

SANTOS-BEACH

COMPILED FOR
SANTOS LIMITED
ABN 80 007 550 923

BUTTRESS 1
WELL COMPLETION REPORT

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Operations Geology
February 2002

BUTTRESS 1 WCR

TABLE OF CONTENTS

LOCATION MAP

WELL DATA CARD

APPENDICES

- I Geophysical Data
- II Geological Sample Descriptions
- III Hydrocarbon Shows
- IV Log Analysis
- V Geothermal Gradient
- VI Deviation Data
- VII FMT Pressure survey
- VIII Gas Sample analysis
(Including discussion on CO₂ Detection)
- IX Well Location Survey
- X Drilling: Final Well Report
- XI Rig Specifications

ENCLOSURES

- 1 Composite Log
- 2 Mudlog
- 3 Depth Structure Map (Near Top Waarre Sand)
- 4 Well Evaluation Summary (WES) Plot

LOCATION MAP



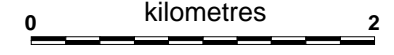
Santos

Exploration & Development

VICTORIA
OTWAY BASIN, PEP 154A

BUTTRASS 1

LOCATION MAP



GDA 1994
Santos Ltd ABN 80 007 550 923 6 February 2002 File No. OTWAY 450

Buttrass 1

Buttrass 1

Boggy Creek 1

Naylor 1

Squibbs Road

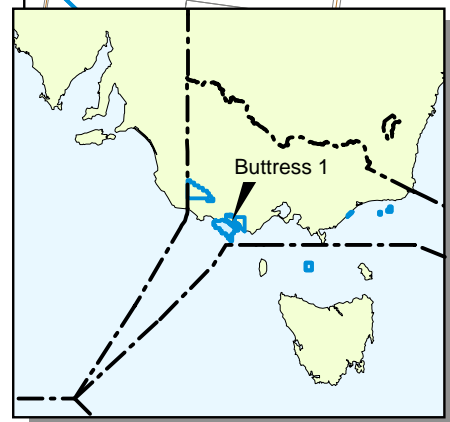
Naylor South 10

Croft 1

Curdie 1

Curdievale

East-West Road



WELL DATA CARD

WELL:	BUTTRESS 1			WELL CATEGORY:	Near Field Expl.(EXPN)	SPUD:	08-January-01, 7:00 AM	TD REACHED:	17-January-02 @ 14.45			
				WELL INTENT:	GAS	RIG RELEASE:	21.30 19-January-02	CMPLT:				
						RIG:	OD&E 30					
LAT:	38 31' 00.10" S GDA94			LONG:	142 48' 30.08" E GDA94	STATUS:	Cased and Suspended CO2 Gas Well					
SEISMIC STATION:	INLINE 2580 CDP 10133					REMARKS:						
ELEVATION GND:	45.75	<i>(m)</i>	ELEVATION RT:	50.45	<i>(m)</i>	RFS Segregated Sample Analysis results: CO2: 84.47%, Methane: 13.04%						
BLOCK/LICENCE:	PEP 154											
TD:	1732	<i>m (Logr Ext)</i>	1730	<i>m (Drlr)</i>								
PBTD:	1701	<i>m (Logr)</i>	1701	<i>m (Drlr)</i>		HOLE SIZE	CASING SIZE	SHOE DEPTH (M)	TYPE			
TYPE STRUCTURE:	STRUCTURAL CLOSURE/FAULT SEAL					250.825mm	193.675mm	378 (D)	L80 26.4 LB/FT			
TYPE COMPLETION:	3 1/2" MONOBORE COMPLETION					171.45mm	88.9mm	1717(D)	13CR95 9.2 LB/FT			
TARGET ZONE(S):	WAARRE SANDSTONE											
DEPTH (M)												
AGE	FORMATIONS OR ZONE TOPS				PROGNOSED DEPTH (SS)	LOGGER (MD)	LOGGERS DEPTH (SS)	INTERVAL THICKNESS (M)	HIGH (H) - LOW (L)			
EARLY OLIGOCENE TO EARLY MIOCENE	CLIFTON FORMATION				-420	484.00	-434	83.00	14 L			
MIDDLE EOCENE - EARLY OLIGOCENE	MEPUNGA FORMATION				-525	567.00	-517	110.00	8 H			
EOCENE	DILWYN FORMATION				-557	677.00	-627	244.00	70 L			
EARLY EOCENE TO LATE PALAEOCENE	PEMBER MUDSTONE				-841	921.00	-871	59.00	30 L			
LATE PALAEOCENE	PEBBLE POINT FORMATION				-894	980.00	-930	165.00	36 L			
MAASTRICHTIAN TO CAMPANIAN	PAARATTE FORMATION				-994	1145.00	-1095	179.00	101 L			
SANTONIAN	SKULL CREEK MUDSTONE				-1335	1324.00	-1274	92.00	61 H			
SANTONIAN TO CONIACIAN	BELFAST MUDSTONE				-1427	1461.00	-1411	141.00	16 H			
TURONIAN	FLAXMANS FORMATION				-1527	1602.00	-1552	9.00	25 L			
TURONIAN	WAARRE FORMATION, UNIT C				-1539	1611.00	-1561	10.00	22 L			
TURONIAN	WAARRE FORMATION, UNIT B					1621.00	-1571	9.50	Not Prognosed			
TURONIAN	WAARRE FORMATION, UNIT A					1630.50	-1580	27.50	Not Prognosed			
LATE ALBIAN	EUMERALLA FORMATION				-1597	1658.00	-1608	72.00	11 L			
as above	TD				-1650	1730.00	-1680		30 L			
PERFORATIONS												
FORMATION	INTERVAL	(M)	Ø%	SW %	FORMATION					INTERVAL		
WAARRE C	1613 - 1623	9.1	21.5	25								
WAARRE A	1632 - 1639	4.1	18.4	33								
WAARRE A	1657 - 1659	0.8	14	43								
CORES												
					FORMATION	NO.	INTERVAL	CUT	REC			
					NO CORES CUT							
LOG	SUITE / RUN	INTERVAL (M)	REMARKS				LOG	SUITE / RUN	INTERVAL	REMARKS		
GR	RUN #1	1708-SURF					GR-RFS	1/2	WAARRE	20 RFS POINTS OVER WAARRE SANDSTONE		
LCS		1698 - 383	FULL WAVEFORM TD - 1565M						1657 - 1614	1 SEGREGATED SAMPLE CHAMBER		
MLL		1709 - 383										
DLL		1706 - 383										
CAL		1708 - 383										
PDS	RUN #2	1691 -1565										
CNS		1689 - 1565										
	BHT	DEPTH	TIME	BHT	DEPTH	TIME	BHT	DEPTH	TIME	BHT	DEPTH	TIME
SUITE 1/1	66	1700	9.75	SUITE 1/2	65.9	1675.8	25.25	SUITE 1/3		SUITE 1/4		
FORMATION TEST												
NO.	INTERVAL	FORMATION	FLOW	SHUT IN	BOTTOM GAUGE IP/FP (psia)	SIP	MAX SURFACE PRESS (psia)	FLUID TO SURF (mins)	TC/BC	REMARKS		
										NO DST CONDUCTED		

HOLE, CASING & CEMENT DETAILS							
BIT SIZE	DEPTH (ft)	CASING SIZE	CASING SHOE DEPTH	JOINTS	CASING WEIGHT	CASING TYPE	CEMENT
250.825mm	383m (D)	193.675mm	378m (D)	40	26.4 lb/ft	L80	Lead: 56 bbls @ 11 ppg 395 lbs D020 Bentonite 149 lbs S001 Accelerator 2 gals D144 Antifoam Tail: 23 bbls @ 15.6 ppg 5 gal D145A Dispersant 1 gal D144 Antifoam 51 lbs S001 Accelerator
171.45mm	1732m(D)	88.9mm	1717m(D)	160	9.2 lb/ft	13cr95	Lead: 157 bbls @ 11.8 ppg 1674 lbs D020 Bentonite 5 gal D144 Antifoam 23 gal D081 Retarder Tail: 28 bbl @15.6 ppg 7.2 gal D145A Dispersant 1.5 gal D144 Antifoam 1.5 gal D081 Retarder

MUD SYSTEM	
MUD TYPE	INTERVAL (ft)
SPUD MUD	0 - 1427
4% KCL PHPA	1427 - 3119
4% KCL POLYMER	3119 - 5613
4% KCL POLYMER	5613 - TD

MUD PARAMETERS	
DENSITY	9.3 ppg
Rm	0.206 ohm @ 18.6 ° C
Rmf	0.168 ohm @ 18.8 ° C
Rmc	0.248 ohm @ 18.4 ° C

SUMMARY:

Interest Holders:

SANTOS 90%
 Beach Petroleum NL 10%

Location:

Buttress-1, is an Otway Basin near field exploration well in the PEP 154 licence. The PEP 154 license is held 90% Santos (Operator) and 10% Beach Petroleum. Buttress-1 lies within an east-west trending horst block closure defined by the Curdievale 3D seismic dataset. The well is located 12.0 km north west of the town of Petersborough, 1.8 km west north-west of the Boggy Creek CO₂ gas field, 3.0 km south of the McIntee gas field and 1.5 km north of the Naylor gas field. The Buttress-1 prospect is situated within the productive Waarre Sandstone play fairway of the Port Campbell Embayment.

Objectives:

The primary objective of the Buttress-1 well is the Waarre sandstone. The prospect is mapped as an east-west aligned horst block closure. The critical risk of the prospect was CO₂ charge, as observed in the Boggy Creek gas field.

Drilling Summary:

Buttress-1 was spudded on the 8/01/02 and a 250.825mm surface hole was drilled to 383 meters (Drlr). 193.675mm surface casing was run and cemented from surface to 378 meters. A 171.45 mm main hole was then drilled to a Total Depth of 1732 meters which was reached on 17/01/02. Buttress-1 was cased and suspended with 88.9mm 13Cr95 casing. The well was subsequently found (from analysis of gas recovered from the wireline pressure testing tool) to contain significant amounts (approximately 85%) of carbon dioxide.

Lost Time:

The Total Lost time for Buttress-1 was 24 hours.

TROUBLE TIME

4.5 hrs Treat losses of up to 160 bbl/hr. Spot 2 x 30 bbl LCM pills. Control pump rate.

1.5 hrs Loose circulation during top up cement job (cement losses). Cut window in conductor and top up manually.

2.5 hrs Pressure testing. Blown kooomey line, replace and service lines. Leaking HCR valve serviced.

11.5 hrs Rig repair - leaking valves on choke manifold.

0.5 hrs Drawworks clutch rig repair.

1.0 hr Misruns on surveys.

0.5 hr Ream 767-790m.

2.0 hrs Logging - repair voltage problem inside unit.

Water Supply:

Water was supplied from a waterbore on location. Additionally, water was hauled for the Mains supply some 3 km from the rig.

Mudlogging:

Geoservices (Australia) provided Mudlogging services. Samples were collected, washed and described at 10m intervals from 1000m to surface and at 3m intervals from 1000m to TD at 1730m RT. Through the objective sections, samples were collected at specific intervals depending on the drilling rate. Samples were checked for oil fluorescence under ultraviolet light. Total gas and composition was recorded from surface to total depth using flame ionisation detectors.

One unit of total gas is equal to 200 ppm of methane equivalent in air. One percent of total gas is equal to 50 units. Gas composition in the range C1 through to C4 (methane, ethane, propane, normal and iso-butane) was determined by a FID chromatograph. In addition, rate of penetration, pump strokes, pit levels, rotary torque and weight on bit were recorded for the duration of drilling. Carbon Dioxide was monitored with an infra red CO₂ detector The mudlog is attached as Enclosure 1.

Electric Logging

Reeves provided the electric logging services for Buttress-1. The electric logging consisted of two logging runs. Run #1 comprised GR-SONIC(LCS)-RESISTIVITY(DLL)-MICRORESISTIVITY(MLL)-CAL-DENSITY(PDL)-NEUTRON-(CNL) with Full Waveform up to 30m above the top Flaxman Formation. The maximum recorded temperature on this run was 66°C @ 1700 m.

Run #2 comprised a Pressure Survey (GR-RFS) over 20 sample points in the Waarre sandstone. Most sample points gave good drawdown and buildup pressures with the exception of two sample points which curtailed. A formation sample was taken (in a segregated chamber) at 1619.1m RT.

Hole Deviation

Buttress-1 was essentially drilled as a vertical well with deviation constraints being set to within 25m radius of correct surface location with a preferred direction of north-east. Deviation was monitored during drilling with single shot surveys every 150 meters or as required. The maximum deviation measured in this well was 2.12° at an azimuth of 021 degrees. The TVD at 1711m was 1710m with a maximum calculated offset from vertical of 9.9m.

Results of Drilling:

Buttress-1 was drilled as an Otway Basin near field gas exploration well in the PEP 154. Buttress-1 was essentially drilled as a vertical well to a Total Depth of 1732 meters (Drlr), which was 30 meters deeper than proposed Total Depth. All the formations, including the primary objective, came in from 11 meters to 101 meters low to prognosis. The exception was the Skull Creek mudstone and the Belfast mudstone which came in 62 meters and 17meters high to prognosis respectively.

Significant gas shows were penetrated in the Waarre C and Warre A units. No oil shows were penetrated.

Geothermal Gradient:

An estimated static bottom hole temperature of 68.4° C at 1732 meters, and a geothermal gradient of 2.73° C/100m was calculated from bottom hole temperatures recorded during logging runs 1 and 2.

Status:

Buttress-1 was cased and suspended as a future CO₂ producer.

