Well Proposal Naringal-1 (W1344)

WP:01/047 Rev. 0

908935 002

Santos (BOL) Ltd
(A.C.N. 000 670 575)

EXPLORATION & DEVELOPMENT - SA

NARINGAL 1
WELL PROPOSAL

SEAM Business Group

November 2001

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1. Geophysical Prognosis

1. WELL DATA SUMMARY

908935 004

WELL NAME: NARINGAL 1				WELL TYPE: GAS EXPLORATION	
LICENCE:	PEP 154	Budget Status	2001 Budget Item	Latitude:	38° 27' 18.32"S
EQUITY:				Longitude:	142° 44' 22.33"E
	Voting (%)			Seismic Reference:	Inline 2202 CDP 10532
Santos Ltd	90%			Ground Level:	49m (preliminary)
Beach Petroleum NL	10%			Rotary Table:	53.7m (preliminary)
				Proposed Total Depth:	1704m (-1650m)
TOTAL:	100%			Rig:	OD&E30
				Nearest Facilities:	Heytesbury (24 km)

Objectives/Fluid Contacts

Primary	Secondary
Waarre Sandstone (gas)	

Stratigraphic Prognosis

Formation	Depth (m-RT)	Depth (m-SS)
Clifton	630	-576
Mepunga	687	-633*
Dilwyn	763	-709
Pember	938	-884*
Pebble Pt	973	-919*
Paaratte	993	-939
Skull Creek	1305	-1251
Belfast	1380	-1326
Flaxmans	1574	-1520*
Waarre	1495	-1541
Eumeralla	1639	-1585
TD	1704	-1650

*Geological pick

Formation Evaluation

Wireline Logging:

GR-SDT	TD to surface casing (GR to surface) Semblance processing over Waarre
MSFL-DLL-CAL	TD to surface casing (MSFL to 100 m above top Pember approx. 840m RT)
LDL-CNL	TD to approx. 20m above top Flaxmans (approx. 1550m RT)

SWC's:
One gun 20 samples.

MDT's:
20 point pressure survey.

Velocity Survey:
No survey.

Mudlogging:
10m samples from surface to approx. 1000m.
3m samples thereafter to TD.
Samples as per well programme.

Formation Testing:
None programmed.

Coring:
None programmed.

REMARKS/RECOMMENDATIONS:

Hole Design/Drilling Issues

Well Class: Down size monobore/exploration

Hole Type: Down size monobore

Hole Size:	Casing Depth:
9 7/8"	7 5/8" Surface to 475m
6¾"	3½" Surface to TD

Drill Fluid:
KCl/PHPA/Polymer

Deviation
Sub-Surface Targets:
Naringal 1 is a vertical well. An accuracy of 50m radius from seismic reference at TD has been requested. The critical structural direction is north of the wellsite.

Other Information/Hazards:
No hazardous zones in offset wells.
No shallow gas expected.
Waarre Sandstones has excellent reservoir properties (porosity 20%).

Nearby Wells and Duration:

Lavers 1	10 days	(TD 1608m)
Rowans 1	18 days	(TD 1799m)

Approved by::	Project Leader:	Team Leader:	Operations Geology	Drilling Engineer:

2. EXECUTIVE SUMMARY

Naringal-1 is proposed as an Otway Basin near field gas exploration well in the PEP 154 licence. The proposed location lies approximately 21 km north west of the town of Peterborough, 9 km WNW of the McIntee gas field and 10 km NW of the Naylor gas field (Figure 1). The Naringal-1 prospect is situated towards the western limit of the productive Waarre Sandstone play fairway of the Port Campbell Embayment.

The PEP 154 licence is held 90% Santos (Operator) and 10% Beach Petroleum NL. The Naringal prospect is a tilted fault block closure defined by the Heytesbury-Naringal 3D seismic dataset and the proposed location will crestally test the structure. The stratigraphic column for the Otway Basin is shown in Figure 2. The primary objective in the well is the Waarre Sandstone, with a prognosed mean average pay of 14m across the structure. **The critical risk on the prospect is seal related to the nature of updip cross fault seal.** The prospect does not exhibit a significant full stack amplitude anomaly at the Waarre Sandstone but has some increase in amplitude with offset over the prospect. The lack of amplitude/AVO at the well location is interpreted either to be a function of the thinner Waarre section at this location or raypath interference from the bounding fault, rather than lack of hydrocarbon charge.

Naringal-1 is an attractive project with a mean prognosed success case of 7.64 BCF sales gas (15.0 BCF OGIP) and a Pc (probability of commercial success) of 25% resulting in expected mean reserves of 1.89 BCF sales gas. If successful the well will be connected via a pipeline routed along the existing GPU easement, which will allow rapid connection and production.

A successful hydrocarbon discovery at Naringal 1 will lead to the drilling of Glenbrae-1 (~1 km north) with a mean success volume of 6.2 BCF and a general upgrading in the prospectivity of the western sector of the Port Campbell Embayment.

3. GEOLOGICAL RISK ASSESSMENT

3.1 Play Analysis

The Naringal-1 prospect is mapped as a tilted fault block closure with the primary reservoir of the Waarre Sandstone. Vertical seal is provided by the Belfast Mudstone with cross fault seal interpreted as being provided by the Belfast/Skull Creek Mudstone section. There is a possibility that the Waarre is juxtaposed against the Nullawarre Greensand along the updip fault, however shale smear may be present thereby provided seal. The prospect is charged from mature source beds located within the underlaying Eumeralla and/or Crayfish Group, with migration either directly into the reservoir or via fault conduits. The play has proven successful in the nearby McIntee, Lavers, Naylor and Croft fields. The prospect does not exhibit a significant full stack amplitude anomaly at the Waarre Sandstone but has some increase in amplitude with offset over the prospect. The lack of amplitude/AVO at the well location is interpreted either to be a function of the thinner Waarre section at this location in the western part of the Port Campbell Embayment, or interference from the bounding fault, as evidenced at the Wallaby Creek Field.

3.2 Trap and Mapping (Pcl = 85%)

Interpretation and mapping of the Naringal prospect was based on the Heytesbury-Naringal 3D survey that was recorded in February – March 2001. The data quality is good in the Naringal area.

The Naringal-1 prospect is mapped as a northwest/southeast aligned tilted fault block. Three way dip closure is to the southwest with updip fault closure along the northeast flank of the structure (Figures 3 and 4). Dip and strike seismic lines are shown in Figures 5 & 6. The Glenbrae-1 prospect to the north of the Naringal (1 km) is a similar structure occurring on the updip side of the next tilted fault block to the north. Regionally the Naringal-1 structure is located on a southwest/northeast trending palaeo ridge, similar in strike to the McIntee/Naylor ridge, and the Mylor/Fenton Creek ridge. Vertical closure at the Waarre is in the order of 60m and Naringal-1 represents a structure similar to the existing discoveries in the Port Campbell Embayment.

No significant full stack amplitude anomaly occurs at the Waarre at the Naringal prospect. This is interpreted either to be a function of the thinning of the Waarre Sandstone package (37m predicted mean gross interval) and variation in sand distribution within this thinner section (variation in unit "C", "B" and "A"), as evidenced from the Naringal-3 water well result or from loss of amplitude from raypath distortion from the bounding fault. From a preliminary review of the post stack near and far offsets there is an increase in amplitude with offset, less than observed at McIntee-1, but comparable to that seen at the Wallaby Creek Field. Wallaby Creek-1 was drilled off structure (but within a higher far-near amplitude zone) and encountered ~9m pay, whereas the structurally higher Wallaby Creek-2 was drilled close to the bounding fault. This well intersected ~20m pay from a 48.6m gross interval (but in a region of little amplitude expression) interpreted to be caused by interference from the fault. This can be used as an analogue for the Naringal-1 prospect.

Proposed location for the Naringal-1 is at Inline 2202 CDP 10532 which is crestal on the structure.

There is a reasonably high level of confidence that the structure is robust and accordingly closure risk is 85%. Geophysical prognosis for the location is contained in Attachment 1.

3.3 Reservoir (Prs = 70%)

At the Naringal-1 prospect area the Waarre Sandstone is considered to be well developed, and of the order of 50m, as observed in nearest wells Rowans-1 (4 km to east), Lavers-1 (6 km to ESE) and Naringal-3 a water well 1.5 km to SSW (Figures 7, 8 & 9). At Naringal-1, 37m of Waarre is predicted. Typically the Waarre "C" and "A" sand prone units are predicted, with the unit "C" being the best in sand quality and quantity. Nearby wells indicate that net sand development in the order of 70% of the total Waarre section can be anticipated with average porosities in the range of 16-25%. Permeabilities in the region area good to excellent (Boggy Creek-1 core permeabilities average 4.5 Darcies).

A 70% risk has been placed on reservoir based on the nearby wells in that there is a risk in sand thickness developed within the various subunits of the Waarre Sandstone.

3.4 Seal (Psl = 60%)

Seal is the major risk on the Naringal-1 prospect, specifically cross fault seal as the structure is reliant on updip cross fault seal via the Belfast/Skull Creek Mudstone package. Top seal is considered to be adequate with about 200m of Belfast Mudstone predicted at the location.

Cross fault seal is reliant on the Belfast/Skull Creek Mudstone section and while this package is present there is a possibility that along the updip fault the Waarre may be juxtaposed in part against the Nullawarre Greensand. In such a case the trap would leak, however the presence of shale smear would negate this problem. Based on this the risk on seal is recognised as critical and accordingly determined at 60%.

3.5 Charge (Pch = 70%)

The concepts on charge are discussed in the Port Campbell Embayment Geological Assessment. The Naringal-1 location meets the requirements for charge.

Charge is risked at 70% to recognise that the location may be reliant on longer migration pathways as the location is in a regionally shallower part of the Port Campbell Embayment.

4. RESOURCE DISTRIBUTION AND ECONOMIC EVALUATION

4.1 Resource Distribution

Distributions for prospect are estimated primarily from nearby well control and fields Rowans-1, Lavers-1 and McIntee-1. Data from other wells contribute to the end members of the distributions. The resource computation sheet shown in Table 1 summarises the results.

4.1.1 Area

The seismic mapping shows a maximum closure area of about 550 acres and therefore the P_{10} area is estimated at 600 acres. The P_{90} low side area is 156 acres, consistent with the structural mapping of the prospect. Mean pool area is 351 acres.

4.1.2 Net Pay

The Waarre Sandstone thicknesses and net pay/net sand thicknesses for control wells are shown below.

Well	Gross Waarre	Net Pay/Sand*
Naylor 1	83.5m (274')	51m (168')
McIntee 1	62m (203')	27m (89')
Lavers 1	56m (183')	11m (35')
Rowans 1	51m (167')	30m (100')*
Naringal-3	31m (101') Unit "C"	not known –1964 SP log

At Naringal-1 37m (122') of gross Waarre is predicted.

P_{10} net pay is estimated at 80' which is consistent with above observations as is the low side P_{90} net pay of 45'. The mean net pay at the well is 18m (60') which is consistent with well results and the geologic trends. A trap geometry factor of 0.75 is then used for the prospect to determine the average net pay.

4.1.3 Porosity

A range of 17-22% average porosity for P_{90} and P_{10} respectively is assumed consistent with results from nearby wells eg. McIntee-1 19%, Naylor-1 16%. A mean porosity of 19.3% is determined for Naringal-1.

4.1.4 Gas Saturation

A gas saturation distribution of 65-85% (P_{90} & P_{10}) results in a mean of 74.7% which is consistent with outcomes of the discoveries in the Port Campbell Embayment.

4.1.5 Recovery Factor

The recovery factor for Naringal-1 is based on Santos experience in the area and assumes a full water drive mechanism. This is estimated to be 60% and is reflected in the prospect mean recovery factor. The P_{90} & P_{10} range is estimated as 45% and 77% respectively.

