Northing north	Easting east	Q DEG	Vert Sect	Vert Plane	Displ (offset)	Direction True
0.00	0.00	0.00	0.00	-68.20	0.00	0.00	0.00000	0.00	0	0.00	0.00
49.00	0.38	132.00	49.00	-19.20	-0.11	0.12	0.00661	0.11	-0.1087	0.16	0.00
169.00	0.38	62.00	169.00	100.80	-0.19	0.77	0.00760	0.19	-0.1882	0.79	103.77
285.00	0.50	37.00	284.99	216.79	0.40	1.41	0.00389	-0.40	0.39663	1.47	74.31
413.00	0.13	5.00	412.99	344.79	0.98	1.76	0.00699	-0.98	0.98177	2.02	60.85
552.00	0.63	65.00	551.99	483.79	1.46	2.47	0.01007	-1.46	1.45578	2.86	59.45
720.00	0.60	354.00	719.98	651.78	2.72	3.21	0.01246	-2.72	-2.7209	4.21	49.73
878.00	0.60	212.00	877.98	809.78	2.84	2.69	0.01979	-2.84	2.84211	3.91	43.39
1082.00	0.25	228.00	1081.97	1013.77	1.64	1.79	0.00641	-1.64	1.63849	2.43	47.52
1234.00	0.75	181.00	1233.97	1165.77	0.42	1.53	0.01059	-0.42	0.42193	1.58	74.54
1610.00	2.20	180.00	1609.83	1541.63	-9.26	1.48	0.02529	9.26	-9.256	9.37	170.90




Lavers 1 Vertical Section @ 180 Deg
TVD (m)
0
200
400
600
800
1000
1200
1400
1600
1800
2000
-10
0
10
20
Vertical Section (m offset)

APPENDIX V: PRESSURE SURVEY

SANTOS LIMITED

PRESSURE SURVEY

WELL: LAVERS 1 K.B.: 68.5m TOOL AND GAUGE TYPE: STRAIN AND HP PAGE: 1 OF 2

WITNESS: TIM CONROY TIME SINCE LAST CIRC.: 6 HOURS PROBE / PACKER TYPE: STANDARD DATE: 03/05/01

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	FORM. PRESS	HYDR. AFTER	TEMP.	DRAW D. MOBILITY	TYPE D/D	TYPE BUILDUP	DEPLET -S/C	
		FT/M	FT/M	PSIG	°C		PSI	PSI	PSI	°F/°C	MD/CP				
1	WAARRE C	1543	1474.5	2000	65	1	2458.6	2130.7	2457.9	60.03	N/A	N	RAPID	N	GOOD TEST
2	WAARRE C	1544	1475.5	2000	65	2	2459.9	2131.1	2459.7	60.5	N/A	N	RAPID	N	GOOD TEST
3	WAARRE C	1545	1476.5	2000	65	3	2461.5	2132.9	2461.1	61	N/A	N	RAPID	N	GOOD TEST
4	WAARRE C	1548.5	1480	2000	65	4	2466.9	2131.4	2466.8	61.5	N/A	N	RAPID	N	GOOD TEST
5	WAARRE C	1550	1481.5	2000	65	5	2469.4	2132.1	2469.2	61.5	N/A	N	RAPID	N	GOOD TEST
6	WAARRE C	1551.7	1483.2	2000	65	6	2472.1	2132.3	2471.9	62	N/A	N	RAPID	N	GOOD TEST
7	WAARRE C	1554	1485.5	2000	65	7	2475.7	2133.3	2475.6	62	N/A	N	RAPID	N	GOOD TEST
8	WAARRE C	1556.3	1487.8	2000	65	8	2479.3	2136.6	2479.3	62	N/A	N	RAPID	N	GOOD TEST
9	WAARRE C	1560	1491.5	2000	65	9	2485.1	2142	2485.1	62.5	N/A	N	RAPID	N	GOOD TEST
10	WAARRE C	1561	1492.5	2000	65	10	2486.6	2143.3	2486.6	63	N/A	N	RAPID	N	GOOD TEST
11	WAARRE C	1562	1493.5	2000	65	11	2488.2	2144.7	2488.2	63	N/A	N	RAPID	N	GOOD TEST

ANTICIPATED GEOTHERMAL GRADIENT: 0.025 °C/M

ANTICIPATED WATER GRADIENT: 0.45 PSI/FT

MUD WEIGHT / GRADIENT: 9.3 PPG

DRAWDOWN NORMAL : PRESSURE DOES NOT DROP TO ZERO
LIMITED : PRESSURE DROPS TO ZERO

BUILD UP TYPES : IMMEDIATE - RAPID - GOOD - SLOW

9080031 050

SANTOS LIMITED

PRESSURE SURVEY

9080031 051

WELL: LAVERS 1 K.B.: 68.5m TOOL AND GAUGE TYPE: STRAIN AND HP PAGE: 2 OF 2

WITNESS: TIM CONROY TIME SINCE LAST CIRC.: 6 HOURS PROBE / PACKER TYPE: STANDARD DATE: 03/05/01

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	FORM. PRESS	HYDR. AFTER	TEMP.	DRAW D. MOBILITY	TYPE D/D	TYPE BUILDUP	DEPLET -S/C	
		FT/M	FT/M	PSIG	°F/P°C		PSI	PSI	PSI	°F/°C	MD/CP				
12	WAARRE C	1562.4	1493.9	2000	65	12	2488.8	2145.3	2488.8	63	N/A	N	RAPID	N	GOOD
13	WAARRE A	1572	1503.5	2050	65	13	2504	2159.9	2504	63	N/A	N	RAPID	N	GOOD
14	WAARRE A	1572.3	1503.8	2050	66	14	2504.5	2160.1	2504.5	63.2	N/A	N	RAPID	N	GOOD
15	WAARRE A	1573	1504.5	2050	66	15	2505.6	2161.4	2505.6	63.5	N/A	N	RAPID	N	GOOD
16	WAARRE A	1582.5	1514	2050	66	16	2520.7	-	2520.7	63.5	N/A	N	-	-	NO SEAL X2
17	WAARRE A	1586.1	1517.6	2050	66	17	2526.3	2211.1	2526.3	63.5	N/A	N	SLOW	SUPER	SLOW
18	WAARRE A	1589	1520.5	2050	66	18	2530.8	2224.7	2530.5	63.5	N/A	N	SLOW	SUPER	SLOW
19	WAARRE C	1548.5	1480	2000	65	21	2466.6	2132.8	-	63.5	N/A	N	RAPID	N	SNORKEL BLOCKED ON SAMPLE
20	WAARRE C	1548.5	1480	2000	65	22	2465.9	2132.3	2464.7	63	N/A	N	RAPID	N	SEGREGATED SAMPLE

ANTICIPATED GEOTHERMAL GRADIENT: 0.025 °C/M

ANTICIPATED WATER GRADIENT: 0.45 PSI/FT

MUD WEIGHT / GRADIENT: 9.3 PPG

DRAWDOWN NORMAL : PRESSURE DOES NOT DROP TO ZERO

LIMITED : PRESSURE DROPS TO ZERO

BUILD UP TYPES : IMMEDIATE - RAPID - GOOD - SLOW

APPENDIX VI: DRILL STEM TEST DATA

No Drill Stem Tests were conducted in Lavers 1

APPENDIX VII: HYDROCARBON ANALYSIS

RFS sample gas analysis

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

29 May 2001

Santos Ltd
GPO Box 1010
BRISBANE QLD 4001

Attention: Andy Pietsch

REPORT LQ10404

CLIENT REFERENCE: 539489-68

WELL NAME/RE: Lavers-1

MATERIAL: RFT sample

WORK REQUIRED: Pressurised gas and liquid

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.cm

G:\Secretary\petroleum\Docs-01\10404.doc

AMDEL PETROLEUM SERVICES

Method GL-02-03

Client: SANTOS Ltd Report # LQ10404

Sample: LAVERS-1
1548.5 m RT
Opening Pressure 9000 kPag

COMPOSITIONAL ANALYSIS OF RECOMBINED SEPARATOR FLUID

Component	Flashed Stock Tank Liquid Mol %	Flashed Stock Tank Gas Mol %	Recomb. Sep. Liquid Mol %
Nitrogen	-------	7.88	7.86
Carbon Dioxide	-------	0.47	0.47
Methane	-------	81.74	81.57
Ethane	0.00	6.07	6.06
Propane	0.00	2.42	2.41
I-Butane	0.01	0.45	0.45
N-Butane	0.04	0.53	0.53
I-Pentane	0.22	0.14	0.14
N-Pentane	0.45	0.11	0.11
Hexanes	9.68	0.12	0.14
Heptanes	28.96	0.05	0.11
Octanes plus	60.64	0.02	0.15
TOTAL	100.00	100.00	100.00
RATIOS			
Molar ratio	0.0021	0.9979	1.0000
Mass Ratio	0.0131	0.9869	1.0000
Gas Liquid Ratio	1.00 bbl @ SC	410242.9 SCF	-------
STREAM PROPERTIES			
Molecular Weight	120.8	19.3	19.6
Density obs(g/cc)	0.7912 @ 15°C	-------	-------
API-Gas Density	47.27 API @60°F	0.668 (air=1)	-------
GHV (BTU/scf)	-------	1048	-------
OCTANE PLUS PROPERTIES			
Mol %	60.64	0.02	0.15
Molecular Weight	137.3	114.2	134.2
Density (g/cc)	0.8337 @ 15°C	-------	-------
API @ 60°F	38.17	-------	-------

LABORATORY FLASH SEPARATION DETAILS

Separation Temperature	20	°C
Flash Gas Volume	1107.20	litres
Stabilised Liquid Volume	15	ml
Liquid Density	0.7875	g/ml

Approved Signatory Diane Cass

Accreditation No: 2013 08-May-01

AMDEL PETROLEUM SERVICES Flash Liquid Analysis
Method GL-02-03
Client: SANTOS Ltd Report # LQ10404

Sample: LAVERS-1
1548.5 m RT
Opening Pressure 9000 kPag

Boiling Point Range (Deg.C)	Component	Weight%	Mol%
-88.6	Ethane	0.00	0.00
-42.1	Propane	0.00	0.00
-11.7	I-Butane	0.01	0.01
-0.5	N-Butane	0.02	0.04
27.9	I-Pentane	0.13	0.22
36.1	N-Pentane	0.27	0.45
36.1-68.9	C-6	6.76	9.57
80.0	Benzene	0.07	0.11
68.9-98.3	C-7	11.74	14.14
100.9	Methylcyclohexane	12.05	14.82
110.6	Toluene	0.59	0.78
98.3-125.6	C-8	17.11	18.08
136.1-144.4	Ethylbenz+Xylenes	2.22	2.52
125.6-150.6	C-9	13.51	12.71
150.6-173.9	C-10	13.55	11.49
173.9-196.1	C-11	7.46	5.76
196.1-215.0	C-12	5.80	4.11
215.0-235.0	C-13	3.14	2.05
235.0-252.2	C-14	2.20	1.34
252.2-270.6	C-15	1.65	0.94
270.6-287.8	C-16	0.76	0.41
287.8-302.8	C-17	0.43	0.21
302.8-317.2	C-18	0.30	0.14
317.2-330.0	C-19	0.09	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	0.01
369.4-380.0	C-23	0.01	0.00
380.0-391.1	C-24	0.01	0.00
391.1-401.7	C-25	0.02	0.01
401.7-412.2	C-26	0.01	0.00
412.2-422.2	C-27	0.00	0.00
>422.2	C-28+	0.05	0.02
	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.

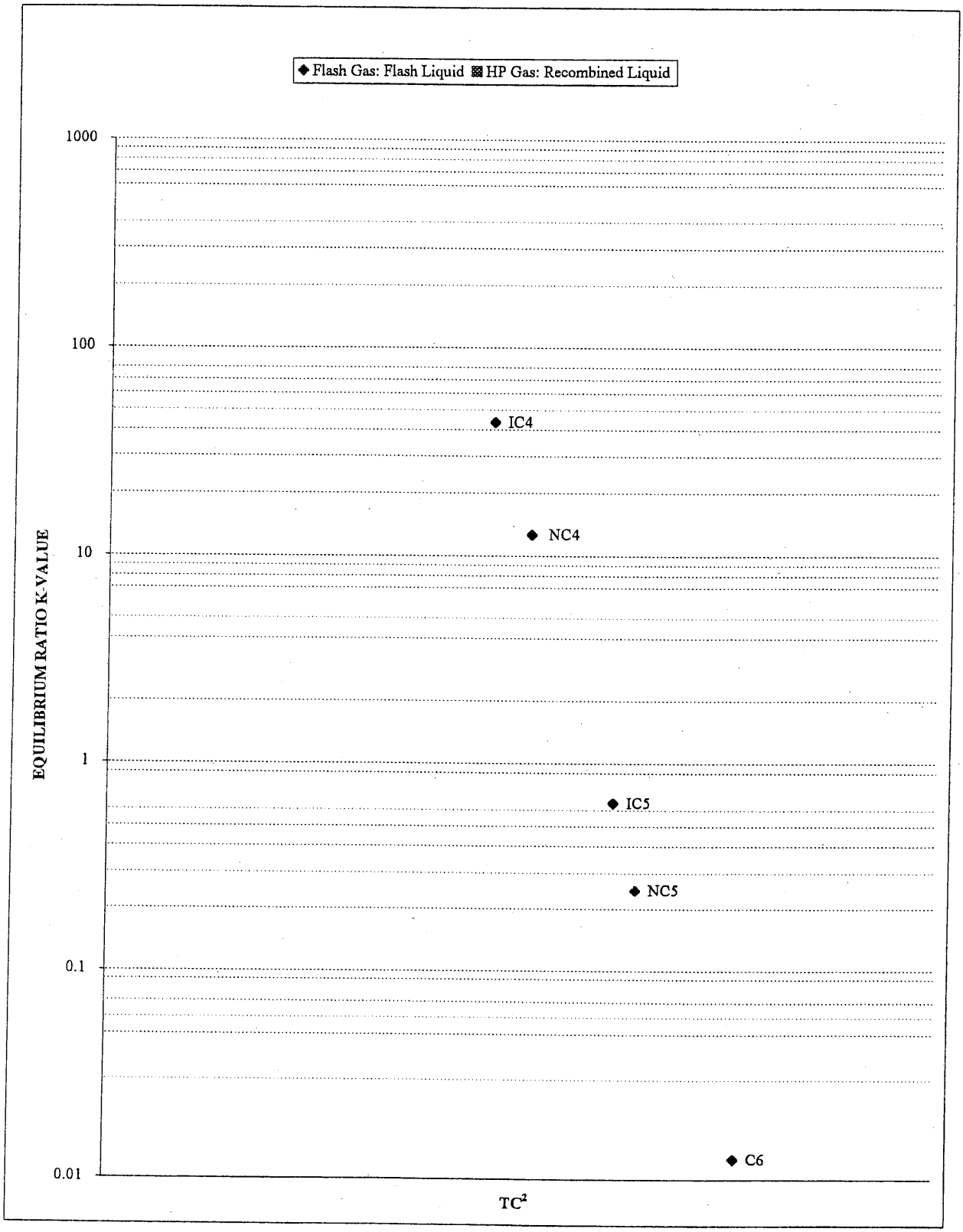
Oil Parameters:

Density of Oil @ 20.0 °C	0.7875	
Specific Gravity @ 15.6 °C	0.7915	
API Gravity	47.27	
Specific Gravity of C8+ fraction	0.8340	(calc)
Average molecular weight of C8+ fractio	137	

AMDEL PETROLEUM SERVICES
Method GL-02-03
Client: SANTOS Ltd

Report # LQ10404

Sample: LAVERS-1
1548.5 m RT
Opening Pressure 9000 kPag



AMDEL PETROLEUM SERVICES
Method GL-02-03

Appendix A
Page A1

Client: SANTOS Ltd

Report # LQ10404

Sample: LAVERS-1
1548.5 m RT
Opening Pressure 9000 kPag

Full Well Stream

Separator Gas	0.000	MMSCF
Stock Tank Oil Rate	0.000	BBLS

		Av Mol Wt
Flash Gas Moles	46.025	19.35
Flash Liquid Moles	0.098	120.80
Recombination Moles	46.123	
Molar Shrinkage Factor	0.002	
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	7.88	-------	7.86	0.00	#DIV/0!
Carbon Dioxide	0.47	-------	0.47	0.00	#DIV/0!
Methane	81.74	-------	81.58	0.00	#DIV/0!
Ethane	6.07	0.00	6.06	0.00	#DIV/0!
Propane	2.42	0.00	2.41	0.00	#DIV/0!
I-Butane	0.45	0.01	0.45	0.00	#DIV/0!
N-Butane	0.53	0.04	0.53	0.00	#DIV/0!
I-Pentane	0.14	0.22	0.14	0.00	#DIV/0!
N-Pentane	0.11	0.45	0.11	0.00	#DIV/0!
Hexanes	0.12	9.68	0.14	0.00	#DIV/0!
Heptanes	0.05	28.96	0.11	0.00	#DIV/0!
Octanes plus	0.02	60.64	0.14	0.00	#DIV/0!
	100.00	100.00	100.00	0.00	#DIV/0!
Av.Mol.Weight	19.35	120.80	19.56	0.00	#DIV/0!