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DATE: 4/03/02

APPENDIX I: GEOPHYSICAL DATA

BUTTRESS 1 GEOPHYSICAL DATA

CURDIE 1						Buttress-1						BOGGY CREEK 1				
	TWT (m/s)	DEPTH (m-ss)	ISO (m)	VAV (m/s)	VINT (m/s)	TWT (ms)	Prop Depth (m-ss)	DEPTH (m-ss)	ISOP (m)	VAV (m/s)	VINT (m/s)	TWT (m/s)	DEPTH (m-ss)	ISO (m)	VAV (m/s)	VINT (m/s)
CLIFTON	458	428	531	1869	2642	440	420	434		1911	136	435	406	464	1867	2529
PEBBLE POINT	860	959	136	2230	2519	570	557	930	438	1953	2669	802	870	98	2170	2800
PAARATE	968	1095	577	2262	3476	898	994	1095	340	2215	3067	872	968	480	2220	2927
SKULL CREEK	1300	1672	180	2572	3273	1120	1335	1274	92	2384	2677	1200	1448	83	2413	3609
BELFAST	1410	1852	558	2627	3331	1189	1427	1411	112	2401	3508	1246	1531	107	2457	3194
WAARRE	1745	2410	103	2762	3745	1253	1539	1561	58	2457	2233	1313	1638	77	2495	2567
EUMERAL	1800	2513	44	2792		1305	1597	1608	53	2448		1373	1715	150	2498	
TD		2557					1650	1680					1865			

**APPENDIX II:
GEOLOGICAL SAMPLE DESCRIPTIONS**

SUFICIAL DEPOSITS & LATE CRETACEOUS FORMATIONS

GAS
Peak/B'grd
nil gas

SPUD - 350m
ROP:1.5 -35 mn/m
Ave: 10 min/m

LIMESTONE: off white, yellow, pale grey, occasional yellowish brown, loose, dispersive, sucrosic in part, occasional friable, common shell fragments.

SANDSTONE: clear, off white, pale grey, fine to medium, moderately sorted, subangular to subrounded, common calcareous, loose, poor to fair inferred porosity, no fluorescence.

MARL: pale to medium grey, medium greyish brown, very calcareous, trace fossil fragments, soft, amorphous to subblocky.

350m – 490m
ROP:0.4–1.5
min/m
Avg:0.75 min/m

LIMESTONE: Orangish red to orangish brown, pale yellow, cream, micromicritic, medium hard to hard, crystalline, common fossil fragments, burrow casts, trace pyrite.

MARL: pale greyish green, very calcareous, common fossil fragments, very soft, subblocky to amorphous

nil gas

CLIFTON FORMATION

490m – 572m
ROP:0.4 – 1.5 min/m
Avg:0.75 min/m

LIMESTONE: orange/red to orange/brown, pale yellow, cream, micromicritic, medium hard to hard, crystalline, common fossil fragments, burrow casts, trace pyrite.

MARL: pale greyish green, very calcareous, common fossil fragments, very soft, subblocky to amorphous

nil gas

MEPUNGA FORMATION

572m – 637m
ROP:0.4 – 5.3 min/m
Avg:1.5 min/m

SANDSTONE: pale reddish brown, translucent, clear, fine to medium grained, locally medium to coarse, subangular to subrounded, very calcareous, loose grains, poor inferred porosity, no fluorescence.

MARL: brown, greyish brown, pale grey, very calcareous, rare fossil fragments, soft to dispersive, occasionally firm, subblocky to amorphous.

nil gas

DYLWYN FORMATION

637m – 905m
ROP:0.4 – 5.3 min/m
Avg:1.5 min/m

SANDSTONE: clear to opaque, pale yellowish brown, medium to very coarse, trace very coarse and fine, moderately poorly sorted, subangular to subrounded, rare to common weak calcareous cement, trace pale brown argillaceous matrix, predominantly loose grains, trace friable to firm aggregates, poor to fair inferred porosity, no fluorescence.

MARL: brownish grey, very calcareous, rare fossil fragments, soft to dispersive, subblocky to amorphous.

nil gas

PEMBER MUDSTONE

905m – 979m
ROP:0.5 – 8.5 min/m
Avg: 4.0 min/m

CLAYSTONE: Brown, pale medium brown, minor carbonaceous specks, silty in part, soft to dispersive, amorphous to rare subblocky.

SANDSTONE: Opaque to translucent, pale brown, medium to coarse, trace very coarse, moderate to poorly sorted, subangular to subrounded, weak siliceous cement, predominantly loose, trace friable aggregates, no fluorescence.

nil gas

PEBBLE POINT FORMATION

979m – 1039m
ROP:0.5–12.0 min/m
Avg: 2.5 min/m

SANDSTONE: Opaque to translucent, pale brown, medium to coarse, trace very coarse, moderate to poorly sorted, subangular to subrounded, weak siliceous cement, predominantly loose, trace friable aggregates, no fluorescence.

SILTSTONE: Medium to dark brown, argillaceous, trace carbonaceous specks, firm to soft, subblocky.

nil gas

1039m- 1070m ROP: 0.5 – 4.0 min/m Avg: 2.5 min/m	<p>PAARATTE FORMATION <u>CLAYSTONE</u>: Medium to dark brown, trace brownish grey, silty, soft to dispersive, rare firm, amorphous to subblocky. <u>SILTSTONE</u>: Medium to dark brown, brownish grey, arenaceous, argillaceous in part, minor carbonaceous specks, soft to firm, dispersive in part, subblocky.</p>	nil gas
1070m-1180m ROP:1 – 16 min/m Avg: 4.0 min/m	<p><u>SANDSTONE</u>: Clear to translucent, pale brown in part, fine to medium, coarse to very coarse in part, poorly sorted, subrounded to rounded, fair to good inferred porosity, no fluorescence. <u>SILTSTONE</u>: Pale to medium grey, dark brownish grey, arenaceous, argillaceous in part, micromicritic, trace carbonaceous specks, trace pyrite, soft to firm, subblocky.</p>	25/0 100% C1
1180m- 1200m ROP: 1.5 – 24 min/m Avg: 3.0 min/m	<p><u>SANDSTONE</u>: Clear to translucent, frosted, milky, fine to coarse, predominantly medium, subangular to subrounded, calcareous cement, white argillaceous matrix, moderately hard, poor to fair inferred porosity, no fluorescence. <u>SILTSTONE</u>: Medium to dark greyish brown, pale brown in part, arenaceous, minor pyrite, trace carbonaceous specks, friable to moderately hard, subblocky.</p>	25 / 1 100% C1
1200 – 1245m ROP:0.8–12.0 min/m Avg: 4.0 min/m	<p><u>SANDSTONE</u>: Clear to translucent, frosted, fine to coarse, very coarse in part, predominantly moderately sorted, subangular to subrounded, calcareous cement, trace off white argillaceous matrix, moderately hard, loose grains, poor to fair inferred porosity, no fluorescence. <u>SILTSTONE</u>: Medium to dark greyish brown, pale brown, arenaceous, argillaceous in part, micromicritic, pyrite in part, trace carbonaceous specks, friable to firm, moderately hard, in part, subblocky.</p>	6 / 0 Trace/ 100% C2
1245m – 1295m ROP:0.7– 37.0 min/m Avg:3.5 min/m	<p><u>SANDSTONE</u>: Clear to opaque, translucent, frosted, milky, fine to coarse, predominantly medium grained, subangular to subrounded, calcareous cement, white argillaceous matrix, moderately hard, poor fair inferred porosity, no fluorescence. <u>SILTSTONE</u>: pale to medium grey, occasionally dark grey, pale brown in part, arenaceous, friable to moderately hard, subblocky.</p>	25 / 0 100% C1
1295m – 1325m ROP:0.7- 5.0 min/m Avg: 3.0 min/m	<p>PAARATTE FORMATION (CONTINUED) <u>SANDSTONE</u>: Clear, opaque to translucent, coarse to very coarse, occasionally fine to medium, moderate to poorly sorted, angular to subrounded, common broken quartz grains, common to abundant pyrite nodules, loose, fair inferred porosity, no fluorescence <u>SILTSTONE</u>: Medium to dark greyish brown, pale brown in part, arenaceous, minor pyrite, trace carbonaceous specks, friable to moderately hard, subblocky.</p>	Tr 100% C1
1325m – 1383m ROP:0.7- 21.0 min/m Avg: 3.5 min/m	<p><u>SANDSTONE</u>: Clear to opaque, translucent, fine to coarse, predominantly medium grained, moderately sorted, subangular to subrounded, pyrite nodules, loose, firm aggregates, poor to fair inferred porosity, no fluorescence. <u>SILTSTONE</u>: light to medium grey, greyish brown, arenaceous grading to very fine sandstone in part, trace argillaceous, common carbonaceous specks, common locally abundant pyrite nodules, micromicaceous in part, friable to firm, subblocky.</p>	100% / Tr
1383m – 1475m ROP:1.7– 4.5 min/m Avg: 2.5 min/m	<p>SKULL CREEK FORMATION <u>SILTSTONE</u>: Medium grey/brown, occasionally light to medium grey, arenaceous, minor argillaceous in part, trace very fine micromicaceous, trace to occasional carbonaceous specks, common pyrite nodules, soft to very soft, dispersive in part, subblocky to amorphous. <u>SANDSTONE</u>: Light grey, light grey/brown, occasionally clear, translucent, very fine to fine, occasionally medium, moderately well sorted, subangular to subounded, trace weak silicious cement, common silty matrix, occasional carbonaceous specks, dispersive to occasionally firm, subblocky</p>	3.5 / 0 100% C1

1475m – 1595m ROP: 1.5-9.0 min/m Avg: 2.75 min/m	<p>BELFAST MUDSTONE</p> <p><u>SILTSTONE</u>: Medium to dark grey, greyish brown, arenaceous, argillaceous grading to CLAYTONE in part, minor carbonaceous specks, minor to common glauconitic grains, trace micromicaceous, trace LIMESTONE, calcareous in part, soft to firm, subblocky to subfissile.</p> <p><u>SANDSTONE</u>: Clear to translucent, very fine to fine, rare medium, moderately sorted, subangular to subrounded, weak siliceous cement, trace off white argillaceous matrix, friable to firm, poor visual porosity, no fluorescence.</p>	20 / 6 94 / 6 %
1595m-1610m ROP: 1.0-2.0 min/m Avg: 1.5 min/m	<p>FLAXMANS FORMATION</p> <p><u>SILTSTONE</u>: Medium to dark grey, argillaceous, arenaceous in part, trace glauconitic grains, trace pyrite, trace carbonaceous specks, soft to firm, subblocky.</p>	20 / 12 94 / 5 / 1 / Tr %
1610m-1622m ROP: 1.0-1.2 min/m Avg: 1.5 min/m	<p>WAARRE SANDSTONE</p> <p><u>(UNIT C): SANDSTONE</u>: Clear to translucent, off white, fine to coarse, predominantly medium, moderate to poorly sorted, subangular to subrounded, trace weak siliceous cement, minor off white argillaceous matrix, friable to firm, loose in part, poor to fair visual and inferred porosity, no fluorescence.</p>	930 / 20 94 / 5 / 1 / % CO ₂ : 4.69 %
1622m-1630m ROP: 1.5-6.0 min/m Avg: 2.3 min/m	<p>WAARRE SANDSTONE</p> <p><u>(UNIT B): SILTSTONE</u>: pale brownish grey, pale to medium grey, argillaceous, very fine arenaceous in part, commonly micromicaceous, common carbonaceous specks and occasional laminations, soft to firm, subblocky, minor subfissile.</p>	20 / 100
1630m-1656m ROP: 1.0-11 min/m Avg: 3.0 min/m	<p><u>(UNIT A): SANDSTONE</u>: Clear to translucent, off white, fine to coarse, poorly sorted, subangular to subrounded, trace weak calcareous cement, minor to locally common off white argillaceous matrix, friable to firm, loose in part, poor to fair inferred porosity, no fluorescence.</p>	360 / 20-45 95 / 4 / 1 / Tr % CO ₂ : 2.59-6.60%
1656m-1685m ROP: 1.8-11 min/m	<p>EUMERALLA FORMATION</p> <p><u>SANDSTONE</u>: White to very light grey, trace clear translucent, fine to medium, predominantly fine, moderately well sorted, subangular to subrounded, common weak calcareous cement, abundant white argillaceous, matrix, common lithics, friable, trace loose, poor visual and inferred porosity, no fluorescence.</p> <p><u>SILTSTONE</u>: Medium to dark grey, trace grey/brown, argillaceous, grading to CLAYSTONE in parts, common carbonaceous specks, trace feldspathic flakes, soft to occasionally firm, subblocky.</p>	100 / 10-20 97 / 3 / Tr %

APPENDIX III: HYDROCARBON SHOWS

HYDROCARBON SHOW SUMMARY		
INTERVAL	LITHOLOGY & FLUORESCENCE	GAS Peak/B'ground
1610m-1622m ROP:1.9- 2.1min/m Avg: 2.0 min/m	WAARRE SANDSTONE: <u>SANDSTONE</u> : clear to translucent, off white, fine to coarse, predominantly medium, moderate to poorly sorted, sub-angular to sub rounded, trace weak siliceous cement, minor off white argillaceous matrix, friable to firm, loose in parts, poor to fair visual and inferred porosity, no fluorescence.	930 / 15-20 97 / 3 / Tr
1628m-1637m ROP:1.0-11 min/m Avg: 3 min/m	<u>SANDSTONE</u> : Clear to translucent, off white, fine to coarse, poorly sorted, subangular to subrounded, trace weak calcareous cement, minor to locally common off white argillaceous matrix, friable to firm, loose in parts, poor to fair inferred porosity, no fluorescence	360 / 20-45 95 / 4 / 1/Tr

APPENDIX IV: LOG ANALYSIS

BUTTRESS 1
LOG ANALYSIS

BUTTRESS 1 - LOG ANALYSIS

Buttress 1 wireline logs were analysed over the Waarre Sandstone and Eumeralla Formation (1612-1708m) intervals. Gas pay was identified in the Waarre A and Waarre C Sandstones. Buttress 1 was cased and suspended as a future CO₂ producer.

A 250.825mm surface hole was drilled to 383 metres and 193.675mm casing set at 378 metres. A 6 171.45mm hole was then drilled with KCl/PHPA mud to 1730 metres (D). Wireline logging was carried out by Reeves (as described below).

