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**ORIGIN ENERGY PETROLEUM PTY LTD**  
**WELL COMPLETION PROGRAMME**  
**PPL 1**  
**DUNBAR 1 DW1**

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Distribution  
Department of Natural Resources and Environment  
Origin Energy Petroleum Pty Ltd  
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Wellsite (3)

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MILTON QLD 4064  
A.B.N. 68 001 646 331

R.A.Naumann  
March 2001

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**PREFACE**

*The completion of this well is to be managed by Oil Company of Australia Limited (A.B.N. 68 001 646 331), an Origin Energy company, on behalf of the permit operator Origin Energy Petroleum Pty Ltd (OEPL).*

**1. SAFETY**

All operations conducted in the course of the Dunbar 1 DW1 completion shall be in accordance with the safety requirements specified by the following documents, copies of which will be available at the well site.

- *Petroleum Regulations 1992 (Victoria)*
- *The "OCA" Drilling Manuals*
- *Expertest Workplace Health Safety & Environmental Operations Manual.*

Oil Company of Australia Limited considers safety to be of paramount importance and stresses that safe work practices in concert with efficient, trouble-free completion procedures will enable the operational and reservoir objectives of this project to be met.

The procedures listed in this program form a guide for the completion operations and may need to be modified, in consultation with the OCA Brisbane office, as the work progresses. If circumstances arise where there is a conflict between safety issues and this program, the OCA Rig Supervisor and the OCA Completions Engineer (if present) and the relevant third party Supervisor should apply judgment and common sense to ensure that safe operations are undertaken as a priority.

- a) OCA requires all personnel involved in the completion operations to be adequately trained and experienced in the relevant operations. Qualifications of key contractor personnel are to be reviewed prior to project startup and details held on file in the OCA Brisbane Drilling office.
- b) The OCA Site Supervisor will hold minuted "Safety Meetings" at the well site with all the rig crewmembers and other third party personnel (e.g. Reeves Wireline) prior to and during the completion process.
- c) Job Safety Analysis (JSA) meetings must be conducted prior to any new or critical operation. Safety meeting minutes are to be transmitted to OCA Brisbane office together with Daily Reports.
- d) Control of work sites is to be formally handed over between Service Groups in the following manner:

<b>Stage</b>	<b>From</b>	<b>To</b>	<b>Document</b>	<b>Attachments</b>
Post Completion	OCA Supervisor	Origin Energy Limited	Well Handover Form Gas Well	Down hole & Wellhead Installation Schematics (DHD & WHD)

**2. ENVIRONMENT**

All operations conducted in the course of the Dunbar 1 DW1 completion operations shall be in accordance with the OCA Drilling Environmental Compliance Manual. The OCA supervisor should review this manual and ensure compliance.

**3. OBJECTIVE**

To perforate Dunbar 1 DW1 and produce the well as a 2-7/8" monobore "Waarre Formation" gas producer.

**4. ACCOUNT CODE**

100 0006 – 52xxx

**5. COST ESTIMATE**

\$TBA

**6. CONTACTS****6.1. Emergency**

Service	Port Campbell
Ambulance	000
Fire	000
CFA – Colac	(03) 5232 1923
Hospital (Warnambool Base Hospital)	(03) 5232 1923 (Ryot St)
Police	(03) 5598 6310 (Lord St) – if unattended, call will divert to Warnambool Police
State Emergency Service	(03) 5598 6363
Corangamite Shire Council: (Camperdown) Peter Johnston	(03) 5593 7100 (03) 5593 2695 Fax

## 6.2. OCA / OEPL

OIL COMPANY OF AUSTRALIA LIMITED  
 Ground Floor, South Court, John Oxley Centre  
 339 Coronation Drive  
 MILTON Qld 4064

Tel: (07) 3858 0600  
 Fax: (07) 3369 7840  
 Log Fax: (07) 3367 1019

		Work	AH	Mobile
Operations Geologist	Severino Simeone	(07) 3858 0637		0419 142 896
Manager – Drilling	Ross Naumann	(07) 3858 0622	(07) 3420 4150	0413 584 661
Drilling Superintendent	Ernie Trethowan	(07) 3858 0233	(07) 3263 9659	0407 692 123
Staff Petroleum Engineer	Joe Parver	(08) 8217 5744	(08) 8338 7527	0418 712 597

