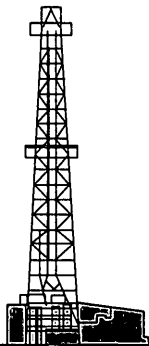


# TREGONY 1

## Well Completion Report



**Santos**

**PEP 153, OTWAY BASIN  
VICTORIA**

**SANTOS**

**COMPILED FOR**

**SANTOS LTD**  
(A.C.N. 000 670 575)

**Petroleum Development**

**24 AUG 2001**

**TREGONY 1**

**WELL COMPLETION REPORT**

**Prepared By:  
D. ZURCHER  
April, 2001**

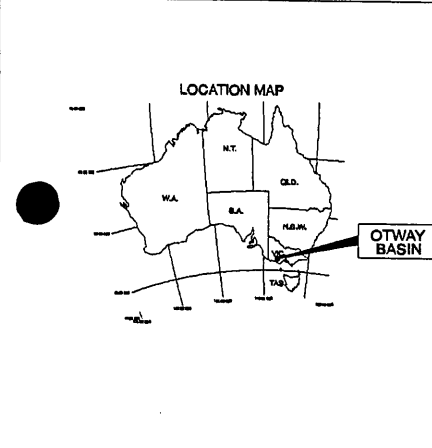
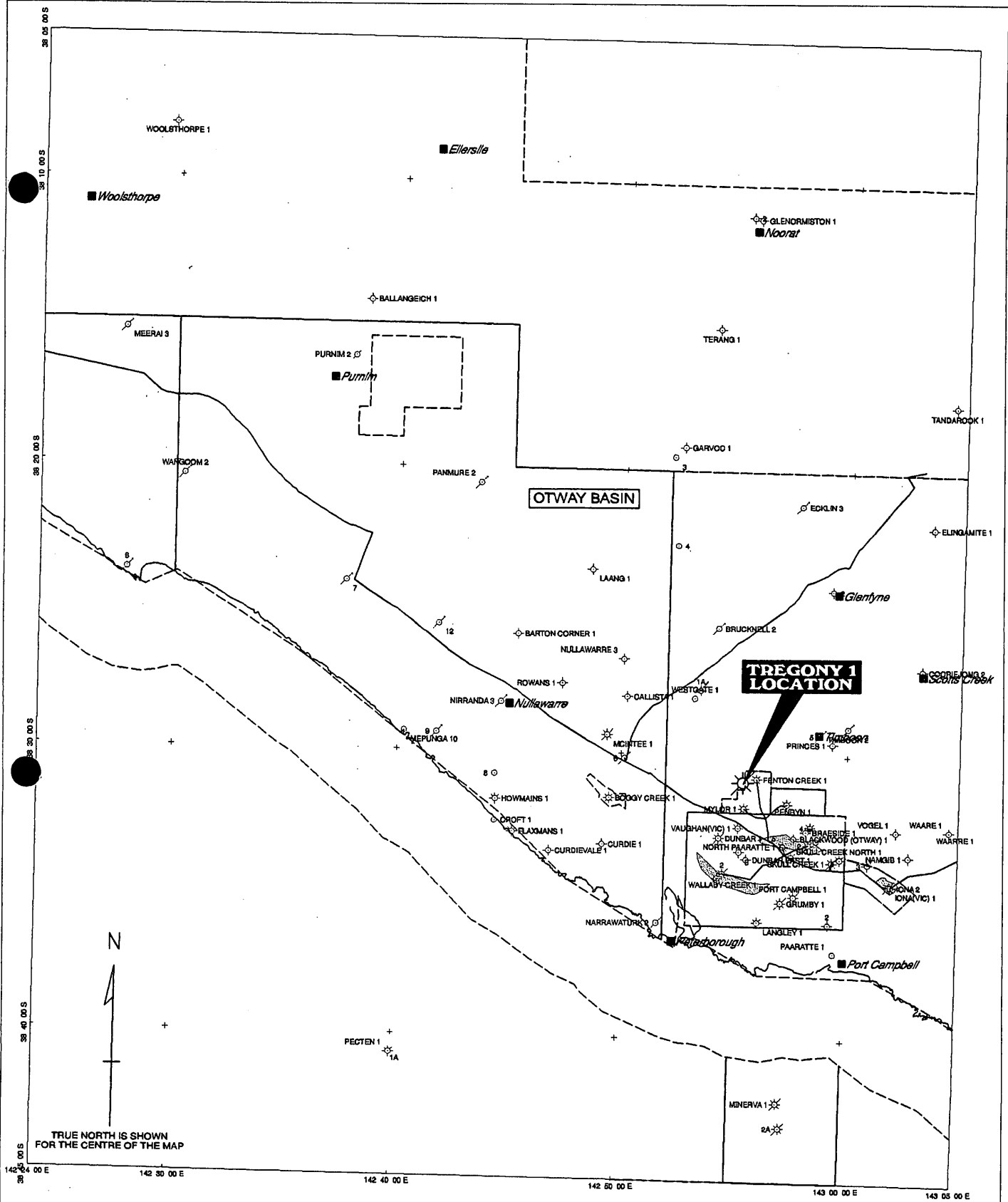
## TREGONY 1 WCR

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**LOCATION MAP**





- LEGEND**
- ◊ Dry hole
  - ⊕ Dry hole with gas show(s)
  - ⊖ Dry hole with oil show(s)
  - ⊕⊖ Dry Hole with oil & gas show(s)
  - ⊙ Gas well
  - ⊕⊙ Gas well with oil show(s)
  - Oil well
  - ⊕⊙ Oil and gas well
  - Gas Pipeline
  - - - Oil Pipeline

**EXPLORATION & DEVELOPMENT**

**Santos**  
South Australia Business Unit

Project: Jay-Arnie Hart  
Title:  
Original Scale: 1:50,000  
Datum: Everest  
Scale: 1:  
Date: April 9, 2001  
Author/Drawn:  
Rev. Number:  
ENCL

**TREGONY 1 LOCATION MAP**

0 2 4 6 8 10  
KILOMETRES  
UTM ANS CM141

SANTOS LTD A.G.N. 007 660 825

FIGURE 1

**WELL CARD**

WELL: TREGONY 1		WELL CATEGORY: EXP WELL INTENT: GAS		SPUD: 27/02/01 05:30hrs TD REACHED: 11/03/01 19:00hrs RIG RELEASED: 15/03/01 12:00 hrs		
LAT: 38° 30' 50.85" S		LONG: 142° 55' 25.40" E (AGD84)		RIG: OD&E 30		
LAT: 38° 30' 45.53" S		LONG: 142° 55' 30.34" E (GDA94)		STATUS: C&S		
SEISMIC STATION: LINE 6870 WAARE 3D CDP 1135				REMARKS:		
ELEVATION GND: 93.9m		RT: 98.6m (Prelim)				
BLOCK/LICENCE: PEP 153						
TD: 1821.5m (Logr Ext)		1819m (Drlr)				
PBTD: m (Logr)		m (Drlr)				
TYPE STRUCTURE: TILTED FAULT BLOCK				CASING SIZE	SHOE DEPTH	TYPE
TYPE COMPLETION: 3 1/2" MONOBORE				9.875"	18.00	CONDUCTOR
ZONE(S): WAARE SANDSTONE				7.625"	377.59	L80 - 26.4lb - BTC R3
				3.5"	1817.00	J55 - 9.3lb - NK3SB

AGE	FORMATION OR ZONE TOPS	DEPTH (m)		THICKNESS TVD (m)	HIGH (H) LOW (L)
		LOGGERS	TVD SS		
LATE OLIGOCENE - E. MIOCENE	CLIFTON FM	378	-278	47	N/P
LATE EOCENE - EARLY OLIGOCENE	NARRAWATURK	426	-325	32	N/P
LATE EOCENE	MEPUNGA FM	458	-357	64	67H
PALAEOCENE - EOCENE	DILWYN FM	523	-421	206	N/P
PALAEOCENE - EARLY EOCENE	PEMBER MUDSTONE	732	-627	84	3L
LATE PALAEOCENE	PEBBLE POINT FM	818	-711	45	13L
MAASTRICHTIAN-PALAEOCENE	MASSACRE SHALE	864	-756	33	N/P
LATE CAMPANIAN- MAASTRICHTIAN	TIMBOON SAND	898	-789	89	N/P
SENONIAN	PAARATTE FM	988	-878	286	93L
CAMPANIAN	SKULL CREEK MUDSTONE	1277	-1164	119	48L
LATE SANTONIAN	NULLAWARRE	1396	-1283	123	42L
CONIACIAN-SANTONIAN	BELFAST MUDSTONE	1520	-1406	104	28L
TURONIAN	FLAXMANS FM	1625	-1510	24	15L
TURONIAN	WAARRE C FM	1650	-1534	60	19L
TURONIAN	WAARRE B FM	1711	-1594	8	N/P
TURONIAN	WAARRE A FM	1719	-1602	45	N/P
LATE ALBIAN	EUMERALLA FM	1764	-1647	75.9 +	9L
	TD	1821.5	-1722.9	-	-

LOG INTERPRETATION (interval averages)						PERFORATIONS (4 shots/m)				
INTERVAL (m)	Ø %	Sw %	INTERVAL (m)	Ø %	Sw %	FORMATION		INTERVAL		
WAARRE C						None				
1650-1711m	17.2	23.5								
(46.6m net pay)										
						CORES				
						FORM	NO.	INTERVAL	CUT	REC
						NIL				

LOG	SUITE/ RUN	INTERVAL (m)	BHT/TIME/ REMARKS	LOG	SUITE/ RUN	INTERVAL (m)	BHT/TIME/ REMARKS
GR	1/1	1813.5 - 11.5	62°C / 7 hrs	PDS	1/2	1810 - 1605	67°C / 14.5 hrs
SP	1/1	1792 - 378		CNS	1/2	1808 - 1606	
DLL	1/1	1807.5 - 378		GR	1/2	1805 - 1600	
SLL	1/1	1807.5 - 378					
MLL	1/1	1812 - 720		RFS	1/3	1654-1795.5	21 TESTS
LCS	1/1	1800 - 378					18 hrs
CAL	1/1	1812 - 340					

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

**SUMMARY:**

Tregony 1 is situated in Southern Victoria, in the onshore portion of the Otway Basin (Port Campbell Embayment). The well is located in the PEP 153 licence (100% Santos), and sited at CDP 1135, Inline 6870, on the Waarre 3D Seismic Survey. It is approximately 4km south of the town of Timboon, and 900m ENE of the Fenton Creek gas field.

The Tregony prospect is a complex tilted -fault block/partially horst structural closure defined by 3D seismic.

The primary objective of Tregony 1 was the Waarre Sandstone. The geological section was penetrated as predicted. All formations tops were intersected close to prognosis or lower than prognosed. The Paaratte Formation was 93 m low to prognosis, and the primary objective, the Waarre, was 19m low (at -1534mSS).

During drilling, excellent gas shows of up to 1890/100 units were detected in the upper portion the Waarre Formation (reservoir). Gas levels decreased in the lower Waarre to a background level of 100 units and increased again in the Eumeralla Formation to a maximum of 1660/130 units.

One suite of wireline logging was carried out by Reeves at total depth, and consisted of the following: Run 1: DLL-SLL-MLL-SP-LCS-GR-CAL, Run 2: PDS-CNS-GR, Run 3: RFS.

Log analysis and formation pressure data indicate a net pay of 46.6m, average porosity of 17.2% with an average water saturation of 23.5% in the Waarre 'C' Sandstone. No reservoir was present in the Waarre 'B' interval, and the Waarre 'A' sands do not contain any interpreted pay.

Tregony 1 reached a total depth of 1819m (D), 1821.5m (L. extr.), and has been cased with 3.5" production tubing.

Tregony 1 is a new field gas discovery and has been suspended as a future gas producer.

**AUTHOR:** D. Zurcher**DATE:** APRIL 2001

**WELL HISTORY**

**1. GENERAL DATA**

Well Name:	Tregony 1
Well Classification:	Exploration (Wildcat)
Interest Holders:	Santos Ltd (100%)
Participating Interests:	Santos Ltd (100%)
Operator	Santos
Block/Licence	PEP 153, Onshore Otway Basin, Victoria
Surface Location	Latitude: 38° 30' 50.89" South Longitude: 142° 55' 25.49" East
Surveyed Elevation	Ground Level: 93.9m Rotary Table: 98.6m
Seismic Survey	WAARRE 3D
Seismic Location	CDP 1135, LINE 6870
Total Depth	Driller: 1819.0m Logger: 1821.5m
Completion	190 joints of 3.5" 9.3 ppft J55 New NK3SB Tubing, set at 1817mRT
Status	Completed Gas Well.

**2. DRILLING DATA**

Date Drilling Commenced	0530 hours, 27 <sup>th</sup> February 2001
Date Drilling Completed	1900 hours, 11 <sup>th</sup> March 2001
Date Rig Released	1200 hours, 15 <sup>th</sup> March 2001
Contractor	Oil Drilling & Exploration Pty Ltd (OD&E)
Rig	OD&E 30
Rig Specifications	Refer to Appendix XII

### 3. DRILLING SUMMARY

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

Tregony 1 was spudded at 0530 hours on the 27<sup>th</sup> February 2001. Tables I and II summarise the major drilling operations in this well. A more comprehensive summary is appended to this report (Appendix XI: (Drilling - Final Well Report).

**TABLE I: CASING, HOLE, AND CEMENT DETAILS**

BIT SIZE	DEPTH	CSG SIZE	CSG DEPTH	JNTS	CSG TYPE	CEMENT
9.875"	380m	7 5/8"	377.59m	32	26.4ppf L80 BTC R3	131sx, 66.2 bbls Class 'G' Plus 78sx, 16.6bbls "G" tail
6.75"	1819m	3 1/2"	1817.00m	190	9.3ppf J55 New NK3SB	319sx, 162.5 bbls Class 'G' Plus 132sx, 29.1 bbls Class 'G' tail

**TABLE II: SUMMARY OF MUD SYSTEMS**

MUD TYPE	INTERVAL (m)
Spud Mud (Gel/Water)	Surface - 380
KCL/PHPA/Polymer	380 - 1819

#### (b) Lost Time

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

#### (c) Water Supply

No water analysis was done.

#### (d) Mudlogging

Mudlogging services were provided by Geoservices Ltd. Samples were collected, washed, and described at 10m intervals from the surface to 900m, and at 3 m intervals from 900m to total depth at 1819m. All samples were checked for oil shows using ultraviolet fluorescence. Gas levels were monitored from the surface casing shoe to TD using a total gas detector and other parameters monitored include rate of penetration, weight on hook and mud pit levels.

#### (e) Testing

No DSTs were conducted in Tregony 1.

**(f) Coring**

No cores were cut in Tregony 1.

**(g) Wireline Logging**

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

**TABLE III: ELECTRIC LOG SUMMARY**

LOG	SUITE/ RUN	INTERVAL (m)	BHT/TIME/ REMARKS	LOG	SUITE/ RUN	INTERVAL (m)	BHT/TIME/ REMARKS
GR	1/1	1813.5 - 11.5	62°C / 7 hrs	PDS	1/2	1810 - 1605	67°C / 14.5 hrs
SP	1/1	1792 - 378		CNS	1/2	1808 - 1606	
DLL	1/1	1807.5 - 378		GR	1/2	1805 - 1600	
SLL	1/1	1807.5 - 378					
MLL	1/1	1812 - 720		RFS	1/3	1654-1795.5	21 TESTS
LCS	1/1	1800 - 378					18 hrs
CAL	1/1	1812 - 340					

\*Logging Contractor - REEVES

**(h) Geothermal Gradient**

A measured static bottom hole temperature of 73°C at 1792m is calculated. This gives a geothermal gradient of 3.0°C/100m. An ambient temperature of 20°C was employed. Data used for calculations is as follows:

62.0°C at 1792.0m after 7.0 hours from Logging Run 1, Suite 1.

67.0°C at 1808.0m after 14.5 hours from Logging Run 2, Suite 1.

**(i) Hole Deviation**

The Tregony 1 well is a deviated hole. Directional surveys indicate a maximum deviation from vertical of 12.0° inclination 318°T at 1656.4mMDRT.

**(j) Velocity Survey**

No velocity survey was run in Tregony 1.

**(k) Completion Summary**

Tregony 1 was cased and suspended.



**GEOLOGY**

## 1. PRE-DRILLING SUMMARY (after Well Proposal)

Tregony 1 is proposed as an Otway Basin gas exploration well to be located in the PEP 153 licence, approximately 4 km south of the town of Timboon and 900m ENE of the Fenton Creek gas field. The Tregony Structure is situated within the Port Campbell Embayment and the productive Waarre Sandstone play fairway.

The PEP 153 Licence surrounds the Petroleum Production Licences 1 and 2, which encompass the North Paaratte, Wallaby Creek, Skull Creek and Iona fields. PL 4, owned 100% Santos is immediately adjacent to the east of the proposed Tregony 1 location. A portion of the mapped structure is located within PL4.

The Tregony Prospect is a complex tilted-fault block / partially horst structural closure defined by 3D seismic. The well is expected to intersect a thick Waarre Sandstone reservoir with mean average net pay of 23.1m.

Tregony 1 is an attractive project with a mean prognosed success case of 3.76 BCF sales gas (8.17 BCF OGIP) and a Pc (probability of commercial success) of 61%, resulting in expected mean reserves of 2.3 BCF sales gas.

## 2. DRILLING RATIONALE (after Well Proposal)

### GEOLOGICAL RISK ASSESSMENT

#### Play Analysis

The Tregony 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. Tregony, as with each of these fields, exhibits a strong amplitude anomaly at the Waarre Sandstone horizon, interpreted as being well-developed gas-saturated reservoir.

#### Trap

The interpretation and mapping of the Tregony Prospect was based on the Waarre 3D Survey, which was recorded in 1993. The Waarre 3D data quality is very good in the central portion of the grid including the Mylor, Fenton Creek and the Tregony area.

Mapping was carried out at top Waarre Sandstone which is the primary target reservoir (Enclosure 1). The Waarre Sandstone has a distinctive characteristic on 3D seismic and therefore a high degree of accuracy was maintained on picking this event. The complex faulting associated with Tregony closure area was also investigated through coherency volumes. The mapping was extended regionally to cover the Mylor and Fenton Creek gas fields. The top Belfast Mudstone was interpreted on a selected grid to adequately evaluate the seal efficiency over the Tregony Structure. A time-interval map top Belfast to top Waarre was generated to investigate the seal thickness.

The Tregony structural closure is formed by a complex tilted fault block/partially horst structure situated between Mylor and Fenton Creek gas fields (Enclosure 1).

A strong amplitude event is present at the top Waarre reflector over the flanks of the Tregony Structure but is less evident over the crestal area due to complex faulting. Similar events over Mylor and Fenton

Creek gas fields suggest that the amplitude anomaly is likely related to the presence of gas in these structures.

The location for the proposed Tregony 1 well has been selected on inline 6870 at CDP 1135. This location is at about the halfway point of the narrow converging horst block and approximately 50 metres away from the northern fault at the Waarre Sand level.

Depth conversion for the prognosis was performed using Mylor 1 and Fenton Creek 1 velocities.

### Reservoir

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 shalier and more cemented and consequentially have lower porosity than the overlying unit C (av 20%). In Mylor 1 however Unit A exhibited good porosity but proved water wet due to juxtaposition of the reservoir against the permeable Unit C. At the Tregony location the amount of vertical closure will likely allow Unit A to be hydrocarbon filled. Thickness changes in the lower units imply that syn-depositional subsidence increased basin-ward to the southwest.

While the Waarre Sandstone thins to the north, the proximity to the Mylor and Fenton Creek wells where excellent reservoir is encountered, provides high confidence that similar good reservoir will be found in Tregony 1. Average core permeabilities of 4.1 Darcies are measured in Mylor 1 and production tests confirmed the potential of the reservoir with test rates of 17-25mmcf/d.

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

### Seal

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

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

The Tregony prospect, located wholly within the 3D seismic coverage, suggests that leakage will not occur at Tregony as the fault displacement (30ms) is considerably less than the thickness of the Belfast Mudstone (100ms+). The larger Tregony structure is likely to rely on downthrown fault seal against the Eumeralla Formation. While it is not clear whether the Waarre Sandstone against Eumeralla Formation forms an effective seal at the Tregony location, this reservoir/seal pairing has proven to be effective in the Boggy Creek CO<sub>2</sub> field.

High amplitude anomalies coincident with the structural closure at Tregony suggest the presence of gas and hence a competent seal mechanism.

### 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 Tregony 1, which is positioned in a similar situation to the adjacent, existing gas fields.

With many of the structures being present prior to the Belfast deposition, the timing of generation and migration does not appear to be a major issue.

### CO<sub>2</sub> Issues

The distribution of CO<sub>2</sub> within the Port Campbell area appears to be related to the introduction of a restricted CO<sub>2</sub> volume at a number of locations and its subsequent migration. The CO<sub>2</sub> is considered to be from a mantle source, and is likely to have occurred in conjunction with the emplacement of an igneous body during the Miocene.

A review of high-resolution aeromagnetic data has been undertaken in an effort to understand the distribution of deep-seated faulting, believed to be the conduit for CO<sub>2</sub> migration and the location of igneous bodies. The preliminary results of the study indicate the presence of an intrusive marginal to the coast and proximal to a major NNE-SSW lineament. This lineament appears to be co-incident with major faulting identified on the seismic and is seen as a likely conduit for the Langley and Grumby CO<sub>2</sub>. While an intrusive is not identified at nearby Boggy Creek, a similar trending lineament is mapped through the Boggy Creek well location.

### 3. RESULTS OF DRILLING

#### (a) Stratigraphy

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

TABLE IV: STRATIGRAPHY IN THE TREGONY 1 WELL

AGE	FORMATIONS	DEPTH (m)	THICK. (m)	ELEV. (m)
LATE EOCENE - E. OLIGOCENE	CLIFTON FM <u>NIRRANDA GRP</u>	378	47	-278
LATE OLIGOCENE - E. MIOCENE	NARRAWATURK MARL	426	32	-325
LATE EOCENE	MEPUNGA FM	458	64	-357
PALAEOCENE - EOCENE	DILWYN FM <u>WANGERRIP GRP</u>	523	206	-421
PALAEOCENE - EARLY EOCENE	PEMBER FM	732	84	-627
LATE PALAEOCENE	PEBBLE PT FM	818	45	-711
LATE CAMPANIAN- MAASTRICHTIAN	MASSACRE <u>SHERBROOK GRP</u>	864	33	-756
LATE CAMPANIAN- MAASTRICHTIAN	TIMBOON SAND	898	89	-789
SENONIAN	PAARATTE FM	988	286	-878
CAMPANIAN	SKULL CK MUDSTONE	1277	119	-1164
LATE SANTONIAN	NULLAWARRE	1396	123	-1283
CONIACIAN-SANTONIAN	BELFAST MUDSTONE	1520	104	-1406
TURONIAN	FLAXMANS FM	1625	24	-1510
TURONIAN	WAARRE FM UNIT C	1650	60	-1534
TURONIAN	UNIT B	1711	8	-1594
TURONIAN	UNIT A	1719	45	-1602
LATE ALBIAN	EUMERALLA FM	1764	75.9 +	-1647
	TD	1821.5	-	-1722.9

Samples were collected, washed, and described at 10m intervals from the surface to 900m, and at 3 m intervals from 900m to total depth at 1819m.

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

Total depth for Tregony 1 was reached at 1819m (D), 1821.5m (L), in the Early Cretaceous **Eumeralla Formation**, of the **Otway Group**. The well intersected 76m of the Eumeralla, the top coming in at 1764m (maximum recorded thickness in the Otway Basin is 2743m, in the Fergusons Hill-1 well). The formation consists of interbedded argillaceous sandstone and silty claystone. The sandstones are translucent to off-white, and commonly light-dark grey. Quartz grains are dominantly medium-sized with rare coarse-very coarse grains. They are angular to subangular, poorly to moderately sorted, better sorted toward the base, contain weak to moderate silica cement, and have a common to abundant white argillaceous matrix. In part the sandstone is matrix supported, increasing with depth. Characteristically, the Eumeralla contains a high percentage of volcanic rock fragments (38-53%--Abele *et al*, 1995) and in Tregony 1 these are commonly pale green and red. There is trace carbonaceous flakes grading to coal in part, and the sandstone varies from friable to occasionally moderately hard, but only exhibits a poor porosity. No oil fluorescence was observed. The claystone comprises approximately 30% of the section drilled and is light olive grey and dark grey brown. It is moderately to very silty in parts, has rare coaly detritus, and is locally micro-micaceous. The claystone is soft to firm and amorphous to sub blocky.