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

Logs Acquired

Run 1	GR	1708 -Surface
	LCS (Long Spaced Compensated Sonic Sonde)	1698-383m
	(Waveform Sonic)	1698-1565m
	DLS (Dual Laterolog Sonde)	1706-383m
	MLL (Microlog)	1709-383m
Run 2	PDS (Compensated Density Sonde)	1691-1565m
	CNS (Compensated Neutron Sonde)	1689-1565m
Run 3	GR-RFS	21 Points in Waarre Sandstone

Mud Parameters

Mud Type	KCl/polymer
Mud Density	9.3 ppg
KCl	4.2 %
Rm	0.206 ohmm @ 18.6 DEGC
Rmf	0.168 ohmm @ 18.8 DEGC
Rmc	0.248 ohmm @ 18.4 DEGC
MRT	66 DEGC from Run 2 at 1730m
Time since circ	11 hrs 45 mins

Remarks

- The laterolog and sonic was run with 1 inch stand-offs.
- 0.7 % Barite in mud.
- Neutron tool run with single bowspring eccentriciser.

Log Processing

- Regional salinity data was used to derive the R_w used for this analysis.
- A BHT of 66 DEGC was used for the analysis (Gradient of 26.58 DEGC/km).

Interpretation Procedures and Parameters

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

- The GR from Run 1 was corrected for environmental effects such as mud-weight, KCl and borehole size using measurements made from the MLL caliper to produce GR_COR.
- The Laterolog and microlog were corrected for mudcake, standoff, borehole and invasion corrections using the BPB/REEVES correction module in Geolog.
- The neutron log was corrected for borehole size, standoff, salinity, temperature and pressure.
- Hydrocarbon-corrected density and neutron porosity was calculated over the Waarre Sandstone using the density of hydrocarbon and its saturation in the flushed zone for hydrocarbon-correction and the Bateman-Konen algorithm for porosity. The corrections due to hydrocarbons can be expressed as:

$$\begin{aligned} \text{DELTA_RHO} &= \text{SHR} * \text{PHIE} * A \text{ and} \\ \text{DELTA_NPHI} &= \text{SHR} * \text{PHIE} * B * E \end{aligned}$$

Where SHR = residual hydrocarbon saturation, PHIE is the effective porosity calculated from Vsh, and;

$$A = 1.07 * ((1.11 - 0.15 * \text{SALMF}) * \text{RHO_MF} - 1.15 * \text{RHO_HC})$$

$$B = (\text{RHO_MF} * (1 - \text{SALMF}) - 1.67 * \text{RHO_HC} + 0.17) / (\text{RHO_MF} * (1 - \text{SALMF}))$$

E is the excavation effect factor on the neutron defaulted to 1.3, SALMF is the Salinity of the mud filtrate in M/M, RHO_MF is the mud filtrate density (g/cc) and RHO_HC is the hydrocarbon density (g/cc).

- A shale corrected porosity (PHIE_HC to be used in the Archie equation) was calculated using the the gamma-ray Vsh algorithm in Geolog:

$$Vsh = (GR_COR - GR_COR_{MA}) / (GR_COR_{SH} - GR_COR_{MA})$$

Where GR_COR is gamma-ray corrected for Borehole size, salinity and mud weight, GR_COR_{MA} is the value of a CLEAN SAND in GAPI, GR_COR_{SH} is the GAPI of shale.

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

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

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

$$\text{Clean sand "n"} = 1.85 \quad \text{Shaly sand "n"} = 1.50$$

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

- Water saturations were calculated using the psuedo-Archie equation.

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

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

Conclusions

1. Buttress 1 log analysis identified pay in the Waarre Sandstones and are described in Table 2.
2. Sandstone development was not observed in the Waarre B.
3. Pay sensitivity plots are shown in Table 3.
4. Buttress 1 was cased and suspended as a future CO₂ producer.

Attached is the well evaluation summary (WES) plot for Buttress 1 (02.004)
data/wes_ot/buttress1_02.004_waarre.wes

TABLE 1
Log Analysis Parameters

PARAMETERS	WAARRE C SANDSTONE	WAARRE A SANDSTONE
R _w (ohmm) @ 25°C	0.3	0.3
a	1	1
m	Variable	Variable
n	Variable	Variable
Borehole cor RD	0.96	0.96
Borehole cor RS	0.95	0.95
RD Shoulder Corr.	0.8	0.8
GR matrix (API)	50	60
GR shale (API)	125	100

TABLE 2
Conventional Pay Summary

FORMATION	SAND	SAND INTERVAL	NET PAY (m)	NET SAND (m)	AVG Porosity (wt %)	AVG Sw (wt %)
WAARRE C	16-01	1613 -1623	9.1	9.6	21.5	25
WAARRE A	16-05	1632 -1639	4.1	4.9	18.4	33
WAARRE A	16-05	1657 -1659	0.8	0.8	14	43

FORMATION	NET PAY (m)	AVG POR (wt %)	WT.AVG SW (wt %)
WAARRE C	9.1	21.2	25
WAARRE A	4.9	17.8	35

Cutoffs:

Gross Sand > 2% PHIE

Net Sand > 8% PHIE

Net Pay > 10% PHIE & <70% Sw

TABLE 3.

**BUTTRESS_1
WAARRE C**

PHIT Cutoff	SWT Cutoff	AVG PHIE V/V	AVG SWT V/V	Phie*H	HCPV Sg*Phie*H	NET (m)	NHCPV
0	0.7	0.224	0.27	1.969	1.438	8.8	1.00
0.02	0.7	0.224	0.27	1.969	1.438	8.8	1.00
0.04	0.7	0.224	0.27	1.969	1.438	8.8	1.00
0.06	0.7	0.224	0.27	1.969	1.438	8.8	1.00
0.08	0.7	0.224	0.27	1.969	1.438	8.8	1.00
0.1	0.7	0.224	0.27	1.969	1.438	8.8	1.00
0.12	0.7	0.224	0.27	1.969	1.438	8.8	1.00
0.14	0.7	0.227	0.262	1.928	1.424	8.5	0.99
0.16	0.7	0.235	0.241	1.807	1.371	7.7	0.95
0.18	0.7	0.238	0.234	1.74	1.333	7.3	0.93
0.2	0.7	0.243	0.221	1.605	1.25	6.6	0.87
0.22	0.7	0.247	0.211	1.48	1.167	6	0.81
0.24	0.7	0.254	0.195	1.067	0.859	4.2	0.60
0.26	0.7	0.271	0.159	0.19	0.159	0.7	0.11
0.28	0.7	0	0	0	0	0	0.00
0.3	0.7	0	0	0	0	0	0.00
0.32	0.7	0	0	0	0	0	0.00
0.34	0.7	0	0	0	0	0	0.00
0.36	0.7	0	0	0	0	0	0.00
0.38	0.7	0	0	0	0	0	0.00
0.4	0.7	0	0	0	0	0	0.00

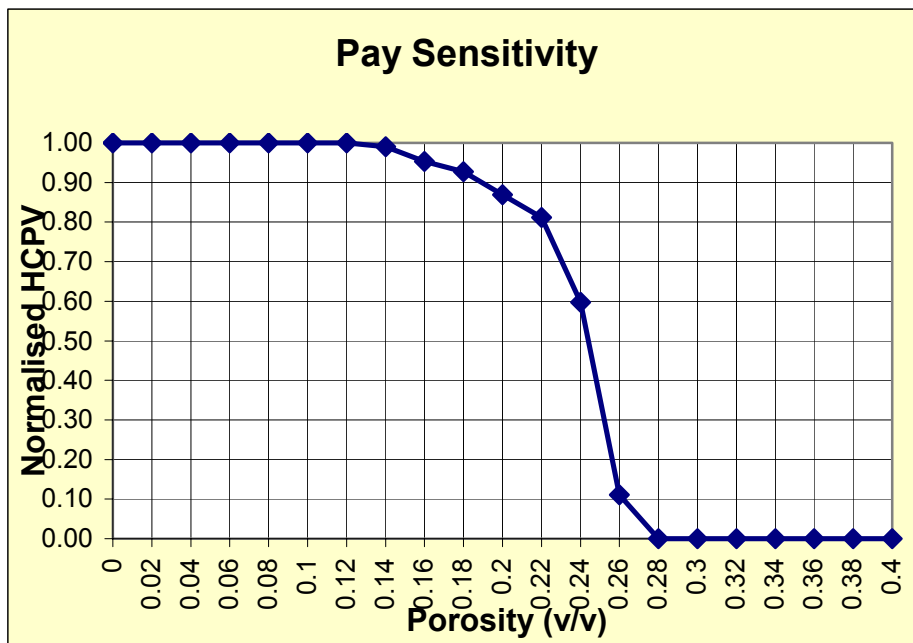
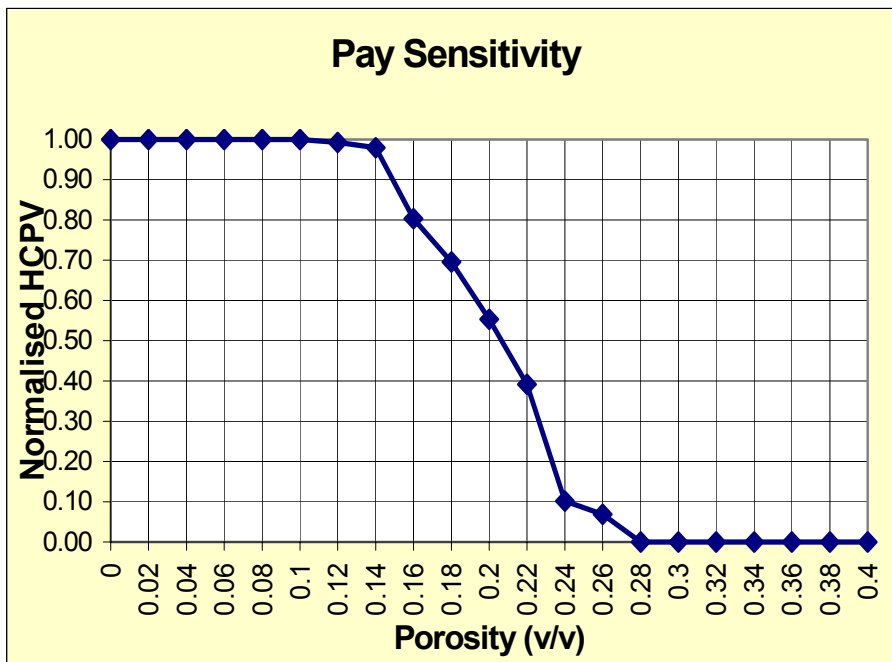


TABLE 3.

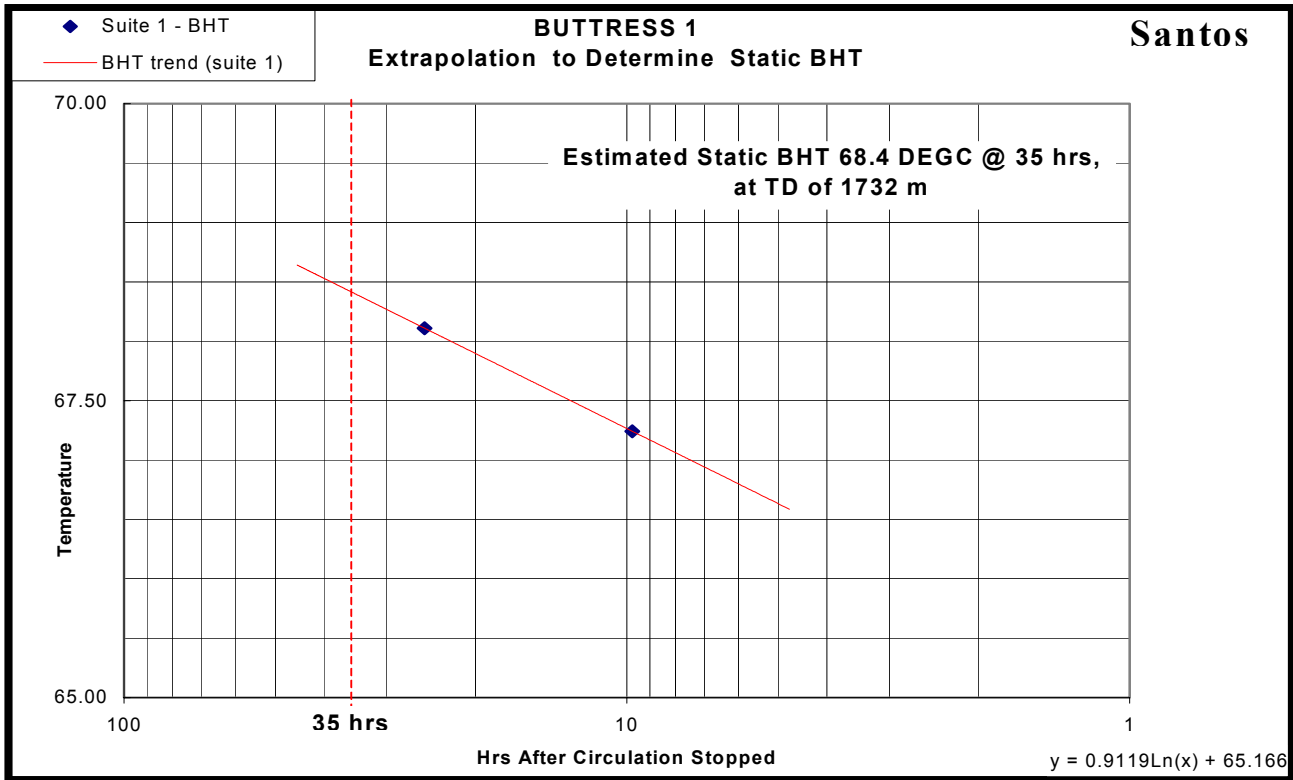
**BUTTRESS_1
WAARRE A**

PHIT Cutoff	SWT Cutoff	AVG PHIE V/V	AVG SWT V/V	Phie*H	HCPV Sg*Phie*H	NET (m)	NHCPV
0	0.7	0.19	0.409	0.912	0.539	4.8	1.00
0.02	0.7	0.19	0.409	0.912	0.539	4.8	1.00
0.04	0.7	0.19	0.409	0.912	0.539	4.8	1.00
0.06	0.7	0.19	0.409	0.912	0.539	4.8	1.00
0.08	0.7	0.19	0.409	0.912	0.539	4.8	1.00
0.1	0.7	0.19	0.409	0.912	0.539	4.8	1.00
0.12	0.7	0.192	0.406	0.9	0.535	4.7	0.99
0.14	0.7	0.193	0.404	0.886	0.528	4.6	0.98
0.16	0.7	0.211	0.359	0.675	0.433	3.2	0.80
0.18	0.7	0.22	0.345	0.573	0.375	2.6	0.70
0.2	0.7	0.231	0.319	0.438	0.298	1.9	0.55
0.22	0.7	0.24	0.322	0.311	0.211	1.3	0.39
0.24	0.7	0.267	0.312	0.08	0.055	0.3	0.10
0.26	0.7	0.271	0.313	0.054	0.037	0.2	0.07
0.28	0.7	0	0	0	0	0	0.00
0.3	0.7	0	0	0	0	0	0.00
0.32	0.7	0	0	0	0	0	0.00
0.34	0.7	0	0	0	0	0	0.00
0.36	0.7	0	0	0	0	0	0.00
0.38	0.7	0	0	0	0	0	0.00
0.4	0.7	0	0	0	0	0	0.00