K Factors

	Flash Gas/ Flash Liquid Ratio	HP Gas/ Recombined Liquid Ratio
C1	-------	0.00
C2	-------	0.00
C3	#DIV/0!	0.00
IC4	43.11	0.00
NC4	12.56	0.00
IC5	0.64	0.00
NC5	0.25	0.00
C6	0.01	0.00
C7	0.00	0.00

ADC1 A, PE 8500 (01MAY07\10404FL1.D)

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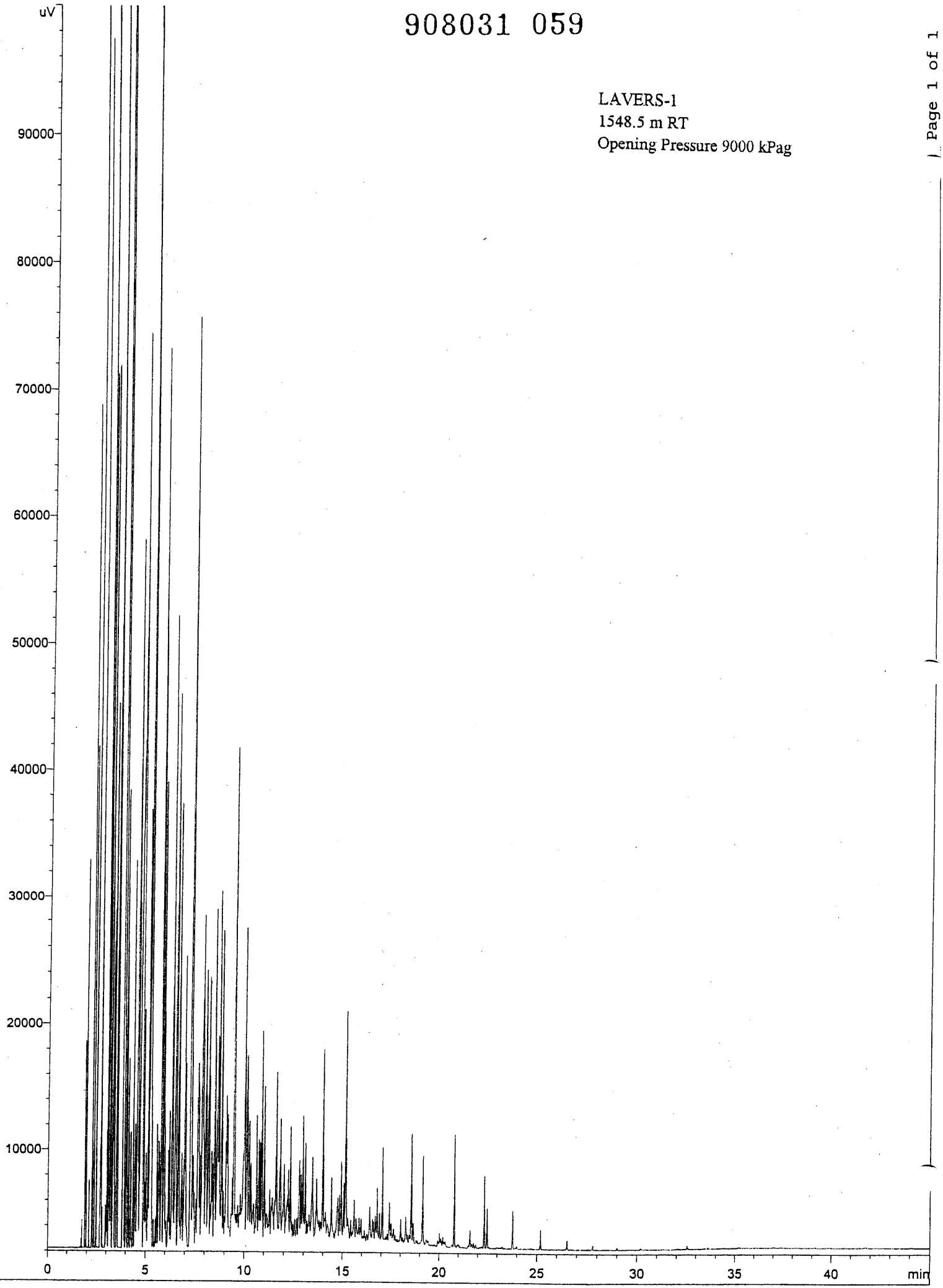
LAVERS-1
1548.5 m RT
Opening Pressure 9000 kPag



APPENDIX VIII: WATER ANALYSIS

No water Analysis was conducted on Lavers 1

APPENDIX IX: PALYNOLOGICAL ANALYSIS

SANTOS PALYNOLOGY SECTION
EXPLORATION SERVICES DEPARTMENT

Palynology Report No. 2001/17

Author: J.GOODALL
Approved by: G.WOOD

PALYNOLOGICAL REPORT NO. 2001/17
PALYNOSTRATIGRAPHICAL ANALYSIS

LAVERS-1 WELL

Santos Ltd
A.C.N. 007 550 923

Circulation: Geology Operations, Team Leader, EIC, Palynology Files

Introduction

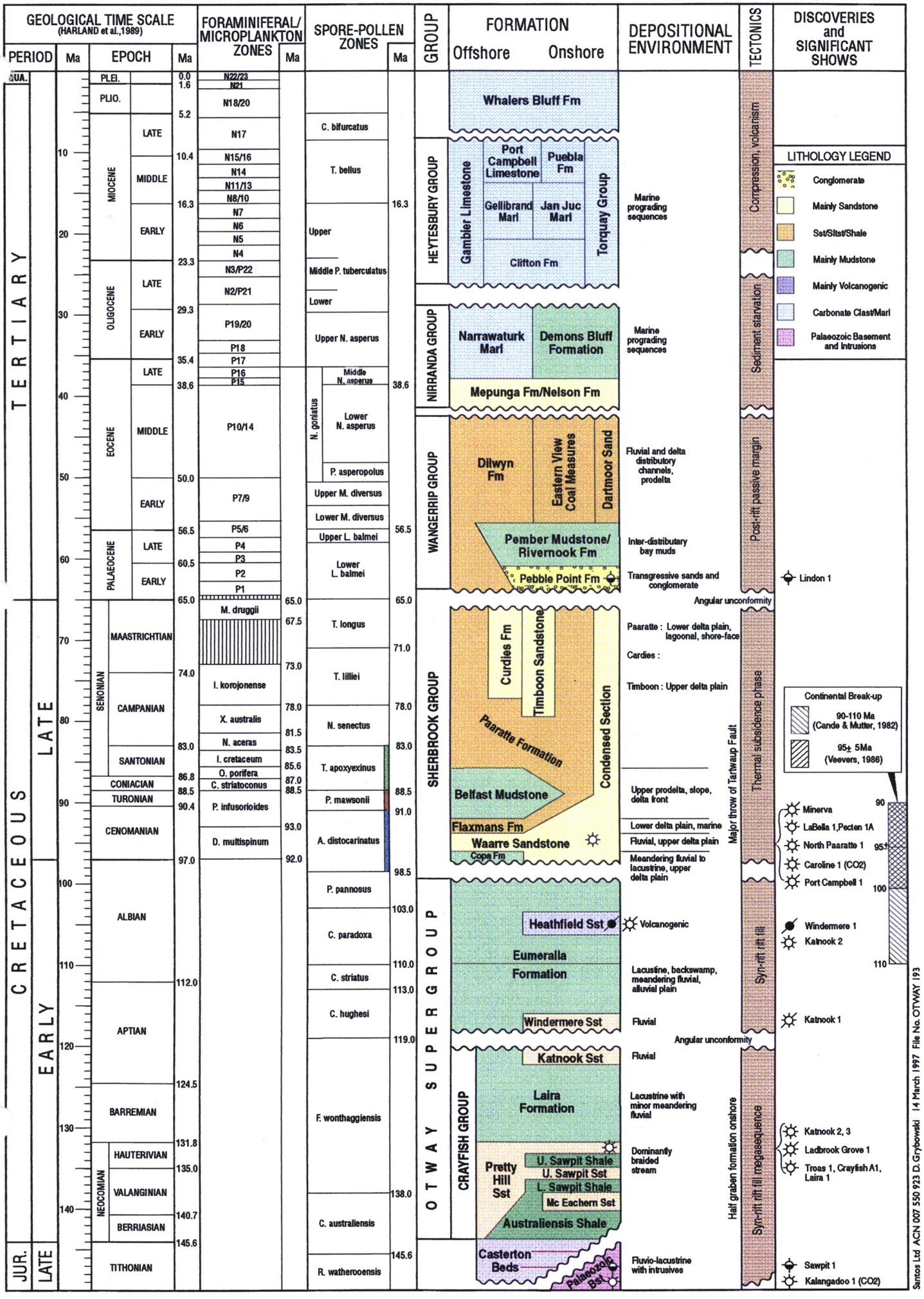
Eight sidewall core samples and from Lavers-1, located in the Otway Basin, PEP 154 were examined palynologically so as to assess their palynostratigraphic position. Total hydrocarbon yield, oil proneness and maturity analysis has not been performed.

Summaries of the results of this study are presented on Table 1. The palynostratigraphic results are presented in more detail on Table 2. The known relationships of the palynological zones to the lithostratigraphy are shown on Chart 1. Range charts of the palynomorphs identified in this study are presented in Appendix 1.

J.Goodall

OTWAY BASIN STRATIGRAPHIC COLUMN

Santos



Santos Ltd ACN 007 550 923 D. Grybowski 14 March 1997 File No. OTWAY 193

Santos

PALYNOLOGICAL SYNTHESIS

Report No. 2001/17

Study: Lavers No. 1

Table 1

Author: J.Goodall

SAMPLE	DEPTH	LITHOLOGY	ROCK UNIT	AGE	PALYNOSTRATIGRAPHIC UNIT	MATURITY SC: Spore Colour Vre: Vitrinite Reflectance Equivalent	TOTAL H.C. YIELD				OIL PRONENESS				MATURITY				
							not a source rock	marginal	adequate	rich	very limited	limited	moderate	high	immature	early mature	peak generation	late mature	post oil window
SWC 22	1520.5M	Claystone	Belfast Mudstone	Turonian	*No older than ? C. vultuosus No older than ?C.striatoconus*														
SWC 21	1527.5M	Siltstone	Belfast / Flaxman	Turonian	*No older than ?C.vultuosus/ ?G. ancorus*														
SWC 20	1536.5M	Siltstone	Waarre Fm 'C'	Turonian	*I. evexus*														
SWC 19	1540M	Claystone	Waarre Fm 'A' (?Misplaced swc)	Turonian	*C. edwardsii Acme* (?Misplaced swc)														
SWC 11	1564M	Sandstone	Waarre Fm 'B'	Turonian	*C. edwardsii* Acme														
SWC 10	1567M	Sandstone	Waarre Fm 'B'	Turonian	*C. edwardsii* Acme / *H. trinalis*														
SWC 6	1577M	Claystone	Waarre Fm 'A'	Turonian	*C. edwardsii* Acme / *H. trinalis*														
SWC 5	1581M	Siltstone	Waarre Fm 'A'	Turonian	*C. edwardsii* Acme/ *H.trinalis*														

Santos
Study: Lavers No. 1
Author: J.Goodall

PALYNOSTRATIGRAPHICAL DATA
Table 2

Report No. 2001/17

SAMPLE	DEPTH (M)	PALYNOSTRATIGRAPHICAL UNIT (Age)	INFERRED STRATIGRAPHICAL UNIT	REWORKED ELEMENTS %	REWORKED ELEMENTS AGE	PRESERVATION	YIELD	DIVERSITY	REMARKS
SWC 22	1520.5 M	*No older than ?C. VULTUOSUS / ?C.STRIATOCONUS*	BELFAST MUDSTONE			POOR	EX LOW	MOD	The presence of specimens of *C.vultuosus* and *I. balmei* indicate an age no older than the *C.striatoconus* dinocyst zone. Questionable specimens of *T. apoxyexinus* are also noted. The absence of younger markers (*O.porifera, I. cretaceum*) may possibly restrict the age assignment to *C.striatoconus*. Other taxa include *Isabelidinium* spp, *Escharisphaeridia* 477 and C..*vultuosus*
SWC 21	1527.5 M	*No older than* ?C. VULTUOSUS/ ?G ANCORUS	BELFAST / ?FLAXMAN			POOR	EX LOW	MOD	The presence of a specimen of *C.vultuosus* suggest an age assignment to the *C.vultuosus* pollen zone. Questionable specimens of *T. apoxyexinus* are also noted. The dinocyst assemblage is very restricted, being dominated by *Cribroperidinium / Apteodinium* spp. Other taxa include ?*I. evexus*, and *H. conjunctum*.
SWC 20	1536.5 M	*P. INFUSORIOIDES ZONE I. EVEXUS* Subzone	WAARRE FM 'C'			FAIR - POOR	LOW / MOD	MOD	The occurrence of *I. evexus* in association with common *H.heterocanthum* and *C. edwardsii* indicates the *I. evexus* subzone. The pollen and spore assemblage is represented by *H. trinalis, D.granulatus, P.mawsonii* and *A.. cruciformis*.
SWC 19	1540M	*C. EDWARDSII*	WAARRE FM 'A' (?misplaced SWC)			FAIR-POOR	LOW / MOD	LOW	Moderately rich assemblage with common *C. edwardsii, O.complex, Circulodinium spp, Spiniferites* spp and rare *H.heterocanthum*. Pollen and spores represented by *H.trinalis, C.minor* and *Cicatricosisporites* spp. The biofacies is closely comparable to the Waarre A and may suggest a misplaced sidewall core.

