SANTOS

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(A.B.N. 80 007 550 923)

SEAMER-1

WELL COMPLETION REPORT

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June 2003

SEAMER-1 WCR

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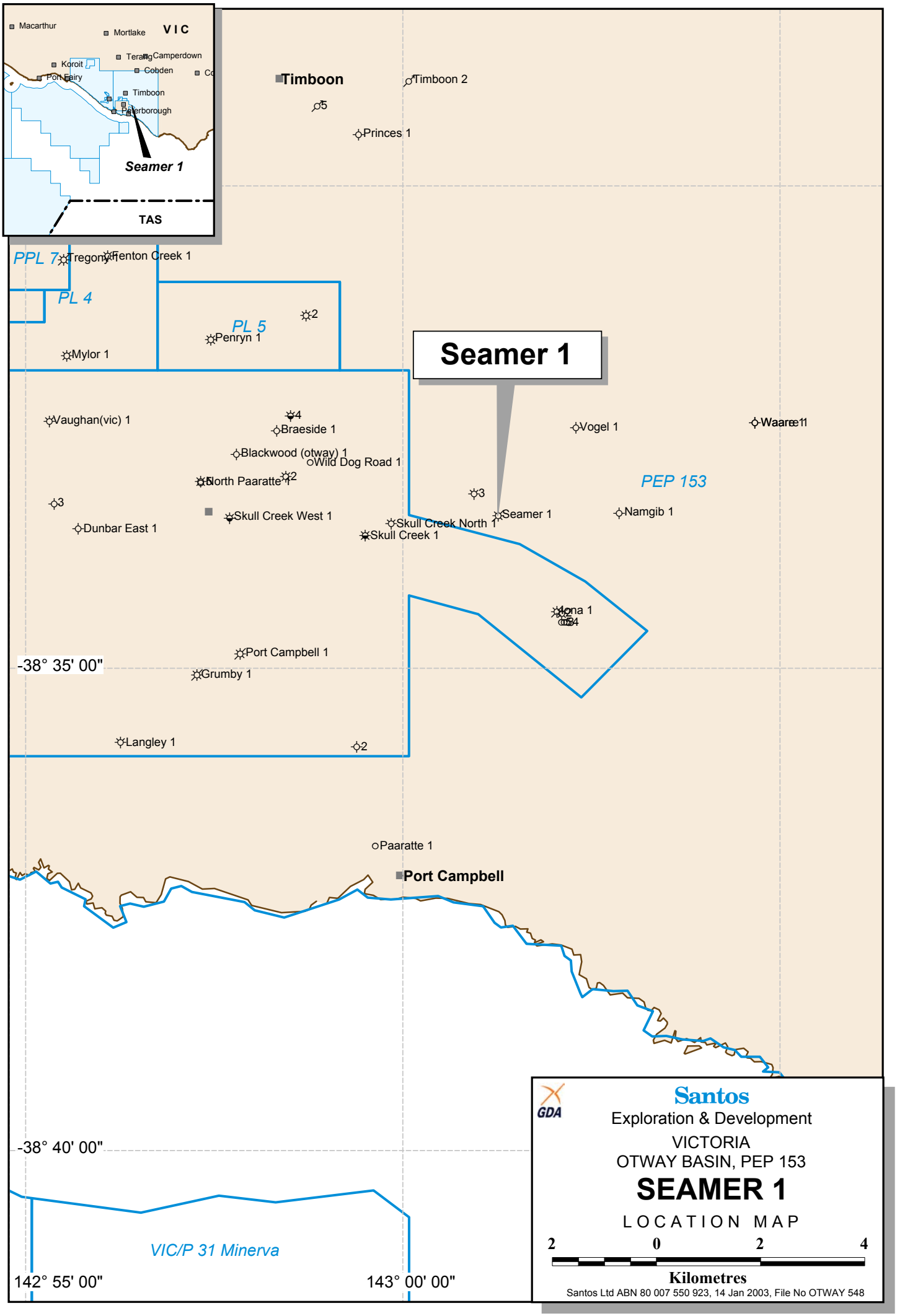
LOCATION MAP


Macarthur
Mortlake
VIC
Koroit
Terang
Camperdown
Cobden
Port Fairy
Timboon
Peterborough
Seamer 1
TAS
Timboon
Timboon 2
5
Princes 1
PPL 7
Tregony 1
Fenton Creek 1
PL 4
PL 5
2
Penryn 1
Mylor 1
Seamer 1
Vaughan(vic) 1
4
Braeside 1
Vogel 1
Waaree 1
Blackwood (otway) 1
Wild Dog Road 1
North Paaratte 1
2
PEP 153
3
3
Skull Creek West 1
Seamer 1
Namgib 1
Skull Creek North 1
Dunbar East 1
Skull Creek 1
Iona 1
Port Campbell 1
-38° 35' 00"
Grumby 1
Langley 1
2
Paaratte 1
Port Campbell
-38° 40' 00"
VIC/P 31 Minerva
142° 55' 00"
143° 00' 00"
GDA
Santos
Exploration & Development
VICTORIA
OTWAY BASIN, PEP 153
SEAMER 1
LOCATION MAP
2 0 2 4
Kilometres
Santos Ltd ABN 80 007 550 923, 14 Jan 2003, File No OTWAY 548

WELL CARD

WELL: SEAMER 1	**WELL CATEGORY:** EXP **WELL INTENT:** GAS	**SPUD:** 18/12/02	**TD REACHED:** 25/12/02
		RIG RELEASED: 29/12/02	**CMPLT**: PENDING
LAT: 38° 33' 24.29" S	**LONG**: 143° 01' 15.69" E	**RIG**: CDL Rig 11	
SEISMIC STATION: CDP 2555, LINE 5255 (Iona 3D)		**STATUS**: SUSPENDED GAS WELL (SUG)	
ELEVATION GND: 59.45m	**RT:** 64.72m	**REMARKS**: NEW FIELD GAS DISCOVERY FROM WAARRE SANDSTONE (17.9m net pay) & NULLAWARRE GREENSAND (1.9m net pay)	
BLOCK/LICENCE: PEP 153 (Victoria), Otway Basin			
TD 1360m (Logr Ext)	1360m (Drlr)		
PBTD (Logr)	(Drlr)		
TYPE STRUCTURE: TILTED FAULT BLOCK			
TYPE COMPLETION: PENDING			
ZONE(S): WAARRE SANDSTONE			

Hole Size	Casing Size	Shoe Depth	Type
9 7/8"	$7^{5}/_{8}$"	434.0m	26.4#, L80, BTC
6 ¾"	3 ½"	1356.5m	9.2#, L80, Fox

AGE	FORMATION OR ZONE TOPS	DEPTH mMD	DEPTH mTVD	DEPTH MSS	THICK (m)	HIGH (H) LOW (L)
Tertiary	Surface Marl	63.7	63.7	0.0	177.3	-
Eocene	Mepunga Formation	241.0	241.0	177.3	64.0	NP
Palaeocene-Eocene	Dilwyn Formation	305.0	305.0	-241.3	195.1	1.3m L
Palaeocene	Pember Mudstone	500.1	500.1	-436.4	74.9	3.6m H
Late Cretaceous	Paaratte Formation	575.1	575.0	-511.3	281.5	13.7m H
Late Cretaceous	Skull Creek Mudstone	864.2	856.5	-792.8	121.8	7.2m H
Late Cretaceous	Nullawarre Formation	994.7	978.3	-914.6	90.2	10.4m H
Late Cretaceous	Belfast Mudstone	1089.2	1068.5	-1004.8	46.6	10.2m H
Late Cretaceous	Flaxmans Formation	1138.2	1115.1	-1051.4	17.0	NP
Early to Late Cretaceous	Waarre Sandstone Waarre "C" unit	1156.1	1132.1	-1068.4	77.1	26.6m H
Early to Late Cretaceous	Waarre Sandstone Waarre "B" unit	1193.2	1167.4	-1103.7	-	NP
Early to Late Cretaceous	Waarre Sandstone Waarre "A" unit	1210.6	1183.8	-1120.1	-	NP
Early Cretaceous	Eumeralla Formation	1237.4	1209.2	-1145.5	115.9	44.5m H
	Total Depth (Log Extrapolated)	1360.0	1325.1	-1261.4		11.4m L

LOG INTERPRETATION (Interval Averages)

INTERVAL (m)	Ø %	SW %	INTERVAL (m)	Ø %	SW %
Nullawarre Greensand			**Waarre Sandstone**		
994m-1083m Net Pay: 1.9m	26.8	62	1151m-1240 Net Pay: 17.9m	24.3	38

PERFORATIONS (4 shots/ft)

FORMATION	INTERVAL
PENDING	

CORES

FORM	NO.	INTERVAL	CUT	REC
NIL				

LOG	SUITE/RUN	INTERVAL (ft)	BHT/TIME
MWD : GR-DNI	**1 & 2 (merged)**	426.0m – 1344.7m	
RUN-1: GRAND SLAM GR (unfiltered) DLL-MLL-SP-CAL DSL ZDL-CN DAC : Full wave monopole (monopole shear) with WFT , semblance processed. DT	**1 / 1**	 TD – Surface TD – Casing shoe TD – 900m TD – 900m TD – 900m 900m – Casing shoe	
RUN 2: FMT-GR	**1 / 2**	**(2 trips)**	
Total 24 points, 18 Good Tests, 4 lost Seals, 2 Curtailed		4 samples, 2 were opened at site, 2 sent to laboratory	
RUN 3: SWC 1 gun (25 shots – 20 Purchased)	**1 / 3**		

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 WERE CONDUCTED

SUMMARY:

Location:
Seamer-1 was proposed as an Otway Basin deviated gas exploration well located in the PEP 153 license, approximately 9 km south-east of the township of Timboon and 2.2 km north-west of the Iona Gas Field. The Seamer structure is situated within the Port Campbell Embayment and the productive Waarre Sandstone play fairway immediately north of PPL1 (see location map). The PEP 153 license surrounds PPL2 which encompasses the Iona gas field and PPL1, which encompasses the North Paaratte, Wallaby Creek and Skull Creek gas fields. Of these fields, only Iona is currently active and it is used as a gas storage facility. The offset wells were Namgib-1 and North Paaratte-3. Logs from both these wells were used for correlation during the drilling of Seamer-1.

Objectives:
The Seamer Prospect is a tilted-fault block closure defined by 3D seismic. The well was expected to intersect a thick Waarre Sandstone reservoir (primary target) with mean average net pay of 14m. The Nullawarre Greensand constituted a secondary target.

Results of Drilling:
The 9 7/8" section in Seamer-1 was drilled to 442m and 7 5/8" casing was run and set at 434m. A 6 ¾" directional build assembly (along with MWD tools) was used to drill out the shoe track and continued to drill essentially vertically to the kick-off point at 574m. From 574m, the well was steered to the planned trajectory of 180°T azimuth while continuing to drill the build section to an inclination of 20°. A bit trip was required at 1169m and thereafter drilling continued without incident to total depth of 1360mMD, 1325mTVD which was reached on 25/12/02. At Total Depth the well was 221m from the wellhead in a 178°T direction and inside the 25m target radius stipulated in the well proposal.

Whilst drilling Seamer-1, the drilled depths of most formations (with the exception of the Waarre Sandstone and the Eumeralla Formation) were between 1.3m Low to 13.7m High to their respective prognosed depths. The primary target Waarre Sandstone was intersected 26.6m High to prognosis and the secondary target Nullawarre Greensand was penetrated 10.4m High to prognosis.

At Total Depth, the following suite of wireline logs were run. Run1: DLL-MLL-ZDL-CN-DAC-SP-CAL-GR, Run 2: FMT-GR (with sampling), Run 3: SWC-GR. Wireline log analysis indicates that the primary target Waarre Sandstone has 17.9m net pay with an average porosity of 24.3%, and water saturation of 38% while the secondary target Nullawarre Greensand has 1.9m net pay with an average porosity of 26.8%, and water saturation of 62%. Gas shows were high in these zones. Subsequently the well was cased and suspended.

Status:
Total Depth of 1360m MD, 1325m TVD was reached on 25/12/02. After acquiring wireline logs, 3 ½" casing was run and set at 1356m. Seamer-1 was Cased & Suspended as a Waarre Sandstone and Nullawarre Greensand well for future completion and production. CDL Rig 11 was released on 29/12/02.

WELL HISTORY

1. GENERAL DATA

Well Name:	Seamer-1
Well Classification:	Exploration (Wildcat)
Interest Holders:	Santos (100%)
Participating Interests:	Santos (100%)
Operator	Santos
Block/Licence	PEP 153, Onshore Otway Basin, Victoria
Surface Location	Latitude: 38° 33' 24.29" South Longitude: 143° 01' 15.69" East
Surveyed Elevation	Ground Level: 59.45m Rotary Table: 64.72m
Seismic Survey	Iona 3D
Seismic Location	CDP 2555, LINE 5255
Total Depth	Driller: 1360m Logger: 1360m
Completion	112 joints of 3.5" 9.2 ppf L-80 production casing, set at 1356.0m
Status	Suspended Gas Well.

2. DRILLING DATA

Date Drilling Commenced	2000 hours, 18th December 2002
Date Drilling Completed	1130 hours, 25th December 2002
Date Rig Released	1100 hours, 29th December 2002
Contractor	Century Drilling (CDL)
Rig	CDL Rig 11
Rig Specifications	Refer to Appendix XIII

3. DRILLING SUMMARY

(a) Drilling Summary (All Depths Driller's KB)

Seamer-1 was spudded at 2000 hours on the 18th December 2002. Tables I and II summarise the major drilling operations in this hole. 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 ⅞"	442m	7 ⅝"	434m	37	26.4ppf L80 BTC	Lead: 150sx, 68 bbls 11.8ppg Class 'G' Tail: 102sx, 21.4bbls 15.6 Class 'G'
6 ¾"	1360m	3 ½"	1356m	112	9.2ppf L80	Lead: 192sx, 89.9 bbls 11.8ppg Class 'G' Tail: 290sx, 59.9 bbls 15.6ppg Class 'G' tail

TABLE II: SUMMARY OF MUD SYSTEMS

MUD TYPE	INTERVAL (m)
Spud Mud (Gel/Water)	Surface - 442
KCL/Polymer	442 - 1360

(b) Lost Time

Lost time at Seamer-1 – Please refer to Appendix XII (Drilling - Final Well Report).

(c) Water Supply

Make up water (Cl 700 mg/l, total hardness 100 mg/l, mf/pf 0.05/0.3, pH 8.5) was sourced from a local rain water dam called McKenzies's Dam. The analysis of the make water was performed at the wellsite.

(d) Mudlogging

Mudlogging services were provided by Unit 271 of Geoservices Ltd. Samples were collected, washed, and described at 10m intervals from the surface to 900m, then at 3m intervals from 900m to total depth at 1360m. 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 included rate of penetration, weight on hook and mud pit levels.

(e) Testing

No DSTs were conducted in Seamer-1.

(f) Coring

No cores were cut in Seamer-1.

(g) Wireline Logging

One suite of wireline logs was run in Seamer-1 at Total Depth, as detailed below:

TABLE III: ELECTRIC LOG SUMMARY

LOG	SUITE/RUN	INTERVAL (ft)	BHT/TIME
RUN-1: GRAND SLAM GR (unfiltered) DLL-MLL-SP-CAL DSL ZDL-CN DAC : Full wave monopole (monopole shear) with WFT , semblance processed. DT	**1 / 1**	 TD – Surface TD – Casing shoe TD – 900m TD – 900m TD – 900m 900m – Casing shoe	
RUN 2: FMT-GR	**1 / 2**	**(2 trips)**	
Total 24 points, 18 Good Tests, 4 lost Seals, 2 Curtailed		4 samples, 2 were opened at site, 2 sent to laboratory	
RUN 3: SWC 1 gun (25 shots – 20 Purchased)	**1 / 3**		

*Logger Contractor – Baker Atlas

(h) Geothermal Gradient

A Static Bottom Hole Temperature of 56.3°C at 1360m is calculated. This gives a geothermal gradient of 2.6°C/100m. An ambient temperature of 21ºC was employed.

(i) Hole Deviation

Seamer-1 is a deviated well. The 6 ¾" production hole was designed to be deviated to intersect the two proposed targets (Nullawarre and Waarre). The well was kicked off from 574m and the angle was built to 20° at an azimuth of 181° by 840m with a build rate of approximately 3°/30m. This trajectory was held to the top of the Nullawarre Formation. Thereafter the direction of the well was turned and at total depth the azimuth was 175.7° with inclination remaining at 19.76°. At total depth of 1360mMD, the TVD was 1325.05m, and the well was 220.71m from the wellhead in a 178.17° azimuth.

(j) Velocity Survey

No velocity survey was run in Seamer-1.

(k) Completion Summary

Seamer-1 was cased and suspended.

GEOLOGY

1. PRE-DRILLING SUMMARY (after Well Proposal)

Seamer-1 is proposed as an Otway Basin deviated gas exploration well to be located in the PEP 153 license, approximately 9 km south-east of the township of Timboon and 2.2 km north-west of the Iona Gas Field. The Seamer Structure is situated within the Port Campbell Embayment and the productive Waarre Sandstone play fairway immediately north of PPL1.

The PEP 153 License surrounds PPL2 which encompasses the Iona gas field and PPL1, which encompasses the North Paaratte, Wallaby Creek and Skull Creek gas fields. Of these fields, only Iona is currently active and it is used as a gas storage facility (Operated by TXU).

The Seamer Prospect is a tilted-fault block closure defined by 3D seismic. The well is expected to intersect a thick Waarre Sandstone reservoir (primary target) with mean average net pay of 14m. The Nullawarre constitutes a secondary target.

Seamer-1 is an attractive project with a mean prognosed (truncated) success case of 5.3 BCF sales gas (10.2 BCF OGIP untruncated) and a Pc (probability of commercial success) of 28% resulting in expected mean reserves of 1.5 BCF sales gas. This resource distribution only considers the primary Waarre sandstone objective.

If the project is successful completion and flow-line construction (2 kilometres to the TXU Iona facility) will be undertaken early in 2003.

The critical geologic risk of the prospect is fault seal on the prospect (Psl = 40%), and possible depletion from the adjacent Iona Gas Field. Gas composition is not expected to be an issue, but if inerts are >7% the gas would be out of specification requiring blending gas. There is also risk associated in the success case with impacting 2003 production as the flow-line will need to be completed by winter, and to ensure this regulatory approvals and commercial terms from TXU will be on the critical path.

2. DRILLING RATIONALE (after Well Proposal)

GEOLOGICAL RISK ASSESSMENT

Play Analysis

Waarre Sandstone

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

Nullawarre Greensand

The Nullawarre Greensand is not a proven gas-producing reservoir. The Seamer Prospect exhibits a strong amplitude anomaly and seismic phase reversal at the top Nullawarre seismic marker that suggests gas charge. This unit is thickly developed in the area around the Seamer Prospect, however, deliverability from this highly glauconitic sandstone is uncertain.

Trap

The interpretation and mapping of the Seamer Prospect is based on the Iona and Heytesbury 3D seismic surveys. Data quality is good for both surveys, however, the data sets have not been merged and there are some slight differences in the time datum and reflection character between the surveys. Gathers are not available for the Iona 3D precluding AVO analyses.