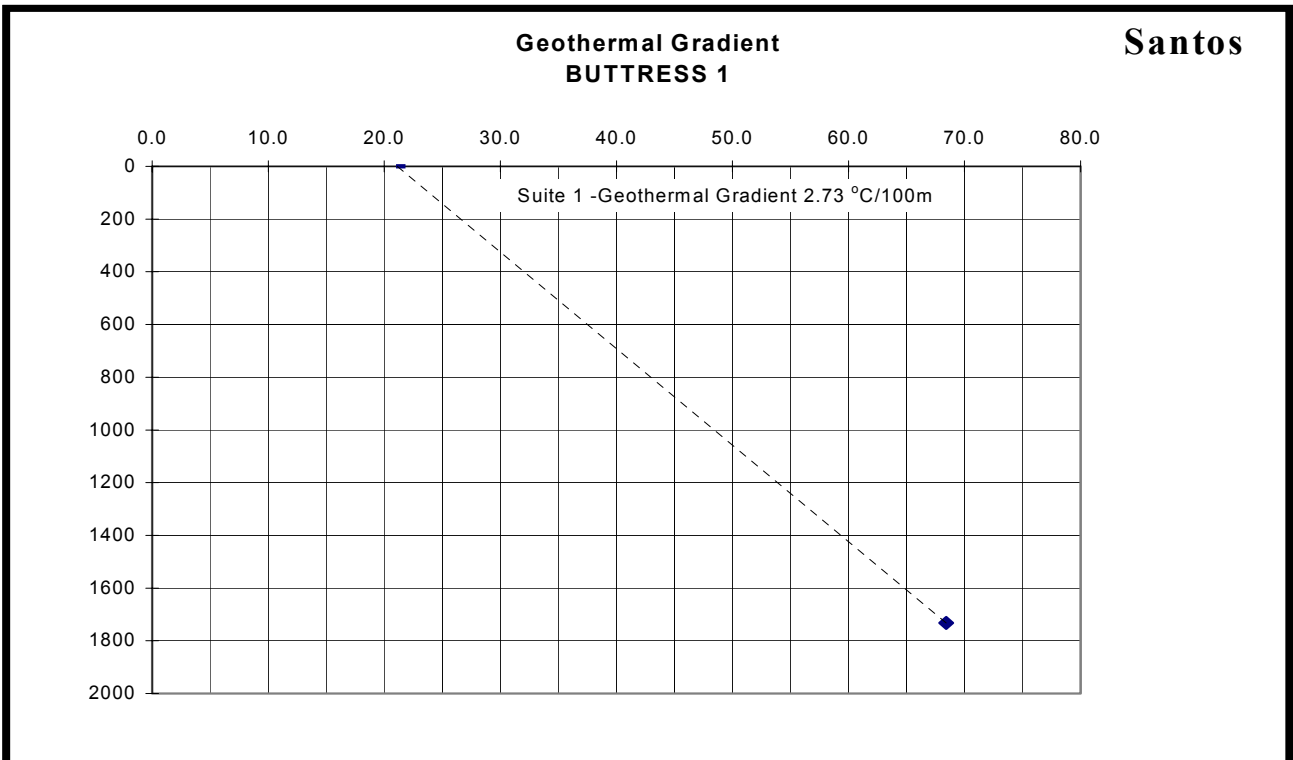


APPENDIX V: GEOTHERMAL GRADIENT

	Max Recorded Temp	Depth Recorded	Time Since Circulation.	Total Depth	Estimated BHT
Run 1	66	1700	9.75	1732	67.24
Run 2	65.9	1675.8	25.25	1732	68.11
Run 3					



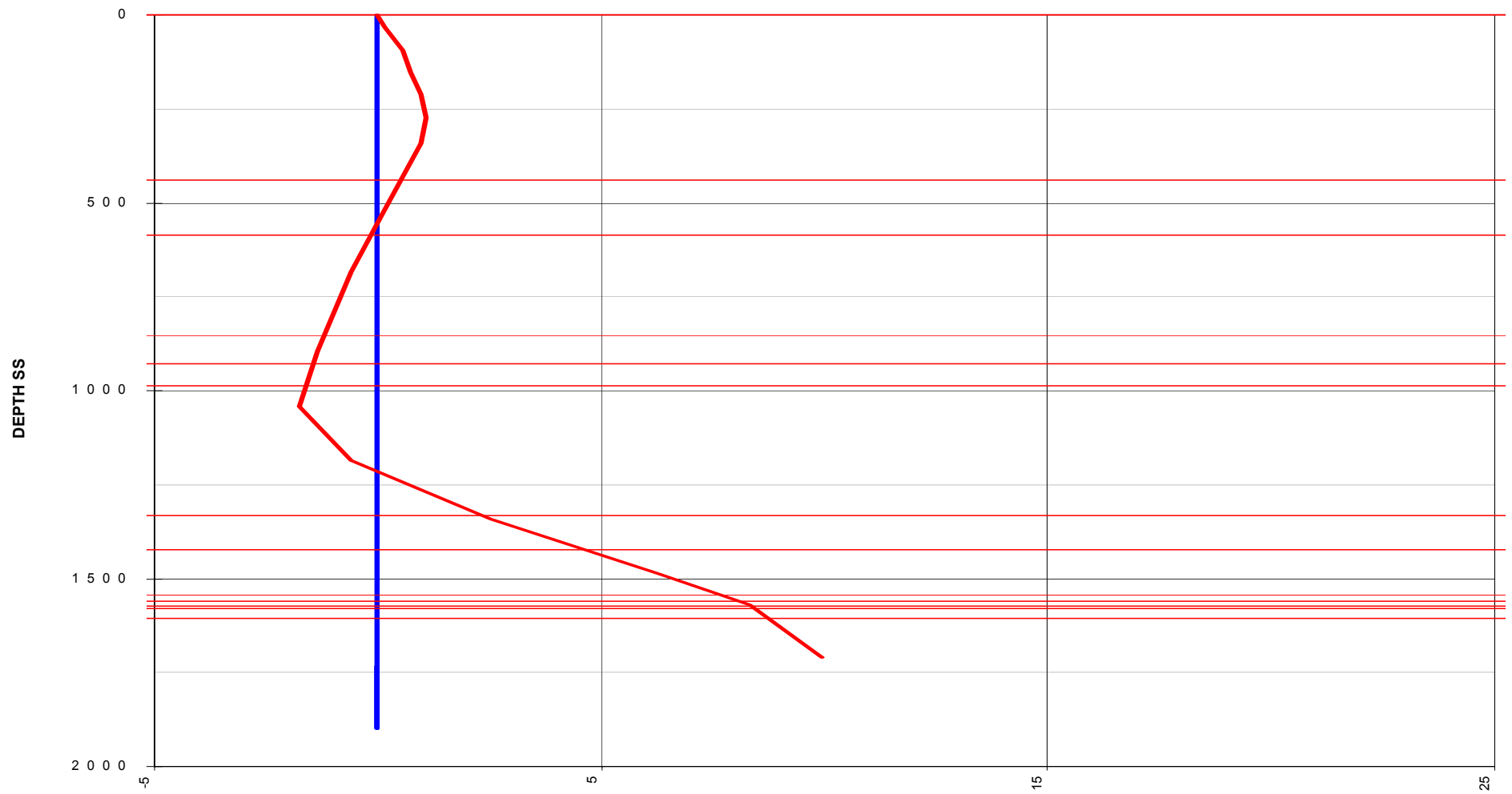
STATIC BHT @ 35 hrs	68.4	°C	@	1732	m
SURFACE TEMP.	21.11	°C	@	0	m
Geothermal Gradient for Suite 1	2.73		°C/100 m		



APPENDIX VI:DEVIATION DATA

BUTTRESS 1					ACTUAL TRAJECTORY DATA				Angle for section plot:			294
DEPTH	INCLIN	Azimuth	TVD	TVD	Northing	Easting	Dog Leg	Vert	Vert	TVD for	Displ	Direction
MD (m)	DEG	DEG (T)	m	S/S m	north	east	°/100'	Sect	Plane	Plan Traj		True
0.00	0.00	000	0.00	-50.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
32.00	0.50	293	32.00	-18.50	0.05	-0.13	1.56	0.14	0.14	32.00	0.14	293.00
94.00	0.50	356	94.00	43.50	0.43	-0.40	0.84	0.54	0.54	94.00	0.58	317.34
152.00	0.50	001	152.00	101.50	0.94	-0.41	0.08	0.75	-0.75	152.00	1.02	336.35
211.00	0.25	343	210.99	160.49	1.32	-0.44	0.46	0.94	0.94	210.99	1.39	341.40
273.00	0.20	221	272.99	222.49	1.36	-0.55	0.63	1.06	-1.06	272.99	1.47	337.92
343.00	0.20	139	342.99	292.49	1.18	-0.55	0.37	0.99	-0.99	342.99	1.30	334.87
530.00	0.40	134	529.99	479.49	0.48	0.13	0.11	0.08	-0.08	529.99	0.50	15.20
684.00	0.50	191	683.99	633.49	-0.55	0.39	0.28	-0.58	0.58	683.99	0.68	144.91
896.00	0.75	181	895.97	845.47	-2.85	0.19	0.13	-1.33	1.33	895.97	2.85	176.22
1042.00	0.50	201	1041.97	991.47	-4.40	-0.06	0.23	-1.74	1.74	1041.97	4.40	180.74
1187.00	1.00	275	1186.96	1136.46	-4.88	-1.54	0.68	-0.57	-0.57	1186.96	5.12	197.56
1341.00	1.37	286	1340.92	1290.42	-4.25	-4.65	0.28	2.52	2.52	1340.92	6.30	227.56
1485.00	1.67	311	1484.87	1434.37	-2.40	-7.89	0.50	6.23	6.23	1484.87	8.25	253.06
1571.00	1.75	341	1570.84	1520.34	-0.34	-9.26	1.03	8.33	8.33	1570.84	9.27	267.90
1711.00	2.12	021	1710.76	1660.26	4.10	-9.03	0.98	9.92	-9.92	1710.76	9.92	294.41

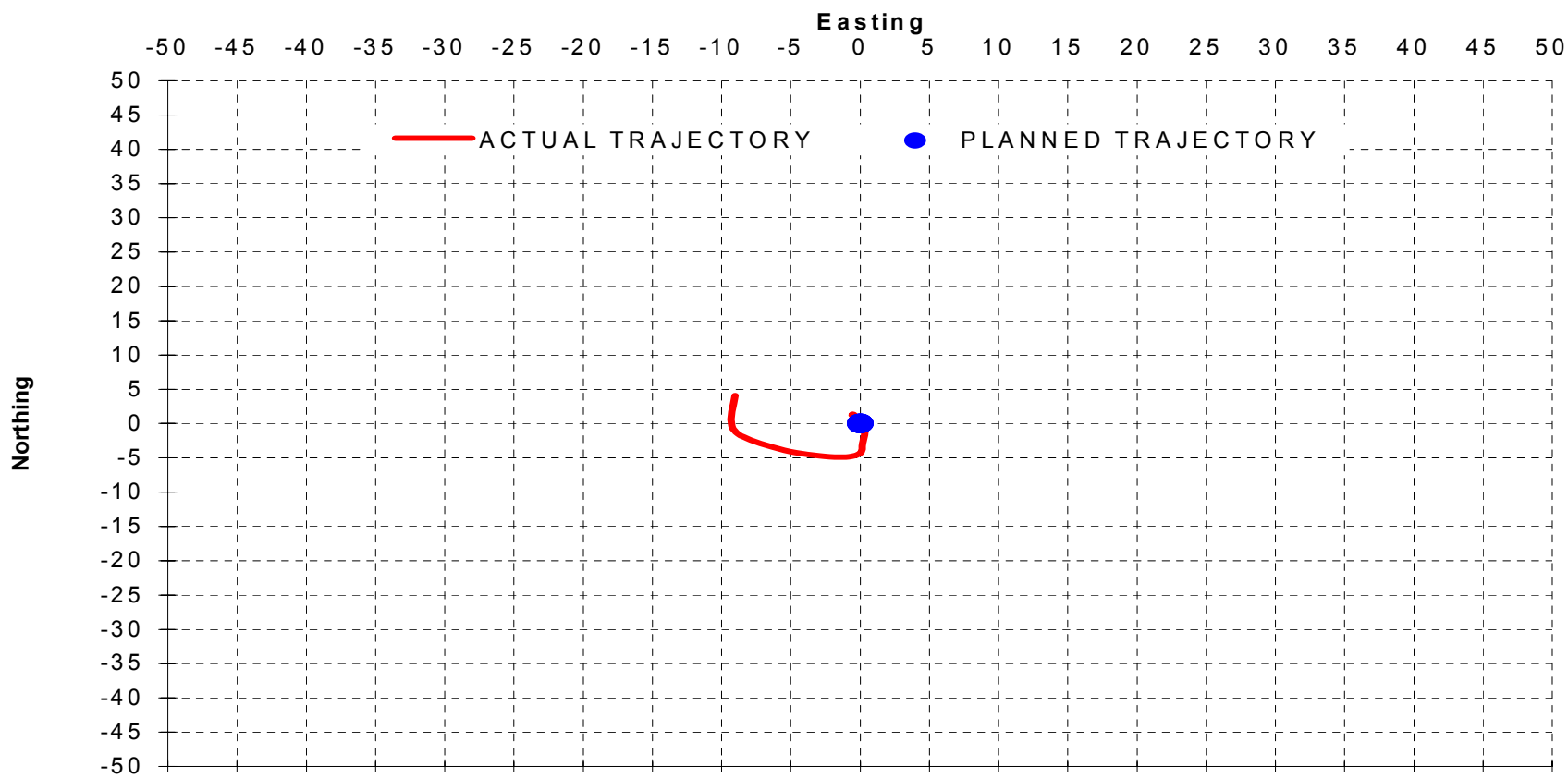
B U T T R E S S 1 - V e r t i c a l S e c t i o n @ 2 9 4 D e g