## 6.3. Contractors

Expertest Pty Ltd (Brad Pate) (07) 3265 5400  
 (Perforate & Production Testing) Fax: (08) 3865 8766  
 138 Richmond Road Mob 0411 758 909  
 Marleston, SA 5033

K & S Freighters (David Whitehead) (03) 5523 4144  
 (Portland) Fax: (03) 5523 5647  
 Mob: (04) 1982 9792

Nelsons Transport Service (Cobden) (Ian Kerr) (03) 5595 1320  
 Fax: (03) 5595 1883  
 Mob: (04) 0979 7223

Petroleum Support Services (Chris Annear) (08) 8723 2082  
 (Landman) Fax: (08) 8724 9305  
 Mob: (04) 0733 8228

Reeves Wireline (Dave Collecott) (07) 3881 1969  
 (Wireline Logging) Fax: (07) 3881 0005  
 11 Moonbi Street A/H: (07) 3353 5919  
 Brendale, QLD 4500 Mob: (04) 19 70 4467

## 7. DISCUSSION

Dunbar 1 was drilled in March 1995 to a total depth of 1758 m KB. Two attempts were made to DST the interval 1526 to 1557 m with a partial failure at the second attempt. The well was then drilled to TD and logged with RFT data recorded. In attempting to run 7" production casing across the Waarre gas zones it became stuck at 1245m. After freeing the casing and becoming hung up at 1253m it became irretrievably stuck at 1210m while attempting to POOH. The casing was then cemented in place and drilled out to place plugs across the reservoir interval and the casing shoe.

Dunbar 1 was re-entered in March 2001. The Dunbar 1 DW1 well spudded March 19. After polishing the cement plug set across the 178 mm casing shoe to 1215 mRT a steerable 152 mm drilling assembly was run and a directional hole reaching a maximum of 28.8 degrees inclination was drilled to a Total Depth of 1636 mRT. Approximately 100 metres offset was achieved at the top of the Waarre "C" sand. At TD Dunbar 1 DW1 was logged and a 63 mm (27/8") tubing string was run in a monobore configuration and cemented in place. Annular cement rise was designed to reach ~ 125 metres above the 178mm (7") casing shoe.

It is proposed to run an acoustic cement bond log to confirm the cement bond quality and the position of the Cement top and to perforate the reservoir section of the Waarre Sandstone using 2-1/8" slick line deployed guns. The perforation strategy is that the Waarre "A" sand will first be perforated and flowed to cleanup. If a stabilised flow rate of ~ 5.0 MMscfd is not achieved then additional perforations will be added in the Waarre "C" sand.

## 8. WELL HISTORY

	<b>Dunbar # 1</b>	<b>Dunbar # 1 DW1</b>
Location - surface	: 38° 32' 53.79" S, 142° 54' 23.11" E	38° 32' 53.79" S, 142° 54' 23.11" E
Location - target	:	38° 32' 50.73" S, 142° 54' 19.78" E
Elevation KB	: 81.8 m MSL	81.8 m MSL
Elevation GL	: 77.2 m MSL	77.2 m MSL
Well Spudded	: 9 March, 1995	19 March 2001
Drilling Rig	: Century Drilling Rig 11	Oil Drilling and Exploration Rig 30
Reached TD	: 19 March, 1995	23 March 2001
Total Depth	: 1754 m KB (MD)	1636 m AHBRT (MD)
PBTD	: 1178 m KB	1624 m AHBRT (MD)
Rig Released	:	26 March 2001

## 9. RESERVOIR DATA

Formation	Interval	Press (psig)	Temp (°F)	Source
Waarre Formation	1534 m KB	2135		RFT (Dunbar 1)

## 10. CASING AND HOLE DATA

Hole Size	Depth	Casing Size/WT/Grade	Casing Shoe Depth
<b>Dunbar 1</b>			
311 mm (12-1/4")	317 m KB	245mm / 53.57 kg/m / K55 (9-5/8" / 36&43.5 ppf)	312
216 mm (8-1/2")	1678 m KB	178mm / 38.77 kg/m / K55 (7" / 26 ppf)	1210
<b>Dunbar 1 DW1</b>			
152 mm (6")	1636 m RT	73 mm / 9.67 kg/m / J55 (2-7/8" / 6.5 ppf)	1624 mRT

## 11. DRILL STEM TEST RESULTS

<b>Dunbar 1</b>					
DST	Formation	Interval (m KB)	FSIP (psi)	Temp (°F)	Comments
1	Waarre 'A'	1526 -1557	-	-	Plugged, recovered 3m of rat hole mud
2	Waarre 'A'	1526 -1557			Partially plugged, GTS @ 750 MCFD (unstabilised) Recovered 40m of mud cut with condensate/light oil.