4.1.6 Gas Composition

The range of gas compositions utilised 2 bbl/mmcf and 8 bbls/mmcf (P_{90} and P_{10}) for Naringal-1 are relatively narrow and reflect the variation between the McIntee-1 and Naylor-1 gas compositions, and the mean is estimated as 4.6 bbls/mmcf. The gas is assumed to be drier than the Santos fields to the east.

4.1.7 Flow Rate

Flow rates are estimated to range between 5 mmcfd and 18 mmcfd (P_{90} & P_{10}). These estimates are based field analogues and recent production tests. Mylor-1 flowed at 25 mmcfd on a ¾" choke, Fenton Creek-1 flowed 17 mmcfd on a ½" choke and McIntee-1 flowed 14.5 mmcfd through a 1" choke.

Location

The proposed Naringal-1 is located about 25 km north west of the town of Peterborough. The site is located in intensive farming land (dairy cattle/sheep) and due to the proximity of remnant native bushland and utmost attention needs to be given to environmental and landholder issues.

5. Port Campbell Embayment Waarre Sandstone Gas Play Geological Assessment

5.1 Play Description

In the Port Campbell Embayment the Waarre gas play is a proven, commercial play type with at least 12 discoveries in fields such as Mylor, Fenton Creek, Tregony, Naylor and McIntee. Gas is reservoired in the Waarre Sandstone in three way updip fault closures on the upthrown side of tilted fault blocks and horst blocks. Seal for the play consists of Belfast Mudstone as top seal and the Belfast Mudstone and/or Skull Creek Mudstone as cross-fault seal. 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.

Gas in the eastern half of the embayment tends to be wetter than in the western half. CO_2 is found in some reservoirs and this is deemed as a local charging effect related to magmatic source. A strong full stack amplitude anomaly at the Waarre Sandstone horizon is seen on most fields and this is related to well developed gas saturated reservoir. Amplitude anomalies therefore are a very effective exploration tool for thick Waarre sandstone targets.

5.2 Interpretation

The seismic interpretation of the area is based on the merged Curdievale and Naringal 3D seismic data sets. Several migrated volumes, including migrated stacks with and without spectral whitening and both near and far offset migrated stacks were generated and used for interpretation. Due to better horizon continuity and amplitude preservation the migrated stack volume without spectral whitening was used for horizon interpretation. Far and near offset volumes were used for amplitude extraction and AVO analysis. A coherency cube (similarity volume) was generated and used in conjunction with other volumes for fault interpretation. Well ties were utilised throughout the 3D volume.

Mapping was carried out at near top Waarre Sandstone, which is the primary target reservoir. The Waarre sand package has a distinctive characteristic and therefore a high degree of consistency was maintained on mapping this unit. The top Belfast Mudstone was interpreted on a selected grid in order to evaluate adequately its seal efficiency over the prospects, as this is the critical cross-fault seal for these play types.

5.3 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". The lower "A" unit represents a basal transgressive systems tract (TST) characterised by flooding of an incised valley with sediments deposited under marginal marine/estuarine conditions. The basal portion of Unit "A" is represented by either sand (as in Curdie-1) or shale (Boggy Creek-1 and Naylor-1). This section is overlain by the widespread predominantly argillaceous Unit "B", which was deposited under estuarine conditions. Unit "C" was then deposited and is characterised by initial estuarine/deltaic conditions succeeded by high-energy sands. As the transgression develops the valley system is flooded with the Flaxmans Formation and Belfast Mudstone. Main reservoir development is in Unit "C" but Units "A" and "B" also contain reservoir sands. Details of regional reservoir intersections for the total Waarre package are shown below.

Well	Gross Waarre (ft)	Net Sand (ft)	Net Pay (ft)
Tregony-1	374	254	153
Curdie-1	328	208	-
Croft-1	314	192	120
Mylor-1	308	218	80
Fenton Creek-1	302	216	113
Naylor-1	274	181	168
Penryn-1	266	130	58
Boggy Creek-1	246	150	93
Penryn-2	221	140	103
McIntee-1	203	158	89
Lavers-1	183	121	35
Rowans-1	167	100	-

5.4 Seal

All Otway Basin successes in the Port Campbell Embayment Waarre Sandstone play have been from high-side, tilted fault blocks or horst blocks. The ultimate top seal to Waarre reservoirs is the marine Belfast Mudstone. While a potential waste or "thief" zone (the Flaxmans Formation) exists between the Waarre sands and the Belfast seal, this unit was deposited under transitional marine conditions and generally acts as a seal. Valid traps tested and dry are generally interpreted to have throw of the fault large enough to juxtaposed the Waarre against other sandstones (ie the Nullawarre sandstone). Also, the Skull Creek shale has been demonstrated as a valid cross fault seal in the Lavers gas field.

5.5 Hydrocarbon Charge

Hydrocarbons are sourced in the Port Campbell Embayment from the Eumeralla Formation and/or the Crayfish Group. Analysis of the condensates and oils from the area suggest a non-marine origin with both algal and higher land plant components (Type III Kerogen). Maturation studies indicate that the top of the hydrocarbon window lies at about 2500m (subsea). Therefore the mature Eumeralla source units which directly underlie the local gas fields are most likely to charge the overlying structures through source-reservoir juxtaposition or via fault conduits. 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. However drilling has shown that as well as the risk of hydrocarbon charge there can be a risk of CO_2 rather than hydrocarbon emplacement.

5.6 CO_2 Issues

The distribution of CO_2 within the Port Campbell area appears to be related to the introduction of a restricted volume of CO_2 at a number of locations and its subsequent migration. The CO_2 is considered to be mantle sourced and is likely to have occurred with the emplacement of igneous bodies during the Miocene.

A review of the high-resolution aeromagnetic data has been undertaken in an effort to understand the distribution of deep-seated faulting, believed to be the conduit for CO_2 migration as well as the emplacement of igneous bodies. The results of the study indicate the presence of an intrusive body marginal to the coast and proximal to a major NNE-SSW lineament. This lineament appears to be coincident with major faulting identified on the seismic and is seen as a likely conduit for the emplacement of CO_2 at the Langley and Grumby Fields. While an intrusive is not identified at nearby Boggy Creek, a similar trending lineament is mapped through the Boggy Creek well location, and this is interpreted to be the source of the CO_2.

ATTACHMENT 1

GEOPHYSICAL PROGNOSIS

ATTACHMENT 1
NARINGAL-1

GEOPHYSICAL PROGNOSIS

	Proposed Naringal 1					
	TWT (ms)	DEPTH (m-ss)	ERROR (+/-m)	Isopach (m)	VAV (m/s)	VINT* (m/s)
CLIFF	589	576			1955	
				133		2300
DILWYN	705	709			2012	
				229		2440
PAAR	893	939			2102	
				312		3340
SKUL	1080	1251			2316	
				75		3587
BELF	1122	1326			2364	
				215		3000
WAAR	1265	1541	+/-20m		2436	
				44		2952
EUME	1295	1585			2448	
				65		
(TD)		1650				