The Eumeralla was deposited in a low-energy fluvial environment, probably in a major braided stream system where there was an abundant supply of sand-sized volcanic detritus. The landscape also included occasional high energy streams, lakes and channel tracts. The source of the volcanic material

is unknown, but due to results from age dating, it appears that volcanism was contemporaneous with sedimentation (Foster and Hodgson, 1995). In the eastern portion of the Otway Basin the Eumeralla has been dated to be Aptian to Albian.

The Late Cretaceous **Sherbrook Group** unconformably overlies the Early Cretaceous Eumeralla in the Otway Basin. The **Waarre Formation** makes up the oldest formation of the group and is dated to be Turonian in age (Partridge, 1997). The formation was divided up into 4 units by Buffin (1989), however the youngest, 'Unit D', is generally called the Flaxmans Formation, after Flaxmans-1, by Bain (1961). The Waarre was intersected at 1650m (-1534m SS), and is 113m thick. The 'Waarre C' contains good 'clean' sand with 46.6m of net pay identified (see Appendix IV for Log Analysis). The 'Waarre B' interval is a shale facies (1711-1719m), and the 'Waarre A' interval contains a number of separate sand packages and is interpreted as being water wet. The sandstone is off-white to light pale grey, very fine to very coarse, but dominantly medium. The grains are subangular to subrounded, moderately sorted, contains a weak to moderate silica cement. There is trace to common white argillaceous matrix throughout. The sandstone is loose to friable, and occasionally moderately hard, has a poor to fair visible porosity, and no fluorescence. The claystone is medium to dark grey and pale brown grey, moderately silty, has common glauconite, with a trace of pyrite and carbonaceous material. It is soft to dispersive, occasionally firm and sub-blocky. The sandstone packages are from 1 to 20m thick and are generally blocky in shape, although the Waarre B sand package exhibits a general fining upward signature. The basal Waarre is interpreted to be shallow marine to marginal marine. After the transgression in the lower part of the Waarre, the formation became more regressive, depositing the best reservoir sands in the lower coastal and delta areas.

The Waarre Formation was transgressed by another flooding event (conformably overlain) by the **Flaxmans Formation**. In the Tregony well it was intersected at 1625m (-1510m SS), and is 24m thick. It consists of a marginally coarsening upward package of approximately equal amounts of siltstone and claystone, with some sandstone at its base. The claystone is medium to dark brown grey and olive brown, moderately silty, has common glauconite, with a trace of very fine siltstone laminae in part, and slightly calcareous. The siltstone is light grey to olive grey, very argillaceous, and amorphous to subblocky. The sandstone is light grey, dominantly medium and occasionally very coarse grained. It is moderately to poorly sorted, subangular to subrounded, has a weak siliceous cement and minor argillaceous matrix. The sand contains abundant glauconite pellets, occasional pyrite, is loose and exhibits fair porosity. The Flaxmans is dated as being Turonian (Partridge, 1997) in age, and is defined as the initial sediments of the major marine transgression to the overlying Belfast Mudstone. Both the Flaxmans and Belfast are considered part of the regional seal and side seal for the Waarre Formation.

The **Belfast Mudstone** conformably overlies the Flaxmans Formation. It was penetrated at 1520m (-1406m SS), and is 104m thick. This formation is dominantly claystone at this location, with siltstone content increasing from midway through to its base, and minor sandstone close to its top. The sandstone is pale grey, dominantly medium and occasionally coarse, with a weak siliceous cement and minor argillaceous matrix. It is dominantly loose, and exhibits fair porosity. The claystone is medium to dark brown and olive brown, moderately silty, has common glauconite, with a trace of very fine siltstone laminae in part. It is dominantly firm, occasionally soft and sub-blocky. The Belfast has been dated as Turonian to Campanian (Abele *et al.*, 1995), but Partridge (1997) considered it to be only Coniacian to Santonian. It was deposited below storm wave base in low-energy marine conditions, in a pro-delta environment.

The **Nullawarre Greensand** conformably overlies the Belfast with a top intersected at 1396m (-1283m SS), and is 123m thick. It is predominantly made up of a pale to medium green, in part orange, medium to coarse, trace very coarse-grained sandstone. The sandstone is subangular to subrounded, moderately to well sorted, with weak calcareous and siliceous cements (including occasional quartz

overgrowths), rare off white argillaceous matrix, and common glauconite especially at the base. The sandstone is loose and exhibits fair porosity. No shows were registered.

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

In this locality, the **Skull Creek Mudstone**, (often considered part of the Paaratte Formation), conformably overlies the Nullawarre Greensand. The top of the mudstone was encountered at 1277m (-1164m SS), and is 119m thick. It comprises a pale to medium brownish-grey and pale grey, moderately to very silty claystone, and approximately 30m of 80-90% sandstone at the base. The claystone has common dispersed very fine quartz, trace:- black coaly detritus, micro-mica, and glauconite. It is soft to firm and slightly subfissile. The sandstone is pale grey, pale orange, occasionally iron oxide stained, medium to coarse, occasionally fine, moderately to poorly sorted, with rare white argillaceous matrix, and poor to fair porosity. A pro-delta environment of deposition is interpreted for the Skull Creek and an age of Campanian has been attributed to it.

The top of the youngest formation of the Sherbrook Group, the **Paaratte Formation**, was intersected at 988m (-878m SS). The formation is 286m thick and is made up of thin (1-5m) to fairly thick (10-35m), sandstone packages, which are interbedded with claystone (1-3m thick), minor siltstone, and coal. The sandstone is pale grey and pale grey-brown, becoming off-white toward the base. Quartz grains are predominantly coarse, ranging from medium to pebbly, are angular to subrounded, and very poorly sorted, though improve to moderate at the base. There is weak pyrite and silica cement (including quartz overgrowths) throughout the section. A trace of dark greyish brown argillaceous matrix occurs in the upper portion of this formation. Minor carbonaceous material is present, some of which is partly pyritised. The sandstone is dominantly loose and exhibits poor to fair porosity, improving slightly toward the top. 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, commonly calcareous, with trace to common pyrite, minor glauconite, increasingly fossiliferous with depth, trace carbonaceous specks, soft to firm, in part very dispersive and sub-blocky. Coal in the Paaratte Formation is black, subvitreous, brittle, and exhibited conchoidal fractures.

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

In Tregony-1, the **Timboon Sandstone** (new formation – A. Partridge, 1999) was intersected at 898m (-789mSS), and is 89m thick. The sandstone is off white with grains being clear to translucent, fine to medium, and sub-angular to sub-rounded. It is held together by a weak siliceous cement, and exhibits fair to poor porosity. The sandstone Multiple unconformities are interpreted to occur at the base, middle, and top of this Campanian to Maastrichtian age sandstone. The Timboon Sandstone is interpreted to be a marginal facies equivalent to overlying Massacre Shale.

The **Massacre Shale** (new formation – A. Partridge, 1999) unconformably overlies the Timboon Sand. It is 33m thick from 864-898m, and ranges in composition from mudstone through silty mudstone to argillaceous fine-grained sandstone. The shale is pale to medium grey, grey brown, and occasionally arenaceous. It contains trace lithics and carbonaceous material, is soft to firm and generally sub-blocky. This shale was deposited in a distal marine neritic environment of uncertain water depth, and is of Maastrichtian to Palaeocene in age.

Unconformably overlying the Massace Shale is the oldest unit in the **Wangerrip Group**, the **Pebble Point Formation**. At Tregony, the Pebble Point is 45m thick, from 818m (-711m SS) to 864m, and consists of interbedded sandstone and claystone. Claystone content averages 20% and decreases,

grading to siltstone with depth. It is pale to medium brown and pale grey, moderately to very silty, with common dispersed very fine to mainly grit-sized iron oxide stained quartz grains, trace:- glauconite, minor iron oxide pellets, and fossil fragments. It is soft, sticky and sub-blocky. The sandstone is off white, pale grey, very fine to grit, dominantly medium to coarse, angular to subrounded, poorly sorted with minor siliceous cement. There are common orange iron oxide stained quartz grains, carbonaceous laminations, and pyrite. The sand is dominantly loose with some moderately hard aggregates, and no visible but good inferred porosity and no fluorescence.

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

Conformably overlying the Pebble Point is the **Pember Mudstone**, between 732m (-627m SS) and 818m, thus is 84m thick. This claystone is medium, occasionally brown grey, is moderately to very silty with abundant dispersed very fine to fine quartz grains in part, common glauconite especially at the top. There is trace:- black carbonaceous flecks, micro-mica, pyrite and it is soft, sticky and sub-blocky. Minor sandstone is present toward the top and the base of this formation. The sandstone is off white, very coarse to medium grained, poorly sorted, with weak siliceous cement. It is loose and exhibits fair 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 Paleocene to Early Eocene (Abele *et al.*, 1995) as a result of enclosed palynomorphs.

The **Dilwyn Formation** conformably overlies the Pember Mudstone at this location, and was encountered between 523m (-421m SS) and 732m (206m thick). The section consists predominantly of sandstone with approximately 40% interbedded silty claystone. The sandstone is a off white, very fine to trace grit, though mainly medium-sized, angular to subrounded, poorly sorted with very weak silica and calcareous cements. It contains minor medium brown argillaceous and silty matrix, black carbonaceous detritus and trace to common pyrite. The sand is friable to unconsolidated with porosity ranging from fair to good, 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, common fossil fragments, trace to common pyrite and is very soft, very dispersive and sub-blocky.

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

The 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 Tregony well the Mepunga was intersected at 458m (-357m SS) and is 64m thick. The massive sandstone is pale brownish orange and very fine to medium in part, commonly coarse to grit-sized, angular to subrounded (dominantly subangular), moderately sorted, becoming poorer with depth, with in part, weak calcareous and siliceous cement generally decreasing with depth, minor medium brown argillaceous and silty matrix, and abundant brown-stained quartz grains, decreasing to common with depth. There is trace fossil fragments and coarse muscovite flakes, and the sand is generally loose, and has a very poor, to in part, very good visible porosity.



The trace claystone is grey, dark 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 sub-blocky.

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

The **Narrawaturk Marl** overlies the Mepunga Formation with a conformable contact. The marl was encountered at 426m (-325m SS), and is 32m thick. The formation is made up of a grey brown to dark grey, and medium green grey marl. It contains abundant fossil fragments, including fenestrate bryozoa, forams, shell fragments, echinoid spines and sponge spicules. It has a trace pyrite, trace to common very fine, clear quartz grains, common glauconite and is very soft, sticky and sub-blocky.

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

The Narrawaturk represents the youngest formation of the Nirranda Group, and overlying it with a regional disconformity is the **Clifton Formation**, the oldest unit of the **Heytesbury Group**. The Clifton is a 47m thick formation of calcarenite, found from 378m (-278m SS) to 426m in the Tregony well. This limestone is white to orange and dark brown, very iron oxide rich with abundant iron oxide pellets and common iron oxide replaced fossil fragments (decreasing with depth). It contains common to abundant very coarse, rounded, brown, iron oxide-stained quartz grains, common fine clear quartz grains, abundant fossil fragments, trace glauconite increasing to abundant with depth, all set in a cryptocrystalline to calcarenitic matrix. The limestone is firm with an inferred poor porosity.

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

The Clifton Formation grades vertically, and in places laterally into the **Gellibrand Marl**. It is medium olive grey with common to abundant fossil fragments including bryozoa, forams, shell fragments, echinoid spines and sponge spicules. There is a trace of pyrite, appearing as fossil replacement in places, trace of very fine grained glauconite, and it is very soft, sticky and non fissile.

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

The Port Campbell Limestone was the first formation penetrated. For further details concerning the formations encountered in Tregony 1, refer to **Appendix I** of this report.

#### (b) Stratigraphic Prognosis (after Well Proposal)

The geological section penetrated was within tolerance to prognosis. Prognosed tops ranged from a maximum of 93m low to prognosis to 67m high. The primary objective, the Waarre Formation, was 19m low. The top of the Eumeralla Formation tends to be difficult to pick on seismic in this region.

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

**TABLE V: ACTUAL VERSUS PREDICTED DEPTHS AND THICKNESSES Tregony 1**

FORMATION	PROG SS DEPTH	ACTUAL SS DEPTH	DEPTH DIFF	PROG THICK	ACTUAL THICK	THICK DIFF
Clifton Fm	-	-278m	-	-	47m	-
Narrawaturk Marl	-	-325m	-	-	32m	-
Mepunga Fm	-424m	-357m	67m H	-	64m	-
Dilwyn Fm	-	-421m	-	-	206m	-
Pember Mdst	-624m	-627m	3mL	74m	84m	+10m
Pebble Point Fm	-698m	-711m	13mL	-	45m	-
Massacre Shale	-	-756m	-	-	-	-
Timboon Sandstone	-	-789m	-	-	-	-
Paaratte Fm	-785m	-878m	93mL	331m	286m	-45m
Skull Creek Mdst	-1116m	-1164m	48mL	125m	119m	-6m
Nullawarre Greensand	-1241m	-1283m	42mL	137m	123m	-14m
Belfast Mdst	-1378m	-1406m	28mL	117m	104m	-13m
Flaxmans Fm	-1495m	-1510m	15mL	20m	24m	+4m
Waarre Fm	-1515m	-1534m	19mL	123m	113m	-10m
Eumeralla Fm	-1638m	-1647m	9mL	-	76+m	-
TD	-1673m	-1722.9m				

(c) **Hydrocarbon Summary**

Total gas was recorded from the surface to total depth (1821.5m RT) using a FID total gas detector run by Geoservices Ltd. One unit of gas is equal to 200ppm methane equivalent. Chromatographic analysis was determined using a FID chromatograph and these values are quoted as percentages (C1-C4). Ditch cuttings were washed, described and checked for fluorescence using ultraviolet light.

Surface to Pebble Point Formation (spud to 818m)

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

Pebble Point Formation – Belfast Mudstone (818-1520m)

Total gas recorded within the Pebble Point, Paaratte, Skull Creek and Nullawarre formations was less than 2 units and mostly nil. The gas analysed was predominantly 100% C1, with minor amounts of C2 in the mid portion of the Pebble Point Formation. No hydrocarbon fluorescence was noted.

Belfast Mudstone (1520-1625m)

Total gas rose steadily throughout the Belfast Mudstone, reaching a maximum of 80 units with a background of 40 units. The gas ratios for the high readings in the lower portion of the Belfast Mudstone are: C1=83%, C2=12%, C3=4%, and C4=1%. No hydrocarbon fluorescence was recorded within this formation.

Flaxmans Formation (1625-1640m)

Gas levels continue to rise through this formation to 200 units with a background of 70 units. Gas breakdown is similar to that in the lower Belfast Formation; C1=85%, C2=8%, C3=5%, and C4=2%. No hydrocarbon fluorescence was recorded for this interval.

#### Waarre Formation (1650-1764m)

##### **Waarre Unit 'C' (1650-1711m)**

The primary objective of the Tregony 1 well was the Waarre Unit 'C'. The Waarre Unit 'C' yielded significant values in the upper sands associated with excellent reservoir qualities. At the wellsite, during the drilling it was assessed as being gas saturated, and that it would likely flow gas at economic recovery rates. A broad gas peak with readings of almost 1900 units occurs between 1650 and 1660m, with components being: C1=60%, C2=17%, C3=13%, and C4=10%. No oil fluorescence was documented at the wellsite.

Log analysis and formation pressure data indicate a gross column of 53.5m with 46.6m of net pay. Average porosity calculated in this interval was 17.2% with an average water saturation of 23.5%. Mudlog gas peaks, log evaluation, combined with MDT tests indicate that the Waarre Unit 'C' has good potential at this location.

##### **Waarre Unit 'B' (1711-1719m)**

Gas readings drop back to background levels of 100 units, with a maximum total gas of approximately 150 units. Gas breakdowns are; C1=75%, C2=11%, C3=9%, and C4=5%. No hydrocarbon fluorescence was recorded for this interval. Log analysis indicates that there is no sand development present in this interval.

##### **Waarre Unit 'A' (1719-1764m)**

Gas readings increase slightly in the Waarre Unit 'A', with a maximum total gas of 500 units and background gas of 150 units, C1=81%, C2=12%, C3=5%, and C4=2%. No hydrocarbon fluorescence was recorded for this interval. Log analysis and formation pressure data indicate a gross column of 24.0m with no net pay. Average porosity calculated in this interval is 17.3%.

#### Eumeralla Formation (1764-1821.5m TD)

The Eumeralla Formation was produced high gas readings throughout the drilled portion (49m). Gas reached a maximum of 1660 units at 1786m, and maintained levels of around 1000 units to total depth (over a background of 200 units). No fluorescence was documented in this formation. Typical breakdown: C1=76%, C2=14%, C3=6%, and C4=4%. No hydrocarbon fluorescence was recorded for this interval.

Although high gas readings were recorded a similar section in the nearby Fenton Creek was drill stem tested and proved tight. On the basis of this analogue and the relatively poor reservoir seen while drilling, no further evaluation was undertaken. The Tregony 1 well has been classed as a new field gas discovery and was cased. It may be further tested in the future.

#### **4. SUMMARY**

Tregony 1 was drilled as a Wildcat (WCNF) gas exploration well within PEP 153, at CDP 1135, Inline 6870, located on the Waarre 3D Seismic Survey. The Tregony Structure is situated within the Port Campbell Embayment (southern Victoria) and the productive Waarre Sandstone play fairway. The Tregony Prospect is a complex tilted-fault block / partially horst structural closure defined by 3D seismic. The well penetrated a thick Waarre Sandstone reservoir section.

Drilling of Tregony 1 was terminated 49m into the Eumeralla Formation. Formation tops were generally intersected within the accuracy of the prognosis. The top of the primary objective, the Waarre, was 19m low (at -1534mSS).

Wireline logging at total depth of 1821.5m consisted of the following: Run 1: DLL-SLL-MLL-SP-LCS-GR-CAL; Run 2: PDS-CNS-GR-CAL; Run 3: RFS. No full hole or sidewall cores were cut in Tregony 1.

Log analysis and formation pressure data indicate a net pay of 46.6m, average porosity of 17.2% with an average water saturation of 23.5% in the Waarre 'C' Sandstone. No pay is present in the Waarre or 'A' interval.

Tregony 1 has established the presence of hydrocarbons reservoired in the Waarre Formation at this location within PEP 153. Tregony 1 has been cased and suspended as a future gas producer.

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**APPENDIX I: LITHOLOGICAL DESCRIPTIONS**

**APPENDIX I (a): CUTTINGS**

LITHOLOGICAL DESCRIPTIONS

Ditch cuttings were collected, washed, described, and checked for fluorescence at 10m intervals from the surface to 900m, and at 3 m intervals from 900m to total depth at 1819m.

HEYTESBURY GROUPPort Campbell Limestone (Middle to Late Miocene)

Top not picked

LIMESTONE: pale to medium grey, dark grey brown, occasionally yellow to orange, clear to translucent grains, fine to medium crystalline, occasional nodular pyrite, very fossiliferous, common to abundant shell fragments and corals, moderately hard to occasionally firm.

Gellibrand Marl (Miocene)

Top not picked

MARL: light grey - medium grey, pale to medium greenish/grey, commonly silty and also argillaceous, very calcareous, common to abundant fossil fragments, echinoid spines, gastropods, fenestrate bryozoans, forams, rare pyrite in parts, rare carbonaceous specks, soft-dispersive, sticky, competency and firmness increases with depth, predominantly sub blocky, occasionally blocky.

Clifton Formation (Late Oligocene to Early Miocene)

47m thick

378-426m MARL: grey brown to dark grey, occasional fossil fragments, common glauconite, occasional pyrite, soft to firm, amorphous.

NIRRANDA GROUPNarrawaturk Marl (Late Eocene to Early Oligocene)

32m thick

426-458m MARL: grey brown to dark grey, occasional fossil fragments, common glauconite, occasional pyrite and iron oxide stained grains, soft to firm, amorphous.

Mepunga Formation (Late Eocene)

64m thick

458-523m SANDSTONE: (50-80%) clear, translucent, occasional iron staining, very fine – coarse, occasional very coarse, very poorly sorted, sub-angular to sub rounded, predominantly well rounded, loose, occasional glauconite grains, minor calcite cement, fair to good visual porosity, no shows.

MARL: (20-50%) dark brown, dark grey, occasionally very calcareous off white, silty, trace to common sand grains, calcareous in part, dispersive.



**WANGERRIP GROUP****Dilwyn Formation (Palaeocene to Eocene)****206m thick**

523-732m SANDSTONE: (90-100%) off white, clear, transparent, very fine – coarse, occasional very coarse, very poorly sorted, subangular to rounded, loose, occasional pyrite and glauconite, minor clay matrix, fair to good visual porosity, no shows

CLAYSTONE: (0-10%) grey, dark grey, dark brown, non to slightly calcareous, occasional carbonaceous specks, soft to firm, blocky, micro-micaceous, occasionally silty in part.

**Pember Mudstone (Palaeocene to Early Eocene)****84m thick**

732-818m CLAYSTONE: (40-60%) dark brown, dark grey, carbonaceous, soft to dispersive, trace to common sand grains, calcareous in part, occasional glauconite granules, very silty grading to siltstone.

SILTSTONE: (0-50%) grey brown, carbonaceous in part, sub-blocky, occasional to common fine to medium quartz grains, trace pyrite

SANDSTONE: (0-40%) clear, translucent, occasional iron staining, very fine to coarse, occasional very coarse, very poorly sorted, sub-angular to sub rounded, predominantly well rounded, loose, occasional glauconite grains, minor calcite cement, fair to good visual porosity, no shows.

**Pebble Point Formation (Late Palaeocene)****45m thick**

818-864m SANDSTONE: (90%) off white, clear, translucent, fine to medium, occasionally coarse, sub rounded to rounded, subangular to subrounded, potentially diagenetic surface features, poorly sorted, minor weak siliceous cement, iron oxide stained grains in part, predominantly loose, fair to poor inferred porosity, no fluorescence.

SILTSTONE: (10%) pale to medium grey, grey brown, argillaceous, occasionally silty with minor very fine quartz grains, trace very fine carbonaceous specks, soft to firm, occasionally moderately hard, sub-blocky to occasionally blocky.

**SHERBROOK GROUP****Massacre Shale (Late Maastichtian to Early Palaeocene)****33m thick**

864-898m CLAYSTONE: pale to medium grey, grey brown, argillaceous, occasionally arenaceous, rare carbonaceous specks, very soft to firm, occasionally moderately hard, sub-blocky to occasionally blocky.

**Timboon Sandstone (Late Campanian to Maastrichtian)****89m thick**

- 898-988m SANDSTONE: (70-100%) clear, translucent, off white, very fine to medium, well sorted, angular to sub-rounded, no visible cement, trace pyrite, trace to common lithics, loose, fair to good inferred porosity, no shows.  
 SILTSTONE: (0-30%), light grey, brown grey, carbonaceous and argillaceous in part, non-calcareous, dispersive.  
 COAL: (Trace) black, subvitreous, brittle, conchoidal fractures.

**Paaratte Formation (Senonian)****286m thick****988-1277m**

- 988-1023m CLAYSTONE: (60-70%) light brown, brown, grey brown, light grey, silty, carbonaceous, moderately calcareous, firm to dispersive.  
 SANDSTONE: (30-40%) clear, translucent, off white, very fine to medium, well sorted, angular to sub-rounded, occasionally well rounded, no visible cement, trace pyrite, trace to common lithics, loose, fair to good inferred porosity, no shows.  
 COAL: (Trace) black, subvitreous, brittle, conchoidal fractures.
- 1023-1064m SANDSTONE: (80-100%) clear, translucent, off white, medium to coarse, occasionally very coarse, moderately well sorted, angular to sub-rounded, trace silica cement, trace pyrite, trace lithics, loose, fair to good inferred porosity, no shows.  
 CLAYSTONE: (0-20%) light brown, brown, grey brown, light grey, silty, carbonaceous, moderately calcareous, firm to dispersive.  
 COAL: (Trace-5%) black, subvitreous, brittle, conchoidal fractures.
- 1064-1090m SILTSTONE: (40-80%) light to medium grey, brown grey, carbonaceous in part, occasional very fine quartz grains, occasional finely disseminated pyrite, micaceous in part, very argillaceous grading to Claystone, non-calcareous, dispersive.  
 SANDSTONE: (20-50%) clear, translucent, off white, fine to coarse, occasionally very coarse, poorly sorted, angular to sub-rounded, trace silica cement, trace pyrite, trace lithics, loose, fair to good inferred porosity, no shows.
- 1090-1277m SANDSTONE: (70-100%) clear, translucent, off white, very fine to very coarse, moderately sorted, angular to sub-rounded, no visible cement, rare glauconite nodules, loose, fair to good inferred porosity, no shows.  
 SILTSTONE: (0-30%) light to medium grey, brown grey, carbonaceous in part, occasional very fine quartz grains, occasional finely disseminated pyrite, micaceous in part, very argillaceous grading to Claystone, non-calcareous, dispersive.  
 COAL: (Trace-5%) black, subvitreous, brittle, conchoidal fractures.