The seismic horizons mapped were the top Waarre Sandstone and top Nullawarre. The Waarre Sandstone has a distinctive character on the 3D seismic and therefore a high degree of accuracy was maintained on picking this event. All three seismic horizons were tied with a high degree of confidence to the surrounding wells and mapping of the Waarre was extended to tie into the regional mapping of the Waarre and Heytesbury 3D surveys. The top Belfast Mudstone was interpreted on a selected grid to adequately evaluate the seal efficiency of the Waarre sandstones for the Seamer prospect. Depth conversion of the mapped TWT horizons was performed using average velocities for each of the horizons from the surrounding wells, contoured and smoothed to define a velocity field for each of the horizons.

The Seamer structure is located at the junction of two fault trends immediately to the north of the Iona Field.

A strong amplitude event is present at the top Waarre reflector over the Seamer structure. The Waarre amplitude at Seamer is less than that observed at the Iona field but still significantly stronger than the "background" amplitude of the reflector. Similar events over most of the gas fields in the Port Campbell Embayment suggest that the amplitude anomaly is likely to be related to the presence of gas.

Strong amplitudes are also present at the Nullawarre reflector. A phase reversal appears to be present at this level. This seismic characteristic is strongly diagnostic of some gas charge although, since there are no known gas accumulations at these levels in the Port Campbell Embayment, there are no calibration points. These amplitudes may also “mask” the full-stack amplitude of the Waarre horizon over parts of the Seamer prospect.

A slightly deviated path has been designed for Seamer-1 which will intersect the primary and secondary targets at near optimum points within the mapped depth closure.

Reservoir

The Waarre Sandstone Formation is the primary reservoir target of the Seamer-1 well and the secondary target is the Nullawarre formations.

The Waarre Sandstone reservoir was deposited as the initial post-rift sequence at the commencement of the Turonian time, under non-marine to marginal marine conditions. The section is sub-divided into three sub-units – Waarre “A”, “B” & “C” in ascending order. The sands within the A & B units are generally more shaly and more cemented and consequently have lower porosity than the overlying unit C (average porosity 20%). The Waarre Sandstone Formation sands are the reservoirs for the Iona Field and are used for gas-storage. Regional thickness changes in the lower units imply that syn-depositional subsidence increased basinward to the southwest.

While the Waarre Sandstone thins to the north, the proximity to the Iona Field wells, where excellent reservoir is encountered, provides high confidence that similar good reservoir will be found in Seamer-1.

The Nullawarre Greensand is a significant secondary target in this well and will be intersected within depth closure by Seamer-1. A DST was planned to be conducted over the Nullawarre if mudlog gas readings indicate gas saturation in this interval. As there has been no production from these formations it is difficult to predict reservoir performance, but petrophysical analysis of nearby wells (e.g. Namgib-1) suggests that the Nullawarre, whilst exhibiting high ineffective porosity, does retain significant primary porosity and potentially permeability. However there is a risk that with a limited gas column height, potential pay will not coincide with zones of better reservoir quality.

Seal

All Otway Basin successes In the Port Campbell Embayment area have been high side, tilted fault and horst blocks. The ultimate top seal to Waarre Sandstone is the marine Belfast Mudstone. For the Nullawarre Formation the seal is the Skull Creek Mudstone.

Cross fault seal is considered the key risk for prospects within the central Port Campbell Embayment area. A fault plane diagram has been prepared for the Seamer prospect to investigate cross-fault seal effectiveness along the main southern bounding fault and to the north-east along the splay fault. The analysis indicates that the Waarre Sandstone is likely to be juxtaposed against Nullawarre Greensand across the fault. The Nullawarre is most likely to be juxtaposed against Skull Creek Mudstone, although there may be some juxtaposition against silty lithologies in the Paaratte Formation. Top seal is expected to be effective for both the Waarre and Nullawarre targets

Therefore the critical risk on the prospect is identified as seal. The above factors have been taken into account during the risking process, however they have been somewhat tempered by the presence of amplitude anomalies coincident with the depth closure at Seamer which suggests the presence of gas and hence at least some degree of effective seal.

Charge

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. Mature source units underlie the gas fields and most likely charge directly into the overlying structures through source-reservoir juxtaposition or via fault conduits. This model is proposed for Seamer-1, which is positioned in a similar situation to adjacent, existing gas fields. The presence of seismic amplitude anomalies at two levels suggests effective gas charge and that timing of generation and migration does not appear to be an issue.

3. RESULTS OF DRILLING

(a) Stratigraphy

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

TABLE IV: STRATIGRAPHY IN THE SEAMER-1 WELL

AGE	FORMATION OR ZONE TOPS	DEPTH mMD	DEPTH mTVD	DEPTH m Subsea	THICK (m)
TERTIARY	SURFACE MARL	63.7	63.7	0.0	177.3
EOCENE	MEPUNGA FORMATION	241.0	241.0	177.3	64.0
PALAEOCENE-EOCENE	DILWYN FORMATION	305.0	305.0	-241.3	195.1
PALAEOCENE	PEMBER MUDSTONE	500.1	500.1	-436.4	74.9
LATE CRETACEOUS	PAARATTE FORMATION	575.1	575.0	-511.3	281.5
LATE CRETACEOUS	SKULL CREEK MUDSTONE	864.2	856.5	-792.8	121.8
LATE CRETACEOUS	NULLAWARRE FORMATION	994.7	978.3	-914.6	90.2
LATE CRETACEOUS	BELFAST MUDSTONE	1089.2	1068.5	-1004.8	46.6
LATE CRETACEOUS	FLAXMANS FORMATION	1138.2	1115.1	-1051.4	17.0
EARLY TO LATE CRETACEOUS	WAARRE SANDSTONE WAARRE "C" UNIT	1156.1	1132.1	-1068.4	77.1
EARLY TO LATE CRETACEOUS	WAARRE SANDSTONE WAARRE "B" UNIT	1193.2	1167.4	-1103.7	-
EARLY TO LATE CRETACEOUS	WAARRE SANDSTONE WAARRE "A" UNIT	1210.6	1183.8	-1120.1	-
EARLY CRETACEOUS	EUMERALLA FORMATION	1237.4	1209.2	-1145.5	115.9
	TOTAL DEPTH (LOG EXTRAPOLATED)	1360.0	1325.1	-1261.4	

Cuttings samples were collected, washed, and described at 10m intervals from the surface to 900m, then at 3m intervals from 900m to total depth at 1360m.

A brief summary of the formations penetrated in Seamer-1, their ages and their interpreted environments of deposition follows: - (Detailed lithological descriptions are in **Appendix I).**

Total depth for Seamer-1 was reached at 1360m (D), 1360m (L), in the Early Cretaceous **Eumeralla Formation,** of the **Otway Group**. The well intersected 115.9m of the Eumeralla Formation, the top coming in at 1237.4mMD. The formation consists of interbedded argillaceous sandstone and silty claystone, with very minor coal. The sandstones are off-white to light and medium greenish-grey, and range in size from very fine to coarse, but are dominantly medium-grained. They are angular to subangular, poorly to moderately sorted, better sorted towards the base, contain weak to moderate silica and calcareous cements and have a common to abundant white argillaceous matrix; in part the sandstone is matrix supported. Characteristically, the Eumeralla contains a high percentage of volcanic rock fragments (38-53%--Abele *et al*, 1995) and there are common grey and green, and trace to common dark lithics. There is trace black coaly detritus in part, trace mica flakes in part, common to abundant glauconite grains, and a trace of pyrite (rare pyritized worm burrows. The sandstone varies from friable to occasionally moderately hard but only exhibits a very poor to poor porosity. No oil fluorescence was observed.

The Eumeralla was deposited in a high-energy fluviatile environment, probably in a major braided stream system where there was an abundant supply of sand-sized volcanic detritus. The source of the volcanic material is unknown, but due to results from age dating, it appears that volcanism was contemporaneous with sedimentation (Abele *et al*, 1995). In the eastern portion of the Otway Basin the Eumeralla has been dated to be Aptian to Albian.

The Late Cretaceous **Sherbrook Group** 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", has been renamed the Flaxmans Formation, after Flaxmans-1, by Bain (1961). Of the approximate 71.2m of net sand in the Waarre, 17.9m is expressed as net pay (see Appendix IV for Log Analysis). The sandstone is off-white to light brownish-grey to light grey, very fine to grit, but dominantly fine to medium in size, though slightly more coarse at the base. The grains are angular to subrounded, very poorly to poorly sorted, contain a weak to moderate silica cement. There is trace to common white argillaceous matrix throughout, clear to opaque quartz grains, and minor black coaly detritus. The sandstone is friable to moderately hard, has a fair visible porosity, commonly excellent reservoir quality was exhibited in the samples, but no fluorescence.

The sandstone packages are from 3 to 10m thick and are generally blocky in shape, although a 5m sands fine upward. 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 Seamer-1 well it was intersected at 1138.2mMD, 1115.1mTVD (-1051.4mSS) and is 17.0 mTVD thick. It consists of a medium brownish-grey to medium grey, moderately silty to very silty claystone, with minor dispersed very fine to pebble size quartz grains in part with orange staining. It contains common fine glauconite grains, with a trace of pyrite nodules and black coaly detritus, common micromica, is soft to firm and slightly subfissile. The Flaxmans is dated as being Turonian (Partridge, 1997) in age, and is defined as the initial marine transgressive unit of the Sherbrook Group (Finlayson, 1994). This formation and the overlying Belfast Mudstone are considered part of the regional seal for the Waarre Formation.

The **Belfast Mudstone** conformably overlies the Flaxmans Formation. Its top came in at 1089.2m (-1004.8 mSS) and was 46.6 mTVD thick. The formation is largely made up of a medium to dark grey, medium olive- to medium brownish-grey claystone with only minor stingers of sandstone (very fine to coarse, common to abundant matrix, moderately hard, very poor to poor porosity).

The claystone is moderately silty, has common glauconite, with a trace of very fine siltstone laminae in part, rare medium brown crypto-crystalline dolomite and very fine partially altered feldspar grains in part, a trace to common carbonaceous detritus and flecks, and a trace of pyrite and micromica. It is firm and subfissile. The Belfast is dated as being mainly Turonian to Campanian (Abele *et al*., 1995), but perhaps only Coniacian to Santonian (Partridge, 1997). It was deposited below storm wave base in low-energy marine conditions in a prodelta situation.

The **Nullawarre Greensand** conformably overlies the Belfast with a top intersected at 994.7m (-914.6 mSS), and was 90.2 mTVD thick. It is predominantly made up of a medium green, in part orange-brown, very fine to coarse, mainly medium-grained sandstone with very minor medium green, partly orange-brown. The sandstone is angular to subrounded, moderately sorted, with weak silica cement. There are abundant yellow/brown iron oxide stained quartz grains, decreasing with depth, common glauconite especially at the top, and trace mica flakes. The sandstone is friable to moderately hard and has a poor to fair porosity. 1.9m of net pay was identified in the Nullawarre Greensand.

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,** (sometimes considered part of the Paaratte Formation), conformably overlies the Nullawarre Greensand. The top of the mudstone was encountered at 864.2m (-792.8 mSS), and is 121.8 mTVD thick. It comprises a medium grey to brownish-grey, moderately

silty, claystones with minor interbedded sandstone. The claystone has common dispersed very fine quartz, and partially altered feldspar grains, traces of black coaly detritus, medium brown cryptocrystalline dolomite, and micromica, with common pyrite. It is soft, sticky and slightly subfissile. 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 575.1 mMD (-511.3 mSS). The formation is 281.8 mTVD thick and is made up of thin to fairly thick sandstone packages, interbedded with claystone and minor siltstone. The sandstone is very light brownish-grey to very light grey, and towards the base becomes off-white to light brown. Grain size is predominantly coarse to very coarse, though ranges from very fine to pebbly, and decreases in grain size to fine to very fine towards the base. The grains are angular to subrounded, are very poorly sorted, though improve to moderate at the base. There is weak pyrite, silica and calcareous cement throughout the section. A trace of argillaceous and silty matrix occurs at the top, and again at the base where it is common to abundant. Common, decreasing to trace, grey, green and red volcanogenic lithics are found and abundant altered feldspar grains were noted. Trace to common very fine carbonaceous material occurs throughout, in part associated with pyrite. The sandstone is dominantly friable and occasionally moderately hard in part. It has fair to occasionally good porosity, decreasing to very poor, visible porosity at the base. No fluorescence was noted.

The minor thinly interbedded claystone is medium to dark grey to medium brownish-grey, moderately to very silty, in part finely arenaceous, trace to common pyrite, trace to common black carbonaceous flecks and detritus, in part associated with pyrite, trace micromica, soft, in part very dispersive and slightly subfissile.

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.

Overlying the Paarrate Formation is the **Pember Mudstone** which was penetrated at 500.1 mMD (-436.4 mSS) and is 74.9 mTVD thick. A light to medium brown to medium olive-grey claystone predominates, with a minor amount of off-white to light brown fine-grained sandstone. The claystone is moderately to very silty with abundant dispersed very fine to fine quartz grains in part, common glauconite especially at the top. There are traces of black carbonaceous flecks, micromica, pyrite and it is soft, sticky and non fissile. The minor sandstone is laminated, finely interbedded and has gradational contacts with the claystone, and is angular to subangular, moderately sorted with weak silica cement and abundant off-white argillaceous and silty matrix (in part matrix supported). It carries a trace of glauconite and pyrite, is friable and has very poor to poor inferred porosity.

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 Palaeocene 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 at 305 mMD (-241.3 mSS) and is 195.1 mTVD thick. The section consists predominantly of sandstone with minor interbedded silty claystone. The sandstone is a pale brownish-grey, very fine to trace grit, though mainly medium-sized, angular to subrounded, poorly sorted with very weak silica and calcareous cements. It contains common to abundant medium brown argillaceous and silty matrix (matrix supported in part), clear to opaque and some orange-brown quartz grains, trace greenish-grey cherty lithics and black carbonaceous detritus and trace to common pyrite. The sand is friable to unconsolidated with porosity ranging from very poor to very good and is interbedded and in part grades to a medium brown claystone. It is moderately to very silty with abundant, in part, dispersed very fine to grit-sized, quartz sand grains, stained brown, and in part grading to argillaceous sandstone. The claystone is slightly calcareous in part, with trace to common pyrite and is very soft, very dispersive and non fissile.

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 shoreface 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 interdistributary bay fills (Abele *et al*., 1995).

The Dilwyn Formation is the youngest unit of the Wangerrip Group, and is disconformably overlain by the **Mepunga Formation**, the oldest formation of the **Nirranda Group**. In the Seamer-1 well the Mepunga was intersected at 241mMD (-177.3 mSS) and is 64m thick. The massive sandstone is medium brown and very light brownish-grey, very fine to medium, in part, common coarse to grit-sized, angular to subrounded (dominantly subangular), moderately sorted, becoming poorer with depth, with in part, strong calcareous cement (in general decreasing with depth, abundant medium brown argillaceous and silty matrix (matrix supported in places), and abundant brown-stained quartz grains, decreasing to common with depth. There is trace glauconite at the top, trace fossil fragments and coarse muscovite flakes, and the sand is unconsolidated to hard in part, and has a very poor, to in part, very good visible porosity.

The trace claystone is medium brown, slightly to very silty in part, with abundant dispersed very fine to grit-sized brown-stained quartz grains in places. It is slightly calcareous in part, with a trace of glauconite, trace to common pyrite and is very soft, very dispersive and non fissile.

According to dating of forams, molluscs and palynomorphs discovered within the Mepunga Formation, an age of Middle Eocene to Early Oligocene has been assigned. The sandstones have been interpreted as being deposited in beach and nearshore locations as barrier islands, whereas the claystones regarded as estuarine and some as deep lagoonal in origin (Abele *et al,* 1995).

The Mepunga Formation is overlain by surficial mainly marl deposits which have not been differentiated.

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

(b) Stratigraphic Prognosis (after Well Proposal)

The Seamer Prospect is mapped as a tilted-fault block closure with the primary reservoir being the Waarre Sandstone; both vertical and cross-fault seal are provided by a thick Belfast Mudstone. Structures are charged from mature source beds located within the underlying Eumeralla and/or Crayfish Group with migration directly into the reservoir or via fault conduits. The play has proven successful in the nearby Mylor, Fenton Creek, Penryn, North Paaratte, Wallaby Creek and Iona Fields. Seamer, as with each of these fields, exhibits a strong amplitude anomaly at the Waarre Sandstone horizon, interpreted as being a well-developed gas-saturated reservoir. Seamer-1 was proposed as an Otway Basin deviated gas exploration well located in the PEP 153 license, approximately 9 km south-east of the township of Timboon and 2.2 km north-west of the Iona Gas Field. The Seamer Structure is situated within the Port Campbell Embayment and the productive Waarre Sandstone play fairway immediately north of PPL1 (see location map). The PEP 153 license surrounds PPL2 which encompasses the Iona gas field and PPL1, which encompasses the North Paaratte, Wallaby Creek and Skull Creek gas fields. Of these fields, only Iona is currently active and it is used as a gas storage facility.

Whilst drilling Seamer-1, the geological section penetrated was within tolerance to prognosis. As can be seen in the wellcard and the table below, the drilled depths of most formations (with the exception of the Waarre Sandstone and the Eumeralla Formation) were between 1.3m low to 13.7m high to their respective prognosed depths. The primary target Waarre Sandstone was intersected 26.6m High to prognosis and the secondary target Nullawarre Greensand was penetrated 10.4m High to prognosis.

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

TABLE V: ACTUAL VERSUS PREDICTED DEPTHS AND THICKNESSES SEAMER-1

FORMATION	PROG SS DEPTH	ACTUAL SS DEPTH	DEPTH DIFF	PROG THICK	ACTUAL THICK	THICK DIFF
Surface Marl	0	0.0	0.0	240	177.3	62.7
Mepunga Formation	-	177.3	-	-	64.0	-
Dilwyn Formation	-240	-241.3	1.3m L	200	195.1	4.9
Pember Mudstone	-440	-436.4	3.6m H	85	74.9	10.1
Paaratte Formation	-525	-511.3	13.7m H	275	281.5	6.5
Skull Creek Mudstone	-800	-792.8	7.2m H	125	121.8	3.2
Nullawarre Formation	-925	-914.6	10.4m H	90	90.2	0.2
Belfast Mudstone	-1015	-1004.8	10.2m H	80	46.6	33.4
Flaxmans Formation	-	-1051.4	-	-	17.0	-
Waarre Sandstone "C"	-1095	-1068.4	26.6m H	95	77.1	17.9
Waarre Sandstone "B"	-	-1103.7	-	-	-	-
Waarre Sandstone "A"	-	-1120.1	-	-	-	-
Eumeralla Formation	-1190	-1145.5	44.5m H	60	115.9	55.6
Total Depth (Logger Extrap.)	-1250	-1261.4	11.4m L			

(c) Hydrocarbon Summary

Total gas was recorded from the surface to total depth (1360 mMD) 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. All gas values in this report are expressed in gas units and where pertinent gas composition is expressed as a percentage ratio of the component alkane gases methane (C1) through butane (C4) (e.g. 80/10/7/3 denotes a composition of 80% methane, 10% ethane, 7% propane and 3% butane). Mudlogging services were provided by Unit 271 of Geoservices Ltd. Samples (ditch cuttings) were collected, washed, and described at 10m intervals from the surface to 900m, then at 3m intervals from 900m to total depth at 1360m. All samples were checked for oil shows using ultraviolet fluorescence.