— PLANNED TRAJECTORY — ACTUAL TRAJECTORY

**BUTTRESS 1
Plan View**

Santos



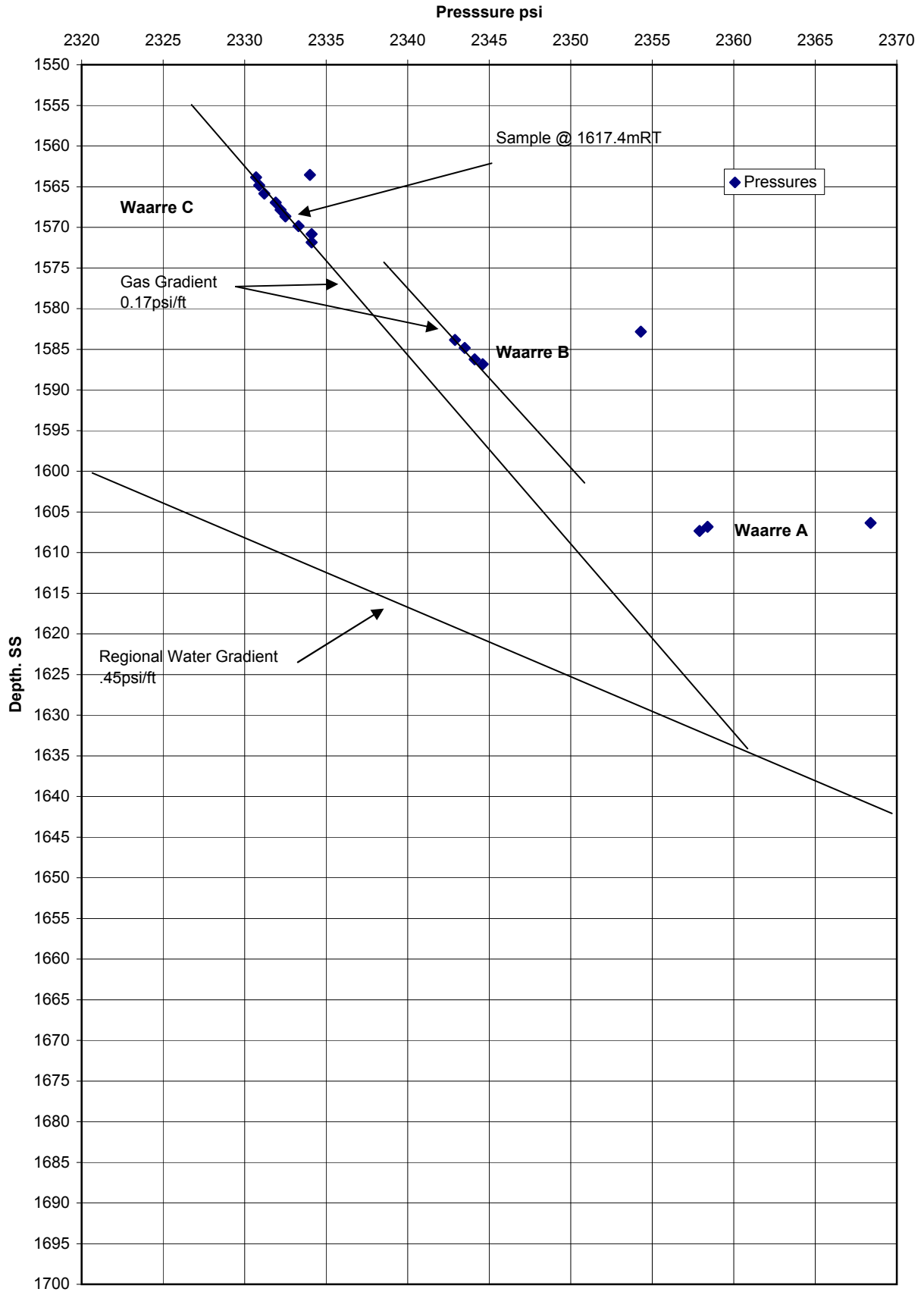
APPENDIX VII: FMT PRESSURE SURVEY

SANTOS LIMITED
PRESSURE SURVEY

WELL: BUTTRESS 1 K.B.: 50.50 TOOL AND GAUGE TYPE: HP QUARTZ/STRAIN
 WITNESS: A. HILL / L.FREDERIKSEN TIME OF LAST CIRC.: 07:45 PM 16/January/2002 PROBE / PACKER TYPE: NORMAL

TEST	FORMATION UNIT SANDS	DEPTH	DEPTH	EXPECT.	EXPECT.	TEST RESULTS					
		K.B.	S.S.	FORM	TEMP.	FILL TIME	HYDR. BEFORE PSI	FORM. PRESS. PSI	HYDR. AFTER PSI	TEMP. °F	DRAW D. MOBILITY MD/CP
		M	M	PSIG	°F						
1	WAARRE UNIT 'C'	1614.0	-1563.5				2600.3	2334	2600.3	63.9	
2	WAARRE UNIT 'C'	1614.3	-1563.8				2600.6	2330.7	2600.6	63.9	60
3	WAARRE UNIT 'C'	1615.3	-1564.8				2602.2	2330.9	2602.2	63.9	225
4	WAARRE UNIT 'C'	1616.3	-1565.8				2603.7	2331.2	2603.7	64.4	184
5	WAARRE UNIT 'C'	1617.4	-1566.9				2605.4	2331.9	2605.4	64.4	55
6	WAARRE UNIT 'C'	1618.3	-1567.8				2606.9	2332.2	2606.9	64.4	81
7	WAARRE UNIT 'C'	1619.1	-1568.6				2608.1	2332.5	2608	64.4	103
8	WAARRE UNIT 'C'	1620.3	-1569.8				2609.9	2333.3	2609.9	64.5	532
9	WAARRE UNIT 'C'	1621.3	-1570.8				2611.5	2334.1	2611.5	64.4	16
10	WAARRE UNIT 'C'	1622.3	-1571.8				2612.9	2334.1	2612.9	64.8	167
11	WAARRE UNIT 'A'	1632.3	-1581.8				2628.7		2628.9	65.1	
12	WAARRE UNIT 'A'	1633.3	-1582.8				2630.3	2354.3	2630.5	65.1	
13	WAARRE UNIT 'A'	1634.3	-1583.8				2631.7	2342.9	2631.8	64.9	53
14	WAARRE UNIT 'A'	1635.3	-1584.8				2633.3	2343.5	2633.4	65.1	18
15	WAARRE UNIT 'A'	1636.7	-1586.2				2635.5	2344.1	2635.6	65.4	93
16	WAARRE UNIT 'A'	1637.3	-1586.8				2636.5	2344.6	2636.6	65.4	
17	WAARRE UNIT 'A'	1647.3	-1596.8				2652.4		2652.8	65.6	
18	WAARRE UNIT 'A'	1656.8	-1606.3				2667.5	2368.4	2667.7	65.9	
19	WAARRE UNIT 'A'	1657.3	-1606.8				2668.5	2358.4	2668.5	65.9	
20	WAARRE UNIT 'A'	1657.8	-1607.3				2669.2	2357.9	2669.2	65.9	
21	WAARRE UNIT 'C'	1619.1	-1568.6				2606.7	2333	2605.8	64.6	
								2331.9			

Buttress 1 RFT Pressure Plot



APPENDIX VIII: GAS SAMPLE ANALYSIS

LABORATORY -VS- MUDLOGGING CO₂ MEASUREMENTS

WELL NAME	METHANE LAB % MOL BY VOL (AMDEL)	CO₂ LAB % MOL BY VOL (AMDEL)	METHANE DRILLING OVER WAARRE SST (% METHANE) (GEOSERVICES)	CO₂ DRILLING (%) OVER WAARRE SST (GEOSERVICES)	CO₂ RFS CHAMBER (%) (GEOSERVICES)
McIntee 1	82.56	2.15	90 – 92	0.1193	1.33
Tregony 1	82.35	0.17	58 – 81	0.1029	0.19
Croft 1	86.24	2.38	85 – 90	0.2769	2.18
Lavers 1	81.74	0.47	82 – 90	0.0786	0.46
Naylor 1	82.8	1.0	93 – 97	0.0921	1.00
Buttress 1	13.04	84.47	94 – 95	4.69 – 6.60	5.00*

* Analysed approximately 18 hours after balloon filled.

CHANGES OF CO₂ CONCENTRATION WITH LAPSED TIME AFTER FILLING A BALLOON WITH 100% CO₂.

TIME LAPSED FROM FILLING BALLOON	MEASURED %
0 hours	100% CO ₂
4 hours	66.5% CO ₂
8 hours	32.3% CO ₂
12 hours	10.4% CO ₂
16 hours	0.96% CO ₂

Discussion:

CO₂ levels detailed in the midstream are significantly lower than expected due to absorption of CO₂ into the drilling mud and dilution due to chemical reaction. The ability of CO₂ to pass through a balloon membrane over time must be accounted for when taking wellsite samples using this technique.

PETROLEUM SERVICES GAS ANALYSIS
 Method GL-01-01 ASTM D 1945-96 (modified)

Client: SANTOS Ltd Report # LQ11280

Sample: BUTTRESS-1
 Revees Lower Chamber

GAS	MOL %
Nitrogen	1.68
Carbon Dioxide	84.47
Methane	13.04
Ethane	0.51
Propane	0.17
I-Butane	0.03
N-Butane	0.04
I-Pentane	0.01
N-Pentane	0.01
Hexanes	0.02
Heptanes	0.01
Octanes and higher h'cs	0.01
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present. These constants are derived from GPSA SI Engineering Data Handbook 1998. The following parameters are derived from ISO 6976 and are calculated from the above composition at 15°C and 101.325 kPa (abs).

Average Molecular Weight	40.06
Lower Flammability limit	33.74
Upper Flammability limit	106.20
Ratio of upper to lower	3.15
Wobbe Index	4.76
Compressibility Factor	0.9967
Ideal Gas Density (Rel to air = 1)	1.383
Real gas Density (Rel to air = 1)	1.387
Ideal Nett Calorific Value MJ/m ³	5.05
Ideal Gross Calorific Value MJ/m ³	5.60
Real Nett Calorific Value MJ/m ³	5.07
Real Gross Calorific Value MJ/m ³	5.62
Gross calorific value of water-saturated gas MJ/m ³	5.47

This report relates specifically to the sample submitted for analysis.

Approved Signatory _____

Accreditation No. 2013
 Date : 21-01-02

PETROLEUM SERVICES GAS ANALYSIS

Method GL-01-01

ASTM D 1945-96 (modified)

Client: SANTOS Ltd

Report # LQ11280

Sample: BUTTRESS-1
Revees Lower Chamber
Sample Taken at 5000 kPag

GAS	MOL. %
Nitrogen	1.35
Carbon Dioxide	84.80
Methane	13.01
Ethane	0.50
Propane	0.16
I-Butane	0.03
N-Butane	0.04
I-Pentane	0.01
N-Pentane	0.01
Hexanes	0.02
Heptanes	0.01
Octanes and higher h'cs	0.06
Total	100.00

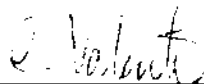
(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present. These constants are derived from GPSA SI Engineering Data Handbook 1998. The following parameters are derived from ISO 6976 and are calculated from the above composition at 15°C and 101.325 kPa (abs).

Average Molecular Weight	40.16
Lower Flammability limit	33.12
Upper Flammability limit	105.64
Ratio of upper to lower	3.19
Wobbe Index	4.84
Compressibility Factor	0.9967
Ideal Gas Density (Rel to air = 1)	1.387
Real gas Density (Rel to air = 1)	1.391
Ideal Nett Calorific Value MJ/m ³	5.15
Ideal Gross Calorific Value MJ/m ³	5.70
Real Nett Calorific Value MJ/m ³	5.17
Real Gross Calorific Value MJ/m ³	5.72
Gross calorific value of water-saturated gas MJ/m ³	5.58

This report relates specifically to the sample submitted for analysis.

Approved Signatory



Accreditation No.

2013

Date :

22-01-02

PETROLEUM SERVICES GAS ANALYSIS
 Method GL-01-01 ASTM D 1945-96 (modified)

Client: SANTOS Ltd Report # LQ11381

Sample: BUTTRESS-1
 Cyl# EX 392

GAS	MOL %
Nitrogen	1.73
Carbon Dioxide	75.67
Methane	21.27
Ethane	0.84
Propane	0.27
I-Butane	0.05
N-Butane	0.06
I-Pentane	0.02
N-Pentane	0.01
Hexanes	0.03
Heptanes	0.03
Octanes and higher h'cs	0.02
Total	100.00

(0.00 = less than 0.01%)

The above results are calculated on an air and water free basis assuming only the measured constituents are present. These constants are derived from GPSA SI Engineering Data Handbook 1998. The following parameters are derived from ISO 6976 and are calculated from the above composition at 15°C and 101.325 kPa (abs).