**Skull Creek Mudstone (Campanian)****119m thick****1277-1396m**

1277-1320m SILTSTONE: (30-100%) off white, light grey, dark grey, occasionally brown, trace to common carbonaceous flakes, arenaceous in part (very fine quartz), non to very calcareous (off white and light grey), very soft to dispersive, argillaceous grading to claystone.

SANDSTONE: (0-70%) clear, frosted, translucent, very fine to medium, occasionally coarse, moderately poorly sorted, subangular to subrounded, silica cement (in very fine grain size), occasional pyrite, loose, friable (in very fine grain size) fair inferred porosity, poor visual porosity.

1320-1335m SANDSTONE: (60-100%) clear, frosted, translucent, fine to coarse predominantly medium, moderately well sorted, subrounded to rounded, no visible cement, occasional pyrite, loose, fair – good inferred porosity.

SILTSTONE: (0-40%) off white, light grey, dark grey, occasionally brown, trace to common carbonaceous flakes, arenaceous in part (very fine quartz), non to very calcareous (off white and light grey), very soft to dispersive, argillaceous grading to claystone.

IRONSTONE: (Trace) dark grey with orange oxidised surface, hard.

1335-1396m SILTSTONE: (0-95%) off white, light grey, dark grey, occasionally brown, trace to common carbonaceous flakes, arenaceous in part (very fine quartz), non to very calcareous (off white and light grey), very soft to dispersive, argillaceous grading to;

CLAYSTONE: (0-100%) dark brown, dark grey, very silty, very carbonaceous in part soft to firm.

SANDSTONE: (0-30%) clear, frosted, translucent, fine to coarse predominantly medium, moderately sorted, subangular to subrounded, no visible cement, loose, fair inferred porosity.

**Nullawarre Greensand (Late Santonian)****123m thick**

1396-1520m SANDSTONE: (80-100%) clear, translucent, green, very fine to coarse, predominantly medium, moderately sorted, subangular to rounded, calcareous and silica cement, glauconitic and occasional ?kaolin matrix, occasional glauconite nodules, loose with occasional friable very fine grain aggregates, poor visual porosity, fair inferred porosity, no shows, interbedded with;

CLAYSTONE: (0-20%) orange brown, non-calcareous, trace carbonaceous flakes, silty grading to Siltstone, very dispersive.

**Belfast Mudstone (Coniacian to Santonian)****104m thick**

- 1520-1625m CLAYSTONE (30-100%): dark to medium grey, common to very abundant glauconite (occasional loose nodules), occasional pyrite, occasional loose quartz grains (fine to coarse), micro-micaceous in part, trace carbonaceous flakes, non calcareous, very dispersive to soft, blocky, silty in part grading to and interbedded with;  
 SILTSTONE (0-70%): light grey, light grey olive, arenaceous, with occasional very fine to fine quartz grains, trace glauconite and carbonaceous material, non-calcareous, dispersive.  
 DOLOMITE (Trace): light brown, cryptocrystalline, trace carbonaceous material, hard, blocky.

**Flaxmans Formation (Turonian)****24m thick**

- 1625-1650m SILTSTONE: (50-90%) light grey, light grey olive, arenaceous, with common very fine to fine quartz grains, trace glauconite and carbonaceous material, non calcareous, dispersive.  
 CLAYSTONE: (10-50%) dark to medium grey, common to very abundant glauconite (occasional loose nodules), occasional pyrite, occasional loose quartz grains (fine to coarse), micro-micaceous in part, trace carbonaceous flakes, non calcareous, very dispersive to soft, blocky, silty in part grading to and interbedded with siltstone.

**Waarre Formation (Turonian)****113m thick****1650-1764m**

- 1650-1711m WAARRE 'UNIT C'  
 SANDSTONE: (100%) clear, translucent, off white, fine to coarse grain, predominantly medium to coarse, moderately sorted, angular (fractured) to subrounded, occasionally common silica cement, occasional pyrite (nodules with glauconite), predominantly loose with occasional fine grained aggregates with koalinitic matrix, good inferred porosity, no fluorescence.  
 SILTSTONE: (0-10%) dark grey, medium brown grey, argillaceous, common carbonaceous material, very common glauconite and very fine sand grains, firm.
- 1711-1719m WAARRE 'UNIT B'  
 CLAYSTONE: (90%) light grey, green grey, brown grey, occasional glauconite nodules, carbonaceous in part, very calcareous, soft to dispersive, interbedded with;  
 SILTSTONE: (5%) dark grey, medium brown grey, argillaceous, common carbonaceous material, very common glauconite and very fine sand grains, firm, sub-fissile to sub-blocky.  
 SANDSTONE: (5%) light grey, very fine grained, well sorted, subangular to subrounded, common glauconite, koalinitic matrix, firm, poor visual porosity, no fluorescence
- 1719-1764m WAARRE 'UNIT A'  
 CLAYSTONE: (80%) dark brown grey, dark grey, occasional glauconite nodules and carbonaceous laminations, non-calcareous, micro-micaceous, firm, blocky.

SANDSTONE: (20%) clear, off white, translucent, fine to medium grain, moderately sorted, subangular to subrounded, common weak silica cement, friable to loose, fair inferred porosity, poor visual porosity, no fluorescence.

**Eumeralla Formation (Late Albian)**

(75.9+m)

1764-1821.5m TD

1764-1776m CLAYSTONE: (30-70%) light olive grey, common very fine quartz grains, often very calcareous, occasional lithics, soft to dispersive, interbedded with:

CLAYSTONE: (10-20%) dark brown grey, dark grey, occasional to common carbonaceous material, laminations, non-calcareous, micro-micaceous, firm, sub-blocky.

SANDSTONE: (10-50%) clear, off white, translucent, dark grey, fine to coarse grain (occasional very fine grain aggregates), moderately sorted, angular to subrounded, common weak silica cement, common kaolinite ? matrix, slight calcareous in part, loose, very poor to poor inferred porosity, no fluorescence.

1776-1821.5m SANDSTONE: (30-90%) clear, off white, translucent, smoky, dark grey, yellow quartz grains, generally very fine to fine (occasional very coarse grain), very well sorted, angular to subrounded, common kaolinite? matrix, slight calcareous in part, loose, very poor to poor inferred porosity, no fluorescence.

CLAYSTONE(1): (5-50%) light olive grey, common very fine quartz grains, often very calcareous, occasional lithics, soft to dispersive, interbedded with;

CLAYSTONE(2): (5-20%) dark brown grey, dark grey, occasional to common carbonaceous material, laminations, non-calcareous, micro-micaceous, firm, sub-blocky

## **APPENDIX I (b): SIDE WALL CORES**

No sidewall cores were run in Tregony 1

## **APPENDIX II: HYDROCARBON SHOW REPORTS**

No oil shows were seen in Tregony 1

**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:** REEVES WIRELINE  
**WELL:** TREGONY 1 **FIELD:** \_\_\_\_\_  
**RIG:** ODE 30 **STATE:** VIC  
**LOCATION:** VIA TIMBOON **BLOCK:** PEP 153  
**LATITUDE:** 38 30 56.41S **LONGITUDE:** 142 55 24.29E  
**ELEVATIONS:** **GL:** 93.9m **RT:** 98.6m **DF:** \_\_\_\_\_  
**9 7/8" HOLE:** 380m **7 5/8" CSG:** 377.6m **WT:** \_\_\_\_\_  
**6 3/4" HOLE:** 380m-1819m **....." CSG:** \_\_\_\_\_ **WT:** \_\_\_\_\_  
**TD (Drlr.):** 1819m **TD (Logr.):** \_\_\_\_\_  
**MUD SYSTEM:** KCl /PHPA/Polymer **CIRCULATION STOPPED:** 21:35 **HRS ON:** 11/3/01  
**WT:** 9.3 **VISC:** 48 **PV/YP:** 14/15 **PH:** 9.0 **FLUID LOSS:** 4.6 **CHL:** 18700  
**GEOLOGIST:** GRAEME PARSONS

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

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

POSSIBLE LEDGES IN UPPER WAARRE / LOWER BELFAST

**DRILL STEM TESTS/CORED INTERVALS:**

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

ADD COMMENT ON WHETHER ENVIRONMENT CORRECTIONS HAVE BEEN APPLIED.

**LOGS:**

PROGRAM CONFIRMED WITH OPERATIONS GEOLOGIST AT 1600 HOURS ON 11/03/2001

PROGRAM VARIES FROM PRE-SPUD NOTES:

YES:

NO:

LOG	INTERVAL	REPEAT SECTION
RUN 1 - COMBO GR-DLS-MRS-LCS	GR - TD TO SURFACE	
	DLS / LCS - TD TO SURFACE CASING SHOE ARRAY SONIC TD TO 1620M MSFL - TD TO 720M	LOG ON WAY INTO HOLE
RUN 2 - GR-PDS-CNS	TD TO 1620M	
RUN 3 - RFS (with Samples)	TBA POST RUNS 1 & 2	

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

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

**APPENDIX III (b): FIELD ELECTRIC LOG REPORT**

## SANTOS LIMITED

## FIELD ELECTRIC LOG REPORT

**WELL:** Tregony -1 **GEOLOGIST:** G. Parsons  
**LOGGING ENGINEERS:**  
**RUN NO:** 1, 2, 3 **DATE LOGGED:** 12 March 2001  
**DRILLERS DEPTH:** 1819m **LOGGERS DEPTH:** 1813.2m  
**ARRIVED ON SITE:** 8 March 2001  
**ACTUAL LOG TIME:** **LOST TIME LOGGER:** ½ hr  
**TOTAL TIME:** 23.75 hrs **LOST TIME OTHER:**

TYPE OF LOG	GR-SP-DLL-SLL-MLL- LCS-CAL	PDS-CNS-GR	RFS
TIME SINCE CIRC. STOPPED	7.0 hrs	14.5 hrs	18.0 hrs
TIME TOOL RIG UP	0300 hrs 12-3-01	1100 hrs	1430 hrs
TIME TOOL RIH	0330 hrs	1100 hrs	1430 hrs
TIME TOOL RIG DOWN	1100 hrs	1430 hrs	0245 hrs 13-3-01
TOTAL TIME	8.0 hrs	3.5 hrs	12.25 hrs

LOG	SUITE/ RUN	INTERVAL (m)	BHT/TIME/ REMARKS	LOG	SUITE/ RUN	INTERVAL (m)	BHT/TIME/ REMARKS
GR	1/1	1813.5 - 11.5	62°C / 7 hrs	PDS	1/2	1810 - 1605	67°C / 14.5 hrs
SP	1/1	1792 - 378		CNS	1/2	1807 - 1606	
DLL	1/1	1807.5 - 378		GR	1/2	1805 - 1600	
SLL	1/1	1807.5 - 378					
MLL	1/1	1812 - 720		RFS	1/3	1654-1795.5	21 TESTS
LCS	1/1	1800 - 378					18.0 hrs
CAL	1/1	1812 - 340					

MUD SYSTEM: KCl/PHPA/Polymer	WEIGHT: 9.3ppg
HOLE CONDITIONS	

REMARKS / RECOMMENDATIONS
Tool seal failure on last RFS test. POOH, replaced module and RIH to complete test and take sample.

**APPENDIX IV: LOG EVALUATION**

## TREGONY 1 - LOG ANALYSIS

Tregony 1 wireline logs were analysed over the Waarre Sandstone (1650-1764m) interval. Gas pay was identified in the Waarre C Sandstone. Tregony 1 was cased as a potential gas producer.

A 9 7/8" surface hole was drilled to 380 metres and 7 5/8" casing set at 377.6 meters. A 6 3/4" hole was then drilled with KCl/PHPA/Polymer mud to 1819 metres (D). Wireline logging was carried out by Reeves as described below. Twenty-one Repeat Formation Sampler (RFS) pressure points were attempted (21 valid).

Unless otherwise specified, all depths mentioned below are logger's depths referenced to the drill floor.

### Pay Summary

Waarre C	Gas Pay 46.6m, Ave Porosity 17.2%, Ave S <sub>w</sub> 23.5%
----------	---

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

### Logs Acquired

Run 1	GR	1809-Surface
	LCS (Long Spaced Compensated Sonic)	1800-378m (Waveforms 1783-1495m)
	DLS (Dual Laterolog Sonde)	1807-378m
	MRS (Micro Resistivity Sonde)	1812-720m
Run 2	PDS (Compensated Density Sonde)	1810-1605m
	CNS (Compensated Neutron Sonde)	1807-1606m
Run 3	RFS	1795.5-1654m

### Mud Parameters

Mud Type	KCl/PHPA/polymer
Mud Density	9.3ppg
KCl	3.8%
Rm	0.288 ohmm @ 19.6°C
Rmf	0.257 ohmm @ 18.6°C
Rmc	0.732 ohmm @ 21.7°C
MRT	67°C from Run 2 at 1810m

### Remarks

- The laterolog and sonic was run with 1 inch stand-offs.
- The geothermal gradient was found to be 28.55°C/km.

Log Processing

- Regional salinity data as well as an *in-situ* calculation of  $R_{wa}$  in water sands was used to derive the  $R_w$  used for this analysis.

Interpretation Procedures and Parameters

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

- The GR from Run 1 was corrected for environmental effects of mud-weight and borehole size using measurements made from the MRS caliper.
- Borehole corrections for the Dual Laterolog LLS and LLD curves using 1.5" stand-offs were applied (Table 1). These are ratios illustrated in the Reeves charts Lat-1 and Lat-2 respectively.
- The borehole corrected deep resistivity curve (LLD<sub>BC</sub>) was further corrected for shoulder effects (LLD<sub>c</sub>).
- The invasion corrected  $R_T$  was derived using the following tornado chart emulation relationship:

$$R_T = (1.59 * LLD_c - 0.59 * LLS_{BC})$$

where:

LLD<sub>c</sub> = Deep resistivity response borehole and shoulder bed corrected.

LLS<sub>BC</sub> = Shallow resistivity response borehole corrected.

- Density porosity was calculated over the Waarre Sandstone:

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

where;

DEN = Bulk Density in g/cc.

- Cross-plot porosity was determined:

$$PHIX = (DPHI + NPRL_{ss}) / 2$$

where;

NPRL<sub>ss</sub> = Neutron porosity corrected for environmental effects (sandstone units).

- A Hunt-Raymer sonic porosity curve was calculated:

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

Where;

DTC2 = 3-4ft Compensated Sonic ( $\mu$ s/ft).

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



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

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

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

- A variable cementation exponent "m" was used in the calculation of  $S_w$ . The derivation of "m" was porosity based and results in "m" decreasing as porosity increases. Currently there is no SCAL data available to confirm this relationship. This relationship is given as;

$$MEXP = (-0.2413 * \text{Log}_{10} PHIE) + 2.4657$$

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

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

where:

RT = True resistivity, i.e. resistivity of the non-invaded reservoir (i.e. LLD corrected for borehole, invasion and shoulder beds).  
 Rw = Resistivity of formation water at formation temperature.  
 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 (default = 2).

## Conclusions

1. Tregony 1 log analysis identified a total of 46.6 metres of pay in the Waarre C Sandstones. This interval has an average porosity of 17.2% and an average water saturation of 23.5%.
2. The Waarre B sandstone interval was not developed in this well.
3. The Waarre A interval was interpreted to be water bearing. A total of 24 metres of sandstone development was interpreted for this interval with an average porosity of 17.3%.

4. Formation pressure points in the Waarre C sandstones indicated a reservoir pressure of around 2070 psi.
5. Low bulk density and high sonic transit time would indicate gas-bearing sands down to 1707m. Below this depth are shales and shaly sands interpreted as water bearing.
6. Tregony 1 was cased as a future gas producer.

Attached is the well evaluation summary (WES) plot for Tregony 1 (01.060)  
*wes/wessa/tregony\_01.060\_permian.wes*

**TABLE 1**

**Log Analysis Parameters**

PARAMETERS	WAARRE C SANDSTONE	WAARRE A SANDSTONE
R <sub>w</sub> (ohmm) @ 25°C	0.3	0.3
a	1	1
m	Variable	Variable
n	2	2
Borehole cor RD	0.85	0.95
Borehole cor RS	0.9	0.98
RD Shoulder Corr.	1.1	1.0
GR matrix (API)	30	30
GR shale (API)	120	120
VSHST	0	0
VSHCO	0.4	0.4
PHISH	0.12	0.12

PE605263

This is an enclosure indicator page.  
The enclosure PE605263 is enclosed within the  
container PE908033 at this location in this  
document.

The enclosure PE605263 has the following characteristics:

ITEM\_BARCODE = PE605263  
CONTAINER\_BARCODE = PE908033  
NAME = Tregony-1 Well Evaluation Summary Log  
BASIN = OTWAY  
ONSHORE? = Y  
DATA\_TYPE = WELL  
DATA\_SUB\_TYPE = WELL\_LOG  
DESCRIPTION = Tregony-1 Well Evaluation Summary Log  
Scale 1:200, by Santos [BOL] Pty Ltd,  
W1314, PEP153. Appendix IV Log  
Evaluation contained within "Well  
Completion Report" [PE908033].  
REMARKS =  
DATE\_WRITTEN =  
DATE\_PROCESSED = 30-APR-2001  
DATE\_RECEIVED = 24-AUG-2001  
RECEIVED\_FROM = Santos Ltd  
WELL\_NAME = Tregony-1  
CONTRACTOR =  
AUTHOR =  
ORIGINATOR = Santos Ltd  
TOP\_DEPTH =  
BOTTOM\_DEPTH =  
ROW\_CREATED\_BY = DN07\_SW

(Inserted by DNRE - Vic Govt Mines Dept)

**APPENDIX V: PRESSURE SURVEY**

SANTOS LIMITED  
PRESSURE SURVEY

WELL: Tregony 1 R.T.: 98.6 m TOOL AND GAUGE TYPE: HP QTZ (strain backup) PAGE: 1 of 1  
 WITNESS: Graeme Parsons TIME SINCE LAST CIRC.: 18.0 hrs PROBE / PACKER TYPE: 7 7/8" HP 80 durometer DATE: 12/03/2001

TEST	FORMATION	DEPTH		EXCEPT.	EXCEPT.	EXCEPT.	FILE NO.	TEST RESULTS				INTERPRETATION			COMMENTS (FLUID TYPE)			
		R.T.	TVD SS					FORM PRESS.	TEMP.	HYDR. BEFORE	FORM. PRESS	HYDR. AFTER	TEMP	DRAW D. MOBILITY		TYPE D/D	TYPE BUILDUP	DEPLET -S/C
		M	M					PSIG	°C	PSIA	PSIA	PSIA	°C	MD/CP				
1	Waarre C	1654	1538.2					2619.3	2062.87	2619.5			Not Calc.					
2	Waarre C	1657.8	1541.9					2625.01	37	2625.5			Not Calc.					
3	Waarre C	1661	1545.1					2630.1	2065.43	2630.28			Not Calc.					
4	Waarre C	1670	1554					2644.4	2107.64	2644.7			Not Calc.					
5	Waarre C	1674.5	1558.5					2651.64	2069.27	2651.46			Not Calc.					
6	Waarre C	1682	1565.9					2663.49	2069.04	2663.66			Not Calc.					
7	Waarre C	1685.5	1569.5					2669.17	2082.6	2669.4			Not Calc.					
8	Waarre C	1693	1576.8					2680.9	2070.96	2681.16			Not Calc.					
9	Waarre C	1701.2	1584.9					2693.7	2073.78	2693.8			Not Calc.					
10	Waarre C	1702.9	1586.6					2696.85	2074.47	2696.86			Not Calc.					
11	Waarre C	1706	1589.7					2701.64	1243.71	2702			Not Calc.					
12	Waarre C	1709.9	1593.5					2707.8	2078.04	2708.07			Not Calc.					
13	Waarre A	1723.5	1607					2729.43	2065.16	2729.74			Not Calc.					
14	Waarre A	1724.7	1608.2					2731.6	2066.49	2731.4			Not Calc.					
15	Waarre A	1727.9	1611.4					2736.15	2071.2	2736.7			Not Calc.					
16	Waarre A	1739.5	1622.9					2754.71	2087.8	2755.46			Not Calc.					
17	Waarre A	1741	1624.3					2757.6	2089.84	2757.7			Not Calc.					
18	Waarre A	1756.7	1639.9					2782.74	851.4	2783.3			Not Calc.					
19	Waarre A	1760.5	1643.7					2789.17	2308.42	2789.4			Not Calc.					
20	Waarre A	1760.7	1643.9					2789.76	2308.79	2789.88			Not Calc.					
21	Eumeralla	1795.5	1678.3					2848	2763.6	2847.97			Not Calc.					

ANTICIPATED GEOTHERMAL GRADIENT: \_\_\_\_\_  
 ANTICIPATED WATER GRADIENT: \_\_\_\_\_  
 MUD WEIGHT / GRADIENT: \_\_\_\_\_

DRAWDOWN  
 BUILD UP

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

## **APPENDIX VI: DRILL STEM TEST DATA**

No Drill Stem Tests were conducted in Tregony 1.