TABLE VI: HYDROCARBON SUMMARY FOR SEAMER-1

Unless noted, all depths are referenced to driller's depth measured from the Rotary Table (RT).

FORMATION	INTERVAL FT RT (m)	TOTAL GAS Max/BG (units)	C1/C2/C3/C4 (%)	FLUORESCENCE / COMMENTS
Nullawarre Greensand	996-1024 & 1046-1063	70 / 4	99/1/-/-	No fluorescence. Due to leak in gas equipment, gas readings are lower than actual.
Waarre Sandstone	1153-1166	60 / 4	98/2/-/-	No fluorescence. Due to leak in gas equipment, gas readings are lower than actual.
Waarre Sandstone	1169-1180	130 – 400 / 20	97/3/trace/trace	No fluorescence. Due to leak in gas equipment, gas readings are lower than actual.
Waarre Sandstone	1186-1190	180 / 20	98/2/trace/trace	Trace dull yellow patchy fluorescence, slow weak crush cut, thick ring residue. Due to leak in gas equipment, gas readings are lower than actual.
Eumeralla Formation	1253-1255	410 / 40	89/5/4/2	No hydrocarbon fluorescence
Eumeralla Formation	1281–1298	280-850/50	95/4/1/trace	No hydrocarbon fluorescence

4. SUMMARY

Seamer-1 was proposed as an Otway Basin deviated gas exploration well located in the PEP 153 license, approximately 9 km south-east of the township of Timboon and 2.2 km north-west of the Iona Gas Field. The Seamer Structure is situated within the Port Campbell Embayment and the productive Waarre Sandstone play fairway immediately north of PPL1 (see location map). The PEP 153 license surrounds PPL2 which encompasses the Iona gas field and PPL1, which encompasses the North Paaratte, Wallaby Creek and Skull Creek gas fields. Of these fields, only Iona is currently active and it is used as a gas storage facility. The offset wells were Namgib-1 and North Paaratte-3. Logs from both these wells were used for correlation during the drilling of Seamer-1.

The Seamer Prospect is a tilted-fault block closure defined by 3D seismic. The well is expected to intersect a thick Waarre Sandstone reservoir (primary target) with mean average net pay of 14m. The Nullawarre constitutes a secondary target.

The 9 7/8" section in Seamer-1 was drilled to 442m and 7 5/8" casing was run and set at 434m. A 6 ¾" directional build assembly (along with MWD tools) was used to drill out the shoe track and continued to drill essentially vertically to the kick-off point at 574m. From 574m, the well was steered to the planned trajectory of 180°T azimuth while continuing to drill the build section to an inclination of 20°. A bit trip was required at 1169m and thereafter drilling continued without incident to total depth of 1360mMD, 1325mTVD which was reached on 25/12/02. At Total Depth the well was 221m from the wellhead in a 178°T direction and inside the 25m target radius stipulated in the well proposal.

Whilst drilling Seamer-1, the drilled depths of most formations (with the exception of the Waarre Sandstone and the Eumeralla Formation) were between 1.3m Low to 13.7m High to their respective prognosed depths. The primary target Waarre Sandstone was intersected 26.6m High to prognosis and the secondary target Nullawarre Greensand was penetrated 10.4m High to prognosis.

At Total Depth, the following suite of wireline logs was run. Run1: DLL-MLL-ZDL-CN-DAC-SP-CAL-GR, Run 2: FMT-GR (with sampling), Run 3: SWC-GR. Wireline logs indicate that the primary target Waarre Sandstone has 17.9m net pay with a average porosity of 24.3%, and water saturation of 38% while the secondary target Nullawarre Greensand has 1.9m net pay with a average porosity of 26.8%, and water saturation of 62%. Gas shows were high in these zones. Subsequently the well was cased and suspended.

Total Depth of 1360m MD, 1325m TVD was reached on 25/12/02. After acquiring wireline logs, 3 ½" casing was run and set at 1356.5m. Seamer-1 was Cased & Suspended as a Waarre Sandstone and Nullawarre Greensand future producer. CDL Rig 11 was released on 29/12/02.

5. REFERENCES

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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 900m, thereafter at 3 intervals from 900m to total depth at 1360m.

SURFACE MARLS OF THE HEYTESBURY GROUP
(Early Miocene to Early Oligocene)
177.3 m thick TVD
63.7 to 214.0mMD

63.7 - 73.8m MARL: Medium light grey to medium grey, medium light greyish brown, calcareous silt, common clay, common coral and shell fragments, minor oolitic, minor LIMESTONE fragments, very soft.

73.8 – 241m MARL: Medium light grey to medium grey, medium light greyish brown, increasing to medium dark grey brown to medium dark brown grey, calcilutite, common clay, abundant to common coral and shell fragments, minor ooids, minor LIMESTONE fragments, firm, sub-blocky.

MEPUNGA FORMATION
(Middle Eocene to Early Oligocene)
64m thick TVD
241.0 to 305.0mMD

241 – 305m MASSIVE SANDSTONE INTERBEDDED WITH MINOR CLAYSTONE
SANDSTONE: Clear to translucent, orange yellow, very fine to medium, predominantly fine, well sorted, sub-rounded to sub-angular, trace calcareous cement, trace to no argillaceous matrix, trace glauconite, occasional pyrite nodules, minor dark green to black lithics, trace fossiliferous, loose, good inferred porosity, no fluorescence.
CLAYSTONE: Medium brown, slightly to often very silty, often abundant dispersed very fine to grit sized brown stained quartz sand grains, slightly calcareous in part, trace glauconite at top, trace to common pyrite, very soft, very dispersive, non fissile.

WANGERRIP GROUP
DILWYN FORMATION (Early Eocene)
195.1m thick TVD
305.0 to 500.1mMD

305 – 442m SANDSTONE INTERBEDDED WITH SILTSTONE

SANDSTONE: Very light brown, off white, clear, translucent, very fine to occasionally grit, dominantly medium, angular to subrounded, poorly sorted, very weak silica and calcareous cements, common to minor medium brown argillaceous and silt matrix, clear to opaque to occasionally orange brown quartz grains, trace to common pyrite, trace black carbonaceous detritus, friable to unconsolidated, very poor to very good dominantly fair inferred porosity, no fluorescence.

SILTSTONE: Medium brown, moderately to very silty, often abundant dispersed very fine to grit sized brown stained quartz sand grains - in part grading to argillaceous SANDSTONE, slightly calcareous in part, trace to common pyrite, very soft, very dispersive, non fissile.

442 – 470m INTERBEDDED SILTSTONE AND SANDSTONE

SILTSTONE: Medium brown grey to grey brown, argillaceous, trace disseminated pyrite, trace carbonaceous material, dispersive, amorphous.

SANDSTONE: Clear to translucent, dominantly medium, occasional fine to coarse grained, moderately well sorted, angular to subrounded, trace pyrite cement, trace glauconite (?), loose, fair inferred porosity, no fluorescence.

470 – 500.1m INTERBEDDED SANDSTONE AND SILTSTONE

SANDSTONE: Clear to translucent, pale brown, dominantly medium to coarse grained, occasional fine and very coarse grained, poorly sorted, subangular to subrounded, trace siliceous cement, trace pyrite nodules, generally loose and clean, fair to good visual and inferred porosity, no hydrocarbon fluorescence.

SILTSTONE: Medium brown grey to medium grey brown, argillaceous, trace disseminated pyrite, trace carbonaceous specks, dispersive, amorphous.

PEMBER MUDSTONE (Early Eocene to Late Palaeocene)
74.9m thick TVD
500.1 to 575.1MmD

500.1 – 575.1 m MASSIVE CLAYSTONE INTERBEDDED WITH THIN SANDSTONE AND SILTSTONE STRINGERS

CLAYSTONE: Medium brown to medium olive-grey, dominantly olive Grey, moderate to commonly silty, minor to common very fine brown stained quartz grains, in part grading to argillaceous very fine SANDSTONE, minor to common glauconite, common carbonaceous specks, trace micromicaceous, trace pyrite, soft, sticky.

SANDSTONE: Light brown to translucent quartz, dominantly pale brown, very fine to fine, sub angular to sub rounded, moderately sorted, very weak silica cement, commonly matrix supported, trace glauconite, loose, friable, very poor inferred porosity, no fluorescence.

SILTSTONE: Olive grey to black, dark brown, commonly argillaceous, trace carbonaceous specks, trace pyrite nodules, trace glauconite, abundant iron stained very fine quartz grains, very soft and dispersive, predominantly soft to occasionally firm.

SHERBROOK GROUP
PAARATE FORMATION
(Maastrichtian to Campanian)
281.5m thick TVD
575.1 to 864.2mMD

575.1 – 604 m MASSIVE SANDSTONE WITH TRACE SILTSTONE

SANDSTONE: Very light brown grey, very fine to pebble, dominantly very coarse, angular to subrounded, dominantly subangular, very poorly sorted, weak pyrite and silica cements, trace medium brown argillaceous and silt matrix, common yellow quartz grains, common grey green and red volcanogenic lithics, trace coarse brown and green mica flakes, trace black coaly detritus, friable, very good inferred porosity, no oil fluorescence.

SILTSTONE: (Trace) Medium to dark brown- grey, olive-brown grey, common very fine carbonaceous specks, common pyrite in part, trace micromica, amorphous to firm, commonly soft.

604 – 668m SANDSTONE: Pale grey, clear to translucent, minor frosted, pale yellow, coarse grained to very coarse grained, occasional pebbly, trace medium grained, poorly sorted, dominantly subangular to angular, occasional subrounded, trace weak siliceous cement, rare pyrite nodules, trace black lithic fragments, loose and clean, good inferred porosity, no hydrocarbon fluorescence.

668 – 698m INTERBEDDED SANDSTONE AND MINOR SILTSTONE
SANDSTONE: Clear to translucent, minor frosted, trace light grey, coarse grained to very coarse grained, subangular to subrounded, trace angular, trace weak siliceous cement, trace to minor pyrite cement, minor to locally common pyrite nodules, dominantly loose and clean, good inferred porosity, no hydrocarbon fluorescence.
SILTSTONE: Medium to occasional dark grey brown, medium grey, argillaceous to very argillaceous, trace carbonaceous specks, soft, dispersive in part, amorphous to subblocky.

698 – 742m INTERBEDDED SANDSTONE AND SILTSTONE
SANDSTONE: Clear to translucent, light grey, minor white, coarse grained to very coarse grained, minor fine to medium grained, partly pebbly, moderately poorly sorted, subrounded to rounded in part, trace to locally common pyrite cement, generally loose, clean, good inferred porosity, no hydrocarbon fluorescence.
SILTSTONE: Medium to occasional dark green grey, argillaceous to very argillaceous, trace carbonaceous specks, soft, dispersive in part, subblocky to amorphous.

742 – 784m INTERBEDDED SILTSTONE AND SANDSTONE
SILTSTONE: Medium to dark brown, occasional very dark brown, carbonaceous in part, argillaceous, soft, dispersive, amorphous to subblocky in part.
SANDSTONE: Clear to translucent, opaque, pale grey, white in part, medium to very coarse grained, poorly sorted, angular to subrounded, common angular very coarse grained to pebbly secondary siliceous fragments, rare white argillaceous matrix, generally loose and clean, trace moderately hard aggregates, fair inferred porosity, no hydrocarbon fluorescence.

784 – 847m INTERBEDDED SANDSTONE AND SILTSTONE
SANDSTONE: Clear to translucent, trace opaque, medium to very coarse grained, poorly sorted, subangular to subrounded, trace pyrite nodules, trace pyrite cement, generally loose, fair inferred porosity, no hydrocarbon fluorescence.
SILTSTONE: Medium grey to medium grey brown, argillaceous, trace to minor carbonaceous specks, soft to minor firm, dispersive in part, amorphous to subblocky in part.

847 – 864.2m INTERBEDDED SANDSTONE AND SILTSTONE
SANDSTONE: Clear to translucent, dominantly medium grained, fine grained in part, minor coarse to very coarse grained, moderately sorted, subangular to subrounded, trace to weak siliceous cement, loose, poor to fair inferred porosity, no hydrocarbon fluorescence.
SILTSTONE: Medium grey to medium grey brown, argillaceous, trace to minor carbonaceous specks, soft to minor firm, dispersive in part, amorphous to subblocky in part.

SKULL CREEK MUDSTONE (Santonian)
121.8m thick TVD
864.2 to 994.7mMD

864.2 – 912m	INTERBEDDED SILTSTONE AND SANDSTONE SILTSTONE: Medium grey brown medium brown, grey in part, argillaceous, trace micromicaceous, soft, dispersive, amorphous. SANDSTONE: Clear to translucent, fine to medium, moderately well sorted, subangular to subrounded, moderately strong siliceous cement in part, dominantly loose, occasional fine grained aggregates, poor visual and inferred porosity, no hydrocarbon fluorescence.
912- 938m	INTERBEDDED SILTSTONE AND SANDSTONE SILTSTONE: Medium grey brown to medium brown, grey in part, argillaceous, trace pyrite, slightly micromicaceous, trace carbonaceous specks, soft, dispersive, amorphous. SANDSTONE: Clear to translucent, dominantly coarse grained, common medium to very coarse grained, moderately poorly sorted, subangular to subrounded, moderately strong siliceous cement in fine to very fine grained aggregates, trace white argillaceous matrix, dominantly loose, moderately strong aggregates, poor visual porosity, fair inferred porosity, no hydrocarbon fluorescence.
938- 994.7m	MASSIVE SILTSTONE WITH MINOR SANDSTONE SILTSTONE: Medium grey brown to medium brown, pale brown grey in part, argillaceous, trace pyrite, slightly micromicaceous, trace siliceous lithic fragments, trace carbonaceous specks, soft, dispersive, amorphous. SANDSTONE: Very pale grey, very fine grained to fine grained, well sorted, subangular, common strong calcareous cement, minor white to pale grey argillaceous matrix, moderately hard to hard aggregates, poor visual porosity, poor inferred porosity, no hydrocarbon fluorescence.

<u>NULLAWARRE GREENSAND</u> (Santonian)
90.2m thick TVD
994.7 to 1089.2mMD

994.7-1024m	SANDSTONE INTERBEDDED WITH CLAYSTONE SANDSTONE: Clear to translucent, pale yellow, pale green to green, occasional frosted, fine to dominantly medium grained, occasional coarse grained to very coarse grained, moderately sorted, subangular to subrounded, rounded in part, trace weak siliceous cement, trace to locally common light green to off-white argillaceous to glauconitic matrix, common glauconite grains, friable, loose, fair inferred porosity, no hydrocarbon fluorescence. CLAYSTONE: Olive brown, yellow brown, brown, soft, dispersive, amorphous.
1024 – 1089.2m	SANDSTONE INTERBEDDED WITH MINOR CLAYSTONE SANDSTONE: Pale brown, clear to translucent, light yellow, dominantly medium, fine and coarse grained in part, moderately well sorted, subangular to subrounded, trace weak to moderately strong siliceous cement, trace rare lithic fragments, trace to locally common light green to off-white argillaceous to glauconitic matrix, trace glauconite grains, dominantly loose, minor moderately hard aggregates, poor visual porosity, fair inferred porosity, no hydrocarbon fluorescence. CLAYSTONE: Olive brown, light yellow brown, light brown, soft, dispersive, amorphous, minor subblocky.

BELFAST MUDSTONE (Santonian to Coniacian)
46.6m thick TVD
1089.2 to 1138.2mMD

1089.2-1138.2m MASSIVE CLAYSTONE
CLAYSTONE: Medium brown grey to brown, light to medium brown, grin brown in part, locally common to abundant very fine grained disseminated glauconite, rare pyrite nodules, soft, dispersive, amorphous.

FLAXMANS FORMATION (Turonian)
17.0m thick TVD
1138.2 to 1156.1mMD

1138.2-1156.1m CLAYSTONE: Medium brown to medium olive-brown, moderately silty, abundant dispersed very fine to rare coarse quartz grains often stained green and orange, slightly calcareous in part, common glauconite, trace pyrite, soft, sticky, non fissile.
SILTSTONE: Medium grey brown, common very fine to coarse orange to green stained quartz grains, abundant medium green to orange brown argillaceous matrix, common glauconite, trace pyrite, friable.

WAARRE SANDSTONE (Turonian)
77.1m thick TVD
1156.1-1237.4mMD

1156.1-1169m SANDSTONE: Very pale brown, clear to translucent, pale grey, minor opaque, fine to very coarse grained, poorly sorted, subangular to subrounded, trace weak siliceous cement, trace light brown argillaceous matrix, trace glauconite, generally loose, good inferred porosity, no hydrocarbon fluorescence.

1169-1186m SANDSTONE INTERBEDDED WITH SILTSTONE
SANDSTONE: Clear to translucent, light grey, rare pale yellow, fine to very coarse grained, poorly sorted, dominantly subangular, subrounded in part, trace lithic fragments, common nodular pyrite, generally loose and clean, good inferred porosity, no hydrocarbon fluorescence.
SILTSTONE: Medium to light grey brown, medium to light grey, argillaceous to very argillaceous grading to claystone, trace glauconite, soft, dispersive, amorphous to minor subblocky.

1186-1212m INTERBEDDED SANDSTONE AND SILTSTONE
SANDSTONE: Clear to translucent, light grey, very pale brown in part, fine to medium grained, occasional coarse grained to very coarse grained, moderately sorted, dominantly subrounded, subangular in part, occasional rounded, locally common argillaceous matrix, generally loose, silty in part, common pyrite nodules, fair to good inferred porosity.
1188-1197m: Trace dull yellow patchy fluorescence, slow weak crush cut, thick ring residue.
SILTSTONE: Light brown grey, light grey, off white to pale brown, argillaceous grading to claystone in part, trace carbonaceous specks and microlaminations, trace glauconite, soft, dispersive, amorphous.

1212 – 1230m INTERBEDDED SANDSTONE AND MINOR SILTSTONE
SANDSTONE: Light grey, translucent, off white, medium to coarse grained, occasional fine and very coarse grained, moderately poorly sorted, subangular to subrounded in part, trace weak calcareous cement, common off white argillaceous matrix, trace lithic fragments, trace pyrite, loose, friable to occasional moderately hard in part, poor visual porosity, poor to fair inferred porosity, no hydrocarbon fluorescence.
SILTSTONE: Light brown grey, light grey, off white to pale brown, argillaceous grading to claystone in part, trace carbonaceous specks and microlaminations, trace glauconite, soft, dispersive, amorphous.