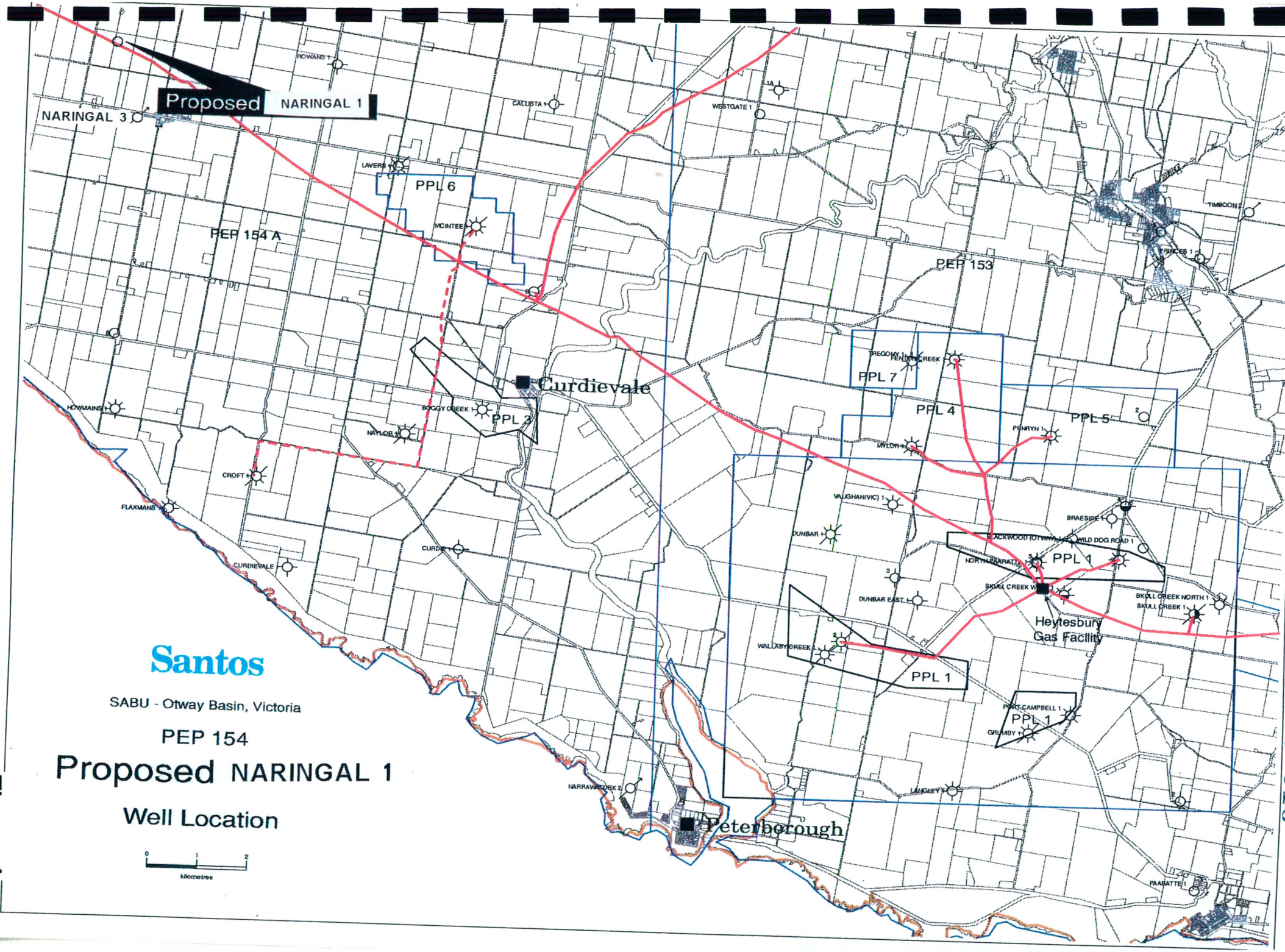

Figure 1

Pe908935 - colour Ø1

908935 015

Pe908935 – colour ØØ2

908935 016

OTWAY BASIN STRATIGRAPHIC COLUMN

Santos

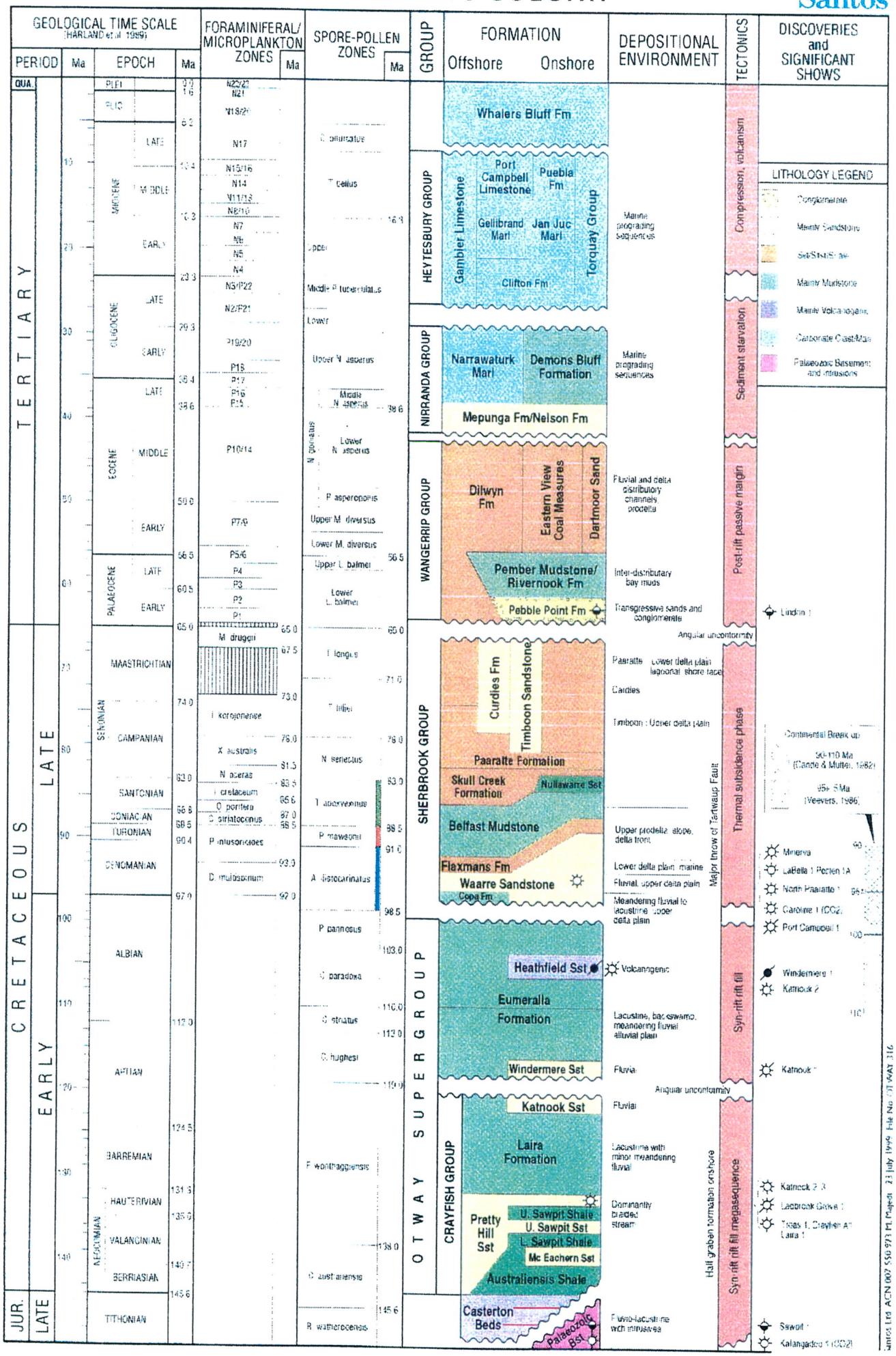

Figure 2

Pe908935 – colour ØØ3

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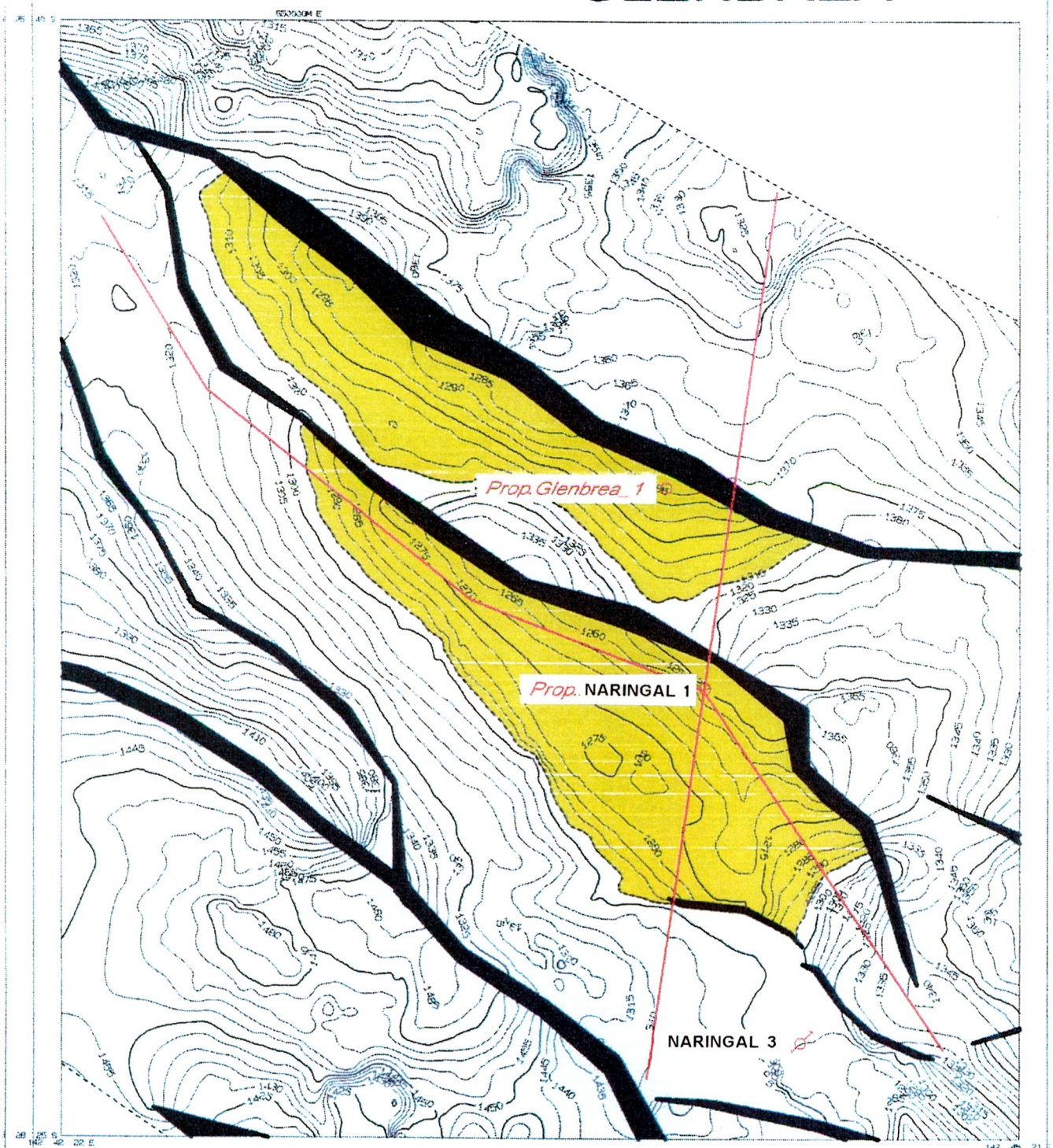
NARINGAL GLENBREA



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KILOMETRES

UNIVERSAL TRANSVERSE MERCATOR PROJECTION
G.R.S. 1980 SPHEROID
CENTRAL MERIDIAN 141 00 00 E
MAPSHEET DATUM "GDA94"

GDA **Santos**

TWT

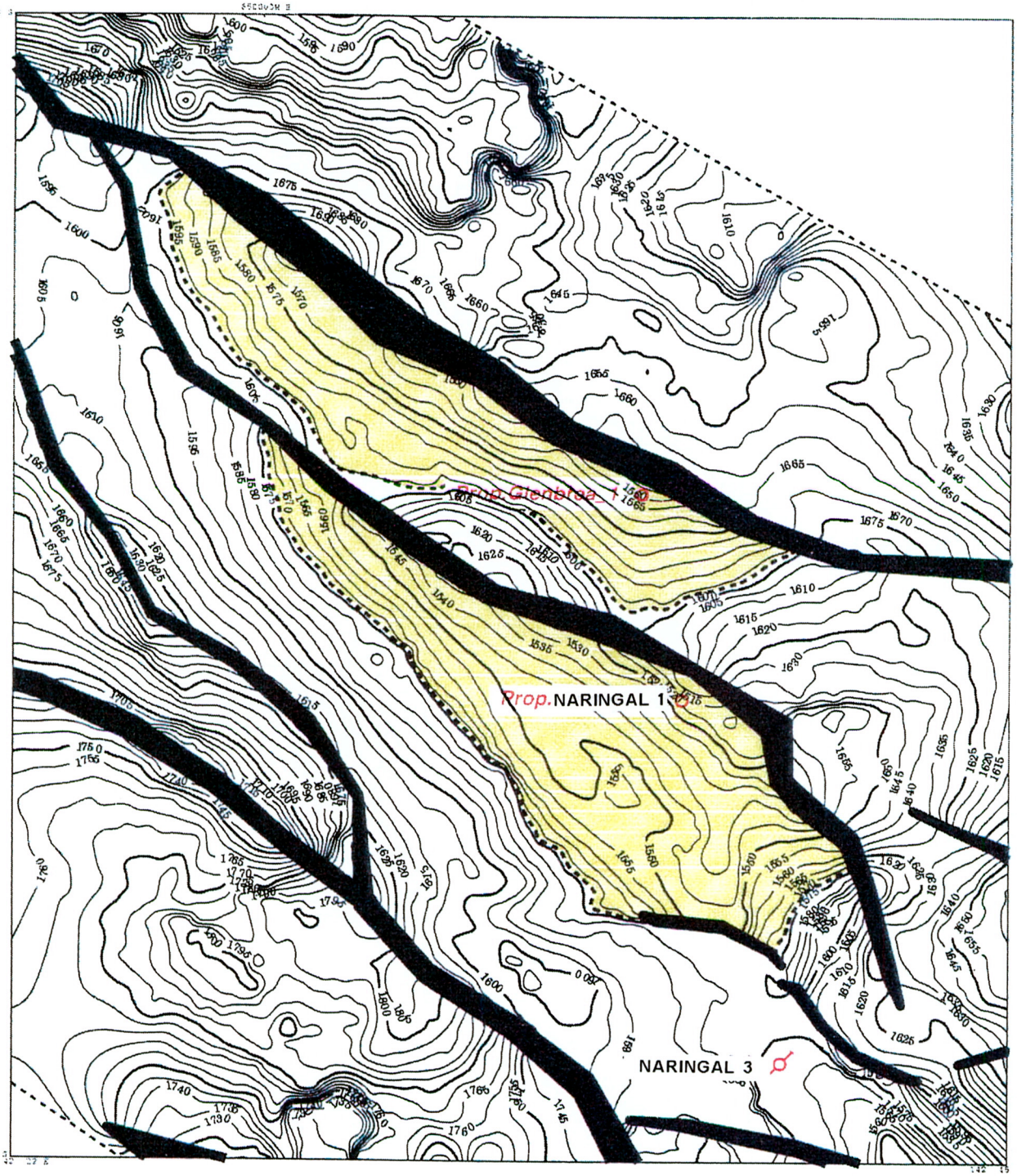
Near Top Waarre Sand

Nov. 2001

M.Majedi

Figure 3

NARINGAL GLENBREA



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KILOMETRES

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

GDA

Santos

DEPTH

Near Top Waarre Sand

Nov. 2001

M.Majedi

Horizon:w_pc_pre (beyourworld survey trim_pre_mig class)
(based on ave.vel.of 3420m/s)

Date: (October 30, 2001)	Author:	ENCL
Contour Interval: 5	Drafted:	
Datum: G.R.S. 1980	File No.	