## 12. PROPOSED PERFORATIONS

Dunbar 1 DW1						
Formation	Interval (m RT)	Size	Type	Spf	Ø	Gm
Waarre Formation "A" sand	1559 - 1562 1564 - 1569	2.1/8"	SDP-2125-402NTX	6	60	6.5
Waarre Formation "C" sand	1501 - 1505	2.1/8"	SDP-2125-402NTX	6	60	2.1/8"

The Waarre "C" sand will only be perforated if a stabilised flow rate of 5.0 MMscfd is not achieved from perforating the Waarre "A" sand.

## 13. PROPOSE CASED HOLE LOGS

Dunbar 1 DW1			
Log	Interval (m RT)	Company	Date
CBL-VDL-GR-CCL	PBTD to 1400 mRT and 50m across TOC	Reeves Wireline	

## 14. PROCEDURE

The following completion operations will be performed in two stages; the first using a crane and Reeves Wireline Services logging truck to obtain a cement Bond log; thereafter Expertest will rig up an independent slick line unit to swab the well to under-balance, and perforate the Waarre "A" sand using a slick line deployed casing guns with a micro smart programmable firing head. Expertest will then conduct a quick clean up flow assess whether the Waarre "C" sand is also to be perforated. Note that the Xmas tree (attachment 3.0) has already been installed and pressure tested by the drilling rig

## 14.1. Obtain Cement Bond Log.

1. MIRU with crane
2. Rig up Reeves Wireline Services logging truck. Make up logging tools and RIH to PBTD at ~ 1622 mRT. Monitor for TOC whilst running in hole. The estimated TOC is at 1075 mRT.
3. Log well, CBL-VDL-CCL-GR from PBTD to 1400 mRT and for 50 metres across the TOC. Correlate on depth to open-hole Resistivity log (Reeves DLL/SLL/MLLA/GR 24-March-2001)
4. Rig out logging equipment and crane.



**14.2. Swab well to under-balance, perforate Waarre "A" sand**

5. MIRU Expertest skid mounted twin drum slick line unit and swabbing unit.
6. Lay flare line to flare pit. Rig to and swab well to ~ 400 metres to obtain 500 psi under-balance for perforating.

**Note: The vacuum effects of swabbing an unperforated / closed system well can be minimised by drilling a small bypass hole in the swab mandrel.**

7. Rig out swabbing equipment.
8. Rig up slick line lubricator. Pressure test to 2000 psi against Xmas tree swab valve. Rig in adjustable choke and chiksans tie in to flare line.
9. RIH with 2.35" gauge ring to PBTD at ~ 1622 mRT. RIH and set a 2.5" tubing stop below the proposed perforating interval at ~ 1570 metres
10. RIH with programmable GR-CCL tool and record depth of tubing stop. Correlate to CBL-VDL-GR-CCL log (Reeves – obtained in Step 3)
11. RIH with 6.0 m x 2.0" dummy gun drift to tubing stop.
12. Make up 2.1/8" casing guns loaded at 6 spf with NTX high performance charges and micro smart programmable firing head.
13. RIH and perforate Waarre "A" sand interval 1564.0 – 1569.0 & 1559.0 – 1562.0. mRT POOH with firing head.
14. Flow well to unload fluid from hole. Continue to flow well for a further two hours after the well has unloaded and the gas flow is relatively dry. Record choke size, FTHP & Qg at regular intervals. Collect two gas samples for compositional analysis. **Monitor SICHP and bleed back to 1400 kPa (200 psi) if necessary.**

***REPORT RESULTS TO BRISBANE OFFICE BEFORE PROCEEDING***

15. If Qg is  $\geq 5.0$  MMscfd, shut in well and proceed to Step 19, otherwise Repeat steps 12 to 14 to perforate the Waarre "C" sand.