1230-1237.4m INTERBEDDED SILTSTONE AND SANDSTONE
SILTSTONE: Light brown grey, light grey, off white to pale brown, argillaceous grading to claystone in part, trace carbonaceous specks and microlaminations, trace glauconite, soft, dispersive, amorphous.
SANDSTONE: Pale brown, pale grey, occasional orange brown, medium to very coarse grained, poorly sorted, angular to subangular, trace weak siliceous cement, trace to locally common off white argillaceous matrix, trace black and orange brown lithic fragments, trace pyrite, loose, friable in part, poor visual porosity, poor to fair inferred porosity, no hydrocarbon fluorescence.

EUMERALLA FORMATION (Late Albian)
115.9+ m TVD
1237.4 to 1360mMD

1237.4-1281 m SILTSTONE INTERBEDDED WITH MINOR SANDSTONE
SILTSTONE: Medium to light grey, light green grey, argillaceous, grading to claystone in part, dominantly soft to minor firm, subblocky to amorphous.
SANDSTONE: Light green grey, greenish white, very fine grained to fine grained, occasional medium, moderately well sorted, subangular to subrounded in part, abundant white argillaceous matrix, slightly calcareous, trace glauconite, trace lithic fragments, soft to moderately hard aggregates, poor visual porosity, no hydrocarbon fluorescence.

1281 – 1298 m SANDSTONE INTERBEDDED WITH SILTSTONE
SANDSTONE: Green grey, off white to pale green, trace red brown, mottled in part, medium to coarse grained, moderately well sorted, dominantly subangular, trace to locally common moderately strong siliceous cement, trace to locally common light grey argillaceous matrix, slightly calcareous, common lithic fragments, moderately hard aggregates, commonly loose, poor visual porosity, fair inferred porosity, no hydrocarbon fluorescence.
SILTSTONE: Medium to light grey, light green grey, argillaceous, grading to claystone in part, dominantly soft to minor firm, subblocky to amorphous.

1298-1360m	INTERBEDDED SILTSTONE AND SANDSTONE SILTSTONE: Light to medium green grey, light to medium brown grey, pale green, argillaceous, grading to claystone in part, trace lithic fragments, soft to moderately hard, subblocky. SANDSTONE: Clear to translucent, light to medium grey, off white in part, pale green, dominantly medium grained, fine and coarse grained in part, moderately well sorted, subangular to subrounded, trace weak siliceous cement, abundant dark grey lithic fragments, trace glauconite, loose, fair to good inferred porosity, no hydrocarbon fluorescence.

Total Depth : 1360mMD, 1325.1mTVD, -1261.4mSS.

APPENDIX II: HYDROCARBON SHOW REPORTS

SANTOS LIMITED

OIL SHOW EVALUATION REPORT

WELL: Seamer-1 **GEOLOGIST:** R. SUBRAMANIAN

INTERVAL: 1185.5 to 1194.5m (L)

FORMATION: WAARRE SANDSTONE

C1 ppm	<5k	10k	20k	30k	40k	50k	100k	150k	200k	>250k
C2+ ppm	<500	750	1k	2k	3k	4k	5k	7.5k	10k	>15k
Porosity Ø	tight			poor		fair		good		
% with fluorescence	trace	10	20	30	40	50	60	70	80	>90
Fluorescence appearance	trace		spotted			streaked		patchy		solid
Brightness of fluorescence	v. dull		dull		dim			mod bright	v. bright	glowing
Type of cut	trace	v. slow crush cut	Weak crush cut	instant crush cut	v. slow streaming cut	slow stream	moderate streaming	streaming	Fast Streaming	instant
Residue on spot plate	trace	heavy trace	v. thin ring	thin ring	Moderately thick ring	v. thick ring	thin film	thin film	thick film	solid
Show rating	trace		poor		fair		good			
Comments:	Dull yellow fluorescence.									

APPENDIX III: WIRELINE LOGGING REPORTS

APPENDIX III (a): LOGGING ORDER FORM

Santos

A.C.N. 007 550 923

REVISION 1.0
(DATE: 22/11/96)

LOGGING ORDER

COMPANY:	SANTOS				
WELL:	SEAMER 1	**FIELD:**	WILDCAT EXPLORATION		
RIG:	CDL RIG 11	**STATE:**	VICTORIA		
LOCATION:	OTWAY BASIN	**BLOCK:**	PEP 153		
LATITUDE:	38° 33' 24.28" S	**LONGITUDE:**	143° 01' 15.7" E		
ELEVATIONS:	**GL**: 58.5m	**RT:**	63.7m	**DF**:	
9 7/8" HOLE:	442m	**7 5/8" CSG:**	434m	**WT**:	26.4# (L80) ID=6.969"
6 ¾" HOLE:	1360m	**CSG**		**WT**:	
TD (Drlr.):	1360m	**TD (Logr.):**			

MUD SYSTEM: KCl/PHPA/Polymer **CIRCULATION STOPPED:** 04:00 **HRS ON** 26/12/02

WT: 9.2 **VISC**: 37 **PV/YP:** 9 / 15 **PH**: 8.5 **FLUID LOSS:** 7.0 **CL**: 31000

*** See attached Mud Report for details

GEOLOGIST: **R. Subramanian**

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

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

Hole conditions expected to be good for logging run.
No Tight spots on trip out of hole.
See Anadrill Survey sheet for deviation data. Maximum deviation = 20°.
Barite in mud = Nil

DRILL STEM TESTS/CORED INTERVALS:

No DST's planned. No cores cut.

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

LOGS:

PROGRAM CONFIRMED WITH OPERATIONS GEOLOGIST ON 26/12/02.

PROGRAM VARIES FROM PRE-SPUD NOTES: **YES**: [ ] **NO:** [X]

LOG	INTERVAL	REPEAT SECTION / COMMENTS
RUN-1: SUPER COMBO		
GR (unfiltered)	TD – Surface	
DLL-MLL-SP-CAL	TD – Casing shoe	
DSL	TD – 900m	
ZDL-CN	TD – 900m	
DAC : Full wave monopole (monopole shear) with WFT , semblance processed	TD – 900m	
DT	900m – Casing shoe	
RUN 2: FMT-GR		Use 20cc
20 points programmed	TBA, 4 samples, 2 to be opened at site	
RUN 3: SWC		
25 shots – 1 gun	TBA	

REMARKS: (ALL OPERATIONS AS PER CURRENT SANTOS OPERATING PROCEDURES)

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

APPENDIX III (b): FIELD ELECTRIC LOG REPORT

SANTOS LIMITED

FIELD ELECTRIC LOG REPORT

WELL:	SEAMER 1	**GEOLOGIST:**	R. Subramanian
LOGGING ENGINEER:	Barrett / Gleeson		
RUN NO.:	1 to 3	**DATE LOGGED:**	26 to 27/12/02
DRILLERS DEPTH:	1360m	**LOGGERS DEPTH:**	1355m (Stuck)
ARRIVED ON SITE:	23/12/02		
ACTUAL LOG TIME:	12:45 hrs	**LOST TIME LOGGER:**	3:45 hrs
TOTAL TIME:	29:00 hrs	**LOST TIME OTHER:**	-

TYPE OF LOG	GRAND SLAM (RUN 1)	FMT (RUN 2 – TRIP 1)	FMT (RUN 2 – TRIP 2)	SWC-GR (RUN 3)
TIME CIRC. STOPPED	04:00 26/12/02	04:00 26/12/02	04:00 26/12/02	04:00 26/12/02
TIME TOOL RIG UP	10:15 26/12/02	20:30 26/12/02	04:30 27/12/02	07:00 27/12/02
TIME TOOL RUN IN HOLE	11:30 26/12/02	22:00 26/12/02	04:45 27/12/02	11:15 27/12/02
TIME TOOL RIG DOWN	20:30 26/12/02	04:30 27/12/02	07:00 27/12/02	15:15 27/12/02
TOTAL TIME	10:15 hrs	8:00 hrs	2:30 hrs	8:15 hrs

WIRELINE LOG	SUITE/RUN	INTERVAL (ft)	BHT/TIME
RUN-1: GRAND SLAM GR (unfiltered) DLL-MLL-SP-CAL DSL ZDL-CN DAC : Full wave monopole (monopole shear) with WFT , semblance processed DT	**1 / 1**	 TD – Surface TD – Casing shoe TD – 900m TD – 900m TD – 900m 900m – Casing shoe	
RUN 2: FMT-GR Total 24 points, 18 Good Tests, 4 lost Seals, 2 Curtailed	**1 / 2**	**(2 trips)** 4 samples, 2 were opened at site, 2 sent to laboratory	
RUN 3: SWC 1 gun (25 shots – 20 Purchased)	**1 / 3**		

MUD SYSTEM: **WEIGHT: 9.2ppg**

HOLE CONDITIONS:

Good hole conditions reasonably good. Got stuck after tagging fill at 1355m. Worked free. Hole deviated at approx. 20°.

REMARKS / RECOMMENDATIONS:

Depth counter had problems. Later traced to computer problems. Communications/computer problems encountered during the SWC run. 3.75hrs total downtime.

DLL failed above 900m. Downlog was spliced into the log.

WELLSITE LOG QUALITY CONTROL CHECKS

LOG ORDER FORM	✓	MUD SAMPLE RESISTIVITY	✓	TOOL NO. / CODE CHECK	✓
OFFSET WELL DATA	✓	CABLE DATA CARD	✓	LOG SEQUENCE CONFIRM.	✓

LOG TYPE	GR	CAL	DAC	DLL	MLL	LDL	CNL	SP	FMT	SWC	REMARKS
CASING CHECK		✓	✓								
SCALE CHECK	✓										
DEPTH Casing Total				✓							D=434m; L=434m
CALIBRATIONS OK											
REPEATABILITY	✓										Matched with MWD log
LOGGING SPEED											5 m/min
OFFSET WELL Repeatability											Matched with Penryn-1
NOISY / MISSING DATA				✓							DLL failed above 900m. Spliced from downlog.
CURVES/LOGS Depth Matched									✓	✓	Correlated to Run 1
Rm MEASUREMENT											
LLS / LLD / CHECK											
PERF / RHOB CHECK											
LOG HEADER / TAIL											
PRINT/FILM QUALITY											

COMMENTS:

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

APPENDIX IV: LOG EVALUATION

SEAMER 1

LOG ANALYSIS

SEAMER 1 - LOG ANALYSIS

Seamer 1 wireline logs were analysed over the Nullawaarre-Waarre Sandstone (993.5m-1311m) interval. Conventional gas pay was identified in the Nullawaarre and Waarre Formations. Seamer 1 was cased and suspended as a future gas producer.

A 9 7/8" surface hole was drilled to 442 metres and 7 5/8" casing set at 434 metres. A 6 3/4" hole was then drilled with KCl/PHPA mud to 1360 metres (D). Wireline logging was carried out by Baker Atlas (as described below).

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

Logs Acquired

Run 1	DSL	1301m-Surface
	MAC	1324m-SCS
	(Waveform Sonic)	1324m-900m
	DLL	1337m-SCS
	MLL (Microlog)	1345m-SCS
	ZDL (Compensated Density Sonde)	1318m-SCS
	CNC (Compensated Neutron Sonde)	1311m-SCS
Run 2	GR-FMT (24 tests, 18 good, 4 lost seals & 2 curtailed)	
Run 3	SWC (Recovered 21 of 25 cut)	

Mud Parameters

Mud Type	KCl/PHPA
Mud Density	9.15LB/G
KCl	4.3%
Rm	0.146 ohmm @ 60.4^{o}F
Rmf	0.108 ohmm @ 61.0^{o}F
Rmc	0.235 ohmm @ 59.36^{o}F
MRT	130^{o}F from Run 2 at 1287m

Remarks

- The laterolog was run with 1.5inch stand-offs and sonic was run centralised.
- 0.0% Barite in mud.

Log Processing

- Regional salinity data was used to derive the R_w used for this analysis.
- A BHT of 91^{o}C was used for the analysis (Gradient of 30^{o}C/km).

Interpretation Procedures and Parameters

An interpretation over the Nullawaarre and Waarre Sandstone intervals was conducted using a combination of density-neutron crossplot (PHIT_DN), density (DPHI), neutron (CNC) and sonic porosity (SPHI) from sonic. A density-neutron 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 RS and RD curves were applied (Table 1). These are ratios used to emulate the algorithms illustrated in the Baker Atlas charts 7-18 and 7-15 respectively.

- The RD_BC (deep resistivity borehole corrected) curve was further corrected for shoulder bed and Groningen effects (RDc) and calibrated in shale zones (Table 1).

- The invasion corrected R_T was derived using the following relationship:

$$R_T = (DIF \times RD_C - SIF \times RS\_BC)$$

where: RDc = borehole, shoulder and Groningen corrected deep resistivity.
RS_BC = borehole corrected shallow resistivity.
DIF = deep resistivity invasion correction factor (Table 1).
SIF = shallow resistivity invasion correction factor (Table 1).

- Density porosity was calculated over the Waarre Sandstones:

$$DPHI = (2.65 - RHO\_COR) / (1.65)$$

where:
RHO_COR= Corrected Bulk Density in g/cc.

- A Hunt-Raymer sonic porosity curve was calculated:

$$SPHI = (DTH - 55.5/DTH)*0.625$$

where:
DTH = Compensated Sonic (μs/ft).

- PHIE was primarily produced from the density-neutron crossplot porosity with some editing to DPHI, CNC, 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_DN

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

elseif Vsh > VshCO …… PHIE = PHIT_DN - (Vsh * PHIsh)

where:
- VshSt = The start of the sliding scale Vsh correction.
- VshCO = Shale volume cut-off.
- Vsh = Shale volume.
- PHIT_DN = Density-neutron crossplot porosity.
- PHIsh = Apparent shale porosity.

- 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. 1.9m of gas pay was identified in the Nullawaarre Greensand.
2. 17.9m of gas pay was identified in the Waarre Formation.
3. Seamer 1 was cased and suspended as a future gas producer.

Attached is the well evaluation summary (WES) plot for Seamer 1 (02.213)
data/wes_ot/seamer1_02.213.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	0.96	0.96
Borehole cor RS	0.95	0.95
RD Shoulder Corr.	0.8	0.8
GR matrix (API)	23	23
GR shale (API)	100	100
VSHST	0.2	0.2
VSHCO	0.4	0.4
PHISH	0.13	0.15

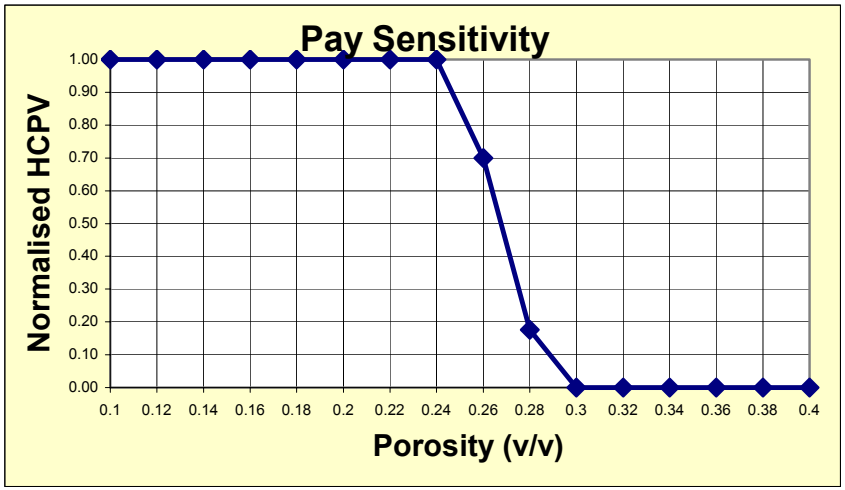
TABLE 2
Conventional Pay Summary

FORMATION	SAND INTERVAL	GROSS SAND	NET SAND (ft)	AVG PHI_S (wt %)	NET PAY (ft)	AVG PHI_P (wt %)	AVG SW (wt %)
NULLAWARRE GREENSAND	994 -1083	87.6	80.6	20.8	1.9	26.8	62
WAARRE FORMATION	1151 -1240	88.4	71.2	22.5	17.9	24.3	38

Cutoffs: Gross Sand > 2% PHIE, Net Sand > 10% PHIE, Net Pay > 10% PHIE & <70% Sw

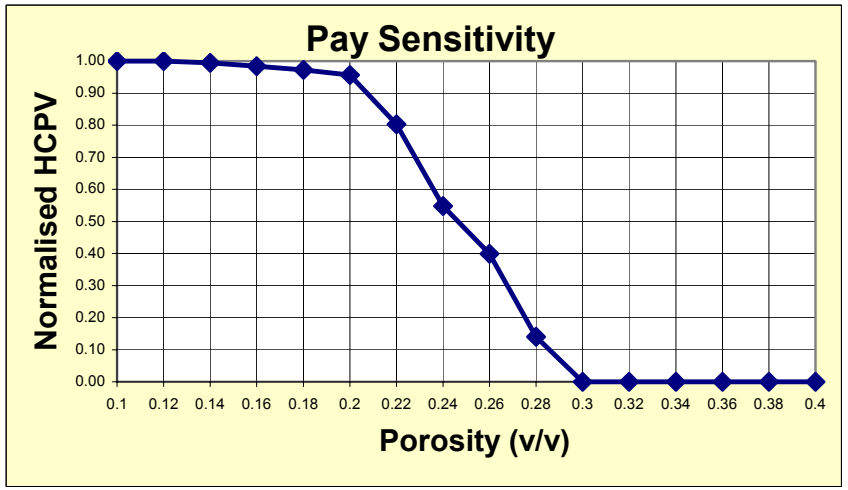
SEAMER_1
NULLAWARRE

PHIT Cutoff	SWT Cutoff	AVG PHIE V/V	AVG SWT V/V	Phie*H	HCPV Sg*Phie*H	NET (ft)	NHCPV
0.1	0.7	0.267	0.621	0.51	0.193	1.91	1.00
0.12	0.7	0.267	0.621	0.51	0.193	1.91	1.00
0.14	0.7	0.267	0.621	0.51	0.193	1.91	1.00
0.16	0.7	0.267	0.621	0.51	0.193	1.91	1.00
0.18	0.7	0.267	0.621	0.51	0.193	1.91	1.00
0.2	0.7	0.267	0.621	0.51	0.193	1.91	1.00
0.22	0.7	0.267	0.621	0.51	0.193	1.91	1.00
0.24	0.7	0.267	0.621	0.51	0.193	1.91	1.00
0.26	0.7	0.277	0.601	0.338	0.135	1.22	0.70
0.28	0.7	0.284	0.612	0.087	0.034	0.31	0.18
0.3	0.7	0	0	0	0	0	0.00
0.32	0.7	0	0	0	0	0	0
0.34	0.7	0	0	0	0	0	0
0.36	0.7	0	0	0	0	0	0
0.38	0.7	0	0	0	0	0	0
0.4	0.7	0	0	0	0	0	0