Average Molecular Weight	37.73
Lower Flammability limit	20.64
Upper Flammability limit	65.03
Ratio of upper to lower	3.15
Wobbe Index	8.02
Compressibility Factor	0.9968
Ideal Gas Density (Rel to air = 1)	1.303
Real gas Density (Rel to air = 1)	1.307
Ideal Nett Calorific Value MJ/m3	8.27
Ideal Gross Calorific Value MJ/m3	9.16
Real Nett Calorific Value MJ/m3	8.29
Real Gross Calorific Value MJ/m3	9.19
Gross calorific value of water-saturated gas MJ/m3	8.97

This report relates specifically to the sample submitted for analysis.

Approved Signatory _____

Accreditation No. 2013
 Date : 17-07-02

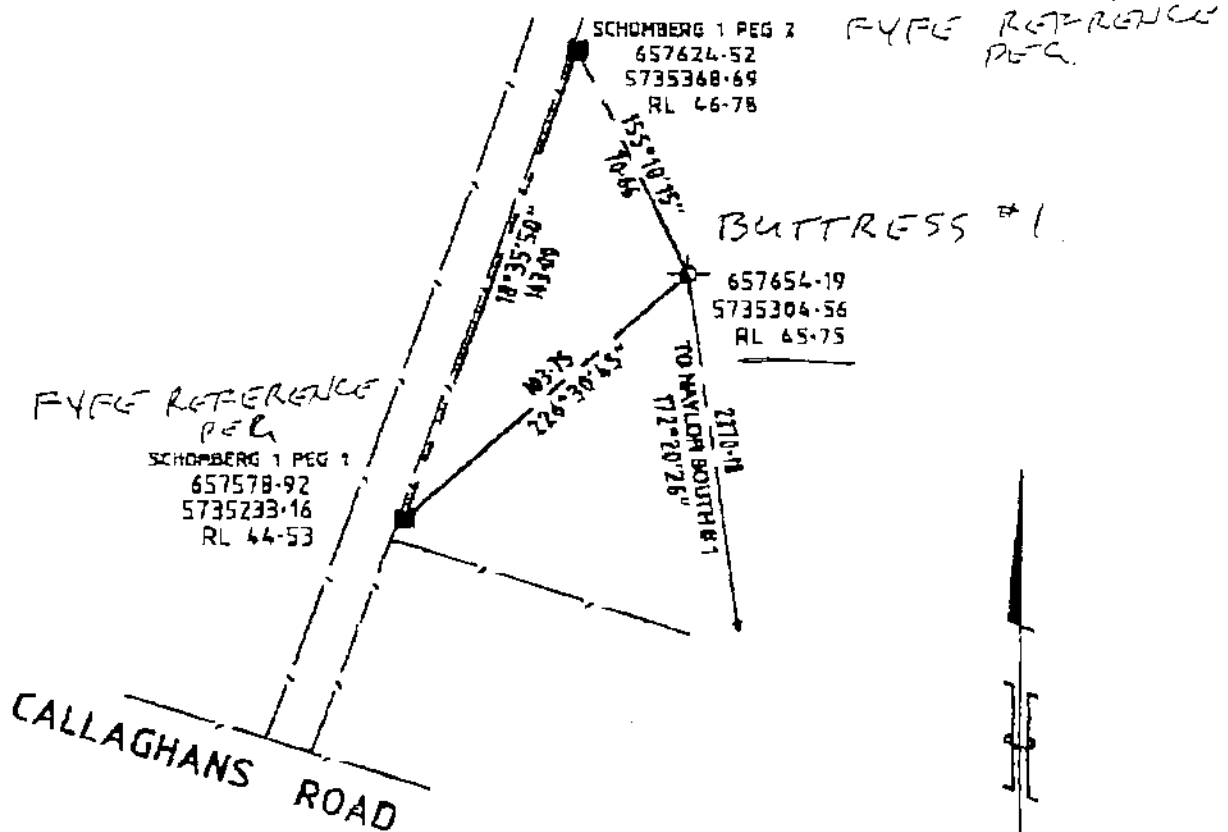
APPENDIX IX: WELL LOCATION SURVEY

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

Well Name **BUTTRESS #1**

Map

Spheroid	GDA84	MGA 84	ZONE 54
Latitude	S 38°31'00.10"	Measurement units (metres)	
Longitude	E 142°48'30.08"	Easting	657 654.19
Convergence	1°07'35"	Northing	5 735 304.56
Scale Factor	0.99989893	Elevation	45.75 (AHD)



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

DATUM: GDA84 vide Peg 1 and Peg 2
Datum coordinates determined by Fyfe
Surveyors 22 / 10 / 2001.
Height datum is to AHD vide Peg 1 and Peg 2.

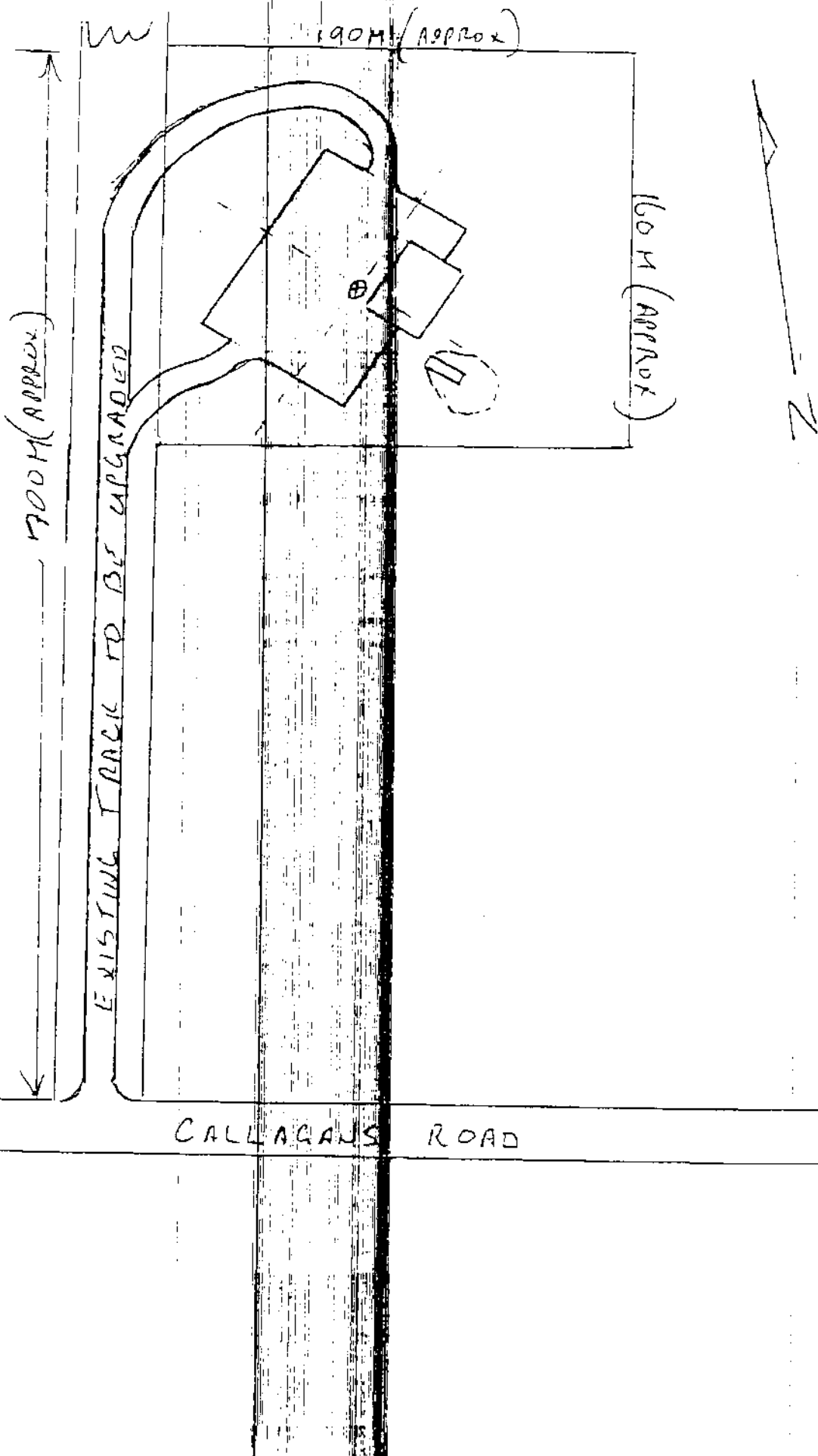
Estimated Horizontal error is less than +/- 0.05 metre.
Estimated Vertical error is less than +/- 0.05 metre.
Date of Survey : 29 / 12 / 2001

Paul Crowe Surveyor ABN 59521601183 "Ambleside" 182 Koroit Street Warrnambool 3280 Ph. (03) 5561 1500	REF 1059
---	------------------------

Date 29 / 12 / 2001
Trevor M. McDowell
 TREVOR McDOWELL
 LICENSED SURVEYOR

BUTTRESS #1

* NOT TO SCALE



APPENDIX X: DRILLING – FINAL WELL REPORT

The background of the entire page is a high-contrast, black and white photograph of an oil drilling rig. The rig's derrick and various mechanical components are visible against a light sky. The image is somewhat grainy and has a high level of contrast, making it appear almost like a negative or a heavily processed photograph.

SANTOS

FINAL WELL REPORT

BUTTRESS #1

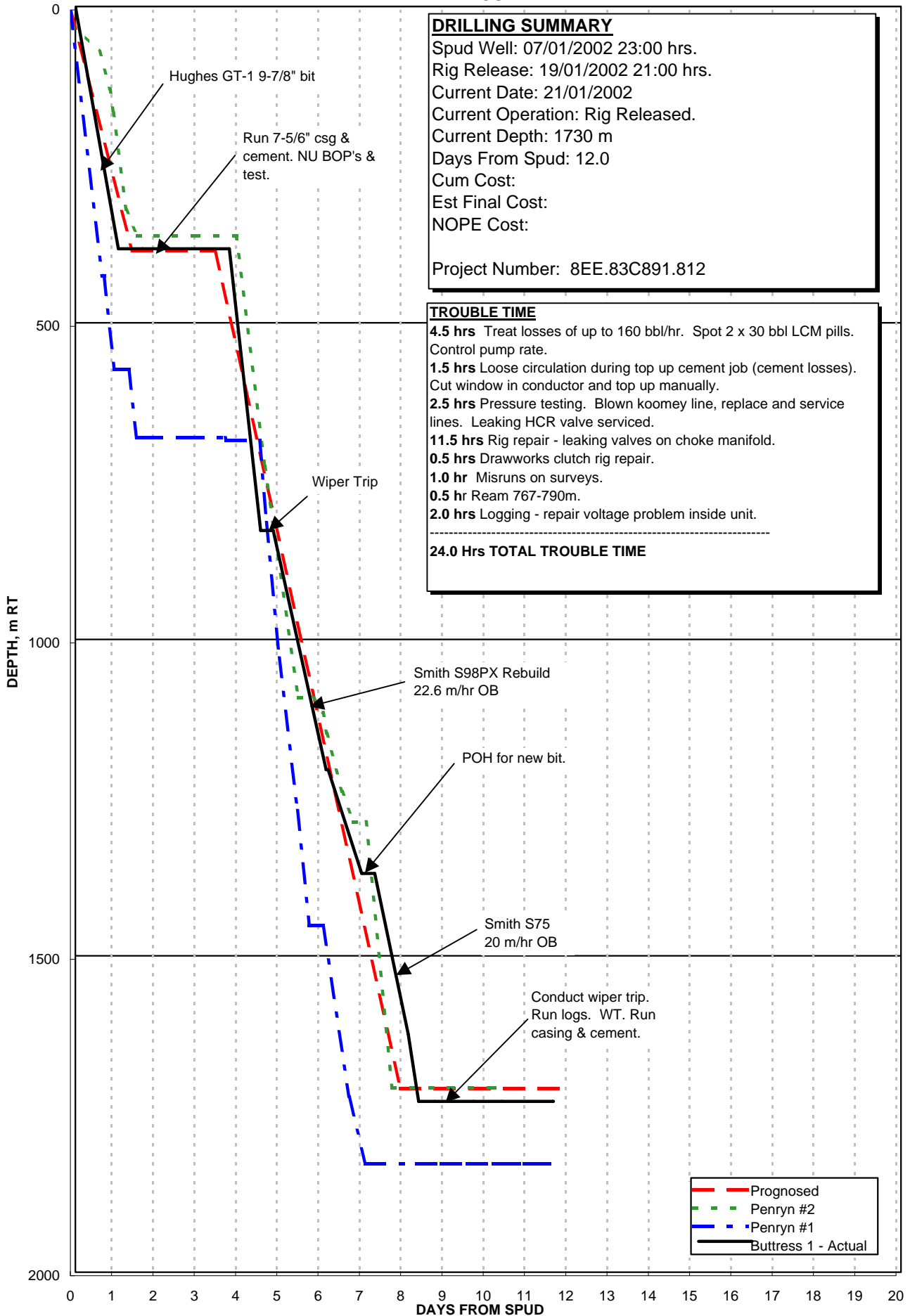
Drilling Supervisor(s)	: Graham Klenner
Drilling Engineer(s)	: J. Bevern
Report Author	: T. Robertson
Report Supervisor	: M. Bill
Date of Issue	: 19th April 2002

Table of Contents

Section 1 – Well Summary	
Time vs Depth Curve	
Section 2 – Well History	
Well History Report	
Section 3 - Drilling Data.....	
Bit Record	
FIT/LOT Report.....	
Section 4 – Casing and Cementing.....	
Casing and Cementing Report/s.....	
Wellhead Installation Report/Plug and Abandonment Report.....	