**APPENDIX VII: HYDROCARBON ANALYSIS**

Amdel Limited  
A.C.N. 008 127 802Petroleum Services  
PO Box 338  
Torrensville Plaza SA 5031Telephone: (08) 8416 5240  
Fax: (08) 8234 2933

24 April 2001

Santos Limited  
GPO Box 2319  
ADELAIDE SA 5001

Attention: Andy Pietsch

**REPORT LQ10237**

**CLIENT REFERENCE:** 539489-44

**WELL NAME/RE:** Tregony-1

**MATERIAL:** Pressurised liquid / gas

**WORK REQUIRED:** MRDT analysis

**AUTHOR'S NAME:** Diane Cass

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



*for*  
Brian L Watson  
Manager  
Petroleum Services

bw.cm

G:\Secretary\petroleum\Docs-01\10237.doc

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AMDEL PETROLEUM SERVICES

Page 1 of 3

Method GL-02-03

Client: SANTOS Ltd

Report # LQ10237

Sample: TREGONY-1

Down hole pressure: 2065 psi @ 60°C

Depth: 1661 m

**COMPOSITIONAL ANALYSIS OF RECOMBINED SEPARATOR FLUID**

Component	Flashed	Flashed	Recomb.
	Stock Tank	Stock Tank	Sep.
	Liquid	Gas	Liquid
	Mol %	Mol %	Mol %
Nitrogen	-----	2.63	2.55
Carbon Dioxide	-----	0.17	0.17
Methane	-----	82.35	79.94
Ethane	0.23	7.99	7.76
Propane	2.73	4.19	4.15
I-Butane	4.32	0.93	1.03
N-Butane	8.29	0.95	1.17
I-Pentane	7.50	0.27	0.48
N-Pentane	7.97	0.19	0.42
Hexanes	20.99	0.21	0.82
Heptanes	25.34	0.07	0.81
Octanes plus	22.63	0.05	0.71
<b>TOTAL</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>

**RATIOS**

Molar ratio	0.0293	0.9707	1.0000
Mass Ratio	0.1220	0.8780	1.0000
Gas Liquid Ratio	1.00 bbl @ SC	33538.0 SCF	-----

**STREAM PROPERTIES**

Molecular Weight	92.0	20.0	22.1
Density obs(g/cc)	0.7008 @ 15°C	-----	-----
API-Gas Density	70.33 API @60°F	0.691 (air=1)	-----
GHV (BTU/scf)	-----	1177	-----

**OCTANE PLUS PROPERTIES**

Mol %	22.63	0.05	0.71
Molecular Weight	127.9	114.2	127.0
Density (g/cc)	0.8156 @ 15°C	-----	-----
API @ 60°F	41.92	-----	-----

**LABORATORY FLASH SEPARATION DETAILS**

Separation Temperature	18	°C
Flash Gas Volume	1273.40	litres
Stabilised Liquid Volume	214	ml
Liquid Density	0.6980	g/ml

Approved Signatory

*A. Diane Cass*

Method GL-02-03

Client:      SANTOS Ltd

Report #    LQ10237

Sample:      TREGONY-1

Down hole pressure: 2065 psi @ 60°C

Depth: 1661 m

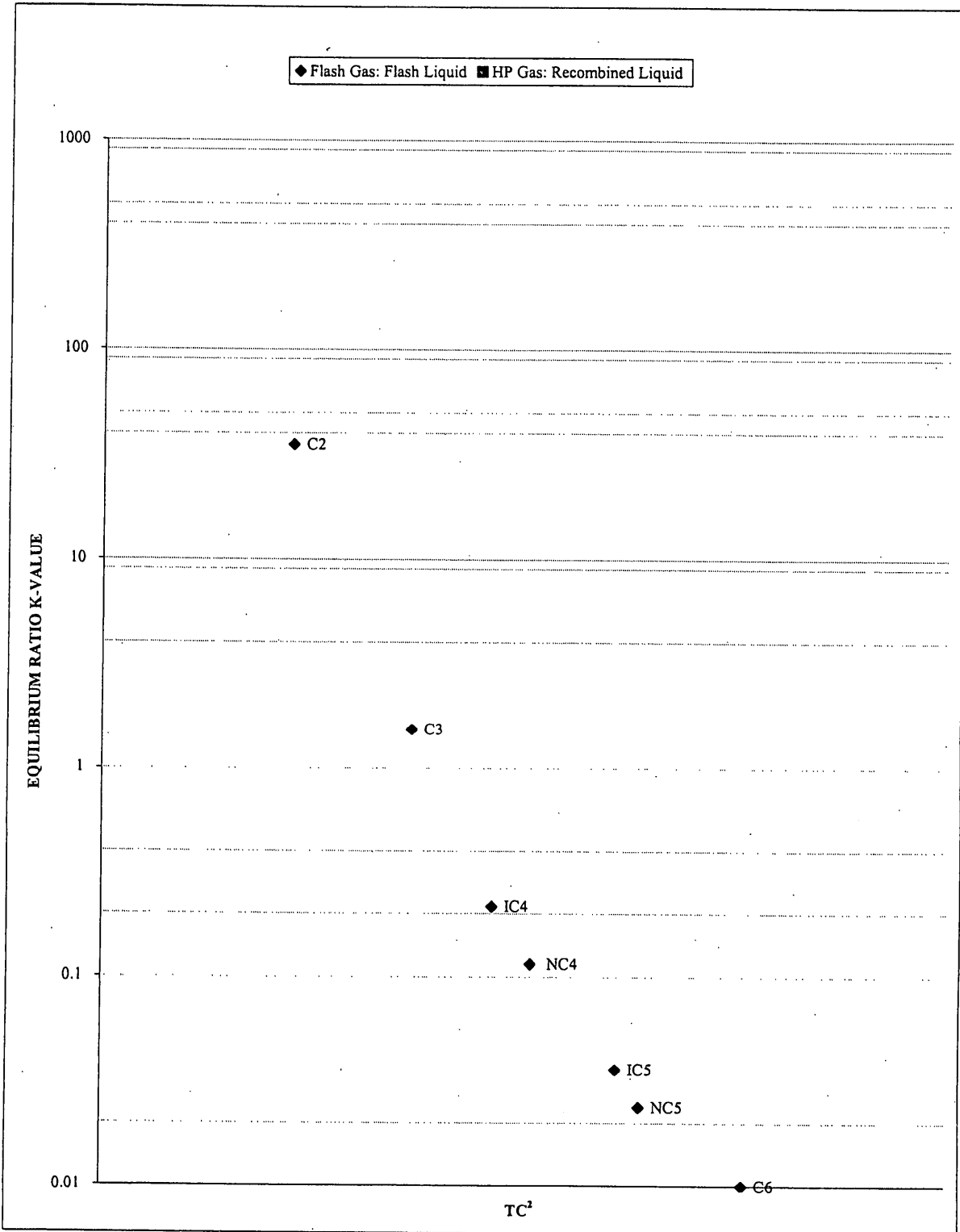
Boiling Point Range (Deg.C)	Component	Weight%	Mol%
-88.6	Ethane	0.07	0.23
-42.1	Propane	1.31	2.73
-11.7	I-Butane	2.73	4.32
-0.5	N-Butane	5.25	8.29
27.9	I-Pentane	5.88	7.50
36.1	N-Pentane	6.26	7.97
36.1-68.9	C-6	19.53	20.94
80.0	Benzene	0.05	0.05
68.9-98.3	C-7	17.86	16.38
100.9	Methylcyclohexane	9.57	8.96
110.6	Toluene	0.28	0.28
98.3-125.6	C-8	12.49	10.05
136.1-144.4	Ethylbenz+Xylenes	0.90	0.78
125.6-150.6	C-9	7.40	5.30
150.6-173.9	C-10	5.36	3.46
173.9-196.1	C-11	2.42	1.42
196.1-215.0	C-12	1.33	0.72
215.0-235.0	C-13	0.75	0.37
235.0-252.2	C-14	0.30	0.14
252.2-270.6	C-15	0.14	0.06
270.6-287.8	C-16	0.06	0.02
287.8-302.8	C-17	0.03	0.01
302.8-317.2	C-18	0.01	0.00
317.2-330.0	C-19	0.01	0.00
330.0-344.4	C-20	0.00	0.00
344.4-357.2	C-21	0.00	0.00
357.2-369.4	C-22	0.00	0.00
369.4-380.0	C-23	0.00	0.00
380.0-391.1	C-24	0.00	0.00
391.1-401.7	C-25	0.00	0.00
401.7-412.2	C-26	0.00	0.00
412.2-422.2	C-27	0.00	0.00
>422.2	C-28+	0.00	0.00
	Total	100.00	100.00

(0.00 = LESS THAN 0.01%)

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

## Oil Parameters:

Density of Oil @ 18.0 °C	0.6980	
Specific Gravity @ 15.6 °C	0.7011	
API Gravity	70.33	
Specific Gravity of C8+ fraction	0.8159	(calc)
Average molecular weight of C8+ fracti	128	



AMDEL PETROLEUM SERVICES  
Method GL-02-03

Appendix A  
Page A1

Client: SANTOS Ltd

Report # LQ10237

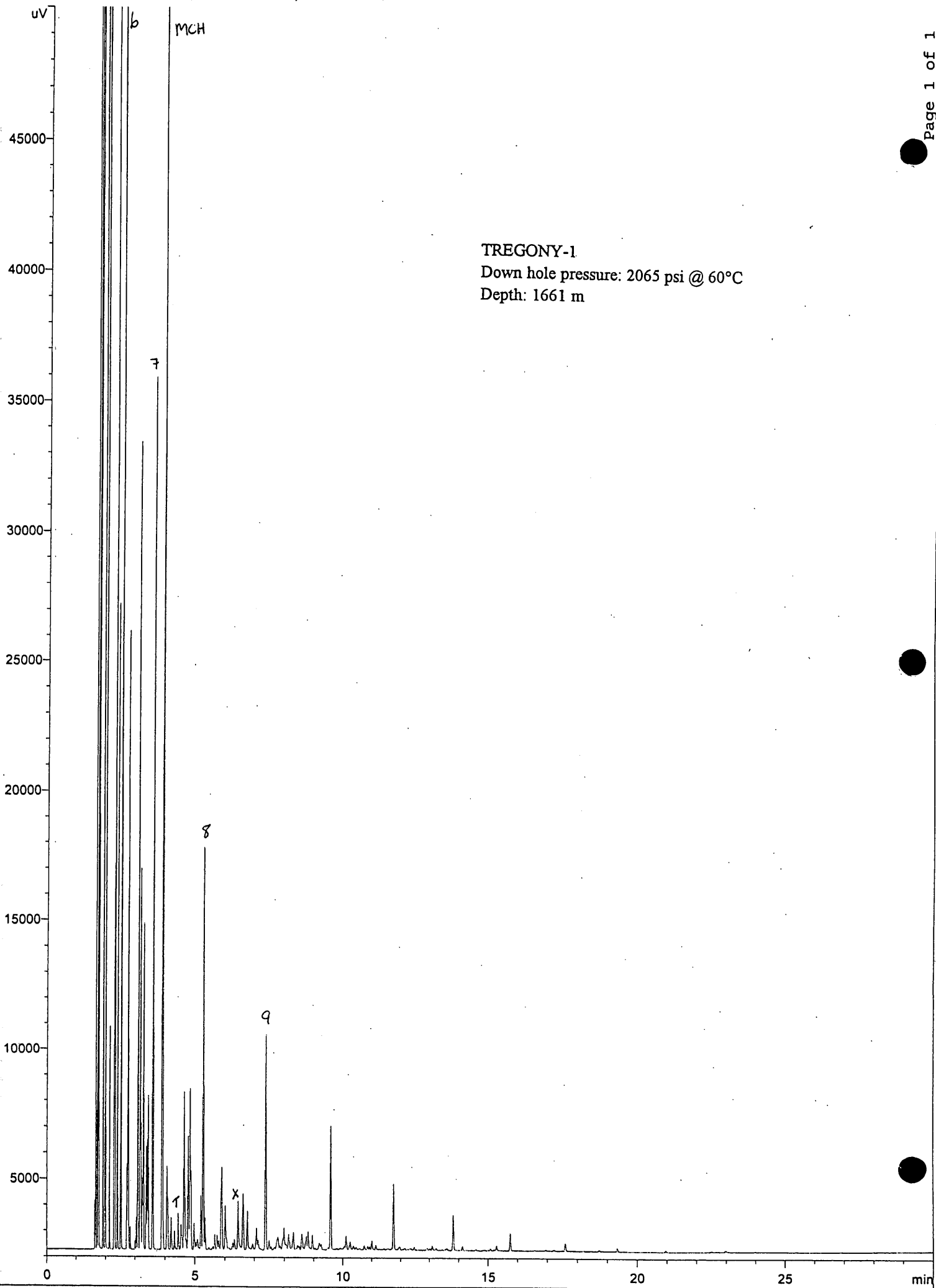
Sample: TREGONY-1  
Down hole pressure: 2065 psi @ 60°C  
Depth: 1661 m

Full Well Stream

Separator Gas	0.000	MMSCF	
Stock Tank Oil Rate	0.000	BBLs	
			Av Mol Wt
Flash Gas Moles	53.714		20.01
Flash Liquid Moles	1.624		92.00
Recombination Moles	55.338		
Molar Shrinkage Factor	0.029		
Full Well Stream	0	Moles Liquid	#DIV/0!
Molar ratio	0	Moles Gas	#DIV/0!

	Flash Gas Mol%	Flash Liquid Mol%	Recomb. Liquid Mol%	HP Gas Mol%	Full Well Stream Mol%
Nitrogen	2.63	-----	2.55	0.00	#DIV/0!
Carbon Dioxide	0.17	-----	0.17	0.00	#DIV/0!
Methane	82.35	-----	79.94	0.00	#DIV/0!
Ethane	7.99	0.23	7.76	0.00	#DIV/0!
Propane	4.19	2.73	4.15	0.00	#DIV/0!
I-Butane	0.93	4.32	1.03	0.00	#DIV/0!
N-Butane	0.95	8.29	1.17	0.00	#DIV/0!
I-Pentane	0.27	7.50	0.48	0.00	#DIV/0!
N-Pentane	0.19	7.97	0.42	0.00	#DIV/0!
Hexanes	0.21	20.99	0.82	0.00	#DIV/0!
Heptanes	0.07	25.34	0.81	0.00	#DIV/0!
Octanes plus	0.05	22.63	0.70	0.00	#DIV/0!
	100.00	100.00	100.00	0.00	#DIV/0!
Av. Mol. Weight	20.01	92.00	22.12	0.00	#DIV/0!

K Factors	Flash Gas/ Flash Liquid Ratio	HP Gas/ Recombined Liquid Ratio
C1	-----	0.00
C2	35.25	0.00
C3	1.53	0.00
IC4	0.22	0.00
NC4	0.11	0.00
IC5	0.04	0.00
NC5	0.02	0.00
C6	0.01	0.00
C7	0.00	0.00



TREGONY-1  
Down hole pressure: 2065 psi @ 60°C  
Depth: 1661 m

Tregony 1 GAS BREAK DOWN FROM SEGREGATED RFS SAMPLE TAKEN AT 1545.7M 21-2-01.  
ANALYSIS BY GEOSERVICES UNIT.

TOTAL GAS: 2542 UNITS  
79/13/6/1/1

C1 236379 PPM  
C2 40027 PPM  
C3 16320 PPM  
iC4 3630 PPM  
nC4 3901 PPM

CO2 1.33%

(NOTE: MAXIMUM CO2 GAS READING DURING THE DRILLING OF THE WELL WAS 2.66%.)

## **APPENDIX VIII: WATER ANALYSIS**

No Water Analysis was conducted on Tregony 1.

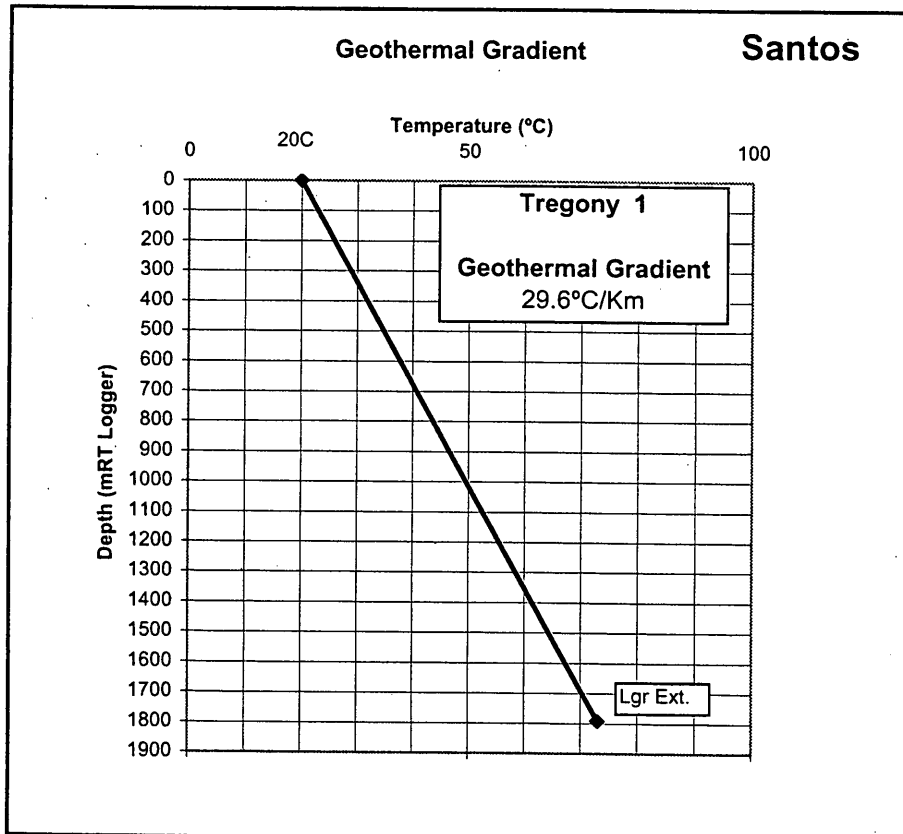
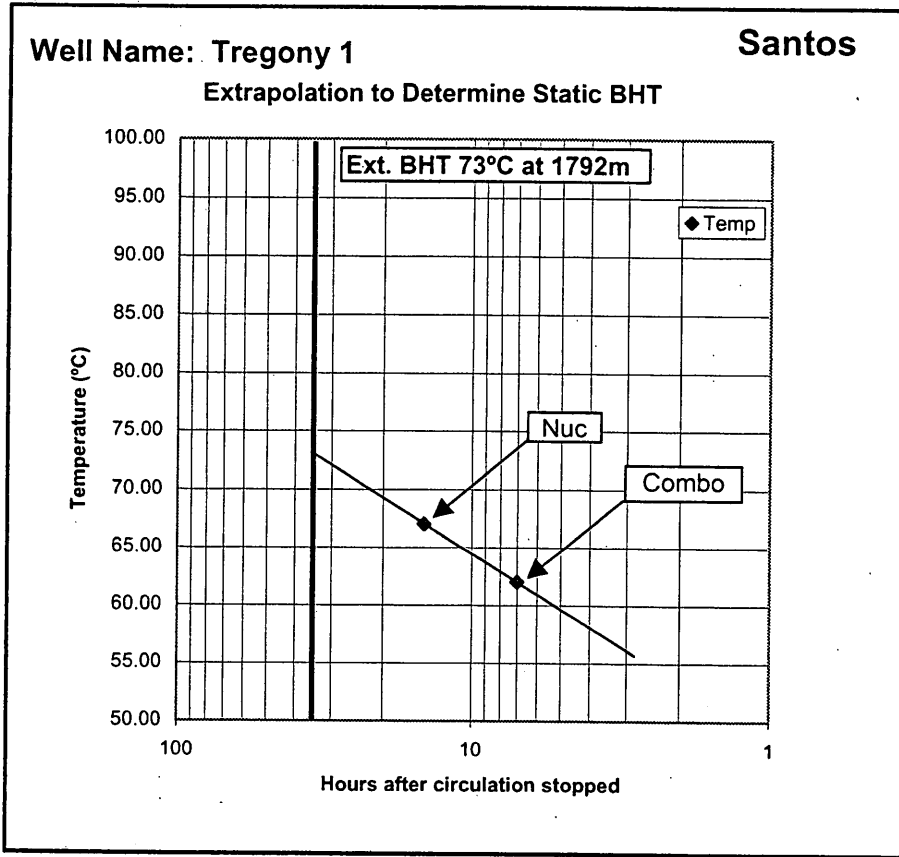
## **APPENDIX VIII: PALYNOLOGICAL ANALYSIS**

No Palynological Analysis was conducted on Tregony 1 samples.



## APPENDIX IX: GEOTHERMAL GRADIENT

Assumed surface temperature = 20°C  
Calculated BHT @ 1792m = 73°C  
Geothermal gradient = 29.6°C/km



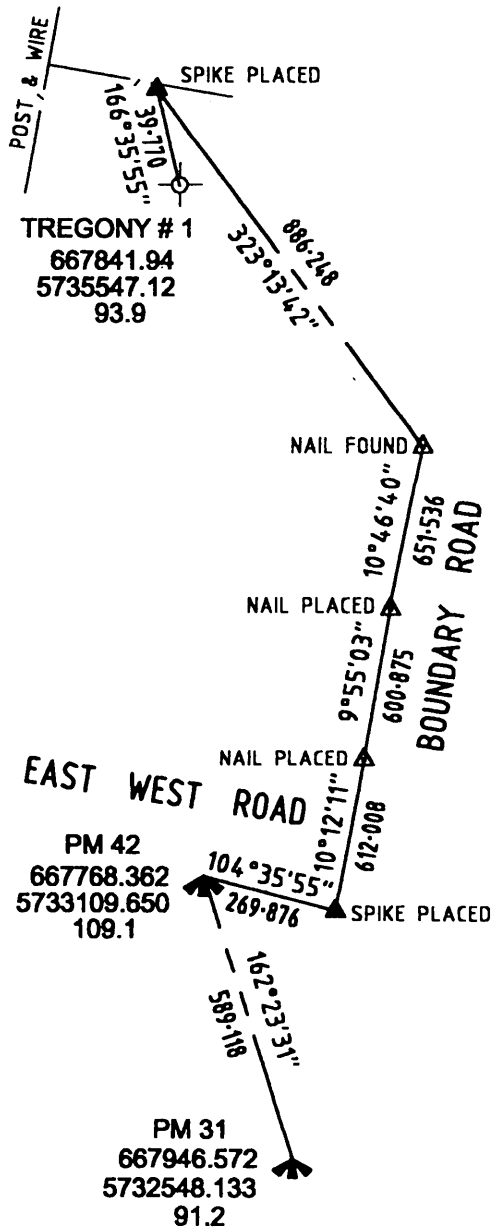
**APPENDIX X: WELL LOCATION SURVEY**

**GAS WELL LOCATION**  
**REFERENCE MARKS SKETCH PLAN**  
**EXPLORATION LICENCE PEP 154**

Well Name **TREGONY # 1**

Map

Spheroid	GDA94 <i>45.53</i>	MGA 94	ZONE 54
Latitude	S 38°30'56"	Measurement units	(metres)
Longitude	E 142°55'30.34"	Easting	667 841.94
Convergence	1°11'56"	Northing	5735 547.12
Scale Factor	0.99993220	Elevation	93.9 (AHD)



**NOTES :** This sketch plan is not to scale.  
 Distances shown are computed grid distances.  
 Bearings shown are computed grid bearings.

**DATUM :** The origin of coordinates was Land Victoria's Survey Mark Enquiry Service (SMES) AGD66 (AMG Zone 54) then transformed to GDA94 (MGA Zone 54) using GDAit software.  
 Height datum is to AHD originating from SMES.

Estimated Horizontal error is less than +/- 0.1 metre.

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

Date of Survey : 15 / 2 / 2001

Paul Crowe Surveyor ABN 59521601183 "Ambleside" 192 Koroit Street Warrambool 3280 Ph. (03) 5561 1500	REF  <b>971</b>
--	-----------------------

Date 16 / 7 / 2001

*Paul Crowe*  
 LICENSED SURVEYOR

**APPENDIX XI: DRILLING - FINAL WELL REPORT**

**SANTOS****FINAL WELL REPORT****TREGONY #1**

Drilling Supervisor(s)	: V. Ozolins
Drilling Engineer(s)	: G. Coker
Report Author	: T. Robertson / D. New <i>PR</i>
Report Supervisor	: D. New
Date of Issue	: 3rd August 2001

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Wellhead Installation Report .....	
Section 5 - Time Breakdown Data .....	
Overview .....	
Trouble Time Breakdown .....	
Section 6 - Survey Data .....	
Survey Report .....	

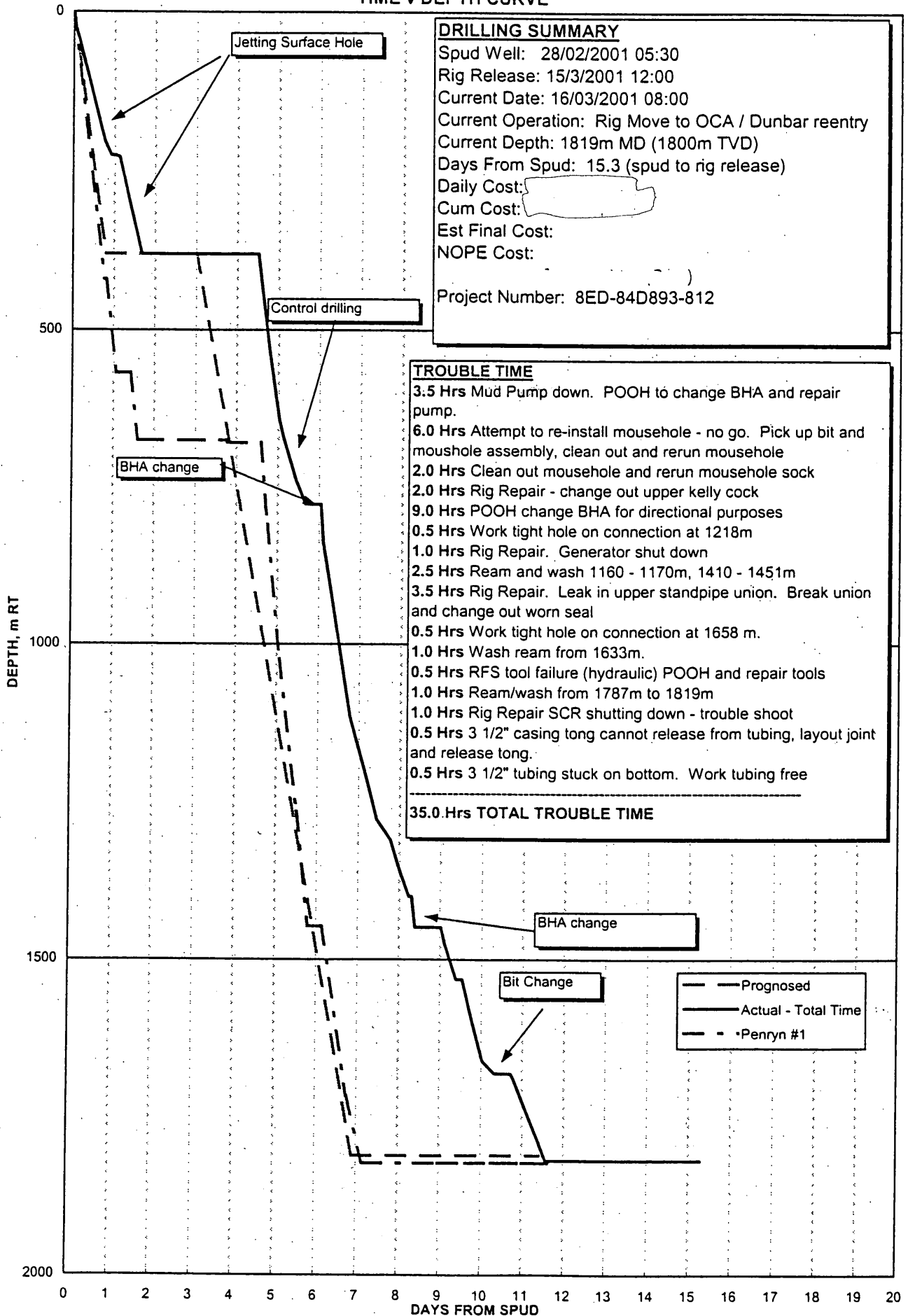
**Section 1.0**

**Well Summary**

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



TREGONY #1  
TIME v DEPTH CURVE



**TREGONY #1**

Drilling Co.: OD&amp;E

Rig: OD&amp;E #30

RT above GL: 4 m Lat : 38 deg 30 min 50.89 sec Spud Date: 28/02/2001 Release Date: 15/03/2001  
 GL above MSL : 93 m Long : 142 deg 55 min 25.49 sec Spud Time: 05:30:00 Release Time: 12:00:00

**ACTIVITY ANNOTATIONS****DATE : 25 February, 2001****REPORT NUMBER : 2****Comment**

Rig Down 100%- Rig Move 95%- Rig Up 25%- Camp  
 0%

**Solution****DATE : 25 February, 2001****REPORT NUMBER : 3****Comment**

Rig Down 100%-Rig Move 100%-Rig Up 60%-Camp  
 100%.