Distribution: Geology Operations, Team Leader, EIC, Palynology Files

PALYNOSTRATIGRAPHICAL DATA

Table 2

SAMPLE	DEPTH (M)	PALYNOSTRATIGRAPHICAL UNIT (Age)	INFERRED STRATIGRAPHICAL UNIT	REWORKED ELEMENTS		PRESERVATION	YIELD	DIVERSITY	REMARKS
				%	AGE				
SWC 11	1564M	*C. EDWARDSII*	WAARRE FM 'B'			POOR	V. LOW	V. LOW	A very low palynomorph abundance / diversity, with a single specimen of *C. edwardsii* and rare *O. operculata* and *Circulodinium spp* recorded. The spores and pollen are dominated by the saccates and *C.minor* with rare *A. distocarinatus*.
SWC 10	1567M	*H. TRINALIS / C. EDWARDSII*	WAARRE FM 'B'			POOR	V. LOW	MOD	The dinocysts are dominated by *C. edwardsii*, with rarer *Spiniferites* spp, *O.operculata*, *O.complex* and *Circulodinium spp*. The spores and pollen are dominated by *Corollina,* bisaccate pollen and *C. minor*, with rarer *H. trinalis*, *A.cruciformis*, *D. pusillus* and *P. mawsonii*.
SWC 6	1577M	*H. TRINALIS / C. EDWARDSII*	WAARRE FM 'A'			POOR	LOW / MOD	MOD	A diverse assemblage is recorded, which includes *H. trinalis*. The dinocysts are dominated by *Circulodinium* spp, , *Exochosphaeridium bifidum*, *P. cretaceum*, and a distinctive species of *Valensiella* spp. This dinocysts assemblage is typical of the lower part of the Waarre 'A' succession.
SWC 5	1581M	*H. TRINALIS / C. EDWARDSII*	WAARRE FM 'A'			POOR	MOD	MOD	A very similar assemblage to that recorded at 1577m is noted, with *H. trinalis* being stratigraphically significant. The presence of a relatively diverse marine assemblage dominated by *Circulodinium* spp and *E. bifidum* with rarer *P. cretaceum*, *Valensiella* spp and *O. complex* is indicative of the lower Waarre 'A'

908031 068

Well Name : LAVERS-1

Operator :
Well Code : LAVERS-1
Interval : 1500m - 1600m
Scale : 1:1500
Chart date : 24 October 2001

Palynology Range Chart
G.R. Wood

Santos Ltd
Adelaide, South Australia

Project : OTWAY
Chart : LAVERS-

LAVERS-1

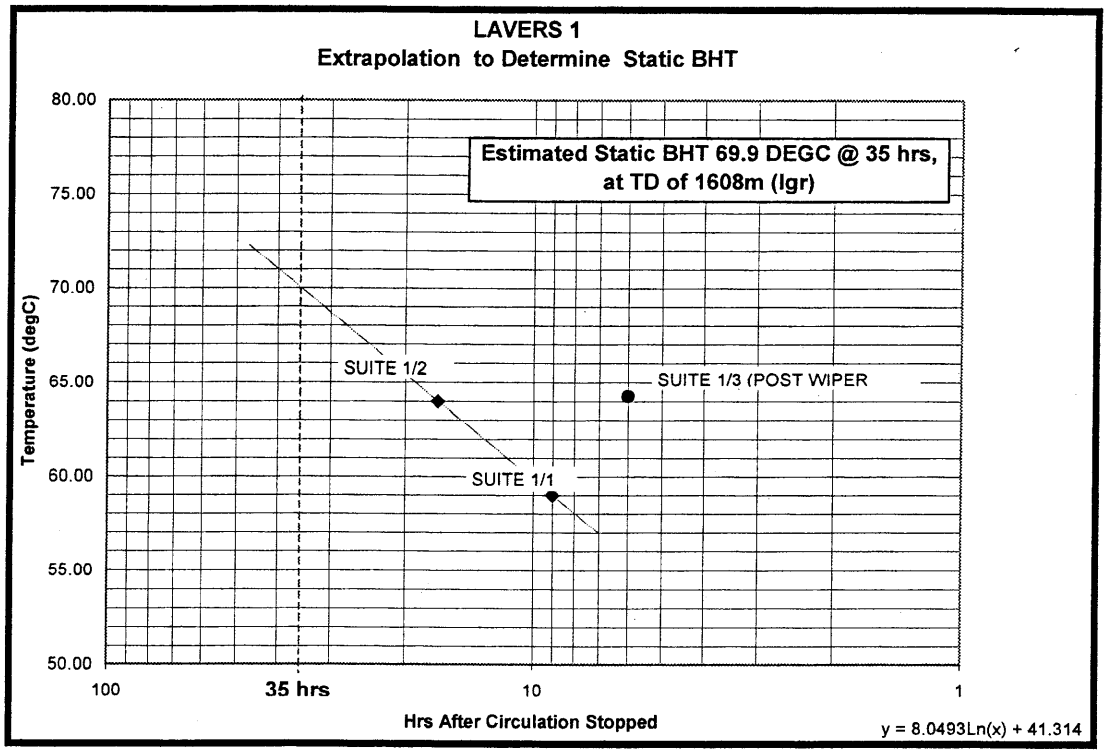
Depth: 1500m – 1600m. Samples (metres): 1520.0, 1527.0, 1536.0, 1540.0, 1564.0, 1567.0, 1577.0, 1581.0

Group	Taxon	1520.0	1527.0	1536.0	1540.0	1564.0	1567.0	1577.0	1581.0
Spores And Pollen (Absolute abundance)	*Bisaccate pollen undiff.*	7	6	3	6	8	7	3	6
	Callialasporites spp								1
	Cicatricosisporites spp	4	2	5	9	2	2	1	2
	Corollina torosa	1	5	2			5	4	1
	Cupressacites spp	2	6		6	2	3	1	1
	Dilwynites granulatus		9	3	4		2	2	2
	Gleicheniidites senonicus	2		3	4	1	2	1	1
	Hoegisporis trinalis			6	1		2	1	1
	Laevigatosporites ovatus 1219		1	2		1	1		1
	Microcachryidites antarcticus 1222	1	3	1	2	1	1	1	1
	Osmundacidites wellmanii 1400	1	3				1		2
	Perotriletes jubatus	1	1	2	3	1			1
	Phyllocladidites mawsonii	3	4	2			1	1	3
	Retitricolpites spp.						1		2
	Retitriletes spp	1		1	1		3	2	3
	Aequitriradites spinulosus				1			1	
	Aratrisporites spp							1	
	Baculatisporites spp			1			3	1	
	Cyathidites minor	6		2	8	4	6	3	
	Dilwynites pusillus	5		7	3		3	5	
	Inaperturopollenites limbatus							2	
	Leptolepidites verrucatus	3	1				1	1	
	Neoraistrickia truncata 698							2	
	Retitriletes circolumenus 930	1					1	1	
	Rouseisporites reticulatus							1	
	Stereisporites antiquasporites 956	1		1			1	1	
	Amosopollis cruciformis	7	8	9	9		1		
	Dictyophyllidites spp 3660						1		
	Gleicheniidites circinidites						1		
	Podocarpidites spp						2		
	Stereisporites pocockii						1		
	Todisporites minor 1401	1					1		
	Uvaesporites verrucosus 144	1					1		
	Verrucosisporites spp						2		
	Vitreisporites pallidus		1	1	1		2		
	Appendicisporites distocarinatus		1	2	1	1			
	Araucariacites australis	6	1		1	2			
	Verrucosisporites admiralis	2	1	1		1			
	Cibotiumspora jurienensis 1406				1				
	Spackmanites spp				1				
	Camarozonosporites australiensis			1					
	Ceratosporites equalis 1243			1					
	Cyathidites australis			1					
	Densoisporites velatus			1					
	Retitriletes austroclavatidites 1063			1					
	Undulatisporites spp			1					
	Aratrisporites / acritarch		4						
	Cicatricosisporites australiensis 681		1						
	Clavifera triplex		2						
	Clavifera vultuosus	2	1						
	Gleicheniidites ancorus	1	1						
	Tricolpites apoxyexinus	3	2						
	Balmeisporites spp	1							
	Dictyotosporites complex 885	1							
	Dilwynites echinatus	1							
	Pilosisporites notensis	1							
	Polycingulatisporites clavus	1							
	Proteacidites spp	2							
	Retitriletes nodosus 830	1							
	Tricolpites spp	1							
Dinoflagellate Cysts (Absolute abundance)	*Circulodinium spp*		3	3	8	4	7	12	17
	Cribroperidinium SPP		9					1	2
	Escharisphaeridia 477	4	3				2	4	3
	Exochosphaeridium bifidum							8	11
	Exochosphaeridium spp	1	1				1	3	2
	Indet palynomorphs			1			2		3
	Oligosphaeridium complex	1	1	9	11	1	2	1	2
	Palaeoperidinium cretaceum				3			9	3
	Valensiella sp.							5	4
	Batiacasphaera spp.	1						1	
	Callaiosphaeridium asymmetricum							1	
	Chlamydophorella nyei			2	1			1	
	Cleistosphaeridium spp.						1	1	
	Dinocyst indet							2	
	Exochosphaeridium robustum		1					2	
	Heterosphaeridium heteracanthum	8	5	5	1			1	
	Odontochitina operculata					3	1	1	
	Palaeohystrichophora infusorioides	1	2					1	
	Spiniferites spp.	6	3	3	6		1	1	
	Cribroperidinium edwardsii	1	2	12	9	1	14		
	Horologinella sp.						1		
	Oligosphaeridium pulcherrimum			1			1		
	Coronifera oceanica				1				
	Hystrichodinium pulchrum				1				
	Trichodinium castanea			3	1				
	Chomotriletes minor			1					
	Isabelidinium evexus		4	4					
	Kiokansium polypes	1	1	3					
	Diconodinium spp.		1						
	Heterosphaeridium conjunctum		3						
	Kallosphaeridium sp.		1						
	Microdinium spp		1						
	Spinidinium sp a		1						
	Avellodinium sp. a	1							
	Isabelidinium balmei	1							
	Isabelidinium spp	3							
	Laciniadinium spp	2							
	Tanyosphaeridium salpinx	1							
Algae (*1)	*Inaperturate 'granulate'*			1	1	4	1	1	4
	Sigmopollis carbonis		1				1	1	
	Palambages sp.	1					1		
	Scenedesmus spp	1					1		
	Botryococcus spp	2		1					
AC (*1)	*Micrhystridium SPP*	1	1	1			1		1
	Nummus spp.	1	3	1	1		1	4	2
	Leiosphere (small)			1				1	
	Veryhachium spp.	1					1		

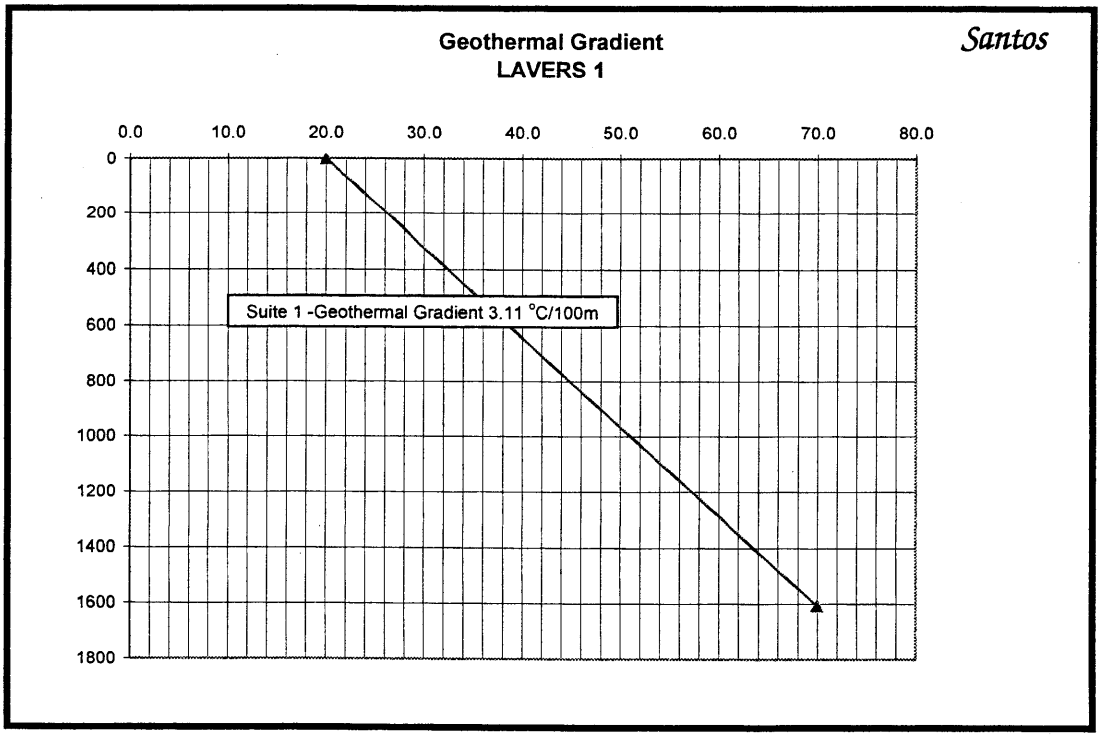
APPENDIX X: GEOTHERMAL GRADIENT

Assumed surface temperature = 20°C.
Calculated BHT @ 1608m = 70°C.
Geothermal Gradient = 3.10°C/100m.

	Max Recorded Temp (degC)	Depth Recorded (m)	Time Since Circulation. (hrs)	Total Depth (m)	Estimated BHT (degC)	
Run 1	59	1608	9	1608	59.00	
Run 2	64	1608	16.75	1608	64.00	
Run 3	63.5	1589	6	1608	64.26	(post wiper trip)



STATIC BHT @ 35 hrs	69.9	°C	@	1608	m
SURFACE TEMP.	20	°C	@	0	m
Geothermal Gradient for Suite 1		3.11	°C/100 m		



APPENDIX XI: WELL LOCATION SURVEY

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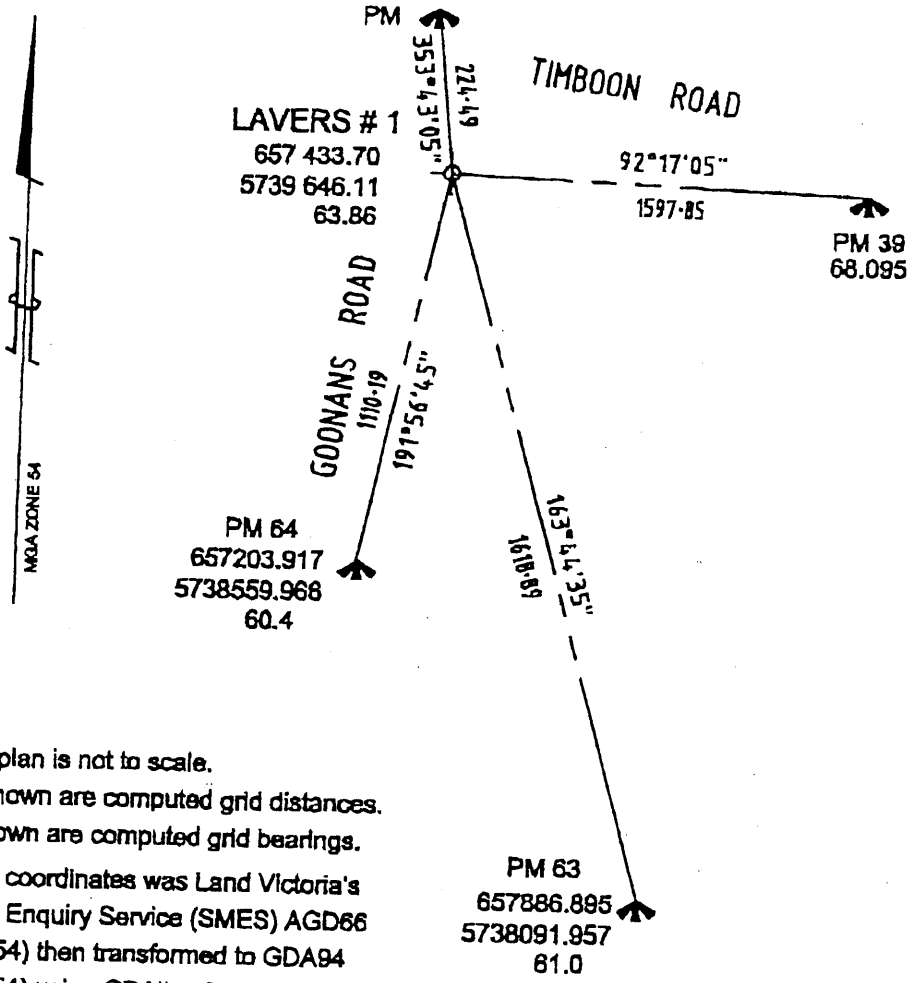
VICTORIA

GAS WELL LOCATION

REFERENCE MARKS SKETCH PLAN

EXPLORATION LICENCE PEP 154

Well Name	LAVERS # 1		
Map			
Spheroid	GDA94	MGA 94	ZONE 54
Latitude	S 38°28'39.45"	Measurement units	(metres)
Longitude	E 142°48'17.46"	Easting	657 433.70
Convergence	1°07'24"	Northing	5739 646.11
Scale Factor	0.99989497	Elevation	63.86 (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 +/- 0.15 metre.