Section 1 – Well Summary
Time vs Depth Curve

BUTTRISS 1 TIME v DEPTH CURVE



Section 2 – Well History
Well History Report

BUTTRESS #1

Drilling Co.: OD&E

Rig: OD&E #30

RT above GL: 4 m Lat : 38 deg 31 min 0.10 sec Spud Date: 08/01/2002 Release Date: 19/01/2002
 GL above MSL : 45 m Long : 142 deg 48 min 30.08 sec Spud Time: 07:00:00 Release Time: 21:00:00

Well History

#	DATE	DEPTH	WELL HISTORY (24 Hr Summary)
10	08/01/2002	250	Spud well and drill ahead, with surveys to 223m.
11	09/01/2002	383	Drill to casing point. POOH. Rig and run Surface casing.
12	10/01/2002	383	Nipple up and test Bops. Prepare 6 3/4" BHA.
13	11/01/2002	386	RIH, Drill float, shoe track, float shoe & rat hole. Drill 3m new hole. Complete Rig repairs
14	12/01/2002	828	Drill main Hole. Wiper trip.
15	13/01/2002	1,128	Ream and Wash to btm, Drill Ahead with Surveys @ 150 m intervals.
16	14/01/2002	1,340	Drill, Wiper trip, Drill ahead w/- surveys @ 150m intervals.
17	15/01/2002	1,504	Drill main Hole. H.F.N.B. Hole Good Condition. Cont Drill.
18	16/01/2002	1,730	Delete this line and enter a brief (240 chars max) summary of the last 24 hrs here
19	17/01/2002	1,730	Logg. RIH wiper trip.
20	18/01/2002	1,730	RIH. Circ bttms up and con mud. lay out sideways. Rig & run monobore.
21	19/01/2002	1,730	Run & Cement 3.5" MonoBore. WOC. Set slips. Nipple Down Bops. Install Xmas Tree & Test. Release rig.

Section 3 – Drilling Data
Bit Record
FIT/LOT Report

BUTTRESS #1

Drilling Co.: OD&E

Rig : OD&E #30

RT above GL : 4 mtrs
GL above MSL : 45 mtrsLat : 38 deg 31 min 0.10 sec
Long : 142 deg 48 min 30.08 secSpud Date: 08/01/2002
Spud Time: 07:00:00Release Date: 19/01/2002
Release Time: 21:00:00**BIT RECORD**

DATE	BIT#	SIZE "	IADC	SER	MFR	TYPE	JETS	D.IN mtrs	D.OUT mtrs	MTRG	HRS o/b	SPP psi	FLW gpm	WOB k-lbs	RPM	MW ppg	TFA sq.in	VEL mps	HHP /sq"	ROP m/hr	I	O1	D	L	B	G	O2	R
09/01/2002	1	9.88	117	A33JB	HUGHES	GT 1	3x20	0	383	383	17.8	750	516	8.0	100	8.9	0.921	55	0.00	21.5	2	2	RR		E	I	NO	TD
15/01/2002	2	6.75		JS3693	SMITH	S98PX	4x11	383	1,370	987	42.0	1686	315	5.7	107	9.0	0.371	82	2.97	23.5	2	3	LT	N2	X	I	CT	PR
16/01/2002	3	6.75		JS7017	SMITH	S75PX	5x11	1,370	1,730	360	17.6	1650	295	8.9	113	9.3	0.464	60	1.48	20.5	2	1	CT	N	X	I	RR	TD

WELL: Buttress # 1

RIG: OD&E 30

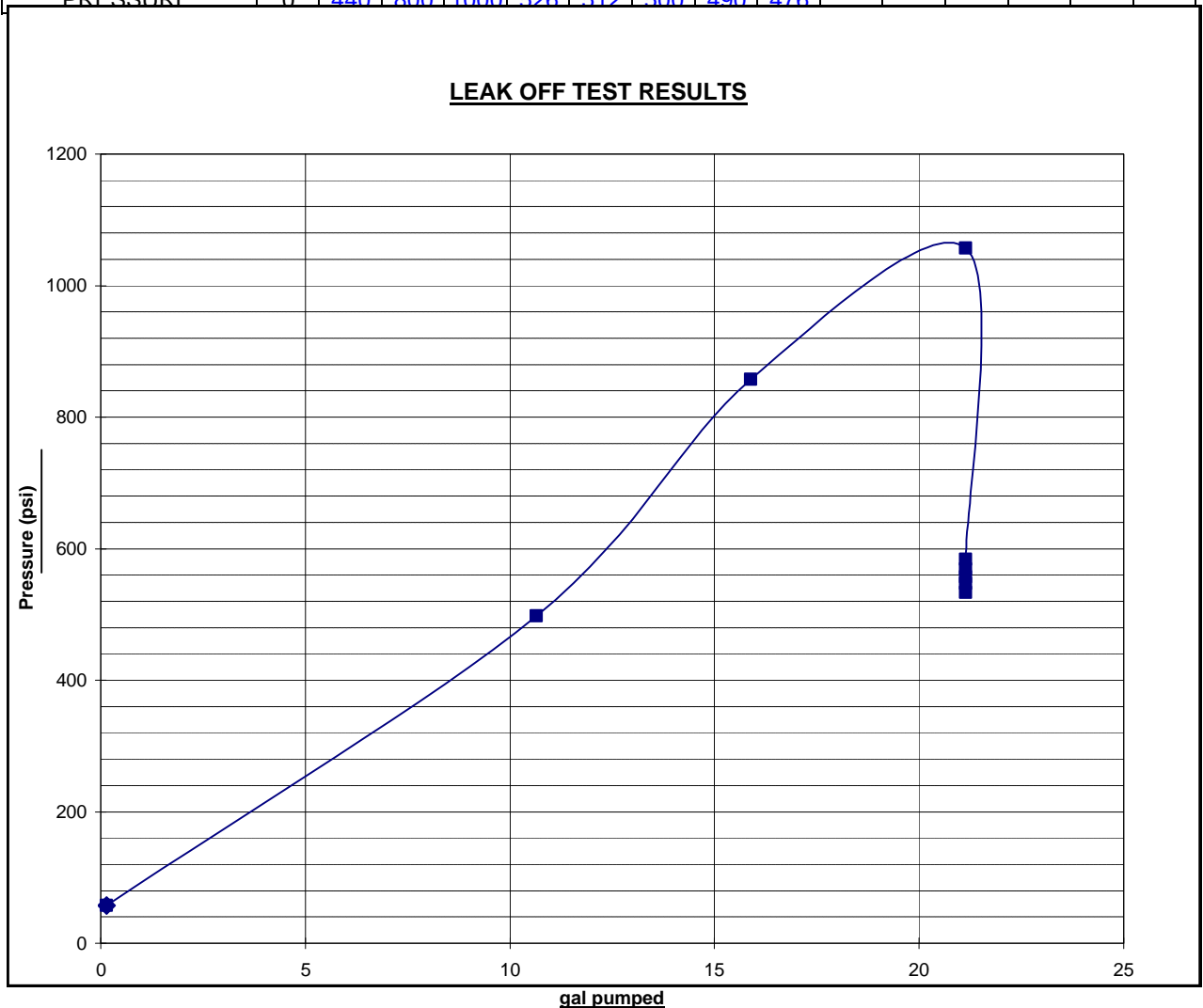
DATE: 19/04/2002

CASING SIZE: 7 5/8 (inch)

SANTOS SUPERVISOR: Graham Klenner

- A. MUD DENSITY IN USE: 8.6 (ppg)
 B. HOLE DEPTH: 1256 (ft)
 C. SHOE DEPTH: 1240 (ft)
 D. LEAK-OFF PRESSURE (GRAPH): 527 (psi)
 E. EQUIVALENT DENSITY:
 LEAK-OFF PRES. (D) (psi) + MUD DENSITY IN USE (A) (ppg) **16.8 (ppg) (EMW)**
 SHOE DEPTH (C) (ft) x 0.052
 F. MAXIMUM PRESSURE RECORDED: 1000 (psi)
 G. VOLUME PUMPED: 21 (gallons)
 H. VOLUME REGAINED: 15.8 (gallons)

		1min	2min	3min	4min	5min							
GALS PUMPED	0	10.5	15.75	21	21	21	21	21	21				
PRESSURE	0	440	800	1000	526	512	500	490	476				



Section 4 – Casing and Cementing

Casing and Cementing Report/s

Wellhead Installation Report/Plug and Abandonment Report

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

Casing type: <input type="checkbox"/> Surface casing <input type="checkbox"/> Intermediate Casing <input checked="" type="checkbox"/> Production Casing <input type="checkbox"/> Completion tubing						
Originated by: G Klenner		Date: 19th Jan 02		Checked by: JNB		Date: 24-Jan-02
Hole Size: 6.75	T.D.: 1730	Rig: ODE Rig 30	Date:	Cemented by:	Dowel	
PRE-FLUSH 10 bbls. @ H20			SPACER 40 bbls@ 8.4 ppg			
Additives: -----			Mains water 8 ppb sapp, 9.2 ppg KCL			

CEMENT				ADDITIVES		
LEAD SLURRY:	328	sacks class	"G"		%	Amount
Slurry Yield:	2.58	cu.ft./sack		D020 Bentonite	4	1674 lbs
Mixwater Req't:	15.55	gal./sack		S001 Accelerator	0	0 lbs
Actual Slurry Pumped:	157.0	bbls @	11.8	D144 Antifoam	0.01 gal/sx	5 gal
	846 cu/ft cu ft			DO81 Retarder	0.05 gal/sx	23 gal
TAIL SLURRY:				D145A Dispersant		
Slurry Yield:	1.19	cu.ft./sack	"G"	D144 Antifoam	0.01 gal/sx	1.5 gal
Mixwater Req't:	5.31	gal./sack		DO81 Retarder	0.01 gal/sx	1.5 gal
Actual Slurry Pumped:	28.0	bbls @	15.6 ppg			
	144 cu/ft cu ft					

DISPLACEMENT				Fluid: Mud 9.4 ppg		
Theoretical Displ.:	49	bbl.		Bumped plug with		1200 psi
Actual Displ.	49.5	bbl @	5 BPM	Pressure Tested to:		2000 psi
Displaced via	Dowel			Bleed back:		0.5 bbl

ACTIVITY	Time	Returns to Surface: 35 preflush and sapp flush 0 bbls Cement				
Start Running csg.	18:00	Reciprocated/Rotated Casing: yes				
Casing on Bottom	04:00	Top Up Job run: Yes / No No sx class G				
Start Circulation	03:30	Plug Set make/type: Baker lycin				
Pump Preflush (Rig)	05:00	Centraliser type/depth: weathrtford, 1704,1691,1679,1654,1629,1604,1579,1554,				
Start Pressure Test	06:05	Remarks: 356,331.00				
Start Mixing	06:18	Full returns.				
Finish Mixing	07:02	Unable to run past 1717m HUD.				
Start Displacing	07:07	Bump plug .				
Bump	07:15	set slips w/- 40 k above string wt.				
Press. test	07:24					

No. JOINTS	SIZE OD	WT lb/ft	GRADE	THREAD	M	FROM	TO
Rotary table to top of bradenhead					4.93	0.00	4.93
Bradenhead. Woods 5k 9" x 7 5/8"					0.54	4.93	5.47
1 cut jnt	3 1/2'	9.2	13cr95	Fox	6.47	5.47	11.94
127	3 1/2'	9.2	13cr95	Fox	1567.07	11.94	1579.01
marker jt	3 1/2"	9.2	13cr95	Fox	1.24	1579.01	1580.25
10	3 1/2"	9.2	13Cr95	Fox	123.59	1580.25	1703.84
Float shoe	3 1/2"	9.2		Fox	0.37	1703.84	1704.21
1	3 1/2"	9.2	13Cr95	Fox	12.36	1704.21	1716.57
Shoe	3 1/2'	9.2		Fox	0.43	1716.57	1717.00

Theoretical Bouyed wt of casing(klb):	45	Bradenhead Height above GL	0.00
Actual wt of casing (last joint run-block wt, klb)	44	Marker jts Left	0.00
Hanging wt (after cementing and pressure bleed off)	42	Total Jts on Loc	160
Casing wt just prior to setting slips	82	Total No. Run	139
	(Indicator wt - Blocks = Csg wt)	No. Left	21

Buttress 1

7-5/8"BTC x 3-1/2"Kawasaki Fox.