Figure 4

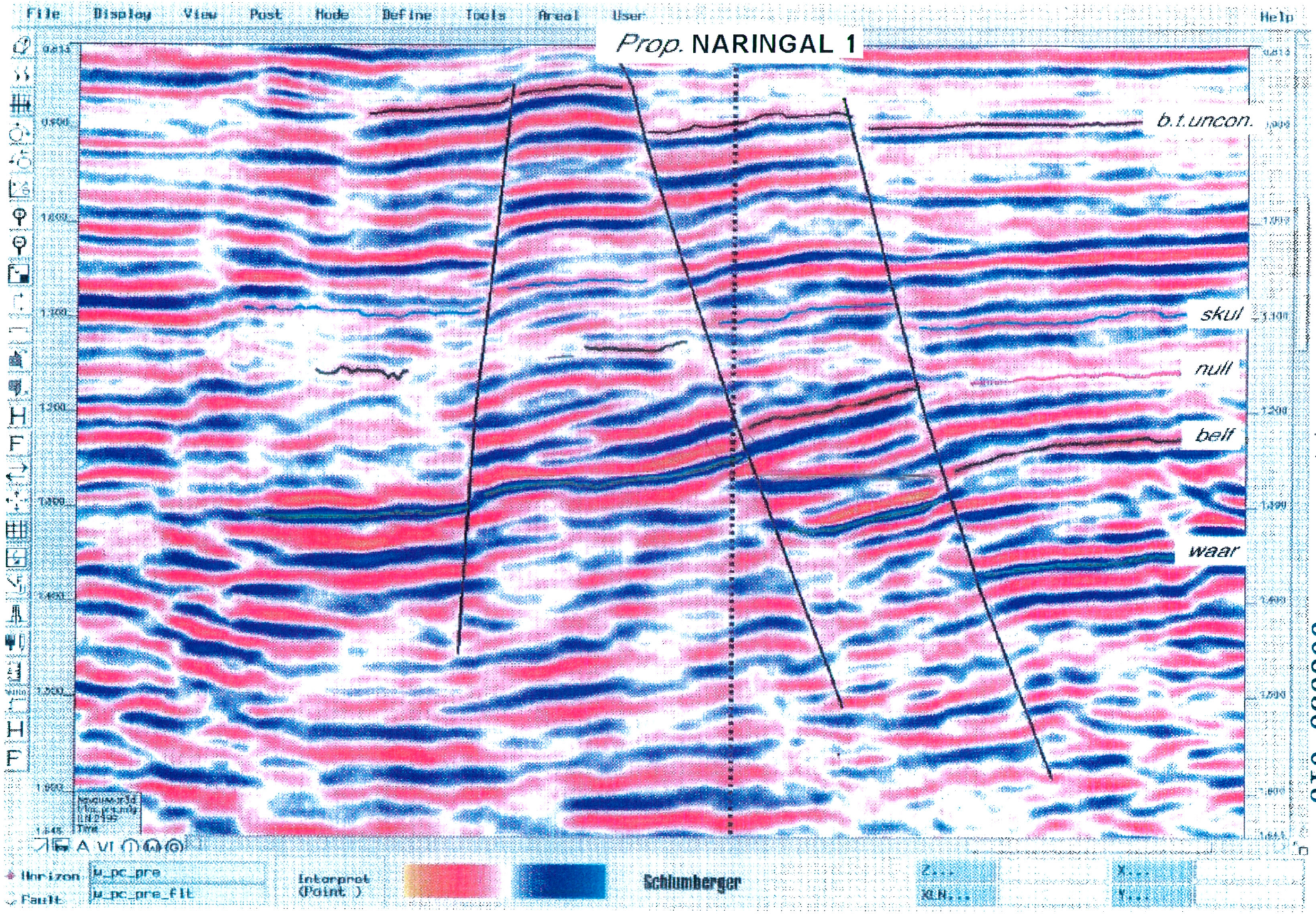

Figure 5

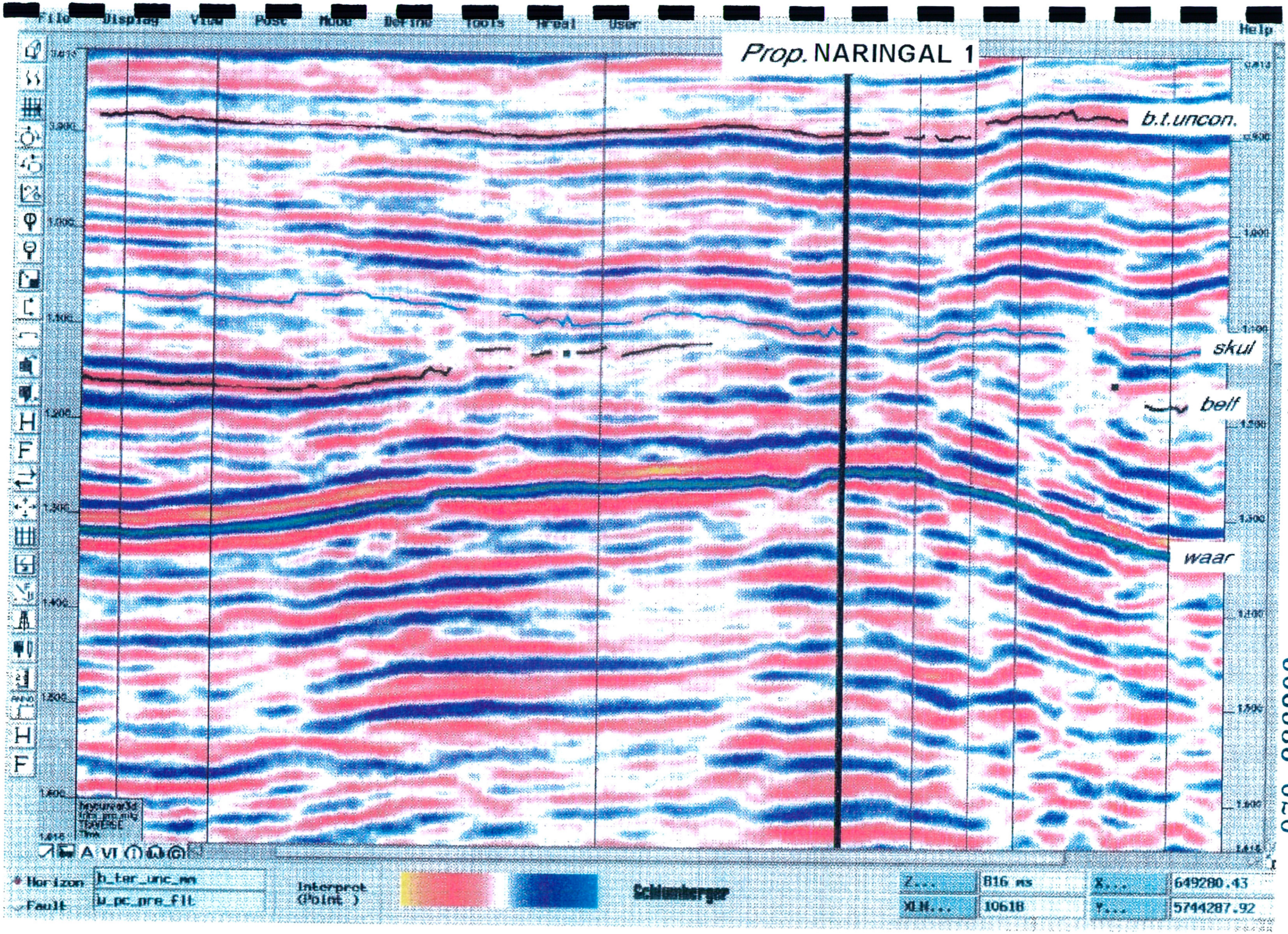

Figure 6

LAVERS 1

KB : 68.55 METRES

TD : 1608 METRES

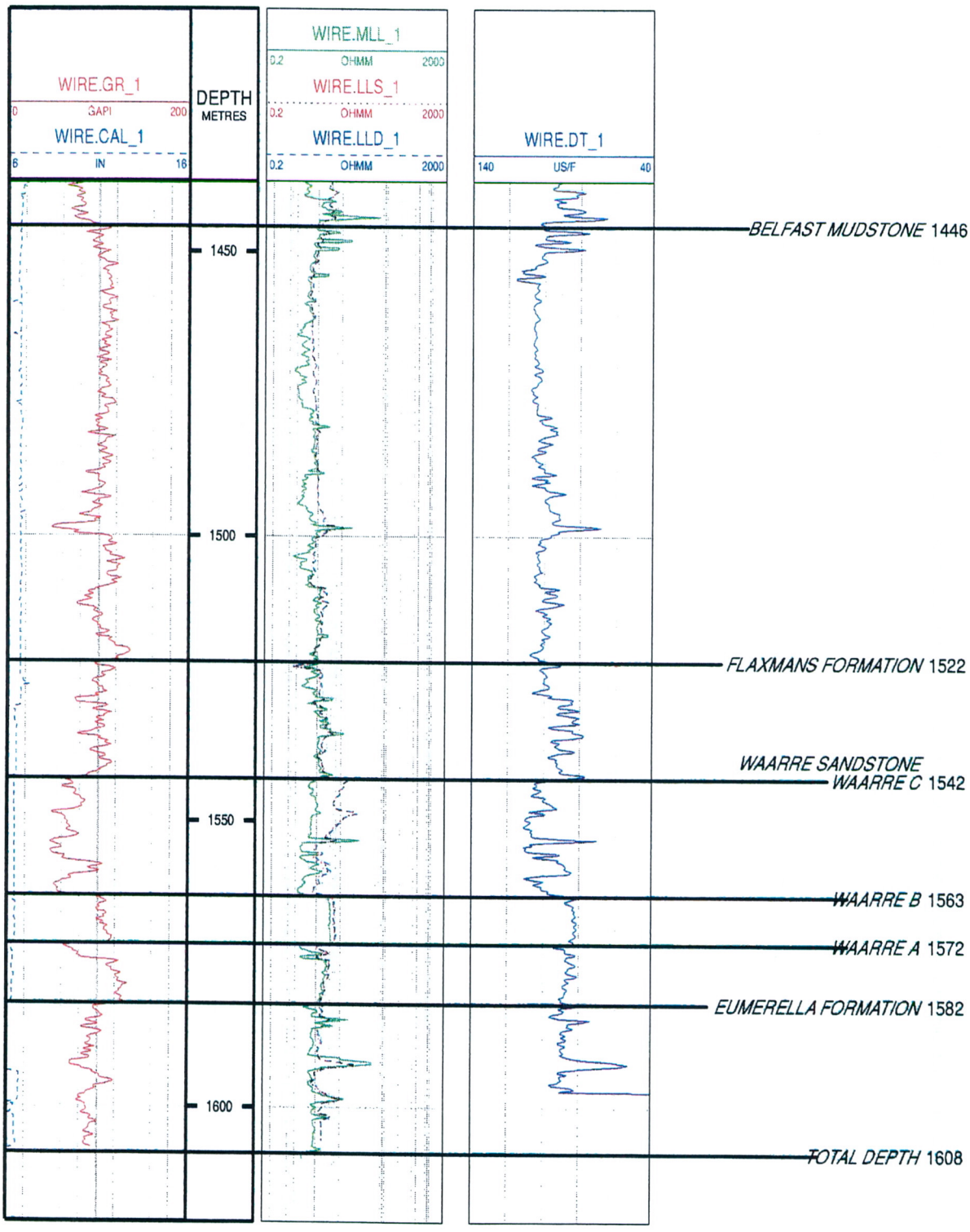

Figure 7

Pe908935 - colour ØØ 8

908935 022

ROWANS 1

KB : 70.7136 METRES

TD : 1798.32 METRES

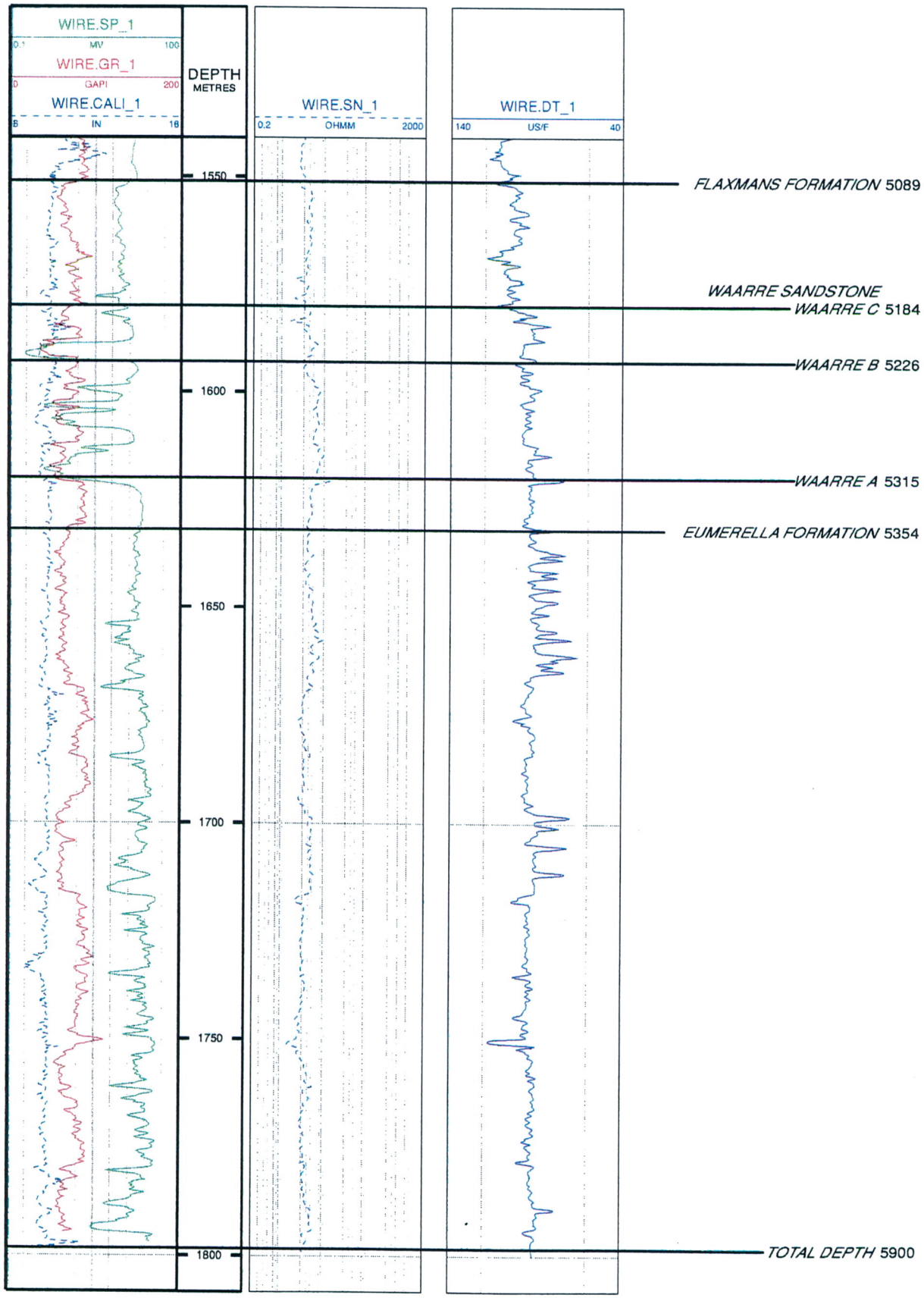

Figure 8

Pe908935 - colour ØØ9

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NARINGAL 3

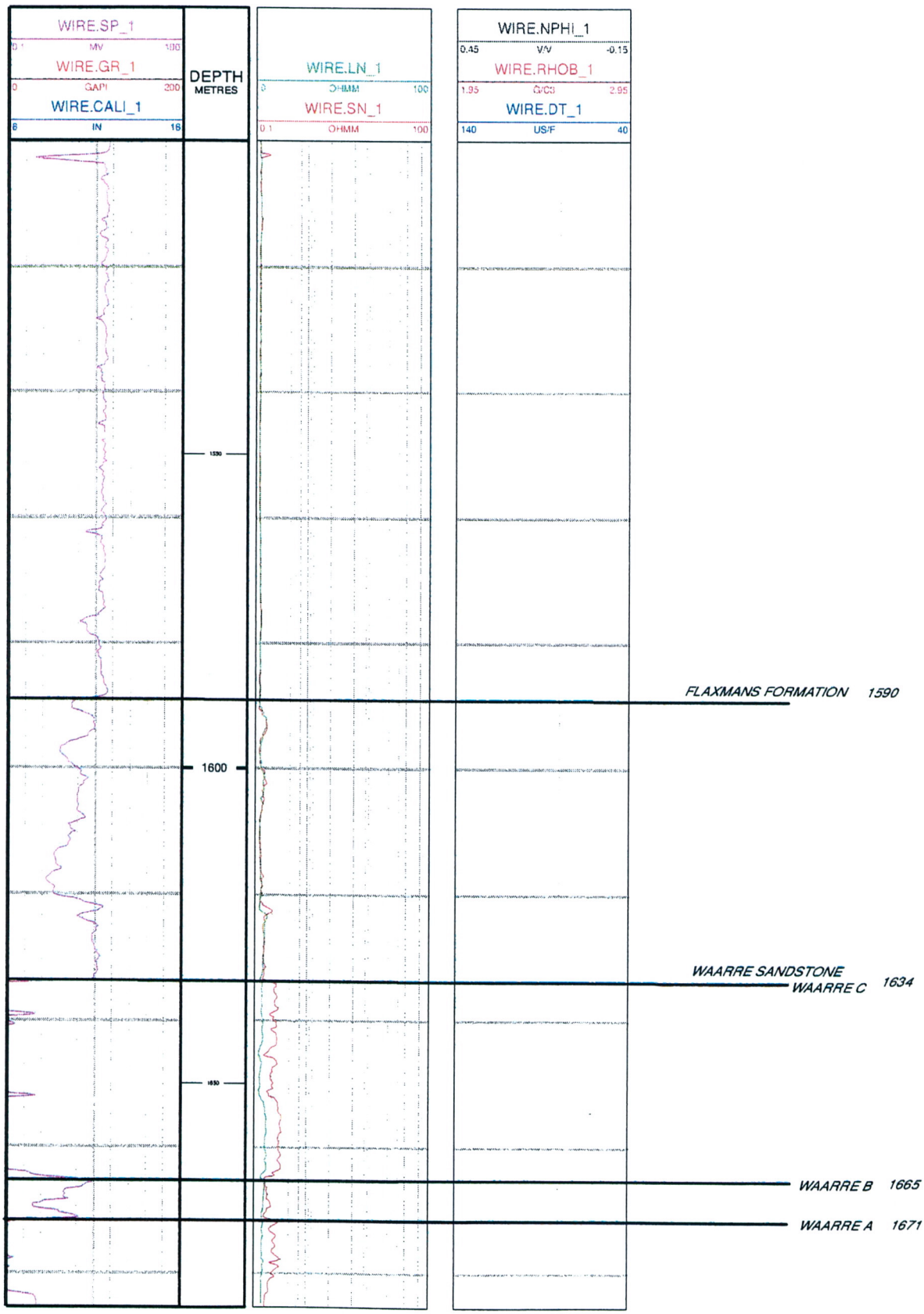


Figure 9

908935 024

DRILLING SERVICES

WELL SPECIFICATIONS

PROJECT NAME: Naringal 1

DATE: January 2002

REVISION: 0

PLEASE SIGN AND PASS ON TO THE NEXT PERSON URGENTLY

DO NOT SEND VIA INTERNAL MAIL

CIRCULATION

POSITION	NAME	PHONE	SIGNATURE	DATE
Drilling Engineer	Justine Bevern	8224 7618 (W) 8357 3098 (H) Mob: 0411 101 206		18th Jan 2002.
Team Leader Drilling	Mike Bill	8224 7150 (W) 8358 6053 (H) Mob: 0419 169 249		18/1/02
Project Leader	Maris Zwigulis	08 8224 7916 (W)	Not Required.	
Drilling Superintendent (Moomba)	Bob Goosem	8224 7406 (W)		18/1/2002
Technical Assistant	Trish Robertson	8224 7331(W)	For Distribution	

General Drilling Procedures

This Well Specifications Program is not a full drilling program.
It contains information specific only to **Naringal 1** and is to be read in conjunction with the Generic Drilling Program for the Otway Basin and the Santos DOM, Drilling Operations Manual. Copies of this should be on Rig 30, if not please contact the Drilling Engineer for further copies.

Note: Where information in this specifications program differs from the Generic Drilling Program for the Otway Basin, adhere to the information in this Specifications Program.

This well is vertical it is not anticipated that a correction run will be required. However some controlled drilling may be required to keep within the 20 m target tolerance.

NOTE: PLEASE BE CAREFUL DURING RIG MOVE AND RIG UP AS OVERHEAD POWER LINES ARE CLOSE TO THE EDGE OF THE LEASE.

9-7/8"Surface Hole

- Spud well with 9 7/8" bit dressed with 3 x 20 nozzles.