**Solution**

1. Power plug for Drawworks was cut off for repair and while hydraulic crimping new plug, Hydraulic pump failed - New pump hire tomorrow and should not cause too much delay.

**DATE : 27 February, 2001****REPORT NUMBER : 4****Comment**

Rig-up 75% complete. Mudlogging unit 99% rigged up.

**Solution****DATE : 28 February, 2001****REPORT NUMBER : 5****Comment**

Total seepage losses from Turkey's nest estimated at 6-800 bbl - losses have slowed down as ground swells.

**Solution**

Turkey's nest was excavated (but not compacted) after the site was built and near surface limestone can be prone to taking losses. Consider use of pit liner on future sites or some form of compaction to eliminate or reduce seepage.

**DATE : 28 February, 2001****REPORT NUMBER : 5****Comment**

Rig has no comms between Rig Floor - M.Tanks - Mudlogger - TP - DSV so there ends up being a lot more human traffic around the site, this in turn increases safety/hazard risks.

**Solution**

Suggest review / implementation of rig comms system for future wells.

TREGONY #1

Drilling Co.: OD&amp;E

Rig: OD&amp;E #30

RT above GL: 4 m Lat : 38 deg 30 min 50.89 sec Spud Date: 28/02/2001 Release Date: 15/03/2001  
 GL above MSL : 93 m Long : 142 deg 55 min 25.49 sec Spud Time: 05:30:00 Release Time: 12:00:00

**ACTIVITY ANNOTATIONS****DATE : 01 March, 2001****REPORT NUMBER :6****Comment****Solution**

Weather for 28/02/2001 : Late morning showers with high gusting winds, clearing to fine & sunny early afternoon.

Max Temp = 21.6degC Min Temp = 7.1degC

**DATE : 02 March, 2001****REPORT NUMBER :7****Comment****Solution**

Weather for 01/03/2001 : Fine and cool.

Max Temp = 24.2degC Min Temp = 8.9degC

**DATE : 03 March, 2001****REPORT NUMBER :8****Comment****Solution**

Weather for 02/03/2001 : Fine, clear and still.

Max Temp = 22.3degC Min Temp = 9.4degC

**DATE : 04 March, 2001****REPORT NUMBER :9****Comment****Solution**

Rig installed new Remote Kooomey Control for rig floor (removed old unit). This job was one of the items noted some time ago by the VDME that the rig needed to address.

**DATE : 04 March, 2001****REPORT NUMBER :9****Comment****Solution**

Weather for 03/3/2001 : Mainly fine & sunny with cloud buildup in the evening. Outlook @ 0600hrs = Overcast with occ. showers.

Max Temp = 23.4degC Min Temp = 9.9degC  
 0600hrs = 16.8degC

**TREGONY #1**

Drilling Co.: OD&amp;E

Rig: OD&amp;E #30

RT above GL: 4 m Lat : 38 deg 30 min 50.89 sec Spud Date: 28/02/2001 Release Date: 15/03/2001  
 GL above MSL : 93 m Long : 142 deg 55 min 25.49 sec Spud Time: 05:30:00 Release Time: 12:00:00

**ACTIVITY ANNOTATIONS****DATE : 05 March, 2001****REPORT NUMBER :10****Comment**

Slower ROP due to control drilling to minimise hole angle / direction change.

**Solution****DATE : 05 March, 2001****REPORT NUMBER :10****Comment**

Turkey's Nest maintaining seepage losses of approx 200 - 400bbl/day.

**Solution**

Consider using a pit liner on future wells (water truck takes 1.5hrs per 200bbl load at \$75/hr).

**DATE : 05 March, 2001****REPORT NUMBER :10****Comment**

Weather for 04/3/2001 : O/cast cleared to partly cloudy with moderate E winds. Outlook @0600hrs = cool, still and clear.

**Solution**

Max Temp = 21.8degC Min Temp = 14degC  
6am = 14.4degC

**DATE : 06 March, 2001****REPORT NUMBER :11****Comment**

Reaming 3x times on connections when survey indicated higher build rate, to try to reduce build.

**Solution**

No real indication of this having any effect, although Sperry advise this should work in v.soft formations.

**DATE : 06 March, 2001****REPORT NUMBER :11****Comment**

Changed out saver sub when DSV noticed that the box connection was belled. On measurement it was found to be 1/8" over OD at the top of the box.

**Solution**

Rig to keep record of saver sub hours & make frequent visual inspections - especially after any operation involving excessive torque.

TREGONY #1

Drilling Co.: OD&amp;E

Rig: OD&amp;E #30

RT above GL: 4 m Lat : 38 deg 30 min 50.89 sec Spud Date: 28/02/2001 Release Date: 15/03/2001  
 GL above MSL : 93 m Long : 142 deg 55 min 25.49 sec Spud Time: 05:30:00 Release Time: 12:00:00

## ACTIVITY ANNOTATIONS

DATE : 06 March, 2001	REPORT NUMBER :11
Comment	Solution
<p>Weather for 05/3/2001 : Fine &amp; sunny, low winds.            Outlook @0600hrs = cool, still &amp; clear.</p> <p>Max Temp = 29.2degC Min Temp = 13.1degC            @6am = 14.2degC</p>	
DATE : 07 March, 2001	REPORT NUMBER :12
Comment	Solution
<p>Weather for 06/03/2001 : Warm &amp; sunny with clear            skies. Outlook @0600hrs = Mild &amp; clear with light            breeze.</p> <p>Max Temp = 32.3degC Min Temp = 16.1degC            @6am = 16.5degC</p>	
DATE : 07 March, 2001	REPORT NUMBER :12
Comment	Solution
<p>Turkey's nest still has water seepage in the order of            400bbls/day.</p>	
DATE : 08 March, 2001	REPORT NUMBER :13
Comment	Solution
<p>Weather for 07/03/2001 : Warm &amp; sunny with clear            skies. Outlook @0600hrs = Cool &amp; clear.</p> <p>Max Temp = 31.2degC Min Temp = 13degC            @6am = 13.6degC</p>	
DATE : 09 March, 2001	REPORT NUMBER :14
Comment	Solution
<p>Weather for 08/3/2001 : Warm &amp; clear with light            breeze. Outlook @0600hrs : Cool, clear and calm.</p> <p>Max Temp = 34.2degC Min Temp = 15.4degC            @6am = 16degC</p>	
DATE : 10 March, 2001	REPORT NUMBER :15
Comment	Solution
<p>Both rig crews conducted BOP drills with stabbing            valve: day crew time = 20secs; night crew time =            23secs.</p>	

TREGONY #1

Drilling Co.: OD&amp;E

Rig: OD&amp;E #30

RT above GL: 4 m Lat : 38 deg 30 min 50.89 sec Spud Date: 28/02/2001 Release Date: 15/03/2001  
 GL above MSL : 93 m Long : 142 deg 55 min 25.49 sec Spud Time: 05:30:00 Release Time: 12:00:00

**ACTIVITY ANNOTATIONS****DATE : 10 March, 2001****REPORT NUMBER : 15****Comment**

Conducted flow check after drilling into top of Waarre fm. MW = 9.15ppg, getting hi torque while drilling ahead - driller momentarily stuck while drilling @ 1658m. Possibly due to combination of interbedded shales and slight dogleg from recent hole angle correction back to target.

**Solution**

Driller working pipe prior to drilling ahead if necessary, to reduce torque.

**DATE : 10 March, 2001****REPORT NUMBER : 15****Comment**

Weather for 09/03/2001 : Hot, fine & sunny with mild breeze. Outlook @0600hrs = Overcast, high storm cloud, forecast for possible rain showers over the weekend.

**Solution**

Max Temp = 36.8degC Min Temp = 16.7degC  
 @6am = 21degC

**DATE : 11 March, 2001****REPORT NUMBER : 16****Comment**

Motor run bit at end of run - occ. stall out & high torque with slow ROP in sand with interbedded shales. Indications of bit going UG (TQ) & with slow ROP made decision to POH for (1) slow PR, (2) high TQ, (3) bit HRS - at current ROP bit would not have made it to TD, (4) L/D motor & MWD - high \$ items no longer req'd in hole.

**Solution****DATE : 11 March, 2001****REPORT NUMBER : 16****Comment**

On trip out - 1st stand okay, then 5-15k o/pull for next 5 stands. Worked through tight spot from 1530-1410m with 35k max o/pull. Otherwise hole condition okay - no signs of tight hole around 1250m (previous trips).

**Solution****DATE : 11 March, 2001****REPORT NUMBER : 16****Comment**

Weather for 10/3/2001 : Overcast with a few drops of rain, cool in the evening. Outlook @0600hrs = Cool, calm, partly overcast & clearing.

**Solution**

Max Temp : 23degC Min Temp = 10.3degC  
 @6am = 11degC

**TREGONY #1**

Drilling Co.: OD&amp;E

Rig: OD&amp;E #30

RT above GL: 4 m Lat : 38 deg 30 min 50.89 sec Spud Date: 28/02/2001 Release Date: 15/03/2001  
 GL above MSL : 93 m Long : 142 deg 55 min 25.49 sec Spud Time: 05:30:00 Release Time: 12:00:00

**ACTIVITY ANNOTATIONS****DATE : 12 March, 2001****REPORT NUMBER :17****Comment****Solution**

On trip out at TD, pulled 1st 4 stands with 20-30k overpull & intermittent hole swabbing - worked pipe 15m to clear stabiliser/wipe wall cake & then no overpull observed. After 1st 4 stands, the hole was good. Rotated out using pipe spinner until drill string inside casing shoe.

**DATE : 12 March, 2001****REPORT NUMBER :17****Comment****Solution**

Weather for 11/03/2001 : Cool, clear & sunny with light winds. Outlook @0600hrs = Cold, overcast & rain, moderate gusting winds, temp dropping.

Max Temp = 19.9degC Min Temp = 10.1degC  
 @6am = 11degC

**DATE : 13 March, 2001****REPORT NUMBER :18****Comment****Solution**

No hole problems during logging operations. Some logging tool malfunctions did occur. GR was run to surface during run-2 when it malfunctioned on run-1 and several hours were lost when the hydraulic system on the RFS tool developed a fault & had to be POH to troubleshoot before rerunning the tool to take a formation sample.

**DATE : 13 March, 2001****REPORT NUMBER :18****Comment****Solution**

Weather for 12/3/2001 : Cold, overcast with showers & moderately gusting winds - clearing in late afternoon. Outlook for 0600hrs = overcast, cool & light winds.

Max Temp = 17.6degC Min Temp = 10.8degC  
 @6am = 12degC

**DATE : 14 March, 2001****REPORT NUMBER :19****Comment****Solution**

While circulating (prior to POH laying down pipe), TP advised that a bearing was out in one of the crown sheaves. Rig will continue working as there is not much load (string weight), but with caution/monitoring of crown for any signs of further deterioration in the bearing.

TP advised that they will plan to overhaul crown block during rigmove and most likely change out all crown sheave bearings at the same time (yet to be confirmed).

TREGONY #1

Drilling Co.: OD&amp;E

Rig: OD&amp;E #30

RT above GL: 4 m    Lat : 38 deg 30 min 50.89 sec    Spud Date: 28/02/2001    Release Date: 15/03/2001  
 GL above MSL : 93 m    Long : 142 deg 55 min 25.49 sec    Spud Time: 05:30:00    Release Time: 12:00:00

**ACTIVITY ANNOTATIONS**

DATE : 14 March, 2001

REPORT NUMBER : 19

Comment	Solution
Details of pressures taken with RFS:	
@1654mMD = 2062.9psi FmHP;    @1657.8m = 41.2psi FmHP;	
@1661mMD = 2065.4psi FmHP;    @1670mMD = 2107.8psi FmHP;	
@1674.5mMD = 2069.2psi FmHP;    @1681.5mMD = 0psi FmHP;	
@1682mMD = 2069psi FmHP;    @1685.5mMD = 2082.7psi FmHP;	
@1693mMD = 2138.2psi FmHP;    @1701.2mMD = 2073.8psi FmHP;	
@1702.9mMD = 2074.9psi FmHP;    @1706mMD = 1244.1psi FmHP;	
@1709.9mMD = 2078.1psi FmHP;    @1723.5mMD = 2065.2psi FmHP;	
@1724.7mMD = 2066.5psi FmHP;    @1727.9mMD = 2071.2psi FmHP;	
@1739.5mMD = 2087.8psi FmHP;    @1741mMD = 2089.9psi FmHP;	
@1756.7mMD = 851.8psi FmHP;    @1760.6mMD = 2308.4psi FmHP;	
@1760.7mMD = 2308.8psi FmHP.	

DATE : 14 March, 2001

REPORT NUMBER : 19

Comment	Solution
Weather for 13/4/2001 : Overcast, cool & slight winds. Outlook @0600hrs = Overcast, mild & calm.	
Max Temp = 20.6degC    Min Temp = 10.3degC @6am = 11.5degC	



TREGONY #1

Drilling Co.: OD&amp;E

Rig: OD&amp;E #30

RT above GL: 4 m Lat : 38 deg 30 min 50.89 sec Spud Date: 28/02/2001 Release Date: 15/03/2001  
 GL above MSL : 93 m Long : 142 deg 55 min 25.49 sec Spud Time: 05:30:00 Release Time: 12:00:00

**ACTIVITY ANNOTATIONS****DATE : 15 March, 2001****REPORT NUMBER :20****Comment**

Premium Casing Services equipment lacking main slips, tong spring & base plate until 0600hrs (arrived ex Adelaide w/SAPP). Operation slower than normal due to missing items - estimate 2-3 hrs lost during entire job.

Items were despatched ex Perth one week ago but ended up in Adelaide.

**Solution**

Additional follow through by despatcher to ensure items arrive at destination and/or copy of paperwork sent to destination (rig) so that they know items are coming - if items do not arrive they can then follow up.

**DATE : 15 March, 2001****REPORT NUMBER :20****Comment**

Premium Casing Services casing tong had problems getting them to 'bite' onto the tubing. They had 2x tong die types - one was for chrome tubing which were not suitable on the softer J55 tubing and the other dies did not seem to grip the tubing evenly. The end result was frequent slippage on the tubing causing occasional gouging/scraping to the tubing and time delays.

**Solution**

Premium Services Operator advised he will check in Moomba for alternate dies which he thought would suit better. Part of the problem was also due to not having the correct tong arm spring initially, which caused the tongs to sit unevenly. Apparently tongs are also quite old and may require maintenance/servicing.

**DATE : 15 March, 2001****REPORT NUMBER :20****Comment**

The Premium Tong could not break out the 3-1/2" x 10ft pup joint (after tagging bottom) and gouged the tong die area on the tubing. A rag was placed across one die to get the tongs to bite and backout the joint, but then the tongs siezed up and would not release from the pipe. It took 20 mins to dismantle the tong sufficiently to release the pipe and recover the circulating swage.

**Solution**

Refer earlier comment - dies & tong require maintenance/servicing.

Premium Casing Services indicated they need one day to check out all their on-site equipment, prior to the job.

**DATE : 15 March, 2001****REPORT NUMBER :20****Comment**

Weather for 14/3/2001 : Overcast & mild with light winds. Outlook @0600hrs = Clear & cool, light breeze.

Max Temp = 22.7degC Min Temp = 10degC  
 @6am = 11.2degC

**Solution****DATE : 15 March, 2001****REPORT NUMBER :20****Comment**

Reciprocated pipe throughout cementing & part of displacement. Good returns throughout cement job - noted approx 10bbl returns to surface of the pre-flush, during final stages displacement - no cement to surface.

**Solution**

TREGONY #1

Drilling Co.: OD&amp;E

Rig: OD&amp;E #30

RT above GL: 4 m Lat : 38 deg 30 min 50.89 sec Spud Date: 28/02/2001 Release Date: 15/03/2001  
 GL above MSL : 93 m Long : 142 deg 55 min 25.49 sec Spud Time: 05:30:00 Release Time: 12:00:00

**ACTIVITY ANNOTATIONS**

DATE : 15 March, 2001

REPORT NUMBER :21

**Comment****Solution**

Cement samples just starting to thicken after 4hrs WOC. Recorded string weight at start & every 1/2hr during WOC but no change observed. Str.wt stayed at 55k (inc.blocks) - PU 40k over str.wt & lowered slips through BOP & landed tubing - okay. Tightened tie-downs.

DATE : 15 March, 2001

REPORT NUMBER :21

**Comment****Solution**

Final cut on 3-1/2" tbg stub made using angle grinder, to 3" above top of Bradenhead flange. Seal pocket on Adapter flange measured 2-3/4" deep and 2" to (cross) seal. With 1/2" gap for ring gasket separation, internal clearance for tbg is 1/4" from top of seal pocket and sits +1/2" across seal.

DATE : 15 March, 2001

REPORT NUMBER :21

**Comment****Solution**

Xmas tree nipped up with 2" companion flange on Flow Cross pointing directly down access road off Boundary Rd.

DATE : 15 March, 2001

REPORT NUMBER :21

**Comment****Solution**

Turkey's nest completely dry. Rig tanks all dumped and cleaned - sump has approx 1.5 - 2 ft of mud in it at rig release.

**Section 2.0**

**Well History**

**- IDS Well History Report**

TREGONY #1

Drilling Co.: OD&amp;E

Rig: OD&amp;E #30

RT above GL: 4 m Lat : 38 deg 30 min 50.89 sec Spud Date: 28/02/2001 Release Date: 15/03/2001  
 GL above MSL : 93 m Long : 142 deg 55 min 25.49 sec Spud Time: 05:30:00 Release Time: 12:00:00

## Well History

#	DATE	DEPTH	WELL HISTORY ( 24 Hr Summary )
1	23/02/2001	0	Rig release McIntee #1 ( 06:00 Hrs ), Rig down rig, wait on daylight.
2	24/02/2001	0	Wait on Daylight, Rig Move Operations, Wait on Daylight.
3	25/02/2001	0	Wait On Daylight, Move & Rig Up Camp, Rig Up Over Tregony #1, Wait On Daylight.
4	26/02/2001	16	WO.Daylight to 0600hrs, continue rig-up, raise mast @ 1700hrs, mix spud mud, dress 20" conductor, install riser & return flowline.
5	27/02/2001	16	Continue rigging up - drill mousehole and rathole (redrill rathole). Move BHA to pipe racks - clean, strap & caliper BHA. Prepare drilling tools.
6	28/02/2001	203	Rig up, inspect rig, conduct pre-spud & safety meetings, spud well @ 0530hrs & drill (rotary & jetting) 9-7/8" hole to 203m taking directional surveys.
7	01/03/2001	380	Drill (rotary & jetting) 9-7/8" hole from 203m to 224m - take dir.surveys. Rig repair (MP#1 down) - POH & repos'n stab. RIH & drill (rotary & jetting) to 380m. Circ, wiper trip. Circ hole clean & pump slug.
8	02/03/2001	380	POH, lay out 6.5" BHA. Run 7-5/8" casing, circ, safety meeting, head up cementers. P/test lines, pump pre-flush, drop plug & pump 11.5ppg lead & 15.6ppg tail slurries. Drop plug, displace w/rig & bump plug. WOC, cut 20", NU WHD & BOP.
9	03/03/2001	380	Nipple up BOP's & function test. NU kill line, HCR & choke manifold. Install wear bushing, reinstall mousehole. P/test surface pressure control equipment to 300psi low & 2000psi high (u. kelly cock failed).
10	04/03/2001	528	P/test floor valves, replace U.kelly cock & retest, do Koomey performance test. MU new bit, MWD tools & test. PU new BHA & RIH to 360m. L/O excess DP, drill out shoe track & 3m new hole, run LOT to 16.1ppg EMW. Drill ahead to 528mMD.
11	05/03/2001	778	Control drill from 528mMD to 788mMD taking MWD surveys. POH to change BHA to pendulum assy to try to drop angle.
12	06/03/2001	1,114	POH, change BHA to slight pendulum assy, RIH and drill ahead from 778m to 1114mMD.
13	07/03/2001	1,325	Drill ahead in 6-3/4" hole from 1114m to 1325mMD.
14	08/03/2001	1,449	Drill to 1449m, POH & change BHA. Pick up Sperry motor, check MWD & RIH to shoe. Slip drill line & RIH to bottom - ream tight spots. Motor drill to 1451mMD.
15	09/03/2001	1,599	RIH to bottom with motor BHA, ream tight spots at 1180m & 1420m. Drill ahead using motor to slide & rotate to correct hole angle and steer towards target.
16	10/03/2001	1,688	Drill 6-3/4" hole from 1599m to 1681mMD. Slow ROP, high TQ, POH for bit & BHA change. L/out Motor, MWD tools & 1x stabiliser. RIH with new bit, wash/ream to bottom & drill ahead from 1681m to 1688mMD (1668mTVD).
17	11/03/2001	1,819	Drill 6-3/4" hole from 1688m to TD at 1819mMD (1796mTVD). Circulate BU, drop carbide, circulate hole clean & flow check. Drop MSS survey, pump slug & POH for logs.
18	12/03/2001	1,819	POH, strap out & lay out NMDC, stabiliser, subs, recover survey & bit. Pre-Logging Safety meeting, RU and run electric logs. Failure in RFS tool hydraulics, POH & troubleshoot. Rerun RFS tool to collect formation sample.
19	13/03/2001	1,819	Finish running electric logs & rig down loggers. RIH slick, wash to bottom & circulate hole clean. POH laying down DP & BHA (repair rig SCR). Pull wear bushing, clear rig floor & rig up to run 3-1/2" tubing.
20	14/03/2001	1,819	Run 3-1/2" prod.casing & wash 13m to btm. Circ casing, pre-job Safety meet, HU & pump pre-flush. P/test lines to 2k, drop B-plug, mix/pump 11.5ppg Lead & 15.6ppg Tail cmt slurries, drop T-plug, displace & bump plug. WOC, prep to set slips.
21	15/03/2001	1,819	WOC, set 3-1/2" slips w/40k overpull. ND Kill & choke lines, hang off BOP assy & rough cut tbg. ND & lay out BOP assy. Make final cut & bevel on tbg. NU Seal Adapter flange & Xmas tree. LD kelly & swivel - release rig @1200hrs, 15/3/01.