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

Date of Survey : 15 / 2 / 2001

Paul Crowe Surveyor
ABN 59521601183
"Ambleside" 192 Koroit Street
Warrnambool 3280
Ph. (03) 5561 1500

REF 993

Date 16 / 7 / 2001

LICENSED SURVEYOR

APPENDIX XII: DRILLING – FINAL WELL REPORT

SANTOS

FINAL WELL REPORT

LAVERS #1

Drilling Supervisor(s)	: A. Chomley
Drilling Engineer(s)	: G. Coker
Report Author	: T. Robertson / D. New
Report Supervisor	: D. New
Date of Issue	: 3rd August 2001

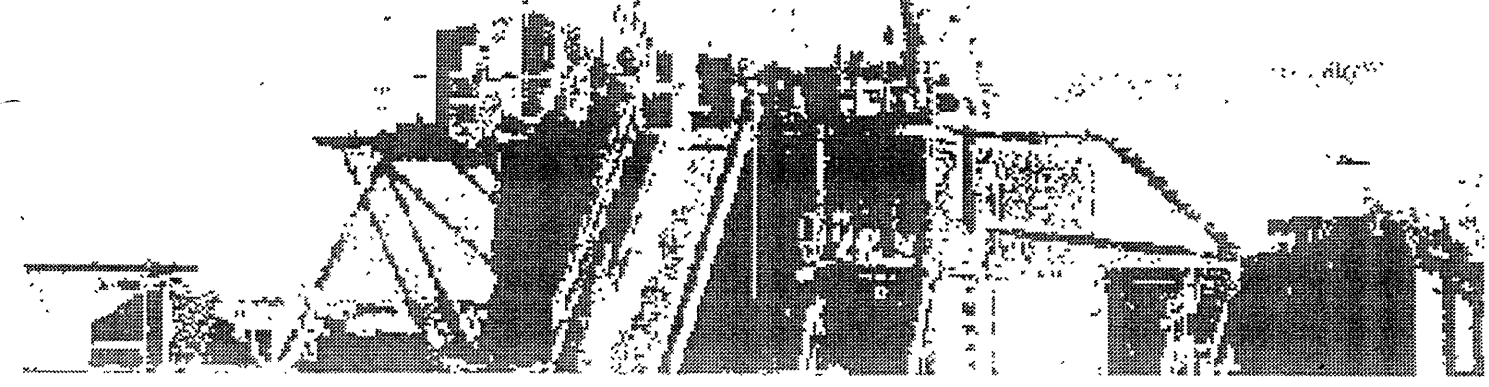


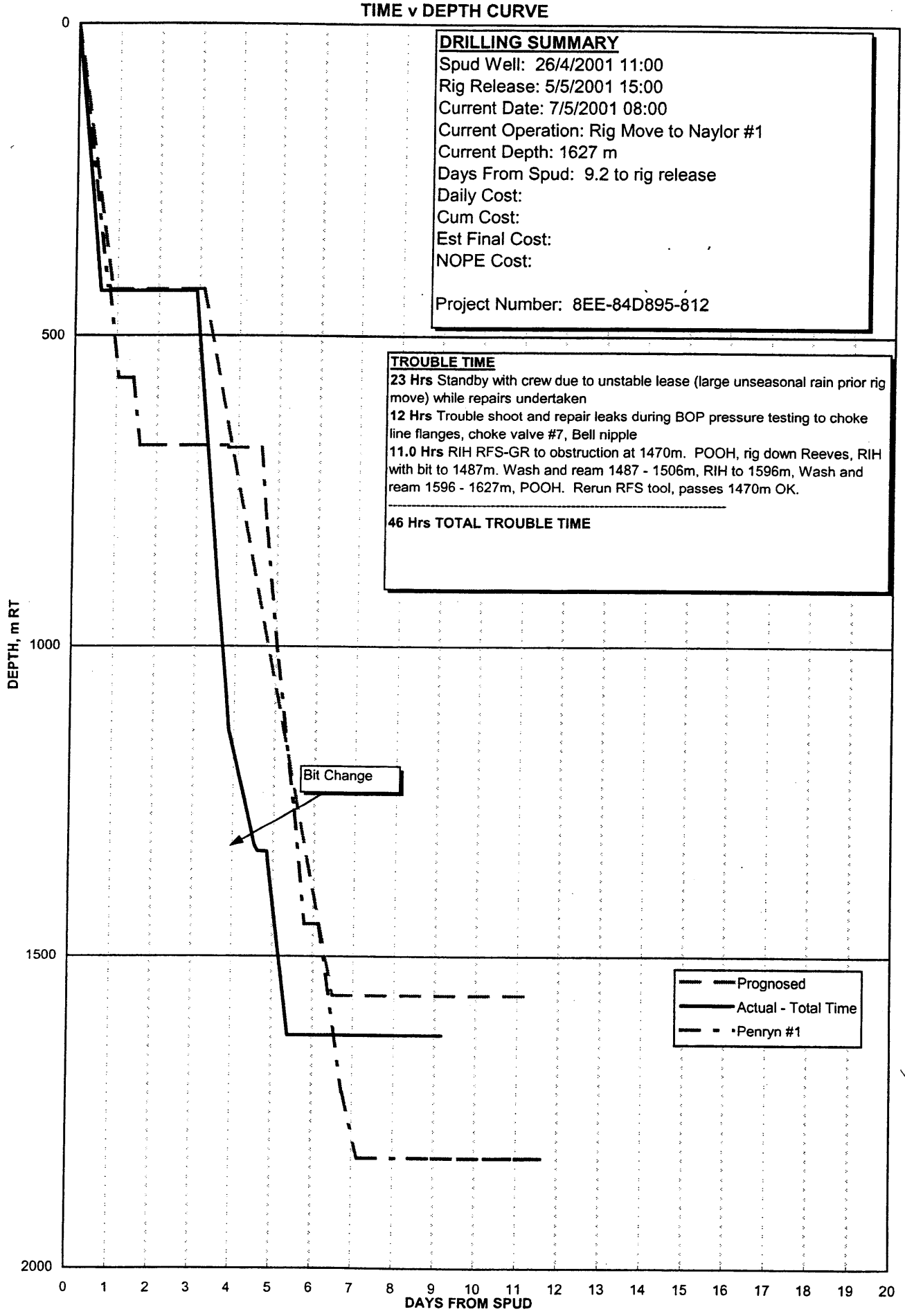
Table of Contents

Section 1.0

Well Summary

- Time vs Depth Curve
- Activity Annotations Report

LAVERS #1
TIME v DEPTH CURVE



LAVERS #1

Drilling Co.: OD&E **Rig:** OD&E #30

RT above GL: 4 m	Lat : 38 deg 28 min 44.75 sec	Spud Date: 26/04/2001	Release Date: 05/05/2001
GL above MSL : 0 m	Long : 142 deg 48 min 12.62 sec	Spud Time: 11:00:00	Release Time: 15:00:00

ACTIVITY ANNOTATIONS

DATE : 21 April, 2001 **REPORT NUMBER :2**

Comment	Solution
Rig Down 75% Rig Up 25% Rig Move 40% Camp 100% ***Overnight rain.	

DATE : 22 April, 2001 **REPORT NUMBER :3**

Comment	Solution
Rig Down 85% Rig Move 35% Rig Up 40% Camp 100% 1.Wet conditions resulted in lease break up and trucks / cranes bogging.	1. Leases at this time of year certainly need to be built to all weather standards, any cutting or shortfall in fill used can certainly risk time delays and remedial work required to rectify lease to working condition.

DATE : 23 April, 2001 **REPORT NUMBER :4**

Comment	Solution
Rig Down 100% Rig Move 95% Rig Up 70% Camp 100%	

DATE : 24 April, 2001 **REPORT NUMBER :5**

Comment	Solution
Rig Down 100% Rig Move 100% Rig Up 80% Camp 100% 1. Camp inspection and remedial actions agreed. Pest exterminator in for mouse/rat control. TV and video functioning. Leaking rooves not yet actioned to closure. Room heaters not actioned to closure.	1. Prior to spud of Lavers crews will attend to camp issues - mainly roof leak action. Electrician to action room heaters to function or replace.

LAVERS #1

Drilling Co.: OD&E **Rig:** OD&E #30

RT above GL: 4 m	Lat : 38 deg 28 min 44.75 sec	Spud Date: 26/04/2001	Release Date: 05/05/2001
GL above MSL : 0 m	Long : 142 deg 48 min 12.62 sec	Spud Time: 11:00:00	Release Time: 15:00:00

ACTIVITY ANNOTATIONS

DATE : 25 April, 2001 **REPORT NUMBER :6**

Comment	Solution
Rig Down 100% Rig Move 100% Rig Up 90% Camp 100% 1. Rig site safety meeting held re PPE and standards/procedures. 2. Camp Issues - TV & Video operational, Roof leaks sealed, Mice infestation - contactor exterminator layed baits, Heaters functional in all rooms. Oven & Cooking facility faults - parts on order. All issues to be monitored on an ongoing basis.	

DATE : 28 April, 2001 **REPORT NUMBER :9**

Comment	Solution
*** Due to "Fix It" time during BOP test period, which, agreed with Steve Ford was due to lack of proffessional service by personnel, a 4 Hr period has been broken out as "Rig On Zero Rate", to cover all those activities that were deemed avoidable if the tasks had been completed initially in a proffessional manner.	

DATE : 30 April, 2001 **REPORT NUMBER :11**

Comment	Solution
Bit was rung out w/ major damage to nose. Reeves logging crew mobilized. ETA 12:00 1st May.	

DATE : 01 May, 2001 **REPORT NUMBER :12**

Comment	Solution
Dowell and Premium Casing mobilized. ETA 2/05/01 Reeves logging crew on site.	

Section 2.0

Well History

- IDS Well History Report

LAVERS #1

Drilling Co.: OD&E **Rig:** OD&E #30

RT above GL: 4 m
GL above MSL : 0 m

Lat : 38 deg 28 min 44.75 sec
Long : 142 deg 48 min 12.62 sec

Spud Date: 26/04/2001
Spud Time: 11:00:00

Release Date: 05/05/2001
Release Time: 15:00:00

Well History

#	DATE	DEPTH	WELL HISTORY (24 Hr Summary)
1	20/04/2001	0	Rig Down and prepare to lower Derrick.
2	21/04/2001	0	Rig Down ops, lay down derrick, Rig move equipment to Lavers #1.
3	22/04/2001	0	Rig move, Rig on Stand-by delay due to Lease breaking up from wet conditions, mobilize Molans and top dress lease.
4	23/04/2001	0	Redress lease, Continue rig move operations.
5	24/04/2001	0	WOD, Wait on Cranes to continue main equip. R/U, pin & string derrick. WOD.
6	25/04/2001	0	WOD, Prepare to and raise Derrick, Continue R/U over Lavers #1.
7	26/04/2001	382	Drill Rat & Mouse holes, final R/U over Lavers #1, Pre Spud meeting, Spud Lavers #1 @ 11:00 Hrs 26th April 2001. Drill & Survey 9 7/8" hole to 382m.
8	27/04/2001	428	Drill from 384m to Section TD 428m, Circ & wiper trip to surface, RIH, Circ, POOH, L/O DCs, Rig Up and Run 7 5/8" Csg, Circ & Cmt Casing, WOC, install "A" Sect., N/U BOPs.
9	28/04/2001	428	N/U & Test BOPs, Rig on Zero Rate, Test BOPs.
10	29/04/2001	896	Repair Bell Nipple, M/U & RIH BHA, Drill Shoe track, Drill 6 3/4" hole from 428m to 433m, LOT, Drill & Survey 6 3/4" hole from 433m to 896m.
11	30/04/2001	1,321	Drill ahead.
12	01/05/2001	1,321	Drill to TD. 1627m.
13	02/05/2001	1,627	Run open hole logs. Wiper trip.
14	03/05/2001	1,627	Complete logging programme. Tight hole conditions below 1575m hampered RFS.
15	04/05/2001	1,627	L/d drill string. Run casing and cement.