- Drill in rotary mode with spud mud at reduced flow rate (under 300 gpm) and parameters until 6 1/2" drill collars buried. Then increase to full drilling flowrate and drilling parameters for optimum ROP. Ensure viscosity at least 50 sec/qrt in the surface limestone prior to reaching the marl formations. If mud rings become a problem in the clay-rich formations then dilute with drill water as a first recourse. If required then switch over to 4% KCl.
- Take a MSS survey at approx 30m. Then survey every 60m or as seen appropriate.
- Drill ahead surface hole in rotary mode to approx 380 m.
- Check bottoms up sample to confirm competent casing seat.

Please note the Shallow Hole Contingency steps in the Generic Drilling Program for the Otway Basin. It is expected that Naringal 1 will have up to 150m of limestone in the surface hole, so caution will be required in this section.

The kick tolerance for this well has been based on 12.4 bbl tolerance if the LOT is 15.5 ppg. A minimum of 14.7 ppg would give a kick tolerance of 10 bbls. As can be seen on the Montage the LOT's for the Otway Basin are often above 15 ppg.

6-3/4"Production Hole

- Make up and run a packed assembly as in BHA number 2.
- Drill ahead 6-3/4" hole with MSS surveys every 150m or as required.
- Make regular wiper trips back to new hole to improve hole conditions.
- A 6.75" hole packed assembly, such as BHA 2, should drop angle at low WOB and high RPM, and hold or build slightly at higher WOB and lower RPM. A 6.75" hole short pendulum assembly, such as the third BHA should drop angle.

- Drill the well in rotary mode as long as possible, however if there are indications that the target may be missed, then drill no further than will allow for a motor run. The motor run is to be no more than 30 degrees inclination and 6 degrees / 30 m dogleg severity.
- If there is a need for a correction run with a motor, then survey with MWD as appropriate.
- Drill to TD at approx 45 - 60 m into the Eumeralla formation (1704 m TVD).

Wait for advice from Operations Geology after logging runs to confirm whether the well will be cased or to plugged and abandoned.