SEAMER_1
WAARRE

PHIT Cutoff	SWT Cutoff	AVG PHIE V/V	AVG SWT V/V	Phie*H	HCPV Sg*Phie*H	NET (ft)	NHCPV
0.1	0.7	0.243	0.375	4.316	2.696	17.755	1.00
0.12	0.7	0.243	0.375	4.316	2.696	17.755	1.00
0.14	0.7	0.245	0.373	4.276	2.68	17.45	0.99
0.16	0.7	0.247	0.371	4.219	2.653	17.069	0.98
0.18	0.7	0.249	0.37	4.166	2.623	16.764	0.97
0.2	0.7	0.25	0.367	4.076	2.579	16.307	0.96
0.22	0.7	0.257	0.383	3.509	2.165	13.64	0.80
0.24	0.7	0.269	0.41	2.505	1.477	9.296	0.55
0.26	0.7	0.278	0.396	1.78	1.075	6.401	0.40
0.28	0.7	0.293	0.438	0.67	0.377	2.286	0.14
0.3	0.7	0	0	0	0	0	0.00
0.32	0.7	0	0	0	0	0	0
0.34	0.7	0	0	0	0	0	0
0.36	0.7	0	0	0	0	0	0
0.38	0.7	0	0	0	0	0	0
0.4	0.7	0	0	0	0	0	0



APPENDIX V: PRESSURE SURVEY

Santos

PRESSURE SURVEY

WELL: Seamer-1 RT: 63.7 metres Gauge Type : Quartz Page : 1 OF 2
WITNESS: R Subramanian Time since last circ : 18.5 hrs Probe/Packer Type : Standard Date : 26-27/12/02

	FORMATION	DEPTH MDRT m	DEPTH TVDRT m	DEPTH SUBSEA m	EXPECT FORM PRESS PSIA	EXPECT TEMP deg F	FILE NO	TEST RESULTS HYDRO BEFORE PSIA	FORM PRESS PSIA	HYDRO AFTER PSIA	TEMP deg F	D/D MOB MD/CP	INTERPRETATION TYPE D/D	TYPE BUILD UP	DEPL S/C	COMMENTS FLUID TYPE
CORRELATION PASS																
1	**Nullawarre**	996.00	980.40	916.70			3	1600.30	1362.80	1600.60	112.5	317.7	N	Rapid		Good Test
2	**Nullawarre**	997.00	981.40	917.70			4	1602.30	1363.70	1602.70	113.4	84.5	N	Rapid		Good Test
3	**Nullawarre**	998.25	982.60	918.90			5	1604.90	1372.20	1604.90	114.4	165.0	N	Rapid		Good Test
4	**Nullawarre**	1002.25	986.30	922.60			6	1611.20	493.10	1611.00	114.5	-	N	Slow		Curtailed
5	**Nullawarre**	1012.75	996.20	932.50			7	1627.30	1384.50	1627.40	114.8	288.2	N	Rapid		Good Test
6	**Nullawarre**	1034.25	1016.70	953.00			8	1660.70	-	1660.70	115.3	-	-	-		No Seal
7	**Nullawarre**	1035.00	1017.40	953.70			9	1662.10	-	1662.10	115.6	-	-	-		Reset; No Seal
8	**Nullawarre**	1033.00	1016.00	952.30			10	1659.10	-	1658.80	116.2	-	-	-		Reset; Lost Seal
9	**Nullawarre**	1050.50	1031.90	968.20			11	1686.20	1437.60	1686.00	116.1	9.90	N	Good		Good Test
10	**Nullawarre**	1075.00	1055.10	991.40			12	1724.10	1245.10	1724.00	116.4	-	N	Slow		Curtailed
CORRELATION PASS																
11	**Waarre**	1152.25	1128.50	1064.80			14	1844.70	1543.90	1845.10	119.6	9.70	N	Good		Good Test
12	**Waarre**	1158.50	1134.40	1070.70			15	1855.20	1545.30	1855.30	120.8	367.70	N	Rapid		Good Test
13	**Waarre**	1162.00	1137.80	1074.10			16	1861.00	1547.00	1861.00	121.3	148.30	N	Rapid		Good Test
14	**Waarre**	1166.00	1141.50	1077.80			17	1867.30	1627.20	1867.20	121.7	64.50	N	Good		Good Test
15	**Waarre**	1170.50	1146.80	1083.10			18	1873.40	1546.20	1873.60	122.0	77.10	N	Rapid		Good Test
16	**Waarre**	1176.00	1151.00	1087.30			19	1883.00	1550.80	1882.90	122.4	244.30	N	Rapid		Good Test
17	**Waarre**	1178.00	1152.90	1089.20			20	1886.20	1553.40	1886.20	122.8	358.85	N	Rapid		Good Test
18	**Waarre**	1186.50	1161.00	1097.30			21	1899.70	1566.10	1899.50	123.4	192.70	N	Rapid		Good Test
19	**Waarre**	1190.25	1165.50	1101.80			22	1905.50	1581.10	1905.50	123.6	140.50	N	Rapid		Good Test
20	**Waarre**	1213.50	1186.60	1122.90			23	1942.00	1600.70	1941.70	124.0	95.00	N	Rapid		Good Test
21	**Waarre**	1217.00	1189.90	1126.20			24	1947.60	1605.20	1947.70	124.4	62.10	N	Rapid		Good Test
22	**Waarre**	1223.00	1195.60	1131.90			25	1957.10	1612.90	1957.10	125.0	104.20	N	Rapid		Good Test
23	**Eumeralla**	1285.75	1255.00	1191.30			26	2055.90	-	2055.90	126.5	-	-	-		Lost Seal
24	**Eumeralla**	1286.50	1255.75	1192.05			27	2057.20	1915.30	2057.10	127.1	5.00	N	Good		Reset; Good Test

Expected Temp Gradient:

Expected Water Gradient: 0.43
Mud Weight : 9.15ppg

Normal Drawdown : Pressure does not drop to zero

Limited Drawdown : Pressure drops to zero
Build Up types: Immediate, Rapid, Good, Slow.

Santos

PRESSURE SURVEY

WELL: Seamer-1 RT: 63.7 metres Gauge Type : Quartz Page : 2 OF 2
WITNESS: R Subramanian Time since last circ : 18.5 hrs Probe/Packer Type : Standard Date : 26-27/12/02

	FORMATION	DEPTH MDRT m	DEPTH TVDRT m	DEPTH SUBSEA m	EXPECT FORM PRESS PSIA	EXPECT TEMP deg F	FILE NO	TEST RESULTS HYDRO BEFORE PSIA	FORM PRESS PSIA	HYDRO AFTER PSIA	TEMP deg F	D/D MOB MD/CP	INTERPRETATION TYPE D/D	TYPE BUILD UP	DEPL S/C	COMMENTS FLUID TYPE
	FLUID SAMPLES FROM FIRST FMT DESCENT - SAMPLES OPENED AT RIGSITE															
	CORRELATION PASS															
1	**Waarre**	1162.0	1137.8	1074.10			31	1862.50	1545.10	1860.50	125.10	125.20	N	Rapid		1300psi. 7cu.ft gas. CO2 = 3.25%. 1700 units 97/3/tr/tr %
	CORRELATION PASS															
2	**Nullawarre**	996.0	980.40	916.70			33	1600.80	1362.30	1600.30	116.40	N/A	N	Rapid		1200psi. 5cu.ft gas. CO2 = 1.8%. 1300 units 98/2/tr/tr %. 350ml filtrate/muddy water R=0.15 @ 64F. Hardness= 360, Cl= 30000, Pf/Mf 0.0/0.06. pH=8.0, KCl=4.4%
	CORRELATION PASS															
3	**Waarre**	1162.0	1137.8	1074.10			36	1857.10	1542.50	1858.50	120.80	140.30	N	Rapid		Some plugging observed affecting pressures & mobility.
	CORRELATION PASS															
4	**Nullawarre**	996.0	980.4	916.70			38	1602.40	1362.80	1600.00	117.30	2.10	N	Good		Some plugging observed affecting pressures & mobility.

TOTAL : 24 Pre-Tests : 18 Good Tests, 4 Lost/No Seals, 2 curtailed
Collected 4 samples. 2 opened at rigsite, 2 sent to lab for analysis.

*** Note: Above readings noted real-time. Software picks could vary slightly. Refer final log presentation.**

Expected Temp Gradient:

Expected Water Gradient: 0.43
Mud Weight : 9.15ppg

Normal Drawdown : Pressure does not drop to zero

Limited Drawdown : Pressure drops to zero
Build Up types: Immediate, Rapid, Good, Slow.

APPENDIX VI: DRILL STEM TEST DATA

No Drill Stem Tests were conducted in Seamer-1.

APPENDIX VII: HYDROCARBON ANALYSIS

Four samples were collected during the FMT-GR logging run. Of these two were opened at the rigsite and two were sent to AMDEL Laboratories in Adelaide for analysis.

Field Results are displayed overleaf.

FIELD ANALYSIS OF FMT SAMPLES

	Sample 1	Sample 2
Formation	Nullawarre Greensand	Waarre Sandstone
Sample Depth (m)	996	1162
Chamber Pressure (psi)	1200	1300
Gas Volume (cubic feet)	5.0	7.0
CO2 (%)	1.8	3.25
Total Gas (units)	1300	1700
Gas Composition (%)	98 / 2 / trace / trace	97 / 3 / trace / trace
Liquid Volume (ml)	350	0
Liquid Resistivity (ohms)	0.15 @ 64°F	-
Liquid Hardness (mg/l)	360	-
Liquid Chlorides (mg/l)	30,000	-
Liquid pf/mf	0.0 / 0.06	-
Liquid pH	8.0	-
KCl (%)	4.4	-

20 January 2003

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A subsidiary of The Gribbles Group

Santos Limited
GPO Box 2319
ADELAIDE SA 5000
Australia

Attention: Andy Pietsch

Project **03PEAD00442**

Customer Sample ID	SEAMER-1
Well ID	Nullawarre FMT sample 996m
Sample Type	Gas
Date Sampled	16/01/2003
Time Sampled	1500 h

GAS ANALYSIS

Test/Reference	Unit	
Gas Analysis ASTM D 1945-96 (modified)		
Nitrogen*	Mol %	2.63
Carbon Dioxide*	Mol %	4.09
Methane*	Mol %	90.35
Ethane*	Mol %	2.26
Propane*	Mol %	0.29
I-Butane*	Mol %	0.18
N-Butane*	Mol %	0.07
I-Pentane*	Mol %	0.03
N-Pentane*	Mol %	0.02
Hexanes*	Mol %	0.03
Heptanes*	Mol %	0.02
Octanes and higher hydrocarbons	Mol %	0.03
Total*	Mol %	100
Gas Parameters ASTM D 1945-96 (modified)		
Average Molecular Weight		18.11
Lower Flammability Limit		5.19
Upper Flammability Limit		15.94
Ratio Of Upper To Lower		3.07
Wobbe Index		46.03
Compressibility Factor		0.9979
Ideal Gas Density (Rel to Air = 1)		0.625
Real Gas Density (Rel to Air = 1)		0.626
Ideal Nett Calorific Value	MJ/m^3	32.81
Ideal Gross Calorific Value	MJ/m^3	36.40
Real Nett Calorific Value	MJ/m^3	32.88
Real Gross Calorific Value	MJ/m^3	36.47
Gross Calorific Val Water-Sat Gas	MJ/m^3	35.75

Gas Parameters The above results are calculated on an air and water free basis assuming only the measured constituents are present. The following parameters are calculated from the above composition at 15°C and 101.325 kPa (abs) using ISO 6976 and the physical constants from the GPSA SI Engineering Data Handbook 11 th Ed.

Amdel Ltd 35-37 Stirling Street Thebarton SA Australia 5031
30 008 127 802 Telephone: +61 8 8416 5200 Facsimile: +61 8 8234 2933

Authorised By: Michelle Fordham
Petroleum Chemist

Signature:

Final Report

- Indicates Not Requested ** Indicates NATA Accredited Test*

Samples will be discarded after 30 days unless otherwise notified.

The samples were not collected by Amdel staff.

Amdel Ltd 35-37 Stirling Street Thebarton SA Australia 5031
30 008 127 802 Telephone: +61 8 8416 5200 Facsimile: +61 8 8234 2933

APPENDIX VIII: WATER ANALYSIS

No Water Analysis was conducted on Seamer-1.

However mud filtrate recovered from the FMT chamber
was analysed and the results are attached overleaf.

10 January 2003

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Santos Limited
GPO Box 2319
ADELAIDE SA 5000
Australia

Attention: Mike Giulliano

Project Name	**03PEAD00125**
Collected by	client
Client Ref:	539489-606596

Customer Sample ID	SEAMER-1
Description	FMT sample
Date Received	07/01/2003
Sample Type	mud filtrate

ANIONS

Test/Reference	Unit	
APHA 20th ed		
Hydroxide as OH	mg/L	<1
Carbonate as CO3	mg/L	<1
Bicarbonate as HCO3	mg/L	1199
Total Alkalinity (calc as CaCO3)	mg/L	983
Chloride as Cl	mg/L	24612
Nitrate as NO3	mg/L	<1
Sulphate as SO4	mg/L	708
Total Anions	mg/L	26519
Hydroxide as OH	meq/L	<0.01
Carbonate as CO3	meq/L	<0.01
Bicarbonate as HCO3	meq/L	20
Chloride as Cl	meq/L	693.30
Nitrate as NO3	meq/L	<0.01
Sulphate as SO4	meq/L	14.74
Total Anions	meq/L	727.70

CATIONS

Test/Reference	Unit	
APHA 20th ed		
Potassium as K	mg/L	26500
Sodium as Na	mg/L	2515
Barium as Ba	mg/L	<1
Calcium as Ca	mg/L	324
Iron as Fe	mg/L	1
Magnesium as Mg	mg/L	174
Strontium as Sr	mg/L	12
Aluminium as Al	mg/L	3
Total Cations	mg/L	29526
Potassium as K	meq/L	677.75
Sodium as Na	meq/L	109.40
Barium as Ba	meq/L	<0.01
Calcium as Ca	meq/L	16.17
Iron as Fe	meq/L	0.05
Magnesium as Mg	meq/L	14.32
Strontium as Sr	meq/L	0.27
Aluminium as Al	meq/L	0.11
Total Cations	meq/L	817.96

Amdel Ltd 35-37 Stirling Street Thebarton SA Australia 5031
30 008 127 802 Telephone: +61 8 8416 5200 Facsimile: +61 8 8234 2933

Customer Sample ID	SEAMER-1
Description	FMT sample
Date Received	07/01/2003
Sample Type	mud filtrate

DERIVED PARAMETERS

Test/Reference	Unit	
APHA 20th ed		
Calculated Total Dissolved Solids	mg/L	47744
Ion balance (Diff * 100/Sum)	%	5.84
Acceptance Criteria	%	5
Satisfactory		No
APHA 20th Ed		
Total Cations + Anions	mg/L	56045
APHA 20th ed		
Hardness (calc as CaCO3)	mg/L	1526

PROPERTIES:

Test/Reference	Unit	
APHA 20th Ed		
Electrical Conductivity @ 25°C	µS/cm	74600
Resistivity @ 25°C	M.Ohm	0.13
pH		7.3

ION_BAL01 If the ion balance in this sample is unsatisfactory it is most likely due to a component or components of the sample that is not within the scope of this analysis.

Authorised By: Rebecca Navarro
Laboratory Assistant

Signature:

Final Report

- Indicates Not Requested ** Indicates NATA Accredited Test*

Samples will be discarded after 30 days unless otherwise notified.

The samples were not collected by Amdel staff.

Amdel Ltd 35-37 Stirling Street Thebarton SA Australia 5031
30 008 127 802 Telephone: +61 8 8416 5200 Facsimile: +61 8 8234 2933

APPENDIX IX: PALYNOLOGICAL ANALYSIS

No Palynological Analysis was undertaken on Seamer-1.

APPENDIX X: GEOTHERMAL GRADIENT

A Static Bottom Hole Temperature of 56.3°C at 1360m is calculated. This gives a geothermal gradient of 2.6°C/100m. An ambient temperature of 21ºC was employed.

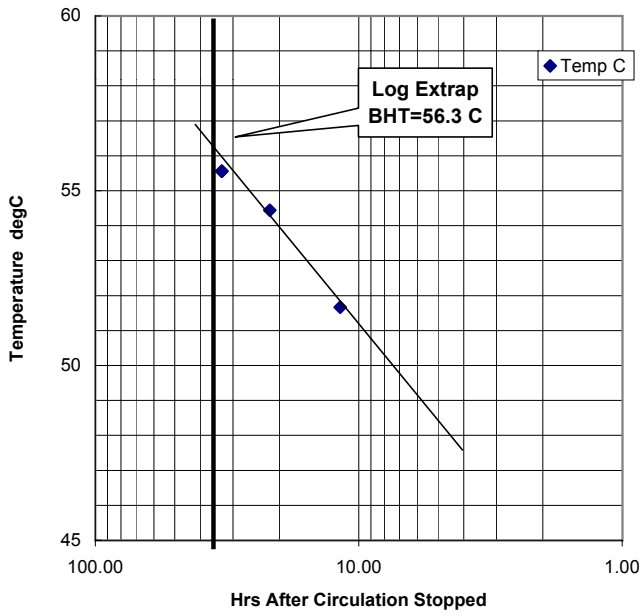
Data used for the calculations is as follows:-

125ºC after 11.75 hours from Run 2, Suite 1.
130ºC after 21.75 hours from Run 2, Suite 1.
132ºC after 33.10 hours from Run 3, Suite 1.