**14.3. Perforate Waarre "C" sand**

16. Make 2.1/8" casing guns loaded at 6 spf with NTX high performance charges and micro smart programmable firing head. Record SITHP. Open well against the adjustable choke to draw down the SITHP by ~ 700 kPa (100 psi.)
17. RIH and perforate Waarre "C" sand interval 1501.0 – 1505.0 mRT. Shut in well. POOH with firing head.
18. Record SITHP. Flow well for a further two hours. Record choke size, FTHP, temperature & Qg at regular intervals. Collect two gas samples for compositional analysis. **Monitor SICHP and bleed back to 1400 kPa (200 psi) if necessary.**
19. RIH and retrieve tubing stop.
20. Rig out Expertest
21. Formally hand well over to Origin Energy Limited Operations representative.

(Document with the OCA WHB (gas) form, and revised DHD and WHD schematics)

# CASING AND CEMENTING REPORT

WELL: Dunbar 1 DW 1 SUPERVISOR: Barry Beetson DATE: 25/03/01

### CASING DETAILS

Size (") 2 7/8 Weight (ppf) 6.5 Grade K-55 Landed depth (mRT) 1634.5 Av. Length 9.58 Collapse (psi) 7680 Burst (psi) 7260  
 Joints on location 172 No. of joints run 170 Joints in shoe track 1 Float shoe (Y/N) Y Float collar (Y/N) Y  
 Final displ. (psi) -834 Buoyed wt. (kLb) 30 Set weight (kLb) 6 Displ. (Bbls) 13 Coupling EUE

### PRE JOB CIRCULATION

Pump 1 (spm) 85 Pump 2 (spm)      Pressure 1100 Time (mins) 30 Vol. Pumped (Bbls) 142 Mud wt (ppg) 9.1

### PRE-FLUSH

Volume (Bbls) 25 Wt(ppg) 9.10 Hyd. Loss (psi) 0 Additives: 150 Kg Sapp 625 Kg KCL

### TAIL SLURRY

Wt(ppg) 15.8 Class G Volume (Bbls) 62 Yield 1.15 Sacks 300 Water (g/sx) 5.10 Water (Bbls) 36 Design top 1075  
 OH/Cal OH Excess (%) 15 Hole size (") 6.3 Mix (bpm) 4.0 Mix (psi) 300 Start 17:00 Finish 17:20  
 Additives: 1 % Halad 322 %      %      Kg       
                   %      %      %      Kg     

### LEAD SLURRY

Wt(ppg)      Class      Volume (Bbls)      Yield      Sacks      Water (g/sx)      Water (Bbls)      Design top       
 OH/Cal      Excess (%)      Integ. vol (Bbls)      Mix (gpm)      Mix (psi)      Start      Finish       
 Additives:      %      %      Kg       
                   %      %      Kg     

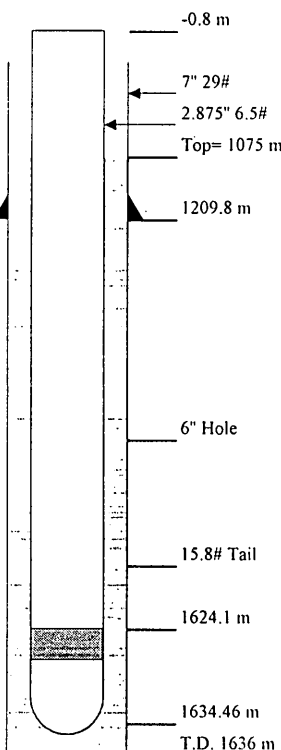
### DISPLACEMENT

Fluid type Water Wt 8.40 Calculated (Bbls) 30 Pumped (Bbls) 30.9 Bump pressure (psi) 2500 Used (Rig/Unit) Unit  
 Time: Start 17:38 Finish 17:45 Returns (%) 100 Top plug (Y/N) y Bottom plug (Y/N) n Floats held (Y/N) y  
 Pressure (psi) Initial 200 final 1200 max 1200 min 400 Rate (bpm) Initial 5.0 final 2.0 max 5.0 min 2.0