Section 3.0

Drilling Data

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

LAVERS #1

Drilling Co.: OD&E **Rig:** OD&E #30 **Mud Co.:**)roid

RT above GL : 4 m
GL above MSL : 0 m

Lat : 38 deg 28 min 44.75 sec
Long : 142 deg 48 min 12.62 sec

Spud Date: 26/04/2001
Spud Time: 11:00

Release Date: 05/05/2001
Release Time: 15:00

Total Cost: $ 23,594

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	KCl %	DAILY $
7	26/04/2001	GEL SPUD	310	70	9.0	39	9	10	6	10	15.0		5	.15	10.0	9.0	750	40	0	1,469
8	27/04/2001	GEL SPUD	310	70	9.0	39	9	10	6	10	15.0		5	.15	10.0	9.0	750	40	0	338
9	28/04/2001	GEL SPUD	428	0	9.0	40	8	15	10	13	15.5		4.9	TR	12.0	8.5	2,000	80	0	2,698
10	29/04/2001	KCl/PHPA	859	28	8.7	36	5	4	2	4	10.0		1.5	TR	1.0	9.3	22,000	240	5	1,541
11	30/04/2001	KCl/PHPA	1,313	33	9.1	39	9	7	4	6	7.6		4.3	.25	1.0	9.3	21,100	280	4	7,707
12	01/05/2001	KCl/PHPA	1,627	39	9.3	42	9	12	6	9	7.0		5.8	.20	4.0	9.5	21,000	240	4	6,473
13	02/05/2001	KCl/PHPA	1,627	39	9.3	43	8	11	5	8	6.8		5.9	.15	4.0	9.3	20,000	240	4	1,906
14	03/05/2001	KCl/PHPA	1,627	0	9.3	44	9	12	5	9	6.8		5.9	trc	3.5	9.0	20,000	240	4	0
15	04/05/2001	KCL/BRINE	1,627	0	8.4	28	0	0	0	0	0.0	0.0	0	0	0.0	0.0	0	0	2	1,463

LAVERS #1

Drilling Co.: OD&E **Rig:** OD&E #30

RT above GL 4 m
GL above MSL 0 m

Lat : 38 deg 28 min 44.75 sec
Long : 142 deg 48 min 12.62 sec

Spud Date: 26/04/2001
Spud Time: 11:00

Release Date: 05/05/2001
Release Time: 15:00

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	162	39		56	58	55	1,600	1,500	600	BIT, BIT SUB, X/O, X/O, MDC, X/O, DC, STB, 10 x DC, X/O, 5 x HWDP = 162.39m
2	248	34	25	60	65	56	9,200	7,500	2,200	BIT, NB STB, PONY DC, STB, MDC, STB, 16 x DCs, JARS, 4 x DCs, 5 x HWDP = 248.04m

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LAVERS #1

Drilling Co.: OD&E

Rig : OD&E #30

RT above GL : 4 mtrs
GL above MSL : 0 mtrs

Lat : 38 deg 28 min 44.75 sec
Long : 142 deg 48 min 12.62 sec

Spud Date: 26/04/2001
Spud Time: 11:00:00

Release Date: 05/05/2001
Release Time: 15:00:00

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
27/04/2001	RR1	9.88		LY9255	SMITH	FGSS+2C	1x0,2x22	0	428	428	11.8	1100	526	7.0	125	9.0	0.743	69	0.00	36.3	2	2	WT	A	E	I	WO	TD
01/05/2001	2	6.75		5008037	DBS	FS 2463	4x11	428	1,330	902	37.0	1350	275	8.0	105	8.9	0.371	72	2.10	24.4	8	7	RO	N	X	I	RO	PP
01/05/2001	3	6.75		5010844	DBS	FM 2465	4x11	1,330	1,627	297	11.5	1700	280	8.0	110	9.3	0.371	74	2.22	25.8	1	1	WT	T	X	I	WT	TD

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Santos

LEAK OFF TEST / FORMATION INTEGRITY TEST

WELL: LAVERS #1 **RIG:** ODE #30 **DATE:** 02-Aug-01

CASING SIZE: 7 5/8 (inch) SANTOS SUPERVISOR: ALISTAIR CHOMLEY

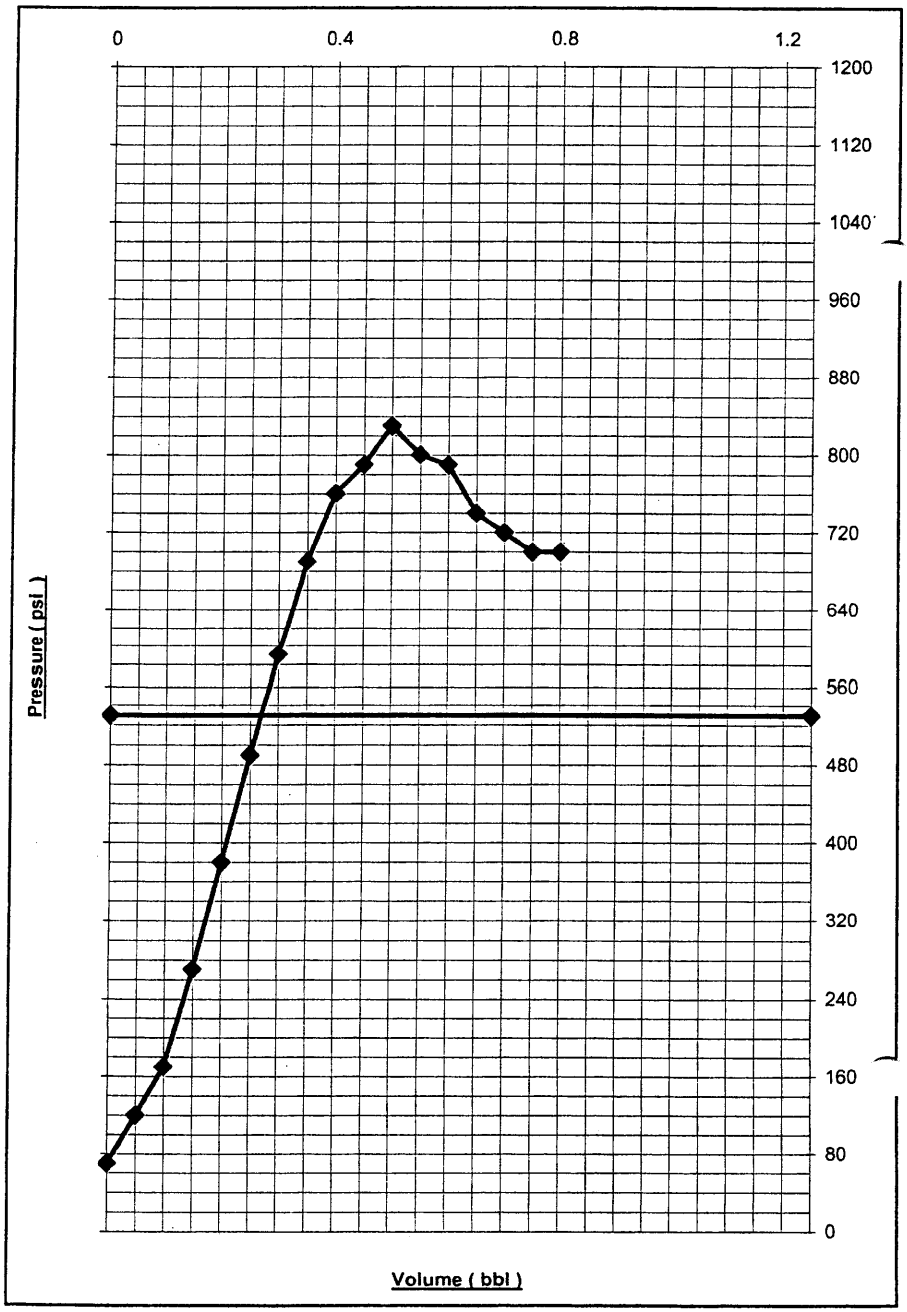
A. MUD DENSITY IN USE:	8.4	(ppg)
B. HOLE DEPTH:	431	(m)
C. SHOE DEPTH:	425	(m)
D. FIT PRESSURE (GRAPH):	760	(psi)
E. EQUIVALENT DENSITY: PRESSURE. (D) (psi) / SHOE DEPTH (C) m x 3.2808 x 0.052 + MUD DENSITY IN USE (A) (ppg)	18.9	(ppg) (EMW)
F. STABILIZED PRESSURE RECORDED:	700	(psi)
G. VOLUME PUMPED:	0.45	(bbl)
H. VOLUME REGAINED:	0.35	(bbl)

MAX. PRESSURE AT PUMP UNIT CALCULATION

DESIRED EMW=	15.7
MUD WT. IN USE	8.4
SHOE DEPTH (m)	425

*** UNIT PRESSURE FOR DESIRED EMW: **529**

	Volume (BBLS)	Pressure (psi)	
CASING PRESS CHART	0.1		
	0.2		
	0.3		
	0.4		
	0.5		
	0.6		
	0.7		
	0.8		
	0.9		
	1		
	1.1		
	1.2		
	1.3		
	1.4		
	1.5		
	1.6		
	1.7		
	1.8		
OPEN HOLE LOT	0	70	
	0.05	120	
	0.1	170	
	0.15	270	
	0.2	380	
	0.25	490	
	0.3	590	
	0.35	690	
	0.4	760	
	0.45	790	
	0.5	830	I.S.I.P
	0.55	800	1 min
	0.6	790	2min
	0.65	740	3 min
	0.7	720	4 min
	0.75	700	5 min
	0.8	700	6 min
	0.85		
	0.9		
MAX PRESS	0	529	
	1.25	529	



Section 4.0

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

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Santos

Santos Ltd

A.C.N. 007 550 923

CASING AND CEMENTING REPORT

Well Name: LAVERS #1

FORM DQMS F-220 Rev.2

Casing type: X Surface casing | Intermediate Casing | Production Casing | Completion tubing

Originated by: ALISTAIR CHOMLEY **Checked by:** GEOFF COKER **Date:** 28-Apr-01

Hole Size: 9-7/8" **T.D.:** 428m MD **Date:** 27-Apr **Contractor:** Schlumberger

PRE-FLUSH 40 bbls. @ 8.4 ppg. **SPACER** 0 bbls@ 0 ppg.

Additives:

Water Source: LAVERS #1 Water Bore Water Source:

CEMENT Mixwater: 61.6 bbls

LEAD SLURRY:	156	sacks Class	G	
Slurry Yield:	2.87	cu.ft./sack		
Mixwater Req't:	17.442	gal./sack		
Actual Slurry Pumped:	80	bbls @	11.5	ppg
Planned TOC:	0	m RT @	55	% o/g hole
Actual est. TOC:	0	m RT @		% o/g hole
TAIL SLURRY:	94	sacks Class	G	
Slurry Yield:	1.19	cu.ft./sack		
Mixwater Req't:	5.299	gal./sack		
Actual Slurry Pumped:	20	bbls @	15.6	ppg
Planned top tail:	330	m RT @	20	% o/g hole
Actual est. top tail:	330	m RT @		% o/g hole

ADDITIVES

Product	% or gps	Product	% or gp
D 020	5% BWOC		
S001 CaCl	1.5% BWOC		
D047	.01 gal/sx		
D145A	.05 gal/sx		
S001 CaCl	0.50%		
D047	.01 gal/sx		

DISPLACEMENT Fluid: 10bbl Water 52bbl Mud @ 9 ppg

Theoretical Displ.: 62 bbl. Bumped plug with 500 psi

Actual Displ. 62.5 bbl @ 5.5 bpm Pressure Tested to: 3000 psi

isplaced via RIG PUMP Bleed back: 0.75 bbls

ACTIVITY	Date/Time	
Start Running csg.	27-Apr-01	10:30
Casing on Bottom	27-Apr-01	14:05
Start Circulation	27-Apr-01	14:10
Start Pressure Test	27-Apr-01	15:25
Pump Preflush	27-Apr-01	14:55
Start Mixing	27-Apr-01	15:36
Finish Mixing	27-Apr-01	16:00
Start Displacing	27-Apr-01	16:05
Stop Displ./Bump	27-Apr-01	16:15
Press. test	27-Apr-01	16:17

Returns to Surface: 154 bbls mud 8 bbls cmt.

Reciprocate / Rotate Casing: Reciprocate till plug bump.

Top Up Job run: Yes / No Yes 10 sx class G

Plug Set Make / Type: Weatherford Model-303 (FS), Model-402NP (FC)

Centraliser Placement, type/depth: Weatherford 423m,412m,400m,377m,353m, BSK & Cent 28m.

Remarks:

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)		-0.87	-0.87	0.0
Rotary table to top of Bradenhead				(Enter for surface casing only)	4.70	0.00	4.7
Bradenhead : WG-22-L, 7-5/8"BTC x 9-5/8"BTC x 11"5K				(Enter for surface casing only)	0.72	4.70	5.4
Rotary table to top of cut jt				(Enter for int. or production casing only)			
1 Cut Jt							
36 Jts	7-5/8"	26.4	L80	BTC	394.88	5.42	400.3
Jts					0.00	400.30	400.3
marker					0.00	400.30	400.3
Jts					0.00	400.30	400.3
marker					0.00	400.30	400.3
Jts					0.00	400.30	400.3
Float Collar	W'ford Model-402NP			BTC	0.40	400.30	400.7
2 Jts	7-5/8"	26.4	L80	BTC	23.25	400.70	423.9
Float Shoe	W'ford Model-303			BTC	0.44	423.95	424.3

Total Jts Run	36
al Jts On Location	42
Jts not run	6

Theoretical Bouyed wt of casing(klb):	31	Bradenhead Height above GL	0.00
Actual wt of casing (last joint run-block wt, klb)	31	Casing wt just prior to landing csg/	24
Landing WT (after cementing and pressure bleed off)	28	setting slips	(indicator wt - blocks = wt

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Santos

Santos Ltd

A.C.N. 007 550 923

CASING AND CEMENTING REPORT

Well Name: LAVERS #1

FORM DQMS F-220 Rev.2

Casing type: ☐ Surface casing ☐ Intermediate Casing ☒ Production Casing ☐ Completion tubing

Originated by: WJ WESTMAN **Checked by:** GEOFF COKER **Date:** 04/05/2001

Hole Size: 6¾" **T.D.:** 1627m **Date:** 04/05/2001 **Contractor:** Schlumberger

PRE-FLUSH 40 bbls. @ 8.6 ppg.

Additives: Sodium acid pyrophosphate @ 8ppb.

Water Source: Heatley's Camp Bore.

SPACE bbls@ ppg.

Water Source:

CEMENT Mixwater:

LEAD SLURRY:	285	sacks Class	G
Slurry Yield:	2.85 (2.84)	cu.ft./sack	
Mixwater Req't:	17.512	gal./sack	
Actual Slurry Pumped:	145	bbls @ 11.5	ppg
Planned TOC:	895	ft RT @ 20	% o/g hole
Actual est. TOC:	895	ft RT @ 20	% o/g hole
TAIL SLURRY:	120	sacks Class	G
Slurry Yield:	1.19	cu.ft./sack	
Mixwater Req't:	5.24	gal./sack	
Actual Slurry Pumped:	25	bbls @ 15.8	ppg
Planned top tail:	4662	ft RT @ 20	% o/g hole
Actual est. top tail:	4662	ft RT @ 20	% o/g hole

ADDITIVES

Product	% or gps	Product	% or gps
Gold Seal Bentonite	1340lbs		
SOO1	134lbs		
D047	3gals		
D080	0.05 gps		
D047	0.01 gps		

DISPLACEMENT Fluid: KCL brir @ 8.4 ppg

Theoretical Displ.:	71 bbl.	Bumped plug with	1100 psi
Actual Displ.	71 bbl @ 6 bpm	Pressure Tested to:	3200 psi
Displaced via	RIG / CEMENT PUMP	Bleed back:	3 bbls

ACTIVITY	Date/Time
Start Running csg.	11:30
Casing on Bottom	20:30
Start Circulation	21:30
Start Pressure Test	21:30
Pump Preflush	22:00
Start Mixing	22:30
Finish Mixing	23:00
Start Displacing	23:00
Stop Displ./Bump	23:15
Press. test	23:20

Returns to Surface: Full bbls mud 0 bbls cmt.

Reciprocate / Rotate Casing: No

Top Up Job run: Yes / No No sx class

Plug Set Make / Type: 3½ c/w Ball.

Centraliser Placement, type/depth: 1620, 1612, 1574, 1526, 1474, 1426, 1378, 1349, 1320, 1291, 1262, 1233, 1214, 1185, BOWSPRING.