Well Name: Seamer-1

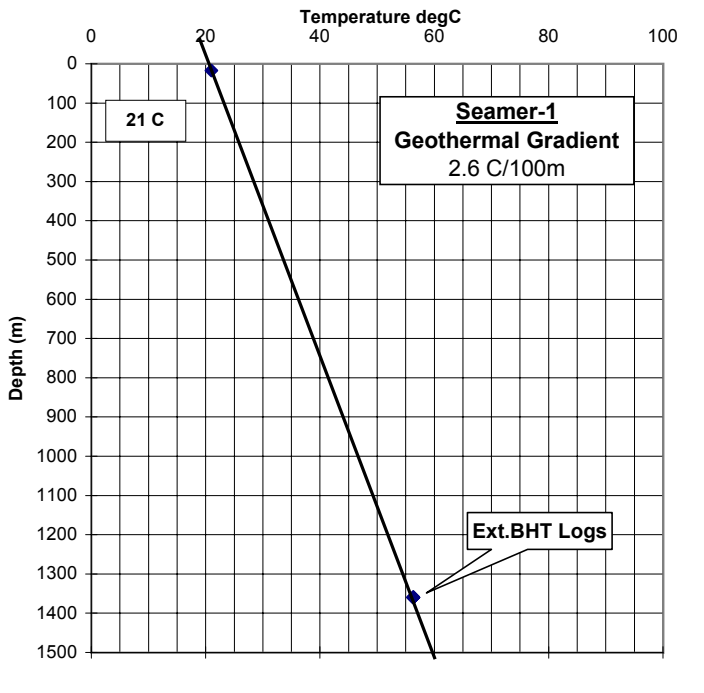
Santos

Extrapolation to Determine Static BHT



Geothermal Gradient

Santos



APPENDIX XI: WELL LOCATION SURVEY

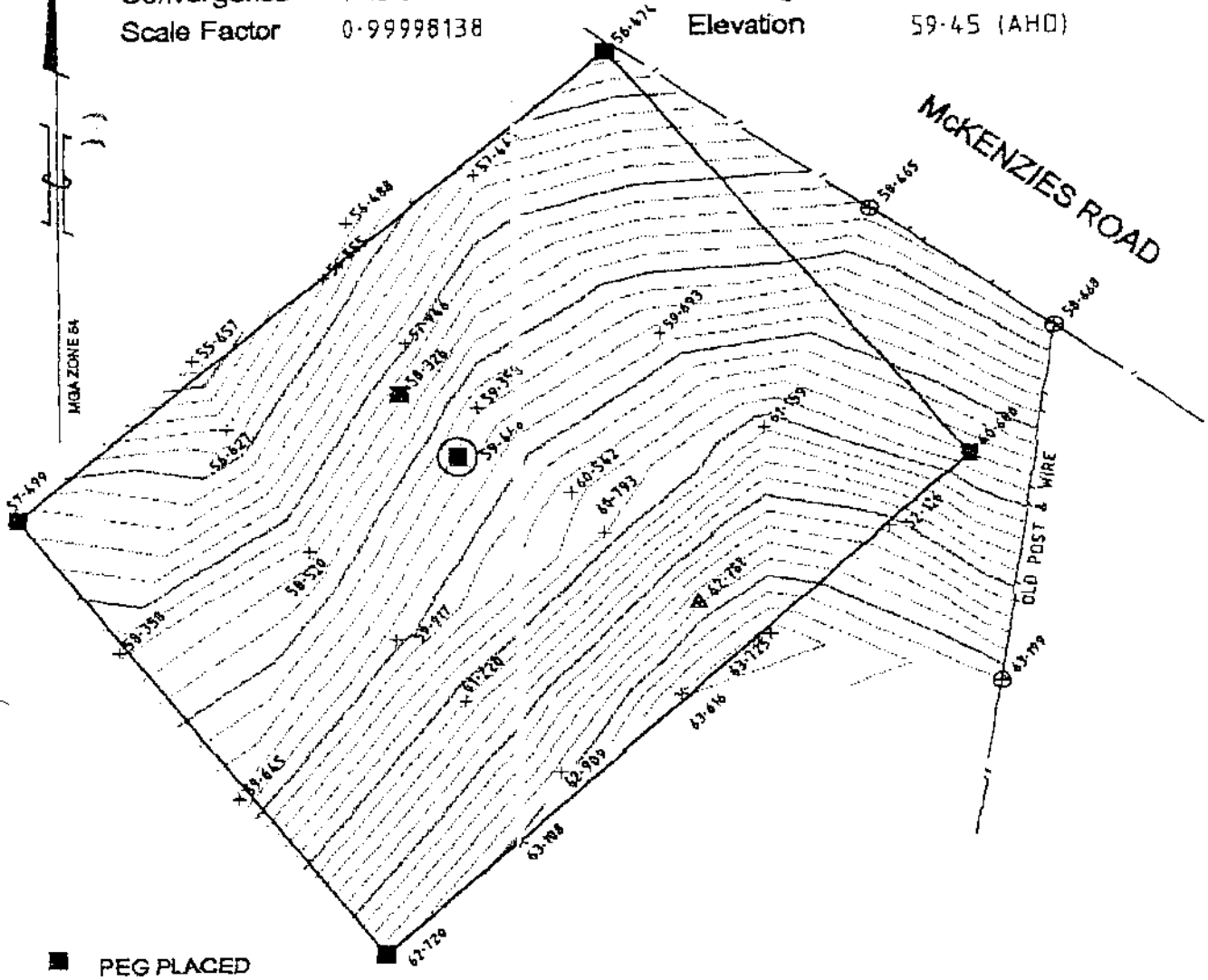
VICTORIA

PROPOSED GAS WELL LOCATION

SKETCH PLAN

EXPLORATION LICENCE PEP 153

Well Name	SEAMER # 1		
Map			
Spheroid	GDA94	MGA 94	ZONE 54
Latitude	S 38°33'24·29"	Measurement units	(metres)
Longitude	E 143°01'15·69"	Easting	676 098·94
Convergence	1°15'33"	Northing	5 730 473·50
Scale Factor	0·99998138	Elevation	59·45 (AHD)



■ PEG PLACED

◉ PEG PLACED AT PROPOSED WELL SITE

BEARING OF AXIS BETWEEN CENTRE PEGS 319°

VOLUME OF PROPOSED CUT 12,300 m^3

VOLUME OF PROPOSED FILL 1,900 m^3

PROPOSED LEVEL OF CUT SURFACE 58.3 m

8 0 8 16 24 32

LENGTHS ARE IN METRES

Date of Survey : 5 / 11 / 2002

Paul Crowe Surveyor
ABN 69621601183
"Ambleside" 192 Koroit Street
Warrnambool 3280
Ph. (03) 5561 1500

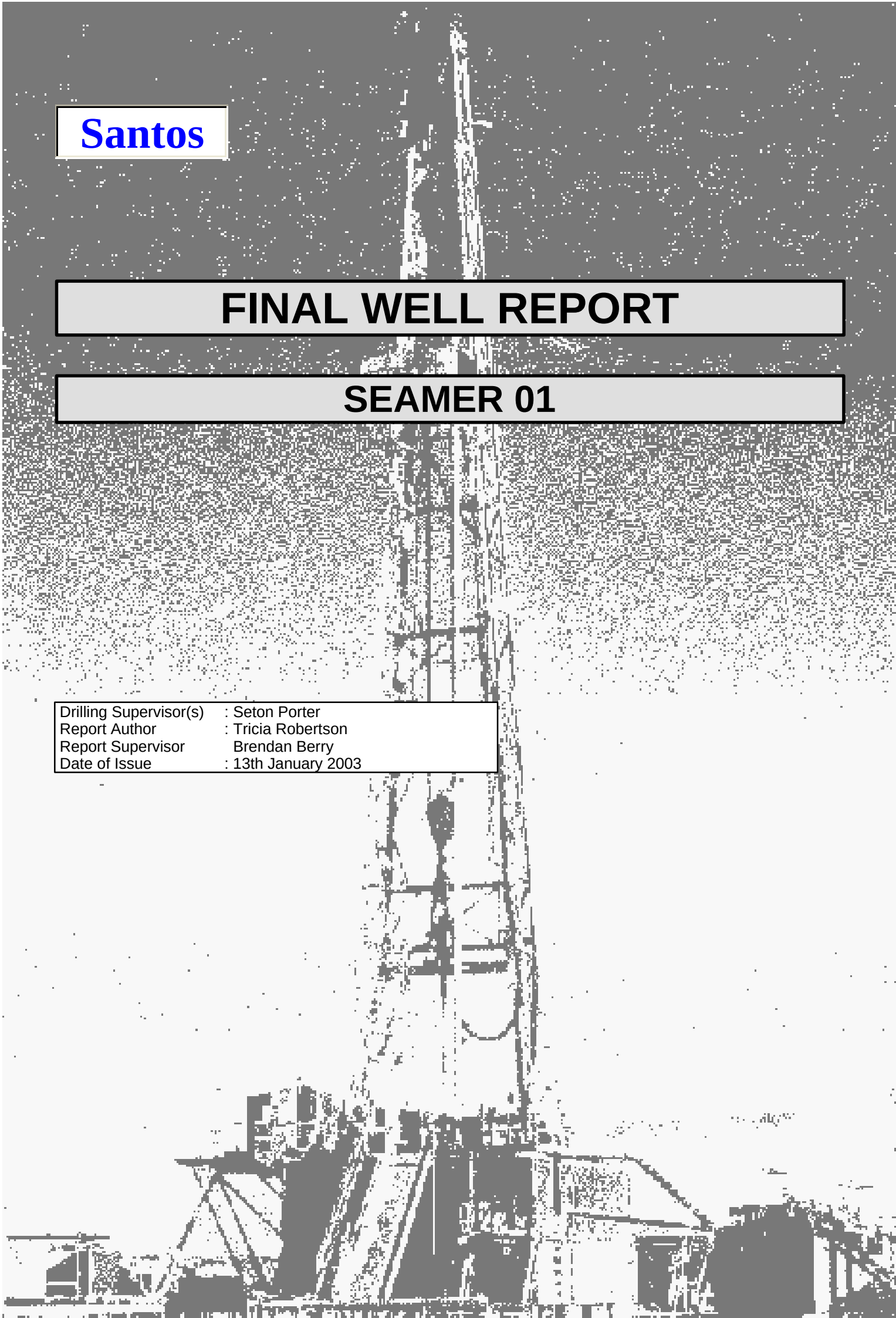
REF 1151

APPENDIX XII: DRILLING - FINAL WELL REPORT

Santos

FINAL WELL REPORT

SEAMER 01



Drilling Supervisor(s)	: Seton Porter
Report Author	: Tricia Robertson
Report Supervisor	Brendan Berry
Date of Issue	: 13th January 2003

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Section 1 – Well Summary.....
Time vs Depth Curve.....

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Wellhead Installation Report/Plug and Abandonment Report.....

Section 5 – Survey Data.....
Survey Report .....

Section 1 – Well Summary

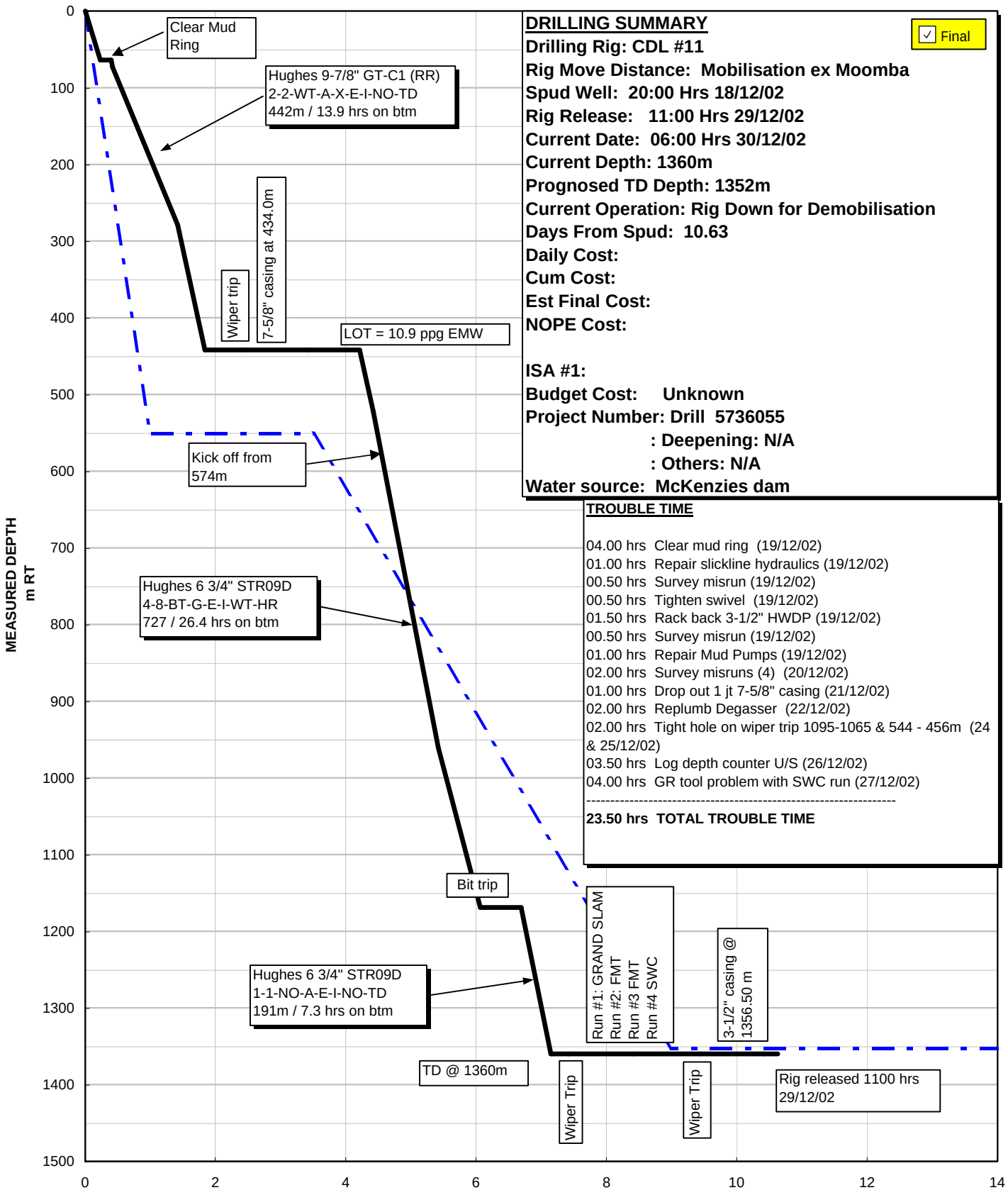
Time vs Depth Curve

SEAMER 1
TIME v DEPTH CURVE

Seamer 1
NOPE

Seamer 1
Actual

DAYS FROM SPUD



DRILLING SUMMARY

☑ Final

Drilling Rig: CDL #11
Rig Move Distance: Mobilisation ex Moomba
Spud Well: 20:00 Hrs 18/12/02
Rig Release: 11:00 Hrs 29/12/02
Current Date: 06:00 Hrs 30/12/02
Current Depth: 1360m
Prognosed TD Depth: 1352m
Current Operation: Rig Down for Demobilisation
Days From Spud: 10.63
Daily Cost:
Cum Cost:
Est Final Cost:
NOPE Cost:

ISA #1:
Budget Cost: Unknown
Project Number: Drill 5736055
: Deepening: N/A
: Others: N/A
Water source: McKenzies dam

TROUBLE TIME

04.00 hrs Clear mud ring (19/12/02)
01.00 hrs Repair slickline hydraulics (19/12/02)
00.50 hrs Survey misrun (19/12/02)
00.50 hrs Tighten swivel (19/12/02)
01.50 hrs Rack back 3-1/2" HWDP (19/12/02)
00.50 hrs Survey misrun (19/12/02)
01.00 hrs Repair Mud Pumps (19/12/02)
02.00 hrs Survey misruns (4) (20/12/02)
01.00 hrs Drop out 1 jt 7-5/8" casing (21/12/02)
02.00 hrs Replumb Degasser (22/12/02)
02.00 hrs Tight hole on wiper trip 1095-1065 & 544 - 456m (24 & 25/12/02)
03.50 hrs Log depth counter U/S (26/12/02)
04.00 hrs GR tool problem with SWC run (27/12/02)

23.50 hrs TOTAL TROUBLE TIME

Section 2 – Well History

Well History Report

SEAMER 01

Drilling Co.: Century **Rig:** Century #11

RT above GL: 5 m	Lat : 38 deg 33 min 24.62 sec	Spud Date: 18/12/2002	Release Date: 29/12/2002
GL above MSL : 58 m	Long : 143 deg 1 min 15.95 sec	Spud Time: 20:00:00	Release Time: 11:00:00

Well History

#	DATE	DEPTH	WELL HISTORY (24 Hr Summary)
1	09/12/2002	0	Rigging up & repairs to CDL 11
2	10/12/2002	0	Rigging up & repairs
3	11/12/2002	0	Rigging up & repairs
4	12/12/2002	0	Rigging up & repairs
5	13/12/2002	0	Rigging up & repairs
6	14/12/2002	0	Ice breaker course in Port Campbell
7	15/12/2002	0	Rigging up & repairs
8	16/12/2002	0	Rigging up & repairs
9	17/12/2002	0	Rigging up
10	18/12/2002	44	Drill & set Rat & Mouse holes. Prepare to spud, wrong size RKB Rollers. Repairs & prepare BOP's etc while waiting on new rollers from Brisbane. Spud in at 2000 hrs & drill to 44m, survey.
11	19/12/2002	198	Drill 9-7/8" hole from 44 to 198m. Trouble with mud rings, and some rig components
12	20/12/2002	442	Drill 9-7/8" hole to 442m, surface casing depth. Condition hole & hoist to run casing
13	21/12/2002	442	Run & cement 7-5/8" casing at 434m. NU BOP's
14	22/12/2002	442	Nipple up & test BOPE. Make up Anadrill Steerable BHA & run in hole to drill out
15	23/12/2002	884	Drill out shoe track & run L.O.T to 10.9 ppg, EMW. Drill ahead in 6-3/4" hole, begin kick-off at 574m, building angle.
16	24/12/2002	1,169	Drill 6-3/4" hole from 884 to 1169m. Trip for new bit
17	25/12/2002	1,360	Trip for new bit, change out MWD tool & NMDC, run in & drill to Total Depth
18	26/12/2002	1,360	Circulate & condition hole & hoist. Lay out directional tools. Run logs with Baker Atlas
19	27/12/2002	1,360	Run logs with Baker Atlas. Run in & begin laying out pipe
20	28/12/2002	1,360	Lay down pipe. Run & cement 3-1/2" casing at 1356m. Wait on cement & nipple down BOP's
21	29/12/2002	1,360	Set Slip & Seal Assembly. Nipple down & lay out BOP's. Nipple up & test Xmas Tree. Release rig

Section 3 – Drilling Data

Bit Record

FIT/LOT Report

SEAMER 01

Drilling Co.: Century

Rig : Century #11

RT above GL : 5 mtrs
GL above MSL : 58 mtrs

Lat : 38 deg 33 min 24.62 sec
Long : 143 deg 1 min 15.95 sec

Spud Date: 18/12/2002
Spud Time: 20:00:00

Release Date: 29/12/2002
Release Time: 11:00:00

BIT RECORD

DATE	BIT#	SIZE "	IADC	SER	MFR	TYPE	JETS	D.IN mtrs	D.OUT mtrs	MTRG	HRS o/b	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
20/12/2002	1	9.88	116	A39JW	HUGHES	GTC1	3x18	0	442	442	13.9	681	502	9.5	100	8.8	0.746	66	1.39	31.8	2	2	WT	A	E	I	NO	TD
25/12/2002	2	6.75	437	D88YU	HUGHES	STR09D	3x13	442	1,169	727	26.4	1478	251	12.0	74	9.1	0.389	0	0.00	27.5	4	8	BT	G	E	2	WT	HR
26/12/2002	3	6.75	437	X75JG	HUGHES	STR09D	3x12	1,169	1,360	191	7.3	1759	252	15.1	216	9.2	0.331	74	1.96	26.2	1	1	NO	A	E	I	NO	TD