### LOT / FIT

OMW (ppg)      FIT (ppg)      FIT Pressure (psi) 0 Test pressure (psi)      EMW (ppg) 0.00

### CASING RUN LIST



QTY	DESCRIPTION	LENGTH	FROM	TO
1	Float shoe 2 7/8"	0.38	1634.08	1634.46
1	2 7/8" Tubing, 6.5#ft J55	9.62	1624.46	1634.08
1	Float Collar 2 7/8"	0.36	1624.10	1624.46
10	2 7/8" Tubing, 6.5#ft J55	96.29	1527.81	1624.10
1	2 7/8" Marker Joint/Marker Joint	1.90	1525.91	1527.81
158	2 7/8" Tubing, 6.5#ft J55	1521.41	4.50	1525.91
1	EN Tubing hanger,FBB	0.30	4.20	4.50
1	Landing JT	5.00	-0.80	4.20

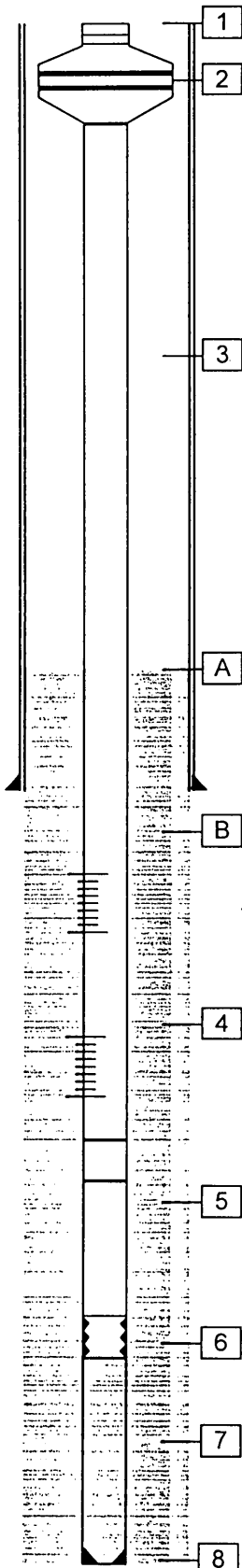
### COMMENTS

Ran 10 centralizers, 1631m;1613;1595;1585;1576;1566;1547;1537;1527;1517  
 1/4 BBI returns at bleed off



**Downhole Installation Diagram**

Well: Dunbar 1 DW1



Item No.	Description	Length (m)	Depth (m RT)	
			MD	Min ID
1	RT to top of tubing spool flange	4.20		
2	Hanger, CIW FBB-EN 6" x 2-7/8" EUE w/ 2.5" Type 'H' BPV thread prep	0.30	4.20 4.50	
3	158 joints 2-7/8" EUE J55 6.5 ppf tubing	1521.41	4.50	
4	6' x 2-7/8" EUE tubing pup joint - 'marker'	1.90	1525.91	
5	10 joints 2-7/8" EUE J55 6.5 ppf tubing	96.29	1527.81	
6	2-7/8" EUE TOPCO float collar	0.36	1624.10	
7	1 joint 2-7/8" EUE J55 6.5 ppf tubing	9.62	1624.46	
8	2-7/8" EUE TOPCO float shoe	0.38	1634.08	
<b>End of Tubing</b>			1634.46	
A	Estimated top of cement		~1075	
B	Kick off point		~1215	
	Max dog leg 7 degrees/30 metres			
	Max inclination 28.8 degrees			

PERFORATIONS		Gun		Charges			
Formation	Interval (m RT)	Size	Type	SPF	Type	Ph	gm
Waarre 'A'	1559-1562 & 1564-1569	2.1/8"	HSD	6	NTX	60	6.5
Waarre 'C' - Contingent	1501 -1505	2.1/8"	HSD	6	NTX	60	6.5

<b>Surface Casing</b>	9-5/8" / 36-43.5 ppf / N80 / BTC shoe at 312 m KB
<b>Intermediate Casing</b>	7" / 23-26 ppf / J55-N80 / LTC shoe at 1210 m KB
<b>Production casing</b>	2-7/8" / 6.5 ppf / J55 / EUE shoe at 1624 m RT
<b>Cementing Details</b>	300 sacks class G + 1% Halad 322
<b>Remarks</b>	2-7/8" tubing cemented to create mono bore
<b>String Weight Calculated</b>	<b>Actual</b>