Bit & Hydraulics Recommendations

Bit No.		# 1	# 2	Correction Run
Bit Size	In	9 7/8"	6 ¾"	6 ¾"
IADC Code		116	PDC	PDC or TCI
Bit Type		GT-1	FS2463	S75 or STR09D
Manufacture		Hughes	Security DBS	Smith or Hughes
Depth In	MD m	0	380	
Depth Out	MD m	380	1704	1704
Metre-age	MD m	380	1324	
Cumulative hrs (IADC)		14	55	
ROP (IADC)	m/hr	28	24	
RPM		90-130	100-140	300
WOB	k lbs	5-10	5-12	5 / 10
Nozzles		3 x 20	4 x 11	4 x 11 or 3 x 12
Jet Velocity	Fps	180	270	
Pump Output	Gpm	515	310	250
Pump Pressure	Psi	750	2000	
SPM		220	130	104
Ann. Velocity	ft/min			
3 ½" DP and HWDP to casing			210	
3 ½" DP and HWDP to hole		148	229	
6 1/2" DC to hole		216		
4 ¾" DC and hole			332	
Pressure @ bit	%	31%	40%	
Bit HSI	Hhp/in^2	1.0	3.0	

NOTE: Attempt to keep pump rates for the production hole to the top Flaxmans formation above 300 gpm as it has been seen to increase ROP. However, keep in mind it is more important to hit the target than increase ROP, so if control drilling is required, this is the main objective.

BHA Recommendations

BHA No.	1	2	3*	4*
Objective	Surface Hole	Production Hole Rotary angle hold / build	Production Hole Contingency rotary angle drop	Production Hole Motor Run
Bit Size	9 7/8"	6 ¾"	6 ¾"	6 ¾"
BHA	Bit Sub (with ported float)	6 ¾" Near Bit Stabiliser (with ported float)	Bit Sub	4/5 PDM 6 ½" motor stab 1.15 deg bent housing
	X Over	1 x 4 ¾" Pony Drill Collar	1 x 4 ¾" Pony Drill Collar	6 ½" String Stab
	1 x 6 ½" NMDC	6 ¾" String Stab	6 ¾" String Stab	4 ¾" NMDC with MWD
	X Over	1 x 4 ¾" NMDC	1 x 4 ¾" NMDC	6 ¼" string stab
	9 7/8" string stab	6 3/4" String Stab	16 x 4 ¾" DC	16 x 4 ¾" DC
	10 x 6 ½" DC	16 x 4 ¾" DC	4 ¾" Jars	4 ¾" Jars
	X Over	4 ¾" Jars	3 x 4 ¾" DC	3 x 4 ¾" DC
	6 x 3½" HWDP	3 x 4 ¾" DC	6 x 3 ½" HWDP	6 x 3 ½" HWDP
	3 ½" DP	6 x 3 ½" HWDP	3 ½" DP	3 ½" DP
		3 ½" DP		
Approx. Buoyed DC Weight Below Jars	24 kbl	22 klb	22 klb	23 klbs
Mud Weight	9.0 ppg (to 9.2)	9.4 ppg at TD	9.4 ppg at TD	9.4 ppg at TD

* **NOTE** – BHA's 3 and 4 are contingent only. These may not need to be run.

Casing Design

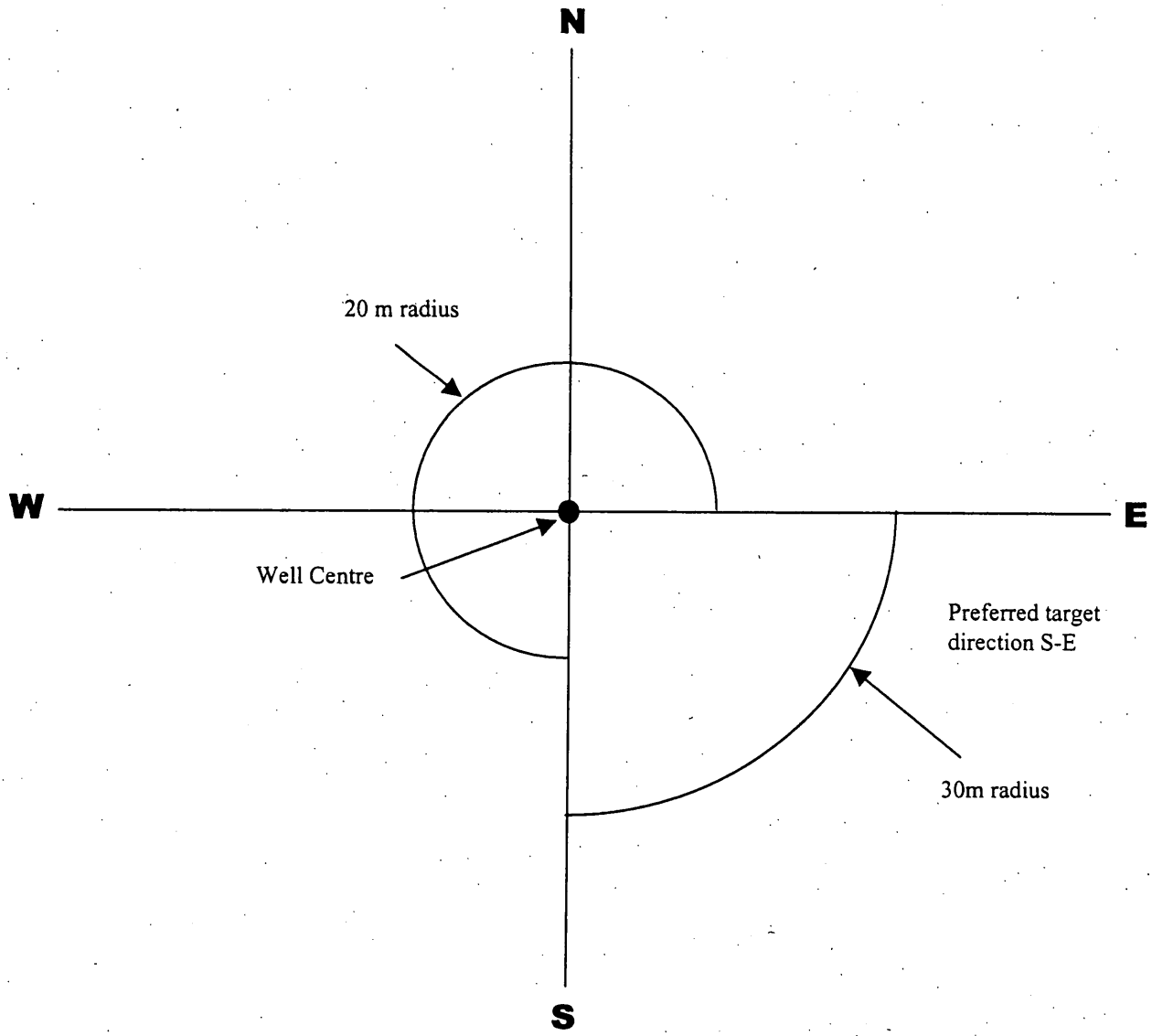
CASING STRING		Surface Casing	Production Casing
Shoe Depth		380 m	1701 m
Casing size (in)		7-5/8	3 1/2"
Grade		L80	J55
Weight (lb/ft)		26.4	9.3
Burst rating (psi)		6020	6980
Collapse rating (psi)		3400	7400
Tensile rating (klb)		602	142
Connection		BTC	Fox
Nominal Wall (in)		0.328	0.254
Inside diameter (in)		6.969	2.992
Drift Diameter (in)		6.844	2.867
Capacity (bbl/ft)		0.0472	.0087
Coupling OD (in)		8.5	4.5
Make-Up Torque (ft/lbs)	Minimum	To bottom	2150
	Optimum	Of triangle	2310
	Maximum		2470
FLOAT EQUIPMENT			
Float Shoe		Non-Rotating	
Float Collar		Non-Rotating	
Shoe Track Length		2 Joints	1 Joint
Threadlock		Shoe Track	Shoe Track
SAFETY FACTORS			
Burst		2.99	3.50
Collapse		7.22	3.51
Tension	- Running	5.34	1.91
	- Pressure Test	5.76	2.30

Pressure Testing Schedule

Component	Pressure Test
7 5/8" Surface casing	2000 psi
Pipe rams, K&C lines, choke manifold, Standpipe, kelly & safety valves	2000 psi
Annular	1500 psi
Bradenhead – casing connection	2000 psi
3 ½" Production casing	2000 psi
Packoff and Seal Assembly	5000 psi
7 5/8" x 3 ½" annulus	2000 psi
Xmas tree valves	5000 psi
LOT	Minimum allowable 14.7ppg EMW (to fracture propagation or max allowable surface pressure)

NOTE: Pressure tests will be a 5 minute low pressure test to 200psi and a 10 minute high pressure test as above. Retest BOPs after 14 days of operations since last test, or nearest operational opportunity thereafter.

NARINGAL 1 – TARGET TOLERANCE



- It is preferred that we hit the target zone (Waarre) on the South-East side of the surface hole.
- A directly vertical well will be fine.

Drilling Fluid Program

Well Name: Naringal 1

Prepared by: Mark Scheide Date: 11/01/2002 Operator: Santos

Approval by: Justine Bevern Block:

Location: Otway Basin

Interval From 0 To: 1247 Surface Hole Spud Mud Hole Size: 9.875 Casing: 7.625" WorkType: Drilling

After arriving on location, test the water source and record its properties on the first daily mud report. The water source is expected to be of reasonable quality to hydrate bentonite. Also record any damaged stocks and amounts during transit on the first report.
Using the short system treat out the hardness and prehydrate 25ppb Trugel 13A. After hydration this should be extended with Lime if extra viscosity is required prior to spudding.
Spud the well with high viscosity bentonite spud mud. If highly reactive clays are encountered add 4% KCl to the surface system to aid inhibition. Maintaining sufficient gel concentrations should minimise downhole losses, however if whole mud loss becomes apparent, Enerseal fine and course are the preferred LCM's to be added either directly to the active system or via sweeps containing a minimum 10ppb. The solids control equipment should be run to keep the mud weight and solids to a minimum. Check the flowline and sand trap regularly for solids build up and clean as required.

Mud Properties		
Mud Weight	ppg	9.0 (TD)
Funnel Viscosity	sec / qt	>40
pH		9-10
Hardness	mg/l	<400
MBT	ppb	15-25
Shaker Screen Size		84/110

Products	Unit:	Size	*Usage*
Barite	Kg	25	30
Caustic Soda	Kg	25	1
Trugel 13A	Kg	25	104
Lime	Kg	20	1
KCl (fine)	Kg	25	193

Pipe Out	*Volume*
Dilution Volume	374.1
Initial Pre Mix	180
Pill Tank Drilling	40
Slugs	40
Total Volume:	634

Interval From 1247 To: 3181 Top Production Hole 4%KCl PHPA Hole Size: 6.75 Casing: WorkType: Drilling

After filling the pill tank with spud mud, dump and clean all other tanks in preparation for the next section. Ensure that all gates are sufficiently gelled to prevent cement contamination to the PHPA mud system whilst drilling the cement, shoe and track.
After treating out the hardness of all the surface tank water, add 0.6ppb JK-261 and apply shear. Just prior to spudding add 4% KCl.
Once the FIT has been performed swap the circulating system over to the PHPA / KCl fluid and commence direct additions of JK-261 to increase PHPA between 1-1.5ppb as soon as possible.
Ensure that all solids control equipment are put on line at the commencment of this section. The integrity of the cuttings at the shakers should be monitored and the concentration of JK-261 and KCl adjusted to ensure adequate inhibition at all times.
Commence reducing fluid loss prior to penetrating the Pebble Point formation by Pac R additions while the yield point should remain above minimum properties at all times. Additions of PHPA is to cease at the Pebble Point formation.