**Section 3.0****Drilling Data**

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

RT above GL : 4 m  
 GL above MSL : 93 m  
 Lat : 38 deg 30 min 50.89 sec  
 Long : 142 deg 55 min 25.49 sec

Spud Date: 28/02/2001  
 Spud Time: 5:30  
 Release Date: 15/03/2001  
 Release Time: 12:00

Total Cost: \$ 28,590

MUD RECAP

R#	DATE	TYPE	DEPTH F	TMP F	MW ppg	VIS secs /qt	PV cps	YP lbs/ 100ft2	Gel10s lbs/ 100ft2	Gel10m lbs/ 100ft2	F.L. API (cm3/ 30min)	F.L. hthp (cm3/ 30min)	Sols %	Sand %	MBT %	PH	Cl ppm	HARD /Ca ppm	KCI %	DAILY \$
5	27/02/2001		16		8.5	41	4	15	9	20						9.0				1,400
6	28/02/2001	Gel Spud Mud	186	77	8.9	40	9	16	11	21						9.0				880
7	01/03/2001	Gel Spud Mud	380	82	9.0	40	10	16	11	19				.25		9.0				676
8	02/03/2001	Gel Spud Mud	380		9.0	39	11	15	10	20				.25		9.0				0
9	03/03/2001	KCL/PHPA/Polymer	380		8.6	37	5	5	3	5	10.0		2.1			9.0	20,500	120	4	1,906
10	04/03/2001	KCL/PHPA/Polymer	500	68	8.6	37	5	6	4	6	9.8		2.1	TR	4.0	9.0	20,000	120	4	1,106
11	05/03/2001	KCL/PHPA/Polymer	779	77	8.8	38	5	5	3	5	9.5		3	TR	2.0	9.5	19,800	160	4	2,804
12	06/03/2001	KCL/PHPA/Polymer	1,103	86	9.0	40	9	8	5	8	7.2		4.5	.15	2.0	9.0	18,400	200	4	4,018
13	07/03/2001	KCL/PHPA/Polymer	1,314	45	9.0	45	12	11	6	9	5.6		4.5	.25	4.0	9.5	19,500	240	4	4,507
14	08/03/2001	KCL/PHPA/Polymer	1,449	47	9.0	47	13	14	5	9	5.2		4.7	.2	4.0	9.5	19,400	240	4	4,552
15	09/03/2001	KCL/PHPA/Polymer	1,582	118	9.2	48	13	13	5	8	5.0		5.2	0.3	4.0	9.4	19,000	240	4	1,498
16	10/03/2001	KCL/PHPA/Polymer	1,680		9.2	47	14	14	7	10	4.6		5.8	0.2	3.0	9.2	18,600	240	4	1,434
17	11/03/2001	KCL/PHPA/Polymer	1,819	86	9.3	48	14	15	7	10	4.6		6.3	.25	2.5	9.0	18,700	200	4	2,135
18	12/03/2001	KCL/PHPA/Polymer	1,819		9.3	46	14	13	5	9	4.6		6.4	0.2	2.0	9.0	184,000	200	4	0
19	13/03/2001	KCL/PHPA/Polymer	1,819	86	9.3	46	15	13	6	9	4.6		6.4	.25	4.0	8.8	18,400	240	4	1,062
20	14/03/2001	2% KCL Brine Displ.Fluid	1,819		8.5	28	1	0											2	612

**TREGONY #1**

Drilling Co.: OD&E

Rig: OD&E #30

RT above GL 4 m  
GL above MSL 93 m

Lat : 38 deg 30 min 50.89 sec  
Long : 142 deg 55 min 25.49 sec

Spud Date: 28/02/2001  
Spud Time: 5:30  
Release Date: 15/03/2001  
Release Time: 12:00

**BHA SUMMARY**

#	Length ( m )	Weight (k-lbs)	Weight blw/Jars (k-lbs)	String Weight (k-lbs)	Pick-Up Weight (k-lbs)	Slack-Off Weight (k-lbs)	Torque Max (ft-lbs)	Torque on bottom (ft-lbs)	Torque off bottom (ft-lbs)	BHA DESCRIPTION
1	172	35	35	44	47	43				9.88"Bit + 7.75"Bit Sub + X/O + 9.88"Slab + X/O + 6.75" UBHO + 6.75"NMDC + X/O + 11x6.5"DC + X/O + 6x3.5"HWDWP.
2	264	36	27	46	51	42				6.75"PDCC + 6.72"NB.Slab + MWD-NM.Sub + 4.75"HO-NMDC + 6.68"Slab + 17x4.75"DC + Jars + 3x4.75"DC + 6xHWDWP.
3	270	33	24	77	85	70				6.75"PDCC + Bit sub + Pony DC + Float sub + 6.72"NB.Slab + MWD-NM.Sub + 4.75"HO-NMDC + 6.68"Slab + 16x4.75"DC + Jars + 3x4.75"DC + 6xHWDWP.
4	274	33	24	86	97	77	300	300	180	6.75"TC.Bit + 4.75"MTR-1.15D + Float sub + 6.72"NB.Slab + MWD-NM.Sub + 4.75"HO-NMDC + 6.68"Slab + 4.75"NMDC + 16x4.75"DC + Jars + 3x4.75"DC + 6xHWDWP.
5	253	30	22	87	103	76	160	160	140	6.75"TC.Bit + Float sub + NMDC + 6.62"Slab + 16x4.75"DC + Jars + 3x4.75"DC + 6xHWDWP.
6	243	29	21	88	100	89				6.75"TC.Bit + Bit sub + 16x4.75"DC + Jars + 3x4.75"DC + 6xHWDWP.

**TREGONY #1**

Drilling Co.: OD&E

Rig : OD&E #30

Lat : 38 deg 30 min 50.89 sec  
 Long : 142 deg 55 min 25.49 sec

Release Date: 15/03/2001  
 Release Time: 12:00:00

Spud Date: 28/02/2001  
 Spud Time: 05:30:00

**BIT RECORD**

DATE	BIT#	SIZE	IADC	SER	MFR	TYPE	JETS	D.IN	D.OUT	MTRG	HRS	SPP	FLW	WOB	RPM	MW	TFA	VEL	HHP	ROP	I	O1	D	L	B	G	O2	R
23/02/2001	XX	0.00					X	0	0	0	0.0	0	0	0.0	0	0.0	0.371	143	0.00	22.1	2	WT	A	E	I	NO	TD	
02/03/2001	1RR	9.88	116	LY9255	SMITH	FGSSJ-2C	1x22,2x0	16	380	365	16.5	2423	545	8.0	100	9.0	0.371	84	0.00	16.0	2	CT	I	X	I	NO	BHA	
05/03/2001	2	6.75	S121	JS3057	GEOD	S98PX	4x11	380	788	408	25.5	1291	316	3.1	124	8.7	0.371	81	2.86	12.5	4	CT	NM	X	I	ER	BHA	
08/03/2001	2RR	6.75	S121	JS3057	GEOD	S98PX	4x11	778	1,449	671	53.5	1703	314	4.3	124	9.0	0.371	81	2.86	12.5	4	CT	NM	X	I	ER	BHA	
10/03/2001	3	6.75	117M	C72JC	HUGHES	STR-1	3x14	1,449	1,681	232	26.5	2035	247	15.4	209	9.2	0.451	53	1.02	8.8	3	RG	G	E	3/8	WT	PR	
12/03/2001	4	6.75	437M	D85YU	HUGHES	STR-R09D	1x14,1x12,1x1	1,681	1,819	138	20.0	2082	269	17.8	99	9.4	0.261	0	0.00	6.9	2	WT	A	E	I	NO	TD	
13/03/2001	4RR	6.75	437M	D85YU	HUGHES	STR-R09D	1x28,1x28,1x1	1,819	1,819	0	0.0	0	0	0.0	0	9.3	1.804	0	0.00		2	WT	A	E	I	NO	TD	





**Section 4.0****Casing and Cementing**

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



<h1>Santos</h1>	<h2>CASING &amp; CEMENTING REPORT</h2>	<h2>FORM</h2>
Santos Ltd A.C.N. 007 550 923	<b>Well Name: TREGONY #1</b>	<b>DQMS F-220</b>

Casing type:  Surface casing  Intermediate Casing  Production Casing  Completion tubing

Originated by: Vilnis Ozolins      Checked by: Geoff Coker      Date: 16-Mar-2001

Hole Size: 3-1/2"    T.D.: 1819    mMD    Date: 14/03/2001    Contractor: Schlumberger

**PRE-FLUSH**    40    bbls. @    8.5    ppg.      **SPACER**    10    bbls@    8.4    ppg.

Additives: Aldacide = 0.5 dr  
S.A.P.P. = 6 sx

CEMENT	ADDITIVES	Product	%	Amount
LEAD SLURRY:                      319                      sx class                      G		D066 Silica Flour	BWOC	lbs
Slurry Yield:                      2.84                      cu.ft./sack		D020 Bentonite	4.00 BWOC	1199 lbs
Mixwater Req't:                      17.56                      gal./sack		D167 UniFLAC	BWOC	lbs
Actual Slurry Pumped:                      162.5                      bbls @                      11.5    ppg		S001 Calc.Chloride	0.50 BWOC	150 lbs
		D110 Retarder	gal/sk	gal
		D047 Antifoam	0.01 gal/sk	3.2 gal
TAIL SLURRY:                      132                      sx class                      G		D066 Silica Flour	BWOC	lbs
Slurry Yield:                      1.19                      cu.ft./sack		D167 UniFLAC	BWOC	lbs
Mixwater Req't:                      5.3                      gal./sack		D080 Dispersant	0.05 gal/sk	6.6 gal
Actual Slurry Pumped:                      29.06                      bbls @                      15.6    ppg		D153 Antisettling	BWOC	lbs
		D110 Retarder	gal/sk	gal
		D047 Antifoam	0.01 gal/sk	1.3 gal

**DISPLACEMENT**      Fluid: 2% KCL      @    8.6    ppg

Theoretical Displ.:                      51.86                      bbl.      Bumped plug with                      500    psi

Actual Displ.                      51.86                      bbl @                      4.7    bpm      Pressure Tested to:                      2000    psi

Displaced via                      Rig / Truck Pump      Bleed back:                      0.5    bbls

ACTIVITY	Time	Returns to Surface:    197    bbls mud                      bbls cmt.
Start Running csg.	02:30	Reciprocate / Rotate Casing:    Reciprocated casing 2-3m entire job to 1/2 way into displacement
Casing on Bottom	18:00	Top Up Job run:    Yes / No    No                      sx class
Start Circulation	17:00	Plug Set Make / Type:    Davis-Lynch : Bottom + Ball + Top
Start Pressure Test	20:32	Centraliser Placement, type/depth:    1813m, 1806m, 1797m, 1781m, 1758m, 1739m, 1720m,
Pump Preflush	20:22	1700m, 1681m, 1662m, 1643m, 1620m, 362m, 343m.
Start Mixing	21:20	
Finish Mixing	22:13	Remarks: Length of cut-off top joint = 5.31m
Start Displacing	22:20	
Stop Displ./Bump	22:34	
Start Press. test	22:35	

No. JOINTS	SIZE OD	WT lb/ft	GRADE	THREAD	MTS	FROM	TO
Stick Up (Enter as negative number)					-0.790	-0.79	
Rotary table to top of Bradenhead					4.598		4.60
Bradenhead / Tubing Hanger or Slip and Seal							
				WG-22 11" x 3-1/2"		4.60	4.60
						4.60	4.60
						4.60	4.60
170 Jts	3.5	9.3	J55	New NK3SB	1629.230	4.60	1633.83
1 marker	3.5	9.3	J55	New NK3SB	3.079	1633.83	1636.91
15 Jts	3.5	9.3	J55	New NK3SB	144.288	1636.91	1781.20
1 marker	3.5	9.3	J55	New NK3SB	3.085	1781.20	1784.28
2 Jts	3.5	9.3	J55	New NK3SB	19.234	1784.28	1803.51
1 Jts	3.5	9.2	13CR95	New NK3SB box to FOX pin	6.167	1803.51	1809.68
Float Collar	3.5		P110	FOX, Davis-Lynch 700 PVTS	0.350	1809.68	1810.03
1 Joint	3.5	9.2	13CR95	FOX	6.232	1810.03	1816.26
Float Shoe	3.5		P110	FOX, Davis-Lynch 500 PVTS	0.735	1816.26	1817.00

Theoretical Bouyed wt of casing(klb):                      47.900    klbs      Bradenhead Height above GL                      0.15    m

Actual wt of casing (last joint run-block wt, klb)                      48.000    klbs      Casing wt just prior to landing casing                      47.000    klbs

Landing WT (after cementing and pressure bleed off)                      47.000    klbs      setting slips (overpull)                      87.000    klbs

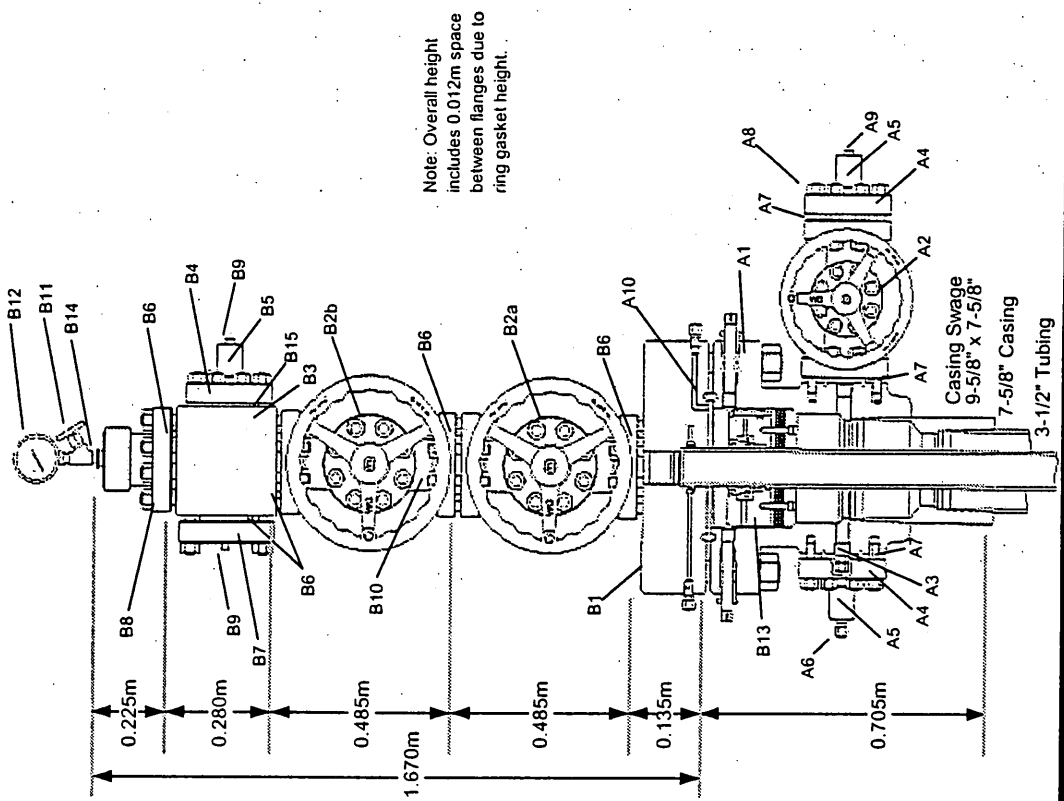
# Santos

## WELLHEAD INSTALLATION REPORT 2 STRING MONOBORE (7-5/8" SURFACE CASING)

FORM  
DQMS F-130

Well: TREGONY #1  
Supervisor: Vilnis Ozolins  
Date: 16-Mar-2001

COMPONENT	DESCRIPTION	No USED
A1. Casing Head	11" 5k x 7-5/8" 5k c/w BTC Box (WG-22-L, PSL-1, PR-2, AA, U)	1
A2. Gate Valve	2-1/16" 5k Model 2200 (Type 'FE', PSL-1, PR-1, BB, U)	1
A3. Plug	1-1/2" line pipe c/w 1-1/4" hex	1
A4. Companion Flange	2-1/16" 5k x 2" line pipe, (AA, U)	2
A5. Bull Plug	2" line pipe tapped c/w 1/2" NPT, XX-H	2
A6. Test Fitting	1/2" NPT	1
A7. Ring Gasket	RX-24 Stainless Steel	3
A8. Studs	7/8" x 6-1/4" long c/w nuts	8
A9. Pipe Plug	1/2" NPT male	1
A10. Ring Gasket	RX-54 Stainless Steel	1
B13. Slip & Seal Assy	11" x 3-1/2" (WG-22, PSL-1, PR-2, AA, U)	1
B1. Adaptor Flange	11" x 3-1/8" 5k, 3.5" P seal, 3" H BPV (WG-A4-P, PSL-1, CC, U)	1
B2a. Gate Valve	3-1/8" 5k Model 2200 (6A, PSL-2, PR-1, CC, PU, 410/NITRO)	1
B2b. Gate Valve	3-1/8" 5k Model 2200 (6A, PSL-1, PR-2, BB, U, AS/NITRO)	1
B3. Flow Cross	3-1/8" x 3-1/8" x 3-1/8" x 2-1/16" 5k (PSL-1, PR-2, CC, U)	1
B4. Companion Flange	2-1/16" 5k x 2" line pipe, (AA, U)	1
B5. Bull Plug	2" line pipe tapped c/w 1/2" NPT, XX-H	1
B6. Ring Gasket	RX-35 Stainless Steel	5
B7. Blind Flange	3-1/8" 5k tapped 1/2" NPT (CC, U)	1
B8. Tree Cap	3-1/8" 5k c/w Bowen union, 3.5" lift thread, tapped 1" NPT	1
B9. Pipe Plug	1/2" NPT male	1
B10. Studs	7-1/4" x 1-1/8" w/ nuts	8
B11. Needle Valve	1/2" NPT 5k Stainless Steel	0
B12. Pressure Gauge	1/2" NPT 0-5000psi	0
B14. Reducer	1" male x 1/2" female NPT Reducer	1
B15. Ring Gasket	RX-24 Stainless Steel	1
Notes:	3-1/2" Tubing stub cut off 3" above top flange on bradenhead. 1/2" NPT male Pipe Plug fitted in lieu of Items B11 & B12 at this time.	



**Section 5.0**

**Time Breakdown Data**

- Overview

- Trouble Time Breakdown

Well : TREGONY #1

Drilling Co : OD&amp;E

Rig : OD&amp;E #30

RT above GL: 4 m    Lat : 38 deg 30 min 50.89 sec    Spud Date: 28/02/2001    Release Date: 15/03/2001  
 GL above MSL : 93 m    Long : 142 deg 55 min 25.49 sec    Spud Time: 05:30:00    Release Time: 12:00:00

### TIME BREAKDOWN DATABASE - single well overview

Spud date : 28/02/2001  
 TD Depth : 1,819.0  
 Final Depth : 1,819.0  
 Total Time (hrs) - Spud/Release : 285.50  
 Total Time (hrs) - Rig Move : 0.00  
 Total NPT (hrs) : 21.00

#### Time-Breakdown : Times by Class and Operation

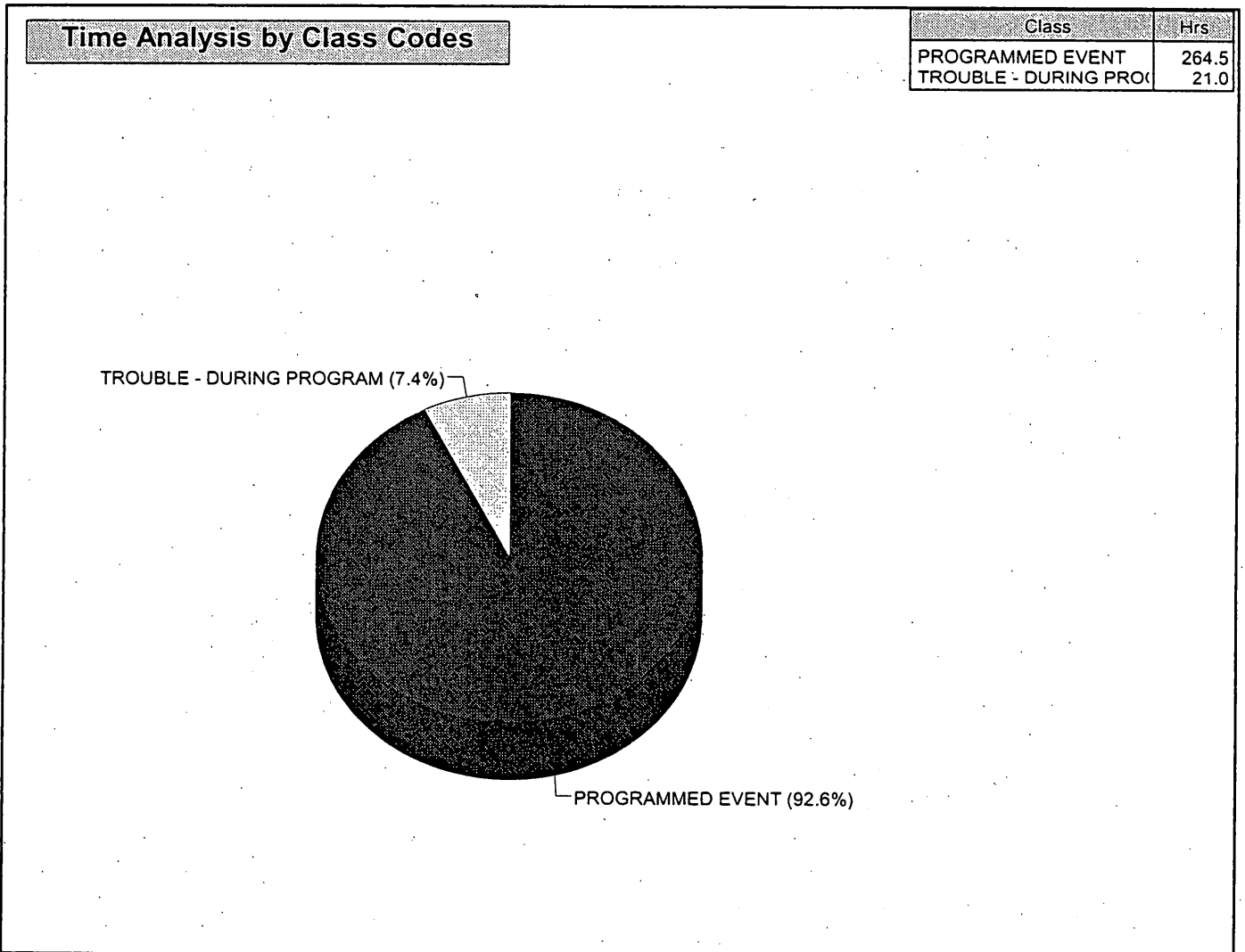
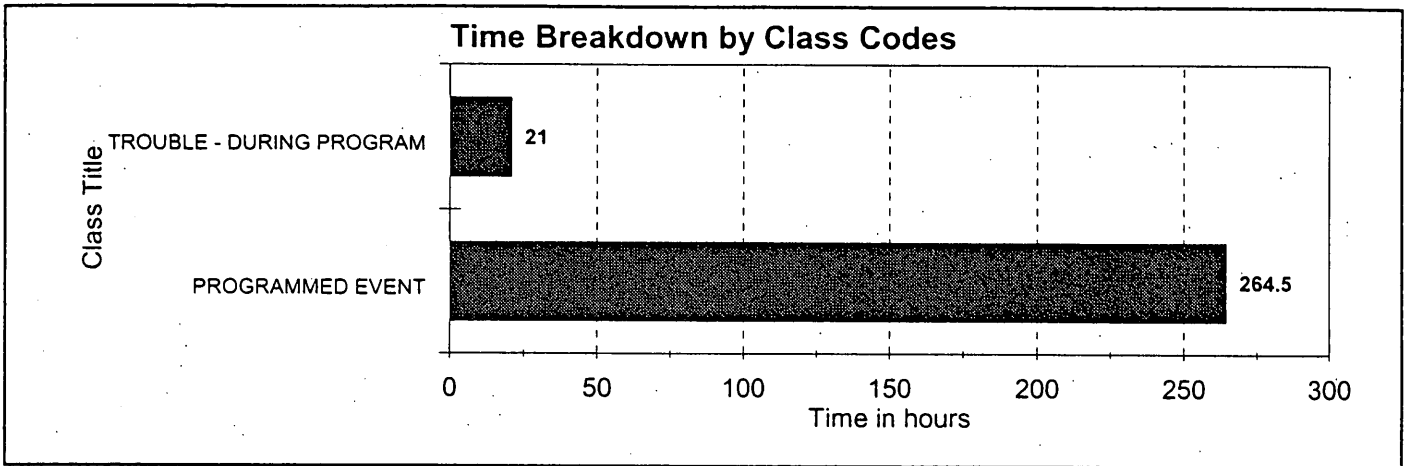
Class	Hrs
PROGRAMMED EVENT	264.5
TROUBLE - DURING PROGRAM	21.0