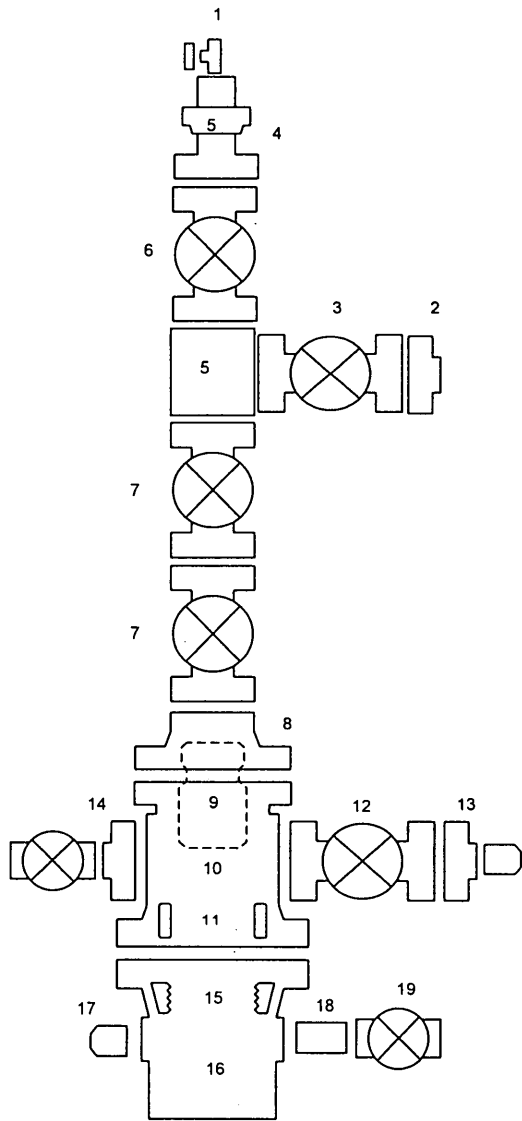
Wellsite Supervisor	B Beetson	Not to Scale	
Date of Installation	25/03/2001	Proposed	X
Drafted by		Date: 16/11/00	Re-Completion
Checked by		Date:	Completion X

PBTD: 1622 m RT



Wellhead Diagram

Well: DUNBAR 1 DW1



C - Section	
1	Needle valve, 1/2"NPT with 1/2" x 1" bush
2	Tree cap 5 1/2" Bowen union with 2 7/8" EUE
3	Gate valve, 2 9/16" 5M flanged, WGPC
4	Tee, 2 9/16" 5M x 2 1/16" 5M
5	Gate valve, 2 9/16" 5M flanged, WGPC
6	Gate valve, 2 9/16" 5M flanged, CIW
7	Gate valve, 2 1/16" 5M flanged, WGPC
8	Companion flange 2 1/16" 5M x 2" NPT
9	Bull plug 2" NPT

B - Section	
10	Tubing spool, 7-1/16" 5M x 11" 3M
11	CIW, FBB; EN Tubing hanger, 2-7/8" EUE
12	Bonnet, 7-1/16" 5M x 2-9/16"
13	Gate valve 2 1/16" 5m flanged
14	2 1/16" Companion flange, 5M x 2" NPT
15	Bull plug 2" NPT
16	Bull plug 2" NPT

A - Section	
16	Casing head 11" 3M x 9-5/8" with 2 x 2" npt outlets
17	2" NPT bull plug
18	2" NPT nipple
19	2" NPT ball valve
20	Slip and seal assembly 11" x 7"

Well Details	Surface	Intermediate	Production
Size (inches)	9-5/8"	7"	2-7/8"
Weight (ppf)	36 - 43.5	23 - 26	6.5
Grade	K55	K55 - N80	J55
Shoe (m KB)	312	1210	1634

Rig Supervisor	B Beetsen		
Date Installed	26/03/01		
Drafted by	BB	Date	26/03/01
Checked by	RAN	Date	27/03/01