Mud Properties		
Mud Weight	ppg	8.5-8.7
Yield Point	lbs/100 sq ft	>4
pH		8.5-9.5
KCl	%wt	3
PHPA	ppb	>1
Hardness	mg/l	<300
Shaker Screen Size		84/110

Products	Unit:	Size	*Usage*
Caustic Soda	Kg	25	3
KCl (fine)	Kg	25	268
JK-261	Kg	25	18

Pipe Out	*Volume*
Dilution Volume	580.2
Initial Pre Mix	400
Total Volume:	980

Drilling Fluid Program

Well Name: Naringal 1

Prepared by: Mark Scheide Date: 11/01/2002 Operator: Santos

Approval by: Justine Bevern Block:

Location: Otway Basin

Interval From 3181 **To:** 5579 **Production Hole** **4% KCl Polymer** **Hole Size:** 6.75 **Casing:** **WorkType:** Drilling

After reaching the Pebble Point formation, cease additions of JK-261 as the encapsulating properties of the PHPA will no longer be required.
Commence additions of Pac R to recude the fluid loss below 6cc/30ml while also using Pac R to increase the yield point to within parametres. If the yield point property requires further increase use Xanthan Gum as required via direct additions or periodic high viscosity sweeps to monitor hole cleaning.
Once the PHPA has been depleted fit the finest possible screens on the shakers from the onset of this section.
Commence additions of Idcide 20 (0.4ppb) and Sodium Sulphite (120ppm) in order to prevent bacterial contamination and reduce downhole oxygen respectively.
Losses may be experienced in the Waarre formation (5222 feet). If downhole losses become apparent add Sandseal Fine via 10-20ppb sweeps or directly into the active system as required.
KCl is to be maintained at a minimum level of 4% excess until TD to provide adequate inhibition.
The mud weight should be maintained as low as possible throughout this section until prior to penetrating the Eumeralla formation (5366 feet) where the mud weight will need to be raised to 9.2ppg with KCl as required. Low gravity solids are not to be used to weigh up the system at any time.
To save on chemical consumption levels, recycle the sump water when the level allows and report properties on a daily basis. Cease using sump water if biological activity is present.
Pump high viscosity Xanthan Gum or Pac R sweeps (if fluid loss reduction is also required) to monitor hole cleaning on a regular basis.

Mud Properties		
Mud Weight	ppg	9.2 Eumeralla
Plastic Viscosity	cps	Alap
Yield Point	lbs/100 sq ft	10-15
API Fluid Loss	cc's	<10
pH		8.5-9.5
KCl	%wt	>4
Hardness	mg/l	<200
Sulphites	mg/l	100
MBT	ppb	<11
Drill Solids	%	<4
Shaker Screen Size		210/250

Products	Unit:	Size	*Usage*
Barite	Kg	25	30
Caustic Soda	Kg	25	2
KCl (fine)	Kg	25	196
Idcide-20	Ltr	20	7
IDPAC-R	Kg	25	20
Sand Seal (fine)	Kg	25	11
Sodium Sulphite	Kg	25	8
Xanthan Gum (P)	Kg	25	5

Pipe Out	*Volume*
Dilution Volume	719.4
Slugs	40
Sweeps	120
Total Volume:	879

Drilling Fluid Program

Well Name: Naringal 1

Prepared by: Mark Scheide Date: 11/01/2002 Operator: Santos

Approval by: Justine Bevern Block:

Location: Otway Basin

Interval From 5579 **To:** 5579 **Post TD Treatment** **4% KCl Polymer** **Hole Size:** 6.75 **Casing:** 3.5" **WorkType:** Post TD Operatio

Ensure that all mud that is left for extended periods of time whilst logging or testing are treated with Idcide and Caustic Soda to prevent biological degradation of viscosifying polymers.
Displacement recipe as per Santos cementing program.
Ensure that two full mud checks are conducted daily and that the sump water analysis is reported daily during usage.
Ensure that all products are protected from the elements and are ready for transport.
Fill out the IDFS rig site checklist and fax through any requirements to the Moomba warehouse 08 86756630.
Ensure that enough stock has been ordered for the whole of the next well.

Products	Unit:	Size	*Usage*
KCl (fine)	Kg	25	22
Idcide-20	Ltr	20	1
SAPP	Kg	25	2

Pipe Out	*Volume*
	0
Displacement Volum	50
Pre Flush Volume	40
Total Volume:	90

908935 032

Schlumberger

908935 033

For: Justine Bevern
Date: 17-Jan-02
Engineer: Andy Prestridge
Lab Tech: Brenton Hocking

SANTOS

Naringal 1

Production - 3.5 Casing

RIG : ODE 30

Hole and Casing Data

Shoe Depth (TMD)	5591 ft	1704 m	Hole Size	6 3/4 in	
Shoe Depth (TVD)	5591 ft	1704 m	Casing Size	3.5 in	
Top of Lead Slurry	919 ft	280 m	Shoe Track Csg Capacity	0.0488 ft3/ft	
Top of Tail Slurry	4921.5 ft	1500 m	Shoe Track Length	30 ft	
Surface Temperature	70 °F	21 °C	Excess Cmt - Lead	20 %	
Gradient	1.68 °F/100ft		Excess Cmt - Tail	20 %	
BHST	154 °F	68 °C	TTRT:	37 min	
BHCT	113 °F	45 °C	BHP:	API	psi

Wash/Spacer

Flush - Fresh Water + SAPP	40	bbls
Flush - Fresh Water	10	bbls

Cement slurry Results

		LEAD SLURRY		TAIL SLURRY	
		Lab Concentration	Quantity	Lab Concentration	Quantity
Slurry			1072.4 ft³		147.7 ft³
Equivalent to			191 bbls		26 bbls
Class "G" Cement		416 Sacks	39104.0 lbs	125 Sacks	11750.0 lbs
D124	Ceramic Spheres - Extender	%BWOC	0 lbs	%BWOC	0.0 lbs
D020	Bentonite - Extender	4 %BWOC	1565 lbs	%BWOC	0.0 lbs
S001	Accelerator	%BWOC	0 lbs	%BWOC	0.0 lbs
D081	Retarder	0.05 gal/sk	21 gals	0.01 gal/sk	1.3 gals
D080	Dispersant - High Temperature	gal/sk	0 gals	gal/sk	0.0 gals
D145A	Dispersant - Low Temperature	gal/sk	0 gals	0.05 gal/sk	6.3 gals
D144	Antifoam	0.01 gal/sk	5 gals	0.01 gal/sk	1.3 gals
Naringal water bore		15.49 gal/sk	153.4 bbl's	5.23 gal/sk	15.6 bbl's
Density		11.8 ppg		15.6 ppg	
Yield		2.58 cuft/sk		1.19 cuft/sk	

LABORATORY REPORTS	Units	Client Request	Test Results	Units	Client Request	Test Results
Thickening Time 100BC	hr:min	06:00	05:33	hr:min	04:30	04:05
Thickening Time 40BC	hr:min	05:30	05:10	hr:min	04:00	03:22
Compressive Strength	psi (24hr)	200	280	psi (24hr)	4500	3800
Free Fluid	%	0.5	0.6	%	0.5	0.5
Fluid Loss	ml/30min	120	NA	ml/30min	50	NA
Plastic Viscosity	cP	30	9.006	cP	120	28.52
Yield Point	lbf/100 ft²	4	43.01	lbf/100 ft²	15	56.45
Gel Strength : 10 sec/ 10min	lbf/100 ft²	5/ 10	22.41/25.62	lbf/100 ft²	5/ 10	17.08/24.55

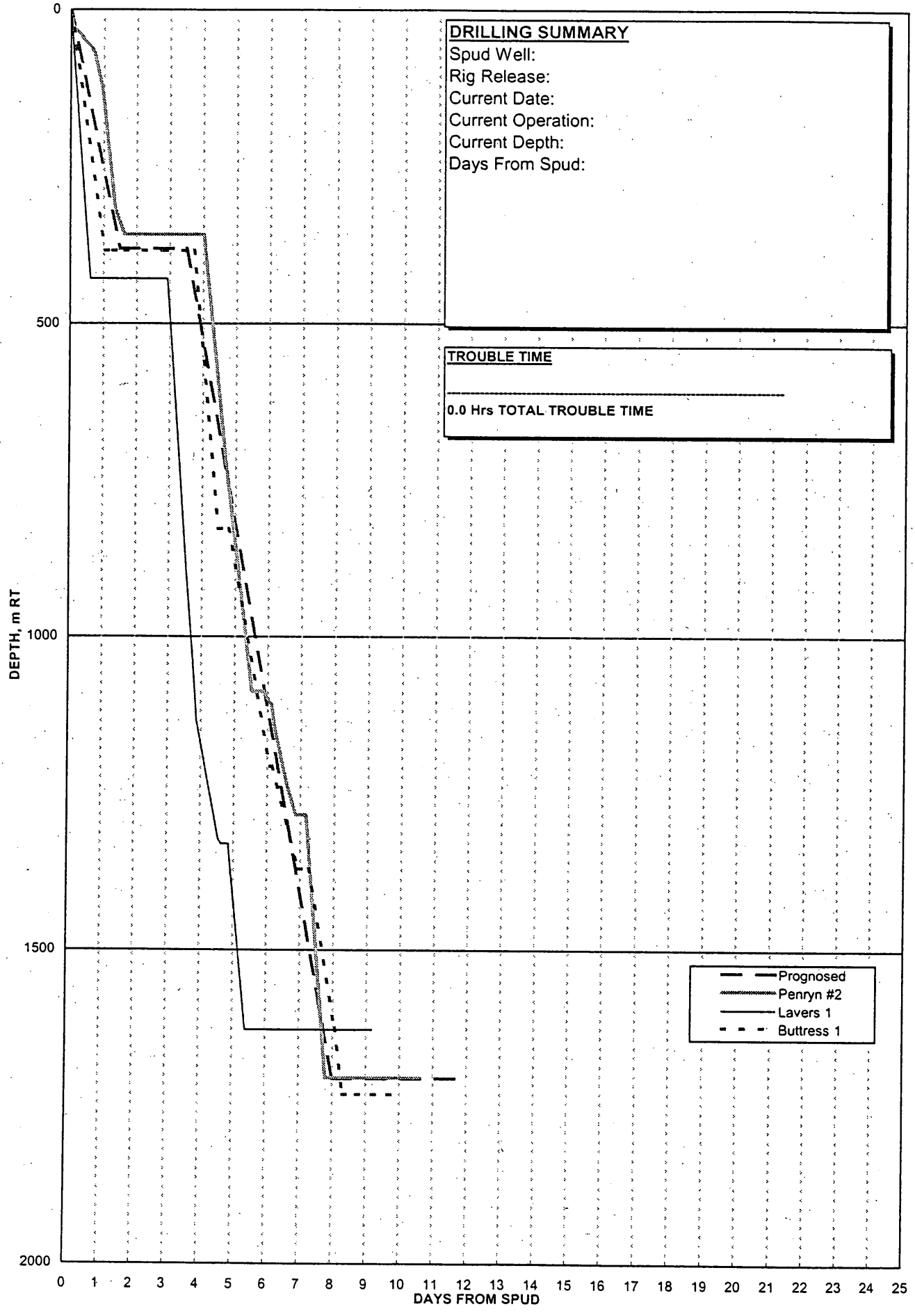
Comments

The BASE FLUID will be Naringal water bore

LAB :
D020 is prehydarated for 2 hours.