Components

Xmas Tree Assembly No. A0084				Serial No.
Description	Manufacturer	Part No.	Size/Rating	Model
Tree Cap	WGPC	2233-3-AS1	3-1/8" 5,000	Bowen
Crown Valve				
Flow Cross	WGPC	2255-3	3-1/8"5Kx2-1/16"5K	
Kill/Vent Valve	CIW	141501-31-62-02	2-1/16"5K	FL
Companion Flange	WGPC	306230	2-1/16"5K	
Production Wing Valve	WGPC	306162	3-1/8"5K BB	2200
Blind Flange	WGPC	1140AU	3-1/8"x 2"NPT	
Upper Master Valve	WGPC	306162	3-1/8"5K BB	2200
Lower Master Valve	WGPC	308143	3-1/8"5K CC1	2200
Adaptor Flange	WGPC	314979	9"5K Hubx3-1/8"5K	2 x 3-1/2"P
Tubing Head				
Production Annulus Valve				
Companion Flange				
Casing Spool				
Intermediate Annulus Valve				
Companion Flange				
Casing Head	WGPC	314958	9"5Kx7-5/8"BTC	WG2LH
Slip & Seal	WGPC	318640	9"x3-1/2"	WG22
Surface Annulus Valve	WGPC	305843	2-1/16"5K	2200
Companion Flange	WGPC	306230	2-1/16"5K	
Casing Swage	N/A			

General Comments :- No swage req'd 7-5/8"BTC straight into body, first completion running the wellhead,

Company Man Duncan New / Graham Keller Rig Rep. Patch / Darren Whithead

APPENDIX XI: RIG SPECIFICATIONS

Rig Inventory for RIG # 30

DRAWWORKS	:	Ideco Hydrair H-725-D double drum with V-80 Parmac hydromatic brake, Martin Decker satellite automatic drilling control. Max. single line pull - 50,000 lbs. Main drum grooved for 1-1/8" drilling line.
SUBSTRUCTURE	:	One piece substructure 14' high x 13'6" wide x 50' long with 12' BOP clearance. Setback area loading: 250,000 lbs Casing area loading: 275,000 lbs
ENGINES	:	Four (4) Caterpillar Model 3412 PCTA diesel engines.
BRAKE	:	V-80 Parmac hydromatic brake,
MAST	:	Dreco Model #: M12713-510 Floor Mounted Cantilever Mast designed in accordance with API Specification 4E Drilling & Well Servicing Structures. Hook load Gross Nominal Capacity - 510,000 lbs with:- 10 lines strung - 365,000 lbs 8 lines strung - 340,000 lbs Clear working height of 127'. Base width of 13'6". Adjustable racking board with capacity for i) 108 stands of 4.½" drill pipe, ii) 10 stands of 6.½" drill collars, iii) 3 stands of 8" drill collars Designed to withstand an API windload of 84 mph with pipe racked and 100 mph with no pipe racked.
CATHEADS	:	One (1) Foster Model 37 make-up spinning cathead mounted on drillers side. One (1) Foster Model 24 break-out cathead mounted off drillers side.
TRAVELLING BLOCK/HOOK	:	One (1) 667 Crosby McKissick 250 ton combination block hook Web Wilson. 250 ton Hydra hook Unit 5 - 36" sheaves.
WINCHES	:	One (1) Ingersol Rand HU-40 with 5/8" wireline. Capacity 2,000 lb. One (1) ANSI B30.7 with 3/8" wire capacity 4000lbs @ 70 fpm
SWIVEL	:	One (1) Oilwell PC-300 ton swivel
RIG LIGHTING	:	Explosive proof fluorescent. As per approved State Specifications.
KELLY DRIVE	:	One (1) 27 HDP Varco kelly drive bushing.
MUD PUMPS	:	Two (2) Gardner Denver mud pumps Model PZH-8 each driven by 750 HP EMD D-79 motors. 8" stroke with liner size 6" through to 5". 6" liner maximum pressure 2387 psi 5.1/2" liner maximum pressure 2841 psi 5" liner maximum pressure 3437 psi 6" liner maximum volume 412 gpm 5.1/2" liner maximum volume 345 gpm 5" liner maximum volume 280 gpm
MIXING PUMP	:	Two (2) Mission Magnum 5" x 6" x 14" centrifugal pump complete with 50 HP, 600 Volt, 60 Hz, 3 phase explosion proof electric motors.

MUD AGITATORS	:	Five (5) Geolograph/Pioneer 40TD - 15" 'Pitbull' mud agitators with 15 HP, 60 Volt, 60 HZ, 3 phase electric motors.
LINEAR MOTION SHALE SHAKERS	:	Two (2) DFE SCR-01 Linear motion shale shakers.
DEGASSER	:	48" Dia Poor Boy Degasser
DESILTER	:	One (1)DFE - Harrisburg style 12 cone desilter 12 x 5" cones. Approximate output of 960 gpm. Driven by Mission Magnum 5" x 6" x 11" centrifugal pump complete with 50 hp 600 volt 60 Hz 3 phase explosion proof motor.
GENERATORS	:	Four (4) Brown Boveri 600 volt, 600 Kw, 750 kva , 3 phase, 60 HZ AC generators. Powered by four (4) Cat 3412 PCTA diesel engines.
BOP's & ACCUMULATOR	:	One (1) Wagner Model 20-160 3 BND 160 gallon accumulator consisting of: Sixteen (16) 11 gallon bladder type bottles One (1) 20 HP electric driven triplex pump 600 volts, 60 HZ, 3 phase motor and controls. One (1) Wagner Model A 60 auxiliary air pump 4.5 gals/minute.
BOP's & ACCUMULATOR (Cont'd)	:	One (1) Wagner Model UM2SCB5S mounted hydraulic control panel with five (5) 1" stainless steel fitted selector valves and two (2) stripping controls and pressure reducing valves. Three (3) 4" hydraulic readout gauges:- one for annular pressure- one for accumulator pressure one for manifold pressure. One (1) Stewart & Stevenson 5 station remote drillers control with air cable umbilical with three pressure gauges, increase and decrease control for annular pressure. One (1) Shaffer 13.5/8" x 3,000 psi spherical annular BOP, One (1) Shaffer 13.5/8" x 5,000 psi LWS studded, double gate autolock B.O.P.
KELLY COCK (UPPER)	:	Two (2) Upper Kelly Cock 7.3/4"OD with 6.5/8" API connections (1 x M&M, 1 x Hydril).
KELLY COCK (LOWER)	:	Three (3) M&M Lower Kelly Cocks 6.½" OD with 4" IF connections
DRILL PIPE SAFETY VALVE	:	One (1) Hydril 6.½" stabbing valve (4" IF). One (1) Gray inside BOP with 4.3/4" OD and 2.1/4" ID with 3.1/2" IF connections c/w releasing tool and thread protectors.
AIR COMPRESSORS AND RECEIVERS	:	Two (2) LeRoi Dresser Model 660A air compressor packages c/w 10 HP motors rated at 600 Volts, 60 HZ, 3 phase. Receivers each 120 gallon capacity and fitted with relief valves.
POWER TONGS	:	One (1) Farr 13.5/8" - 5.½" hydraulic casing tongs c/w hydraulic power pack and hoses and torque gauge assembly. One (1) Foster hydraulic kelly spinner with 6.5/8" LH connection.
TORQUE WRENCH	:	Yutani c/w drive sockets 1 1/8" through to 2 3/8"
SPOOLS	:	One (1) set double studded adaptor flanges to mate 13.5/8" 5,000 psi. API BOP flange to following wellhead flange 13.5/8" x 3,000 series, 11" x 3,000 series, 11" x 5,000 series 7.1/16" x 3,000 series, 7.1/16" x 5,000 series 4 1/16" 5000 x 3 1/16" 5000 3 1/16" 5000 x 2 1/16" 5000

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

SUBSTITUTES	:	<p>Two (2) Bit Sub - 7.5/8" reg x 6.5/8" reg double box. Two (2) Bit Subs - 6.5/8" reg double box. Two (2) Bit Sub - 6.5/8" reg box. x 4½" IF box Two (2) Bit Subs - 4½" 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 4½" IF pin. Two (2) XO Sub - 4½" IF box x 4." IF pin. One (1) XO Sub - 4½" 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 - 4½" reg box x 4½" reg pin. One (1) XO Sub - 4½" IF box x 4" IF box. Two (2) Kelly Saver Subs c/w rubber 4" IF pin & box. Two (2) Kelly Saver Subs 4" IF pin & box One (1) Kelly Saver Subs 4½" IF pin & box. Two (2) 4 IF box x 3.1/2" IF pin Saver Subs. One (1) Circulating Subs - 4" IF x 2" 1502 hammer union. One (1) Circulating Subs - 4" IF x 2" 602 hammer union. Eleven (11) Lifting Subs - 18" Taper 4½" pick up neck and 4" IF pin. Eight (8) Lift Subs with 3.1/2" OD D.P. neck and 3.1/2" IF pin connections.</p>
HANDLING TOOLS	:	<p>2 only 4½" BJ 250 ton 18 degree taper D/P elevators. 1 only 3½" BJ 200 ton 18 degree taper D/P elevators. 1 only 3.1/2" BJ type MGG 18° centre latch Elevators. 1 only 4½" Varco SDXL D/P slips. 1 only 4½" Varco SDML D/P slips 2 only 8" - 6½" DCS-R drill collar slips. 1 only 3.1/2" Varco SDML Slips 1 only 4.3/4" Varco DCS-S Drill Collar Slips</p>
CASING RUNNING TOOLS	:	<p>1 only 13.3/8" Webb Wilson 150 ton side door elevator. 1 only 13.3/8" single joint P.U. elevators. 1 only 9.5/8" Webb Wilson 150 ton side door elevators. 1 only 9.5/8 single joint P.U. elevator. 1 only 7" BJ 150 ton side door elevators. 1 only 7" single joint P.U. elevators. 1 only 5½" BJ 200 ton S11 1 only 2.7/8" BJ 100 ton tubing elevator. 1 only 2.3/8" BJ 100 ton tubing elevator. (all P.U. elevators c/w slings & swivel) 1 only 13.3/8" Varco CMS-XL casing slips 1 only 9.5/8" Varco CMS-XL casing slips. 1 only 7" Varco CMS-XL casing slips. 1 only 3.1/2" Varco SDML tubing slips.</p>
CASING / TUBING DRIFTS	:	<p>9 5/8, 7", 5 ½", 3 ½"</p>
THREAD PROTECTORS	:	<p>9 5/8, 7".</p>
KELLY SPINNER	:	<p>One (1) Foster hydraulic kelly spinner with 6.5/8" LH connection.</p>
PIPE SPINNER	:	<p>One (1) International 850H hydraulic pipe spinner</p>
WELDING EQUIPMENT	:	<p>1 - Miller 400 amp welding machine. 1 - oxy acetylene set.</p>
DOGHOUSE	:	<p>1 Doghouse 5m x 2.4m x 2.3m</p>
GENERATOR HOUSE	:	<p>Ross Hill SCR</p>

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 Geograph 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 Sealite. 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.

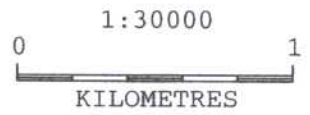
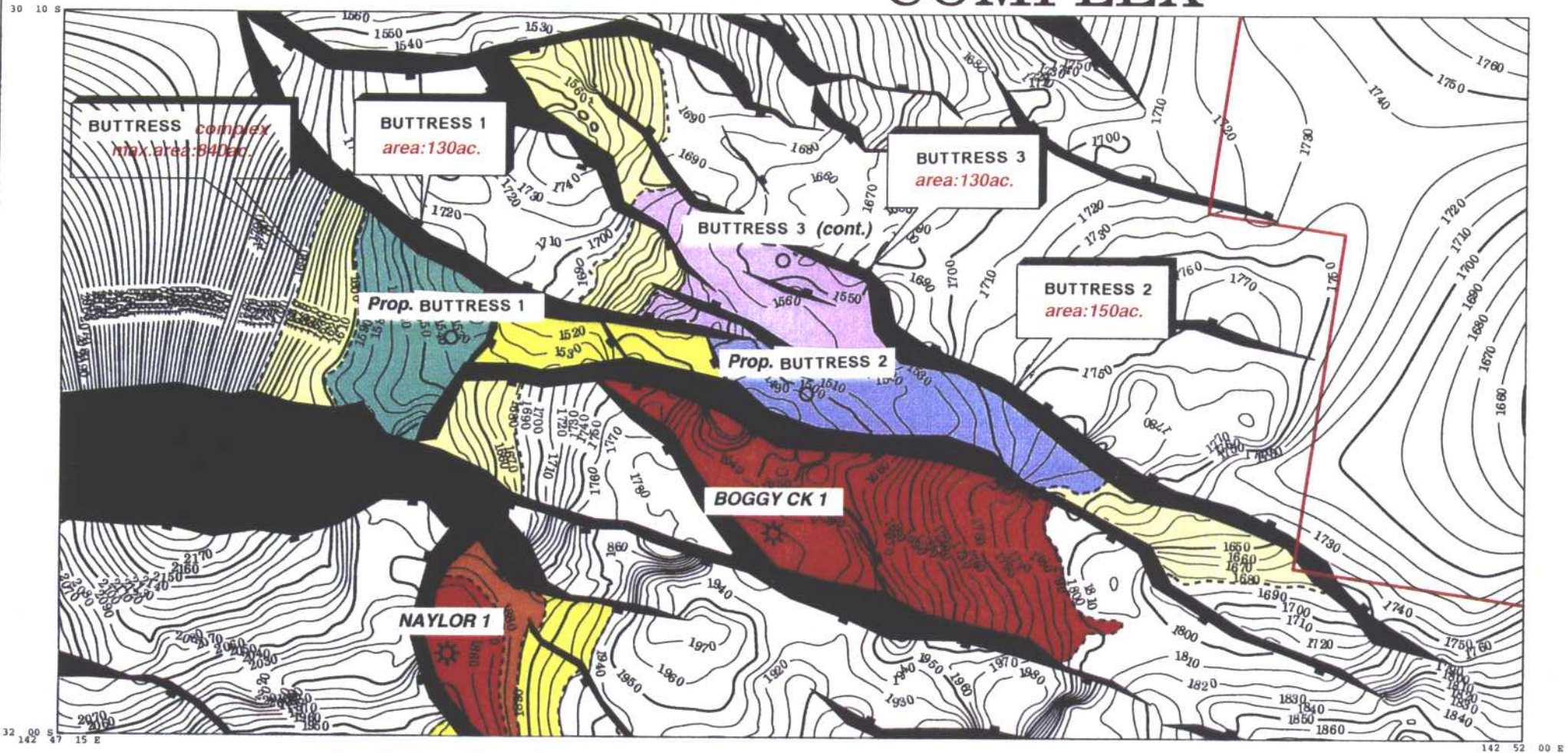
NOTE: At Contractor's discretion any of the foregoing items may be replaced by equipment of equivalent or greater capacity.

ENCLOSURE 1: 5" = 100' (1:240) COMPOSITE LOG

ENCLOSURE 2: 5" = 100' (1:240) MUDLOG

**ENCLOSURE 3: DEPTH STRUCTURE MAP
(NEAR TOP WAARRE SAND)**

BUTTRISS COMPLEX



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


		<h2>Santos</h2>	
DEPTH Near Top Waarre Sand NOV. 2001 M.Majedi (Horizon : cv_war_pk) (based on av. vel. of 2467m/s)			
Date : October 04, 2001	Author :	DWL	
Customer Internal : 18	Drawn :		
Datum : G.S.A. 1980	File No. :		

Figure 4

ENCLOSURE 4: WELL EVALUATION SUMMARY PLOT