Proposed	Actual	X
	<i>RAN</i>	

DUNBAR 1 DW1

DLL/SLL/MLLA/GR

Reeves

24/03/01

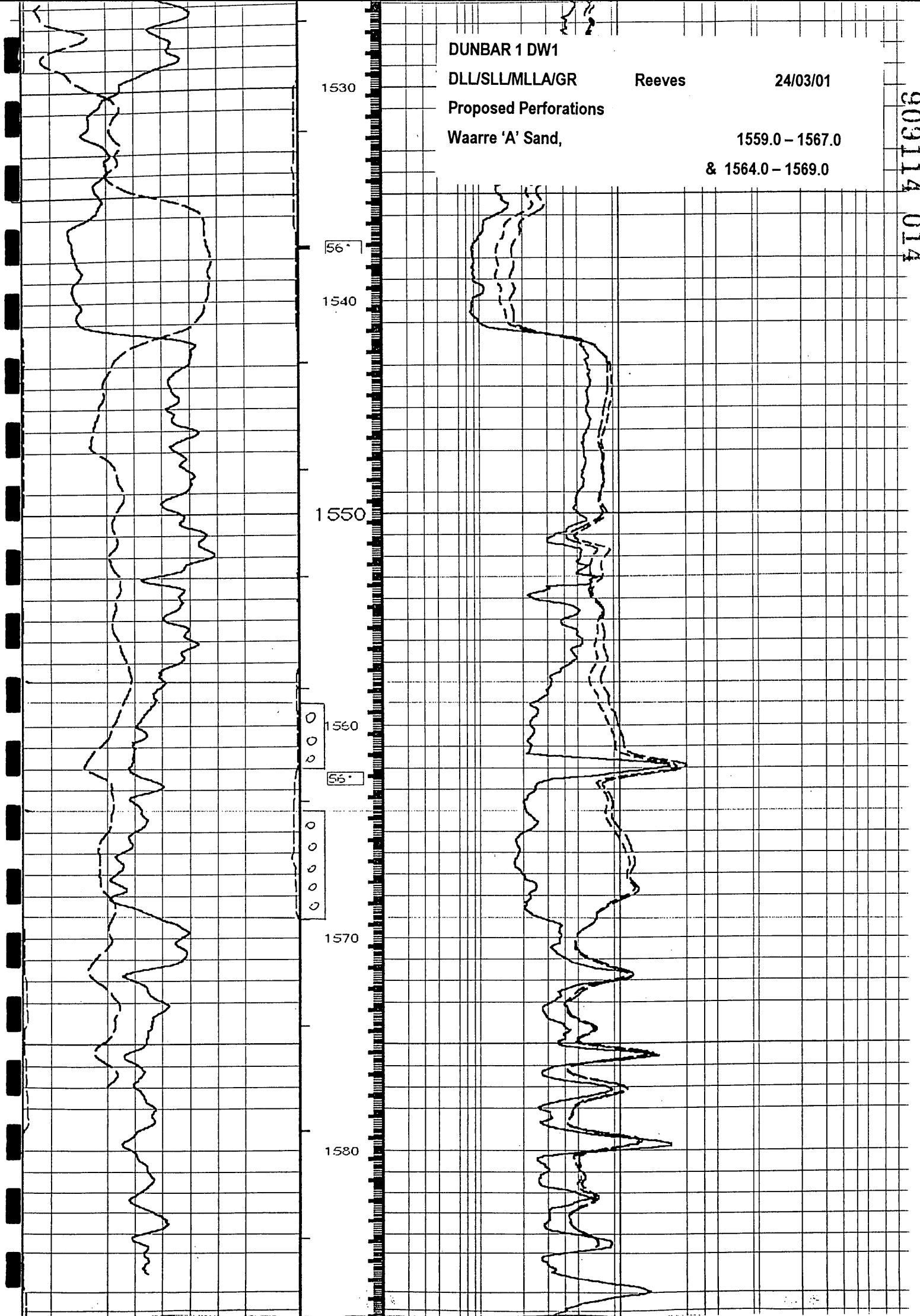
Proposed Perforations

Waarre 'A' Sand,

1559.0 - 1567.0

& 1564.0 - 1569.0

909114 014



DUNBAR 1 DW1

DLL/SLL/MLLA/GR

Reeves

24/03/01

Proposed Perforations (Contingent)

Waarre 'C' Sand,

1501.0 - 1505.0

903114 015