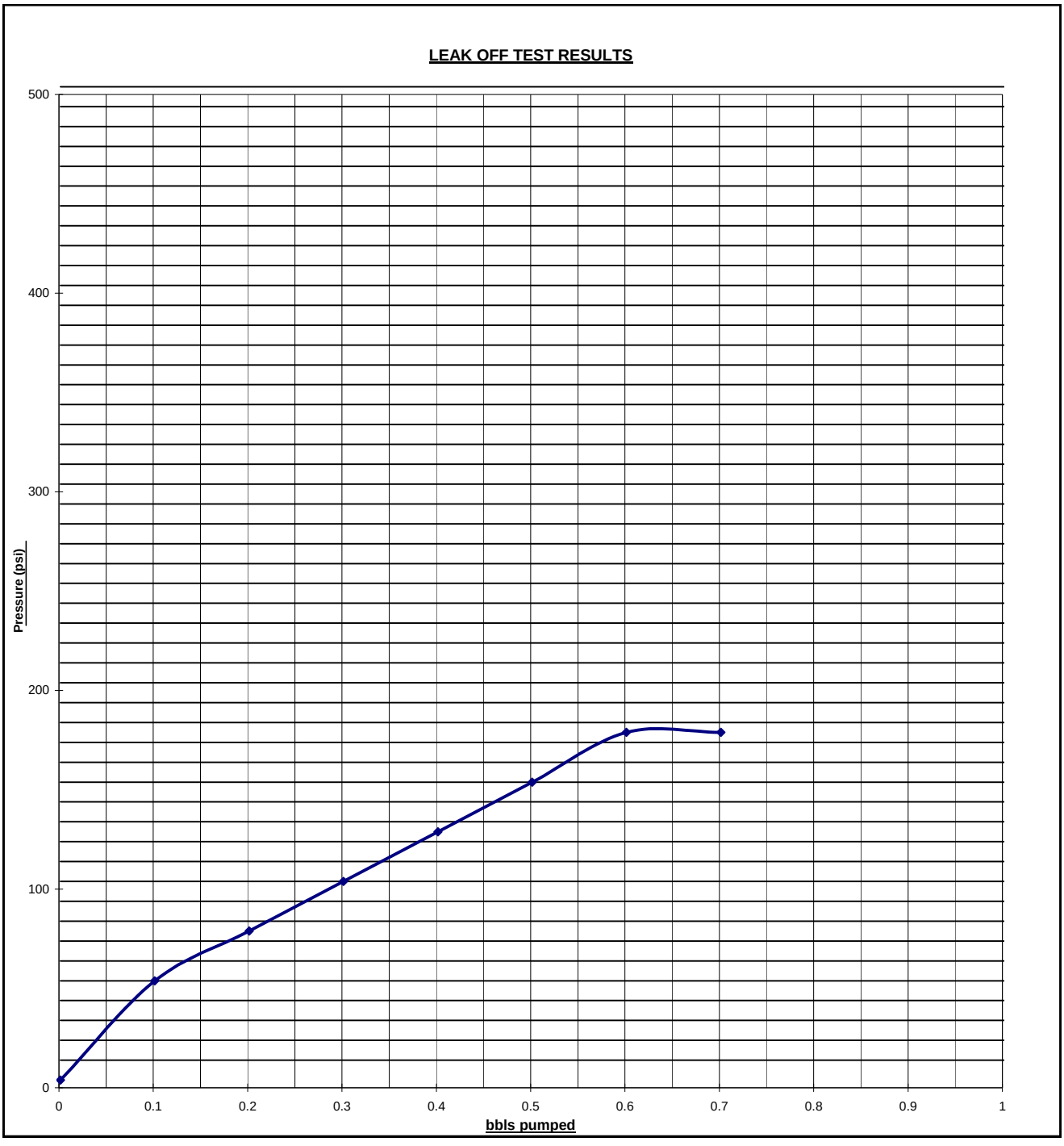
Santos	DRILLING SERVICES LEAK OFF TEST RESULTS	DQMS F- 214

WELL: **Seamer 1** **RIG:** **Century Resources - 11** **23-Dec-02**

CASING SIZE: **9-5/8"** SANTOS SUPERVISOR: **Seton Porter**

A. MUD DENSITY IN USE:	**8.50**	ppg
B. HOLE DEPTH:	**442**	m
C. SHOE DEPTH:	**434**	m
D. LEAK-OFF PRESSURE (GRAPH):	**175**	Psi
E. EQUIVALENT DENSITY:		
$\frac{\text{LEAK-OFF PRES. (D) (psi}}{\text{SHOE DEPTH (C) (ft) x 0.05}}$ + MUD DENSITY IN USE (A) (ppg)	**10.9**	**(ppg) (EMW)**
F. MAXIMUM PRESSURE RECORDED:	**175**	psi
G. VOLUME PUMPED:	**0.7**	bbls
H. VOLUME REGAINED:	**0.5**	bbls

bbls	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7										
Psi	0	50	75	100	125	150	175	175										



Section 4 – Casing and Cementing

Casing and Cementing Report/s

Wellhead Installation Report/Plug and Abandonment Report

Santos — SANTOS CASING AND CEMENTING REPORT — DQMS F-220

WELL:	**Seamer 1**	**DATE:**	21-Dec-02
ELEVATIONS:	**RT:** 63.71 m	**T.D:**	442 m
	GL: 58.51.0 m	**PBTD:**	426 m
CASING BOWL SIZE:	11" 5K x 7-5/8" API BTC WG-22-L	**SERIES:**	5000
STRING TYPE:	Surface		

CASING AND EQUIPMENT RECORD AS RUN FROM BOTTOM TO TOP

SIZE OD.	WEIGHT lb/ft	GRADE	No. of JOINTS	THREAD	LENGTH	FROM	TO	REMARKS
7-5/8"	---	L-80	---	BTC	0.37	433.63	434.00	Float Shoe
7-5/8"	26.4	L-80	1	BTC	11.58	422.05	433.63	
7-5/8"	---	L-80	---	BTC	0.31	421.74	422.05	Float Collar
7-5/8"	26.4	L-80	36	BTC	416.96	4.78	421.74	
7-5/8"	26.4	L-80	---	BTC	5.70	-0.92	4.78	Landing Joint
							-0.92	Stick up
		TOTAL JOINTS	37					
				TALLY TOTAL	434.92			

CASING LANDED AT : **434.00 m**

RT TO TOP OF BRADEN HEAD : **4.54 m**

CENTRALIZERS LOCATED AT - RT.

431	375
410	352
398	16

PREFLUSH Dam Water

Volume: 20 **Density:** 8.4 **Additives:** Water only

LEAD CEMENT

						Additives	%	Amount Used
Brand:	ABC	**Class:**	G	**No. sx:**	150	Bentonite	2	585 lbs
Mixwater:	55.4 bbls	**Slurry Vol:**	68 bbls	**Density:**	11.8 ppg			
Gals/Sack	15.5	**Yield:**	2.56 cu.ft/sack					

TAIL CEMENT

						Additives	%	Amount Used
Brand:	ABC	**Class:**	G	**No. sx:**	102	Nil		
Mixwater:	12.6 bbls	**Slurry Vol:**	21.4 bbls	**Density:**	15.6 ppg			
Gals/Sack	5.18	**Yield:**	1.18 cu.ft/sack					

DISPLACEMENT

Fluid:	Water	**Calc. Displacement:**	66 bbls	**Plug Bump:**	Yes
Density:	8.4	**Actual Displacement:**	67 bbls	**Bleed Back:**	0.5 bbls

TIME:-

STARTED IN HOLE:	04:30 Hr.
FINISHED RUNNING CASING:	07:40 Hr.
START CIRCULATING:	08:25 Hr.
STOP CIRCULATING:	10:25 Hr.
START CEMENTING:	10:50 Hr.
FINISH CEMENTING:	11:25 Hr.
START DISPLACEMENT:	11:27 Hr.
FINISH DISPLACEMENT:	11:40 Hr.

CASING RECIPROCATED DURING

CIRCULATING:	Yes
CEMENTING:	Yes
DISPLACING:	Yes

WIPER PLUGS

TOP:	Yes
BOTTOM:	Yes

CEMENT JOB DETAILS / REMARKS:-

Drilling Supervisor: Seton Porter

Casing ran to bottom OK. Circulated, pumped water pre-flush & pressure tested lines to 2500 psi. Mixed & pumped cement, displaced with Halliburton. Did not get any cement returns, nor water pre-flush. Bumped plug to 2000 psi, floats held.
Ran a 95 sack Top-up job. Did not get mud returns for first 10 bbls pumped. Left cement in conductor for over an hour, but it still slumped back to 4 metres below the cellar. Topped up with cement by hand.
The landing joint is 1.5 metres too short. It was set the minimum height above the RT of 1m, to get the slips in/out, with the plug container removed. This put the Bradenhead 70cm above GL.

RT - top of Bradenhead = 4.54m

Santos — SANTOS CASING AND CEMENTING REPORT — DQMS F-220

WELL: Seamer 1 **DATE:** 28-Dec-02

ELEVATIONS: **RT:** 63.71 m **T.D:** 1360 M
GL: 58.51.0 m **PBTD:** 1343 M

TUBING SPOOL SIZE: 11 5K x 7-1/16" 5K **SERIES:** 5000
STRING TYPE: 3 1/2" Production Casing

CASING AND EQUIPMENT RECORD AS RUN FROM BOTTOM TO SURFACE

SIZE OD.	WEIGHT lb/ft	GRADE	No. of JOINTS	THREAD	LENGTH	TO	FROM	REMARKS
3-1/2"	---	---	---	Fox	0.36	1356.14	1356.50	Float Shoe
3-1/2"	9.2	K-55	1	Fox	12.38	1343.76	1356.14	
3-1/2"	…	---	---	Fox	0.32	1343.44	1343.76	Float Collar
3-1/2"	9.2	K-55	1	Fox	12.38	1331.06	1343.44	
3-1/2"	9.2	K-55	1	Fox	3.07	1327.99	1331.06	Marker Joint
3-1/2"	9.2	K-55	4	Fox	49.50	1278.49	1327.99	
3-1/2"	9.2	13Cr110	11	Fox	136.10	1142.39	1278.49	
3-1/2"	9.2	13Cr110	1	Fox	3.14	1139.25	1142.39	Marker Joint
3-1/2"	9.2	13Cr110	13	Fox	160.03	979.22	1139.25	
3-1/2"	9.2	13Cr110	1	Fox	3.04	976.18	979.22	Marker Joint
3-1/2"	9.2	13Cr110	79	Fox	977.09	-0.91	976.18	
							-0.91	Stick up
		TOTAL JOINTS	112					
				TALLY TOTAL	**1357.41**			

CASING LANDED AT: **1356.50 m**
RT - Bradenhead: **4.54 m**
R.T - Top of Xmas Cap: **2.90 m**

CENTRALISERS LOCATED TO - RT.

1353	1266	1167	1077	979
1327	1241	1142	1052	951
1315	1216	1126	1028	432
1290	1191	1102	1003	407

PREFLUSH

Volume: 30 bbls water, SAPP **Additives:** 200 kgs SAPP

LEAD CEMENT

Brand: ABC **Class:** G **No. sx:** 192
Mix water McKenzies Dam **Slurry Vol:** 89.9 bbls **Density:** 11.8
Gals/Sack 15.84 **Mix Water:** 72.0 bbls **Yield:** 2.63 cu.ft/sack
Cement top = 284 m **10% excess on caliper**

Additives	%	Amount Used	
Bentonite, BWOW	4	1148	lbs
Halad 344, BWOW	0.37	106	lbs

TAIL CEMENT

Brand: ABC **Class:** G **No. sx:** 290
Mix water McKenzies Dam **Slurry Vol:** 59.9 bbls **Density:** 15.6
Gals/Sack 4.94 **Mix Water:** 34.1 bbls **Yield:** 1.16 cu.ft/sack
Top of Tail = 936 m **10% excess on caliper**

Additives	%	Amount Used	
Halad 413, BWOW	1.14	176	lbs
Halad 344, BWOW	0.92	142	lbs
CFR-3. BWOW	0.69	106	lbs

DISPLACEMENT

Fluid: 2% KCL Brine **Calc. Displacement:** 38.4 bbls **Plug Bump:** 2000 psi
Density: 8.8 ppg **Actual Displacement:** 39.0 bbls **Bleed Back:** 0.5 bbls

TIME:

STARTED IN HOLE:	09:10 Hr.
FINISHED RUNNING CASING:	17:35 Hr.
START CIRCULATING:	18:05 Hr.
STOP CIRCULATING:	18:40 Hr.
START CEMENTING:	19:10 Hr.
FINISH CEMENTING:	19:50 Hr.
START DISPLACEMENT:	19:55 Hr.
FINISH DISPLACEMENT:	20:25 Hr.

CASING RECIPROCATED DURING

CEMENTING:	Yes	Casing Wt circulating:	44 klbs
DISPLACING:	Yes, for only 10 bbls	After pumping cement:	32 klbs
	then it got tight	After displacement:	30 klbs

WIPER PLUGS

TOP: Yes, preceded by a ball
BOTTOM: Yes

CEMENT JOB DETAILS / REMARKS:- Drilling Supervisor: Seton Porter

Casing went to bottom OK. Circulated hole clean & pumped Idcide treated mud. Pumped S.A.P.P Pre-Flush & 10 bbls of water. Pressure tested lines to 2500 psi & pumped further 10 bbls of water. Mixed & pumped Lead & Tail cement, some of the tail was a bit light, trouble with cement feed, bulker has too much air pressure. Displaced with 2% KCL brine, using Halliburton. Bumped the plug with 2000 psi, held for 10 minutes. Floats held OK. Getting SAPP pre-flush back at end of displacement.
Set Slip & Seal Assembly with 72 klbs net weight. String weight before cementing was 44 klbs, after, 30 klbs. Net weight, without blocks. Slip & Seal Assembly set with 42 klbs over string weight, 72 klbs, net

Nipple down BOP's & installed Adapter Flange & Xmas Tree. RT to top cap of Xmas Tree = 2.90 m

Santos

Wellhead Installation Report

DQMS F-130

Date 29/12/02

Seamer 1

Conventional 2 String Monobore

7-5/8" Surface Casing x 3-1/2" Tubing

Components

Xmas Tree Assembly No. 001004-17				Serial No. J380/3	
Description	**Manufacturer**	**Part No.**	**Size/Rating**	**Model**	**Serial No.**
Tree Cap	Wood Group	2233-3/R3	3-1/8"5K	Bowen Union	
Crown Valve	N/A				
Flow Cross	Wood Group	2255-3/R1	3-1/8"5Kx2-1/16"5K	Studded	J380/3
Kill/Vent Wing Valve	Wood Group	305025	2-1/16"5K	2200	J294/1
Companion Flange		306230	2-1/16"5Kx2"LP	Thru Bolt	
Production Wing Valve	Wood Group	305809	3-1/8"5K	2200	J334/4
Blind Flange		1140AU	3-1/8"5Kx2"LP	Thru Bolt	
Upper Master Valve	Wood Group	305809	3-1/8"5K	2200	J334/3
Lower Master Valve	Wood Group	308143	3-1/8"5K	2200	J261/4
Adaptor Flange	Wood Group	306308	11"5Kx3-1/8"5K	Single 'P' Seal	J301/3
Tubing Head					
Production Annulus Valve					
Companion Flange					
Casing Spool					
Intermediate Annulus Valve					
Companion Flange					
Casing Head	Wood Group	313513	11"5Kx7-5/8"BTC	WG-22-L	J324/2
Slip & Seal	Wood Group	318634	11"x3-1/2"	WG-22	
Surface Annulus Valve	Wood Group	305843	2-1/16"5K	2200	J393/1
Companion Flange	Wood Group	306230	2-1/16"5Kx2"LP	Thru Bolt	
Casing Swage	N/A				

BPV Prep :- 3" 'H' Type

General Comments :- **Tree Cap** - 1x1/2" Needle valve P/N 24-125 & 1x0-5000psi Gauge P/N 83-353-003-02

SAV - 1x1/2" Needle valve P/N 24-125 & 1x0-5000psi Gauge P/N 83-353-003-02

Section 5 – Survey Data

Survey Report

SEAMER 01

Drilling Co.: Century **Rig:** Century #11

RT above GL: 5 m Lat : 38 deg 33 min 24.62 sec Spud Date: 18/12/2002 Release Date: 29/12/2002
GL above MSL : 58 m Long : 143 deg 1 min 15.95 sec Spud Time: 20:00:00 Release Time: 11:00:00

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)
28	28	0.25	75	87	0.3	0	0	0	0
56	56	0.25	295	307	0.3	0	0	0	0
103	103	0.25	85	97	0.2	0	0	0	0
131	131	0.50	103	115	0.6	0	0	0	0
248	248	0.75	117	129	0.3	1	1	1	1
278	278	0.75	94	106	1.3	1	1	1	1
354	354	0.25	140	152	0.3	1	1	1	2
393	393	0.25	95	107	0.4	1	1	1	2
431	431	0.50	155	167	0.5	1	1	2	2
577	577	2.93	167	179	0.7	4	4	3	5
606	606	4.50	166	178	7.6	5	5	3	5
626	626	4.50	166	178	13.4	5	5	3	5
635	635	4.41	166	178	29.5	5	5	3	5
665	665	6.06	168	180	10.4	5	5	3	6
694	694	8.48	172	184	15.0	6	6	4	7
723	723	11.02	176	188	20.1	6	6	4	7
752	751	14.80	176	188	26.7	7	7	5	8
782	781	17.23	175	187	32.0	8	8	5	9
810	808	20.20	176	188	40.1	8	8	6	10
869	866	20.56	169	181	20.7	8	8	6	10
957	952	19.30	166	178	13.6	7	7	9	12
1,003	997	19.00	165	177	24.7	7	7	11	13
1,063	1,056	18.67	163	175	18.7	6	6	14	15
1,092	1,084	18.19	163	175	37.8	6	6	15	16
1,120	1,113	18.32	163	175	37.5	6	6	17	18
1,150	1,142	18.05	163	175	37.0	6	6	18	19
1,178	1,170	18.61	163	175	37.9	6	6	19	20
1,207	1,198	18.25	163	175	37.7	6	6	21	22
1,237	1,227	18.47	163	175	37.3	6	6	22	23
1,265	1,255	18.99	164	176	38.6	6	6	24	24
1,295	1,284	19.08	164	176	38.6	6	6	25	26
1,323	1,312	19.56	164	176	39.8	6	6	26	27
1,360	1,348	19.76	164	176	31.9	6	6	28	29