Operation	Hrs
CONTROL DRILL - DEV	73.3
TOT. CSG/CMT	43.0
DRILLING AHEAD	34.5
N/U & TEST BOP's	30.5
LOGGING	25.0
TOT. TRIPPING	14.5
WELL-HEAD	12.5
HANDLE TOOLS	11.8
LAY DOWN PIPE	8.5
RIG REPAIR	7.5
SURVEY	7.3
CIRCULATE & CONDITION MUD	3.5
REAM/WASH	3.3
RIG SERVICE	2.5
WIPER TRIP	1.8
RIG DOWN (THE RIG)	1.5
HEAD-UP FOR CMT OPS	1.0
CIRCULATE SAMPLE	1.0
WORK TIGHT HOLE	.5
LOT / FIT	.5
SLIP/CUT DRILL LINE	.5
REPAIR OTHER	.5
BREAK CIRCULATION	.5
PUMP SLUG	.3

TIME BREAKDOWN DATABASE - single well overview

WELL : TREGONY #1

Pacesetter : none selected



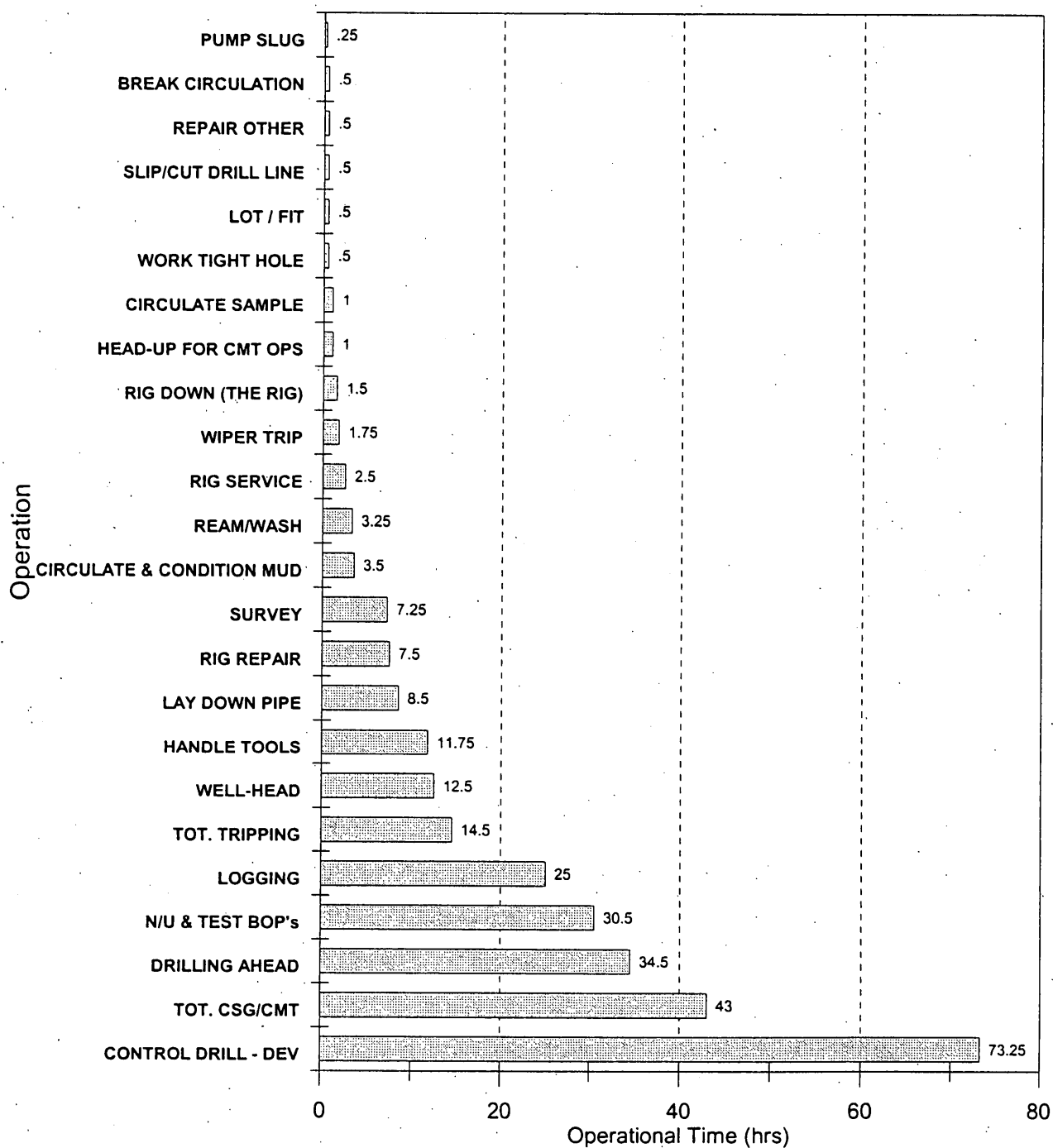


## TIME BREAKDOWN DATABASE - single well overview

WELL : TREGONY #1

Pacesetter : none selected

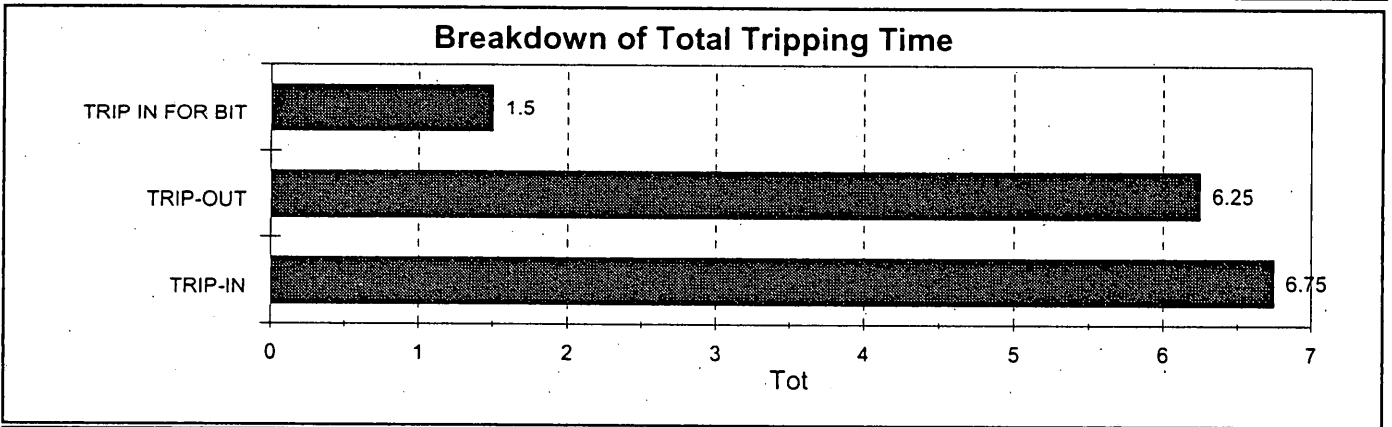
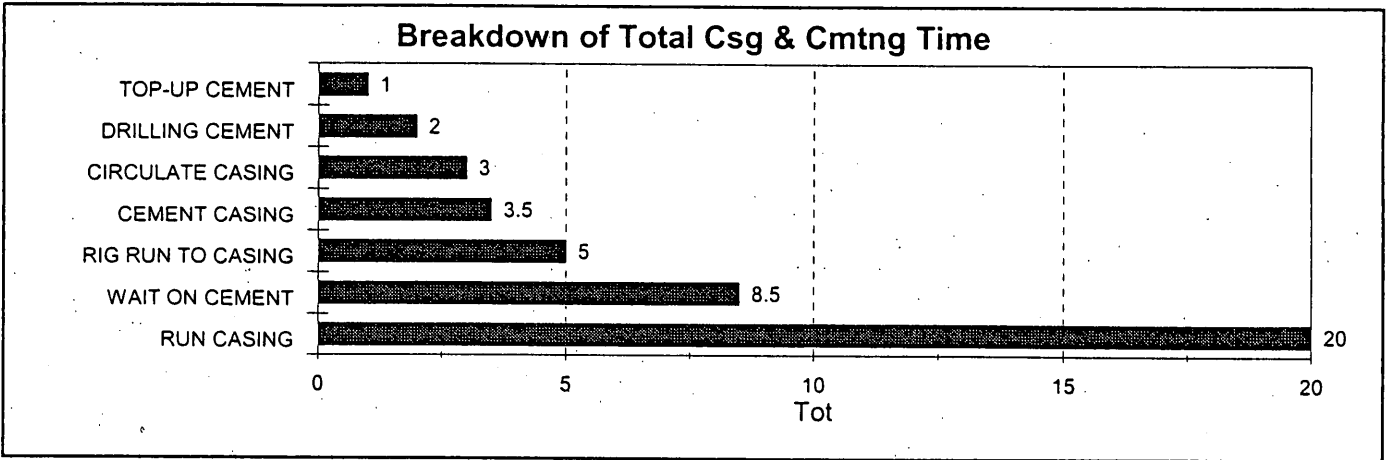
Time Breakdown by Operational Code



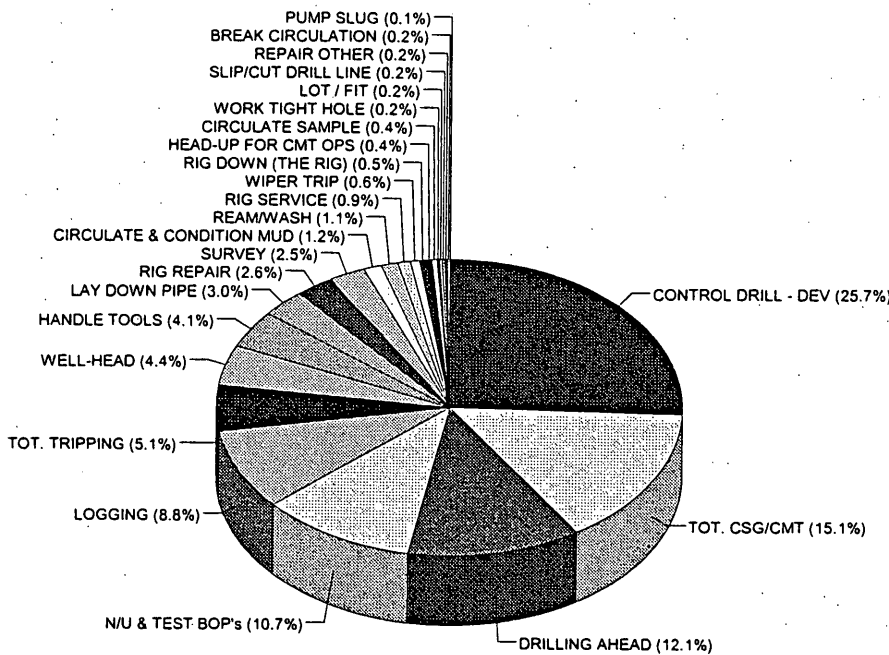
TIME BREAKDOWN DATABASE - single well overview

WELL : TREGONY #1

Pacesetter : none selected



Time Analysis by Operational Codes

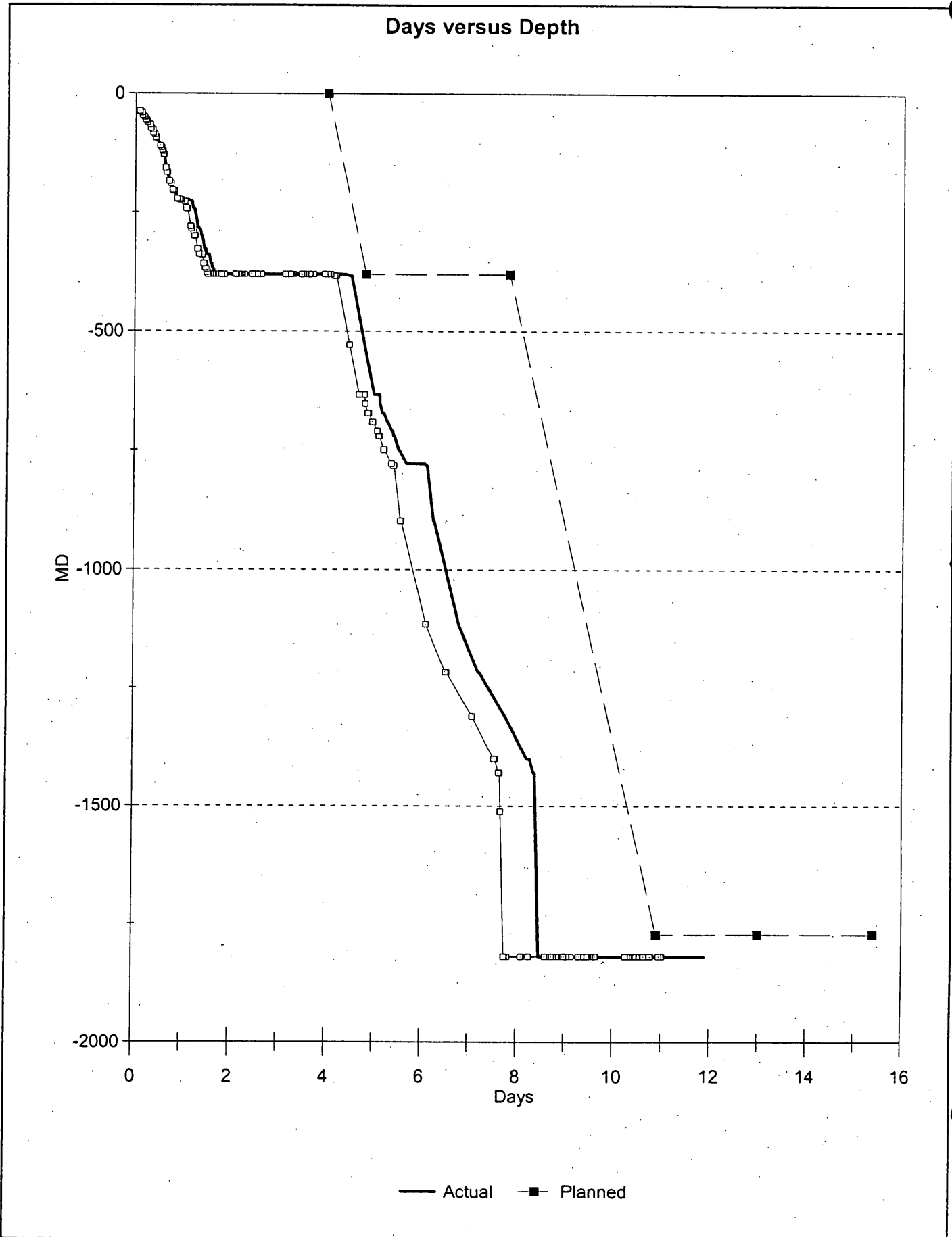


Operation	hrs
CONTROL DRILL - DE	73.3
TOT. CSG/CMT	43.0
DRILLING AHEAD	34.5
N/U & TEST BOP's	30.5
LOGGING	25.0
TOT. TRIPPING	14.5
WELL-HEAD	12.5
HANDLE TOOLS	11.8
LAY DOWN PIPE	8.5
RIG REPAIR	7.5
SURVEY	7.3
CIRCULATE & CONDI	3.5
REAM/WASH	3.3
RIG SERVICE	2.5
WIPER TRIP	1.8
RIG DOWN (THE RIG)	1.5
HEAD-UP FOR CMT O	1.0
CIRCULATE SAMPLE	1.0
WORK TIGHT HOLE	0.5
LOT / FIT	0.5

TIME BREAKDOWN DATABASE - single well overview

WELL : TREGONY #1

Pacesetter : none selected



## TREGONY #1

Drilling Co.: OD&amp;E

Rig : OD&amp;E #30

RT above GL: 4 m Lat : 38 deg 30 min 50.89 sec Spud Date: 28/02/2001 Release Date: 15/03/2001  
 GL above MSL: 93 m Long : 142 deg 55 min 25.49 sec Spud Time: 05:30:00 Release Time: 12:00:00

## TIME BREAKDOWN DATABASE Non-Productive Time Analysis (NPT)

(Pre-Spud time included)

Total Time on Well (hrs) 486.0 (days) 20.25 Spud Date : 28/02/2001  
 Total Trouble Time (hrs) 31.5 (days) 1.31 Total Depth : 1,819  
 Trouble Time (%) 6.48 Final Depth : 1,819

## Total NPT Hours per Phase

PHASE	HOURS
PRESPOD	10.5
SURFACE HOLE	3.5
SURFACE CASING	4.0
PRODUCTION HOLE	11.5
PRODUCTION CASING/LINER	2.0

## NPT during programmed time

DATE	PHS	OPERATION	NPT hrs	DEPTH m	DESCRIPTION OF PROGRAMMED TROUBLE TIME
27/02/2001	PS	RIG UP (THE RIG)	6.0	16	Rig up at correct angle and redrill rathole - set scabbard.
01/03/2001	SH	RIG REPAIR	0.5	224	Rig Repair : Rig mud pump down - cannot continue jetting. Circulate hole clean & pump slug.
01/03/2001	SH	RIG REPAIR	1.0	224	Rig Repair : Rig mud pump down - cannot continue jetting. POH.
01/03/2001	SH	RIG REPAIR	1.0	224	Rig Repair : Rig mud pump down - cannot continue jetting. Change BHA - reposition string stabiliser for rotary drilling, check bit for wear - okay.
01/03/2001	SH	RIG REPAIR	1.0	224	Rig Repair : Rig mud pump down - cannot continue jetting. RIH to bottom - hole good.
03/03/2001	SC	N/U & TEST BOP's	2.0	380	Pick up bit, make up mousehole assy, clean out mousehole and rerun mousehole (continue rigging up BOP remote control air lines)
04/03/2001	SC	RIG REPAIR	2.0	380	Repair rig - change out upper kelly cock.
05/03/2001	PH	PUMP SLUG	0.3	778	Circulate & pump slug.
05/03/2001	PH	TRIP-OUT	2.3	778	POH for BHA change.
06/03/2001	PH	TRIP-OUT	1.0	778	POH for BHA change.
06/03/2001	PH	HANDLE TOOLS	1.5	778	Change BHA to slight pendulum assy.
06/03/2001	PH	HANDLE TOOLS	0.8	778	Circulate & test MWD.
06/03/2001	PH	TRIP-IN	1.8	778	RIH to 584m, tag up, lay out single.
06/03/2001	PH	REAM/WASH	0.5	778	Kelly up & wash single to 595m.
06/03/2001	PH	TRIP-IN	0.5	778	RIH to 772m.
06/03/2001	PH	REAM/WASH	0.5	778	Wash 6m to bottom from 772m.
07/03/2001	PS	WORK TIGHT HOLE	0.5	1,218	Tight hole after connection with v.high torque and 25k o/pull - full circulation. Put string to neutral point and increase RPM to 400amps to break free. Circulate & work pipe - okay.
08/03/2001	PH	RIG REPAIR	1.0	1,400	Repair Rig - Generator shut down - troubleshoot same. Work pipe while checking generator.
09/03/2001	PS	REAM/WASH	0.5	1,449	Kelly up and work through tight spot from 1160m to 1170m.
09/03/2001	PS	REAM/WASH	0.5	1,449	Work through tight spot from 1410m to 1420m, lay down 2x singles DP.
09/03/2001	PS	REAM/WASH	1.5	1,449	Kelly up, wash and ream from 1420m to bottom.
10/03/2001	PS	WORK TIGHT HOLE	0.5	1,658	Work tight hole - high torque through shale sections.
10/03/2001	PS	REAM/WASH	1.0	1,681	Kelly up & precautionary wash/ream 48m from 1633m to bottom.
12/03/2001	PH	LOGGING	0.5	1,819	Log run-3 : RFS, tool failure in hydraulic system, unable to collect formation sample. POH & repair tools.
13/03/2001	PH	REAM/WASH	1.0	1,819	Kelly up and precautionary wash from 1787m to bottom - tag up at 1811m = 8m fill on bottom.
13/03/2001	PC	RIG REPAIR	1.0	1,819	Repair rig - SCR shutting down, no power - troubleshoot same.
14/03/2001	PC	REPAIR OTHER	0.5	1,819	Back out 3m pup - Premium Casing Services tong jammed, unable to release jaws. Dismantle tong jaw to release - to recover circulating swage to circulate tubing.
14/03/2001	PC	WORK TIGHT HOLE	0.5	1,819	Make up circulating swage, work tubing string up to 50k overpull to free stuck pipe.

## NPT during unprogrammed time

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

**Section 6.0**

**Survey Data**

**- IDS Survey Report**

## TREGONY #1

Drilling Co.: OD&amp;E

Rig: OD&amp;E #30

RT above GL: 4 m Lat : 38 deg 30 min 50.89 sec Spud Date: 28/02/2001 Release Date: 15/03/2001  
 GL above MSL : 93 m Long : 142 deg 55 min 25.49 sec Spud Time: 05:30:00 Release Time: 12:00:00

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)
25	25	0.25	45	57	0.3	-0	0	0	0
43	43	0.35	170	182	0.9	-0	-0	0	0
61	61	0.70	135	147	0.8	0	-0	0	0
80	80	1.50	95	107	1.7	0	-0	0	1
99	98	2.20	98	110	1.2	0	-1	1	1
117	117	3.80	123	135	3.2	1	-1	2	2
144	144	5.40	133	145	2.0	2	-3	3	4
154	153	5.30	133	145	0.3	3	-3	4	5
172	172	6.30	135	147	1.7	4	-5	5	7
191	191	7.10	149	161	2.8	6	-7	6	9
211	210	8.20	154	166	2.0	8	-9	6	11
214	213	7.50	152	164	8.0	8	-10	6	12
233	232	8.50	175	187	5.2	11	-12	7	14
272	271	6.75	171	183	1.4	16	-18	6	19
290	289	7.50	177	189	1.7	18	-20	6	21
319	318	6.75	173	185	0.9	22	-23	5	24
348	347	7.25	170	182	0.6	26	-27	5	28
368	366	6.90	179	191	1.8	28	-29	5	30
401	398	7.36	181	193	0.5	32	-33	4	34
449	446	7.72	181	193	0.2	38	-40	3	40
488	485	8.31	183	195	0.5	44	-45	1	45
517	513	8.52	183	195	0.2	48	-49	0	49
555	552	9.09	183	195	0.4	54	-55	-1	55
594	590	9.93	181	193	0.7	60	-61	-3	61
623	619	10.20	180	192	0.3	65	-66	-4	66
652	647	10.72	178	190	0.6	71	-71	-5	71
681	676	10.99	179	191	0.3	76	-76	-6	77
710	704	11.34	178	190	0.4	82	-82	-7	82
739	732	11.69	179	191	0.4	87	-87	-8	88
768	760	12.22	178	190	0.6	93	-93	-9	94
798	790	12.04	181	193	0.6	100	-100	-10	100
836	827	11.43	179	191	0.6	107	-107	-12	108
865	856	11.69	176	188	0.7	113	-113	-13	114
895	884	11.34	175	187	0.4	119	-119	-14	119
924	913	10.63	172	184	0.9	125	-124	-14	125
953	942	10.02	172	184	0.6	130	-129	-15	130
982	971	9.40	172	184	0.6	135	-134	-15	135
1,011	999	9.58	173	185	0.2	140	-139	-15	140
1,040	1,028	8.79	173	185	0.8	144	-144	-16	145
1,069	1,056	8.70	174	186	0.1	148	-148	-16	149
1,098	1,085	8.26	173	185	0.5	153	-152	-17	153
1,127	1,114	7.99	174	186	0.4	157	-156	-17	157
1,155	1,142	7.32	172	184	0.8	161	-160	-17	161
1,184	1,170	6.68	171	183	0.7	164	-164	-17	165
1,213	1,199	6.33	168	180	0.4	167	-167	-17	168
1,242	1,228	6.68	167	179	0.4	170	-170	-17	171
1,281	1,266	6.59	163	175	0.4	175	-175	-17	176
1,290	1,276	6.53	163	175	0.2	176	-176	-17	177
1,320	1,305	6.24	161	173	0.3	179	-179	-17	180
1,348	1,334	5.83	161	173	0.4	182	-182	-16	183
1,377	1,363	5.15	162	174	0.7	185	-185	-16	186
1,406	1,391	4.13	163	175	1.1	187	-187	-16	188
1,416	1,401	4.31	164	176	0.6	187	-188	-16	189
1,435	1,420	4.83	163	175	0.8	189	-189	-16	190
1,464	1,448	3.43	181	193	2.0	191	-191	-16	192