Remarks:

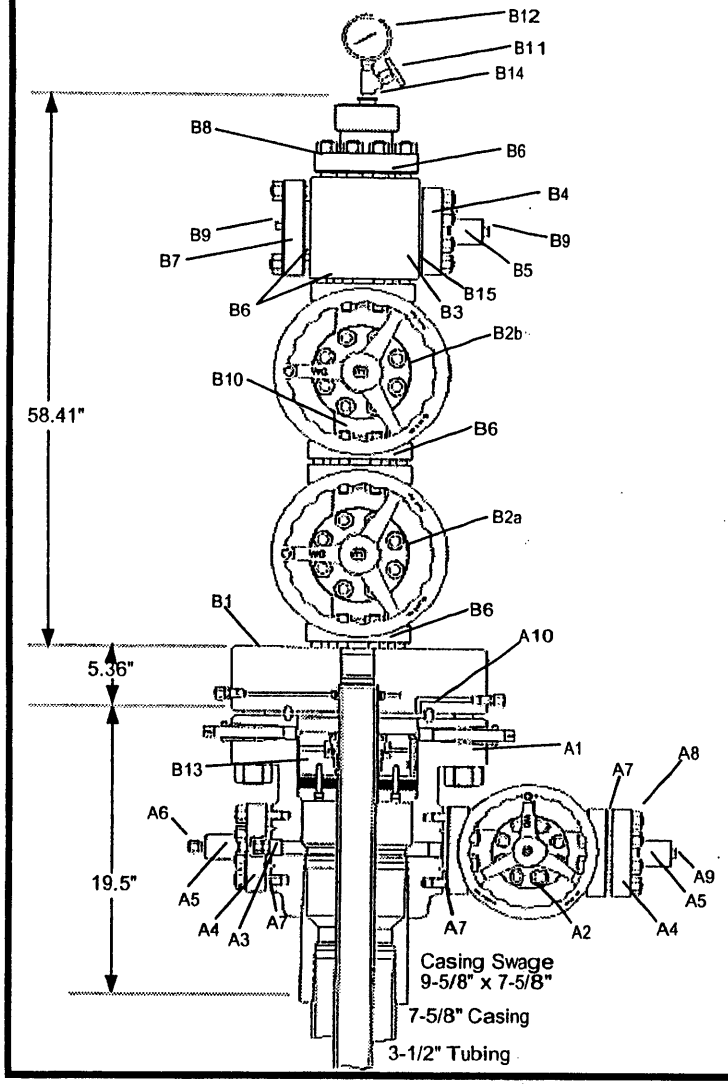
No. JOINTS	SIZE OD	WT lb/ft	GRADE	THREAD	FEET	FROM	TO
Stick Up at RT		(Enter as negative number-do not include stretch, RT = 0)			-2	-2.00	0.00
Rotary table to top of Bradenhead		(Enter for surface casing only)			0	0.00	0.00
Bradenhead (description and rating) / Tubing Hanger or slip and seal		(Enter for surface casing only)			0	0.00	0.00
Rotary table to top of cut jt		(Enter for int. or production casing only)			0	0.00	0.00
1 Cut Jt	3.5	9.3	L80	New NK3SB	15.4	0.00	15.40
6	3.5	9.3	L80	New NK3SB	198	15.40	213.40
150	3.5	9.3	J55	New NK3SB	4747.54	213.40	4960.94
1 marker	3.5	9.3	J55	New NK3SB	10.3	4960.94	4971.24
					0		
					0		
10	3.5	9.3			316.2	4971.24	5287.44
Float Collar	(Make/Type)	DAVIS			1.35	5287.44	5288.79
Joints	1	9.3	J55	New NK3SB	31.59	5288.79	5320.38
Float Shoe	(Make/Type)	DAVIS			1.18		1.18

Total Jts Run	168
Total Jts On Location	
Jts not run	

Theoretical Bouyed wt of casing(klb):	44.000	Bradenhead Height above GL	0.02
Actual wt of casing (last joint run-block wt, klb)	44.000	Casing wt just prior to landing csg/	37000.00
Landing WT (after cementing and pressure bleed off)	37.000	setting slips	(indicator wt - blocks = wt)

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

Well : LAVERS #1
Supervisor : W. Westman
Date : 5th May 2001



COMPONENT	DESCRIPTION	No USED
A1. Casing Head	11" 5k x 7-5/8" 5k c/w BTC Box (WG-22-L, PSL-1, PR-2, AA, U)	1
A2. Gate Valve	2-1/16" 5k Model 2200 (Type 'FE', PSL-1, PR-1, BB, U)	1
A3. Plug	1-1/2" line pipe c/w 1-1/4" hex	1
A4. Companion Flange	2-1/16" 5k x 2" line pipe, (AA, U)	2
A5. Bull Plug	2" line pipe tapped c/w 1/2" NPT, XX-H	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 c/w nuts	8
A9. Pipe Plug	1/2" NPT male	1
A10. Ring Gasket	RX-54 Stainless Steel	1
B13. Slip & Seal Assy	11" x 3-1/2" (WG-22, PSL-1, PR-2, AA, U)	1
B1. Adaptor Flange	11" x 3-1/8" 5k, 3.5" P seal, 3" H BPV (WG-A4-P, PSL-1, CC, U)	1
B2a. Gate Valve	3-1/8" 5k Model 2200 (6A, PSL-2, PR-1, CC, PU, 410/NITRO)	1
B2b. Gate Valve	3-1/8" 5k Model 2200 (6A, PSL-1, PR-2, BB, U, AS/NITRO)	1
B3. Flow Cross	3-1/8" x 3-1/8" x 3-1/8" x 2-1/16" 5k (PSL-1, PR-2, CC, U)	1
B4. Companion Flange	2-1/16" 5k x 2" line pipe, (AA, U)	1
B5. Bull Plug	2" line pipe tapped c/w 1/2" NPT, XX-H	1
B6. Ring Gasket	RX-35 Stainless Steel	5
B7. Blind Flange	3-1/8" 5k tapped 1/2" NPT (CC, U)	1
B8. Tree Cap	3-1/8" 5k c/w Bowen union, 3.5" lift thread, tapped 1" NPT	1
B9. Pipe Plug	1/2" NPT male	1
B10. Studs	7-1/4" x 1-1/8" w/ nuts	8
B11. Needle Valve	1/2" NPT 5k Stainless Steel	0
B12. Pressure Gauge	1/2" NPT 0-5000psi	0
B14. Reducer	1" male x 1/2" female NPT Reducer	1
B15. Ring Gasket	RX-24 Stainless Steel	1
Notes:	3-1/2" Tubing stub cut off 3" above top flange on bradenhead.	
	1/2" NPT male Pipe plug fitted in lieu of Items B11 & B12 at this time.	

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Section 5.0

Time Breakdown Data

- Overview
- Trouble Time Breakdown

Well : LAVERS #1 **Drilling Co : OD&E** **Rig : OD&E #30**

RT above GL: 4 m Lat : 38 deg 28 min 44.75 sec Spud Date: 26/04/2001 Release Date: 05/05/2001
GL above MSL : 0 m Long : 142 deg 48 min 12.62 sec Spud Time: 11:00:00 Release Time: 15:00:00

TIME BREAKDOWN DATABASE - single well overview

Spud date : 26/04/2001
TD Depth : 1,627.0
Final Depth : 1,627.0

Total Time (hrs) - Spud/Release : 211.00
Total Time (hrs) - Rig Move : 0.00
Total NPT (hrs) : 19.00

Time-Breakdown : Times by Class and Operation

Class	Hrs
PROGRAMMED EVENT	192.0
TROUBLE - DURING PROGRAM	19.0

Operation	Hrs
DRILLING AHEAD	60.8
LOGGING	33.0
TOT. CSG/CMT	29.8
N/U & TEST BOP's	25.0
TOT. TRIPPING	24.5
WIPER TRIP	7.5
LAY DOWN PIPE	7.0
CIRCULATE & CONDITION MUD	6.0
WELL-HEAD	5.5
SURVEY	5.0
RIG REPAIR	4.0
RIG SERVICE	1.0
LOT / FIT	1.0
BREAK CIRCULATION	.5
SLIP/CUT DRILL LINE	.5

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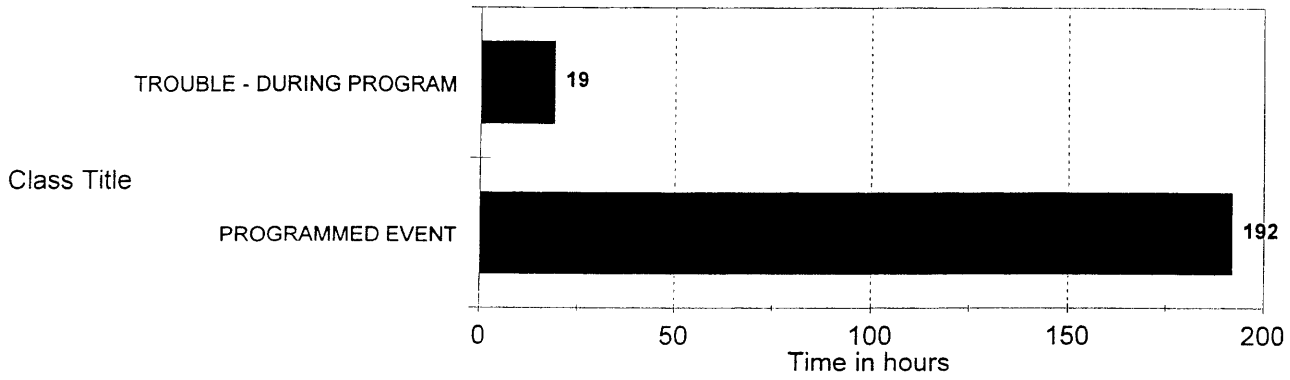
TIME BREAKDOWN DATABASE - single well overview

WELL : LAVERS #1

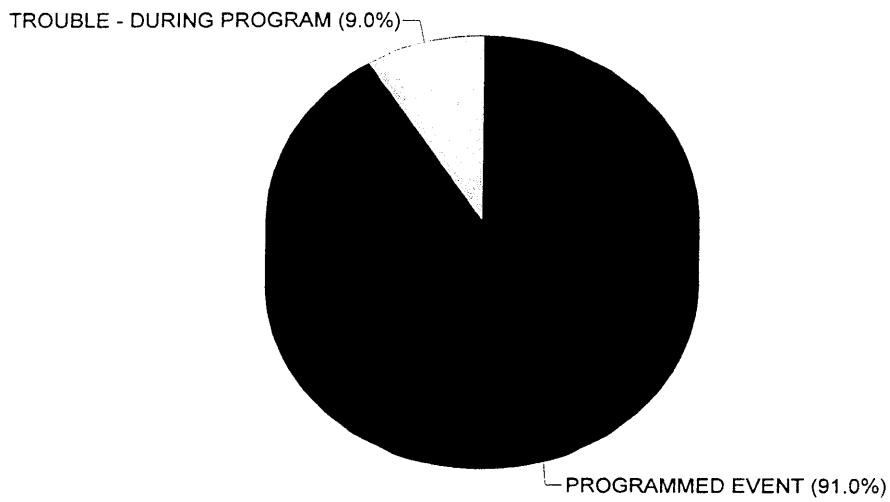
Pacesetter : none selected

Time Breakdown by Class Codes



Time Analysis by Class Codes

Class	Hrs
PROGRAMMED EVENT	192.0
TROUBLE - DURING PROG	19.0



TIME BREAKDOWN DATABASE - single well overview

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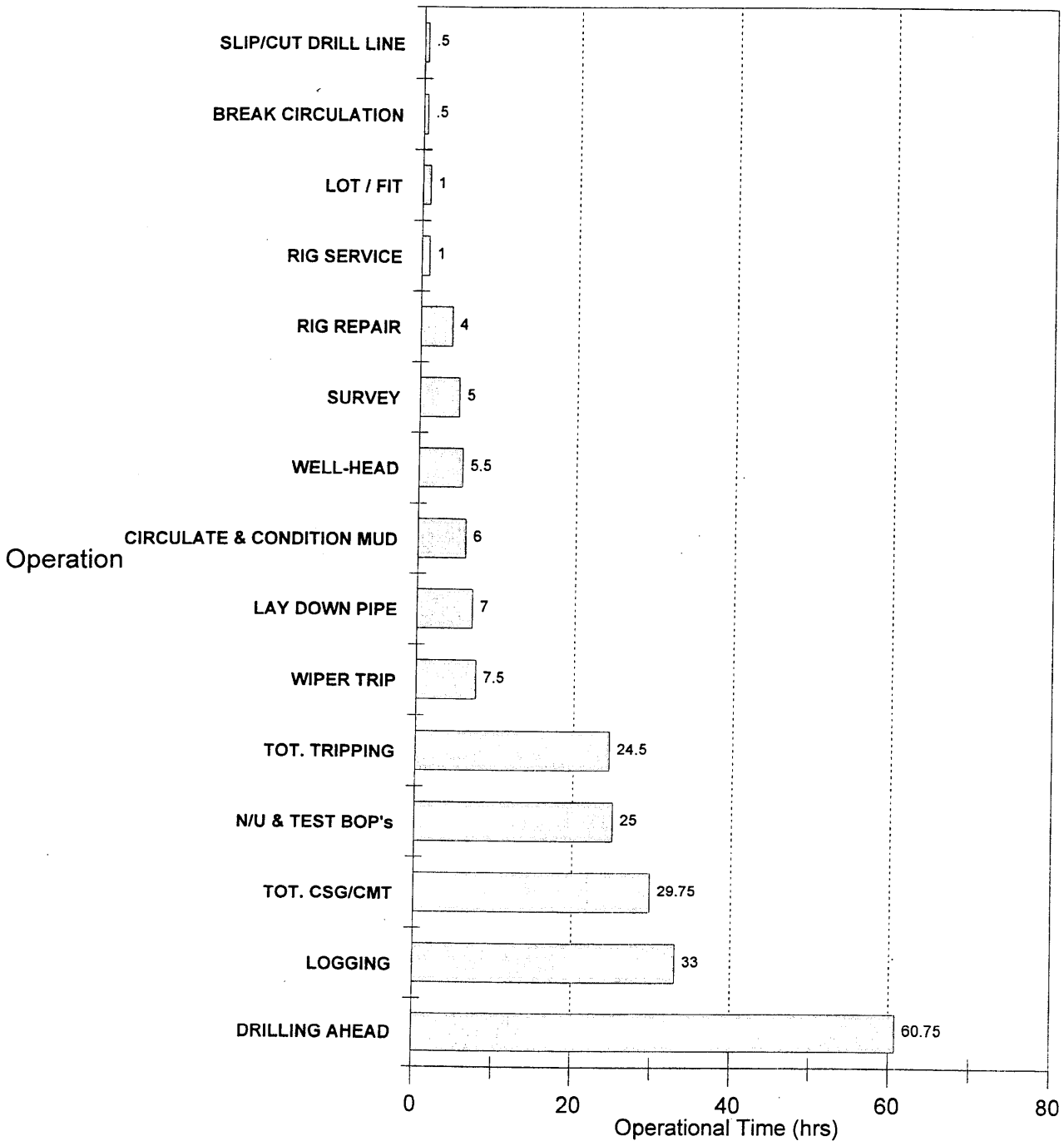
WELL : LAVERS #1