JNB
18.1.2002

NARINGAL 1
TIME v DEPTH CURVE



WELL NAME:	Naringal 1
WELL TYPE:	Gas Exploration
WELL AREA:	PEP 154
RIG	OD&E 30

SEISMIC REF:	Inline 2202 CDP 10532
ELEVATION:	GL - 50.3m RT - 55.0m
LATITUDE:	38 deg 27' 18.32" (N 5742256.8)
LONGITUDE:	142 deg 44' 22.33" (E 651783.4)

SANTOS Limited

FT MD (RT)	LITHOLOGY	FORMATION TOPS Metres RT	P & A	WELL SCHEMATIC
	Limestone to 200 m			9-7/8" → 7-5/8"
250				210 m
				270 m
	Gellibrand Marl to 550 m			380 m
500				
	Some limestone 560 - 600 m			
	Clifton	630		
	Mepunga	687		
750				6-3/4" → 3-1/2"
	Dilwyn	763		
	Pember	938		
	Pebble Point	973		
1000	Paaratte	993		
1250				
	Skull Creek	1305		
	Belfast	1380		
1500				1490 m
	Flaxmans	1574		
	Waarre	● 1595		
	Eumeralla	1639		
	TD	1704		
1750				Well TD at 1704 m

CASING WELLHEAD

SURFACE CASING

If necessary, make wiper wiper trip with bit to conductor.

7 5/8"
31 joints 26.4 ppf
L80 BT&C
2 jnt shoe track

Connection to be torqued to triangle
Set Shoe @ +/- 380 m

Centralisers
Mid 1st & 2nd jnts
4th, 6th couplings
1st coupling below cellar

PRODUCTION CASING

3 1/2" 9.3 lb J55 Fox
Surface to TD

Make up single jnt shoe track.
Run Dowell float equipment.

Make up connections to optimum torque

Centralisers
3 1/2" x 6 3/4" type
3m above shoe.
Next 2 couplings.
Every 2nd coupling from 15m above Flaxmans to 15m below Eumeralla
1st & 3rd coupling above
7 5/8" shoe.

Marker Joints
15m above Waarre top.
15m above any other pay zone encountered.

CEMENTATION

SURFACE CASING

Lead to surface
Tail slurry 90 m rise.

Calculate mud and cement returns to surface.

Perform Top Fill Job using 1" stinger regardless of cement returns.

Displace cement with old mud.

Use 50% excess for lead and 50% excess for tail.
Use Mains water for cementing.

PRODUCTION CASING

Top of Lead 170m inside surface casing shoe.

Top of tail to go to 100m above top Waarre
Approx 1490m

Use 10% excess over caliper or 20% over gauge hole (lead & tail)

Pump NaCl/SAPP preflush & water as per schedule
Use Dowell unit for mixing & pumping cement and displacing with 2% KCl (8.5 ppg) brine

Hold safety meeting prior to pressure testing to minimise delays.

Reciprocate the production casing string during job.

Should be able to use Naringal 1 water bore for cementing. However, wait for confirmation from Dowel after testing is done.

DRILLING FLUID

SURFACE HOLE
9-7/8" to 380 m

Spud Mud with Gel Spud mud

Run solids control equipment to keep mud weight and solids content to a minimum.

Funnel Viscosity 35 - 40 sec/qrt
YP 20 - 25

Use 84 mesh shaker screens

MAIN HOLE
6-3/4" to 1704 m

4% KCl/PHPA/Polymer
MW: 8.6 - 9.2 ppg
PV: ALAP
YP: > 4 - 12
6 rpm: 1 - 4

Shoe to 950 m
4% KCl minimum
MW: 8.5 - 8.7 ppg
API fluid loss 10 cc
PHPA 1.5 ppb

950 - 1390 m
Allow PHPA to deplete
MW: 8.6 - 8.7 ppg
API fluid loss 7 - 8 cc
YP 8 - 12

1390 - 1704 m
4% KCl
MW: 9.0 - 9.4 ppg

Ensure that MW is 9.0 ppg prior to Waarre
May need to weight up to 9.4 ppg in the Eumeralla for pore pressure control.

Up to 8.9 ppg pore pressure in Eumeralla has been observed.

Use finest possible shaker screens as possible, ie 250 mesh.
Ensure YP is 7 - 9 prior to first trip.

EVALUATION

SURFACE HOLE

Mudlogging -
As Directed by Ops Geology

MAIN HOLE

Mudlogging -

Samples every 10 m to approx 1000 m
3 m samples
1000 m to TD

Coring

None

Wireline Logs

GR
TD to Surface
SDT
Over Waarre
MSFL
TD to 100 m above Pember
DLL - CAL
TD to Surface Casing
LDL - CNL
TD to approx 20 m above Flaxmans

MDT Points

20 points

SWC's

One gun, 20 samples

WELL DATA

20"
Conductor
set at +/- 10 m

MSS
Survey at 30 m
then every 70 m

Test casing
2000 psi
when bump
plug

MAIN SECTION

Install 5K x 9"
Bradenhead with with wear bushing bushing and BOP's

Pressure test BOPs to 200/2000 psi.
Hydril to 200/1500 psi
5 mins / 10 mins
LOT allow 14.5 ppg EMW (min)
Note: Clamp lock system to be used

Target	Tolerance
20m radius at top Waarre	

Survey with MSS in rotary
150 m minimum frequency

MWD for correction runs

Test casing
to 2000 psi.
when bump
plug

OFFSET WELL INFO.

Assumed Temp Grad

1.86 deg F / 100 ft
BHT = 70 deg C or 167 deg F

Offsets include:

Lavers 1 - 10 days drill, 1608 m
Rowan 1 - 18 days drill, 1799 m

Potential for lost circulation in shallow surface hole and for mud rings in deeper Marls.

LOT Data:

18.9 ppg @ 424 m Lavers 1
15.7 ppg @ 428 m McIntee 1
18.0 ppg @ 487 m Naylor 1
15.9 ppg @ 438 m Naylor South 1
16.8 @ 378 m Buttress 1
16.2 ppg @ 471 m Croft 1

Directional Tendency:
Lavers 1 - Updip. Surface hole went NE then main hole turned south and TD at 2.2 deg.
McIntee 1 - Updip. Jetted surface hole to N 1.6 deg at SH TD. Rotary main hole to NE to N direction.
Naylor 1 - Slightly down dip. East from surface, turning full circle to south-east main hole.
Naylor South 1 - Down dip. Towards N-E and then coming around to S-W at TD.
Buttress 1 - Pretty much vertical. Small spiral S-E through to N-W.

Reservoir Pressures:
Waarre expected reservoir pressure at 1595 m is 2200 psi (equates to 8.1 ppg MW)
Max surface pressure with gas filled pipe is 1625 psi
Potential for 8.9 ppg pore pressure in the Eumeralla formation

Notes:
Naylor South had tight hole on wiper trips pulling 10-20 klb over.
Also had to back ream some sections especially those that had some sort of dog leg.
Buttress 1 had lost circulation at 71 - 108 m up to 160 bbl/hr
Tight hole 767 - 790 m. Ream & wsh.
Hang up on logs at 855 m but worked through ok.

TARGETS:
Primary ●
Secondary ○

P & A PLUGS (if required) Minimum 90 m in length. Tag plug across shoe and pressure test 500 psi above leak off

No changes to the drilling program can be made without the Program Change Control form (DQMS-F207) first being signed and sent to the rig.

Prepared by: Justine N. Bevern

Well Objectives: Waarre
Water Source: Hauled water from Mains approx 3 km

DRILLING HAZARDS: Possible lost circulation at very shallow depths and mud rings in surface hole. Swelling clays in the Skull crk and Belfast may cause tight hole. Hard stringers in Croft 1 1406-1513m and 1900-2000m drilled with a pendulum assy caused ledges and troublesome logging.

Signed by: Date:

VERSION 0
REVISION 0

908935 036

Country Fire Authority Regulations 1992 No. 180

SCHEDULE 14

Country Fire Authority Regulations 1992

PERMIT TO LIGHT A FIRE FOR MISCELLANEOUS PURPOSES

(Not valid on a day of **TOTAL FIRE BAN**)

Regulation 128(2)

(1) This permit is granted to **RAY WILLOX of GREAT OCEAN RD PETERBOROUGH**, to light or cause a fire to be lit for the purpose of **FLARING GAS AT VARIOUS GAS WELL TEST SITES WITHIN THE SHIRE OF MOYNE** at any time between **8th Jan 2002 to 30th April 2002.**

(2) This permit is subject to the following conditions:

* **The person performing this operation to which this permit relates is in possession of this permit or a copy of it.**
* **The flare pit site is constructed in accordance with Santos Flare Pit Specifications dated 29th October 2001.**
* **Dedicated to the site is a 2000 litre capacity fire truck in fully operational condition and a crew of 2 persons trained in tanker operations.**
* **The local fire brigade captain be advised of the operation of the flare prior to and at the conclusion of the flaring.**
* **That a butane ignition system or a container preventing the escape of ignition material to be used to ignite the flare.**

Date: 8th January 2002

Signature: .....

Title: Colin Watt
Regional Officer in Charge
Region 5 Headquarters
Hamilton

No. 01../2001-2002

908935 037

PERMIT NO. R5 20 2001/2002

A

COUNTRY FIRE AUTHORITY ACT 1958 (SECTION 40)
PERMIT
WELDING CUTTING GRINDING

NAME: Exploration Field Services Pty Ltd (Ray Willox)

ADDRESS: Great Ocean Rd, Peterborough 3270

is authorised to light a fire, maintain a fire or permit or suffer a fire to remain alight in the open air for the purpose of Welding, Gas Cutting or Grinding on a day of Total Fire Ban at:

Sites in the Shires of Corangamite and Moyne

CONDITIONS OF PERMIT

i) (a) *That the welding, cutting or grinding is performed by the permit holder; or*

(b) *That the welding, cutting or grinding is performed by an officer, employee, contractor or sub-contractor of the permit holder who holds the office of* Supervisor *or is acting under the direction of the person for the time being holding the office of* Supervisor *and*

ii) *That the person performing the work is in personal possession of this permit or a true copy of it; and*

iii) *That the ground for 10 metres is cleared of all combustible material or maintained in a wetted-down condition for a distance of not less than 10 metres from the site of the fire; and*

iv) a) *That there is an adequate length of hose equipped with fittings and available for immediate use connected to a permanent water supply; or*

b) *That there is located in the work area one mobile tanker unit containing not less than 1,000 litres of water fitted with a power pump equipped with hose and fittings and manned ready for immediate use; and*

v) *That there are not less than two persons on site, one of whom shall be available solely for fire watching and firefighting purposes; and*

vi) *That there is erected around the work area a shield or guard of fire resistant material placed in such a manner as to prevent a fire being caused by the emission of sparks or by the production of hot metal or slag; and*

vii) *That all work cut-offs and electrode stubs are placed directly into a fire resistant container; and*

viii) *That provision is made to enable immediate notification of an outbreak of fire to the local fire brigade, a member of the Police Force or a Forest Officer; and*

ix) *That vehicle access is provided across trenches and pipe-lines not more than 500 metres from the site of any welding, cutting or grinding operation; and*

x) *That the Officer in Charge of* Region 5, Telephone Number 5572 3122 *be notified of the time, location and duration of the work prior to its commencement each day; and*

xi) *That the permit holder must indemnify the CFA against any actions arising out of activities carried out under this permit by the holder's officers, employees, contractors and sub-contractors.*

xii) *Any other conditions:* nil

xiii) *This permit is valid for the period:* **From 7th December 2002 to 1st June, 2002.**

THIS PERMIT APPLIES ONLY IN THE COUNTRY AREA OF VICTORIA AND IS NOT VALID IN THE METROPOLITAN FIRE DISTRICT OR WITHIN ANY FIRE PROTECTED AREA UNDER THE FOREST ACT 1958.

Date of Issue: 7th December 2002

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REGIONAL OFFICER
REGION 5
COUNTRY FIRE AUTHORITY