**TREGONY #1**

Drilling Co.: OD&amp;E

Rig: OD&amp;E #30

RT above GL: 4 m    Lat : 38 deg 30 min 50.89 sec    Spud Date: 28/02/2001    Release Date: 15/03/2001  
 GL above MSL : 93 m    Long : 142 deg 55 min 25.49 sec    Spud Time: 05:30:00    Release Time: 12:00:00

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)
1,493	1,478	3.08	238	250	3.2	192	-193	-17	193
1,512	1,497	4.04	270	282	3.3	192	-193	-18	193
1,522	1,507	4.99	278	290	3.5	192	-192	-19	193
1,532	1,516	6.46	287	299	5.4	192	-192	-20	193
1,541	1,526	8.79	297	309	8.6	192	-191	-21	192
1,570	1,554	9.93	301	313	1.4	189	-188	-24	190
1,599	1,583	10.37	300	312	0.5	187	-185	-28	187
1,628	1,611	10.81	305	317	1.0	184	-181	-32	184
1,650	1,633	11.71	306	318	1.3	181	-178	-35	181
1,656	1,639	11.97	306	318	1.3	180	-177	-35	180
1,814	1,795	6.20	33	45	2.5	163	-159	-40	164

TREGONY #1

Drilling Co.: OD&E

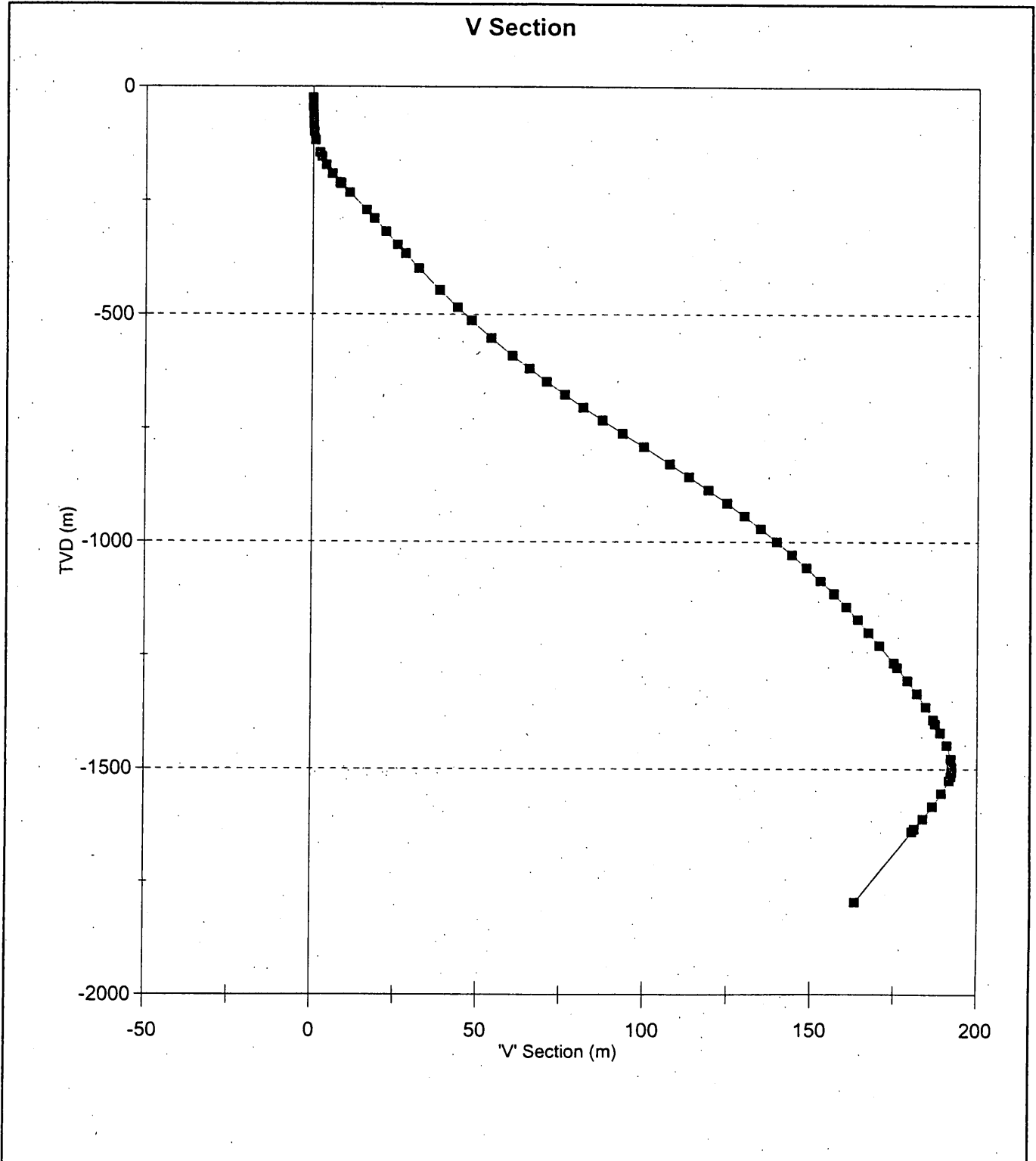
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Magnetic Declination (degs): 12.00

Projection:

DEVIATION SURVEY





**Section 7.0**

**Well Cost Information**

**- Well Phase Cost Summary**

**APPENDIX XII: RIG SPECIFICATIONS**

## Rig Inventory for ODE RIG # 30

- DRAWWORKS** : Ideco Hydrair H-725-D double drum with V-80 Parmac hydromatic brake, Martin Decker satellite automatic drilling control.  
Max. single line pull - 50,000 lbs.  
Main drum grooved for 1-1/8" drilling line.
- SUBSTRUCTURE** : One piece substructure 14' high x 13'6" wide x 50' long with 12' BOP clearance.  
Setback area loading: 250,000 lbs  
Casing area loading: 275,000 lbs
- ENGINES** : Four (4) Caterpillar Model 3412 PCTA diesel engines.
- BRAKE** : V-80 Parmac hydromatic brake,
- MAST** : Dresco Model #: M12713-510 Floor Mounted Cantilever Mast designed in accordance with API Specification 4E Drilling & Well Servicing Structures.  
Hook load Gross Nominal Capacity - 510,000 lbs with:-  
10 lines strung - 365,000 lbs  
8 lines strung - 340,000 lbs  
Clear working height of 127'.  
Base width of 13'6".  
Adjustable racking board with capacity for  
i) 108 stands of 4.½" drill pipe,  
ii) 10 stands of 6.½" drill collars,  
iii) 3 stands of 8" drill collars  
Designed to withstand an API windload of 84 mph with pipe racked and 100 mph with no pipe racked.
- CATHEADS** : One (1) Foster Model 37 make-up spinning cathead mounted on drillers side.  
One (1) Foster Model 24 break-out cathead mounted off drillers side.
- TRAVELLING BLOCK/HOOK** : One (1) 667 Crosby McKissick 250 ton combination block hook Web Wilson. 250 ton Hydra hook Unit 5 - 36" sheaves.
- WINCHES** : One (1) Ingersol Rand HU-40 with 5/8" wireline.  
Capacity 2,000 lb.  
One (1) ANSI B30.7 with 3/8' wire capacity 4000lbs @ 70 fpm
- SWIVEL** : One (1) Oilwell PC-300 ton swivel
- RIG LIGHTING** : Explosive proof fluorescent. As per approved State Specifications.
- KELLY DRIVE** : One (1) 27 HDP Varco kelly drive bushing.

- MUD PUMPS : Two (2) Gardner Denver mud pumps Model PZH-8 each driven by 750 HP EMD D-79 motors.  
8" stroke with liner size 6" through to 5".  
6" liner maximum pressure 2387 psi  
5.1/2" liner maximum pressure 2841 psi  
5" liner maximum pressure 3437 psi  
6" liner maximum volume 412 gpm  
5.1/2" liner maximum volume 345 gpm  
5" liner maximum volume 280 gpm
- MIXING PUMP : Two (2) Mission Magnum 5" x 6" x 14" centrifugal pump complete with 50 HP, 600 Volt, 60 Hz, 3 phase explosion proof electric motors.
- MUD AGITATORS : Five (5) Geolograph/Pioneer 40TD - 15" 'Pitbull' mud agitators with 15 HP, 60 Volt, 60 HZ, 3 phase electric motors.
- LINEAR MOTION SHALE SHAKERS : Two (2) DFE SCR-01 Linear motion shale shakers.
- DEGASSER : 48" Dia Poor Boy Degasser
- DESILTER : One (1) DFE - Harrisburg style 12 cone desilter 12 x 5" cones. Approximate output of 960 gpm. Driven by Mission Magnum 5" x 6" x 11" centrifugal pump complete with 50 hp 600 volt 60 Hz 3 phase explosion proof motor.
- GENERATORS : Four (4) Brown Boveri 600 volt, 600 Kw, 750 kva, 3 phase, 60 HZ AC generators. Powered by four (4) Cat 3412 PCTA diesel engines.
- BOP's & ACCUMULATOR : One (1) Wagner Model 20-160 3 BND 160 gallon accumulator consisting of:  
Sixteen (16) 11 gallon bladder type bottles  
One (1) 20 HP electric driven triplex pump 600 volts, 60 HZ, 3 phase motor and controls.  
One (1) Wagner Model A 60 auxiliary air pump 4.5 gals/minute.

- BOP's & ACCUMULATOR  
(Cont'd) : One (1) Wagner Model UM2SCB5S mounted hydraulic control panel with five (5) 1" stainless steel fitted selector valves and two (2) stripping controls and pressure reducing valves.  
Three (3) 4" hydraulic readout gauges:- one for annular pressure- one for accumulator pressure one for manifold pressure.  
One (1) Stewart & Stevenson 5 station remote drillers control with air cable umbilical with three pressure gauges, increase and decrease control for annular pressure.  
One (1) Shaffer 13.5/8" x 3,000 psi spherical annular BOP,  
One (1) Shaffer 13.5/8" x 5,000 psi LWS studded, double gate autolock B.O.P.
- KELLY COCK (UPPER) : Two (2) Upper Kelly Cock 7.3/4"OD with 6.5/8" API connections ( 1 x M&M, 1 x Hydril ).
- KELLY COCK (LOWER) : Three (3) M&M Lower Kelly Cocks 6.1/2" OD with 4" IF connections
- DRILL PIPE SAFETY VALVE : One (1) Hydril 6.1/2" stabbing valve (4" IF).  
One (1) Gray inside BOP with 4.3/4" OD and 2.1/4" ID with 3.1/2" IF connections c/w releasing tool and thread protectors.
- AIR COMPRESSORS  
AND RECEIVERS : Two (2) LeRoi Dresser Model 660A air compressor packages c/w 10 HP motors rated at 600 Volts, 60 HZ, 3 phase. Receivers each 120 gallon capacity and fitted with relief valves.
- POWER TONGS : One (1) Farr 13.5/8" - 5.1/2" hydraulic casing tongs c/w hydraulic power pack and hoses and torque gauge assembly.  
One (1) Foster hydraulic kelly spinner with 6.5/8" LH connection.
- TORQUE WRENCH : Yutani c/w drive sockets 1 1/8" through to 2 3/8"
- SPOOLS : One (1) set double studded adaptor flanges to mate 13.5/8" 5,000 psi. API BOP flange to following wellhead flange  
13.5/8" x 3,000 series,  
11" x 3,000 series,  
11" x 5,000 series  
7.1/16" x 3,000 series,  
7.1/16" x 5,000 series  
4 1/16" 5000 x 3 1/16" 5000  
3 1/16" 5000 x 2 1/16" 5000

SPOOLS (Cont'd)	:	1 double studded adaptor flange 4 1/16" 5K x 3 1/16" 5K 1 double studded adaptor flange 3 1/16" 5K x 2 1/16" 5K 1 only 14" - BOP mud cross (drilling spool) 13.5/8" 5,000 x 13.5/8" 5,000 BX160. with 2 x 3 1/16" 5K outlets. 1 only BOP spacer spool 13 5/8" 3,000 x 13 5/8" 3,000 1 only BOP spacer .spool 11" 3,000 x 13.5/8" 5,000 .
ROTARY TABLE	:	One (1) Oilwell A 20.1/2" rotary table torque tube driven from drawworks complete with Varco MASTER bushings and Insert Bowls.
MUD TANKS	:	SHAKER Active No 1. 277 BBL Desilter 73 BBL Sand Trap 50 BBL Trip Tank 29 BBL Total <u>429 BBL</u>
		SUCTION Active No 2 174 BBL Pre-Mix 146 BBL Pill Tank 63 BBL Total <u>383 BBL</u>
TRIP TANK	:	Trip Tank <u>29 BBL</u> One (1) Mission Magnum 2" x 3" centrifugal pump complete with 20 HP, 600 Volts, 60 HZ, 3 phase explosion proof motors
KILL LINE VALVE	:	2 x 3 1/8" Cameron FL 5K gate valves
CHOKE LINE VALVES	:	1 x 4 1/16 Cameron FC 5K hydraulic operated gate valve 1 x 4 1/16 5K manual gate valve
CHOKE MANIFOLD	:	One (1) McEvoy choke and kill manifold 3" 5,000 psi with hydraulic Swaco "super" choke.
DRILL PIPE	:	240 joints ( 2270 m) - 3.1/2" 13.30lb/ft drill pipe Grade 'G' 105 with 3 1/2" IF conn
PUP JOINTS	:	One (1) - 10' ( 3.65 m) 3.1/2" OD Grade 'G' with 3.1/2" IF conn
HEVI-WATE DRILL PIPE	:	6 joints of 3.1/2" H.W.D.P. with 3.1/2" IF conn
DRILL COLLARS	:	12 x 6.1/2" OD drill collars (113 m) with 4" IF conn 24 x 4 3/4" O.D. drill collars ( 227 m) with 3.1/2" IF conn 1 x 4.3/4" OD Pony Drill Collar
KELLIES	:	Two (2) Square Kelly drive 4.1/4" x 40' complete with Scabbard and 55 ft x 3 1/2" kelly hose

## FISHING TOOLS

- : One (1) only 8.1/8" Bowen series 150 FS overshot
- One (1) 5.3/4" SH Bowen 150 Overshot c/w grapples and packoffs to fish contractors downhole equipment.
- One (1) only Reverse circulating junk basket 4" IF box
- One (1) only 6.1/2" OD Griffith Fishing Jars One (1) only 4 3/4" O.D. Bowen Type "Z" Fishing Jar
- One (1) only Bumper Sub 6.1/2" OD 4" IF pin & box.
- One (1) 5" R.C.J.B.
- One (1) 5" Junk Sub with 4.3/4" OD x 1.1/2" ID.

## WIRELINE SURVEY UNIT

- : Gearmatic hydraulic drive Model 5 c/w .092" line

## SUBSTITUTES

- : Two (2) Bit Sub - 7.5/8" reg x 6.5/8" reg double box.
- Two (2) Bit Subs - 6.5/8" reg double box.
- Two (2) Bit Sub - 6.5/8" reg box. x 4 1/2" IF box
- Two (2) Bit Subs - 4.1/2" reg x 4" IF double box.
- Two (2) 4.3/4" bit subs (36" long) with 3.1/2" IF box x 3.1/2" reg box bored for float.
- One (1) Float Sub 6.5/8" reg box (FC) x 6.5/8" reg pin
- Two (2) XO Sub - 4" IF box x 4.1/2" IF pin.
- Two (2) XO Sub - 4.1/2" IF box x 4." IF pin.
- One (1) XO Sub - 4.1/2" reg x 4" IF double pin.
- Two (2) XO Sub - 6.5/8" reg pin x 4" IF box.
- One (1) Junk Sub - 6.5/8" reg pin x 6.5/8" reg box
- One (1) Junk Sub - 4.1/2" reg box x 4.1/2" reg pin.
- One (1) XO Sub - 4.1/2" IF box x 4" IF box.
- Two (2) Kelly Saver Subs c/w rubber 4" IF pin & box.
- Two (2) Kelly Saver Subs 4" IF pin & box
- One (1) Kelly Saver Subs 4 1/2" IF pin & box.
- Two (2) 4 IF box x 3.1/2" IF pin Saver Subs.
- One (1) Circulating Subs - 4" IF x 2" 1502 hammer union.
- One (1) Circulating Subs - 4" IF x 2" 602 hammer union.
- Eleven (11) Lifting Subs - 18" Taper 4.1/2" pick up neck and 4" IF pin.
- Eight (8) Lift Subs with 3.1/2" OD D.P. neck and 3.1/2" IF pin connections.

## HANDLING TOOLS

- : 2 only 4.1/2" BJ 250 ton 18 degree taper D/P elevators.
- 1 only 3.1/2" BJ 200 ton 18 degree taper D/P elevators.
- 1 only 3.1/2" BJ type MGG 18° centre latch Elevators.
- 1 only 4.1/2" Varco SDXL D/P slips.
- 1 only 4.1/2" Varco SDML D/P slips
- 2 only 8" - 6.1/2" DCS-R drill collar slips.
- 1 only 3.1/2" Varco SDML Slips
- 1 only 4.3/4" Varco DCS-S Drill Collar Slips

CASING RUNNING TOOLS	:	1 only 13.3/8" Webb Wilson 150 ton side door elevator. 1 only 13.3/8" single joint P.U. elevators. 1 only 9.5/8" Webb Wilson 150 ton side door elevators. 1 only 9.5/8" single joint P.U. elevator. 1 only 7" BJ 150 ton side door elevators. 1 only 7" single joint P.U. elevators. 1 only 5.1/2" BJ 200 ton S11 1 only 2.7/8" BJ 100 ton tubing elevator. 1 only 2.3/8" BJ 100 ton tubing elevator. (all P.U. elevators c/w slings & swivel) 1 only 13.3/8" Varco CMS-XL casing slips 1 only 9.5/8" Varco CMS-XL casing slips. 1 only 7" Varco CMS-XL casing slips. 1 only 3.1/2" Varco SDML tubing slips.
CASING / TUBING DRIFTS	:	9 5/8, 7", 5 1/2", 3 1/2"
THREAD PROTECTORS	:	9 5/8, 7".
KELLY SPINNER	:	One (1) Foster hydraulic kelly spinner with 6.5/8" LH connection.
PIPE SPINNER	:	One (1) International 850H hydraulic pipe spinner
WELDING EQUIPMENT	:	1 - Miller 400 amp welding machine. 1 - oxy acetylene set.
DOGHOUSE	:	1 Doghouse 5m x 2.4m x 2.3m
GENERATOR HOUSE	:	Ross Hill SCR
UTILITY HOUSE	:	1 Utility and Mechanics House
CATWALKS	:	2 catwalks total 18.6m long x 1.6m wide x 1.08m high
PIPE RACKS	:	8 - 9m tumble racks.
DAY FUEL TANK	:	1 only 19,000 ltrs
WATER/FUEL TANK	:	WATER 1 only 320 bbls. 1 only brake cooling tank 80 bbl FUEL 1 only 27,500 litres
OIL STORAGE	:	drums
DRILLING RATE RECORDER	:	1 only 6 pen Pioneer Geologist drill sentry recorder to record: weight (D) penetration (feet) pump pressure (0-6,000 psi) electric rotary torque rotary speed (rpm) pump spm (with selector switch)



DEVIATION RECORDER : 1 set Totco 'Double Shot' deviation instrument 0□-8□.

INSTRUMENTS & INDICATORS : 1 only Martin Decker Sealrite.  
 1 only Martin Decker Deadline type.  
 1 only drillers console including the following equipment.  
 Martin Decker Weight Indicator type'D'  
 Electric rotary torque gauge.  
 MD Totco Mud Watch Instrumentation c/w display and  
 alarms.  
 Rotary rpm gauge

MUD TESTING : 1 set Baroid mud testing laboratory (standard kit

RATHOLE DRILLER : One (1) fabricated rotary table chain driven.

MUD SAVER : Okeh unit

CELLAR PUMP : Cellar jet from No 1 pump

WATER PUMP : Three (3) Mission Magnum 2" x 3" centrifugal pumps c/w  
 20 HP, 600 Volts, 60 HZ, 3 phase explosion proof motors

FIRE EXTINGUISHERS : Dry Chemical Rig 22 Camp 20  
 CO2 Rig 3 Camp 0  
 Foam Rig 1 Camp 1

PIPE BINS : 5 units

CUP TESTER : Two (2) Grey Cup Tester c/w test cups for 9.5/8" &  
 13.3/8".

DRILLING LINE : 5,000' 1.1/8" - E.I.P.S

TRANSPORT EQUIPMENT AND MOTOR VEHICLES

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

## CAMP EQUIPMENT

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

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

**ENCLOSURE I: 1 : 200 COMPOSITE LOG**

PE605264

This is an enclosure indicator page.  
The enclosure PE605264 is enclosed within the  
container PE908033 at this location in this  
document.

The enclosure PE605264 has the following characteristics:

ITEM\_BARCODE = PE605264  
CONTAINER\_BARCODE = PE908033  
NAME = Encl.1 Tregony-1 Composite Well Log  
BASIN = OTWAY  
ONSHORE? = Y  
DATA\_TYPE = WELL  
DATA\_SUB\_TYPE = COMPOSITE\_LOG  
DESCRIPTION = Encl.1 Tregony-1 Composite Well Log,  
Scale 1:200, by Santos [BOL] Pty Ltd,  
W1314, PEP153. Enclosure 1 contained  
within "Well Completion Report"  
[PE908033].  
REMARKS =  
DATE\_WRITTEN =  
DATE\_PROCESSED =  
DATE\_RECEIVED = 24-AUG-2001  
RECEIVED\_FROM = Santos Ltd  
WELL\_NAME = Tregony-1  
CONTRACTOR =  
AUTHOR =  
ORIGINATOR = Santos Ltd  
TOP\_DEPTH =  
BOTTOM\_DEPTH =  
ROW\_CREATED\_BY = DN07\_SW

(Inserted by DNRE - Vic Govt Mines Dept)

**ENCLOSURE II: 1 : 500 MUDLOG**

PE605265

This is an enclosure indicator page.  
The enclosure PE605265 is enclosed within the  
container PE908033 at this location in this  
document.

The enclosure PE605265 has the following characteristics:

ITEM\_BARCODE = PE605265  
CONTAINER\_BARCODE = PE908033  
NAME = Encl.2 Tregony-1 Mud Log  
BASIN = OTWAY  
ONSHORE? = Y  
DATA\_TYPE = WELL  
DATA\_SUB\_TYPE = MUD\_LOG  
DESCRIPTION = Encl.2 Tregony-1 Mud Log, Scale 1:500,  
by Santos [BOL] Pty Ltd, W1314, PEP157.  
Enclosure 2 contained within "Well  
Completion Report" [PE908033].  
REMARKS =  
DATE\_WRITTEN =  
DATE\_PROCESSED =  
DATE\_RECEIVED = 24-AUG-2001  
RECEIVED\_FROM = Santos Ltd  
WELL\_NAME = Tregony-1  
CONTRACTOR = Santos Ltd  
AUTHOR =  
ORIGINATOR = Santos Ltd  
TOP\_DEPTH = 0  
BOTTOM\_DEPTH = 1819  
ROW\_CREATED\_BY = DN07\_SW

(Inserted by DNRE - Vic Govt Mines Dept)

**ENCLOSURE III: STRUCTURE MAPS**

PE908034

This is an enclosure indicator page.  
The enclosure PE908034 is enclosed within the  
container PE908033 at this location in this  
document.

The enclosure PE908034 has the following characteristics:

ITEM\_BARCODE = PE908034  
CONTAINER\_BARCODE = PE908033  
NAME = Encl.3 Tregony Gas Field Structure Map  
BASIN = OTWAY  
ONSHORE? = Y  
DATA\_TYPE = SEISMIC  
DATA\_SUB\_TYPE = STRUCTURE\_MAP  
DESCRIPTION = Encl.3 Tregony Gas Field Near Top  
Waarre Sand Depth Structure Map, C.I.  
5m, Datum: G.R.S. 1980, by Santos [BOL]  
Pty Ltd, W1314, PEP153. Enclosure 3  
contained within "Well Completion  
Report" [PE908033].  
REMARKS =  
DATE\_WRITTEN =  
DATE\_PROCESSED = 04-JUL-2001  
DATE\_RECEIVED = 24-AUG-2001  
RECEIVED\_FROM = Santos Ltd  
WELL\_NAME = Tregony-1  
CONTRACTOR =  
AUTHOR =  
ORIGINATOR = Santos Ltd  
TOP\_DEPTH =  
BOTTOM\_DEPTH =  
ROW\_CREATED\_BY = DN07\_SW

(Inserted by DNRE - Vic Govt Mines Dept)



OTWAY BASIN STRATIGRAPHIC COLUMN