Pacesetter : none selected

Time Breakdown by Operational Code



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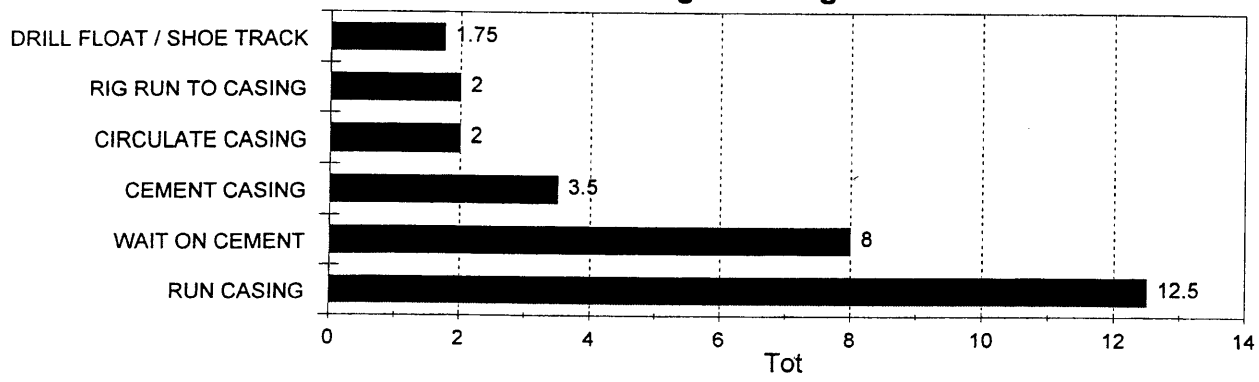
TIME BREAKDOWN DATABASE - single well overview

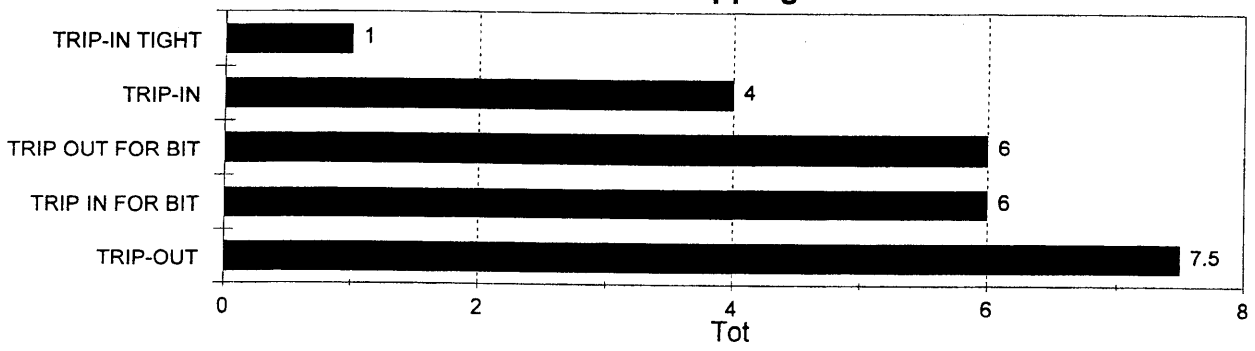
WELL : LAVERS #1

Pacesetter : none selected

Breakdown of Total Csg & Cmtng Time

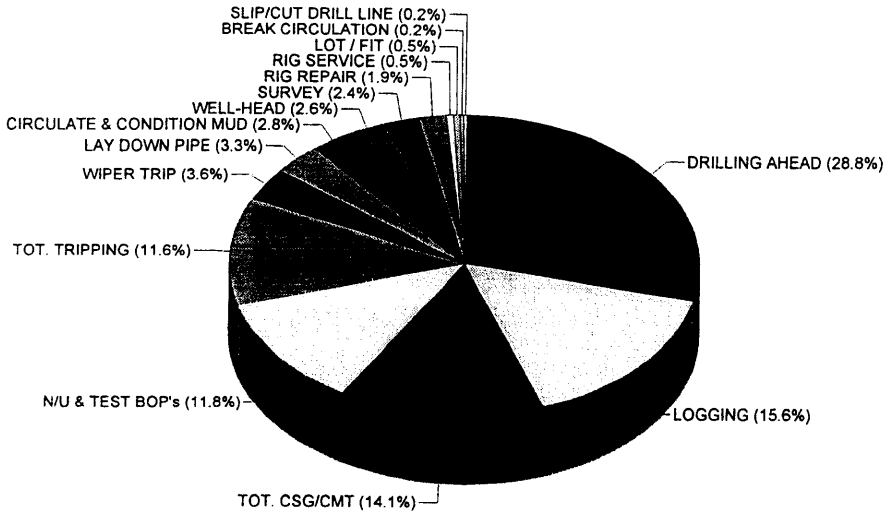


Breakdown of Total Tripping Time



Time Analysis by Operational Codes

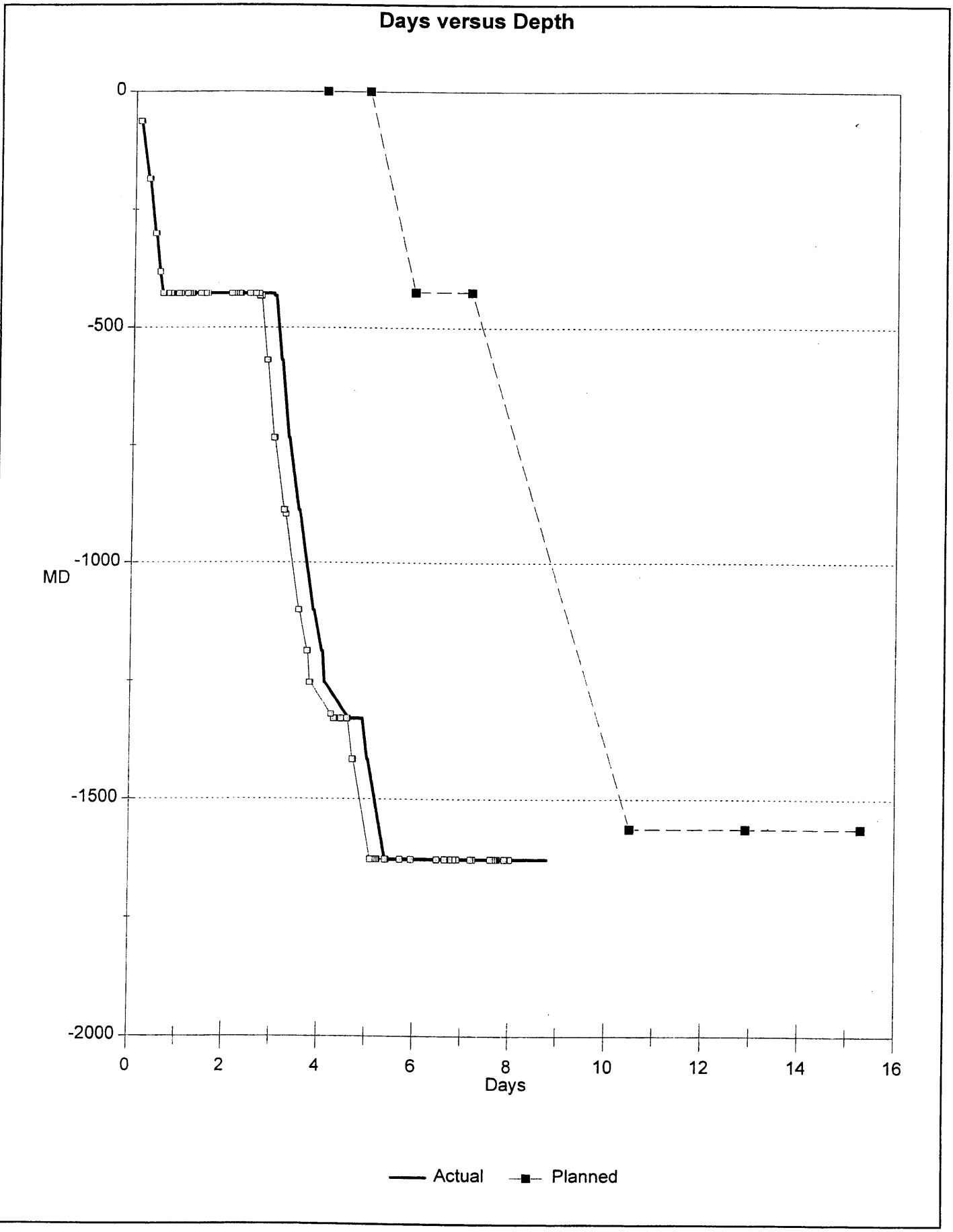
Operation	hrs
DRILLING AHEAD	60.8
LOGGING	33.0
TOT. CSG/CMT	29.8
N/U & TEST BOP's	25.0
TOT. TRIPPING	24.5
WIPER TRIP	7.5
LAY DOWN PIPE	7.0
CIRCULATE & CONDIT	6.0
WELL-HEAD	5.5
SURVEY	5.0
RIG REPAIR	4.0
RIG SERVICE	1.0
LOT / FIT	1.0
BREAK CIRCULATION	0.5
SLIP/CUT DRILL LINE	0.5



TIME BREAKDOWN DATABASE - single well overview

WELL : LAVERS #1

Pacesetter : none selected



LAVERS #1 908031 097

Drilling Co.: OD&E **Rig :** OD&E #30

RT above GL: 4 m
GL above MSL: 0 m

Lat : 38 deg 28 min 44.75 sec
Long : 142 deg 48 min 12.62 sec

Spud Date: 26/04/2001
Spud Time: 11:00:00

Release Date: 05/05/2001
Release Time: 15:00:00

TIME BREAKDOWN DATABASE Non-Productive Time Analysis (NPT)

(Pre-Spud time included)

Total Time on Well (hrs)	**346.0**	**(days)**	**14.42**	**Spud Date :**	**26/04/2001**
Total Trouble Time (hrs)	**31.5**	**(days)**	**1.31**	**Total Depth :**	**1,627**
Trouble Time (%)	**9.10**			**Final Depth :**	**1,627**

Total NPT Hours per Phase

PHASE	HOURS
PRESPUD	12.5
SURFACE CASING	7.5
EVALUATION PROD. HOLE	11.5

NPT during programmed time

DATE	PHS	OPERATION	NPT hrs	DEPTH m	DESCRIPTION OF PROGRAMMED TROUBLE TIME
22/04/2001	PS	WAIT ON	11.0	0	Rig On Stand-by with crews. Mobilize Molans Eath Moving and truck in rock topping and grade lease. Install and Pressure Test Well-Head on Croft #1. Back fill Rat/Mouse holes, Rebuild load cell, PMS Gens, Dig drains. Rig up pits.
23/04/2001	PS	WAIT ON	1.5	0	Rig on Stand-by. Load mud chemicals and derrick sections at Croft #1. Continue grade and dress Lavers #1 lease damaged due to rain. Spikins inspect lease and clear for operations.
28/04/2001	SC	N/U & TEST BOP's	3.0	428	Pressure test BOPs & Choke manifold to 300/2000 psi. Failures, repairs and retests to Choke Line, Choke V/V #7, Choke V/V #7 again, HCR flange, "A" Sect dog packing, Ram flange, Outer choke V/V, HCR non-function.
28/04/2001	SC	RIG REPAIR	4.0	428	Rig On Zero Rate (As agreed by Steve Ford) due to avoidable non-productive time on BOP test period.
28/04/2001	SC	N/U & TEST BOP's	0.5	428	Attempt to seal leaking Bell-Nipple - NoGo.
02/05/2001	EP	LOGGING	2.0	1,627	R/u and RIH w/ RFS-GR. Obstruction at 1470m. POOH.
02/05/2001	EP	LOGGING	0.5	1,627	R/d Reeves.
02/05/2001	EP	WIPER TRIP	1.0	1,627	P/u BHA and RIH for wiper trip.
02/05/2001	EP	SLIP/CUT DRILL LINE	0.5	1,627	Slip 33ft Drlg line.
02/05/2001	EP	TRIP-IN	1.5	1,627	RIH to 1487m.
02/05/2001	EP	TRIP-IN TIGHT	0.5	1,627	Wash and ream 1487m to 1506m.
02/05/2001	EP	TRIP-IN	0.5	1,627	RIH to 1596m.
02/05/2001	EP	TRIP-IN TIGHT	0.5	1,627	Wash and ream f/ 1596m 1627m.
03/05/2001	EP	CIRCULATE & CONDITION MUD	1.0	1,627	Circulate and condition mud. Trip gas 1300units.
03/05/2001	EP	TRIP-OUT	3.5	1,627	Flow check. Slug pipe. POOH. Flow check at 5 stds, 10stds, csg shoe.

NPT during unprogrammed time

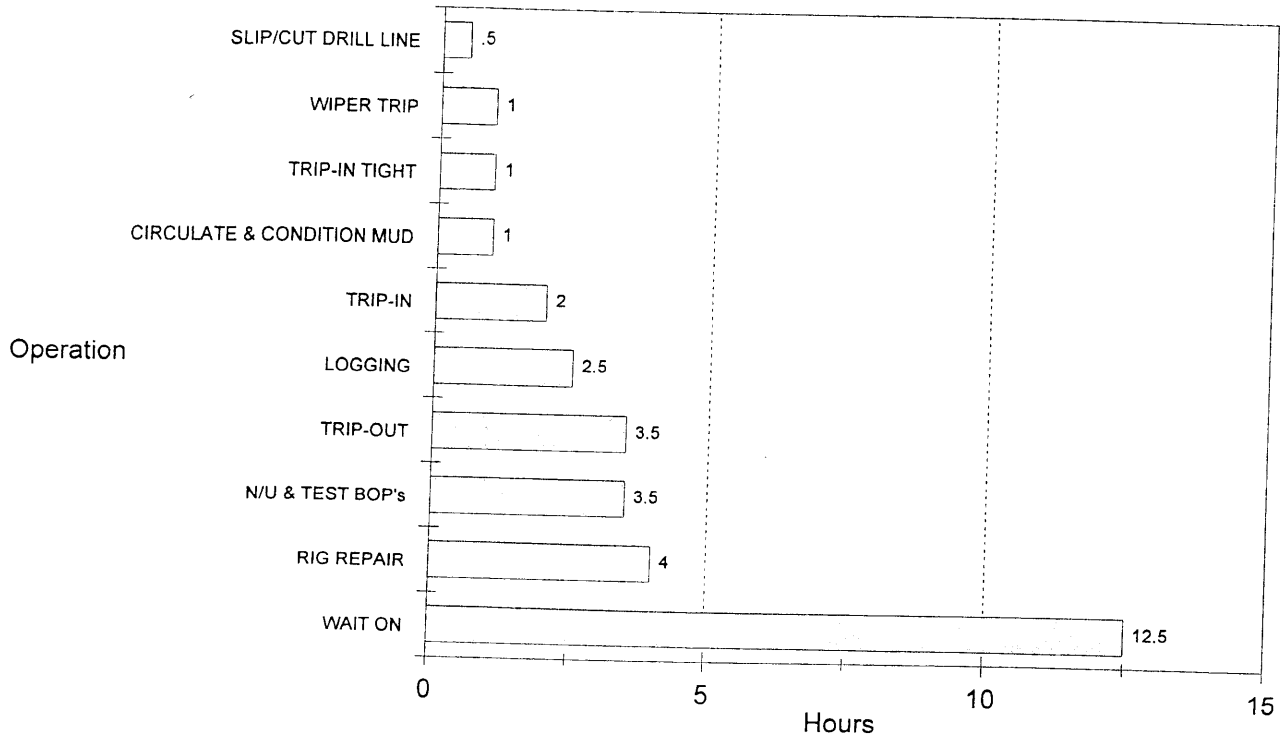
DATE	PHS	OPERATION	NPT hrs	DEPTH m	DESCRIPTION OF UNPROGRAMMED TROUBLE TIME
			0.0		No Trouble Time Present

RT above GL: 4 m
GL above MSL: 0 m
Lat : 38 deg 28 min 44.75 sec
Long : 142 deg 48 min 12.62 sec
Spud Date: 26/04/2001
Spud Time: 11:00:00
Release Date: 05/05/2001
Release Time: 15:00:00