SEAMER 01

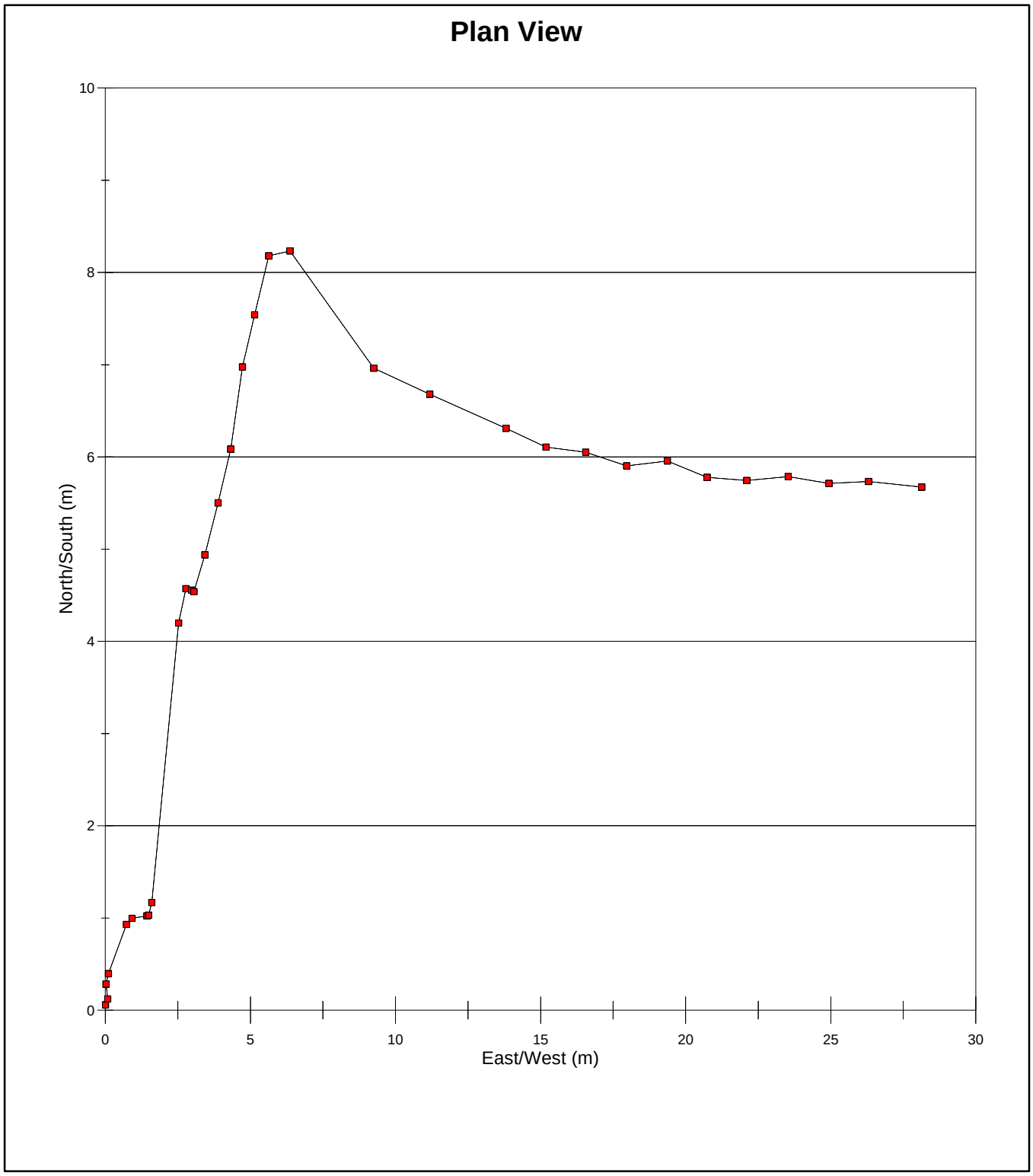
Drilling Co.: Century **Rig:** Century #11

RT above GL: 5 m Lat : 38 deg 33 min 24.62 sec Spud Date: 18/12/2002 Release Date: 29/12/2002
GL above MSL : 58 m Long : 143 deg 1 min 15.95 sec Spud Time: 20:00:00 Release Time: 11:00:00

Magnetic Declination (degs): 12.00

Projection:

DEVIATION SURVEY



SEAMER 01

Drilling Co.: Century **Rig:** Century #11

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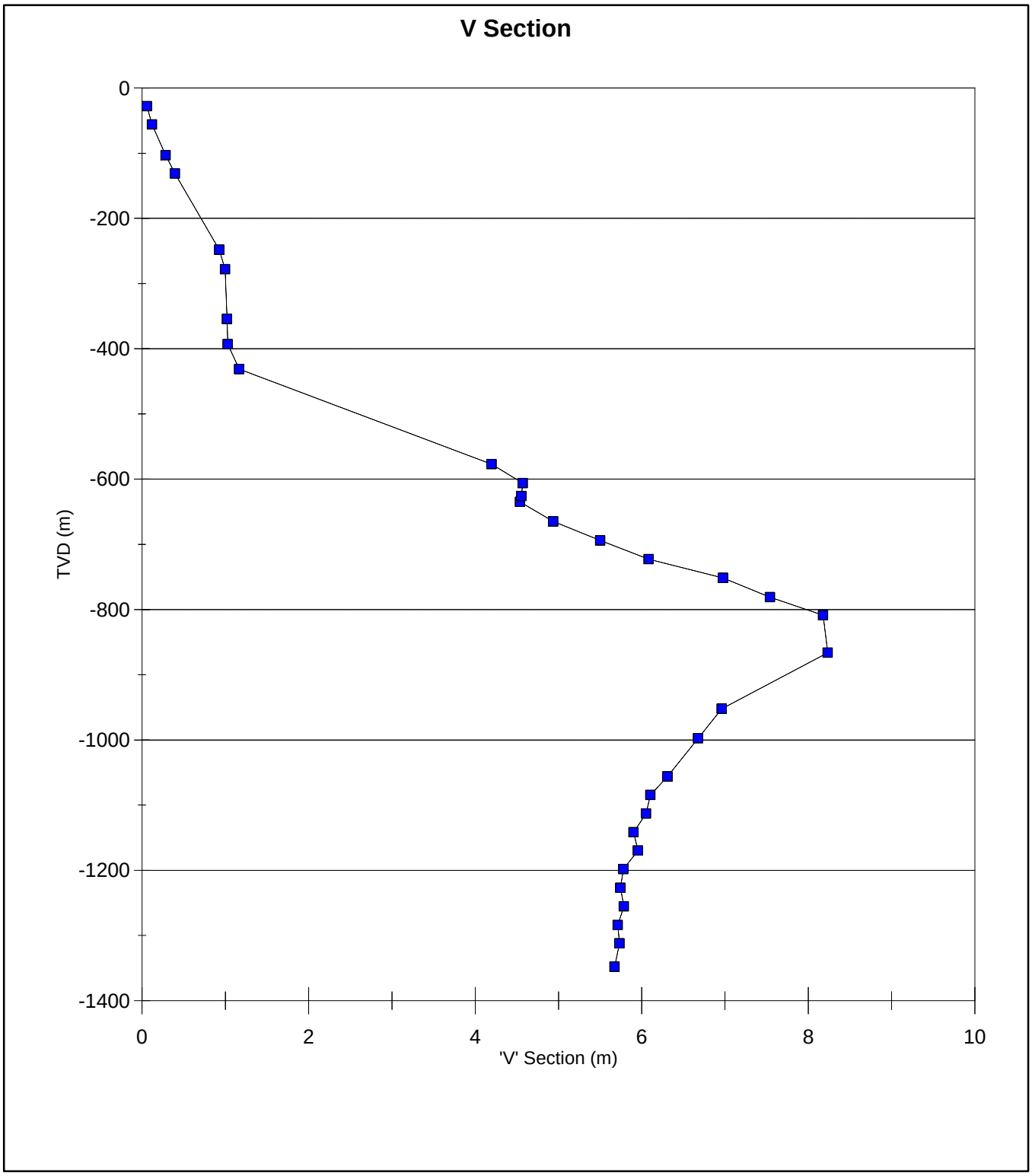
Projection:

DEVIATION SURVEY



APPENDIX XIII: RIG SPECIFICATIONS

RIG INVENTORY FOR RIG # 11

CARRIER:	Cooper LTO 750 Carrier with triple front and rear axles 54,000lb front and 70,000lb rear. All necessary highway equipment. Unit levelled with hydraulic jacks when stationary
SUBSTRUCTURE:	17' floor height – 14' below table beams with plates in base
DRAWWORKS:	Cooper 750 HP Double Drum Drawworks 3000 metres $^{9}/_{16}$" sandline
ENGINES:	Driven by 2 each Caterpillar 3406 TA Diesel Engines
BRAKE:	Parmac V80 Hydromatic
ROTARY TABLE:	National Rotary Table Model C-175
DERRICK:	Cooper Derrick Model 118-365. Ground height 118' Maximum rated static hook load 35,0000 lbs with 10 lines Mast raised, lowered and telescoped hydraulically
CROWN BLOCK:	Cooper Crown Block with 4 working sheaves. Fast line sheave and dead line sheave. All grooved for $1^{1}/_{8}$" line. Sandline sheave grooved for $^{9}/_{16}$" line. National Hook Block Model 435 G-175. 175 ton capacity 4 - 35" sheaves grooved for $1^{1}/_{8}$" line.
SWIVEL:	P-200 National
SLUSH PUMPS:	2 Gardner Denver PZ-7 Triplex Pumps driven by Cat 379TA Diesel Engines Rated 550 HP each. Liner sizes 5 $^{1}/_{2}$" and 6".
MUD SYSTEM:	2 × 300 bbl tanks incorporating 80 bbl pill tank and 54 bbl trip tank.
SHAKERS:	2x Triton NNF Screening Machine (Linear Motion).
DEGASSER:	Drilco Atmospheric Degasser Standard Pit. $7^{1}/_{2}$ HP 60 Hz, 230v.
MUD / GAS SEPARATOR	Minimum 36" separator with 10ft. maximum mud seal.
VENT LINE:	Minimum 6" vent line from Separator to flare pit, 200 ft. length.
DESANDER:	Demco Model 122. Two, 12" cone with Warman 6" × 4" Centrifugal pump driven by 50 HP Electric Motor.
DESILTER:	Pioneer Economaster Model T12-E4. 12 × 4" cones with Warman 6" × 4" Centrifugal pump, driven by a 50 HP Electric Motor.
MUD MIXING PUMP:	Warman 6" × 4" Centrifugal pump driven by a 50 HP Electric Motor
MUD AGITATORS:	4 only Brandt Mud Agitator Model MA 7.5
BOP's & ACCUMULATOR:	Annular: 11" 5,000psi Shaffer Spherical 11" 5,000psi Shaffer Double Gate Model 'LWS' Complete with $2^{3}/_{8}$", $2^{7}/_{8}$", $3^{1}/_{2}$", $4^{1}/_{2}$", $5^{1}/_{2}$", 7" and Blind Rams Accumulator: Koomey Model 100-11S

CHOKE MANIFOLD:	Cameron 5,000 psi, as per attached drawing but with hydraulic choke fitted and pressure tested with remote control panel
KELLY COCK: (Upper)	Packard 5000 PSI upper kelly cock with 6 $^{5}/_{8}$" reg. LH connections.
KELLY COCK: (Lower)	Packard 5000 PSI upper kelly cock with 4" IH connections
DRILL PIPE SAFETY VALVE:	1 x 4" IF Inside BOP (Gray) 1 x 4" IF full Operating Stab Valve
SPOOL:	1-11" 5,000psi Flanged Drilling Spool with 3$^{1}/_{8}$" 5,000psi Flanged Choke Line out and 2$^{1}/_{16}$" 5,000 psi Kill Line Outlet 1-11" 5,000 psi to 11" 3,000psi Kill Line Double Studded Adaptor 1-11" 5,000 psi to 7$^{1}/_{16}$" 5,000 psi Double Studded Adaptor
KILL LINE VALVES:	2-2$^{1}/_{16}$" 5,000psi Manual Flanged Valves
CHOKE LINE VALVES:	1-3$^{1}/_{8}$" 5,000psi Manual Flanged Valve 1-3$^{1}/_{8}$" 5,000 psi HCR Flanged Valve
INSTRUMENTATION:	Martin–Decker 6 pen Record-O-Graph Martin–Decker Weight Indicator Type FS Martin–Decker Mud Pressure Gauge Martin–Decker Rotary RPM Indicator Martin–Decker Pump Stroke Indicator (2 off) Martin–Decker Rota Torque Indicator Martin–Decker Tong Torque Indicator Martin–Decker Mud Flow Sensor Martin–Decker Mud Flow Fill System Martin–Decker Mud Volume Totaliser (MVT)
AUTOMATIC DRILLER:	Satellite Automatic Driller Model SA100-50-1500
KELLY SPINNER:	Foster Model K-77
KELLY:	1-5$^{1}/_{4}$"Hex Kelly. 2$^{13}/_{16}$" ID × 40' long with 6$^{5}/_{8}$" API Reg LH Box up 4" IF Pin Down
UPPER KELLY VALVE:	Upper Kelly Cock. 10,000 test 6$^{5}/_{8}$" API Reg LH Connections.
LOWER KELLY VALVE:	1 – Hydril Kelly Guard 6$^{1}/_{4}$" OD 10,000 psi, 4" IF (NC46) Pin and Box Connection
KELLY DRIVE BUSHING:	Varco Type 4 KRS Kelly Drive Bushing
DRILL PIPE AND TOOLS:	6 joints 4$^{1}/_{2}$" Range II Hevi Wate Drill Pipe with 18^{0} Taper 4" IF (NC46) Connections. 10,000ft. 3 ½" 13.3lbs/ft Grade 'G" Drill Pipe 30 x 4 ¾" slick Drill collars 3 ½ " IF 1 x 4 ¾" pony collar, 3 ½" IF, 10 ft. long 9 x 3 ½" HWDP, 3 ½" IF 4 ¼" Hexagonal Kelly, 6 $^{5}/_{8}$" Reg LH Box up, 3 ½" IF Pin Down 4 ¾" Lower Kelly Valve, 3 ½" IF 4 ¾" Inside BOP / Stabbing Valve, 3 ½" IF 4 ¾" Bit Sub, 3 ½" IF Box Up, 3 ½" Reg Box Down 3 ½" rotary slips 3 ½" elevators

All cross-over, lifting and saver subs to match above tools
4 ¾" drill collar slips

DRILL COLLARS:

4 - 8" Drill Collars, Range II, with $6^{5}/_{8}$" Reg. Connections.
24 – $6^{1}/_{4}$" Drill Collars, Range II, with 4" IF (NC46) Connections.
1 x 6 1/4" Monel Drill collar

FISHING TOOLS:

1 only Bowen $6^{1}/_{4}$" OD Type Z Fishing Jar
1 only Bowen $8^{1}/_{8}$" Series 150 FS Overshot
1 only Bowen $7^{7}/_{8}$" Reverse Circulating Junk Basket
1 only Junk Sub – $8^{1}/_{2}$" Hole
1 only Flat Bottom Mill – $8^{1}/_{2}$" Hole

HANDLING TOOLS:

Elevators:
1 Set $9^{5}/_{8}$" Casing
1 Set 7" Casing
1 Set $5^{1}/_{2}$" Casing
1 Set $9^{5}/_{8}$" Single Jt
1 Set 7" Single Jt
1 Set $5^{1}/_{2}$" Single Jt
2 Sets $4^{1}/_{2}$" DP 18 Degree
1 Set $3^{1}/_{2}$" Tubing Elevators
1 Set $2^{7}/_{8}$" Tubing Elevators
1 Set $2^{3}/_{8}$" Tubing Elevators

Safety clamp
1 Safety clamp for 8" and 6 1/4" Drill Collars.

Slips:
1 set $9^{5}/_{8}$" Casing
1 Set 7" Casing
1 Set $5^{1}/_{2}$" Casing
2 Sets $4^{1}/_{2}$" Drill Pipe
1 Set $3^{1}/_{2}$" Tubing Slips
1 Set 8" DC Slips
1 Set 6 1/4 DC Slips
1 Set 2 7/8 tubing slips

Tongs:
1 set BJ Type 'B' Rotary Tongs
1 set Farr Hydraulic Power Tongs
Jaws to suit $5^{1}/_{2}$", 7", $9^{5}/_{8}$" and $13^{3}/_{8}$"

PIPE SPINNER:

Varco SSW-10 Spinning Wrench

SUBS:

1 - $6^{5}/_{8}$" Reg. X $6^{5}/_{8}$" Reg. Bit Sub (Double Box)
2 – $4^{1}/_{2}$" Reg. X 4" IF (NC46) Bit Subs
1 – $6^{5}/_{8}$" Reg. X 4" IF (NC46) Crossover Sub (Pin x Box)
2 – 4" IF (NC46) Saver Subs (Pin x Box)
3 – $6^{5}/_{8}$" Reg. Lift Nubbins
11 – 4" IF (NC46) Lift Nubbins

CASING / TUBING DRIFTS:

1 – $9^{5}/_{8}$"	36 lb/ft
1 - 7"	26 lb/ft
1 - 7"	23 lb/ft
1 – $5^{1}/_{2}$"	17 lb/ft
1 – $5^{1}/_{2}$"	15.5 lb/ft

THREAD PROTECTORS:

3 – $9^{5}/_{8}$" Klampon Style
3 - 7" Klampon Style
3 – $5^{1}/_{2}$" Klampon Style

WELDING EQUIPMENT:	Lincoln Electric Welder Model 400AS
AIR COMPRESSORS:	Sullair compressor Package Model 10-30L - 100 cfm @ 125 psi Gardner Denver - 20 HP 80 cfm @ 110 psi.
AC GENERATOR:	2 each Caterpillar 3408TA AC Generator Model SR-4. 1,800 rpm 60 hz 275 kw.
FUEL TANKS:	2 each 10,000 litre - Skid Mounted
WATER TANK:	400 BBL tank with two Warman 3×2 pumps driven by 24 HP electric motors
PIPE RACKS:	5 sets 30ft in length
CATWALKS:	2 piece Catwalk drill pipe construction 42" height
COMMUNICATION:	Westinghouse Satellite Phone and Fax
SURVEY UNIT:	Totco 8^0 Deg. Recorder
MUD LAB:	Baroid Rig Laboratory Model 821
RATHOLE DRILLER:	Manufactured Rat Hole Driller for $5^1/_4$" Kelly
MUD SAVER:	Harrisburg Unit with $4^1/_2$" Sealing Rubbers
CELLAR PUMP:	1 only 3" Pacific Diaphragm Unit
WATER PUMP:	1 only Centrifugal Pump Unit
FIRE EXTINGUISHER:	1 lot as per State Mining Regulations for Rig and Camp
PIPE BINS:	3 only 36' L × 10' W × 42" H
CUP TESTER:	Cameron Type 'F' Cup Tester Mandrel with 4" IF Connections. $9\ ^5/_8$" 47- 36 lbs rubber for cup tester.
PRESSURE TEST PUMP	1 "Nearwhich" 3000 psi test pump with chart recorder.
HAMMER UNIONS:	Replace all 2" hammer unions with 1502 Welded Hammer Unions.
TRANSPORTATION:	International 530 Payloader or equivalent Toyota 4 × 4 Pickup Toyota 4 × 4 Crew Vehicle
RIG ACCOMMODATION:	2 Skid-Mounted Rig Manager/Companyman Units 1 Communication Hut 40ft. X 10ft. which will accommodate Anadrill office requirements.
FORKLIFT:	One (1)
INTERCOM:	4 stations unit, borrowed from CDL 27 if possible.
CAMP:	1–Camp Generator House 31' long × 10' wide skid-mounted complete with 2 – 3304 T 80 Kw, 50 Hz, 200 – 400 volt generators, camp distribution panel. 6,794 litres fuel storage, 12,000 litres fresh water storage and 24,000 litres shower water storage.

1-Kitchen/Dining Room	40' × 10' × 10'
1-Recreation Room	40' × 10' × 10'
1-Ablution/Laundry	40' × 10' × 10'
4-12 Man Bunkhouses	40' × 10' × 10'
1-Cooler/Freezer	20' × 8' × 8’
1-Female Ablution Block	20’ x 8’ x 8’

ENCLOSURE I: 1: 200m COMPOSITE LOG

ENCLOSURE II: 1: 200m MUDLOG

ENCLOSURE III: STRUCTURE MAPS

ENCLOSURE IV: WELL EVALUATION SUMMARY PLOT