TIME BREAKDOWN DATABASE Non-Productive Time Analysis (NPT)

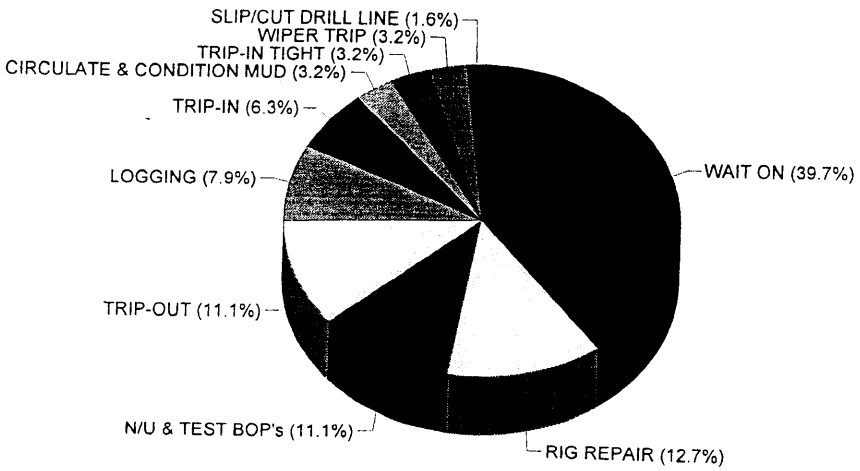
(Pre-Spud time included)

Trouble Drilling by Operational Code



Trouble Drilling by Operational Code

OPERATION	HRS
WAIT ON	12.5
RIG REPAIR	4.0
N/U & TEST BOP's	3.5
TRIP-OUT	3.5
LOGGING	2.5
TRIP-IN	2.0
CIRCULATE & CONDITION MUD	1.0
TRIP-IN TIGHT	1.0
WIPER TRIP	1.0
SLIP/CUT DRILL LINE	0.5



Section 6.0

Survey Data
- IDS Survey Report

908031 100

LAVERS #1

Drilling Co.: OD&E **Rig:** OD&E #30

RT above GL: 4 m Lat : 38 deg 28 min 44.75 sec Spud Date: 26/04/2001 Release Date: 05/05/2001
GL above MSL : 0 m Long : 142 deg 48 min 12.62 sec Spud Time: 11:00:00 Release Time: 15:00:00
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)
49	49	0.38	120	132	0.2	-0	-0	0	0
169	169	0.38	50	62	0.1	-0	-0	1	1
285	285	0.50	25	37	0.1	0	0	1	1
413	413	0.20	38	50	0.1	1	1	2	2
552	552	0.63	53	65	0.1	2	1	3	3
720	720	0.60	342	354	0.1	3	3	4	4
878	878	0.60	200	212	0.2	3	3	3	4
1,082	1,082	0.25	216	228	0.1	2	2	2	3
1,234	1,234	0.75	169	181	0.1	0	0	2	2
1,610	1,610	2.20	168	180	0.1	-9	-9	2	9

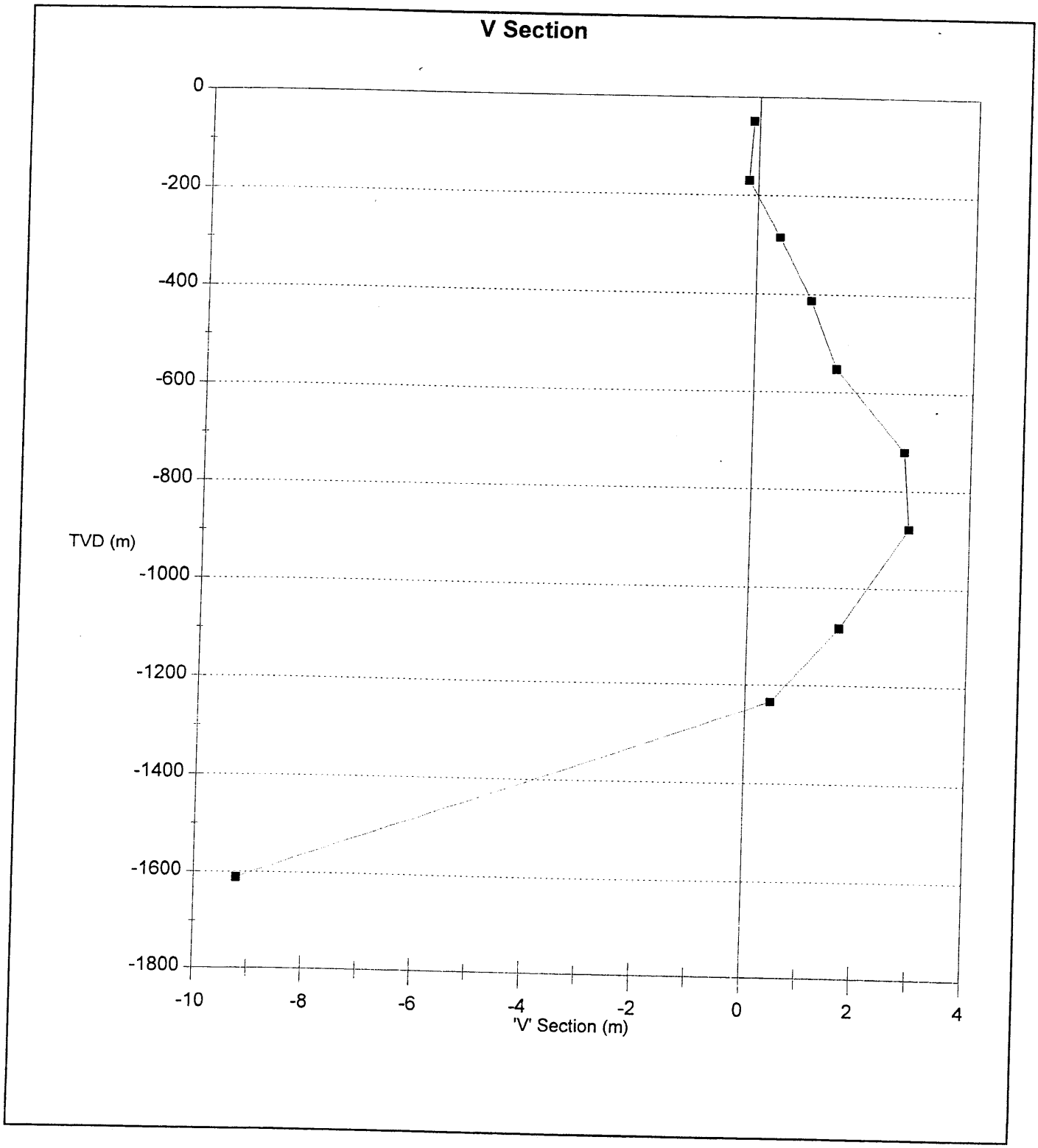
908031 101

LAVERS #1

Drilling Co.: OD&E **Rig:** OD&E #30

RT above GL: 4 m
GL above MSL : 0 m
Lat : 38 deg 28 min 44.75 sec
Long : 142 deg 48 min 12.62 sec
Spud Date: 26/04/2001
Spud Time: 11:00:00
Release Date: 05/05/2001
Release Time: 15:00:00
Magnetic Declination (degs): 12.00
Projection:

DEVIATION SURVEY



APPENDIX XIII: RIG SPECIFICATIONS

Rig Inventory for RIG # 30

DRAWWORKS	:	Ideco Hydrair 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 4.½" drill pipe, ii) 10 stands of 6.½" 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. One (1) Wagner Model A 60 auxiliary air pump 4.5 gals/minute.
BOP's & ACCUMULATOR (Cont'd)	:	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 6.½" OD with 4" IF connections
DRILL PIPE SAFETY VALVE	:	One (1) Hydril 6.½" 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" - 5.½" 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 20.½" 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 429 BBL SUCTION Active No 2 174 BBL Pre-Mix 146 BBL Pill Tank 63 BBL Total 383 BBL
TRIP TANK	:	Trip Tank 29 BBL 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) - 3.½" 13.30lb/ft drill pipe Grade 'G' 105 with 3 1/2" IF conn
PUP JOINTS	:	One (1) - 10'(3.65 m)3.½" OD Grade 'G' with 3.½" IF conn
HEVI-WATE DRILL PIPE	:	6 joints of 3.½" H.W.D.P. with 3.½" IF conn
DRILL COLLARS	:	12 x 6.½" OD drill collars (113 m) with 4" IF conn 24 x 4 ¾" O.D. drill collars (227 m) with 3.½"IF conn 1 x 4.3/4" OD Pony Drill Collar
KELLIES	:	Two (2) Square Kelly drive 4.¼" x 40' complete with Scabbard and 55 ft x 3 ½" 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 6.½" OD Griffith Fishing Jars One (1) only 4 ¾" O.D. Bowen Type "Z" Fishing Jar One (1) only Bumper Sub 6.½" 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	:	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 4½" IF box Two (2) Bit Subs - 4.½" 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 4.½" IF pin. Two (2) XO Sub - 4½" IF box x 4." IF pin. One (1) XO Sub - 4.½" 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 - 4.½" reg box x 4.½" reg pin. One (1) XO Sub - 4.½" 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 4½" 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 4.½" 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.
HANDLING TOOLS	:	2 only 4.½" BJ 250 ton 18 degree taper D/P elevators. 1 only 3.½" BJ 200 ton 18 degree taper D/P elevators. 1 only 3.1/2" BJ type MGG 18° centre latch Elevators. 1 only 4.½" Varco SDXL D/P slips. 1 only 4.½" Varco SDML D/P slips 2 only 8" - 6.½" DCS-R drill collar slips. 1 only 3.1/2" Varco SDML Slips 1 only 4.3/4" Varco DCS-S Drill Collar Slips
CASING RUNNING TOOLS	:	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 5.½" 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.
CASING / TUBING DRIFTS	:	9 5/8, 7", 5 ½",3 ½"
THREAD PROTECTORS	:	9 5/8, 7".
KELLY SPINNER	:	One (1) Foster hydraulic kelly spinner with 6.5/8" LH connection.
PIPE SPINNER	:	One (1) International 850H hydraulic pipe spinner
WELDING EQUIPMENT	:	1 - Miller 400 amp welding machine. 1 - oxy acetylene set.
DOGHOUSE	:	1 Doghouse 5m x 2.4m x 2.3m
GENERATOR HOUSE	:	Ross Hill SCR

UTILITY HOUSE	:	1 Utility and Mechanics House
CATWALKS	:	2 catwalks total 18.6m long x 1.6m wide x1.08m 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 Sealtite. 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.

ENCLOSURE I: 1 : 200 COMPOSITE LOG

PE605260

This is an enclosure indicator page.
The enclosure PE605260 is enclosed within the container PE908031 at this location in this document.

The enclosure PE605260 has the following characteristics:

ITEM_BARCODE	PE605260
CONTAINER_BARCODE	PE908031
NAME	Encl.1 Lavers-1 Composite Well Log
BASIN	OTWAY
ONSHORE?	Y
DATA_TYPE	WELL
DATA_SUB_TYPE	COMPOSITE_LOG
DESCRIPTION	Encl.1 Lavers-1 Composite Well Log, Scale 1:200, W1317, PEP154. Enclosure 1 contained within "Lavers-1 Well Completion Report" [PE908031]
REMARKS	
DATE_WRITTEN	
DATE_PROCESSED	
DATE_RECEIVED	09-NOV-2001
RECEIVED_FROM	Santos Ltd
WELL_NAME	Lavers-1
CONTRACTOR	
AUTHOR	
ORIGINATOR	Santos Ltd
TOP_DEPTH	0
BOTTOM_DEPTH	1608
ROW_CREATED_BY	DN07_SW

(Inserted by DNRE - Vic Govt Mines Dept)

ENCLOSURE II: 1 : 500 MUDLOG

PE605261

This is an enclosure indicator page.
The enclosure PE605261 is enclosed within the container PE908031 at this location in this document.

The enclosure PE605261 has the following characteristics:

ITEM_BARCODE	PE605261
CONTAINER_BARCODE	PE908031
NAME	Encl.2 Lavers-1 Mud Log
BASIN	OTWAY
ONSHORE?	Y
DATA_TYPE	WELL
DATA_SUB_TYPE	MUD_LOG
DESCRIPTION	Encl.2 Lavers-1 Mud Log, Scale 1:500, W1317, PEP154. Enclosure 2 contained within "Lavers-1 Well Completion Report" [PE908031].
REMARKS	
DATE_WRITTEN	
DATE_PROCESSED	
DATE_RECEIVED	09-NOV-2001
RECEIVED_FROM	Santos Ltd
WELL_NAME	Lavers-1
CONTRACTOR	Santos Ltd
AUTHOR	
ORIGINATOR	Santos Ltd
TOP_DEPTH	
BOTTOM_DEPTH	
ROW_CREATED_BY	DN07_SW

(Inserted by DNRE - Vic Govt Mines Dept)

ENCLOSURE III: STRUCTURE MAPS

PE908032

This is an enclosure indicator page.
The enclosure PE908032 is enclosed within the container PE908031 at this location in this document.

The enclosure PE908032 has the following characteristics:

ITEM_BARCODE	PE908032
CONTAINER_BARCODE	PE908031
NAME	Encl.3 Lavers-1 Field Structure Map
BASIN	OTWAY
ONSHORE?	Y
DATA_TYPE	SEISMIC
DATA_SUB_TYPE	STRUCTURE_MAP
DESCRIPTION	Encl.3 Lavers-1 Field Top Waarre Sand Depth Structure Map, [Pre-drilling] Scale 1:20000, C.I. 5m, W1317, PEP154. Enclosure 3 contained within "Lavers-1 Well Completion Report" [PE908031].
REMARKS	
DATE_WRITTEN	27-JUL-2001
DATE_PROCESSED	
DATE_RECEIVED	09-NOV-2001
RECEIVED_FROM	Santos Ltd
WELL_NAME	Lavers-1
CONTRACTOR	
AUTHOR	
ORIGINATOR	Santos Ltd
TOP_DEPTH	
BOTTOM_DEPTH	
ROW_CREATED_BY	DN07_SW

(Inserted by DNRE - Vic Govt Mines Dept)

ENCLOSURE IV: WELL EVALUATION PLOT

PE605262

This is an enclosure indicator page.
The enclosure PE605262 is enclosed within the container PE908031 at this location in this document.

The enclosure PE605262 has the following characteristics:

ITEM_BARCODE	= PE605262
CONTAINER_BARCODE	= PE908031
NAME	= Encl.4 Lavers-1 Well Evaluation Plot
BASIN	= OTWAY
ONSHORE?	= Y
DATA_TYPE	= WELL
DATA_SUB_TYPE	= WELL_LOG
DESCRIPTION	= Encl.4 Lavers-1 Well Evaluation Plot, Scale 1:200, W1317, PEP154. Enclosure 4 contained within "Lavers-1 Well Completion Report" [PE908031].
REMARKS	=
DATE_WRITTEN	= 31-JUL-2001
DATE_PROCESSED	=
DATE_RECEIVED	= 09-NOV-2001
RECEIVED_FROM	= Santos Ltd
WELL_NAME	= Lavers-1
CONTRACTOR	=
AUTHOR	=
ORIGINATOR	= Santos Ltd
TOP_DEPTH	=
BOTTOM_DEPTH	=
ROW_CREATED_BY	= DN07_SW

(Inserted by DNRE - Vic Govt Mines Dept)